



Ref: A5689002

22 November 2024

Merryn York
Executive General Manager, System Design
Australian Energy Market Operator
Level 22, 530 Collins Street
Melbourne VIC 3000
By email: ISP@aemo.com.au

Dear Ms York

**Powerlink Queensland Submission
ISP Methodology Issues Paper November 2024**

Powerlink Queensland (Powerlink) welcomes the opportunity to provide feedback on the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP) Methodology Issues Paper and recognises its importance in helping to shape forecast and planning outcomes of the National Electricity Market (NEM).

Powerlink's response to the ISP Methodology Issues Paper questions are included as an attachment to this correspondence.

In summary, Powerlink acknowledges the potential benefits of building a new gas expansion model to understand and validate Gas-powered generation (GPG) needs but emphasises the importance of rigorously testing these requirements. Powerlink has proposed several changes to current modelling approaches to provide greater clarity and understanding of GPG needs, which include applying a cost penalty on greenhouse gas emissions to inform a least-cost investment pathway, assessing reserve requirements over all periods to understand reserve needs, and testing multiple weather reference years to understand system needs.

Powerlink also supports further engagement with Distribution Network Service Providers (DNSPs) to understand distribution network capabilities, while recognising the challenging nature of its application to an abstracted transmission network model, and proposes exploring the impact of each CER component on the system. Powerlink also supports AEMO's proposal to test previously-actionable projects for actionability and supports approaches to address forecast inaccuracy and uncertainty.

If you have any questions in relation to this submission or would like to meet with Powerlink to discuss this matter further, please contact Joe Hemingway.

Yours sincerely,

A handwritten signature in black ink that reads "J. Bridge".

Jacqui Bridge
EXECUTIVE GENERAL MANAGER, ENERGY FUTURES

Enquiries: Joe Hemingway, Manager Network Strategy – joe.hemingway@powerlink.com.au

1. *Do you consider that the proposal to develop a gas supply expansion model appropriately addresses the action in the Energy Ministers' response to the Review of the ISP for additional gas analysis to be incorporated in the ISP? If yes, why? If not, why not, and how could this action otherwise be achieved?*
2. *Do you agree with the proposal for AEMO to develop at least one gas development projection per ISP scenario, and apply the projection as an input to the capacity outlook model? If yes, why? If not, what method would you recommend for the inclusion of gas development projections in the ISP?*
3. *What alternative approaches should AEMO consider for enhancing the incorporation of gas in the ISP to address the action in the Energy Ministers' response?*
4. *What improvements could be made to AEMO's proposed approach to increase consideration of gas availability, considering gas transportation and storage capacity?*
5. *What improvements could be made to AEMO's proposed approach in its capacity outlook models to improve the representation of fuel usage for gas generation, particularly for mid-merit capacity?*

Powerlink agrees that building a new gas expansion model could help to understand and validate gas development requirements to facilitate Gas-powered generation (GPG) needs (and gas needs more holistically). However, Powerlink appreciates this is likely to be a very onerous process which may still not adequately address gas supply constraints and developments if the requirements for GPG are not rigorously tested. This would include the changing nature of the timing and frequency of GPG requirements. Powerlink recognises the challenges in GPG use may shift from an annual focus to a peak day use focus as the energy transition progresses towards a lower emissions future in a world highly dependent on variable renewable supply and demand.

Powerlink has identified changes to AEMO's modelling approaches that could provide greater clarity and understanding of whether the GPG needs modelled are adequate, reasonable and aligned with the scenario objectives at least-cost:

- **Emissions approach** – AEMO's current approach of applying a hard constraint on emissions forces the model to reduce emissions below the constraint and will alter or mask reasonable economic operation of generation and storage that is no longer credible or aligned with least-cost outcomes. Powerlink proposes applying a penalty cost on greenhouse gas emissions (in the form of new technologies) that can still inform a least-cost investment pathway while retaining the economic merit order of operation. This will also inform the value of emissions reductions under this scenario as well as more viable system requirements for GPG.
- **Reserve constraints approach** – AEMO's current approach of looking only at a reserve above peak demand becomes less viable in a future that is more reliant on weather dependent supply and energy limited storage. Powerlink proposes assessing available reserves over every time interval period instead helps to understand the size, shape, duration, frequency and timing of when reserves are likely to be lowest and what least-cost remediations can cover these periods to effectively meet reserve requirements. The role of non-energy limited dispatchable capacity (currently in the form of GPG) is critical during these periods and will help to inform these requirements more effectively as an input into gas supply requirements.

