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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 Pricing Review — Electricity Pricing for a Consumer-Driven Future**

Introduction

Antora Energy (Antora) and Rondo Energy (Rondo) welcome the opportunity to submit these comments to the Australian Energy Market Commission's Pricing Review: Electricity Pricing for a Consumer-Driven Future. Antora and Rondo manufacture and deploy electric thermal energy storage (eTES) systems that provide on-demand heat to industrial customers. eTES systems charge from intermittently available low-value hours of electricity provided from the grid (typically correlated with surplus renewable generation) or via direct-connection to a renewable energy project. Antora's technology uses graphite blocks heated to above 2,000°C, and Rondo's technology uses bricks that can be heated to 1,500°C - each to store thermal energy for multiple days. The rapid charging and long storage durations enable flexible industrial energy use, displacing on-site continuous fossil fuel combustion with the hours of electricity that are cleanest and cheapest.

Current commercially available technology enables industrial facilities to electrify process heat up to ~350° C, which constitutes more than 10% of final energy consumption in Australia.[1] eTES technology to serve higher temperature process heat demand is currently under development for deployment in the coming years.

eTES systems are highly flexible, low load factor loads. They charge exclusively during low-price, high-generation periods, avoid system peaks and can be instantaneously curtailed at the network operator's request. In this respect, eTES represents a category of load whose grid cost impacts are fundamentally and verifiably different from those of inflexible industrial loads. Under prevailing network tariff structures, these two categories are treated as economically equivalent even though they are not; eTES has the ability to provide a range of network benefits that are largely masked by the lack of rate structures that incentivise moving consumption away from system peaks and high congestion hours.

This submission argues that the efficiency principles set out in the Commission's draft report, together with the AER's call for tariffs that align with the opportunity presented by large, flexible

[1] ITP Thermal, The Australian Industrial Process Heat Market – Towards Zero Emissions, prepared for CSIRO, April 2025, available at https://www.solarpaces.org/wp-content/uploads/2025/04/Australian-Industrial-Process-Heat-Market-CSIRO-ITP.pdf.

industrial loads,[2] point to a clear necessity for reform. Network tariff structures should explicitly recognise and reward highly flexible loads, including eTES and other industrial demand that is fully curtailable, avoids peak periods, and can absorb renewable curtailment by applying transparent network charges that reflect the materially lower network costs these loads impose.

Summary of Recommendations

Antora and Rondo make the following recommendations to the Commission:

- **Recommendation 1:** Establish a formal "highly flexible and curtailable load" classification in network tariff frameworks, noted here as the "Highly Flexible Load" classification. The Australian Energy Regulator (AER) should develop and publish, under the mandate of the AEMC, a standard set of qualifying criteria for highly flexible load status, including: (a) technical curtailability; (b) technical ability to avoid peaks; and (c) charging behaviour concentrated in high supply hours and in hours not affected by local network congestion, as evidenced by the absence of binding local transmission constraints (or other AER-specified congestion indicators), assessed over an annual period.
- **Recommendation 2:** The AEMC should amend the National Electricity Rules (NER) to ensure that flexible connection agreements include transparent network charges that fairly reflect the congestion benefits delivered by the flexibility offered. These rules should require that tariff structure statements developed by Distribution Network Service Providers (DNSPs) and Transmission Pricing Methodologies developed by Transmission Network Service Providers (TNSPs) include specific tariff offerings for highly flexible customers that reflect the low network costs these loads impose, including appropriately lower charges for consumption that occurs in designated off-peak windows or for consumption that is allowed to be curtailed by the network service provider at their election.

Section 1: The Distinctive Grid Cost Profile of Highly Flexible Loads

1.1 What drives network costs

Network infrastructure is sized to meet maximum coincident demand, which is the peak level of simultaneous load across the network. A consumer who draws power at the system peak forces network investment to accommodate that draw. A consumer who draws the same total volume of energy, but exclusively outside peak periods, imposes little or no incremental infrastructure cost. The network capacity needed to serve that load already exists at the times it is used. The same network with no new investment can deliver more GWhs of energy by increasing energy flows during times when the network is only partially utilised, thus increasing utilisation of the existing network assets.

