

Understanding the Code

Code Requirements for Solar Photovoltaic (PV) Systems for One and Two-Family Dwellings

Based on the 2013 California Building Code (CBC), the 2013 California Residential Code (CRC) and the California Energy Code (CEC)

PURPOSE

The purpose of this information bulletin is to clarify requirements of the State Building Standards Codes (Title 24) that pertain to solar PV installations on one- and two-family dwellings. This bulletin can serve as a reference guide for permit applicants and enforcing agencies to clarify how state code requirements are practically applied in the local jurisdiction. It is intended to minimize permitting uncertainty and differing interpretation regarding specific code requirements for solar PV installations. This information bulletin primarily clarifies requirements pertaining to the California Building Code and the California Residential Code, since these codes in their current form require significant local interpretation. This information bulletin does not address local regulations.

The implementation of uniform standards to achieve the timely and cost-effective installation is consistent with the California Solar Rights Act that views solar installation as a matter of statewide concern and prohibits local jurisdictions from adopting unreasonable barriers to the installation of solar energy systems (CA Government Code Section 65850.5).

PART I: BUILDING AND RESIDENTIAL CODE REQUIREMENTS

1. Definitions

- 1.1 **Solar photovoltaic system:** The total components and subsystems that, in combination, convert solar energy into electric energy suitable for connection to utilization load (CEC Article 100 and Article 690.2)
- 1.2 **Module:** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight (CEC Article 690.2)
- 1.3 **Panel:** A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit (CEC Article 690.2)
- 1.4 **Building integrated photovoltaics (BIPV):** Photovoltaic cells, devices, modules or modular materials that are integrated into the outer surface or structure of a building and serve as the outer protective surface of the building (CEC Article 690.2)
- 1.5 **Alternating-current (AC) module (alternating-current photovoltaic module):** A complete, environmentally protected unit consisting of solar cells, optics, inverter and other components, exclusive of tracker, designed to generate AC power when exposed to sunlight (CEC Article 690.2)
- 1.6 **Photovoltaic modules/shingles:** A roof covering composed of flat-plate photovoltaic modules fabricated into shingles. (CRC Chapter 2, Section 202)

2. Solar Ready Requirements

The California Energy Code (Section 110.10) contains mandatory requirements for solar readiness in certain newly constructed single-family and multifamily residences. Although these requirements apply to new construction only, these requirements are briefly outlined for informational purposes.

- 2.1 **Solar Zone:** Newly constructed homes are required to have an area on the roof or overhang available for future solar installations that meets certain requirements:
 - 2.1.1 **Minimum area:** The solar zone must be a minimum of 250 square feet, subject to certain exceptions outlined in the code (Section 110.10.b.1.[b]).
 - 2.1.2 **Orientation:** All sections of the solar zone located on steep-sloped roofs (defined as a roof whose pitch is greater than 2:12) shall be oriented between 110 degrees and 270 degrees of true north.
 - 2.1.3 **Shading:** The solar zone must be free of obstructions and may not be shaded by certain obstructions outside the zone (Section 110.10.b.3).
- 2.2 **Documentation:** Construction documentation must clearly show the dead and live load for the solar zone. Collateral loads for future solar energy systems do not need to be shown on the construction documents. (Section 110.10[b][4])

Construction documentation must also show pathways for electrical or plumbing interconnections. This includes a location for inverters and metering equipment and a pathway for routing of conduit from the solar zone to the point of interconnection with the electrical service. For single-family residences, the point of interconnection will be the main service panel. (Section 110.10[c])

This information must also be provided to the occupant. (Section 110.10[d])

- 2.3 **Main Electrical Service Panel:** The main electrical service panel shall have a minimum bus bar rating of 200 amps and a marked reserved space for future solar electric installation. (Section 110.10[e])

3. Structural Requirements

3.1 PV systems positively anchored to the building

- 3.1.1 **Exemption from structural calculations:** The building official may waive the requirement for structural calculations for solar PV installations on top of existing roofs if the official can readily determine that the additional weight of the new solar PV system on the roof does not affect the structural integrity of the building. Some jurisdictions may choose to use the provided Structural Criteria for Flush-Mounted PV and SWH Systems as a prescriptive approach for when structural calculations can be waived, however, that varies by the enforcing agency.
- 3.1.2 **Structural calculations for non-qualified systems:** When structural calculations are required, calculations shall demonstrate that the primary structure will support the additional vertical and lateral loads from the panels and related equipment.

Note 1: See the Appendix for additional guidance on structural calculations.

- 3.1.2.1 **Roof dead load:** The weight of solar PV systems shall be considered as dead load in the design of the structure (CBC Section 1606, CRC Section R301.4).

For installation of conventional (not BIPV) solar PV panels on existing roofs, roof live load is not imposed where PV panels occur, provided the clear distance under the panels to top of the roof is less than 42" and provided the roof design is adequate for the concentrated loads from the solar PV panel support frames. See Structural Engineers Association of California (SEAOC) Solar PV-3 Live Load document for additional information.

When the roof live load is allowed to be reduced, consideration should be given to the possibility that a roof may have more than one layer of existing roofing. For pre-1960 wood-framed construction, structural calculations may be based on actual (field-measured) lumber sizes (typically greater than modern lumber sizes), and Douglas fir Grade 1 may be assumed unless field conditions indicate otherwise.

- 3.1.2.2 Roof live load: Roof live load is not considered in areas covered by roof-mounted panels where there is less than 42” clear under the panels. Roof surfaces not covered by solar PV panels shall be designed for the roof live load (CBC Section 1607, CRC R301.6).

The building official may determine that live load need not be considered for solar PV panels and associated supporting members that are built on grade. Such interpretation is generally based on the assumption that the solar PV panels will not be stepped on or used by anyone to support any live load.

- 3.1.2.3 Wind design: Calculations shall demonstrate that the solar PV panels and associated supporting members are designed to resist wind loads. For ballasted PV systems, see Section 2.2 of this information bulletin (CBC Section 1609, CRC R301.2.1).

Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from CRC Table R905.2.4.1(2) Classification of Asphalt Shingles Per ASTM D 3161 (CRC Section R905.16.3).

For ballasted PV systems, see Code Requirements for Solar Photovoltaic (PV) Systems – General, Section 2.2 of this information.

