

# AEMO EAAP REPORT UPDATE SEPTEMBER 2011

PREPARED BY: Electricity System Operations Planning and Performance Division

APPROVED BY: Henry Gorniak – Acting Executive General Manager System Operations

VERSION: Final

DATE: 30 September 2011

## **Disclaimer**

### **Purpose**

This report has been prepared by the Australian Energy Market Operator Limited (AEMO) for the sole purpose of meeting obligations in accordance with clause 3.7C of the National Electricity Rules.

### **No reliance or warranty**

This report contains data provided by third parties and might contain conclusions or forecasts and the like that rely on that data. This data might not be free from errors or omissions. While AEMO has used due care and skill, AEMO does not warrant or represent that the data, conclusions, forecasts or other information in this report are accurate, reliable, complete or current or that they are suitable for particular purposes. You should verify and check the accuracy, completeness, reliability and suitability of this report for any use to which you intend to put it, and seek independent expert advice before using it, or any information contained in it.

### **Limitation of liability**

To the extent permitted by law, AEMO and its advisers, consultants and other contributors to this report (or their respective associated companies, businesses, partners, directors, officers or employees) shall not be liable for any errors, omissions, defects or misrepresentations in the information contained in this report, or for any loss or damage suffered by persons who use or rely on such information (including by reason of negligence, negligent misstatement or otherwise). If any law prohibits the exclusion of such liability, AEMO's liability is limited, at AEMO's option, to the re-supply of the information, provided that this limitation is permitted by law and is fair and reasonable.

© 2011 - Australian Energy Market Operator Ltd. All rights reserved

# Contents

|  |    |
|--|----|
| EXECUTIVE SUMMARY .....  | 4  |
| List of Abbreviations .....  | 5  |
| 1 INTRODUCTION.....  | 6  |
| 1.1 September 2011 <i>EAAP</i> Report.....   | 6  |
| 1.2 <i>EAAP</i> inputs and outputs.....  | 7  |
| 1.3 Interpretation of <i>USE</i> forecasts determined by <i>EAAP</i> studies.....        | 7  |
| 2 RESULTS SUMMARY .....  | 8  |
| 3 NEW GENERATION AND GENERATION RETIREMENTS .....  | 9  |
| 3.1 New Generator Projects .....   | 9  |
| 3.2 Retired Generation .....   | 10 |
| 4 DETAILED RESULTS .....   | 10 |
| 4.1 Scenario 1: Low Rainfall - Forecast <i>Unservd Energy</i> (GWh) .....                | 11 |
| 4.2 Scenario 2: Short Term Average Rainfall - Forecast <i>Unservd Energy</i> (GWh) ..... | 12 |
| 4.3 Scenario 3: Long Term Average Rainfall - Forecast <i>Unservd Energy</i> (GWh).....   | 13 |
| 4.4 FORECAST MONTHLY ENERGY GENERATION ON <i>NEM</i> -WIDE BASIS .....                   | 14 |
| 4.5 <i>USE</i> Distributions .....   | 14 |

## EXECUTIVE SUMMARY

The purpose of the Energy Adequacy Assessment Projection (*EAAP*) report update September 2011 is to make available to Market Participants and other interested persons an analysis that quantifies the impact of energy constraints on energy availability over a 24 month period under a range of scenarios.

For the purpose of producing the *EAAP*, Scheduled Generators prepare and submit to AEMO, the level of energy constraints that each scheduled generating unit is likely to experience under the following three rainfall scenarios (further discussed in section 1.1):

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

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 demand forecasts that are provided by Jurisdictional Planning Bodies for the purposes of ES00.

The annual percentage of *Unservd Energy*<sup>1</sup> (*USE*) per *region* is the key indicator of energy adequacy in the *NEM*.

The forecast *USE* in September 2011 *EAAP* is below the Reliability Panel Standard of 0.002% for all regions in both years of the three scenarios covered in *EAAP*. This indicates that the availability of energy in all *NEM* regions meets the reliability standard for supply adequacy over the coming 24 month period. More detailed results are presented in sections 2 and 4.

---

<sup>1</sup> Glossary of the national Electricity Rules define *Unservd Energy* as:  
The amount of *energy* that is demanded, but cannot be supplied, in a *region* and which is defined in accordance with the *power system security and reliability standards* and is expressed as:  
(a) GWh; or  
(b) a percentage of the total *energy* demanded in that *region* over a specific period of time such as a year.

## 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          |
| NEM          | National Electricity Market                    |
| NTNDP        | National Transmission Network Development Plan |
| POE          | Probability of Exceedence                      |
| USE          | Unserviced Energy                              |

# 1 INTRODUCTION

AEMO is required by the National Electricity Rule 3.7C(d) to publish an *EAAP*<sup>2</sup> on a quarterly basis. 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 *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 2011 *EAAP* Report

The study period<sup>5</sup> for this *EAAP* report is from 1 October 2011 to 30 September 2013.

The closing date for submitting Variable GELF Parameters<sup>6</sup> by Scheduled Generators was 5 August 2011.

For the purpose of this report 'Year 1' is defined as 1 October 2011 to 30 September 2012, and 'Year 2' is defined as 1 October 2012 to 30 September 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<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.

---

<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 *unserved 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/electricityops/408-0001.html>

<sup>4</sup> Previous AEMO EAAP are available at the following location on AEMO website:  
<http://www.aemo.com.au/electricityops/eaap.html>

<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 and outputs

The Scheduled Generators submitted their variable GELF Parameters within the required timeframe. These include all the Scheduled Generators that had provided their generation constraints under various rainfall scenarios for the June 2011 EAAP.

The demand profiles used in September 2011 EAAP are consistent with the energy and demand projections published in the 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 were modelled in EAAP consistent with the values published in the 2011 ESOO.

