Australian Competition & Consumer Commission
Promoting Competition and Fair Trading

AUSTRALIAN COMPETITION AND CONSUMER COMMISSION (ACCC)

Transmission Network Service Provider (TNSP) - Service Standards

Final Report

MARCH 2003

SINCLAIR KNIGHT MERZ
SKM

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1. Executive Summary

Sinclair Knight Merz has been engaged by the Australian Competition and Consumer Commission (ACCC) to develop a set of service standards for Transmission Network Service Providers (TNSP's) operating in the Australian National Electricity Market (NEM).

The obligations of the ACCC, in respect of monitoring and regulating the TNSP's, are outlined in Clause 6.2 of the National Electricity Code (NEC). Further, the ACCC published on 27 May 1999, a draft "Statement of Principles for the Regulation of Transmission Revenues". This statement of principles document outlined in general terms the guidelines under which the ACCC proposed to "exercise its powers to regulate transmission revenues".

It should be noted that the various TNSP's have, or will come under the jurisdictional control of the ACCC according to the following timetable:

TNSP	Date
ElectraNet SA	01.01.2003
EnergyAustralia	01.07.1999
Powerlink	01.01.2002
SPI PowerNet/VENCORP	01.01.2003
Snowy Mountains Hydro Electricity Authority	01.07.1999
Transend Networks	Before Tasmania joins NEM
TransGrid	01.07.1999

Within the statement of principles document, specific reference was made to the issue of service standards for TNSP's. In particular, under section 7 of the summary, the ACCC noted that:

"The Commission believes that effective incentive-based regulation should include an explicit level of service, for which the TNSP has been provided by the regulators sufficient income to maintain the assets necessary to provide that level of service."

The ACCC further noted that:

"… the Commission required TNSP's to propose a single set of service standards, and proposed benchmarks for each standard, as part of their regulatory review application. The Commission will review the TNSP's application and establish a set of service standards with performance benchmarks, and a quality of service monitoring program for each TNSP under its jurisdiction."

Finally, the ACCC noted that:

"Penalties for non-performance of service standards will be developed and will be imposed during a regulatory review for a TNSP that does not, in the opinion of the Commission, maintain its service to customers at the benchmark level."

In Stage 1 of this assignment, Sinclair Knight Merz prepared a draft discussion paper (dated March 2002) which presented the results of its initial work in researching and defining an appropriate set of performance measures for TNSP's. A range of views and submissions has been made on this discussion paper, and these have been considered, and incorporated where appropriate into the refinement of the proposed measures, and their implementation.

This final report presents Sinclair Knight Merz's findings and recommendations for the design and implementation of the proposed TNSP Performance Incentive (PI) Scheme.

Sinclair Knight Merz recommends the use, initially, of five (5) performance indicators for the TNSP Performance Incentive (PI) Scheme, namely:

Measure 1 Circuit Availability (with up to 7 sub-measures)
Measure 2 Loss of Supply Event Frequency Index (2 sub measures)
Measure 3 Average Outage Duration (up to 2 sub-measures)
Measure 4 Hours Constrained – Intra-regional
Measure 5 Hours Constrained – Inter-regional

Sinclair Knight Merz recognises, in recommending these measures, that not all TNSP's currently collect and record the necessary data to enable performance against all of the measures to be monitored. In particular, information about measures 4 and 5 is only just now becoming available from NEMMCO, and there is insufficient historical data to enable meaningful target levels of performance to be set. It is SKM's view however that the lack of available and consistent data should not become the basis for dispensing with a valid and appropriate measure. We propose therefore that the necessary information and analysis systems be put in place as soon as practicable to report against the full suite of recommended measures.

Sinclair Knight Merz further recommends that a flexible approach be adopted in applying these measures to the various TNSP's, to reflect their differing statutory roles, and transmission system configurations, as well as the lack of reliable data and immature recording systems in respect of some of the measures.

Sinclair Knight Merz also recommends that more development work needs to be done within the various bodies of the Australian electricity supply industry (eg. NECA, NEMMCO, TNSP's) to agree, define and record more specific "market impact" performance measures than those included in this initial suite of measures.

The SKM recommended targets for the initial suite of performance indicators over the 5 year period of the Performance Incentive Scheme are outlined in Table 1-1.

■ Table 1-1 Initial Performance Targets

TNSP	Measure	Description	Unit	Performance Targets				
				Year 1	Year 2	Year 3	Year 4	Year 5
ElectraNet SA	1	Circuit Availability (total)	%	99.25	99.25	99.25	99.25	99.25
	2a	Loss of Supply Freq Index > 0.2 mins	No	5	5	5	5	5
	2b	Loss of Supply Freq Index > 1.0 mins	No	2	2	2	2	2
	3	Average Outage Duration	Hrs	100	100	100	100	100
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F
EnergyAustralia	1	Circuit Availability (total)	%	95.50	95.50	95.50	95.50	95.50
	2	Loss of Supply Freq Index	No	N/A	N/A	N/A	N/A	N/A
	3	Average Outage Duration	Mins	N/A	F	F	F	F
	4	Hours Constrained Intra-regional	Hrs	N/A	N/A	N/A	N/A	N/A
	5	Hours Constrained Inter-regional	Hrs	N/A	N/A	N/A	N/A	N/A
Powerlink	1a	Circuit Availability (critical)	%	97.15	97.15	97.15	97.15	97.15
	1b	Circuit Availability (non-critical)	%	97.98	97.98	97.98	97.98	97.98
	1c	Circuit Availability (peak)	%	97.45	97.45	97.45	97.45	97.45
	2a	Loss of Supply Freq Index > 0.2 mins	No	4	4	4	4	4
	2b	Loss of Supply Freq Index > 1.0 mins	No	1	1	1	1	1
	3	Average Outage Duration	Mins	800	800	800	800	800
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F
SMHEA	1	Circuit Availability (total)	%	99.50	99.50	99.50	99.50	99.50
	1a	Circuit Availability (critical)	%	99.75	99.75	99.75	99.75	99.75
	2	Loss of Supply Freq Index	No	N/A	N/A	N/A	N/A	N/A
	3	Average Outage Duration	Hrs	N/A	F	F	F	F
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F
SPI PowerNet	1	Circuit Availability (total)	%	99.20	99.20	99.20	99.20	99.20
	1a	Circuit Availability (critical) (peak)	%	99.90	99.90	99.90	99.90	99.90
	1b	Circuit Availability (non-critical) (peak)	%	99.85	99.85	99.85	99.85	99.85
	1c	Circuit Availability (critical) (inter)	%	99.85	99.85	99.85	99.85	99.85
	1d	Circuit Availability (non-critical) (inter)	%	99.75	99.75	99.75	99.75	99.75
	2a	Loss of Supply Freq Index > 0.05 mins	No	2	2	2	2	2
	2b	Loss of Supply Freq Index > 0.3 mins	No	1	1	1	1	1
	3a	Average Outage Duration (lines)	Hrs	10	10	10	10	10
	3b	Average Outage Duration (transf)	Hrs	10	10	10	10	10
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F
Transend	1a	Circuit Availability (trans lines)	%	99.05	99.05	99.05	99.05	99.05
	1b	Circuit Availability (transformers)	%	99.05	99.05	99.05	99.05	99.05
	2a	Loss of Supply Freq Index > 0.1 mins	No	15	15	15	15	15
	2b	Loss of Supply Freq Index > 2.0 mins	No	2	2	2	2	2

TNSP	Measure	Description	Unit	Performance Targets				
				Year 1	Year 2	Year 3	Year 4	Year 5
	3	Average Outage Duration	Mins	F	F	F	F	F
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F
TransGrid	1a	Circuit Availability (trans circuits)	%	99.40	99.40	99.40	99.40	99.40
	1b	Circuit Availability (transformers)	%	99.00	99.00	99.00	99.00	99.00
	1c	Circuit Availability (reactive)	%	98.50	98.50	98.50	98.50	98.50
	2a	Loss of Supply Freq Index > 0.05 mins	No	6	6	6	6	6
	2b	Loss of Supply Freq Index > 0.4 mins	No	1	1	1	1	1
	3	Average Outage Duration	Hrs	1500	1500	1500	1500	1500
	4	Hours Constrained Intra-regional	Hrs	N/A	F	F	F	F
	5	Hours Constrained Inter-regional	Hrs	N/A	F	F	F	F

Notes

1. "N/A" indicates measure is not applicable to the relevant TNSP.
2. "F" indicates measure is applicable to the relevant TNSP, but adequate data is not currently available, and it is recommended as a "future" inclusion in the Performance Incentive scheme.

The targets in Table 1-1 are SKM's best recommendation to the ACCC at this time, as it is difficult to predict what would constitute reasonable targets further into the future. Circumstances could change prior to the individual TNSP revenue cap decisions are made by the ACCC, and therefore it is recommended that the ACCC should assess the need to adopt other targets in each revenue cap decision.

The design of the TNSP Performance Incentive (PI) scheme is described in detail in Section 4 of this report, and a generic copy of the Performance Incentive Model is attached at Appendix E.

Appendix C contains a summary of the proposed measures, weighting factors and targets for each of the TNSP's, based on the information supplied to date.

2. Update on Draft Discussion Paper

The Sinclair Knight Merz draft discussion paper dated March 2002 was used as a vehicle for obtaining input and comments on the research work undertaken to that stage, and to obtain views from a range of market participants, interested parties and regulatory bodies, on an initial set of proposed performance measures.

A public forum was held in Melbourne on Thursday 28 March, at which a summary of the research, findings to date, and initial proposals, were presented. The remainder of this chapter contains information that has been updated from the draft discussion paper including more accurate views that have been expressed since 28 March, in the form of:

- meetings;
- submissions; and
- other discussions.

2.1 Deletion of "Minutes off Supply" as a Performance Measure

The appropriateness of this measure as an indicator of TNSP performance has been questioned for some time. It is however a widely used measure, both in Australia and internationally, and is still used for monitoring the performance of distribution networks. The measure was retained in the draft discussion paper, as it was the only available measure at that time that measured the direct impact of network performance end on customers.

Powerlink (Qld) has undertaken substantial statistical analysis over a long period, and have found that this measure is statistically unsound in terms of describing the underlying performance of transmission networks. SKM engaged the services of ERM Consulting Services to provide an independent expert review of the statistical soundness of "minutes off supply" as a performance measure (refer ERM report at Appendix F). ERM confirmed Powerlink's view that the measure was unsound, but recommended that it be deleted as a measure, only if an alternative measure which directly measures the impact of network performance on end-customer reliability. This has been achieved by the inclusion of the measure "Loss of Supply Event Frequency Index".

"Minutes off supply" has therefore been replaced with the alternative measure "Loss of Supply Event Frequency Index" although it should be noted that historical performance against this measure is not available for all TNSP's and it is not proposed for universal application to all TNSP's until greater confidence can be gained in its measurement and application.

2.2 Consultation Process

An initial project briefing session was held at the ACCC offices in Canberra on Monday 3 December 2001, at which the views and opinions of TNSP representatives were sought regarding this project. A survey questionnaire was designed to obtain information about any existing system performance monitoring programmes and data available within the TNSP's, or reported to the existing State based regulators. Each TNSP was requested to provide performance data from the past 5 years (if available).

In addition, a questionnaire was distributed to other interested stakeholders in the National Electricity Market including NEMMCO, NECA and State based regulators. This provided the opportunity for comment on service standards considered appropriate by each, covering both system performance and market impact measures.

After the submissions were received, individual one-on-one interviews were conducted by Sinclair Knight Merz staff with each TNSP and regulatory authority. These offered the opportunity to further understand any particular opinions or issues that were raised in their submission. These interviews highlighted any unique circumstances that were considered to apply to each TNSP, together with identifying any concerns that they may have regarding the design and implementation of the TNSP performance incentive scheme.

The Draft Stage 1 Discussion Paper was presented and discussed at a public forum on 28 March 2002.

Subsequent to the public forum in Melbourne on 28 March 2002, further meetings and discussions have been held with various consumer representative groups, and a number of State based regulatory bodies. As a result of these further discussions, a number of additional views and issues have been received and considered, along with clarified positions of some of the state-based regulatory bodies.

SKM has given due consideration to all of these additional views and positions, and wherever possible incorporated them into the design of the TNSP Performance Incentive (PI) Scheme.

A summary of the consultation process that has preceded this final report is attached at Appendix G.

2.2.1 Independent Pricing and Regulatory Tribunal (IPART, NSW)

IPART's position on service standards for networks businesses is outlined below.

Discussions with IPART predominantly centred on their view of the general role of incentive schemes for service/reliability improvement, and particularly as it applies to distribution, rather than transmission, since IPART have no jurisdictional responsibility for TransGrid, or transmission.

In reporting the performance of EnergyAustralia, IPART use the following measures:

- System Average Interruption Duration Index (SAIDI)
- System Average Interruption Frequency Index (SAIFI)
- Customer Average Interruption Duration Index (CAIDI)
- Transmission Circuit Availability

IPART do not currently apply a financial incentive scheme against performance measures for the distribution companies in NSW. IPART will be considering this for their next pricing review and have outlined the process per timetable for consideration of these issues.

IPART also made mention of a new study proposed to be undertaken by the distributors in NSW. This study commissioned by NSW Treasury, on behalf of the DNSP's, is designed to quantify the customer's "willingness to pay" for improved reliability and quality of supply. The study is in an embryonic stage, and is not considered further in this report.

2.2.2 Essential Services Commission (Victoria)

In Victoria, the Essential Services Commission (ESC) and its predecessor the Office of the Regulator-General regulated TNSPs prior to 1 January 2001. Since that date, the ESC has retained much of its regulatory framework as a transitional arrangement pending the ACCC fully taking up its role.

The structure of the Electricity Industry in Victoria is different to that adopted in other states of Australia in that the governing legislation, the Electricity Industry Act 2000, provides that the responsibility for planning and augmenting the shared transmission system lies with a state government corporation (VENCorp), rather than with the TNSP who owns the assets. In addition, the electricity distribution businesses are responsible for planning and augmenting transmission connection assets within terminal stations. Thus, some aspects of transmission service standards may apply across VENCorp Distribution Businesses and another TNSP in their roles as planner and asset owner respectively.

Major new works are undertaken on a build, own and operate basis. Thus, while the majority of the transmission system is owned by a single TNSP (SPI PowerNet), there are two other TNSP's who own small portions of the transmission system.

All TNSP's are licensed or exempted from holding a licence by the ESC. The licence provided to SPI PowerNet sets out an obligation to connect customers, to provide information to VENCorp and to meet certain service standards as set out in the Electricity System Code.

The ESC supports the work being undertaken by ACCC in establishing common service standards across NEM jurisdictions and expects that it will be able to remove licence and code provisions relating to TNSP service standards when similar provisions are included in the National Electricity Code.

In addition, TNSP's licences require that they enter into an agreement with VENCorp regarding their provision of transmission services. The ESC understands that these commercial agreements also contain service standards and financial penalties that may be impacted by any proposed new service standard incentive scheme that might be established under the National Electricity Code.

2.2.3 SAIIR

SAIIR monitors and reports on the performance of all sectors of the electricity industry in South Australia. SAIIR previously had in place a performance incentive scheme (the PI scheme) with financial bonuses/penalties on ElectraNet SA, based on the following three measures:

- Operating and maintenance costs ($/kW of maximum demand);
- System minutes off supply; and
- Number of supply interruptions.

In addition to the above three measures, SAIIR also reported on ElectraNet's performance in respect of:

- Response times to written enquiries;
- Transmission circuit availability; and
- Transmission circuit services availability.

Results against these measures were not included in the financial incentives.

It should be noted that the "minutes off supply" reported to SAIIR was not the total minutes off supply caused by outages on the transmission system. In the case of "SAIIR minutes off supply", outages on ElectraNet's connection points that were supplied by a single radial circuit (ie. Category 1 Connection Points, SA Transmission Code) were not included.

SAIIR issued a discussion paper titled "Transmission Line Performance in South Australia and the SA Transmission Code" in December 2001, which stated, in part:
"This discussion paper has been prepared by the South Australia Independent Industry Regulator (SAIIR) to provide a basis for consulting on possible changes to the SAIIR Transmission Code and in particular the performance incentive scheme (PI scheme) within the Transmission Code. The paper also reviews the changing role of the SAIIR in relation to the PI scheme and the current and future role of the Australian Competition and Consumer Commission (ACCC) in transmission pricing and associated performance incentives."

No final report was issued from this Discussion Paper, as it was agreed by the ACCC and SAIIR to delete references to the SAIIR Incentive Scheme for ElectraNet from the SA Transmission Code, and that ElectraNet would become subject to the ACCC Performance Incentive Scheme based on the measures proposed by SKM. However, it should be noted that the SA Transmission Code will continue to prescribe performance standards for particular load categories, which are generally recognised as appropriate and clearly define the performance standards required at these exit points.

2.2.4 OTTER

Transend has a licence under the Electricity Supply Industry Act 1995 to operate the main transmission system in Tasmania. Under the Tasmanian Electricity Code (TEC), Transend is obliged to report to the Regulator annually, principally against targets for service included in the management plans (compliance plan, asset management plan and service plan). There is no financial incentive scheme in place to reward improved performance or penalise poor performance.

The three primary measures used are:

- Percentage of unserved energy.
- Transmission circuit availability.
- System minutes off supply.

The management plans set targets for each service measure, and OTTER have noted in their 2000-2001 report the annual volatility, particularly in the measures "% of unserved energy" and "system minutes off supply". They attribute this volatility, at least in part to "the nature of Transend's transmission network which includes assets down to 6.6 kV", and the impact of "single significant incidents, particularly on radial lines or weakly "meshed" parts of the network".

It should also be noted that Transend's reported "minutes off supply" include outages on network and connection assets operating across a wide range of voltage levels (220 kV, 110 kV, 88 kV, 44 kV, 33 kV, 6.6 kV). This situation is unique to Tasmania, and inflates the reported "minutes off supply" substantially above what would normally be expected for a TNSP.

A Reliability and Network Planning Panel (RNPP) has been established by OTTER in accordance with the TEC. The RNPP has a brief to determine power system security and reliability standards, report on the performance of the industry in terms of reliability of the power system and review network augmentation proposals. It has set standards for frequency control and capacity reserves. A review is underway to determine what performance targets and / or standards should be set for power system operation and network services, but believe that the separation of price setting and the setting of performance targets / standards involves significant regulatory risk.

OTTER acknowledges that transmission price control will come under ACCC jurisdiction, effective 1 January 2004, however they are not clear on the ACCC's approach to setting performance targets / standards. OTTER is also conscious of the equity issue of whether the costs of higher reliability would have to be borne mainly by those who do not attribute higher value on a level of reliability higher than what they currently have.

2.2.5 QCA

The Queensland Competition Authority saw no particular regulatory overlap or conflict with the TNSP Service Standards project. In particular they observed that the TNSP Service Standards project did not seek to apply performance standards to either Energex or Ergon Energy, the two distributors that come under the QCA's regulatory responsibility.

They do recognise the issues and trade-offs associated with the total regulatory contract involving quality, service and price.

In the initial regulatory period for both Energex and Ergon Energy, QCA made allowance for some unspecified improvement of system reliability, quality of supply, and service quality in setting the efficiency factor to be applied to operating and maintenance costs. In its Final Determination, the QCA indicated it would investigate options to incorporate an incentive-based service quality regime in the next regulatory period commencing 2004/2005. QCA made reference to work of the Steering Committee on National Regulatory Reporting Requirements.

2.2.6 SCNRRR

The Steering Committee on National Regulatory Reporting Requirements established a working group, the Quality of Supply working group, to review and compare the measures of network service quality currently used by State based regulators, and to develop performance measures that can be collected on a consistent and reliable basis across the jurisdictions.

These measures related to the performance of distribution networks managed by any Distribution Network Service Provider (DNSP), but are restricted to grid connected DNSP networks including remote and long rural networks.

The Utilities Regulators Forum (URF) approved the final report on 22 March 2002. We have found that there is little relevance between the performance measures contained in their report and the performance measures recommended for the TNSP Service Standards.

2.2.7 Meeting with Consumer Group Representatives

A number of representatives from various consumer groups were invited to a recountable meeting with ACCC and SKM representatives in Melbourne on 7 May 2002. The organisations included Energy Action Group (EAG), Energy Users Association (EUA), Consumer Law Centre (CLC), and Energy Management and Procurement Services. Unfortunately, not all organisations were able to attend the meeting, however valuable discussions and input into the TNSP service standards project did occur.

The views of the representatives were sought on the findings and recommendations of the SKM draft discussion paper of March 2002, as well as a broader range of service standard issues, as seen from the consumer's perspective. A summary of the main points that emerged from the meeting is contained in Appendix H.

2.3 Written Submissions

A number of written submissions have been received on the draft discussion paper, and more generally on the TNSP Performance Incentive (PI) Scheme, and these have all been considered in finalising our recommendations on the design and implementation of the PI scheme. These included written submissions from:

- Powerlink
- Southern Hydro
- TransGrid
- Snowy Hydro

3. Selection of Performance Measures

3.1 Process

The process followed for the selection of the performance measures closely followed the Terms of Reference for the consultancy and can broadly be described as follows:

- Assess appropriateness of Service Standards outlined in Annex 8.1 of Draft Regulatory Principles (ACCC document dated 27 May 1999).
- Consider existing studies being undertaken by NECA and the jurisdictional regulators Steering Committee on National Reporting Requirements.
- Review and analyse service standards used internationally (particularly US, UK and NZ) and advise on the applicability of such service standards within the NEM.
- Propose a set of service standards and benchmarks suitable for regulatory purposes.
- Advise on performance indicators for interconnector availability and market based outcomes. Consider also the NECA review into the scope for integrating the energy market and network services.
- Identify current statutory obligations imposed by licensing authorities on the transmission networks, and incorporate these into the service standards. Consider also current reporting requirements associated with service standards in developing reporting guidelines.
- Develop options for providing appropriate commercial incentives for TNSP's to meet agreed service standards. Focus should be on adjustments to the regulatory revenue cap equation developed for each TNSP at the revenue reset carried out in accordance with Chapter 6 of the Code.

3.2 Range of Performance Measures

In following this process, Sinclair Knight Merz identified and researched a total of seventy (70) potential performance measures that are used by either Australian TNSP's, or their international counterparts (refer Appendix D). Many of these measures were specific or unique to particular companies or countries, or were used to monitor performance in electricity markets where the role of the TNSP's is different to that of the TNSP's in Australia. Care therefore needs to be exercised, both in selecting the appropriate measures, and in interpreting the relevance of international benchmark performance.

As an example of this, one measure used by National Grid in the UK is "Annual total of sustained under/over voltage excursions pa". This measure would not be appropriate to measure the performance of TNSP's in Australia because of the separation of functions between the TNSP's (asset owner/manager) and NEMMCO (system operator).

A further example of international differences occurs when one considers the comparison between actual levels of performance against the measure "transmission circuit availability". Even though this measure is the most commonly used performance indicator of transmission system performance internationally, there are differences in the definitions used to calculate the indicator, and even where the definition is the same, different actual results can be misleading. Comparison of the performance of Australian TNSP's on this measure indicates results ranging between 98.96% and 99.71%. In contrast, the published statistics for National Grid in the UK vary from 95.80% to 96.30%. Superficially it would appear, based on this measure alone, that the performance of the UK transmission system is inferior to the Australian system. This is not the case however, as the system security criteria for the majority of the UK is based on an N-2 principle, whereas parts of the Australian transmission system (particularly those parts supplying transmission exit points in regional centres) is based on an N-1 criteria. NEMMCO manage the interconnected transmission network based on an "N-1 secure" criteria.

