GE Renewable Energy

Martin Kennedy
Head of Sales – Hydropower Australia
M : +61 416 642 398
E : martin.kennedy@ge.com

www.ge.com
www.gerenewableenergy.com

Audrey Zibelman
Managing Director & CEO
Australian Energy Market Operator

www.aemo.com.au

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Subject: ISP Methodology Issues Paper (released 1 Feb 2021)

Dear Audrey,

We would firstly like to thank you and your team for the considerable effort expended on activities such as the Integrated System Plan (ISP), which play a vital role in the ongoing development of the NEM by ensuring a consistent, widely agreed fact-base lies at the heart of the analysis and recommendations put forward.

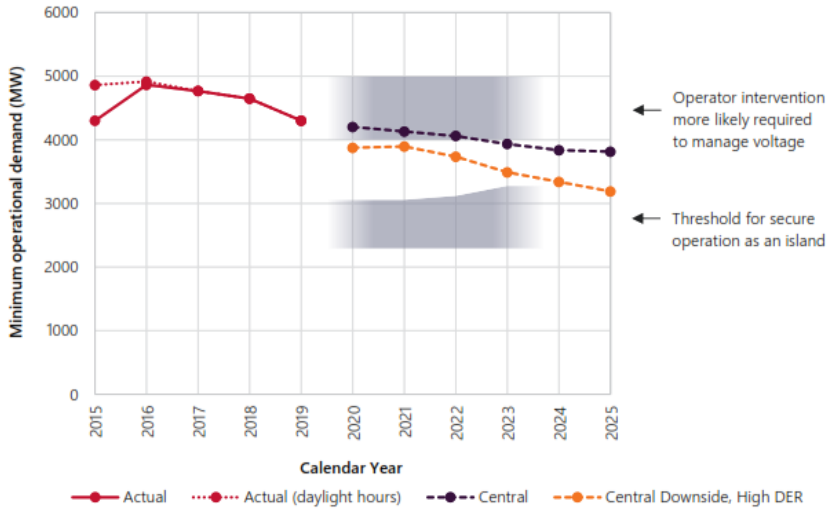
As such, we are pleased to share our feedback on the ISP Methodology Issues Paper, released 1 February 2021. We have focused our attention on the topics of greatest relevance to us and endeavoured to provide supporting information and references, as outlined below.

2.2.2 KEY MODELLING APPROACHES USED IN CAPACITY OUTLOOK MODELS – FIRM CONTRIBUTION FACTORS FOR STORAGE

Do you agree with AEMO's proposed approach to determining firm contribution factors for storage by approximating the duration of peak demand events? Do you have any proposals for how AEMO may otherwise account for the contribution to firm capacity provided by storage technologies?

While we understand the logic of attaching firm contribution factors to the duration peak demand events, we also note from the most recent Electricity Statement of Opportunities (ESOO) that managing minimum demand is becoming a significant challenge too. Refer below on QLD for example.

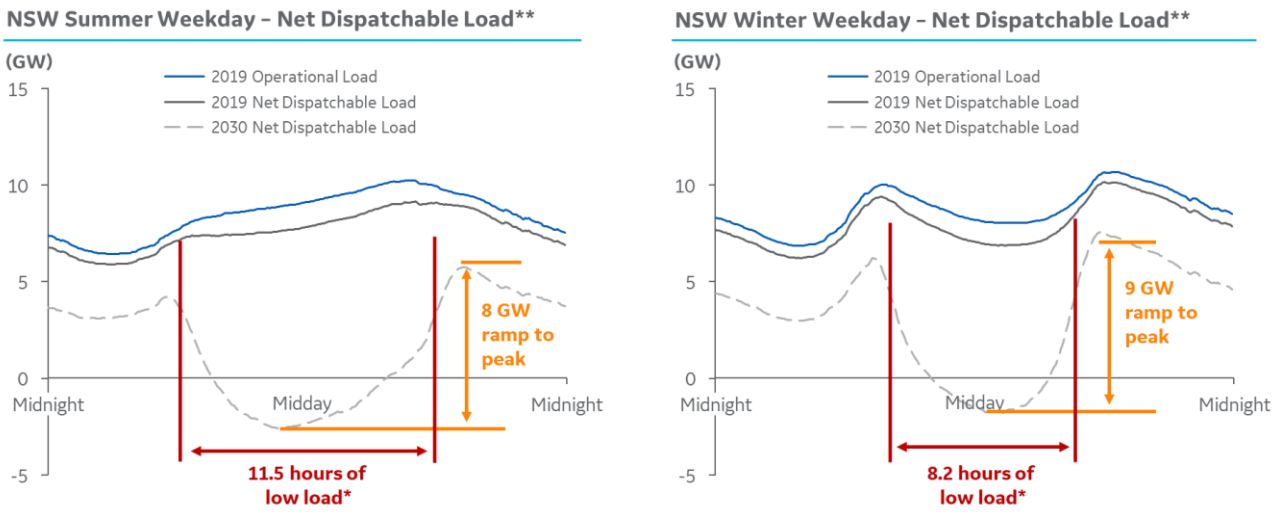
Figure 34 Minimum operational demand thresholds in Queensland (90% POE as generated)



Source: 2020 ESOO, p78

Given that storage technologies can help raise minimum demand by providing predictable (or firm) load, we believe minimum load duration (as well as peak load duration) should be used when looking at firm contribution factors for storage.

