

14 February 2024

NEM Review Secretariat
Australian Government
Department of Climate Change, Energy, the Environment and Water
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Submitted electronically

Submission on the NEM Wholesale Market Settings Review – Initial Consultation

Nexa Advisory welcomes the opportunity to provide a submission on the the National Electricity Market (NEM) wholesale market settings review (the Review), led by an independent expert panel and Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Nexa is a dedicated advisory firm focused on accelerating the clean energy transition in a way that provides secure, reliable, and affordable power for consumers of all types. Nexa Advisory is a team of experienced specialists in the energy market, policy and regulation design, stakeholder engagement, and advocacy. We work with public and private clients including renewable energy developers, investors and climate impact philanthropists to help them get Australia’s clean energy transition done.

The NEM Wholesale Market settings Review offers an important opportunity to address the evolving challenges in Australia’s energy sector. However, for this review to succeed, the problem to be solved must be clearly articulated and agreed on by the vast stakeholders involved, before any new mechanisms are introduced or recommended. Without clear definition of the issues being addressed, we risk proposed solutions being ineffective or misaligned with the long-term needs of the market - whether they concern the physical system or financial and contracts market.

Addressing the basics of the transition

Australia’s energy transition to date has been slow and disorderly¹². The two key overarching components of the transition which must be managed over the next decade are:

- ensuring timely firmed renewable and storage replacement capacity; and
- the orderly retirement of Australia’s ageing coal-fired generator fleet - uncertainty around coal retirements will remain one of the largest market risks over this period.

While recent market and policy developments have contributed to enabling new generation and storage, this replacement capacity is not coming online fast enough.

Policy and political uncertainty – driven by a lack of bipartisanship – remains the key risk for investment in renewable generation and storage. This has resulted in short-termism, policy

¹ Nexa Advisory, [Australia’s disorderly transition and coal retirement](#), May 2024

² Nexa Advisory, [Eraring can be closed on schedule](#), July 2023

instability and a lack of enduring policy or market signals, which undermine the long-term outcomes of the clean energy transition for investors and consumers.

For example, this disorderly transition has seen knee-jerk policy interventions which delay the closure of coal-fired power stations – exemplified by the deal between the New South Wales Government and Origin Energy to extend Eraring³ - due to perceived threats to reliability, and resulting in an upward trend in wholesale electricity prices due to the market volatility⁴ caused by planned and unplanned outages of the ageing power stations when they are needed most. These higher wholesale costs ultimately flow to the prices paid by consumers.⁵

Additionally, the lack of bipartisanship in energy policy has created uncertainty around whether key support mechanisms, such as the Capacity Investment Scheme (CIS), would be delivered in full. However, the recently passed⁶ *Electricity Infrastructure Legislation Amendment Bill 2025* provides certainty around the full delivery of the program and is a step in the right direction to minimise policy risks driven by an ongoing lack of bipartisanship.

While outside the scope of this Review, another key issue contributing to the slow transition is the ongoing delays to delivering new transmission projects⁷. The lack of national coordination and accountability for delivering nation-building transmission infrastructure remains a key challenge to the transition⁸. This failure to build transmission quickly enough reflects market structure and regulatory arrangements, rather than market design.

We consider that addressing the above challenges is a prerequisite to the recommendations discussed as part of this Review.

It is critical that this Review considers how the ‘basics’ of the transition can be addressed, ensuring coal-fired generation is closed on time to deliver efficient investment and maintain a stable and reliable system. We consider these can be implemented under the current market paradigm and may be best addressed through changes outside of the wholesale market.

The remainder of our submission details how the current energy-only market design can provide enduring market signals and certainty required for an orderly energy transition, when complemented by:

- a mechanism which ensures the reliability certainty to needed to advance the NEM to the post-coal era such as a strategic reserve;
- improved outcomes in the contracting markets, to support project financeability for firming technologies such as energy storage and batteries; and
- the role of demand side management and consumer energy markets (homes and businesses).

³ Nexa Advisory, [Media release on the NSW Government decision to extend Eraring coal power station](#), 23 May 2024

⁴ AER, [Wholesale electricity market performance report 2024](#), December 2024

⁵ AEMO, [Quarterly Energy Dynamics Q4 2024](#), January 2025

⁶ [Electricity Infrastructure Legislation Amendment Bill 2025 – Parliament of Australia](#)

⁷ Nexa Advisory, [We Plan and then Don't Build](#), May 2024

⁸ Nexa Advisory, [Supercharging Transmission Buildout](#), September 2024

We also refer to our recent paper on market design which outlines key recommendations needed for an orderly transition that provides long-term certainty, ensuring stability and minimising investment risks despite potential shifts in government priorities⁹.

