How to Enter Shading Data into PowerClerk®

Data Required by PowerClerk

When adding or editing a PV array in PowerClerk, a section called “Solar Obstruction (Shading) Angles” is visible, similar to the one shown in Figure 1. For each azimuth direction (East, -60°, etc.), PowerClerk accepts a shading angle input value. Once the shading data is entered for a PV array, the user clicks the save link and the values are then used by PowerClerk to adjust estimated PV energy production due to shading.

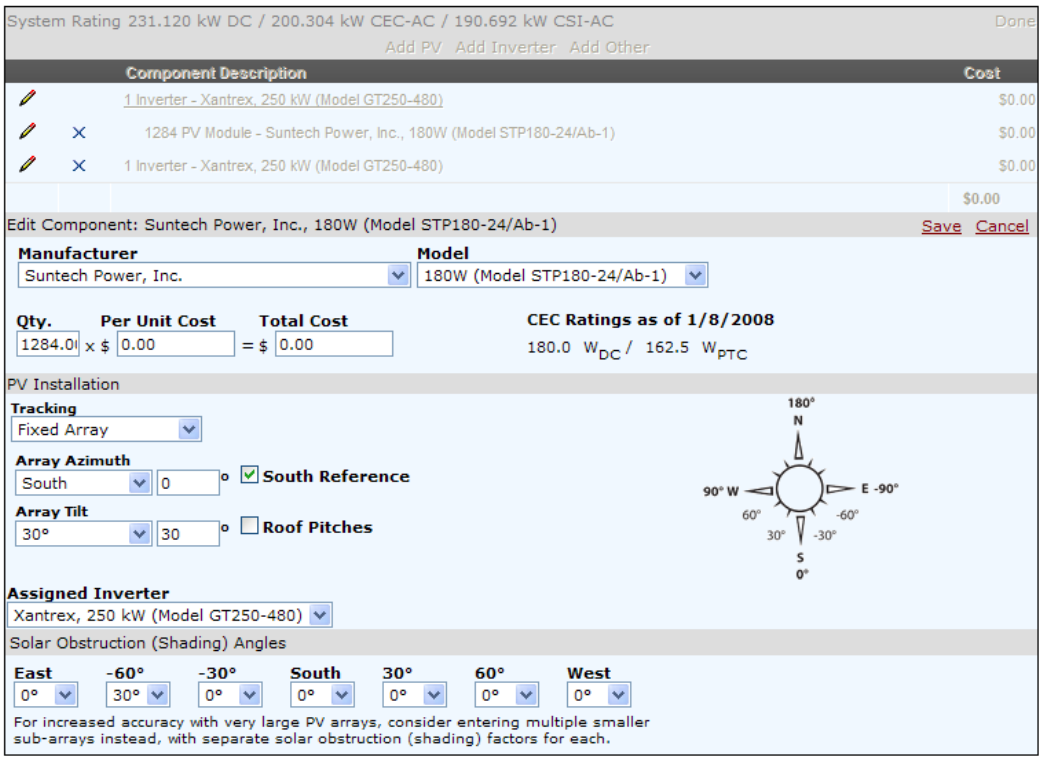

Figure 1. PV Module Editor and Shading Inputs.

The required angle is the elevation of the object as measured from horizontal. In the example shown, 30° has been input by the user for the -60° direction and no shading entered for other directions. This means that, from the visual reference point of the PV array, an obstructing object is found in that direction that extends 30° above the horizon.

In estimating PV energy production, PowerClerk treats obstructions as solid objects extending across a directional range. In the example, the 30° obstruction is assumed to be centered in the -60° direction. That is, it is assumed to extend across the azimuth range of -75° to -45°. While it is possible to configure PowerClerk with higher resolution (requiring more numeric values for the user to enter), most agencies have found that about seven azimuth directions provide sufficient accuracy without being too cumbersome for data entry.

Measuring Obstruction Angles

Most PowerClerk users use one of two commercially available devices to measure obstruction angles in the field: the **Solar Pathfinder™** or the **Solmetric SunEye™**. PowerClerk accepts measured data from either of these devices, however, care must be taken to ensure that the correct values are used and that the angular directions are consistent.

The sections below provide instructions for ensuring that the data obtained from these devices is correctly entered into PowerClerk.

Solar Pathfinder

There are two options:

Option 1 is to use the Solar Pathfinder Assistant software. Print out a Site Report and look at the Altitude/Azimuth Data table (*not* the Solar Obstruction Data table). Average the values corresponding to the directional range of interest. Figure 2 shows an example for the direction of -60°. In this example, the user would enter 50.1 into PowerClerk for the -60° direction. Averages should be calculated in a similar way for the other directions.

