APPENDIX 10

Sinclair Knight Merz, *Transend's Service Target Performance Incentive Scheme: Parameters values and Weightings,* May 2008

Transend's Service Target Performance Incentive Scheme

PARAMETER VALUES & WEIGHTINGS

- Final (version 1.1)
- 1 May 2008

Transend's Service Target Performance Incentive Scheme

PARAMETER TARGETS & WEIGHTINGS

- Final (version 1.1)
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1. Executive Summary

Sinclair Knight Merz (SKM) was engaged by Transend Networks to undertake a review of the current suite of service standards performance parameters and sub-parameters within the Australian Energy Regulator's (AER) Service Target Performance Incentive Scheme (STPIS) as published in March 2008[1]. This review was in two stages - the first concentrated on the selection of the performance parameters and sub-parameters for the next regulatory period 2009 - 2014, and this review on the methodology for establishing the values and weightings of the sub-parameters.

The AER accepted the first stage review of parameters submitted by Transend, also recommending the inclusion of Average Outage Duration parameters for transmission line and transformer circuits. The AER accepted that the Average Outage Duration parameters should carry a zero weighting.

In reviewing the historical performance of Transend during the period 2003 - 2007, SKM noted that there has been good performance improvement against the transformer circuit availability and the larger loss of supply event parameter (> 2.0 system minutes), and consistent performance against the smaller loss of supply event parameter (> 0.1 system minutes). Overall, the historical performance against the STPIS parameters for the period 2004 - 2007 was positive, reflecting the focus on performance improvement that has been adopted by Transend in examining its internal as well as external behaviours.

In establishing the parameter values for the next regulatory period, SKM considered the allowable data adjustments under the STPIS that may apply to Transend for the period 2009 - 2014. These focused on the forecast capital and operational works programs (excluding contingent projects) and any impacts that Basslink may have had since it commenced in April 2006.

SKM concluded that:

- There is insufficient data available as yet to quantify any effects that Basslink is having on the Tasmanian transmission system. There is no identifiable increase in maximum demand which impact on the calculation of system minutes outages (for the loss of supply event frequency parameter), although there is some anecdotal evidence that the transmission system is under more stress since Basslink became operational. This is apparent through an increased number of "hot joints" being identified on transmission circuits. Although no adjustments have been

[1] AER, *Electricity transmission network service providers: Service Target Performance Incentive Scheme - Final*, March 2008

made for the next regulatory period, it is recommended that this situation be closely monitored and considered again during the regulatory submission for the post 2014 period;

- The proposed capital works program is extensive[2]. The focus in the next regulatory period is on raising the system security at a number of key 220 kV substations (to meet new transmission system performance criteria enacted in legislation by the Office of the Tasmanian Electricity Regulator (OTTER) in July 2006, which addresses load growth and asset age requirements. A model of standard outage durations has been used by Transend to develop outage estimates during the coming regulatory period, and these forecasts were found to fit within the historic profile for capital works on transmission line and transformer circuits. At this stage SKM has not recommended any adjustments to targets, caps and collars based on an initial assessment of the capital works program for the next regulatory period. SKM does, however, recognise that there is an inherent risk in the complexity and impacts on critical circuits of projects to be undertaken. SKM recommends that these allowances be reviewed once the capital program has been finalised, and therefore the magnitude of the required adjustment can be established, and should a risk be identified that is not already apparent; and
- The operational works program is forecast to remain consistent with the historical level of activity and its impact is considered will remain at the historic levels.

SKM has adopted a methodology that encompasses approaches that have been accepted by the AER in recent determinations as reasonable including a performance deadband. The future targets have been set at the average of the historical performance for the most recent 5 calendar years (2003 - 2007). The caps and collars have been determined by a curve-of-best-fit approach set at 5% and 95% (which correspond to values at ± 1.5 standard deviation either side of the target). A performance deadband has been included in each parameter, to account for the natural variation in the performance results (set to the calculated variance of the most recent 5 years historical results), and to provide a driver for positive improvement in internal behaviours and performance to achieve a reward. SKM also considered the objectives stated in clause 1.4 of the STPIS in establishing targets, caps and collars by selecting values that returned a revenue neutral result for annual historical performance measured against the parameter values proposed for the next regulatory period.

The weightings allocated to each parameter are based on a suitable balance between aspects of system reliability and security of supply, and the needs of customers, whilst also considering desired links to drivers of internal behavioural change, and ensuring that attaining the required performance is within Transend's control.

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[2] Transend capital program 2008 to 2014 published April 2008

The values shown in Table 1 are a summary of the sub-parameters determined in this review.

- **Table 1 STPIS Parameters based on this methodology**

Parameter	Weighting	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transmission circuit availability (critical)	20%	98.36%	98.94%	99.13%	99.32%	99.89%
Transmission circuit availability (non-critical)	10%	98.54%	98.95%	98.99%	99.03%	99.43%
Transformer circuit availability	15%	98.82%	99.23%	99.28%	99.33%	99.75%
Loss of Supply > 0.1 system minutes	20%	20	16	15	14	10
Loss of Supply > 1.0 system minutes	35%	5	3	2	2	0
Average outage duration (transmission lines)	0%	387	304	276	248	166
Average outage duration (transformers)	0%	1085	595	541	487	118

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2. Historical Performance

Transend has statutory and regulatory obligations to monitor and report on transmission system performance to the AER, OTTER and customers (through connection agreements). The inter-related fundamentals of transmission system performance that are monitored by Transend are:

- availability (supply and plant);
- security of supply; and
- quality of supply.

In clause 1.3(a)(1) of the STPIS, the AER has focused reporting on the reliability of the transmission system through PI Scheme parameters measuring plant and supply availability, and transmission system outages.

2.1 Existing Performance Incentive (PI) Scheme

During the current regulatory period 2004 - 2009, Transend has been subject to an annual review of its service performance, as per stipulations within the then ACCC's 2003 revenue determination[3].

The existing PI Scheme for Transend is based on four sub-parameters:

- Circuit availability (transmission lines);
- Circuit availability (transformers);
- Loss of supply event frequency index - number of events > 0.1 system minute; and
- Loss of supply event frequency index - number of events > 2.0 system minutes.

In addition to these parameters, the ACCC required Transend to "… *report on average outage duration over the regulatory period*"[4] whilst accepting that Average Outage Duration was not suitable for inclusion[5] in the Transend PI Scheme.

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[3] ACCC, *Tasmanian Transmission Network Revenue Cap 2004 to 2008/09: Decision*, 10 December 2003

[4] ibid, section 8.5, pp 106

[5] ibid, section 8.4, pp 105

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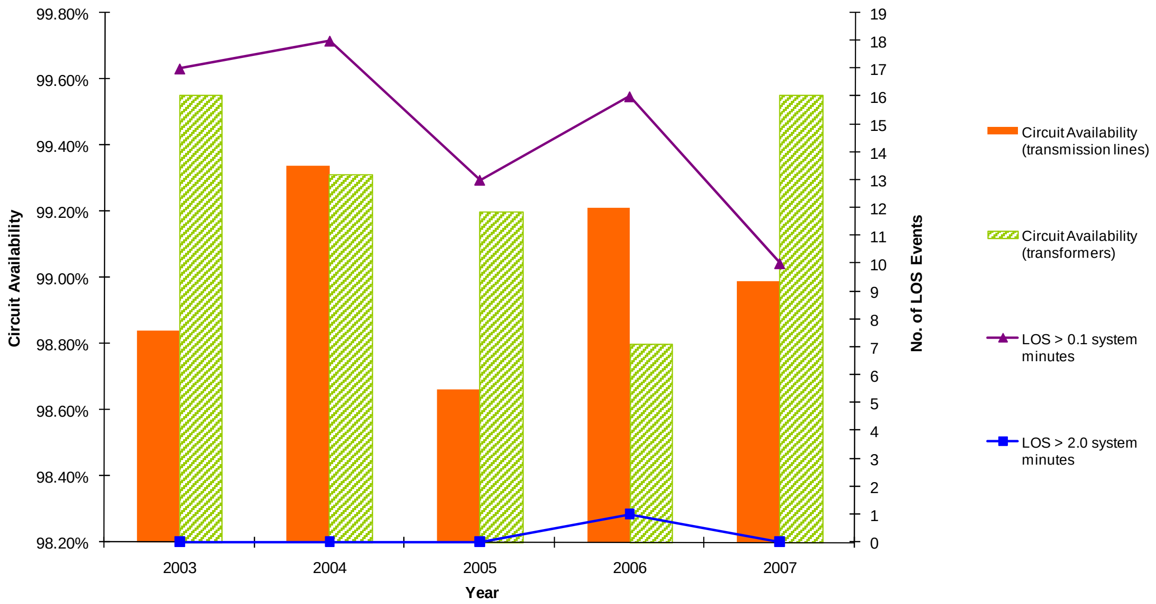
2.2 Past Annual Performance

Table 2 summarises the annual performance for Transend over the period 2003 – 2007, against the 4 parameters shown in section 2.1, with the corresponding S-factor results shown in Table 3.

Table 2 Historical Annual Performance Results

No	Parameter	Annual Target[6]		Annual Performance				
		Lower DB	Upper DB	2003[7]	2004	2005	2006	2007
1a	Circuit availability (transmission lines)	99.10%	99.20%	98.84%	99.34%	98.66%	99.21%	98.99%
1b	Circuit availability (transformers)	99.00%	99.10%	99.55%	99.31%	99.20%	98.80%	99.55%
2a	Loss of supply > 0.1 system minute	16	13	17	18	13	16	10
2b	Loss of supply > 2.0 system minutes	3	2	0	0	0	1	0