- 3.1.2.4 Seismic design: Calculations shall demonstrate that the solar PV panels and associated supporting members are designed to resist earthquake loads.

- 3.1.2.5 For wood construction, supports shall be attached with fasteners of sufficient length and size to achieve minimum required embedment into solid wood taking into consideration the plywood and multiple layers of roofing that may exist, unless otherwise approved by the enforcing agency (CRC Section R301.1.3).

- 3.1.2.6 Snow load: When applicable, include snow loads and loads from snowdrift (CBC Section 1608, CRC R301.2.3).

- 3.1.2.7 Requirements for load combinations: The applicable load combinations in CBC 1605 may be applied to all loading conditions, including evaluating the effects of dead load to counteract wind uplift.

- 3.1.2.8 The Division of the State Architect (DSA) Interpretation of Regulations Article 16.8, intended for public schools, provides useful code interpretation guidance to non-DSA code officials regarding several types of solar systems, both ground- and roof-mounted.

3.2 Structural strength of PV panels: The structural strength of solar PV panels is not addressed in the code.

UL 1703, Third Edition, published March 15, 2002, requires that solar PV panels be tested to withstand a superimposed load of 30 PSF. Therefore, all solar PV panels that are listed per UL 1703 are considered to meet this requirement.

When used as a building component and depending on the load values that the solar PV panels are subjected to, the enforcing agency may require a test report from an agency recognized by the enforcing agency showing the strength of the solar PV panels.

- 3.3 **Condition of existing roof:** Solar PV systems shall not be installed on an existing roof that is deteriorated to the point where it is not adequate as a base (this interpretation is based on CRC R907).
- 3.4 **Premanufactured support systems:** Premanufactured support systems must support the PV system and allow the system to stay attached to the structure when exposed to wind, snow or seismic load. Compliance of the PV support system with appropriate building codes is accomplished through a design specified by a licensed engineer or architect or through research reports from approved sources as addressed in CBC Section 1703.4.2. Solar support component manufacturers often provide structural engineering design guidelines, worksheets, code compliance reports and Internet website calculators. The manufacturer's engineering guidelines are intended to ensure that the PV system above the roof and its connection to the roof assembly are code compliant. Additional requirements may be imposed by the enforcing agency (CRC Section R301.1.3).

4. Fire Safety Provisions

4.1 Fire/roof classification of photovoltaic (PV) panels

4.1.1 Solar PV panels installed on top of a building's roof structure

- 4.1.1.1 Solar PV systems installed on top of a roof where the space between the solar PV panels and the roof has no use and no potential use are generally considered equipment. These solar PV panels/models shall comply with the minimum fire/roof classification requirements or roof covering as required by the current CRC Section R902.4

For installations in State Responsibility Areas (SRA) or High Fire Hazard Severity Zones, additional provisions adopted by the local enforcing agency may be applicable. Check with the enforcing agency for any additional requirements.

- 4.1.1.2 Solar PV panels used as roofing on an independent (stand-alone) structure: Solar PV panels/modules that are designed to be on the roof and span to structural supports, and have a use or occupancy underneath, shall comply with the minimum fire/roof classification requirements for roof covering as required by CRC Section R902.4. An example of this type of installation is a carport structure having solar PV panels as the roof.

- 4.1.1.3 Solar PV panels installed as a part of a building's roof structure: Solar PV panels installed as integrated roofing material shall comply with the minimum fire/roof classification requirements for roof covering as required by the current CRC Section R902. An example of this type of installation is PV modules integrated into the roofing shingles (BIPV systems).

- 4.1.2 Solar PV systems installed on grade: Solar PV panels that are part of a stand-alone, ground-mounted solar PV panel structure, with no use and no potential use underneath are generally considered equipment and therefore the fire/roof classification requirements would not apply. The solar PV panels will require a clear, brush-free area of 10 feet around the installation (based on the definition of a roof assembly in CRC Section R202 and R331.5).

- 4.2 **Area, height and story limitations:** Where there is a use between the solar PV panels and the roof/grade underneath, adding such solar PV structures may constitute additional floor area, story and/or height. Solar PV panels supported by framing that has sufficient uniformly distributed and

unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency, are generally considered equipment.

- 4.3 Location from property line and adjacent buildings:** Solar PV panels and associated framing, with no use and no potential use between the panels and the grade underneath, are generally treated as equipment. When not considered equipment, they may be considered a structure and shall be located and protected based upon the code required fire separation distance to property lines and adjacent buildings. (CRC Section R302.1)
- 4.4 Roof Access and Pathways:** The installation of solar PV systems must allow for fire department smoke ventilation operations. Roof access point, clear access pathways, solar PV systems spacing and layout must comply with the requirements outlined in CRC Section R331.
- 4.5 Markings:** The solar PV systems must be marked or labeled in accordance with CRC Section R331 and CEC Article 690. Markings are to be placed every 10 feet and in other areas as required.
- 4.6 Other fire safety requirements or guidelines:** The installation of solar PV systems may be subject to additional provisions adopted by the local enforcing agency. Check with the enforcing agency for additional requirements.

5. Roof drainage: Roof-mounted solar PV systems shall not cause excessive sagging of the roof that results in water ponding. They shall also not block or impede drainage flows to roof drains and scuppers. (CRC Section R903.4; CPC Section 1101.11 also applies)

6. Roof penetrations: All roof penetrations shall be sealed using approved methods and products to prevent water leakage. Such methods include but not limited to caulking, roof jacks and sheet metal flashing. (CRC Section R903.2)

7. Skylights: Solar PV panels shall maintain a minimum clearance around the perimeter of skylights as not to interfere with the function of the skylight, as determined by the enforcing agency

8. Plumbing vent, mechanical equipment and mechanical exhaust terminations: Solar PV panels shall not obstruct or interfere with the function of plumbing vents or mechanical equipment. (CPC Sections 901.1 & 906, CMC Section 304)

PART II: ELECTRICAL CODE REQUIREMENTS

- 1. Product listing (certification):** The solar PV panel/module and other equipment used in the PV system shall be listed/certified by a nationally recognized listing/certification agency in accordance with the applicable standards.
- 2. Installation:** The installation of the solar PV system must conform to the requirements of the California Electrical Code (CEC).
- 3. Signage:** Signage must conform to the requirements of the CEC. Signage requirements and location of certain equipment for solar PV systems may be subject to additional provisions adopted by the enforcing agency.

