

# AEMO EAAP REPORT UPDATE SEPTEMBER 2012

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## EXECUTIVE SUMMARY

The purpose of the Energy Adequacy Assessment Projection (EAAP) report for September 2012 is to provide an analysis of the potential effects of the water availability and the other energy constraints<sup>1</sup> on the electricity system, under a range of scenarios, over a 24 month period.

National Electricity Market (NEM) standards currently state that *Unserviced 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 September 2012 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 September EAAP. This indicates that the availability of energy in these NEM regions meets the reliability standard for supply adequacy over the coming 24 month period.

More detailed results are presented in sections two and four.

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 ESOO 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

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<sup>1</sup> 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 EAAP<sup>2</sup> 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*<sup>3</sup> in preparing EAAP.

The EAAP<sup>4</sup> 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 *Unserviced 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 September 2012 EAAP Report

The study period<sup>5</sup> for this EAAP report is from 1 October 2012 to 30 September 2014.

The closing date for submitting Variable Generator Energy Limitation Framework (GELF) Parameters<sup>6</sup> by Scheduled Generators was 17 August 2012.

For the purpose of this report 'Year 1' is defined as 1 October 2012 to 30 September 2013, and 'Year 2' is defined as 1 October 2013 to 30 September 2014.

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 2007<sup>7</sup>.

**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.

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<sup>2</sup> 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 *Unserviced Energy* for each region.'

<sup>3</sup> 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/Copy-of-Development-of-Energy-Adequacy-Assessment-Projection-EAAP-Guidelines-Consultation>

<sup>4</sup> Previous AEMO EAAP are available at the following location on AEMO website:  
<http://www.aemo.com.au/Electricity/Market-Operations/LINKS-FOR-ARCHIVE/Energy-Adequacy-Assessment-Projection>

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

<sup>6</sup> 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."

<sup>7</sup> 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 September 2012 EAAP.

The demand profiles used in September 2012 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 Guidelines<sup>8</sup> 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 reports<sup>9</sup> 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 September 2012 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 July and August 2012, so the results should be regarded as reflecting an input ‘snapshot’ taken at that time.

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<sup>8</sup> EAAP Guidelines are available at:  
<http://www.aemo.com.au/electricityops/4080006.pdf> <http://www.aemo.com.au/electricityops/408-0006.pdf>

<sup>9</sup> 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 June 2012 and the September 2012.

Based on the results of September 2012 *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 September *EAAP* study. This indicates that the availability of energy in these NEM regions meets the reliability standard for supply adequacy in both years.

Reduction in *USE* is observed for Victoria and South Australia in the first and the second year in September 2012 *EAAP* as compared to June 2012. This reduction in *USE* is because of reduced energy restrictions on a major power station in Victoria.

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

Low rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0002%
	September 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2012 Update	0.0000%	0.0000%	0.0009%	0.0000%	0.0017%
	September 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%

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

Short term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0002%
	September 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2012 Update	0.0000%	0.0000%	0.0002%	0.0000%	0.0001%
	September 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%

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

Long term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%
	September 2012 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0001%
	September 2012 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0000%

### 3 NEW GENERATION AND GENERATION RETIREMENTS

#### 3.1 New Generator Projects

Based on the information published on the Generation Information Page<sup>10</sup>, 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

#### 3.2 Retired Generation

TABLE 5: RETIRED GENERATORS

Station	State	Capacity	When
Swanbank B power station <sup>11</sup>	QLD	420 MW	Summer 2012/13

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<sup>12</sup>, using the following weightings:

<sup>10</sup> The Generation Information Page is available on AEMO website at:

<http://www.aemo.com.au/Electricity/Planning/Related-Information/Generation-Information>

This webpage has been updated on 31 July 2012.

<sup>11</sup> Swanbank B1, B2 and B4 units were assumed unavailable and in long term storage in the June 2012 EAAP report.

Weighted result = 0.696 x 50% POE result + 0.304 x 10% POE result.

