NEM Demand Forecasting Methodology – Industry Workshop Minutes

MEETING: #1

DATE: Tuesday 13 November 2018

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ATTENDEES:

NAME	ORGANISATION	LOCATION
Adrian Grantham	AEMO	Adelaide
Deirdre Butler	AER	Adelaide
Andrew Manson	Department of State DevelopmentEnergy and Mining	Adelaide
Steve Fraser	SA Power Networks	Adelaide
Andrew Turley	AEMO	Brisbane
Elijah Walker	AEMO	Brisbane
Magnus Hindsberger	AEMO	Brisbane
Alex Driscoll	Edge Energy	Brisbane
Craig Pollard	Energy Queensland	Brisbane
Steven Rawlins	Powerlink	Brisbane
Sam Ingram	QTC	Brisbane
Win Arefta	Stanwell	Brisbane
Daniel Guppy	AEMO	Melbourne
Greg Staib	AEMO	Melbourne
Neale Scott (Chair)	AEMO	Melbourne
Andrew Godfrey	Energy Australia	Melbourne
Khai Chang	Energy Australia	Melbourne
Craig Tupper	Ausgrid	Sydney
Liam Ryan	Department of Planning and Environment	Sydney
Ron Logan	ERM	Sydney
Alex Fattal	Origin	Sydney
Trevor Bornstein	Origin	Sydney

1. Welcome and Introductions

Andrew Turley (AEMO) welcomed attendees to the forecasting methodology workshop. Andrew Turley (AEMO) advised that the purpose of the workshop was to develop an understanding of how effectively AEMO's recently published Demand Forecasting Methodology Information Paper explains the approaches taken in forecasting annual consumption, maximum demand and minimum demand, as used in the Electricity Statement of Opportunities (ESOO).

2. Workshop Purpose and Broader Consultation Process

Andrew Turley (AEMO) advised that today's workshop would form part of a broader consultation process centred on guiding improvements in transparency of AEMO's forecasting process.

Additional feedback outside of the workshop may be submitted to Energy.Forecasting@aemo.com.au, and the Issues Paper which outlines the intent of the current consulation is also available online.

3. Business Consumption Methodology

Greg Staib (AEMO) presented an overview to the approach taken in modelling the different business consumption components in the 2018 ESOO.

Key discussion points in relation to this topic included:

- Khai Chang (Energy Australia) advised that it would be beneficial if the methodology paper could also reflect drivers modelled in the past and assess the magnitude of their impact retrospectively, explaining what elements have worked well and those that haven't in evolving the methodologies. Greg Staib (AEMO) raised the issue that appropriate data is not always forthcoming. Daniel Guppy (AEMO) added that the selection of statistical models is based on sample performance.
- Khai Chang (Energy Australia) stated that it would be advantageous to see AEMO's assessment on what key issues have led to deviations from previous forecasts. Daniel Guppy (AEMO) stated that this information is typically included ESOO and the Forecasting Accuracy Report released by AEMO, rather than in the Methodology paper. Magnus Hindsberger (AEMO) suggested that our intention for increasing the transparency of our forecasting methodologies also was to increase the ease in which the linkages between these reports were better understood.

- Liam Ryan (Department of Planning and Environment) questioned how the different sub-components are selected and suggested that econometric modelling may not be the best approach to all sectors. Liam suggested, for example, that urban rail might be a subsector that may not fit an econometric model. Greg Staib (AEMO) responded that some sectors are selected because AEMO has a significant degree of visibility over them whilst others are chosen because of their relevance to energy consumption assumptions but acknowledged that the reasons for the subsector selections should be made clearer in the document.
- Liam Ryan (Department of Planning and Environment) queried how AEMO determined the method used to forecast each sector and why the survey approach was deemed appropriate for particular sectors. Liam also questioned whether a survey based approach would have a limited horizon where it provided meaningful and consistent forecasts, and a long term 20-year forecast may not be appropriate. Greg Staib (AEMO) responded that AEMO attempts to interview as many large industrial loads (loads that exceed a threshold level of consumption) as possible to gauge industry expectations.
- Craig Pollard (Energy Queensland) made the comment that it is important for AEMO to publish all economic assumptions around each sector as participants need to be able to determine how volatile the forecasts are. Criag suggested that rail loads should be split out, for example, and that data centres would be missed through an econometric model. Craig Tupper (Ausgrid) furthered this concern and iterated that the methodology does not go into enough detail for each sector and a greater volume of information is required. Craig suggested that the methodology needed to explain:
    - Process for determining sectors that were to be surveyed
    - Aggregated results of the surveys, including response rate
    - Interpretation of survey responses in including in the forecast models
    - Questions asked to surveyed participants

  Greg Staib (AEMO) noted that some of these aspects had previously been described in methodologies and agreed this information is valuable and consequentially should be made available in future.

