

## **Submission to AEMO: Electricity Demand Forecasting Methodology Consultation**

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### **Introduction:**

The Centre for Applied Energy Economics and Policy Research (CAEEPR) is a collaborative partnership between Griffith Business School and energy sector participants in Australia's National Electricity Market.

CAEEPR aims to maximise the energy sector's potential to achieve emission reductions and contribute to inclusive, sustainable, and prosperous businesses and communities while building capacity in the electricity economics. CAEEPR uses a national electricity market model to develop and analyse different scenarios to assess different policy positions for generator dispatch and transmission efficiency.

CAEEPR uses a simulation model of the NEM called the Australian National Electricity Market Model (ANEM) to model the transition to zero-net emissions and the impacts on the NEM, reliability, security and affordability.

### **Background:**

AEMO's Forecasting Approach sets out the various components that contribute to the forecast of electricity demand and consumption critical to AEMO's NEM forecasting and planning publications, including the reliability forecast. The forecasting review is conducted every four years. Two categories of changes are provided for consultation:

- Proposed changes, where AEMO has a specific proposal for how it is seeking to amend the methodology in the second stage of the consultation.
- Potential changes, where AEMO has noted that the existing methodology may need to be revised, but has not yet formed a specific approach that it seeking feedback on at this time.

### **Feedback:**

AEMO acknowledges that improved outcomes might be achieved through better understanding of input data, rather than requiring a modification to the methodology and in the main, we support this view. This view is built on the lessons from the simulation modelling of the NEM which highlights the accuracy of input data when forecasting 20-30 years into the future.

### **Spatial forecasting**

For the five NEM regions, AEMO needs (at a high level) five sets of actual data to train models on, five sets of the various inputs (economic, energy efficiency, PV, etc.), five model runs, etc. These inputs and models then produce forecasts included AEMO's key forecasting publications.

CAEPR's experience is that in developing regional analysis that locations are not homogenous nor growing at the same pace, and with each state promoting regional residential and manufacturing, more regional disaggregation is required.

**1. Does a component-based forecasting approach continue to provide a fit-for-purpose method that reflects best practice for electricity demand forecasting?**

CAEPR: Component based forecasting is supported. It allows for compartmentalisation of drivers which in turn allows information to be updated by users between AEMO publications.

**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?**

CAEPR: The AEMO customer segmentation is just one approach to segmenting electricity users: perhaps a comparison of different segmentations might identify the sensitivities of the categorisation method. In particular, the economic categories used by the ABS might provide an indication of the decarbonisation pathway in each sector and the innovations required. We are interested in the forecasting approach below that makes the assumptions of flat and whether this could be refined.

Given P57 of [forecasting-approach\\_electricity-demand-forecasting-methodology\\_final.pdf \(aemo.com.au\)](#) states:

*"The business electrification load is dominated by larger sites and is assumed to be flat across the year and across the day as large industrial loads electrify their processes. The electrification component only captures the energy needed to perform the activities previously performed by alternative fuels, with inherent fuel-conversion efficiency gains as appropriate."*

**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?**

CAEPR: Subregional consumption and demand data is required to address the issue of aggregation behind the meter in energy zones. In addition, the subregional consumption and demand detail is required given the geographic variation across Australia and within States.

More detailed sub-regional demand traces would also permit a more detailed assessment of whether more spatially aggregated network structures associated with the zonal model framework typically employed in the ISP conveys any spatial aggregation of the underlying VRE resource yield. This aggregation can disguise the energy dynamics within these regions and inflate VRE yield. In addition, the significant transition to low carbon energy leads to the structural changes in the modelling that may violate the statistical assumptions underlying the techniques applied.

Central to this more spatially distributed modelling approach would include:

- Locating demand at its location within the grid and not at the regional reference node

- By leveraging spatial location [i.e. network location of demand, generation including Renewable Energy Zones (REZ) and transmission infrastructure], include more disaggregated sub-regional energy balance constraints (instead of the more aggregated zonal constraints) to better trace out power flows between interconnected REZs, with major load centres and more fully capture the impacts of both spatial diversity and intermittency of renewable energy sources on network reliability and security.
- Have a goal of aligning AEMO regions with ABS Statistical geography to provide underlying labour supply and demand, housing data, and manufacturing and industry data. Long term SA2 level would be advantageous to allow linking with domestic and small business energy usage projections.