Figure 1 Historical Annual Performance Results



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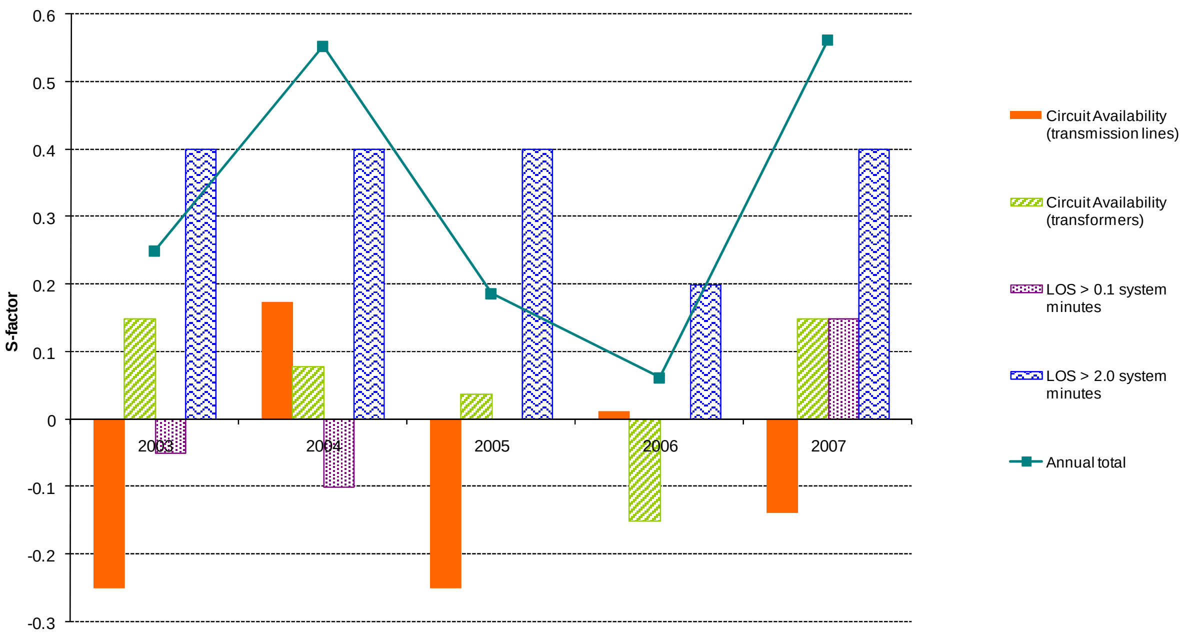
[6] All parameters include deadbands

[7] These results were prior to the commencement of the PI scheme and were not subject to any external audit

■ **Table 3 Historical Annual S-factor Results**

No	Parameter	%MAR[8]	S-factors (%MAR)					Total
			2003[9]	2004	2005	2006	2007	2003-07
1a	Circuit availability (lines)	±0.25	(0.2500)	0.1750	(0.2500)	0.0125	(0.1375)	(0.4500)
1b	Circuit availability (transformers)	±0.15	0.1500	0.0788	0.0375	(0.1500)	0.1500	0.2663
2a	Loss of supply > 0.1 system minutes	±0.20	(0.0500)	(0.1000)	0.0000	0.0000	0.1500	0.0000
2b	Loss of supply > 2.0 system minutes	±0.40	0.4000	0.4000	0.4000	0.2000	0.4000	1.8000
	Total	±1.00	0.2500	0.5538	0.1875	0.0625	0.5625	1.6163

■ **Figure 2 Historical Annual S-factor Results**



As shown in Table 3, Transend has achieved a positive result during the 4 years that the PI Scheme has been in place. Following a solid performance in 2004, Transend experienced mixed

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[8] For the current regulatory period, the amount at risk was set at 1% of the Maximum Allowable Revenue for the calendar year

[9] These S-factors are based on the un-audited 2003 results and have been calculated using the same parameter equations as those applied during the period Transend were subject to the service standards incentive scheme (from 2004 onwards)

transmission circuit availability results in 2005 and 2006 due to a heavy works program (for both maintenance and capital work projects). Transend's performance in 2007 was supported by an exceptionally good result in loss of supply events, during an unseasonably dry period. This uncharacteristic result for 2007 has significantly distorted the average for the > 1.0 system minutes measure.

2.3 Historical Works Programs

Table 4 summarises the comparative effect that the capital and operational expenditure works programs have had on the transmission system for the period 2003 - 2007.

- **Table 4 Relative Outage Impact on Transmission Circuit Availability Parameter**[10]

Parameter	Outage Reason	Year					Average
		2003	2004	2005	2006	2007	
Circuit Availability (transmission lines)	Capital	66.87%	70.72%	60.13%	40.91%	17.08%	51.14%
	Emergency	0.35%	2.07%	1.49%	0.32%	2.21%	1.29%
	Fault	2.03%	3.75%	1.09%	1.41%	1.79%	2.01%
	Forced	0.00%	0.36%	2.16%	0.47%	1.41%	0.88%
	Operating	30.74%	23.09%	35.13%	56.89%	77.50%	44.67%
	Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
Circuit Availability (transformers)	Capital	53.93%	54.92%	64.49%	77.86%	12.80%	52.80%
	Emergency	8.00%	7.27%	0.39%	0.95%	1.26%	3.58%
	Fault	2.44%	2.96%	1.15%	0.89%	14.80%	4.45%
	Forced	0.00%	0.21%	1.32%	0.50%	8.32%	2.07%
	Operating	35.62%	34.64%	32.64%	19.79%	62.83%	37.10%
	Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

A review of the outage causes that have impacted on the availability parameters shows that a relatively small percentage of outages are due to unplanned events - approximately 4% for transmission circuits and 10% for transformers.[11]

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[10] Data source: Transend's HISREP performance reporting system

[11] The 5-year average for transformer outages due to emergency/fault/forced has been distorted by the 2007 result, where there were significant outages due to faults at Port Latta and Chapel Street and a major forced outage at Kermandie. The average outage impact due to unplanned outages, excluding 2007, is in the range of 6-9%.

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3. Transend's STPIS Methodology

The "service component" of a STPIS scheme as specified in the guideline relates to the rules that the parameters and their values must satisfy.

In particular, section 3.3 of the STPIS provides scope for Transend to propose:

- variations to the dataset;
- the shape of the curve for each sub-parameter;
- caps and collars for each sub-parameter;
- reasonable adjustments to historical average performance based targets; and
- a summary of the approach adopted by Transend in establishing the values for each of the sub-parameters.

3.1 Length of Historical Dataset

Clause 3.3 of the STPIS states that "*… proposed performance targets must be equal to the TNSP's average performance history over the most recent five years. The data used to calculate the performance target must be consistently recorded based on the parameter definitions that apply to the TNSP*"[12] although "*… the AER may approve a performance target based on a different period if it is satisfied that the use of a different period is consistent with the objectives … of this scheme.*"[13]

SKM is of the opinion that using data beyond the 5-year time horizon for availability parameters introduces a distortion, as this would include transmission system performance, reliability and security considerations which have most likely been improved by the previous capital and operational work programs. So whilst conceding that relying on only the last 5 years of data introduces a limited confidence level in any statistical analysis, SKM considers that the most recent 5 years represents the best basis for target setting for availability parameters going forward which is in line with clause 3.3(g) of the STPIS. SKM noted that Transend has a high degree of confidence in the accuracy and integrity of its performance data for the last 5 years.

For Loss of Supply (LOS) event frequency, there has recently been a detailed analysis[14] conducted, which sought to identify the characteristics of a transmission system through determining the "x" and "y" threshold values using data from connection points in the transmission system from the

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[12] clause 3.3(g)

[13] clause 3.3(h)

[14] SAHA International, *TransGrid - Service Standards Incentive Scheme: Review of data, methodology and parameters*, 21 December 2007

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past 11 years. SKM agrees that for the purpose of establishing appropriate LOS threshold values, extending the time horizon in such a manner is acceptable. Events causing a loss of supply are stochastic, caused by weather or other unpredictable events which are beyond the control of a TNSP. However, SKM considers that using data beyond the most recent 5-year period must be used in an operational context eg. given that LOS relates to unplanned events, an appreciation of the weather cycle may assist in assessing whether any given annual result is “good”, “bad” or “typical”.

Therefore, SKM would agree with potentially extending the time horizon for parameters related to unplanned events - loss of supply and average outage duration - provided it is done with an understanding of the operating conditions, and does not introduce a distortion by selective inclusion of “bad” years.

SKM recommends that Transend uses its last 5-years of history to base its targets.

3.2 Shapes of Performance Curves

Clause 3.3(b) of the STPIS stipulates that for each parameter applying to Transend, the following values must be proposed:

- a performance target;
- a collar - the performance level at which the maximum financial penalty is applied; and
- a cap - the performance level at which the maximum financial bonus is received.

Clause 3.3(c) states that a proposed performance target may take the form of a performance deadband.

Clause 3.3(f) allows for the proposal of symmetric or asymmetric incentive curves.

3.2.1 Asymmetric caps and collars

Clause 3.3(f) of the STPIS states that a “… *proposed cap and collar may result in symmetric and asymmetric incentives for the TNSP*.”

In establishing the shapes of the curves for each parameter, SKM did not assume either a symmetric or asymmetric shape. In developing the caps and collars, SKM has relied on a method which considers the inherent probability distribution of the data set. This is consistent with those approaches that have been adopted in recent TNSPs’ determinations.

Symmetrical curves are used as it is considered that this represents an equivalent incentive for a bonus for an identifiable performance improvement and a penalty for falling below target performance.

3.2.2 Deadbands

Within the STPIS, a performance deadband is defined as "… *a performance target that is set over a range of values, within which a TNSP neither receives a financial penalty nor financial reward in the regulatory year*."[15]

SKM considers the purpose of allowing a deadband within a TNSP's performance measure is to account for the natural variation within the comparative year-on-year performance of an electricity transmission system. Performance within such a range should therefore neither be rewarded, nor penalised under the STPIS, as this was seen to be contrary to the primary objective of providing an incentive for performance improvement.

In recommending appropriate values for the Transend performance parameters, SKM considered the provisions of section 3.3(c) of the STPIS to allow deadbands, and the desire for Transend to link the objectives of the scheme to improvements in internal behaviour.

3.2.2.1 Precedents

In consideration of the application of deadbands within the Transend suite of performance parameters, SKM considered any precedents set, or previous suggestions made, within revenue determinations published by the AER for other TNSPs.

Powerlink

In its review of the Powerlink submission for the AER, PB Associates expressed the opinion that the use of deadbands contributed to a reduction in "… *the sharpness of the scheme*."[16] The review recommended the use of single data point targets for all parameters, as it was considered that deadbands effectively broaden the target to a range.[17] These single data point targets were considered to enhance a TNSP's incentive to improve the performance of its transmission system.

In its final determination, the AER considered that the targets being proposed did not place excessive risk on Powerlink, and therefore determined that deadbands should not be applied in that

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15 AER, *FInal Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme*, March 2008, Glossary, pp 14

16 PB Associates, *Powerlink Revenue Reset - Response on Selected Issues in Powerlink's Submission*, June 2007, section 4.3, pp 27

17 AER, *Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12: Decision*, 14 June 2007, section 7.5.1, pp 129

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instance. The AER further determined that the application of deadbands to any performance parameter would be applied "… *on a case-by-case basis*".[18]

SP AusNet

SP AusNet did not propose the use of nor included any discussion of any deadbands within its revenue proposal.

ElectraNet

ElectraNet engaged the services of SAHA International Limited to provide statistical advice, as an aid to develop an appropriate set of performance incentive measures.

