

AEMO REVIEW OF TECHNICAL REQUIREMENTS FOR CONNECTION – ADDENDUM TO DRAFT REPORT

23 MAY 2023

INTRODUCTION

The Energy Users' Association of Australia (EUAA) is the peak body representing Australian commercial and industrial energy users. Our membership covers a broad cross section of the Australian economy including significant retail, manufacturing, building materials and food processing industries. Combined our members employ over 1 million Australians, pay billions in energy bills every year and in many cases are exposed to the fluctuations and challenges of international trade.

Thank you for the opportunity to make a submission under the Review of Technical Requirements for Connection – Addendum to Draft Report.

The EUAA understands that AEMO is concerned with potential positive feedback loop contingency events, whereby a disturbance happens in the electricity network which triggers some loads to trip, further exacerbating the disturbance and causing additional loads to trip. We further understand through consultation with AEMO, that AEMO are specifically concerned about inverter-based loads (IBL) where they believe the above risk is far more likely to occur, and in areas where there are numerous IBL that could potentially trip.

The proposed rule change as we understand it will require all consumers that meet the proposed new load definitions to perform system strength impact assessments (modelling), requiring engagement of Power Systems Engineers. Our understanding is that many traditional industrial loads will be captured by the proposed new load definitions and be required to undertake modelling. This would impose yet another energy related cost onto Australian industries in an environment where cost increases are all too frequent,

It is the EUAA's view that a targeted rule change aimed at the particular risks identified by AEMO in relation to IBL is a better option than a rule change that captures many industrial loads which have proven over time to be of no issue.

While the EUAA supports the non-retrospective nature of the proposed rule change, EUAA recommends that AEMO needs to define when changes to existing loads would be captured by the proposed rule change. For example, would a change in network capacity/connection agreement with the NSP trigger the proposed rule, or would a change in equipment type behind the meter (with no change to connection agreement or load requirements from the network) trigger the proposed rule? EUAA's view is that the proposed rule should only apply when there is a "material" change to the operations of the load, for example, a complete change in industry or type, order of magnitude change in scale, or change which would require a new connection agreement with the NSP. Minor, or even moderate changes, to a load should not trigger the proposed rule. Similarly, if a site is significantly expanding requiring a new supply point and connection agreement, the existing plant should remain exempt from the proposed rule change.

In circumstances where modelling is required as part of the proposed rule change, the EUAA does not support the notion that this modelling should be completed by the customer. In the vast majority of cases load customers do not have expertise in electricity networks and system designs, and NSPs are far better suited to carry out this modelling work on an as needs basis.

The EUAA also considers that a better approach to the current proposed rule change is to develop or modify Australian Standards loads of concern. To draw parallels, AS/NZS 5033:2021, Installation and safety requirements for photovoltaic (PV) arrays and AS/NZS 4777.2:2020 Inverter Requirements have worked efficiently for roof-top solar on households and small commercial facilities and have been updated as issues have arisen, including safety concerns, minimum standards for inverters and standard settings for each jurisdiction.

Existing standard AS/NZ 61800 covers “Adjustable speed electrical power drive systems” includes requirements for voltage and frequency immunity. If this standard is not adequate, AEMO should consider having the standard revised.

AEMO should also consider if a satisfactory outcome can be achieved via modifications to existing standards such as AS/NZ 62040 for “Uninterruptible power systems” and AS/NZ 22734 “Hydrogen generators using water electrolysis – Industrial, commercial, and residential applications”, which seem directly related to AEMO’s major concern.

An added benefit of using Australian Standards as a mechanism for change is that they can also be adopted for smaller installations, avoiding the need to set a threshold while also ensuring that existing equipment is not subject to retrospective changes.

The EUAA supports proposed rule changes where evidence points to an issue and the proposed rule change clearly leads to improved efficiency of markets and/or improved system security and where the costs and risks are appropriately allocated to those best able to manage them. In the case of this rule change proposal, some of the proposed thresholds do not appear to have adequate evidence to support AEMO’s proposals, and some of the AEMO’s proposals shift risk from the NSPs to the consumers. The EUAA does not support approaches that lack evidence or require consumers to perform activities best managed by the NSP’s, e.g. consumers do not have the Power Systems Engineers required to perform some of the tasks set out on the proposed rule change.

Definitions

AEMO is proposing to create new definitions for consumers, being Single Facility Load (>5MW), Large Single Facility IBL (>30MW of IBL irrespective of total load) and Large Single Facility Load (>200MW), with trigger levels for when they will be required to meet this proposed rule change at the point of a network connection application.

