Update to auxiliary load forecasts

2018 Electricity Statement of Opportunities

February 2019

A report for the National Electricity Market

Important notice

PURPOSE

AEMO publishes the National Electricity Market Electricity Statement of Opportunities under clause 3.13.3(q) of the National Electricity Rules (NER).

This update has been prepared by AEMO using information available at 30 November 2018 to advise of changes to the auxiliary load forecast published in the 2018 Electricity Statement of Opportunities. Information made available after this date may have been included in this publication where practical.

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Executive summary

AEMO has updated the forecast auxiliary load published in the 2018 Electricity Statement of Opportunities (ESOO) for the National Electricity Market (NEM). AEMO's forecasting and reliability modelling does not include auxiliary loads as an input and is thus not affected by this update in any way. However, AEMO understands that some market participants use auxiliary load forecasts in their own processes or to adjust AEMO's demand forecasts to allow comparison with live data.

What has been updated?

Auxiliary load represents the electricity consumed within the power stations themselves and varies significantly by generation technology. The forecast auxiliary load has been updated for both the maximum and minimum operational demand forecast for all NEM regions to reflect the changing generation mix in the system and, in particular, during these load conditions. The auxiliary load forecast for annual consumption is unchanged.

With the adjustment to the auxiliary load forecast, the derived forecast for "as generated" operational maximum and minimum demand has also changed. The "as generated" demand is the sum of the operational "sent out" demand forecasts (these are unchanged and represent the electricity that is supplied to the transmission network from power stations) and the auxiliary load forecasts for that region.

Implications of the update

AEMO's modelling for the 2018 ESOO and other reliability processes using the same forecast – 2018 Energy Adequacy Assessment Projection (EAAP)[1] and weekly Medium Term Projected Assessment of System Adequacy (MT PASA)[2] runs – is based on sent out demand forecasts, *so there are no implication to the modelling outcomes of any of these processes*.

The market operations in the NEM, including the dispatch process, uses "as generated" demand. Any parties using "as generated" demand forecasts or seeking to compare AEMO's forecast with observed demand presented in this definition, should use this revised "as generated" forecast based on the new auxiliary load forecast.

Other changes

This update also includes actual maximum demand data for summer 2017-18, which was not available at the time the 2018 ESOO was published.

The full forecast data is available on AEMO's Forecasting Data Portal[3].

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[1] At https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Energy-Adequacy-Assessment-Projection.

[2] At https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data/Market-Management-System-MMS/Projected-Assessment-of-System-Adequacy.

[3] At http://forecasting.aemo.com.au/.

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1. Background

1.1   Demand forecast definitions – "sent out" and "as generated"

AEMO publishes electricity demand forecasts as part of planning analysis to inform the market and policy-makers about the generation that will be needed to balance projected demand. These demand forecasts are provided on an operational "sent out" basis, which represents the net electrical power output supplied by generators to meet consumption from business and household consumers and the associated network losses, and thus excludes the auxiliary load used within the power stations themselves.

This is appropriate for planning purposes, because no assumptions need to be made on the future mix of generation technologies as the associated auxiliary load varies significantly between different technologies.

Many parties operating in the National Electricity Market (NEM) often use the measure of operational demand "as generated", which represents the demand met by the gross electrical power output from the generating unit and includes generating units' auxiliary load as well as sent out demand. This is the basis used in the NEM dispatch engine, and actual NEM operational demand is typically published on an "as generated" basis[4].

As shown in the figure below, the relationship between as generated and sent out demand is:

