

AEMO EAAP REPORT UPDATE MARCH 2013

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EXECUTIVE SUMMARY

The purpose of the Energy Adequacy Assessment Projection (EAAP) report for March 2013 is to provide an analysis of the potential effects of the water availability and the other energy constraints¹ on the electricity system, under a range of scenarios, over a 24 month period.

National Electricity Market (NEM) standards currently state that *Unreserved Energy* per year for each region must not exceed 0.002% of the total energy consumed in that region for that year.

The NEM is required to operate with defined levels of reserve in order to meet the required standard of supply reliability.

Based on the results of March 2013 EAAP studies, AEMO has determined that the forecast *Unreserved Energy* is below the Reliability Panel Standard of 0.002% for all regions for both years in the three scenarios covered, with the exception of the Victorian region, year 2, low rainfall scenario.

This indicates that the availability of energy in all NEM regions, excluding the Victorian Region for the low rain fall scenario in year 2, meets the reliability standard for supply adequacy over the coming 24 month period.

More detailed results are presented in sections 2 and 4.

The results of this study are largely based on the energy constraints provided by Scheduled Generators, as well as planned generation outages, power transfer capability of the NEM power system and a combination of demand forecasts that were provided by Jurisdictional Planning Bodies for the purposes of ESOP as well AEMO's own forecasts.

Information was provided on the level of energy constraints that each scheduled generating unit would be likely to experience under the three rainfall scenarios below (further discussed in section 1.1):

- Low rainfall
- Short term average rainfall
- Long term average rainfall

¹ Energy generation can be constrained due to limitations of fuel supply in addition to the availability of water supplies.

List of Abbreviations

Abbreviation	Term
AEMO	Australian Energy Market Operator
EAAP	Energy Adequacy Assessment Projection
ESOO	Electricity Statement of Opportunities
GELF	Generator Energy Limitation Framework
MT PASA	Medium Term Projected Assessment of System Adequacy
NEM	National Electricity Market
NTNDP	National Transmission Network Development Plan
POE	Probability of Exceedence
USE	Unserviced Energy

1 INTRODUCTION

AEMO publishes the EAAP² on a quarterly basis to provide an analysis of the potential effects of the water availability and the other energy constraints on the electricity system, under a range of scenarios, over a 24 month period.

The National Electricity Rule 3.7C(n) requires AEMO to comply with *EAAP guidelines*³ in preparing EAAP.

The EAAP⁴ replaced the quarterly AEMO Drought Scenarios Investigation Report, with the final Drought Report having been published in December 2009. The first EAAP was published on 31 March 2010.

EAAP uses probabilistic modelling to determine the regional *Unserved Energy (USE)* at an hourly resolution during the 24 month study period.

The annual percentage of *USE* per region is the key indicator of energy adequacy in the NEM.

1.1 March 2013 EAAP Report

The study period⁵ for this EAAP report is from 1 April 2013 to 31 March 2015.

The closing date for submitting Variable Generator Energy Limitation Framework (GELF) Parameters⁶ by Scheduled Generators was 7 February 2013.

For the purpose of this report 'Year 1' is defined as 1 April 2013 to 31 March 2014, and 'Year 2' is defined as 1 April 2014 to 31 March 2015.

This EAAP report is based on the following three Rainfall Scenarios:

Scenario 1: Low rainfall – based on rainfall between 1 July 2006 and 30 June 2007 for all Regions except New South Wales. For New South Wales the low rainfall scenario is based on the rainfall experienced between 1 June 2006 and 31 May 2007⁷.

Scenario 2: Short term average rainfall – based on the average rainfall recorded over the past 10 years.

Scenario 3: Long term average rainfall – based on the average rainfall recorded over the past 50 years, or the longest period for which rainfall data is available should this be less than 50 years.

² Energy Adequacy Assessment Projection (EAAP) – Glossary of the Electricity Market Rules defines the EAAP as 'A projection of AEMO's assessment of energy availability that accounts for energy constraints for each month over a 24 month period, which is prepared and published in accordance with rule 3.7C and is measured as *Unserved Energy* for each region.'

