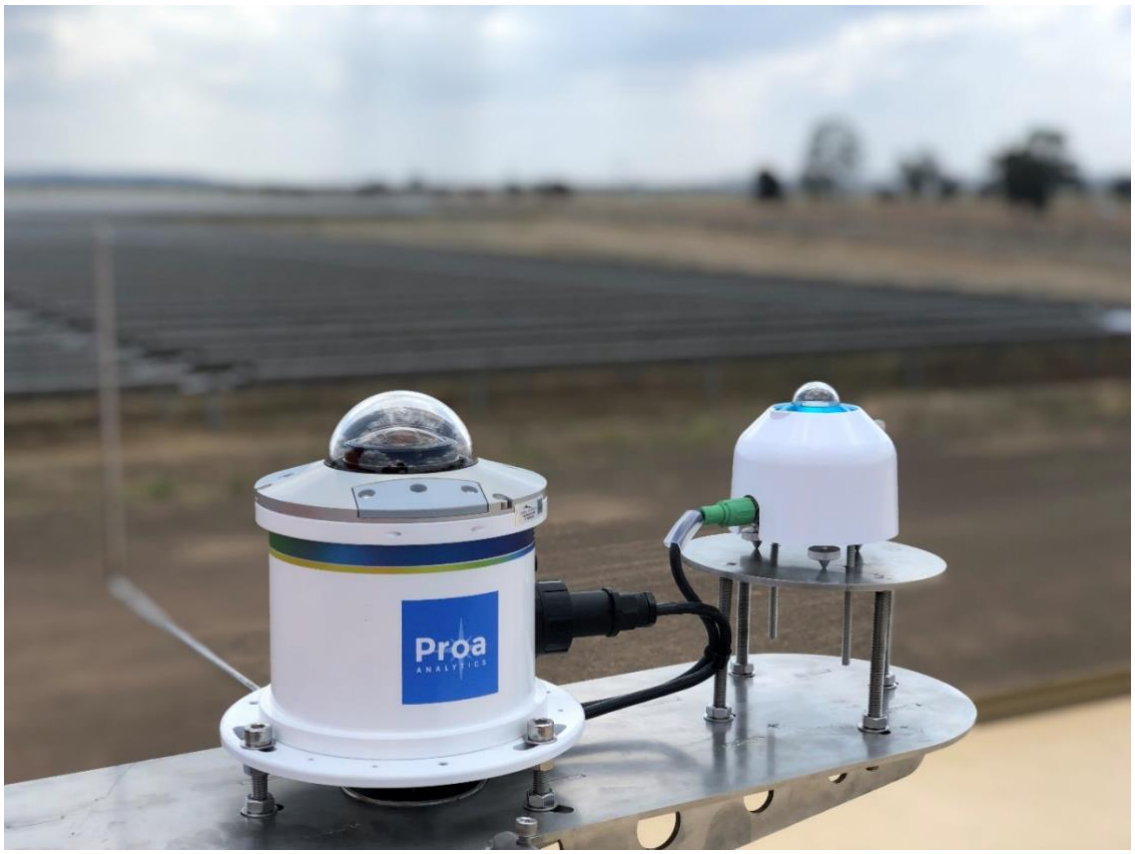
Proa Solar Farm Short Term Forecasting Project: Lessons Learned

October 2019



1 Introduction

This is the first public Lessons Learned report from the ARENA funded Proa Solar Farm Short Term Forecasting Project.

Proa (proa.energy) is an Australian solar forecasting and energy system modelling company founded in 2016. In this project Proa will demonstrate our state-of-the-art forecasts at three large scale solar farms in the NEM. Proa's solar farm forecasts have already achieved the milestone of the first self-forecasts approved by AEMO for NEM Dispatch[1], including Proa's forecasts for the Kidston Solar Farm as part of this project. In passing the AEMO self-forecast assessment process, Proa has demonstrated the accuracy and reliability of our forecasts. We are confident that this can be continued and improved upon further, and we look forward to sharing more information on this project as it progresses. For more information on this ARENA project, please visit: https://proaanalytics.com/proa-analytics-arena-solar-forecasting-project/

This report describes the lessons learnt from the initial phase of the project: installing equipment at solar farms, registering as a self-forecasting provider, and passing the AEMO self-forecast assessment process. As the project continues, Proa will share further insights in subsequent Lessons Learnt Reports.

Proa skycam at Bannerton Solar Project in Victoria

[1] https://energylive.aemo.com.au/News/AEMO-approves-first-solar-farm-forecast

Proa Analytics Solar Forecasts Project

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Funding Agreement Details

Recipient Name	Proa Analytics Pty Ltd
Project Commencement Date	21/1/2019
Project Completion Date	15/1/2021
Project Partners / Participants / Sub-contractors	Genex Power Limited - ABN 18 152 098 854 Oakey 1 Asset Company Pty Ltd - ABN 47 616 058 069 Foresight Group Australia Pty Ltd - ABN 76 611 110 617 Sieltec Canarias - ABN N/A
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2 Key Lessons

1. Strong working relationship between self-forecasting stakeholders

The most significant lesson learnt in the project so far is the importance of a good working relationship and communication between solar farm owner, asset manager, AEMO Operational Forecasting, and solar forecasting provider.

Proa have been fortunate that all such relationships for us have worked well and been highly productive, as the importance of these relationships and good communication has apparent on numerous occasions. For example:

- Each party brings important expertise which is needed to produce successful self-forecasting, for example technical information about the operation of the plant, the way that it interacts with the market, or important on-site OWHS and technical information used when planning equipment installation.
- Only the officially registered market participant is permitted by AEMO to complete most of the tasks for initial and ongoing registration as a self-forecast provider. This includes resetting EMMS passwords which are currently required to be reset every 90 days (EMMS passwords are required to submit forecasts to AEMO via the AEMO API).
- The AEMO Operational Forecasting team has been extremely helpful in providing support to register as a provider and in troubleshooting the connection to the API.