SKM noted that SAHA International's extensive statistical analysis included an argument for the retention of deadbands, as a means of eliminating the possibility of punishing or rewarding a TNSP for performance that could possibly occur within the "*natural variation*" (refer Figure 3) of any performance parameter around its target.

- **Figure 3 Extract From SAHA International report[19]**

> **2.3 Deadbands**
>
> While appropriate definition of each parameter should provide for a high signal to noise ratio and (hopefully) a strong read on performance changes, it is not possible to completely eliminate the effects of random factors. In view of this, standard statistical techniques for inference testing have to be applied before drawing any conclusions regarding whether underlying performance has changed. The deadbands allowed by the STPIS provide for this, by not penalising or rewarding outcomes that are within the natural variation of the parameter around the target.

3.2.2.2 Methodology for developing deadbands

In seeking a suitable methodology that would allow for the reasonable determination of the extent of a performance deadband, SKM examined the statistics provided within the data set for guidance, whilst reviewing the information in a transmission system operational context.

In establishing the deadband around the target, SKM has considered the statistical variance of the data set for each parameter, so as to allow for the natural variation in the annual result (refer section

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18 ibid

19 SAHA International, *Service Target Incentive Scheme Review*, May 2007, section 2.3, pp 6

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3.2.2.1). The size of the deadband recommended by SKM is considered indicative of the natural variability of the Tasmanian transmission system performance. Table 5 summarises the maximum and minimum annual historical performance results, together with the calculated statistical variance for each availability parameter.

- **Table 5 Historical Performance Variance[20]**

Sub-Parameter	Minimum Result	Maximum Result	Variance	Target	Lower Deadband	Upper Deadband
Transmission circuit availability (critical)	98.47%	99.70%	0.38	99.13%	98.94%	99.32%
Transmission circuit availability (non-critical)	98.74%	99.41%	0.07	98.99%	98.95%	99.03%
Transformer circuit availability	98.80%	99.55%	0.10	99.28%	99.23%	99.33%
Loss of supply > 0.1 system minutes[21]	18	10	0.72*	15	16	14
Loss of supply > 1.0 system minutes	3	1	0.50*	2	3	2

* As fraction of 5-year historical average

3.2.2.3 Proposed use of deadbands

SKM considers that Transend is seeking to align improvements in its own internal behaviours with the proposed incentive scheme, in order to drive the actions necessary to realise the service performance improvements being targeted. Without utilising the option of instituting a performance deadband, Transend would be leaving the achievement of a small gain (or penalty), through doing nothing fundamentally different, purely to chance, due to natural variance in service performance within the transmission system.

Using deadbands provides Transend with a solid incentive for a true performance improvement before receiving a reward. This would drive the desired change in behaviours and such use of a deadband would be considered to be aligned with the objectives of the STPIS.

Further, SKM considers that service targets with deadbands provide a link to tangible service improvements. A TNSP places itself in a position of some amount of operational risk in terms of their ability to reach the target. The AER, in allowing deadbands within the target setting process, provides a tool that could assist in ensuring that a TNSP received a reward only by actions it had

[20] Data source AER published TNSP Annual Performance Results

[21] Target value calculated was 14.80, rounded up to 15 as shown

undertaken and not through the natural variability of the performance levels of a transmission system over time.

SKM concluded that the use of a performance deadband should be influenced by a consideration of the level of control that Transend could reasonably be expected to have over the performance within the specific parameter in question, as this would ultimately determine the risk that the target itself presented.

3.3 Methodology for Setting Targets, Caps and Collars

As the understanding of the historical information has improved, both TNSPs and the AER have been examining possible methods of improving the statistical approach to be used in examining recent performance results.

There has come a preference for more deterministic support in establishing the targets, caps, collars and deadbands applied to the nominated parameters.

3.3.1 Original PI scheme parameters

The targets, caps and collars that were originally established by SKM for each TNSP individually used the arithmetic mean of the historic performance results as the target, with the caps, collars and deadbands essentially set by inspection with some consideration of the spread (standard deviation) of the annual results.

A problem encountered with some TNSPs' parameters was that the caps and collars were not consistently calculated, leaving the potential for some TNSPs to find their annual results falling at or near the limits.

3.3.2 Recommended approach for Transend

As an alternative approach, SKM used the past 5 years of Transend historical performance data and plotted best fit curves. Whilst the statistical confidence in the best fit curves generated is limited by the small data set, it allows for an analysis of the data that considers the nature of the distribution of the historical data.

In recent determinations, the cap and collar values were selected as a number of standard deviations either side of the mean, with some adjustments required to avoid establishing circuit availability cap values above 100%. SKM examined the 5% and 95% values from the cumulative probability distributions generated by the curves-of-best-fit. SKM utilised two separate software solutions that fitted a large number of probability distributions to the historical data, and ranked the best fitting models using standard statistical "goodness of fit" tests.[22]

As a cross-check, SKM reviewed the symmetric/asymmetric nature of the caps and collars generated by the curve-of-best-fit, and compared this with the approach which used standard deviations as a guide to setting caps and collars used in recent determinations for Powerlink and SP AusNet. In reviewing these past determinations, and based on observations for preliminary data analysis for Transend, SKM considers that a range ± 1.5 standard deviations around the mean appears to be a better intuitive fit compared with that generated assuming a normal distribution. The use of a collar at 1.5 standard deviations below the target represents a more stringent condition on below-average performance, whilst the use of the deadband around the target ensures that an identifiable performance improvement must be achieved before a performance bonus is achieved. SKM considers that the ± 1.5 standard deviations remains consistent with previously methodologies acknowledged and accepted by the AER.

SKM believes that this approach is a refinement of the earlier methodologies of assuming normal distribution statistics applied, as it retained the notion of using the 5% and 95% values as the caps and collars (simulating the effect of 2 standard deviations either side of the target) whilst applying the initiative of using a probability distribution better matched to the actual dataset presented.

SKM also considered the objectives stated in clause 1.4 of the STPIS in establishing targets, caps and collars by selecting values that returned a revenue neutral result for annual historical performance measured against the parameter values proposed for the next regulatory period.

SKM makes the following observations with regards to the setting of the parameter values for the current revenue period:

- The targets, caps and collars for the STPIS parameters were set with similar considerations to those being used for the 2009 - 2014 regulatory period;
- The performance results achieved for the current regulatory period suggest that the methodology adopted in 2003 was appropriate, as the historical performance was comparable to the targets, caps and collars originally proposed (as compared to the amended circuit availability parameter, and the widened deadband for the LOS > 0.1 system minutes as stipulated by the ACCC for the current period).

[22] The Goodness of fit of a statistical model describes how well the model fits a set of observations. Measures of goodness of fit typically summarise the discrepancy between observed values and the values expected under the model in question. Such measures can be used in statistical hypothesis testing, e.g. whether outcome frequencies follow a specified distribution.

SKM is confident that the proposed methodology will generate practical targets, caps and collars for the STPIS parameters that should provide good incentive for performance improvement during the next regulatory period.

3.4 Adjustments to Historical Averages

The STPIS allows for targets, caps and collars to be based on the most recent historical five year performance data, including certain permissible adjustments, to determine a TNSP's performance parameters value for use within a regulatory period.

Section 3.3(k) of the STPIS provides a number of adjustments that are permitted:

> "*Proposed performance targets may be subject to reasonable adjustment to allow for:*
>
> *(1) statistical outliers;*
>
> *(2) the expected effects on the TNSP's performance from any increases or decreases in the volume of capital works planned during the regulatory control period (compared with the volume of capital works undertaken during the period used to calculate the performance target);*
>
> *(3) the expected material effects on the TNSP's performance from any changes to the age and ratings of the assets comprising the TNSP's transmission system during the TNSP's next regulatory control period (compared to the age and ratings of the TNSP's assets comprising the TNSP's transmission system during the period used to calculate performance targets); and*
>
> *(4) material changes to an applicable regulatory obligation.*"

3.4.1 Statistical outliers

There were no annual performance results that were considered to be sufficiently outside the overall pattern of data or of sufficient size as to distort the total transmission system performance over any of the years reviewed.

However, SKM established that in 2007 (a year of exceptionally low rainfall) Transend experienced a dramatic decrease in all loss of supply events, which has had a significant influence on the 5-year average for events > 1.0 system minutes. Although the LOS >1.0 system minutes performance for 2007 cannot be removed from the data set used to calculate Transend's performance target for this parameter going forward, as such an unusual external influence was seen to be possible, although unlikely, within the forthcoming regulatory control period, the target thus calculated was seen to expose Transend to a high level of risk, in terms of their potential to achieve such a target.

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3.4.2 Capital and operational expenditure works programs

SKM undertook an analysis of Transend's current and future capital and operational works programs to ascertain what effect potential changes to the volume of work might have on the its performance.

To do this, SKM reviewed the historical level of effect the capital and operational works programs had had on the performance parameters, and compared this with the projected effect of the capital and operational works planned for the next regulatory period. This analysis was undertaken subject to the exclusion of any contingent projects.

3.4.3 Planned capital works

OTTER introduced changes to security and planning criteria[23] in July 2006, which were subsequently incorporated into a statutory Regulation[24] in December 2007. The Regulation details the minimum transmission system performance requirements from the Transend transmission system, including the maximum load levels susceptible to a single contingency event or single asset failure, together with overall system security requirements. In addition, the Regulation specifies the maximum repair times for transmission lines, transformers and autotransformers.

It is the driver for components of the capital expenditure budget in the next regulatory period which requires substantial work at several critical 220 kV substations, potentially affecting the availability parameter for the critical circuits in the transmission system.

Transend also proposes to continue its expansion of its OPGW and in this period this will have significant impacts on the availability of 220 kV and 110 kV transmission circuits.

3.4.4 Adjustments for planned capital works

To forecast the expected circuit outage impact for each major capital project in the next regulatory period, Transend used an internal guide which estimated the standard outage duration related to different project activities. Projects were categorised as:

- transmission lines (brownfield / greenfield / small / large / new easements);
- substations (brownfield / greenfield / single bay / multiple bays);
- protection and control (single bay / multiple bays); and

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[23] OTTER Regulatory and Network Planning Panel, *Transmission Network Security and Planning Criteria - Final Report*, version 2.0, July 2006

[24] *Electricity Supply Industry (Network Performance Requirements) Regulations 2007 (S.R. 2007, No. 114)* gazetted 12 December 2007

- capacitor banks.

For each of these categories, consideration was given to the standard outages associated with:

- construction work, including foundations, structures and earthing;
- replacement, either as stringing of conductor or replacing electrical equipment; and
- cut-over and commissioning of transmission system assets.

