Calculation of the 2008/09 – 2013/14 Service Standards

SP AusNet™
A member of Singapore Power Group

ISSUE/AMENDMENT STATUS

Issue Number	Date	Description	Author	Approved by
1	15/1/2007	Original Document	Chris Grinter	Gary Towns
2	17/4/2007	Updated to reflect 2006 performance	Chris Grinter	Gary Towns
3	30/4/2007	Updated - Explanation of methodology used to forecast CAPEX circuit availability target	Chris Grinter	Gary Towns

Contact

This document is the responsibility of **Network Development Division**, SP AusNet. Please contact the indicated owner of the document with any inquiries.

Gary Towns
SP AusNet
Level 31, 2 Southbank Boulevard
Melbourne Victoria 3006
Ph: (03) 9695 6000

Contents

1 Purpose of Paper

This paper covers the methodology used to estimate the new targets for the AER service standards scheme over the next regulatory period.

2 Background

The AER has advised that the outage incentive scheme will continue in the next reset period and that they would like the scheme to include transmission outages for customer and third party related works on the shared network. Their aim is to have SP AusNet reporting on a consistent basis with the other TNSP's.

3 Targets Measured in Scheme

These targets measure performance across a wide number of targets. These targets are categorised in to three groups, which are;

- **Availability Measures**
  - Total Circuit Availability,
  - Peak Critical Availability,
  - Peak Non Critical Availability,
  - Intermediate Critical Availability, and
  - Intermediate Non Critical Availability.
- **Loss of Supply Event Index**
  - >0.05 min per annum, and
  - >0.3 min per annum.
- **Average Outage Duration**
  - Lines, and
  - Transformers.

4 Historical Performance, 2002 to 2006

Table one contains actual performance outcomes over the past five years. These performance outcomes include outages caused through SP AusNet's CAPITAL and OPEX works along with forced and fault outages.

Without Customer Augmentation

Measure	Actual Performance					
	2002	2003	2004	2005	2006	Average
Circuit availability:						
Total	99.191	99.323	99.269	99.341	99.251	99.275
Peak Critical	99.085	99.787	99.974	99.945	99.878	99.734
Peak Non-critical elements	99.107	99.841	99.571	99.857	99.786	99.632
Intermediate Critical	98.515	99.479	99.804	99.745	99.541	99.417
Intermediate Non-critical elements	99.487	99.338	99.394	98.210	98.972	99.08
Loss of supply events:						
>0.05 system minutes	NA	3	2	5	5	3.75
>0.3 system minutes	NA	0	0	2	2	1
Average outage duration:						
Lines	6.136	9.978	2.730	7.542	33.379	11.953
Transformers	7.498	7.659	4.862	6.644	7.692	6.871

Table 1: Performance incentive scheme – Historical Performance without Customer Augmentation Outages.

5 Method Used To Derive Targets

5.1 Availability Measures

The target 'Availability Measures' are determined by the duration of outages on transmission elements. These outages are categorised by the cause of the outage as follows;

- Forced and Fault,
- SP AusNet Maintenance,
- SP AusNet CAPEX, and
- Customer / Third party Works.

Forced and Fault

Forced and fault outages are determined using the historical averages of 2002 to 2006. The averaged forced and fault outage duration has been divided into peak and intermediate periods based on the duration of each period i.e. a random failure pattern.

SP AusNet OPEX

Planned and routine maintenance as well as asset work outages are determined using the historical averages of 2002 to 2006. The division of peak, intermediate, critical and non-critical hours have also been determined through historical performance. No adjustments to the historical averages have been made to reflect the increased asset works program, in accordance with the AER Guidelines (AER - Draft Proposed Service Target Performance Incentive Scheme, January 2007)

SP AusNet CAPEX

Forecast circuit availability for CAPEX outages has been calculated by analysing the system outages required to replace over 3200 equipment items identified in the proposed capital works plan over the 2008 to 2013 reset period (e.g. outage for the replacement of GNTS NO.3 220KV LINE CIRCUIT BREAKER AT DDTS).

Each outage was assessed so that works causing multiple outages on the same transmission element were optimised, reducing the overall network outages to around 1200 work packages – packages of capital works bundled together to reflect practical and efficient outage planning practices (e.g. an outage to replace a circuit breaker could also include its associated current transformer's etc).

In special cases (where the equipment can be rebuilt in a new location) the outage duration was calculated based on installation time rather than the time needed to replace the element in situ, hence reducing the overall outage time.

Of the 1200 work packages identified, 100 unique job types where created (e.g. duration to replace a 220kV bay; including, one circuit breaker, a current transformer and a remote operated isolator). Each of these job types were then allocated an average outage duration (in hrs) based on SP AusNet's experiences in delivering work of this nature. With this information a complete outage listing was compiled and performance targets forecast.

Critical and Non-Critical

The definition of critical and non-critical equipment has been rolled forward from the existing scheme. Critical and Non-Critical outage durations are allocated based on the forecast outages on these network elements.

