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Friday, 23 August 2024

Ms Merryn York
Executive General Manager System Design
Australian Energy Market Operator
Lodged via email: Electricity.Forecasting@AEMO.com.au

Dear Ms York

Consultation on AEMO's Electricity Demand Forecasting Methodology

Transgrid welcomes the opportunity to respond to the Australian Energy Market Operator's (AEMO) consultation to review its Electricity Demand Forecasting Methodology. We understand the forecasts produced under this methodology are key inputs into several AEMO reliability and planning processes in the National Electricity Market (NEM), including the Electricity Statement of Opportunities (ESOO) and the Integrated System Plan (ISP).

Transgrid operates and manages the high-voltage electricity transmission network in NSW and the ACT, connecting generators, distributors and major end users. We have an important role in managing one of the key parts of Australia's National Electricity Market (NEM) as it transitions to increasing levels of renewables generation.

There have been many significant changes in Australia's energy transition since AEMO last formally consulted on its forecasting methodology in 2021. We strongly support AEMO's consultative review process as it provides the opportunity to ensure forecasting for the NEM is aligned with best practice and allows for appropriate anticipatory planning to account for the fast-moving dynamics in demand growth for our energy system. This includes the increasing role of consumer energy resources, both passive and orchestrated, and potentially huge growth in data centre connections over the next five to ten years.

We have provided feedback in the attached submission and look forward to further engagement, including when AEMO publish the draft methodology. If you have any questions, please feel free to contact me or Sam Martin at Sam.Martin@transgrid.com.au.

Yours faithfully



Kasia Kulbacka, General Manager, Network Planning

Transgrid submission

We welcome the opportunity through this consultation to comment on the AER's proposed approach to updating the EFA guidelines. We provide key areas of feedback below.

Feedback to specific questions

Transgrid provides its feedback on a select list of questions raised by the AEMO in the table below.

AEMO question	Transgrid feedback
1. Does a component-based forecasting approach continue to provide a fit-for-purpose method that reflects best practice for electricity demand forecasting?	Transgrid supports AEMO continuing with a component-based approach. Electricity demand forecasting has historically adopted the approach of breaking down demand into components that are capable of being better understood on their own (e.g., residential consumers behave differently to commercial and industrial consumers; large industrial loads such as aluminium smelters and data centres behave differently as these loads are not weather sensitive). Importantly, electricity demand in aggregate is the combination of diverse activities, so separately forecast components improve the accuracy of the forecast and allow them to be understood and explained in greater detail.
2. Are the customer segments appropriate aggregations of electricity consumers, and do they provide sufficient capability to apply aggregate methodologies for each in order to forecast each cohort's future electricity consumption?	Transgrid supports AEMO's proposed customer segmentation and its view that the segmentation approach concept remains reasonable to meet the collective purposes of the electricity demand forecasting methodology. Notwithstanding, Transgrid supports the inclusion of a new customer segment for data centres, as further detailed in our response to Question 7.
3. Do you have any comments on the benefits of AEMO developing specific sub-regional consumption and demand forecasts? Are there specific inputs and assumptions that are more likely to be important to understand on a spatial level more granular than the NEM region, or would a simpler allocation approach of the regional forecasts provide sufficient insight to inform sub-regional forecasting?	There is significant value in the development of specific sub-regional consumption and demand forecasts, as these are key to transmission planning decision making through a credible optimal development path. In particular, an accurate understanding of changing loads within the Sydney, Newcastle, Wollongong (SNW) sub-region, which represents nearly 80% of NSW peak demand, will be critical to capacity expansion planning to replace generator retirements. Within the SNW region, it is relevant to understand specific drivers of load growth in key development precincts around Western Sydney, in the Illawarra region and in the Hunter region. A simple allocation approach of regional forecasting is unlikely to accurately reflect the localised, out-of-trend developments in these areas driven by new commercial loads including data centres and industrial electrification. Transgrid suggests that the most effective approach to forecast sub-regional demand is to develop connection point forecasts, taking input from DNSPs and TNSPs to capture connections interest from prospective load developments. Transgrid publishes top-down load forecasts in its TAPR every year. These forecasts are produced using economic and demographic data as well as other drivers of energy demand such as PV, EV and hydrogen electrolyser uptake

