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GE Hydro Response to Draft 2022 Integrated System Plan (ISP)

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(Lodged by email to ISP@aemo.com.au)

Date: 10 February 2022
Subject: Consultation on the Draft 2022 ISP

To whom it may concern,

We commend AEMO for the significant time and effort invested in the preparation of the Draft 2022 ISP. It is clear both methodology and process have evolved since the 2018 and 2020 ISPs, enabling greater detail in the 2022 plan as well as making the rationale for the proposed approach much clearer.

GE has been a significant player in the Australian energy space for over 100 years, with an installed base across wind, hydro, gas, battery, steam and transmission equipment of close to 20GW. In addition, GE Hydro's turbines and generators power 3.9GW capacity, roughly half of Australia's hydro fleet. Across our work with both developers of new projects and operators of existing plants, it's clear our customers and their investors confer great importance on the ISP as a roadmap for the development of our electricity network and the generation plants that connect to it.

On this basis, we have done our utmost to review the plan in detail and provide feedback that we hope will prove useful both in the development of the 2022 plan and also in shaping the approach for future ISPs.

General Comments

It is encouraging (and also unsurprising) that the Step Change scenario is now understood to present the most likely direction for the development of the NEM. In saying this, we note that, while the ISP provides a direct pathway for investment in transmission, the same is not true for the investment in generation and storage on which the ISP's transmission pathway is predicated. More needs to be done to ensure the same investment signals the ISP creates for transmission are provided for generation and storage, particularly long duration storage.

Our expectation is that the work of the ESB, particularly in relation to a capacity mechanism, will address this in a manner consistent with the ISP's Step Change scenario and the associated Optimal Development Path (ODP). Noting AEMO's findings that the cost of being late greatly exceeds the cost of being early, we hope and expect a case can be made by AEMO to state and federal leaders to put in place the regulations, legislation and market mechanisms needed for Australia to accelerate confidently down the ODP as quickly as possible.

Coordinated DER Storage

While the Draft ISP assumes this category of capacity will be able to respond to dispatch signals, it is unclear how this will come to pass. As things stand, these assets are typically under the control of householders/owners who can use them as they see fit, with a relative minority of systems participating in VPPs (or similar arrangements). As such, it would be useful to understand the path AEMO foresees for us to get from the current framework of independent decision makers to one in which perfect coordination of dispatch is the norm for a large part of the NEM-connected distributed storage capacity.

Distributed vs Utility Scale Storage

Having many small storage systems behind the meter is less efficient than having a smaller number of larger storages within the network. This is for two reasons: Firstly, the demand (and behind the meter VRE generation) of consumers will be imperfectly correlated, even within a single state let alone at the NEM level. As such, firming rooftop solar using grid-based assets would benefit from this diversification effect and require a lot less storage capacity to firm the same amount of VRE. Secondly, there are economies of scale in relation to storage that mean the $/MWh of installed capacity will tend to be much cheaper for larger systems than small ones. While certain energy storage systems necessarily need to be behind the meter (e.g. electric vehicle batteries), it is unclear why the ISP would favour locating so much storage capacity behind the meter when the firming these systems provide could be more cost effectively undertaken at the aggregate level.

Medium Storage

For Medium Storage, it is important to consider the need not only to provide power when 'the sun doesn't shine and the wind doesn't blow', but also to provide a means of absorbing the excess when 'the sun shines too brightly, or the wind blows too strongly'. As the last two Electricity Statement of Opportunities (ESOO) reports have shown, managing low load during daytime periods is already a challenge in several NEM jurisdictions and is expected to become a larger one over time if not addressed. GE's internal analysis indicates low-load periods of 10+ hours occurring across the NEM, across the seasons by 2030. It is these low load periods more than the peak load periods that drive the need for Medium Storage.

The alternative to addressing low load by investing in Medium Storage is to address it by curtailing VRE. However, our analysis is based on POE50 values of VRE output, meaning curtailment levels would need to be extremely high if minimum daytime load were to be kept at stable levels, and it seems very likely that such levels of curtailment would make utility VRE uninvestable.

Ensuring a Fair Comparison of Storage Technologies

Most chemical storage technologies offer a warranty period of 10-15 years on the assumption of a single operating cycle per day across that timeframe, however, the chemical storage assets already present in the NEM are operating in a much more dynamic manner. As such, the operating lifetime of these assets is likely to be significantly less than initially indicated and appropriate adjustment needs to be made in the ISP analysis for this reduced lifetime (much like AEMO has undertaken its own analysis of coal closure dates vs modelling on the basis of announced closure dates).

Pumped Hydro lies at the other end of the spectrum, with design lifetimes often nearing or exceeding 100 years. As such, when comparing Pumped Hydro with shorter-lived alternative technologies, it is important to do so on the basis of total lifetime cost. Simply using an up-front $/MW value will understate the cost of shorter-lived technologies and overstate the cost of longer-lived ones, leading to a more expensive and less efficient outcome for the market and consumers.

Distributed PV

While the capacity of Distributed (rooftop) solar PV has grown rapidly to date, we would expect there to come a time when it starts to become constrained by its own success – i.e. the % of addressable rooftops with solar PV cannot exceed 100%. It would be a useful 'sense check' of the various scenarios if AEMO were able to include a forecast of the assumed penetration of Rooftop Solar PV (and similarly Distributed Storage) in each case, noting that among residential dwellings, only owner-occupied, free-standing houses are typically able to install rooftop solar.

Energy Efficiency Savings

Figure 7 of the 2022 Draft ISP highlights significant TWh of 'Energy Efficiency Savings' across all four scenarios. If AEMO could provide further detail on the make-up of these expected savings that would be a useful way of validating this line item and ensuring the forecast total demand values are correct.

Hydrogen

The assumption of zero hydrogen exports in all scenarios except the 'Export Superpower' scenario appears unrealistic, given various proponents around the country are already developing hydrogen export facilities.

Coal Retirements

It is important that the ESB's work on a Capacity Mechanism is aligned to AEMO's ISP analysis, to ensure coal capacity is not kept in the system any longer than needed.

Marinus Link

The Draft ISP notes that delays in resolving cost recovery for Marinus Link could lead to delays in its construction and identifies this as a key risk on the ODP. It further calls for Marinus to be brought forward by 2 years, only to note (presumably due to this cost recovery issue) that Tas Networks has advised such an acceleration would not be possible. Given that AEMO has previously lodged various rule change requests in relation to various matters, could it not lodge a rule change request associated with interconnector cost recovery? This appears to be well within AEMO's remit and would allow much greater certainty (and acceleration) of the timing of Marinus Link.

Jobs and Employment

The issue of Jobs and Employment is a loaded one when it comes to the energy transition, with the focus too often on the jobs in thermal generation and mining that could be impacted rather than the overall net impact of the transition. A 9-fold increase in utility-scale VRE implies a significant pool of opportunities for workers. Likewise, a 5-fold increase in rooftop solar and a 3-fold increase in firming capacity. If possible, it would be worthwhile including an analysis of the workforce implications of the ODP as an appendix to the final 2022 ISP. This would ensure any conversation around jobs can be grounded in facts and analysis. It would also serve to highlight any capacity or skill shortages that will need to be addressed as we build towards a renewable future.

Should it be possible to do so, we would welcome the opportunity to further discuss any or all of the above matters with the ISP team, as we see this process as an important part of the optimal evolution of the NEM.

Best regards,

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