Star of the South

AEMO Draft 2024 Integrated System Plan for the National Electricity Market – Consultation Submission

Overview

Star of the South acknowledges the Australian Energy Market Operator (AEMO)'s extensive work on the Draft 2024 Integrated System Plan (ISP). We welcome the opportunity to make a submission to the consultation process. Star of the South recognises the broad industry and stakeholder engagement involved in the ISP planning process.

As Star of the South is Australia's most advanced offshore wind project, we have utilised our work to date, alongside our local and international experience successfully delivering offshore wind in global markets, to provide AEMO with critical insight into the Integrated System Plan.

Star of the South is committed to supporting the development of a clear and progressive framework that focuses on accelerating the transition to a low-carbon economy, addressing Australia's energy needs and net zero ambition.

Star of the South takes this opportunity to highlight the vast potential of offshore wind to contribute to increasing renewable energy generation, diversifying the energy mix and enhancing energy security.

We welcome AEMO's inclusion of Victoria's offshore wind targets in the Draft ISP. Including offshore wind in the National Electricity Market's (NEM) generation mix presents opportunities to generate clean energy at scale and close to load centres – a crucial consideration given that 85 per cent of Australians live within 50 kilometres of the coast.

Noting the significant undertaking to build an offshore wind industry, Victoria's offshore generation delivery requires a national approach. Such an approach is necessary to ensure the requisite workforce is skilled and available, and the global supply chain can deliver within Australia. With this in mind, and as AEMO's 2022 ISP provides for offshore wind in Victoria, the Draft 2024 ISP does not include offshore wind in the New South Wales (NSW) generation mix. Noting the significant requirements for offshore wind, we propose that AEMO include offshore wind more broadly within the Optimal Development Plan (ODP). Given that the ODP assumes that all new generation will be located onshore and envisions a balanced distribution of wind and solar energy resources across the state, such an approach may not be fit-for-purpose.

Given the broader positive impacts of a national approach to offshore wind, we have undertaken detailed analyses and modelling, supported by independent studies from external consultants, to understand the role offshore wind off the Hunter coast will play in supporting NSW's renewable energy needs. The findings attest to the value of including offshore wind in NSW's generation mix in the next decade.

In addition to driving job creation for regional communities, offshore wind in the Hunter will de-risk NSW's pathway to net zero and support network reliability and security as coal-fired generation is phased out. The onshore pipeline, dependent on substantial transmission upgrades and expansions, is already encountering significant delays and challenges. These delays are driven across differing fronts, including securing social licence and planning approvals. These challenges highlight the need to supplement onshore resources with offshore wind to replace major coal exits and meet forecasted demand effectively.

Offshore wind in the Hunter complements NSW's renewable generation portfolio by tapping into alternate weather patterns that align with demand when onshore solar and wind are not generating. The Hunter region is also close to major load centres and where coal-fired power plants are retiring, reducing the need for new transmission developments.

Offshore wind will be crucial to meeting Australia's emissions reduction and renewable energy targets. However, offshore wind relies on the correct risk settings, transmission and regulatory certainty, and a path to market to deploy the capital required to deliver large-scale offshore infrastructure. Ongoing investment is needed to avoid a 'just in time' transition. We commend government initiatives such as Long-Term Energy Service Agreements and the establishment of Renewable Energy Zones (REZs).

We strongly support implementing additional measures, such as mandated renewable energy infrastructure targets, as they reduce uncertainty and offer the necessary investment signals to advance projects through critical milestones.

Risk mitigation for disorderly coal closure

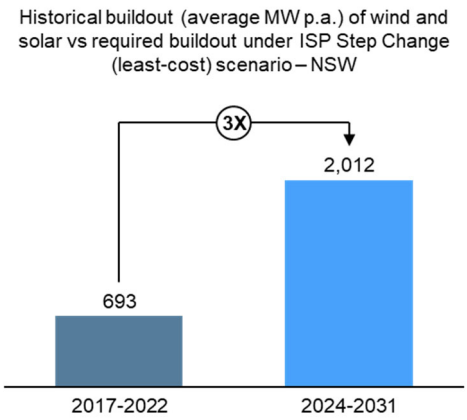
As the draft ISP acknowledges, "*offshore wind can drive further diversity in the generation mix*." Offshore wind generation profiles can provide a renewable source complementing onshore renewable generation profiles, providing a secure, large-scale and reliable renewable energy supply. As AEMO notes, "*Coal owners are only required to give three and a half years' notice of a closure, which gives very little time for the NEM to react. Replacement capacity must be put in place well in advance*." Offshore wind mitigates risks associated with dependence on a single energy source profile and aged coal generators, strengthening the reliability and security of the grid.

