AEMO EAAP REPORT UPDATE SEPTEMBER 2010

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Contents

1 INTRODUCTION

AEMO is required by the National Electricity Rule 3.7C(d) to publish an *EAAP*[1] on a quarterly basis. The National Electricity Rule 3.7C(n) requires *AEMO* to comply with *EAAP guidelines*[2] in preparing *EAAP*.

The *EAAP* replaces the quarterly AEMO Drought Scenarios Investigation Report[3], 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. This involves the use of time-sequential, security constrained optimal dispatch simulations, incorporating Monte-Carlo Simulations.

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

1.1 September 2010 *EAAP* Report

Study period[4] for this *EAAP* report: **01-10-2010 to 30-09-2012**

Closing date for submitting Variable GELF Parameters by

Scheduled Generators: **06-08-2010**

For the purpose of this report 'Year 1' is defined as 01-10-2010 to 30-09-2011, and 'Year 2' is defined as 01-10-2011 to 30-09-2012.

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[5].

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.

1.2 *EAAP* inputs and outputs

The scheduled generating units submitted their Variable GELF Parameters[6] within the required timeframe specified in *EAAP guidelines*. These included all the scheduled generating units that

[1] 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.'

[2] 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/electricityops/408-0001.html

[3] Previous AEMO EAAP and Drought Report Updates are available at the following location on *AEMO* website:
http://www.aemo.com.au/electricityops/eaap.html

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

[5] 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.

have provided their generation constraints under various rainfall scenarios for the September 2010 *EAAP*.

The demand profiles used in September 2010 *EAAP* are consistent with the energy and demand projections that have been published in 2010 Electricity Statement of Opportunities. Estimates of demand side participation published as "Very Likely" in the 2010 Electricity Statement of Opportunities has also been used as an input in September 2010 *EAAP*.

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; and
   - Monthly energy generation for the study period in GWh on a *NEM*-wide basis.
2. Private *EAAP* reports 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; and
   - 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 2010 covers the requirement to publish the *EAAP* Public Report (i.e. first report stated above).

1.3 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 Aug 2010, so the results should be regarded as reflecting an input 'snapshot' taken at that time.

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 *unserved energy* (*USE*) figures for each region, and provide comparisons between the *EAAP* published in June 2010 and the September 2010 *EAAP* report. The grey shading highlights where the annual *USE* is higher than the Reliability Panel standard of 0.002%[7].

[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] The Reliability Panel establish the standard for supply reliability in the *NEM*, which is 0.002% *unserved energy* in each region. This standard requires that no more than 0.002% of each region's energy demand should be unserved due to supply shortfalls. Note that this does not include customer interruptions due to failures in transmission and distribution networks.

The September 2010 *EAAP* results forecast reduced *USE* for New South Wales, Victoria and South Australia for Year 1 of the low rainfall scenario, which includes summer 2010/11, compared to the June 2010 *EAAP*. The marginal levels of *USE* forecast for these three regions are below the Reliability Panel Standard of 0.002%. There was no noticeable forecast *USE* for Queensland and Tasmania in the June and September 2010 *EAAP* studies for Year 1 of the low rainfall scenario.

The September 2010 *EAAP* forecasts a marginal decrease of *USE* for Victoria and marginal increases for South Australia and New South Wales regions for the Year 2 of the low rainfall scenario, compared to June 2010 *EAAP*. The forecast *USE* is above the Reliability Panel Standard of 0.002% for Victoria and South Australia regions for the Year 2 in the low rainfall scenario. The forecast *USE* is below the Reliability Panel Standard of 0.002% for all other regions.

The forecast *USE* is higher than the Reliability Panel Standard in the Year 2 of the low rainfall scenario for Victoria and South Australia due to energy restrictions on two power stations in Victoria.

Forecast *unserved energy* in all regions is below 0.002% for both years of the short term and long term average rainfall scenarios.

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

Low rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2010 Update	0.0003%	0.0000%	0.0012%	0.0000%	0.0015%
	September 2010 Update	0.0001%	0.0000%	0.0002%	0.0000%	0.0003%
Year 2	June 2010 Update	0.0001%	0.0002%	0.0019%	0.0000%	0.0074%
	September 2010 Update	0.0006%	0.0002%	0.0022%	0.0000%	0.0067%

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

Short term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2010 Update	0.0001%	0.0000%	0.0001%	0.0000%	0.0001%
	September 2010 Update	0.0001%	0.0000%	0.0002%	0.0000%	0.0003%
Year 2	June 2010 Update	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
	September 2010 Update	0.0000%	0.0001%	0.0000%	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	June 2010 Update	0.0000%	0.0000%	0.0001%	0.0000%	0.0000%
	September 2010 Update	0.0001%	0.0000%	0.0001%	0.0000%	0.0003%
Year 2	June 2010 Update	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
	September 2010 Update	0.0000%	0.0001%	0.0000%	0.0000%	0.0001%

