Solar Power Ensemble Forecaster

Lessons Learned Report

Revision	Prepared By	Reviewed By	Release Date	Revision Notes
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1. Introduction

The purpose of this document is to summarise the lessons learned during the first reporting period for the “2018/ARP161 - Industrial Monitoring & Control - Skycam and Multi-Model Solar Forecasting Project”. This includes work conducted between 15th March 2019 through 30th September 2019. First forecasts are being submitted to AEMO but there has been no extended analysis of the forecast accuracy or the impact of individual forecast methods conducted to date.

2. Key Lessons Learned

- There have been several key lessons learned during the project to date:
- There is no “standard” for control system interfaces on solar farms. Data tagging conventions, capture/storage rates and interface mechanisms are different for every farm within the trial.
- AEMO integration for MP5F is still in its early days and there were teething issues when attempting to submit forecasts.
- From both a NEM management and an academic standpoint, providing the most accurate forecast possible at multiple time horizons is the end goal of the forecasting technology. However, at a market participant level, the primary driver may be slightly different. For example, producing a forecast that minimises FCAS Causer Pays charges may be the principle objective. Even for market participants, the commercial objectives of forecasting may vary based on contractual arrangements and site operating agreements. This technology is new to all parties and a key part of the steering committee agenda revolves around:
    - Defining terminology and standard naming
    - Identifying what metrics are of most value, how should they be defined, measured and reported on
    - What are the KPIs and how is a successful forecast defined for each stakeholder
- Errors in short-term irradiance forecasts using the advection of derived Global Horizontal Irradiance (GHI) with Cloud Motion Vectors (CMVs) depend more on the quality of derived GHI than the CMVs.
- 3% PCM accuracy for clear sky data is easily achievable
- <5% PCM accuracy for consistent sky data is also easily achievable
- Field operational status knowledge is required

3. Implications for future projects

- Identification and definition of the key reporting metrics and KPIs will assist future project specification
- Improvements in the accuracy of GHI derived using multiple satellite channels may require fast radiative transfer models, but this may increase computational costs and processing times for forecasts at short time scales.

4. Knowledge gaps identified

- Machine-learning approaches to derive GHI using multiple satellite channels is missing
- An economic model relating the FCAS causer-pay penalty to the quality of solar forecasts in the NEM does not exist
- Single irradiance value inputs to for field performance are only likely to produce accurate results for

~50% of field operation

- String/Inverter level data is likely required to modify expected field outputs
- Full panel I-V model is required

5. Supporting Information

- To develop the PCM, data from the field has been filtered to include only data where a consistent irradiance reading has been observed across all pyranometers. This is achieved using a clear sky model to estimate the clearness index and infer points from the collocated GHI data when the model matches the measurement within a +/- 2.5% window. A further filtering step is applied to ensure that agreement within all measurements in the field is achieved to +/- 5%.