The above weighting is similar to the weightings used in studies for the 2010 National Transmission Network Development Plan<sup>13</sup>, and provides a balance by giving higher weighting to the more expected 50% POE results, whilst still capturing the influence of the more pessimistic 10% POE results.

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 *Unserved 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 *Unserved 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.

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<sup>12</sup> The *EAAP guidelines* are available at the following location on AEMO website:  
<http://www.aemo.com.au/electricityops/408-0006.pdf>

<sup>13</sup> The 2010 National Transmission Network Development Plan is available at the following location on AEMO website:  
<http://www.aemo.com.au/Electricity/Planning/Reports/Archive-of-previous-Planning-reports/2010-NTNDP>

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

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

	NSW	QLD	SA	TAS	VIC
Oct-12	-	-	-	-	-
Nov-12	-	-	-	-	-
Dec-12	-	-	-	-	-
Jan-13	-	-	0.0015	-	0.0043
Feb-13	-	-	0.0002	-	0.0021
Mar-13	-	-	-	-	-
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	-	-	-	-	-
Aug-13	-	-	-	-	-
Sep-13	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0017	-	0.0064
<b>Region %</b>	-	-	-	-	-
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0039	-	0.0116
Feb-14	-	-	0.0023	-	0.0087
Mar-14	-	-	-	-	0.0120
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0062	-	0.0323
<b>Region %</b>	-	-	0.0001%	-	0.0001%

## 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
Oct-12	-	-	-	-	-
Nov-12	-	-	-	-	-
Dec-12	-	-	-	-	-
Jan-13	-	-	0.0013	-	0.0038
Feb-13	-	-	0.0002	-	0.0019
Mar-13	-	-	-	-	-
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	-	-	-	-	-
Aug-13	-	-	-	-	-
Sep-13	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0015	-	0.0058
<b>Region %</b>	-	-	-	-	-
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0040	-	0.0121
Feb-14	-	-	0.0020	-	0.0080
Mar-14	-	-	-	-	0.0006
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0060	-	0.0206
<b>Region %</b>	-	-	-	-	-

### 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
Oct-12	-	-	-	-	-
Nov-12	-	-	-	-	-
Dec-12	-	-	-	-	-
Jan-13	-	-	0.0013	-	0.0039
Feb-13	-	-	0.0002	-	0.0020
Mar-13	-	-	-	-	-
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Jul-13	-	-	-	-	-
Aug-13	-	-	-	-	-
Sep-13	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0015	-	0.0058
<b>Region %</b>	-	-	-	-	-
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0041	-	0.0122
Feb-14	-	-	0.0021	-	0.0090
Mar-14	-	-	-	-	0.0004
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
<b>Total GWh</b>	-	-	0.0062	-	0.0216
<b>Region %</b>	-	-	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 Avg Rainfall	Long-Term Avg Rainfall
Oct-12	15861	15863	15860
Nov-12	15813	15809	15775
Dec-12	16343	16385	16309
Jan-13	17384	17422	17381
Feb-13	15778	15778	15762
Mar-13	16867	16931	16900
Apr-13	15411	15414	15421
May-13	16849	16887	16862
Jun-13	16819	16839	16816
Jul-13	17922	17965	17896
Aug-13	17353	17378	17347
Sep-13	15722	15729	15742
<b>Total GWh</b>	<b>198121</b>	<b>198400</b>	<b>198072</b>
Oct-13	16147	16160	16161
Nov-13	15993	16014	16020
Dec-13	16630	16643	16658
Jan-14	17708	17744	17740
Feb-14	16011	16083	16034
Mar-14	17117	17141	17093
Apr-14	15657	15673	15631
May-14	17128	17110	17104
Jun-14	17096	17093	17045
Jul-14	18374	18393	18347
Aug-14	17698	17722	17697
Sep-14	16150	16163	16143
<b>Total GWh</b>	<b>201709</b>	<b>201939</b>	<b>201674</b>

#### 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.











