

From: A group Long Duration Storage developers

Date: 21 June 2024

Re: **A joint submission to NSW DCCEEW on the Long Duration Storage Review**

Dear [REDACTED],

We are writing as a concerned group of Long-Duration Storage (LDS) developers, who all are in various stages of development in NSW. Considering the New South Wales Government's review of LDS, our report provides an in-depth examination of the impacts of reducing LDS minimum duration requirements on LDS development. Our objective is to present a data-based view that considers both cost and value of future system reliability.

First, it is important to stress the impact of the current LDS definition. The signal sent by the current LDS LTESA has meant that NSW will be home to the development of LDS technologies including some first-of-a-kind to Australia Long Duration Energy Storage facilities. Development has only been possible because of the clear signal sent to project developers and investors for the need for long duration storage, at its current definition. A change to the definition will specifically incentivise short-duration technologies (that already have existing mechanisms for support), while steering investors away from the LDS that will be critical for NSW's long-term energy security. In the context of current debates around viable forms of energy, LDS assets are the only realistic and affordable pathway to support the exit of coal. Development of these assets is path-dependent – without supporting them today, they cannot compete with short duration storage technologies, and NSW will be left without secure power when coal plants need to close.

The letter sets out the views of signatories, based on the results of the associated analysis appended hereto, that the definition of LDS must remain at 8 hours + as:

- A portfolio of assets across short duration storage (2-4 hours) and intraday storage (8-hours +) is the least cost way for meeting reliability.
- Failure to properly incentivise LDS at its current definition would result in a minimum of 37.6% higher system costs given the storage needs into the 2030s, and likely much higher given the inability of a multitude of shorter duration assets to operate equivalently to true LDS assets.
- Appropriate incentive mechanisms already exist for short duration storage.
- An LDS target to 2035 must be set to continue development of these assets.

This submission includes a report prepared by Endgame Economics on the value of LDS within the National Electricity Market (NEM). It highlights the critical role of LDS in ensuring the resilience and reliability of the energy sector, particularly for durations exceeding 8 hours.

The case for keeping the definition of 8 hours +

The resilience of an energy system is largely dependent on its ability to adapt to fluctuations and uncertainties. A diversified portfolio of storage technologies, especially those with varying durations of continuous discharge capability, is essential to mitigate risks and ensure the lowest cost. This diversification provides a buffer against the volatility of renewable energy sources

and is a cornerstone for a robust energy infrastructure. There is a balance required between short-term reliability and long-term investment to mitigate tail-risk. To be clear, the value of LDS with durations exceeding 8-hours is significant and goes beyond reliability. The following section describes the three key dimensions set out in the attached report: duration, de-risking and optionality.

Duration

The Roadmap recognised the clear need for 8-hour + duration LDS to ensure a reliable energy system. The analysis in the AEMO Services review did not change this view and LDS as currently defined remains critical to 2035.

While the AEMO report identified an additional need for shorter durations in the nearer term, reliability and wholesale market risks will change as coal exits the system. This is described as a tail-risk in the report, where 4-hour duration storage is less able to provide the reliability required. This is particularly true where there are consecutive events of USEs, where shorter duration storage is unable to recharge and therefore be utilised.

The AEMO report assumes that enough capacity of 4-hour storage would be able to cover the consecutive USEs like storage of longer durations. However, this is misguided and is not how the market would operate. In the case of market signals for potential USEs, multiple 4-hour storage facilities will all respond to the same price signals to dispatch, leaving gaps in reliability after the 4th hour. The AEMO report's Figure 2 assumes 20% of USE events last 4hrs, but a 4hr battery that is not 100% will not cover this event. Whereas 8-hour + storage facilities could operate as a 2-hour or 4-hour facility delivering flexible reliability as required. Additionally, AEMO's report also recognises that as VRE penetration increases, the more frequent and longer duration incidents will be (requiring 8+ hr continuous discharge capabilities at maximum asset capacity to address).

The attached report demonstrates that there remains a need for policy makers to build a portfolio that would meet the range of future scenarios in the NEM. The proposed 4-hour definition disincentivises the development of emerging and traditional LDS technology projects that will be critical to meet USE events as the coal fleet exits. The required duration of LDS will increase to 12-15 hours + to cover the overnight electricity market as coal generation is reduced. Without investing in these LDS projects today, NSW will have limited availability of deeper and cheaper storage to deliver reliable, affordable energy post-2030.