3 NEW GENERATION AND GENERATION RETIREMENTS

3.1 New Generator Projects

Based on the information published on the Generation Information Page[8], as well as on the subsequent updates received, the following committed significant generator projects have been included in the model:

TABLE 4: NEW GENERATORS

Station	State	Capacity	When
Lake Bonney 3 wind farm	SA	39 MW	Summer 2010/11
Mortlake Stage 1	VIC	553 MW (winter) 518 MW (summer)	Late Summer 2010/11
North Brown Hill wind farm	SA	132 MW	Winter 2011
Port Lincoln 3	SA	23 MW	Summer 2010/11
Waterloo wind farm	SA	111 MW	Summer 2010/11
Oaklands wind farm	VIC	67 MW	Winter 2011
Hallett GT expansion	SA	23 MW	Summer 2010/11

3.2 Retired Generation

Based on the information published on the Generation Information Page, as well as the subsequent updates received, there were no retirements of Scheduled Generating Units modelled in September 2010 *EAAP* report.

Swanbank B2 and B4 units in Queensland region were assumed unavailable since these generating units would be in long term storage during the study period.

[8] The Generation Information Page is available on *AEMO* website at: http://www.aemo.com.au/data/gendata.shtml

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*[9], using the following weightings:

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 2009 National Transmission Statement[10], 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 *EAAP* modelling is probabilistic in nature because it is not possible to be certain about future customer demand or generator failures, etc. As a result, 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. 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.

[9] The *EAAP guidelines* can be accessed using the following web link:
http://www.aemo.com.au/electricityops/408-0001.html

[10] The 2009 National Transmission Statement is available at the following location on AEMO website:
http://www.aemo.com.au/planning/nts2009.html

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

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

	NSW	QLD	SA	TAS	VIC
Oct-10	0.000	0.000	0.000	0.000	0.000
Nov-10	0.000	0.000	0.003	0.000	0.000
Dec-10	0.000	0.004	0.000	0.000	0.000
Jan-11	0.014	0.008	0.000	0.000	0.021
Feb-11	0.096	0.013	0.000	0.000	0.114
Mar-11	0.001	0.000	0.019	0.000	0.031
Apr-11	0.000	0.000	0.000	0.000	0.000
May-11	0.000	0.000	0.000	0.000	0.000
Jun-11	0.000	0.000	0.000	0.000	0.000
Jul-11	0.000	0.000	0.000	0.000	0.000
Aug-11	0.000	0.000	0.000	0.000	0.000
Sep-11	0.000	0.000	0.000	0.000	0.000
Total GWh	0.112	0.024	0.023	0.000	0.166
Region %	0.0001%	0.0000%	0.0002%	0.000%	0.0003%
Oct-11	0.000	0.000	0.000	0.000	0.000
Nov-11	0.000	0.000	0.000	0.000	0.000
Dec-11	0.000	0.000	0.000	0.000	0.003
Jan-12	0.000	0.008	0.021	0.000	0.779
Feb-12	0.484	0.094	0.043	0.000	1.907
Mar-12	0.001	0.004	0.231	0.000	0.820
Apr-12	0.000	0.000	0.000	0.000	0.000
May-12	0.001	0.000	0.000	0.000	0.000
Jun-12	0.000	0.000	0.000	0.000	0.000
Jul-12	0.000	0.000	0.000	0.000	0.000
Aug-12	0.000	0.000	0.000	0.000	0.000
Sep-12	0.000	0.000	0.000	0.000	0.000
Total GWh	0.486	0.106	0.295	0.000	3.509
Region %	0.0006%	0.0002%	0.0022%	0.0000%	0.0067%

