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Australian Energy Market Operator
GPO Box 2008

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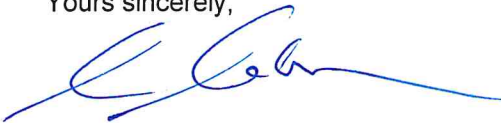
Consultation – Amendments to the Power System Model Guidelines.

Please accept this letter as CitiPower, Powercor and United Energy's (distribution network service providers in Victoria) formal submission to the Australian Energy Market Operator's (AEMO) Consultation paper – Amendments to the Power System Model Guidelines.

We have outlined our responses to the questions raised in the consultation paper in the attached submission.

Please direct any further enquiries to myself on 0409 132 311.

Yours sincerely,



Richard Robson
Manager - Subtransmission Planning & Connections
CitiPower, Powercor and United Energy

Consultation Questions	Submission
<p>1. What is the threshold (if any) for deciding when to model a traditional large power system load in detail for power system simulations, be it megawatt-based, location-based or otherwise?</p>	<p>CitiPower, Powercor and United Energy submit that a graduated approach should be taken. As a starting point the threshold should be megawatt-based at 30MW as this aligns well with existing AEMO thresholds for Semi-Scheduled generators. Location-based requirements should apply between 5 MW and 30 MW, as 5 MW aligns well with Chapter 5A load connections and the requirements for these loads should require agreement between the NSP and AEMO. However, this threshold should be regularly reviewed and as IBL penetration increases over time, this threshold may need to be reduced to 5 MW.</p>
<p>2. Is the IEEE or Composite and DER Load models suitable for these types of loads or is more detail required</p>	<p>CitiPower, Powercor and United Energy submit that IEEE and Composite load (CMLD) models are aggregate models, not specific models for a certain type of technology, more detail is required for large IBL loads such as large data centres or hydrogen electrolyzers.</p>
<p>3. Are there any other types of large loads that have not been considered here?</p>	<p>CitiPower, Powercor and United Energy are not aware of any other types of large loads that need to be considered.</p>
<p>4. Is the Composite and DER Load model sufficient to model data centres in RMS and EMT domains?</p>	<p>CitiPower, Powercor and United Energy submit that IEEE and CMLD models are aggregate models, not specific models for a certain type of technology, they are not sufficient for large IBL loads such as large data centres or hydrogen electrolyzers.</p>
<p>5. What additional protection and control systems are expected to be required in the models?</p>	<p>CitiPower, Powercor and United Energy are not aware of any additional protection and control systems that need to be considered.</p>
<p>6. What level of detail is required for IBL in RMS and EMT domains?</p>	<p>CitiPower, Powercor and United Energy submit that RMS models will not capture the switching frequency of IBLs, this is a similar issue seen with RMS models of IBRs. Therefore, the same level of detail that has been required of IBRs should also apply to IBLs.</p>
<p>7. What are the black start simulation model requirements for large power system loads (if any)?</p>	<p>CitiPower, Powercor and United Energy have a diverse range of customers that connect to our networks. Some of our customers are deemed essential services and provide extremely critical infrastructure such as Hospitals, Fire Stations, Police Stations, Traffic Infrastructure, Transport (Train and Tram) Infrastructure, Water, Sewerage Treatment, and Waste Treatment. Considering these customers, CitiPower, Powercor and United Energy believe that large data centre loads and hydrogen electrolyzers may not be the most critical customers to re-energise after a system black event, and</p>

	therefore black start simulation models for these customers may not be required.
8. What level of R2 validation is appropriate for different types of load models?	CitiPower, Powercor and United Energy submit that a similar level of validation that has been required of IBRs should also apply to IBLs.
9. What should the requirements for model provision in Section 7.4 be for IBL? Should it be identical to Generator data?	CitiPower, Powercor and United Energy submit that an identical level of data be required of IBLs as Generators.
10. What components should be included in a new table in Appendix C for IBL? Are there any specific control systems, protection systems or other components that are specific for loads that will have material impact on power system simulations?	CitiPower, Powercor and United Energy submit that a similar level of validation that has been required of IBRs should also apply to IBLs, similar to "Section C. 4 Converter-based energy storage system" of the current Power System Model Guidelines.
11. Are there any other issues relating to model requirements for large loads that AEMO has not considered?	CitiPower, Powercor and United Energy are not aware of any additional model requirements for large loads that AEMO has not considered.
12. Are there any other methods that could guarantee that models remain usable for the life of the plant despite changes to simulation tools, versions, or compiler toolchains that AEMO has not considered here?	CitiPower, Powercor and United Energy are not aware of any additional methods that AEMO has not considered.
13. Would there be any issues with developing a DLL to conform with a standardised explicit linking routine?	CitiPower, Powercor and United Energy agree with the approach to require a standardised DLL format and interface to ensure model compatibility for the life of the plant.
14. Are there any issues with the proposals made under "Other matters"?	CitiPower, Powercor and United Energy are not aware of any issues with the proposals made under "Other matters"
15. Are there any additional required modifications to the Guidelines that AEMO has not considered here?	CitiPower, Powercor and United Energy submit that the following minor updates to the PSMG should be made: <ul style="list-style-type: none"> • Section 4.3.9 should be updated to require RMS models be compatible with PSSE 34.4 • Section 4.3.10 should be updated to PSCAD V5 and Intel Visual Fortran 2022