- Craig Tupper (Ausgrid) raised a concern that information on energy efficiency is opaque and lacked justification in many areas. Some assumptions are stated without justification, such as applying only 60% of forecast energy efficiency savings. Liam Ryan (Department of Planning and Environment) remarked that the Office of Heritage and

the Environment had a lot of information, and a common data model and data set would improve all forecasts associated with energy efficiency.

- Ron Logan (ERM) appreciated the transparency improvements that this paper delivers, but raised a concern on the climate change adjustment and whether it incorporates a saturation effect. Ron considered that at certain temperatures energy efficiency savings will degrade to nil, leading to a linear increase in load relative to temperature. Ron expressed that further explanation is required in the methodology document around this aspect, and the relationship between annual consumption and maximum demand in the context of energy efficiency.
- Ron Logan (ERM) questioned whether the methodology misestimates energy sourced from rooftop solar due to an increasing trend for customers to install over-sized PV systems, such that the capacity of the inverter rather than the capacity of the panels presented the most reliable measure of PV capacity.
- Deirdre Butler (AER) made the comment that it was unclear where batteries fit into the definitions of grid demand. Greg Staib (AEMO) advised that utility scale batteries would come under operational demand whilst only small scale batteries (that are not operated by a third part) would be modelled as part of underlying demand.
- Andrew Manson (Department of the Premier and Cabinet, South Australia) questioned whether the methodology paper could provide greater content to determine the 'skill of the forecaster'. In particular, Andrew asked if there was means for AEMO to consult more broadly to ensure the best data is used in the forecasts. As an example, Andrew wondered whether government productivity programs such as that recently deployed in South Australia were included in the energy efficiency forecasts. Andrew suggested that there may be room for collaboration with AEMO on this data source.
- Win Arefta (Stanwell) emphasised the importance of the residential and business split assumptions, and asked if this split only applied for the base year and whether it changed over time. Greg Staib (AEMO) stated that AEMO applies the split to the base year and that the forecast determines the split in the long run. Win Arefta (Stanwell) questioned how a new energy intensive technology such as hydrogen production would be incorporated into such a split, which could shift the split between business and residential consumption if the industry was to develop.
- Craig Pollard (Energy Queensland) questioned the usage of a global financial crisis (GFC) dummy variable in the model and asked what this explains with respect to the future. Do the variables demonstrate a change in business attitude, business investment, and

will it repeat or reverse? Greg Staib (AEMO) commented that this particular variable was included to ensure any underlying trends could continue unaffected over these periods. In some cases though, such as the extinction of local car manufacturing in Australia, specific data (if able to be sourced) is applied.

- Win Arefta (Stanwell) asked whether demand side participation (DSP) is included in the annual consumption model. Greg Staib (AEMO) noted that DSP is included in a post model adjustment. However in terms of annual consumption, little impact is observed with the effect more noticeable when considering half hourly demand. Magnus Hindsberger (AEMO) added that AEMO's DSP forecasts are currently based on historical data. New electricity rule requirements now provide AEMO with a greater insight into DSP contributions during a given time period and will over time be used to improve forecasts.

4. Residential Consumption Methodology Transparency

Greg Staib (AEMO) presented on the current methodology AEMO employs to deliver its residential consumption forecasts.

Key points raised by stakeholders during this presentation included:

- Deirdre Butler (AER) raised a question as to whether the heating and cooling load forecast approach has been deemed successful by AEMO – whether any evidence of its accuracy is observed in back-casting. Greg Staib (AEMO) mentioned that AEMO does regress on historical data to check the model is robust. Daniel Guppy stated that this assessment is most appropriate in the annual Forecasting Accuracy Report, which reports on forecast values versus actual observations.
- Trevor Bornstein (Origin) asked if it was possible for AEMO to provide stakeholders with the breakdown of heating, cooling and base load energy consumption on the dynamic interface. Greg Staib (AEMO) advised that this was possible, however he noted that there was a time lag with the actuals. As this is an outcome of the regression models Greg Staib (AEMO) advised that this could be published along with details of the regression models in future methodology papers.
- Liam Ryan (Department of Planning and Environment) questioned whether price elasticity was captured in the residential consumption forecasts as it is in the business forecast; this was unclear in the methodology paper. Greg Staib (AEMO) confirmed that it was.