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-10	0.000	0.000	0.000	0.000	0.000
Nov-10	0.000	0.000	0.003	0.000	0.000
Dec-10	0.000	0.004	0.000	0.000	0.000
Jan-11	0.013	0.007	0.000	0.000	0.017
Feb-11	0.094	0.014	0.000	0.000	0.103
Mar-11	0.001	0.000	0.018	0.000	0.030
Apr-11	0.000	0.000	0.000	0.000	0.000
May-11	0.000	0.000	0.000	0.000	0.000
Jun-11	0.000	0.000	0.000	0.000	0.000
Jul-11	0.000	0.000	0.000	0.000	0.000
Aug-11	0.000	0.000	0.000	0.000	0.000
Sep-11	0.000	0.000	0.000	0.000	0.000
Total GWh	0.108	0.025	0.021	0.000	0.150
Region %	0.0001%	0.0000%	0.0002%	0.0000%	0.0003%
Oct-11	0.000	0.000	0.000	0.000	0.000
Nov-11	0.000	0.000	0.000	0.000	0.000
Dec-11	0.000	0.000	0.000	0.000	0.000
Jan-12	0.000	0.007	0.000	0.000	0.008
Feb-12	0.018	0.072	0.000	0.000	0.015
Mar-12	0.021	0.004	0.005	0.000	0.007
Apr-12	0.000	0.000	0.000	0.000	0.000
May-12	0.000	0.000	0.000	0.000	0.000
Jun-12	0.000	0.000	0.000	0.000	0.000
Jul-12	0.000	0.000	0.000	0.000	0.000
Aug-12	0.000	0.000	0.000	0.000	0.000
Sep-12	0.000	0.000	0.000	0.000	0.000
Total GWh	0.039	0.084	0.006	0.000	0.030
Region %	0.0000%	0.0001%	0.0000%	0.0000%	0.0001%

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

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

	NSW	QLD	SA	TAS	VIC
Oct-10	0.000	0.000	0.000	0.000	0.000
Nov-10	0.000	0.000	0.003	0.000	0.000
Dec-10	0.000	0.004	0.000	0.000	0.000
Jan-11	0.025	0.006	0.000	0.000	0.017
Feb-11	0.090	0.012	0.000	0.000	0.096
Mar-11	0.001	0.000	0.015	0.000	0.024
Apr-11	0.000	0.000	0.000	0.000	0.000
May-11	0.000	0.000	0.000	0.000	0.000
Jun-11	0.000	0.000	0.000	0.000	0.000
Jul-11	0.000	0.000	0.000	0.000	0.000
Aug-11	0.000	0.000	0.000	0.000	0.000
Sep-11	0.000	0.000	0.000	0.000	0.000
Total GWh	0.116	0.022	0.019	0.000	0.137
Region %	0.0001%	0.0000%	0.0001%	0.0000%	0.0003%
Oct-11	0.000	0.000	0.000	0.000	0.000
Nov-11	0.000	0.000	0.000	0.000	0.000
Dec-11	0.000	0.000	0.000	0.000	0.000
Jan-12	0.000	0.007	0.000	0.000	0.006
Feb-12	0.035	0.072	0.000	0.000	0.025
Mar-12	0.002	0.004	0.005	0.000	0.005
Apr-12	0.000	0.000	0.000	0.000	0.000
May-12	0.000	0.000	0.000	0.000	0.000
Jun-12	0.000	0.000	0.000	0.000	0.000
Jul-12	0.000	0.000	0.000	0.000	0.000
Aug-12	0.000	0.000	0.000	0.000	0.000
Sep-12	0.000	0.000	0.000	0.000	0.000
Total GWh	0.037	0.084	0.005	0.000	0.036
Region %	0.0000%	0.0001%	0.0000%	0.0000%	0.0001%

