Submission to AEMO regarding ISP Methodology Issues Paper

From: An alliance of Long Duration Energy Storage companies

November 22, 2024

We are responding to the ISP Methodology Issues Paper as an alliance of Long Duration Energy Storage (LDES) companies, comprising developers and technology providers including EDF Australia, Vast Energy, RayGen, Hydrostor and Energy Dome.

The biggest challenge facing Australia's electricity system in the next decade is replacing coal fired power stations, which still generate a significant proportion of our electricity – and provide almost all overnight capacity. LDES is critical to effectively maintain reliability at the lowest overall system cost as coal retires. LDES technologies – including solar thermal, compressed air, and CO2 batteries – will play a central role in Australia's energy market to 2030 and beyond, including:

- De-risking: LDES plays an important role in de-risking the transition in terms of reliability and technology diversification as well as enabling increasing amounts of VRE into the system.
- Optionality: LDES technologies offer flexibility and very low incremental costs to increase duration (MWhs). These technologies can come online at a certain duration, like 8-hours, and can scale to higher durations cheaply and flexibly based on system needs.
- Green economy: Australia can be a world leader in deploying LDES, creating jobs, fostering innovation and ensuring the country benefits from the energy transition.

The proposed changes regarding the gas supply model, distributed network capabilities, perfect foresight for storage devices, and analysis of power system security are key steps in the right direction. However, it is critical that the ISP correctly model the costs associated with these changes and reward LDES technologies for their capability, including dispatchability and system strength benefits, to ensure the ISP creates the right policy and investment incentives.

Change 1: Expand the gas supply model and introduce gas development projections in the ISP

We welcome the proposal to expand the gas supply model and introduce gas development projections in the ISP, in particular the proposal for a cost database to develop a plausible gas development projection for each scenario. However, it's critical that the gas supply expansion modelling proposed incorporates the transmission costs of gas supply, in addition to the production costs that are proposed. Accounting for the supply of interstate gas, or imported supply in the form of LNG, and the associated transmission costs will ensure a reasonable indication of the cost of supply.

We recognise the critical role that gas will play to 2030 and beyond as a firming solution in the grid. However, overreliance on gas-powered generation risks material reliability issues, particularly in the later stages of coal phase-out in the late-2030s and 2040s. Paul Simshauser and Joel Gilmore's "*Solving for 'y': demand shock from Australia's gas turbine fleet*" paper, published in 2024, demonstrates the fundamental issue in resource adequacy modelling that 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 LDES 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 on gas-powered generation. The paper concludes that to minimise the risk of gas-powered generation not being able to cover winter VRE troughs, policy must support the diversifying of the firming task across a portfolio of technologies.

Informing the optimal mix of gas with other firming solutions, such as LDES which can deliver a zero emissions solution, is critical in the ISP. Developing a more robust foundation to consider the investment trade-offs between gas and electricity sector investments is a positive step to achieving this, by ensuring limitations of gas supply in Australia are accounted for.

Change 2: Develop an approach to analyse distributed network capabilities for CER and other distributed resources

We recognise the critical role of Customer Energy Resources (CER) and other distributed capacity in Australia's energy transition. As part of analysing distributed network capabilities for these resources, we encourage AEMO to focus on required changes to the distribution network capabilities to enable charging from CERs and other distributed capacity.

Correctly modelling the expected storage supply that CER will carry ensures the right market signals are provided for LDES supply. Significant grid infrastructure upgrades are required for CER to provide storage solutions to the grid, with associated costs not currently clearly funded by distribution network service providers. Furthermore, while LDES offers a predictable, dispatchable power supply to maintain grid stability during prolonged renewable intermittency, CER systems depend on less predictable consumer behaviour and aggregation technology. We encourage AEMO to consider the associated costs and challenges of relying on CER for storage to ensure the ISP does not crowd out the critical role LDES technologies will play.