As generated demand = Sent out demand + auxiliary load

Figure 1 Electricity network topology

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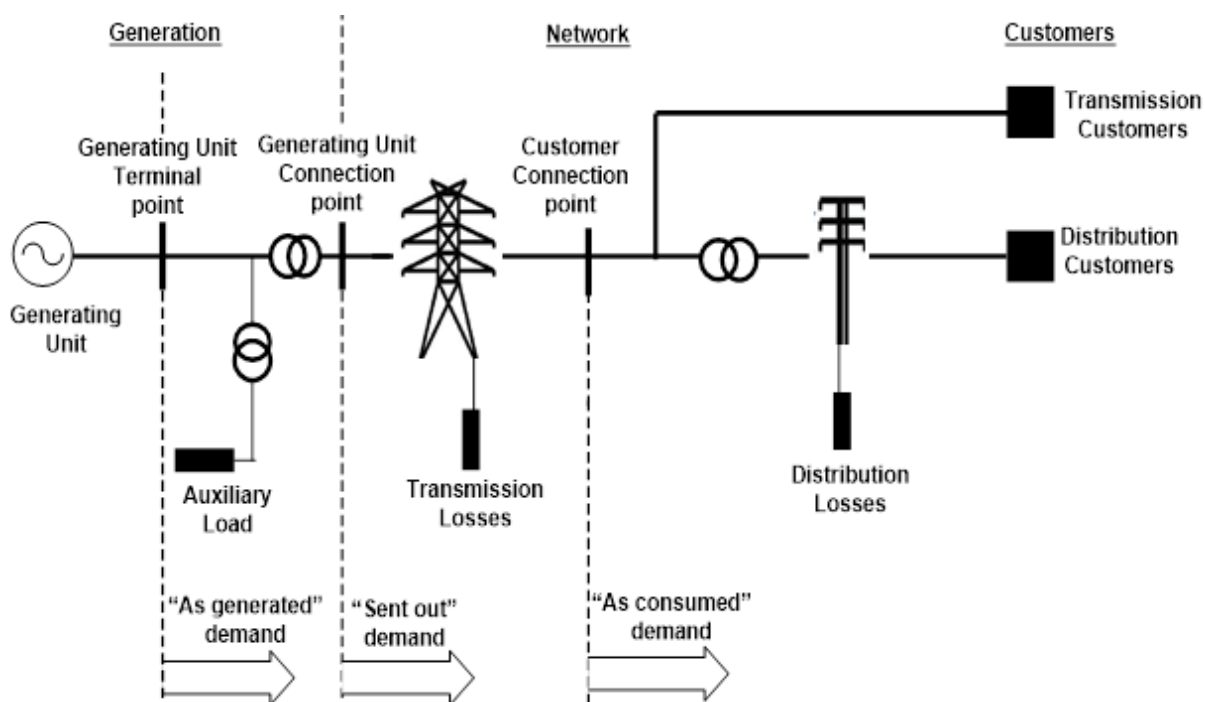
[4] Actual operational demand (as generated) is published at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data-dashboard#operational-demand.

To cater for the different needs, AEMO supplements its forecasts of electricity demand on a "sent out" basis with forecast auxiliary load, so participants can calculate the equivalent "as generated" forecasts.

The Demand Terms EMMS Data Model report[5] has a complete definition of demand measures.

1.2   Revising the demand forecasts – what has changed?

With this update, AEMO has:

- Updated the forecast auxiliary load for its maximum and minimum operational demand forecasts for all NEM regions to better reflect current and forecast changes to the generation mix during these load conditions[6]. There is no change to the auxiliary load forecast for annual consumption.
- Incorporated data for maximum demand actuals for summer 2017-18, which was not available for inclusion in the 2018 Electricity Statement of Opportunities (ESOO) for the NEM.

With the adjustment to the auxiliary load forecast, the derived forecast for operational "as generated" demand has also changed. Operational "sent out" demand forecasts are unchanged from those published in the 2018 ESOO.

AEMO's modelling for the 2018 ESOO and other reliability processes using the same forecast – 2018 Energy Adequacy Assessment Projection (EAAP)[7] and weekly Medium Term Projected Assessment of System Adequacy (MT PASA)[8] runs – is based on "sent out" demand forecasts, *so there are no updates to the modelling outcomes of any of these processes*.

Any parties using "as generated" demand forecasts, or wish to compare AEMO's forecast with observed demand presented in this definition (such as in AEMO's Operational Demand Data Files), should use the new auxiliary load forecast to derive the "as generated" demand. Tables with the derived "as generated" forecast are provided in the next section.

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[5] Demand terms in EMMS Data Model can be found at http://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Demand-terms-in-EMMS-Data-Model.pdf.

[6] Rather than using a fixed average percentage, the auxiliary forecast at time of maximum demand is now based on historical contribution at time of high demand conditions where high auxiliary load technologies like coal meet a relative smaller percentage of demand, whereas the average percentage worked fine for annual consumption. Similar time-appropriate logic is applied to forecast auxiliary load at time of minimum demand. The auxiliary load is projected into the future for the different scenarios based on the 2018 Integrated System Plan generation projections.

[7] At https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Energy-Adequacy-Assessment-Projection.

[8] At https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data/Market-Management-System-MMS/Projected-Assessment-of-System-Adequacy.

2. Updated demand forecasts

The following tables show, for the Neutral scenario:

- The "sent out" 10% probability of exceedance (POE) [9] operational maximum demand forecasts as published in the 2018 ESOO.
- The updated auxiliary load forecasts.
- The resulting "as generated" 10% POE operational maximum demand forecasts.

For full results across scenarios, years, and POE forecasts, see AEMO's Forecasting Data Portal[10].