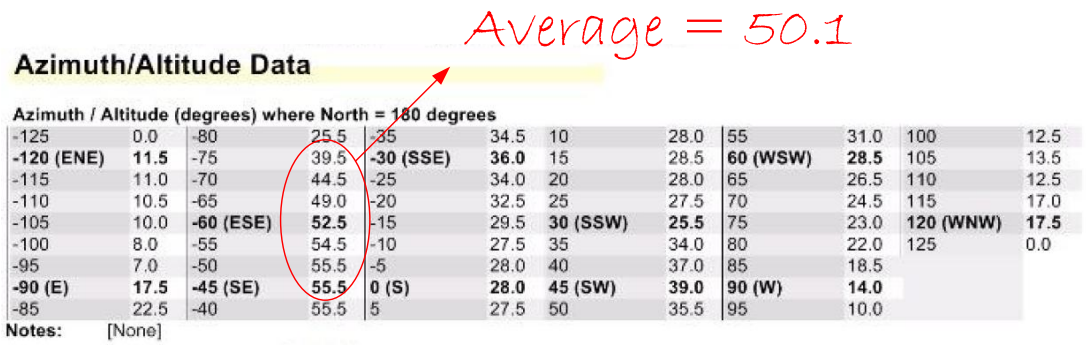

Figure 2. Averaging values from Site Report.

Option 2 is to use the Angle Estimator template that is placed on top of the paper Sunpath Diagram (or equivalently use a paper Angle Estimator diagram without the template). This template provides elevation angles as shown in Figure 3. Draw the path on this diagram and (visually) average the obstruction angles across the range of interest.

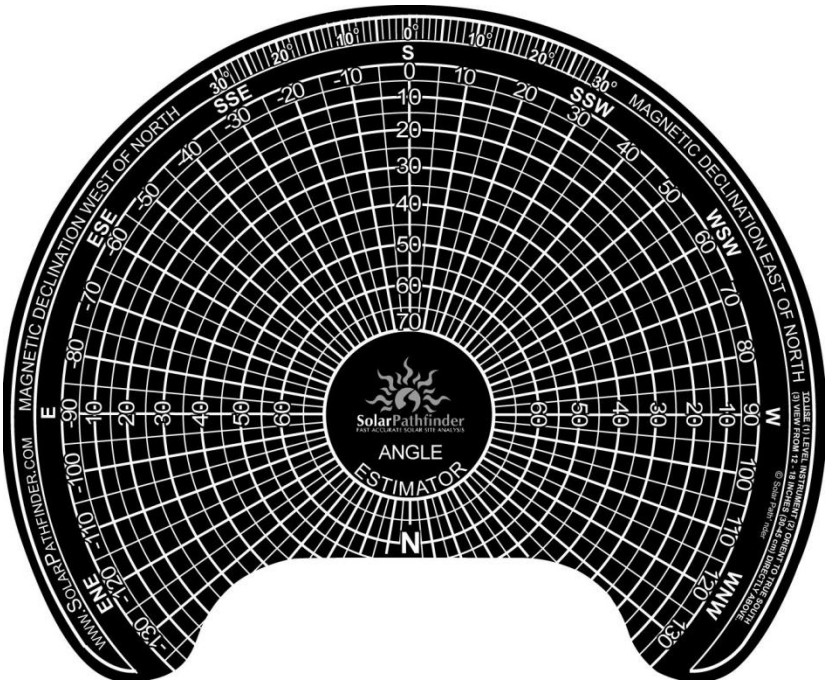

Figure 3. Angle Estimator template.

Solmetric SunEye

Export site data to a Comma Separated Value (CSV) file, and load into a spreadsheet program like Microsoft Office Excel as shown in Figure 4. Average the elevation data column across the range of interest. In this example, elevation values are averaged across a range centered on the -60° azimuth direction and span the full range from -75° to -45°. The "Southerly Oriented Aziumth" column corresponds to PowerClerk's "South Reference" option (if this option checkbox is not selected in PowerClerk, use the SunEye "Compass Heading" column instead). Average values similarly for other direction angles, and enter the averages into PowerClerk.

Obstruction Elevations 1.1				
Session Name:	Paul			
Skyline:	Sky01			
Creation Date:	2/20/2008 11:45			
Latitude:	38.5			
Longitude:	-121.5			
Mag Dec:	14.6			
Panel Tilt:	23			
Panel Azimuth:	170			
Time Zone:	GMT-08:00			
The elevation given for each azimuth represents the highest point a shade causing obstruction occurs at that azimuth.				
begin data				
Compass Heading (0-360°; North=0; East=90)	Southernly Oriented Azimuth (-180 to +180; south=0; East=-90)	Elevation (0-90)		Average
0	-180	61		
1	-179	60		
	• • •			
105	-75	0		
106	-74	0		
107	-73	0		
108	-72	0		
109	-71	7		
110	-70	7		
111	-69	6		
112	-68	7		
113	-67	7		
114	-66	7		
115	-65	7		
116	-64	6		
117	-63	6		
118	-62	8		
119	-61	7		
120	-60	7		6.3
121	-59	7		
122	-58	7		
123	-57	9		

Figure 4. SunEye spreadsheet.