4.4 FORECAST MONTHLY ENERGY GENERATION ON *NEM*-WIDE BASIS

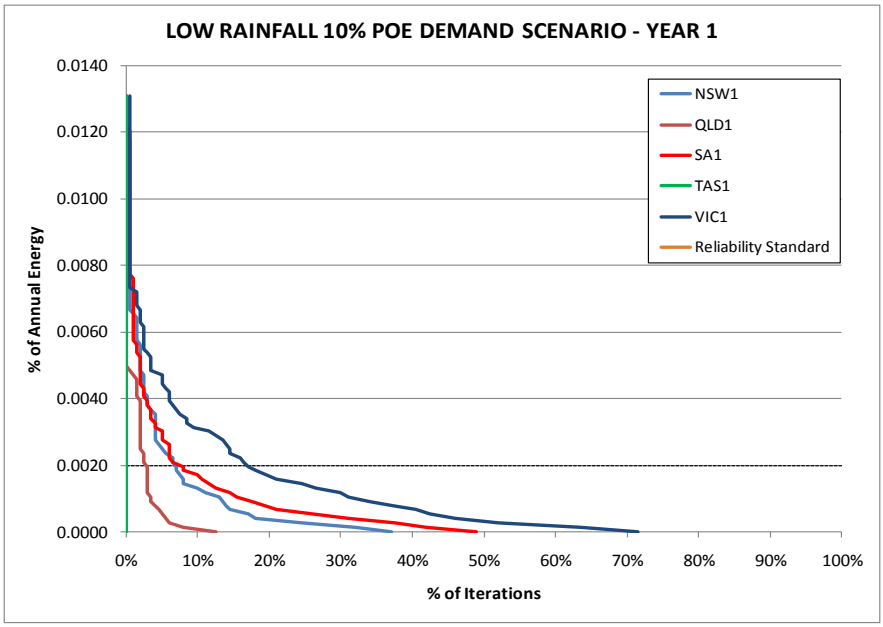
TABLE 8: FORECAST MONTHLY ENERGY GENERATION ON *NEM*-WIDE BASIS

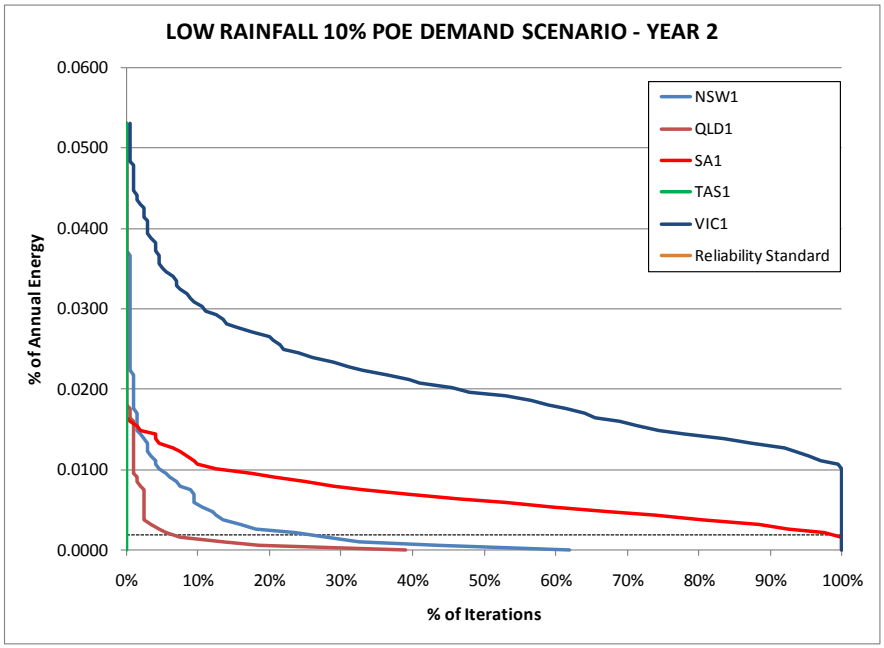
	Low Rainfall Scenario	Short Term Average Rainfall Scenario	Long Term Average Rainfall Scenario
Oct-10	16933.934	16975.766	16938.244
Nov-10	16958.514	17057.611	16981.107
Dec-10	17488.975	17568.115	17542.822
Jan-11	18812.322	18839.746	18809.883
Feb-11	16954.580	16990.131	16957.260
Mar-11	18203.750	18221.219	18213.031
Apr-11	16539.779	16552.186	16535.695
May-11	18323.953	18340.293	18347.395
Jun-11	18002.398	18051.467	17993.641
Jul-11	19166.285	19176.439	19153.057
Aug-11	18759.609	18788.262	18768.682
Sep-11	17255.078	17259.906	17248.203
Total GWh	213399.188	213821.141	213489.016
Oct-11	17345.025	17364.773	17354.436
Nov-11	17463.861	17468.783	17465.434
Dec-11	18125.070	18176.111	18143.406
Jan-12	19243.820	19217.262	19231.371
Feb-12	18084.268	18132.561	18109.016
Mar-12	18700.973	18718.688	18701.531
Apr-12	16949.119	16951.480	16949.564
May-12	18712.902	18730.172	18728.072
Jun-12	18439.984	18454.521	18438.131
Jul-12	19666.559	19655.846	19674.652
Aug-12	19238.863	19216.314	19231.002
Sep-12	17517.262	17505.303	17517.738
Total GWh	219487.719	219591.813	219544.359

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.