For each capital project included in the regulatory submission, Transend estimated the impact on each of the three circuit availability parameters for each project, and aggregated the forecasts to compare with the historical capital works outage hours. The introduction of the statutory Regulation specifying transmission system performance dictated that a number of the projects for the next regulatory period addressed system security issues at a number of key 220 kV substations, the overall availability impact of the forecast capital program would have significant impacts greater than historic levels.

In reviewing this forecast, SKM examined a sample of the standard outage duration estimates, and found the estimates to be reasonable, considering that the Transend estimates are based on “working days”. SKM noted that a “day” was considered to be 24 hours. That model calculated total outage days and did not factor in weekend breaks. Neither did it attempt to optimise outages for assets being returned to service during the course of a capital project as the nature of most projects were such that this did not yield any significant savings. Transend has used this model as a guide in forecasting outages, with separate consideration of factors such as terrain, crew sizes or particular project requirements.

SKM noted that a number of comparisons have been done internally between estimates for outages based on the Transend standard outage duration model and actual outages that have been recorded for capital works, and on each occasion the estimate was found to be comparable. As a result, SKM is satisfied that the standard outage duration model provides a reasonable basis for forecasting outages for projects during the next regulatory period.

SKM noted that Transend has allowed separate provisions for protection and control work, and is of the opinion that this was prudent to do so. The historical outage data suggested that there was considerable time taken in setting up protection schemes as part of capital projects, and the allowances in the forecasts included similar provisions.

SKM considers that the Transend forecasts of the impact of its 5-year capital program are reasonable. They are not inflated to reflect concerns as to the ability to gain access to transmission system assets in a system which is significantly constrained and in which there is a large amount of outage optimisation already being undertaken.

Transend's 2 April 2008 Capital Program model predicts greater impacts on circuit availability than those experienced in the past. SKM would recommend that Transend considers proposing adjustments in setting the targets, caps and collars for its three availability sub-parameters.

3.4.5 Planned operational works

Transend has suggested that the operational maintenance regime intended to be undertaken during the next regulatory period does not require any adjustment to the proposed performance targets. The level of maintenance activity, including vegetation control, is anticipated to be similar to that during the most recent 5 years, with no major changes in asset management priorities anticipated to occur during the next regulatory period.

SKM reviewed the impact of the operating works on availability during the period 2003 - 2007, and found that a reasonably consistent allocation of outage hours for both transmission lines and transformers between 2003 and 2007 were due to asset management.

For transmission lines, the level of operating activities was reasonably consistent year-on-year over the period 2003 - 2007, averaging approximately 4,000 hours per annum.

For transformer circuits, the annual level of outages for operating activities was approximately 2,100 hours per annum, with the relative % impacts for 2006 and 2007 being lower due to a substantial increase in capital work (2006), and significant unplanned outages during 2007 (refer Table 4).

In 2006, Transend undertook transformer replacement / installation at Chapel Street, Palmerston and Triabunna, together with a number of switchgear replacements at other substations. As a result, whilst the total number of outage hours due to operating works on transformers remained fairly consistent with other years, its relative impact was lower due to the increased capital works. In 2007, there were significant outages due to faults at Port Latta and Chapel Street substations and a major forced outage at Kermandie substation.

Therefore, as SKM found that the total number of outage hours for transmission lines and transformers due to planned operational expenditure was reasonably constant over the 5 year period 2003-2007 and with the forecast program for the next regulatory period showing no significant change, SKM considered that no adjustments due to the planned operational expenditure program were required to the target, cap or collar for the three circuit availability parameters.

3.4.6 Changes to ages and ratings of assets

On 29 April 2006, Basslink commenced operation, connecting the Tasmanian transmission system to the mainland Australian electricity transmission system. Transend did not undertake any consideration of Basslink's system performance impacts in the current 2004 - 2009 revenue cap determination, as it is a relatively new asset.

Basslink is a 400kV DC electricity interconnector that allows the trade of electricity between Tasmania and mainland Australia. The interconnector is rated to transmit 500 megawatts (MW) of energy on a continuous basis in either direction and up to 630MW export from Tasmania. Basslink is intended to enhance "*… security of supply on both sides of Bass Strait; protecting Tasmania against the risk of drought-constrained energy shortages and protecting Victoria and southern states against the forecast shortage of peak load power identified in the NEMMCO Statement of Opportunities.*"[25]

SKM considered that where it could be clearly identified that Basslink had affected Transend's service performance over the current revenue control period, suitable adjustments to take account of such affects would be necessary when proposing relevant future performance targets. Any historical targets, which had been based on Transend's performance prior to the installation of Basslink, would not have included such considerations. Such adjustments are regarded to be permissible within the provisions of clause 3.3(k)(4) of the STPIS.

3.4.6.1 Impact of Basslink on system maximum demand

No increase in maximum demand was registered during 2006 when Basslink was commissioned, and that the highest system demand (ie. Tasmanian customers) experienced within the system to date is only 40MW higher than prior to the commissioning of Basslink. Generally, the system maximum demand has been at or lower than values recorded prior to Basslink beginning operation.

Trends in both System Maximum Demand and Transmission system peaks are shown in the following graphs.

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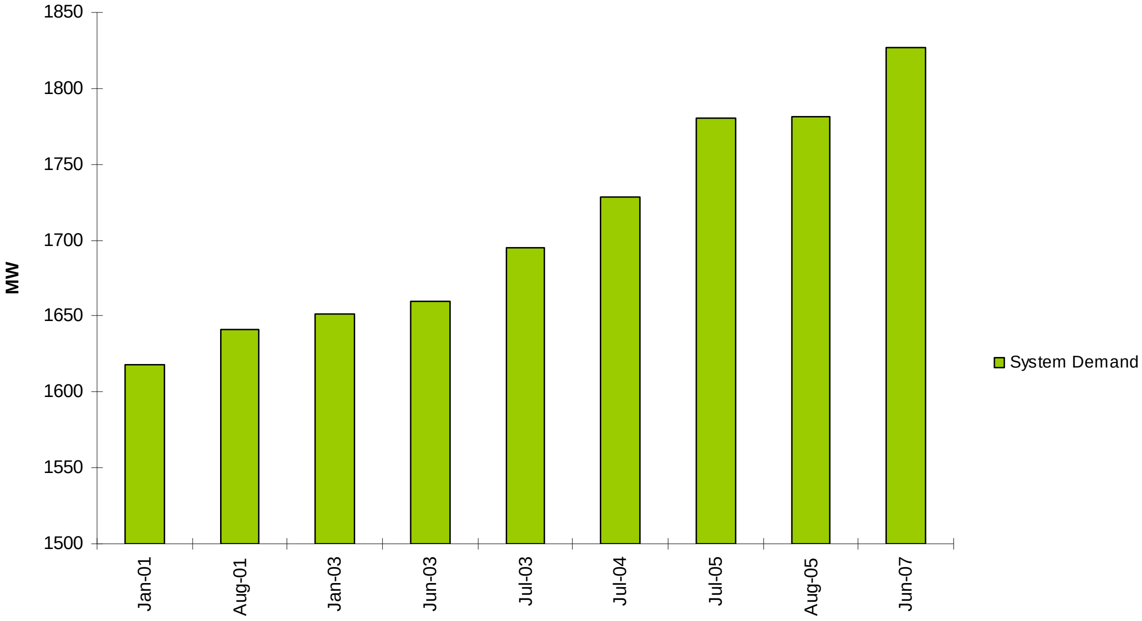
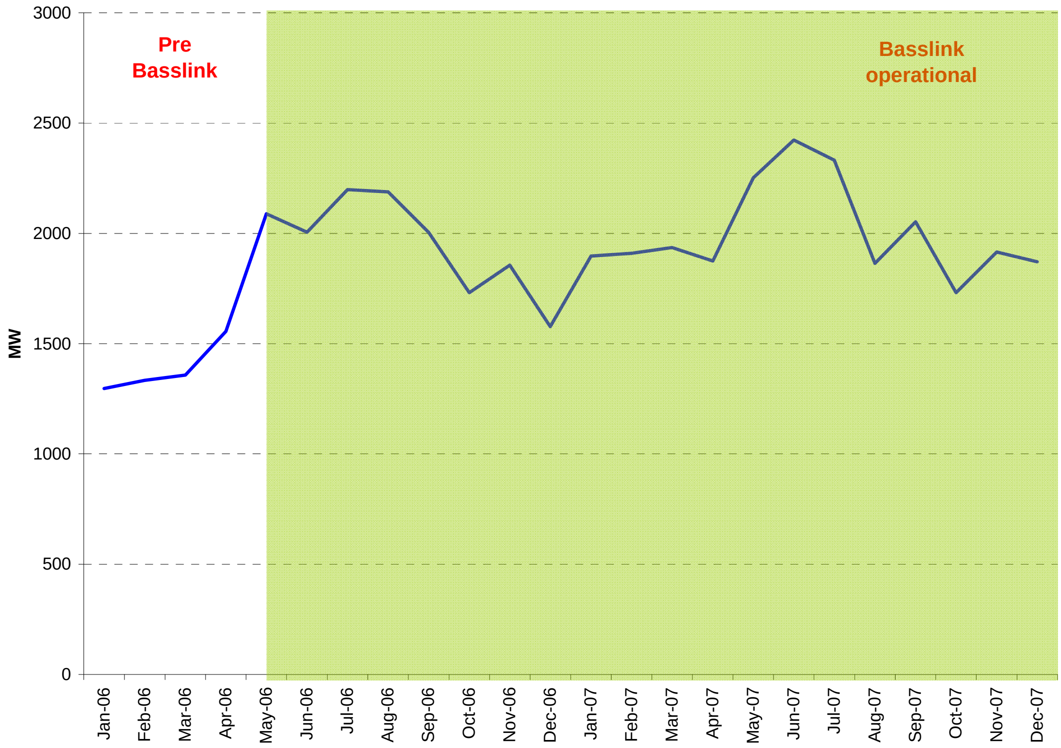
[25] Extract from Basslink website http://www.basslink.com.au

■ **Figure 4 Trend in Tasmanian System Maximum Demand since 2001**



■ **Figure 5 Transmission System Transfer Peaks**



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Whilst the highest maximum demand level experienced within the Tasmanian transmission system occurred subsequent to the introduction of Basslink in 2006, SKM is of the opinion that Basslink does not appear to have contributed to a significant change in the system maximum demand although historic patterns of system utilisation have changed significantly.

Therefore, SKM has concluded that no adjustments are justified for changes in maximum demand due to Basslink in the calculation of system minutes events for setting the targets of the LOS parameters.

