Draft Victorian Transmission Network Revenue Caps 2003-2008

Service Standards

1 November 2002

Table of Contents

Glossary

AR	Annual revenue
code	National Electricity Code
Commission	Australian Competition and Consumer Commission
MAR	Maximum allowed revenue
NECA	National Electricity Code Administrator
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
PI	Performance incentive
SKM	Sinclair Knight Merz
TNSP	Transmission Network Service Provider

1 Opening comment

The Australian Competition and Consumer Commission (Commission) released its draft Victorian revenue cap decision[1] on 14 October 2002. This paper explains the service standards proposed in Chapter 7 of the draft Victorian revenue cap decision.

This paper enables the interested parties to make written submissions on the proposed service standards prior to the Commission issuing its final decision in relation to the Victorian revenue caps.

2 Introduction

Transmission network service providers (TNSPs) provide a service and receive revenues not exceeding the maximum allowed revenue (MAR), which is determined by the Commission. Such service differs from state-to-state, usually explained by differing asset structures, topography, etc.

Under existing arrangements TNSPs do not have any incentive to improve service quality. Such an incentive would exist if TNSPs could earn more revenue for improving their service. Also under existing arrangements, TNSPs have incentives to minimise costs, as it would increase their profits. In doing so they may impose much larger costs on other market participants resulting from lower levels of service. Therefore TNSPs should have incentives not to let service quality fall.

The Commission intends to design and implement an incentive scheme to provide appropriate incentives to maintain or improve service quality for all TNSPs. This scheme will provide an incentive (or penalty) in addition to the Annual Revenue (AR) that a TNSP can earn.

The remainder of this document sets out:

- the National Electricity Code (code) requirements for the inclusion of service standards in a revenue cap decision
- the Commission's current review of transmission service standards
- SPI PowerNet's application
- VENCorp's application
- views of interested parties
- the Commission's considerations concerning service standards.

[1] ACCC, *Draft Decision Victorian Transmission Network Revenue Caps 2003-2008*, October 2002

3 Code Requirements

The code requires that the Commission establish a framework for the regulation of transmission revenues.

Clause 6.2.4(c)(2) of the code states that when the Commission sets a revenue cap it must have regard to:

- the service standards referred to in the code applicable to the regulated transmission network; and
- any other standards imposed on the network by agreement with the relevant network users.

Clause 5.2.3(b) and schedule 5.1 of the code specify the quality of supply to be achieved by the networks.

Clause 5.2.3(b) states that a network must comply with the service standards specified either in schedule 5.1 or in a connection agreement. However if a connection agreement adversely affects a third network user, then it would be superseded by schedule 5.1.

Schedule 5.1 outlines the planning, design and operating criteria that a network must achieve. The design of a network has a clear impact on its performance over time.

Schedule 5.1.1 of the code states that:

> "A Network Service Provider must:
>
> (1) fully describe the quantity and quality of network services which it agrees to provide to a person under a connection agreement in terms that apply to the connection point as well as to the transmission or distribution system as a whole; and
>
> (2) ensure that the quantity and quality of those network services are not less than could be provided to the relevant person if the national grid were planned, designed and operated in accordance with the criteria set out in this schedule S5.1.1 and recognising that levels of service will vary depending on location of the connection point in the network.
>
> To the extent that this schedule 5.1 does not contain criteria that are relevant to the description of a particular network service, the Network Service Provider must describe the network service in terms which are fair and reasonable."

The code defines 'satisfactory operating state' for the power system in clause 4.4.2. The system is in a satisfactory operating state when the service standard indicators in Schedule 5.1 are met or exceeded.

4 Review of transmission service standards

The code defines a minimum service standard that TNSPs must provide. This is to ensure the entire national electricity market (NEM) can operate in unison. These minimum (technical) standards do not give the TNSPs any incentive to provide better levels of service.

Currently the Commission is undertaking a review of transmission service standards. The purpose of the review is to develop a scheme that will provide incentives for TNSPs to consider the market impacts of their actions.

A perfect incentive scheme should match TNSPs revenue to costs or benefits on the market resulting from its actions. However, the Commission does not view that a perfect scheme is practicable at this time. The main reason is that currently there is insufficient information to establish a clear linkage between TNSP actions and resulting market outcomes.

The Commission intends to design and implement a simple, practical and effective incentive scheme. Though the review has not yet been finalised, it has progressed enough to indicate the likely outcome. The incentive scheme will have the following characteristics:

- TNSPs will be held responsible for outcomes that they can control or are the best placed to manage
- simple measures of constraints, outage times and restoration times will be used as proxy for TNSP performance
- a TNSP's benchmark will be developed using its own historical data. Where historical data is not available the Commission may:
    - use national and international TNSP data to set a benchmark
    - collect data and implement particular measures over time, which seems to be the preferred option.
- improvements upon the benchmark will result in an incentive in addition to the MAR
- reductions below the benchmark will result in a penalty that will reduce the MAR
- insubstantial improvements or reductions in service will not affect the MAR
- the expected value of the extra revenue should be zero, ie. the scheme will be revenue neutral
- maximum incentives or penalties will be small, yet sufficient to change behaviour. They are likely to be around one per cent of the total MAR.

