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Generator Performance Standards (GPS) Feedback

Assure Energy Asset Pty Ltd (as trustee for the Assure Energy Asset Trust) **(Assure Energy)** is pleased to submit the following feedback in relation to the NT Generator Performance Standards**.** We appreciate the ongoing engagement and involvement of stakeholders in the development of the new standards. We attended the workshop on 26 June 2019 and will continue to participate in engagement and be available as necessary**.**

Assure Energy is the parent entity of its two wholly owned special purpose vehicles (SPVs) Assure Energy NT Robertson Pty Ltd (as Trustee for the Assure Energy NT Robertson Trust) and Assure Energy NT Darwin Pty Ltd (as Trustee for the Assure Energy NT Darwin Trust) **(Assure Energy SPVs).**

The Assure Energy SPVs have entered into Power Purchase Contracts with the Commonwealth of Australia, represented by the Department of Defence **(Defence)** in respect of a project involving the design, construction, operation and finance of two on-base solar photovoltaic power stations and associated batteries at the Defence sites Robertson Barracks and RAAF Darwin in Darwin **(Project).**

The power stations are scheduled to commence commissioning phase in November/December 2019 and will be indirectly connected to the Darwin – Katherine interconnected transmission system via Defence substations located at Robertson Barracks and RAAF Darwin. Electricity generated from these facilities will primarily be sold to Defence as an embedded generator.

We provide below our key feedback related to the draft Generator Performance Standards. Our comments respond to the current draft standards, workshop engagement and associated PWC Responses for Questions Taken on Notice.

Feedback Items

Forecasting

- We appreciate the workshop and recognise the importance of system security provided by accurate forecasting as solar penetration increases in the system over the coming years. We appreciate the target and ambition provided and provide the following input and comments to the proposed generator performance standards.
- **Accuracy and Forecasting Requirements Unachievable** - Our understanding of the 5% accuracy target was that it achieved a desired level of stability for a given solar penetration based on modelling undertaken. While, the technology of forecasting remains nascent and will improve over time with greater experience and implementation, the physics, technology and systems currently available to provide this forecasting accuracy 30 minutes out from dispatch is not available at this time. We provide some specific feedback based on discussions with participants in the short-term forecasting market:
    - The technology for forecasting is in its infancy. We note that Arena, AEMO and various providers are currently undertaking a study in the forecasting and accuracy analysis with an investment of $9million (see: https://arena.gov.au/news/9-million-funding-to-enhance-short-term-forecasting-of-wind-and-solar-farms/). We understand that this forecasting is predominantly dealing with short-term forecasting and accuracy of less than 10 minutes which is the current limit for somewhat accurate forecasting. The study is ongoing with results to be published later

this year which may provide some commercially objective evidence of the level of accuracy achievable.

- We have engaged with industry parties that are participating in forecasting in Australia including parties participating in the NEM as to what is being achieved. At a high-level there is a good degree of accuracy achieved at 7 to 10 minutes (ie 2 to 5 minutes prior to dispatch plus the 5-minute dispatch window). This timeframe has the best chance to achieve the accuracy you are seeking but this would need to be confirmed.
- Individual forecasting on a site by site basis has a higher level of error beyond 10 minutes (5 minutes prior to dispatch) given the movement and variability of cloud cover that can be observed by sky cameras. However, on an aggregate basis across multiple power stations geographically separated, a single forecast system would benefit from the portfolio effect which would even out individual errors to provide far more accurate forecasts on an aggregated basis beyond 10 minutes. Aggregate assessment and forecasting can be used appropriately to provide system security and mitigation measures.
- There are factors in addition to solar insolation that need to be considered in producing capacity forecasts, including temperature derates, DC and AC losses, auxiliary power consumption of BOP and BESS etc. While we note that these are not as significant as insolation forecasts, accuracy errors have potential to compound and we would suggest this should be considered in determining the required accuracy of capacity forecasts.