Star of the South shares AEMO's concerns regarding the risk of early and disorderly coal closures. It creates unrealistic scenario planning, leading to under-investment risk potentially greater than over-investment risk. State-based offshore wind targets provide 'insurance value' for early coal retirements and their increasing maintenance outages. As such, ODP selection is sensitive to coal retirement risks. Star of the South is concerned that insufficient risk mitigations for coal retirements will lead to retirements outpacing the ISP. If coal exits over the next several years are faster than forecasted in the draft ISP and major actionable transmission projects remain incomplete, this is a major risk for energy reliability and security in the NEM.

Star of the South suggests that AEMO emphasises coal closure risks in the ISP and further considers the optimal generation mix and associated transmission requirements. This is expected to signal to policymakers the urgent need to include offshore wind in the NEM generation mix in all states.

For example, the expected closure of four out of five of the state's coal power stations within the next 15 years – constituting over 80 per cent of NSW's baseload generation – necessitates the deployment of substantial new generation and fit-for-purpose transmission infrastructure in NSW and other declared offshore wind zones.

Figure 1: Historical vs forecast delivery rate of renewable projects



Historical installation rates and social licence issues suggest onshore resources alone cannot meet the scale required to replace the coal station closures. Based on the ISP's Step Change scenario, NSW will need to install over 2 GW per annum of wind and solar between 2024 and 2031 to meet coal closures and emissions reduction targets – 3 times the historic (2017-2022) rate of 0.7 GW per year (Figure 1). Given the limited wind generation installed in NSW over the past five years, these multiples are much steeper when solar is excluded.

Offshore wind off the Hunter coast contributes to de-risking NSW's pathway to net zero. Being located offshore positions it close to load centres and, importantly, to existing transmission infrastructure. Such proximity supports reduced transmission costs and lowers the risk of delays related to social licence and approvals while supporting the transition of the Hunter region's energy industry toward cleaner and sustainable sources. This provides an optimal pathway to net zero, mitigating energy security and reliability risk as NSW coal generators retire.

Recommendation 1: AEMO reconsiders the benefits of offshore wind in de-risking disorderly coal closure and its implications delivering the ODP weighed – given the scale offshore generation can bring.

Supporting social licence

Renewable energy sited appropriately, with proximity to load centres and connected efficiently to the grid, is better placed to reduce transmission line development costs and associated social licence risks, providing an optimal pathway to net zero.

Star of the South supports AEMO's approach to incorporating social licence considerations in the ISP by assessing social licence sensitivity, quantifying the cost-benefits and how the loss of social licence could impact the delivery of the ODP. The draft ISP finding that the risk of delays caused by loss of social licence leads to $17 billion more in overall costs is useful in quantifying the risk social licence poses to the energy transition.

We continue to encourage AEMO to consider further assessment of the social licence risks and potential benefits associated with specific generation technology types – and, subsequently, any impacts on the Levelised Cost of Energy (LCOE) assessments across technologies. Such inclusions would be useful to evaluate the optimal generation mix that diminishes social licence costs for transmission line developments. For example, offshore wind's proximity to load centres and existing grid infrastructure are inherent advantages reducing the length and number of transmission developments. Such proximity results in reduced transmission requirements and other costs, including the overall cost of earning a social licence, and lower risks of the impact of planning and approval delays – which, importantly, may not be included in any transmission delivery reference pricing.

Transmission development delays pose grave risks to the energy transition and elevate risks for the path to net zero.

The draft ISP forecasts that *"…close to 10,000 km of transmission will be needed by 2050 under the Step Change and Progressive Change scenarios. About 5,000 km of this transmission delivery is in the next decade, creating about 4,000 km of new transmission*." Also noted in the draft ISP, "*…some actionable ISP projects have already experienced schedule delays, and such slippages are likely to continue*."

Transmission delivery at the scale proposed in the ISP depends on earned and delivered social licence. At-scale generation technologies requiring fewer transmission developments, and close to load centres reduce social licence risks, with delay impacts materially risk the timely delivery of the ODP.

Recommendation 2: AEMO to model social licence sensitivity and delay costs for different generation and transmission technologies.

