Attachment 5.01

Spatial demand forecasting – revised methodology

January 2015

Ausgrid revised regulatory proposal attachment

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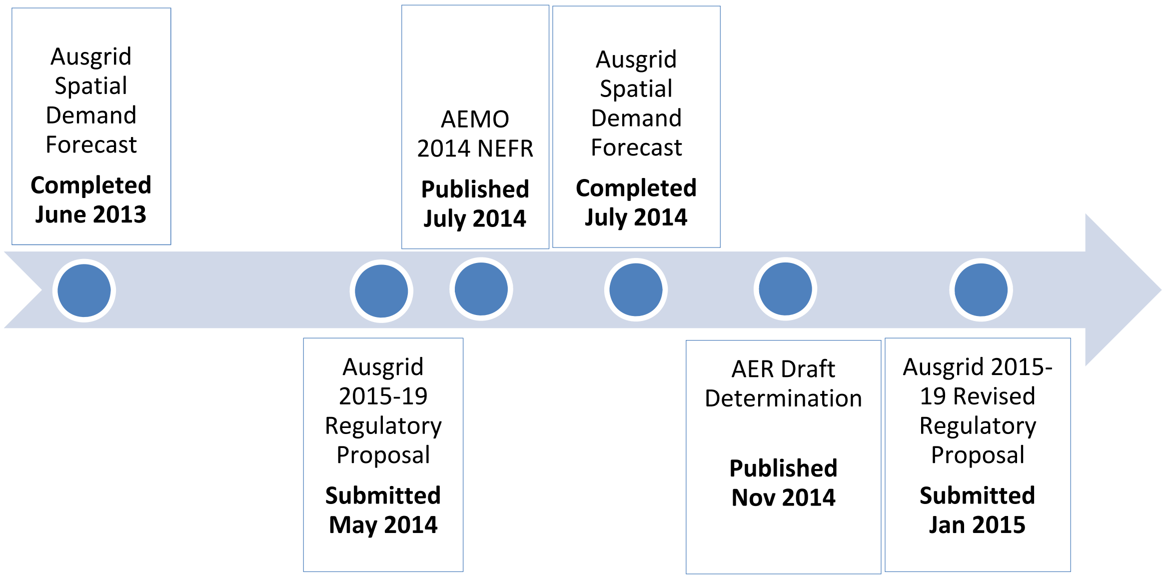
1 Overview

Spatial demand forecasts are a key input for augmentation capex on Ausgrid's network and an important input into the network planning process. Accordingly, the spatial demand forecast is developed annually for each of the 181 zone and 33 transmission substations in Ausgrid's network area. The updated forecast is an important first step in the assessment of network needs through the network planning process. Similar to AEMO, Ausgrid's forecast is produced annually at the end of the summer season, uses the latest summer and winter actual demands and is typically completed in June of each year.

In submissions to the AER on Ausgrid's 2015-19 regulatory proposal, several stakeholders raised concerns that the demand forecast used as part of Ausgrid's 2015-19 regulatory proposal was higher than the National Electricity Forecasting Review (NEFR) published by AEMO in 2014. Due to the AER timetable for the regulatory submission, the demand forecast used in the development of Ausgrid's Regulatory proposal was completed in June 2013. The time required to assess network needs, identify least cost solutions and finalise the regulatory proposal prevented the use of the forecast completed in July 2014 in our May 2014 submission.

The timeline of Ausgrid's spatial demand forecasts and the regulatory submission are as follows:



The most recent spatial demand forecast has been completed in July 2014 and was submitted to the AER in October 2014. The forecast completed in July 2014 is the basis for Ausgrid's revised Regulatory proposal.

2 Forecast methodology

2.1 Scope

Ausgrid's maximum demand forecast is produced for summer and winter seasons only since these are the seasons that maximum demands on the electricity network occur. The maximum demand forecast is not produced for autumn or spring. The forecast is produced for each of Ausgrid's 181 zone and 33 sub-transmission substations.

The forecast is comprised of, a short term forecast that is based on the statistically derived trend line of the weather corrected historical loads, and the medium to long term forecast that is based on econometric projections applicable to the overall network area. Post model adjustments are made for impacts from embedded generation and energy efficiency. High, medium and low forecast scenarios have been produced for the forecast completed in July 2014, to facilitate probabilistic planning after the removal of Schedule 1 of the NSW Licence Conditions on 1 July 2014.