PART III: LOCAL ELECTRIC UTILITY REQUIREMENTS

Check with the local utility for any incentives, interconnection, operating and metering requirements.

Code Requirements for PV on Buildings other than One- and Two-Family Dwellings

Based on the 2013 California Building Code (CBC), California Residential Code (CRC) and California Energy Code (CEC)

PURPOSE

The purpose of this information bulletin is to clarify requirements of the State Building Standards Codes (Title 24) that pertain to solar PV installations. This bulletin can serve as a reference guide for permit applicants and enforcing agencies to clarify how state code requirements are practically applied in the local jurisdiction. It is intended to minimize permitting uncertainty and differing interpretation regarding specific code requirements for solar PV installations. This information bulletin primarily clarifies requirements pertaining to the California Building Code and the California Residential Code, since these codes in their current form require significant local interpretation. This information bulletin does not address local regulations.

The implementation of uniform standards to achieve the timely and cost-effective installation is consistent with the California Solar Rights Act that views solar installation as a matter of statewide concern and prohibits local jurisdictions from adopting unreasonable barriers to the installation of solar energy systems (CA Government Code Section 65850.5).

PART I: BUILDING AND RESIDENTIAL CODE REQUIREMENTS

1. Definitions

- 1.1 **Solar photovoltaic (PV) system:** The total components and subsystems that, in combination, convert solar energy into electric energy suitable for connection to utilization load (CEC Article 100 and Article 690.2).
- 1.2 **Module:** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight (CEC Article 690.2).
- 1.3 **Panel:** A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit (CEC Article 690.2).

Building integrated photovoltaics (BIPV): Photovoltaic cells, devices, modules or modular materials that are integrated into the outer surface or structure of a building and serve as the outer protective surface of the building (CEC Article 690.2).

- 1.4.1 Photovoltaic modules/shingles: A roof covering composed of flat-plate photovoltaic modules fabricated in sheets that resemble three-tab composite shingles (CBC Chapter 2, Section 202).
- 1.5 **Alternating-current (AC) module (alternating-current photovoltaic module):** A complete, environmentally protected unit consisting of solar cells, optics, inverter and other components, exclusive of tracker, designed to generate AC power when exposed to sunlight (CEC Article 690.2).
- 1.6 **Ballasted photovoltaic system:** A roof-mounted system composed of solar photovoltaic panels and supporting members that are unattached or partially attached to the roof and must rely on its weight, aerodynamics and friction to counter the effect of wind and seismic forces (CBC Chapter 16, 1613.5.1 [1.2]).

2. Solar Ready Requirements

The California Energy Code (Section 110.10) contains mandatory requirements for solar readiness in certain newly constructed single-family and multifamily residences. Although these requirements apply to new construction only, they are briefly outlined here for informational purposes.

2.1 Solar Zone: Subject to certain exceptions outlined in the code, newly constructed homes are required to have an area designated for future solar installations on the roof or overhang of the building, the roof or overhang of another structure located within 250 feet of the building or covered parking installed with the building project. This area must meet certain requirements. The minimum solar zone area must have the following.

2.1.1 **Minimum area:** The solar zone must be no less than 15 percent of the total roof area of the building excluding any skylight area.

2.1.2 **Orientation:** All sections of the solar zone located on steep-sloped roofs (defined as a roof whose pitch is greater than 2:12) shall be oriented between 110 degrees and 270 degrees of true north.

2.1.3 **Shading:** The solar zone must be free of obstructions and may not be shaded by certain obstructions outside the zone (Section 110.10.b.2).

2.2 Documentation: Construction documentation must clearly show the dead and live load for the solar zone. Collateral loads for future solar energy systems do not need to be shown on the construction documents.

Construction documentation must also show pathways for electrical or plumbing interconnections. This includes a location for inverters and metering equipment and a pathway for routing of conduit from the solar zone to the point of interconnection with the electrical service. For single-family residences, the point of interconnection will be the main service panel.

This information must also be provided to the occupant.

2.3 Main Electrical Service Panel

The main electrical service panel shall have a minimum bus bar rating of 200 amps and a marked reserved space for future solar electric installation.

3. Structural Requirements

3.1 PV systems positively anchored to the building

3.1.1 **Exemption from structural calculations:** The building official may waive the requirement for structural calculations for solar PV installations on top of existing roofs if the official can readily determine that the additional weight of the new solar PV system on the roof does not affect the structural integrity of the building. Some jurisdictions may have a prescriptive approach for when structural calculations can be waived, however, that varies by the enforcing agency.

To help streamline and simplify the permitting process for roof-mounted solar PV systems, it is highly recommended that local jurisdictions develop a prescriptive approach to meeting the structural requirements so that structural calculations are not always required. Some parameters to consider under such prescriptive approach include the following.

- Maximum distributed weight of the solar PV system in PSF
- Maximum perpendicular distance between the solar PV system and the roof below
- Maximum concentrated load imposed by the PV panel support onto the building's roof
- Minimum size and spacing of rafters or joists for portion of the roof that is supporting the solar PV system
- Maximum span of rafters or joists for portion of the roof that is supporting the solar PV system
- Anchoring requirements such as type of fasteners, minimum fastener size, minimum embedment and minimum number of attachment points
- Any limitation on the type of building construction

- 3.1.2 Structural calculations: When structural calculations are required, calculations shall demonstrate that the primary structure will support the additional vertical and lateral loads from the panels and related equipment.

Note 1: See the appendix to this document for additional guidance on structural calculations.

- 3.1.2.1 Roof dead load: The weight of solar PV systems shall be considered as dead load in the design of the structure (CBC Section 1606, CRC Section R301.4).

For installation of conventional (not BIPV) solar PV panels on existing roofs, roof live load is not imposed where PV panels occur, provided the clear distance under the panels to top of the roof is less than 42” and provided the roof design is adequate for the concentrated loads from the solar PV panel support frames. See Structural Engineers Association of California (SEAOC) Solar PV-3 Live Load document for additional information.