The Commission's draft report correctly identifies this principle: use efficient and effective network tariffs to create opportunities for load behavior that promotes grid benefits and to

[2] Australian Energy Regulator, Submission to AEMC Pricing Review — Electricity Pricing for a Consumer-Driven Future, 20 December 2024, available at https://www.aer.gov.au/publications/reports/submissions/aemc-review-electricity-pricing-consumer-driven-future.

ensure accurate and fair sharing of costs.[3] The primary driver of network costs is the coincident peak. Tariffs that do not distinguish between peak and off-peak consumption, including flat volumetric or demand charges based on a contract demand value or non-coincident site peak capacity, systematically misallocate network costs, requiring off-peak consumers (who impose low costs) to cross-subsidise peak consumers (who impose high costs). Customers that consume electricity only during low demand/high generation periods can lower total system costs by increasing utilisation of variable renewable energy generation assets and reducing both economic and congestion-driven curtailment of those assets. Unless transmission and distribution rates are designed to reflect these benefits, these flexible users will be unfairly penalised and grid assets will remain underutilised.

1.2 How highly flexible loads differ

Highly flexible loads differ from conventional industrial loads in three specific respects that determine their network cost profile:

- **Peak avoidance:** Highly flexible loads can avoid consumption during system peak periods and can operate under firm operator control that prevents such consumption. eTES systems are designed with a heat reservoir that decouples electricity consumption from heat delivery. The eTES system draws power when demand is low, the grid has surplus generation available, and when the network is underutilised. It can curtail and avoid consumption when the network is strained.
- **Curtailability:** Highly flexible loads are technically capable of reducing consumption to zero within the five-minute dispatch trading interval independently or at the network operator's instruction. This means that in the event of unexpected system stress, the load imposes no reliability obligation on the network and can be removed from the grid on demand. This is a materially different risk profile from an inflexible load that cannot be reduced on demand or at all without causing significant operating costs and risks to its facility.
- **Curtailment absorption:** Highly flexible loads consume electricity during periods of surplus renewable generation which have historically been hours where renewable generators are incentivised to economically curtail based on unattractive regional reference price (RRP) trading intervals and face reliability curtailment based on network constraints. By consuming otherwise curtailed energy, highly flexible loads reduce curtailment of renewable generation assets, improve network utilisation at off-peak times, and support the financial viability of renewable generation. It is therefore apparent that eTES deployment provides direct grid network asset and system benefits well beyond the notion that it just helps to avoid costly infrastructure buildout and network strain.

1.3 The scale of Australia's curtailment problem

The grid context makes the case for recognising the unique value of highly flexible loads more urgent than it may have appeared even just five years ago. AEMO's own data shows that several utility-scale solar plants in the NEM experienced curtailment exceeding 25% in 2024,

[3] AEMC, The Pricing Review — Electricity Pricing for a Consumer-Driven Future: Draft Report, 11 December 2025 (AEMC Pricing Review Draft Report).

with network-driven curtailment averaging 4.5% across solar generation.[4] AEMO has forecasted that curtailment levels will continue rising in the near term,[5] reflecting the mismatch between renewable capacity additions and transmission infrastructure development. This curtailment concern is especially important at a time where the anticipated phased closures of multiple coal plants across the NEM puts greater focus on the ability of renewable generation projects to successfully deliver reliable electricity generation to new and existing customers.

Each megawatt-hour of eTES charging during a curtailment event represents energy that would otherwise have been wasted. This is a direct reduction in system operating costs that benefits all network users. Tariff structures should reflect this benefit. Instead, current structures impose volumetric charges on curtailment-absorbing loads that are indistinguishable from charges on loads that cause or exacerbate network stress.

Section 2: eTES Flexibility and Grid Benefits

2.1 Technology overview

Electric thermal energy storage (eTES) converts electricity to usable heat stored in a solid medium such as carbon blocks or bricks, and releases that heat on demand to industrial processes, replacing combustion of natural gas, coal, or other fossil fuels. The key operating characteristic relevant to network tariff design is the complete decoupling of electricity consumption from heat delivery: the heat storage reservoir can be charged during short windows of low-price electricity (e.g., 4-8 hours per day, not necessarily consecutive) and can provide can dispatch heat continuously for tens of hours without charging.