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>8</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 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 July and August 2011, 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.

---

<sup>8</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.

## 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 2011 and the September 2011 *EAAP*. The grey shading highlights where the annual *USE* is higher than the Reliability Panel standard of 0.002%<sup>9</sup>.

The September 2011 *EAAP* results forecast a small increase in *USE* for South Australia and small decreases for Queensland and Victoria for Year 1 of the low rainfall scenario compared to June 2011 *EAAP*. There was no noticeable forecast *USE* for New South Wales and Tasmania in the June 2011 and September 2011 *EAAP* studies for Year 1 of the low rainfall scenario. The September 2011 *EAAP* forecasts a small increase in *USE* for New South Wales as well as significant decreases in *USE* for Queensland, South Australia and Victoria for the Year 2 of the low rainfall scenario compared to June 2011 *EAAP*.

The significant reductions of forecast *USE* for Queensland, South Australia and Victoria regions for Year 2 of the low rainfall scenario in September 2011 *EAAP* can be largely attributed to reductions of summer maximum demand projections published in 2011 *ESOO*. Changes to generator availabilities and GELF restrictions have also contributed to the differences in forecast *USE*.

The forecast *USE* in September 2011 *EAAP* is below the Reliability Panel Standard of 0.002% for all regions in both years of the three scenarios covered in *EAAP*.

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

| Low rainfall |                       | NSW     | QLD     | SA      | TAS     | VIC            |
|--------------|-----------------------|---------|---------|---------|---------|----------------|
| Year 1       | June 2011 Update      | 0.0000% | 0.0001% | 0.0001% | 0.0000% | 0.0001%        |
|              | September 2011 Update | 0.0000% | 0.0000% | 0.0002% | 0.0000% | 0.0000%        |
| Year 2       | June 2011 Update      | 0.0001% | 0.0017% | 0.0015% | 0.0000% | <b>0.0026%</b> |
|              | September 2011 Update | 0.0002% | 0.0008% | 0.0003% | 0.0000% | 0.0003%        |

<sup>9</sup> 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                      | June 2011 Update      | 0.0002% | 0.0001% | 0.0002% | 0.0000% | 0.0002% |
|                             | September 2011 Update | 0.0000% | 0.0000% | 0.0003% | 0.0000% | 0.0000% |
| Year 2                      | June 2011 Update      | 0.0001% | 0.0016% | 0.0002% | 0.0000% | 0.0002% |
|                             | September 2011 Update | 0.0000% | 0.0008% | 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 2011 Update      | 0.0000% | 0.0001% | 0.0001% | 0.0000% | 0.0001% |
|                            | September 2011 Update | 0.0000% | 0.0000% | 0.0002% | 0.0000% | 0.0000% |
| Year 2                     | June 2011 Update      | 0.0000% | 0.0016% | 0.0002% | 0.0000% | 0.0002% |
|                            | September 2011 Update | 0.0000% | 0.0008% | 0.0000% | 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 generator projects have been included in the model:

TABLE 4: NEW GENERATORS

| Station             | State | Capacity        | When           |
|---------------------|-------|-----------------|----------------|
| Mortlake            | VIC   | 553 MW (winter) | Summer 2011/12 |
|                     |       | 518 MW (summer) |                |
| Macarthur wind farm | VIC   | 420 MW          | Winter 2012    |

<sup>10</sup> The Generation Information Page is available on AEMO website at:  
<http://www.aemo.com.au/data/gendata.shtml>

### 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 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*<sup>11</sup>, 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<sup>12</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 *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.

---

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

<sup>12</sup> 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 *Unserviced Energy* (GWh)

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

|                  | NSW            | QLD            | SA             | TAS            | VIC            |
|------------------|----------------|----------------|----------------|----------------|----------------|
| Oct-11           | -              | -              | -              | -              | -              |
| Nov-11           | -              | -              | 0.001          | -              | -              |
| Dec-11           | -              | -              | 0.001          | -              | -              |
| Jan-12           | 0.001          | 0.009          | 0.003          | -              | -              |
| Feb-12           | 0.006          | 0.009          | 0.023          | -              | 0.003          |
| Mar-12           | -              | -              | -              | -              | -              |
| Apr-12           | -              | -              | -              | -              | -              |
| May-12           | -              | -              | -              | -              | -              |
| Jun-12           | -              | -              | -              | -              | -              |
| Jul-12           | -              | 0.001          | -              | -              | -              |
| Aug-12           | -              | -              | -              | -              | -              |
| Sep-12           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.006</b>   | <b>0.018</b>   | <b>0.028</b>   | <b>-</b>       | <b>0.003</b>   |
| <b>Region %</b>  | <b>0.0000%</b> | <b>0.0000%</b> | <b>0.0002%</b> | <b>0.0000%</b> | <b>0.0000%</b> |
| Oct-12           | -              | -              | -              | -              | -              |
| Nov-12           | -              | 0.016          | -              | -              | -              |
| Dec-12           | -              | 0.005          | -              | -              | -              |
| Jan-13           | 0.001          | 0.260          | 0.002          | -              | 0.003          |
| Feb-13           | 0.172          | 0.163          | 0.045          | -              | 0.145          |
| Mar-13           | 0.001          | 0.017          | -              | -              | 0.008          |
| Apr-13           | -              | -              | -              | -              | -              |
| May-13           | -              | -              | -              | -              | -              |
| Jun-13           | -              | -              | -              | -              | -              |
| Jul-13           | -              | -              | -              | -              | -              |
| Aug-13           | -              | -              | -              | -              | -              |
| Sep-13           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.174</b>   | <b>0.461</b>   | <b>0.047</b>   | <b>-</b>       | <b>0.156</b>   |
| <b>Region %</b>  | <b>0.0002%</b> | <b>0.0008%</b> | <b>0.0003%</b> | <b>0.0000%</b> | <b>0.0003%</b> |