When the roof live load is allowed to be reduced, consideration should be given to the possibility that a roof may have more than one layer of existing. For pre-1960 wood-framed construction, structural calculations may be based on actual (field-measured) lumber sizes (typically greater than modern lumber sizes), and Douglas fir Grade 1 may be assumed unless field conditions indicate otherwise.

Section 3403.3 of the CBC states, in part, that “Any existing gravity load-carrying structural element for which an addition and its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased load required by this code for new structures.”

- 3.1.2.2 Roof live load: Roof live load is not considered in areas covered by roof-mounted panels where there is less than 42” clear under the panels. Roof surfaces not covered by solar PV panels shall be designed for the roof live load (CBC Section 1607, CRC R301.6).

The building official may determine that live load need not be considered for solar PV panels and associated supporting members that are built on grade. Such interpretation is generally based on the assumption that the solar PV panels will not be stepped on or used by anyone to support any live load.

- 3.1.2.3 Wind design: Calculations shall demonstrate that the solar PV panels and associated supporting members are designed to resist wind loads. For ballasted PV systems, see Section 2.2 of this information bulletin (CBC Section 1609, CRC R301.2.1).

Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from CBC Table 1507.2.7.1(2) Classification of Asphalt Shingles Per ASTM D 3161 (CBC Section 1507.2.7.1[2]).

The Structural Engineering Association of California has released a white paper titled “Wind Loads on Low-Profile Solar Photovoltaic Systems on Flat Roofs.” View the document [here](#).

- 3.1.2.4 Seismic design: Calculations shall demonstrate that the solar PV panels and associated supporting members are designed to resist earthquake loads. For ballasted PV systems, see Section 2.2 of this information bulletin (CBC Section 1613, CRC 301.2.2).

Note that Section 3404.4 of the CBC states, in part, that “Any existing lateral load-carrying structural element whose demand-capacity ratios with alteration considered is no more than 5 percent greater than its demand-capacity ratio with the alteration ignored shall be permitted to remain unaltered. . . .”

- 3.1.2.5 For wood construction, supports shall be attached with fasteners of sufficient length and size to achieve minimum required embedment into solid wood taking into consideration the plywood and multiple layers of roofing that may exist, unless otherwise approved by the enforcing agency (ASCE/SEI 7 Section 13.4, CRC Section R301.1.3).
- 3.1.2.6 Snow load: When applicable, include snow loads and loads from snowdrift (CBC Section 1608, CRC R301.2.3).
- 3.1.2.7 Requirements for load combinations: The applicable load combinations in CBC 1605 shall be applied to all loading conditions, including evaluating the effects of dead load to counteract wind uplift for ballasted and anchored systems (CBC Section 1605, CRC Section R301.1.3).
- 3.1.2.8 Alterations, additions and repairs: Sections 3403, 3404, and 3405 of the CBC shall apply to additions, alterations and repairs associated with PV systems. Roof structural components, their connections, additions, alterations and repairs shall be designed to support the loads from the PV panel support frames
- 3.1.2.9 The Division of the State Architect (DSA) Interpretation of Regulations Article 16.8, intended for public schools, provides useful code interpretation guidance to non-DSA code officials regarding several types of solar systems, both ground- and roof-mounted.

3.2 Ballasted PV system: PV panels in a ballasted system are typically not attached to the roof and rely on their weight, aerodynamics and friction to counter the effect of wind and seismic forces. In some cases, ballasted systems have few attachment points to supplement the friction forces. Ballasted systems have low ratios of height-to-base width or length, which makes them inherently stable against overturning.

Section 13.4 of ASCE/SEI 7-10 requires that nonstructural components and their supports be attached (or anchored) to the structure. Ballasted solar PV systems are not addressed in the ASCE/SEI 7 and not part of the 2010 CBC.

During the 2012 Triennial Code Adoption Cycle, the Department of Housing and Community Development and the Building Standards Commission proposed an amendment in CBC Section 1613.5, which provides a definition for ballasted photovoltaic systems and allows local governments to approve such systems if they are inclined to accept the weight and friction methodology. This amendment was developed by the Structural Engineers Association of California – Solar Photovoltaic Systems Committee and was based on recently approved Item S72-12 at the ICC Code Development Hearing.

This new language, as written, provides building officials with additional criteria under which a ballasted solar system can be permitted.

Note 1: Electrical connections and wiring in a ballasted system should be designed to accommodate movements within the system.

Note 2: The Structural Engineering Association of California is in the process of developing a white paper, titled “Structural Seismic Requirements and Commentary for Rooftop Solar Photovoltaic Systems,” addressing the seismic design of ballasted systems. Once available, a link to the white paper will be included in this document.

3.3 Structural strength of PV panels: The structural strength of solar PV panels is not addressed in the code.

UL 1703, Third Edition, published March 15, 2002, requires that solar PV panels be tested to withstand a superimposed load of 30 PSF. Therefore, all solar PV panels that are listed per UL 1703 are considered to meet this requirement. When used as a building component and depending on the load values that the solar PV panels are subjected to, the enforcing agency may require a test report from an agency recognized by the enforcing agency showing the strength of the solar PV panels.

3.4 Condition of existing roof: Solar PV systems shall not be installed on an existing roof that is deteriorated to the point where it is not adequate as a base. (This interpretation is based on CBC Section 1510 and CRC R907.)

3.5 Premanufactured support systems: Premanufactured support systems must support the PV system and allow the system to stay attached to the structure when exposed to wind, snow or seismic loads. Compliance of the PV support system with appropriate building codes is accomplished through a design specified by a licensed engineer or architect or through research reports from approved sources as defined in CBC Section 1703.4.2. Solar support component manufacturers often provide structural engineering design guidelines, worksheets, code compliance reports and Internet website calculators. The manufacturer's engineering guidelines are intended to ensure that the solar array above the roof and its connection to the roof are code compliant. Additional requirements may be imposed by the enforcing agency (CRC Section R301.1.3, CBC Section 1703.4.2).

4. Fire Safety Provisions

4.1 Fire/roof classification of photovoltaic (PV) panels

4.1.1 Solar PV panels installed on top of a building's roof structure

4.1.1.1 Solar PV systems installed on top of a roof where the space between the solar PV panels and the roof has no use and no potential use are generally considered to be equipment. These solar PV panels/modules shall comply with the minimum fire/roof classification requirements for roof covers as required by CBC Section 1505.