As part of the review the Commission has engaged Sinclair Knight Merz (SKM) to make a recommendation to the Commission regarding the design and implementation of this incentive scheme. SKM has consulted with:

- market participants
- the National Electricity Market Management Company (NEMMCo)
- the National Electricity Code Administrator (NECA)
- consumer representatives
- State regulators
- extensively with TNSPs.

SKM provided the Commission with a progress report. SKM has decided on five simple indicators of a TNSP's service quality.

1. Circuit availability
2. Number of events
3. Average restoration time
4. Minutes constrained (inter-regional)
5. Minutes constrained (intra-regional)

5 SPI PowerNet's application

SPI PowerNet recognised that the Commission's current review of transmission service standards was incomplete at the time of writing its application. This review remains incomplete at the time of writing this paper.

5.1 Victoria's current arrangements

In its application SPI PowerNet included its current service standards. These arise from State regulation and a service agreement with VENCorp. The service performance arrangements have been in operation in Victoria since 1994.

SPI PowerNet's transmission license and the Victorian System Code require that it meet certain performance measures. These performance measures include:

- sustained forced outage rate for transmission lines
- mean duration of forced outages
- successful auto re-close of transient faults on transmission lines
- sustained forced outage rate for transformers

- mean duration of forced outages for transformers
- availability of equipment forming part of the transmission network
- percentage of incorrect protection system responses.

These performance measures have been aimed at measuring equipment availability. SPI PowerNet stated these measures are consistent with its primary function. These performance measures will be incorporated into the network agreement between SPI PowerNet and VENCorp.

Outside these performance benchmarks SPI PowerNet is subject to an incentive scheme depending on:

- the availability of the transmission network
- (reduction of) constraints.

SPI PowerNet and VENCorp have undertaken a review of this arrangement. Both will determine a revised scheme, which will involve estimating the cost of outages. SPI PowerNet will then pay this cost to VENCorp. This should be a saving passed on to customers.

5.2 Commission's review of transmission service standards

SPI PowerNet proposed a framework for performance regulation under the Commission's revenue cap. It acknowledged that monitoring service standards is an integral part of the revenue cap.

SPI PowerNet believes that the service standards under the revenue cap should be consistent with its service agreement with VENCorp. SPI PowerNet believes its current performance measures and availability incentive scheme will produce the outcomes the Commission desires.

SPI PowerNet anticipates that the Commission intends to introduce an incentive scheme for the Victorian network as a whole, rather than just SPI PowerNet.

6 VENCorp's application

VENCorp recognises the importance of linking the MAR with level of service. VENCorp's forecast costs assume:

- its service standards under service agreements will be maintained
- service standards of future augmentation will be consistent with existing standards.

VENCorp acknowledged the Commission's transmission service standards review. It notes that increased service standards may increase the cost of operating its business. VENCorp believes there must be consistency between the service standards it

provides under the revenue cap and the service standards that networks provide to VENCorp under service agreements.

Finally VENCorp notes it probabilistic approach to planning may impact the incentive scheme. VENCorp believes that the probabilistic approach would be the best way to ensure efficient reliability.

7 Views of interested parties

The Commission received various written submissions regarding the Victorian transmission revenue cap applications. Only Citipower made a submission regarding service standards.

Citipower noted that the Commission's transmission service standards review is the only proposal that would encapsulate service levels at distribution connection points. Citipower believe there is scope to consider the introduction of a financial incentive to reward good performance of distribution connections.

8 Commission's consideration

The Victorian regulatory framework is unique as the planning and operation functions of the transmission network are split between SPI PowerNet and VENCorp.

- SPI PowerNet owns, maintains and operates the transmission network. It is a company and its returns are paid to its shareholders.
- VENCorp is responsible for planning the network. It is a not-for-profit statutory organisation.

The service standards review is aimed at giving the incentive to TNSPs to operate the network in a fashion consistent with market outcomes. The Commission believes that it is appropriate that SPI PowerNet be given this incentive.

8.1 Consultation on the service standards incentive scheme

The Commission proposes in its draft revenue cap decision[2] that SPI PowerNet will be provided with financial incentives to maintain transmission service levels. These service standards proposed by the Commission provide insight into SKM's final recommendation to the Commission. SKM is, at the time of writing this paper, finalising its recommendations in regard to the selection of performance indicators, setting of targets, and the design of the TNSP Performance Incentive (PI) Scheme.

The Commission will seek written submissions on SKM's final report when it becomes available. The Commission believes SKM's final report will be made available in November 2002. As such, the Commission has outlined the details that

[2] ibid

SKM has made available about its recommendation. This will give SPI PowerNet, VENCorp and other interested parties the opportunity to provide a written submission on the incentive scheme in regard to this revenue cap.

The alternative was to seek submissions within the review of service standards. The timing of this alternative could have delayed the Commission's final decision in regard to the Victorian revenue caps.

