



EnergyAustralia

LIGHT THE WAY

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Dear Chris,

RENEWABLE INTEGRATION STUDY FEEDBACK

EnergyAustralia (EA) welcomes the opportunity to provide feedback to the Australian Energy Market Operator (AEMO) on the Renewable Integration Study (RIS).

EA is one of Australia's largest energy companies with around 2.5 million electricity and gas accounts in NSW, Victoria, Queensland, South Australia, and the Australian Capital Territory. EA is dedicated to building an energy system that lowers emissions and delivers secure, reliable and affordable energy to all households and businesses. To support this, EA owns, contracts and operates an energy generation portfolio that includes coal, gas, battery storage, demand response, solar and wind assets. Combined, these assets comprise 4,500MW of generation capacity.

EnergyAustralia supports the RIS

The National Energy Market (NEM) and its associated regulatory framework is undergoing once in a generation change and will transform considerably over the next five years to 2025. EA, therefore, appreciates AEMO's efforts to provide a foundational engineering perspective with which to inform future NEM investment, design and operation. In the face of world-leading wind and solar generation penetration, the RIS represents a crucial, technical piece of the national planning puzzle with critical implications for many current and ongoing NEM reforms. These include the Energy Security Board's post-2025 NEM redesign (MD2025) and the Open Energy Networks (OpEN) initiative amongst others. However, the preeminent relationship lies with the Integrated System Plan (ISP).

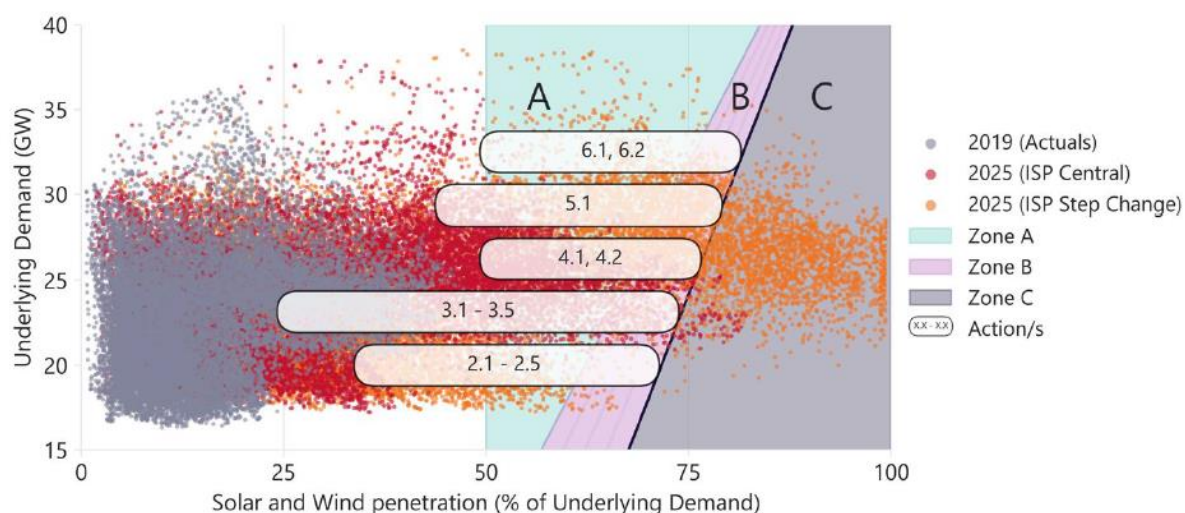
The Stage 1 RIS report takes the ISP's projections as given and investigates the challenges with maintaining power system security to 2025 while operating at very high penetrations of wind and solar generation. However, as detailed below, this interaction is symbiotic with RIS analysis with far-reaching implications for ISP outcomes. It is, therefore, vital that these two analytical works are produced in a coordinated, timely and harmonious manner.

The RIS must be integrated with the ISP

The Draft 2020 ISP shows that the total, current NEM Variable Renewable Energy (VRE)¹ generation capacity is 17GW. This capacity is forecast to grow to 27GW under the Central scenario, and 45 GW in the Step Change scenario by 2025. However, the RIS has highlighted the serious operational challenges associated with such growth.

The graph below identifies the system limits and remedial actions required for given levels of instantaneous penetration of wind and solar generation in 2019, and to 2025 under the ISP Central and Step Change scenarios. Zone A indicates where managing variability and uncertainty will become increasingly challenging. Zone B highlights where inertia and system strength limits will impact secure operation. Zone C illustrates the aggregated minimum online synchronous generation limits required to ensure the safe operation of the power system.

If outcomes are consistent with forecasts, remedial actions are shown to be required as soon as solar and wind penetration reaches 25%. Moreover, penetration levels are forecast to grow to levels beyond those required for safe system operation at times in both the Central and Step Change scenarios.



The ISP objective is to provide a whole-of-system plan to maximise net market benefits and deliver low-cost, secure and reliable energy across a complex range of plausible energy futures to 2040². However, EA questions how this can be achieved if the technical implications of the RIS, particularly the costs of remedial actions associated with managing system security under various ISP scenarios, are not considered as part of the ISP process. That is, how can AEMO, market participants and customers be confident that an alternate ISP pathway that includes lower wind and solar penetration, with commensurately lower remedial system security costs, does not have higher overall net market benefits?

This question highlights two areas for immediate action. First, RIS recommendations critical to maintaining system security under different ISP scenarios must be costed.

¹ Utility wind, solar and behind the meter rooftop solar.

² Draft 2020 ISP

Second, these costs must be included as part of the overall ISP net market benefits assessment. Doing so will obviate the risk that ISP pathways and RIS recommendations are pursued at any cost and will thereby help to ensure that the ISP objective and the National Electricity Objective (NEO) are both met.