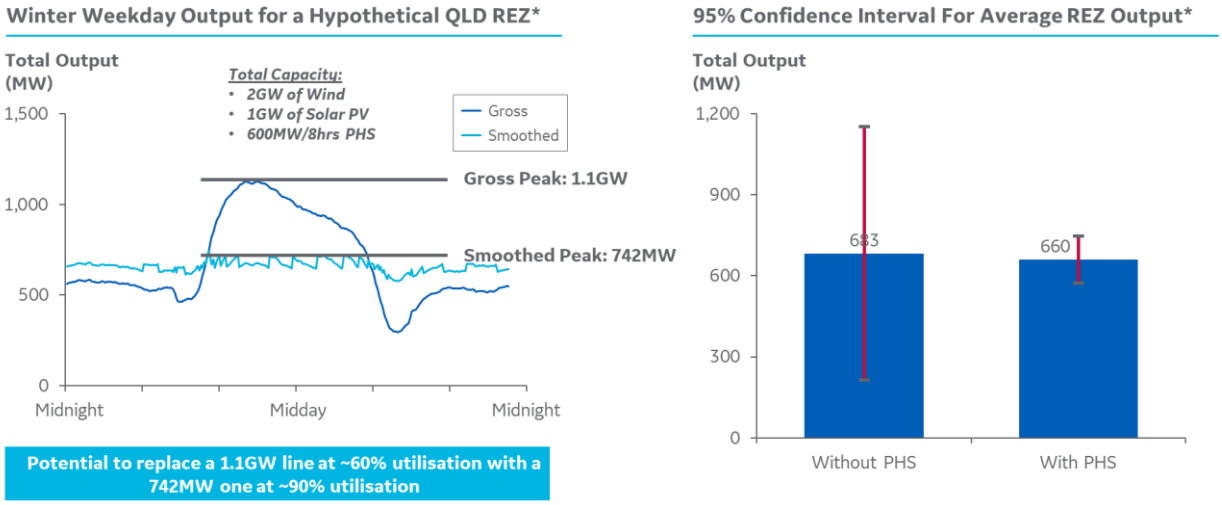
GE's in-house analysis suggests the low-load periods are likely to be deeper and longer than the peak load periods, so basing the analysis on them would ensure we had sufficient storage to maintain stable operation, whereas sizing the storage need based on peak load duration could lead to the system being 'caught short' during the low load periods. Refer below our analysis of the NSW market, looking at the average daily shape of dispatchable load (operational load minus intermittent REN generation) in 2019 vs 2030.



Source: Aurecon 2019 Cost & Technical Parameters Review; AEMO Market Generation & Load Data; AEMO 2020 ISP; AEMO Dispatch Data; GE Analysis
Notes: * Defined as the period during the daylight hours for which net dispatchable load is below the overnight minimum; ** Load includes Tumut 3 and Shoalhaven pumping load, but not their generation output

AEMO welcomes consultation on what matters should be considered in determining the location of storage and traditional thermal generators in the power system.

We support the approach of considering the benefits at a subregional level of storage. This would allow the wind and solar resources in that sub-region to be smoothed by the storage, enabling a smaller, more cost-effective, and better utilised transmission network. Refer below a simplified illustration of this effect in action for a hypothetical REZ in QLD.



Source: AEMO dispatch data; Aurecon capacity factors; GE Hydro Analysis
Notes: * Based on Aurecon capacity factors & AEMO data on solar and wind output by dispatch period for CY19; Data for an average winter day

In addition to the ability of storage to optimise/reduce transmission line costs, the consideration of synchronous storage technologies (such as pumped hydro) alongside wind and solar development would also allow that subregion (or REZ) to benefit from the system strength and inertia that fixed speed pumped hydro inherently provides. This would help reduce the required investment in system strength remediation and enable a more cost-effective overall solution.

Is the penalty factor approach with soft land use limits appropriate?

Previous approaches to determining resource limits tended to presume that the presence of wind or solar generators on land precluded it being used for anything else. In fact, we increasingly see projects collocating renewables with farming, for instance grazing sheep or cattle below solar panels or around wind turbine towers. As such, we support the more nuanced approach to determining resource limits as it seems to better reflect reality.

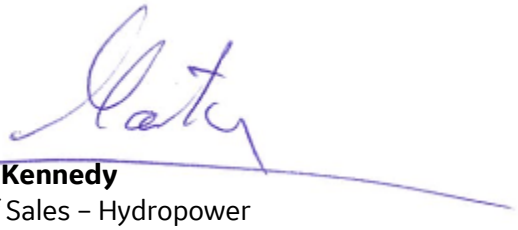
How might the 2022 ISP, or subsequent ISPs, consider smoothing the delivery of multiple simultaneous large ISP infrastructure projects – especially considering the relationship with infrastructure projects outside the energy sector?

While pushing projects far into the future may look logical from within the confines of an NPV model, or to preserve the flexibility to adapt course, we need to be mindful such thinking doesn't leave us reliant on too many things happening concurrently.

Spreading the load over a longer timeframe (i.e. getting started sooner) will alleviate potential capacity constraints and allow us to benefit from learning curve effects, both of which should enable a smoother transition, at lower cost to consumers.

We are happy to further discuss any element of the above as useful and look forward to working together in future on this and other projects.

With best regards,



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