South Australia exemplifies high VRE penetration under current market design

Australia has already seen strong uptake of solar PV – both small- and large-scale - and wind generation across the NEM. South Australia has successfully integrated high levels of variable renewable energy into its energy mix, demonstrating what can be achieved under the current market design. The state’s abundant renewable resources have supported instantaneous renewable penetration of 150 per cent and an average of above 70 per cent of demand¹⁰.

Key firming projects, such as the Hornsdale Power Reserve (HPR), which was the world’s largest lithium-ion battery upon its completion in 2017 at 100 MW / 129 MWh. HPR has operated under a hybrid model that meets the physical needs of the grid, while maintaining the ability to participate in the spot energy and Frequency Control Ancillary Service (FCAS) markets.

Through an agreement with the South Australian Government, HPR has provided critical system services like frequency control through participation in the System Integrity Protection Scheme (SIPS)¹¹. Separately, it participates in the spot market through energy arbitrage and FCAS. The asset was upgraded to 150 MW in 2020, to provide additional synthetic inertia capability¹².

This dual approach ensures that HPR contributes to system security while optimising its role in the spot market, demonstrating how storage assets can balance physical grid needs with market-driven operations. The innovative contracting arrangement of this asset exemplifies that with the right financial and incentive arrangements, storage assets can feasibly meet the needs of the physical system, while also contributing to efficient market outcomes in the wholesale market.

As South Australia has seen continued investment in renewable generation, the need for firming capacity has increased. The South Australian Government has recently introduced the Firm Energy Reliability Mechanism (FERM) to meet this need, aiming to secure dispatchable resources, such as large-scale battery storage and pumped hydro, to manage periods of high demand and low renewable output¹³. The FERM mechanism is designed to provide investment certainty by offering contracts (revenue ‘top-up’ via availability payments)

⁹ Nexa Advisory, [A Solution Looking for a Problem](#), November 2024

¹⁰ RenewEconomy, [South Australia sets spectacular new records for wind, solar and negative demand](#), 30 September 2024

¹¹ Aurecon, [Year 1 Technical and Market Impact Case Study](#), Jan 2018

¹² Neoen, Hornsdale [Power Reserve Expansion Project Summary Report](#), December 2023

¹³ Government of South Australia, [Firm Energy Reliability Mechanism](#), Nov 2024

that guarantee capacity availability during critical periods, thereby reducing market volatility and supporting long-term system stability¹⁴.

However, we note that the timely delivery of Project EnergyConnect interconnector would also contribute to improved reliability outcomes for the state¹⁵. While outside the context of this Review, this demonstrates that broader considerations across the energy system will be needed to deliver reliable and affordable electricity to consumers; changes to market design are not the only lever to address this objective.

This experience demonstrates that, high VRE penetration can be achieved without compromising grid reliability and under the current market design. However, as this transition progresses at a national level, the market must evolve to address emerging challenges related to investment certainty and financial stability.

A strategic capacity reserve could provide reliability ‘insurance’ (*Topic 1 – Investment incentives*)

As discussed above, the uncertainty around coal closures remains a key component for the transition over the next decade.

Bolstering existing mechanisms, rather than implementing a capacity mechanism, is the best method to ensure reliability outcomes around the retirement of coal-fired power stations. This could additionally provide an avenue for bipartisan support, removing the risk of ongoing political and policy uncertainty to ensure replacement generation for the ageing coal power stations are coming online in time.

This would underwrite new firmed renewable generation through an auction held five years ahead of a scheduled closure, leveraging the auction process established by the Capacity Investment Scheme.

The new, dispatchable capacity could include both short- and long-duration energy storage, as well as demand-side solutions, including aggregated demand response and Virtual Power Plants (VPPs)¹⁶.

Reserve capacity would need to demonstrate its ability to address the reliability risk – that is, to provide energy to meet a shortfall or capacity to manage peak demand.

Once constructed and commissioned, the contracted capacity would be held in reserve (off market). In the event of an early closure (which is desirable) or a coal-fired unit failure near the end of its life, this capacity would be rapidly deployed into the market. This would guarantee a smooth transition for any future coal closures and reduce price volatility, without distorting investment signals for other necessary firmed renewable energy investments.