AEMO should consider the practicalities and scope of these proposed thresholds for facilities that are not comprised of modular mono-technology systems.

Many large industrial sites that are involved in material processing, manufacturing or mining have extensive onsite distribution networks and loads that will, in aggregate, meet these thresholds. However, they are often comprised of many hundreds or thousands of different individual loads from various suppliers and vary in size, function and capability. Additionally, these sites are rarely static and are often subject to continuous ongoing change due to operational requirements. Some examples of constant change that these changes may complicate include electrical reconfiguration due to onsite network switching, replacement of equipment (with like-for-like not always possible or desirable) or equipment relocation.

While AEMO's proposed requirements and thresholds may be practical for application to datacentres and H2 facilities that consist of many identical modular, mono-technology systems, the application of the same requirements to facilities that are more complex may have unintended consequences.

Inverter-Based Load

The current definition of Inverter-Based Load in the NER is not clear and may be misinterpreted by consumers. EUAA understands that it is AEMO's intention to include rectifiers, variable frequency and variable speed drives etc in the current proposed rule change. EUAA recommends that AEMO re-write the definition to be clear and not open to interpretation or "grey" areas. Should new technologies be created in the future, the definition can be updated as required.

Single Facility Load (>5MW)

AEMO has not demonstrated the need for loads between 5MW and 30MW to be required to meet the proposed rule change.

The EUAA believes that the 5MW threshold for a facility to be required to have Minimum Access Standards and system strength impact assessments is too low. Requiring such small loads to perform system strength impact assessments is unnecessarily onerous for the impacted consumer, the NSP and AEMO. EUAA members agree that the 5MW threshold is far too low.

AEMO advised in meetings that the thresholds were chosen to align with existing generator connection thresholds. This is inappropriate as it does not take into account the likely size of the impact of the potential system security events that concern AEMO. In addition, the current generator thresholds existed prior to inverter-based generation joining the NEM.

EUAA suggests that AEMO obtains and provides evidence for the potential system security impacts for the thresholds for each definition, rather than aligning the thresholds with the existing generator thresholds.

Large Single Facility IBL (>30MW of IBL)

AEMO has provided circumstantial evidence for the 30MW IBL threshold, however, EUAA understands that IBL is the major concern for AEMO, particularly with large hydrogen electrolyzers (>50MW) within hydrogen precincts.

Many of EUAA's members have in excess of 30MW of IBL, and to their knowledge, have not been part of, or caused a feedback loop contingency event or created system security issues. EUAA members believe that the evidence will suggest a threshold of 50-100MW of IBL, which would be more practical, manageable by all electricity participants and would resolve the issues highlighted in AEMO's thesis.

The EUAA recommends that AEMO obtains and provides evidence for the potential system security events created by IBL to justify setting an IBL threshold at 30MW (or some other level), and not set the thresholds in alignment with the generator connection thresholds (which existed pre-inverter-based generation).

Large Single Facility Load (>200MW)

AEMO has not demonstrated the need for traditional loads greater than 200MW and having less than 30MW IBL (or other level of IBL) to be required to meet the requirements of the proposed rule change.

Many of EUAA's members have in excess of 200MW loads, and to their knowledge, have not caused system security events and have little knowledge of system security events that their facilities have "ridden through" unless they have been contacted directly by AEMO or their NSP when a credible or non-credible contingency event has been predicted.

Without the evidence of system security issues caused by non-ride through of the contingency events, either by AEMO or consumers, it is impossible to comment on whether 200MW is the correct threshold.

The EUAA agree with its members' assertions that Large Single Load Facilities with traditional loads should not be included in the new load connection requirements. This aligns with AEMO's thesis that large juxtaposed IBL are the major concern.

The EUAA recommends that AEMO obtains and provides evidence for including traditional loads in the current proposed rule change rather than including these loads because they align with the current thresholds for generator connections.

Treatment of different load technologies

The EUAA considers that the proposed solution to a problem identified should be targeted to the problem based on the evidence of the problem, and not a generic solution that imposes unnecessary time and cost requirements on other NEM participants. During consultation, AEMO highlighted IBL as their primary concern and in particular when large hydrogen electrolyzers (>50MW) that are juxtaposed cause a positive feedback contingency event.

EUAA recommends that if large IBL is AEMO's concern, then large IBL should be the target of the proposed rule change. EUAA members' support this approach.

Continuous Uninterrupted Operations and Uninterruptable Power Supply

AEMO has not demonstrated the need to have active power thresholds (or otherwise) in either CUO or UPS systems for all of the defined load types.