- **Weather patterns approach** – AEMO’s current approach of using a rolling reference year horizon for weather-driven load and supply can significantly distort system needs depending on the timing of these weather patterns with the coincidence of major shifts in supply and/or demand outcomes. Powerlink proposes testing multiple single weather reference years (and even synthetic weather traces) to understand how system needs change, in particular dispatchable capacity needs to maintain reliability of supply. This will also help to understand the drivers of outcomes in particular years that may drive the requirement for key investments (such as transmission projects) which may otherwise be distorted or hidden by a particular weather pattern. Powerlink recognises this may be an onerous exercise, but one that is needed to explore and enhance investments outlined in the capacity outlook model, including GPG needs. Powerlink has investigated different weather patterns in partnership with the Bureau of Meteorology and is willing and able to support AEMO with this approach.
- **Reliability assessment approach** – Powerlink understands that AEMO assesses resource adequacy as part of the time-sequential modelling, and would encourage these studies to be explored, enhanced and published to address reliability gaps and proposed remediations in the form of additional dispatchable capacity needs including GPG. Powerlink has undertaken internal studies on the reliability of supply requirements in Queensland. These studies identified notable supply deficiencies beyond those predicted by least-cost expansion models, particularly when accounting for reasonable outage considerations and limitations across generation, storage, and transmission assets, as well as varying weather patterns. A greater analysis of this area is highly beneficial to adequately evaluate reliability needs. Powerlink is a willing and able participant to support further work in this area.

If the requirements for GPG are adequately evaluated via the proposed approaches above, Powerlink agrees with the proposal for a gas development projection for each scenario as this would be a function of the requirements for GPG. Where GPG requirements are not adequately accounted for, then gas development projections as an input into the capacity outlook model may constrain the ability of what GPG can provide to the system, which may not be aligned with least cost objectives. A greater understanding of GPG needs will help to understand the timing and impact of existing pipeline and supply constraints, and indicate what expansions are available and needed to facilitate GPG outcomes.

6. What are your views on AEMO’s proposed inclusion of distribution network capabilities and their impact on CER within the ISP model? What further enhancements could be made?

Powerlink agrees there is merit to further engagement with Distribution Network Service Providers (DNSPs) to better understand distribution network capabilities. However, Powerlink acknowledges the difficulty of adequately providing relevant information that is computationally tractable (given the level of granularity and complexity of the distribution network) and applying that to a highly abstracted view of the transmission network.

Further enhancements could explore, test, and demonstrate the impact of each CER component on the system and the associated trade-offs at the transmission level. This will help to understand the ‘size of the prize’ which can help inform DNSPs, policy makers and stakeholders more broadly on decision making and their consideration to facilitating least-cost outcomes.

7. Do you agree with AEMO’s proposals to improve its hydrogen electrolyser load modelling, or have further enhancements to suggest? Please provide any supporting evidence.

Powerlink agrees with the approach to apply minimum utilisation factors to meet economic investment requirements and adjust the production requirements from a monthly to daily basis.

8. *What are your views on AEMO's proposal to test previously-actionable projects for actionability at the project proponent's timing within the actionable window, and at a later re-start timing?*

Powerlink supports AEMO's proposal to test previously-actionable projects for actionability at the project proponent's timing within the actionable window, and at a later re-start timing.

9. *Do you agree with AEMO's proposed approach to model storage devices with headroom and footroom energy reserves and imperfect energy targets in the time-sequential modelling component? What improvements should be made to model energy storage limits to better reflect actual behaviour and address issues of 'perfect foresight'? Please provide any supporting evidence.*

Powerlink strongly supports approaches to better capture issues around perfect foresight and perfect coordination as part of a least-cost mix and maintaining reliability of supply. Powerlink recognises the materiality of assumptions around perfect foresight combined with perfect market coordination and how this leads to underestimating both the level of storage and backup dispatchable generation in the form of GPG. Powerlink supports practical applications to address forecast inaccuracy, uncertainty and reasonable market behaviour. Powerlink is particularly supportive of an 'energy planning with error' approach that may better capture uncertain operational conditions and how participants may respond based on their objectives and risk appetite. Powerlink has a strategic partnership with the Bureau of Meteorology to better understand weather-driven dynamics, their uncertainty and associated impact on the power system. This includes a preliminary investigation of the imperfect behaviour of energy-limited storage devices in response to uncertain weather-driven demand and supply conditions. Powerlink is able to actively support AEMO in their investigations and approaches to addressing perfect foresight.

10. *What risks should AEMO consider when assessing how IBR can complement synchronous machines in providing system strength and inertia?*

11. *Do you agree with AEMO's proposed approach for uplifting cost and modelling representation for system security services in the ISP? If not, what alternative methods would you recommend? Please provide any supporting evidence.*

Powerlink has identified several risks that AEMO should consider when assessing how Inverter-based resources (IBR) can complement synchronous machines in providing system strength and inertia. These include, but are not limited to:

- **Protection operation** – continues to be fast and reliable.
- **Stability** – the ability to ride through disturbances.
- **Power Quality** – acceptable levels of harmonics and oscillations (no control system interaction between grid-forming inverters and other power electronic devices).

Powerlink acknowledges the challenges of accounting for the costs and modelling representation of system security services with particular unit-commitment assumptions and how that can change with different information and/or a more detailed assessment of localised services required. Powerlink is keen to explore these opportunities and approaches further via Joint Planning activities.

12. Do you agree with AEMO's proposal to model more than two wind resource quality tranches for geographically large REZs? If not, what alternatives should AEMO consider?

Powerlink strongly supports the inclusion of multiple wind resource quality tranches for REZs, particularly in geographically diverse locations. Powerlink acknowledges that weather diversity and uncertainty, particularly related to wind generation, can have a large impact on the outlook for the power system. Powerlink can support further exploration in this space via Joint Planning activities.