2. Network constraints, negative spot prices and AEMO 80% eligibility criterion.

A further lesson learnt which Proa can report is that frequent network constraints or negative NEM spot prices may make it difficult or impossible to pass the AEMO self-forecast assessment process, even if the self-forecast accuracy is greater than AWEFS/ASEFS. This has fortunately not occurred to Proa so far, but it could be an issue in the future for Proa or for another self-forecast provider. Proa's suggested solution is 1) for AEMO to require a certain minimum number of Dispatch Intervals (DIs)[2] to be eligible for assessment rather than a percentage or 2) simplify the process for participants (including self-forecasters) to provide Possible Power data, by allowing submission over the self-forecast API.

Details:

There is a requirement under the AEMO self-forecast assessment procedure that 80% or more the during the self-forecast assessment period be "included" in the assessment. This criterion is also referred to by AEMO as Pre-Condition 2: Minimum DIs for SF Performance

[2] In the NEM a Dispatch Interval (DI) is the 5-minute period used to schedule generators and determine prices.

Assessment. A DI is excluded if the Total Cleared quantity (i.e. the energy target) for that DI for a solar farm or wind farm is less than the Unconstrained Intermittent Generation Forecast (UIGF). For more details, refer to the AEMO *Semi-Scheduled Generation Dispatch Self-Forecast –Assessment Procedure* [1]. If a solar farm or wind farm is constrained by AEMO due to external network conditions, then that DI will be excluded by AEMO for self-forecast assessment. If a solar or wind farm offers its generation to the NEM at a price greater than the cleared market price for that DI, then its Total Cleared quantity by the NEM dispatch engine (NEMDE) will be lower than its UIGF, and the DI will also be excluded by AEMO. If either or both of these occur too frequently, then the 80% eligibility criterion will not be met, and the self-forecasts will not be assessed for accuracy. If these conditions persist then self-forecasts may never be eligible for assessment.

Proa's suggested solution is for the eligibility criterion to be based on a minimum number of DIs rather than a percentage. Under ordinary circumstances, the 80% eligibility criterion over an 8-week assessment period for a solar farm would require 9,184 DIs to be eligible. (For a wind farm it would be a larger number of DIs since wind farms also generate at night.) Proa's suggestion would be to use this fixed value as the minimum number of eligible DIs for self-forecast assessment but potentially over a longer timeframe than 8 weeks.

There another possible solution: a solar farm or wind farm may provide *Possible Power* values via SCADA. Possible Power is the best estimate of what a solar farm or wind farm could potentially produce given current weather measurements. (It is essentially the "nowcast" version of a UIGF.) If this is done, then that DI is eligible for assessment and the Possible Power values are used to assess the self-forecast accuracy. However, it is not currently possible for a self-forecast provider to submit Possible Power values themselves via the API, and this would be a valuable addition to the API functionality.

[1] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Semi-Scheduled-Generation-Dispatch-Self-Forecast---Assessment-Procedure.pdf

3 Implications for Future Projects

As noted above, it would be beneficial for the self-forecast industry if the Registered Market Participant could authorise a specialist forecaster to act on their behalf with respect to self-forecasting once, at the beginning of the project. The self-forecaster could then act with authority in the matter of self-forecasting. This would reduce the communication overheads and delays that can occur when repeatedly asking for explicit participant permission, for example in requesting a password reset for the API.

Currently, only the Registered Market Participant can reset the self-forecast API password. However, they cannot verify themselves that the password has been reset correctly, that can only be done by the self-forecast provider. This diffusion of responsibility can create delays.

We note that AEMO is planning a new method for forecaster providers to be able to reset the API password themselves which would be a significant improvement and which Proa would highly support. However, there are other issues for which a forecast provider must seek repeated permission from the market participant, for example to access the Intermittent_DS data tables in real time as detailed in the Knowledge Gaps section, below.

4 Knowledge Gaps Identified

We have one suggestion for a Knowledge Gap to be addressed:

Real time access to Intermittent_DS data

This Knowledge Gap suggestion refers to information which AEMO publishes publicly on self-forecast submissions on the day after they were made. Although not essential, it would be beneficial if AEMO made live data the **Intermittent_DS** reports available for the same day to self-forecasters via a secure but separate data feed to the EMMS portal. Specifically, the MSATS tables: INTERMITTENT_DS_RUN, INTERMITTENT_DS_PRED, and INTERMITTENT_FORECAST_TRK.

These data tables are published by AEMO and provides useful information on forecast performance and ASEFS/AWEFS forecasts and are made available to the public here, for the previous day:

http://nemweb.com.au/Reports/Current/Next_Day_Intermittent_DS/

This data source for example, contains the previously submitted self-forecasts and ASEFS/AWEFS forecasts which a self-forecaster needs to use to validate the performance of their forecasts.

Values for the current day are available for the Registered Market Participant only via the EMMS portal. However, this EMMS portal contains a significant amount of confidential market information relating to the generator, and so it is unlikely to be possible or advisable for the Participant to provide a forecasting provider with credentials for their account. It can be useful to see the current ASEFS/AWEFS forecasts for a site, as well as to confirm that previously submitted self-forecasts were accepted correctly by AEMO. Currently, this can only be done in real time if the Registered Participant arranges to forward on the relevant data from the EMMS portal, which is why it would be useful if AEMO made the relevant information public. We appreciate that this would add additional complexity for AEMO, however, it would be useful for forecasting providers.