LOW RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard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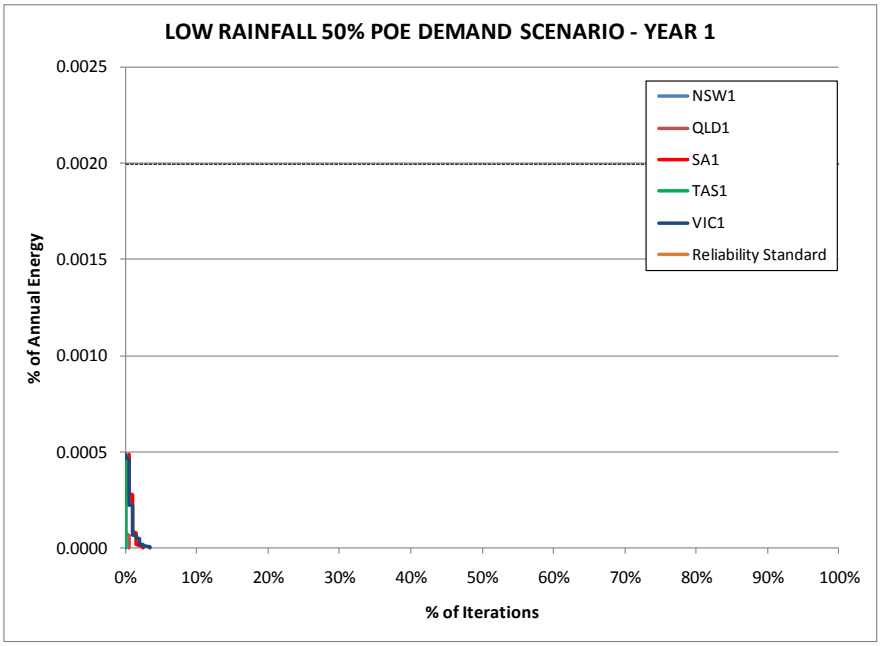
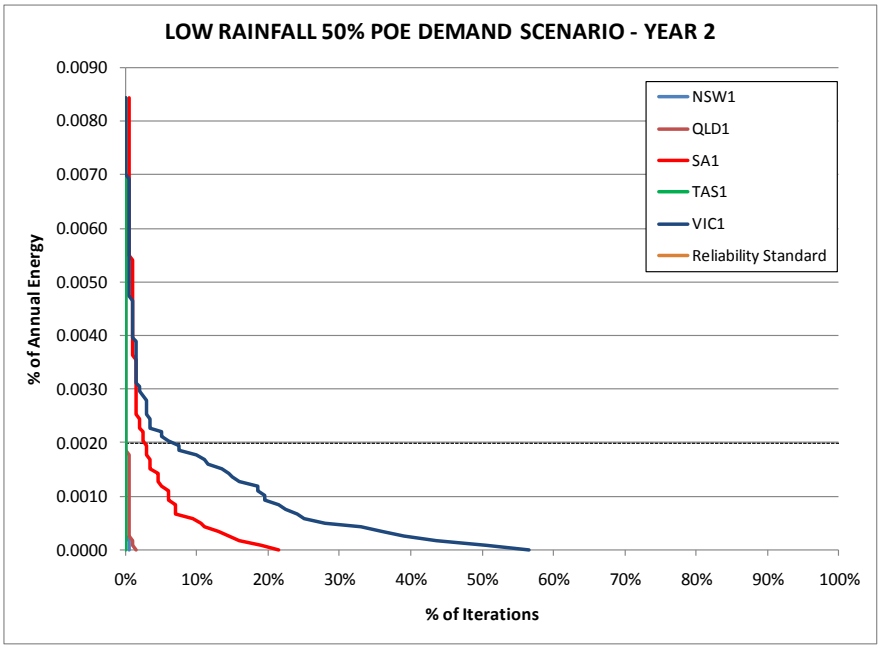
