CASE STUDY

Soiling comparison to a manually cleaned array

Abstract

The purpose of this case study is to compare the soiling loss measurement of Fracsun's ARES device with the inverter outputs of two similar PV arrays, wherein one of the arrays is manually cleaned periodically and the other is naturally soiled. While the array monitored is only being cleaned on a weekly or biweekly basis, the ARES device is automatically cleaned every day without human intervention. During the course of this study, the ARES soiling loss measurements was found to correlate very closely with the inverter measurements, proving the efficacy of an automated soiling measurement system.

System description

The array involved in the study is a horizontal single axis tracker with polycrystalline modules. The two tracking arrays are 60 kWAC and within 0.5 degrees slope between each other.

Two ARES soiling stations placed at separate locations within the array were installed for statistical significance and averaging.

Figure 1: *ARES and Wash Extension devices installed within the array*

These two stations also incorporate Fracsun's Wash Extension device, which pumps water up to the spray nozzles on the ARES device and washes the "clean" large area reference cell. This fully automated system provides soiling loss data at two separate locations in the array. Any variation in soiling data between the two devices is due to differing soiling deposition profiles due to local conditions at the array site.

Results

One ARES Soiling Station is seen in Figure 2 with extant soiling on the ambient large area reference cell. The soiling loss seen in this figure is equivalent to 4% daily loss.

The data comparison of the ARES soiling stations and the manually cleaned arrays can be seen in Figure 3 below. It is worth noting that the periods of no soiling loss increase in the manually cleaned data. This is due to similar soiling matter deposition on the arrays during periods between cleaning events. This data is shown for a 6-week dry period from October to mid-November in 2019.

Figure 2: *ARES device in the field exhibiting 4% soiling loss*

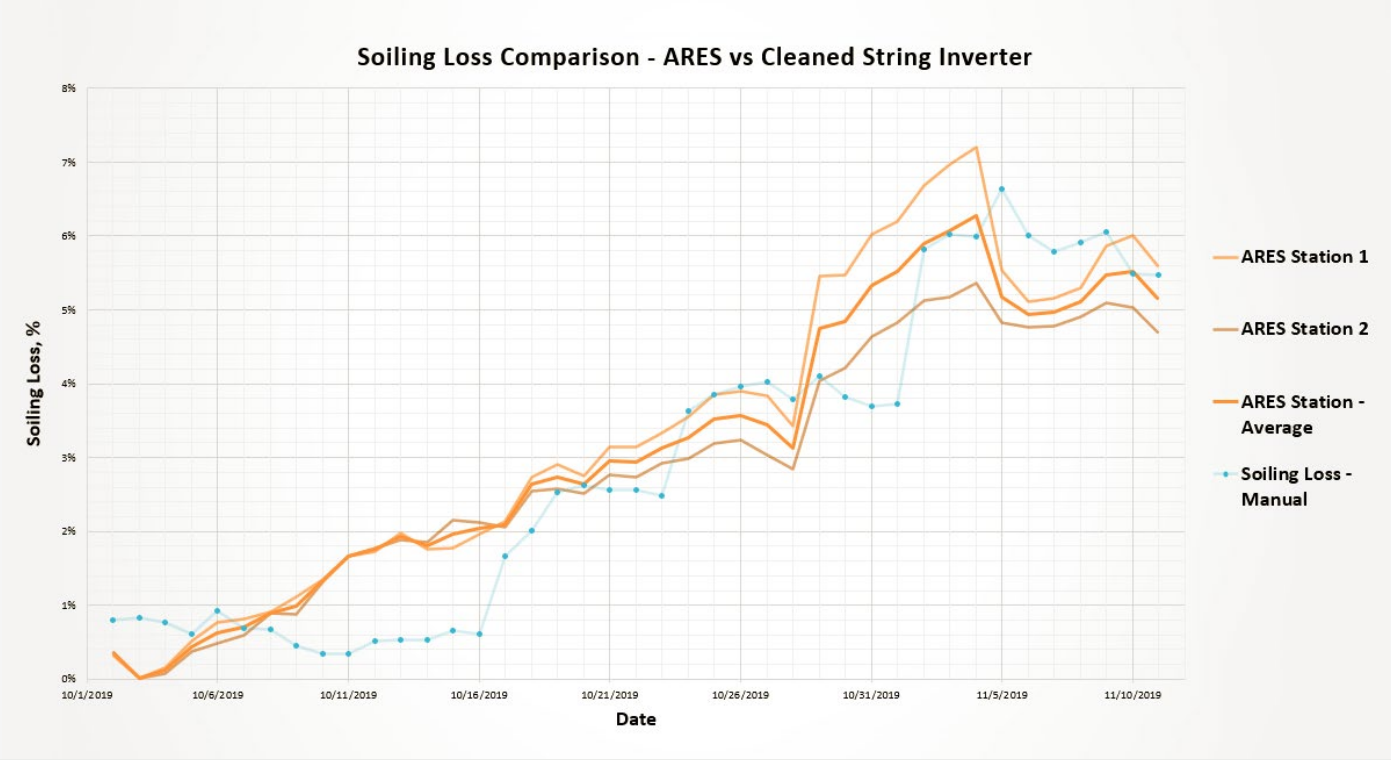

Figure 3: *ARES daily soiling loss compared to a manually cleaned array*

Conclusion

The results above clearly show the possibility of manually cleaning a single array within an array field to determine soiling loss within that array. This method is highly labor intensive and only gives sporadic data that applies to a small area within the array field.

In addition, this method is only feasible in arrays that utilize string inverters. The method is, however, a useful tool for validating Fracsun's ARES soiling station data for the array field in this study. The correlation to the performance of an array and the ARES data is an extremely useful tool in determining the current state of soiling loss throughout an array with little to no field labor involved.

Optimizing solar asset performance

LOCAL MEASUREMENTS

At Fracsun we specialize in on-site soiling loss measurement using our patented ARES soiling station. By directly measuring soiling with local instrumentation, we eliminate uncertainty and enable your team to confidently manage soiling loss with ease.

INTELLIGENT ANALYSIS

Our software enables your team to access key soiling metrics from anywhere. View or download soiling station data, forecast the best wash dates, and calculate accurate costs and savings.

PROJECT DEVELOPMENT DATA

Fracsun's unique soiling dataset is the largest in the country and takes the guesswork out of project development to reduce financial risk.

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