- Ron Logan (ERM) questioned if connections were categorised into whether they were owner occupier, rental or a holiday residence. Greg Staib (AEMO) advised that all connections currently have the same assumptions applied to them. Greg Staib (AEMO) went on to note that AEMO does intend to look into futher levels of disaggregation, however there are limitations in attaining the appropriate data. Daniel Guppy (AEMO) also noted that PV and battery forecasts were based on the proportain of free-standing houses as well as owner occupied versus rental properites. Ron Logan (ERM) commented that there is a substantial change in load during holiday periods and the methodology paper does not adequately describe how this is addressed. Daniel Guppy (AEMO) explained that AEMO at the regional level captures the effect of weekends and holiday periods through a suite of seasonality variables.
- Another question was asked on how energy efficiency is apportioned to heating, cooling and base loads. This could be further explained in the methodology paper.
- A question was asked as to how AEMO determines the critical temperatures with respect to Cooling Degree Days (CDD) and Heating Degree Days (HDD). Greg Staib (AEMO) described the process for annual consumption was that a suite of temperatures are separately modelled and those with the best fit are used. This is not the case for Maximum Demand forecasts which uses a half hourly model and dynamic variables.
- Andrew Manson (Department of Energy and Mining) asked if new connections are distinguished from existing connections, given that new connections may have materially different energy consumption patterns and magnitudes to older connections. Greg Staib (AEMO) stated that AEMO uses the consumption data from the last two years only when determining the base residential load, rather than the average of more years to ensure the latest snapshot of consumer behaviour is captured. Andrew Manson (Department of State Development) reiterated that new customers tend to use substantially less energy and the methodology document could explain how an evolving housing stock is incorporated into the projections.
- Andrew Manson (Department of State Development) asked for the methodology paper to provide greater content on <u>why</u> some values were applied, rather than just stating what was applied. Andrew questioned whether the assumptions could be criticised by simply being targeted to hit a desired trend. For example using a 40% rebound effect for energy efficiency savings is not explained.
- Ron Logan (ERM) raised a concern that published demand values were not on the same basis of his view of industry expectations, and requested that AEMO publish annual

consumption values as sent out and maximum demand values as generated. Greg Staib (AEMO) noted that the forecasting dynamic interface may be used to calculate these values and stated that users can calculate 'as generated', however Ron questioned whether users should be expected to do the conversions between measurement points.

5. Maximum and Minimum Demand Methodology

Daniel Guppy (AEMO) presented on the current approach implemented to develop maximum and minimum demand forecasts.

Key discussion points raised by stakeholders during this presentation included the following:

- Ron Logan (ERM) raised that the methodology suggests residential demand increases without limit as temperature increases, however a saturation effect would occur at some stage. Daniel Guppy (AEMO) mentioned that quadratic variables in place in all models prevent an infinite linear model as well as a physical limit on temperature in the Bureau of Meteorology's (BOM) climate model.
- Liam Ryan (Department of Planning and Environment) questioned how the climate change adjustment was implemented for maximum and minimum demand forecasts. Daniel Guppy (AEMO) stated that the information could be found in the Appendix. Daniel Guppy (AEMO) went on to explain the methodology involved consuming data provided by the Australian BOM whereby a scaling factor is applied at the half hourly level.
- Ron Logan (ERM) questioned why the maximum demand forecasts appeared to be at odds with the maximum daily demand in the Medium-Term Projected Assessment of System Adequacy (MT PASA). Daniel Guppy (AEMO) stated that the published maximum demand forecast is a probabilistic distribution that is made up of the results of thousands of simulations. Daniel Guppy (AEMO) elaborated that only the single greatest value is taken from each simulation and that the time at which it occurred is irrelevant given the resultant distribution is done on a seasonal basis. Daniel Guppy (AEMO) explained that the demand that the MT PASA is assessed against a series of demand traces, which are historical load shapes scaled to meet maximum demand targets then they are reconciled for energy.
- Craig Tupper (Ausgrid) raised a concern that many assumptions around electric vehicles (EV) and batteries were not adequately clarified in the methodology paper nor in the consultant reports. Craig stated that there appeared to be little testing of the

approaches adopted, and this would make readers question the energy saved in schemes. Craig Tupper (Ausgrid) went on to state that the consultant report appeared to be quite dismissive in considering the potential implementation of cost-reflective tariff structures.

- Steve Fraser (SA Power Networks) stated that the methodology appeared clear around maximum demand but the approach to minimum demand methods were less clear. Daniel Guppy (AEMO) commented that the same approach was taken for both minimum and maximum demand.

Following the conversation on the maximum and minimum demand forecasting methodology, Daniel Guppy (AEMO) proceeded to present the process to develop demand traces.

Key discussion points on this part of the presentation included:

- Deirdre Butler (AER) questioned whether AEMO could provide a comprehensive example of how a load trace is developed.
- Ron Logan (ERM) asked how many high demand days were scaled in the trace growing process. Daniel Guppy (AEMO) advised that only the highest period was scaled to meet maximum demand and the next highest demand events were scaled accordingly. This process does not make any assumptions around the maximum and minimum.

6. Meeting Close

Andrew Turley (AEMO) thanked all attendees for their attendance and feedback.

Andrew Turley (AEMO) reiterated that feedback should be submitted to Energy.Forecasting@aemo.com.au