¹⁴ Note the design of this mechanism differs from

¹⁵ AEMO, [2024 Electricity Statement of Opportunities](#), August 2024

¹⁶ Nexa Advisory, [Accelerating C&I rooftop solar and batteries is a ‘win win’ Discussion Paper](#), June 2024

This mechanism would also have the advantage of leveraging existing frameworks and having a low level of policy intervention, as compared to any broader changes to the wholesale market.

Recommendation 1

The NEM Review Panel should recommend to the Energy and Climate Ministerial Council (ECMC) to implement a targeted strategic reserve mechanism to manage reliability risks associated with coal-fired power station retirements until the NEM fully transitions to the post-coal era. The policy design of this mechanism should include:

- auction-based procurement, leveraging the CIS process;
- technology neutrality, including short- and long-duration storage and demand-side solutions able to contribute to reliability outcomes; and
- an obligation for contracted capacity to be held off-market as physical reserve.

The need for enduring market signals (*Topic 1 – Investment incentives; Topic 4 – Essential System Services*)

While government support arrangements help investment in the short-term, longer-term market-based mechanisms are still required to overcome barriers to investment, particularly for utility-scale storage- of which the Australian Energy Market Operator (AEMO) has projected 19 GW to be needed by 2030¹⁷.

Nexa Advisory has previously discussed the significant barriers which are challenging the timely delivery of firming capacity – many of which relate to missing markets and project financeability¹⁸.

Lack of long-term revenue certainty – particularly for long-duration energy storage

Energy storage in the NEM currently comprises of batteries and pumped hydro energy storage. There is currently only 1.6 GW / 2.3 GWh of large-scale battery capacity and 0.8 GW / 15.7 GWh of Pumped Hydro Energy Storage (PHES) in the NEM. While short (1-2 hours) and medium (4-8 hours) duration batteries have found viable revenue streams, these don't apply in the same way as long-duration storage (LDS), which will therefore continue to need government intervention.

LDS of 8–12 hours or more, particularly seasonal storage over multiple days, will be needed to meet demand during weather-induced supply shortfalls. While interconnection and demand side flexibility will help manage these shortfall situations, established long duration storage technologies will also be critical.

LDS will play a critical role in addressing the underlying objective of reliability in the NEM and support continued development of bulk renewable energy generation.

¹⁷ AEMO, 2024 Integrated System Plan (*Step Change*)

¹⁸ Nexa Advisory, [Energy Storage Financeability in Australia](#), March 2024

Recommendation 2

The NEM Review Panel should recommend immediate government attention to fund the gap and develop programs that incentivise investment in LDES technologies that are scalable such as flow batteries and liquid air storage.

Beyond that, Federal and state energy ministers need to step in and support the scale needed in long duration storage, this includes PHES projects. While PHES is a mature technology, the environmental complexities may limit delivery at the scale and in the timeframe required. This means governments need to commit to projects 10 years ahead of when they would be required in the market to ensure these project are delivered in time.

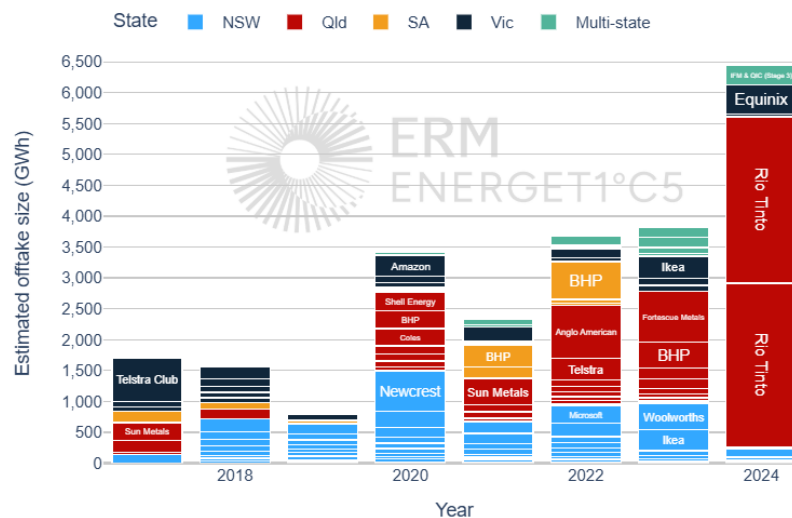
Limited contracting

Investors typically require structured offtake agreements - such as long-term Power Purchase Agreements (PPAs), capacity contracts, or government-backed underwriting - to provide revenue certainty and de-risk investments.

