2018-19 reconciliation report

A 2019 Wholesale Electricity Market Electricity Statement of Opportunities supplementary report

This report reconciles actual operational consumption[1] for the 2018-19 financial year[2] with the forecast from the 2018 Wholesale Electricity Market (WEM) Electricity Statement of Opportunities (ESOO). This reconciliation was not provided in the 2019 WEM ESOO[3] because actual operational consumption for the entire financial year was not available at the time of publication on 14 June 2019.

AEMO has examined three input assumptions - behind the meter photovoltaics (PV), weather (temperature), and economic growth – that have resulted in lower actual operational consumption than the forecast published in the 2018 WEM ESOO. Some aspects of forecast variance cannot be individually quantified and are captured as forecasting error, including block loads and energy efficiency improvements.

1. Operational consumption reconciliation

Actual operational consumption was 17,420 gigawatt hours (GWh), 4.8% lower than the forecast published in the 2018 WEM ESOO (18,296 GWh).

The breakdown of the sources of variance between the 2018 WEM ESOO forecast and the actual operational consumption for 2018-19 is shown in Table 1.

Table 1 Breakdown of variance between the 2018 WEM ESOO forecast and actual for 2018-19

2018-19 operational consumption	Breakdown (GWh)	Contribution to variance (%)
Behind the meter PV	- 109	12.5%
Weather (temperature)	- 84	9.6%
Economic growth	- 66	7.6%
Forecasting error	- 617	70.4%

Operational consumption decreased by 3.8% between 2017-18 and 2018-19, compared to a fall of 0.8% between 2016-17 and 2017-18. Further analysis of historical operational consumption can be found in Chapter 5 of the 2019 WEM ESOO.

The remainder of this document discusses the sources of forecast variance in more detail.

1.1 Behind the meter PV

The rapid increase in behind the meter PV[4] capacity has affected operational consumption, as the energy produced at these sites displaces electricity that otherwise would have been supplied through wholesale generation.

Higher generation from behind the meter PV in 2018-19 compared to the forecast offset consumption from the electricity grid, resulting in lower operational consumption.

AEMO estimates behind the meter PV generation was 1,472 GWh[5] in 2018-19, 109 GWh higher than the forecast of 1,363 GWh. This was largely because installed capacity (1,162 megawatts [MW]) was 8.6% higher than the forecast (1,070 MW).

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[1] Operational consumption refers to electricity supplied from the transmission grid. All forecasts presented in this report are for the expected scenario published in the 2018 WEM ESOO, unless otherwise specified.

[2] All data is presented in financial year terms unless otherwise specified.

[3] The *2019 Electricity Statement of Opportunities* for the WEM is available at: https://www.aemo.com.au/-/media/Files/Electricity/WEM/Planning_and_Forecasting/ESOO/2019/2019-WEM-ESOO-report.pdf. Further information about the forecasting methodology and assumptions can be found in ACIL Allen's report at: https://www.aemo.com.au/-/media/Files/Electricity/WEM/Planning_and_Forecasting/ESOO/2018/2018-WEM-ESOO-methodology-report---Peak-demand-and-energy-forecasts-for-the-SWIS.pdf.

[4] Behind the meter PV capacity includes both residential and commercial rooftop PV that is less than 100 kilowatts (kW) and commercial PV systems ranging between 100 kW and 30 MW.

[5] Based on data sourced from the Clean Energy Regulator (for systems up to 100 kW) and the Australian PV Institute (for systems larger than 100 kW). See http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Agents-and-installers/Small-scale-systems-eligible-for-certificates and https://pv-map.apvi.org.au/power-stations.

1.2 Weather (temperature)

Temperature is a key driver of energy consumption. The forecast impact of the average temperature on energy consumption is calculated using an estimate of the number of heating degree days (HDD) and cooling degree days (CDD)[6] in each month.

Overall, the summer of 2018-19 was milder than forecast, with 863 CDD observed compared to 922 forecast CDD. January and February 2019 (normally the hottest months of the year) saw a total of 50 fewer CDD compared to the forecast.

Milder than usual summer temperatures are estimated to have reduced operational consumption by 84 GWh.

1.3 Economic growth

Economic growth (measured by gross state product [GSP]) affects operational consumption, particularly in the commercial sector. The 2018 WEM ESOO GSP forecast of 2.6% was higher than actual growth of 1.0%[7]. Lower than forecast GSP was observed as depressed operational consumption of 66 GWh relative to the forecast.

1.4 Forecasting error

The error term accounts for all factors that are not separately reconciled in this report, totalling 617 GWh. Some of these factors were accounted for in the 2018 forecasting model, but were not able to be individually reconciled or to be calculated due to lack of actual data, such as block loads[8], electric vehicle charging profiles or responses to the Individual Reserve Capacity Requirement (IRCR)[9]. Changes in consumer behaviour, and growth in technology adoption leading to energy efficiency improvements, are not easily quantifiable in the forecast model.

Other sources of disparity within the forecast may be attributed to model design. For example, the model does not consider humidity, rainfall, or more complex interrelationships between variables.

2. Forecast improvements

AEMO updates forecasting models each year to account for observed trends in operational consumption.

The 2019 WEM ESOO forecast updated the categorisation of HDDs and CDDs, to better account for observed temperature effects. The benchmark temperature threshold for CDDs has been changed to 24°C for non-residential and 26°C for residential customers, while the benchmark temperature threshold for HDDs remained unchanged at 18°C for both sectors.

Block load operational consumption has been forecast separately in the 2019 WEM ESOO. This will allow AEMO to individually quantify these effects when reconciling against the 2019 WEM ESOO forecasts.

AEMO will refine its in-house demand forecasting model for future WEM ESOOs, which is expected to allow greater control over forecast inputs and improve future reconciliations.

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[6] HDD and CDD indicate how cool (or hot) a year is, with a higher number of HDD representing a colder year and a higher number of CDD representing a warmer year. For details about the calculations, see page 33 of ACIL Allen's methodology report.

[7] Australian Bureau of Statistics, *2019. 5220.0 - Australian National Accounts: State Accounts, 2018-19*, 15 November 2019, at: https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/5220.0Main%20Features22018-19?opendocument&tabname=Summary&prodno=5220.0&issue=2018-19&num=&view=.

[8] Block loads are temperature-insensitive loads (at least 20 MW in size) that are expected to operate almost continuously at a relatively stable level. Energy consumption from the block loads was not forecast separately in the 2018 WEM ESOO and may have contributed to the error term.

[9] The IRCR financially incentivises Market Customers to reduce consumption during peak demand periods and consequently reduce their exposure to capacity payments, see Chapter 4.1 of the 2019 WEM ESOO for further information.