NT Solar Futures

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By email

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Supplementary Response to Review of the Generator Performance Standards

As stated in our initial response, Northern Territory Solar Futures Developments Limited (NSTFDL), are proposing the 50MW Livingstone Solar Farm near Berry Springs. Our input is therefore from the perspective of a Renewable Energy Developer, enabling significant private sector investment towards achieving the NT Government's target of reaching 50% renewable energy generation by 2030.

NTSFDL provided a detailed response to initially published proposed changes to the Generator Performance Standards for the Northern Territory. The subsequent document provided on 12th March 2019 has been carefully considered by our technical team and we provide the following responses:

1. The document entitled, "GPS Overarching Paper v0.7" shows a great deal of bias to support the position taken, and it is our view that a number of the statements of fact are simply opinion and arguably wrong.
2. Capacity forecasting all assumes scheduled generation. There is no consideration of semi-scheduled generation.
3. Page 1 – "Asynchronous technologies have no inertia (resistance to change in frequency) that is inherent in synchronous technology and limitations in reactive power range capabilities" – this statement is <u>not true</u>. The ABB solar inverters we intend to utilise on the Livingstone Solar Farm have a wide frequency tolerance and hence will stay online for at and their current operating level as long as they can and as required by the NTC. They therefore resist frequency change (they don't just drop off when abnormal and transient frequency events occur). Also, the ABB Solar Inverters, for example, have a 100% reactive capability, therefore the second part of the statement is also false. Most solar inverters for utility scale PV will have a wide operating frequency range to meet grid codes, and have a decent reactive capability. Statements like this are not productive and, worse, are misleading.
4. Capacity Forecasting – page 4, dot point 4 – Addressing system wide capacity forecasting errors is part of what R-FACS should be for, in our view. Just like we do not know when a GT is going to have a fuel supply issue, we cannot forecast the solar resource with 100% accuracy. R-FCAS should be allowed for in this scenario (and the NTEM should deal with who pays for this service).
5. Capacity Forecasting 3.3.5.17 – pages 3 and 4 – this is generally in line with what we had previously seen at the information session and commented on (e.g. this will lead to significant under-forecasting). The proposed implementation is complicated and onerous, and difficult to calculate without being conservative. A simpler regime needs to be put forward (such as in our submission) that uses a more standard approach.

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6. Capacity Forecasting – 3.3.5.17, point (d) - leaves compliance totally up to the System Controller as to the format and frequency of compliance assessment. This needs to be specified as annually (any less would be too onerous) and the format needs to be specified (e.g. comparative assessment of actual vs forecast of for all trading intervals for the year). Also, the consequence of failing to comply needs to be specified.
7. How does this compare to the NEM? – page 7 – The comparison given to the NEM is tenuous. It does not mention that AEMO are responsible for solar and wind dispatch forecasting and generators are responsible for availability forecasting. There is also an optional Market Participant 5-Minute self-forecast program being trialled. There is better and alternate ways to manage forecasting and this is disingenuous to not include this and to discuss.
8. Managing Power System Frequency Objective – page 8 – Scenario A – We are not sure why this would increase the levels of R-FCAS and C-FCAS being dispatched. If R-FCAS can manage the situation then this is a normal scenario for R-FCAS (maintain frequency within +/- 0.2Hz). As per the comment above the forecast will be inaccurate at times (despite best efforts), and something that System Control will need to manage. R-FCAS operation will become more normal in a network dominated by Solar, compared to the present-day situation.
9. Power System Tolerance to Capacity Forecast Errors – page 9 – The example and plot presented is very conservative as it does not consider FCAS, and hence the ability of generators to respond to frequency changes. This is therefore theoretical and not a real example. Including the ability of generators to respond to frequency changes should be used as the basis to deal with forecasting errors. This would provide a realistic basis for looking at the issue and give a much more positive outcome!
10. Capability of Existing Generators to Manage Capacity Forecast Reductions – page 10 – there is no mention of the future role of storage in addressing this issue. This should be included here. To get to anywhere near 50% RE there will be no synchronous generators on the network during a normal sunny day, and hence storage can and will need to play a significant role. Figure 5, blue line is accepted but this will not leave much room on the system for Solar and hence is not particularly relevant. The red line is very conservative (50MW, minimal headroom, unit start required). The more normal situation is if there is synchronous generation on the network then it will need to operate at 'low load' and be available to ramp up, if required. In the future the NT may need to consider new synchronous technology such as low load GTs (like the GE LMS100s that were installed in WA in 2012), and that are capable of operating at low load sustainability (~20%) with reasonable efficiency (gross ~30%) that facilitate intermittent RE (or there are market signals to encourage private investment in such technology).
11. Capability of Solar Forecasting Technology – page 12 – Table 2 is noted as are the comments that solar forecasting technology is improving. The reality of the situation is that for an individual solar forecasting station the accuracy on a 1 hour ahead basis is up to ~15% in the worst month. During other months the error may be less than 5%. This shows the benefit of not only a forecast value (P50) but also a P90 forecast such that System Control can have a level of confidence in the values. Now with solar forecasting for multiple sites, there will be some benefit of averaging and the overall error will be less (based on the studies that have been completed – for example https://www.nrel.gov/docs/fy16osti/65728.pdf). Therefore, for System Control the more solar generators there are on the system, the less the overall forecasting error, and the more manageable the system will be.
12. Options to Manage Capacity Forecasting Accuracy and Operational Risks – page 13 to 15 – for generators the potential amount of energy spilled (wasted) is a significant concern and issue with the proposed changes to the NTC. The result will be high prices of RE for NT electricity consumers or RE projects will not happen. This does not have to be the case with a more reasonable and balanced NTC. Statements such as "Intermittent generators cause harm to the system by requiring additional reserves to be online at all times" are not productive and demonstrate PWC's thinking. All generators (including gas) are intermittent and need to have their variability