8.2 Performance targets and incentives

The incentive scheme recommended is detailed and complex. However it can be explained by breaking it up into parts.

8.2.1 Indicators

SKM recommended to the Commission five basic indicators as described above. These indicators proxy the level of service provided. It is important that these indicators are defined so that each TNSP can report on a consistent basis over time. The definition of each indicator is attached in appendix 1. The specific performance indicators selected for SPI PowerNet are:

1. Circuit availability

- Peak critical circuit availability
- Peak non critical circuit availability
- Intermediate critical circuit availability
- Intermediate non critical circuit availability

2. Loss of Supply Event Frequency Index

- Frequency of events lasting more than 0.05 system minutes
- Frequency of events lasting more than 0.3 system minute

3. Average restoration time

- Lines
- Transformers

4. Minutes constrained (inter-regional)

5. Minutes constrained (intra-regional)

8.2.2 Performance targets

The performance targets recommended by SKM and the historical performance are shown in appendix 2. The historical performance was used to assess what level of service SPI PowerNet has been providing. Further they provided a reasonableness

check to ensure the performance targets were set according to what SPI PowerNet could actually deliver.

Historical information is not available for the constraint indicators (indicators 4-5). There is information available about the loss of supply frequency index. However there is low confidence in this information and for this reason no performance target could be set for this indicator.

However the Commission intends to collect this data annually during the regulatory period. Performance targets will be set for these measures when the Commission has the data to do so.

8.2.3 Financial incentives

Linking the level of service to financial incentives was done by selecting an appropriate percentage of the AR that SPI PowerNet can gain or forfeit depending on the performance it achieves. The Commission considers that a one per cent increase in the AR (per annum) would provide a large enough incentive for the TNSP to maintain or improve their current level of service. Further, a one per cent decrease in the AR would strengthen the TNSP's incentive to avoid deterioration of their current level of service.

The Commission considers that the potential loss of one per cent of its AR will not subject SPI PowerNet to extra material risk.

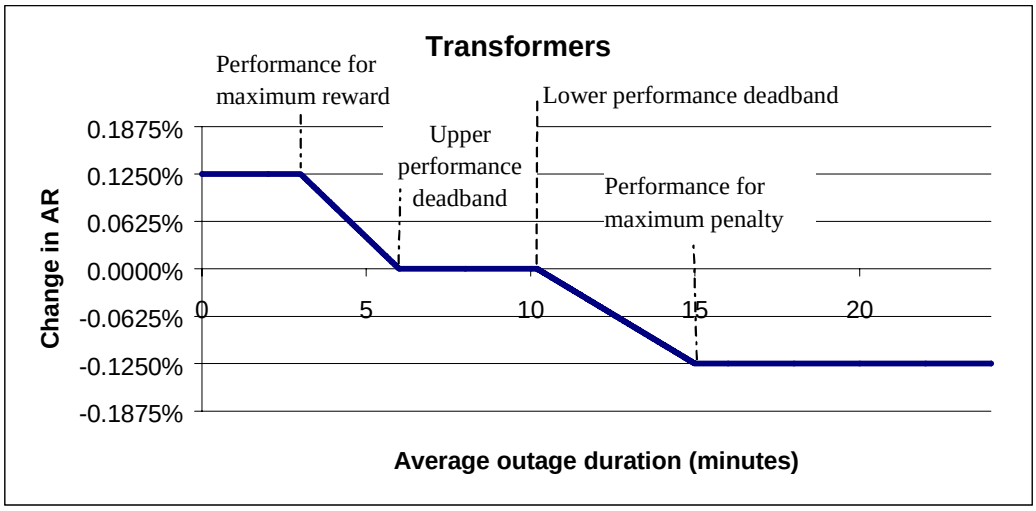
The code requires the Commission, when deciding a revenue cap, to consider existing service standards. SPI PowerNet is subject to another performance incentive scheme with VENCorp. Basically, this scheme requires SPI PowerNet to pay VENCorp when its circuit availability falls. The Commission allowed operating expenditure for SPI PowerNet to comply with this scheme.

The Commission believes that one percent of a TNSP's AR is an appropriate size incentive during the early stages of the incentive scheme. However the Commission proposes to only use half a percent of SPI PowerNet's AR as an incentive because of the similarities between the two PI schemes. Where the size of the incentive is less than half a percent the scheme would not be effective.

The size of SPI PowerNet's incentive will be increased in the future. This increase is proposed to occur at the next revenue reset.

Performance between the "Lower performance deadband" and the "Upper performance deadband" will not change the AR. Figure 1 is an example of this relationship.

Figure 1: Change in the AR due to average outage duration



Performance better than the "Performance for maximum penalty" and not as good as the "Lower performance deadband" will result in a decrease in the AR.

The inverse is true for rewards. That is performance better than the "Upper performance deadband" will result in an increase in the AR. The amount of the reward and penalty can be calculated using appendix 3. The maximum reward can be earned if performance is equal to or better than the "Performance for maximum reward".