## 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-11           | -              | -              | -              | -              | -              |
| Nov-11           | -              | -              | 0.001          | -              | -              |
| Dec-11           | -              | -              | 0.001          | -              | -              |
| Jan-12           | 0.001          | 0.009          | 0.003          | -              | -              |
| Feb-12           | 0.004          | 0.009          | 0.030          | -              | 0.002          |
| Mar-12           | -              | -              | -              | -              | -              |
| Apr-12           | -              | -              | -              | -              | -              |
| May-12           | -              | -              | -              | -              | -              |
| Jun-12           | -              | -              | -              | -              | -              |
| Jul-12           | -              | 0.001          | -              | -              | -              |
| Aug-12           | -              | -              | -              | -              | -              |
| Sep-12           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.005</b>   | <b>0.019</b>   | <b>0.036</b>   | <b>-</b>       | <b>0.002</b>   |
| <b>Region %</b>  | <b>0.0000%</b> | <b>0.0000%</b> | <b>0.0003%</b> | <b>0.0000%</b> | <b>0.0000%</b> |
| Oct-12           | -              | -              | -              | -              | -              |
| Nov-12           | -              | 0.016          | -              | -              | -              |
| Dec-12           | -              | 0.005          | -              | -              | -              |
| Jan-13           | -              | 0.259          | -              | -              | 0.001          |
| Feb-13           | 0.004          | 0.161          | 0.006          | -              | 0.005          |
| Mar-13           | -              | 0.017          | -              | -              | -              |
| Apr-13           | -              | -              | -              | -              | -              |
| May-13           | -              | -              | -              | -              | -              |
| Jun-13           | -              | -              | -              | -              | -              |
| Jul-13           | -              | -              | -              | -              | -              |
| Aug-13           | -              | -              | -              | -              | -              |
| Sep-13           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.004</b>   | <b>0.457</b>   | <b>0.007</b>   | <b>-</b>       | <b>0.005</b>   |
| <b>Region %</b>  | <b>0.0000%</b> | <b>0.0008%</b> | <b>0.0000%</b> | <b>0.0000%</b> | <b>0.0000%</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-11           | -              | -              | -              | -              | -              |
| Nov-11           | -              | -              | 0.001          | -              | -              |
| Dec-11           | -              | -              | 0.001          | -              | -              |
| Jan-12           | 0.001          | 0.009          | 0.002          | -              | -              |
| Feb-12           | 0.004          | 0.009          | 0.024          | -              | 0.002          |
| Mar-12           | -              | -              | -              | -              | -              |
| Apr-12           | -              | -              | -              | -              | -              |
| May-12           | -              | -              | -              | -              | -              |
| Jun-12           | -              | -              | -              | -              | -              |
| Jul-12           | -              | 0.001          | -              | -              | -              |
| Aug-12           | -              | -              | -              | -              | -              |
| Sep-12           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.005</b>   | <b>0.018</b>   | <b>0.028</b>   | <b>-</b>       | <b>0.002</b>   |
| <b>Region %</b>  | <b>0.0000%</b> | <b>0.0000%</b> | <b>0.0002%</b> | <b>0.0000%</b> | <b>0.0000%</b> |
| Oct-12           | -              | -              | -              | -              | -              |
| Nov-12           | -              | 0.016          | -              | -              | -              |
| Dec-12           | -              | 0.006          | -              | -              | -              |
| Jan-13           | -              | 0.258          | -              | -              | -              |
| Feb-13           | 0.003          | 0.161          | 0.006          | -              | 0.005          |
| Mar-13           | -              | 0.017          | -              | -              | -              |
| Apr-13           | -              | -              | -              | -              | -              |
| May-13           | -              | -              | -              | -              | -              |
| Jun-13           | -              | -              | -              | -              | -              |
| Jul-13           | -              | -              | -              | -              | -              |
| Aug-13           | -              | -              | -              | -              | -              |
| Sep-13           | -              | -              | -              | -              | -              |
| <b>Total GWh</b> | <b>0.003</b>   | <b>0.457</b>   | <b>0.006</b>   | <b>-</b>       | <b>0.005</b>   |
| <b>Region %</b>  | <b>0.0000%</b> | <b>0.0008%</b> | <b>0.0000%</b> | <b>0.0000%</b> | <b>0.0000%</b> |