2.2 Short term forecast

The short term forecast uses seven years of demand data, network configuration information, weather data from the Bureau of Meteorology and historical and forecast impacts from rooftop solar end energy efficiency to derive the trend for each of the zone and sub-transmission substations.

The demand data is screened to remove abnormal loads so as to prevent network switching or abnormal configurations from distorting trends. The historical demand impacts from rooftop solar at the zone substation level are modelled from customer interval data and combined with the raw demand data to derive the total customer electricity demand.

The remaining valid historical loads are then weather corrected based on the variable of average ambient temperature and subjected to Monte Carlo simulation analysis. This enables calculation of probability of exceedance (POE) levels. The weather corrected loads are adjusted to reverse out the effect of historical load transfers, spot customer loads and rooftop solar to reveal the underlying trend. Rate of change and the starting point for the forecast are calculated using a line of best fit. If necessary, this trend may be adjusted to take account for any anticipated local factors that are expected to change the base rate of change in an area.

To complete the short term forecast, future committed spot loads, load transfers, out of trend impacts from energy efficiency and forecast rooftop solar are superimposed over the base rate of change trend line. The resultant rate of change for each zone and sub-transmission substation is used for years one and two of the spatial demand forecast.

2.3 Medium to long term forecast

For the medium to long term period, an econometric model is derived from key drivers at the system total level which has both residential and non-residential elements. The residential component includes drivers for the change in real retail residential electricity prices, the change in real average household disposable income, air conditioner penetration rate and customer numbers. The non-residential component includes drivers for the change in real retail non-residential electicity prices and the change in NSW Gross State Product. Each component is derived at a system level and allocated at a zone substation level. Income and price variables are based upon projections compiled by the National Institute of Economic and Industry Research (NIEIR).

The model is based upon the total ‘electricity services‘ to customers, which includes the total metered demand, the historical demand impacts from rooftop solar as modelled from customer interval data and the historical demand impacts from energy efficiency programs. The total ‘electricity services‘ are then weather corrected based on the variable of average ambient temperature and subjected to Monte Carlo simulation analysis. This enables calculation of probability of exceedance (POE) levels.

Post model adjustments are applied at a zone substation level. These adjustments are due to forecast rooftop solar and impacts from energy efficiency. Energy efficiency impacts from Minimum Energy Performance Standards (MEPS), Building Code of Australia (BCA) and the NSW Energy Savings Scheme (ESS) are derived from published reports and analyses. Existing growth trends, installed capacity at a zone substation level and predicted future uptake are used to derive the forecast impacts from rooftop solar.

The derived demand impacts from the medium to long term model are used for years five and beyond of the spatial demand forecast. A blend of the historical trend and the econometric model is used for years three and four.

3 Forecast improvements

The spatial demand forecast completed in July 2014 has introduced a number of improvements including modifications to the weather correction methodology, improvements to the post model adjustments and refinements to the econometric modelling procedures. Combined with the impact of a continuing downward trend in peak demand, the forecast demand at most zone and transmission substations has declined.

In particular, the treatment of energy efficiency impacts have been further refined from those used in the previous forecast as new knowledge was gained. In addition to an improved understanding of the energy use impacts on households and businesses from these programs, adjustments were made in how the energy use reductions flowed through to changes in peak demand.

Impacts from embedded generation were also adjusted using latest network connection data and forecast take-up rates by customers. Analysis of interval meter data from gross metered solar generation systems has enabled a detailed assessment of the time of peak impacts on individual zone substations.

Improvements were made to the econometric model component of the forecast, primarily involving the impacts from energy efficiency and rooftop solar both in the historical trend and the future. Reflecting concerns both internally and as noted in the Frontier Economics review of AEMO's 2013 forecast[1], Ausgrid completed an analysis on the potential for bias to be inserted into the model elasticities. Due to concerns that the influence of energy efficiency in particular could be masking as a price response, the historical total impacts from energy efficiency and embedded generation have been combined with the metered electricity use to derive values for 'energy services'.

[1] Frontier Economics, Nov 2013, Review of AEMO's 2013 National Electricity Forecasts

4 Latest spatial demand forecast

The most recent spatial demand forecast was completed in July 2014. For our revised proposal, we have reviewed all relevant planning elements based on this latest demand forecast through a full review of the Area Plans, and re-running the models that underpin the Distribution Capacity Plan.