For installations in State Responsibility Areas (SRA) or High Fire Hazard Severity Zones, additional provisions adopted by the local enforcing agency may be applicable. Check with the enforcing agency for any additional requirements.

4.1.1.2 Solar PV panels used as roofing on an independent (stand-alone) structure: Solar PV panels/modules that are designed to be on the roof and span to structural supports, and have a use or occupancy underneath, shall comply with the minimum fire/roof classification requirements for roof covering as required by CRC Section R902. An example of this type of installation is a carport structure having solar PV panels as the roof.

4.1.1.3 Solar PV panels installed as a part of a building's roof structure: Solar PV panels installed as integrated roofing material shall comply with the minimum fire/roof classification requirements for roof covering as required by the current CRC Section R902. An example of this type of installation is PV modules integrated into the roofing shingles (BIPV systems).

4.1.2 Solar PV systems installed on grade: Solar PV panels that are part of a stand-alone, ground-mounted solar PV panel structures, with no use and no potential use underneath are generally considered equipment and therefore the fire/roof classification requirements would not apply. The solar PV panels will require a clear, brush free area of 10 feet around the installation. (Based on the definition of a roof assembly in CRC Section R202/CBC Section 1502.)

- 4.2 Area, height and story limitations:** Where there is a use between the solar PV panels and the roof/grade underneath, adding such solar PV structures may constitute additional floor area, story and/or height. Solar PV panels supported by framing that has sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency, are generally considered equipment. Provisions relating to solar PV height and area requirements are contained in CBC Section 503 and Table 503.
- 4.3 Location from property line and adjacent buildings:** Solar PV panels and associated framing, with no use and no potential use between the panels and the grade underneath, are generally treated as equipment. When not considered equipment, they may be considered a structure and shall be located and protected based upon the code required fire separation distance to property lines and adjacent buildings (CRC Section R302.1, CBC Section 602).
- 4.4 Fire proofing of structural support:** Depending on the type of building, support structures of solar PV systems that have a use or have potential for use underneath (such as carports) may be required to be fire proofed in accordance with CBC Section 602.
- 4.4.1 The following installations are generally considered equipment and are not subject to this requirement provided that the structural members are noncombustible.
- Stand-alone PV panel structures with no use and no potential use underneath (based on definition of a roof assembly in CBC Section 202).
- Solar PV panels supported by framing that has sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency (based on definition of a roof assembly in CBC Section 202).
- 4.4.2 Alternate designs can be considered when approved by the enforcing agency as an alternative material, design or method of construction pursuant to CBC Sections 1.2.2, 1.8.7, or 1.11.2.4 as applicable.
- 4.5 Rooftop structures:** Unenclosed rooftop structures supporting solar PV systems with no use underneath are generally not subject to CBC Section 1509.2.
- 4.6 Fire sprinklers:** In buildings that are required to be provided with fire sprinklers, the CBC requires that all parts of the building have sprinkler coverage except where an exemption is specifically required. See amendments to NFPA section 8.15.7.6 in Chapter 35 of the CBC.
- 4.6.1 Solar photovoltaic (PV) panels supported by framing that have sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency, are generally not subject to this requirement (CBC Section 903.3.3).
- 4.6.2 Solar PV panels placed above the roof, with no use and no potential use between the panels and the roof, are generally not subject to this requirement (based on definition of a roof assembly in CBC Section 1502 and CRC Section R202).
- 4.6.3 Existing exemptions in the code may be used for a solar PV installation if it meets the intent of the exemption. This will be subject to approval by the enforcing agency.
- 4.7 Roof Access and Pathways:** The installation of solar PV systems must allow for fire department smoke ventilation operations. Roof access point, clear access pathways, solar PV systems spacing and layout must comply with the recruitments outlined in CRC Section R331
- 4.8 Markings:** The solar PV systems must be marked or labeled in accordance with CRC Section R331 and CEC Article 690. Markings are to be placed every 10 feet and in other areas as required.

4.9 Other fire safety requirements or guidelines: The installation of solar PV systems may be subject to additional provisions adopted by the local enforcing agency. Check with the enforcing agency for additional requirements.

5. Roof drainage: Roof-mounted solar PV systems shall not cause excessive sagging of the roof that results in water ponding. They shall also not block or impede drainage flows to roof drains and scuppers. See CBC Section 1503.4 and CRC Section R903.4. CPC Section 1101.11 also applies.

6. Roof penetrations: All roof penetrations shall be sealed using approved methods and products to prevent water leakage. Such methods include but not limited to caulking, roof jacks and sheet metal flashing (CBC Section 1503.2, CRC Section R903.2).

7. Skylights: Solar PV panels shall maintain a minimum clearance around the perimeter of skylights as not to interfere with the function of the skylight, as determined by the enforcing agency.

8. Plumbing vent, mechanical equipment and mechanical exhaust terminations: Solar PV panels shall not obstruct or interfere with the function of plumbing vents or mechanical equipment (CPC Sections 901.1 & 906, CMC Section 304).

9. Guard rails: When required by the enforcing agency, guard rails may apply to solar PV systems (CBC Section 1013.6).

10. Disabled access requirements

10.1 Nonresidential, hotel, motel buildings, facilities or structures (See CBC Chapter 11B)

10.1.1 Scope: Accessibility to solar PV support structures that create a use or occupancy shall be provided for all occupancy classifications in accordance with Chapter 11B.

10.1.2 General: When alterations, structural repairs or additions are made to existing buildings or facilities for the purpose of installing a solar PV system, they shall comply with Chapter 11B.

Note: New solar PV systems that do not create or expand a use or occupancy and consist only of installation of the solar PV system and related electrical work that does not affect disabled access requirements for existing buildings regulated by Chapter 11B are not considered alterations for the purpose of accessibility and should not be subject to accessibility upgrades.

10.2 Residential buildings, facilities or structures

10.2.1 Scope: New solar PV systems serving covered multifamily dwellings that create a use or occupancy shall comply with the provisions of Chapter 11A.

10.2.2 Existing buildings: The building standards contained in Chapter 11A do not apply to the installation of solar PV systems serving privately funded multifamily dwellings constructed for first occupancy prior to March 13, 1991.

