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Energy, Climate Change and Sustainability Group
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Review of Long Duration Storage — Consultation Paper — 22 May 2024

EnergyAustralia is one of Australia's largest energy companies with around 2.4 million electricity and gas accounts across eastern Australia. We also own, operate and contract a diversified energy generation portfolio across Australia, including coal, gas, battery storage, demand response, wind and solar assets, with control of over 5,000MW of generation capacity.

We appreciate the opportunity to comment on the Department's review of the role of long duration storage (LDS) under the NSW Electricity Infrastructure Roadmap. We also appreciate the Department seeking and publishing analysis from AEMO Services Limited (ASL) on the cost and reliability aspects of different storage solutions.

We support the Government and Trustee having flexibility in pursuing a mix of technologies under the Roadmap, with a broad aim of delivering emissions reduction and reliable supply at least cost for consumers. At the same time, we recognise the need for explicit investment targets, including for particular technology types. Having such targets set in legislation provides certainty for project developers, and signals stability in the broader policy environment, thereby reducing the risk and overall cost of the transition.

Any amendment to the LDS target signals a weakening of government support for technologies that have higher capital intensity or longer lead times. The lead times for pumped hydro energy storage (PHES) and other emerging long duration technologies mean that developers require certainty now if continued effort is to be spent on projects that will be commissioned after 2030.

On balance, however, we support amending the minimum storage duration requirement in the Roadmap's Infrastructure Investment Objectives (IIO) to 4 hours, in relation to infrastructure that must be constructed by 2030. As highlighted in the Department's discussion paper, this flexibility may need to be supplemented by additional guidance in the Electricity Infrastructure Investment (EII) Act or in regulations that affect how Long-term Energy Service Agreements (LTESAs) are awarded. As explained further below, there may be inherent technology biases in the tender process, merit criteria assessment or in the meeting of 2030 targets that detract from delivering long term value from a customer and system perspective. The Department should consider ways to address these issues in a more targeted manner, rather than introducing a broad countervailing bias for the Trustee to 'prefer' projects with longer duration.



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The Department should formulate a minimum target for LDS in a set of investment objectives for 2035. Given the scheduled review of the IIO targets next year, it seems prudent to review all of these in tandem if possible.

We also support amendments to the EII Act that would allow virtual power plants and similar assets on the customer side to be eligible to bid for LTESAs. Certain demand side resources are already eligible for 'firming' LTESAs, and it is worth considering whether ongoing and broader support for these resources is warranted. There is scope for Department to confer with the Federal Government on these issues as virtual power plants are being considered under the Capacity Investment Scheme (CIS). That notwithstanding, reducing the minimum LDS duration requirement to 4 hours should broaden the scope for participation of consumer resources in storage tenders, and ensure the Trustee can deliver the best outcomes for NSW electricity consumers.

Further comments on the treatment of LDS under the Roadmap are set out below.

A review of the LDS target is warranted

As outlined in the Department's consultation paper, the 2GW and 16 GWh storage target was initially set in expectation of PHES playing a critical role in NSW. Recognising the longer lead times and significant development costs for PHES projects, the Government established a recoverable grants program, with the aim of enabling 3GW of PHES projects to be shovel ready and hence able to submit competitive bids in LTESAs tenders.¹ The subsequent Marsden Jacob 'Check-up' review in 2023 highlighted that the Government was unlikely to meet its 2GW target if solely relying on PHES, and that these projects would likely require greater support than LTESAs and recoverable grants to reach financial close.²

EnergyAustralia has a recoverable grant for the Lake Lyell PHES project in NSW and is a partner in the Kidston PHES project in North QLD. We are aware of the development risks associated with PHES projects but also the critical role they will play in underpinning least cost supply as the NEM transitions. The IIO targets for LDS (as well as for renewable generation) were announced in 2020. The Roadmap is a major government-led investment scheme in the NEM and since it was announced we have seen other jurisdictions set similar targets and sectoral investment plans. This includes the CIS which was further expanded in late 2023. The energy sector now has a better appreciation of the scale of investment required to meet 2030 targets and beyond, as well as challenges in achieving these in the face of global supply constraints and the need for local community support. Part of this learning has been reflected in the pursuit of PHES. We accept that various projects are unlikely to be commissioned by 2030 as originally anticipated, and so a review of the Roadmap's targets is warranted.