³ The EAAP guidelines have been determined following Electricity Rule Consultation Procedures and can be accessed using the following web link:

http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/~/_media/Files/Other/electricityops/EAAP_Guidelines.ashx

⁴ Previous AEMO EAAP are available at the following location on AEMO website:

<http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/EAAP>

⁵ A study period refers to a specified time period for which the Energy Adequacy Assessment Projections are conducted.

⁶ Generator Energy Limitation Framework (GELF) – Glossary of the Electricity Market Rules defines the GELF as "A description of the energy constraints that affect the ability of scheduled generating unit to generate electricity prepared in accordance with the EAAP guidelines."

⁷ Had this change not been made for New South Wales, the low rainfall scenario would have had more rainfall than the short term average rainfall scenario in the catchment areas.

1.2 EAAP inputs

Scheduled Generators provided their generation constraints under various rainfall scenarios for the March 2013 EAAP.

The demand profiles used in March 2013 EAAP are consistent with the energy and demand projections published in the 2012 National Electricity Forecasting Report (NEFR). Suitable adjustments have been made to the demand profiles used in EAAP to take into account the generation contributions from the existing and committed future non-scheduled generation.

EAAP models the availability of the existing and committed future scheduled and semi-scheduled generation as well as the anticipated increases to capacities of existing scheduled and semi-scheduled generation used in MT PASA process as a key input.

Refer to EAAP Guidelines⁸ for information on the other EAAP inputs.

1.3 EAAP outputs

The EAAP guidelines require AEMO to publish the following EAAP reports:

1. EAAP Public Report – This report will include the following items for each of the Scenarios on regional basis:
 - Monthly USE for the study period in GWh
 - USE for the first 12 months and for the second 12 months in the study period in GWh
 - Monthly energy generation for the study period in GWh on a NEM-wide basis
2. Participant EAAP reports⁹ for each Generator who owns scheduled generating units or hydro power schemes that have been included in each of the Scenarios:
 - Monthly energy generation reductions in GWh for the scheduled generating unit or hydro power scheme for the study period
 - Monthly capacity reductions in MW for the scheduled generating unit or hydro power scheme for the study period
 - Monthly generation contribution in GWh from the scheduled generating unit or hydro power scheme for the study period
 - Monthly generation contribution in GWh for the first 12 months and for the second 12 months in the study period.

This AEMO EAAP Report Update March 2013 covers the requirement to publish the EAAP Public Report (i.e. first report stated above).

1.4 Interpretation of USE forecasts determined by EAAP studies

The electricity supply estimates in this EAAP Report are based on the variable GELF parameters submitted by NEM Scheduled Generators as required by the EAAP guidelines, during February and March 2013, so the results should be regarded as reflecting an input ‘snapshot’ taken at that time.

⁸ EAAP Guidelines are available at: <http://www.aemo.com.au/electricityops/408-0006.pdf>

⁹ Participants are required to subscribe to the “EAAP_Results” file if they wish to receive the participant EAAP reports. Participant file subscriptions are managed in the MMS Web Portal via the Data Subscriptions option available from the Data Interchange menu.

The water-related energy limitations submitted by Scheduled Generators are based on the known share of water available for generation at the time, as advised by jurisdictions and water authorities.

2 RESULTS SUMMARY

The following tables summarise the annual *Unserviced Energy (USE)* figures for each region, and provide comparisons between the *EAAP* published in December 2012 and March 2013.

Based on the results of March 2013 *EAAP* studies, AEMO has determined that the forecast *Unserviced Energy* is below the Reliability Panel Standard of 0.002% for all regions for both years in the three scenarios covered in the March *EAAP* study, except for the Victoria region, year 2, low rainfall scenario.

