CloudCAM Reference Site

Fulcrum3D treat all information regarding monitoring sites in the strictest of confidence. Below is a case study from monitoring sites that we are at liberty to discuss with express permission from our clients.

Epuron – Ti Tree / Kalkarindji/Lake Nash Solar Power Plants, Northern Territory, Australia

Epuron own and operate three high penetration solar power stations with battery storage for grid stabilization via ramp-rate limiting. Ti-Tree, Kalkarindji and Lake-Nash are each ~300kW solar power stations with over 85% instantaneous penetration into Power and Water Corporation (PWC) micro-grids. A grid stabilization system with a large bank of lead acid batteries provides ramp-rate limiting during cloud events. Fulcrum3D CloudCAM was installed (Figure 1) and integrated into the real-time control systems at Ti-Tree and Kalkarindji each power station as the batteries near the end of their useful life.

CloudCAM reduced battery usage by approximately 30% while increasing the average energy yield of the solar power station by 4-5% through:

- The removal of inefficiencies associated with charging and discharging the batteries (round trip efficiency for the lead acid batteries is around 80%).
- Allowing the solar power station to provide more power during periods of clear sky.

Epuron is able to view the images and performance of CloudCAM in real-time via FlightDECK - Fulcrum3D's secure server and visualization system (see Figures 2 and 3).

Figure 1: Fulcrum3D CloudCAM & Kipp & Zonen SMP11 pyranometer at Ti-Tree, NT. Installation and integration completed by Fulcrum 3D's in-house technicians and engineers.

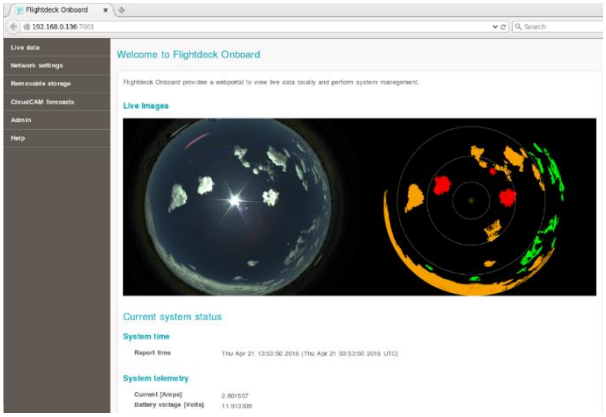

Figure 2: Fulcrum3D CloudCAM real-time visualization and instrument plots on FlightDECK.

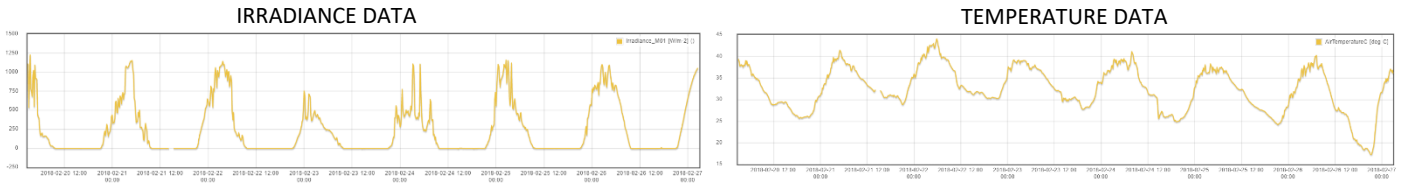

Figure 3: Sample of Ti-Tree Instrument plots displayed on FlightDECK.

The success at Ti-Tree and Kalkarindji (<1 year payback) led Epuron to install CloudCAM at Lake-Nash in 2016.

CloudCAM has now been operating continuously for 3 years and continues to deliver demonstrated savings:

- To Epuron through avoided battery capex and maintenance
- To PWC through reduced diesel consumption and spinning reserve requirement

The data plot below (Figure 4) shows a sample day at a Northern Territory microgrid that uses Fulcrum3D CloudCAM for ramp rate control and spinning reserve management.