These actions could be performed iteratively with RIS findings informing and necessitating further ISP drafts. However, this is unlikely to be an optimal use of AEMO or stakeholder resource, nor result in superior planning outcomes. AEMO must publish an ISP by 30 June every two years per clause 5.22 of the National Energy Rules (NER). This includes a transparent and robust stakeholder consultation process. The RIS, however, has no such NER obligations. As witnessed this year when the RIS was published after the Draft 2020 ISP had been released, this runs the risk that late publication of the RIS leaves insufficient time for considered stakeholder deliberation and appropriate integration within the Final ISP.

To remedy this situation, EA suggests that the RIS is integrated within the ISP process. This may be achieved via an ISP guideline recommendation for AEMO to have regard to RIS analysis. Alternatively, it may be instituted as a formal Rules requirement. Either way, regular, integrated reports on priority issues, based on stakeholder interest or known ISP limitations should be included. By better coordinating and prioritising investigation of the technical considerations relevant to the ISP, AEMO and stakeholder resource efficiency will be maximised. More importantly, confidence in ISP modelling results will be enhanced, thereby strengthening signals for efficient investment.

More investigation is required

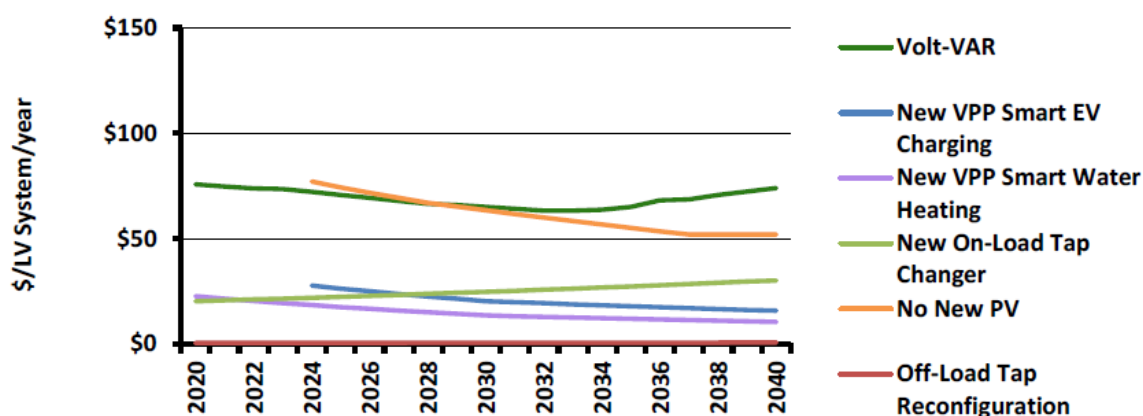
The RIS sheds light on many important issues but, as acknowledged in the report, more work is required. EA agrees and considers that investigation into the impacts of Project EnergyConnect should be a high priority. There is currently some doubt as to the timing of this project, with no contingent project application having been submitted. However, EA notes that once complete this will create the first looped interconnection circuit in the NEM. Given the high impact of interconnector headroom on system ability to respond to ramping requirements, understanding potential limitations under different network configurations will be critical to maintaining a secure power system.

The implications for frequency management is another area that merits further attention. The RIS variability and uncertainty analysis looked at system ramping and forward-looking forecast error. However, deviations to forecast on a dispatch interval basis were not evaluated. This is important for understanding the headroom required to balance the system in terms of Primary Frequency Response (PFR) and Frequency Control Ancillary Services (FCAS). Given AEMO does not have good visibility of the amount or quality of PFR outside of FCAS markets until an event occurs³, it is surprising and somewhat disconcerting that this analysis was omitted. Further, that there was no explicit RIS recommendation to address this. This omission may be explained by a purported, forthcoming paper that will speak to balancing requirements. However, to the extent that this does not appear in a timely fashion, or address headroom implications, EA suggests that further RIS investigation into frequency management be expedited.

³ page 23, Appendix B.

Further investigation might also be undertaken into RIS recommendations 3.4 and 3.5. These combined recommendations would see AEMO working with industry to increase standards and visibility of Distributed Energy Resources (DER) to enable remote curtailment of DER generation. As highlighted in a recent Energeia report⁴, however, there may be other, alternative solutions that are cheaper from a whole of system perspective. For example, investment in off-load transformer tap reconfiguration, as shown below. This once again underscores the need for a rigorous cost-benefit assessment of RIS recommendations and its impact on ISP analysis.

Urban LV System: Least Cost Annual Expenditure by Solution – Neutral Scenario



Source: Energeia; Note: Off-load or manual tap changes, are shown but difficult to see due to their very low cost (<\$1 per PV kW p.a.) and are between 20x and 30x cheaper than on-load or dynamic tap changer installations (between \$20 and \$30 per PV kW pa).

This work should not be delayed

There are numerous rule changes and reforms on foot or slated to begin soon, that bear on the integration and coordination of increasing VRE penetration in the NEM. Examples include consultations on synchronous services markets, system strength frameworks, operating reserves and ramping requirements. Lacking further technical insight that would be provided by additional RIS investigation, the risk is that sub-optimal regulatory outcomes result. Given this risk, EA contends the proposed 12-month delay before RIS stage two work is to begin is far too long. EA, therefore, strongly suggests that second stage RIS investigations are expedited to help inform and enable an effective, efficient energy market transition.

EA would welcome the opportunity to discuss this submission further with you. Should you have any questions, please contact me by phone on 03 8628 1293 or via email (bradley.woods@energyaustralia.com.au).

Yours sincerely,

Bradley Woods

Industry Regulation Lead

⁴ Available from <https://renew.org.au/wp-content/uploads/2020/06/Energeia.pdf>