



OFFICE OF THE CHIEF EXECUTIVE

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21 February 2020

Alex Wonhas

Australian Energy Market Operator (AEMO)

By Email: isp@aemo.com.au

Dear Alex,

Powerlink Queensland Response to 2020 Draft ISP

Powerlink Queensland (Powerlink) welcomes the opportunity to provide further input to the Australian Energy Market Operator's (AEMO's) 2020 Draft Integrated System Plan (ISP). Powerlink agrees with the intent of the ISP. While Powerlink appreciates AEMO consulting and engaging with Transmission Network Service Providers (TNSPs) given the significant amount of interest forecast in the plan, we consider that consultation with stakeholders – particularly consumers – needs to be further developed. Customer engagement would be complemented by the inclusion of key financial analysis summaries in the main report.

Powerlink appreciates the challenge and importance of this analysis and the role it will have in providing a roadmap for the efficient and secure operation of the National Electricity Market (NEM).

Powerlink has provided feedback as an active member of the joint planning process within the ISP development framework and the technical working groups that AEMO has established. Powerlink is of the view that there is great value in this continuing. We recommend more frequent jurisdiction-specific joint planning workshops and discussions as the ISP analysis progresses from the Draft to the Final ISP.

Powerlink recognises the sheer volume of modelling and analysis work required to publish the ISP and agrees with the areas identified by AEMO that require further focus and analysis to deliver more rigorous conclusions for the Final 2020 ISP. This includes:

- More in-depth power system analysis of all scenarios (not just Central), including system strength and marginal loss factor robustness.
- Validation of cost benefit analysis using time-sequential modelling that is more granular and inclusive of all relevant system normal transmission constraints.
- More detailed analysis of the impact the New South Wales Electricity Strategy may have on optimal timing and scale of projects.

It is also Powerlink's view that the Central Queensland – Southern Queensland (CQ-SQ) constraints would benefit from further scenario analysis, particularly taking account of the development of renewable generation in northern Queensland. Powerlink will pursue this with AEMO as part of the finalisation of the 2020 ISP.

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In addition, Powerlink recommends that the following items be considered as part of the analysis for the 2020 Final ISP:

- A smaller scale 'virtual transmission line option' and how this may impact the optimal timing and scale of the group 2 'actionable' QNI medium project.
- The impact of continued high uptake of rooftop PV on the optimal development path.

Along with the New South Wales Electricity Strategy, these important factors may defer the timing and/or reduce the scope of the QNI medium project. It is particularly important to assess the impact on the Step Change and Fast Change scenarios which are currently driving the 'actionable' status given to the QNI medium project and timing for the required regulatory consultation prior to the 2022 ISP.

More broadly, Powerlink requests that AEMO considers the following changes for the 2022 ISP:

- Investigate further the impact that marginal loss factors have on the least cost expansion plan.
- Further develop inputs and methodology to better consider the incremental cost (both in terms of timing and scale) of network reinvestment decisions on major flow paths.

These matters are explored further in our attachment to this letter.

If you have any questions in relation to this submission or would like to meet with Powerlink to discuss this matter further, please contact Powerlink's Acting Executive General Manager Strategy and Business Development, Stewart Bell.

Yours sincerely



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ATTACHMENT

2020 Draft ISP

1. Further analysis for the Final 2020 ISP

Based on the Draft 2020 ISP modelling, AEMO identified the QNI medium interconnector upgrade as a Group 2 'actionable' project. AEMO identified this as an important project that should be delivered by 2028/29 with an option of accelerating delivery to 2026/27 should the Step Change or fast Change scenario emerge. AEMO also recommended that Powerlink and TransGrid publish the Project Assessment Draft Report (PADR) prior to the publication of the 2022 ISP (PADR to be published by 10 December 2021).

Consideration of 'virtual transmission line' options

The Draft 2020 ISP considered a large (600MW/150MWh) battery energy storage system (BESS) option at an estimated cost of \$700 million to \$1.3 billion but concluded that these are not yet – but may very well be in future – a viable alternative to traditional transmission infrastructure (Appendix 9, page 298).

For the same reasons, 'virtual transmission line' solutions were not assessed as part of Powerlink and TransGrid's Project Assessment Conclusions Report (PACR) for 'Expanding NSW-QLD transmission transfer capacity'. However, TransGrid and Powerlink considered that 'virtual transmission lines' may form a viable option as part of a next stage upgrade of QNI. The 2026-2028 Draft ISP timeframe for the QNI medium upgrade allows for a comprehensive assessment of the technical feasibility of these options.