8.3 Incorporating the penalty or reward into the MAR

The Commission requires, as part of its regulatory regime, each TNSP to report annually on its service standards according to the targets set. In the case of SPI PowerNet this will be actual performance measured by the indicators defined in Appendix 1. These indicators should be broken down into the specific categories shown in chapter 8.2.1.

The penalty/reward from this incentive scheme will lag by a little more than one year.

The MAR is calculated as follows:

$$MAR_{financial\ year} = AR_{financial\ year} + PI$$

Where:

MAR = Maximum allowed revenue for the financial year

AR = Allowed revenue for the financial year

(Appendix 4 shows the calculation of AR)

PI = Performance incentive

The PI is calculated based on the calender year rather than the regulatory/financial year. This is to allow time to gather the service standards information and calculate the MAR for the next regulatory/financial year.

The performance incentive is calculated as follows:

$$PI = AR_{\text{calender year}} \times S_{\text{calender year}}$$

Where:

AR = Annual revenue for the calender year

S = Service standards factor for the calender year

(Appendix 3 shows how to calculate 'S')

The MAR uses an AR that is based on the regulatory/financial year. For the purpose of calculating the PI the AR should be based on the calender year. In this case a time weighted average AR of the two relevant regulatory/financial years should be used.

This will result in a 1¼ year's lag between the performance measured and the PI revenue for that performance.

For example, the MAR for the first complete regulatory period (ie year ending 31 March 2004) will not include a PI component. The following regulatory/financial year (ie year ending 31 March 2005) will include the PI calculated for the first calender year (ie year ending 31 December 2003).

The PI for the final calender year within the regulatory period can be included in the first regulatory/financial year of the following regulatory period.

This calculation does not allow the effect of 'S' to be compounded into future periods. That is each annual service standards reward or penalty will only affect revenues in one year.

Appendix 1 Performance indicator definitions

Measure	**Transmission Circuit Availability**
Unit of Measure	% of total possible hours available
Source of Data	▪ TNSP outage reports and TNSP system for circuit availability
Definition/Formula	Formula: $$\frac{\text{No hours pa circuits available x 100}}{\text{Total possible no of circuit hours}}$$ Definition: The actual circuit hours available for transmission circuits divided by the total possible circuit hours available.
Exclusions	▪ Exclude unregulated transmission assets (eg. Some connection assets). ▪ Excludes connection assets ▪ Possible number of circuit hours does not exclude any outages caused by a fault or other event on a "3rd party system" eg. Intertrip signal, generator outage, customer installation. ▪ Force majeure events.
Inclusions	▪ Circuits includes overhead lines, underground cables, power transformers, phase shifting transformers, static var compensators, capacitor banks, and any other primary transmission equipment essential for the successful operation of the transmission system. ▪ Actual circuit unavailability includes outages from all causes including planned, forced and emergency events, including extreme events.

Measure	**Loss of Supply Event Frequency Index**
Unit of Measure	Number of loss of supply events per annum
Source of Data	TNSP outage reports and TNSP system for circuit availability
Definition/Formula	Number of events greater than "x" minutes per annum Number of events greater than "y" minutes per annum Where x and y are threshold values appropriate to each TNSP
Exclusions	▪ Exclude unregulated transmission assets (eg. some connection assets). ▪ Exclude any outages shown to be caused by a fault or other event on a "3rd party system" eg intertrip signal, generator outage, customer installation. ▪ Force majeure events.
Inclusions	▪ All unplanned outages exceeding the specified impact (ie. threshold values). ▪ Includes outages on all parts of the regulated transmission system. ▪ Includes extreme events.

Measure	**Average Outage Duration**
Unit of Measure	Minutes
Source of Data	TNSP Outage Reporting System
Definition/Formula	Formula: $$\frac{\textbf{Aggregate minutes duration of all unplanned outages}}{\textbf{No of events}}$$ Definition: The cumulative summation of the outage duration time for the period, divided by the number of outage events during the period.
Exclusions	▪ Planned outages. ▪ Excludes momentary interruptions (<1min). ▪ Force majeure events.
Inclusions	▪ Includes faults on all parts of the transmission system (connection assets, interconnected system assets). ▪ Includes all forced and fault outages whether or not loss of supply occurs.

Measure	Hours of Binding Constraints (Intra-regional)
Unit of Measure	Hours per annum
Source of Data	NEMMCO and TNSP
Definition/Formula	Formula: Aggregate number of hours per annum that binding constraints exist on any part of the interconnected transmission system within a region (excludes interconnectors)
Exclusions	▪ Hours of binding constraints at or near (>95%) the capacity determined by the constraint equation describing all transmission elements in service. ▪ Excludes connection assets. ▪ Hours of binding constraints where non-credible generation contingencies coincide with previously notified planned outages. ▪ Force majeure events.
Inclusions	▪ Includes binding constraints requiring "out-of-merit-order" scheduling of generation or rotational load shedding. ▪ Includes binding constraints from all causes including planned, forced and emergency events, including extreme events.

