ElectraNet

23 August 2024

By email: energy.forecasting@aemo.com.au

Re: Demand Forecasting Consultation Paper

Thank you for the opportunity to comment on updates to AEMO's demand forecasting methodology. Forecasting is an attempt to estimate the future state of the world to ensure prudent investments are made in keeping with the National Electricity Objective. Forecasting the future is of course, difficult to do and we acknowledge AEMO's recent maximum demand forecasts have had a good track record with South Australian summers.

In an environment of growing demand and rapid change it is more important than ever that demand forecasts are sufficiently forward-looking to capture expected load growth to ensure timely and efficient transmission development to deliver the transition to net zero at least cost to customers. We set out the essential improvements needed to the correct forecasting approach to achieve this below.

There is a growing need for greater flexibility to include large industrial loads.

AEMO's recent experience in forecasting South Australia's demand maxima has occurred in an environment of slow growth in maximum demand, a declining energy demand and a series of mild summers over the last five years.

Evidence suggests the economic factors driving low growth in maximum demand and declining energy demand are about to change

In May 2023, we published an update to our Transmission Annual Planning Report. In that report we summarised the growing level of interest in Large Industrial Load connections in South Australia, which was unique in ElectraNet's history.

These loads have typically commenced connection investigations since 2021. However, since then only the South Australian Government's Hydrogen Jobs Plan has satisfied the commitment criteria to be included in AEMO's demand forecast. The Hydrogen Jobs Plan includes a 250 MW electrolyser and a 200 MW hydrogen gas generator.[1]

[1] Whyalla hydrogen power facility | Office of Hydrogen Power South Australia (ohpsa.sa.gov.au)

The electrolyser load will be the single largest electrical load in South Australia. There are a further four connections under investigation that are individually larger than this load. There are more that are of similar magnitude to the current largest load.

The remaining loads in conversation with ElectraNet comprise many different proponents and span multiple industries. Critical minerals supported by the State Government's prosperity project are represented as are datacentres and electrification of existing industry with high energy requirements.

Importantly, this interest we presented in our 2023 TAPR update did not focus on hydrogen hubs. These remain an additional source of potential demand that could be multiples bigger again. Likewise, green steel is also emerging as a very large source of demand that is mostly in addition to our 2023 TAPR update.

Irrespective of what is not represented in the 2023 Update, the wide range of proponents and industries that are represented, increases the likelihood that some projects will proceed. In aggregate, it is plausible that South Australia's energy consumption will double and that maximum demand will increase significantly over the next 5 - 10 years. This is demonstrated below.

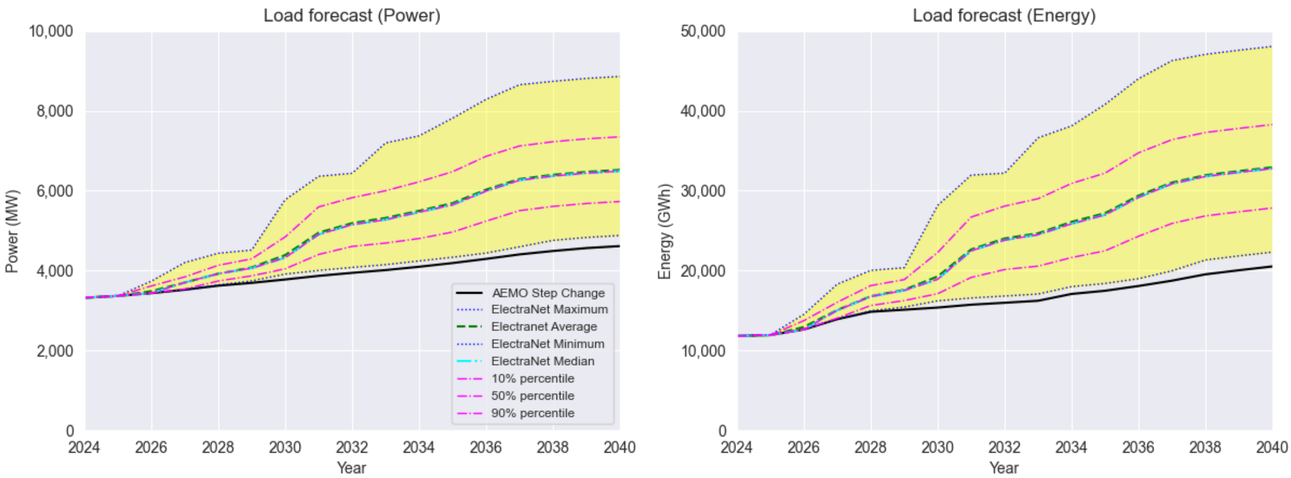

Figure 1: projected probabilistic increase in maximum demand and energy.