All of the Roadmap's investment targets should be reviewed together

We have broader questions about the Roadmap's approach to delivering a least cost mix of technologies over the longer term and how this is affected by interim 2030 targets. As noted above, these targets involve a trade off in terms of providing investment certainty, while still needing deal with changing circumstances that affect value for customers.

¹ NSW Electricity Infrastructure Roadmap p.30.

² NSW Electricity Supply and Reliability Check Up - Marsden Jacob Associates Report p. 78.

The Check-up review highlighted that delivery risks were high for all forms of new infrastructure, especially for PHES and transmission.³ Delays in project commissioning and the impact on NSW reliability outcomes were recently examined by AEMO.⁴ The slower than expected rate of new investment was also the basis for extending the life of the Eraring power station, even following direct responses by the NSW Government.⁵ These developments suggest there is scope to reassess the entire technology mix in terms of updated costs, revised timing for key transmission and storage projects, and realistic lead times for new generation investment, all of which have materially changed since the Roadmap's investment targets were set in 2020. The Check-up review also highlighted issues with the deterministic N-2 Energy Security Target in the Roadmap's reliability settings. The nature of reliability risk has been subject to further analysis and improved data in the last few years, particularly regarding 'tail risk' due to reliance on weather dependent renewables.⁶ Any changes to NSW-specific reliability settings would likely materially affect the need for LDS and other firming technologies.

Section 78 of the EII Act requires the Roadmap policy objectives and terms of the Act to be reviewed from next year. Noting the need to resolve storage duration requirements ahead of the next scheduled LDS tender, it may be prudent to conduct a more holistic review. Our expectation is that targets for all technology types beyond 2030 are now necessary and we believe setting a 2035 target for LDS only (as suggested in the paper) would be a piecemeal solution, and subject to revision within a short period of time. Other policy developments, notably the CIS and expected 'post 2030' market reforms are also likely to influence how investment takes place in NSW and should be taken into account.

The value of pumped hydro needs to be fairly assessed by the Trustee

Our understanding of the Trustee's merit assessment process is that this tends to bias in favour of battery projects and not fairly value PHES for several reasons:

- most obviously, the tendering targets reflect a 2030 policy objective, which while important, is arbitrary from the perspective of customer outcomes and system needs. Projects that may form part of a least cost mix from 2030 and beyond are effectively excluded, in spite of needing support now to enter the market after 2030
- the LTESA design and bidding process (again reflecting prudent practice) requires developers to financially commit to project costs, however this penalises technologies that are capital intensive and subject to out-turn cost uncertainties
- it is not clear to us that financial merit criteria appropriately value assets with markedly different life spans. For example PHES has an effective life of 80 years, which should be reflected in high terminal values and favourable against batteries that require several replacements over these timeframes
- merit criteria regarding local content benefits tends to be binary, whereas it should be proportional to economic value. Capital spending on PHES projects reflects up to

³ NSW Electricity Supply and Reliability Check Up - Marsden Jacob Associates Report – pp. 77-78.

⁴ https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/may-2024-update-to-the-2023-electricity-statement-of-opportunities.pdf?la=en

⁵ <https://www.energy.nsw.gov.au/news/nsw-response-closure-eraring-power-station#energy-affordability-and-reliability>

⁶ [Review of the form of the reliability standard and APC | AEMC](#)

80% local content given the site and civil works, compared to typically 20% for batteries

- while somewhat difficult to capture given the evolving nature of system services, PHES can deliver a range of system benefits including inertia. AEMO is expected to release guidelines with service definitions and benchmark costs later this year. This information can be coupled with system needs forecasts in AEMO's annual system risk reviews, which in turn could be reflected in LTESA bids and assessments for all relevant technologies
- there is also a recognised need for additional firming technologies to promote diversity and competition in wholesale markets, leading to lower prices. This takes the form of contract market liquidity and lower hedging costs for retailers and large customers. With the exit of coal, and uncertainties in fuel supply for gas generation, an over-reliance on shorter duration batteries to back hedging contracts could be problematic.