10.3 Parking: Required accessible parking spaces shall be provided and maintained in accordance with the applicable provisions of Chapter 11A, Sections 1109A and Chapter 11B.

Note: Alterations: Where parking lots, parking structures or parking facilities are re-striped or otherwise altered to accommodate solar PV systems, required accessible parking spaces shall be maintained or shall be provided in accordance with the applicable provisions of Section 1109A and Chapter 11B.

PART II: ELECTRICAL CODE REQUIREMENTS

- 1. Product listing (certification):** The solar PV panel/module and other equipment used in the PV system shall be listed/certified by a nationally recognized listing/certification agency in accordance with the applicable standards.
- 2. Installation:** The installation of the solar PV system must conform to the requirements of the California Electrical Code (CEC).
- 3. Signage:** Signage must conform to the requirements of the (CEC). Signage requirements and location of certain equipment for solar PV systems may be subject to additional provisions adopted by the enforcing agency.

PART III: LOCAL ELECTRIC UTILITY REQUIREMENTS

Check with the local utility for any incentives, interconnection, operating and metering requirements.

Code Requirements for Solar Water Heating (SWH) Systems for One and Two-Family Dwellings

Based on the 2013 California Building Code (CBC), the 2013 California Residential Code (CRC), the 2013 California Plumbing Code (CPC), and the California Electrical Code (CEC).

PURPOSE

The purpose of this information bulletin is to clarify requirements of the State Building Standards Codes (Title 24) that pertain to solar water heating system installations on one- and two-family dwellings. This bulletin can serve as a reference guide for permit applicants and enforcing agencies to clarify how state code requirements are practically applied in the local jurisdiction. It is intended to minimize permitting uncertainty and differing interpretation regarding specific code requirements for solar water heating installations. This information bulletin primarily clarifies requirements pertaining to the California Plumbing Code and the California Electrical Code. This information bulletin does not address local regulations.

The implementation of uniform standards to achieve the timely and cost-effective installation is consistent with the California Solar Rights Act that views solar installation as a matter of statewide concern and prohibits local jurisdictions from adopting unreasonable barriers to the installation of solar energy systems (CA Government Code Section 65850.5).

DEFINITIONS

Control or Controller: A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected. (CEC Section 100)

Indirect-Fired Water Heater: A water heater consisting of a storage tank equipped with an internal or external heat exchanger used to transfer heat from an external source to heat potable water. The storage tank either contains heated potable water or water supplied from an external source, such as a boiler. (CPC 211.0)

PART I: BUILDING AND RESIDENTIAL CODE REQUIREMENTS

1. Solar Ready Requirements

- 1.1 Single-family residences with a permanently installed solar water heating system meeting the installation criteria specified in the Reference Residential Appendix RA4 and with a minimum solar savings fraction of 0.50 are exempt to Section 110.10 (b) 1A of the California Energy Code that requires a “Solar Zone.”

2. Structural Requirements

- 2.1 See the solar water heating code requirements section of the Solar Permitting Guidebook.

PART II: ELECTRICAL CODE REQUIREMENTS

- 1.1 The control and pump disconnect(s) must be properly installed. (CEC 430 [IX])
- 1.2 The conductors between the control and power source must be properly installed. (CEC 430 [II])
- 1.3 The conductors between the control and pump must be properly installed. (CEC 430 [II] and 690 [IV])
- 1.4 The controller must have an appropriate rating. (CEC 430.83)

PART III: PLUMBING CODE REQUIREMENTS

1. Piping

- 1.1 All piping must be supported in such a manner that maintains its alignment and prevents sagging. (CPC 313.2)
- 1.2 Except for necessary valves, where inter-membering or mixing of dissimilar metals occurs, the point of connection must be confined to exposed or accessible locations. (CPC 310.6)
- 1.3 Piping shall be installed so that connections and piping will not be subject to undue strains or stresses and provisions shall be made for expansion, contraction and structural settlement. No plumbing piping shall be directly embedded in concrete or masonry. No structural member shall be seriously weakened or impaired by cutting, notching or otherwise, as defined in the building code. (CPC 312.2)
- 1.4 Water piping must have adequate freeze protection. (CPC 312.6)
- 1.5 Piping must be labeled in accordance with code. (CPC 601.2)
- 1.6 All pipe, tube, fittings, solvent cements, thread sealants, solders and flux must be in accordance with the California Plumbing Code & NSF 61. (CPC 604.1)
- 1.7 Any flexible connection to PEX must be more than 18” from tank fittings. Copper or stainless steel flexible connectors shall not exceed 24”. Furthermore, PEX-AL-PEX is not adopted for use in potable water supply and distribution systems. (CPC 604.13)
- 1.8 All systems must comply with the California lead law.

2. Storage Tank

- 2.1 Indirect-fired water heaters must be labeled in accordance with ASME requirements or an approved testing agency certifying and attesting that such an appliance has been tested, inspected and meets the requirements of the applicable standards or code. (CPC 505.4)
- 2.2 Heat exchangers used for solar heating shall protect the potable water system from being contaminated by the heat-transfer medium. Double-wall heat exchangers shall separate the potable water from the heat-transfer medium by providing a space between the two walls that are vented to the atmosphere. (CPC 603.5.4)
- 2.3 A single-wall heat exchanger must utilize either potable water as a heat transfer medium or certain fluids having a toxicity rating or class of 1 or less. (CPC 505.4.1)
- 2.4 If necessary, systems shall be provided with an over temperature safety protection device in addition to a combination temperature and pressure relief valve that is in accordance with relevant code. (CPC 505.2)
- 2.5 If necessary, each pressure relief valve shall be an approved automatic type with drain and must be set at a pressure of not more than 150 psi (1034 kPa). No shutoff valve shall be installed between the relief valve and the system or in the drain line. (CPC 608.4)
- 2.6 Water heaters installed in a garage or in the adjacent living space of a dwelling unit must be installed so that the burners and burner-ignition devices are located not less than 18 inches (457 mm) above the floor unless listed as flammable vapor ignition resistant. (CPC 507.13)
- 2.7 Water heaters located in an attic, attic-ceiling assembly, floor-ceiling assembly or floor-subfloor require a watertight pan of corrosion-resistant materials to be installed beneath the water heater to specifications. (CPC 507.4)

- 2.8 Water heaters must be anchored to resist horizontal displacement due to earthquakes as specified. (CPC 507.2)
- 2.9 Unions must be installed within 12” of tank connections for all piping to and from the tank and heat exchangers. (CPC 609.5)

PART IV: MECHANICAL CODE REQUIREMENTS

- 1.1 Relief valves must be installed in accordance with code. (CMC 1006.1, CPC 504.6)
- 1.2 In closed-loop systems, tanks must be properly sized and the system must be designed for a hydrostatic test pressure of 2.5 times the allowable working pressure of the system. (CMC 1005.3, 1005.4)

GLOSSARY

AHJ: Acronym that stands for authority having jurisdiction. AHJ is often used to describe the designated department or agency that enforces certain laws or regulations. It is often used interchangeably with the term enforcing agency.

