McHale & ASSOCIATES, INC.

Cochrane, Ontario, Canada

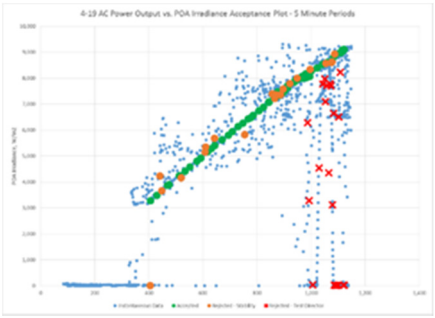
Facility Summary

Photovoltaic Solar Facility

40 MWe (68 MWe peak)

Cochrane & Long Lake Solar Facility

Long Lake Photovoltaic Solar Panels



Example of Solar PV Data Acceptance Analysis

COCHRANE & LONG LAKE SOLAR PROJECT

The Cochrane and Long Lake Solar Project (CLLSP) is a nominal 40e MW (68 MWe peak) photovoltaic power generation project consisting of four (4) 10 MWe nominal fields: Abitibi, Empire, Long Lake and Martin's Meadow.

Project Issues

McHale was retained to conduct performance testing on each of these facilities. The scope of testing included developing the test procedure, providing precision test instrumentation, conducting the test per the test procedures, calculating results, and providing those results in a test report. McHale had previously provided these same testing services to the client for other solar power projects in Ontario, and continues to work with the client on other future projects.

McHale Contracted Tasks

The development of the Test Procedure was performed by McHale consistent with ASTM 2848-13 regression methodology used for solar PV specific calculations. As part of the development of the test procedure, McHale created a PVSyst (an industry standard PV solar modelling program) model of each of the facilities based on design parameters. This Reference Performance Model was used to generate the expected annual energy generation of the facility when operating as designed.

Problem Resolution

Performance testing to include all related instrumentation installation, performance calculations, and reporting of results was performed by McHale in September and October of 2015 at three of the four sites. Due to snowfall, the last site was tested in April 2016. Data logging was performed automatically over the course of several days at each site using the McHale data logging software IDEAS. Collection of a sufficient amount of data needed to satisfy ASTM 2848 in good weather conditions only takes 3-5 days, but in the case of last site, changing weather conditions required 22 days of on-site data collection.

Each day, McHale performed an analysis of the collected data to identify periods of 5-minute average that complied with ASTM 2848 stability and other criteria. A regression analysis was then performed on this data in order to relate the net power output of the farm to solar irradiation, wind speed, and ambient temperature. Final results were then calculated in the form of expected annual energy generation of each farm based on the project design weather data and the as-tested performance of the plant determined from the regression analysis.

Work Outcome

The aggregate expected annual energy generation of the four sites based on as-tested performance was then compared to the expected annual energy generation predicted by the PVSyst model.

The expertise of the engineering staff and accuracy of temporary instrumentation minimized schedule impacts due to inclement weather. Therefore, final reports were able to be expedited to meet the needs of the client and those of the project.