In the aforementioned PACR, Powerlink and TransGrid encouraged proponents of these solutions to respond to the current 2020 Draft ISP consultation, both in relation to:

- The capabilities of these technologies generally (to inform the ISP's consideration of these technologies as network solutions).
- Any non-network solutions they might propose.

This would enable consideration of those technologies by AEMO as part of the Final 2020 ISP.

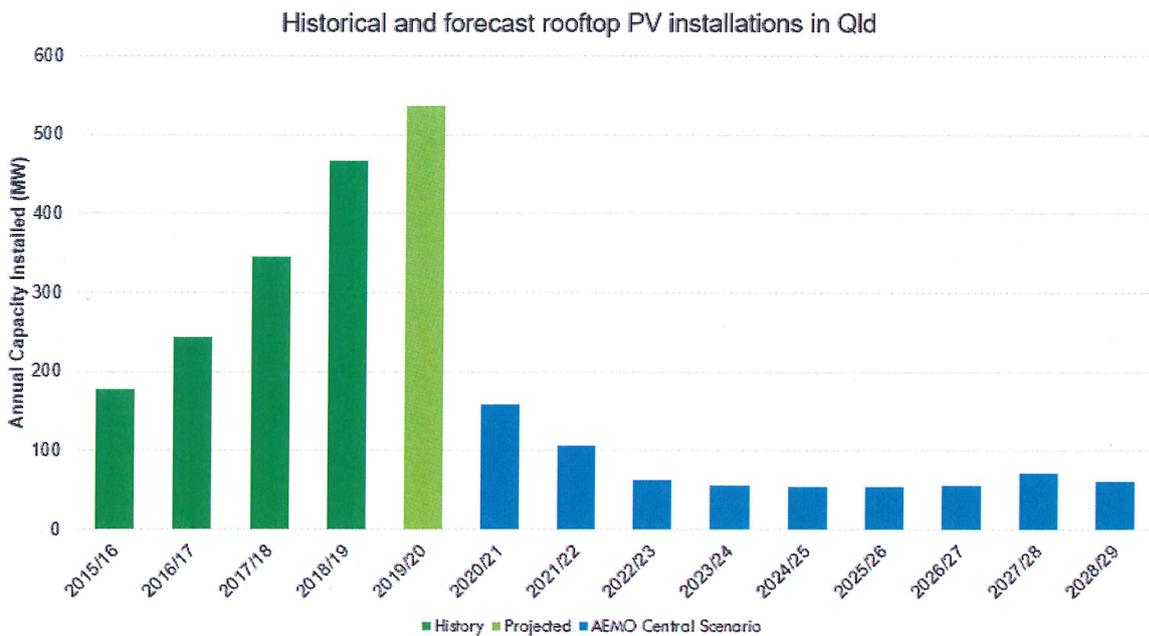
Based on Powerlink and TransGrid's consultation with BESS suppliers and the anticipated costs associated with smaller systems (e.g. 200MW/100-200MWh at \$250 million to \$350 million) Powerlink recommends that the 2020 Final ISP consider the merits of such scaled systems ahead of the QNI medium project (i.e. deferral benefits).

When assessing the benefits of this BESS technology it is also recommended that this analysis takes into account the option of locating the northern BESS at Calvale (or equivalent) as this allows both increases in the QNI limit as well as the Central Queensland to Southern Queensland (CQ-SQ) limit. Further efficiencies could be achieved by assessing whether the benefits from increasing the northerly flow on QNI are sufficient to justify the additional expense of a BESS in Central Queensland compared to a less expensive power resistor or even non-network response that trips generation in Central and/or North Queensland.

Understand the sensitivity of investments to rooftop penetration rates

Whilst forecast rooftop PV levels is predominantly an input assumption, Powerlink considers there is value in assessing the sensitivity of the medium-term optimal development path to the ongoing strong installation of rooftop PV (which is playing out across many states).

The figure below illustrates the stark comparison between what is occurring in the Queensland region versus AEMO's Central scenario forecast.



Sources: Australian PV Institute (APVI) Solar Map, funded by the Australian Renewable Energy Agency, accessed from pv-map.apvi.org.au on 6 February 2020, [2019 Input and Assumptions workbook v1.3](#)

A similar picture can also be observed with the southern regions.