The uncertainty of duration required to cover nearer-term reliability shortfalls is also highlighted within Paul Simshauser and Joel Gilmore's "*Solving for 'y': demand shock from Australia's gas turbine fleet*" paper in 2024. This paper explores a fundamental issue in resource adequacy modelling, which assumes significant amounts of gas-fired generation underpinning the NEM. The paper explores the extent of gas availability in the NEM in the 2030s post-coal closure across scenarios including where no new LDS is built, and where there is a portfolio of energy storage durations. The paper finds significant gas shortfalls occur in winter coinciding with an increase in domestic gas use. It also finds these shortfalls are exacerbated by a lack of storage due to an increase in reliance of gas-powered generation (GPG). The paper concludes that to minimise the risk of GPG not being able to cover winter VRE troughs, policy must support the diversifying of the firming task across a portfolio of technologies. This paper also calls into question the average duration of USEs in the AEMO

Services modelling, as it is unclear whether gas constraints have been taken into account. If not, these USEs are only expected to grow in duration.

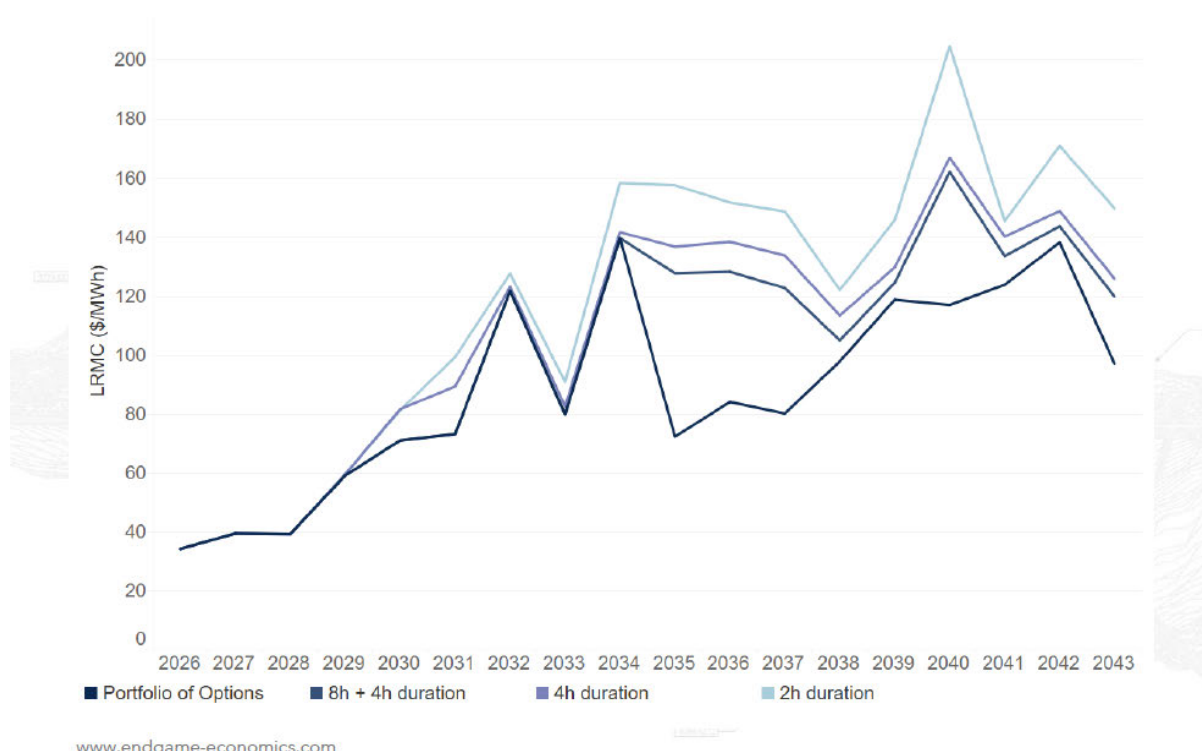
De-risking

LDS in its current definition plays an important role in de-risking the transition in terms of reliability, technology diversification as well as enabling increasing amounts of VRE into the system. The most cost-effective and resilient energy system is one that comprises a diversified portfolio of storage technologies with varying durations. The attached case studies indicate that a portfolio of storage durations will be significantly lower in cost to consumers.

