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Docket Number:	17-BSTD-02
Project Title:	2019 Title 24, Part 6, Building Energy Efficiency Standards Rulemaking
TN #:	223245-12
Document Title:	2019 Reference Joint Appendix 11 (JA11) Revised Express Terms
Description:	2019 Reference Joint Appendix 11 (JA11) Revised Express Terms
Filer:	Peter Strait
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	4/20/2018 9:54:19 AM
Docketed Date:	4/20/2018

Joint Appendix JA11

Appendix JA11 – Qualification Requirements for Photovoltaic System

JA11.1 Purpose and Scope

Joint Appendix JA11 provides the qualification requirements for photovoltaic (PV) system to meet the prescriptive or performance standards set forth in Title 24, Part 6, Sections 150.1(b) and 150.1(c).

JA11.2 System Orientation

No PV systems or strings with module pitches greater than 2:12 or 10 degrees shall be installed outside of the azimuth range between 90 to 300 degrees measured clockwise from true north. If the PV array does not meet this orientation requirement, then the actual orientation of the PV array shall be described in the performance method.

When the California Flexible Installation (CFI) is selected in the performance calculation, the PV array shall be installed with an azimuth range between 150 to 270 degrees from true north, and with all modules at the same tilt as the roof for pitches ~~between 0:12 and~~up to 7:12.

JA11.3 ~~-~~Shading

The PV array shall meet either JA11.3.1 or JA11.3.2.

JA11.3.1 Minimal Shading Criterion

The minimal shading criterion is that no obstruction is closer than a distance (“D”) of twice the height (“H”) it extends above the PV array. (See Figure JA11-1 for an artistic depiction of “H” and “D.”) As Figure JA11-1 illustrates, the distance “D” must be at least two times greater than the distance “H.” All obstructions that project above the point on the array that is closest to the obstruction shall meet this criterion for the array to be considered minimally shaded. Any obstruction located north of all points on the array need not be considered as shading obstructions. Obstructions that are subject to this criterion include:

(a) Any vent, chimney, architectural feature, mechanical equipment, or other obstruction that is on the roof or any other part of the building.

(b) Any part of the neighboring terrain.

(c) Any tree that is mature at the time of installation of the PV system.

(d) Any tree that is planted on the building lot or neighboring lots or planned to be planted as part of landscaping for the building. (The expected shading shall be based on the mature height of the tree.)

(e) Any existing neighboring building or structure.

(f) Any planned neighboring building or structure that is known to the applicant or building owner.

(g) Any telephone or other utility pole that is closer than 30 feet from the nearest point of the array.

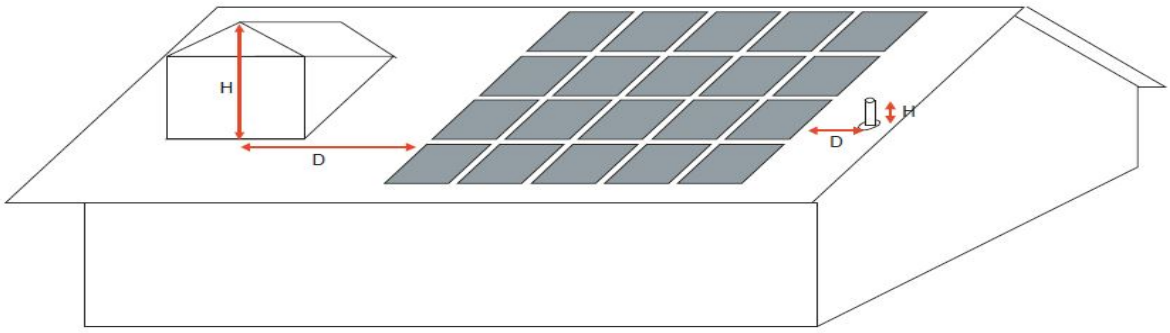

Figure JA11-1: The Minimal Shading Criterion Artistic Depiction of "H" and "D"

JA11.3.2 PV Array Geometries Performance Input

If the PV array does not meet the minimal shading criterion as specified in JA11.3.1, then the detailed geometries of the PV array ~~must~~ shall be described in the performance method.