Timing of Peak, Intermediate and Off-Peak

The timing of peak, intermediate and off-peak hours have been rolled forward from the existing scheme. Forecast peak, intermediate and off-peak outage hours are allocated through historical averages over the 2002 to 2006 period.

Period Designation	Inclusive Calendar Period	Calendar Period Exclusions
Period 1 – Peak	Mid-November – Mid-March (inclusive) Weekdays (Mon. – Fri.) Between 1100-2000hrs (Eastern Summer Time)	Weekend days (Sat. / Sun.) Public Holidays From the last weekday before Christmas Day to the first weekday after New Year's Day (inclusive)
Period 2 – Intermediate	1 June – 31 August (inclusive) Weekdays (Mon. – Fri.) Between 0700-2200 hours	Weekend days (Sat. / Sun.)
Period 3 – Off Peak	All other times	

Table 2: Performance incentive scheme – Timing of Peak, Intermediate and Off-peak hours.

5.2 Loss of Supply Event Index

The target 'Loss of Supply Event Index' measures the frequency of events that directly impacts on customers. The proposed targets are calculated using the historical average from 2003 to 2006 adjusted for the increase in the CAPEX program. This adjustment is justified, as there is a direct relationship between the amount of work performed on the network and interruptions to supply.

The increased CAPEX program over the 2008 to 2013 period will decrease the circuit availability due to outages needed for construction and connection of the identified works program. The increased outages on the network will reduce the redundancy of the system and therefore an increase in loss of supply events may also occur.

5.3 Average Outage Duration

The target 'Average Outage Duration' measures the average amount of time it takes to return a piece of plant to service after a fault. The proposed targets have been set using the historical data from 2002 to 2006.

Proposed Outage Duration Cap

A proposed one week (168 hours) cap on individual events ensures that one event cannot dominate the measured performance, therefore destroying the incentive properties of the measure.

5.4 Proposed Targets without Customer Augmentation

Table three contains the existing performance targets, average historical performance outcomes and the proposed targets as calculated using the methodology listed above. The proposed targets include forced and fault, SP AusNet CAPEX and SP AusNet OPEX outages as well as taking into account the proposed fault duration cap. As the Forced and Fault and the SP OPEX targets are based on the historical average the 'shift' from the historical values is only attributable to the increase in CAPEX related outages.

Without Customer Augmentation

Measure	2003/08	Historical 2002/06	Proposed Targets Without Customer Augmentation	Adjustment from Historical
	Target	Outcome	Target	
Circuit availability:				
Total	99.200	99.275	98.851	-0.424
Peak Critical	99.900	99.734	99.551	-0.183
Peak Non-critical elements	99.850	99.632	99.444	-0.188
Intermediate Critical	99.850	99.417	98.813	-0.604
Intermediate Non-critical elements	99.750	99.080	98.721	-0.359
Loss of supply events:				
>0.05 system minutes	2	3.75	4.00	0.25
>0.3 system minutes	1	1	2.00	1
Average outage duration:				
Lines	10	6.589*	7	0.411
Transformers	10	6.871	7	0.129

Table 3: Performance incentive scheme – Proposed Targets without Customer Augmentation Outages
** Adjusted for proposed outage duration cap*
NOTE: NUMBERS IN TABLES MAY NOT ADD TO TOTAL DUE TO ROUNDING.

NOTE: With the finalisation of the 2006 performance measures the proposed targets have changed. The changes in the proposed targets are attributed to a change in the hours against OPEX (increased) and CAPEX (decreased). Due to the allocation of hours the proposed target has changed by larger amount than the historical average.

6 Customer Augmentation

The AER has advised that they would like the scheme to include transmission outages for customer related works. To fulfil this request the following method was used to predict the outages.

Augmentation CAPEX outages have been forecast based on the 2006 VENCorp Annual Planning Report and the distribution companies Transmission Connection Planning Report. Circuit availability was calculated using outage plans developed to complete these projects.

Some additional outages allowances have been made for tower relocations, as these are not reported in these documents, and for generator connections, as these are not planned out to 2013. Both these allowances have been calculated based on the historical and forecast frequency of tower relocations and generator connections.

Circuit availability targets including customer CAPEX augmentation have been calculated using the same methodology use to determine SP AusNet's CAPEX outages as described in section 5.1.

6.1 Proposed New Exclusions

NOTE: Future targets have been modelled under the conditions of existing exclusions, changes to existing exclusions will modify the future targets. Existing exclusions can be found in Appendix A.

Fault Level Mitigation Works

It is posed to exclude fault level mitigation works as Vencorp has not formulated a strategy to deal with this issue and the solution chosen can have significantly different outage requirements. It is also proposed to exclude fault level mitigation works associated with new customer connections for the same reason.

Line Up Rating

Line up rating where replacement of line conductors is required have a significant affect on circuit availability and as there is none forecast for the next reset period it is proposed to exclude outages for this work if a line up rating is requested by a customer.