Change 5: Address perfect foresight for storage devices in the time-sequential model

We welcome the proposed change in modelling approach and methodology to account for perfect foresight, particularly the imperfect energy targets change. If short duration solutions, such as <4hr batteries, are assumed to have perfect foresight, insufficient benefit is applied to LDES capacity that can smooth out variability over longer periods when short-duration systems have forecasting errors.

In the event of an under-supply event today, short duration storage facilities will all respond to the price signal and dispatch, meaning long duration solutions of 4hrs+ are required to bridge the gap and maintain reliability. The importance of LDES capacity will also only become more important as coal exits the system and VRE penetration increases, with under-supply events only increasing in frequency and length. Replicating this dynamic in the ISP by incorporating energy planning with error is critical to ensure sufficient long duration capacity is built to cover these events and capture value. We believe this is correctly captured by the proposed approach of modelling dispatch with error.

Change 6: Enhance analysis of power system security

The focus on enhancing analysis of system security by ensuring the minimum fault level is met, rather than assuming it will be delivered through the separate system strength framework, is an important change to the ISP to accurately model system security requirements and cost. However, alternative solutions beyond synchronous condensers must be considered to meet the system security requirements at the lowest cost.

Key LDES technologies, including solar thermal and compressed air, utilise synchronous turbine generators to provide synchronous services such as inertia, system strength and voltage regulation. By explicitly modelling the cost of system security measures, the ISP will increase the value of LDES technologies with synchronous generator capacity, particularly in regions where synchronous machines are retiring. However, to accurately capture these benefits, the synchronous capacity of LDES technologies must be appropriately recognised and these technologies rewarded for the services they can deliver. This also applies to other system security benefits LDES technologies can deliver, such as black start capacity due to their significant power capability.

Furthermore, we also urge AEMO to consider rewarding power generators for the capabilities provided that exceed the minimum standard, but don't reach the automatic standard set by AEMO. The capabilities many LDES technologies can deliver in the form of system security should be recognised as a value-add to the system and be fairly compensated. As traditional synchronous generators, such as coal and gas, retire and there is demand for additional system security services, rewarding generators for these capabilities will create the right incentives for their development.

Additional recommendations

Expanding the range of modelled technologies

To ensure the benefits and criticality of LDES to Australia's grid are correctly captured, we believe the ISP should consider what we understand to be a limitation in the PLEXOS software used by AEMO to model the ISP. Many viable LDES technologies are not a technology choice in PLEXOS, meaning that their benefits are not correctly captured. For example, LDES technologies such as solar thermal that can dispatch strategically are not modelled as a dispatchable resource, meaning the modelling does not capture the net benefits they can provide in terms of grid flexibility, reliability, and revenue generation from peak pricing periods.

Considering zero or low-cost transmission tariffs for LDES providers

LDES systems differ fundamentally from traditional energy loads. Unlike consumers, LDES provides essential services to the grid, which contribute to energy security, system strength, and grid reliability. Imposing high transmission tariffs on these systems fails to account for their unique role and the benefits they deliver. Treating LDES as a load subject to traditional TUOS charges undermines its critical role in supporting grid stability and energy security. A zero or low-cost tariff framework would recognise the unique value LDES delivers to the grid and incentivise its deployment. Such an approach aligns with the principles of cost-reflective pricing, supports energy transition objectives, and ensures a fair and efficient energy system.

The market signals provided via these changes to the ISP are fundamental to delivering the LDES infrastructure Australia needs for a successful transition. Our members, with the support of state and federal governments, are already investing in LDES projects. With the right market signals, these projects would be accelerated, and many others would be developed to bring much needed capacity into the market. This is becoming increasingly urgent as without investing in LDES projects today, Australia will have limited availability of deeper and cheaper storage to deliver reliable, affordable energy post-2030.

We would welcome the opportunity to discuss this response and how AEMO can better incorporate the capability and role of LDES technologies in further detail.

Sincerely,

Alliance of LDES companies

EDF Australia, Vast Energy, RayGen, Hydrostor and Energy Dome