

15 February 2024

Australian Energy Market Operator (AEMO)
GPO Box 2008
Melbourne VIC 3001

Submitted by email to ISP@AEMO.com.au

AEMO Draft 2024 ISP Consultation

Snowy Hydro Limited welcomes the opportunity to comment on matters raised in the Australian Energy Market Operator (AEMO) Draft 2024 ISP Consultation.

A foundation for a smooth transition in the NEM is through an Integrated System Plan (ISP) with clear timelines for strategic network upgrades and interconnection. The Draft 2024 ISP has demonstrated the economic benefits of actionable projects under all scenarios, including sensitivity under different assumptions such as the rate of change and the progress of major energy storage initiatives. Snowy Hydro supports AEMO's continued improvement of the ISP methodology to support the strategic transmission requirements of the NEM.

Increasing transmission capacity in a timely manner should continue to be prioritised in the ISP by AEMO with committed timelines. Until transmission is built the lowest cost renewable energy will be unavailable to consumers. As part of the Draft 2024 ISP Consultation, Snowy Hydro believes AEMO should undertake further assessment and improvements in the below:

- **Data assessment on droughts:** On Variable Renewable Energy (VRE) drought, AEMO's ISP modelling applies weather patterns from 2010-11 to 2021-22 and analyses the operability of the power system during future conditions, modelled off the historically observed weather. We believe that the 10 year data assessment is not long enough to capture the full range wind and solar droughts and recommend a historical profile of 30-50 years.
- **Timing certainty on critical transmission:**
 - Under the Draft 2024 ISP, the Sydney Ring South project is noted as requiring more investigation of network options. While the project is expected to be completed in 2027, should other proposed projects move ahead of this augmentation (such as the North connection), this timeline increasingly becomes unlikely. Timing for Sydney Ring South is critical to coincide with the completion of HumeLink so as NSW can obtain the full benefits from the Project Energy Connect (PEC) and the HumeLink transmission lines.
 - The current timing of both the Northern and Southern Circuit for HumeLink is optimal and should not be delayed. Transmission capacity into Sydney is already full. HumeLink will unlock existing, constrained dispatchable and variable renewable capacity and substantially improve reliability of electricity supply in NSW. Furthermore, this project will enable NSW to receive the very considerable benefits of the Snowy 2.0 project.
 - HumeLink will also provide additional transmission access to the South-East NSW and Southern NSW Renewable Energy Zones (REZ), in which 7,500MW of renewable connection enquiries have been made along with connecting PEC.

More detail on the two improvements are explained below.

System Reliability - Data assessment on droughts

The 2024 ISP highlights the importance of firming and deep storage as coal retires. AEMO models an eight-day VRE drought in 2040, in which gas and deep hydro are required to run more or less continuously, as there is insufficient spare generation to fully recharge shallow and medium storages. On the last day of the event (26 June 2040), deep storages only held 16 per cent of their storage capacity. At this point the draft 2024 ISP notes that "*if the VRE drought were to continue*

much longer, deep storages in the southern states may become incapable of providing further energy."

While this VRE drought work is critical, it only applies weather patterns from 2010-11 to 2021-22 and analyses the operability of the power system during future conditions, modelled off the historically observed weather. AEMO also noted that *"it is not guaranteed that this historical period includes the worst possible VRE drought conditions."* It is for this reason Snowy Hydro believes that a 10 year data assessment is not long enough to capture the full range wind and solar droughts and that AEMO should seek to assess a historical profile of 30-50 years. While a longer historical profile may not guarantee the worst possible VRE drought conditions it could provide a much improved assessment.

VRE generation in the NEM is dominated by wind and solar generation. Wind and solar tend to complement one another because their seasonality is different, which leads to annual timescales for both wind and solar being very reliable and the annual energy output not varying too much. On monthly timescales however both wind and solar can vary a lot from the expected (seasonal) amount which requires a more detailed assessment from AEMO.

VRE droughts occur during extended periods of low wind and decreased sunshine hours. The most at-risk period is late autumn to early winter, when solar is seasonally low and before the winter winds develop. For example, in June 2017 there was an extended period of low wind coinciding with solar seasonal minimum. Seasonal predictability (i.e. 1-6 months ahead) of wind and solar is very hard, so a VRE drought in any particular year will nearly always take us by surprise. Therefore more analysis needs to be undertaken to achieve more detailed data sets or to highlight the risks of extended wind and solar droughts by AEMO.

AEMO projections show renewable droughts can last from days to months but as the amount of VRE in the system increases, the importance of managing this variation increases. A key variable to assess reliability moving forward is the adequate energy supply for prolonged periods of low VRE.

AEMO models their ISP with data from 2011-2021, however this is unlikely to be representative of VRE risk. The Griffith University Paper *"Quantifying the risk of renewable energy droughts in Australia's National Electricity Market (NEM) using MERRA-2 weather data"*¹ recently developed a 42 year backcast of simulation of VRE output across the entire NEM, something AEMO could emulate. This simulation would give a greater data set, increasing the accuracy of AEMO's modelling.