Measure	**Hours of Binding Constraints (Inter-regional)**
Unit of Measure	Hours per annum
Source of Data	NEMMCO and TNSP
Definition/Formula	Formula: Aggregate number of hours per annum that binding constraints exist on an inter-regional interconnector. Hours of binding constraints to be accumulated against "importing" TNSP.
Exclusions	▪ Hours of binding constraints at or near (>95%) the capacity determined by the constraint equation describing all transmission elements in service. ▪ Hours of binding constraints where non-credible generation contingencies coincide with previously notified planned outages. ▪ Any event which was clearly as a consequence of action or inaction of another TNSP. ▪ Force majeure events.
Inclusions	▪ Events where binding constraints occur due to unavailability of interconnector support assets. ▪ Includes binding constraints from all causes including planned, forced and emergency events, including extreme events.

Definition of Force Majeure

For the purpose of applying the service standards PI scheme to SPI PowerNet, "Force majeure events" means any event, act or circumstance or combination of events, acts and circumstances which (notwithstanding the observance of good electricity industry practice) is beyond the reasonable control of the party affected by any such event, which may include, without limitation, the following:

- Fire, lightning, explosion, flood, earthquake, storm, cyclone, action of the elements, riots, civil commotion, malicious damage, natural disaster, sabotage, act of a public enemy, act of God, war (declared or undeclared), blockage, revolution, radioactive contamination, toxic or dangerous chemical contamination or force of nature

- Action or inaction by a court, NEMMCO, Government agency (including denial, refusal or failure to grant any authorisation, despite timely best endeavour to obtain same)

- Strikes, lockouts, industrial and/or labour disputes and/or difficulties, work bans, blockades or picketing

- Acts or omissions (other than a failure to pay money) of a party other than the TNSP which party either is connected to or uses the high voltage grid or is directly connected to or uses a system for the supply of electricity which in turn is connected to the high voltage grid

- Where those acts or omissions affect the ability of the TNSP to perform its obligations under the service standard by virtue of that direct or indirect connection to or use of the high voltage grid.

Force majeure, in this occurrence, specifically includes:

- The collapse of three or more consecutive intermediate transmission towers

- loss or damage to more than one switch bay in a terminal station

- loss or damage to transformers, capacitor banks, reactors, static var compensators, or synchronous condensers, which loss or damage is not repairable on site according to normal practices.

This page was intentionally left blank

Appendix 2 Performance targets and incentives

Indicator	Historical performance					Performance for maximum penalty	Lower Deadband	Performance target	Upper Deadband	Performance for maximum reward	Weighting Factor	Maximum decrease in AR (%)	Maximum increase in AR (%)
	96/97	97/98	98/99	99/00	00/01								
Total circuit availability (%)	99.41	99.46	99.19	99.54	99.49	98.65	99.2	99.2	99.2	99.5	0.2	-0.100%	0.100%
Peak circuit critical availability	99.95	99.94	99.90	99.94	99.95	99.42	99.9	99.9	99.9	99.95	0.15	-0.075%	0.075%
Peak non-critical availability	99.93	99.90	99.75	99.97	99.96	99.53	99.85	99.85	99.85	99.95	0.05	-0.025%	0.025%
Intermediate critical availability	99.88	99.92	99.89	99.93	99.92	99.53	99.85	99.85	99.85	99.95	0.05	-0.025%	0.025%
Intermediate non-critical availability	99.74	99.81	99.89	99.77	99.93	99.49	99.75	99.75	99.75	99.85	0.05	-0.025%	0.025%
Loss of supply event frequency index													
>0.05 minutes per annum	1	2	2	2	3	N/a	N/a	N/a	N/a	N/a	0	0	0
>0.3 minutes per annum	0	0	1	1	3	N/a	N/a	N/a	N/a	N/a	0	0	0
Average outage duration (minutes)													
Lines	6.32	24.14	14.46	7.52	6.41	20	10.4	10	8	3	0.25	-0.125%	0.125%
Transformers	6.93	8.52	3.13	5.92	3.97	15	10.2	10	6	3	0.25	-0.125%	0.125%
Minutes constrained (inter-regional)	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	0	0	0
Minutes constrained (intra-regional)	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	0	0	0