Retail contract terms in the NEM are typically 2-3 years, which is insufficient to support project financing. Investors require contract lengths of 10-15 years to secure low-cost capital and drive deployment at scale.

Developers and financiers face significant barriers in securing long-term off-take agreements (PPAs). These agreements are vital for ensuring predictable revenue streams, yet remain at a nascent stage, with developers and counterparties still progressing through early stages of the learning curve of their use and value.

As shown below, the PPA market remains dominated by incumbent fossil fuel players, limiting the negotiating power of new entrants and heightening investment risks.



Source: [Business Renewables Centre Australia](#)

While this only includes publicly announced transactions above 5 GW, it highlights a gap for smaller-scale projects seeking contracts.

Smaller projects can face additional challenges in negotiating contracts. Lenders may not consider PPA off-take agreements unless counterparties have a very high credit rating. Additionally, smaller off-takers may not be flexible around the project's milestones, resulting in the developer taking on greater risk.

These challenges all reflect limited competition in the PPA market which restricts financing opportunities and makes it harder to develop projects.

If the market is to attract the necessary private investment to meet future generation and firming capacity needs, this issue must be addressed through reforms that enhance contracting certainty and revenue stability.

We note however that as investors become more familiar with the market, innovative project structures and commercial arrangements are emerging, which was recently exemplified by the financing of Bungama solar and battery project on a fully-merchant basis¹⁹.

Innovative project design – such as co-location – is also being seen as “bridging the gap” as developers try to meet the needs of counterparties in the PPA market.

Missing markets for essential system services

The closure of each coal-fired station will have an impact on the technical and essential system services provided to the local grid. There is an opportunity to better outline the short-term gaps in providing these services immediately following each of these closures and provide a market signal for investment for any required network or non-network solutions.

Market signals are also required to deliver efficient investment and maintain a stable and reliable system. This includes ancillary services, in addition to other signals that reflect the changing techno-physical requirements and two-way nature of the grid, such as through improved demand-side response.

The Australian Energy Market Commission (AEMC) has recently progressed²⁰ the development of improved security frameworks to deliver essential system services such as inertia and system strength – including through the new transitional non-market ancillary service (NMAS) to be procured by AEMO²¹.

As discussed above, the innovative SIPS contract and subsequent upgrade to Hornsdale Power Reserve allowed this project to contribute these services, namely inertia, to the energy system. This non-network ‘virtual’ transmission solution has since been seen through another successful project - the Waratah Super Battery, in New South Wales.

¹⁹ RenewEconomy, [Huge solar and battery project to help propel South Australia towards 100 pct net renewables and beyond](#), 7 February 2025

²⁰ AEMC, [Improving Security Frameworks for the energy transition](#), March 2024

²¹ AEMO, [Transitional Services Guideline](#), Nov 2024

Although complex and contracted bilaterally between projects and AEMO/Transmission Network Service Providers (TNSPs), these mechanisms complement the current energy-only market design and incentivise innovative generation and storage solutions which provide essential services for the system, while providing a ‘revenue stacking’ opportunity for projects.

While AEMO and/or TNSPs may remain the best placed entities to determine the need for these services, it is critical that enduring market signals are made readily available to attract investment, competitively deliver these services and facilitate efficient market outcomes.

Recommendation 3

The NEM Review Panel must prioritise work to establish and further deepen contract and essential system services markets to facilitate investment.

- Reassess recent rule changes and processes which have created barriers to the delivery of batteries and energy storage
 - This should consider the outcomes of the recently introduced transitional services framework by AEMO to ensure this is resulting in efficient market outcomes which benefit the grid and electricity consumers.
- Undertake a review of potential new market services such as inertia, system strength, voltage control and others, that could be delivered by storage and provide additional revenue streams for the services storage can provide.
 - This includes a reassessment of the recent operating reserve rule change draft determination (ERC0295) by the AEMC which ruled out a reserve service.
- Establish contracts for existing markets — financial contracts for FCAS, peak energy, or a volatility index would help batteries gain better finance and lower equity returns.

Energy storage faces non-market challenges which must be separately addressed

In addition to the contracting and missing market challenges, there are other development challenges which continue to hinder the delivery of energy storage across the NEM. Although outside the scope of this Review, Nexa Advisory considers these must be addressed alongside the above recommendations.