3.4.6.2 Impact of Basslink on system reliability or security

During this review, SKM learnt of anecdotal evidence of an increase in the number of reported incidents of large short duration load increases on the transmission system since 2006, considered to be as a direct result of the Basslink interconnector. These increases in load are believed to be placing stress on individual pieces of transmission equipment.

For example, analysis of historical planned outages shows that in comparison to the previous five years, in 2007 Transend experienced the highest number of outages for the purpose of repairing hot joints on the 220kV transmission system.

- **Figure 6 Outages due to Hot Joints on 220kV Circuits**

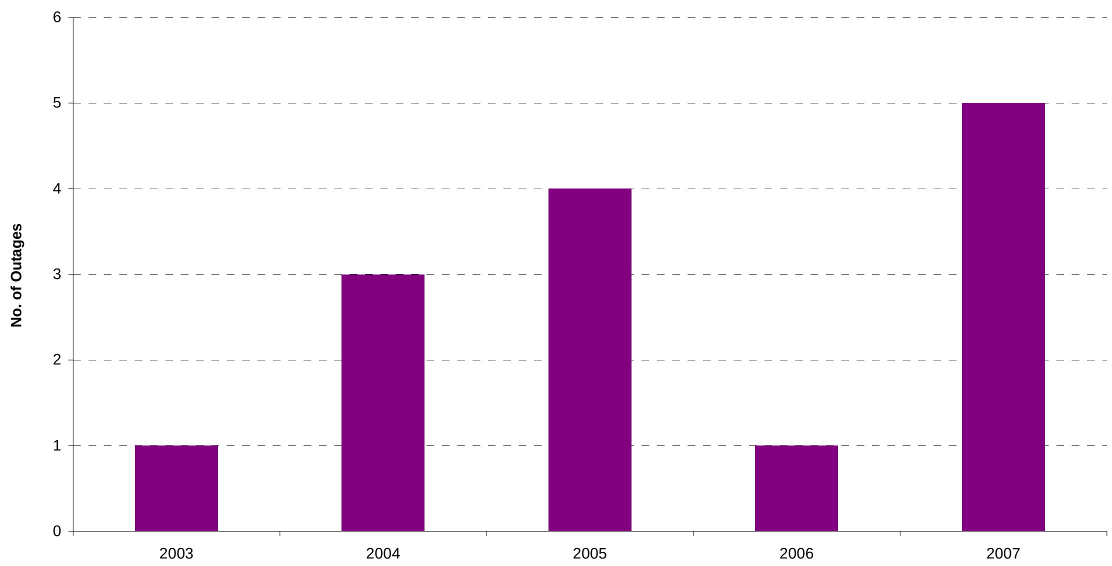

Figure 6 illustrates that in the first full year of operation for Basslink (2007), Transend experienced the highest number of hot joint repairs in the past 5 years. Compared to an annual average of 2.8

outages per year over the past 5 years, Transend had 5 outages in 2007 on 220kV transmission line circuits.

It is not unreasonable to suggest that the number of planned outages for the purposes of hot joint repairs will continue to remain higher than previously experienced, and this also has the potential to result in a small rise in the number of fault outages.

In its 2007 reliability review, the Reliability and Network Planning Panel (RNPP) assessed the impact of Basslink on the transmission system[26] as follows:

- a number of issues impacted on system reliability or security in 2006 during the initial operational period for Basslink due to commissioning matters. It is believed that these have now been addressed;
- Transend noted in its 2007 Annual Planning Report that issues remain with voltage control at George Town substation during changes in power flows over Basslink;
- noted there could be some additional risk to system security with an excessive number of Basslink trips or ongoing voltage management at George Town, although no such similar risk was considered to exist for reliability of supply;
- suggested that the experience of Basslink operation throughout the period 2006 - 07 has been such that "*… its ongoing operation is not likely to have any adverse impact on the reliability of the Tasmanian power system in the future.*"[27]

Although there is some anecdotal evidence suggesting the transmission system is under greater stress than previous years, there is presently insufficient data available to adequately quantify any effects that Basslink may have had on the transmission system since 2006, and therefore SKM has not proposed any adjustments to the availability parameter targets, caps and collars to allow for the influence of Basslink.

SKM would recommend that these potential influences, due to the existence of Basslink, on the performance of the transmission system be monitored to establish whether adjustments to performance targets are justified in future regulatory periods.

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[26] RNPP, *2007 Reliability Review - Report*,January 2008

[27] ibid, section 6.7.3, pp 59

3.4.7 Material changes to regulatory obligation

The primary material change found by SKM related to security criteria changes which apply to the Tasmanian electricity system, and which have had a significant impact on the evaluation of future capital programs. This impact has been discussed in section 3.4.4.

These changes have resulted in an expanded capital works program leading to impacts on the predicted circuit availability targets. Significant projects include the 220kV security upgrades.

4. Parameter Values

In establishing the targets, caps and collars for each parameter, clause 3.3 of the STPIS has the following provisions:

- The proposed caps and collars must be calculated by reference to the proposed performance target and using a sound methodology. Adjustments to the proposed performance target may result in adjustment to the proposed cap and collar (clause 3.3(e));
- A proposed cap and collar may result in symmetric or asymmetric incentives for the TNSP (clause 3.3(f)); and
- A proposed performance target may take the form of a performance deadband (clause 3.3(c));

In establishing the values for the parameters, SKM considered the following:

- the methodology outlined in section 3.3.2, basing any statistical analysis on the most recent 5-year historical performance;
- any clearly identifiable and justified adjustments for the planned capital and operational works programs for the next regulatory period (excluding contingent projects);
- the application of deadbands as per section 3.2.1; and
- consideration for any changes that may be applicable due to statutory legislation.

4.1 Transmission line circuit availability

The availability of transmission lines is affected by capital and operational works both on the line itself, and at substations at either end of the transmission line. This parameter has historically been essentially affected by outages due to planned work (representing 96 - 97% of total unavailable hours), rather than forced or fault reasons (refer section 2.3). This reflects the capital investment that Transend made during the past 5 years in improving the performance of the transmission system.

To satisfy the provisions of the *Electricity Supply Industry (Network Performance Requirements) Regulations 2007*[28] and the supporting RNPP network security and planning criteria[29], Transend

[28] Legislation also known as *Electricity Supply Industry (Network Performance Requirements) Regulations 2007 (S.R.2007, No. 114)*, gazetted 12 December 2007 by the Tasmanian Parliament

[29] OTTER Reliability and Network Planning Panel (RNPP), *Transmission Network Security and Planning Criteria: Final Report*, version 2.0, July 2006. This report establishes minimum network performance requirements to be used for assessment under the reliability augmentation limb of the Regulatory Test.

has identified a number of substations that will require upgrading during the next and subsequent regulatory periods[30] to meet the recommended minimum transmission system performance requirements.

The capital works program impacts of these changes in jurisdictional regulation and their outage impacts will have a flow on impact on transmission circuit availability in the next regulatory period. Historical performance and the effect of the proposed capital works program have been included in the establishment of the targets, caps and collars determined for critical and non-critical circuit availability parameters.

The AER has accepted the separation of transmission line circuit availability into critical and non-critical sub-parameters, as this was considered to be "…*consistent with the NER as it provides incentives for Transend to improve and maintain reliability on those elements of its network that are important for determining spot prices.*"[31]

4.1.1 Critical circuits

The target for this sub-parameter has been calculated on the historical performance for the nominated critical circuits between 2003 and 2007. The relatively higher target, as compared with the non-critical circuits reflects the positive impact on availability performance that Basslink has had, through the market need to have the critical circuits in service for the maximum possible amount of time.

The higher cap value compared with the non-critical lines highlights the focus Transend has had in the past capital program for improving the performance of the critical portion of the transmission system.

The deadband has been calculated in accordance with the methodology outlined in section 3.2.2.2.

Cap and collar settings using the methodology detailed in section 3.3.2 are considered to provide sufficient incentive for further performance improvement during next 5 years.

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[30] The RNPP report details a number of substations in section 9.4 that will require upgrading, but notes that, at the time of the release of the report, the market benefits test required under the Regulatory Test was still to be completed to identify the best solutions.

[31] AER, *Service target performance incentive scheme - Explanatory Statement*, November 2007, section 3.2.3, pp 15

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The capital works outage impact modelling undertaken by Transend for the 2 April 2008 Capital Program indicates a 45% increase in the outage impacts on critical circuits which will have a substantial impact on its critical circuit performance.

4.1.2 Non-critical circuits

As for the critical circuit availability, the target for the non-critical circuit availability has been calculated using the average of the most recent 5-year historical performance, with adjustment for any clearly identifiable increase in capital and operational work programs over and above the level underpinning that 5-year period.

The slightly higher target for the non-critical circuit availability is a reflection of the focus and relative impact of the recent works programs on improving the transmission system, rather than an inference as to the comparative historical transmission system performances of the non-critical transmission system elements.

The deadband has been calculated in accordance with the methodology outlined in section 3.2.2.2.

Cap and collar settings using the methodology detailed in section 3.3.2 are considered to provide sufficient incentive for further performance improvement during next 5 years.

The outage modelling on the proposed capital works program undertaken by Transend for the 2 April 2008 Capital Program indicates a 98% increase in the outage impacts on non-critical circuits which will have a significant and unavoidable impacts on its non-critical availability result.

4.2 Transformer circuit availability

In its review of the proposed STPIS parameters for the next regulatory period, the AER agreed that the transformer circuit availability parameter should be retained.

To set the target, SKM has used the transformer availability data for the most recent 5 years. There was a very heavy capital expenditure program on power transformers during 2006, including new transformers at Hadspen and Mowbray substations and replacements at Chapel Street, Palmerston, Risdon and Triabunna substations. It is expected that there will continue to be capital works on transformer circuits during the next regulatory period.

Therefore, SKM has considered the effect that this capital work may have in setting the target. It should be noted that there was an overall improvement in the performance of transformer circuit availability during the past years (refer Table 2), and the target based on historical performance for the next regulatory period would be higher than that currently used in the STPIS.

The deadband has been calculated in accordance with the methodology outlined in section 3.2.2.2.

Cap and collar settings using the methodology as described in section 3.3.2 are considered to provide sufficient incentive for further performance improvement during next 5 years.

The capital works outage impact modelling undertaken by Transend for the 2 April 2008 Capital Program indicates a 45% increase in the outage impacts on transformer circuits which will have a substantial impact on its critical circuit performance.

4.3 Loss of supply event frequency index

In the Stage 1 review[32], an analysis to determine the suitability of the existing Loss of Supply (LOS) Event Frequency targets for inclusion within Transend's forthcoming revenue control period was undertaken. This analysis concluded that threshold values of 0.1 system minutes ("x") and 1.0 system minutes ("y") be proposed for application during the next revenue control period. These threshold values were developed through careful consideration of Transend's historical improvement in performance over the current regulatory period, as well as the Transend's desire to maintain incentives for continued improvements going forward, which both SKM and Transend recognised as being in alignment with the objectives of the scheme itself. These thresholds were accepted by the AER.