Powerlink is concerned that if the current high NEM penetration rates continue beyond AEMO's forecast then this may impact on the need for daytime exports from Queensland. It is not clear from the Draft 2020 ISP analysis the extent to which this could impact the benefit in further expanding QNI capacity.

The Draft 2020 ISP does consider scenarios with higher PV penetration rates. However, coincident other factors, such as earlier timings of generator retirements and/or significant installations of behind the meter batteries, mask the effects of low day time demand in southern states.

Therefore, Powerlink recommends AEMO perform additional analysis considering this across all scenarios for the 2020 Final ISP to confirm that the "actionable" status of the QNI medium project is robust. It is particularly important that this analysis is done for the Step Change and Fast Change scenarios, and considers the regret of delaying the project, as the 2026/27 timing under these scenarios are driving the recommendation that Powerlink and TransGrid complete the RIT-T for this project prior to the 2022 ISP.

Powerlink believes the analysis should also include the impact of the New South Wales Electricity Strategy and focus on understanding the impact these assumptions have on the optimal timing and scale of the recommended development path for QNI.

If there is a shift in either the timing (i.e. deferred) and/or scale of the recommended project (that reduces the required lead time), Powerlink recommends the QNI medium 'actionable' project for the 2020 Final ISP be modified to QNI medium 'shovel-ready' with recommendations on the RIT-T to be deferred to after the 2022 ISP.

2. Network hosting capacity

Powerlink would like to raise a possible source of confusion for proponents between the Draft 2020 ISP documentation (page 74) and Powerlink's own [Generator Capacity Guide](#). Referred to as 'Existing Spare Capacity', Table 17 of the ISP may be interpreted to be the network hosting capacity, however this is not the case.

The Draft 2020 ISP figures are the market model's initial maximum generator build limits before a material augmentation is triggered. In contrast, Powerlink's Generator Capacity Guide informs proponents of the expected available capacity considering system strength and/or thermal ratings, i.e. the expected 'hosting capacity'. The expected hosting capacity is significantly lower than AEMO's build limits and is sensitive to system conditions such as differing market dispatches and the commitment of new generators.

3. Recommended improvements for the 2022 ISP

Powerlink requests that AEMO consider the following improvements for the 2022 ISP:

- Investigate the impact marginal loss factors have on the least cost expansion plan.
- Further develop inputs and methodology to better consider the incremental cost (both in terms of timing and scale) of network reinvestment decisions on major flow paths.

Marginal loss factors and impact on the least cost expansion plan

For the 2020 Final ISP, AEMO plans to do more in-depth power system analysis of all scenarios, including system strength and marginal loss factor (MLF) robustness.

Powerlink notes that the Draft 2020 ISP anticipates that retiring base load generators (positioned near load centres) will be progressively replaced by generation in quite remote network locations. As such, the consideration of losses becomes important in accurately ranking network locations and intra-regional augmentations. To account for this complexity Powerlink believes AEMO should consider applying:

- Future static MLFs for a particular generation and intra-regional transmission development combination.
- Dynamic MLFs for the various options of interconnectors.
- Allowances for the difference in losses with different dispatches in addition to the demand (using an average rather than marginal loss factor).

This will allow for a more iterative approach to the impact of losses on network location selection, acknowledging its impact in selecting the least cost expansion plan. If possible AEMO could apply this approach with MLFs to the Central scenario with the least cost expansion plan in the 2020 ISP and aim to incorporate it more fully into the process for the 2022 ISP.

Asset reinvestment cost and opportunities on major flow paths

The nature of transmission means that developing new or replacement infrastructure incurs a substantial cost 'flag fall', but then relatively low incremental costs to develop assets with larger

capacity. As such, condition driven asset reinvestments present unique opportunities to economically add additional capacity to major flow paths when it is aligned with the optimal development.

The challenge is for the joint planning process to provide the ISP development and assessment methodology sufficient visibility of the reinvestment needs across major flow paths. This would enable the ISP to identify synergies between asset reinvestment decisions and network development leading to more efficient market outcomes.

Where the ISP identifies quality renewable generation sources that are efficient to develop even with augmentation of the main transmission system – and there are synergies with reinvestment needs on the same grid sections – then this least cost expansion plan would be further reinforced. By considering only the incremental cost of augmenting a major flow path to achieve additional capacity, the ISP may converge on either:

- An earlier timing for this development; or
- Development of an alternative network location where the cost of required additional major flow path infrastructure was originally not considered efficient.