Clean Power Research

PowerClerk® Estimated Annual Production Calculation

The PowerClerk PV production estimate is generated using the SolarAnywhere® CprPVForm solar simulation model (documentation). The model (CprPVForm) considers the most critical factors[1] for estimating solar production at a location. This includes the hardware specifications that you reference within PowerClerk, the irradiance and weather data for that location, and a variety of other system losses detailed below. The model utilizes our industry backed Typical Global Horizontal Irradiance Year (TGY)* weather dataset associated with the system location provided for the site location.

All solar models based on PVFORM (pvlib, PVWatts, CprPVForm) follow a similar process, as diagramed below. However, each implementation has its nuances, such as the irradiance data used and how the assumed losses are applied. See the diagram below for a simplified explanation of CPR's industry-backed solar production modeling. See this documentation for additional details on the API call PowerClerk makes to SolarAnywhere (see CprPVForm sections).

1. PowerClerk captures the system's location and uses it to fetch the correct irradiance and weather input tile[2] from our bankable SolarAnywhere TGY[3] dataset.
2. The model calculates the system's plane of array irradiance using the tracking and orientation provided in PowerClerk.
3. Shading losses are provided in PowerClerk, soiling is not considered.
4. PowerClerk captures the module's power/temp coefficients from the CEC for the model to calculate temperature losses.
5. The model assumes that max power point tracking will keep the module operating at the maximum power point and therefore does not consider the module IV curve.

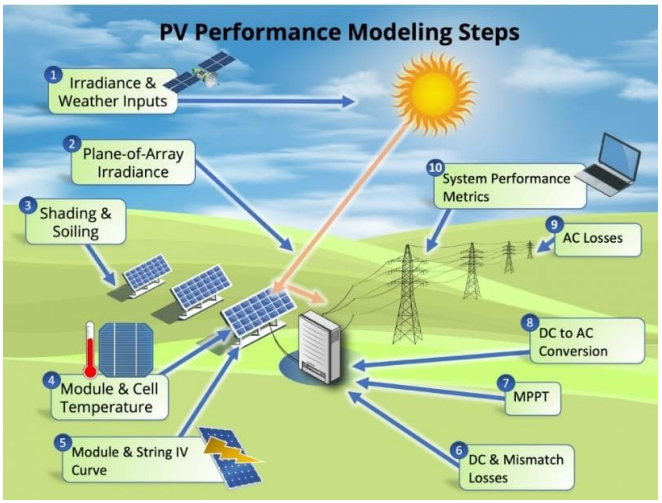

Image Credit: https://pvpmc.sandia.gov/

6. The model applies standard loss values for equipment DC wiring and mismatch losses.
7. Per 5, the model does not consider losses for max power point tracking.
8. The model calculates the system's DC/AC conversion losses using a typical inverter efficiency curve in conjunction with the weighted efficiency from the CEC to calculate the inverter efficiency at load.
9. The model (and most other models) does not consider distribution system AC losses and transmission system performance losses since this is on the other side of the meter for distributed resources.

1. Research Paper on a simplified PV simulation engine by Clean Power Research's lead researcher Richard Perez and Founder/Chief Research Officer Tom Hoff: https://www.sciencedirect.com/science/article/abs/pii/S0038092X0400060X
2. A tile is the 10km x 10km TGY grid square the location resides in.
3. TGY stands for Typical Global Horizontal Irradiance Year. Note that this is a "typical" year and is not intended to match previous or upcoming years irradiation. More info on the creation of TGY datasets can be found here.

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