**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?**

CAEPR: Supportive of the proposal to provide ramping estimates. Given that financial close on a project can be unavailable when AEMO does its survey, but the project gets the green light shortly afterwards. In modelling 20-30 years into the future, having some indication of these forthcoming projects is valuable.

**5. Do you have any comments on if the forecasting approach should apply criteria differently across the short and long term?**

CAEPR: Different approaches for short and long term forecasting of industrial load should be considered. Long term industrial loads depend on a broader range of factors and often depend on other industries and technologies. In addition, there is a history of overestimating generation being available / infrastructure completion occurring on time, it would be interesting to have tolerance bands for the long term.

**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?**

CAEPR: It would be appreciated if the practicalities of location bound hydrogen manufacture is considered in the forecasts: is there space for the manufacture in the vicinity of where the hydrogen is to be used, and whether the project has environmental and safety approvals. This would give an indication of whether forecasts are realistic. In addition, the competition for water in a dry continent and hydrogen storage issues (Australia sub-terranean storage capacity if limited) and not usually located where loads are available implies more disaggregated regional forecasts are required.

Finally, it should also be recognised that hydrogen has an indirect global warming potential sitting between CO<sub>2</sub> and CH<sub>4</sub> over short time periods. This could have implications on project economics especially if fugitive emissions of hydrogen become an issue, especially in the case of long distance underground pipeline based transport.

**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?**

CAEEPR: Yes, remove the data centres from LIL and BMM as these are a growth industry with specific load demands. The social licence demand will be for these centres not to be constrained by the grid. If international trend data is available, please use.

**8. Are there other sectors which should have their own category within the BMM model?**

CAEEPR: no comment

**9. Do you think AEMO should be considering any other external drivers of energy consumption when developing its residential consumption forecasts?**

CAEEPR: The deadlines to have smart meters installed will have an impact on the residential consumption. The application and removal of the subsidies applied in Queensland in 2024 need to be monitored as other states might follow suit and the rebound effect might be substantial. The other external driver is the behavioural change push to move Queenslanders out of personal cars into electric trains and electric buses. This is an example of the conflation of the different externalities impacting on the grid.

**10. Should AEMO's approach to the solar rebound effect take into account differences in the impacts on base load, cooling load and heating load? What data sources exist that may help to estimate these impacts?**

CAEEPR: Yes, this should be incorporated to provide a better estimate of load. Smart metering will assist with the provision of additional data. We also suggest AEMO talk to the insurance industry as they are collecting data on solar PV and batteries and where they are located on residences and businesses as this could inform on some of these scenarios.

**11. What data sources can stakeholders recommend that provide additional visibility or insights on non-scheduled generators?**

We are aware of a number of these that exist without fanfare: we suggest contacting larger hospitals and sugar mills for example. Perhaps contact Chambers of Commerce to access their members.

**12. Do you have any comments on AEMO's potential improvements to developing demand traces?**

CAEEPR: no comment

**13. Should AEMO continue to use weather data back to the year 2000 when determining the median weather standard? If not, what time period do you consider appropriate?**

CAEEPR: Supports the use of weather data back to 2000 to understand weather trends; however the Bureau of Meteorology has a long of weather data which can be used – not just for the median but also for the max and min temperatures. We believe that max and min values are valuable as these points (eg for 3 days per annum) will be where the grid struggles.

**14. Are the weather variables (average 30-minute temperature compared to critical temperatures) used in AEMO's weather standards still appropriate?**

CAEEPR: On average days 30 minute averages are satisfactory. Modelling of specific segments of the calendar year to identify extreme maximum or minimum demand requires more granulated data.

**15. Are the adjustments for the impact of climate change on consumption and demand appropriate? If not, how might they be improved**

**a. Roof top solar**

**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?**

No comment

**17. Do you support AEMO's proposal to remove specific references to the types of charging behaviours adopted in its EV forecast methodology and instead include these in the IASR?**

No comment

**18. Can you suggest data sources that would assist AEMO's investigation of the impact of embedded networks on consumption forecasts?**

No comment