In all instances, these loads can be accommodated. However, a piecemeal connection of these loads will miss an opportunity to optimise developments. Optimised development will help new loads connect by reducing the cost of connection. This will drive greater benefits for all transmission users, driving greater utilisation of existing transmission, while optimised investment will minimise the need for new transmission. In addition, the proponent's activities will drive economic benefits to the community, so increasing the likelihood of it going ahead is even more beneficial to consumers.

For the most part the loads in question are not expected to make final investment commitment before late 2025. Most will make that commitment later than this. That is, most will not have made an affirmative investment decision ahead of the 2026 ISP or ElectraNet's Project Assessment Draft Report on the mid-north renewable expansion, highlighting the need for improvements to accurately account for expected load in future demand forecasts urgently. It is also worth noting that, while slow to progress, the number of active projects progressing to an investment decision, has not declined since the TAPR update.

Forecasting Large Industrial Loads

Forecasting large ‘lumpy’ industrial loads is difficult and subject to uncertainty. The way that uncertainty affects the forecasts changes with the time frame considered.

In the short term, the main sources of uncertainty are likely to be:

- when a particular load will commence
- at what rate will it grow to its anticipated scale, and
- how frequently will it operate at this scale and hence what impact will it have on state-wide maxima.

In this timeframe there is less likelihood that an entirely new load will appear from nowhere.

In the medium to longer term it is much more plausible that loads unknown to the forecaster will emerge and, when they do, that they will be of size unknown when the forecast is prepared.

These differences mean that different forecasting methodologies are required for different time frames. This is the process adopted by AEMO and the CSIRO.

The premise underlying much of AEMO’s current methodology for forecasting large industrial loads is that a small group of identifiable, mainly existing, load customers (organisations) have the best available information about their future needs and timing and thus the future needs of large industrial loads in total.

This information is accessed via survey and added to a model with a small amount of causally forecast underlying growth. In the short to medium this is probably the best available approach

In the longer term, though, it is much less likely that existing load customers know their (longer term) future needs with any precision. Furthermore, they may be reluctant to share such information due to the confidential nature of their plans. More importantly, it is very likely that load customers currently unknown to the forecaster will enter the market.

One conclusion arising from this is that it is imperative that AEMO modify its forecasting methodology to acknowledge that loads that are not committed when forecasts are prepared will enter the market, at least in the medium to longer term, and to give greater weight to known interest.

The current forecasting methodology is clearly insufficient beyond the short term as it is simply blind to loads that have not yet finalised their plans.

It follows that AEMO’s forecasting methodology should be amended to allow non committed loads to be included in the medium term and that the forecasting approach should clearly apply different (less stringent) criteria to medium- and longer-term forecasts.

As a result, we support AEMO’s consideration of an anticipated category ahead of requiring a high threshold for commitment of new large industrial loads. This will allow us to consider these loads in transmission investment decision making and increase the likelihood of optimised outcomes for the community based on a planning outlook that reflects expected load growth.

This could also be augmented by a probabilistic forecast of known interest beyond that which would satisfy either anticipated or committed thresholds.

The risk to customers of underinvestment or delayed investment is asymmetric

AEMO's forecasting methodology must be developed with explicit regard to the requirements of the National Electricity Rules (NER) as they apply to it and to whether it is in the long-term interests of consumers for forecasts tend to over, or under, forecast. Clause 5.22.10 (5) of the NER requires AEMO to explicitly consider, among other things, both the risk to consumers arising from uncertainty and from under investment.

As a general proposition, underinvestment in electricity infrastructure, whether generation or network, will hinder or limit economic growth and/ or put the power system in jeopardy.

On the other hand, over investment will tend to put unnecessary upward pressure on prices.

Of these two risks, the costs of over investment are tangible and easily expressed. This easy expression contrasts with the risks of under investment which can be expressed as increasing barriers to entry for new industry, less coordinated and more costly piecemeal solutions over time, and risks to supply reliability. While less visible, the risk of underinvestment is quantifiably greater than the risk of over-investment, particularly in an environment of demand growth and rapid change.

While the 'right' amount of investment is clearly preferable, the cost of under investment, in the form of foregone growth and reliability, is likely to outweigh the cost of modest over investment.

This suggests that, where there is uncertainty, AEMO's forecasting methodology should have a positive (upward) bias to drive least regrets planning outcomes. This also recognises that the lead times for large transmission developments will generally exceed those of new load developments, underscoring the need for timely planning and decision making.

