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Building & Safety



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Solar Photovoltaic Exceptions

Overview

The 2019 California Energy Code requires that all new single family and low-rise residential construction (R-2, multifamily, with 3 habitable stories or less; or R-3, single family; or U-building, located on a residential site) have a solar photovoltaic system installed - **2019 CEC 150.1(c)14**. Exceptions from this requirement may be granted based on limited solar exposure or high snow load.

It is important to note that building permit applicants should address all issues under their control to design and install PV systems that meet snow load structural requirements where possible. These include the specific characteristics of the PV panels and the method of installation, the slope and design of the roof, and the location of PV panels on the roof. The expectation is that designers will optimize the building design for solar PV from the start of their project.

Solar Access and Shading Exception

No PV system is required if the effective annual solar access is restricted to less than 80 contiguous square feet by shading from existing permanent natural or manmade barriers external to the dwelling, including but not limited to trees, hills, and adjacent structures. The effective annual solar access shall be at least 70% of the output of an unshaded PV array on an annual basis.

A solar assessment using one of the approved software tools is required to determine if your project qualifies for the exception, which may only be granted once the final grading/tree removal and rough framing of the residence has been completed, not during the application phase of your project.

Approved Solar Assessment Tools: <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/solar-assessment-tools>

High Snow Load Exception

The California Energy Commission has recently approved an exception which applies to projects with design snow loads greater than the highest rated PV panels currently available.

To determine if your project qualifies for the exception, enter your project information below:

- Roof slope at PV system location: _____ degrees
- Is the roof fully exposed or partially exposed (fully exposed means no shelter afforded by terrain, higher structures or trees)? _____

- Is the PV system location unobstructed and slippery (typically yes unless there are valleys, ground snow build-up, or other obstructions that prevent the snow from sliding off of the panels)? _____
- Project ground snow load: _____ psf
- Threshold ground snow load from Table 1 below: _____ psf
- If your project ground snow load is greater than the threshold ground snow load, your project may qualify for the high snow load exception. Submit this worksheet at building permit application for review by the local enforcement agency. *

Table 1: Maximum Ground Snow Loads

Example 1:

- Roof slope at PV system location: 30 degrees
- Is the roof fully exposed or partially exposed? Fully Exposed
- Is the PV system location unobstructed and slippery? Yes, Unobstructed and Slippery
- Project ground snow load: 419 psf
- Threshold ground snow load from Table 1: 465 psf

This project does not qualify for the high snow load exception.

Example 2:

- Same as above, but project ground snow load: 470 psf

This project qualifies for the high snow load exception.

Maximum Ground Snow Loads based on Panel Rating, p_g (lb/ft ²)				
Roof Slope (°)	Fully Exposed Site		Partially Exposed Site	
	Unobstructed Slippery Surfaces	All Other Surfaces	Unobstructed Slippery Surfaces	All Other Surfaces
0	248	248	223	223
5	249	249	224	224
10	273	252	246	227
15	303	257	273	231
20	343	264	309	238
25	395	274	356	246
30	465	286	419	258
35	562	346	506	311
40	701	432	631	389
45	912	561	821	505
50	1,254	772	1,128	695
55	1,873	1,153	1,686	1,038
60	3,223	1,984	2,901	1,786
65	7,625	4,695	6,863	4,225
≥70	No Maximum	No Maximum	No Maximum	No Maximum

Note: Grey areas are maximum ground snow loads that exceed snow levels reported in the petition.

For more information, including guidance on roof snow load factors, refer to the California Energy Commission’s [Notice of Final Conclusions](#).

*Pertinent design requirements go beyond what is covered in this threshold calculation. If you wish to explore the exception further, a registered design professional shall provide supporting documentation and the local enforcement agency shall determine if the project qualifies for the exception.