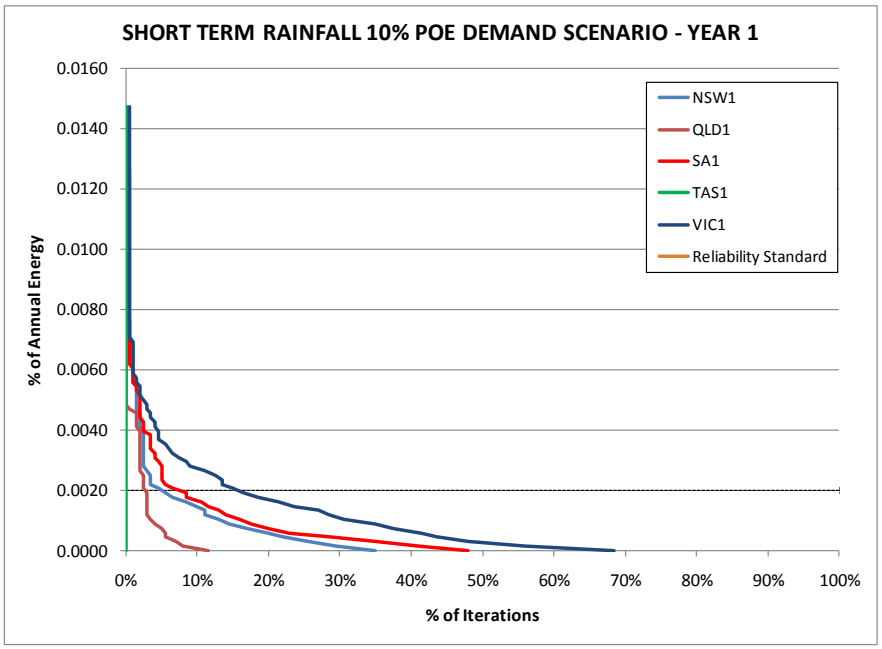
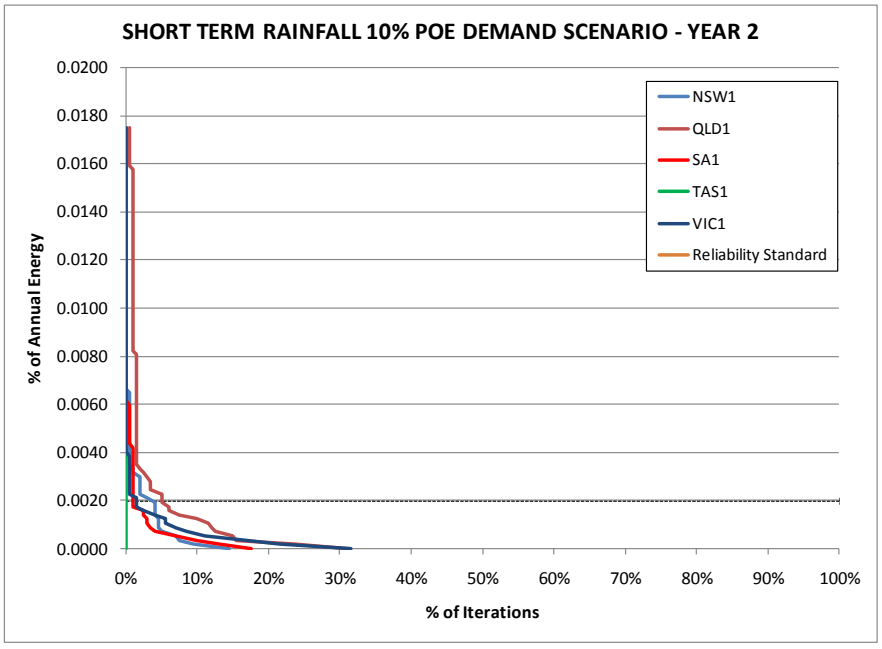
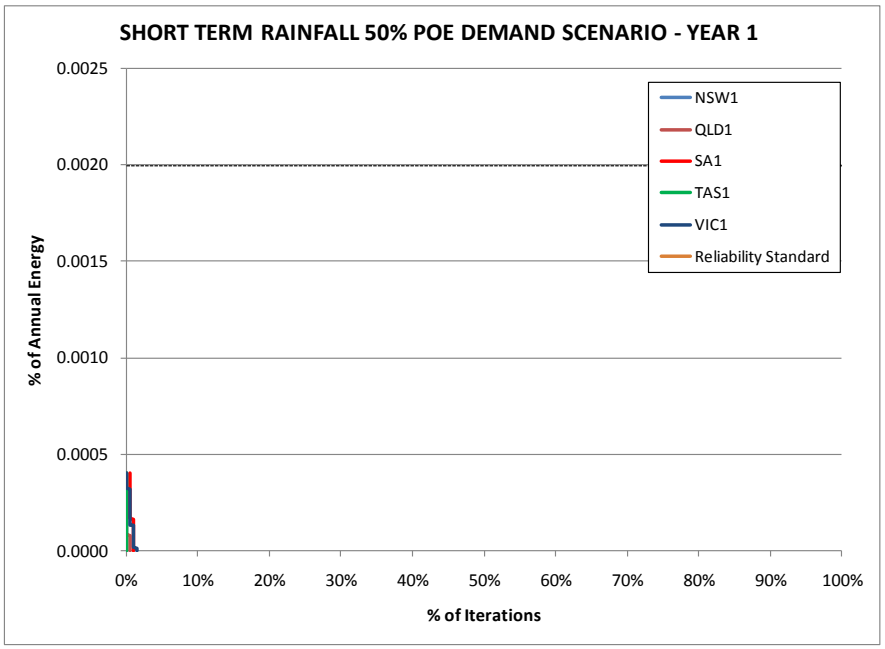
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