TABLE 1: *UNSERVED ENERGY* FOR SCENARIO 1 - LOW RAINFALL

Low rainfall		NSW	QLD	SA	TAS	VIC
Year 1	December 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
	March 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	December 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0003%
	March 2013 Update	0.0000%	0.0001%	0.0016%	0.0000%	0.0052%

TABLE 2: *UNSERVED ENERGY* FOR SCENARIO 2 - SHORT TERM AVERAGE RAINFALL

Short term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	December 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
	March 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	December 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%
	March 2013 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%

TABLE 3: *UNSERVED ENERGY* FOR SCENARIO 3 - LONG TERM AVERAGE RAINFALL

Long term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	December 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
	March 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	December 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%
	March 2013 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%

3 NEW GENERATION AND GENERATION RETIREMENTS

3.1 New Generator Projects

Based on the information published on the Generation Information Page¹⁰, as well as on the subsequent updates received, the following committed significant scheduled and semi-scheduled generating units have been included in the model:

TABLE 4: NEW GENERATORS

Station	State	Capacity	When
Macarthur wind farm	VIC	420 MW	Summer 2012/13
Musselroe wind farm	TAS	168 MW	Winter 2013
Snowtown Stage 2 South	SA	126 MW	Winter 2014
Snowtown Stage 2 North	SA	144 MW	Spring 2014

3.2 Retired Generation

No additional retired generation for this quarter.

Munmorah No.3 and 4 units in New South Wales were assumed to be out of service with a recall time longer than 24 hours.

4 DETAILED RESULTS

The *EAAP* simulation studies provide forecasts of customer load that might not be able to be met during the study period. As the studies are probabilistic in nature, 400 simulation studies were performed for each rainfall scenario using both 10% Probability of Exceedence (POE) and 50% POE demand forecasts.

The results of all of these simulation studies have been 'averaged' as explained in the section 5.2 of the *EAAP guidelines*¹¹, by giving a higher weighting to the more expected 50% POE results, whilst still capturing the influence of the more pessimistic 10% POE results:

¹⁰ The Generation Information Page is available on *AEMO* website at:
<http://www.aemo.com.au/Electricity/Planning/Related-Information/Generation-Information>
 This webpage was last updated on 22 February 2013.

¹¹ The *EAAP guidelines* are available at the following location on *AEMO* website:

Weighted result = $0.696 \times 50\% \text{ POE result} + 0.304 \times 10\% \text{ POE result}$.

The figures in the following tables represent the average monthly regional energy demand that was not able to be met in gigawatt hours (GWh).

The forecast *Unserviced Energy* figures presented in the following tables should not be interpreted as certainty of blackouts, but rather as an estimate of what could occur as it is not possible to be certain about future customer demand or generator failures with the *EAAP* modelling conducted.

If customer demand is moderate to low, or generator failures do not occur at critical times, then the *Unserviced Energy* estimates contained in this update are unlikely to eventuate.

Shaded cells indicate where *USE* exceeds the Reliability Panel Standard of 0.002% in a region.

4.1 Scenario 1: Low Rainfall - Forecast *Unserviced Energy* (GWh)

TABLE 5: FORECAST *USE* IN SCENARIO 1 – LOW RAINFALL

	NSW	QLD	SA	TAS	VIC
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	0.0045	-	-	-	-
Aug-13	-	0.0005	-	-	-
Sep-13	-	-	-	-	-
Oct-13	-	0.0003	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	0.0003	-	-	-
Jan-14	-	-	0.0031	-	0.0084
Feb-14	-	-	0.0030	-	0.0028
Mar-14	-	-	-	-	0.0010
Total GWh	0.0045	0.0011	0.0060	-	0.0121
Region %	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	0.0004	-	-
Jul-14	-	0.0013	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Oct-14	-	0.0027	-	-	-
Nov-14	-	-	-	-	-
Dec-14	-	0.0053	-	-	0.0016
Jan-15	-	0.0096	0.0730	-	0.2595
Feb-15	0.0056	0.0106	0.1232	-	1.9113
Mar-15	-	0.0012	-	-	0.4278
Total GWh	0.0056	0.0307	0.1967	-	2.6001
Region %	-	0.0001%	0.0016%	-	0.0052%