The most plausible explanation for the "circuit availability" in the UK being some 2.0 to 3.0% lower than in Australia is that the higher level of system security enables circuits to be taken out for planned maintenance purposes more frequently, and for longer periods of time, without seriously impacting supply availability or market conditions.

3.3 High Level Principles

In terms of selecting, defining and refining the measures to be used in the TNSP Performance Incentive Scheme, several discussions and meetings were held with the TNSP's which led to the development of a set of high level principles that were to be used in formulating and applying the measures. These high level principles are:

Principle 1 – Sound Accountability Regime

This principle requires that a TNSP should only be accountable for outcomes that it can control, or which it is best placed to manage.

It is noted that although a TNSP cannot directly control the impacts of weather, lightning strikes etc it is in the best position to assess the likely impacts of these elements on its system and to take the necessary design decisions, and operational actions to minimise the impacts.

Principle 2 – Recognition of Individual TNSP Accountabilities and Limits on "Powers to Act"

Performance measures must reflect structural differences between jurisdictions and relative "powers to act" such as planning powers.

Principle 3 – Commensurate Rewards for New Risks and Costs

Performance measures, standards and incentives must only be applied once there has been explicit consideration of the cost and risk impacts on revenue caps.

Principle 4 – Emphasis Should be on Providing Positive Incentives

Performance incentives must be positive and not punitive. The NEC identifies that the regulatory regime to apply to TNSP's is to be "incentive based". TNSP's believe that this concept aims to encourage TNSP's to be innovative in their business operations to improve performance and reduce costs that will ultimately provide economic benefit to the market as a whole. Accordingly, financial performance incentives in the service standards regime should provide positive incentives by allowing the TNSP to earn additional revenue over and above the revenue caps.

The ACCC view is that performance incentives should have a balance between providing rewards for good performance, and substantial incentives for improvement where performance is below standard.

Principle 5 – Statistical Soundness

Performance measures must be statistically sound. Many networks performance measures exhibit a statistical distribution that is not consistent with using the mean or median values as a simple target for a single year. For these measures, statistical approaches applicable to small populations and rare events must be applied to identify appropriate norms and acceptable variances.

While it is recognised that there is an element of variability of any measure that may be adopted, this variability should not be so great as to overshadow the underlying level of performance being delivered by the TNSP.

Principle 6 – Auditable Measures

Any performance parameters should be relatively easy to measure, and be relatively easy to "check measure". However, simplicity should not be given preference over the fundamental issues.

Principle 7 – Alignment with Desired Outcomes

The performance targets should be carefully aligned with the desired outcomes. This requires the definition of desired outcomes as a first step.

Principle 8 – Key Measures

Measures must be significant in achieving desired outcomes, and preferably be few in number. This principle imposes disciplined consideration of the relative importance of each measure to achieving desired outcomes to ensure maximum effectiveness.

Principle 9 – Legal Context

Service standards must mesh coherently with other legal and regulatory requirements applying to TNSP's and the ACCC.

These high level principles, while describing the desirable features of the performance measures to be selected, and the overall characteristic of the PI scheme, also needed to be considered in the broader context of implementing a scheme that monitors both the technical performance of the transmission network, and the impact of that performance on the NEM.

3.4 Performance Measure Selection Matrix

The attached Appendix A summarises the process and outcome of the various considerations that went in to determining the basis of the selection of the five (5) performance measures finally recommended by Sinclair Knight Merz. This matrix covers consideration such as:

- Whether the measure is a network measure, or a measure of customer/market impact.
- The extent of use of the measure nationally and internationally.

- Whether benchmark performance information is available nationally/ internationally.
- The general level of compliance with the nine (9) high level principles.
- The availability of reliable performance data for each measure within the Australian TNSP's, or whether such data could be reasonably provided in the future.
- The statistical soundness of the measure as a guide to TNSP performance.

3.5 Selection of Initial Performance Measures

As can be seen from the selection matrix, Sinclair Knight Merz is recommending the initial adoption of five (5) performance measures, as summarised in the following table:

Table 3-1 Proposed Initial Performance Measures

No	Services Standards Measure	ElectraNet SA	EnergyAustralia	Powerlink	SMHEA	SPI PowerNet/ VENCorp	Transend	Transgrid
1	Circuit Availability	✓	✓	✓	✓	✓	✓	✓
	- Various Sub-measures based on criticality, circuit type, and/or peak/off peak timing	F	N/A	✓	✓	✓	✓	✓
2	Loss of Supply Event Frequency Index	✓	F	✓	N/A	F	✓	✓
3	Average Outage Duration (unplanned)	✓	✓	✓	F	✓	F	✓
4	Hours Constrained pa. - Intra-Regional	F	N/A	F	F	F	F	F
5	Hours Constrained pa. - Interconnector (Importer)	F	N/A	F	F	F	F	F

Notes

1. "✓" indicates measures is applicable to the relevant TNSP, historical data is available, and targets can be set in the Performance Incentive (PI Scheme).
2. "N/A" indicates measure is not applicable to the relevant TNSP.
3. "F" indicates measure is applicable to the relevant TNSP, but adequate data is not currently available, and it is recommended as a "future" inclusion in the Performance Incentive scheme.

Due in part to the differing roles, responsibilities, and system configuration of the seven (7) Australian TNSP's, and in part to the lack of reliable data for some of the measures, it is not possible to apply all of these measures in an identical way to all of the TNSP's.

Sinclair Knight Merz also recognises that the initial suite of performance measures only goes part of the way in terms of meeting the desire to incorporate some measures of "market impact" using data that should reasonably be available from NEMMCO information systems (although the full 3 year history of this data is not yet available). SKM recognises however that "hours constrained" is only a single dimensional measure, which should be supplemented by an "impact" dimension as well as a "time" dimension. Many constraints may occur which have minimal market impact, while other constraints (even for a short duration) may have significant impact in terms of regional price separations.

Current advice from NEMMCO is that while there has been some discussions and research work on this subject, there is no reliable method of analysis, with supporting data streams, that can isolate the "market impact" of transmission constraints from other unrelated market events or participant behaviour.

In summary, Sinclair Knight Merz is of the view that the performance measures proposed represent the best suite of suitable measures that exhibit both technical performance and market impact, for which sufficiently robust data is currently available, or could be developed within the next 5 years of a regulatory re-set.

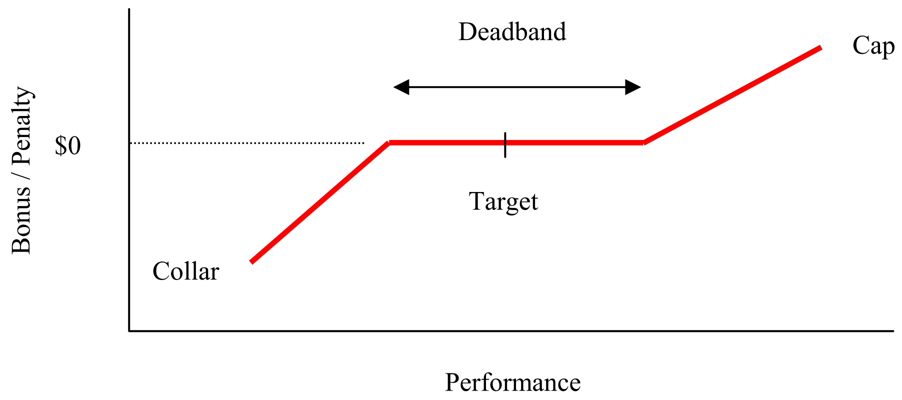
4. Design Aspects of PI Scheme

4.1 Introduction

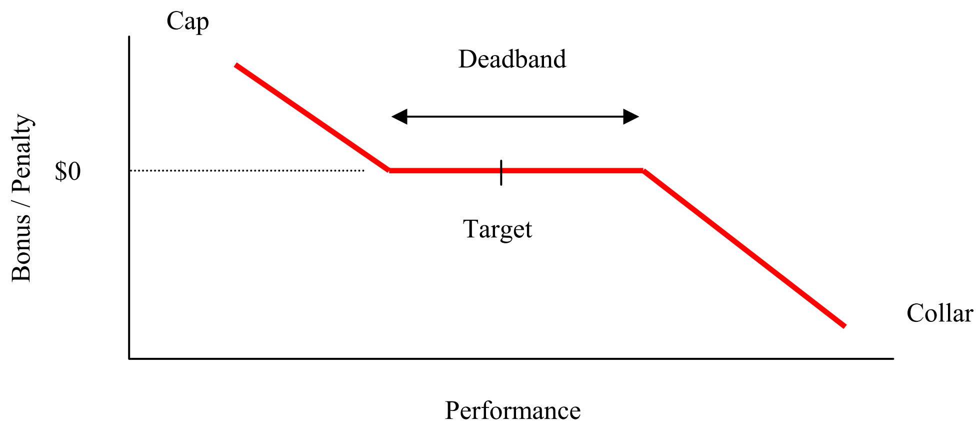
To ensure a consistent and auditable implementation of the TNSP Service Standards scheme, a model has been developed to monitor the performance of each TNSP against preset and agreed targets.

Each performance measure has a profile graph, with the following features:
- Allowance of a deadband to define targets;
- Allowance for asymmetric incentive and penalty rates; and
- Provision for asymmetric collars and caps.

These may be represented graphically as:



where higher actual values achieved represents improved performance, or



where lower actual values achieved represents improved performance.

Each performance measure profile is determined by 7 values:

- Target value;
- Deadband values either side of target;
- $ collar applicable to the measure;
- $ cap applicable to the measure; and
- An interim value between the cap and the deadband limit, and an interim value between the collar and deadband limit.

For each profile, there is flexibility provided to preset each of these values, allowing for customisation of each performance measure profile to suit each TNSP.

4.2 Status Switches

For each performance measure, 2 status switches have been provided to select the applicability of the measure and the reliability of the historical data provided by the TNSP. Both switches must be "on" for an Impact Factor and Cap / Collar values to be calculated. Where 1 or both switches are off, the Weighting Factors, Impact Factors and Cap / Collar values sections of the worksheet will be shaded to indicate that any values contained within have been excluded from the performance result.

4.3 Targets

The target values for each measure will be based on historical performance data, but not necessarily an average of this historical data, or as a projection based on any past trends. The targets will be nominally set to reflect what is considered to be "typical" performance, and will generally be slightly less than the average value of the historical data.

4.4 Deadband

The deadband establishes a range either side of the target that represents a cost neutral performance for that measure. It provides for variability in performance around the target for a measure that is not directly attributable to the performance of, or improvements by, a TNSP.

The deadband range for each measure may be varied for each measure annually, with asymmetrical settings available. A warning shade of orange is used to highlight deadband settings outside the range ± 10%, with a red shading indicating an invalid setting eg. a positive % setting for the "-" deadband parameter.

4.5 Caps and Collars

The cap and collar values for each measure are based on a number of separate factors, which allows the revenue at risk profile to be appropriately matched to a TNSP's particular operations and circumstances. The factors that can be adjusted to set caps and collars are:

- Annual Revenue and Limits
- Transition Factors
- Weighting Factors
- Impact Factors

- Asymmetric Factors

4.5.1 Annual Revenue and Limits

The Annual Revenue for each TNSP will be as determined by the ACCC following the review process, with the total revenue at risk in the PI scheme as a percentage (± %).

A warning shade of orange highlights any risk percentage greater than 5%, with a red shading for an invalid setting.

4.5.2 Transition Factors

The Transition Factors for each measure are based on the initial assessment of the likely rate of transition from initial performance measures to new market impact measures. These may be adjusted in circumstances where the adoption of a measure follows a different timetable in the future.

These Transition Factors must be a value between 0 and 1. A shading of red highlights an invalid setting.

4.5.3 Weighting Factors

The Weighting Factors establish the relative importance of the various measures, and may be varied annually to suit any changing conditions that may apply to the TNSP.

The sum of the Weighting Factors shall always be 1. A warning shade of orange highlights instances where the total is not 1.

4.5.4 Impact Factors

The Impact Factor indicates the relative contribution of each measure to the final annual result, based on the relative importance of the measure (Weighting Factor) and the timetable for phasing in or out of the measure (Transition Factor).

This factor is calculated as:

(Weighting Factor) * (Transition Factor)

provided both status switches (applicability and data reliability) are "on". If either or both switches are "off", the Impact Factor for that measure is 0.

The sum of all Impact Factors will be in the range 0 to 1.

4.5.5 Cap and Collar Values

The cap and collar values are limits on the impact that any 1 measure can have on the total annual result. They are set to limit the impact of extreme events without eroding the incentive for improved performance.

Asymmetric Factors for the caps and collars have been included to provide for asymmetric cap and collar for each measure. These can be independently set for each measure, and the value must be in the range 0 to 1.

The cap for each measure is determined as:

(Impact Factor) * ("+" Total Revenue at Risk value) * (Cap Asymmetric Factor)

whilst the collar for each measure is:

(Impact Factor) * ("-" Total Revenue at Risk value) * (Collar Asymmetric Factor)

The sum of the caps and collars shall equal the total "+" and "-" Revenue at Risk values.

As the Impact Factor for measures that are either not applicable or not considered to have reliable data are set to 0, the cap and collar values for these measures is also 0.

4.5.6 Ramping Factors

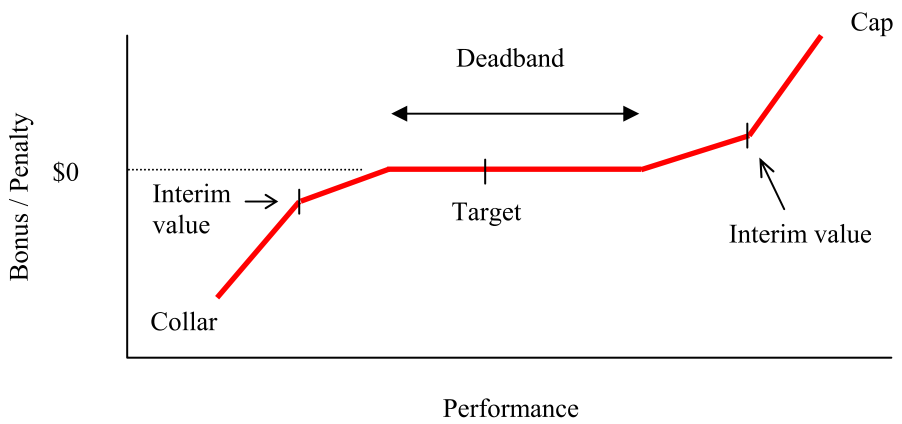
The Ramping Factors are the slopes of the bonus and penalty lines on the profile for each measure. Indicative values for these slopes are calculated for each measure using the performance data entered for maximum incentives and penalties, although each Ramping Factor may be manually set where considered appropriate.

A shading of red highlights any invalid setting. For Measures 1 to 1d, all Ramping Factors are positive, as higher performance data values indicates improved performance. For Measures 2 to 5, all Ramping Factors are negative, as lower performance data values indicate improved performance.

4.6 Interim Values

It has been proposed that, in some instances, a non-linear model may more appropriately reflect the increasingly higher costs and greater effort that a company incurs in continuing to pursue improvements in performance, particularly for companies with currently high performance levels.

In recognition of this, the model provides for the calculation of interim values between the deadband limits and the cap / collar, and therefore introduces a scale of bonus / penalty rates rather than a single bonus / penalty rate.

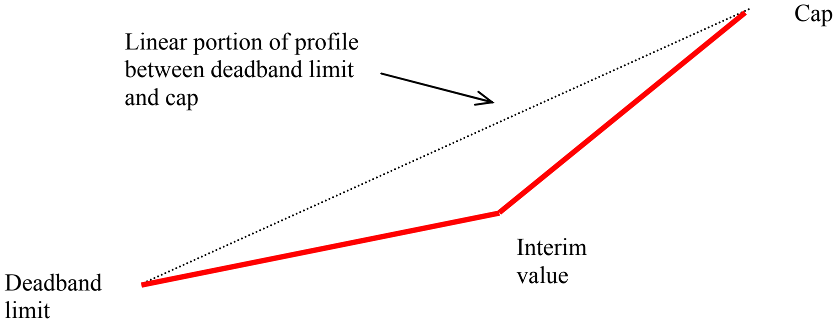


The interim value is calculated using the mid-point between the cap or collar and the deadband limit. The slope of the line from the deadband limit to the interim value is modified by an adjustment factor that may be set at different values for the bonus and penalty sides of the profile. The model then recalculates the slope of the bonus / penalty lines from the interim values to the cap or collar as appropriate.

As the adjustment factors may be set independently for calculating interim values in the bonus and penalty lines, the profile can be modified to approximate any non-linear function considered appropriate for measuring the TNSP performance.

To enable this non-linear feature, 2 switches are provided for introducing interim values in the bonus and penalty lines for each performance measure. If the switch is off, the interim value is calculated using the linear function for the bonus or penalty line. If the switch is on, the slope between the deadband limit and the interim value can be adjusted to any setting, and the model then recalculates the slope of the bonus or penalty line for the section between the interim value and the cap or collar.

For example, for an interim value introduced between a upper deadband limit and a cap –

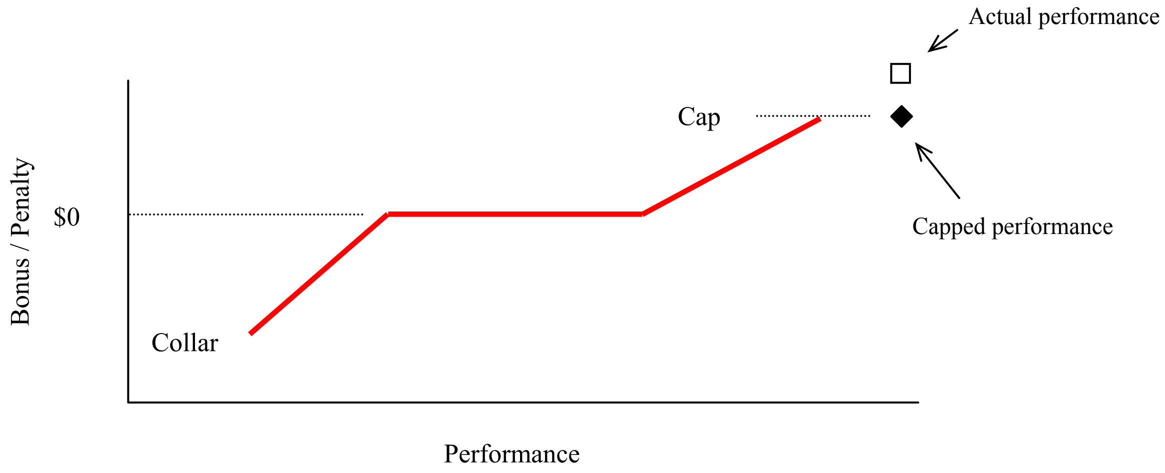


4.7 Bonus and Penalty Payments

Bonus and penalty payments are calculated based on the position of the actual performance value on the profile for each performance measure.

The return for performance that falls within the deadband specified around the target value is $0. The return for improved performance is capped to the Cap value, and the penalty for poorer performance is capped to the Collar. The profiles provided by the model show the uncapped performance return as an open square, with the capped return shown as a shaded diamond.

The following diagram demonstrates an actual performance that exceeded the performance level associated with the Cap for the measure, and with the bonus for this measure capped to the maximum value. This would similarly apply for a performance level below the minimum value associated with the Collar.



For an actual performance that lies between the performance levels associated with the Cap and Collar values, the return is calculated by the position on the profile.

5. Data Collection and Final Submission by TNSP's

After selection and definition of the preferred performance indicators was complete, Sinclair Knight Merz issued a final data collection pack to all TNSP's requesting historical performance data against the selected indicators. All TNSP's have since supplied available data, and a number of the TNSP's made further submissions and commentary on the proposed TNSP Service Standards. These are summarised below.

5.1 ElectraNet SA – refer Appendix I

ElectraNet SA submitted performance data for the period 1996/97 to 2000/01, as summarised below, together with comments as to the degree of confidence that they had in the data.

- Measure 1 – Circuit Availability – Data available, but low level of confidence.
- Sub-Measures (a)-(d) – Circuit Availability – Data not available.
- Measure 2 – Loss of Supply Event Frequency Index – Data available for >0.2 min and 1.0 min, with high level of confidence.
- Measure 3 – Average Outage Duration – Data available, with a high level of confidence.
- Measure 4 – Transmission Constraints (Intra-Regional) – Data not available, and no critical circuits.
- Measure 5 – Transmission Constraints (Inter-Regional) – Data not available

ElectraNet SA further noted in its submission that:

"A fundamental issue that remains to be resolved before constraint measures can be finalised is the question of what constitutes "minimal market impact"? There appears to be a fundamental conflict between the desires to introduce:

- *Incentives for TNSPs to be responsive to market signals and reschedule transmission outages at short notice in order to minimise binding transmission constraints; and*
- *Increased predictability in the timing of planned outages – some market participants will act to hedge their financial positions in response to advance notice of planned outages and may face an adverse financial impact if these outages are subsequently rescheduled in order to minimise binding constraints.*

This issue has been raised a number of times previously and should be clearly highlighted and the views of market participants sought during the public consultation processes arising from the ACCC Service Standards Review."

ElectraNet SA also proposed some points of clarification on the definition of "force majeure", and noted the potential for TNSP's to record and report data in different ways, despite the existence of specific definitions designed to standardise data collection and reporting.

5.2 EnergyAustralia – refer Appendix J

EnergyAustralia submitted performance data for just one financial year, namely 2000/01. This data was applicable to only two measures, as noted below:

- Measure 1 – Circuit Availability – Data available for one year only with high level of confidence.
- Sub-Measures 1(b) – Circuit Availability – As for one above.
- Sub-Measures 1(a), (c), (d) – Not applicable to EnergyAustralia.
- Measure 2 – Loss of Supply Event Frequency Index – Not available.
- Measure 3 – Average Outage Duration – Data available for one year only, with a high level of confidence.
- Measure 4 – Transmission Constraints (Intra-Regional) – Not applicable to EnergyAustralia.
- Measure 5 – Transmission Constraints (Inter-Regional) – Not applicable to EnergyAustralia.

5.3 Powerlink (Qld) – refer Appendix K

Powerlink submitted performance data for the period 1996/97 to 2000/01, as summarised below, together with comments as to the degree of confidence that they had in the data.

- Measure 1 – Circuit Availability – Data available, but low level of confidence.
- Sub-Measures 1(a)-(d) – Circuit Availability – Only one year of available data, low level of confidence.
- Measure 2 – Loss of Supply Event Frequency Index – Data available for >0.2min and >1.0min, with high level of confidence.
- Measure 3 – Average Outage Duration – Data available, but low level of confidence.
- Measure 4 – Transmission Constraints (Intra-Regional) – Data not available.
- Measure 5 – Transmission Constraints (Inter-Regional) – Data not available.

