AEMO EAAP REPORT UPDATE JUNE 2011

PREPARED BY:	Electricity System Operations Planning and Performance Division
APPROVED BY:	Mark Miller – Executive General Manager System Operations
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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*[3] 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. 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 June 2011 *EAAP* Report

The study period[4] for this *EAAP* report is from 1 July 2011 to 30 June 2013.

The closing date for submitting Variable GELF Parameters by Scheduled Generators was 6 May 2011.

For the purpose of this report 'Year 1' is defined as 1 July 2011 to 30 June 2012, and 'Year 2' is defined as 1 July 2012 to 30 June 2013.

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] 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 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.

1.2 *EAAP* inputs and outputs

The closing date for GELF submissions was extended past the required timeframe specified in *EAAP guidelines* due to participant request. The scheduled generating units submitted their Variable GELF Parameters[6] by the extended deadline. These include all the scheduled generating units that had provided their generation constraints under various rainfall scenarios for the March 2011 *EAAP*.

The demand profiles used in June 2011 EAAP are consistent with the energy and demand projections that will be published in 2011 Electricity Statement of Opportunities (ESOO). These projections are based on the energy and demand projections provided to AEMO by Jurisdictional Planning Bodies for the purposes of ESOO.

Estimates of demand side participation published as "Very likely" in the 2010 ESOO[7] have also been used as an input in June 2011 *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
    - Monthly energy generation for the study period in GWh on a *NEM*-wide basis
2. Private *EAAP* reports[8] 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 June 2011 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 April and May 2011, so the results should be regarded as reflecting an input 'snapshot' taken at that time.

[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] Note that the demand side participation levels to be published in 2011 ESOO had not been finalised at time of preparing inputs for June 2011 EAAP.

[8] Participants are required to subscribe to the "EAAP_Results" file if they wish to receive the private 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 *unserved energy* (*USE*) figures for each region, and provide comparisons between the *EAAP* published in March 2011 and the June 2011 *EAAP* report. The grey shading highlights where the annual *USE* is higher than the Reliability Panel standard of 0.002%[9].

The June 2011 EAAP results forecast small decreases for Queensland, Victoria and South Australia for Year 1 of the low rainfall scenario. 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 New South Wales and Tasmania in the March 2011 and June 2011 *EAAP* studies for Year 1 of the low rainfall scenario.

The June 2011 EAAP forecasts some reductions in *USE* for Queensland, New South Wales, and South Australia as well as a significant reduction in *USE* for Victoria for the Year 2 of the low rainfall scenario, compared to March 2011 *EAAP*. The forecast *USE* is marginally above the Reliability Panel Standard of 0.002% for Victoria for the Year 2 in this scenario. The forecast *USE* is below the Reliability Panel Standard of 0.002% for other regions for this period. The forecast *USE* is higher than the Reliability Panel Standard in the Year 2 of the low rainfall scenario for Victoria due to energy restrictions on a power station in Victoria.

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

The forecast reductions of *USE* for all regions except Tasmania in June 2011 *EAAP* can be attributed to marginal reductions of summer maximum demand projections for all regions to be included in the 2011 ESOO under the medium growth scenario.

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

Low rainfall		NSW	QLD	SA	TAS	VIC
Year 1	March 2011 Update	0.0000%	0.0002%	0.0002%	0.0000%	0.0002%
	June 2011 Update	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
Year 2	March 2011 Update	0.0004%	**0.0022%**	**0.0024%**	0.0000%	**0.0083%**
	June 2011 Update	0.0001%	0.0017%	0.0015%	0.0000%	**0.0026%**

[9] 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.

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

Short term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	March 2011 Update	0.0000%	0.0002%	0.0002%	0.0000%	0.0001%
	June 2011 Update	0.0002%	0.0001%	0.0002%	0.0000%	0.0002%
Year 2	March 2011 Update	0.0004%	**0.0022%**	0.0003%	0.0000%	0.0004%
	June 2011 Update	0.0001%	0.0016%	0.0002%	0.0000%	0.0002%

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

Long term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	March 2011 Update	0.0000%	0.0002%	0.0002%	0.0000%	0.0001%
	June 2011 Update	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
Year 2	March 2011 Update	0.0006%	**0.0022%**	0.0003%	0.0000%	0.0004%
	June 2011 Update	0.0000%	0.0016%	0.0002%	0.0000%	0.0002%

3 NEW GENERATION AND GENERATION RETIREMENTS

3.1 New Generator Projects

Based on the information published on the Generation Information Page[10], 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
Mortlake	VIC	553 MW (winter) 518 MW (summer)	Summer 2011/12
Oaklands Hill wind farm	VIC	67 MW	Winter 2011
Hallett 5 (The Bluff) wind farm	SA	53 MW	Summer 2011/12
Woodlawn wind farm	NSW	42 MW	Winter 2011
Gunning wind farm	NSW	46.5 MW	Winter 2011

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

Station	State	Capacity	When
Macarthur wind farm	VIC	420 MW	Winter 2012

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 June 2011 *EAAP* report.

Swanbank B1, B2 and B4 units in Queensland region were assumed unavailable since these generating units would be in long term storage during the study period.

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], 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 2010 National Transmission Network Development Plan[12], 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.

[11] The *EAAP guidelines* are available at the following location on AEMO website: http://www.aemo.com.au/electricityops/408-0001.html

[12] The 2010 National Transmission Network Development Plan is available at the following location on AEMO website: http://www.aemo.com.au/planning/ntndp.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
Jul-11	0.0002	-	-	-	-
Aug-11	-	-	-	-	-
Sep-11	-	-	-	-	-
Oct-11	-	-	-	-	-
Nov-11	-	-	-	-	-
Dec-11	-	0.0006	-	-	-
Jan-12	0.0021	0.0062	0.0031	-	0.0119
Feb-12	0.0117	0.0316	0.0063	-	0.0161
Mar-12	-	0.0056	-	-	0.0004
Apr-12	-	-	-	-	-
May-12	-	-	-	-	-
Jun-12	-	-	-	-	-
Total GWh	0.0140	0.0440	0.0093	-	0.0284
Region %	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
Jul-12	-	0.0014	-	-	-
Aug-12	-	0.0067	-	-	-
Sep-12	-	0.0001	-	-	-
Oct-12	-	-	-	-	-
Nov-12	-	0.0334	-	-	-
Dec-12	-	0.0290	-	-	-
Jan-13	-	0.6390	0.0211	-	0.0835
Feb-13	0.0629	0.2510	0.1783	-	0.8507
Mar-13	-	0.0521	0.0010	-	0.4492
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Total GWh	0.0629	1.0128	0.2004	-	1.3833
Region %	0.0001%	0.0017%	0.0015%	0.0000%	**0.0026%**