Specific comments on ASL's supporting analysis

We understand ASL's analysis was presented solely to illustrate the expected cost and reliability outcomes in relation to technology choices for the current 2030 LDS target.

It is perhaps unsurprising that modelling of reliability risks in 2030 favours storage technologies of shorter duration, as significant amounts of thermal capacity would still be present to mitigate the risk of longer duration events.

The framing of ASL's 2030 analysis presupposes that all PHES would be feasibly commissioned by this time, which does not seem likely. It is also questionable whether cost and reliability outcomes in 2030 are relevant under the EII Act. The EII Act's 'overall objectives' in section 44(2) include construction of infrastructure that minimises costs and meets the reliability standard, without specifying timeframes. ASL seeks to minimise costs for NSW electricity customers by adopting a 20 year horizon in its IIO modelling objective function.⁷ AEMO's Integrated System Plan (ISP) adopts a modelling horizon beyond 2050 in order to ensure optimal development paths reflect long term emissions reduction targets.

As part of informing the full set of IIO targets, including for LDS in 2035, we recommend ASL refine its analysis and inform further discussion on the least cost technology mix and associated Roadmap settings. This would include:

- extending the modelling horizon to enable a full view of system optimisation from a cost and reliability perspective, not just the build cost to 2030
- use of scenarios, namely those in the 2024 ISP, and key sensitivities on technology costs, and timing of new entrants and exits
- including 8 hour PHES as a candidate technology. Even in the context of hypothetical delivery by 2030, this seems an oversight in ASL's modelling
- adopting AEMO's latest assumptions for construction lead times and other inputs as per the 2024 ISP

⁷ [2023-iio-report-december_final.pdf \(aemoservices.com.au\)](#) – see section 2.3.

- ASL's presentation of USE results should be extended to consider the depth of events rather than just their duration, and so provide a more accurate assessment of reliability risk and customer impacts. This aspect of ASL's analysis also presupposes it will procure storage assets up to and including 8 hours of duration in the absence of a legal requirement to do so, reinforcing the need to have robust financial and reliability merit criteria. As noted above, the Trustee appears to be constrained in satisfying 2030 targets rather than a longer-term view of system needs and costs
- ASL's assessment of the cost of candidate portfolios that satisfy the Interim Reliability Measure should be amended to meeting the Reliability Standard, which is the applicable constraint in 2030 and beyond
- ASL should include a sensitivity analysis on the plausible contribution of gas-fired generation out to 2030 and beyond, with associated implications on scarce fuel supply. Under the current Roadmap policy settings, gas generation would only be commissioned under a 'firming' trigger and experience suggests governments may prefer to temporarily extend the life of coal generation to solve reliability issues rather than support new peaking gas assets
- further incorporation of synthetic weather reference years and associated method improvements to inform reliability drivers over the medium to longer term, which we expect ASL to consider and adopt in its routine IIO report modelling in any case
- modelling of carbon benefits. In line with a more fulsome set of optimisation modelling, ASL should revisit the carbon assumptions that initially formed part of Aurora's modelling for the NSW Roadmap.⁸ Ideally this would align with the value of emission reduction being applied under the National Electricity Law and in the final 2024 ISP. The presence of longer duration technologies in the system is expected to materially impact on dispatch patterns thus the reliance on coal generation in the near term, and gas generation over the medium term. The presence of longer duration technologies may also improve utilisation of renewable plant, thus lowering system costs and financial burden via LTESA payouts.

If you would like to discuss this submission, please contact me on [REDACTED] or [REDACTED].

Regards

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⁸ For example, as illustrated from page 54: [NSW Electricity Infrastructure Roadmap](#)