considered. Using a 60 min ahead forecast, there will be a lot of times when solar can be forecast with a high level of accuracy (e.g. sunny dry season day), and hence the need for additional reserves online can be reduced. We need to work together to get the best out of our assets whilst ensuring system security, and maximising RE. There will need to a paradigm shift in thinking from operating the existing network to operating a network with 50% RE.

13. Part B – Scheduled Generator Classification - What is Security Constrained Economic Dispatch? - Statements such as "Due to this it is critical that the supply can be relied upon to meet the energy demand and reserve requirements, these features are only provided by scheduled generation" is not true in our view. As discussed above with accurate short term forecasting solar can be relied upon to meet demand. There is a paradigm change needed to get the best out of RE.
14. Part B – Scheduled Generator Classification - Why Semi Scheduled Classification Is Inappropriate – We have addressed "Semi-scheduled generation cannot be relied upon to meet energy demand or reserve requirements" above. Regarding "Semi-scheduled generation increases the reserves required on the system to manage a new form of generation supply uncertainty" this is correct but should not be seen as a problem. Yes, at times there will need to more reserves on the system but the market will allocate these costs appropriately. It is much more efficiently managed at the system level rather than forcing all generators to be scheduled. This will lead to significant increase in costs that will discourage RE investment and/or be met by NT electricity consumers.
15. Part B – Scheduled Generator Classification - Why Semi Scheduled Classification Is Inappropriate – The last para "For example, a solar PV site that is semi-scheduled is self-dispatched and may intend to operate at its capacity except when restricted by a security constraint. The solar PV site has no obligation to achieve this capacity; it could cease supplying energy at any point in time" is very pessimistic. Please provide evidence of where this has happened elsewhere. A Solar PV site has commercial drivers, typically under a Power Purchase Agreement (PPA), to generate the most it can into the market. The more generation the better the return for investors. Contingency situations happen to all generators to cause them to cease supply, but this is by exception and not just for semi-schedule generators.

We also take the opportunity, here to include our supplementary responses to the C-FCAS paper with the following additional comments. Generally, there was not a lot in this paper that we have not already commented on.

1. Why do we need generators to provide C-FCAS? – page 3 – Statement in the paper "New generators, including renewables need to provide the equivalent capability in supporting the management of frequency as the generators that they displace."

   Why? This is the simple argument that is put forward but should not be the case. Historically we have had high inertia due to mechanical inertia from synchronous generators on the network but this is not necessarily required for a secure network. The system characteristics should change with changing generation technology on the network. Inertia should be studied (modelled) by PWC to look at the system wide requirements under a 50% RE scenario with a mixture of grid following solar inverters and grid forming inverters with storage. Inertia provision is a control issue not an issue of mechanical inertia. Based on the modelling appropriate levels of inertia can be set. Statements like this put cost burdens on RE without real benefit to electricity consumers. Articles such as this https://reneweconomy.com.au/inertia-power-system-dont-actually-need-much-65691/ and

papers such as this https://www.digsilent.com.au/publications/2018/papers/SIW18-57_paper_Hagaman.pdf demonstrate the point. We appreciate this is a significant adjustment in thinking for PWC but a necessary one for an economically efficient outcome.

2. NTEM – Future – page 5 – NTSFDL supports the competitive dispatch of C-FCAS, as this will lead to the most economic outcome, although it is recognised that T-Gen are well positioned to provide this service for the medium term.
3. Proposed Approach to C-FCAS Capability – page 4 - NSTFDL does not object to the requirement for generators to provide Inertia and/or C-FCAS to the system, as it is recognised that all generators need to contribute. But as per the comment above, NTSFDL request that the level of inertia/C-FCAS should be studied and set for an RE future.

Finally, we are of the view that a whole of system plan development would be the most desirable, cost effective and efficient plan for the NT's long term energy generation future. We draw your attention to recent announcements by the WA government to be led by the Public Utilities Office. Their plan is to be developed by mid-2020. It is a great initiative and one that NT could follow.

https://www.mediastatements.wa.gov.au/Pages/McGowan/2019/03/McGowan-Government-launches-Energy-Transformation-Strategy.aspx

http://www.treasury.wa.gov.au/uploadedFiles/Site-content/Public_Utilities_Office/Industry_reform/Whole-System-Plan-South-West.pdf

Yours sincerely,

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Director

cc. NT Utilities Commission