Another paper which could assist AEMO is the Australian Pipelines and Gas Association Frontier report on the *"Potential for Gas-Powered Generation to support renewables"*², which developed a simplified model of the electricity system in South Australia to analyse the role of gas-powered generation in a 100% renewable (or close to) electricity system. It found in the forecast 2035 traces, there is a three-month period where wind output is approximately 25% of capacity overall, and a month-long period where wind output is approximately 13% of capacity. This represents a deficit of 64% compared to the average wind output, which was 36% of capacity for the full year.

Transmission will help diversify the risk of VRE droughts in one region, particularly around the worst events. However the market will need long-duration firming to fill the drought gaps.

¹ Gilmore, J., Nelson, T., Nolan, T., 2022, "Quantifying the risk of renewable energy droughts in Australia's National Electricity Market (NEM) using MERRA-2 weather data"

<< https://www.griffith.edu.au/_data/assets/pdf_file/0024/1615614/No2022-04-VRE-droughts-modelling-Griffith.pdf >>

² Frontier Economics, 2021, "Potential for Gas-Powered Generation to support renewables"

Transmission timelines

Under the 2024 ISP, the Sydney Ring South is expected to be completed in 2027 however should other proposed projects move ahead of this augmentation, such as Sydney Ring North this timeline increasingly becomes unlikely. Timing is critical to coincide with the completion of HumeLink so as NSW can obtain the full benefits from the HumeLink and PEC transmission line.

The final AEMO 2022 ISP demonstrated the importance of HumeLink. The ISP noted that *"the Sydney Ring project increases transfer capacity into the Sydney, Newcastle and Wollongong area by approximately 5,000 MW"* and that *"it should commence immediately, to support REZ development in the New South Wales Government's Electricity Infrastructure Roadmap and maintain reliability of supply for New South Wales consumers"*³

The increased transfer capability between southern NSW and Sydney (HumeLink with Sydney Ring) would maximise the reliability and resilience benefits from the Southwest NSW REZ, new interconnection with South Australia and future interconnection with Victoria, and the Snowy 2.0 pumped hydro energy storage facility at lowest cost for New South Wales consumers. The advanced transmission augmentations between Snowy Mountains and Bannaby will help support Sydney under peak load conditions only if the Sydney Ring Southern Option is completed.

The transmission upgrades from Sydney Ring South would also improve system security for the NEM by increasing firming capacity from both the existing Snowy Scheme and Snowy 2.0. (Snowy currently has 1,200 MW it cannot deploy in NSW at times of peak demand.)

There is a significant push on the urgency of HumeLink. Energy Ministers agreed that under the new National Energy Transformation Partnership, HumeLink would be a declared transmission project of national significance, to accelerate the timely delivery of the critical project. In addition to this NSW and Australian Governments are jointly funding over \$2 billion⁴ in energy and emissions reduction initiatives, which includes the HumeLink project. Without the Sydney Ring South however the benefits of HumeLink for reliability in the NEM are significantly impaired.

With the 2024 ISP noting that more investigation is required on the southern network options it is important to note that the Sydney Ring South was a future ISP Project in the 2020 ISP and an actionable ISP project in the Draft 2022 ISP. Transmission augmentations have long lead times so it is therefore important that early works on these projects start as early as possible.

HumeLink

The timing of HumeLink in the 2024 ISP is optimal. HumeLink will release 1,200MW of constrained energy capacity from the Snowy Hydro that cannot currently get to consumers in NSW at times of peak demand, and ultimately enable NSW to receive the very considerable benefits of the Snowy 2.0 project.

Furthermore, HumeLink will provide additional transmission access to the South-East NSW and Southern NSW REZ, in which 7,500MW of renewable connection enquires have been made. Further, HumeLink will integrate with the South Australia-NSW Interconnector (PEC), which will have access to the South-West NSW, which will increase the potential renewable energy available (based on connection enquiries) to almost 10,000MW.

³ AEMO ISP 2022, PP 70

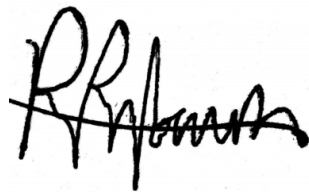
⁴<https://www.energy.nsw.gov.au/nsw-plans-and-progress/government-strategies-and-frameworks/nsw-electricity-strategy/memorandum>

About Snowy Hydro

Snowy Hydro Limited is a producer, supplier, trader and retailer of energy in the National Electricity Market ('NEM') and a leading provider of risk management financial hedge contracts. We are an integrated energy company with more than 5,500 megawatts (MW) of generating capacity. We are one of Australia's largest renewable generators, the third largest generator by capacity and the fourth largest retailer in the NEM through our award-winning retail energy companies - Red Energy and Lumo Energy.

Snowy Hydro appreciates the opportunity to respond to the Australian Energy Market Operator (AEMO) Draft 2024 ISP Consultation. Any questions about this submission should be addressed to panos.priftakis@snowyhydro.com.au.

Yours sincerely,

A handwritten signature in black ink, appearing to read "P. Priftakis".

Panos Priftakis
Head of Wholesale Regulation
Snowy Hydro