Supporting reliability, security and affordability

Noting that the global offshore wind supply chain requires a significant pipeline to ensure the proposed Victorian offshore wind targets are being met, we collaborated with the Bureau of Meteorology (BOM) to explore the potential contribution of offshore wind in the Hunter to the benefits of electricity generation diversification in NSW, given the Commonwealth has declared the area as an offshore wind area. Such work was designed to establish the potential pathways to assist the continual offshore wind pipeline development.

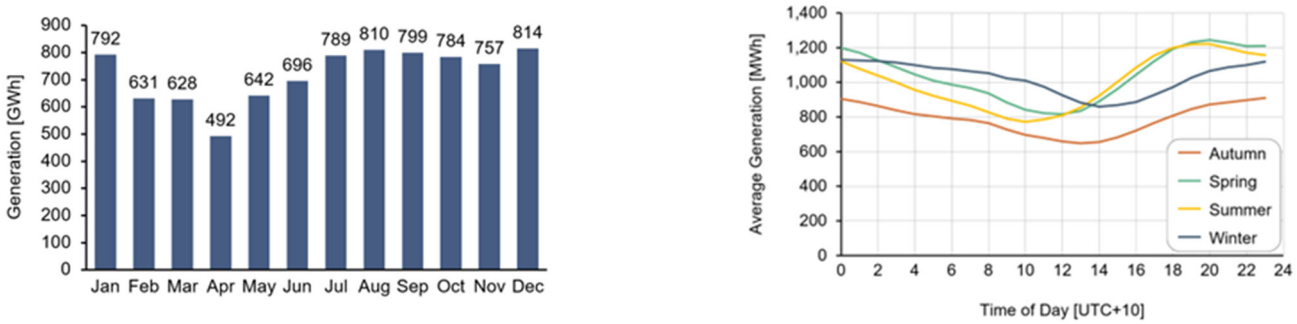
Further illustrating the benefits of adding offshore wind to the grid, the detailed modelling suggests a need for offshore wind in the Hunter region as part of a portfolio of diversified assets to increase reliability, security and price stability of supply in the state and throughout the NEM. As such, not only does NSW benefit from the improved resilience, the generation profile within the Hunter offshore region aligns with peak demand periods, providing critical support to the grid when it is most needed.

Data was sourced from the BOM's Atmospheric High-Resolution Regional Reanalysis for Australia (BARRA) and NSW's electricity demand data. The study compares wind conditions at a Hunter offshore wind farm against six high-potential onshore wind farm locations in the Central-West Orana and New England REZs. The performance of offshore wind and related synoptic weather patterns is assessed under various specific conditions, such as during peak demand or evening hours.

Our analysis suggests that offshore wind in the Hunter outperforms NSW's onshore portfolio during peak periods – cold winter evenings and hot summer afternoons. During summer peak demand periods, an offshore wind project in the Hunter region has an average capacity factor above 70 per cent, compared to just over 30 per cent in a reference onshore portfolio. During the winter peak, an offshore wind project in the Hunter is four times more likely to generate at full capacity than modelled onshore wind locations.

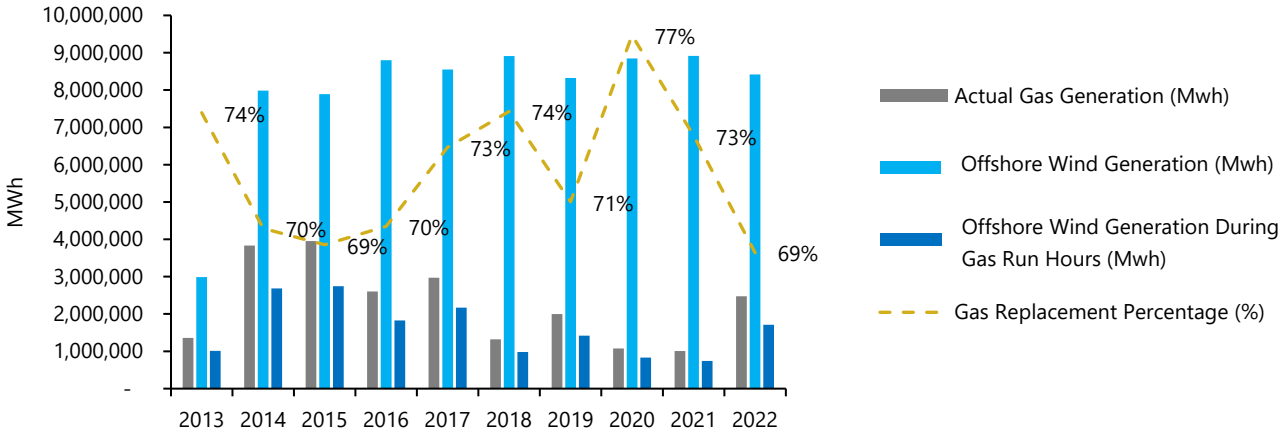
Importantly, for planning and grid-stability purposes, offshore wind in the Hunter is also generally consistent throughout the year. Production is marginally lower in Autumn and reaches its peak in December. Offshore wind is frequently generated at partial or full output in the evening and at night when solar generation is unavailable – providing valuable regional optionality. During the Summer and Spring seasons, generation peaks at 8:00 pm, aligning with peak demand periods and coinciding with the decline in solar energy production. Refer Figure 2.