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
Jul-11	0.0004	-	-	-	-
Aug-11	-	-	-	-	-
Sep-11	-	-	-	-	-
Oct-11	-	-	-	-	-
Nov-11	-	-	-	-	-
Dec-11	-	0.0007	-	-	-
Jan-12	0.0019	0.0055	0.0028	-	0.0117
Feb-12	0.1869	0.0415	0.0219	-	0.0662
Mar-12	-	0.0056	-	-	0.0003
Apr-12	-	-	-	-	-
May-12	-	-	-	-	-
Jun-12	-	-	-	-	-
Total GWh	0.1892	0.0533	0.0247	-	0.0781
Region %	0.0002%	0.0001%	0.0002%	0.0000%	0.0002%
Jul-12	-	0.0014	-	-	-
Aug-12	-	0.0067	-	-	-
Sep-12	-	-	-	-	-
Oct-12	-	-	-	-	-
Nov-12	-	0.0341	-	-	-
Dec-12	-	0.0298	-	-	-
Jan-13	-	0.6390	0.0080	-	0.0275
Feb-13	0.0503	0.2294	0.0228	-	0.0772
Mar-13	-	0.0520	-	-	0.0113
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Total GWh	0.0503	0.9924	0.0308	-	0.1161
Region %	0.0001%	0.0016%	0.0002%	0.0000%	0.0002%

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
Jul-11	0.0004	-	-	-	-
Aug-11	-	-	-	-	-
Sep-11	-	-	-	-	-
Oct-11	-	-	-	-	-
Nov-11	-	-	-	-	-
Dec-11	-	-	-	-	-
Jan-12	0.0008	0.0047	0.0016	-	0.0068
Feb-12	0.0237	0.0315	0.0083	-	0.0225
Mar-12	-	0.0056	-	-	-
Apr-12	-	-	-	-	-
May-12	-	-	-	-	-
Jun-12	-	-	-	-	-
Total GWh	0.0249	0.0418	0.0099	-	0.0293
Region %	0.0000%	0.0001%	0.0001%	0.0000%	0.0001%
Jul-12	-	0.0014	-	-	-
Aug-12	-	0.0067	-	-	-
Sep-12	-	-	-	-	-
Oct-12	-	-	-	-	-
Nov-12	-	0.0333	-	-	-
Dec-12	-	0.0265	-	-	-
Jan-13	-	0.6369	0.0088	-	0.0301
Feb-13	0.0130	0.2144	0.0199	-	0.0684
Mar-13	-	0.0521	-	-	0.0131
Apr-13	-	-	-	-	-
May-13	-	-	-	-	-
Jun-13	-	-	-	-	-
Total GWh	0.0130	0.9714	0.0288	-	0.1116
Region %	0.0000%	0.0016%	0.0002%	0.0000%	0.0002%

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

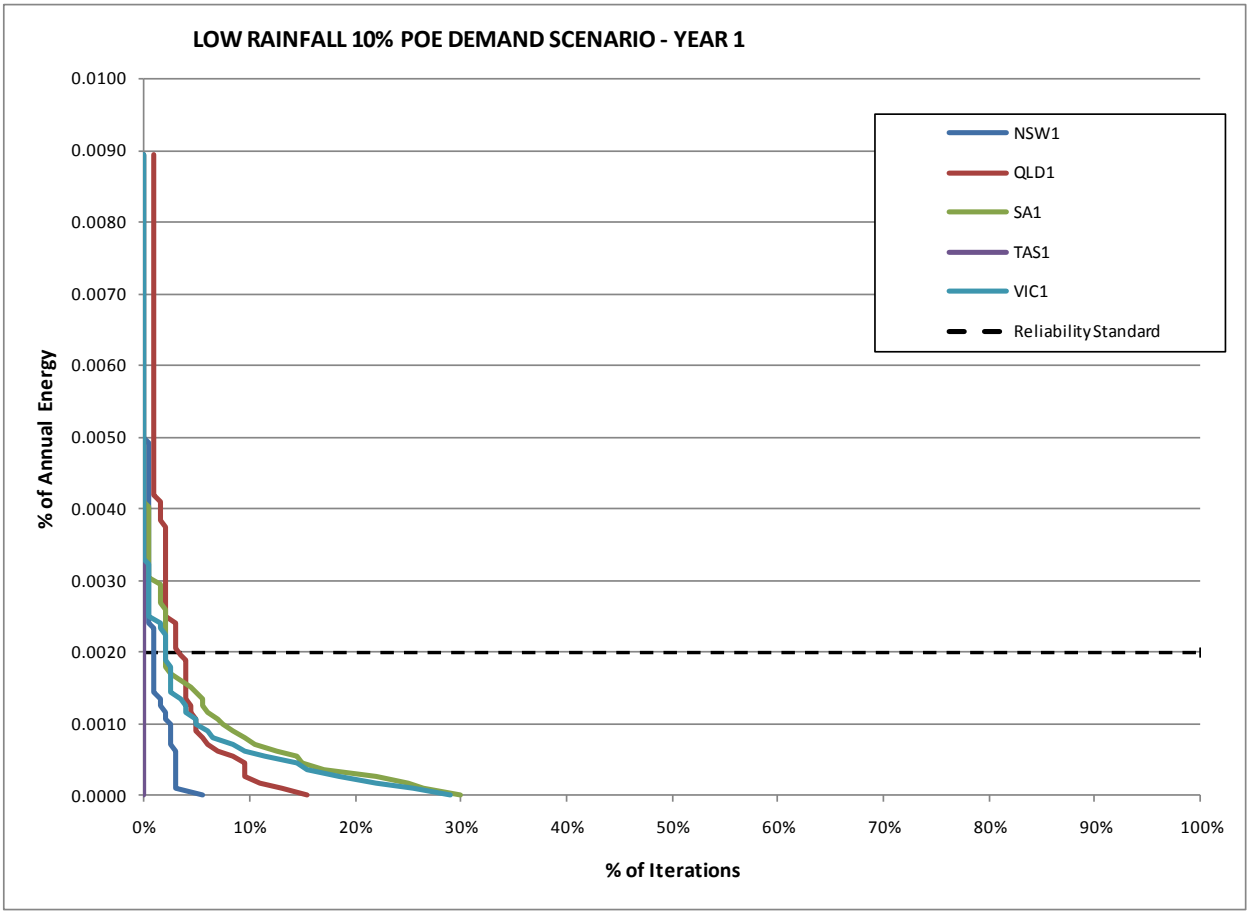
TABLE 8: FORECAST MONTHLY ENERGY GENERATION ON *NEM*-WIDE BASIS

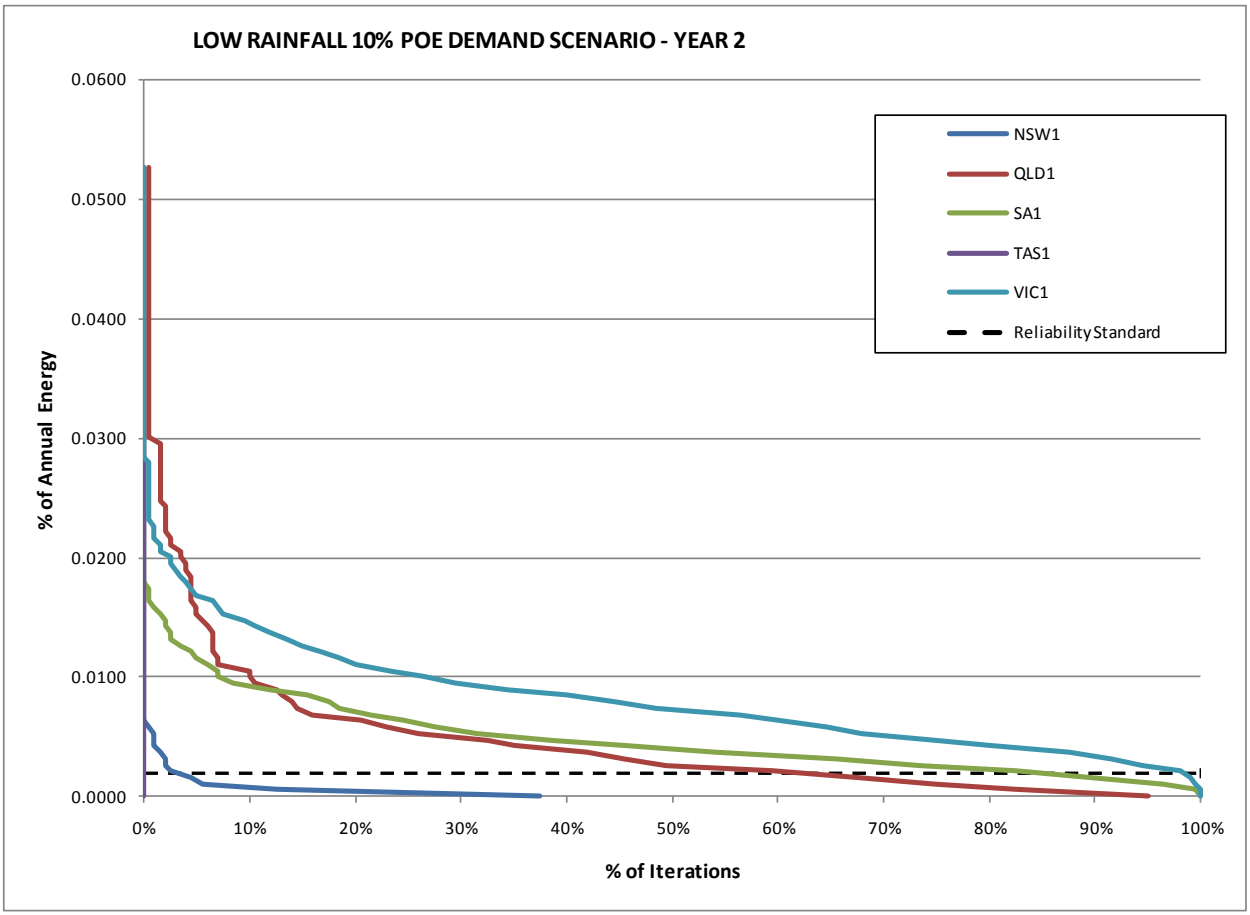
	Low Rainfall	Short-Term Average Rainfall	Long-Term Average Rainfall
Jul-11	18552	18587	18562
Aug-11	18146	18185	18161
Sep-11	16751	16753	16753
Oct-11	16870	16901	16907
Nov-11	17067	17097	17074
Dec-11	17653	17674	17672
Jan-12	18701	18731	18698
Feb-12	17603	17668	17654
Mar-12	18171	18179	18188
Apr-12	16392	16441	16414
May-12	18079	18076	18084
Jun-12	17849	17873	17855
Total GWh	211834	212166	212023
Jul-12	19247	19248	19257
Aug-12	18807	18819	18814
Sep-12	17192	17216	17203
Oct-12	17562	17596	17593
Nov-12	17616	17627	17624
Dec-12	18219	18191	18236
Jan-13	19370	19404	19426
Feb-13	17581	17599	17608
Mar-13	18846	18857	18866
Apr-13	17079	17091	17088
May-13	18681	18692	18693
Jun-13	18393	18408	18411
Total GWh	218594	218749	218818

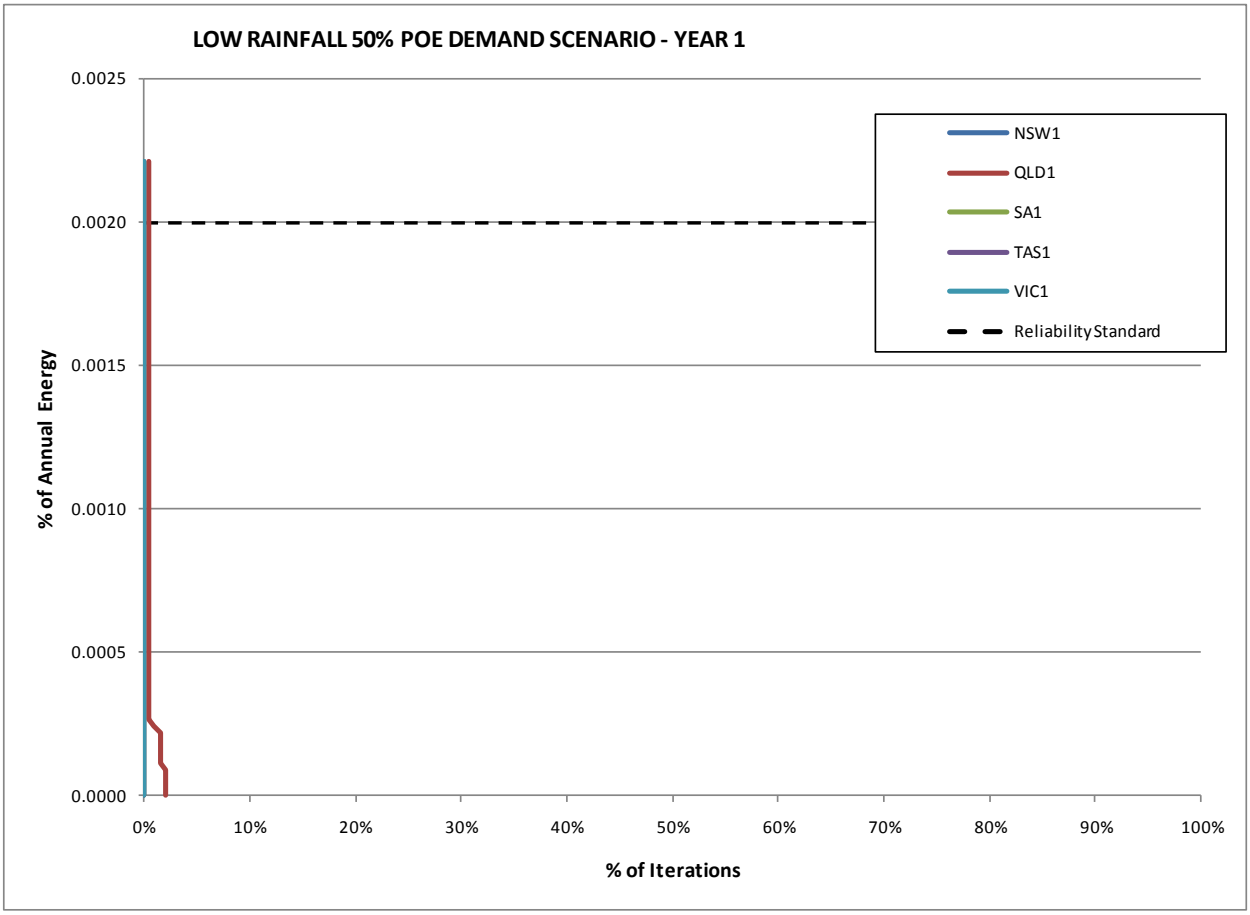
4.5 *USE* Distributions

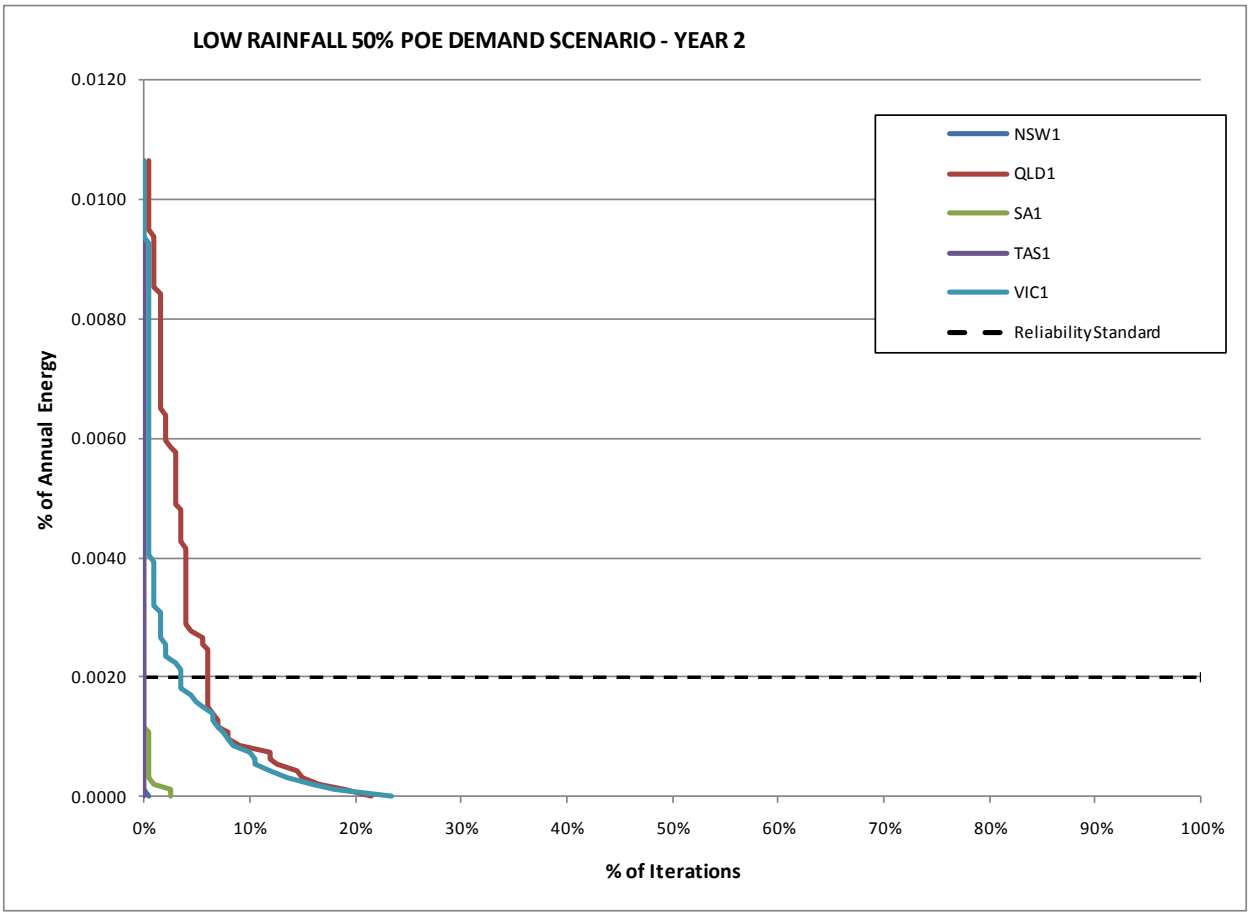
The *USE* distribution graphs are used to show how many *EAAP* simulation studies (Monte Carlo iterations) exceeded a given *USE* level. The *USE* values are expressed as a percentage of regional energy. This is to allow easier reference to the Reliability Panel standard of 0.002% *USE*.

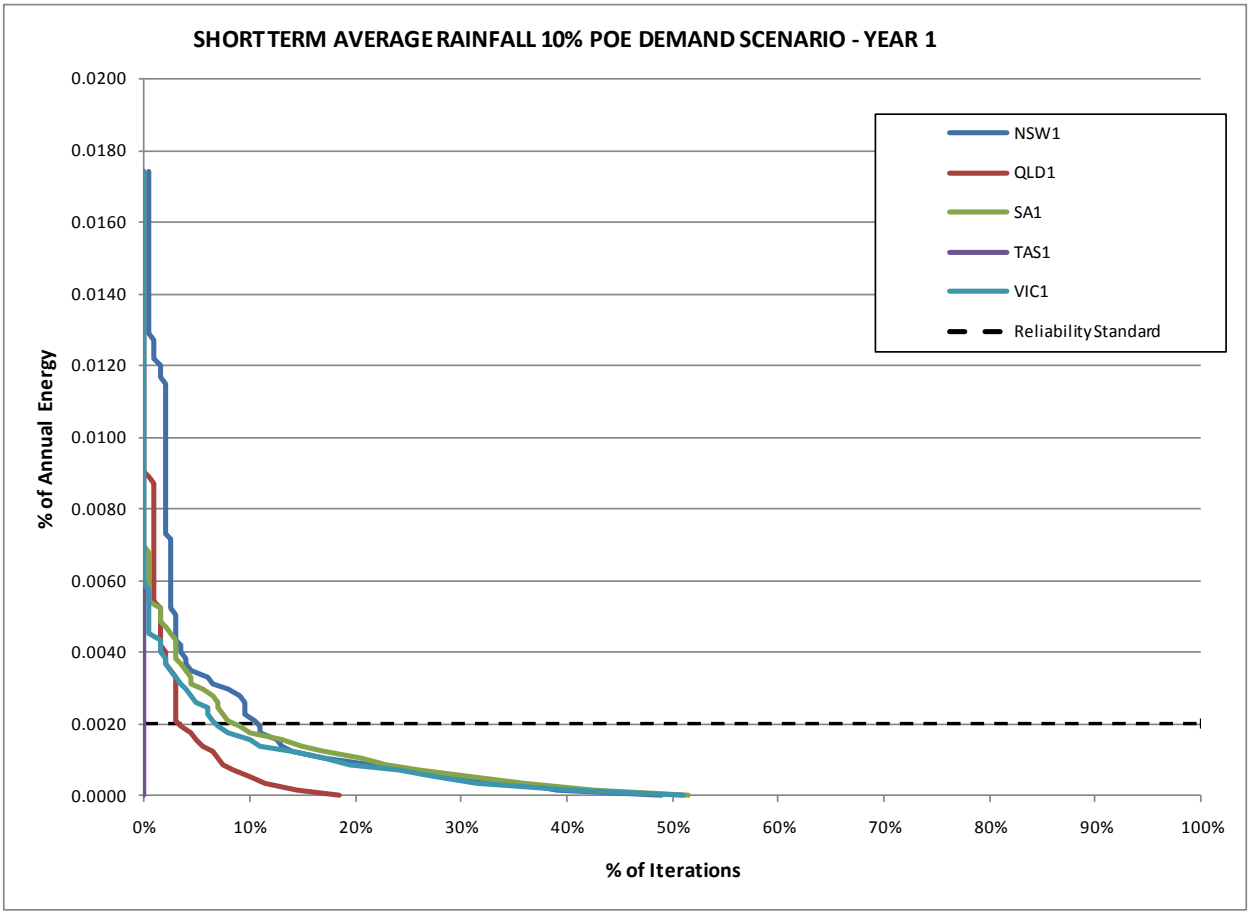
Separate graphs are presented for the 10% and 50% POE simulations.

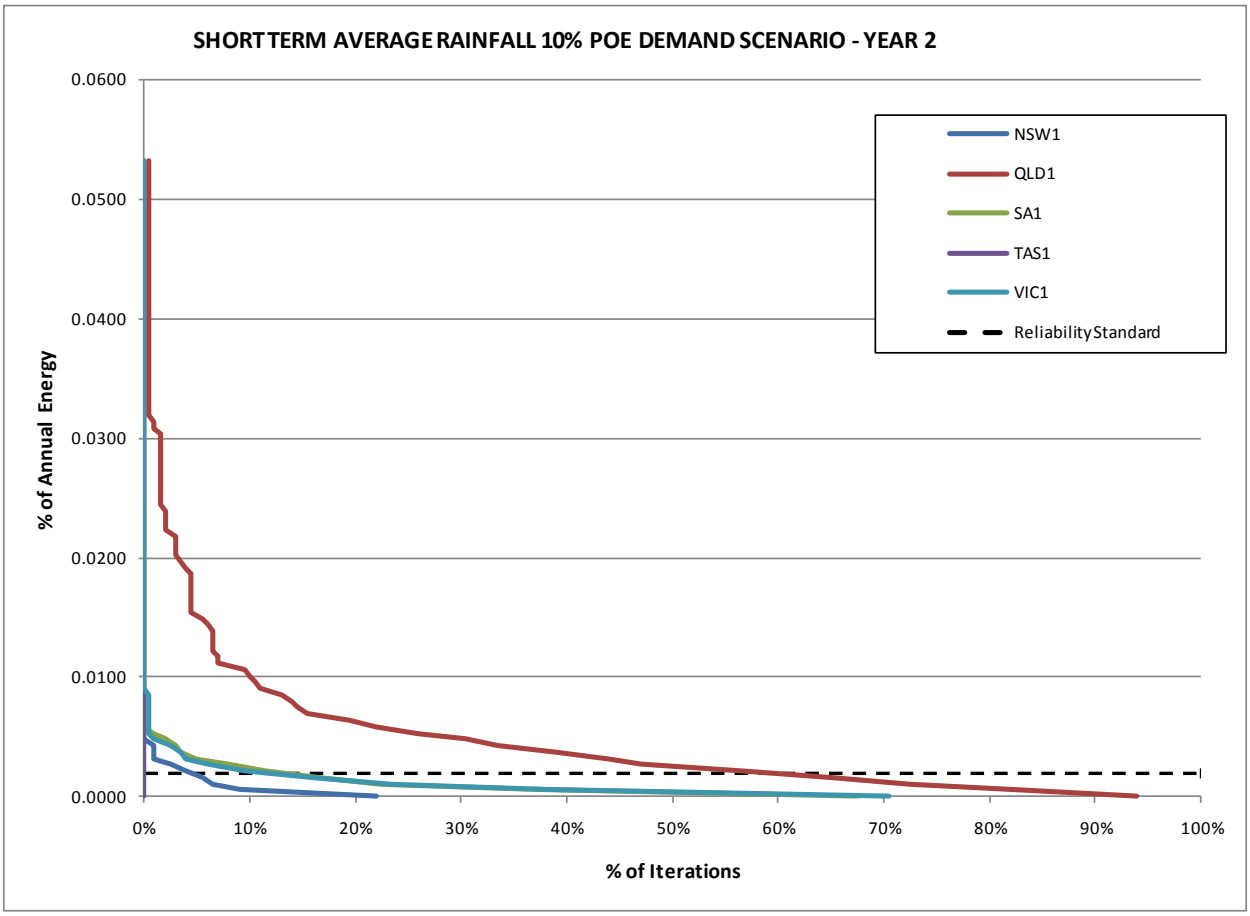

LOW RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
0.0100
0.0090
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard


LOW RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
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
0.0120
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 AVERAGE RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
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 AVERAGE RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
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%
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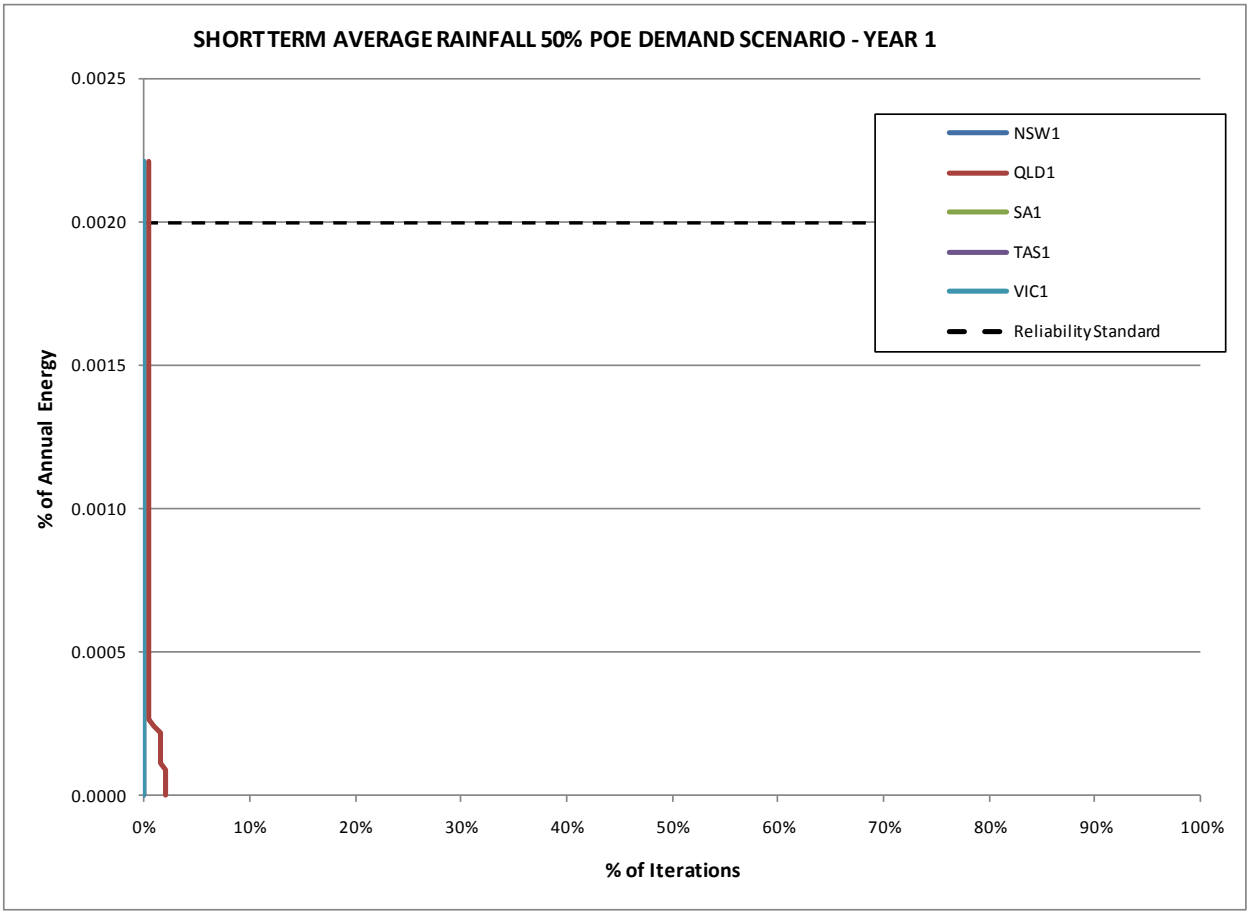
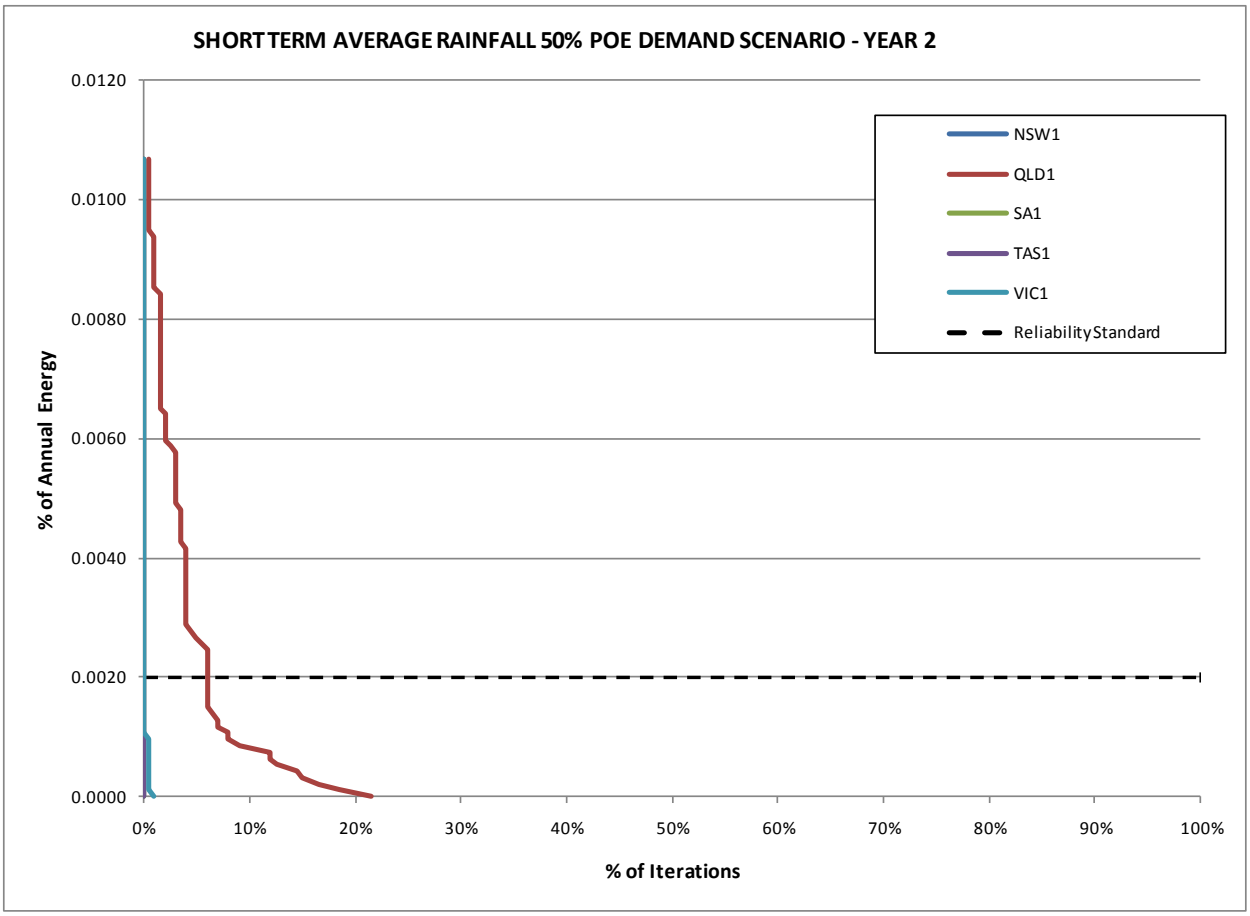
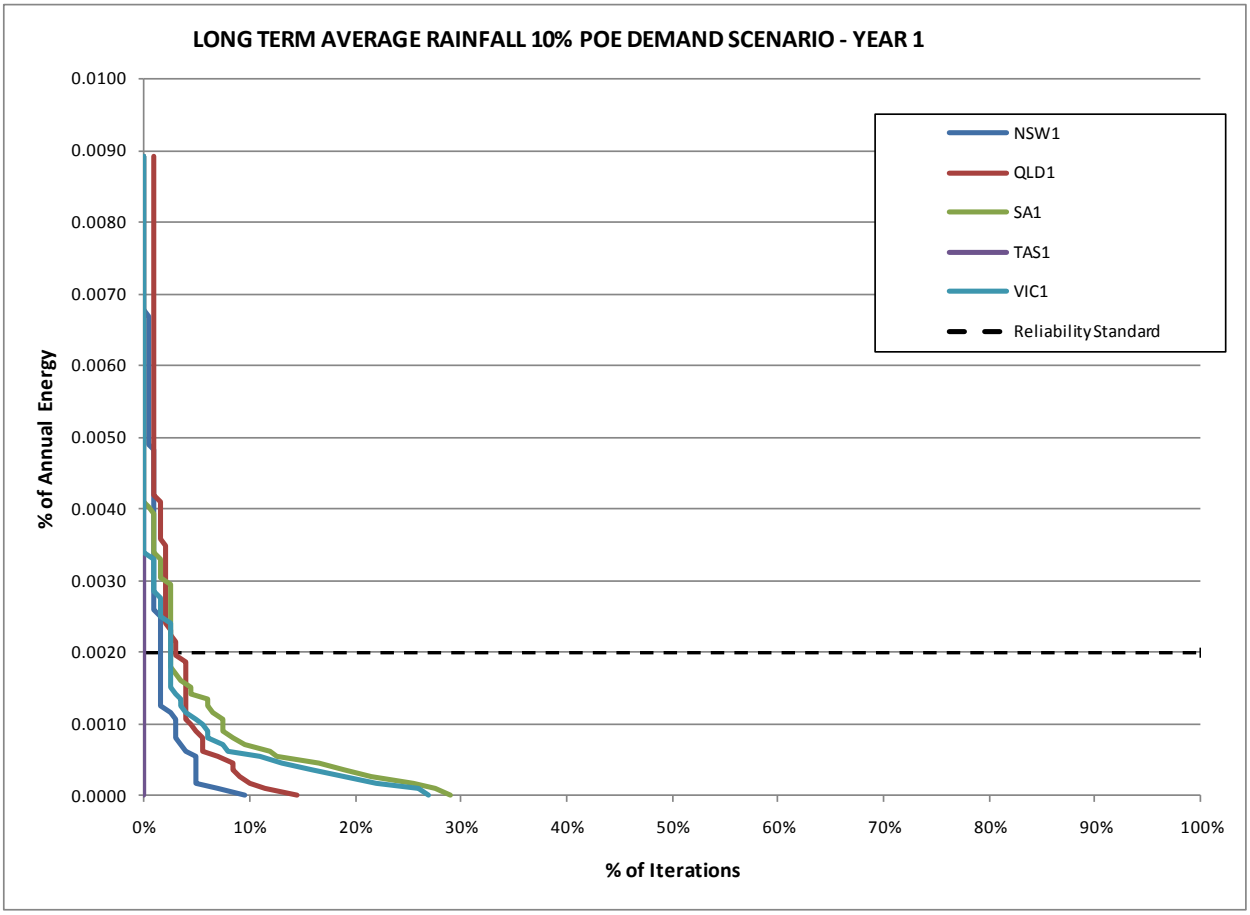
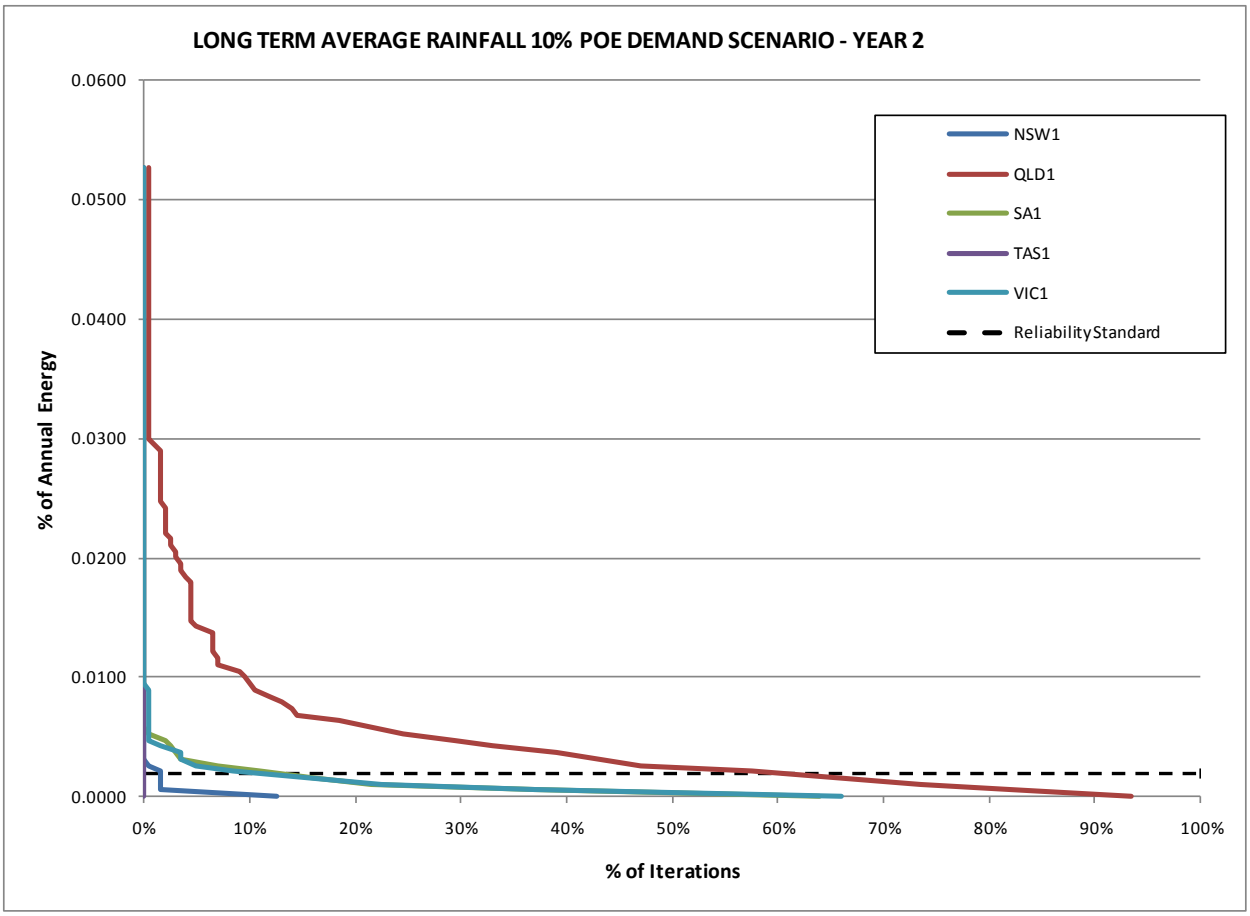
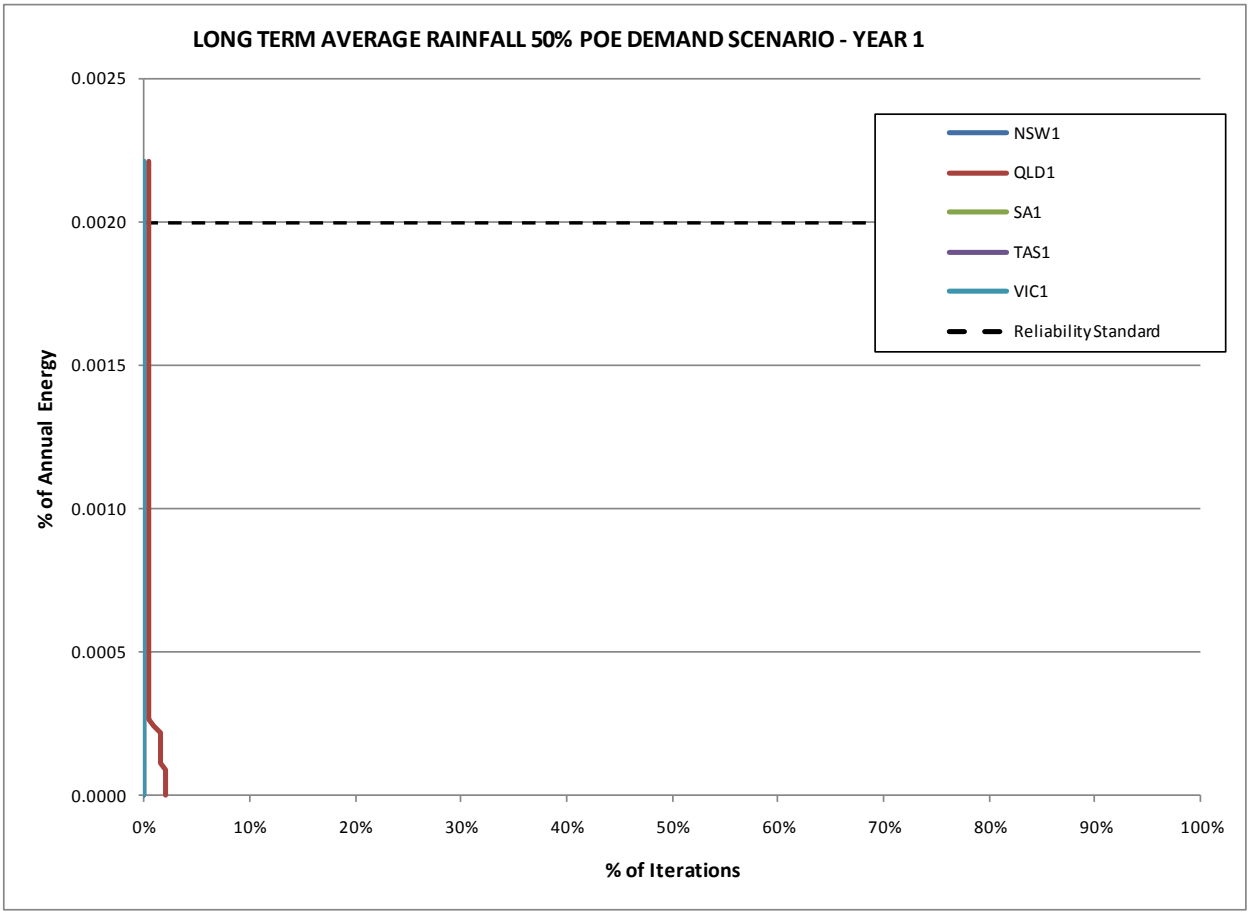
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard

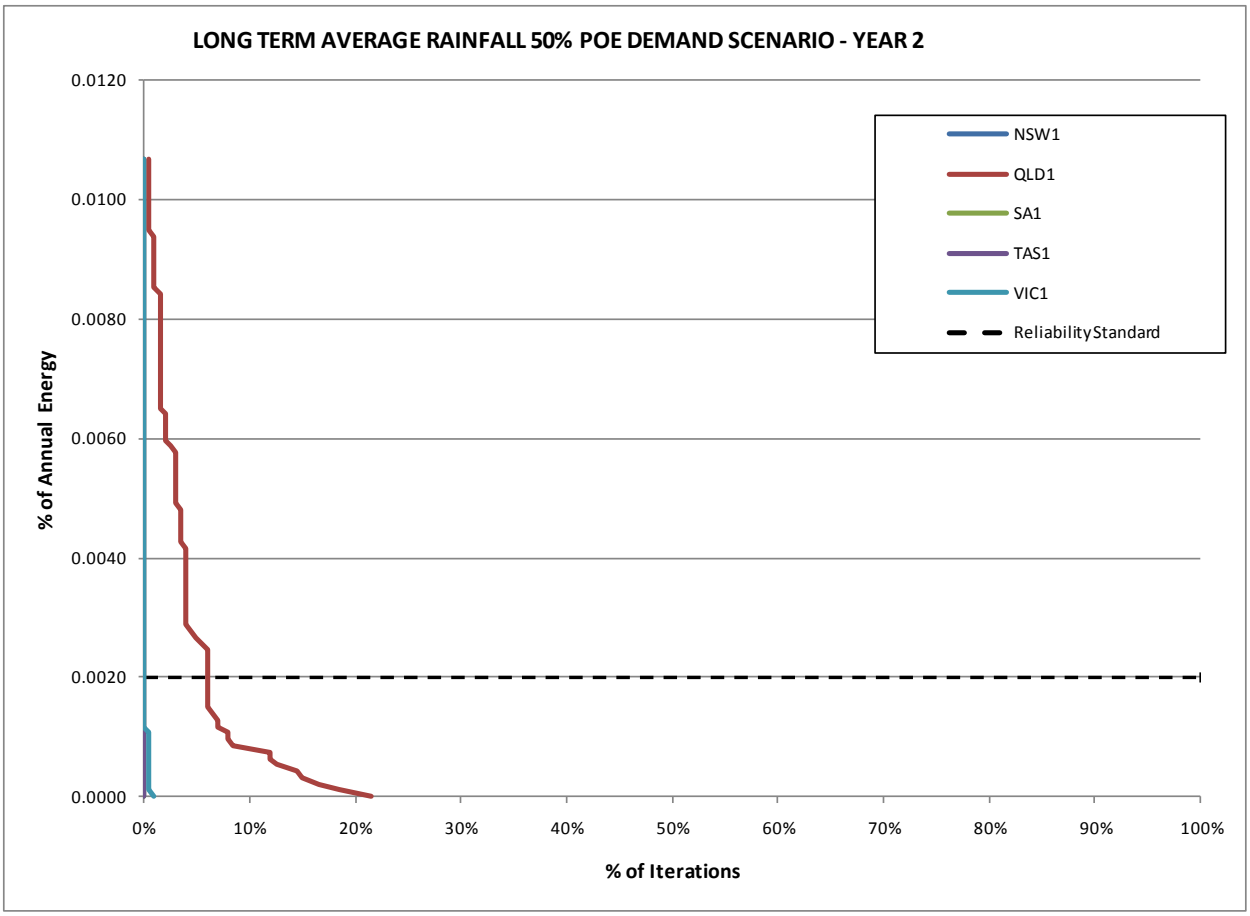

SHORT TERM AVERAGE RAINFALL 50% POE DEMAND SCENARIO - YEAR 1
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
% of Annual Energy
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
% of Iterations
NSW1
QLD1
SA1
TAS1
VIC1
Reliability Standard


SHORT TERM AVERAGE RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
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 AVERAGE RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
0.0100
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


LONG TERM AVERAGE RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
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


LONG TERM AVERAGE 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 AVERAGE RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
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