	projections obtained from reputed consultants. While inputs used by AEMO for their forecasts might be slightly different, it is our expectation that AEMO and Transgrid can work together to better align the inputs that go into the forecasts as well as our views on the future trajectory of load growth in the NSW region. Better coordination with DNSPs who have local knowledge of spot loads in their respective jurisdictions will also go a long way to better align our forecasts.
4. Do you have any views on whether the existing commitment criteria for LIL inclusion in the single scenario forecast should be expanded to include a similar level of certainty as the 'anticipated' generator developments?	Transgrid supports the expansion of the demand forecasting methodology to include consideration of LIL projects with a similar level of certainty as 'anticipated' generator developments in the single scenario forecast. We consider this will improve sub-regional forecast accuracy into the medium term and enable prudent network augmentations to be delivered in a timely manner. By only considering committed LIL projects, which are typically near-term connections, medium to long term transmission planning decisions do not accurately reflect the needs for the network and may preclude developments from reaching commitment due to capacity constraints. We acknowledge that the criteria used to assess whether LIL projects have reached a level of commitment necessary to be deemed 'anticipated' will require further refinement to ensure consumer interests are balanced.
6. Are there any other changes that AEMO should consider to the methodology for developing hydrogen forecasts, beyond expanding its use into other green commodities?	Transgrid considers that green hydrogen offers an important avenue to decarbonise hard-to-abate sectors of the Australian economy that cannot be easily electrified. We understand that AEMO currently includes electricity demand driven by the production of renewable hydrogen, which in turn is based on various end-uses for that hydrogen. All forecast hydrogen electrolyser facilities are assumed to be grid-connected (rather than self-consuming their own bespoke power source). We would support clarification from AEMO on how it considers potential fuel cell electric vehicle hydrogen in its forecasts. Given AEMO's forecast minimum demands, we would appreciate clarification for why, for example in the green energy exports scenario, minimum demand does not begin to rise with the amount of energy required for hydrogen production during the middle of the day.
7. Should AEMO create a separate customer segmentation for data centres, removing them from the LIL and BMM segments? Would the preferred approach apply a survey-driven forecast, observations from international trends, or another technique?	Transgrid supports the separation of data centres as a separate customer segment, due to their unique load profiles and forecast parameters. Currently there a huge quantum of data centre loads waiting to be connected to the DNSP network, and strong interest is also being seen for direct transmission connections. We recommend improved data and knowledge sharing between AEMO and DNSPs, as DNSPs have the best experience engaging with datacentre proponents. We also recommend direct engagement with data centre proponents to gain a better understanding of the load profiles and ramp up rates of loads in this segment.
8. Are there other sectors which should have their own category within the BMM model?	Transgrid considers that load categories with unique development trajectories and load profiles, such as mining developments, hydrogen electrolyzers and industrial electrification should be considered separately. We acknowledge that the current LIL and BMM forecast methodology already accommodates for hydrogen and electrification categories and support their continued inclusion, however, recommend that consideration of mining and minerals processing facilities (other than coal mining) is improved in the LIL model.
13. Should AEMO continue to use weather data back to the year 2000 when determining the	Transgrid supports AEMO using a comprehensive weather dataset to inform reliability forecast purposes, especially given the risks of renewable lulls to reliability. Transgrid considers data back to 2000 should provide a statistically

median weather standard? If not, what time period do you consider appropriate?	comprehensive period for this work. We do support expanding the number of weather stations used, to better inform the diversity of weather within a NEM region.
15. Are the adjustments for the impact of climate change on consumption and demand appropriate? If not, how might they be improved?	Transgrid considers that incorporating the impacts of climate change on demand forecasting are increasingly important given, amongst other impacts, potential increases in future maximum temperatures will make a small but significant contribution to annual energy and summer demand growth.¹ At this stage we have no suggested improvements to AEMO's approach to considering climate change in its forecasting methodology. However, we consider it important that AEMO ensures that it is aligned with best practice including through targeted consultation with relevant experts, such as the Bureau of Meteorology (BoM) and CSIRO (who supported the development of AEMO's existing approach). This should include consideration of whether any updates are needed to understand the possible effects on electricity demand from increasing extreme heat waves and natural disasters resulting from climate change.
16. Do stakeholders consider that the current collection of methodologies, published by AEMO and/or its consultants, provide sufficient transparency on its approach to forecasting PV, battery and VPP uptake and operation?	Transgrid considers transparency in the development of CER forecasts critical to understanding the nuanced role of CER in future supply adequacy assessments and transmission planning decision making, and ensuring future plans are robust to a high degree of uncertainty in CER uptake and orchestration. AEMO uses econometric modelling for production of top-down forecasts. However, it is not clear what type of testing is done before selecting an appropriate model and whether independent variables used for estimation differ across different NEM regions. A high degree of transparency is required with respect to model parameters, diagnostics and model validation across historical periods. It would be also good to understand if AEMO can publish price and income elasticities of demand as also measures of demand responsiveness. AEMO's Electricity Demand Forecasting Methodology provides a good overview of how the rooftop PV, energy storage and EV forecasts are derived. However, some direct references to the underlying consultants' reports would be helpful for those interested in greater detail. Particular transparency and nuance are required in forecasting the degree of CER orchestration due to buy-in decisions by individuals, who will need to be motivated to participate. It is also important to understand the responsiveness of consumers to sign-up incentive schemes, such as the recently announce NSW government program. Understanding the nuances of CER orchestration trends and factors will improve the development of specific sensitivity analysis cases in planning processes including the ISP, which need to be robust to the high degree of uncertainty in future CER development and the degree of CER orchestration.
Additional Transgrid feedback - Section 3.5 Minimum Demand	Historically, minimum demand in the NSW Region has fallen at a steady rate mainly due to the uptake of rooftop PV and the timing has shifted from early morning around Christmas/Boxing Day to mid-day in either spring or autumn. Minimum demand is expected to further decline in future causing issues to system security. It will be beneficial to understand how AEMO plans to introduce improvements to how it forecasts minimum demand given the changing nature of generation and load characteristics. It is unclear how AEMO plans to incorporate the effect of major spot loads on minimum demand, especially data centres and hydrogen loads. As mentioned above, AEMO's (ESOO 2023) minimum demand forecasts for green energy exports scenario, does not seem to consider rising demands due to increased hydrogen production.

¹ For more detailed analysis of climate change impacts on Transgrid's demand forecasts see [section 4.2.3 of the 2023 TAPR](#).

	Additionally, impacts of charging for grid-connected and distributed (CER) battery energy storage should be considered in minimum demands.
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END OF SUBMISSION