Powerlink made several other key points in its submission, including:

- The identification of critical feeders and plant items, for the measurement against sub-measures 1(a) and (b).
- The proposed deletion of the effects of "storm", "lightning" and "fire" from the definition of force majeure.
- Their view that the TNSP Service Standards scheme should "provide no material impact to Powerlink's risk profile if the scheme is to be introduced before Powerlink's next revenue reset.
- A number of other observations and suggestions in regard to the treatment of special case events (eg. warranty claims on manufacturers).

5.4 SPI PowerNet – refer Appendix L

SPI PowerNet submitted performance data for the period 1995 to 2000, as summarised below, together with comments as to the degree of confidence that they have in the data.

- Measure 1 – Circuit Availability – Data available with a high degree of confidence.
- Sub-Measures 1(a)-1(f) – Circuit Availability – Data available with a high degree of confidence.
- Measure 2 – Loss of Supply Event Frequency Index – Data available for >0.05 min and >0.3 min, but low level of confidence.
- Measure 3 – Average Outage Duration (separately reported for lines and transformers) – Data available for both categories, with a high level of confidence. Also specified in Victorian System Code.
- Measure 4 – Transmission Constraints (Intra-Regional) – No data available.
- Measure 5 – Transmission Constraints (Inter-Regional) – No data available.

SPI PowerNet also noted in their submission that:

"Therefore SPI PowerNet proposes that its availability incentive scheme constitutes the initial incentive regime the Company faces under its revenue period 1 January 2003 to 31 March 2008. This scheme places around 2% of its proposed revenue at risk.

If the Regulator wishes to expand the number of measures which have incentives attached to them before the end of the current ACCC Revenue Determination this would require that SPI PowerNet's proposed revenue be adjusted once the costs of the risk of the new scheme is priced.

Changes to incentive schemes mid-term of a regulatory period are covered under the proposed pass-through provisions of the SPI PowerNet Application (Chapter 10, p70 – Service Standards Event)."

5.5 Snowy Hydro (SMHEA) – refer Appendix M

Snowy Mountains Hydro Electricity Authority (SMHEA) was able to provide data for only three financial years (1998/99-2000/01), and only for Measure 1 – Circuit Availability, and Measure 1(a) – Circuit Availability (Critical). They have a high degree of confidence in the data provided, and the unique nature of the SMHEA transmission system does not readily facilitate the application of the remaining performance measures.

5.6 Transend – refer Appendix N

Transend submitted performance data for the period 1998/99 to 2001/02, as summarised below, together with comments as to the degree of confidence that they have in the data.

- Measure 1 – Circuit Availability (three categories; transmission circuit, transformers and reactive plant) – Data available for four years with medium to high level of confidence.
- Sub-Measures 1(a) to (d) – Circuit Availability – Not available.
- Measure 2 – Loss of Supply Event Frequency Index – Data available for >0.01 min, > 0.1 min, >0.2 min, >1.0 min and > 2.0 min with a high level of data confidence.
- Measure 3 – Average Outage Duration – Data available, but with a low level of confidence.

- Measure 4 – Transmission Constraints (Intra-Regional) – Data not available.
- Measure 5 – Transmission Constraints (Inter-Regional) – Data not available.

In their final data submission, Transend made extensive commentary on their historical reporting measures, and definitional differences with the proposed SKM measures.

Transend also commented on the complex reporting that will be required as follows:

"In future, even though the pricing determination and ongoing performance reporting is going to be under ACCC jurisdiction, Transend will have an obligation to report its performance to:

- *OTTER*
- *Its Customers (Generator and DNSP)*
- *ACCC (under the new regime)*

It is worthwhile to note here that the focus, intent and context of Transend's performance report to the ACCC, OTTER and Transend's customer will be different and hence leads to a complex performance reporting regime for Transend. This will be apparent not only on the set of performance measures, but also on how these three reports are analysed by different entities for differing purposes. This will introduce a complex decision making process for Transend, for example, a particular action by Transend can have a favourable impact on performance measure under the ACCC framework, but an unfavourable impact on performance measures under the OTTER or Transend's customer frameworks."

5.7 TransGrid – refer Appendix O

TransGrid submitted performance data for the period 1996/97 to 2000/01, as summarised below, together with comments as to the degree of confidence that they have in the data.

- Measure 1 – Circuit Availability – Data available with a high level of confidence.
- Sub-Measures 1(a)-1(b) – Circuit Availability (critical/non-critical, peak/off-peak and by line/equipment type) – Data available with a high degree of confidence.
- Measure 2 – Loss of Supply Event Frequency Index – Data available for >0.01 min, >0.2 min and >1.0 min, with a high level of confidence.
- Measure 3 – Average Outage Restoration Time – Data available with a high level of confidence.
- Measure 4 – Transmission Constraints (Intra-Regional) – Data available for one year only, (2000/01) with a high level of confidence.
- Measure 5 – Transmission Constraints (Inter-Regional) – Data available for one year only (2000/01) with a high level of confidence.

TransGrid also made a number of very relevant observations and proposals in respect of:

- The appropriateness of sub-measures relating to "critical circuits" and "peak periods".

- The need to undertake further work to define appropriate frequency and event size benchmarks for Measure 2.
- Capping the impact of any specific event duration under Measure 3, to say 14 days per event.
- The need to identify contributory causes for given constraints under measures 4 and 5, thereby defining the degree to which a TNSP should be held accountable under these measures.
- Determining the degree to which market participants favour "responsiveness" to market conditions (ie. minimise constraints, particularly those with significant market impact) versus "predictability" in timing of outages as the primary objective of TNSP's in managing constraints (ie. proceed with planned outages, even if subsequent events lead to constraints with significant market impact).
- Refinement of the definition of force majeure.

6. Definition of Force Majeure Events

For the purposes of implementing the TNSP Services Standards Incentive Scheme, force majeure events are excluded from the performance statistics to be reported. It is noted that the precise definition of what constitutes a force majeure event varies to some small degree from TNSP to TNSP.

In order to achieve some degree of consistency between TNSP's, SKM initially recommended the adoption of the same definition of force majeure as currently exists in the National Electricity Code, viz:

"Force Majeure 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 (the "Affected Party"), which may include, without limitation the following:

a) 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;
b) Action or inaction by a court, Government Agency (including denial, refusal or failure to grant any Authorisation, despite timely best endeavour to obtain same);
c) Strikes, lockouts, industrial and/or labour disputes and/or difficulties, work bans, blockades or picketing."

A number of TNSP's have incorrectly interpreted this definition as excluding all, or most, events caused by fire, lightning, storm, etc. and have commented to that effect in their final submissions.

Clearly the intent of the words "beyond the reasonable control of the party affected by any such event (the "Affected Party")" is not to exclude all events of the type described, but to exclude the most severe of these events which it is unreasonable for the TNSP to plan and design the transmission system to protect against.

A number of the TNSP's have suggested the adoption of a more prescriptive "force majeure" definition, such as those that they themselves have adopted, but since each of them have adopted subtly different definitions, there is little to be gained from such a refinement, as they will be unable to report data against any definition other than their own.

It is presumed that the definitions of "force majeure" adopted by the TNSP's comply in principle with the intent of the code definition that events of the type mentioned are only excluded from reported data is they are "beyond the reasonable control of the party affected (TNSP) by any such event".

Appendix A Service Standard Measure Selection Matrix

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
	System								
1	System Average Interruption Duration Index (SAIDI) Units ~ Minutes per year	Customer	Nat, Int	Yes	M	Yes	No	No	Deemed statistically unsound widely used internationally.
2	System Average Interruption Frequency Index (SAIFI) Units ~ Number per year	Customer	Nat, Int	Yes	M	Yes	No	No	Deemed statistically unsound widely used internationally.
3	Customer Average Interruption Duration Index (System) (CAIDI) Units ~ Minutes per year	Customer	Nat, Int	Yes	H	Yes	Yes	No	Widely used internationally.
4	Interruption - energy not supplied Units ~ System Minutes	Customer	Aust, NZ, UK	Yes	M	Yes	No	No	Deemed statistically unsound widely used internationally.
5	Transmission circuit availability Units ~ %	Network	Nat, Int	Yes	H	Yes	Yes	Yes	Recommended Measure 1.
6	Annual total of sustained under / over voltage excursions Units ~ Number per year	Network	UK	Limited	L	No	Yes	No	
7	Annual total of excessive transient voltage excursions Units ~ Number per year	Network	UK	No	L	No	Yes	No	
	For Multiple Connection Points								
8	Annual total of unplanned outages Units ~ Number per year	Network	US, UK	Yes	H	No	Yes	No	System specific and comparisons difficult
9	Annual total of unplanned outages causing loss of supply Units ~ Number per year	Customer	US, UK	Yes	M	Some	Yes	No	Recommended Measure No 2 is similar
10	Energy not supplied during outage Units ~ MWh	Customer	UK	No	M	No	No	No	Similar to No4 system specific. Comparisons difficult
11	Maximum load lost during outage Units ~ MW	Customer	UK	No	L	No	No	No	System specific. Comparisons difficult.

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
12	Outage duration Units ~ Minutes	Customer	UK, US	Yes	M	Some	Yes	Yes	Recommended Measure 3
	For Individual Connection Points								
13	Customer Average Interruption Duration Index (CAIDI) Units ~ Minutes per year	Customer	No	No	H	No	Yes	No	Similar to No 3 but for individual connection points
14	Customer maximum interruption duration Units ~ Minutes	Customer	No	No	M	No	No	No	
15	Customer minimum interruption duration Units ~ Minutes	Customer	No	No	M	No	No	No	
16	Customer average interruption frequency Units ~ Number per year	Customer	NZ, US	No	M	No	No	No	Similar to No 2
17	Average restoration time Units ~ Minutes	Customer	US, UK	No	M	No	Yes	No	Same as No 12
18	Annual total of unplanned outages Units ~ Minutes	Customer	NZ, US, UK	Limited	M	No	No	No	
19	Annual total of energy not supplied during unplanned outage Units ~ MWh	Customer	NZ, UK	No	M	No	No	No	Same as No 10
20	Maximum load lost during unplanned outage Units ~ MW	Customer	UK	No	L	No	No	No	Same as No 11
21	Duration of planned interruptions Units ~ Minutes per year	Customer	No	No	L	No	Yes	No	
22	Frequency of planned interruptions Units ~ Number per year	Customer	NZ, UK	No	L	No	Yes	No	System specific. Comparisons difficult.
23	Period of notice for planned interruptions Units ~ Days	Customer	No	No	H	No	Yes	No	
	Market Related Measures								
24	Cost of transmission outages Units ~ $ (Aus, NZ, USA) / £ (UK) per year	Customer	NZ, UK, US	No	M	No	Yes	No	

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
25	Potential / actual cost benefits from rescheduling planned outage / improved restoration performance Units ~ $ (Aus, NZ, USA) / £ (UK)	Customer	UK, US	No	L	No	Yes	No	
26	Comparison of potential savings and actual costs of outage from rescheduling planned outage / improved restoration performance Units ~ $ (Aus, NZ, USA) / £ (UK)	Customer	UK	No	L	No	Yes	No	
27	Retrospective assessment of actual costs and benefits of augmentation Units ~ $ (Aus, NZ, USA) / £ (UK)	Network	UK	No	L	No	Yes	No	
28	Outcomes from availability incentive scheme (if such a scheme exists) Units ~ $ (Aus, NZ, USA) / £ (UK)	N/A	UK	No	L	No	Yes	No	
29	Annual total of network constraint events Units ~ Number per year	Customer	NZ, UK	No	M	No	Yes	No	
30	Amount of additional generation to overcome network constraints Units ~ MW	Network	UK	Some for UK	L	No	Yes	No	
31	Cost of additional energy to overcome network constraints Units ~ $ (Aus, NZ, USA) / £ (UK)	Network	UK	Some for UK	L	No	Yes	No	
32	Interconnector and critical circuit availability Units ~ %	Network	NZ, UK, Aust	Yes	H	Yes	Yes	Yes	Recommended Measure 1
	Other								
33	SAIIR System Minutes Units ~ System Minutes	Customer	No	No	L	N/A	No	No	Unique to South Australia.
34	SAIIR No. of Supply Interruptions Units ~ Number per year	Customer	No	No	L	N/A	No	No	Unique to South Australia.
35	Interconnector Forced Outage Rate Units ~ %	Network	SMHEA only	No	L	No	Yes	No	

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
36	Line Forced Outage Rate for equipment failure & op error Units ~ Inc per 100 km	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
37	Line Forced Outage Rate for Lightning and Storms Units ~ Inc per 100 km	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
38	Mean Duration of Forced Outages (Circuits) Units ~ Hours	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
39	Successful Auto Reclose of Circuits Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
40	Forced Outage Rate (transformers) Units ~ Inc per year	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
41	Mean Duration of Forced Outage (transformers) Units ~ Hours	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
42	Availability of Transformers Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
43	Availability of Static VAR Compensators Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
44	Availability of Synchronous Condensors Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
45	Availability of Capacitor Banks Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
46	Availability of Protection Systems Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
47	Incorrect Protection Operations Units ~ %	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
48	Contractual (Rebates) - Generation constrained Units ~ $ (Aus, NZ, USA) / £ (UK)	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
49	Contractual (Rebates) - Shared Network Availability Units ~ $ (Aus, NZ, USA) / £ (UK)	Network	PowerNet only	No	M	No	Yes	No	Unique to PowerNet
50	Total number of loss of supply events > 0.2 system minutes Units ~ Number per year	Customer	Powerlink only	Limited to Aust	H	Limited	Yes	Yes	Recommended Measure 2
51	Total number of loss of supply events > 0.1 system minutes Units ~ Number per year	Customer	Powerlink only	Limited to Aust	H	Limited	Yes	Yes	Recommended Measure 2
52	Percentage unplanned connection point interruptions not restored within 3 hours Units ~ %	Customer	Powerlink only	No	M	No	Yes	No	
53	Total balancing costs (including constraints & losses) Units ~ $ (Aus, NZ, USA) / £ (UK)	Customer	UK	No	L	No	Yes	No	
54	No. of frequency excursions larger than + / - 1% and exceeding 60 seconds Units ~ Number	Network	UK	No	L	No	Yes	No	
55	Transmission Availability Composite (TAC) score Units ~ Number	Network	No	No	H	No	Yes	No	Unique to Montana Power
56	MAIFI Monetary Forced Interruptions Units ~ Number (assumed as not stated)	Network	No	No	L	No	Yes	No	Unique to San Diego Electric
57	500 kV Annual Forced Outage Frequency Units ~ Number per year	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
58	500 kV Annual Forced Outage Duration Units ~ Minutes	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
59	500 kV Proportion of Lines without Forced Outages Units ~ %	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison

No.	Service Standard Measure	Network Focus or Customer/ Market Focus	National or International Use	Benchmark Perf. Info Available? (Yes/No)	High Level Principles Compliance (H/M/L)	Data Available for Aust TNSP's (Yes/No)	Statistical Soundness (Yes/No)	Recommended (Yes/No)	Comments
60	220 kV Annual Forced Outage Frequency Units ~ Number per year	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
61	220 kV Annual Forced Outage Duration Units ~ Minutes	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
62	220 kV Proportion of Lines without Forced Outages Units ~ %	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
63	115 kV Annual Forced Outage Frequency Units ~ Number per year	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
64	115 kV Annual Forced Outage Duration Units ~ Minutes	Network	US only	No	M	No	No	No	Unique to Southern California Edison
65	115 kV Proportion of Lines without Forced Outages Units ~ %	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
66	66 kV Annual Forced Outage Frequency Units ~ Number per year	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
67	66 kV Annual Forced Outage Duration Units ~ Minutes	Network	US only	No	M	No	No	No	Unique to Southern California Edison
68	66 kV Proportion of Lines without Forced Outages Units ~ %	Network	US only	No	M	No	Yes	No	Unique to Southern California Edison
69	French Interconnector availability Units ~ %	Network	France	Yes	H	Yes	Yes	No	Unique to National Grid. Similar to proposed Measure 1.
70	Scottish Interconnector availability Units ~ %	Network	Scotland	Yes	H	Yes	Yes	No	Unique to National Grid. Similar to Proposed Measure 1.

Appendix B Definition of Measures

Measure 1 – Transmission Circuit Availability

Measure	Transmission Circuit Availability
Sub-measures	❑ Transmission circuit availability (critical circuits) ❑ Transmission circuit availability (non-critical circuits) ❑ Transmission circuit availability (peak periods) ❑ Transmission circuit availability (intermediate periods) ❑ Transmission lines ❑ Transmission transformers ❑ Transmission reactive
Unit of Measure	% of total possible hours available.
Source of Data	❑ TNSP outage reports and system for circuit availability ❑ Agreed Schedule of Critical Circuits and plant ❑ Nominated peak / off-peak hours - Currently peak – 7:00 am to 10:00 pm weekdays - Or as otherwise defined by the TNSP/NEMMCO - Off peak – all other times - May include intermediate time periods and seasonal periods
Definition/Formula	Formula: No hours pa defined (critical / non-critical) circuits are available x 100 Total possible no of defined circuit hours Definition: The actual circuit hours available for defined (critical / non-critical) transmission circuits divided by the total possible defined circuit hours available. Note that there shall be an annual review of the nominated list of critical circuits / system components
Exclusions	❑ Exclude unregulated transmission assets (eg. same connection assets). ❑ Exclude from "circuit unavailability" any outages shown to be caused by a fault or other event on a "3rd party system" eg. intertrip signal, generator outage, customer installation (TNSP to provide list) ❑ 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 (TNSP to provide lists) ❑ Circuit "unavailability" to include outages from all causes including planned, forced and emergency events, including extreme events

Measure 2 – Loss of Supply Event Frequency Index

Measure	Loss of Supply Event Frequency Index
Unit of Measure	Number of significant events per annum
Source of Data	TNSP outage reports and system for circuit availability
Definition/Formula	Number of events greater than X minutes pa Number of events greater than Y minutes pa Where X and Y are to be defined for each TNSP, such that: - an X system minute event has a return period of 1 year, and - a Y system minute event has a return period of 2 years (Refer Powerlink detailed methodology)
Exclusions	❑ Exclude unregulated transmission assets (eg. some connection assets). ❑ Exclude any outages shown to be caused by a fault or other event on a "third party system" eg. intertrip signal, generator outage, customer installation. ❑ Planned outages. ❑ Force Majeure events.
Inclusions	❑ All unplanned outages exceeding the specified impact (ie. 0.2 minutes and 1.0 minutes). ❑ Includes outages on all parts of the regulated transmission system. ❑ Includes extreme events.

Measure 3 – Average Outage Duration

Measure	Average Outage Restoration Time
Sub-measures	❑ Transmission lines ❑ Transmission transformers/plant
Unit of Measure	Minutes
Source of Data	TNSP Outage Reporting System
Definition/Formula	Formula: Aggregate minutes duration of all unplanned outages 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 (< 1 min) ❑ 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 4 – Transmission Constraints (Intra-regional)

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 5 – Transmission Constraints (Inter-regional)

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

Appendix C Summary of Proposed Measures, Weightings and Targets

TNSP	Measure No	Measure	Unit	Weighting Factor (%)	Proposed Targets				
					Year 1	Year 2	Year 3	Year 4	Year 5
ElectraNet SA	1	Circuit Availability (total)	%	35.0	99.25	99.25	99.25	99.25	99.25
	2a	Loss of Supply Event Frequency Index > 0.2 min	No	10.0	5	5	5	5	5
	2b	Loss of Supply Event Frequency Index > 1.0 min	No	30.0	2	2	2	2	2
	3	Average Outage Duration	Min	25.0	100	100	100	100	100
EnergyAustralia	1	Circuit Availability (total)	%	100.0	95.50	95.50	95.50	95.50	95.50
	3	Average Outage Duration	Min	0.0	-	-	-	-	-
Powerlink	1a	Circuit Availability (critical)	%	15.5	97.15	97.15	97.15	97.15	97.15
	1b	Circuit Availability (non-critical)	%	8.5	97.98	97.98	97.98	97.98	97.98
	1c	Circuit Availability (peak)	%	15.5	97.45	97.45	97.45	97.45	97.45
	2a	Loss of Supply Event Frequency Index > 0.2 min	No	15.5	4	4	4	4	4
	2b	Loss of Supply Event Frequency Index > 1.0 min	No	30.0	1	1	1	1	1
	3	Average Outage Duration	Min	15.0	800	800	800	800	800
SPI PowerNet	1	Circuit Availability (total)	%	20.0	99.20	99.20	99.20	99.20	99.20
	1a	Circuit Availability (critical)(peak)	%	15.0	99.90	99.90	99.90	99.90	99.90
	1b	Circuit Availability (non-critical)(peak)	%	5.0	99.85	99.85	99.85	99.85	99.85
	1c	Circuit Availability (critical)(intermediate)	%	5.0	99.85	99.85	99.85	99.85	99.85
	1d	Circuit Availability (non-critical)(intermediate)	%	5.0	99.75	99.75	99.75	99.75	99.75
	2a	Loss of Supply Event Frequency Index > 0.05 min	No	0.0	2	2	2	2	2
	2b	Loss of Supply Event Frequency Index > 0.3 min	No	0.0	1	1	1	1	1
	3a	Average Outage Duration (lines)	Hrs	25.0	10	10	10	10	10
	3b	Average Outage Duration (transformers)	Hrs	25.0	10	10	10	10	10
Snowy Hydro	1	Circuit Availability (total)	%	40.0	99.50	99.50	99.50	99.50	99.50
	1a	Circuit Availability (critical)	%	60.0	99.75	99.75	99.75	99.75	99.75
Transend	1a	Circuit Availability (trans lines)	%	25.0	99.05	99.05	99.05	99.05	99.05
	1b	Circuit Availability (transformers)	%	15.0	99.05	99.05	99.05	99.05	99.05

TNSP	Measure No	Measure	Unit	Weighting Factor (%)	Proposed Targets				
					Year 1	Year 2	Year 3	Year 4	Year 5
	2a	Loss of Supply Event Frequency Index > 0.1 min	No	20.0	15	15	15	15	15
	2b	Loss of Supply Event Frequency Index > 2.0 min	No	40.0	2	2	2	2	2
TransGrid	1a	Circuit Availability (lines)	%	20.0	99.40	99.40	99.40	99.40	99.40
	1b	Circuit Availability (transformers)	%	15.0	99.00	99.00	99.00	99.00	99.00
	1c	Circuit Availability (reactive plant)	%	10.0	98.50	98.50	98.50	98.50	98.50
	2a	Loss of Supply Event Frequency Index > 0.05 min	%	25.0	6	6	6	6	6
	2b	Loss of Supply Event Frequency Index >0.4 min		20.0	1	1	1	1	1
	3	Average Outage Duration	Min	10.0	1500	1500	1500	1500	1500
	4	Transmission Constraints (Intra-Regional)	Hrs	0.0	-	-	-	-	-
	5	Transmission Constraints (Inter-Regional)	Hrs	0.0	-	-	-	-	-

Appendix D Summary of TNSP Historical Performance Data (Australian and International)