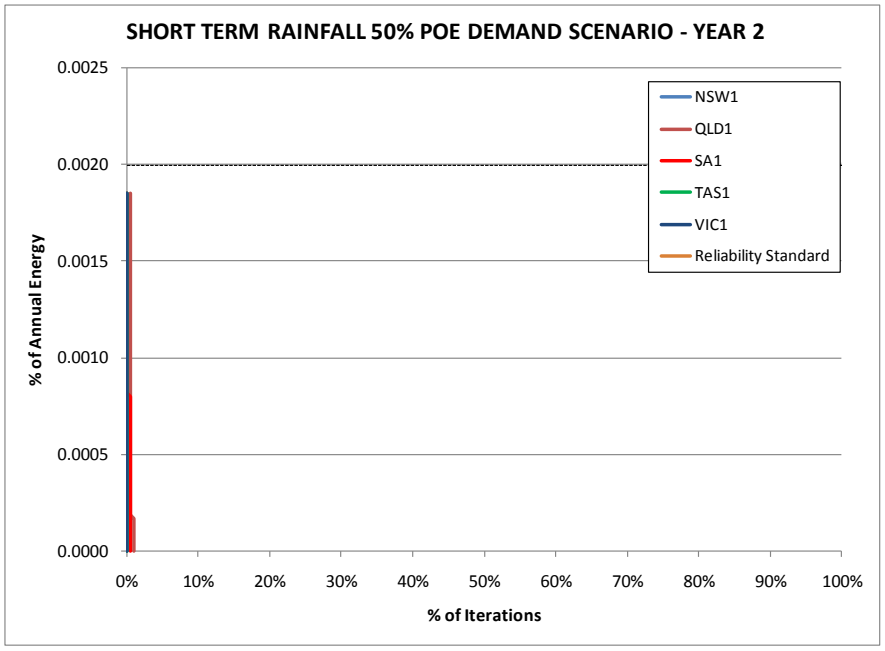

LOW RAINFALL 50% POE DEMAND SCENARIO - YEAR 1
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

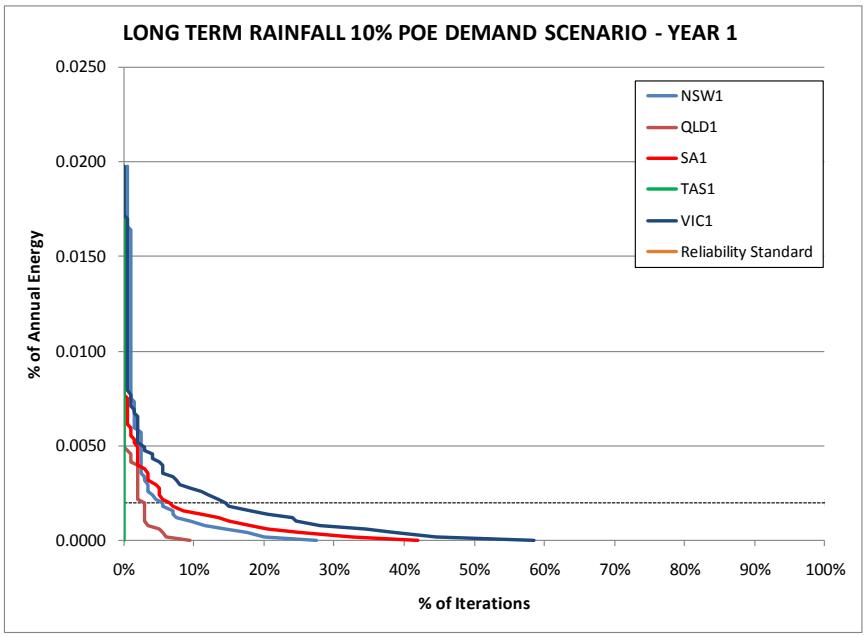

LOW RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
0.0090
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