Appendix 3 Equations linking performance and penalty/reward

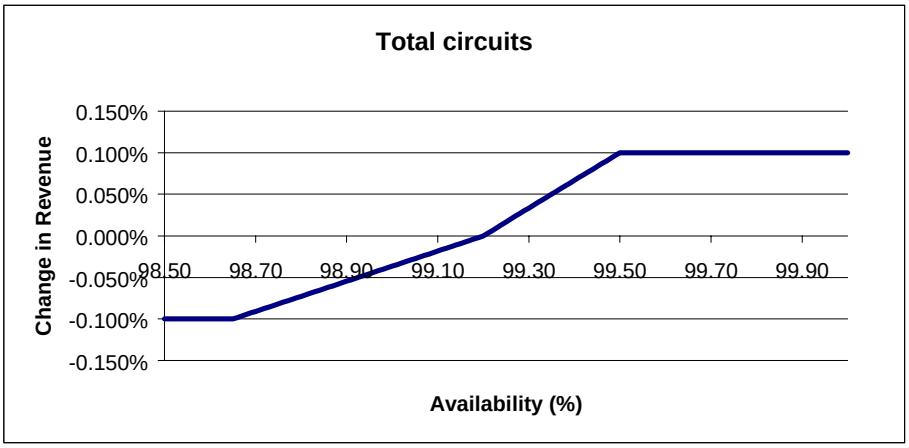
In its annual notification to the Commission of it MAR, SPI PowerNet will include its calculation of 'S'. SPI PowerNet will use the following tables to calculate 'S' at the end of each year. The Commission will audit SPI PowerNet's calculation and approve 'S', making adjustments if necessary. The total 'S' factor is equal to the sum of the individual 'S' factors for each performance target.

The 'S' factor for each performance indicator is calculated separately as per the equations below. Each equation has a graph to show the relationship between the performance indicator and the change in revenue.

The AR will be adjusted by S as indicated in the body of this document. The total 'S' will be the sum of the individual 'S' for each performance indicator.

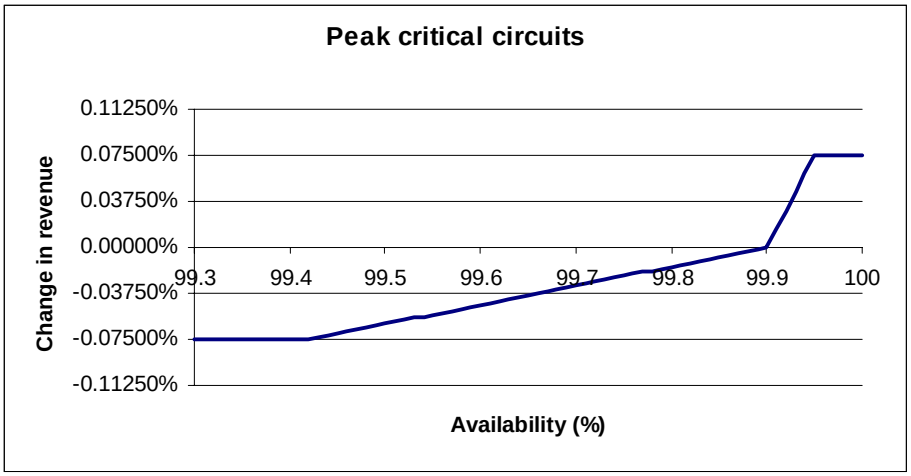
Total circuit availability (%)

							Where:					
S	=	0.00181818	x	Actual Availability	-	0.18036	98.65	≤	Actual Availability	<	99.20
S	=	0.00333333	x	Actual Availability	-	0.33067	99.20	<	Actual Availability	≤	99.50
S	=	0.00000					99.20	≤	Actual Availability	≤	99.20
S	=	-0.00100							Actual Availability	<	98.65
S	=	0.00100							Actual Availability	>	99.50



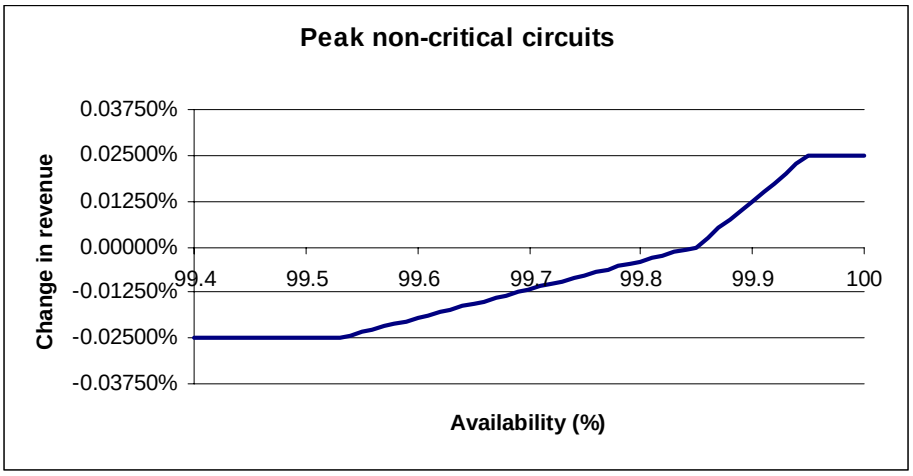
Peak circuit critical availability

							Where:					
S	=	0.00156250	x	Actual Availability	-	0.15609	99.42	≤	Actual Availability	<	99.90
S	=	0.01500000	x	Actual Availability	-	1.49850	99.90	<	Actual Availability	≤	99.95
S	=	0.00000					99.90	≤	Actual Availability	≤	99.90
S	=	-0.00075							Actual Availability	<	99.42
S	=	0.00075							Actual Availability	>	99.95