JA11.4 Solar Access Verification

The installer shall provide documentation that demonstrates the shading condition of the actual installation of the PV module is consistent with compliance with either JA11.3.1 or JA11.3.2 by one of the following methods:

a) Solar Assessment Tool. ~~At the time of module installation, the installer shall make measurements with~~Use a solar assessment tool approved by the Executive Director to ascertain the extent of the shading conditions on the PV system from existing obstructions. At each measurement point, the tool placed on the PV array, leveled, and oriented consistent with the manufacturer's instructions. ~~Once the tool is properly positioned, it determines the obstructions that cast shade and the month and time of day when shading will occur. The tool enables these determinations using either a digital photograph or a manual tracing on an angle estimator grid overlay. The installer keeps documentation of the shading shown on the tool, the location of the tool on the array, and the shading obstructions that are indicated on the tool.~~

Measurements shall be made at all the major corners of the array with no adjacent measurement being more than 40 feet apart. (See example in Figure JA12-2.) The points of measurement shall be distributed evenly between two major corners if they are more than 40 feet apart such that the linear distance between any sequential points is no more than 40 feet. However, if any linear edge of the array has no obstructions that are closer than two times the height they project above the closest point on the array, then the intermediate measurements along that edge do not need to be made. Measurements made at each major corner and intermediate point shall be documented in the CF-2R Certificate of Installation.

The measurements shall be made either after the array has been installed or after the roof sheathing has been installed but prior to installation of the array. If the measurements are made prior to actual installations, the location of the array shall be marked on the roof plans and the measurement points shall be located on the roof and the measurements shall be made. The location of the array shall be marked on the roof so that the actuall installation is made consistent with the measurements. If the location of the array is changed during the construction process or new obstructions are introduced that did not exist at the time of the original measurements, the measurements will be re-determined after the actual installation.

b) **Alternative Methods.** Alternatively, for verification of solar access, the installer shall verify by an aerial satellite image(s), ~~or~~ drone image(s), or other digital image(s) along with supporting documents showing the height of shading obstructions as well as the horizontal distance on the

actual roof, and surrounding structures and trees, or by using an alternate method approved by the Executive Director to evaluate the solar access availability of the building location.

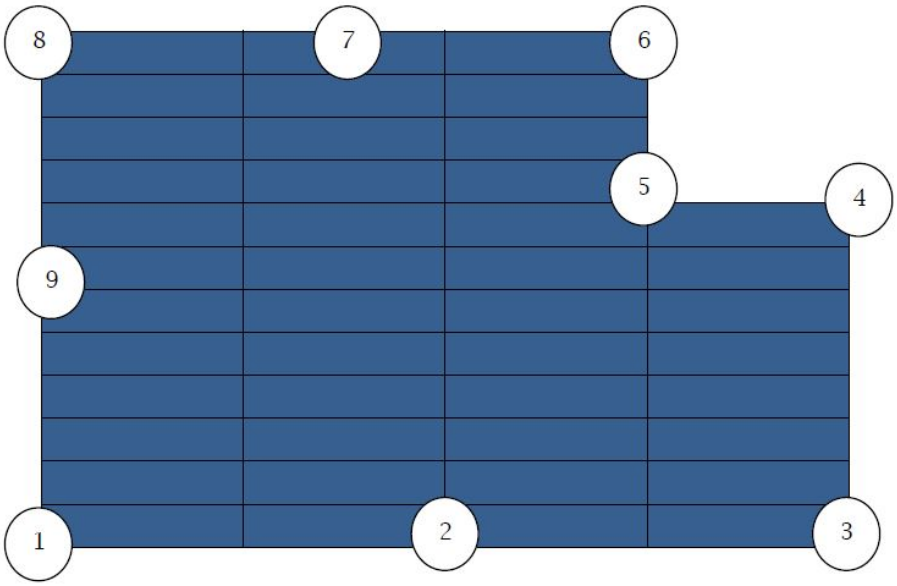

Figure JA12-2: Example of Points Where Measurement Shall Be Made Using a Solar Assessment Tool

JA11.5 System Monitoring Requirements

JA11.5.1 Remote Monitoring Capability

The PV system shall have a web based portal and a mobile device application that at a minimum provide the dwelling occupants access to the following information:

(a) The nominal kW rating the PV system.

(b) Number of PV modules and the nominal watt rating of each module.

(c) Hourly (or 15 minute interval), daily, monthly, and annual kWh production in numeric and graphic formats.

(d) Running total of daily kWh production.

(e) Daily kW peak power production.

(f) Current kW production of the entire PV system.

JA11.6 Interconnection Requirements

The installed inverters shall be tested in accordance with the applicable requirements in UL1741 and UL1741 Supplement A. The PV system and the associated components, including inverters, shall comply with all applicable requirements specified in Rule 21 as adopted by the California Public Utilities Commission (CPUC).

JA11.7 Certificates and Availability

The PV installer shall certify on the Certificate of Installation that all provisions of JA11 are met and provide PV array geometries used in the performance calculation if applicable. The Certificate of Installation shall be available on the building site for inspections.

JA11.8 Enforcement Agency

The local enforcement agency shall verify that ~~all~~ the Certificate of Installation~~s are~~ is ~~valid~~ complete and correct, and uploaded into a Commission-approved registry. ~~For verification of the minimal shading criterion in JA11.3.1, the local enforcement agency shall verify the array physically or use an online satellite mapping tool approved by the Executive Director to evaluate the solar access availability of the building location.~~