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Australian Energy Market Commission

Level 15, 60 Castlereagh Street

Sydney NSW 2000

Submitted electronically via submissions@aemc.gov.au

Re: Submission to the AEMC Rule Change Request: Improving the NEM Access Standards - Package 2

Introduction

Antora Energy (Antora) welcomes the opportunity to submit comments on the AEMC's Rule Change Request: Improving the NEM Access Standards - Package 2. Antora manufactures and deploys electric thermal energy storage (eTES) systems that provide on-demand heat to industrial customers by heating graphite blocks above 2,000°C, storing thermal energy for multiple days. eTES systems have low load factors and charge three or more times at their discharge rate, allowing them to charge only during hours of low-value grid electricity, typically during periods of surplus renewable generation, and can be rapidly curtailed during grid stress or system peaks. This makes eTES a fundamentally different category of large load from inverter-based large loads, with verifiably different grid cost impacts.

Antora submits these comments to assist the Commission in ensuring that the draft rule's classification and access standards framework is technically accurate and does not inadvertently capture load technologies that do not present the system security risks the rule is designed to address. In particular, Antora supports the Commission's objective of targeting regulatory obligations proportionately to actual technical risk.

Summary of Recommendations

Antora makes the following recommendations to the Commission:

- **Recommendation 1:** Confirm that resistive thermal storage loads are not inverter-based loads (IBLs) and are therefore not subject to the new IBL-specific access standards under the draft rule, consistent with the Commission's stated intent to target reform where the technical risk profile warrants it.
- **Recommendation 2:** Affirm that the tiered IBL classification framework, specifically the short circuit ratio (SCR) requirement, applies only to loads that use power electronic converters in their grid-facing interface, not to loads that are purely resistive in nature.
- **Recommendation 3:** Support and strengthen the fast ramp-down provision for under-frequency load shedding (UFLS), and recognise that eTES systems represent a particularly capable and reliable implementation of this mechanism that should be explicitly encouraged within the access standards framework.

- **Recommendation 4:** Ensure the tiering criteria are defined by reference to actual grid interaction characteristics, specifically the use of power electronic converters, rather than load size alone, so that the proportionality principle is applied consistently.

The System Security Risks Identified in the Draft Determination

The draft determination identifies the following key risks associated with large IBLs:

- **Rapid disconnection during disturbances:** Large IBLs connect to the grid through actively controlled power electronic converters whose behaviour during voltage and frequency disturbances is governed by software and control systems. These converters can rapidly reduce or cease demand during disturbances, worsening system events and increasing the risk of cascading outages or system black events.
- **Dynamic interaction with system strength:** IBLs contribute limited fault current and can interact dynamically with system strength in ways that are not well-characterised under the existing NER framework. In weaker grid conditions this can destabilise voltage and frequency control.
- **Instability risk:** The aggregate behaviour of multiple large IBLs, each responding to the same disturbance signal via software-governed converters, can cause or amplify instability, potentially leading to plant disconnections and system black events.

The Commission explicitly distinguishes IBLs from traditional industrial loads in paragraph 25 of the draft determination, noting that facilities such as mines, refineries, and processing plants "typically comprise heterogeneous motors and resistive processes that largely follow prevailing grid conditions and exhibit more predictable electrical behaviour." Antora's eTES technology falls within this characterisation.

How Antora's eTES Technology Differs from Inverter-Based Loads

The critical question for the Commission's framework is not simply whether a load is large, but whether it exhibits the control-driven, grid-interactive characteristics that give rise to the risks described above. eTES has several key performance characteristics that make it distinct from most other large loads and IBLs:

- **Resistive grid interface, not converter-based.** eTES systems charge via resistive heating elements. The grid-facing interface is a resistive load with no actively controlled inverter or converter. The software-controlled disconnection and modulation behaviour that drives IBL system security risks is therefore absent, and eTES exhibits the same predictable electrical behaviour the Commission attributes to traditional industrial loads.
- **Favourable disturbance behaviour.** Since the carbon block's thermal storage sustains industrial heat output for hours or days without continuous charging, eTES can absorb a charging interruption without operational impact on the end customer. Rather than disconnecting and worsening a disturbance, eTES is inherently tolerant of grid events and can provide fast, deep demand reduction as a positive contribution to system management.
- **Fast ramp-down as a system asset.** eTES charging load can be reduced to zero in a controlled and recoverable manner in response to an external operator signal. This is a designed and verifiable capability that provides exactly the fast flexible demand

response the Commission's fast ramp-down UFLS provision seeks to enable and should be explicitly recognised as such in the framework.

Recommended Approach to the Classification Framework

To ensure the framework is applied accurately, Antora recommends the Commission provide the following clarifications in the final determination:

- **The definition of "inverter-based load"** should refer to loads whose grid-facing interface uses actively controlled power electronic converters. Loads with a purely resistive grid-facing interface are not IBLs.
- **The IBL classification** should be determined by the nature of the grid-facing electrical interface, not the technology used downstream, so that thermal storage systems charged via resistive elements are correctly treated as non-IBLs.
- **SCR requirements and IBL-specific performance obligations** should not apply to non-IBL loads by default, consistent with the draft rule's intent to target obligations proportionately. eTES charging is resistive and does not use power electronic converters, meaning it does not present the system strength risks that drive the SCR requirement, regardless of nameplate MW rating. These clarifications would strengthen the framework, ensuring regulatory burden is directed accurately at the loads that present the risks it is designed to manage.

Conclusion

Australia's electricity system is undergoing a rapid structural transformation. The integration of large volumes of renewable generation has created a system in which renewable generation curtailment, grid congestion, and coincident peak costs are all growing simultaneously. The emergence of large inverter-based loads adds genuine and well-documented system security risks that the Commission is right to address.

Antora supports the Commission's objectives and the proportionality principle underpinning the draft rule. eTES technology, which is resistive, predictable, highly controllable, and rapidly curtailable, represents a different class of large load that should be recognised as such. Antora respectfully urges the Commission to confirm this distinction in the final rule, and to ensure the framework actively encourages the connection of flexible thermal storage that can contribute positively to system security and the energy transition.

We welcome the opportunity to discuss this submission further.

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