- **Proposed Approach** – We propose the following amendments for a commercial, feasible and deliverable framework that can evolve as the system, generation and technology improves.
  - **Trial** – The current draft standards appear to require an accuracy of forecasts that are based around a much higher level of solar penetration than will occur over the coming years which provides an opportunity to trial and implement these measures over a greater timeframe. Given the current status of projects there should be an appropriate allowance for projects that will connect over the next 12 months to transition to the requirements over a period of time. That is, projects already underway should be able to apply v0.8 of the GPS to deliver certainty when commissioning their projects and connect to the network. It is difficult for existing projects to anticipate what standards they will be held to and given the likely timing of finalising the draft GPS Specifications there is currently no certainty. Once connected, these projects can take part in any trial with results evaluated and assessed. This timeframe would also allow PWC and the market to benefit from the outcomes of the ARENA/AEMO trials currently underway.
  - **Short-Term Forecasting** - The firm offer for dispatch is commercially unachievable on a 30-minute look ahead basis and it can only be suitably provided with a high degree of accuracy 2 to 5 minutes ahead of the 5 minute dispatch window (7 to 10 minutes in total). The plant providers should only need to provide accurate forecasts 2 to 5 minutes ahead on their individual plant. The requirements for the desired level of accuracy beyond 10 minutes is not possible and should be removed on an individual generator level and instead assessed at an aggregate level (as noted below). The opportunity for firm offers further out than 5 minutes prior to dispatch should be monitored and assessed as part of ongoing implementation when the level of technology and market maturity is achieved. It can then be assessed as part of a review that can refine the outcomes and the targets.
  - **PWC Aggregate Modelling on Longer Forecasts** – While individual forecasts beyond 5 minutes prior to dispatch are highly uncertain, aggregated forecasting by PWC across all plants, taking into account the nature of each facility and location, can provide a better aggregate result that provides a portfolio effect to smooth out errors. As such PWC should lead the longer-term forecasting on an aggregate basis that will provide far more accurate data on an overall basis. This will also give PWC information on the likely generation of various domestic and small PV arrays across the network which will further increase the stability of the network. Individual generators can continue to provide short term forecasts and provide additional data to assist the process and work on progressing towards longer-term firm-offers.
  - **Implementation Period** – These efforts should be implemented over a period of time given the nascent status of these technologies. Following a period of 12-18 months of data, the system can be reviewed and assessed as to any further amendments deemed necessary. The review should asses the system security implications, technology development and implementation

outcomes. At this point revised accuracy targets, timeframes or adjustment to methodologies can be determined based on the evidence. This will allow the system to also respond to the growth in solar penetration along with the greater experience and maturity of forecasting along with other mitigating technologies.

Embedded Generation:

- With respect to embedded generators we acknowledge that any system over 2MW will have the GPS apply to them however, there are some details that we would seek further definition around:
    - Following the PWC Responses for Questions Taken on Notice, it is noted that an embedded generator that exports surplus energy to the grid will be able to provide a gross generation forecast and are not required to forecast their load. As such their firm offer for dispatch will be on the basis of gross supply and not net, that is not taking into account the load. We support this decision.
    - If Embedded Generators are not exporting to the grid, since only a net load will be visible to the PWC System what are expected to be the dispatching arrangements in this regard (noting an Embedded Generator that is not exporting to the grid can only dispatch up to the total load)?

Ramp Rate Controls as under Class 4 Embedded Generator Requirements:

- Under the current requirements ramp rate control for Class 4 Embedded Generators is required. Under the new standards is it expected for this to be a requirement for ramp rate control? If firm offers and dispatch is required, we do not believe this is necessary as firm dispatch offers over 5min increments will conflict with calculation of the required ramping. If there was to be a ramping requirement, this would need to be integrated with the firm offer requirements to provide a leeway for ramp control that overlaps with the requirement of certainty of firm dispatch. Alternatively, if the semi-scheduled generator classification is retained here, the ramping control would then need to be implemented.

C-FCAS and Frequency Droop

- Based on the workshop meeting and the responses to questions taken on notice we wanted to clarify our understanding with regard to C-FCAS droop, specifically the response below
    - *The frequency response capability as provided by the set of equipment considered a generating system must be able to deliver C-FCAS subject to energy availability (as determined by the 'Firm offer' in forecasting 3.3.5.17). How this is delivered would be subject to the specific applicant's plant design. For example: a DC coupled solar PV and battery combination may operate the inverter(s) in drop frequency control. It may require a dynamic limit (that applies to frequency droop) on the active power output that aligns with the firm capacity offer to ensure it can achieve the forecasting requirements by not draining the battery when delivering C-FCAS raise.*
- Our understanding is that the generating system should deviate from its dispatch target (based on its capacity offer) if a frequency event occurs that requires a C-FCAS droop response. We also understand that based on the principle that no energy/headroom needs to be reserved for C-FCAS that being enabled for C-FCAS should not otherwise impact the operational strategy of the generating system. Please clarify?
- If a battery normally operated to firm the dispatch from a PV generator to meet its capacity offer / dispatch target is drained through providing C-FCAS, it will no longer have the floor room needed to provide this firming service. Please clarify how any failure to meet dispatch accuracy requirements would be treated in this scenario where C-FCAS has drained the battery to the detriment of firming capacity?

Other Items

- **Power Factor / Voltage Control** - Requirements differ with respect to power factor / voltage control modes between the NTC, Embedded Generator Requirements and Class 4 commercial PV systems. The NTC requires capability for voltage control at the PCC, embedded generator requirements state an operational power factor of 0.98 lagging, and Class 4 commercial PV system requirements state a requirement for Power factor at site to be > 0.9 at all times. Please clarify the intended operating mode for a behind the meter generator of > 2 MW (operating to supply a large customer).

- **C-FCAS from Battery and Solar PV** - The current framework for capacity forecasts does not appear complete to enable recognition of C-FCAS capacity availability from both battery and solar PV elements. Can the intention be clarified going forward?

Thank you for the opportunity to provide input to these standards. Please do not hesitate to contact Ed Hart should you have any questions in relation to this application.

Yours sincerely,

Edward Hart

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