windlab

31 May 2023

Australian Energy Market Operator (AEMO)
Submitted via: ISP@aemo.com.au

Re: Draft Transmission Expansion Options Report Consultation

Windlab welcomes the opportunity to provide a submission on AEMO's draft Transmission Expansion Options Report which was released on 2nd May 2023. As background, Windlab is a 100% Australian-owned renewable developer (owned by Squadron Energy and Federation Asset Management), which has operated in the industry for over 20 years. It has a massive Australian project portfolio of 23.5GW under development and 1GW constructed.

Windlab would like to make the following main points:

1. Windlab is encouraged to see the addition of many transmission development options in QLD considering recent policy announcements such as the Queensland Energy and Jobs Plan (QEJP), and SuperGrid Infrastructure Blueprint. Constraints between Southern Queensland and Northern NSW may drive price separation and inefficient market outcomes between these two jurisdictions should the QEJP be realised along the lines proposed by the Queensland Government.

2. The renewable resources in QLD are of particular importance to a mostly renewable grid. The wind in QLD, and particularly Northern QLD tends to be slightly negatively correlated to wind elsewhere on the NEM. QLD solar also tends to perform comparatively well in winter relative to other states. For these reasons it is likely that an optimised mostly renewable grid will be over-weight to wind & solar in these regions, so it is important that transmission augmentation options that could enable this are well considered.

3. Windlab has noted in other submissions to AEMO that the capacity factors for the wind traces in South-West NSW REZ (N5) are much too low. Windlab has run the ISP Step-Change PLEXOS model with more accurate wind traces for this REZ and noted that it resulted in 2.5 GW more wind in this REZ in 2030 compared to the Step-Change scenario. It is therefore important that AEMO places a higher priority on transmission augmentation options in this region than may be obvious when looking at the Step-Change results.

Importance of transmission augmentation options in QLD

Since the 2022 ISP was released, there have been significant policy announcements for QLD such as the Queensland Energy and Jobs Plan (QEJP), and SuperGrid Infrastructure Blueprint. These announcements are likely to see more renewable development in QLD than previously thought, increasing the importance of transmission augmentation options in this state.

Windlab has also done extensive modelling of a highly renewable NEM and determined that the times of extreme stress on the grid are most likely to be cloudy winter days when it is calm across most of southern Australia[1]. Figure 1 shows the relative performance of wind and solar on the most challenging 10% of days of a three-year simulation. It demonstrates that QLD wind and utility PV are the highest performing on these challenging days. This emphasises that a mostly renewable grid is likely to be over-weight in wind and solar from QLD.

Wind in northern QLD is of particular importance to a mostly renewable NEM. Figure 2 shows correlation coefficients between the daily output of wind and solar in every NEM state, except in QLD where the wind results shown are for the Coopers Gap (Sth QLD) and Mt Emerald (Nth QLD) wind farms. Mt Emerald is negatively correlated with renewable generation in every other state. Both these figures emphasise the importance of renewable resources in QLD and the importance of ensuring adequate transmission in these regions.

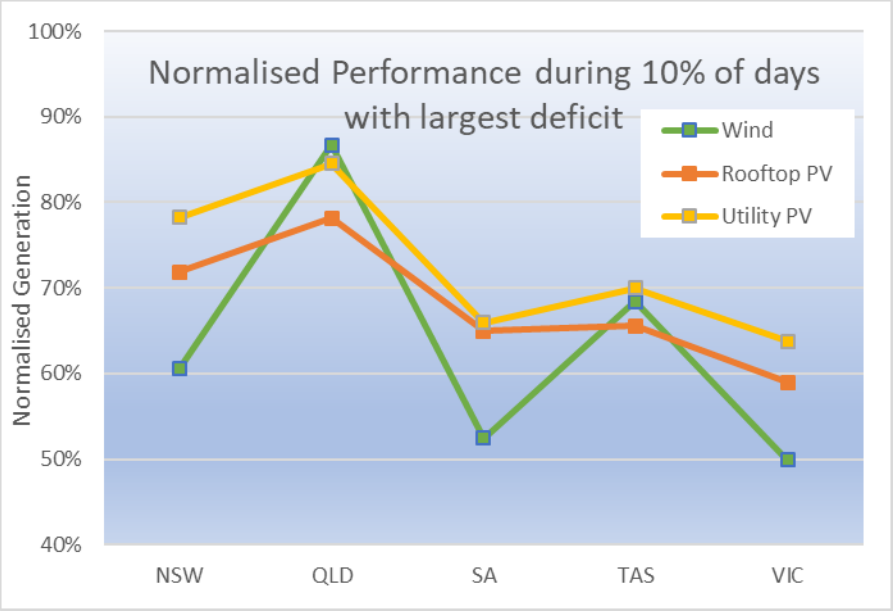

Figure 1: Relative performance of wind and solar by state on the days with the largest generation deficits (demand – wind – solar). A normalised generation of 100% implies that the generation type is performing at average levels in that state. QLD wind performs the best on these most challenging days, with a relative performance of 87%, or 13% below average.

