



AEMO

21 August 2023

To whom it may concern'

Lodged via email: contact.connections@aemo.com.au

RE: CT LAB (Australia) feedback on the Draft Recommendations Update Report (Part 1) – Schedules 5.2 & 5.3a of the National Electricity Rules

Thank you for the opportunity to provide feedback on AEMO's review of technical requirements for connection 26 July 2023 as detailed in the document named above.

CT LAB is a global player in Power Quality, Wide Area Monitoring, Grid stability and associated Monitoring and Automation markets. Working across the major regions of, Africa, Europe, Canada and Australia, with more than 30 years' experience in advanced grid monitoring.

More recently in Australia CT LAB have been and continue to be involved together with AEMO, AusNet and Powercor with investigation of sub-synchronous oscillations in the West Murry region using our multifunction VECTO 3 measurement platforms and our cloud based big data hosting platform called VECTO Grid OS.

This led to the development of a GPS time synchronised algorithm with the ability to accurately acquire a spectrum of oscillation phasors at 1Hz and at 0.1Hz resolution. This spectrum provides the ability to accurately detect the occurrence and shape of multiple oscillation modes.

We then built a suite of event and trend monitors to record statistical data, but also to record EMT based waveform events with large pre-and post-waveform buffers containing 50kHz GPS synchronised waveform data with ± 100 ns absolute time accuracy.

We further enhanced the product to provide interposing relay control to disconnect plant for a given amplitude of a sustained oscillation. Provision has been made to holdoff control tripping for unrelated events like dips.

Concurrent to the small signal stability monitoring, the device still functions as a PMU device and as a Ed3.0 Class-A PQ monitoring device.

We have limited our feedback to the areas of our expertise and experience, S5.2.5.10 and S5.3a.4.

We look forward to contributing to the ongoing development of these important regulatory changes.

Sincerely

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Update report Stakeholder feedback template:

AEMO Review of technical requirements for connection

Stakeholders making a submission on the recommendations set out in the AEMO draft report may use the below template to provide feedback. Please consider the confidentiality disclaimer at the end of this document.

Stakeholder: CT Lab (PTY) LTD

Schedule 5.2 Conditions for Connection of Generators

NER Schedule 5.2 issue	Schedule 5.2 (Generators) – feedback on revised recommendations and relevant draft NER amendments
NER S5.2.5.10 – Protection to trip plant for unstable operation	
Requirements for stability protection on asynchronous generating systems	<p><i>In the AAS, specify that a generating system or IRS, for its asynchronous units:</i></p> <p><i>Must have system that can detect an instability in voltage, reactive power and active power.</i></p> <p>A clear definition and preferably a standard defining instability and describing the measurement methods and its test protocols is required.</p> <p><i>Must have a protection system capable of disconnecting for oscillatory behaviour.</i></p> <p>CT LAB propose the monitoring system be separate from the protection system, providing both system operator alarming and a control signal to a protection relay to initiate a trip action.</p> <p><i>On detection of oscillations, execute a hierarchy of actions based on configurable trigger conditions, thresholds, and timeframes, agreed with the NSP and AEMO, where</i></p> <ul style="list-style-type: none"> <i>• Any action to disconnect is based on contribution to the oscillations.</i> <i>• Actions are automatically and promptly actioned.</i> <p>CT LAB propose a multi-level strategy that includes alarming at lower levels and tripping at higher levels as defined by NSPs. In the early stages tripping should be disabled until the NSP has agreed upon practical tripping values and strategies. This will assist in refining the settings for control and further refinement in the case of non-related contingency events.</p> <p><i>For synchronous and asynchronous production systems 100 MW or greater, must have a PMU and capability to receive</i></p>

information about contribution to oscillations from an AEMO central system (in a form nominated by AEMO)

CT LAB propose the use of reprogrammable measurement platforms that can adapt and grow with ever changing system needs and not to specifically call for PMU devices – rather call for the ability to stream PMU data to meet AEMO’s need for synchrophasor data.

CT LAB also recommends that recording devices contain the ability to record diagnostic EMT and synchrophasor data with pre- and post-information during tripping events. This information will be valuable in the event of communication break-down between installations and AEMO and it will also support the case where it is not viable to stream PMU data back to AEMO. The EMT data also contains valuable information due to its broad bandwidth.

The MAS requires:

Where the plant, considering its reactive power range under S5.2.5.1, can change the voltage at the connection point, for system normal or planned outage conditions, by more than 1%,

- ***The plant must have capability to detect an oscillation of voltage, reactive power and, where relevant, active power***
- ***For asynchronous production systems a process agreed with the NSP and AEMO to manage oscillations promptly***
- ***For synchronous production units and synchronous condensers a protection system to disconnect the plant for sustained pole slipping, if required by the NSP***

As per our response to AAS

If required by AEMO or the NSP, for production systems with active power capability 100 MW or greater and synchronous condensers 100 MVA a PMU, and capability to receive data on contribution to an oscillation in a form nominated by AEMO;

CT LAB propose the use of reprogrammable measurement platforms that can adapt and grow with ever changing system needs and not to specifically call for PMU devices – rather call for the ability to stream PMU data to meet AEMO’s need for synchrophasor data

Schedule 5.3a Conditions for connection of MNSPs

Issue	Schedule 5.3a (HVDC links) – feedback on revised recommendations and relevant draft NER amendments
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NER S5.3a.4 – Monitoring and control requirements

Remote monitoring and protection against instability	<p><i>Align remote monitoring and protection against inverter instability requirements for HVDC systems to the equivalent requirements for generating systems in NER S5.2.5.10.</i></p> <p>CT Lab Supports the alignment of remote monitoring and protection against inverter instability requirements for HVDC systems to the equivalent requirements for generating systems in NER S5.2.5.10. with consideration to our comments against NER S5.2.5.10.</p>
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Confidentiality disclaimer

Under clause 5.2.6A(d)(2), AEMO is required to publish all submissions received about this Review on its website. Please identify any part of your submission that is confidential, which you do not wish to be published. Please note that if material identified as confidential cannot be shared and validated with other interested persons, then it may be accorded less weight in AEMO’s decision-making process than published material. AEMO prefers that submissions be forwarded in electronic format.