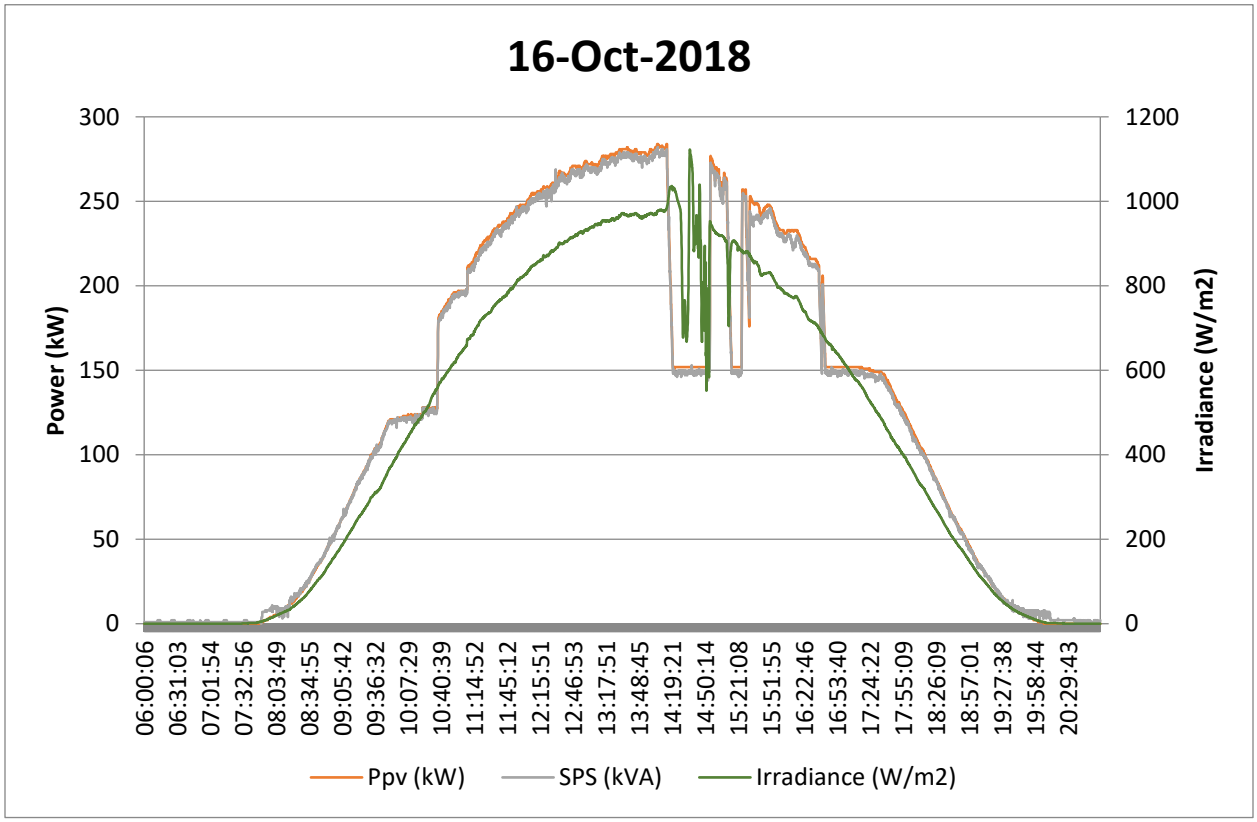

Figure 4: Sample day for Fulcrum3D CloudCAM operation in Australia's Northern Territory. In this application the PV power output (Ppv and SPS) ramps down ahead of the irradiance drop. This pre-emptive ramp down is in response to the CloudCAM signal forecasting a cloud event and allows the diesel generator to safely ramp up. CloudCAM then provides a ramp up signal when a sustained period of clear sky is predicted to return.