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	EnergyAustralia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
	System																
1	System Average Interruption Duration Index (SAIDI)	1996/97		66.66													
	Units ~ Minutes per year	1997/98		97.20													
		1998/99		93.95													
		1999/00		84.00													
		2000/01		96.39													
2	System Average Interruption Frequency Index (SAIFI)	1996/97		0.98													
	Units ~ Number per year	1997/98		1.22													
		1998/99		1.29													
		1999/00		1.26													
		2000/01		1.21													
3	Customer Average Interruption Duration Index (System) (CAIDI)	1996/97		67.79													
	Units ~ Minutes per year	1997/98		79.80													
		1998/99		73.00													
		1999/00		66.63													
		2000/01		79.67													
4	Interruption - energy not supplied	1996/97			1.80 *				1.59 *	11.50 *	83.00 *						
	Units ~ System Minutes	1997/98	875.79 *		2.50 *				1.21 *	2.90 *	441.00 *						
		1998/99	413.54 *		3.20 *				0.96 *	7.10 *	36.00 *						
		1999/00	100.43 *		11.10 *				4.23 *	2.10 *	292.50 *						
		2000/01	529.79 *						0.67 *	11.60 *	526.00 *						
5	Transmission circuit availability	1996/97				99.57			99.57	98.90 *	95.80	97.36					99.99
	Units ~ %	1997/98	99.23			99.54			99.54	99.10 *	96.30	97.53					99.99
		1998/99	99.25			99.58	99.67	99.13	99.37	99.10 *	96.30	97.31					99.99
		1999/00	99.67		99.60	99.69	98.63	99.17	99.42	99.20 *	96.00	97.02					99.99
		2000/01	99.63	96.55		99.71	99.55	98.96	99.62	98.90 *	95.80	98.13					99.99
6	Annual total of sustained under / over voltage excursions	1996/97									0.00						
	Units ~ Number per year	1997/98									2.00						
		1998/99									0.00						
		1999/00									0.00						
		2000/01									1.00						
7	Annual total of excessive transient voltage excursions	1996/97															
	Units ~ Number per year	1997/98															
		1998/99															
		1999/00															
		2000/01															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia: ElectraNet SA	Australia: Energy Australia	Australia: Powerlink	Australia: SPI PowerNet	Australia: Snowy Hydro	Australia: Transend	Australia: TransGrid	NZ: Transpower	UK: National Grid	UK: Scottish & Southern Energy	USA: California ISO	USA: Idaho Power	USA: Montana Power	USA: San Diego Gas & Electric	USA: Southern California Edison
	For Multiple Connection Points																
8	Annual total of unplanned outages	1996/97			201.00							122.00					469.00
	Units ~ Number per year	1997/98			219.00							147.00					382.00
		1998/99			165.00							167.00					366.00
		1999/00			173.00							138.00					423.00
		2000/01										74.00					355.00
9	Annual total of unplanned outages causing loss of supply	1996/97			19.00						14.00 *						
	Units ~ Number per year	1997/98			24.00						14.00 *						
		1998/99			20.00			45.00			5.00 *						
		1999/00			20.00			47.00			4.00 *						
		2000/01						59.00			3.00 *						
10	Energy not supplied during outage	1996/97															
	Units ~ MWh	1997/98															
		1998/99															
		1999/00															
		2000/01															
11	Maximum load lost during outage	1996/97															
	Units ~ MW	1997/98															
		1998/99															
		1999/00															
		2000/01															
12	Outage duration	1996/97									7.00						57509
	Units ~ Minutes per year	1997/98									18.00						30548
		1998/99						3954.00			11.00						30277
		1999/00									48.00						20001
		2000/01						4174.00			68.00						13606
	For Individual Connection Points																
13	Customer Average Interruption Duration Index (CAIDI)	1996/97															
	Units ~ Minutes per year	1997/98															
		1998/99															
		1999/00															
		2000/01															
14	Customer maximum interruption duration	1996/97															
	Units ~ Minutes	1997/98															
		1998/99															
		1999/00															
		2000/01															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia: ElectraNet SA	Australia: Energy Australia	Australia: Powerlink	Australia: SPI PowerNet	Australia: Snowy Hydro	Australia: Transend	Australia: TransGrid	NZ: Transpower	UK: National Grid	UK: Scottish & Southern Energy	USA: California ISO	USA: Idaho Power	USA: Montana Power	USA: San Diego Gas & Electric	USA: Southern California Edison
15	Customer minimum interruption duration	1996/97															
	Units ~ Minutes	1997/98															
		1998/99															
		1999/00															
		2000/01															
16	Customer average interruption frequency	1996/97								Report to customer, annual QPR *							
	Units ~ Number per year	1997/98															
		1998/99															
		1999/00															
		2000/01															
17	Average restoration time	1996/97															
	Units ~ Minutes	1997/98															
		1998/99															
		1999/00															
		2000/01															
18	Annual total of unplanned outages	1996/97								92.00							48.00
	Units ~ Minutes	1997/98								58.00							28.00
		1998/99					0.00			69.00							17.00
		1999/00					0.00			50.00							21.00
		2000/01					0.00			55.00							9.00
19	Annual total of energy not supplied during unplanned outage	1996/97															
	Units ~ MWh	1997/98															
		1998/99															
		1999/00															
		2000/01															
20	Maximum load lost during unplanned outage	1996/97															
	Units ~ MW	1997/98															
		1998/99															
		1999/00															
		2000/01															
21	Duration of planned interruptions	1996/97								Individual POS result report to customer							5636
	Units ~ Minutes per year	1997/98															2263
		1998/99															956
		1999/00															17581
		2000/01															169

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
22	Frequency of planned interruptions	1996/97								Individual POS result report to customer							
	Units ~ Number per year	1997/98															
		1998/99															
		1999/00															
		2000/01															
23	Period of notice for planned interruptions	1996/97															
	Units ~ Days	1997/98															
		1998/99															
		1999/00															
		2000/01															
	Market Related Measures																
24	Cost of transmission outages	1996/97								Req'd by Regulator, unable to calculate							
	Units ~ $ (Aus, NZ, USA) / £ (UK) per year	1997/98															
		1998/99															
		1999/00															
		2000/01															
25	Potential / actual cost benefits from rescheduling planned outage / improved restoration performance	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															
26	Comparison of potential savings and actual costs of outage from rescheduling planned outage / improved restoration performance	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															
27	Retrospective assessment of actual costs and benefits of augmentation	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															
28	Outcomes from availability incentive scheme (if such a scheme exists)	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
		2000/01															

Summary of Transmission System data

			Australia							NZ	UK		USA				
No.	Service Standard Measure	Period	ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
29	Annual total of network constraint events	1996/97															
	Units ~ Number per year	1997/98								Measure being developed							
		1998/99															
		1999/00															
		2000/01										99.00					
30	Amount of additional generation to overcome network constraints	1996/97															
	Units ~ MW	1997/98															
		1998/99															
		1999/00															
		2000/01										320.00					
31	Cost of additional energy to overcome network constraints	1996/97										92.05					
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98										97.90					
		1998/99										97.13					
		1999/00										95.48					
		2000/01										93.27					
32	Interconnector and critical circuit availability	1996/97								97.30 *							
	Units ~ %	1997/98								97.40 *	Refer measures 69 and 70						
		1998/99					99.36			96.50 *							
		1999/00					98.81			97.30 *							
		2000/01		95.98			99.99			96.90 *							
	Other																
33	SAIIR System Minutes	1996/97															
	Units ~ System Minutes	1997/98	2.49														
		1998/99	8.18														
		1999/00	2.09														
		2000/01	5.04														
34	SAIIR No. of Supply Interruptions	1996/97															
	Units ~ Number per year	1997/98	24.00														
		1998/99	15.00														
		1999/00	23.00														
		2000/01	26.00														
35	Interconnector Forced Outage Rate	1996/97															
	Units ~ %	1997/98															
		1998/99					0.07										
		1999/00					0.00										
		2000/01					0.00										

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
36	Line Forced Outage Rate for equipment failure & op error	1996/97				0.14											
	Units ~ Inc per 100 km	1997/98				0.37											
		1998/99				0.31											
		1999/00				0.28											
		2000/01															
37	Line Forced Outage Rate for Lightning and Storms	1996/97				0.09											
	Units ~ Inc per 100 km	1997/98				0.09											
		1998/99				0.05											
		1999/00				0.06											
		2000/01															
38	Mean Duration of Forced Outages (Circuits)	1996/97				24.14											
	Units ~ Hours	1997/98				14.46											
		1998/99				7.52											
		1999/00				6.41											
		2000/01															
39	Successful Auto Reclose of Circuits	1996/97				82.00											
	Units ~ %	1997/98				78.00											
		1998/99				82.00											
		1999/00				80.00											
		2000/01															
40	Forced Outage Rate (transformers)	1996/97				0.12											
	Units ~ Inc per year	1997/98				0.01											
		1998/99				0.06											
		1999/00				0.25											
		2000/01															
41	Mean Duration of Forced Outage (transformers)	1996/97				8.52											
	Units ~ Hours	1997/98				3.13											
		1998/99				5.92											
		1999/00				92.71											
		2000/01															
42	Availability of Transformers	1996/97				99.70											
	Units ~ %	1997/98				99.79											
		1998/99				99.62											
		1999/00				99.35											
		2000/01															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	EnergyAustralia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
43	Availability of Static VAR Compensators	1996/97				98.88											
	Units ~ %	1997/98				99.42											
		1998/99				99.04											
		1999/00				99.28											
		2000/01															
44	Availability of Synchronous Condensors	1996/97				92.43											
	Units ~ %	1997/98				90.10											
		1998/99				72.95											
		1999/00				90.78											
		2000/01															
45	Availability of Capacitor Banks	1996/97				99.56											
	Units ~ %	1997/98				99.60											
		1998/99				98.94											
		1999/00				99.15											
		2000/01															
46	Availability of Protection Systems	1996/97															
	Units ~ %	1997/98															
		1998/99															
		1999/00															
		2000/01															
47	Incorrect Protection Operations	1996/97				3.33											
	Units ~ %	1997/98				3.53											
		1998/99				6.49											
		1999/00				1.19											
		2000/01															
48	Contractural (Rebates) - Generation constrained	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															
49	Contractural (Rebates) - Shared Network Availability	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia: ElectraNet SA	Australia: Energy Australia	Australia: Powerlink	Australia: SPI PowerNet	Australia: Snowy Hydro	Australia: Transend	Australia: TransGrid	NZ: Transpower	UK: National Grid	UK: Scottish & Southern Energy	USA: California ISO	USA: Idaho Power	USA: Montana Power	USA: San Diego Gas & Electric	USA: Southern California Edison
50	Total number of loss of supply events > 0.2 system minutes	1996/97			0.00												
	Units ~ Number per year	1997/98			3.00												
		1998/99			1.00												
		1999/00			2.00												
		2000/01															
51	Total number of loss of supply events > 0.1 system minutes	1996/97			5.00												
	Units ~ Number per year	1997/98			4.00												
		1998/99			2.00												
		1999/00			5.00												
		2000/01															
52	Percentage unplanned connection point interruptions not restored within 3 hours	1996/97															
	Units ~ %	1997/98															
		1998/99															
		1999/00															
		2000/01															
53	Total balancing costs (including constraints & losses)	1996/97															
	Units ~ $ (Aus, NZ, USA) / £ (UK)	1997/98															
		1998/99															
		1999/00															
		2000/01															
54	No. of frequency excursions larger than + / - 1% and exceeding 60 seconds	1996/97															
	Units ~ Number	1997/98															
		1998/99															
		1999/00															
		2000/01															
55	Transmission Availability Composite (TAC) score	1996/97													169.00		
	Units ~ Number	1997/98													182.00		
		1998/99													184.00		
		1999/00													169.00		
		2000/01													188.00		
56	MAIFI Monetary Forced Interruptions	1996/97															
	Units ~ Number (assumed as not stated)	1997/98															
		1998/99															
		1999/00															
		2000/01															

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
57	500 kV Annual Forced Outage Frequency	1996/97															2.05
	Units ~ Number per year	1997/98															0.63
		1998/99															1.00
		1999/00															2.00
		2000/01															0.84
		14 yr Mean															1.39
58	500 kV Annual Forced Outage Duration	1996/97															712.00
	Units ~ Minutes	1997/98															738.00
		1998/99															362.00
		1999/00															142.00
		2000/01															141.00
		14 yr Mean															559.00
59	500 kV Proportion of Lines without Forced Outages	1996/97															36.80
	Units ~ %	1997/98															57.90
		1998/99															52.60
		1999/00															31.60
		2000/01															42.10
		14 yr Mean															41.80
60	220 kV Annual Forced Outage Frequency	1996/97															0.70
	Units ~ Number per year	1997/98															0.70
		1998/99															0.48
		1999/00															0.50
		2000/01															0.48
		14 yr Mean															0.63
61	220 kV Annual Forced Outage Duration	1996/97															738.00
	Units ~ Minutes	1997/98															222.00
		1998/99															119.00
		1999/00															37.50
		2000/01															62.50
		14 yr Mean															265.00
62	220 kV Proportion of Lines without Forced Outages	1996/97															74.60
	Units ~ %	1997/98															74.60
		1998/99															81.70
		1999/00															74.60
		2000/01															75.40
		14 yr Mean															71.20

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia							NZ	UK		USA				
			ElectraNet SA	Energy Australia	Powerlink	SPI PowerNet	Snowy Hydro	Transend	TransGrid	Transpower	National Grid	Scottish & Southern Energy	California ISO	Idaho Power	Montana Power	San Diego Gas & Electric	Southern California Edison
63	115 kV Annual Forced Outage Frequency	1996/97															2.75
	Units ~ Number per year	1997/98															3.08
		1998/99															2.71
		1999/00															2.67
		2000/01															2.92
		14 yr Mean															3.48
64	115 kV Annual Forced Outage Duration	1996/97															390.00
	Units ~ Minutes	1997/98															151.40
		1998/99															377.00
		1999/00															151.00
		2000/01															177.00
		14 yr Mean															225.00
65	115 kV Proportion of Lines without Forced Outages	1996/97															41.70
	Units ~ %	1997/98															37.50
		1998/99															29.20
		1999/00															54.20
		2000/01															29.20
		14 yr Mean															33.00
66	66 kV Annual Forced Outage Frequency	1996/97															2.33
	Units ~ Number per year	1997/98															2.80
		1998/99															3.30
		1999/00															3.61
		2000/01															2.30
		14 yr Mean															3.48
67	66 kV Annual Forced Outage Duration	1996/97															455.00
	Units ~ Minutes	1997/98															332.00
		1998/99															352.00
		1999/00															287.00
		2000/01															149.00
		14 yr Mean															331.00
68	66 kV Proportion of Lines without Forced Outages	1996/97															33.30
	Units ~ %	1997/98															36.70
		1998/99															36.70
		1999/00															20.00
		2000/01															30.00
		14 yr Mean															29.00

Summary of Transmission System data

No.	Service Standard Measure	Period	Australia: ElectraNet SA	Australia: Energy Australia	Australia: Powerlink	Australia: SPI PowerNet	Australia: Snowy Hydro	Australia: Transend	Australia: TransGrid	NZ: Transpower	UK: National Grid	UK: Scottish & Southern Energy	USA: California ISO	USA: Idaho Power	USA: Montana Power	USA: San Diego Gas & Electric	USA: Southern California Edison
69	French Interconnector availability	1996/97									97.30						
	Units ~ %	1997/98									97.90						
		1998/99									97.40						
		1999/00									95.60						
		2000/01									96.20						
70	Scottish Interconnector availability	1996/97									97.30						
	Units ~ %	1997/98									95.40						
		1998/99									98.30						
		1999/00									99.90						
		2000/01									99.70						

Notes :

ElectraNet
* *Interruption - energy not supplied* measured as lost minutes

Powerlink
* *Interruption - energy not supplied* measured as system minutes based on highest maximum demand prior to the event

TransGrid
* *Interruption - energy not supplied* measured as system minutes of TransGrid caused supply interruptions on TransGrid owned equipment

Transpower
* *Interruption - energy not supplied* measured as system minutes = MW minutes / system demand peak
* *Transmission circuit availability* measured for HVAC system only
* *Interconnector and critical ciruit availability* measured for HVDC line
* QPR - Annual Quality Power Report available on website www.transpower.co.nz

National Grid
* Values include anomalous losses which result from particular connection or running arrangments chosen by customers or from other causes which are not due to faults on National Grid equipment.
  These losses were 25 MWh (1996/97), 221 MWh (1997/98), 5 MWh (1998/99), 0.5 MWh (1999/00), and 425 MWh (2000/01).
  The number of such incidents were 5 (1996/97), 5 (1997/98), 3 (1998/99), 1 (1999/00), and 2 (2000/01).

Appendix E Performance Incentive (PI) Model – Generic Example

ACCC TNSP Service Standards — Annual Summary

TNSP A

Transmission Network Service Provider TNSP A
State Qld
Summary for financial year 2003/04

Service Standard	Applicable	Reliable data	Target	Performance Result	Collar $M	Cap $M	Incentive / (Penalty) $M
Circuit Availability (total)	☑	☑	99.20	99.30	($ 0.50)	$ 0.50	$ 0.08
Circuit Availability (critical)(peak)	☑	☑	99.85	99.94	($ 0.38)	$ 0.38	$ 0.34
Circuit Availability (non-critical)(peak)	☑	☑	99.85	99.80	($ 0.13)	$ 0.13	($ 0.01)
Circuit Availability (critical)(inter)	☑	☑	99.85	99.83	($ 0.13)	$ 0.13	($ 0.00)
Circuit Availability (non-critical)(inter)	☑	☑	99.75	99.74	($ 0.13)	$ 0.13	($ 0.00)
Loss of Supply Event Frequency Index							
> 0.2 minutes pa	☑	☑	5.00	1.00	($ 0.25)	$ 0.25	$ 0.16
> 1.0 minutes pa	☑	☑	2.00	5.00	($ 0.25)	$ 0.25	($ 0.25)
Average Outage Duration	☑	☑	200.00	200.00	($ 0.38)	$ 0.38	$ 0.00
Average Outage Duration (lines)	☑	☑	150.00	156.45	($ 0.19)	$ 0.19	($ 0.05)
Average Outage Duration (transformers)	☑	☑	150.00	144.00	($ 0.19)	$ 0.19	$ 0.00
Transmission Constraints (intra-regional)	☑	☐	0.00	0.00	$ 0.00	$ 0.00	$ 0.00
Transmission Constraints (inter-regional)	☑	☐	0.00	0.00	$ 0.00	$ 0.00	$ 0.00
Market Measure 1	☐	☐					
Market Measure 2	☐	☐					
Market Measure 3	☐	☐					
TOTAL					**($ 2.50)**	**$ 2.50**	**$ 0.26**

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ACCC TNSP Service Standards | Data Entry

Service Standards Scheme for financial period beginning **2003**

Historical Data

Service Standard	1996/97	1997/98	1998/99	1999/00	2000/01		
Circuit Availability (total)	99.41	99.46	99.19	99.54	99.49		
Circuit Availability (critical)(peak)	99.95	99.94	99.90	99.94	99.95		
Circuit Availability (non-critical)(peak)	99.93	99.90	99.75	99.97	99.96		
Circuit Availability (critical)(inter)	99.88	99.92	99.89	99.93	99.92		
Circuit Availability (non-critical)(inter)	99.74	99.81	99.89	99.77	99.93		
Loss of Supply Event Frequency Index							
> 0.2 minutes pa	5.00	5.00	3.00	9.00	5.00		
> 1.0 minutes pa	3.00	2.00	0.00	2.00	1.00		
Average Outage Duration	478.20	411.40	165.40	141.80	282.60		
Average Outage Duration (lines)	94.80	362.10	216.90	112.80	96.15		
Average Outage Duration (transformers)	103.95	127.80	46.95	88.80	59.55		
Transmission Constraints (intra-regional)							
Transmission Constraints (inter-regional)							
Market Measure 1							
Market Measure 2							
Market Measure 3							

Performance Data

Service Standard	2003/04	2004/05	2005/06	2006/07	2007/08	Average
Circuit Availability (total)	99.30					99.30
Circuit Availability (critical)(peak)	99.94					99.94
Circuit Availability (non-critical)(peak)	99.80					99.80
Circuit Availability (critical)(inter)	99.83					99.83
Circuit Availability (non-critical)(inter)	99.74					99.74
Loss of Supply Event Frequency Index						
> 0.2 minutes pa	1.00					1.00
> 1.0 minutes pa	5.00					5.00
Average Outage Duration	200.00					200.00
Average Outage Duration (lines)	156.45					156.45
Average Outage Duration (transformers)	144.00					144.00
Transmission Constraints (intra-regional)						
Transmission Constraints (inter-regional)						
Market Measure 1						
Market Measure 2						
Market Measure 3						

Performance Targets

Service Standard	2003/04	2004/05	2005/06	2006/07	2007/08	Historical Average	Overall Average
Circuit Availability (total)	99.20	99.20	99.20	99.20	99.20	99.42	99.40
Circuit Availability (critical)(peak)	99.85	99.85	99.85	99.85	99.85	99.94	99.94
Circuit Availability (non-critical)(peak)	99.85	99.85	99.85	99.85	99.85	99.90	99.89
Circuit Availability (critical)(inter)	99.85	99.85	99.85	99.85	99.85	99.91	99.90
Circuit Availability (non-critical)(inter)	99.75	99.75	99.75	99.75	99.75	99.83	99.81
Loss of Supply Event Frequency Index							
> 0.2 minutes pa	5.00	5.00	5.00	5.00	5.00	5.40	4.67
> 1.0 minutes pa	2.00	2.00	2.00	2.00	2.00	1.60	2.17
Average Outage Duration	200.00	200.00	200.00	200.00	200.00	295.88	279.90
Average Outage Duration (lines)	150.00	150.00	150.00	150.00	150.00	176.55	173.20
Average Outage Duration (transformers)	150.00	150.00	150.00	150.00	150.00	85.41	95.18
Transmission Constraints (intra-regional)							
Transmission Constraints (inter-regional)							
Market Measure 1							
Market Measure 2							
Market Measure 3							