This decoupling means eTES can be programmed to charge only when network conditions are favourable. This includes charging during periods of renewable curtailment in addition to low-price midday or overnight windows. The dispatch control can be configured to zero consumption within a single dispatch interval, making it fully curtailable at the instruction of AEMO or the network operator.

2.2 Grid benefits

An eTES installation serving an industrial facility provides the following verifiable grid services, each of which reduces network costs borne by all users:

- **Peak demand reduction:** Network reinforcement is driven predominantly by electricity consumption during the coincident system peak. An eTES system can be operated to draw zero power during high system demand periods. This represents significant avoided network capex compared to the grid infrastructure investment required to electrify these heat loads with firm baseload electrification solutions such as electric boilers.
- **Renewable generation asset curtailment absorption:** An eTES charging during a renewable generation asset curtailment event can absorb (depending on the size of the system) hundreds of MWh per event. With renewable curtailment events occurring with increasing frequency across the NEM, the aggregate curtailment absorption across a fleet of eTES installations represents a material reduction in system operating costs.

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[4] AEMO, Enhanced Locational Information (ELI) Report 2025, available at https://www.aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/enhanced-locational-information/2025/2025-enhanced-locational-information-report.pdf.

[5] See AEMO ELI Report, footnote 4.

- **Increased Grid Revenues:** By electrifying industrial process heat, eTES brings additional energy consumption and associated revenues to the electric grid with minimal impact on new infrastructure buildout requirements and thus minimal system risk and cost.
- **Reliability reserve:** Full eTES curtailability within a single dispatch interval provides AEMO, TNSPs, and DNSPs with a reliable demand reduction resource. Unlike voluntary demand response programs, eTES curtailability can be contractually committed under flexible connection agreements, providing firm capacity relief. This provides an additional safety net for system reliability before an emergency event is called.

2.3 The tariff barrier

Despite these benefits, eTES installations currently face the same network charges as inflexible industrial loads of equivalent peak capacity. Under a flat volumetric tariff with rates based on total utilisation and non-coincident peak consumption, an eTES system that consumes exclusively during off-peak periods pays the same total network charge per MWh as an equivalently sized inflexible load that consumes energy during system peaks. This is economically irrational: the former imposes near-zero network costs; the latter drives network investment.

The result is a significant barrier to industrial electrification. The business case for replacing fossil fuel combustion with eTES depends on the total delivered cost of electricity, including network charges. When network charges are set without reference to the timing or controllability of consumption, they become an inappropriately allocated cost burden that prevents industrial facilities from deploying eTES systems. Additionally, it directly prevents all highly flexible electrical loads from deploying and benefiting the electricity system in the NEM.

Section 3: The Efficiency and Policy Case for Tariff Reform for Highly Flexible Loads

3.1 Consistency with the Commission's efficiency framework

The Commission's draft report states that the Pricing Review aims to ensure network tariffs are "efficient and effective" and provide more equitable cost-sharing among consumers.[6] Efficiency in network tariff design requires that each user pay for the costs they impose and not the costs they do not impose. A user who imposes near-zero coincident peak costs should transparently pay near-zero peak-related charges. A user who provides verifiable grid services including curtailment absorption and reliability reserve should see that value reflected in their tariff obligations, with the recognition that making transmission and distribution rates more competitive for electrification will support faster industry adoption and greater grid revenues, with minimal impacts to infrastructure requirements.

The Commission has also noted the importance of tariffs that support demand-side flexibility alongside the AER's submission that explicitly called for better alignment of pricing signals to support large flexible industrial loads.[7] Tariff reform that recognises the unique characteristics of highly flexible loads can translate these objectives into concrete market outcomes: if flexible loads receive appropriately lower network charges in alignment with their consumption profile, eTES systems will deploy and operate as fully flexible loads, producing the orchestrated flexibility the AER identified as beneficial to the network.

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[6] See AEMC Pricing Review Draft Report, footnote 3.
[7] See AER Submission, footnote 2.

