

# DustVue installations in various orientations



02/2024

The DustVue photovoltaic (PV) soiling sensor employs the IEC 61724-1:2021 compliant methodology of comparing short-circuit current from two PV modules to determine soiling-loss on operational solar PV installations. This method is widely accepted because short-circuit current is directly proportional to the light intensity reaching the cells. The DustVue uses a pair of identical PV devices (panels in this case) installed side-by-side, one is marked Clean and the other Test (Do Not Clean), ensuring it is allowed to accumulate soiling at natural rates along with all other PV modules installed on the site. Monitoring the ratio of the two output currents from both panels directly indicates light intensity loss on the panels and, consequently, a decrease in electrical energy production.

The two panels used with the DustVue should be installed at the same orientation as the production panels. If the site is using trackers (single-axis or dual-axis) the DustVue panels should be located on the tracker with the production panels to provide the most accurate and representative soiling-loss data.

FIGURE 2-1 shows the calculated Effective Irradiance values (Geff) from soiled and clean panels on a particular day with the Soiling Loss Index (SLI) overlaid (in percent on right-axis). The two panels were installed at a fixed tilt of ~42 degrees to match the latitude of the site location. The output pattern is a cosine curve corresponding to the diurnal pattern of solar irradiance. Soiling loss depends on the angle of incidence. The industry standard is to calculate a daily average of soiling loss during periods of near normal incidence, using data only from a one or two-hour window around solar noon.

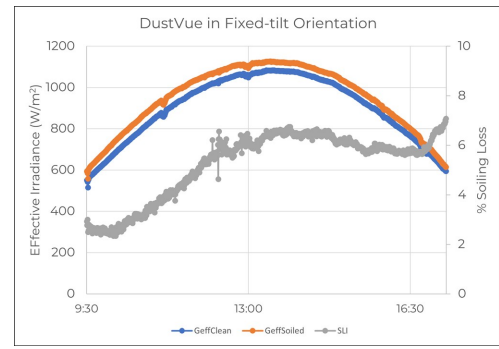


FIGURE 2-1. Fixed tilt data.

FIGURE 2-2 uses the same parameters, but is measured on a DustVue that has been installed on a single-axis tracker. The Effective Irradiance values rise sharply in the morning, remain flat during the day, and drop sharply in the evening. The flat portion is because incident sunlight rays are nearly normal to the PV panels due to tracking. When the DustVue is used on tracker systems, more raw data can be used in calculating the daily average soiling-loss because angle of incidence effects are minimized for longer periods. More data points used to calculate soiling-loss results in better analysis of soiling loss.

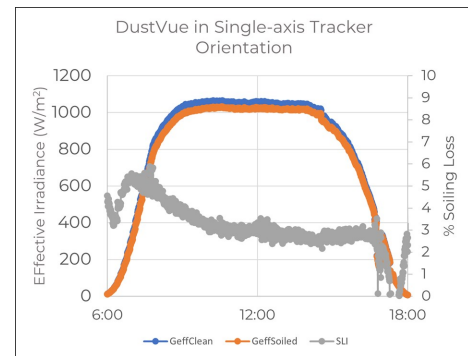


FIGURE 2-2. Single axis tracker data.

Daily average soiling rate data from the DustVue in either orientation should exhibit a sawtooth variation in long-term soiling-loss trends, as depicted in FIGURE 2-3.

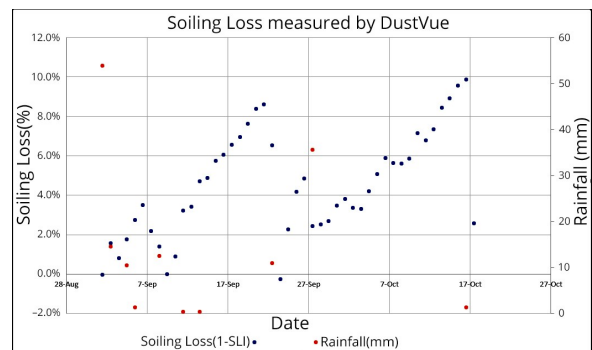


FIGURE 2-3. 2 months of daily average soiling-loss.

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