EUAA recommends that AEMO obtains and provides evidence for the inclusion of CUO requirements and UPS in each of the proposed defined load types prior to their inclusion.

Technical Requirements

Operation of large loads

In developing Automatic Access Standards (AAS) and Minimum Access Standards (MAS) for frequency disturbances, contingency events and voltage disturbances, AEMO needs to ensure that currently available equipment and existing in-use equipment can meet the requirements as well as ensuring that the requirements are not onerous. This should be evidence based and not set using arbitrary theoretical limits.

EUAA can see two scenarios occurring:

- A new greenfields site is proposed that is required to meet the standards and a piece of equipment is unable to meet the standards, thus losing the investment.
- An existing brownfields site triggers the proposed rule change through an upgrade/expansion to the site and is unable to meet the standard across the whole site due to existing equipment failing to meet the standard.

EUAA and its members point out that, while there exists a requirement in the NEM for all participants to ensure system security, industrial participants are not well placed to manage the system security. Generators, NSPs and AEMO are far better placed to manage system security as they have the necessary expertise and the knowledge and experience of the local network, broader network and entire network functionality and operations that the industrial participants are not reasonably expected to understand.

Likewise, it is unrealistic to expect industrial participants to develop electrical models of their sites' interaction with the existing grid for connection. The existing process for consumers is that NSPs collect data on equipment and likely utilisation as part of a connection application process and carry out the necessary network modelling as appropriate. This is then billed back to the applicant as part of the connection cost. This is an efficient approach as the NSP has a fixed price and knows the particular nuances of their network, allowing them to automatically include these in the model.

If the consumer is required to have the modelling performed (as generators currently do), EUAA can see inefficiencies and unknown extra costs mounting for the consumer. The EUAA is aware that this already occurs with generators (who have a much better grasp on Power Systems Engineering) with a third-party model being managed by the generator, and with frequent checks by the NSP and corrections required to match the particular network nuances. This process often requires up to 8-10 iterations before the model is acceptable to the NSP, whereas the models built by the NSP usually require 2-3 iterations. With consumers managing a third-party to develop a model, it is likely to take more iterations than the generators take as it is unrealistic to expect consumers to employ a full-time connections expert to manage the process

EUAA members agree that meeting AAS and MAS requirements will increase costs due to limited equipment suppliers and limited Power Systems Engineers capable of performing the modelling. EUAA and its members agree that the inclusion of all traditional large loads in the proposed rule change will result in the consumers delaying or foregoing future investment due to unknown cost and time requirements of meeting the standards.

AEMO's argument that the costs will be offset through fewer disturbances does not appear credible and was not supported through an evidence-based approach, but rather a theoretically hypothetical approach. AEMO also did not provide estimates of the savings, nor the costs of meeting the AAS or MAS.

Concluding Remarks

EUAA and its members are concerned about the unknown financial impact and the appropriateness of applying the proposed rule to large consumers, who are both the electricity system user and the equipment user, i.e. having little-to-no control over either the electricity system nor the equipment they require.

With many of EUAA's members requiring updates to their sites through the Commonwealth Government's Safeguard Mechanism, the EUAA would be very concerned if AEMO's proposed rule change impacted the viability

of those upgrades by triggering AAS or MAS requirements on the existing sites, potentially leading to those companies withdrawing from those sites and/or Australia.

As mentioned in the Introduction, an alternative approach to the proposed rule change for large loads, is the development of an Australian Standard requiring equipment manufacturers to meet that Australian Standard. This will see the equipment manufacturers ensure their equipment meets the Standard and thus reducing impacts on system security, as has been observed in the responses to AS/NZS 5033:2021 and AS/NZS 4777.2:2020.

It is unreasonable to expect equipment manufacturers to read the NER to ascertain if their equipment complies, even though the equipment manufacturers are best placed to ensure that equipment they produce does not impact system security. EUAA would be supportive of the development of an appropriate Australian Standard for IBL.

In developing an Australian Standard for IBL, AEMO can ensure that all requirements for system security are met to the best of the ability of the equipment manufacturers, enabling AEMO to better manage IBL and system security into the future when it is expected that higher percentages of loads are afforded through IBL.

As raised in the introduction to this submission, the EUAA maintains that rule changes should only be made to improve the efficiency of the electricity market, improve system security and to clarify the allocation of cost and risks to those best able to manage them. While consumers are becoming more involved in energy markets it is in many cases by necessity rather than choice and is a step away from their core business. We would be very concerned if customers were inadvertently and unfairly required to behave as generators or networks under these proposed rule changes.

Do not hesitate to be in contact should you have any questions.



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