While AEMO Service's modelling shows a mix of 4- and 8-hour durations are least-cost and sufficient to meet reliability needs, the value of longer-duration storage is significantly understated, particularly during periods of renewable energy scarcity or frequent daily events.

When looking at the capacity required across the 4 scenarios, the concern about building "excess and underutilised" capacity is significantly higher at the 2- and 4-hour AEMO Services scenarios, where long and deep duration is restricted.

System annual Long-Run Marginal Cost (LRMC) across scenarios



Comparing the scenarios by Long-Run Marginal Cost (LRMC) in 2030, a portfolio approach is around \$20/MWh cheaper than the AEMO Services preferred 8- + 4- hour duration mix. In 2035, this increases to a gap of around \$60/MWh (slide 19). The modelling also demonstrates that the portfolio of options brings the highest duration to the market soonest.

The AEMO report's proposal to meet today's needs with shorter duration storage has long-run implications for LDS affordability. By developing LDS today, long-run costs are reduced as LDS assets can take advantage of profitable short-term opportunities (e.g., storing cheaper renewable energy and selling it when prices are higher), which subsidises the longer duration storage hours that are currently competing with cheaper sources such as coal.

To realise this affordability benefit, LDS at 8-hours + must continue to be incentivised via its own mechanism. A change in the incentive will change the nature of investment decisions, particularly in the near-term which would impede any realistic development of LDS assets. In fact, a failure to incentivise LDS at 8 hours + will lead to at least a 37.6% increase to system costs into the 2030s (and likely much higher given operational constraints of shorter duration assets acting within the NEM). We concur with AEMO Services view that further incentives are required to bring LDS online. As such, merging short-term reliability with longer-term investment needs at this point in time, does not seem like the right course of action, especially when there are existing mechanisms in place to incentivise 4-hour durations, not including the LTESA Firming tenders and the Capacity Investment Scheme.

Optionality

There is no perfect foresight and there remains significant uncertainty on the specific level of duration which will become apparent as the system transitions and evolves. The attached report examines duration requirements across three scenarios, to understand the flexibility that could be required of storage assets that operate within the system.

The AEMO report highlights the uncertainty of duration between 8- and 24-hours in 2035 and beyond. One of the key benefits of some of the emerging LDS technologies is their flexibility and very low incremental costs to increase duration (MWhs). These technologies are able to come to online at a certain duration, like 8-hours, and can scale to higher durations cheaply and flexibly based on system needs.

This value cannot be understated, as the need for storage demand significantly changes based on the mix of VREs in the system. Where there is a constraint on on-shore wind development, the storage needs for 8-hours + increases exponentially, along with significant increases across other storage durations. Policy makers must build a portfolio that meets the range of credible scenarios, and emerging LDS technologies such as solar thermal are potentially the only technologies that can provide this scaling benefit.

Policy Recommendation

1. Do not conflate near-term reliability shortfalls with longer-term investment need – the risk to LDS investment (and impact to mid-term reliability into the 2030s) is greater than the benefit of changing the LDS definition.
2. Provide further market support for LDS to ensure the least cost and most reliable transition for NSW consumers, as a minimum by maintaining the 8hr + mandate already required by legislation.
3. Extend the LTESA LDS COD requirement to account for the planned 2035 exit of coal and to encourage increased engagement in the tender rounds.

Strategic support is essential to promote the competitiveness of emerging LDS technologies in the evolving energy market, which will be crucial for a seamless transition towards decarbonisation and sustained reliability. One of the key benefits of some of the emerging LDS technologies is their flexibility and incremental costs of change. LDS tenders should aim to provide clear signals of the value of a given duration of storage, including 12-15-hour + technologies, and make allowances for the longer construction times of the most cost-effective LDS solutions.

We believe that the findings and recommendations outlined in this letter and attached report will contribute significantly to the ongoing discourse on energy storage and its role in the future

of the NSW. We look forward to the opportunity to discuss the contents of this report with you further.

Thank you for considering our work on this critical matter. Please find the attached report for your review.

Sincerely,

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