

# Lessons Learnt Report #1

Date: October 2019

Project: Advisian Wind and Solar Forecasting for the NEM Project

## Key Learnings

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### Contracting Phase

- **Multiple Contracting Entities:** This ARENA project is a joint initiative with our power generation partner Palisade and Monash University requiring contracts to be established between the parties prior to commencing work. This added additional complexity to the contracting phase.
- **Finalising T&C's:** Delays in finalising the ARENA contract and subsequent delays in finalising the terms and conditions for partner subcontracts resulted in a late start to the project which required milestone dates to be amended.

### Equipment Procurement & Installation

- **Delivery Lead Times:** Sky cameras for the Solar farm were ordered early in the project but had significantly longer lead times than previously estimated.
- **Work Priorities:** The solar farm was only recently commissioned, and the site was very busy with post construction and start-up activities. This meant that camera installation and commissioning was delayed as other work took priority.
- **SCADA Integration:** Incorporation of the SCADA data into models requires integration with the SCADA system. We were able to work with the Palisade instrument team to identify a suitable method for SCADA data integration, and our Edge Device software natively supports the integration protocol chosen.

### Data Collection

- **Historical Data Granularity:** To develop a 5 minute ahead forecast, the data being used to train our models must be at granularities of at least 5 minutes. Data from one of the generation sites was initially supplied in intervals of greater than 5 minutes. Fortunately, we were able to gain another data extract with the necessary granularity.

### Solar Farm Data Analysis

- **Operational Delays:** As the solar farm is only recently commissioned, data for analysis is limited. Allowances were made for this in the project schedule, but the solar farm took longer to be fully operational than expected which has impacted the amount of data available for analysis.

### Wind Farm Data Analysis

- **Computationally Expensive Models:** Our exploratory analysis identified high degrees of seasonality in the underlying data requiring more complex modelling approaches. The data used to train the models is also sizable. These two factors together have a considerable impact on the computation power needed to train models within a reasonable time frame. We have used cloud

hosted computing resources which allows us to scale our computing platform as needed to support model iterations.

- **Removal of Exogeneous Data from the Data Set:** There are several indigenous and exogenous variables driving the dynamic of power output from the wind farm. Exogenous variables such as AEMO constraints and maintenance outages can cause power output to be artificially suppressed and these periods had to be removed from the dataset used to train the model. This results in time periods where data is unavailable for model training which may have a detrimental impact on model accuracy. We expect periodic retraining the model after it goes into production would achieve incremental improvements in model accuracy.
- **Variation in the Wind Turbine Make/Model within the Wind Farm:** The target wind farm has two different Vestas wind turbines. We are evaluating whether there are significant differences in the performance of our models across the two wind turbine variants when aggregated across the overall wind farm. This may require us to develop separate models depending on results.

## AEMO API

- **Accessing AEMO API Portal:** We encountered difficulties in gaining access to the API portal for download of the API reference documents and files. For a long period of time we were able to access the portal and have encountered problems with team members who are accessing the portal from outside of Australia.

## Project Team

- **Collaboration:** Weekly meetings between Advisian, Palisades and Monash project team members have proven to be extremely valuable. With a team spread over multiple locations the regular project review meetings allows us to maintain momentum and quickly address issues as they arise. Input from Palisades has been essential to interpret the raw data and understand the current operation of the network.

## Implications for future projects

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- Additional allowances should be made for contracting delays with, especially if multiple parties are involved.
- Before engaging with our customers, due diligence should be conducted to assess the quality of data, the operational history of the site, site SCADA system capabilities and other factors that may impact the successful development of a forecasting model.
- Identification of a sky camera supplier with shorter lead times that meets our requirements will be important if our forecasting solution is to be scaled.
- Close engagement with the generator operations team will continue to be an essential requirement for future deployments
- Accessibility issues for the AEMO API portal should be investigated and resolved.