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

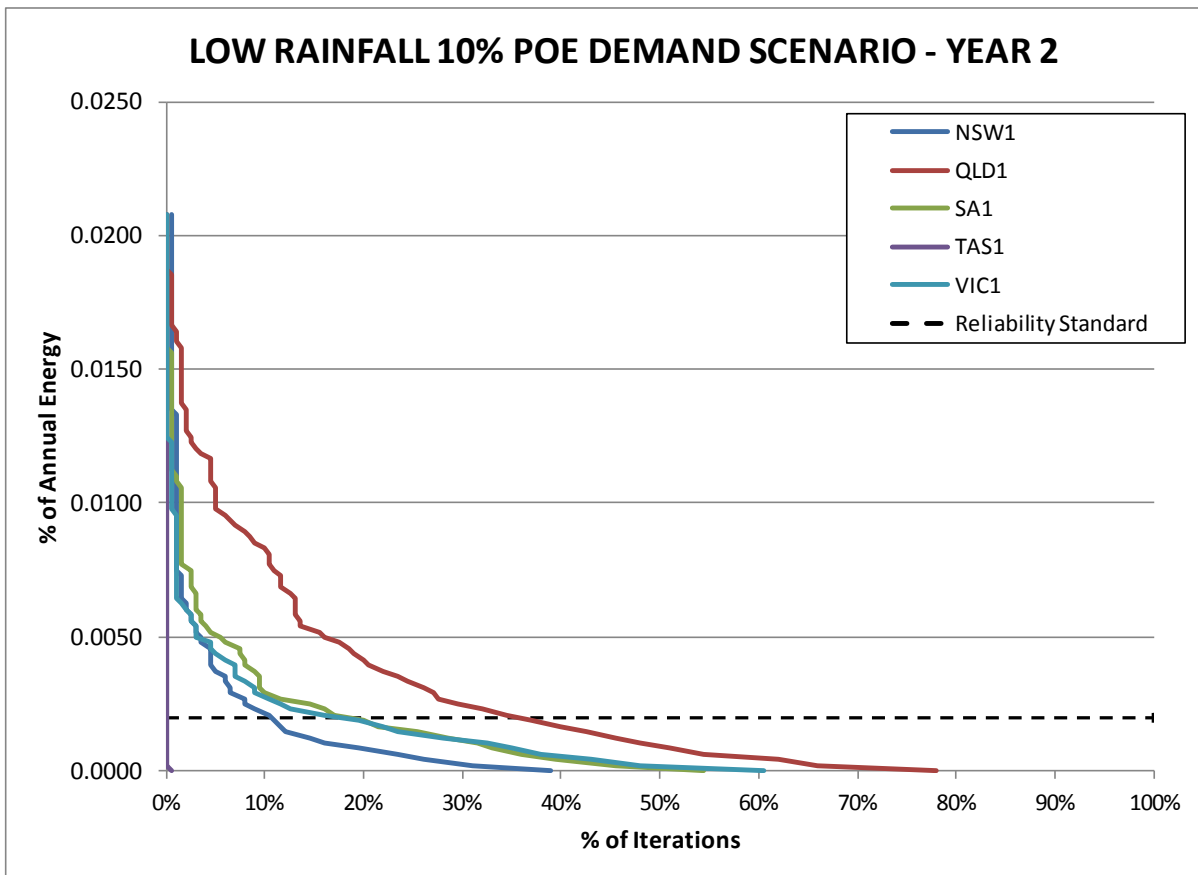
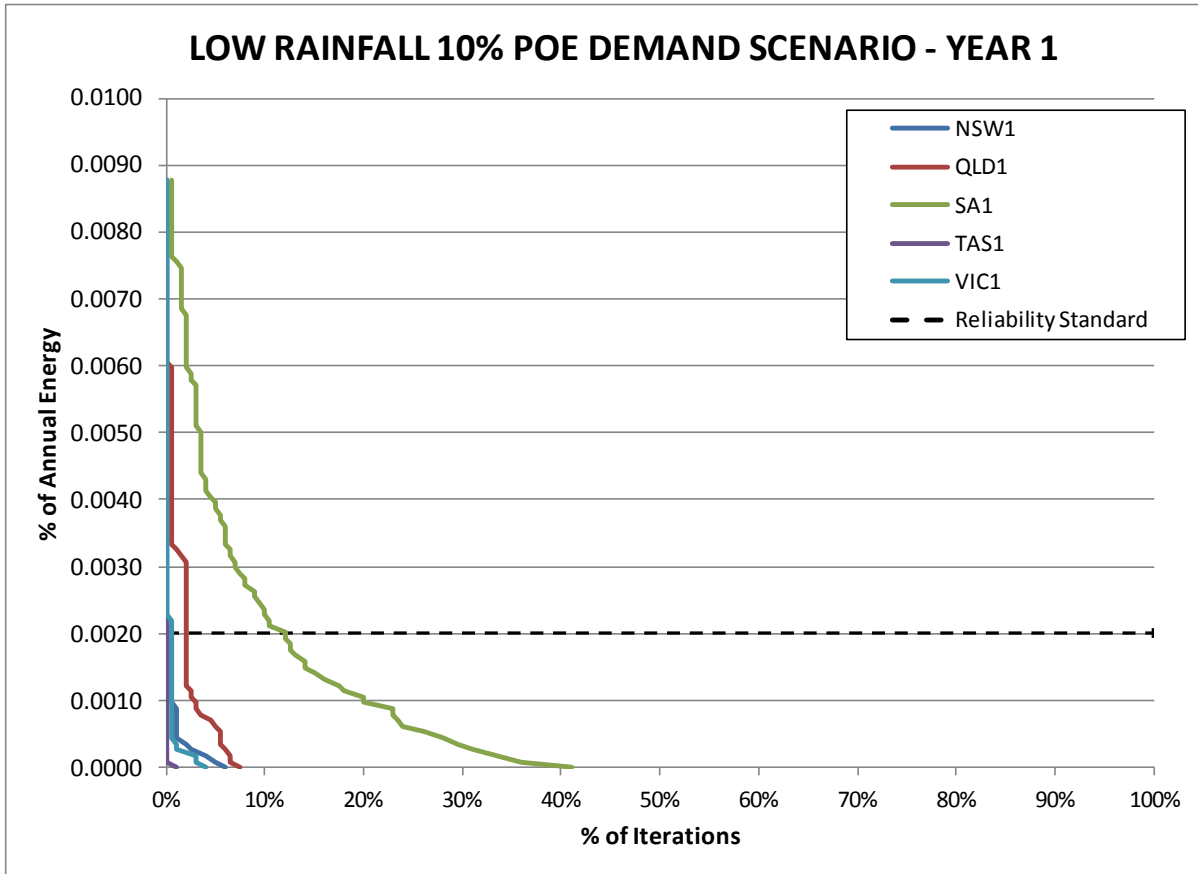
TABLE 8: FORECAST MONTHLY ENERGY GENERATION ON NEM-WIDE BASIS