Figure 2: Monthly and Diurnal generation profiles - Hunter offshore wind



Due to its premium profile and strong peak-hour generation, offshore wind contributes significantly to gas-fired generation replacement – providing significant peak-hour displacement of emissions intensive generation. Simulation of offshore wind performance over period 2014-2022 shows that it would have consistently reduced the need for over 70 percent of gas-fired generation.

Figure 3: Hunter Offshore Wind and Gas-fired generation replacement



The draft ISP primarily focuses on the efficient delivery of new capacity, aiming to minimise the impact on power prices. However, it does not explicitly model power prices. To address this, modelling was commissioned from Jacobs to assess how the diversity of wind generation from an offshore wind farm in the Hunter region affects price outcomes in NSW.

Given the observed strong relationship between first-rate offshore wind resources and very hot weather, offshore wind strongly contributes during high-price periods (further confirmed by the BOM assessment). If included in the system, offshore wind displaces high-cost gas generation, offsets some transmission costs, reduces transmission losses, and defers investment needs in some firming assets (Pumped Hydro and battery storage), and so should be expected to reduce the absolute prices during those periods.

More importantly, the combined contribution from offshore and onshore wind with a more diversified generation pattern would reduce price volatility and put downward pressure on prices in NSW across all periods in a year. The modelling demonstrated across multiple potential scenarios that a diverse level of offshore wind generation, delivers up to 8 percent in energy bill savings to the NSW consumer and around 6 percent reduction throughout NEM.

Recommendation 3: Based on the insights described in this submission, we recommend that the 2024 ISP incorporate offshore wind more broadly into the generation mix, encompassing regions such as NSW and Tasmania, and provide policy guidance facilitating the progression of Australia's offshore wind sector and advancement towards a net-zero future.

Benefits beyond LCOE

While Levelised Cost of Energy (LCOE) is an effective tool to assess technology competitiveness, it can oversimplify and distort the optimal generation mix required to transition to net zero. The availability of dispatchable scheduled power and not just semi-scheduled generation is the optimal generation mix to replace fossil generation. Due to offshore wind's inherent higher capacity factors and less intermittency in a typical generation profile, less firming capacity is required – reducing the overall cost of the technology. It is not appropriate to compare the costs of technologies if non-measured costs differ significantly or if the technologies provide different services to the electricity system. There is risk that the benefits of offshore wind are overlooked and left out of the LCOE metric and therefore not reflect relative costs correctly.

Recommendation 4: AEMO to model overall system benefits of different technologies in relation to value add based on total system costs.

Conclusion

Offshore wind offers diversification benefits that go beyond capturing stronger, more consistent wind compared to onshore turbines. When assessing these benefits, it's important to consider the inherent advantages of generation sites near load centres that can efficiently connect to the grid. This can help address risks related to energy security, reliability, and transmission development delays in the National Electricity Market (NEM).

Quantifying these benefits is crucial, as it enables the Integrated System Plan (ISP) and policymakers in states without offshore wind targets to assess the costs and risks associated with securing reliable generation and timely transmission developments with and without offshore wind. If targets are set, we expect a reduction in transmission development costs and risks, which we anticipate will be reflected in the next ISP instalment in 2026. Star of the South will continue to collaborate with AEMO on the significant benefits of offshore wind targets and consequential infrastructure required to meet the national net zero targets.

We look forward to discussing our submission in more detail.

Contact details

For further information regarding our submission, please contact Jessica Kite, Development Director NSW at jek@cop.dk.