[1] See https://reneweconomy.com.au/how-to-run-the-national-electricity-market-on-96-per-cent-renewables-91522/

daily	Coopers Gap	Mt Emerald	SA wind	NSW wind	VIC wind	TAS wind	QLD PV	SA PV	NSW PV	VIC PV	TAS PV
Coopers Gap		-1%	14%	42%	14%	-17%	-18%	-10%	-13%	-9%	-11%
Mt Emerald	-1%		-8%	-24%	-6%	-11%	-10%	-28%	-9%	-21%	-17%
SA wind	14%	-8%		46%	76%	15%	5%	-23%	-3%	-17%	-18%
NSW wind	42%	-24%	46%		54%	34%	4%	-13%	-10%	-18%	-18%
VIC wind	14%	-6%	76%	54%		47%	9%	-27%	5%	-26%	-28%
TAS wind	-17%	-11%	15%	34%	47%		19%	-8%	16%	-12%	-14%
QLD PV	-18%	-10%	5%	4%	9%	19%		44%	65%	43%	60%
SA PV	-10%	-28%	-23%	-13%	-27%	-8%	44%		44%	77%	71%
NSW PV	-13%	-9%	-3%	-10%	5%	16%	65%	44%		43%	58%
VIC PV	-9%	-21%	-17%	-18%	-26%	-12%	43%	77%	43%		78%
TAS PV	-11%	-17%	-18%	-18%	-28%	-14%	60%	71%	58%	78%	

Figure 2: Daily correlation coefficients between renewable resources in each state. Mt Emerald generation is negatively correlated with the renewable resources in every other state. This emphasises the importance of wind in northern QLD as being uniquely important to a mostly renewable NEM.

South-West NSW REZ

As Windlab has submitted to AEMO in other consultation processes (such as the ISP methodology review), the wind resource in the South-West NSW REZ (N5) is of much higher quality than suggested by the wind traces used by the ISP. Windlab has been monitoring in these REZ for multiple years and is confident that wind farms in the region will be able to achieve pre-curtailment capacity factors exceeding 40%. In contrast, the ISP assumes the capacity factor to be much lower at around 29%.

Windlab has used the ISP step-change model in PLEXOS and run a scenario with more accurate capacity factors in SW-NSW REZ (CF~40%). The capacity of wind in the N3 & N5 REZs from this simulation is shown in Table 1 below. Approximately 2.6 GW more wind is built in the SW-NSW REZ by 2030, compared to the ISP Step-Change scenario, with most of that wind being shifted from the Central-West Orana REZ. The impact is reduced by 2050, with the SW-NSW REZ having an additional 700MW of wind.

GW	N3 (CW-Orana)		N5 (SW-NSW)	
Year	Base	CF40	Base	CF40
2030	3.0	1.9	0.0	2.6
2050	8.3	7.7	3.6	4.3

Table 1: Modelled wind capacity in Central West Orana (N3) and SW NSW (N5) according to the ISP step change (Base), and again when the capacity factor of wind in N5 is increased to 40% (CF40)

It is clear that more accurate capacity factors could materially change new capacity build and hence transmission requirements in the region. Ensuring that there are sufficient options, especially to facilitate capacity west of Hay, is essential at this stage of the transmission development process.

Furthermore, sequencing of announcements will be a challenge regarding development of this REZ as the final version of the NSW Network Infrastructure Strategy has only just been released and is waiting for a formal declaration from the NSW Energy Minister. While Windlab appreciates that AEMO does not want to pre-empt

the results of that process, ensuring that there are sufficient options on the table whatever the outcome should be a priority.

Windlab looks forward to being part of ongoing consultation with AEMO. Please don't hesitate to reach out if you would like to discuss these items or the massive potential that wind projects in these regions can deliver for consumers.

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