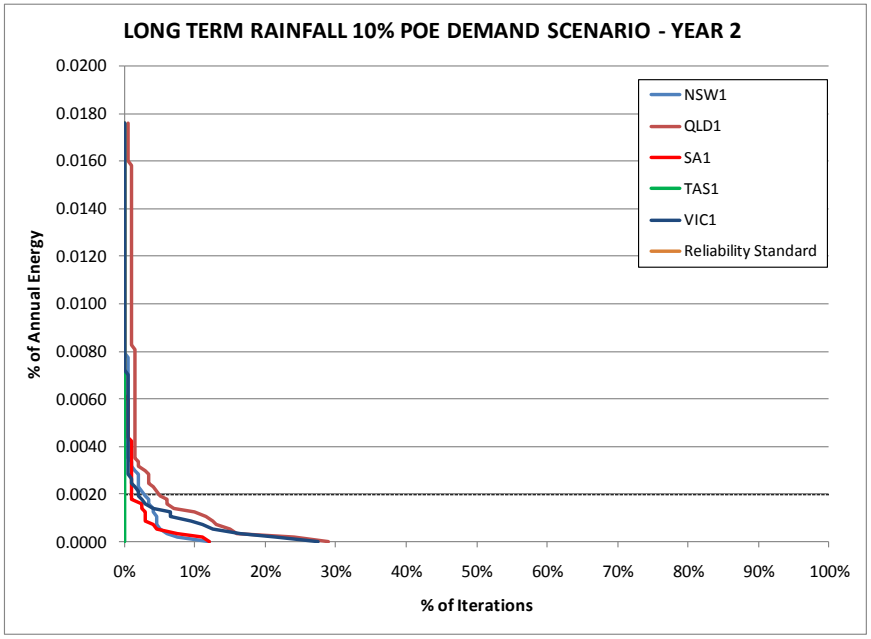

SHORT TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

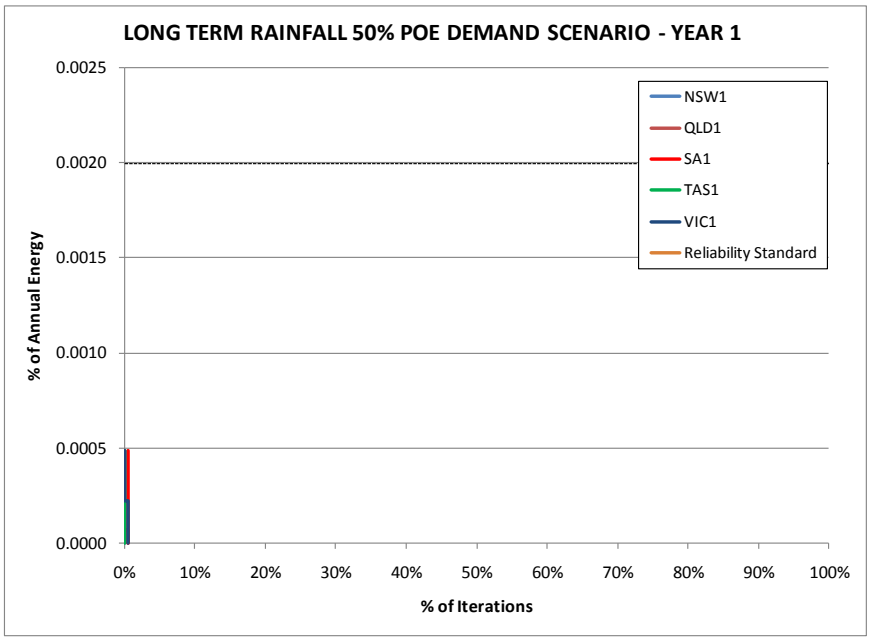

SHORT TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

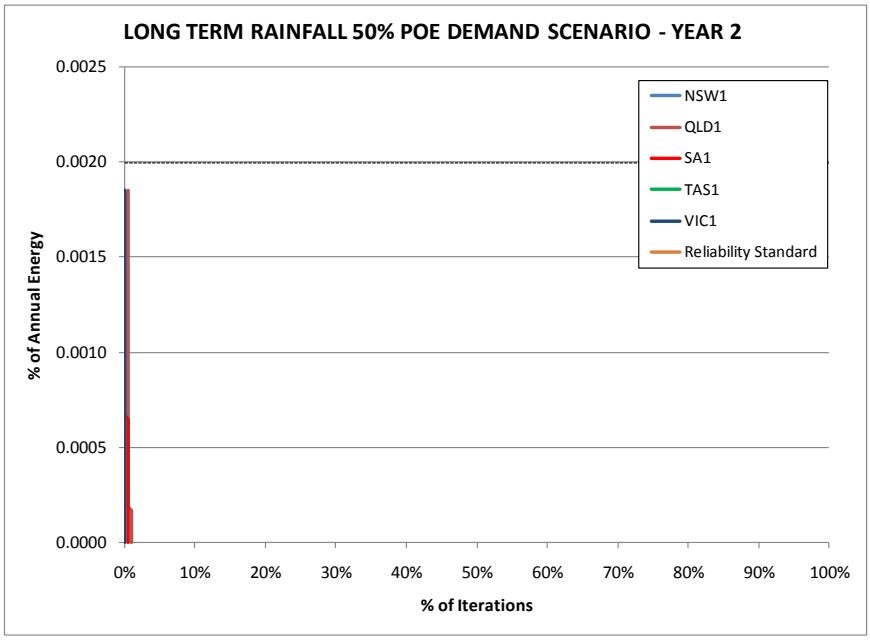

SHORT TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 1
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations


SHORT TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations


LONG TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard


LONG TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard


LONG TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 1
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard


LONG TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard