AEMO EAAP REPORT UPDATE SEPTEMBER 2013

PREPARED BY:	Systems Capability Group
APPROVED BY:	Mark Stedwell – Group Manager Systems Capability
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Contents

EXECUTIVE SUMMARY

The purpose of the Energy Adequacy Assessment Projection (EAAP) report for September 2013 is to provide an analysis of the potential effects of water availability and the other energy constraints[1] on the electricity system under three scenarios over a 24-month period.

National Electricity Market (NEM) standards currently state that unserved energy (USE) per year for each NEM 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 to meet the required standard of supply reliability.

Based on the results of September 2013 EAAP studies, AEMO has determined that the forecast USE is below the Reliability Panel Standard of 0.002% for all regions for both years in all three scenarios. This indicates that the availability of energy in all NEM regions meets the reliability standard for supply adequacy over the coming 24-month period.

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 AEMO's own demand 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:

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

[1] Energy generation can be constrained due to fuel supply limitations in addition to water supply availability.

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	Unserved energy

1 INTRODUCTION

AEMO publishes the EAAP[2] on a quarterly basis. It provides an analysis of the potential effects of water availability and other energy constraints on the electricity system, under three scenarios over a 24-month period.

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

The EAAP[4] replaced the quarterly AEMO Drought Scenarios Investigation Report, with the final Drought Report published in December 2009. The first EAAP was published on 31 March 2010.

The 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 September 2013 EAAP

The study period[5] for this EAAP is from 1 October 2013 to 30 September 2015.

The closing date for submitting Variable Generator Energy Limitation Framework (GELF) Parameters[6] by scheduled generators was 27 August 2013.

For the purpose of this report "Year 1" is defined as 1 October 2013 to 30 September 2014, and "Year 2" is defined as 1 October 2014 to 30 September 2015.

This EAAP 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. New South Wales is based on rainfall between 1 June 2006 and 31 May 2007.[7]
- 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 if less than 50 years.

1.2 EAAP inputs

Scheduled generators provided their generation constraints under the three rainfall scenarios for the September 2013 EAAP.

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

[2] Defined in the Electricity Market Rules glossary 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 USE for each region."
[3] Determined following Electricity Rule Consultation Procedures. Available at: http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/~/media/Files/Other/electricityops/EAAP_Guidelines.ashx.
[4] Previous EAAPs are available at: http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/EAAP.
[5] A study period refers to a specified time period for which the EAAP is conducted.
[6] Defined in Electricity Market Rules glossary 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.

The EAAP models the availability of 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[8] 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 – includes the following items per scenario per region:
    - Monthly USE for the study period in gigawatt hours.
    - USE for the first 12 months and second 12 months in the study period in gigawatt hours.
    - NEM-wide monthly energy generation for the study period in gigawatt hours.
2. Participant EAAP reports[9] for each generator who owns scheduled generating units, or hydro power schemes that have been included in each of the scenarios. These include:
    - Monthly energy generation reductions in gigawatt hours for the scheduled generating unit or hydro power scheme for the study period.
    - Monthly capacity reductions in megawatts for the scheduled generating unit or hydro power scheme for the study period.
    - Monthly generation contribution in gigawatt hours from the scheduled generating unit or hydro power scheme for the study period.
    - Monthly generation contribution in gigawatt hours for the first 12 months and the second 12 months in the study period.

This AEMO EAAP Report Update September 2013 covers the requirement to publish the EAAP Public Report.

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 per the EAAP guidelines) during August and September 2013. The results should be regarded as reflecting an input “snapshot” 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 USE for each region, and compare these to the EAAP published in June 2013.

Based on the September 2013 EAAP results, AEMO has determined that the forecast USE is below the Reliability Panel Standard of 0.002% for all regions for both years in the three scenarios covered.

[8] EAAP Guidelines. Available at: http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/~/media/Files/Other/electricityops/EAAP_Guidelines.ashx.

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

Significant reduction in USE is observed for Victoria and South Australia in the second year in the September 2013 EAAP compared to June 2013 because of the reduction in demand forecasts in 2013 NEFR.

TABLE 1: UNSERVED ENERGY FOR SCENARIO 1 - LOW RAINFALL

Low rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2013 Update	0.0000%	0.0000%	0.0002%	0.0000%	0.0002%
	September 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2013 Update	0.0000%	0.0001%	**0.0026%**	0.0000%	**0.0055%**
	September 2013 Update	0.0000%	0.0002%	0.0000%	0.0000%	0.0000%

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

Short term average rainfall		NSW	QLD	SA	TAS	VIC
Year 1	June 2013 Update	0.0000%	0.0000%	0.0002%	0.0000%	0.0002%
	September 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2013 Update	0.0000%	0.0001%	0.0002%	0.0000%	0.0002%
	September 2013 Update	0.0000%	0.0002%	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 2013 Update	0.0000%	0.0000%	0.0002%	0.0000%	0.0002%
	September 2013 Update	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Year 2	June 2013 Update	0.0000%	0.0001%	0.0002%	0.0000%	0.0001%
	September 2013 Update	0.0000%	0.0002%	0.0000%	0.0000%	0.0000%

3 NEW GENERATION AND GENERATION RETIREMENTS

3.1 New generator projects

Based on information published on the Generation Information Page[10], as well as in subsequent updates, the following committed significant scheduled and semi-scheduled generating units have been included in the model:

[10] Available at: http://www.aemo.com.au/Electricity/Planning/Related-Information/Generation-Information. Last updated 13 August 2013.

TABLE 4: NEW GENERATORS

Station	State	Capacity (MW)	When
Musselroe Wind Farm	TAS	168	Winter 2013
Snowtown Stage 2 South Wind Farm	SA	126	Winter 2014
Snowtown Stage 2 North Wind Farm	SA	144	Summer 2014–15
Gullen Range Wind Farm	NSW	166	Winter 2014
Mt Mercer Wind Farm	VIC	132	Summer 2014–15
Taralga Wind Farm	NSW	107	Summer 2014–15
Bocorock Wind Farm	NSW	113	Summer 2014–15

3.2 Retired generation

There is 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, AEMO performed 400 simulation studies 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 Section 5.2 of the EAAP guidelines.[11] This is done by giving a higher weighting to the more likely 50% POE results, while still capturing the influence of the more pessimistic 10% POE results:

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

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

The forecast USE figures presented in the following tables should not be interpreted as certainty of blackouts, but rather as an estimate of what could occur. 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, the USE 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] See footnote 8.

4.1 Scenario 1: Low rainfall – forecast USE (GWh)

TABLE 5: FORECAST USE IN SCENARIO 1 – LOW RAINFALL

	NSW	QLD	SA	TAS	VIC
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0021	-	0.0001
Feb-14	-	-	-	-	-
Mar-14	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Total GWh	-	-	0.0021	-	0.0001
Region %	-	-	-	-	-
Oct-14	-	-	-	-	-
Nov-14	-	0.0001	-	-	-
Dec-14	-	-	0.0021	-	-
Jan-15	-	0.0005	0.0006	-	-
Feb-15	-	0.0052	0.0002	-	0.0005
Mar-15	-	-	-	-	0.0102
Apr-15	-	-	-	-	-
May-15	-	-	-	-	-
Jun-15	-	-	-	-	-
Jul-15	-	0.0198	-	-	-
Aug-15	-	0.0057	-	-	-
Sep-15	-	0.0985	-	-	-
Total GWh	-	0.1299	0.0028	-	0.0108
Region %	-	0.0002%	-	-	-

4.3 Scenario 2: Short term average rainfall – forecast USE (GWh)

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

	NSW	QLD	SA	TAS	VIC
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0018	-	0.0001
Feb-14	-	-	-	-	-
Mar-14	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Total GWh	-	-	0.0018	-	0.0001
Region %	-	-	-	-	-
Oct-14	-	-	-	-	-
Nov-14	-	0.0001	-	-	-
Dec-14	-	-	0.0021	-	-
Jan-15	-	0.0005	0.0006	-	-
Feb-15	-	0.0052	0.0002	-	0.0005
Mar-15	-	-	-	-	-
Apr-15	-	-	-	-	-
May-15	-	-	-	-	-
Jun-15	-	-	-	-	-
Jul-15	-	0.0198	-	-	-
Aug-15	-	0.0073	-	-	-
Sep-15	-	0.1006	-	-	-
Total GWh	-	0.1336	0.0028	-	0.0006
Region %	-	0.0002%	-	-	-

4.4 Scenario 3: Long term average rainfall – forecast USE (GWh)

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

	NSW	QLD	SA	TAS	VIC
Oct-13	-	-	-	-	-
Nov-13	-	-	-	-	-
Dec-13	-	-	-	-	-
Jan-14	-	-	0.0016	-	0.0001
Feb-14	-	-	-	-	-
Mar-14	-	-	-	-	-
Apr-14	-	-	-	-	-
May-14	-	-	-	-	-
Jun-14	-	-	-	-	-
Jul-14	-	-	-	-	-
Aug-14	-	-	-	-	-
Sep-14	-	-	-	-	-
Total GWh	-	-	0.0016	-	0.0001
Region %	-	-	-	-	-
Oct-14	-	-	-	-	-
Nov-14	-	0.0001	-	-	-
Dec-14	-	-	0.0021	-	-
Jan-15	-	0.0005	0.0005	-	-
Feb-15	-	0.0052	0.0002	-	0.0005
Mar-15	-	-	-	-	-
Apr-15	-	-	-	-	-
May-15	-	-	-	-	-
Jun-15	-	-	-	-	-
Jul-15	-	0.0198	-	-	-
Aug-15	-	0.0077	-	-	-
Sep-15	-	0.0996	-	-	-
Total GWh	-	0.1329	0.0028	-	0.0005
Region %	-	0.0002%	-	-	-

4.5 Forecast NEM-wide monthly energy generation (GWh)

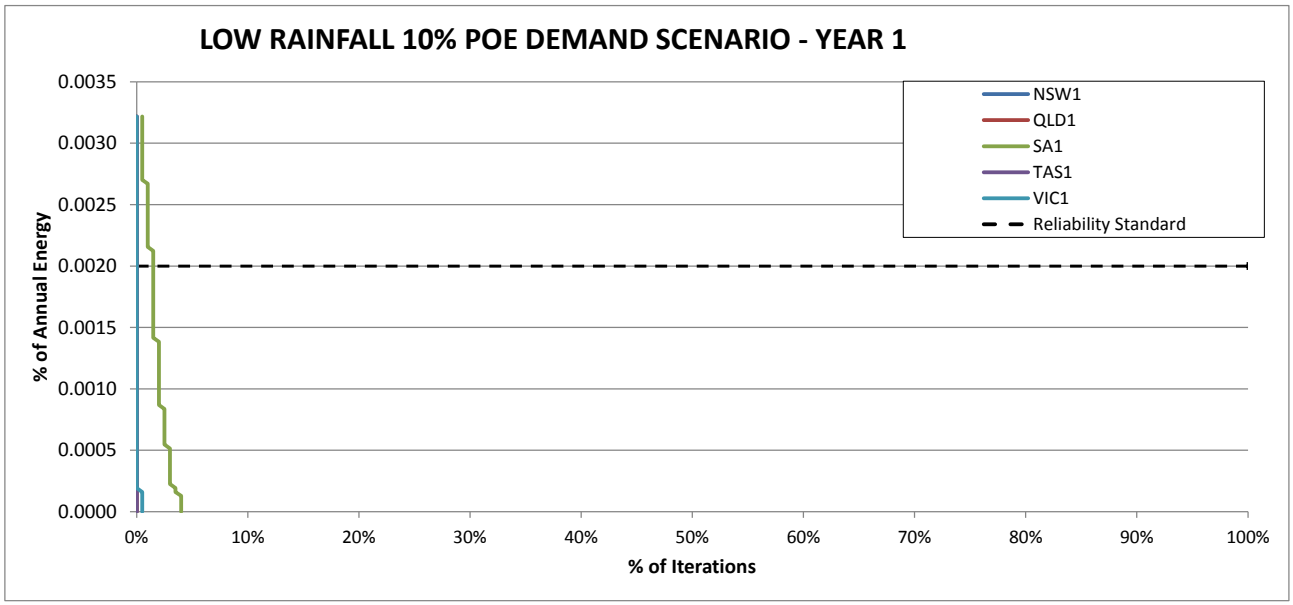
TABLE 8: FORECAST MONTHLY NEM-WIDE ENERGY GENERATION

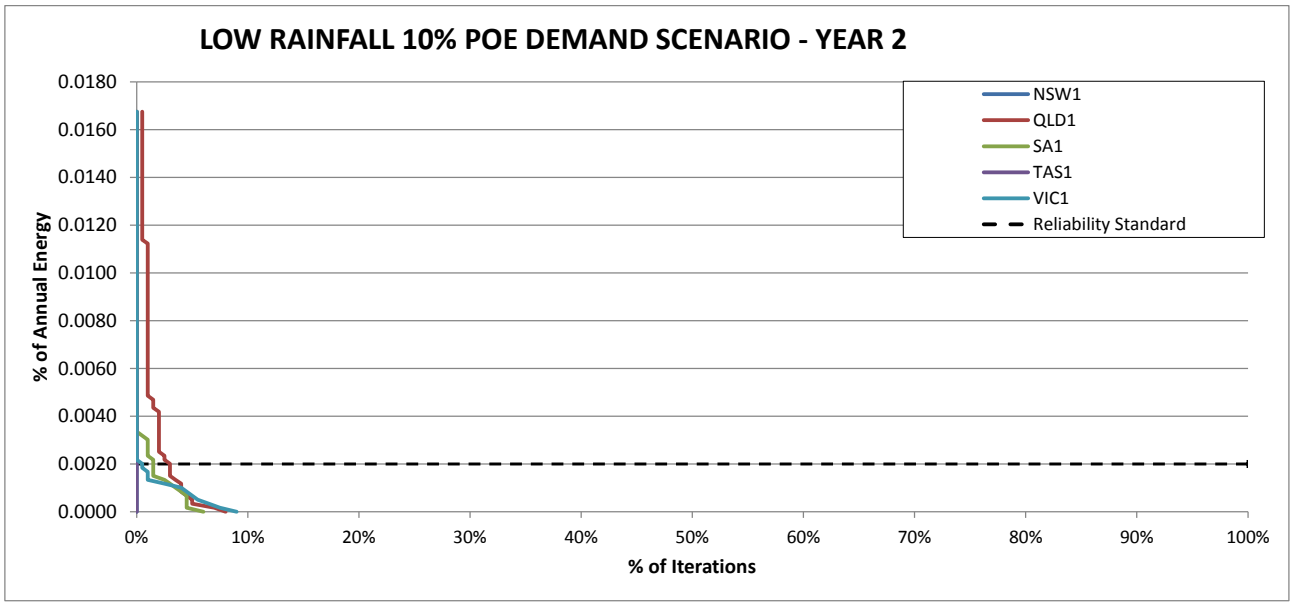
	Low rainfall	Short term average rainfall	Long term average rainfall
Oct-13	15,811	15,810	15,796
Nov-13	15,558	15,553	15,586
Dec-13	16,147	16,200	16,188
Jan-14	17,212	17,203	17,216
Feb-14	15,588	15,559	15,580
Mar-14	16,609	16,621	16,614
Apr-14	15,331	15,326	15,337
May-14	16,762	16,780	16,755
Jun-14	16,521	16,572	16,505
Jul-14	17,729	17,772	17,734
Aug-14	17,207	17,232	17,204
Sep-14	15,971	15,964	15,959
Total GWh	19,6445	196,592	196,474
Oct-14	16,365	16,362	16,336
Nov-14	15,982	15,979	15,988
Dec-14	16,722	16,734	16,762
Jan-15	17,771	17,777	17,755
Feb-15	16,132	16,122	16,125
Mar-15	17,210	17,193	17,209
Apr-15	15,819	15,817	15,805
May-15	17,239	17,243	17,234
Jun-15	17,118	17,122	17,128
Jul-15	18,023	18,036	18,010
Aug-15	17,425	17,445	17,424
Sep-15	16,122	16,122	16,122
Total GWh	201,928	201,952	201,898

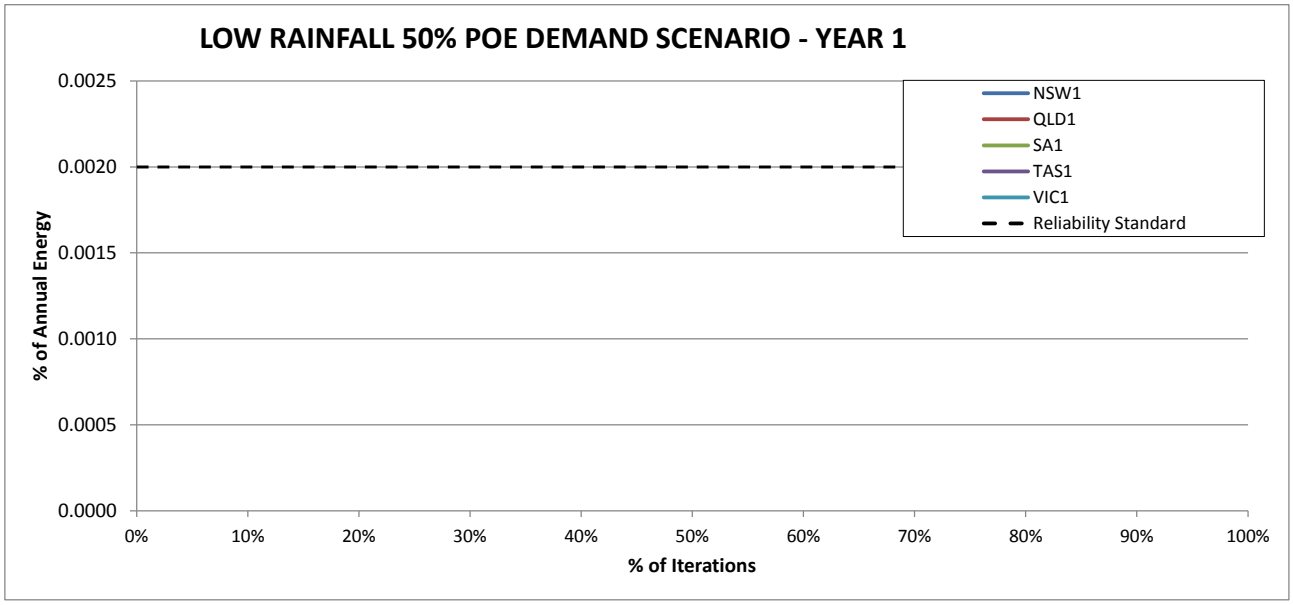
4.6 USE distributions

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.



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0.0025
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% of Annual Energy
0%
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20%
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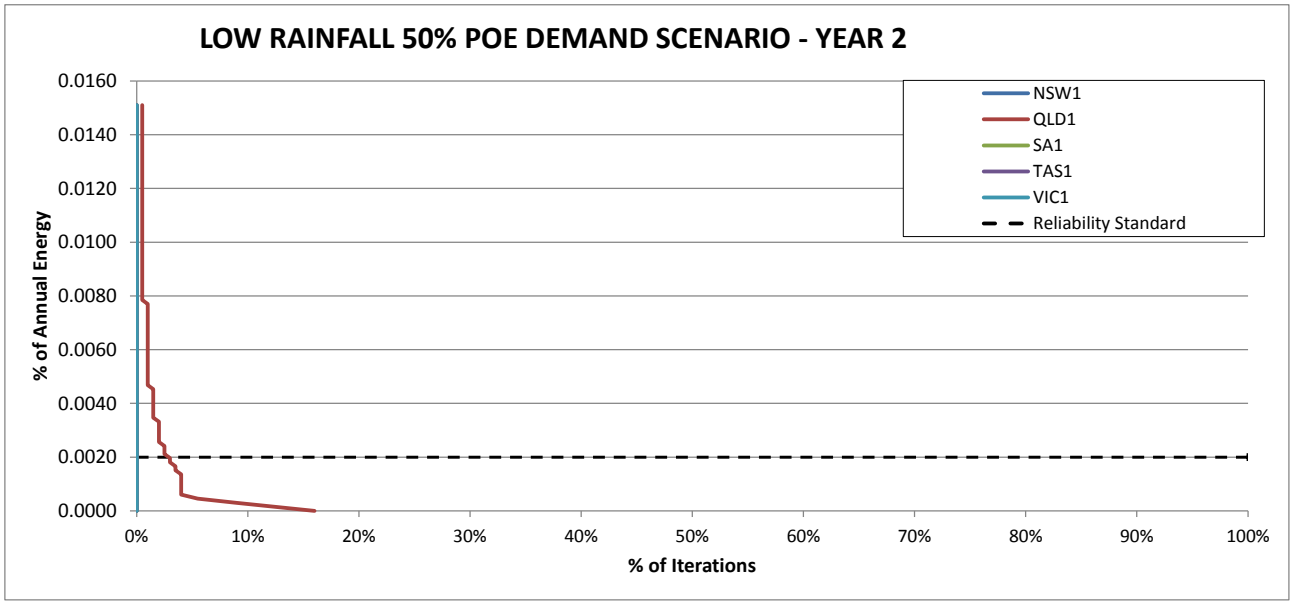
SA1
TAS1
VIC1
Reliability Standard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0.0160
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0.0080
0.0060
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0.0020
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% of Annual Energy
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TAS1
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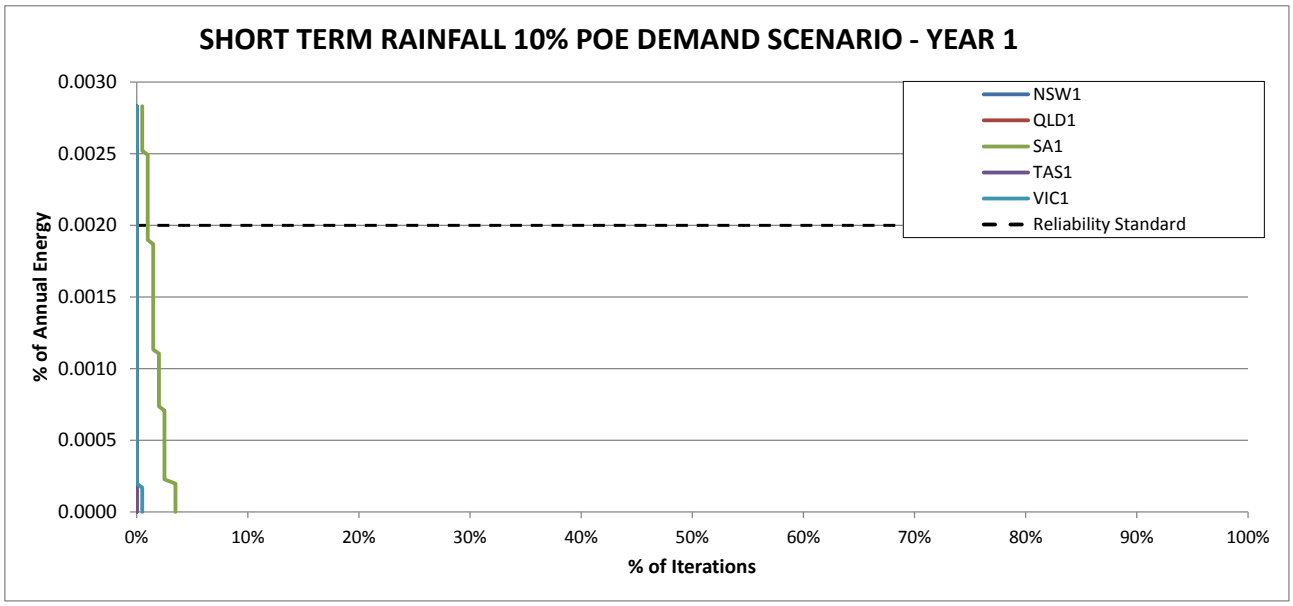
Reliability Standard


SHORT TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
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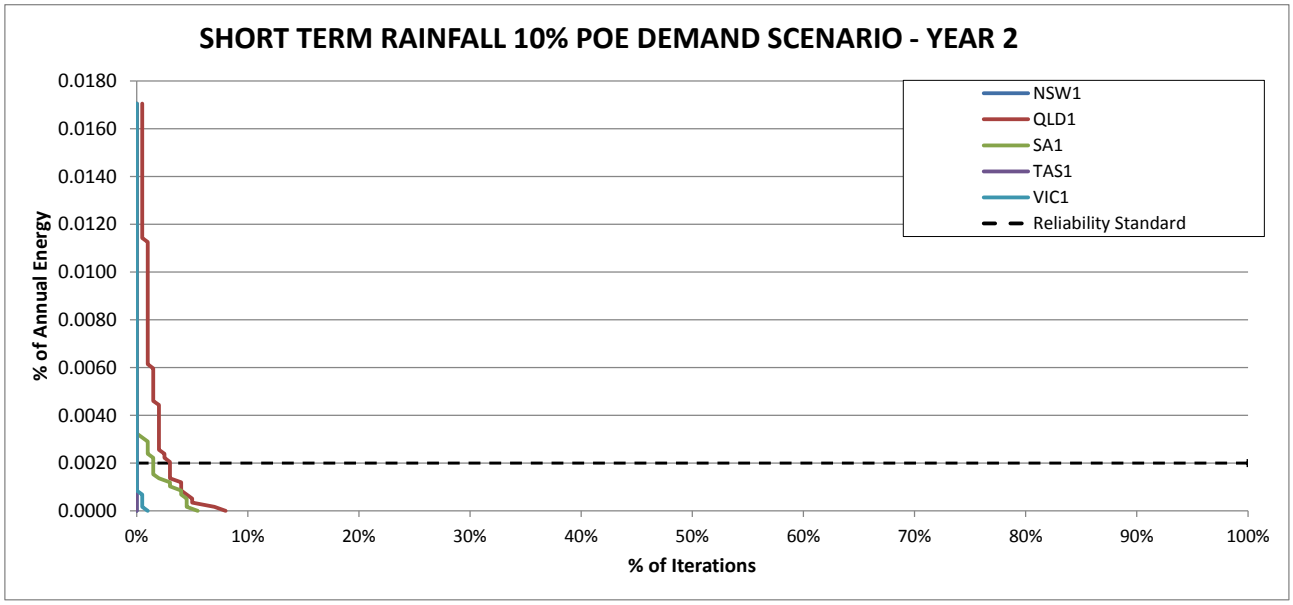
SHORT TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
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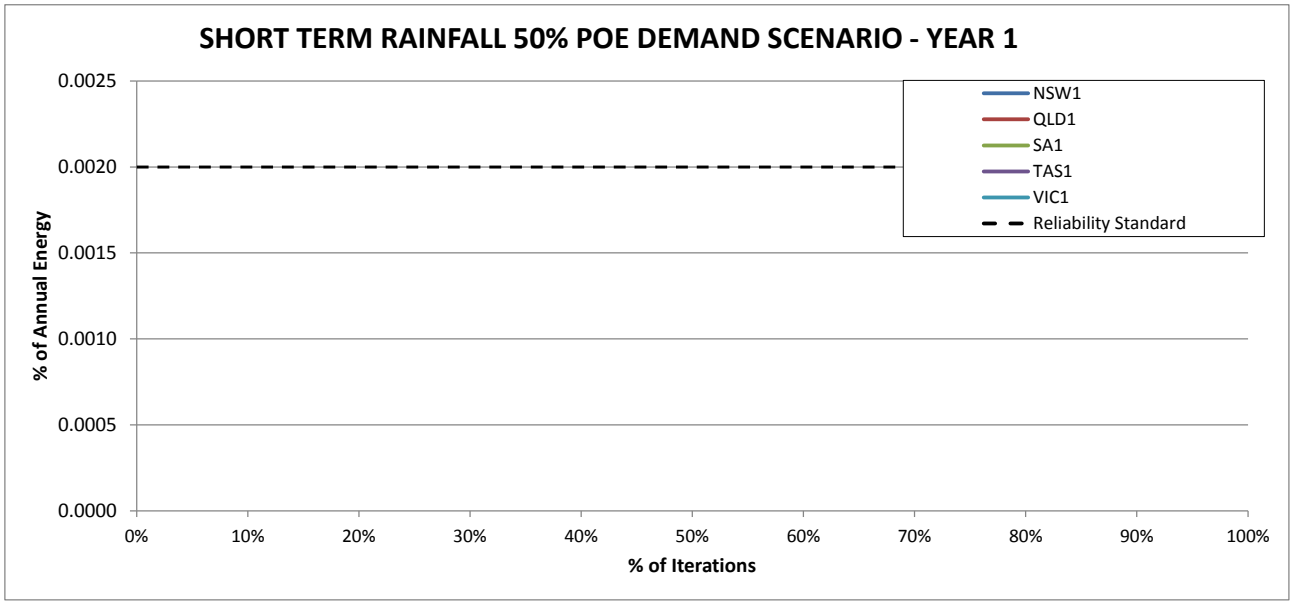
