

29 March 2019

Network Operator
Power and Water Corporation
Attention: Djuna Pollard
Executive General Manager Network Services

By email market.operator@powerwater.com.au

Dear Market & Network Operator,

NT Generator Performance Standards

I write in response to the call for submissions to the NT Generator Performance Standards (GPS) Consultation Paper, namely the changes to the Network Technical Code v4.0 (NTC) (particularly section 3.3), System Control Technical Code v6.0 (SCTC) and Secure System Guidelines v4.1 (SSG).

Epuron is the owner and operator of the 4MW Uterne solar power plant at Alice Springs, the 1.8MW solar power plant at Yulara and also the three integrated high penetration solar power stations at Ti Tree, Kalkarindji and Alpururulam (Lake Nash), known as TKLN Solar which total 1MW. Epuron also developed the 25MW Katherine solar power plant, which has recently been sold to ENI Australia Ltd and is now under construction. Katherine Solar is likely to be the first large solar generator connected through the new NT GPS. Also relevant is that Epuron operates the three TKLN sites with on-site 10-minute cloud forecasting capability.

Section 3.3 of the Network Technical Code has seen significant changes to incorporate an update to the NT GPS v0.8 draft that had previously been released. Epuron's comments and questions are below.

- The mantra of 'do no harm' excludes the benefits that renewable non-synchronous generation brings to the network, namely in reduction in fuel use, reduction in harmful emissions and reduction in energy cost which all benefit the network.
- Epuron notes that the ability of solar non-synchronous generators to exhibit the ancillary services of ramp rate, forecasting, provide inertia and C-FCAS response is:
 - Expensive. This will lessen the interest for new generators to invest
 - Untested on a large scale. A testing and commissioning framework is yet to be developed.
- It is understood that there is no method or intention for these ancillary services to be paid for. This is due to the understanding that new generators need to provide similar characteristics to the generators they are replacing, however in the current system Territory Generation gets paid for these services indirectly. New generators will not be paid for these services directly or indirectly. A mechanism for some method of payment for required ancillary services would encourage investment and boost the NT Governments Roadmap to Renewables plan.
- Removal of the 'semi-scheduled' category removes an important distinction in the manner of the generators under this category and forces non-synchronous generation to behave more like synchronous generators. This may be achievable through batteries and forecasting methods described in the consultation paper but doesn't address the different manner in which these generators operate.

- The removal of semi-scheduled classification removes the ability of semi-scheduled generators to always be dispatched, and so determining the merit order of generators (based on Security Constrained Economic Dispatch) will need to be developed, noting that PWC may not know the price that generators have under contracts with retailers.
- The introduction of an FCAS market may more easily allow new entrants that could receive payment for providing ancillary services. Alternatively, new entrants could contract for these services with another provider.

Power and Water Corporation then released the “Supplementary Consultation Papers” primarily on Capacity Forecasting. Epuron’s comments and questions on that paper are below.

- PWC explained that they were unsure if the forecasting requirements should be within the NTC or the SSG. Due to the complexity of the issue and uncertainty around exactly how it will be implemented, Epuron suggests that it is in a regulatory form that is more easily updated as required.
- Epuron notes that although on-site 10-minute forecasting has been in operation in Australia for several years now, obtaining longer term forecasts requires more advanced forecasting techniques blending on-site forecasting with satellite imagery forecasting. Such techniques are now commercially available but represent the cutting edge of new technology that is yet to be proven on a utility MW scale. Therefore implementation, especially to a required 95% accuracy level for the hour-ahead forecast, may be difficult and/or cost prohibitive.
- In Epuron’s opinion, the accuracy requirements are on the more difficult side of the range of what is technically possible. PWC should talk to forecasting providers (such as Fulcrum3D and SolCast) about their opinions on the technical capacity to meet these requirements.
- On page 4 and 5, relating to the specific forecast requirements:
 - What resolution is required for (1) month ahead and (2) week ahead forecasts?
 - Short term (1 - 20 minutes) forecasting can be provided by on-site cameras and satellite forecasting. This can be fairly accurate as per the document. However, beyond that timeframe the accuracy possible to provide to PWC reduces drastically.
 - It is possible that the forecast can be more conservative in values beyond the short term, updating to less conservative and more accurate values as those time periods advance.
 - Epuron notes that the required forecasts and accuracy within this section may be difficult to meet, even with advanced forecasting methods.
 - It would be beneficial to trial or have a pilot implementation. PWC flagged the possibility for an interim arrangement while the exact requirements are determined. Epuron supports this idea.
- On page 7, regarding a real time capacity measurement the document states that “For solar generators it is assumed the capability is measured on the DC side of the inverter and the conversion losses are well known and calibrated.” Epuron notes that solar inverters just as easily provide actual AC exported power which would be simpler to record and report.
- On page 7, Table 1 compares forecasting requirements of this document to the NEM. In general, the forecast terms of 3.3.5.17 (b) matches the NEM, but the accuracy and resolution requirement of the 60-minute ahead (1-minute resolution) forecast is vastly more difficult to comply with. In comparison, the NEM requires a 5-minute dispatch forecast out to two hours.
- On page 8 and 9, Figures 3 and 4 depict changes in frequency leading to C-FCAS and load shedding. Epuron notes that these Figures exclude consideration of governor or AGC response. In a similar manner, on page 10, the document states “there is no R-FCAS provision for shortfalls in generation”. Due to the way that the DKIS has been run historically with thermal generation this makes sense. Epuron agrees that generators must not cause C-FCAS events; that clouds are considered normal operation; and understands PWC’s desire to treat all generation as scheduled.

However, the relatively minor changes in load that are handled by R-FCAS have an equivalent on the generation side. There is no functional difference in R-FCAS for load or R-FCAS for generation and it should be treated the same. The imbalance between load and generation will always be matched by governor action. Epuron understands that PWC is concerned about the predictability of required R-FCAS levels, however it appears that load and generator side requirements can be treated in a similar manner. In some instances, they will cancel each other out.

- This may result in an ability to relax the specifications in the 1-minute resolution 95% accurate forecast to a level more easily achieved via forecasting providers.
- On page 12, Table 2 shows accuracy for solar forecasting from an ARENA/CSIRO report. However, these accuracy results do not correctly represent the capacity for solar forecasting noting the following:
 - The results are from a 1.5kW PV system which cannot be accurately applied to the multi-megawatt systems to be deployed on the DKIS;
 - The five-minute forecast required a 50% accuracy (page 13 of report), much lower than the 95% accuracy required for the NT GPS;
 - The smallest resolution forecast is 5-minute, not 1-minute as per the GPS;
 - Epuron agrees that the best forecasting possible should be implemented but is concerned about the levels of accuracy required. As stated earlier, a trial or pilot for a real utility scale solar generator may be appropriate.
- On page 13, Figure 7 and associated text show forecast accuracy for upcoming shade events. The text states that “the system was able to detect the upcoming shade events more than 10 minutes in advance in all cases...”. The issue here is that this is only detecting a cloud event (yes/no), not predicting output solar power from a power station (in MW). If the only requirement is to give a 10-minute warning of a cloud event (yes/no) then that can certainly be achieved. Accurately giving a forecast of power from 1 minute – 60 minutes in one-minute resolution will be significantly more difficult.
- The consequences of not meeting a forecast accuracy requirement have not been defined.

We look forward to engaging further with PWC on the changes to the NTC and the exciting renewable technology opportunities in the Northern Territory.

Please do not hesitate to contact us if we can usefully provide any further information.

Yours sincerely,



MARTIN POOLE
EXECUTIVE DIRECTOR
EPURON