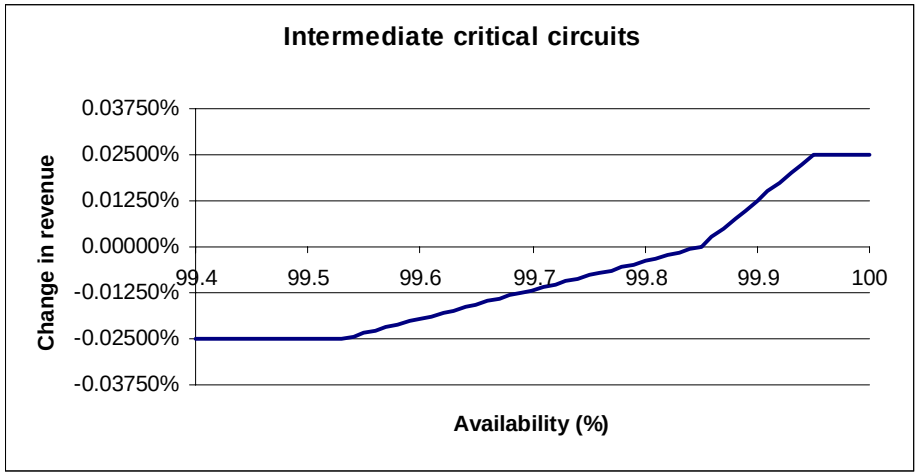
Peak non-critical availability

							Where:					
S	=	0.00078125	x	Actual Availability	-	0.07801	99.53	≤	Actual Availability	<	99.85
S	=	0.00250000	x	Actual Availability	-	0.24962	99.85	<	Actual Availability	≤	99.95
S	=	0.00000					99.85	≤	Actual Availability	≤	99.85
S	=	-0.00025							Actual Availability	<	99.53
S	=	0.00025							Actual Availability	>	99.95



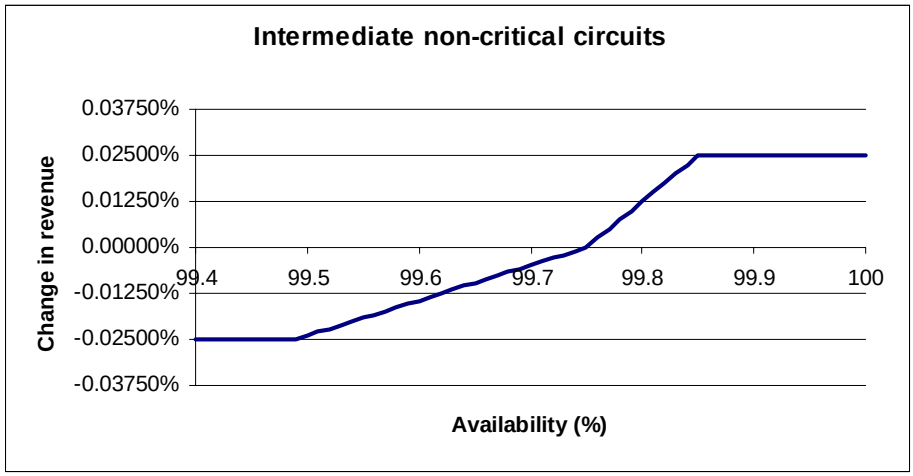
Intermediate critical availability

							Where:				
S	=	0.00078125	x	Actual Availability	-	0.07801	99.53	≤	Actual Availability	<	99.85
S	=	0.00250000	x	Actual Availability	-	0.24962	99.85	<	Actual Availability	≤	99.95
S	=	0.00000					99.85	≤	Actual Availability	≤	99.85
S	=	-0.00025							Actual Availability	<	99.53
S	=	0.00025							Actual Availability	>	99.95



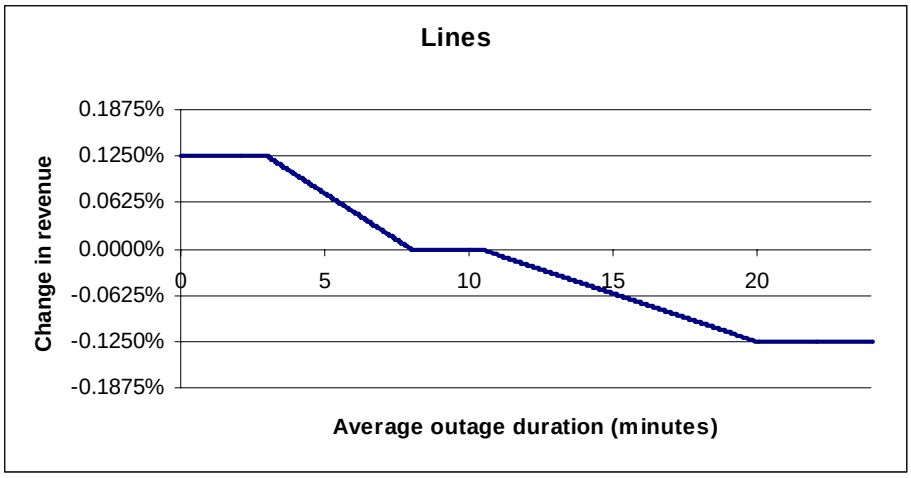
Intermediate non-critical availability

							Where:				
S	=	0.00096154	x	Actual Availability	-	0.09591	99.49	≤	Actual Availability	<	99.75
S	=	0.00250000	x	Actual Availability	-	0.24938	99.75	<	Actual Availability	≤	99.85
S	=	0.00000					99.75	≤	Actual Availability	≤	99.75
S	=	-0.00025							Actual Availability	<	99.49
S	=	0.00025							Actual Availability	>	99.85