|                  | Low Rainfall  | Short-Term Average Rainfall | Long-Term Average Rainfall |
|------------------|---------------|-----------------------------|----------------------------|
| Oct-11           | 16524         | 16556                       | 16519                      |
| Nov-11           | 16811         | 16828                       | 16862                      |
| Dec-11           | 17418         | 17444                       | 17420                      |
| Jan-12           | 18460         | 18473                       | 18458                      |
| Feb-12           | 17413         | 17425                       | 17403                      |
| Mar-12           | 17965         | 17919                       | 17926                      |
| Apr-12           | 16061         | 16064                       | 16074                      |
| May-12           | 17717         | 17720                       | 17730                      |
| Jun-12           | 17628         | 17630                       | 17600                      |
| Jul-12           | 19041         | 19039                       | 19027                      |
| Aug-12           | 18614         | 18624                       | 18584                      |
| Sep-12           | 16876         | 16899                       | 16875                      |
| <b>Total GWh</b> | <b>210527</b> | <b>210621</b>               | <b>210479</b>              |
| Oct-12           | 17250         | 17289                       | 17247                      |
| Nov-12           | 17416         | 17411                       | 17414                      |
| Dec-12           | 17991         | 17997                       | 18001                      |
| Jan-13           | 19206         | 19206                       | 19217                      |
| Feb-13           | 17410         | 17425                       | 17408                      |
| Mar-13           | 18666         | 18665                       | 18653                      |
| Apr-13           | 16760         | 16758                       | 16759                      |
| May-13           | 18331         | 18358                       | 18337                      |
| Jun-13           | 18134         | 18160                       | 18154                      |
| Jul-13           | 19482         | 19487                       | 19487                      |
| Aug-13           | 18901         | 18915                       | 18896                      |
| Sep-13           | 17242         | 17246                       | 17240                      |
| <b>Total GWh</b> | <b>216788</b> | <b>216917</b>               | <b>216814</b>              |

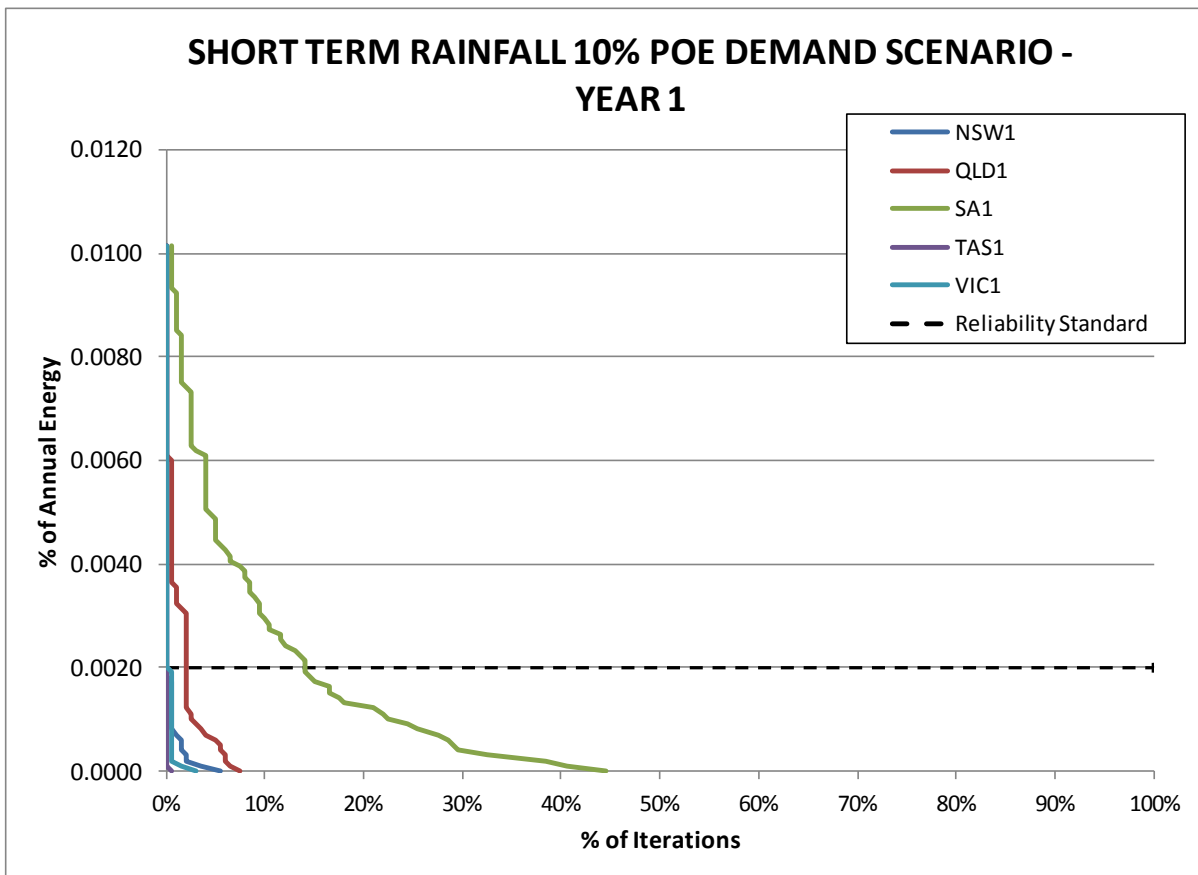
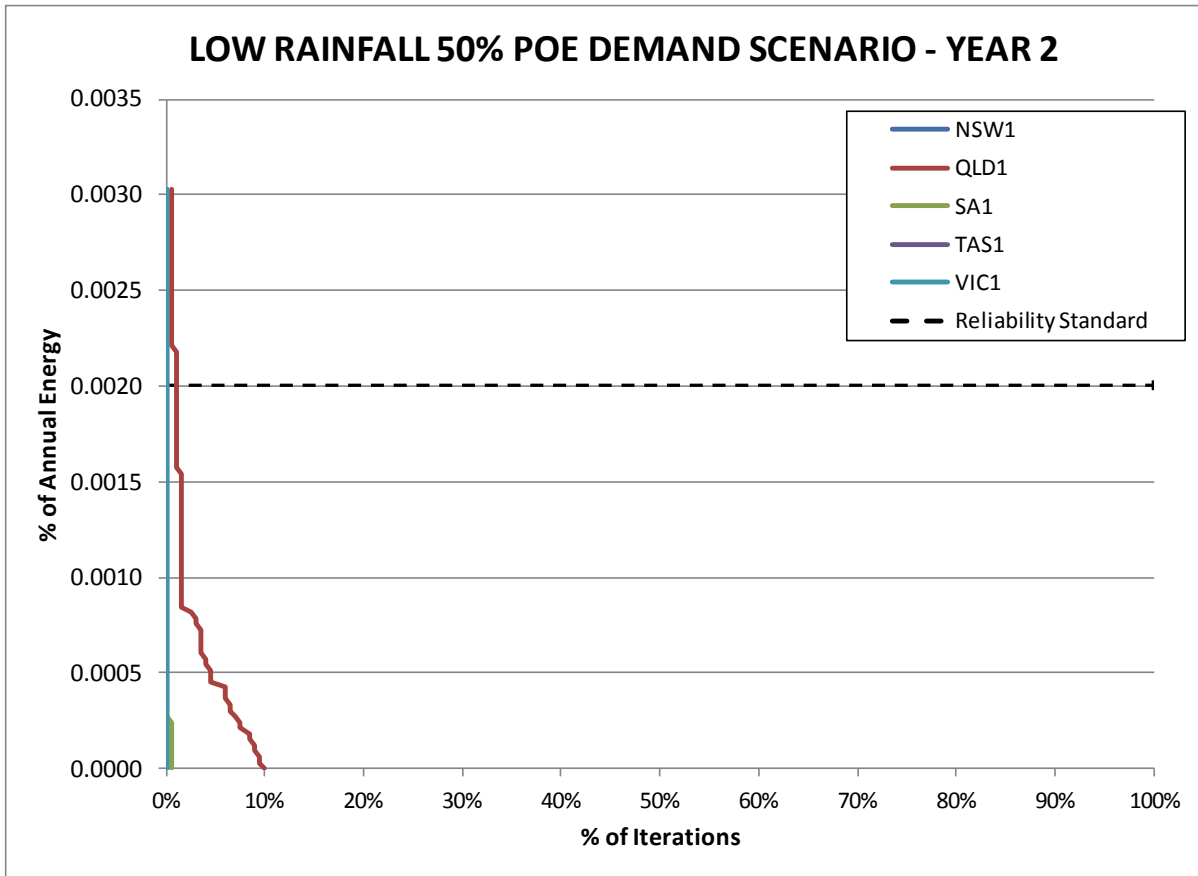
#### 4.5 USE Distributions

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*.

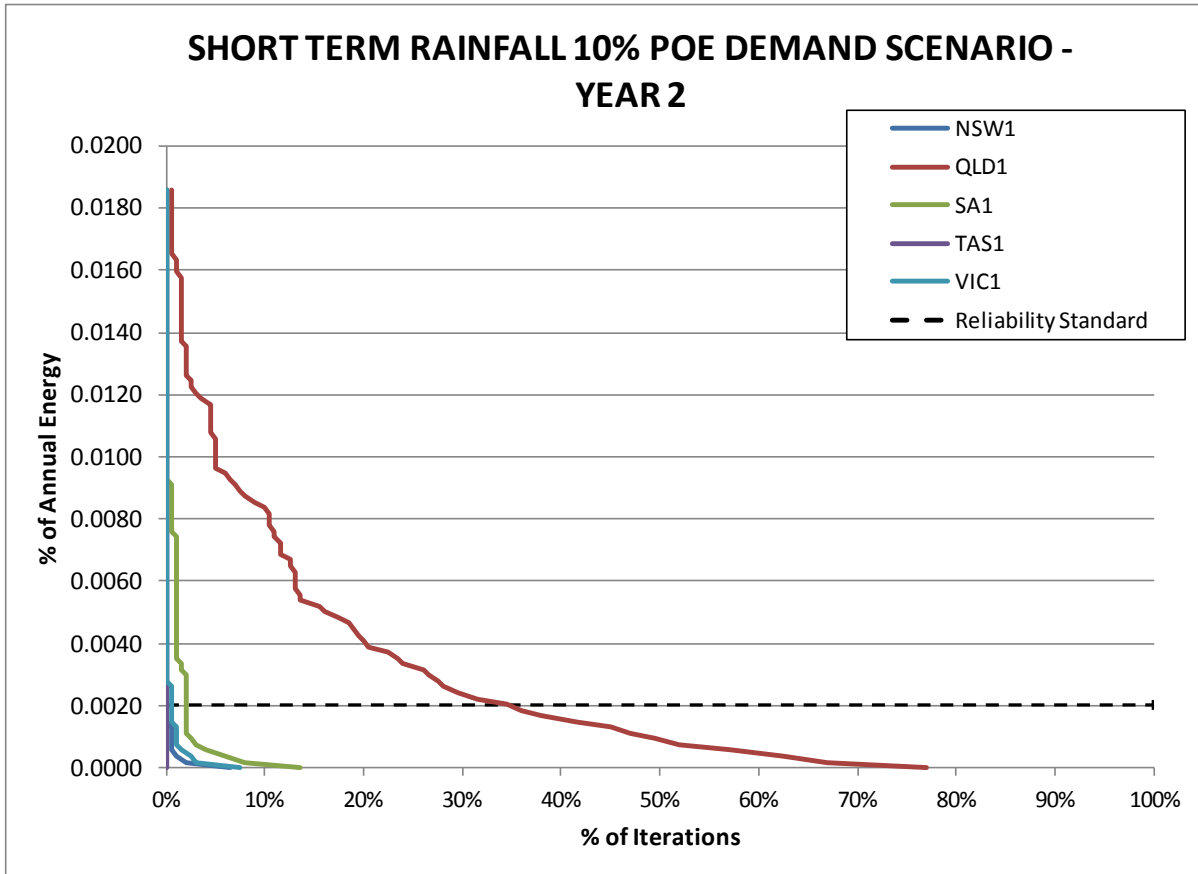
Separate graphs are presented for the 10% and 50% POE simulations.