Interconnector Upgrades

Interconnector upgrades are generally very large projects with substantial outage requirements. No projects of this nature are specifically forecast by VENCorp so it is proposed to exclude this work category rather than attempt to make a provision

Switchyard Busbar Up rating

Works required to up rate a busbar rating for fault level or normal current are to be excluded as the outage requirements for this work may be significant depending on the station configuration. As there is no definite forecast works it is proposed to exclude this work category rather than attempt to make a provision.

6.2 Proposed Targets with Customer Augmentation

The output of the proposed performance targets is shown in table four below. The measures (both historical and proposed) include customer augmentation and the proposed exclusions.

With Customer Augmentation

Measure	2002/06 Historical Performance	2008/13 Using Forecast Outages	Adjustment from Historical
	With Customer Augmentation	Proposed Targets	
Circuit availability:			
Total	99.148	**98.674**	-0.474
Peak Critical	99.623	**99.283**	-0.34
Peak Non-critical elements	99.561	**99.354**	-0.207
Intermediate Critical	99.172	**98.496**	-0.676
Intermediate Non-critical elements	99.046	**98.644**	-0.402
Loss of supply events:			
>0.05 system minutes	3.750	**4**	0.25
>0.3 system minutes	1	**2**	1
Average outage duration:			
Lines	6.589*	**7**	0.411
Transformers	6.871	**7**	0.129

Table 4: Performance incentive scheme – Proposed Targets with Customer Augmentation Outages
** Adjusted for proposed outage duration cap*
NOTE: NUMBERS IN TABLES MAY NOT ADD TO TOTAL DUE TO ROUNDING.

A comparison of the proposed performance targets with and without customer augmentation is shown in table five below.

With / Without Customer Augmentation

Measure	Proposed Targets 2008/13 Using Forecast Outages		Adjustment
	Without Customer Augmentation	With Customer Augmentation	
Circuit availability:			
Total	98.851	**98.674**	-0.177
Peak Critical	99.551	**99.283**	-0.268
Peak Non-critical elements	99.444	**99.354**	-0.09
Intermediate Critical	98.813	**98.496**	-0.317
Intermediate Non-critical elements	98.721	**98.644**	-0.077
Loss of supply events:			
>0.05 system minutes	4	**4**	0
>0.3 system minutes	2	**2**	0
Average outage duration:			
Lines	7	**7**	0
Transformers	7	**7**	0

Table 5: Performance incentive scheme – Proposed Targets with and without Customer Augmentation Outages
NOTE: NUMBERS IN TABLES MAY NOT ADD TO TOTAL DUE TO ROUNDING.

7 Caps and Collars

Caps are placed above the target by an amount equal to one standard deviation from the historical average, while collars are placed below the target by an amount equal to two standard deviations from the historical average. The asymmetry reflects the fact that performance is already high and therefore improvements are more difficult to achieve than performance reductions.

8 Proposed Targets

The output of the proposed performance targets with collars and caps are shown in table six below.

With Customer Works

Measure	Historical	Using Forecast Outages		
	With customer works	Collar	**Target**	Cap
		Proposed Targets		
Circuit availability:				
Total	99.148	**98.355**	**98.674**	**98.834**
Peak Critical	99.623	**98.512**	**99.283**	**99.669**
Peak Non-critical elements	99.561	**98.782**	**99.354**	**99.640**
Intermediate Critical	99.172	**97.118**	**98.496**	**99.185**
Intermediate Non-critical elements	99.046	**97.487**	**98.644**	**99.222**
Loss of supply events:				
>0.05 system minutes	3.750	7	**4**	2
>0.3 system minutes	1	4	**2**	1
Average outage duration:				
Lines	6.589*	12	**7**	4
Transformers	6.871	10	**7**	6

Table 6: Performance incentive scheme – Proposed Targets with Collars and Caps
** Adjusted for proposed outage duration cap*
NOTE: NUMBERS IN TABLES MAY NOT ADD TO TOTAL DUE TO ROUNDING.

Appendix A – Existing Exclusions

Transmission Circuit Availability

- Unregulated transmission assets.

- Connection assets, including connection transformers.

- Exclude from 'circuit unavailability' any outages shown to be caused by a fault, outage request or other event on a '3rd party system' e.g. intertrip signal, generator outage, customer installation (TNSP to provide lists).

- Any outage requested by a 3rd party for construction or demolition activities on land over which the TNSP has an easement.

- *Force majeure events.*

- Outages to control voltages within required limits, both as directed by *NEMMCO* and where *NEMMCO* does not have direct oversight of the network (in both cases only where the element is available for immediate energisation if required).

Peak Critical & Peak Non-critical elements

- Outages on shunt reactors (during peak periods).

Loss of supply event frequency

- Unregulated transmission assets.

- Successful reclose events (less than 1 minute duration)

- Any outages shown to be caused by a fault or other event on a '3rd party system' e.g. intertrip signal, generator outage, customer installation

- Planned outages

- *Force majeure events*

Average outage duration

- Planned outages

- *Force majeure events*

- Momentary interruptions (less than one minute)

- Any outages shown to be caused by a fault or other event on a '3rd party system' e.g. intertrip signal, generator outage, customer installation

- Unregulated transmission assets.