Table 1   New South Wales 10% POE summer maximum demand and auxiliary forecasts for 2018-19 to 2037-38, Neutral scenario

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2018-19	14,024	499	14,523
2019-20	13,975	489	14,464
2020-21	13,994	485	14,479
2021-22	14,202	484	14,686
2022-23	14,260	457	14,717
2023-24	14,454	431	14,885
2024-25	14,579	437	15,016
2025-26	14,644	428	15,072
2026-27	14,938	430	15,368
2027-28	15,062	430	15,492
2028-29	15,357	392	15,749
2029-30	15,500	401	15,901
2030-31	15,693	405	16,099
2031-32	15,972	413	16,384

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[9] POE demand is the probability or likelihood the forecast would be met or exceeded. The 10% POE forecast is likely to be met or exceeded one year in 10, so considers more extreme weather conditions than a 50% POE forecast, which is expected to be met or exceeded one year in two. Different POE demand forecasts are used to determine a realistic range of power system and market outcomes.

[10] At http://forecasting.aemo.com.au/.

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2032-33	16,147	412	16,559
2033-34	16,291	411	16,702
2034-35	16,536	262	16,799
2035-36	16,656	138	16,794
2036-37	16,804	150	16,954
2037-38	16,965	150	17,116

Table 2   Queensland 10% POE summer maximum demand and auxiliary forecasts for 2018-19 to 2037-38, Neutral scenario

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2018-19	9,067	622	9,689
2019-20	9,076	580	9,656
2020-21	9,006	571	9,577
2021-22	9,080	565	9,645
2022-23	9,091	571	9,662
2023-24	9,103	582	9,685
2024-25	9,246	594	9,839
2025-26	9,161	574	9,735
2026-27	9,249	564	9,813
2027-28	9,287	553	9,840
2028-29	9,323	566	9,890
2029-30	9,438	530	9,968
2030-31	9,572	527	10,099
2031-32	9,692	527	10,218
2032-33	9,767	530	10,297
2033-34	9,874	535	10,409
2034-35	9,962	545	10,507
2035-36	10,109	555	10,663
2036-37	10,183	512	10,695
2037-38	10,258	515	10,773

Table 3   South Australia 10% POE summer maximum demand and auxiliary forecasts for 2018-19 to 2037-38, Neutral scenario

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2018-19	3,176	71	3,247
2019-20	3,170	66	3,236
2020-21	3,185	64	3,249
2021-22	3,259	63	3,322
2022-23	3,228	70	3,298
2023-24	3,265	73	3,338
2024-25	3,292	52	3,344
2025-26	3,289	65	3,354
2026-27	3,272	69	3,341
2027-28	3,309	75	3,384
2028-29	3,326	86	3,412
2029-30	3,352	93	3,446
2030-31	3,406	88	3,494
2031-32	3,470	85	3,555
2032-33	3,490	108	3,599
2033-34	3,482	112	3,593
2034-35	3,492	130	3,622
2035-36	3,524	156	3,680
2036-37	3,593	188	3,781
2037-38	3,639	191	3,830

Table 4   Tasmania 10% POE winter maximum demand and auxiliary forecasts for 2018-19 to 2037-38, Neutral scenario

Calendar year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2019	1,718	14	1,732
2020	1,723	14	1,737
2021	1,734	14	1,748
2022	1,747	15	1,762

Calendar year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2023	1,729	15	1,744
2024	1,737	15	1,752
2025	1,749	14	1,764
2026	1,737	15	1,752
2027	1,730	14	1,744
2028	1,742	14	1,756
2029	1,746	15	1,760
2030	1,750	15	1,765
2031	1,752	15	1,768
2032	1,767	15	1,782
2033	1,776	17	1,792
2034	1,784	17	1,800
2035	1,794	20	1,814
2036	1,808	20	1,828
2037	1,816	20	1,837
2038	1,859	21	1,880

Table 5   Victoria 10% POE summer maximum demand and auxiliary forecasts for 2018-19 to 2037-38, Neutral scenario

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2018-19	9,764	462	10,227
2019-20	9,721	467	10,188
2020-21	9,791	462	10,253
2021-22	9,965	468	10,434
2022-23	9,959	465	10,423
2023-24	10,084	453	10,537
2024-25	10,278	458	10,736
2025-26	10,318	453	10,771
2026-27	10,277	451	10,728
2027-28	10,455	459	10,914

Financial year	Operational maximum demand, sent out (MW)	Auxiliary load (MW)	Operational maximum demand, as generated (MW)
2028-29	10,567	470	11,037
2029-30	10,764	477	11,241
2030-31	10,962	488	11,450
2031-32	11,234	496	11,731
2032-33	11,293	354	11,647
2033-34	11,554	358	11,912
2034-35	11,752	393	12,145
2035-36	12,002	395	12,397
2036-37	12,106	399	12,504
2037-38	12,126	397	12,522