These challenges include:

- **Planning application costs and processing times** – storage projects continue to be assessed under the same processes as renewable generation developments, as there is a lack of defined standards for energy storage and batteries. The differences and maturity in the technologies are currently not reflected in planning processes and approvals. This creates further delays and unnecessary complexity. For example, noise regulation for energy storage is not fit-for-purpose, adding further complexity and time to planning approvals.
- **Securing grid connection** – connection processes TNSPs and AEMO are complex and prolonged, with each new project requiring adjustments to those projects that have already commenced the connection process. The application of Generator Technical Standards (GTS) may not be appropriate for a stand-alone utility-scale battery with an advanced inverter. While Transmission Service

Operator and TNSP experience with connecting batteries is developing, there are still relatively few batteries in the NEM, resulting in connections teams having limited experience in accommodating batteries on the power system.

Recommendation 4

The NEM Review should recommend to the ECMC that all approval processes related to storage projects are prioritised to ensure the firm capacity can be delivered prior to the upcoming closures of coal-fired power stations.

This could be achieved through use of state-based planning frameworks – for example, in New South Wales through broader use of the Critical State Significant Infrastructure (CSSI) Ministerial declaration to accelerate assessments, or through a similar planning exemption scheme to South Australia’s Crown Sponsorship initiative.

At a minimum, state and federal governments should accelerate the approvals for projects included in the National Priority list developed jointly through the ECMC²².

Additionally, we recommend that energy ministers direct their departments to provide storage specific guidance and the standards required by the various jurisdictional planning departments to minimise complexity and cost. For example, noise regulation is not fit-for-purpose. Wind farms have regulator exemption for noise, and it would be useful to have something similar for battery storage.

A note on the current reliability framework (*Topic 1 – Investment incentives*)

The NEM already has several mechanisms to ensure the reliability of supply, aimed at ensuring there is adequate capacity during periods of high demand. These include:

- **The Retailer Reliability Obligation (RRO)** which requires electricity retailers and some large energy users to secure sufficient capacity to meet their share of forecast peak demand, promoting investment in dispatchable resources through market-based contracts. This occurs through a forecast reliability assessment undertaken by the AEMO. Critically, this is a market-based mechanism which allows for a technology-neutral approach.
- **The Reliability and Emergency Reserve Trader (RERT)** which allows AEMO to procure additional emergency reserves from outside the market when a supply shortfall is forecast, acting as a safety net to maintain system reliability during extreme events.
- **The Interim Reliability Reserve (IRR)** which enables AEMO to procure additional reserves to meet the stricter reliability standard set by the Interim Reliability Measure (IRM), utilising mechanisms like the RERT to secure capacity and ensure adequate supply during periods of potential shortfall.

There is no evidence that these comprehensive frameworks to underpin reliability do not work or are unlikely to work in the future. Additionally, there remain continuous

²² Energy and Climate Change Ministerial Council, [Meeting Communiqué](#), 19 July 2024

improvements to this framework²³ to improve its operation, while reducing regulatory burden of the RRO on retailers and resulting in lower costs for consumers²⁴.

As highlighted by the AEMC’s Reliability Panel:

While the changing risk profile brings new challenges, the current form remains fit for purpose... There was a concern prior to this Review that the changing reliability risk in a high-variable renewable energy (VRE) system may lead to very extreme reliability shortfalls and the current form of the standard may not adequately address such risk...

Our modelling has demonstrated that, while the characteristics of the reliability risk are expected to change in a number of ways, the current form of the reliability standard still adequately captures the vast majority of [reliability] events that will likely arise in the NEM. Therefore, it remains an effective way to measure reliability risk and weigh it against the costs of increased reliability.

The role of the consumer (Topic 2 – Consumer interaction; Topic 5 – Enhancing competition)

The consumer energy products and services market must become more integrated with the wholesale market to achieve efficient market outcomes which accurately value CER for both consumers and the broader market. Market harmonisation between CER and the broader wholesale market is a key issue for the energy system today – and has implications for the physical operation of the grid as well as longer-term system planning.

Nexa Advisory considers that reforms around the role of networks and governance arrangements remain the best way to improve integration of consumers within the broader wholesale electricity market²⁵.

