Fulcrum3D Sodar data availability improvements

Lessons learnt through the ARENA Wind Forecasting for the NEM Project

Fulcrum3Ds's short-term wind forecasting system is currently undergoing ARENA funded trials at three wind farms on the NEM in partnership with Pacific Hydro. While the work has been focused on forecasting wind flow over complex terrain and site-specific power model including real-time SCADA data, it has also included a work stream to increase Sodar data availability and therefore forecast availability and robustness. These lessons have been made public through the ARENA Knowledge Sharing requirements. The initial results are summarised while further work on multiple sites is underway to validate these achievements the improvement results will be available soon.

The work included vertical resolution and additional acoustic baffles. The images below show Fulcrum3D Sodars with baffles installed at two of the project sites.

Figure 1: Fulcrum3D Sodar at Taralga wind farm

Figure 2: Fulcrum3D Sodar at Clements Gap wind farm

Baffles increase availability at all heights by at least 10 percentage points:

At Taralga wind farm in NSW, two Fulcrum3D Sodars were deployed for forecasting. While on the wind farm for validation, one Sodar was used a reference device to account for environmental variations while a second Sodar was operated for several months with and without baffles. Figure 3 below shows the results of a statistical analysis that baffles provide an increase in data availability of 10~15 percentage points at typical monitoring heights.

Figure 3: Availability improvement over height range through use of acoustic baffles.

20 metre range bins improved higher height availability by 20 percentage points on average (25 percentage point improvement at 200m):

Figure 4 below shows the data availability improvement achieved by operating the Sodar with 20m resolution instead of the standard 10m range bins. As with the baffle test, two Sodars were on the site with one acting as a reference device. The plot below demonstrates the availably increase as a function of height: blue is reference Sodar with 10m range bins, while orange is the Sodar operating with 20m range bins. This new operating mode is a software change that can be applied to any existing Sodar and initial tests against a well-instrumented reference mast show no impact in wind speed measurement accuracy. Note that the 40m range bin is lost.

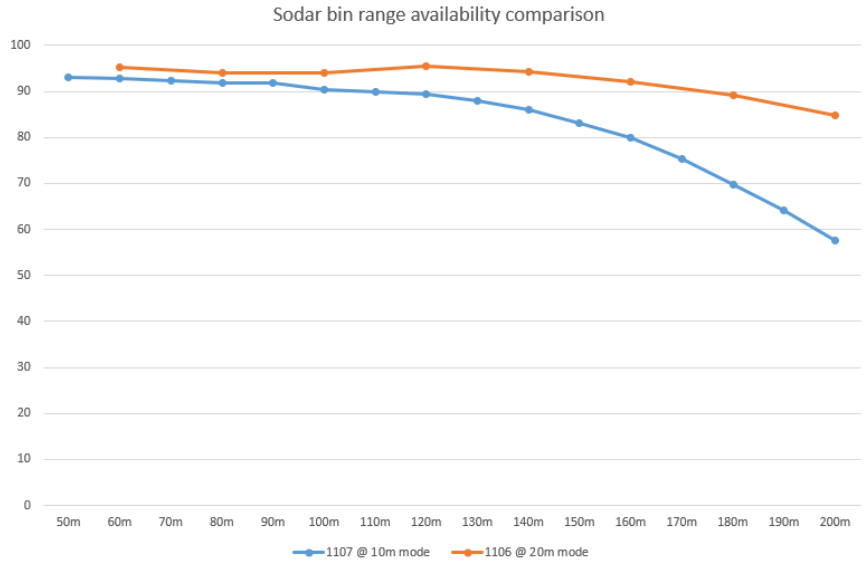

Figure 4: Availability improvement over height range 20m vs. 10m range bins. Vertical axis is % data availability.