BIPV: Acronym that stands for building integrated photovoltaics, which is a form of photovoltaic solar energy technology that is integrated into the building envelope to become a part of the roof, skylight or facade.

California Building Standards Commission: State entity that administers California's building codes, including the adoption, approval and publication. They follow a triennial code adoption cycle in which state agencies submit their proposals for code changes.

California Department of Housing and Community Development (HCD): State department responsible for preserving and expanding safe and affordable housing opportunities. HCD develops the building standards that govern construction and maintenance on all forms of housing and ensures that the standards are properly enforced, identifies California's housing needs and develops policies to meet those needs.

California State Fire Marshal: State office that supports CAL FIRE by focusing on fire prevention through fire prevention engineering, training, education and enforcement.

Contractor: A contractor licensed by the State of California performing work within the scope of their license.

Dead load: The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items and the weight of fixed service equipment, such as cranes, plumbing stacks and risers; electrical feeders; heating, ventilating and air-conditioning systems; and automatic sprinkler systems. Solar water heating system dead load includes collectors (wet) and mounting materials.

Diverter valve: A manual or automatic valve that diverts pool filtration flow into solar collectors when solar-collected energy is available.

Drainback freeze protection: Configuration whereby water is removed from the collectors automatically each night by draining back into a reservoir or the storage tank. Requires careful sloping of tubing and collector risers to ensure total drainage. In solar water heating systems, the solar loop water is separated from the potable water by a one-wall heat exchanger. In solar pool heating systems, the pool water itself drains back into the pool, if piping gradients are continuously sloped to drain.

Enforcement: (As defined in Title 24) A diligent effort to secure compliance, including review of plans and permit applications, response to complaints, citation of violations and other legal process. Except as otherwise provided in this part, "enforcement" may, but need not, include inspections of existing buildings on which no complaint or permit application has been filed and effort to secure compliance as to these existing buildings.

Enforcing agency: The designated department or agency that enforces certain laws or regulations, as specified by statute or regulation. In regard to solar PV installations, this entity is can also be referred to as the "permitting agency," since it is often the entity that issues a permit to allow for solar installations to be constructed.

Forced circulation: Circulation between a storage tank and the collectors by means of a pump.

Forced circulation (recirculation) freeze protection: A method of circulating warm tank water through the collectors when the collector temperature sensor drops below about 41°F (at this ambient temperature, the water inside the collectors may be close to the freezing temperature). Usually reserved for mild climates and soft water.

Freeze protection: In the context of solar water heating systems, is the method of protecting water in the collector loop from freezing when ambient temperature drops below about 41° F.

General plan: A document adopted by a city or county to create a long-term vision to guide the jurisdictions future growth and land use. It includes a statement of development policies and implementing actions to achieve its development objectives.

International Association of Plumbing and Mechanical Officials (IAPMO): National code development organization that publishes codes and standards for California and other states and rates and certifies solar heating collectors and systems.

International Code Council (ICC): National organization that publishes a complete family of building codes used in many states, including the building, residential and energy codes used in California.

Live load: Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

Photovoltaic: A method of generating electrical power by converting solar radiation (sunlight) into direct current electricity using semiconductors.

Pool filtration turnover rate: The amount of time in hours required to filter one pool volume. Some AHJs may require three or four turnovers per day. Solar installers should show by calculations that the addition of a solar system won't add so much resistance to flow that filtration rate is affected. It may be necessary to add a solar booster pump to ensure no degradation of filtration rate.

Qualified person: One who has the required state license and has proper skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.

Solar domestic water heating (SDWH) system: Collectors and system components that comprise a solar heating system that preheats domestic water to be boosted to a required domestic hot water temperature.

Solar photovoltaic system: The total components and subsystems that, in combination, convert solar energy into electric energy suitable for connection to utilization load.

Solar pool heating (SPH) system: Collectors and system components that comprise a solar heating system that supplies all heated water for swimming pool comfort.

Solar water heating (SWH) system: In this context is either a SDWH or SPH system.

Solar Rating and Certification Corporation (SRCC): National organization that publishes renewable energy standards and rates and certifies solar thermal collectors and systems. SRCC is a member of the ICC family of companies (see "International Code Council").

Stagnation: The condition where no fluid flow exists in a collector to remove thermal energy. On very hot days the fluid temperature can reach 300° – 400°F when there is no flow. Systems must be designed to accommodate maximum stagnation temperatures without damage and without creating an unsafe condition.

Title 24: The section of the California Code of Regulations that governs the design and construction of all buildings and associated facilities and equipment in California.

Toxicity (of heat transfer fluid): Used in reference to heat transfer fluid such as propylene glycol in solar water heating systems. The California Plumbing Code refers to the Gosselin toxicity rating method to determine whether certain cross-connection prevention measures (such as double-walled heat exchangers) must be used. Pure propylene glycol (without chemical additives) is Class 1, essentially nontoxic, while the addition of chemical additives can result in greater toxicity. As per CPC 505.4.1, heat transfer fluid classified as Gosselin Class 1 is required to use a one-wall heat exchanger.

ADDITIONAL RESOURCES

Alternative Energy Equipment and Systems Marking and Application Guide

Underwriters Laboratories (UL) publishes the [Alternative Energy Equipment and Systems Marking and Application Guide](#). The guide provides application and UL product category information for PV systems, thermal solar systems, fuel cells and hydrogen generators, engine generators, microturbines and wind turbine generating systems. This guide is available online and can be found in Appendix A of the most recent *UL White Book*.