The historical actual and weather corrected trend, and peak demand forecasts used in Ausgrid's regulatory proposal (2013) and Ausgrid's revised regulatory proposal (2014) are detailed below for both the summer and winter system coincident peak demand.

For the spatial demand forecast completed in July 2014, the 'medium' forecast represents the 50% probability of exceedance (POE) forecast. The 'high' and 'low' forecasts are similar to those developed by AEMO and reflect the range of uncertainty associated with the forecast variables. All forecasts have factored in the demand reductions from the broad based demand management program (BBDM) proposed in Ausgrid's regulatory submission.

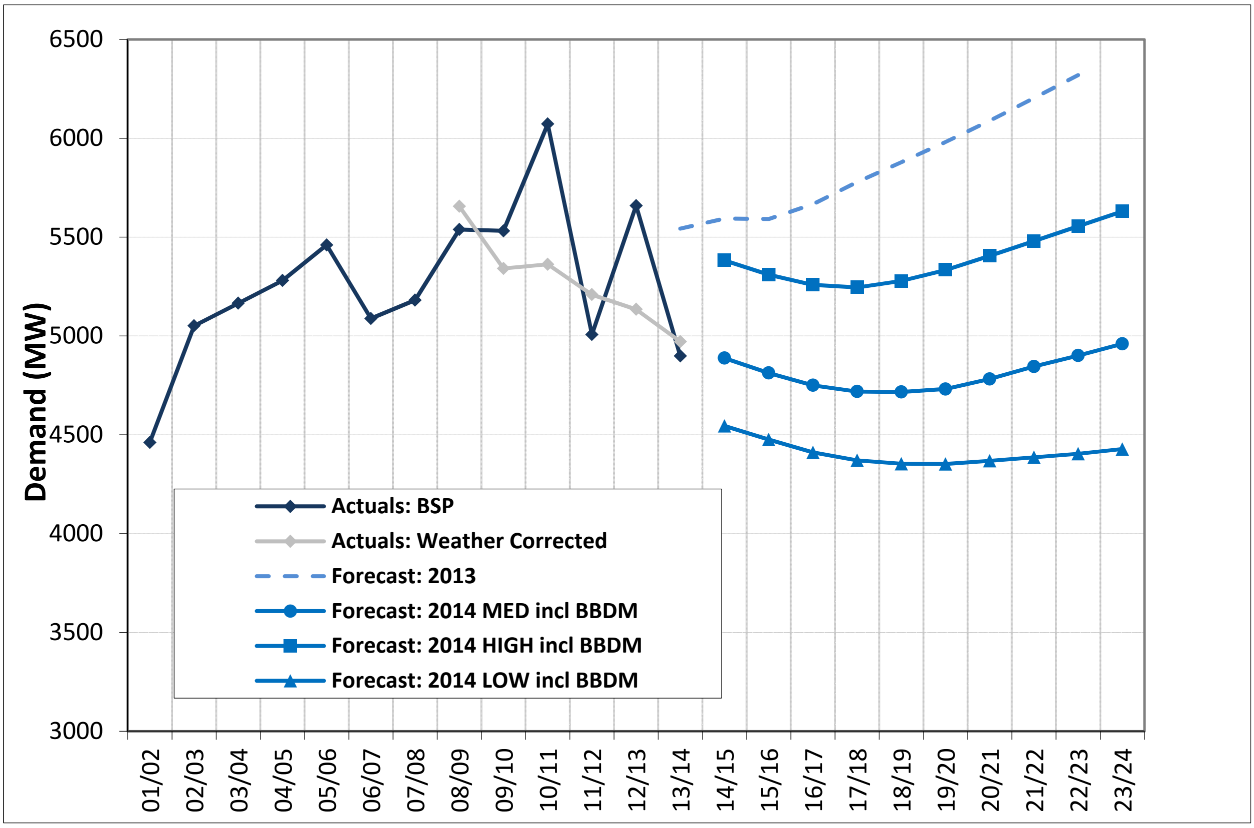


Figure 1 – Ausgrid summer system coincident peak demand (MW) – 2014

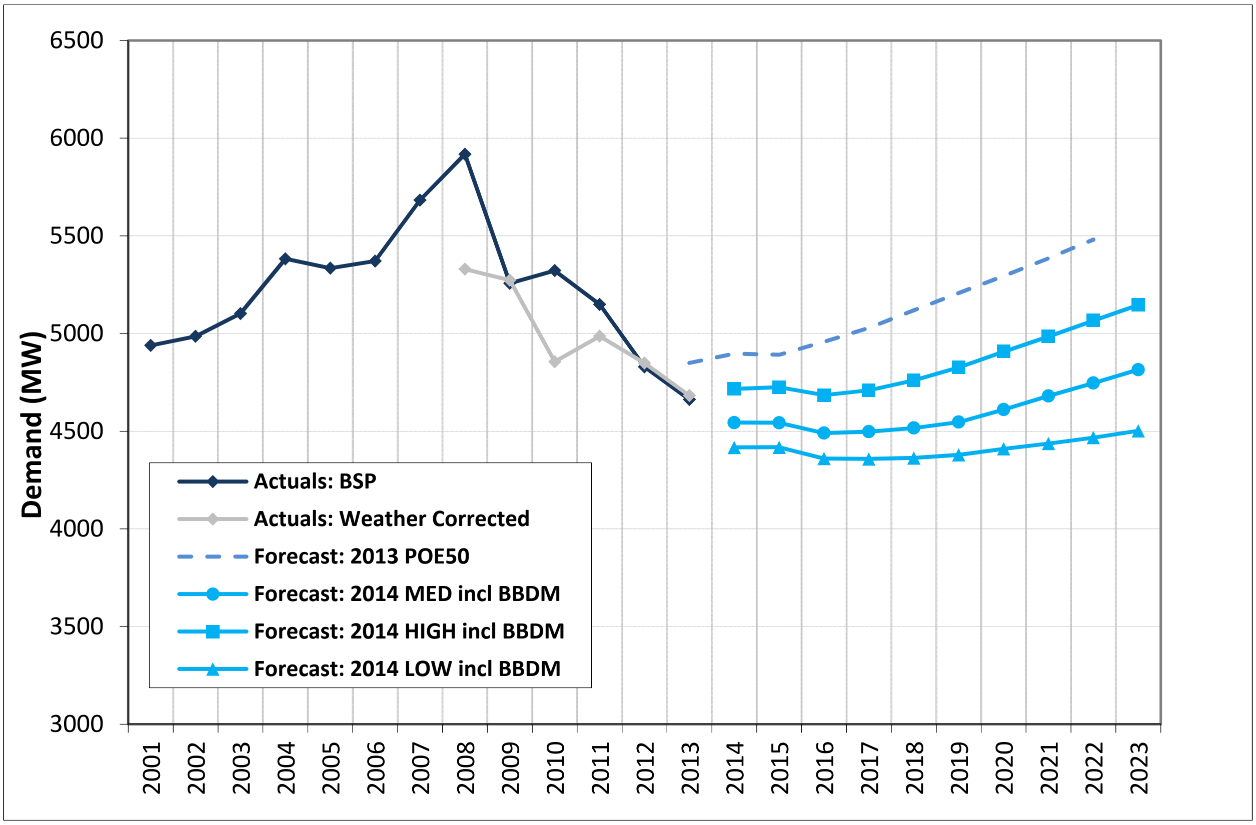


Figure 2 – Ausgrid winter system coincident peak demand (MW) – 2014

5 Forecast comparison

Ausgrid endeavours to continuously improve its spatial demand forecasting capability and collaborates closely with AEMO, government agencies and industry experts to improve the accuracy of forecasts. We are confident that our spatial demand forecast has considered recent customer and technology trends appropriately and is a reasonable basis from which augmentation expenditure requirements are derived.

In comparison with AEMO's 2013 NSW NEFR and AEMO's 2014 Transmission connection point (TCP) forecast, Ausgrid's spatial demand forecasts from both 2013 and 2014 results in similar annualised growth rates over the 2013/14 to 2018/19 period. See results of analysis below in Table 1.

Table 1: AEMO and Ausgrid Forecast comparison

	Annualised growth rate (2013/14 – 2018/19)	
	2013	**2014**
Ausgrid	1.00%	-0.75%
AEMO	1.18%	-0.60%