3.2 Consistency with existing regulatory direction

The case for flexible load tariff reform is not a departure from existing Australian regulatory policy, rather it is a logical extension of it:

- The AEMC's December 2024 final rule on Integrating price-responsive resources into the NEM created the "dispatch mode" framework, allowing currently unscheduled price-responsive resources (including flexible load) to be scheduled and dispatched, bid into the spot market, and access scheduled services such as regulation FCAS.[8] This reform treats flexible loads as a valuable source of system strength in the wholesale market. Network tariff reform should follow the same logic: if a load is valued for providing system benefits in wholesale markets, it should not be penalised in network tariffs by facing costs that it does not cause.
- AEMO's Integrated System Plan identifies a need for 49 GW / 646 GWh of dispatchable storage by 2050[9], a quantity unlikely to be met by large-scale BESS alone. Industrial-scale flexible loads that function equivalently to storage (absorbing surplus generation and avoiding peaks) must form part of Australia's flexibility portfolio. Network tariffs that create barriers to flexible load deployment directly impede this planning objective.
- The Australian Government's Safeguard Mechanism allows for industrial electrification as an abatement strategy to reduce industrial Scope 1 emissions.[10] eTES is a direct electrification technology for industrial heat that can be widely applied across multiple sectors. Further, eTES electrifies industrial heat with electricity consumption concentrated during low-price hours which occur at times correlated to high renewable generation. The electricity used therefore has far lower (often zero) marginal emissions intensity compared to the average electricity grid emissions intensity. Barriers to eTES deployment are therefore barriers to Safeguard Mechanism Scope 1 and 2 compliance, resulting in a cost imposed on industry by a regulatory inconsistency rather than a genuine economic constraint.

3.3 Addressing cost allocation concerns

A standard concern with reduced charges for any class of electricity load is that additional costs may need to be recovered from remaining consumers. Antora and Rondo acknowledge this concern but note two key factors that address this concern in the case of reduced network charges for eTES and other highly flexible loads:

First, a customer with a coincident-peak load of zero does not cause the costly network investment required to serve new on-peak load, as on-peak load is what predominantly drives network investment. Appropriately reduced charges for an off-peak-only customer do not reduce revenue for the network, rather any such new off-peak-only customer increases

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[8] AEMC, National Electricity Amendment (Integrating price-responsive resources into the NEM) Rule 2024, Final Determination, 19 December 2024, available at https://www.aemc.gov.au/rule-changes/integrating-price-responsive-resources-nem.

[9] AEMO, 2024 Integrated System Plan (ISP), June 2024, available at https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp. The 49 GW / 646 GWh figure is from the Step Change scenario, which underpins Australia's 43% emissions reduction commitment by 2030.

[10] Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW), Safeguard Mechanism, available at https://www.dcceew.gov.au/climate-change/emissions-reporting/national-greenhouse-energy-reporting-scheme/safeguard-mechanism/overview.

revenue to the network (for any network charge amount that is greater than zero) with no additional peak driven costs to the network.

Second, the long-run effect of a transparent, appropriately-priced tariff for highly flexible loads is system cost reduction for all customers. As more industrial loads adopt flexible electrical solutions in response to network operator and price signals encouraging consumption away from system peaks, network utilisation increases (more GWh is served on the same network because load that would otherwise consume during peak hours has instead shifted consumption to hours of low demand) and renewable curtailment decreases. The reduction in network cost per MWh benefits all consumers through lower aggregate charges over time. The efficiency argument is not a trade-off between new highly flexible customers and other customers, it is an argument that the current tariff structure causes excess total system cost on flexible customers. This therefore keeps flexible loads out of the system, resulting in underutilised network assets and associated costs that fall on all customers, regardless of their consumption profile and associated risk to the grid system.

Section 4: Specific Recommendations

Recommendation 1: Establish a Highly Flexible Load Classification

The Commission should implement a new rule under the National Electric Rules (NER) to enable the AER to develop and publish qualifying criteria for a Highly Flexible Load classification. We propose the following indicative criteria:

Proposed Highly Flexible Load Qualifying Criteria

- **Curtailability:** Demonstrated capability for curtailment: (i) in response to market signals (automated price/dispatch response) and (ii) under network operating requirements (e.g., during defined peak/event windows).
- **System Peak Avoidance:** Demonstrated ability and commitment to reduce consumption during designated system peaks (high congestion/demand) periods where events are triggered and notified under a published methodology (e.g., DNSP/TNSP peak windows or event-based declarations) and assessed annually.
- **Charging Concentration:** Consumption occurs predominantly during the lowest-price third of trading intervals, measured using the AEMO-published Regional Reference Price (RRP) for the relevant NEM region.
- **Monitoring and Compliance:** Interval metering, with metering data made available to the relevant network service provider(s) and to the AER for compliance purposes, subject to existing data access/consent frameworks. In the case of a flexible load being part of an industrial customer's broader site load behind a single meter point, the load should be able to classify and be monitored via sub-metering.

Recommendation 2: Amend the National National Electricity Rules (NER) to require Highly Flexible Load tariff offerings effective at the next practical regulatory period

Network tariff treatment of flexible loads currently varies across jurisdictions, creating investment uncertainty for industrial operators considering eTES or other flexible load technologies across multiple sites in different states. A NEM-wide framework for flexible load classification and tariff treatment developed by the AER in response to Commission's NER rule change would provide the regulatory certainty needed to unlock investment at scale. We urge the Commission to frame its final recommendations as NER standards, specifically under NER Chapter 6A as it relates to TNSPs, not merely guidance to individual DNSPs and TNSPs.

The Commission should amend the tariff design objectives to require that each DNSP's Tariff Structure Statement (TSS) and each TNSP's Transmission Pricing Methodology include at least one specific tariff offering for classified "highly flexible load" customers. The tariff design for this offering should:

- Reflect the transparently allocated lower network charges for consumption that occurs during periods where the load has demonstrated curtailability commitment and off-peak charging behaviour; and
- Apply demand charges, if any, based on the coincident demand occurring during locational and/or system peak windows rather than a contract demand or (non-coincident) site maximum demand, such that a load that draws zero power during system peaks pays zero peak-related demand charges. This structure currently exists under transmission use of system (TUOS) structures as part of the locational rate component, however it is not widely adopted across NEM with transparent allocation to the coincident demand, rather a non-coincident maximum contract demand value.
- The Commission should ensure that flexible connection agreements carry with them an explicit entitlement to network charges commensurate with the flexibility being provided. A customer that accepts a flexible connection (committing to curtailment on the network operator's request) should receive, as a matter of right, a network charge reflecting the economic and congestion-relief value of that commitment.

Specific to distribution-level tariffs, these cost allocation decisions should be specified in the AER's distribution connection access model, not left to bilateral commercial negotiation.

The Commission should make clear that it expects Highly Flexible Load tariff offerings to be available to qualifying industrial customers beginning with the commencement of the next practical regulatory period (1 July, 2026 for Victorian networks, and applicable periods for other jurisdictions). The Victorian DNSPs' revised Tariff Structure Statements, currently under AER final determination, represent an immediate opportunity to implement this direction. The AER should be empowered to request supplementary TSS provisions from DNSPs where existing proposals do not adequately address the Highly Flexible Load customer category.

Conclusion

Australia's electricity system is undergoing the most rapid structural transformation since its earliest days. The integration of large volumes of renewable generation has created a system in which renewable generation asset curtailment, grid congestion, and coincident peak costs are all growing simultaneously; and in which the tools available to manage these challenges include, critically, the demand-side flexibility that technologies like eTES can provide.

Network tariff structures are among the most powerful tools in the regulator's kit for unlocking this flexibility. A customer that charges during curtailment events, avoids consuming power at high grid stress and system peak hours, and can be rapidly removed from the grid should face network charges that transparently reflect this beneficial cost profile. Recognition of flexibility and curtailability are appropriate applications of cost-reflective tariff principles that the Commission has itself endorsed.

Antora and Rondo respectfully urge the Commission to translate these principles into the specific, binding recommendations described above, and to ensure that the next scheduled distribution-level Tariff Structure Statement and transmission-level Transmission Pricing Methodology processes in each of the NEM regions deliver tangible tariff outcomes for highly flexible industrial loads.

We welcome the opportunity to discuss this submission in further detail.

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