Competition in consumer products and services is key to meeting varied consumer preferences

Australian consumers have been leading the energy transition through the uptake of innovative CER including through rooftop solar PV, batteries, smart EV chargers, heat pumps and smart home appliances. Key reasons driving consumer uptake of rooftop solar are lowering bills, independence from energy providers, energy efficiency and protecting the environment²⁶.

This has changed the energy system from a one-way flow to a bidirectional flow with consumers taking control of their energy consumption and the services they expect from their providers. However, despite ‘long term interests of consumer outcomes’ being a critical objective²⁷ within the existing electricity rules and policy framework, and consumer preferences being the focus of current rule change processes²⁸, this segment is becoming increasingly marginalised in market developments and throughout the broader energy transition. These consumers are now being left to navigate the increasingly complex energy environment on their own.

²³ Conducted by the AEMC’s Reliability Panel

²⁴ AEMC, [Review of the operation of the Retailer Reliability Obligation](#), February 2024

²⁵ Refer to our recent submission to the [Select Committee on Energy Planning and Regulation in Australia](#) for further detail

²⁶ Nexa Advisory, [Accelerating Consumer Energy in Australia](#), April 2024

²⁷ Per the [National Energy Objectives](#) as stated under the relevant national energy legislation

²⁸ AEMC, [Electricity pricing for a consumer-driven future](#), July 2024

New consumer energy service providers are critical to facilitate better interaction between consumers – including Commercial and Industrial users - and the broader energy market

While there is significant opportunity in Consumer Energy Resources – with distributed solar PV expected to increase four-fold by 2050²⁹ – there are several roadblocks preventing the integration of CER and consumer participation into the broader electricity market. These include complicated retail market structures and a lack of understanding around the products, services opportunities available to consumers.

This remains a challenge despite the entry of new energy service providers, many of which have struggled to thrive within the existing retail ecosystem. This was exemplified in the challenging conditions in mid-2022, which resulted in the costs of market volatility flowing to retailers, the exit of several retailers and reduced new entry³⁰.

The successful entry of these players – providing various energy services such as aggregation, virtual power plants, and demand response – will be critical to harmonise the wholesale and CER markets. This is a necessary prerequisite to competition and innovation, which will be vital to meeting the varying consumer preferences and level of engagement with the broader energy market.

Additionally, these players will have a critical role in unlocking the currently untapped potential of Commercial and Industrial (C&I) CER and facilitating greater demand-side participation (DSP). There is an estimated potential of up to 28 GW of C&I rooftop solar PV alone³¹. This would require innovative players in the retail sector to provide aggregation or VPP energy services and efficiently integrate this capacity the wholesale market.

We consider this unexplored segment provides additional ‘insurance’ to allow the timely closure of the coal-fired power stations, delivering lower costs and higher reliability to consumers.

²⁹ AEMO, [2024 Integrated System Plan](#), June 2024

³⁰ ACCC, [Inquiry into the National Electricity Market](#), December 2023

³¹ Nexa Advisory, [More NSW businesses with rooftop solar would be a ‘win win’ for power bills and the clean energy transition](#), June 2024

Recommendation 5

The NEM Review Panel should recommend the ECMC to develop a dedicated program to take advantage of the 28 GW potential of Commercial and Industrial CER. This should target implementation and delivery of CER products and services to businesses in the next 12-24 months, to improve affordability and reliability outcomes for business consumers prior to the closure of coal-fired power stations.

This should build on existing work such as the National Consumer Energy Roadmap and could form part of a national target for CER to drive consumer engagement and uptake.

More broadly, the NEM Review Panel should recommend the ECMC to undertake an independent review of the role and performance of electricity distribution networks. In the context of the current NEM Review, this should also explore competition in the consumer energy services market, considering:

- the changing business models of traditional networks and retailers, and new consumer energy businesses; and
- the role of these participants in integrating consumers into the wholesale market via CER innovative products and service offerings.

Concluding remarks

This NEM Review is being undertaken at a critical time, providing the opportunity to ensure confidence in the markets ability to maintain energy reliability as we approach the closure of coal-fired power stations. Energy Ministers should action the above recommendations to address the challenges discussed in the near-term, rather than implement changes to market design which may threaten the pace of the transition and further delay the retirement of coal-fired generation across the NEM.

Thank you for the opportunity to provide input to the initial consultation. We welcome the opportunity to further discuss any aspect of our report or submission - please contact either myself or Jordan Ferrari, Director - Policy and Analysis, jordanferrari@nexaadvisory.com.au.

Yours Sincerely,

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