14 February 2023

Lodged via the PSMGReview@aemo.com.au email address.

Dear AEMO Power System Modelling Reference Group,

Submission in response to the PSMG Review Consultation

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with hundreds of leading businesses operating in renewable energy and energy storage along with more than 7,000 solar and battery installers.

The CEC is committed to accelerating the decarbonisation of Australia's energy system as rapidly as possible, while maintaining a secure and reliable supply of electricity for customers.

We welcome AEMO's consideration of legacy plant models in the consultation paper and how they might be dealt with. We consider this represents an opportunity to address an underlying issue that was identified in the Connection Reform Initiative (CRI).

In the CRI, it was identified that complexity associated with retrofitting a battery energy storage system (BESS) behind an existing connection point with a legacy asset has led to many proponents abandoning these kinds of projects. This has resulted in several lost opportunities for helping to install more firming capacity in the NEM, which would help improve reliability and price outcomes for consumers.

Feedback from CEC members revealed several project risks when attempting to retrofit a BESS behind an existing connection point the grid connection process.

- The pursuit a 'perfect' model instead of using a 'good enough' one, could materially delay the progression of the project. In some case, this delay was so significant, or intractable, that the project was abandoned.
- The requirement to develop a detailed EMT models for the associated legacy plant behind the connection point - even when the NER did not require EMT models to be developed at the original time of connection. This has major cost implications where the original OEM no longer exists, or where support contracts with the OEM have expired.
- The specific risk that seeking to add a BESS to an existing plant will trigger a clause 5.3.9 review. Many members expressed concern that the legacy asset GPS would be reopened and potentially forced up to the level of capability established in the latest NER defined generator access standards (especially for pre 2018 connected plant).

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In aggregate, these outcomes pose a major impediment to progressing these kinds of BESS retrofit projects as they lead to significant delays and very often the cost of the modelling exceeds the capital cost of site changes being proposed.

The CEC therefore welcomes the opportunity to address this issue and acknowledges AEMO's openness to considering the issue through the PSMG process. We also acknowledge that some of the underlying issues will be addressed through AEMO's upcoming review of the 5.3.9 process.

Retrofitting a BESS to a legacy asset has an upside to all parties as it:

- Provides NSPs and AEMO with at least more accurate and updated EMT models of legacy assets – even if those models cannot be developed to 100% accuracy.
- Allows connecting parties to leverage sunk costs in connection assets to incorporate a BESS; and
- Provides overall market benefits by increasing the number of firming assets connected to grid, supporting reliability, security and price benefits.

Hence there is a mutual benefit to both plant owners as well as NSPs & AEMO to ensure a successful retrofitting a BESS.

While we look forward to addressing these issues through the PSMG consultation, we are concerned that the proposed approach of requiring only certain control loops to be represented in the new EMT model will not adequately resolve the underlying issues faced by industry:

- The control loops mentioned - voltage, reactive power and fault ride-through - are in fact the control loops that CEC members have identified as being most problematic. Hence our understanding of AEMO's indicative approach is that it may not do enough to change the status quo.
- AEMO's existing approach lacks sufficient detail on how other matters will be managed. For example, RMS/EMT model alignment issues, timeframes for resolving issues, and not meeting all the requirements of the PSMG, etc.

Developing EMT models for legacy assets that meet the present requirements (PSMG & DMAT) can be challenging, hence it is often not feasible for a newly developed EMT model of a legacy asset to meet the current requirements for the following reasons:

1. Technical information / access to expertise required to develop the model is not available due to the age of the asset and lack of support from the OEM;[1] and
2. Costs and resource constraints resulting in the process taking a significant amount of time (some members have spent 6 - 12 months developing models and resolve technical issues with models). This is often required before the GPS incorporating a BESS can even be negotiated.

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[1] Moreover, several OEMs have withdrawn from the market and thus are no longer able to assist with building models even should they desire to contribute.