SHORT TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 1
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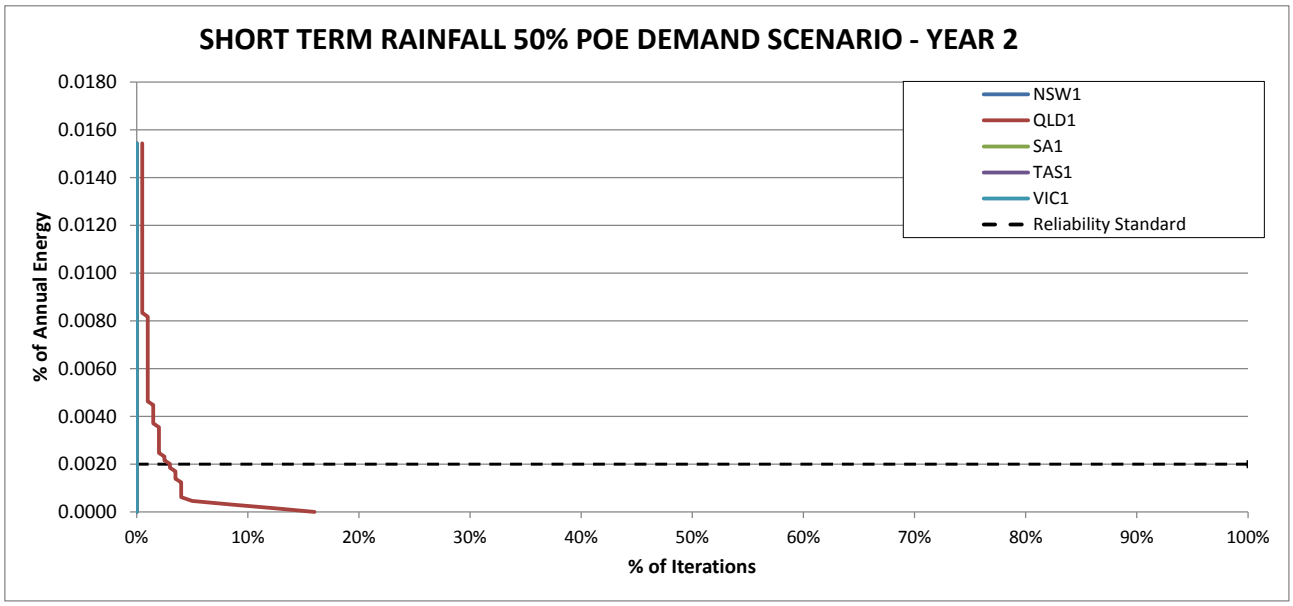
SHORT TERM RAINFALL 50% POE DEMAND SCENARIO - YEAR 2
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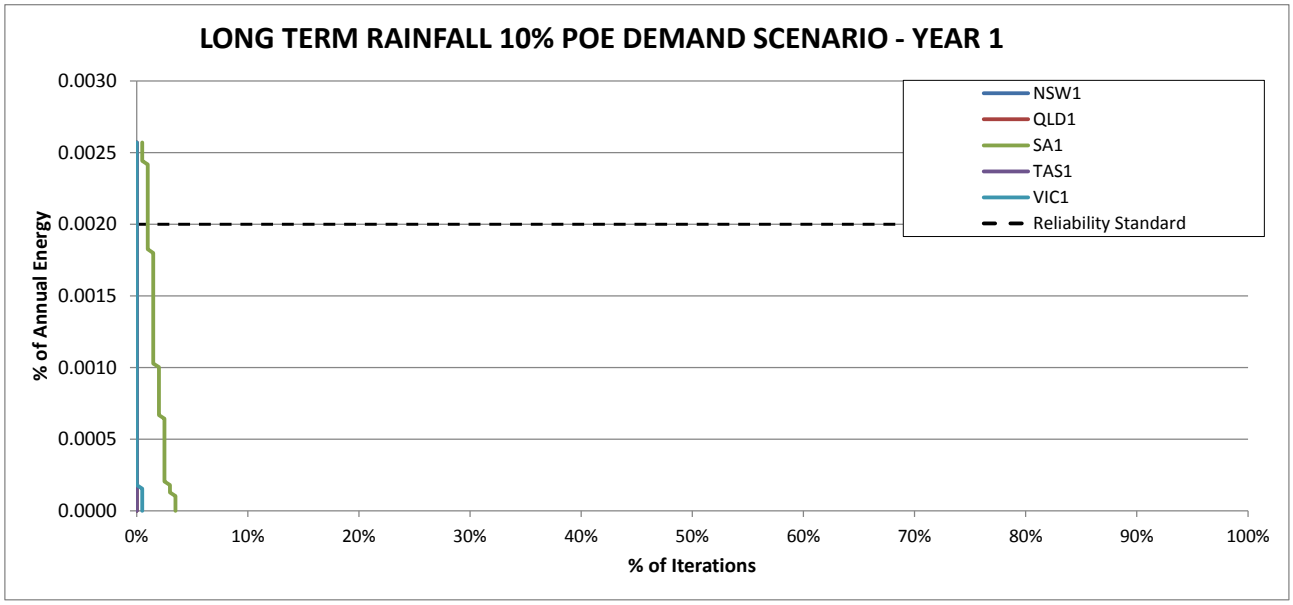
Reliability Standard