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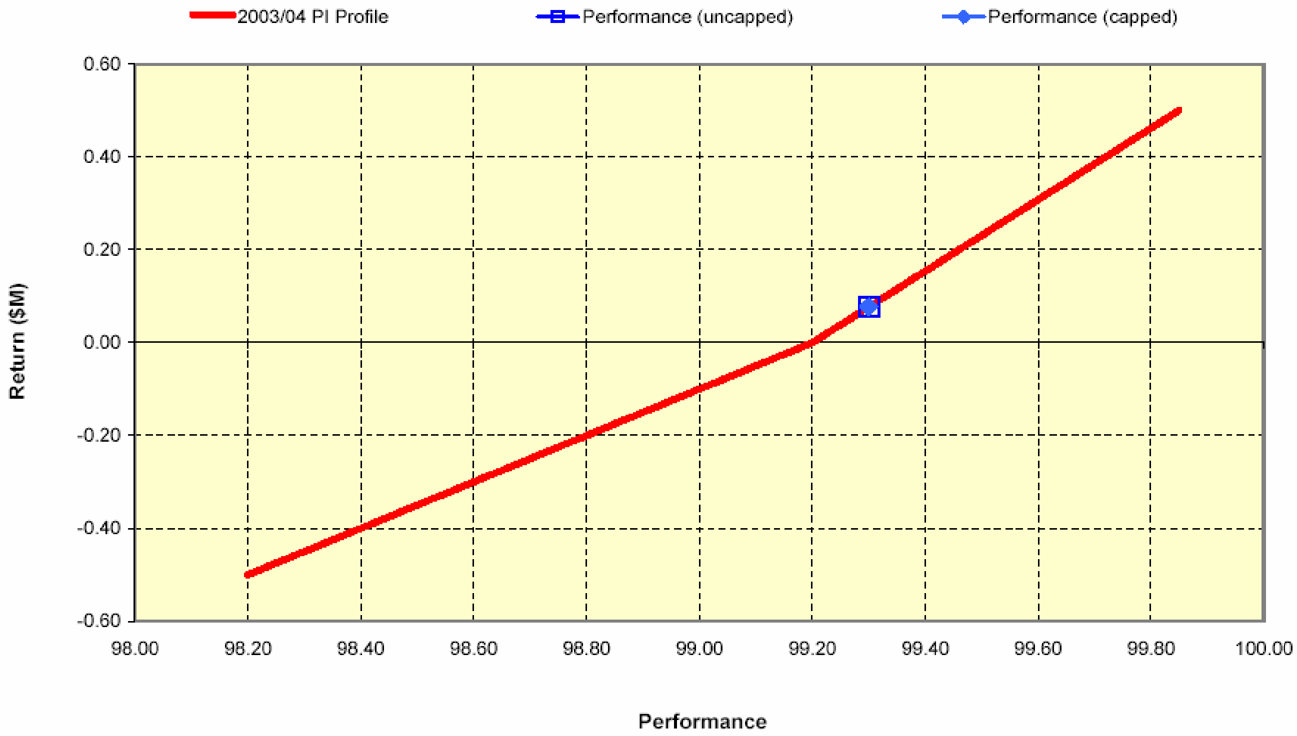
Maximum Incentive Performance Values (cap)

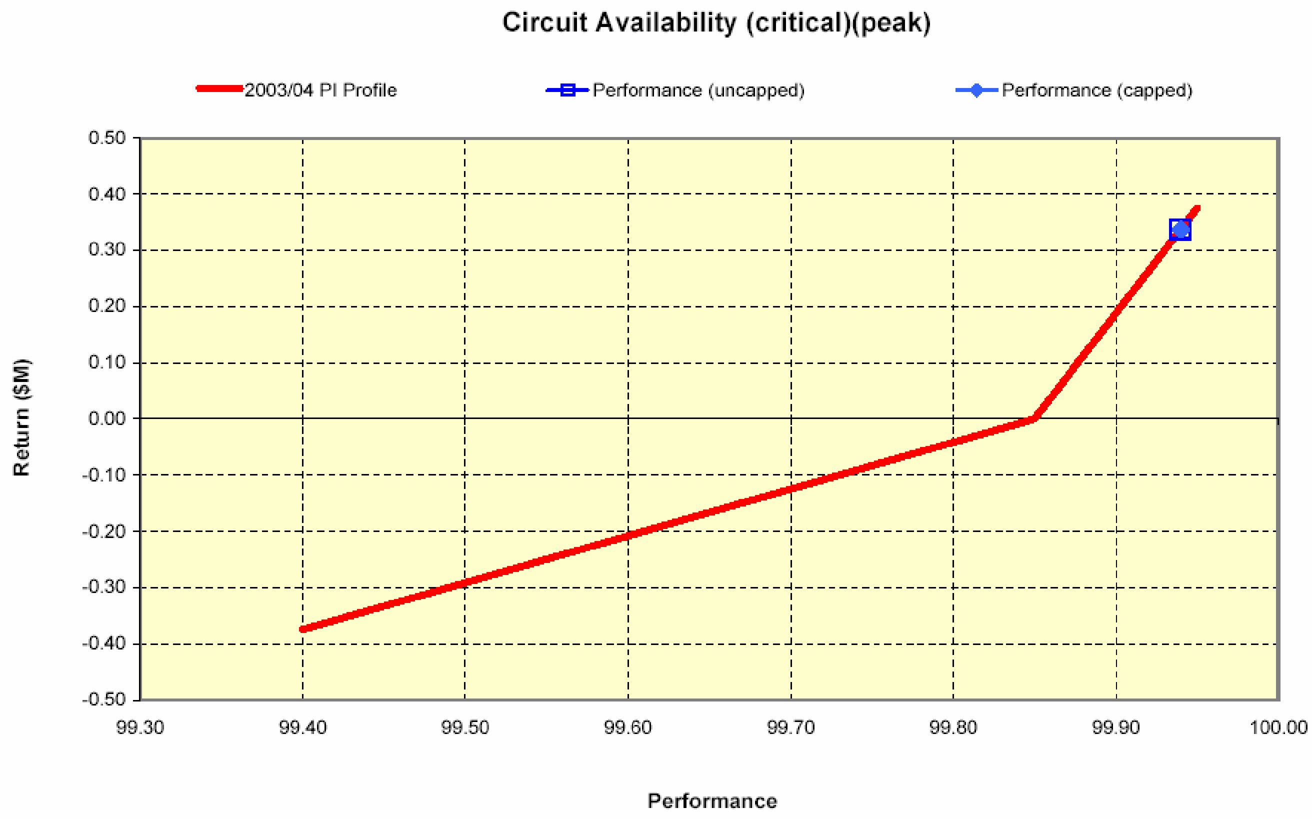
Service Standard	2003/04	2004/05	2005/06	2006/07	2007/08
Circuit Availability (total)	99.85	99.85	99.85	99.85	99.85
Circuit Availability (critical)(peak)	99.95	99.95	99.95	99.95	99.95
Circuit Availability (non-critical)(peak)	99.95	99.95	99.95	99.95	99.95
Circuit Availability (critical)(inter)	99.95	99.95	99.95	99.95	99.95
Circuit Availability (non-critical)(inter)	99.95	99.95	99.95	99.95	99.95
Loss of Supply Event Frequency Index					
> 0.2 minutes pa	0.00	0.00	0.00	0.00	0.00
> 1.0 minutes pa	0.00	0.00	0.00	0.00	0.00
Average Outage Duration	175.00	175.00	175.00	175.00	175.00
Average Outage Duration (lines)	125.00	125.00	125.00	125.00	125.00
Average Outage Duration (transformers)	125.00	125.00	125.00	125.00	125.00
Transmission Constraints (intra-regional)					
Transmission Constraints (inter-regional)					
Market Measure 1					
Market Measure 2					
Market Measure 3					

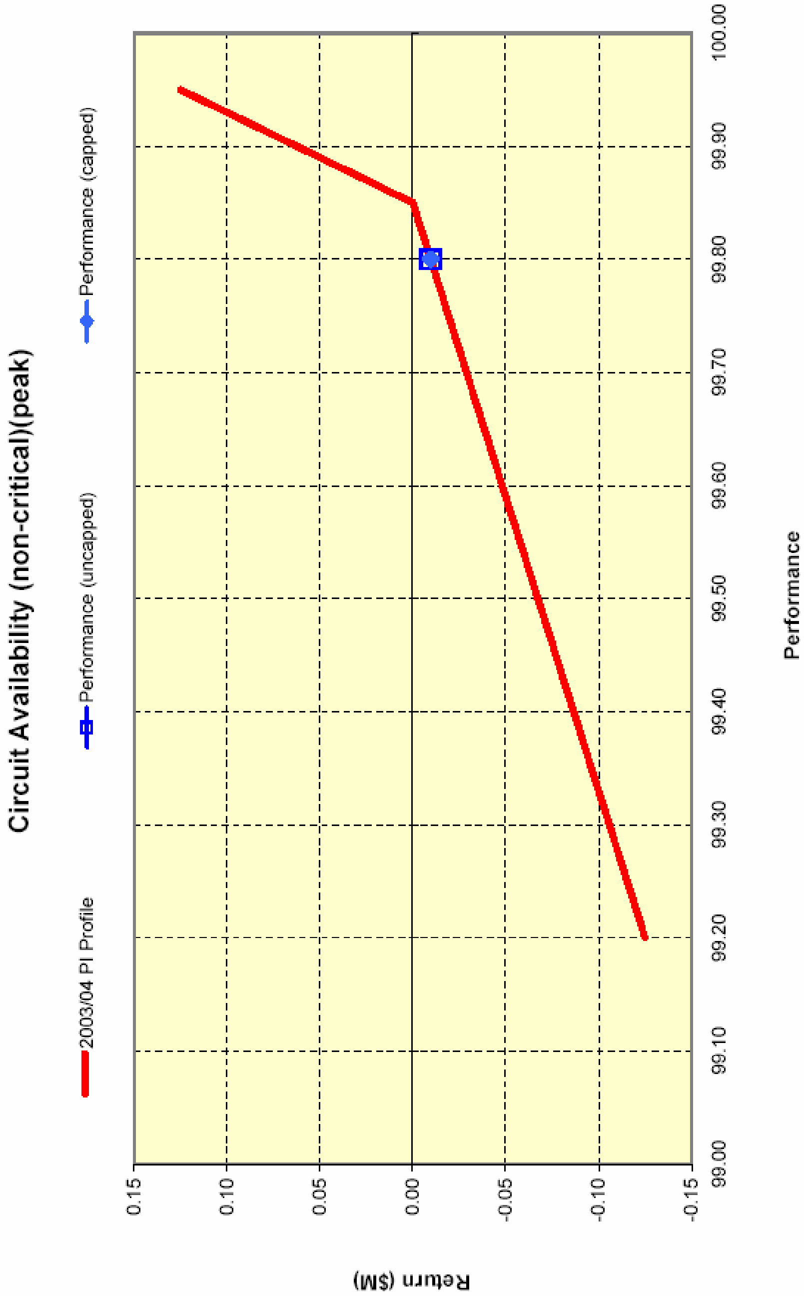
Maximum Penalty Performance Values (collar)

Service Standard	2003/04	2004/05	2005/06	2006/07	2007/08
Circuit Availability (total)	98.20	98.20	98.20	98.20	98.20
Circuit Availability (critical)(peak)	99.40	99.40	99.40	99.40	99.40
Circuit Availability (non-critical)(peak)	99.20	99.20	99.20	99.20	99.20
Circuit Availability (critical)(inter)	99.20	99.20	99.20	99.20	99.20
Circuit Availability (non-critical)(inter)	99.25	99.25	99.25	99.25	99.25
Loss of Supply Event Frequency Index					
> 0.2 minutes pa	12.00	12.00	12.00	12.00	12.00
> 1.0 minutes pa	5.00	5.00	5.00	5.00	5.00
Average Outage Duration	240.00	240.00	240.00	240.00	240.00
Average Outage Duration (lines)	175.00	175.00	175.00	175.00	175.00
Average Outage Duration (transformers)	205.00	205.00	205.00	205.00	205.00
Transmission Constraints (intra-regional)					
Transmission Constraints (inter-regional)					
Market Measure 1					
Market Measure 2					
Market Measure 3					

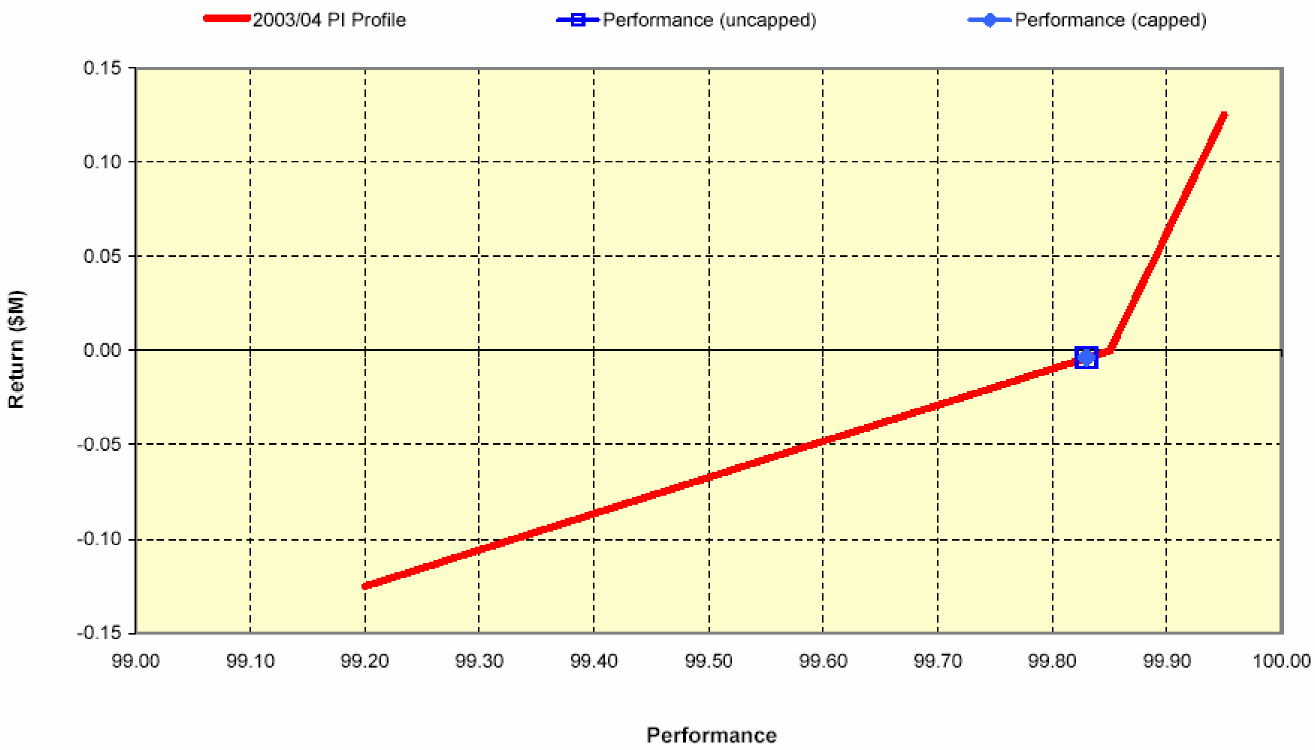
Circuit Availability (total)

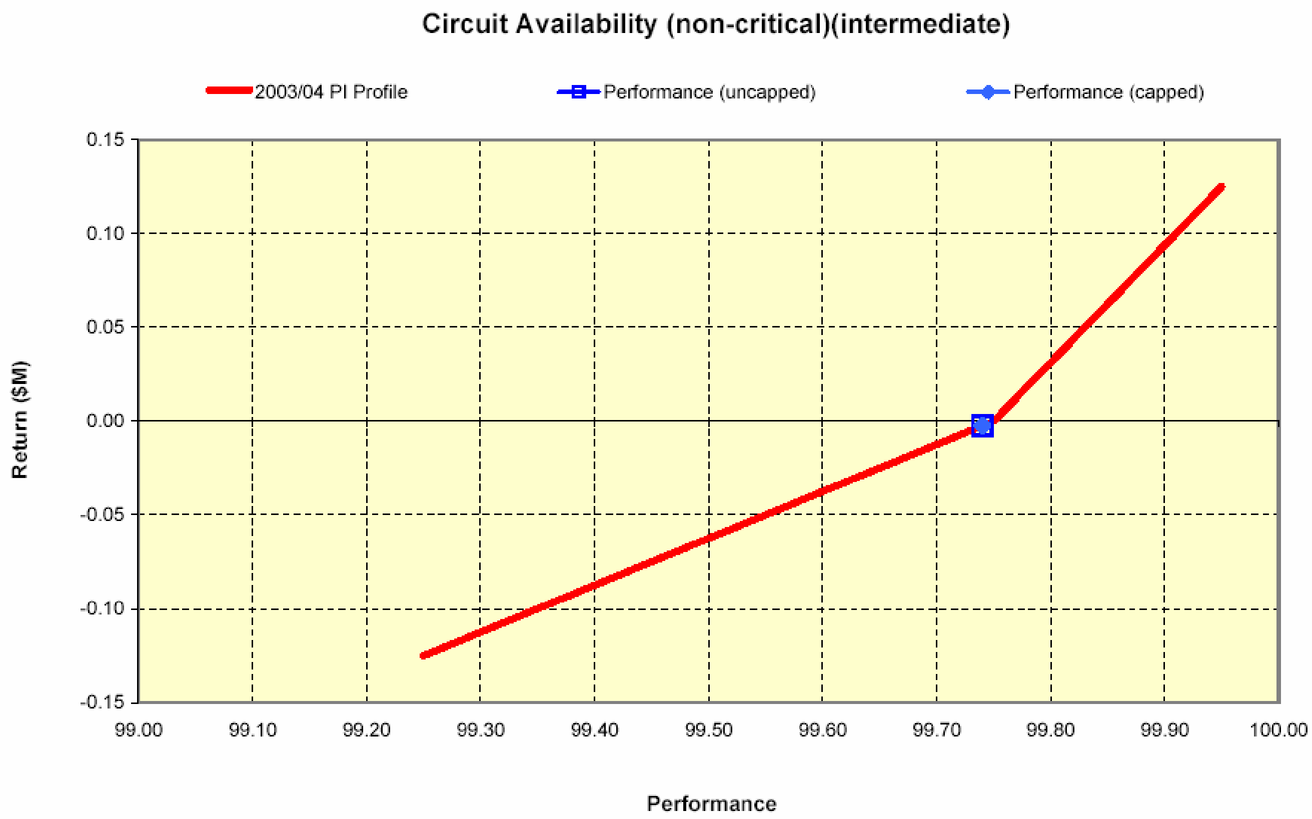



Circuit Availability (critical)(peak)
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
Return ($M)
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
99.30
99.40
99.50
99.60
99.70
99.80
99.90
100.00
Performance


Circuit Availability (non-critical)(peak)
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
Return ($M)
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
99.00
99.10
99.20
99.30
99.40
99.50
99.60
99.70
99.80
99.90
100.00
Performance

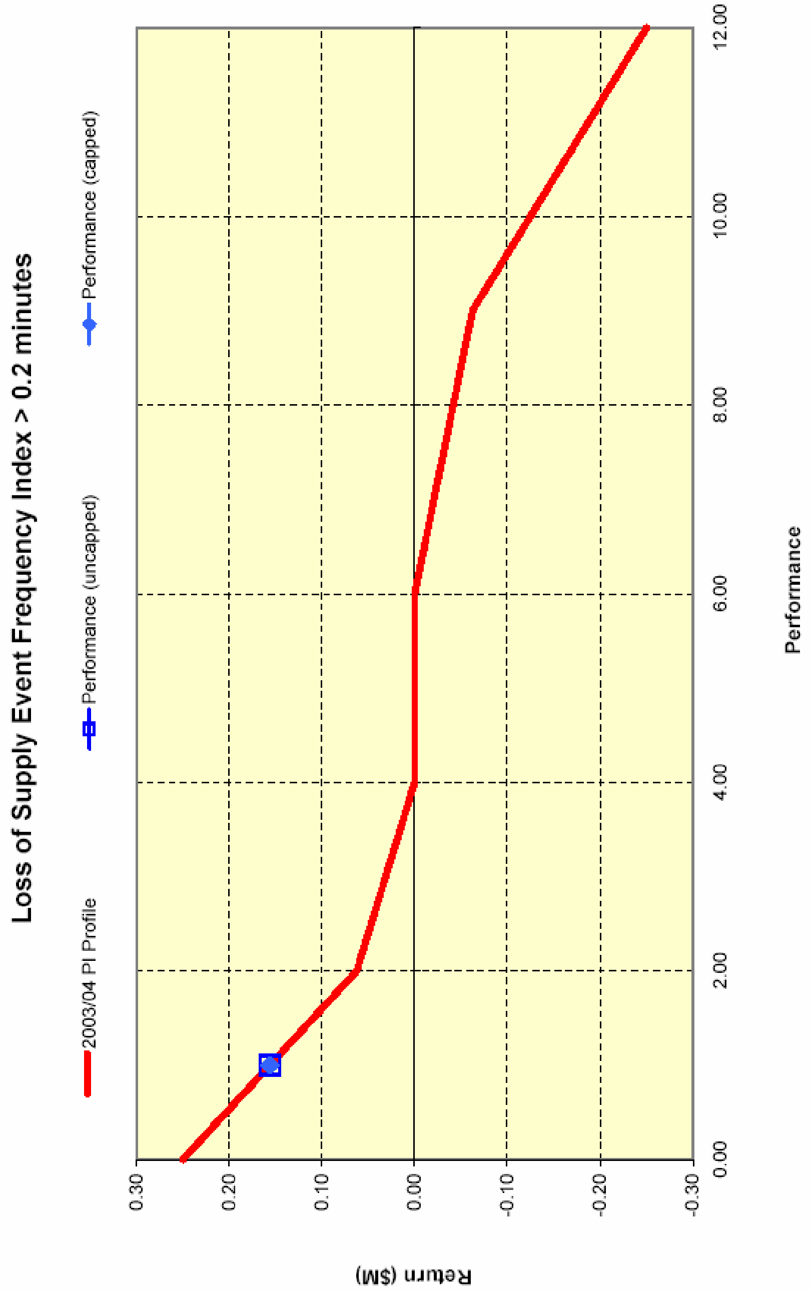
Circuit Availability (critical)(intermediate)




Circuit Availability (non-critical)(intermediate)
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
Return ($M)
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
99.00
99.10
99.20
99.30
99.40
99.50
99.60
99.70
99.80
99.90
100.00
Performance

ACCC TNSP Service Standards

Measure 2a chart



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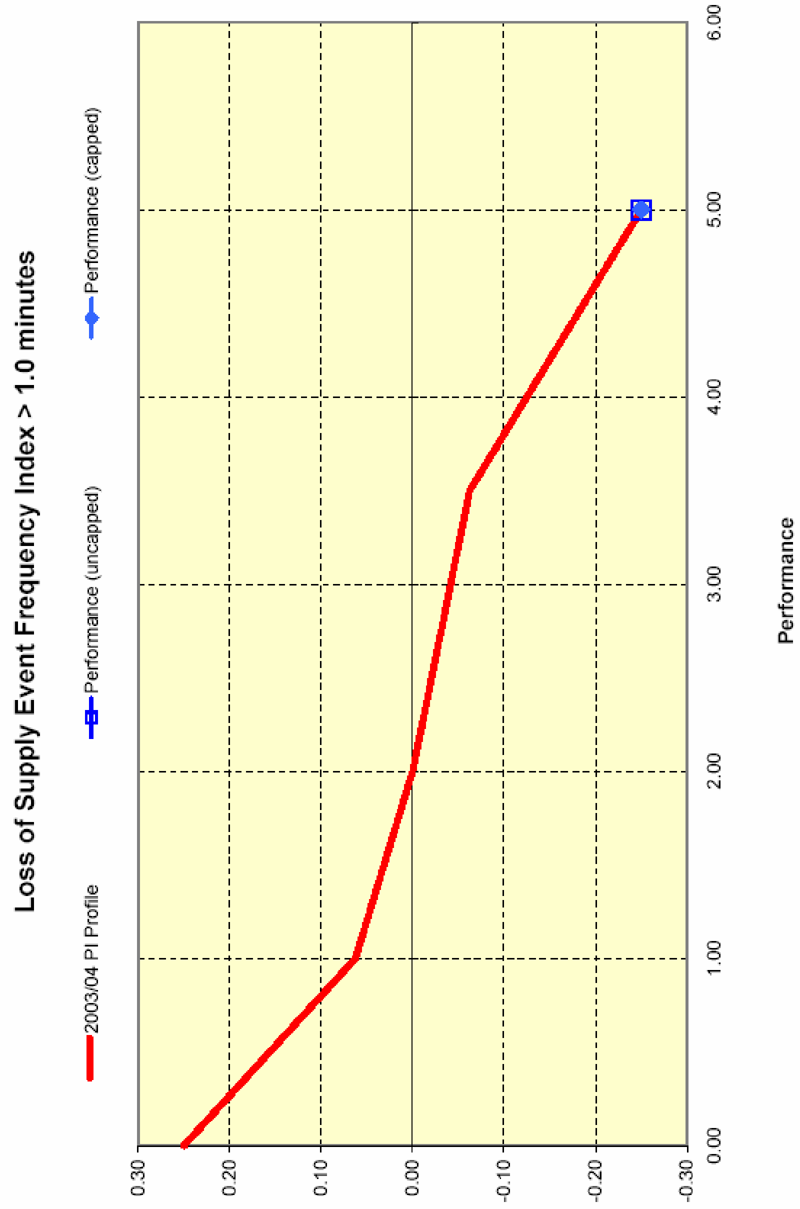
ACCC TNSP Service Standards