4.2 Scenario 2: Short Term Average Rainfall - Forecast *Unserved Energy* (GWh)

TABLE 6: FORECAST *USE* IN SCENARIO 2 – SHORT TERM AVERAGE RAINFALL

	NSW	QLD	SA	TAS	VIC
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	0.0046	-	-	-	-
Aug-13	-	0.0006	-	-	-
Sep-13	-	-	-	-	-
Oct-13	-	0.0003	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	0.0004	-	-	-
Jan-14	-	-	0.0029	-	0.0082
Feb-14	-	-	0.0022	-	0.0027
Mar-14	-	-	-	-	0.0012
Total GWh	0.0046	0.0013	0.0051	-	0.0121
Region %	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	0.0005	-	-
Jul-14	-	0.0013	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Oct-14	-	0.0027	-	-	-
Nov-14	-	-	-	-	-
Dec-14	-	0.0052	-	-	-
Jan-15	-	0.0096	0.0102	-	0.0273
Feb-15	-	0.0054	0.0043	-	0.0221
Mar-15	-	0.0012	-	-	0.0001
Total GWh	-	0.0255	0.0149	-	0.0496
Region %	-	-	0.0001%	-	0.0001%

4.3 Scenario 3: Long Term Average Rainfall - Forecast *Unservd Energy* (GWh)

TABLE 7: FORECAST *USE* IN SCENARIO 3 – LONG TERM AVERAGE RAINFALL

	NSW	QLD	SA	TAS	VIC
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	0.0051	-	-	-	-
Aug-13	-	0.0005	-	-	-
Sep-13	-	-	-	-	-
Oct-13	-	0.0003	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	0.0003	-	-	-
Jan-14	-	-	0.0023	-	0.0057
Feb-14	-	-	0.0022	-	0.0026
Mar-14	-	-	-	-	0.0012
Total GWh	0.0051	0.0011	0.0045	-	0.0095
Region %	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	0.0005	-	-
Jul-14	-	0.0013	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Oct-14	-	0.0027	-	-	-
Nov-14	-	-	-	-	-
Dec-14	-	0.0052	-	-	-
Jan-15	-	0.0096	0.0100	-	0.0269
Feb-15	-	0.0055	0.0043	-	0.0219
Mar-15	-	0.0012	-	-	-
Total GWh	-	0.0254	0.0148	-	0.0489
Region %	-	-	0.0001%	-	0.0001%

4.4 FORECAST MONTHLY ENERGY GENERATION ON NEM-WIDE BASIS

TABLE 8: FORECAST MONTHLY ENERGY GENERATION ON NEM-WIDE BASIS

	Low Rainfall	Short-Term Average Rainfall	Long-Term Average Rainfall
Apr-13	15418	15398	15400
May-13	16877	16881	16863
Jun-13	16859	16873	16867
Jul-13	17903	17937	17923
Aug-13	17344	17351	17333
Sep-13	15718	15738	15724
Oct-13	16155	16157	16135
Nov-13	16024	16060	16011
Dec-13	16636	16630	16648
Jan-14	17718	17762	17741
Feb-14	16043	16055	16020
Mar-14	17108	17130	17107
Total GWh	199805	199975	199771
Anr-14	15658	15661	15648
May-14	17130	17147	17100
Jun-14	17063	17118	17084
Jul-14	18384	18388	18380
Aug-14	17703	17723	17708
Sep-14	16174	16174	16184
Oct-14	16551	16561	16541
Nov-14	16265	16302	16276
Dec-14	17061	17069	17085
Jan-15	18156	18167	18144
Feb-15	16478	16451	16470
Mar-15	17525	17525	17536
Total GWh	204150	204285	204157

4.5 USE Distributions

The *USE* distribution graphs are used to show how many *EAAP* simulation studies (Monte Carlo iterations) exceeded a given *USE* level. The *USE* values are expressed as a percentage of regional energy. This is to allow easier reference to the Reliability Panel standard of 0.002% *USE*.

Separate graphs are presented for the 10% and 50% POE simulations.