Given that it may not be feasible for a legacy plant model to meet all the current requirements, flexibility is required both in meeting all the requirements in the PSMG & DMAT as well as the timeframes for resolving these issues. The PSMG & DMAT were not written with the intent of applying to legacy assets, and expecting a legacy asset to meet the current requirements is often impractical. This is reflected in feedback from CEC members where some have abandoned retrofitting a BESS to a legacy asset as a result (*after* spending a large amount of time and cost trying to develop EMT models).

In our engagement with CEC members, a number of pragmatic solutions to the above issues were identified. Some of these are described below:

1. **Issues with EMT models** - Where there is a known issue with the model that is not reflective of actual plant performance and it does not affect the ability to assess performance (e.g., an RMS model can be utilised in the interim), allow the performance assessment to proceed and agree a timeframe for resolution.
2. **Inconsistencies in EMT & RMS models -** Where there are inconsistencies between RMS & EMT models as part of the DMAT and the inconsistencies are not reflective of actual plant performance or will not have a material impact on performance established under 5.2.5 of the NER, allow the project to continue negotiating performance standards and agree a timeframe for resolution of the issue post 5.3.4A / 5.3.4B.
3. **Unclear definitions of error bands and tolerances necessary for benchmarking EMT & RMS models -** The routine benchmarking of RMS against EMT models was not yet a requirement for connections when the 2018 guidelines were drafted. Consequently, in practice current benchmarking criteria come from the 2018 guidelines for validation of models against field results in section 6. These criteria are not always fully applicable to direct comparison of the two model results. This means they do not address necessary exclusions where the nature of the two modelling approaches is expected to differ. The opportunity should be taken in this review to define the criteria to be used specifically for model benchmarking given this is now such a critical part of the connection process.
4. **Timeframes for resolving model issues generally** - Where an issue is identified that is not reflective of actual plant behaviour or does not have a material impact on generator performance standards established under clause 5.2.5 of the NER, agree a timeframe for resolution. For example, for a model issue identified at the application stage (usually following the 5.3.9 process when retrofitting to legacy plant), have the ability to resolve the issue post 5.3.4A and/or 5.3.4B.
5. **NSP to consult with AEMO** - Where the model issues are holding up the performance negotiation process, the NSP must consult with AEMO and state why the issue is holding up the process, what efforts have been made to demonstrate that the issue is not reflective of actual plant performance and that a timeframe for resolution has been discussed with the intent of agreeing a suitable timeframe.
6. **AEMO to progress a request under S8.3 & S8.4 of the PSMG -** The NSP and AEMO to make the connecting party aware of S8.3 of the PSMG and make an assessment as to how issues identified with models will impact each of the 10 matters to be considered that are established under S8.3 of the PSMG. As part of

this, AEMO to make a reasonable effort to agree a timeframe for rectification of the issues where they cannot be reasonably rectified prior to beginning the negotiation of performance standards. AEMO to negotiate the timeframes for resolution in good faith such that the 5.3.9 process can progress through to 5.3.4.A / 5.3.4B.

CEC members have communicated that most legacy plant model issues occur at a transient stage during the simulation or when running the model at a boundary condition. Those issues are often a result of numerical issues with the model, not necessarily a reflection of the plant's performance. Resolving these issues usually requires significant effort but does not contribute to real plant performance improvement or any impact on system security. Therefore, we recommend relaxing the model accuracy requirement for plant transient performance in the existing PSMG guideline if this does not compromise network security and reliability from engineering judgement.

We also understand that model development and tuning is a lengthy process and may take years. Currently, the PSCAD model acceptance is on the critical path of the 5.3.9 process for a retrofit plant. We recommend that this PSMG guideline provide flexibility in which PSCAD model acceptance and completion can be deferred to a later project milestone if certain aspects of the model do not meet the final PSMG guideline. This will allow the proponent to develop the project in a timelier manner while ensuring the proponent can supply a compliant model before the project is built and has a material impact on the network.

As always, the CEC welcomes further engagement from the AEMC and AEMO on this reform. Further queries can be directed to Christiaan Zuur at the CEC on czuur@cleanenergycouncil.org.au

Kind regards

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