4.3.1 Events > 0.1 system minutes

SKM proposes to adopt the original target, cap and collar values set by Transend in its 2003 submission, as the historical performance results during the last 5 years reflect that these parameter values provided sufficient incentive for performance improvement.

Using the methodology proposed for the deadband (refer section 3.2.1), SKM recommends using a consistent approach to setting deadband as was originally proposed by Transend in the previous regulatory submission. SKM considers that the revised deadband set by the ACCC in the 2004 - 2009 determination was too wide and recommends that the width be set according to the consistent methodology used here.

Cap and collar settings using the methodology detailed in section 3.3.2 are considered to provide sufficient incentive for further performance improvement during next 5 years.

4.3.2 Events > 1.0 system minutes

Transend demonstrated a solid performance over the past 5 years for LOS > 2.0 system minutes, consistently achieving an annual result well ahead of the target. For the period 2004 - 2007, only 1

[32] SKM, *Review of AER Service Standard Performance Incentive Scheme: Stage 1 - Standard Measures & Definitions*, September 2007

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event greater than 2.0 system minutes was recorded. As mentioned above, SKM recommended that this upper threshold be lowered to 1.0 system minutes, to allow for a meaningful target to be set, and to provide greater opportunity for performance improvement.

The historical 5-year average for 1.0 minutes threshold is 2 events. However, the 2007 result was particularly low, as unusually dry weather conditions contributed to a favourable result. The longer term average for this parameter was found to be 3 events. Therefore, SKM would propose adopting a target of 2 for this parameter, with a deadband between 2 and 3, to account for the natural variation that has been recorded and with consideration of the good 2007 operating year.

The deadband has been calculated in accordance with the methodology outlined in section 3.2.2.2.

Cap and collar settings using the methodology detailed in section 3.3.2 are considered to provide sufficient incentive for further performance improvement during next 5 years.

4.4 Average Outage Duration

This parameter was previously excluded from the Transend STPIS, and in the Stage 1 review, SKM recommended that Average Outage Duration continued to be omitted. Whilst agreeing that the annual results appeared to be highly volatile and vary significantly each year, the AER considered that " … *this parameter is still an important measure of management and operational responses to outages on* [a] *TNSP's network and Transend should report against this parameter during its next regulatory period*"[33] although it is to carry zero weighting.

SKM investigated the inherent volatility in the annual performance results for both transmission line and transformer circuits, and found that:

- the statistical nature of the historical data means there is difficulty in making valid and appropriate decisions in establishing targets, caps and collars;
- the standard deviation of the historical performance results for both transmission lines and transformers was greater than half the value of the 5-year historical average, meaning that the spread of the cap and collar values will be comparatively large compared with the annual target; and
- both data sets have very large variances, reflecting the inherent volatility in performance.

As a result, SKM has proposed a target, cap and collar value for average outage duration of transmission lines and transformers, recognising the volatility of the historical performance. The targets shown in Table 7 are the average outage durations for transmission lines and transformers

[33] ibid, section 3.2.3, pp 15

circuits over the past 5 years. As for the availability parameters, the cap and collar values have been set at the 5% and 95% cumulative probability distribution values, with a slight adjustment for the transformers sub-parameter to avoid setting an unrealistic negative cap value.

4.5 Proposed Values

Table 6 shows the current STPIS sub-parameter values, whilst Table 7 specifies the proposed targets, deadbands, caps and collars for each of the STPIS performance parameters for the next regulatory period.

Table 6 Current STPIS Values

Sub-Parameter	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transmission circuit availability	98.90%	99.10%	99.15%	99.20%	99.40%
Transformer availability	98.80%	99.00%	99.05%	99.10%	99.50%
Loss of supply > 0.1 system minutes	20	16	15	13	9
Loss of supply > 2.0 system minutes	5	3	2	2	0

Table 7 STPIS Values based on this methodology

Sub-Parameter	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transmission circuit availability (critical)	98.36%	98.94%	99.13%	99.32%	99.89%
Transmission circuit availability (non-critical)	98.54%	98.95%	98.99%	99.03%	99.43%
Transformer circuit availability	98.82%	99.23%	99.28%	99.33%	99.75%
Loss of supply > 0.1 system minutes	20	16	15	14	10
Loss of supply > 1.0 system minutes	5	3	2	2	0
Average outage duration (transmission lines)*	387	304	276	248	166
Average outage duration (transformers)*	1085	595	541	487	118

* Values to be used as basis for reporting only, as these parameters carry zero weighting in the STPIS.

In summary:

- SKM has applied the methodology described in section 3.3.2, and considers that the targets, caps and collars calculated for each parameter provides sufficient incentive for performance improvement, whilst recognising the natural variation in historical performance;
- The target for the critical availability sub-parameter is higher than the previous total circuit availability value;

- The performance improvement in the availability of transformer circuits that was achieved during 2003 - 2007 is reflected in a higher target for the next regulatory period, in line with the objectives of the STPIS;
- The target, cap and collar for the LOS > 0.1 system minutes have been amended to reflect those originally proposed by Transend in 2003. The overall performance of this parameter during the period 2003 - 2007 showed slight improvement. The longer term results suggest that the values proposed by SKM will continue to provide incentive for improvement;
- The target and deadband for the LOS > 1.0 system minutes parameter have been based on both the 5-year average 2003 - 2007, and the longer term average. The overall performance of this parameter was significantly impacted by a particularly good result in 2007, during a period of sustained drought. SKM is of the opinion that consideration has already been included for a significant performance improvement in longer system minutes outages by reducing the threshold for this parameter from 2.0 system minutes to 1.0 system minutes; and
- The targets, caps and collars have been consistently set.

5. Weightings

Clause 3.5(a) of the STPIS stipulates that within its revenue proposal, each TNSP is obligated to propose weightings that determine the proportion of revenue at risk relative to each individual performance parameter and to demonstrate how the proposed weightings are consistent with the objectives of the STPIS.

Although the scheme allows for an individual rating of zero[34], clause 3.5(e) permits the AER to reject the proposed weightings where it forms an opinion that the weightings are inconsistent with the objectives listed in clause 1.4.

Section 3.5 of the STPIS also provided the following guidance in terms of how a TNSP was to develop appropriate weightings:

(d) A TNSP must, where relevant, take the following factors into account when proposing weightings to apply to each parameter:

(1) the extent to which each parameter applying to the TNSP under this scheme provides the incentives described in clause 6A.7.4(b)(1) of the NER

(2) the availability of accurate and reliable data for determining the values for each parameter applying to the TNSP under this scheme

(3) the scope that the TNSP has to improve its performance as measured by each of the parameters that apply to it under this scheme, and

(4) the extent to which the parameters and sub-parameters applying to the TNSP under the scheme overlap.

5.1 Addressing Customer Needs

In its effort to ensure that proposed weightings within Transend's STPIS were aligned with section 3.5 of the STPIS, as listed above, as well as being assigned in a manner that was consistent with those attributes of its service performance identified as most important by the Tasmanian customer base, SKM identified a number of market survey reports that indicated which attributes of a transmission system were likely to be of most importance to its customers. SKM and Transend were in agreement that an appropriate distribution of weightings between the various parameters

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[34] STPIS, Clause 3.5(c).

SKM

and sub-parameters within Transend's performance incentive scheme would need to depict a suitable balance between aspects of system reliability and security of supply.

A 2003 Tasmanian electricity customer survey compiled on behalf of Aurora[35] indicated that *"providing a continuous power supply"*, and *"restoring power quickly after blackouts"* were seen as the most important performance based criteria for customer satisfaction.

A 2003 KPMG study commissioned by ESCOSA[36] also concluded that system reliability was the leading concern of transmission system customers, with reliability in this instance having been measured in terms of:

- frequency of sustained interruptions (planned and unplanned);
- duration of sustained interruptions (planned and unplanned);
- duration of longest interruption;
- frequency of momentary interruptions;
- frequency of planned interruptions; and
- duration of longest planned interruption.

The conclusions of these two papers contributed toward the final allocation of parameter weightings.

5.2 Weighting Allocations to Proposed Parameters

During consultations with Transend, SKM sought to assist the TNSP to propose appropriate weightings to individual parameters, taking the above factors into account, whilst considering Transend's own mandate to ensure that the various weightings have as much focus as possible on those performance measures that the TNSP's own customers have stated are of most concern or value, whilst also considering desired links to drivers of internal behavioural change, and ensuring the required performance is within Transend's control.

As the AER had already determined that in this specific case, "… *it would not be suitable to attach a financial incentive to this parameter for Transend during the next regulatory control period*",[37]

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35 Enterprise Marketing and Research Services, *Aurora Energy Customer Value Equation Research Report*, February 2003

36 http://www.escosa.sa.gov.au/webdata/resources/files/030916-PublicConsumerSurvey-KPMG.pdf

this parameter was not included in deliberations relating to weightings. The Average Outage Duration parameters were therefore assigned a zero (0) weighting.

In terms of the two remaining parameters, "Transmission Circuit Availability", and "Loss of Supply event frequency", the conclusion of the process of consultation with Transend determined that the weightings for these parameters should be assigned as illustrated in Table 8 below.

- **Table 8 Proposed Adjustments to Parameter Weightings**

Parameter	Current Weighting	Proposed Weighting
Transmission circuit availability	25%	
Transmission circuit availability (critical circuits)		20%
Transmission circuit availability (non-critical circuits)		10%
Transformer circuit availability	15%	15%
Loss of supply event frequency > 0.1 system minutes	20%	20%
Loss of supply event frequency > 1.0 system minutes		35%
Loss of supply event frequency > 2.0 system minutes	40%	
Average outage duration (transmission lines)	0%	0%*
Average outage duration (transformers)	0%	0%*
Total	**100%**	**100%**

* In the Final STPIS Decision March 2008, the AER recommended that Average Outage Duration receive a 0% weighting.

Within the "Transmission circuit availability' parameter, the new sub-parameter 'Transmission line circuit availability – critical circuits" was deemed to require a high weighting, as it was determined that providing appropriate incentives toward improving actions and behaviours that drive the service performance underlying this measure, would align with the principle of the STPIS in seeking to "*improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices*".[38]

It was also considered that Transend's service performance accountability, in terms of this specific measure, to some extent mirrored the AER's initiative to incorporate incentives based on market

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[37] AER, *Draft Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme(incorporating incentives based on the market impact of transmission congestion) Explanatory Statement*, November 2007, p15.