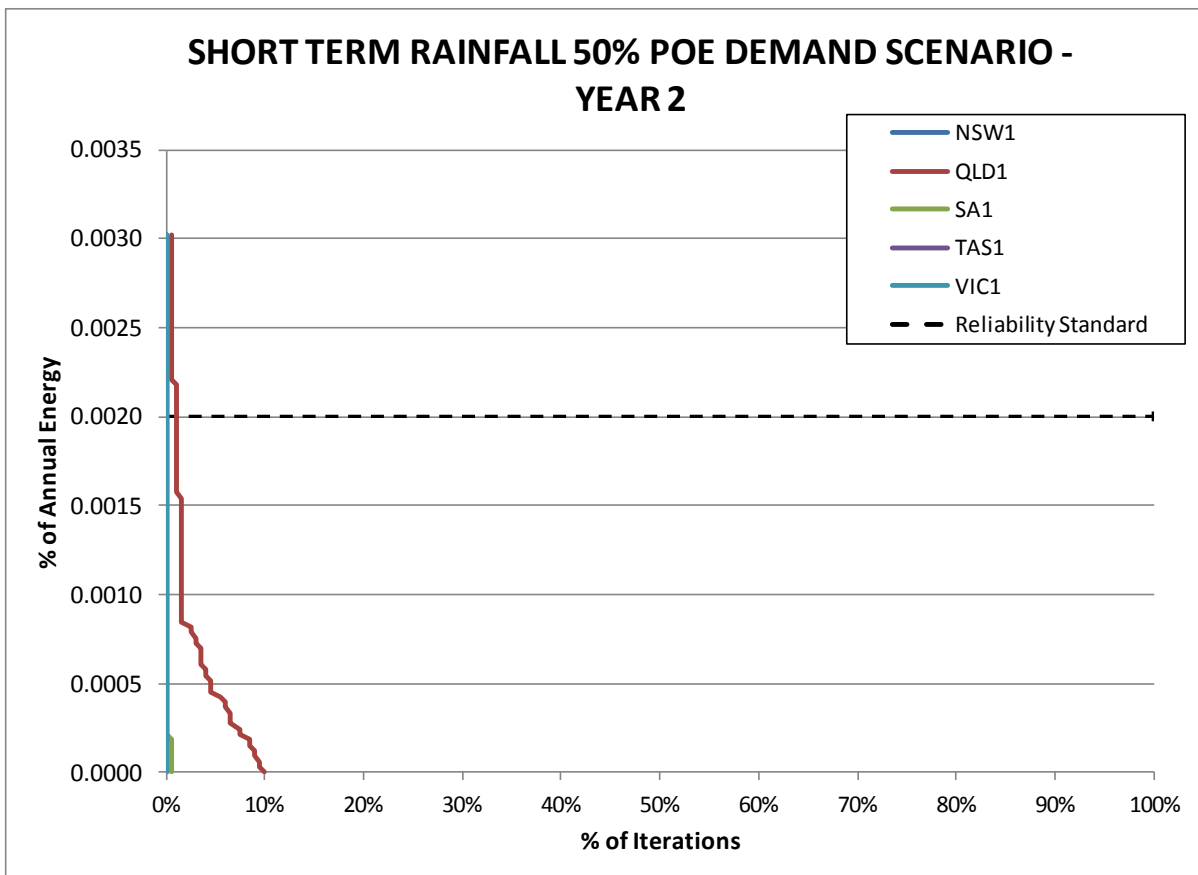
A graph is not shown for Year 1 of the low rainfall scenario with 50% POE demands because there was approximately zero forecast unserved energy for all NEM regions.