LONG TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 1
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% of Annual Energy
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10%
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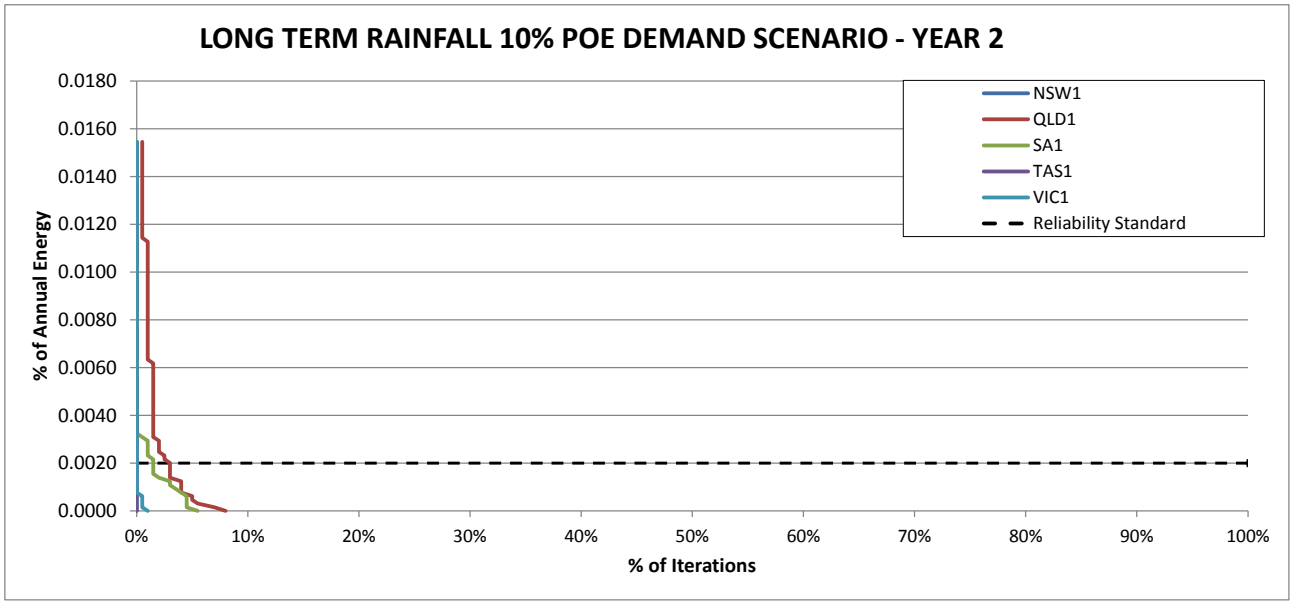
LONG TERM RAINFALL 10% POE DEMAND SCENARIO - YEAR 2
0.0180
0.0160
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0.0080
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0.0040
0.0020
0.0000
% of Annual Energy
0%
10%
20%
30%
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NSW1
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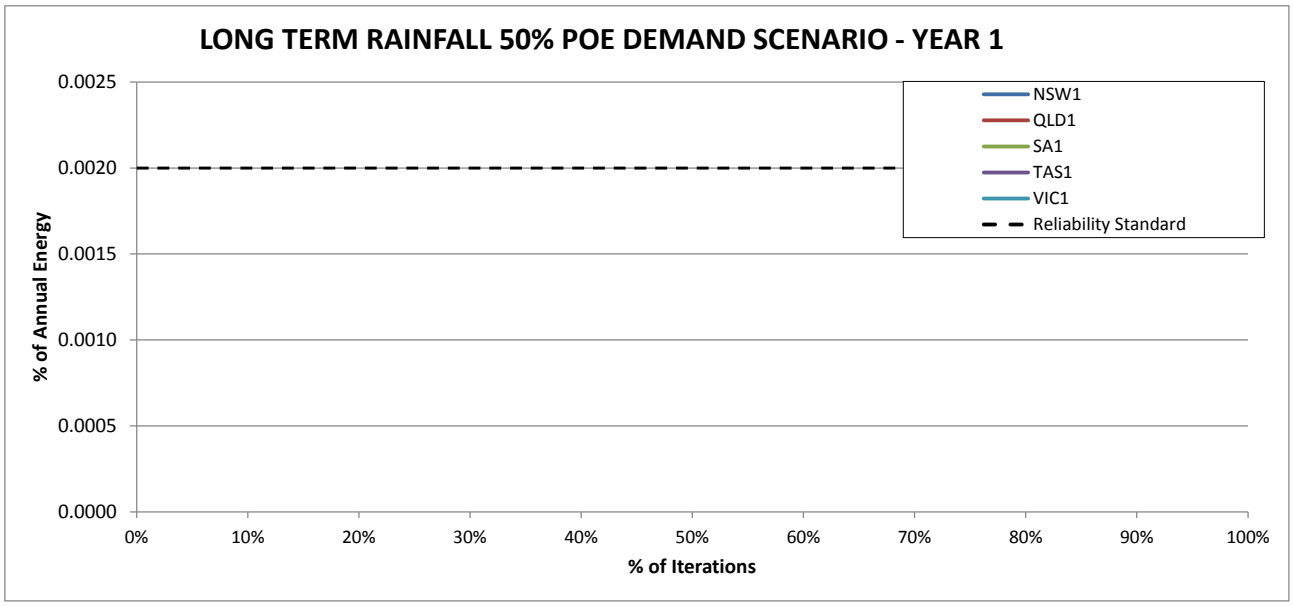
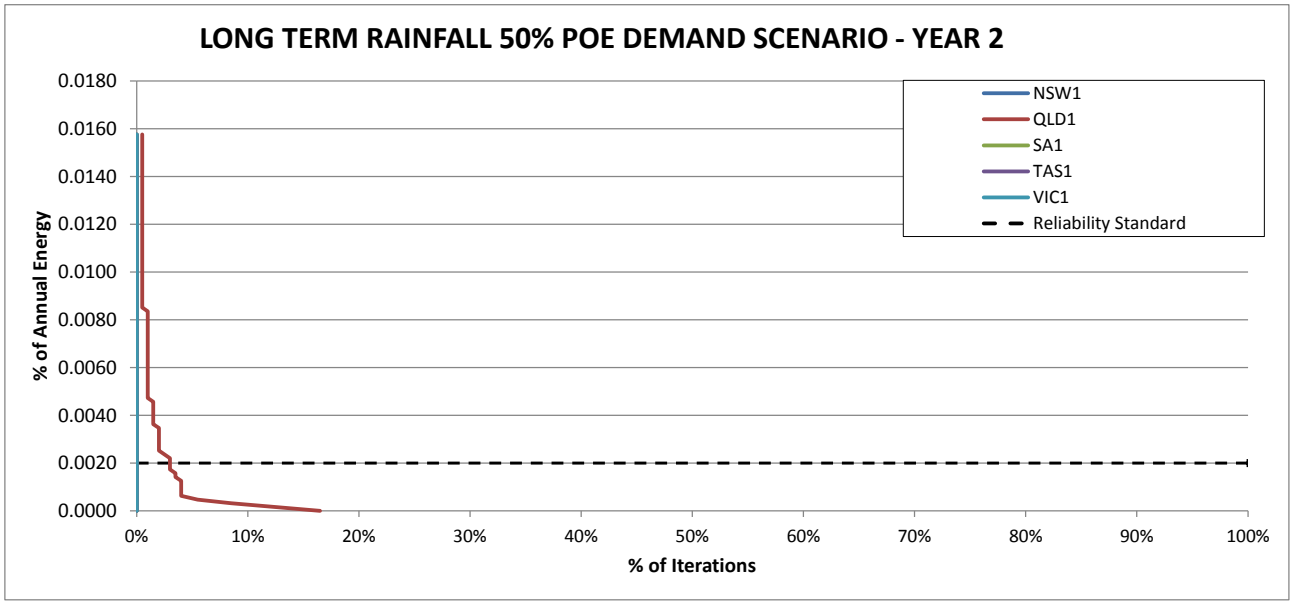
Reliability Standard


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
0.0180
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