[38] NER, *clause 6A.7.4(b)(1)*

impacts of transmission congestion within the STPIS, to which the Tasmanian transmission system, due to a lack of appropriate data, is currently exempt.[39]

The remaining sub-parameters of "transmission line circuit availability" i.e. "transmission line circuit availability – non-critical circuits" and "transformer availability' were then assigned weightings deemed appropriate in relation to the critical circuits.

In terms of the loss of supply event frequency measures, the shorter "x" loss of supply event frequency sub-parameter, i.e. events > 0.1 system minutes, was seen by both SKM and Transend to present somewhat less scope for performance improvement within the scheme than the longer "y" measure, which was seen to be influenced by events that were more often within the TNSP control, and to which the TNSP had already displayed a significant positive contribution. Therefore under section 3.5(d)(3) of the STPIS for assigning proposed weightings , the "x" system minutes sub-parameter was seen to warrant a lesser weighting. Transend preferred to ensure that the 'x' system minutes loss of supply event frequency sub-parameter was not assigned so low a weighting as to eliminated any ability to provide incentive for potential internal improvement in this regard over the upcoming revenue proposal period.

The resulting set of weightings assigned to Transend's service performance measures, as shown in Table 8 was deemed to provide an appropriate balance between system security and reliability.

The effect of this proposal is to increase the weighting of the availability parameter from 40% to 45% of its MAR at risk and to reduce the loss of supply weighting from 60% to 55%. These weightings are recommended in the expectation that the targets will be determined for Transend are consistent with the STPIS guideline and reflect the historical performances achieved and moderated only by quantified factors.

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[39] AER, *Draft Electricity Transmission Network Service Providers - Service Target Performance Incentive Scheme(incorporating incentives based on the market impact of transmission congestion) Explanatory Statement*, November 2007, p32.

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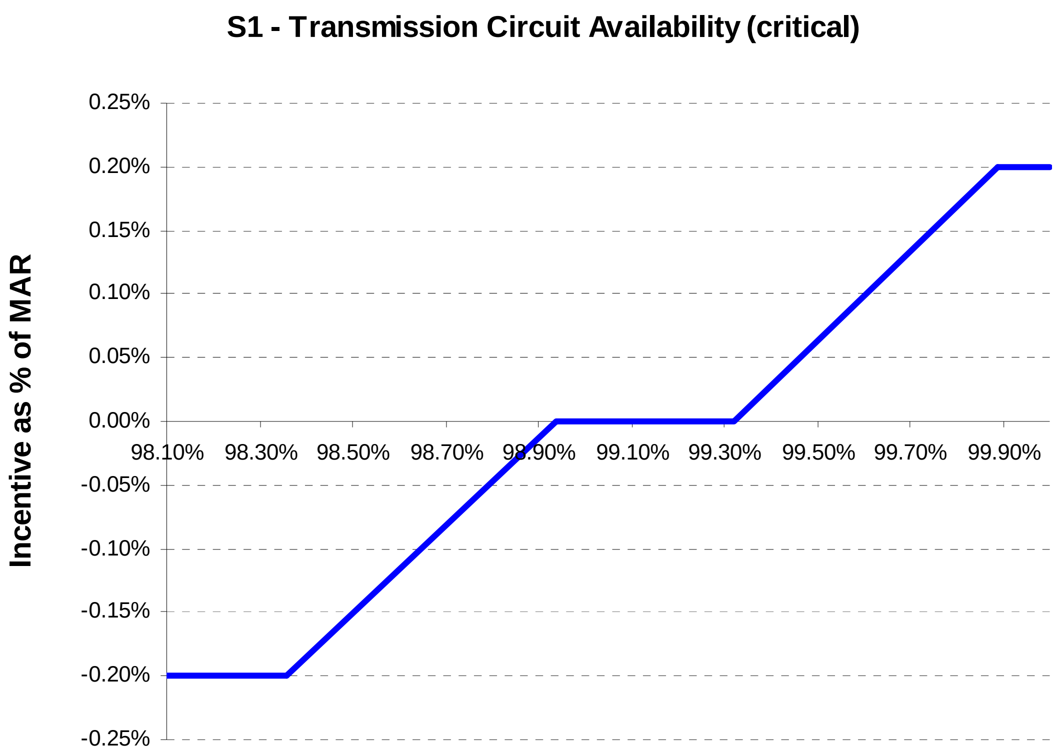
Appendix A Sub-Parameter Equations

A.1 S1 - Transmission Line Circuit Availability (critical)

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transmission line circuit availability (critical)	98.36%	98.94%	99.13%	99.32%	99.89%
Weighting	-0.20%	0.00%	0.00%	0.00%	0.20%

Performance Formulae							**Conditions**				
S-factor	=	-0.002000							Availability	<	98.36%
	=	0.344828	x	Availability	+	-0.341172	98.36%	≤	Availability	≤	98.94%
	=	0.000000					98.94%	≤	Availability	≤	99.32%
	=	0.3508777	x	Availability	+	-0.348491	99.32%	≤	Availability	≤	99.89%
	=	0.002000					99.89%	<	Availability		

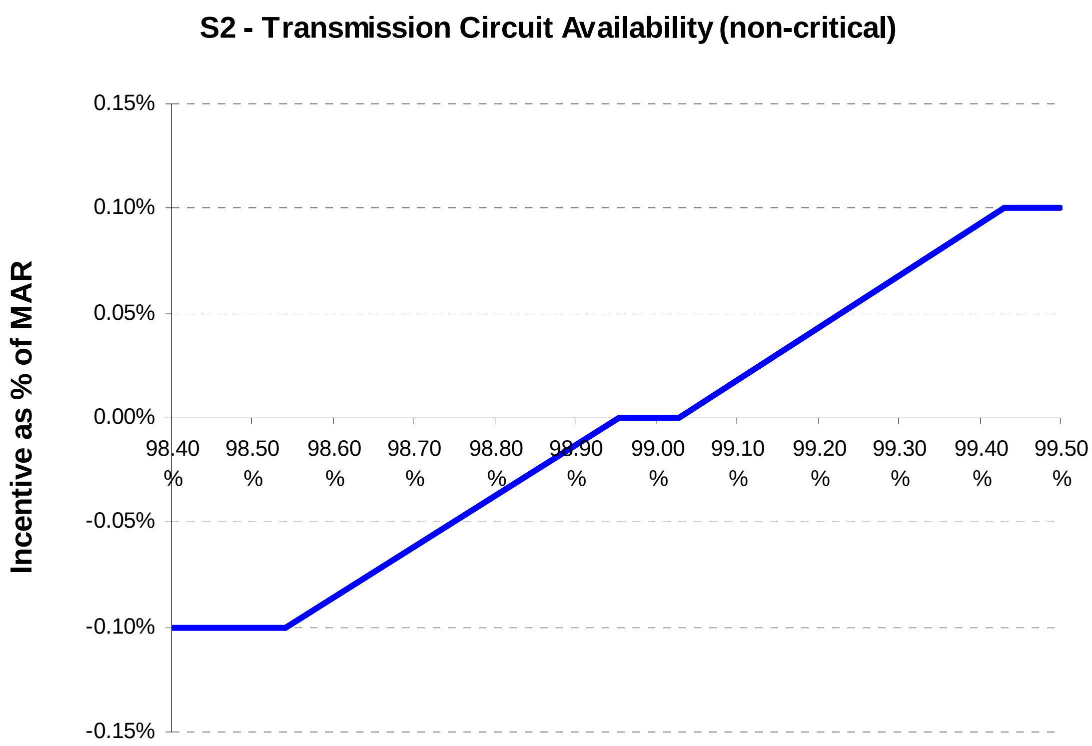


SKM

A.2 S2 - Transmission Line Circuit Availability (non-critical)

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transmission line circuit availability (non-critical)	98.54%	98.95%	98.99%	99.03%	99.43%
Weighting	-0.10%	0.00%	0.00%	0.00%	0.10%

Performance Formulae							Conditions				
S-factor	=	-0.001000							Availability	<	98.54%
	=	0.243902	x	Availability	+	-0.241341	98.54%	≤	Availability	≤	98.95%
	=	0.000000					98.95%	≤	Availability	≤	99.03%
	=	0.250000	x	Availability	+	-0.247575	99.03%	≤	Availability	≤	99.43%
	=	0.001000					99.43%	<	Availability		

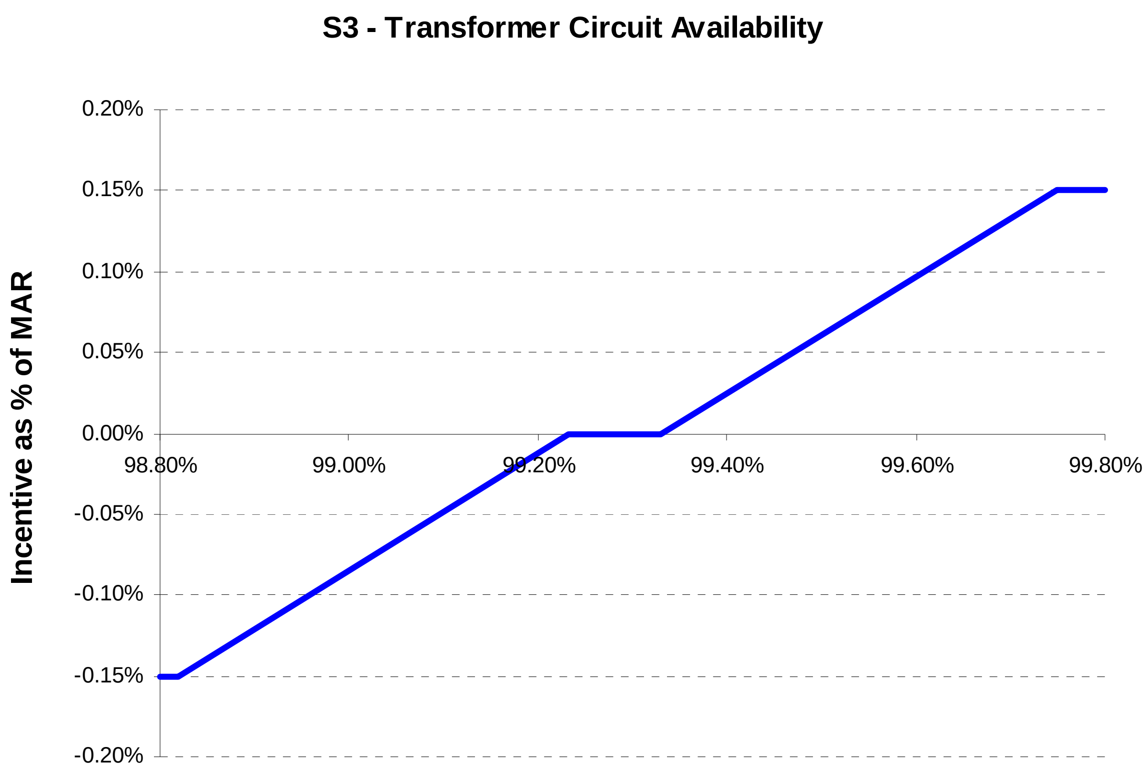


SKM

A.3 S3 - Transformer Circuit Availability

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
Transformer circuit availability	98.82%	99.23%	99.28%	99.33%	99.75%
Weighting	-0.15%	0.00%	0.00%	0.00%	0.15%