Measure 2b chart



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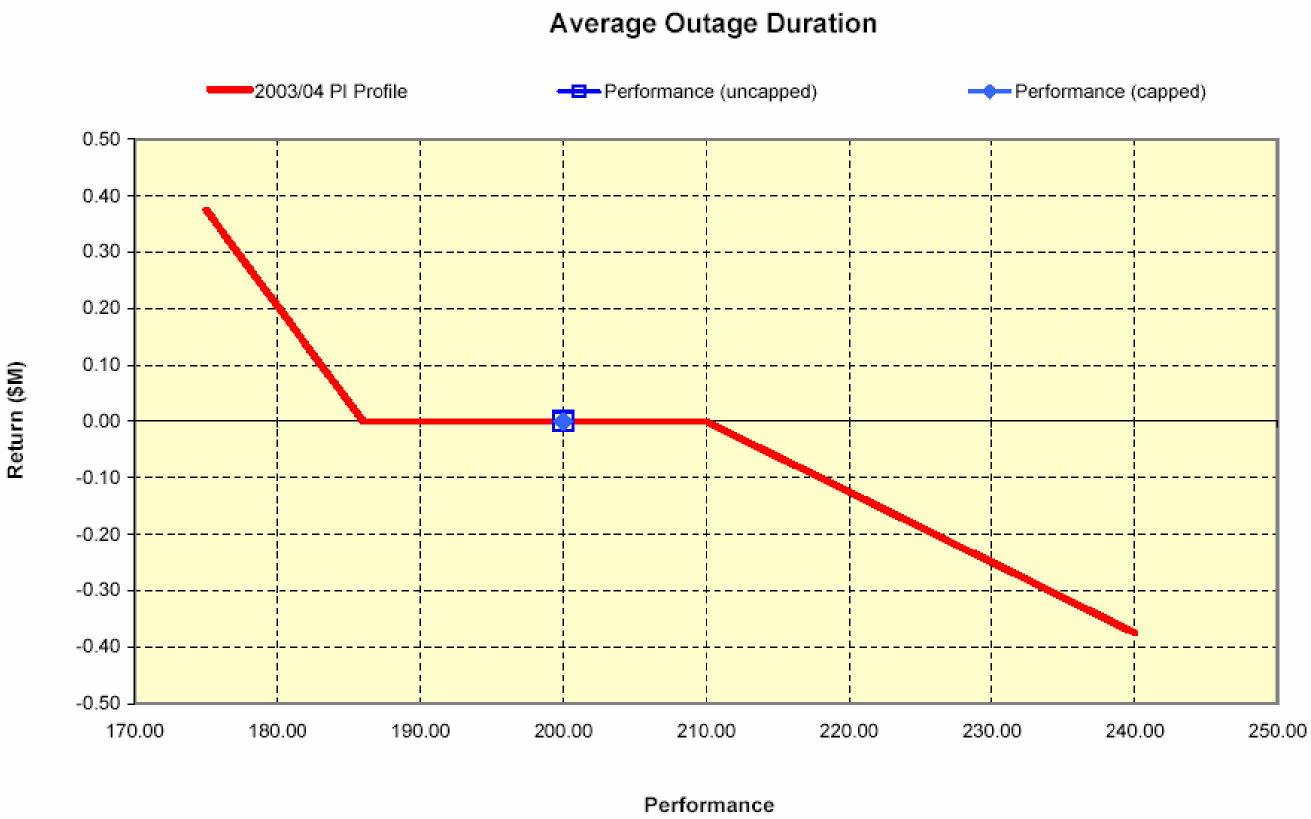
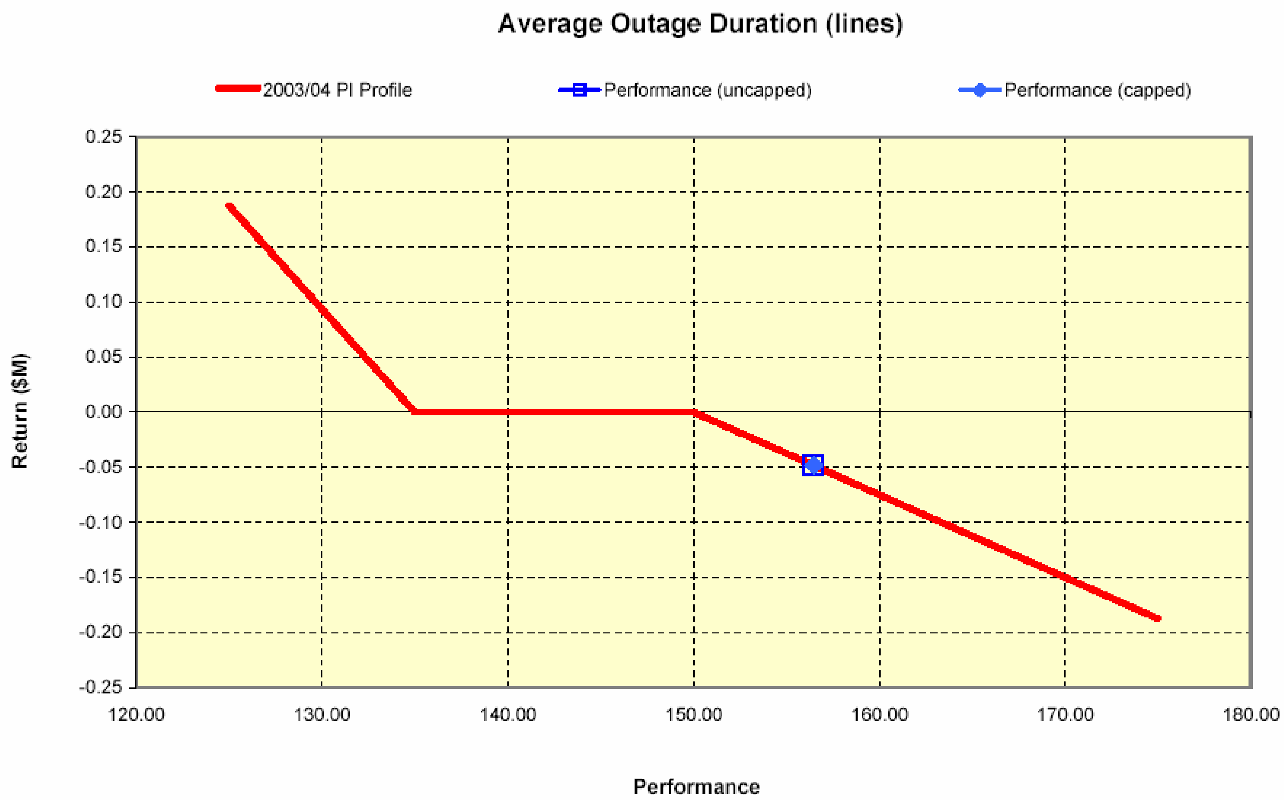
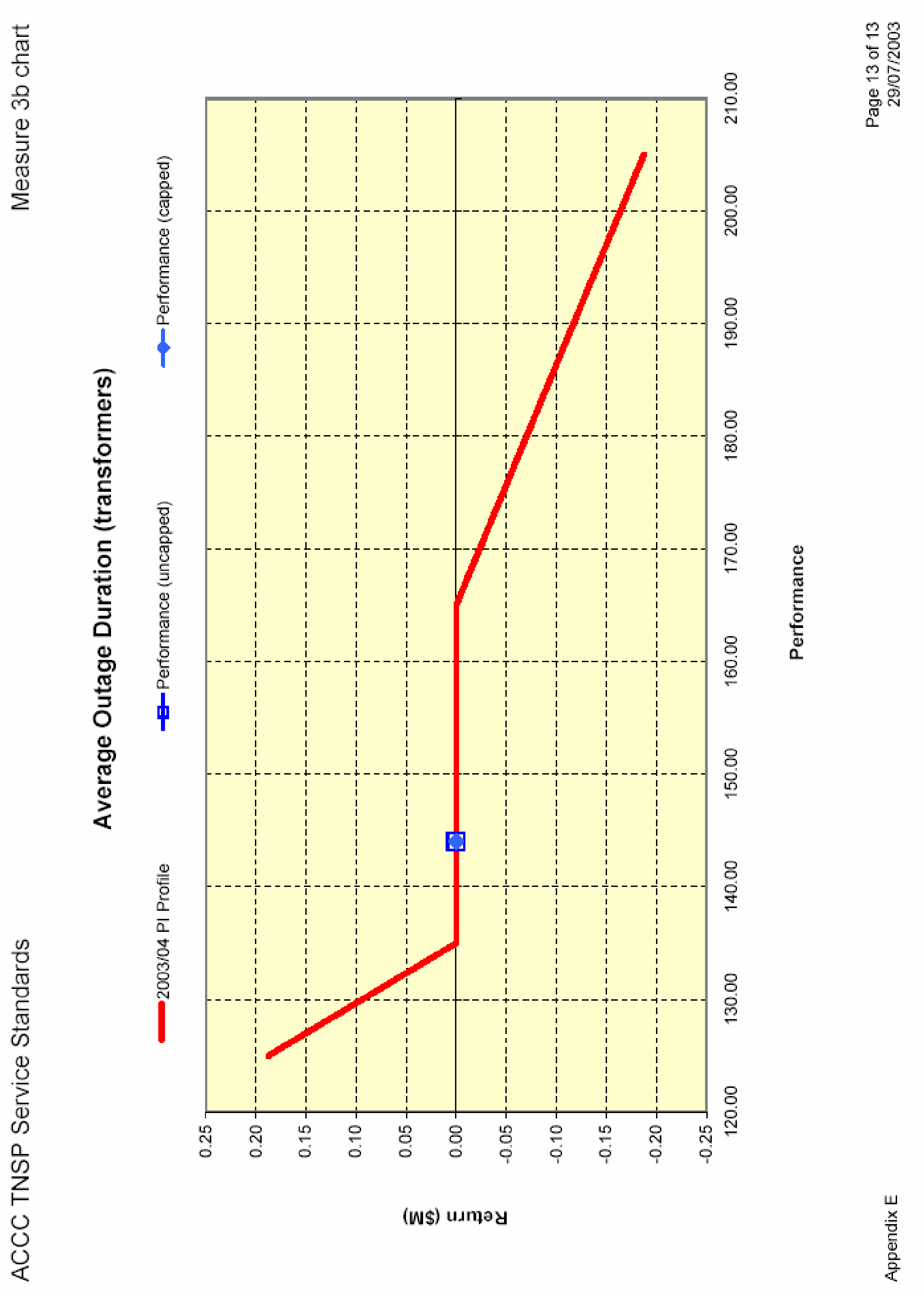

Average Outage Duration
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
Return ($M)
170.00
180.00
190.00
200.00
210.00
220.00
230.00
240.00
250.00
Performance


Average Outage Duration (lines)
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
Return ($M)
120.00
130.00
140.00
150.00
160.00
170.00
180.00
Performance


ACCC TNSP Service Standards
Measure 3b chart
Average Outage Duration (transformers)
2003/04 PI Profile
Performance (uncapped)
Performance (capped)
Return ($M)
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
120.00
130.00
140.00
150.00
160.00
170.00
180.00
190.00
200.00
210.00
Performance
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Appendix F ERM Energy Report on Statistical Soundness of Selected Performance Measures

ADVICE ON STATISTICAL SOUNDNESS OF TRANSMISSION NETWORK SERVICE MEASURES

Report

Copy emailed 15/5/02.

For:
SKM

May 2002

Report No. 8020297RP1

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Approved by:	DAVID ADAMS
Position:	Project Director
Signed:	[signature]
Date:	~~0 XXX, 0000~~ 17 MAY 2002

Environmental Resources Management Australia Pty Ltd Quality System

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Chapter 1

STATISTICAL SOUNDNESS

SKM has asked ERM Energy for advice on 5 proposed performance measures for TNSPs.

The measures are:

1) Circuit Availability (%)

2) Minutes off supply (minutes pa)

3) Average restoration Period (minutes per event)

4) Hours constrained (Intra-regional)

5) Hours constrained (Inter-regional)

1.1 ASSESSMENT OF STATISTICAL SOUNDNESS OF MINUTES OFF SUPPLY

TNSPs have submitted that the measure of 'minutes off supply' is not statistically sound as a measure of performance because:

- Events causing loss of supply are stochastic, being caused by weather or other unpredictable events beyond the control of TNSPs; and
- It is not sound to assess performance using a one-point measure such as average, let alone moving average.

ERM Energy agrees with TNSPs that there are statistical problems with the measure of 'minutes off supply', as illustrated in Table 1.

For simplicity, assume that outages are caused solely by uniform weather events and the TNSP does not change performance. Illustratively, suppose that there was one weather event causing outages in all years except Year 5, when there were 4 events. The measure of minutes off supply would be higher in Year 5 than all other years, even though the performance of the TNSP may be the same. The 'moving average minutes off' would be understated in Year 5, but overstated in Years 6 and 7.

Table 1 Problem with one point measure (illustrative data only)

Year	Number of similar weather events	Minutes off supply	Moving average (say 3 year)
1	1	2	
2	1	2	-
3	1	2	2
4	1	2	2
5	**4**	**8**	**4**
6	1	2	4
7	1	2	4
8	1	2	2
9	1	2	2

The issue would be similar if, instead of 4 identical events in Year 5, there was an event of 4 times the severity (if it was possible to measure severity of an event).

Another way of seeing the problem is by analogy with river heights during flooding. The performance of an infrastructure operator, eg. dam operator, in managing floods is not measured by the average of river heights during all flood events in a year, let alone by the moving average over subsequent years. Rather it is assessed by mitigation of river heights during the flood, taking into account the frequency and severity of the underlying rainfall event.

What makes TNSP performance harder to measure is that there is no simple underlying measure of severity of external events causing outages. ERM Energy is aware of statistical studies commissioned by NSPs, which conclude it is not possible to correlate measures of weather with outages. Hence it does not seem possible to define inclusions and exclusions or transform the measure to make it valid.

However outages are important to customers so it is important to have some measure of TNSP performance. Fortunately there is a better measure than minutes off supply, which is discussed in the next section. Provided that a better measure is implemented, ERM Energy recommends that minutes off supply not be used as a measure.

1.2 ASSESSMENT OF STATISTICAL SOUNDNESS OF OTHER MEASURES

ERM Energy notes that the statistical problem with minutes off supply occur to a lesser extent with the other proposed measures.

Average restoration time will depend to some extent on the underlying cause. For example, one would expect that it would take longer to restore supply after a very severe storm or cyclone than after a lesser storm. SKM have suggested excluding planned outages and force majeure events but not severe weather events. ERM Energy suggests that extreme weather events might be excluded.

Circuit availability probably needs certain events to be excluded,. ERM Energy agrees with exclusions suggested by SKM.

Hours constrained also needs events to be excluded. For example, some events causing constraints are beyond the control of TNSPs, eg. bidding by generators or demand patterns, so hours constrained has a stochastic component. Hence it is necessary to exclude constraints not associated TNSP performance. ERM agree with the exclusions proposed by SKM, especially constraints when the transmission network is at or near nominal capacity for inter- or intra-regional transmission.

This raises a definitional issue of what constitutes nominal capacity. ERM Energy is not qualified to which might be defined in terms of parameters as set in the dispatch system.

1.3 ANOTHER OUTAGE MEASURE

ERM supports the general approach suggested by Powerlink, namely to analyse outages in terms of frequency and severity as a statistical distribution.

It is expected theoretically, and observed practically, that the number of outage events in a given period is a Poisson distribution. The general approach is as follows:

1. List outage durations over time
2. To reduce outages to a 1-dimensional distribution, apply a 'cut-off' severity, eg. greater than X minutes, and count the number of events in a given time.

3. Hence calculate the fundamental parameter (μ) of the best-fit Poisson distribution. Note that μ need not be an integer, as it is the expected value of the number of outages in a given time.

4. The variance of a Poisson distribution is equal to the square root of the mean, so the cut-off needs to be low enough to have 'sufficiently many' events.

The Poisson mean, μ, associated with a given severity is a useful statistical measure of performance in a given period. However it may be difficult for customers to interpret and for assessing changes in performance over time.

Powerlink has published[1] a statistical measure that is more meaningful to customers, namely 'return period'. The return period is the average period at which events of greater than specified size will occur. For example, a Powerlink outage of 1 minute has a return period of 1.8 years. In other words, a 1 minute outage will occur, on average, every 1.8 years. In terms of return periods, on average, every 5 years, there will be an outage of 6.3 minutes or greater.

ERM Energy believes that return periods have the potential to be a useful measure for reporting TNSP performance. Indeed, similar measures are used in other industries, such as water. For example, Sydney Water uses capacity to accommodate rainfall events of specified return period as an indicator of sewerage system performance. This has been used in customer willingness to pay surveys to assess capital expenditure options.

Return periods depend on the infrastructure design and environment, as well as operator performance. For example, a return period of 1.8 years for a 1 minute outage on a network could be changed by capital expenditure on the network. Also, a network designed for 1 minute outage every 1.8 years in one region may have quite a different return period in another region with different climatic conditions. Hence it is not meaningful to benchmark return periods for different TNSPs.

ERM Energy believes that return periods are a relatively simple measure that facilitates meaningful performance reporting. They should also enable testing of customer demand for changes in return period, even if through measures such as willingness to pay. However, further work would be needed to define such measures, eg:

- Establishing parameters for different TNSPs;

[1] Sharp B., "Monitoring System Reliability Using Statistical Methods", CEPSI Conference, 1998.

- Finding appropriate statements of measures, eg. outages corresponding to specified return periods, or return periods corresponding to specified outages;
- Testing responsiveness of measures to TNSP performance;
- Confirming statistical soundness of measures, eg. robustness to methods of calculation, eg. period, cut-off; and
- Analysing variations over time.

Without having done the above analysis, ERM Energy cannot comment on how well changes in the Poisson mean or return period over time might measure changes in TNSP performance.

However, Powerlink has submitted[2] that Control Chart techniques can be used to assess changes in underlying performance over time, using Australian Standard AS 3940. ERM Energy accepts that it would be statistically sound to measure TNSP performance by analysing variance from long run averages using Poisson Control Chart techniques, eg. as described in Australian Standards AS 3940.

CONCLUSIONS

ERM Energy recommends that system minutes off supply not be used as a measure of TNSP performance provided that a better measure of customer service is developed, such as Control Charting to measure variances from long run averages.

Other proposed measures of TNSP performance are acceptable with the proposed exclusions and inclusions.

2 Powerlink, "Powerlink's Comments on ACCC's Draft Decision on Queensland Transmission Network Revenue Cap 2002-2006/07", August 2001

Appendix G Consultation Process – List of Meetings, Forums, Presentations

Date	Consultation Type	Organisations Represented	Purpose
03/12/01	Project briefing session	ACCC, SKM, Powerlink, SPI PowerNet, EnergyAustralia, ElectraNet SA, TransGrid, SMHEA	Brief TNSPs on project scope and objectives
19/12/01	Roundtable meeting of market participants	ACCC, SKM, NEMMCO, Origin Energy, TransGrid, Tarong Energy, SPI PowerNet, SAIIR, CitiPower, Agility, VENCorp	Brief market participants on scope and objectives
17/01/02	Meeting	ACCC, SKM, Powerlink	Discuss statistical relevance of performance measures and other issues
21/01/02	Roundtable meeting	ACCC, SKM, TransGrid, Powerlink, ElectraNet SA, SPI PowerNet, Transend	Discussion of principles that should apply to service standards, and other issues
23/01/02	Meeting	SKM, Transend	Discuss survey response and other issues
23/01/02	Meeting	SKM, OTTER	Discuss survey results, regulatory issues / overlaps and other issues
29/01/02	Meeting	SKM, VENCorp, SPI PowerNet	Discuss survey response and other issues
30/01/02	Meeting	ACCC, SKM, EnergyAustralia	Discuss survey response and other issues
30/01/02 30/01/02	Meeting Meeting	ACCC, SKM, IPART ACCC, SKM, TransGrid	Discuss survey results, regulatory overlap and other issues Discuss survey response and other issues
31/01/02	Meeting	ACCC, SKM, SAIIR, ElectraNet SA	Discuss survey response and other issues
31/01/02	Meeting	ACCC, SKM, NECA	Discuss NECA views and market impact issues
06/02/02	Meeting	ACCC, SKM, NEMMCO	Discuss survey results, market impact and other issues
06/02/02	Meeting	ACCC, SKM, Powerlink	Discuss survey response and other issues
07/02/02	Meeting	SKM, QCA	Discuss survey results, regulatory overlaps and other issues
18/02/02	Teleconference	SKM, SMHEA	Discuss survey response and SMHEA system configuration
21/02/02	Meeting	ACCC, SKM, NEMMCO	Discuss survey results, role of TNSPs, direction of NEM performance measures and other issues
21/3/02	Meeting	ACCC, SKM, Dept of Industry, Tourism & Resources	Review Stage 1 discussion paper. Discuss direction of NEM performance measures and other issues
21/03/02	Roundtable meeting	ACCC, SKM, all TNSPs	Review Stage 1 discussion paper
28/03/02	Public Forum	ACCC, SKM, various market participants, State based regulators, etc	Present and discuss Stage 1 discussion paper
06/05/02	Meeting	ACCC, SKM, EAG, EMPS, ECCSA	Discuss Stage 1 discussion and other consumer issues
10/05/02	Meeting	SKM, IPART	Review IPART submission re Stage 1 discussion paper

Appendix H Summary of Issues Raised by Consumer Group Representatives

- The lack of forward planning in the market creates uncertainty and volatility.
- Volatility creates risk and consumers are prepared to pay for risk mitigation, but not when the uncertainty/risk is exploited by generator "gaming".
- In SA, some customers signed up on long term contracts @ $60-$70/Mwh, while others waited and are buying on spot market at $30/Mwh (average) but with greater risk.
- Government has given a 2 year period of "grace" for customers to stay on old tariffs.
- Longer term transmission system planning should return to TNSP responsibility.
- Network businesses in Australia both transmission and distribution tend to be underfunded (Capex).
- Distribution in SA had never been tested under extreme weather conditions until summer 2000/01 and then failed.
- Many networks businesses report concern over ageing assets.
- Refer ElectraNet submission re Capex deficiency.
- Similar story from SPI PowerNet.
- ORG recognised the problem in Victoria and approved extra capex.
- Many networks businesses reported concern over ageing, outdated and unreliable control and protection systems.
- Analysis indicated that SA needed a new "solid" interconnector, followed by a new base load power station.
- SA does not have enough low cost generation, and the cost of doing business in SA was too high.
- Consumer representatives believed there is a somewhat uncontrolled driving of demand from the "bottom end" of the market, the unprecedented growth in domestic air conditioning load, and the current response was the building "peaking stations" (gas fired). This was as a result of the lack of long term planning, and the shortage of skills/knowledge/experience in critical areas such as system planning, protection, control, and system operations.
- Some studies indicate transmission costs to be $6-$12/MWh, but that this was reasonable compared to the high cost of volatility if the spot price went to VOLL. It is therefore preferable to optimise (not minimise) transmission costs, rather than suffer high costs due to transmission constraints.
- There are 5 key areas of transmission performance that should be monitored/measured/incentivised
  1) Management of planned outages (eg. reference northern NSW incident affecting prices in Qld).
  2) Impact of electrical storms on SA/Vic interconnector.
  3) "Soft transition", ie. use of emergency ratings on overload capability to mitigate against hitting "hard" ceilings caused by application of "constraint equations".
  4) Minimise the impact of unplanned outages on the market.
  5) Recognise and give incentives to TNSP's to plan transmission "downtime" when it is not likely to impact on the market.