That is, the consequences of underestimating demand growth are greater than the consequences of overestimating, reinforcing the need for balanced forecasts that are not 'on the low side.' This strongly supports including anticipated load growth and less advanced project interest on a probabilistic basis, reflected throughout the forecasting methodology.

Electricity Statement of Opportunities versus Integrated System Plan

AEMO is using the same scenarios and demand forecasts across the suite of planning documents that it publishes. This should be reviewed as the documents serve different purposes and must hence balance different risks.

For example, one of the primary purposes of the ISP is to plan for the optimal development of the transmission network as we transition to a net zero economy. The lead times for transmission development are long. This is due to the complexity of projects that span hundreds of kilometres at a time, the community engagement required and the engineering and workforce challenges involved. The time frames for development of an ISP project are no sooner than five years and out to ten years.

On the other hand, the ESOO – historically information only – now serves as a trigger for AEMO to intervene and use its Reliability Emergency Reserve Trader (RERT) obligations up to three years out to address a capacity shortfall.

These time scales have an inherently different risk profile.

ElectraNet recommends that the demand forecasts are developed specifically, and independently, for the planning task being undertaken to ensure a fit for purpose forecast is being applied to each.

Empirical testing over opinions

Many of the questions asked and concepts examined lend themselves to empirical testing.

ElectraNet supports AEMO's consultation approach, and of course notes that this is consistent with the AER's guideline. However, consultation is not a substitute for the type of evidence that can be derived from in and out of sample testing of alternative forecasting methods.

Put another way, in some of the cases examined here, it is less important whether stakeholders expect that one approach or another will work well than whether that approach can be demonstrated, objectively and empirically, to work well.

We identify several places in our response where our views could readily be tested by empirical analysis and accept that, if AEMO preforms that analysis and finds that is contradicts our views, the evidence-based answer would prevail.

Flexible approaches are necessary

AEMO's forecasting methodology should retain the flexibility to make amendments to reflect change within the four-year period.

An inherent challenge in forecasting is the appropriate way to deal with uncertainty. The longer into the future forecasts are prepared, the more important uncertainty becomes and the 'wider' the margin of uncertainty.

Nothing in the Rules or the AER's guideline requires AEMO to develop a mechanical methodology that is 'locked in' for four years. This spans two ISP cycles and stands in contrast to the range of other inputs, assumptions and methodologies that are reviewed, updated and applied in the development of the ISP.

A better methodology would establish principles for resolving uncertainty while retaining flexibility to adjust the methodology (at a detailed level) during the four-year period between reviews.

For instance, AEMO has asked stakeholders whether to treat data centres as a load class of their own. It might be appropriate to treat data centres as a subset of mass market business customers for the 2026 ISP, but to deal with them separately in 2028. The methodology should retain the flexibility necessary to make this change mid-cycle.

Component base approaches

The continuation of component-based approaches is a good example of a question that can, and should, be tested empirically.

We recommend AEMO conduct, or commission, analyses of alternative approaches to structure the components and to test the relative accuracy of forecasts developed in different structures.

For example, it is conceivable that residential customer forecasts should be prepared differently for places dominated by holiday homes, or in metropolitan areas vs rural and regional areas.

Consultation on questions such as this can raise questions, but not provide answers.

The same applies to whether sub regional forecasts should use different inputs and assumptions. It is easy to hypothesise that they should probably be different and even to hypothesise how they should differ.

However, going beyond hypothesis to identify whether one approach produces better forecasts than another should be examined empirically, not only through consultation. Back-casting may be one useful method to test such alternatives.

Emerging energy intensive industries

In our view Hydrogen is best treated as a subset of large industrial load forecasts.

In this sense it highlights the difficulties with forecasting in this sector, namely that it is likely that hydrogen loads will enter the market in the medium term, but those loads cannot be readily identified today in either scale or operating cycle, so survey based approaches cannot be used reliably.

AEMO should develop a robust model to forecast growth in Hydrogen load, based on a range of methods including surveys and fundamental (causal) analysis. In doing this it should have regard to the relative consequences of over vs under forecasting and select a modelling approach accordingly.

Like Hydrogen, data centres are analogous to large industrial loads in that they are large ‘block’ loads which may not lend themselves well to time series or regression-based forecasts due to a limited historical database within Australia with which to ‘train’ models. Although, outside of Australia data centres are already well established.

In our view these forecasts should be prepared using a mix of survey based and causal (fundamentals) analysis.

We thank AEMO for the opportunity to comment on AEMO’s demand forecasting methodologies. We are in a period of dramatic change on the electricity sector, and we applaud and encourage AEMO continue to engage in an open and transparent manner.

Should you wish to discuss any of the above matters please contact Brad Harrison on 08 8404 7568 or harrison.bradley@electranet.com.au.

Yours sincerely

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