Performance Formulae							**Conditions**				
S-factor	=	-0.001500							Availability	<	98.82%
	=	0.365854	x	Availability	+	-0.363037	98.82%	≤	Availability	≤	99.23%
	=	0.000000					99.23%	≤	Availability	≤	99.33%
	=	0.357143	x	Availability	+	-0.354750	99.33%	≤	Availability	≤	99.75%
	=	0.001500					99.75%	<	Availability		

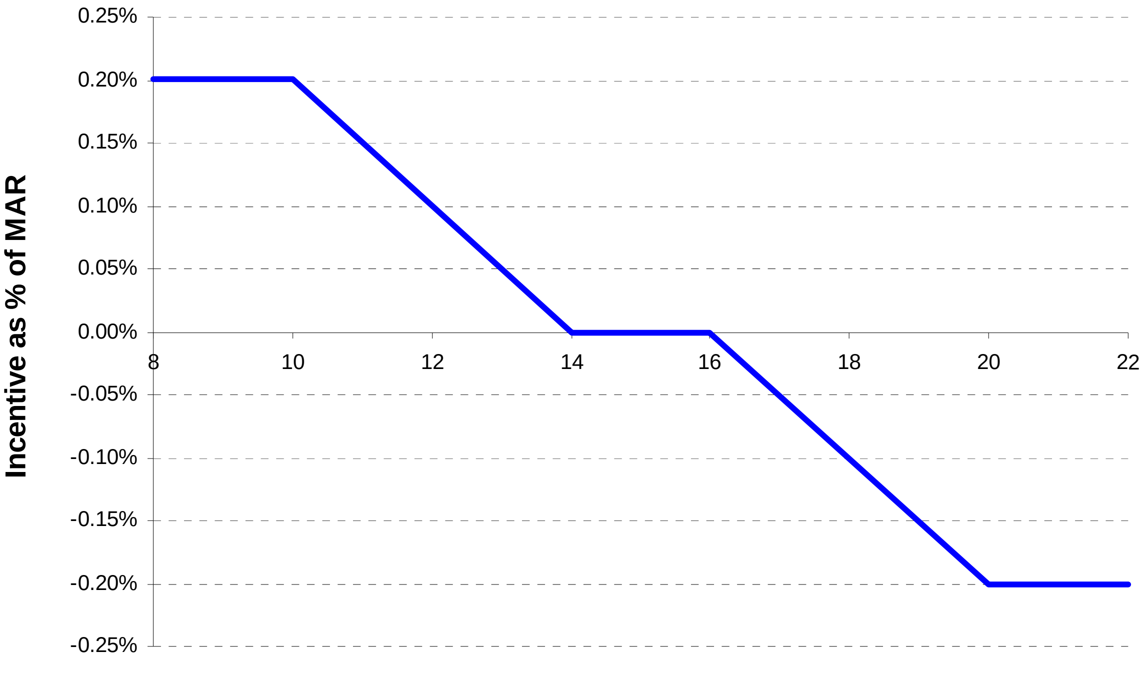


A.4 S4 - Loss of Supply Event > 0.1 system minute

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
LOS > 0.1 system minute	20	16	15	14	10
Weighting	-0.20%	0.00%	0.00%	0.00%	0.20%

Performance Formulae							Conditions				
S-factor	=	-0.002000					20	<	Availability		
	=	-0.000500	x	Availability	+	0.008000	16	≤	Availability	≤	20
	=	0.000000					14	≤	Availability	≤	16
	=	-0.000500	x	Availability	+	0.007000	10	≤	Availability	≤	14
	=	0.002000							Availability	<	10

S4 - Loss of Supply > 0.1 system minutes



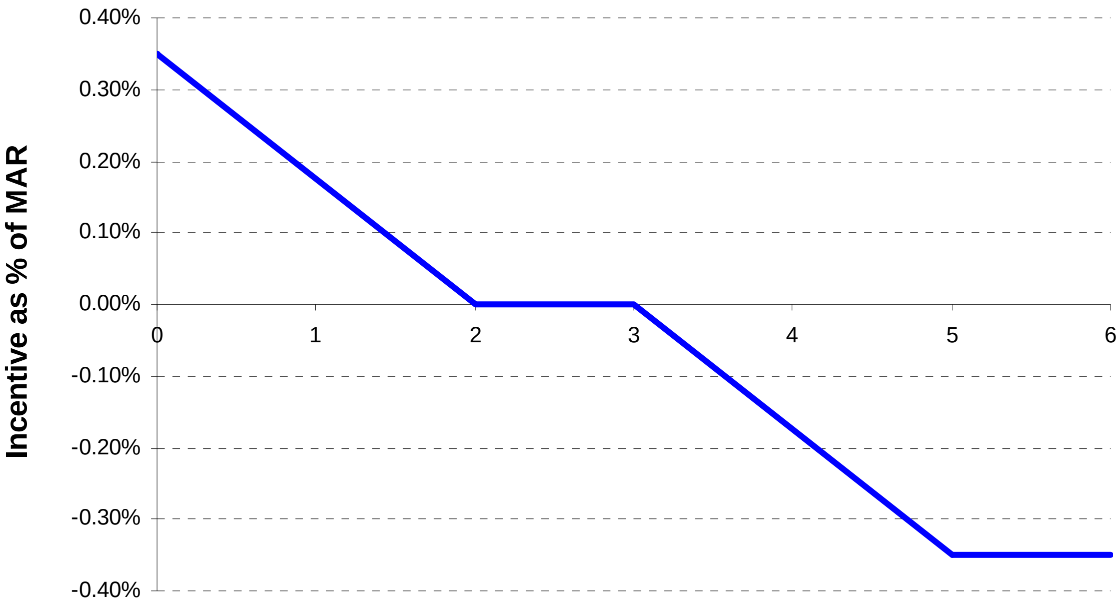
SKM

A.5 S5 - Loss of Supply Event > 1.0 system minute

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
LOS > 1.0 system minute	5	3	2	2	0
Weighting	-0.35%	0.00%	0.00%	0.00%	0.35%

Performance Formulae							**Conditions**				
S-factor	=	-0.003500					5	<	Availability		
	=	-0.001750	x	Availability	+	0.005250	3	≤	Availability	≤	5
	=	0.000000					2	≤	Availability	≤	3
	=	-0.001750	x	Availability	+	0.003500	0	≤	Availability	≤	2
	=	0.003500							Availability	=	0

S5 - Loss of Supply > 1.0 system minutes



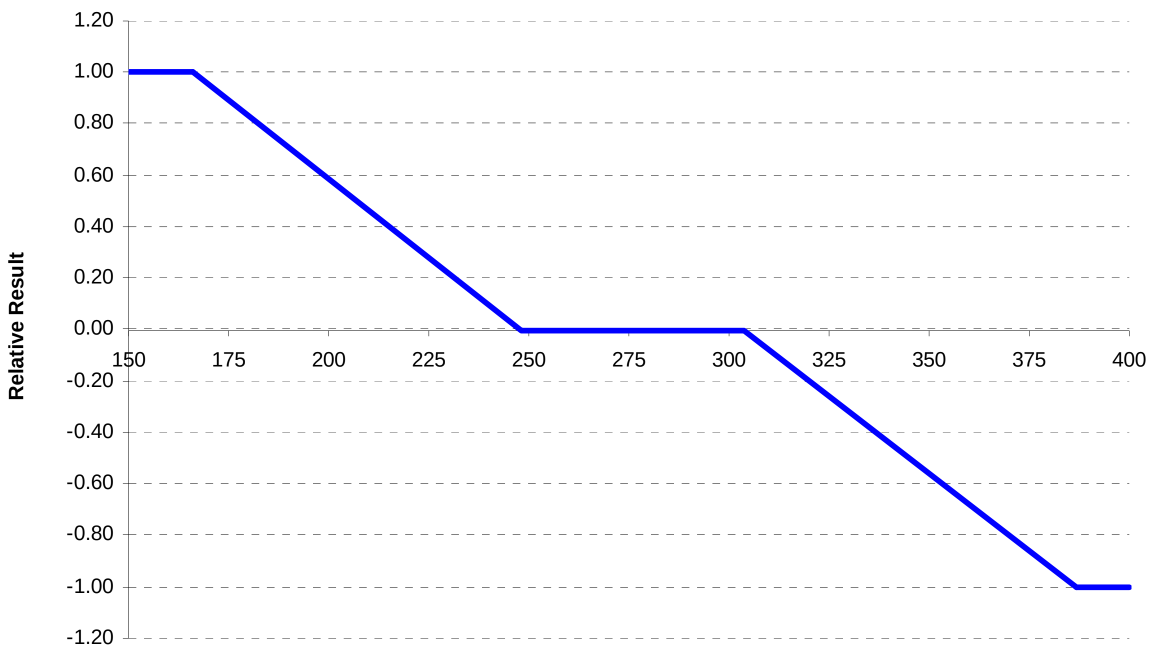
A.6 S6 - Average Outage Duration (transmission lines)

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
Average Outage Duration (transmission lines)	387	304	276	248	166
Weighting	0.00%	0.00%	0.00%	0.00%	0.00%

Performance Formulae*						**Conditions**
S-factor	=					Duration
	=		x	Duration	+	Duration
	=					Duration
	=		x	Duration	+	Duration
	=					Duration

* As this parameter has zero weighting, no performance formulae are presented.

S6 - Average Outage Duration (transmission lines)



A.7 S7 - Average Outage Duration (transformers)

Performance Target	Collar	Lower Deadband	Target	Upper Deadband	Cap
Average Outage Duration (transformers)	1085	595	541	487	118
Weighting	0.00%	0.00%	0.00%	0.00%	0.00%

Performance Formulae*					Conditions
S-factor	=				Duration
	=	x	Duration	+	Duration
	=				Duration
	=	x	Duration	+	Duration
	=				Duration

* As this parameter has zero weighting, no performance formulae are presented.