- Some consumer representatives also spoke about the need to also consider the quality of supply issue. Harmonics (particularly 7^{th} and 11^{th}) and transients are an increasing problem with modern industry/business reliance on computers and process control.
- Capex expenditure must be adequate to meet new demand, new generation capacity, and refurbishment/replacement requirements.
- It was noted that while TNSP total revenue cap determination came under ACCC jurisdiction, proportional allocation of TUOS pricing was determined/approved by State regulators. This, and other regulatory issues, presented a huge constraint to the economic justification of embedded generation and alternative energy options.
- Consumer representatives spoke about the lack of incentive under the existing regulatory regimes to promote embedded generation and alternative energy sources. TUOS "nodal allocation" was not always being applied in a cost reflective manner, and this could represent a significant barrier to the cost justification of embedded generation.
- It was emphasised that above all other considerations, consumers would benefit most by having an "unconstrained transmission system", as constraints provide the opportunity for generator "gaming".

Appendix I Submissions – ElectraNet SA

SKM

ElectraNet SA

ACC Service Standards Review – Response to SKM Data Request

26 June 2002

ElectraNet SA
electricity transmission network

1. Introduction

ElectraNet SA is committed to the ACCC Service Standards Review's objective to introduce financial incentives for TNSPs to maintain and exceed base service levels contained in the regulatory compact within a low risk reward framework.

To date the review has focussed on developing suitable performance measures. The purpose of this note is to respond to the 29 April 2002 and 20 May 2002 data requests from Sinclair Knight Merz (SKM). The note also makes comment on the practical implementation of the performance measures proposed by SKM and recommends some refinements.

2. Performance Measure Success Criteria

In order to introduce appropriate incentives within a low risk reward framework, the performance measures to which financial incentives are attached must satisfy the following criteria:

- Improved performance against the selected measures must be of real benefit to customers (directly or via the market); and
- TNSPs must be able to control and improve their performance against these measures by making relatively small expenditures and changes in asset management practices.

3. What do Customers and the Market Want?

In our view customers are primarily concerned about price and minimising the number and duration of interruptions to supply.

Market participants are concerned about firm access. Introducing financial incentives for TNSPs to minimise the market impact of transmission network constraints is a step towards introducing firm access arrangements.

However, a fundamental issue that remains to be resolved before constraint measures can be finalised is the question of what constitutes "minimising market impact"? There appears to be a fundamental conflict between the desires to introduce:

- Incentives for TNSPs to be responsive to market signals and reschedule transmission outages at short notice in order to minimise binding transmission constraints; and
- Increased predictability in the timing of planned outages – some market participants will act to hedge their financial positions in response to advance notice of planned outages and may face an adverse financial impact if these outages are subsequently rescheduled in order to minimise binding constraints.

This issue has been raised a number of times previously and should be clearly highlighted and the views of market participants sought during the public consultation processes arising from the ACCC Service Standards Review.

4. Definition of Force Majeure

ElectraNet SA generally supports the definition of force majeure proposed by SKM, but recommends some fine-tuning. On the face of it the proposed definition would exclude most events (e.g. all storms would be excluded). However, when events occur leading to interruption to supply the TNSP's response time is what really matters to customers.

We believe that the intent of the definition should be to exclude third party events and natural events for which the TNSP cannot reasonably be expected to cater in the design of the network or in providing response capability (consistent with good electricity industry practice). Extreme events of this nature, while they are very uncommon, can be expected to severely distort any performance measure when they do occur (if they are not excluded by force majeure).

5. Transmission Circuit Availability

Transmission networks are generally designed to withstand any credible single contingency. This means that at most times network elements may be taken out of service (in the meshed network) with little or no immediate effect on customers.

Higher levels of availability may reduce the likelihood of adverse market impacts and customer interruptions occurring.

Which circuits are critical will depend on prior outages of transmission plant. A static list of critical circuits may not be warranted or appropriate.

The proposed sub measures for peak and non-peak times would only be of benefit if incentives could be provided to move outages from periods when constraints and customer interruptions are more likely to occur to periods when they are less likely to occur. However, recent experience in SA has shown that for the interconnector (the major assets involving market impact) these periods are related to market behaviour, and in particular the amount of generation reserve present in SA. Peak and non-peak periods cannot be accurately defined with reference to times of day or year.

Given the above, ElectraNet SA believes that the proposed sub-measures are inappropriate for measuring the performance of its network.

Customer requested outages should be excluded from the performance measure.

We note that the interpretation of what "availability" means may vary in current TNSP practice. For ElectraNet SA, an asset becomes available following an outage when it is energised. However, we believe that other TNSPs may count their plant as available as soon as earths are removed and the plant is available to be brought back into service if required (this interpretation would result in comparatively higher availability).

A rigorous and consistent definition of availability is required if meaningful comparisons are to be made between TNSPs.

ElectraNet SA has historical data for transmission circuit availability for transmission line outages only (refer to Appendix A). A high level of confidence in this data does not exist for a number of reasons, including the fact that the historical treatment of fault outages and multi-circuit outages has varied. This may tend to overstate the actual availability of network to some degree.

Setting a target for circuit availability needs to recognise that 100% availability is neither practical nor economic. The incremental costs of improving availability are significantly higher at higher levels of availability.

Performance against circuit availability has been reported to the SAIIR in accordance with the SA Transmission Code, which sets a base service standard of 99.0. The measure was not included in the Performance Incentive Scheme established in the Transmission Code.

ElectraNet SA proposes that initially its Performance Incentive (PI) scheme include:

- Financial incentives applied to the availability of transmission line circuits only; and
- Separate reporting of availability of other plant items such as transformers and critical SVCs and capacitor banks.

6. Loss of Supply Events

This performance measure has been proposed as a statistically sound alternative to the traditional system minutes off supply measure.

ElectraNet SA supports the proposed measure and has suitable historical data available (refer to Appendix A).

We note that the definitions should be in terms of system minutes rather than minutes.

7. Average Outage Duration

This measure in its present form would provide incentives for the TNSP to minimise the time taken to restore the transmission network to its normal state following an outage irrespective of the criticality of the outage and whether or not the outage has resulted in a customer or market impact. In this respect the proposed measure is equivalent to the Transmission Circuit Availability measure and provides similar incentives.

ElectraNet SA believes that the proposed incentives can be improved by separately monitoring performance in response to supply interruptions and performance in response to outages that do not have an immediate impact on customers.

For supply interruptions (generally from outages on the radial network) the incentive should be to minimise the time taken to restore supply. For outages that do not result in a supply interruption (on the meshed network) the incentive should be to minimise the time taken to restore the system to an unconstrained operational state in which service has been fully restored to customers.

ElectraNet SA has historical data available only in relation to supply interruptions (refer to Appendix A).

ElectraNet SA proposes that initially its Performance Incentive (PI) scheme include:

- Financial incentives applied to restoration following supply interruptions only; and
- Separate reporting of average outage duration in relation to other plant outages.

8. Transmission Constraints (Inter-regional)

As discussed earlier, a fundamental issue still remains to be resolved before constraint measures can be finalised. This performance measure assumes that the market wants incentives for TNSPs to be responsive to market signals and reschedule transmission outages at short notice in order to minimise binding constraints. However, some market participants are asking for increased predictability in the timing of planned outages – a conflicting objective.

The following comments assume that incentives for TNSP's to be responsive in the scheduling of outages are the appropriate objective.

The measure in its present form would provide incentives to minimise the duration of binding constraints but would not include the market impact of these constraints (in terms of either price or volume).

NEMMCO has advised that there is no suitable historical data available for this measure. While we understand that they have been looking at generating aggregate hours of historical constraint, this information would still not be sufficient for target setting because it would not be possible to accurately attribute each binding constraint to a cause.

NEMMCO has recently sought to improve collection of the relevant constraint data, but even with this improvement determining the causes of constraints is difficult. Future data collection against constraint performance measures will require TNSPs to correlate the NEMMCO binding constraint data with their own data on plant outages.

Clearly more work is required before any financial incentives can be attached to this performance measure. However, this does not preclude commencing reporting against a suitably defined performance measure.

For the purpose of the PI scheme, this performance measure should only include binding constraints caused by an outage of an asset operated by the TNSP.

ElectraNet SA proposes the following:

- Initially no financial incentives can be applied to constraint measures;
- Consultation with market participants to determine whether incentives should be designed for TNSPs to be responsive to market signals and reschedule transmission outages at short notice, or for increased predictability in the timing of planned outages;
- If responsiveness is what the market wants, reporting of performance against a binding constraint measure which includes the price and volume impacts of the constraints; and
- If predictability is what the market wants, reporting against an alternative performance measure that would discourage taking or cancelling transmission outages at short notice.

Appropriate data will need to be sourced for whatever performance measure is finally agreed.

9. Transmission Constraints (Intra-regional)

Intra-regional constraints should be treated in the same way as inter-regional transmission constraints, discussed in the previous section.

10. Conclusion

ElectraNet SA has responded in this note to the 29 April 2002 and 20 May 2002 data requests from SKM in relation to the ACCC Service Standards Review.

ElectraNet SA proposes that initially its PI scheme include:

- Transmission Circuit Availability – Financial incentives applied to the availability of transmission line circuits only and separate reporting of the availability of other plant items such as transformers and critical SVCs and capacitor banks;
- Loss of Supply Events;
- Average Outage Duration – Financial incentives applied to restoration following supply interruptions only and separate reporting of average outage duration in relation to other plant outages.
- Transmission Constraints – No financial incentives can be applied until consultation with market participants to determine what incentives are appropriate and the resolution of data issues. These issues should be addressed as a high priority so that the initial scheme can include reporting against appropriate performance measures.

Historical data to support these proposals is provided in Appendix A.

Performance Measure	Unit of Measure	Historical Results					Historical Results to specified definitions (Y/N)	Data Confidence (High / Medium / Low)	Comments
		1996/97	1997/98	1998/99	1999/00	2000/01			
Measure 1 – Circuit Availability (Total)	%	99.24%	99.26%	99.68%	99.64%	99.70%	N	L	Transmission LINE circuit outages only. A circuit is counted as available only when it is in service as opposed to the time during which the circuit is available for return to service. Historic treatment of multicircuit outages unclear. Historic treatment of fault outages unclear.
Measure 1(a) – Circuit Availability (Critical)	%								
Measure 1(b) – Circuit Availability (Non-Critical)	%								
Measure 1(c) – Circuit Availability (Peak)	%								
Measure 1(d) – Circuit Availability (Non-Peak)	%								
Measure 2 - Loss of Supply Event Frequency Index (>0.2)	No pa	5	5	3	9	5	Y	H	
Measure 2 - Loss of Supply Event Frequency Index (>1.0)	No pa	3	2	0	2	1	Y	H	
Measure 3 – Average Outage Duration							N	H	Customer Outages only. ElectraNet SA records all protection operations. Exit point outages resulting in interruption to customer supply are rigourously recorded. For other plant outages only the time to restore the system to a safe operating state is recorded - i.e. if an item of plant fails, the time taken to restore the plant is not recorded only the time to switch around it.
Radial (category 1-2 loads)	Minutes	293.4	204.3	100.8	74.7	137.4	N	H	Based on interruptions to supply only and excluding successful recloses from the number of events
Meshed (category 3-5 loads)	Minutes	21.8	207.9	31.5	56.2	168.5	N	H	Based on interruptions to supply only and excluding successful recloses from the number of events
Grand Total	Minutes	239.1	205.7	82.7	70.9	141.3	N	H	Based on interruptions to supply only and excluding successful recloses from the number of events
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa								No intra regional critical circuits
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa	-	-						Historical data including attribution to ElectraNet SA is unavailabe.

Threshold values for Measure 2	Minutes	0.2
	Minutes	1

J:/QMEL/Jobs/QM43502/3502R021 Appendix A SKM.xls

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26/06/2002

Appendix J Submissions – EnergyAustralia

Appendix J1 (EnergyAustralia)

Subject: Re: ACCC TNSP Service Standards data collection
Date: Fri, 24 May 2002 11:11:38 +1000
From: hcolebourn@energy.com.au
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Jeff,

This note and the attachment constitute EnergyAustralia's response to your data request.

EnergyAustralia still has some concerns regarding the proposed indicators and their potential use in an incentive mechanism, as follows:

A. Transmission Circuit Availability

The use of a simple time definition of peak and off peak are inappropriate, even in a network like EA's where there is not normally significant variation in flow due to generation dispatch. The critical periods for our network are limited to relatively few days of high loading (say 20). At other times, network elements may be taken out of service with little or no effect on customers. Any incentive scheme targeted at improving availability needs to focus on when it really matters - on the critical occasions.

B. System Minutes Lost

EA would be keen to investigate a statistical approach for application to system minutes lost, to effectively discount the effect of large one-off and
random events on reported performance.

C. Average Outage Restoration Time

Transmission systems are designed with a level of spare capacity, most commonly to meet peak requirements with one element out of service. Except during critical periods of high loading or load transfer, the restoration time for equipment will not affect participants. Its general use as an incentive mechanism would therefore be inappropriate.

D. Force majeure events

Some further thought and greater level of specificity is needed in this area. For example, the exclusion of all storms would very greatly reduce the data set. In these conditions, the utility's response time is what really matters to customers. What needs to be excluded is major or widespread events which cause disruption beyond the reasonable response capability of the utility. In this regard, the following definition of a major natural event is drawn from EA's Network Management Report and is the standard for reporting in NSW.

Definitions:

A major natural event is one which a network operator cannot reasonably be expected to cater for in the design of the supply network.

Items which may fall into this definition include:-

1. Severe thunderstorms which produce one or more of the following:
2. Heavy rain causing flash flooding, wind gusts greater than 90km/h, hail 2cm or larger or a tornado, or;

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3. Severe environmental conditions such as bushfires, earthquakes etc. or;
4. Extensive flooding requiring de-energisation of the network or preventing access to network infrastructure or;
5. Blizzards resulting in exceptional snow loading problems or preventing reasonable access to network infrastructure.

Regards,

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29/04/2002 15:34

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cc: Sabesh Shivasabesan <sabesh.shivasabesan@accc.gov.au>, "Jones Cliff" <CJones@skm.com.au>
Subject: ACCC TNSP Service Standards data collection

Following on from discussions at the TNSP meeting held in Canberra on 21 March 2002, please find attached a document and associated spreadsheet detailing the next round of data collection as part of the ACCC TNSP Service Standards review.

Could you please return by 24 May 2002.

Regards
Jeff Butler
SKM Brisbane
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3502R020 Appendix A EA.xls

Name: 3502R020 Appendix A EA.xls
Type: Microsoft Excel Worksheet (application/vnd.ms-excel)
Encoding: base64

Performance Measure	Unit of Measure	Historical Results					Historical Results to specified definitions (Y/N)	Data Confidence (High / Medium / Low)	Non-typical events effecting results	Comments
		1996/97	1997/98	1998/99	1999/00	2000/01				
Measure 1 – Circuit Availability (Total)	%					96.55	Y	H		
Measure 1(a) – Circuit Availability (Critical)	%									Note 1
Measure 1(b) – Circuit Availability (Non-Critical)	%					96.55	Y	H		Note 1
Measure 1(c) – Circuit Availability (Peak)	%					N/A				Note 2
Measure 1(d) – Circuit Availability (Non-Peak)	%					N/A				Note 2
Measure 3 – Average Outage Duration	Minutes					8	Y	H		
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa					N/A				Note 3
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa					N/A				Note 3

Notes

1 EnergyAustralia does not have any "critical circuits" as defined by NEMMCO. It is understood that NEMMCO's definition relates to circuits critical to the security of the interconnected network and/or pool operation.

2 Data is presently manually recorded (EnergyAustralia does not have a state estimator, or similar to automatically record network element status). The time incidence of ciricut unavailability is not currently recorded.

With regard to "peak" and "off peak", the critical periods for network availability are limited to a few (say 20) days of high loading each year. At other times circuits may be withdrawn from service with little or no impact on customers and this of course is the normal approach.

3 EnergyAustralia presently has no circuits that cross regional boundaries.

Appendix K Submissions – Powerlink

Submission in response to SKM's Data Request

1 Introduction

Powerlink makes this submission in response to the "Final Data Collection" document issued by SKM on 26 April 2002 and supplemented on 20 May 2002.

This submission contains data relating to the five performance measures and sub-categories detailed within the SKM request for the financial periods 1996/97 through 2000/01 (where available), and includes comments regarding the level of confidence in historical data validity.

Powerlink also recommends that the results for 2001/02 be included in the history (and used for setting targets) when they become available in the next couple of months.

2 Performance Measures

Historical performance measures within the format requested by SKM for the financial years 1996/97 through 2000/01 are described in this section and summarised within appendix A. Qualifications and clarifying remarks regarding data validity, definition interpretations and exclusions have also been detailed.

2.1 Measure 1 – Transmission Circuit Availability

Data Confidence

Planned outages are logged by maintenance personnel and operators within the Powerlink planned outage database (OS-TRAC). The primary purpose of the database is to manage the approval process for works applications, rather than to facilitate reporting on outage information.

Although the database contains information relating to planned outage work, the systems have not been structured to reliably generate planned outage summary information in the format required by the SKM measures. In many cases, there are no standard conventions for plant identification and works categories, and database querying may not reliably capture the required information.

Furthermore, the previous version of the database was programmed in an application environment which is no longer supported, and it is not practical to evaluate sub-measure summaries for the 1996/97 to 1999/2000 years.

Circuit availability is primarily dependent on planned outages, as forced outages contribute only a small part of unavailability in transmission systems. As there is a low level of confidence in the validity of the historical planned outage performance data and limited past sub-measure information, it is proposed that this measure be given a low weighting until sufficient verifiable data has been collected to form the basis for targets.

Compliance with Definitions

For the purposes of the SKM data collection process, critical plant is assumed to consist of the QLD to NSW interconnector (QNI) and backbone 275kV network, consistent with the definition of plant which could result in binding constraints or insecure states if out of service. Schedules of proposed critical circuits and equipment (for the June 2002 system) are detailed within appendix B, but have yet to be confirmed with NEMMCO.

Primary transmission equipment used in the compilation of historical circuit availability includes overhead lines, underground cables, transformers, capacitors, reactors and SVCs, but excludes circuit breakers, isolators, protection equipment and metering devices.

Peak hours are designated as 7:00am to 10:00pm inclusive during weekdays, with off-peak as all other times. Adjustments have not been made for public holidays.

It has not been possible to include planned outages less than or equal to one hour duration within the historical availability measures, which can result in higher historical availability levels compared to if all outages were included.

It is proposed that an alternate definition of force majeure be adopted for the performance measure indicators, which excludes the effects of "storm", "lightning" and "fire" (refer section 3.1). Historical performance levels in this submission have been prepared according to this alternate definition.

Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	Validity
Transmission Circuit Availability	%	99.35%	99.15%	99.28%	98.84%	98.67%	Low
Transmission circuit availability (critical circuits)	%	na	na	na	na	98.37%	Low
Transmission circuit availability (non-critical circuits)	%	na	na	na	na	98.71%	Low
Transmission circuit availability (peak periods)	%	na	na	na	na	98.30%	Low
Transmission circuit availability (off-peak periods)	%	na	na	na	na	98.97%	Low

2.2 Measure 2 – Loss of Supply Event Frequency Index

Data Confidence

Forced outage details are logged by system operators and stored within the Powerlink forced outage database (FOD). Forced outages involving loss of supply are subject to processes of diligence since the measures form the basis of international benchmarks and published reports. Accordingly, Powerlink considers that there is a high level of confidence in this data for the five year historical time frame.

Compliance with Definitions

The revised SKM loss of supply event frequency specification (e-mail dated 20 May 2002) have not excluded force majeure events. In order that this measure be consistent with outcomes that are controllable by TNSPs, it is proposed that the alternate definition of force majeure (refer section 3.1) also be used for this measure. The compilation of historical performance has been made based on the alternate definition of force majeure detailed within this submission.

Powerlink has incorporated threshold values of 0.2 and 1.0 system minutes for this measure, which may need review subject to final agreed indicator definition and exclusions to ensure statistically valid event sizes.

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	Validity
Loss of supply events > 0.2 system minutes	no. pa	2	4	2	3	6	High
Loss of supply events > 1.0 system minutes	no. pa	0	0	1	1	2	High

2.3 Measure 3 – Average Outage Duration

Data Confidence

While forced outage data involving loss of supply is subjected to processes of verification, forced outage data involving no loss of supply is not subject to the same level of scrutiny. On some occasions, records have been incomplete or omitted, and there is a low level of confidence in the validity of this data.

Since forced outages involving no loss of supply form a much higher component of outage times compared to the more accurately recorded forced outages involving loss of supply, it is proposed that this measure be given a low weighting until sufficient verifiable data has been collected to form the basis for targets and incentives.

Compliance with Definitions

Powerlink has compiled historical performance data for this measure based on primary plant described with the transmission circuit availability measure. Outage times have in the most part been measured on the basis of restoration of primary plant required for operation of the network.

Powerlink proposes that outages resulting from equipment failures within manufacturer's warranty period (where it can be shown to be the fault of the supplier) be excluded from this measure since these occurrences are beyond the control of the TNSP (refer section 3.2). Historical performance data provided within this submission has not been adjusted for this proposal.

Powerlink is also concerned about the impacts of rare and isolated cases where replacement of equipment is prolonged due to unplanned multiple equipment failures resulting in spare shortages which involve supplier delays or long production lead times (refer section 3.3). These factors can negatively skew outage duration measures, and it is proposed that such occurrences also be excluded or capped.