Assessment of Overheat & Freeze Protection Mechanisms

Created by the Solar Rating and Certification Corporation (SRCC), the [Assessment of Overheat & Freeze Protection Mechanism](#) provides a review of various methods of protecting solar systems from freeze damage and protecting heat transfer fluids from damage caused by extreme collector temperatures in no-flow conditions.

California Solar Initiative Incentives

This website provides information about state incentives offered for solar installations. Most incentives allocated for PV installations have been exhausted, but incentives remain for new construction homes and solar thermal installations.

California Solar Energy Industries Association (CALSEIA)

CALSEIA provides a ready-made forum for public agencies to communicate with contractors and/or seek feedback on changes to local permitting requirements or processes. Local chapters of CALSEIA exist throughout the state.

Center for Sustainable Energy (CSE)

CSE provides implementation expertise and training to public agencies on solar permitting. CSE is the statewide awardee of the Department of Energy's Rooftop Solar Challenge, a component of the SunShot Initiative. Template permitting documents and AB 2188 Implementation Guide are available [here](#).

Energy Aware Planning Guide

Developed by the California Energy Commission, the [Energy Aware Planning Guide](#) is a comprehensive resource for local governments seeking to reduce energy use, improve energy efficiency and increase adoption of renewable energy across all sectors. The guide presents a menu of strategies and best management practices to help local governments improve energy efficiency, reduce energy consumption through transportation and land use and enhance renewable sources of energy.

Energy Aware Facility Siting and Permitting Guide

Developed by the California Energy Commission, the [Energy Aware Facility Siting and Permitting Guide](#) assists local governments with developing general plan energy and transmission elements and provides guidance on utility-scale electricity generation and transmission planning and permitting. The guide discusses the increasing role of local governments in energy planning and permitting, describes the energy regulations and policies (both federal and state) and planning processes that define future electricity generation and transmission needs, and identifies opportunities for local government involvement in electricity infrastructure planning and permitting.

Expedited Permit Process for PV System

Recommendations developed for the Solar American Board for Codes and Standards (Solar ABCs) by Bill Brooks, P.E., Brooks Engineering. This [document](#) outlines a standardized review process for small-scale PV systems.

Guidelines for Roof-Mounted Photovoltaic System Installations

Developed by the National Roofing Contractors Association (NRCA), this document provides the latest best practices for PV roof systems, including information about new energy code requirements applicable to rooftop PV systems. This valuable technical resource is complemented by figures displaying proper photovoltaic system installation, helpful references and a topic-specific glossary.

Incentive and Interconnection Information

Following are web links to information on major utilities' interconnection rules and procedures.

International Association of Plumbing and Mechanical Officials (IAPMO) Solar Product Certification Listings

IAPMO's [website](#) provides listings and performance ratings of solar collectors and systems that meet the certification criteria established for the CSI-Thermal Program.

Los Angeles Department of Water and Power (LADWP)

Pacific Gas and Electric (PG&E)

- [Standard Net Energy Metering](#) (includes links to Interconnection forms)

Sacramento Municipal Utility District (SMUD)

San Diego Gas and Electric (SDG&E)

Southern California Edison (SCE)

- [Net Metering FAQs](#)
- [Net Energy Metering Interconnection Handbook](#)

On the Use of PEX in Drainback Systems

Created by the Solar Rating and Certification Corporation (SRCC), the [Policy on the Use of PEX in Drainback Systems](#) provides recommendations on the appropriate conditions where cross-linked polyethylene (PEX) piping can be used successfully in drainback systems.

Sharing Success — Emerging Approaches to Efficient Rooftop Solar Permitting

Published by the Interstate Renewable Energy Council (IREC) in May 2012, this [report](#) outlines innovative strategies being implemented across the U.S. to help increase the efficiency of permitting procedures for rooftop solar systems.

Solar America Board for Codes and Standards (Solar ABCs)

[Solar ABCs](#) is a collaborative effort funded by the Department of Energy. This entity publishes several helpful reports and recommendations, including a permit streamlining guideline.

Solar Energy Facilities Permit Streamlining Guide

A [guide](#) produced by the California County Planning Directors Association (CCPDA) to help counties facilitate development of solar energy facilities. The guide describes the laws and regulations applying to solar energy facilities, points to consider regarding solar energy development and lists current procurement and incentive programs for renewable energy. The guide also provides a model ordinance regarding solar energy facilities and further outlines policy options and guidance for counties regarding solar energy.

Solar Instructor Training Network

The Solar Instructor Training Network (SITN) promotes high-quality training in the installation of solar technologies. Nine regional resource and training providers support the professional development of trainers and instructors of solar PV and solar heating and cooling technologies across the country. The [Interstate Renewable Energy Council](#) (IREC) became the national administrator of the Solar Instructor Training Network in 2010. IREC also provides several guides and checklists on permitting best practices.

Solar Rating and Certification Corporation (SRCC) Certification Listings

The [SRCC website](#) provides a listing of solar thermal collectors certified to its OG-100 collector rating program and solar thermal systems certified to its OG-300 system rating program. Certification listings provide performance data and system configuration information needed for incentive programs and code enforcement. The SRCC website also provides free access to all SRCC standards.

Structural Technical Appendix for Residential Rooftop Solar Installations

A detailed description of the structural engineering principles and assumptions behind PV Toolkit Document #5, Structural Criteria for Residential Rooftop Solar Energy Installations. This Appendix delineates how the document conforms to the California Residential Code and California Building Code and also discusses options that jurisdictions may want to consider in implementing PV Toolkit Document #5. Additionally, the Technical Appendix offers guidance to address some nonconforming items, such as when an anchor layout is not based on a solar support component manufacturer's guidelines or when a dwelling is located within 200 yards of the ocean (Wind Exposure D).

California Solar Rights Act: A Review of the Statutes and Relevant Cases

The Energy Policy Initiatives Center at the University of San Diego School of Law has produced this detailed analysis of the California Solar Rights Act. This review details the evolution of the act since its passage in the late 1970s. A series of court cases, detailed in this [document](#), have shaped how the act is applied and practiced throughout the state.