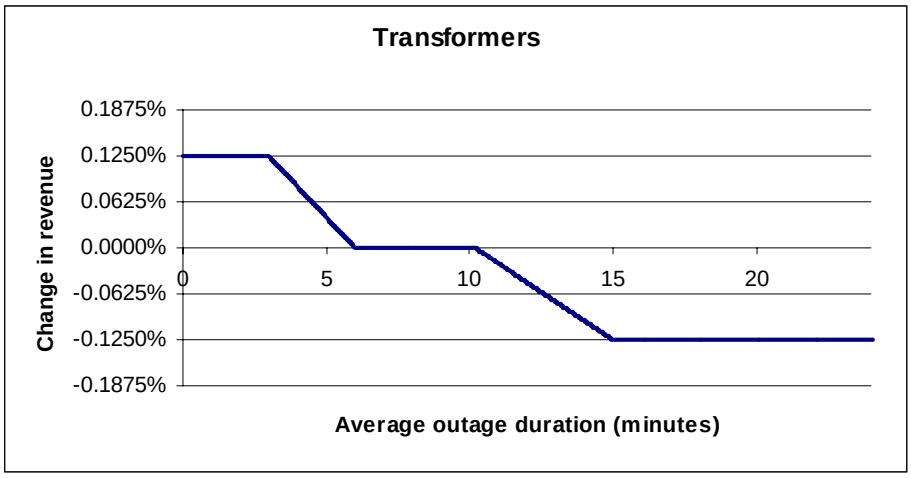
Average outage duration (mins) – Lines

						Where:				
S	=	-0.00013021	X	Average outage duration	+	0.0013542	10.40	<	Average outage duration	≤ 20.00
S	=	-0.00025000	X	Average outage duration	+	0.0020000	3.00	≤	Average outage duration	< 8.00
S	=	0.00000					8.00	≤	Average outage duration	≤ 10.40
S	=	-0.00125							Average outage duration	> 20.00
S	=	0.00125							Average outage duration	< 3.00



Average outage duration (mins) – Transformers

						Where:				
S	=	-0.00026042	X	Average outage duration	+	0.0026563	10.20	<	Average outage duration	≤ 15.00
S	=	-0.00041667	X	Average outage duration	+	0.0025000	3.00	≤	Average outage duration	< 6.00
S	=	0.00000					6.00	≤	Average outage duration	≤ 10.20
S	=	-0.00125							Average outage duration	> 15
S	=	0.00125							Average outage duration	< 3



Appendix 4 Calculation of Annual Revenue

Establishment of revenue caps and CPI-X adjustment	
Step 1.	
Decision parameters at start of period: - The regulatory asset base (A) - Post-tax WACC	Collect forecast variables for each year of the regulatory periods: - O&M (OM) - Capital expenditure (K) - Change in CPI (ΔCPI) *That is estimate:* *OM(i), K(i), ΔCPI(i), A(I) for i= 1,2,..5*
Step 2.	
Compute Target Revenues (TR) on the basis of forecasts	Sum forecast elements of cost for each year (taking into account any forecast efficiency improvements) to determine total revenue for each year: That is: *TR(i) = OM(I) + A(i)+K(i) - A(i+1)+ r* x *A(i) + Tax*
Step 3.	
Choose the revenue cap for Year 1 Usually select AR(1)=TR(1)	The chosen revenue cap that will be used as the basis for the revenue cap in the following years via the CPI-X adjustment mechanism That is: *AR(i) = AR(i-1)* x *(1+ΔCPI(I))*x*(1- X)*
Step 4.	
Calculate X	Determine the revenue caps to give same net present value as the target revenues (net of O&M) – using WACC as discount rate That is: *NPV(TR(1),..TR(5)) = NPV(R(1),…R(2))*
Step 5.	
Calculate Maximum Allowed Revenue (MAR)	Annual revenue is adjusted by a service standards performance incentive (PI) as outlined in chapter 7 That is: *MAR (i) = AR(i) + (PI)*

Adjustments At End Year I

Establish Actual Revenue Cap for Year i+1 ie AR(i+1) Given: AR(1)=R(1)	Re-apply CPI-X adjustment using CPI outcome for year just past ΔACPI (i) That is: *AR(i+1) = AR(I)* x *(1+ΔACPI(I))* x *(1- X)*

Adjust Regulatory asset base for next regulatory period

Adjust Regulatory Asset Base for changes in Actual Inflation and Actual Capex	Apply depreciation allowances for period as assessed to asset base based on actual capex