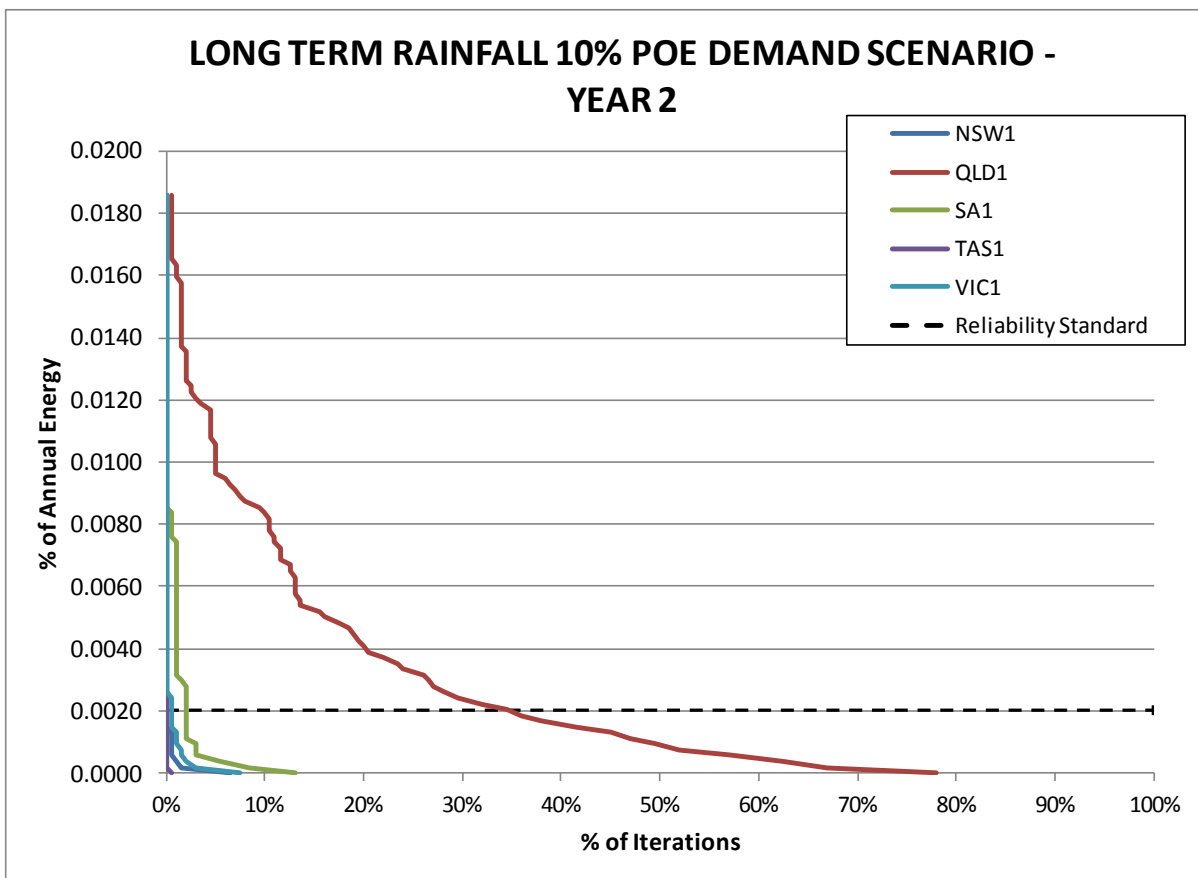
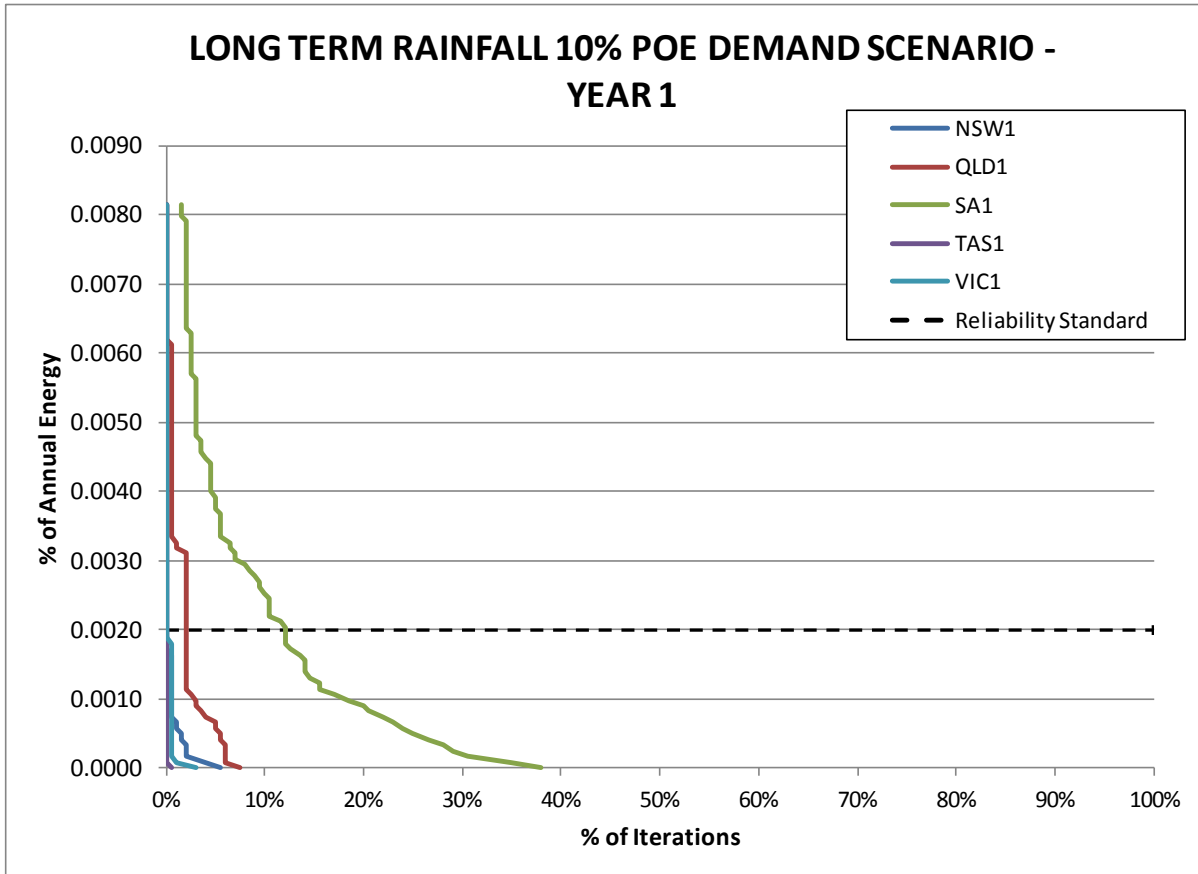






A graph is not shown for Year 1 of the short term average rainfall scenario with 50% POE demands because there was approximately zero forecast unserved energy for all NEM regions.





A graph is not shown for Year 1 of the long term average rainfall scenario with 50% POE demands because there was approximately zero forecast unserved energy for all NEM regions.