As with the other measures, historical data has been adjusted in accordance with the proposed alternate definition of force majeure (refer section 3.1).

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	Validity
Average Outage Restoration Time	Minutes	970	2027	625	518	183	Low

2.4 Measure 4 – Transmission Constraints (Intra-regional)

The compilation of historical intra-regional constraint binding occurrences and intact system limit data is currently being examined by NEMMCO. Powerlink has no internal data which could provide the required intra-regional constraint performance evaluation as specified by SKM, and it is proposed that this measure be given a weighting factor of zero until sufficient history has been collected to form the basis for a target.

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	Validity
Intra-regional Binding Constraints	hrs pa	na	na	na	na	na	na

2.5 Measure 5 – Transmission Constraints (Inter-regional)

Compilation of historical inter-regional performance data is also being examined by NEMMCO. Powerlink does not have internal data which could assist with this process, and it is proposed that this measure also be given a weighting of zero until sufficient history has been compiled.

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	Validity
Inter-regional Binding Constraints	hrs pa	na	na	na	na	na	na

3 Comments on Design of Scheme

Powerlink made a submission on the 21 June 2002 regarding the necessity for the scheme to provide no material impact to Powerlink's risk profile if the scheme is to be introduced before Powerlink's next revenue reset. This may be addressed by the formulation of indicators which are largely controllable and indicative of TNSP performance, choosing target incentives and penalties such that the upside and downside risks are appropriately balanced, and limiting the exposure of the scheme.

Powerlink makes the following additional proposals and comments relating to the design of the scheme such that performance indicators more accurately reflect and represent measures which are largely controllable by TNSPs.

3.1 Force Majeure

Powerlink notes that the definition of force majeure contained within the SKM performance measure exclusions relates to events beyond the "reasonable control of the party affected by any such event", and includes occurrences of "fire", "lightning" and "storm".

Transmission networks are designed to Australian and international codes and standards, and would reasonably be expected to withstand the effects of many natural forces and stresses. Nonetheless, it would not be economic for transmission networks to be constructed to withstand rare catastrophic events, and these incidences should be excluded from performance levels.

Powerlink considers that further work is required to qualify the extent of force majeure, and proposes that force majeure should be defined in terms of whether transmission failures are the result of forces beyond which the system should have reasonably been expected to withstand in light of regulatory code and design standards (eg. wind loadings for tower structures).

However, for the purposes of compiling historical performance data for this submission, Powerlink has excluded the "fire", "lightning" or "storm" criteria within the SKM force majeure definition (unless the event is considered beyond the design capability and control of the TNSP).

3.2 Warranty Claim Exclusions

Powerlink proposes that events relating to equipment failures within manufacturer's warranty period be excluded from service measures (where it can be shown that the outages are the fault of the supplier), since inclusion of these events could disproportionably penalise circuit availability and outage duration performance.

3.3 Forced Outage Duration Cap

Powerlink is also concerned about the impacts of isolated cases where replacement of equipment is prolonged due to spare shortages resulting from multiple equipment failures involving supplier delays or long production lead times. It is not cost-effective to hold spares for every combination of chance simultaneous failures (which would ultimately translate to higher end-user costs), and these events can disproportionably skew performance distorting incentive signals.

It is suggested that prolonged equipment replacement delays under circumstances for which TNSPs could not be reasonably be expected to hold spares be excluded from the performance measures, or capped to levels representative of expected restoration times.

4 Incentive Scheme Proposal

Powerlink considers that there is a high level of confidence in the validity of historical performance for only the loss of supply event frequency index (measure 2), and proposes the following incentive scheme based on historical mean calculations across the five year history. Bonuses and penalties have been capped and collared to ensure additional risk levels above that factored within the ACCC revenue cap formulation are not imposed.

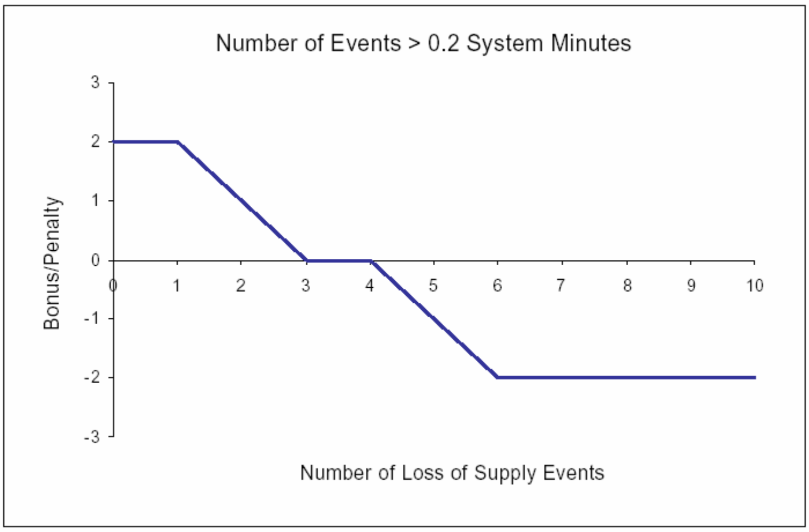
Since there is a low level of confidence in the validity of data associated with performance measures 1 and 3 (and limited history for the sub-measures), Powerlink proposes that targets and incentives not be established until sufficient verifiable data has been collected to form the basis of reliable benchmarks.

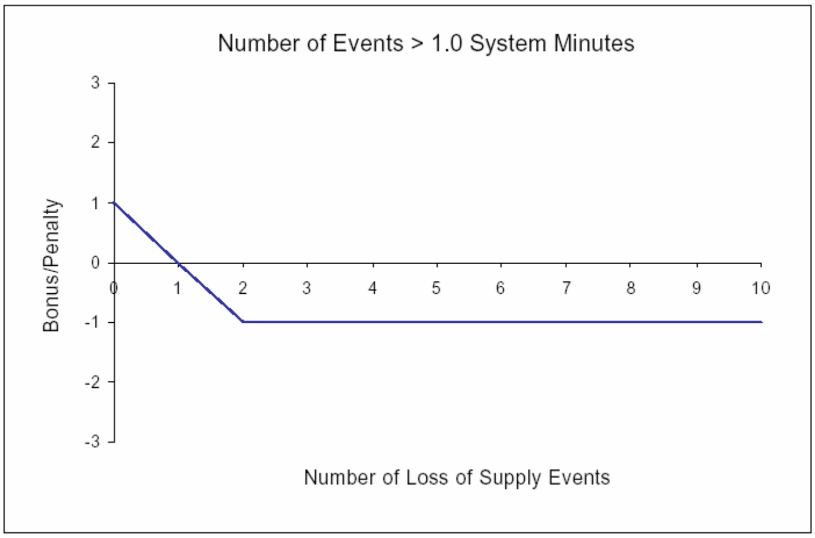
As there is no historical data available for measures 4 and 5, Powerlink proposes that targets and incentive schemes should not utilise these measures at this time.

The incentive scheme for performance measure 2 is based on the following historical averages:

Average number of loss of supply events > 0.2 system minutes = 3.4
Average number of loss of supply events > 1.0 system minutes = 0.8

	Large bonus	Small bonus	No bonus or penalty	Small penalty	Large penalty
Number of loss of supply events > 0.2 system minutes	< 2	2	3, 4	5	>5
Number of loss of supply events > 1.0 system minutes	-	0	1	> 1	-




Number of Events > 1.0 System Minutes
Bonus/Penalty
3
2
1
0
-1
-2
-3
0
1
2
3
4
5
6
7
8
9
10
Number of Loss of Supply Events

APPENDIX A

Attached is the summary of the five historical performance measures within the format requested by the SKM final data collection document for the financial years 1996/97 to 2000/01.

APPENDIX B

Schedule of critical feeders and plant meeting the SKM definition of critical circuits for the Powerlink transmission network as of June 2002 (to be confirmed with NEMMCO).

330kV Feeders

Bulli Creek to Braemar
Dumaresq to Bulli Creek.

275kV Feeders

Chalumbin to Ross
Ross to Nebo
Nebo to Broadsound
Nebo to Bouldercombe
Broadsound to Bouldercombe
Broadsound to Stanwell
Broadsound to Lilyvale
Bouldercombe to Stanwell
Bouldercombe to Gladstone
Gladstone to Wurdong
Gladstone to Gin Gin
Wurdong to Gin Gin
Calvale to Wurdong
Calvale to Tarong
Gin Gin to Woolooga
Woolooga to South Pine
Woolooga to Palmwoods
Palmwoods to South Pine
Tarong to South Pine
Tarong to Mt England
Tarong to Blackwall
Tarong to Middle Ridge
Tarong to Braemar
South Pine to Blackwall
Mt England to South Pine

Mt England to Blackwall
Blackwall to Rocklea
Blackwall to Swanbank
Blackwall to Belmont
Swanbank to Belmont
Swanbank to Mudgeeraba

Transformers

Braemar 330/275kV

SVCs

Ross 275kV
Nebo 275kV
Braemar 275kV

Performance Measure	Unit of Measure	Historical Results					Historical Results to specified definitions	Data Confidence
		1996/97	1997/98	1998/99	1999/00	2000/01		
Measure 1 – Circuit Availability (Total)	%	99.35%	99.15%	99.28%	98.84%	98.67%	Refer section 2.1	Low
Measure 1(a) – Circuit Availability (Critical)	%	na	na	na	na	98.37%	Refer section 2.1	Low
Measure 1(b) – Circuit Availability (Non-Critical)	%	na	na	na	na	98.71%	Refer section 2.1	Low
Measure 1(c) – Circuit Availability (Peak)	%	na	na	na	na	98.30%	Refer section 2.1	Low
Measure 1(d) – Circuit Availability (Non-Peak)	%	na	na	na	na	98.97%	Refer section 2.1	Low
Measure 2 - Loss of Supply Event Frequency Index (> 0.2 system minutes)	No pa	2	4	2	3	6	Refer section 2.2	High
Measure 2 - Loss of Supply Event Frequency Index (> 1.0 system minutes)	No pa	0	0	1	1	2	Refer section 2.2	High
Measure 3 – Average Outage Duration	Minutes	970	2027	625	518	183	Refer section 2.3	Low
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa	na	na	na	na	na	na	na
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa	na	na	na	na	na	na	na

Submission in response to SKM's Data Request

Addendum A

Powerlink's recent submission to SKM (dated 5 July 2002) relating to the "Final Data Collection" document recommended that historical performance data for the financial year 2001/02 be used in the setting of targets and incentives when they become available. The inclusion of additional historical data provides a more robust benchmark on which to base future performance levels.

Powerlink is in the process of evaluating performance levels for the 2001/02 financial year, and is able to provide updated historical data for measure 2. The data has been compiled in accordance with the methods and qualifications detailed within Powerlink's submission to SKM. Confidence in data validity is considered high.

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Validity
Loss of supply events > 0.2 system minutes	no. pa	2	4	2	3	6	4	High
Loss of supply events > 1.0 system minutes	no. pa	0	0	1	1	2	2	High

The updated historical averages for the second performance measure across the period 1996/97 through to 2001/02 are as follows:

Average number of loss of supply events > 0.2 system minutes = 3.5

Average number of loss of supply events > 1.0 system minutes = 1.0

The updated historical averages do not vary significantly from the five year averages detailed within the original submission, and it is not considered necessary to modify the incentive and penalty scheme proposed by Powerlink within the SKM submission.

Performance Measure	Unit of Measure	Historical Results						Historical Results to specified definitions	Data Confidence
		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02		
Measure 1 – Circuit Availability (Total)	%	99.35%	99.15%	99.28%	98.84%	98.67%	TBA	Refer section 2.1	Low
Measure 1(a) – Circuit Availability (Critical)	%	na	na	na	na	98.37%	TBA	Refer section 2.1	Low
Measure 1(b) – Circuit Availability (Non-Critical)	%	na	na	na	na	98.71%	TBA	Refer section 2.1	Low
Measure 1(c) – Circuit Availability (Peak)	%	na	na	na	na	98.30%	TBA	Refer section 2.1	Low
Measure 1(d) – Circuit Availability (Non-Peak)	%	na	na	na	na	98.97%	TBA	Refer section 2.1	Low
Measure 2 - Loss of Supply Event Frequency Index (> 0.2 system minutes)	No pa	2	4	2	3	6	4	Refer section 2.2	High
Measure 2 - Loss of Supply Event Frequency Index (> 1.0 system minutes)	No pa	0	0	1	1	2	2	Refer section 2.2	High
Measure 3 – Average Outage Duration	Minutes	970	2027	625	518	183	TBA	Refer section 2.3	Low
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa	na	na	na	na	na	na	na	na
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa	na	na	na	na	na	na	na	na

Powerlink QUEENSLAND

Submission in response to SKM's Data Request

Addendum B

Powerlink's recent submission to SKM (dated 5 July 2002) relating to the "Final Data Collection" document recommended that historical performance data for the financial year 2001/02 be used in the setting of targets and incentives when they become available. The inclusion of additional historical data provides a more robust benchmark on which to base future performance levels.

Historical performance data for the 2001/02 financial year for performance measure 2 has already been submitted to SKM (refer Addendum A dated 19 July 2002). Powerlink has now completed the evaluation of planned and forced outage occurrences for the 2001/02 financial year, and is able to provide historical data for measures 1 and 3.

The data has been compiled in accordance with the methods and qualifications detailed within Powerlink's submission to SKM. However, Powerlink has re-assessed the process of compiling forced outage information, and now considers the level of confidence for the validity of data for measure 3 to be medium. The level of confidence for measure 1 data remains low.

Measure 1 – Transmission Circuit Availability

Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Validity
Transmission Circuit Availability	%	99.35%	99.15%	99.28%	98.84%	98.67%	98.62%	Low
Transmission circuit availability (critical circuits)	%	na	na	na	na	98.37%	98.18%	Low
Transmission circuit availability (non-critical circuits)	%	na	na	na	na	98.71%	98.69%	Low
Transmission circuit availability (peak periods)	%	na	na	na	na	98.30%	98.42%	Low
Transmission circuit availability (off-peak periods)	%	na	na	na	na	98.97%	98.78%	Low

Measure 2 – Loss of Supply Event Frequency Index

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Validity
Loss of supply events > 0.2 system minutes	no. pa	2	4	2	3	6	4	High
Loss of supply events > 1.0 system minutes	no. pa	0	0	1	1	2	2	High

Measure 3 – Average Outage Duration

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	Validity
Average Outage Restoration Time	minutes	970	2027	625	518	183	286	Medium

Measures 4 and 5 – Transmission Constraints

Powerlink does not have any internal data which can provide historical performance for the 2001/02 financial year for measures 4 and 5.

Performance Measure	Unit of Measure	Historical Results						Historical Results to specified definitions	Data Confidence
		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02		
Measure 1 – Circuit Availability (Total)	%	99.35%	99.15%	99.28%	98.84%	98.67%	98.62%	Refer section 2.1	Low
Measure 1(a) – Circuit Availability (Critical)	%	na	na	na	na	98.37%	98.18%	Refer section 2.1	Low
Measure 1(b) – Circuit Availability (Non-Critical)	%	na	na	na	na	98.71%	98.69%	Refer section 2.1	Low
Measure 1(c) – Circuit Availability (Peak)	%	na	na	na	na	98.30%	98.42%	Refer section 2.1	Low
Measure 1(d) – Circuit Availability (Non-Peak)	%	na	na	na	na	98.97%	98.78%	Refer section 2.1	Low
Measure 2 - Loss of Supply Event Frequency Index (> 0.2 system minutes)	No pa	2	4	2	3	6	4	Refer section 2.2	High
Measure 2 - Loss of Supply Event Frequency Index (> 1.0 system minutes)	No pa	0	0	1	1	2	2	Refer section 2.2	High
Measure 3 – Average Outage Duration	Minutes	970	2027	625	518	183	286	Refer section 2.3	Medium
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa	na	na	na	na	na	na	na	na
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa	na	na	na	na	na	na	na	na

Appendix L Submissions – SPI PowerNet

26 June 2002

Mr Sabesh Shivasabesan
ACCC
470 Northbourne Ave
Dickson
ACT 2602

Dear Mr Shivasabesan

ACCC Review of Service Standards

Please find attached, SPI PowerNet's data submission to SKM's *Report on TNSP Service Standards*. This submission provides:

- data where available for the five measures proposed in the ACCC issues paper released in April 2002; and
- a brief outline of SPI PowerNet's initial position on incentives to apply in the Victorian Jurisdiction.

SPI PowerNet understands that the SKM Report will be the beginning of an ACCC public consultation process and welcomes the further opportunity to discuss the design of incentives to be developed around these agreed measures. While many of the definitional issues with the proposed measures have been addressed by the TNSPs both individually and collectively, incentives raise a new series of problems that have to be solved before sensible schemes can be put in place.

SPI PowerNet also supports the ACCC's intention to include this process within the current revenue determination process being conducted for the Victorian and South Australian TNSPs. It is clear that revenue and service standards issues cannot be determined in isolation.

If you should wish to discuss any of the issues raised in the submission, don't hesitate to contact Tom Hallam on 03 8635 7335 or Kelvin Gebert on 03 8635 7322.

Yours sincerely,

Anne Barker
Executive Manager Reset Team
SPI PowerNet Pty Ltd (ACN 079 798 173)

1. INTRODUCTION

This data submission is a response to SKM's request for input to its *Review of TNSP Performance Standards* Report to the ACCC. It includes a brief description of SPI PowerNet's proposed targets for the five performance measures and outlines a position on the treatment of incentive schemes.

2. SPI POWERNET'S PROPOSAL

SPI PowerNet proposals on each of the measures are set out below. To summarise:

- SPI PowerNet has proposed targets for the first three measures;
- SPI PowerNet has no historical data on which to base targets for the final two measures but will begin measurement once NEMMCO data is available; and
- SPI PowerNet will begin recording its performance against the measures (subject to data availability) from January 2003.

2.1 Measure 1: Circuit Availability

SPI PowerNet has extensive historical data on which to base its targets for this measure because of the operation of the availability incentive scheme in the Victorian Jurisdiction. SPI PowerNet has proposed targets that align with the new availability scheme agreed with VENCorp to apply for the period 1 January 2003 to 31 March 2008.

SPI is proposing six categories of availability: Critical and Non-Critical Circuit Availability (Peak); Critical and Non-Critical Circuit Availability (Intermediate); and Critical and Non-Critical Circuit Availability (Whole Year). No target is provided for off-peak periods, as the company is encouraged to move planned outages into these periods. The whole year availability targets provide an incentive to maintain availability as high as possible in off-peak periods.

Availability Targets

	Historical performance (1995-2000)	Target
Critical (Peak)	99.94	99.90
Non-Critical (Peak)	99.91	99.85
Critical (Intermediate)	99.91	99.85
Non-Critical (Intermediate)	99.85	99.75
Critical (Whole year)	99.50	99.25
Non-Critical (Whole year)	99.22	98.80

Note: critical circuits, as determined by VENCorp, are attached in Appendix A.

Targets are set below the historical average to account for the expected increase in construction and refurbishment going forward (around 50%).

2.2 Measure 2: Loss of Supply Event Frequency Index

Powerlink has performed an assessment on SPI PowerNet's system minutes data to generate targets for the Loss of Supply Event Frequency Index (Appendix B). SPI PowerNet has relatively few 'loss of supply' events when compare to other TNSPS (which have many more radial lines). This has the effect of making SPI PowerNet's historic average low with infrequent volatile events. SPI PowerNet has been collecting reliable system minutes lost information for less than three years (1999-2001). This has been combined with a further three years of less reliable data (1996-1998). It is noted that Powerlink used 15 years of reliable data to construct their own targets for this measure.

Therefore, SPI PowerNet places a low reliability on the targets proposed and would wish a zero weighting be placed on this measure in the initial period of an incentive scheme.

Loss of Supply Frequency

Target System Minutes Threshold	Average Quarterly Number of Events	Average Annual Number of Events	Annual Target
0.05	0.54	2.17	2.2
0.3	0.29	1.17	1.2

If revenue is to be put at risk against this measure a design for an incentive scheme is suggested below. The six-year historic average is likely to be lower than the long-term average because of the absence of extreme weather events in the last six years, the aging of the network and the quality of the data used to determine the targets. Therefore, a dead band and incentives/penalties are proposed that are asymmetric around the historic average.

Possible Design for Loss of Supply Frequency Incentive Scheme

Target System Minutes Threshold	Large bonus	Small bonus	Dead band No Bonus	Small penalty	Large penalty
0.05	0	1	2-3	4	>4
0.3		0	1-2	>2	

2.3 Measure 3: Average Outage Duration

SPI PowerNet has extensive historical records on which to base its targets for this measure because of current reporting requirements in the Victorian System Code. The benchmarks in the System Code were calculated from historical data from before 1995. SPI PowerNet proposes to continue to use the System Code benchmarks (10 hours) as targets in the current regulatory period as more recent historical data suggests they were reasonable when established.

The measure is split into the categories lines and transformers. Data provided is adjusted for the Force Majeure definition outlined in Section 3.

Average Outage Duration

Financial year ending June	Lines	Transformers
1995/96	3.72	15.6
1996/97	6.32	6.93
1997/98	24.14	8.52
1998/99	14.46	3.13
1999/00	7.52	5.92
2000/01	6.41	3.97
Average	*10.43*	*7.35*
System Code Target	**10.00**	**10.00**

2.4 Measures 4 and 5: Transmission Constraints

SKM has indicated that NEMMCO has advised that they are attempting to produce three years of historic data for both inter-regional and intra-regional constraints for each Jurisdiction and that this process will take several months.

SPI PowerNet has no internal data that could aid this process, therefore no historical data or targets are provided. Once NEMMCO begins to generate sufficient information the Victorian Jurisdiction will begin measurement.

Incentives placed on these measures are problematic in Victoria given the split in responsibilities between SPI PowerNet and VENCorp. More time will be required by both organisations to enable a method of measurement to be established which recognises each Companies' responsibility.

3. DEFINITION OF FORCE MAJEURE

The proposed Force Majeure provisions in SKM's document on Service Standards are not that dissimilar to definitions that already apply to SPI PowerNet.

However, a TNSP can handle a limited amount of damage from most events described in part a) of the definition but would not be expected to have immediate solutions to catastrophic damage. Therefore, SPI PowerNet proposes a damage threshold taken from the Victorian rebate scheme, above which Force Majeure would apply. This threshold is determined by spares holdings, ability to respond to tower collapses, contingency plans, etc.

It is proposed that the following events would be treated as Force Majeure events for the purposes of the Service Standards scheme:

- The collapse of more than 3 consecutive intermediate towers;
- The loss of or damage to more than one switchbay in a terminal station;
- The loss of or damage to more than 10 control cables; and
- The loss of or damage to transformers and capacitor banks (in both cases provided that the damage in a single incident is limited to a single item of apparatus connected to the bus), reactors, SVCs or synchronous condensers which loss or damage is not repairable on site, according to normal practice.

In addition, as more than one TNSP exists in Victoria due to the contestability of transmission the following event should be added to the list of Force Majeure events in the ACCC SKM's document:

d) 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; and

   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.

4. PERFORMANCE INCENTIVES

While a mix of measures may be appropriate for monitoring performance, financial incentives should only be applied to measures that:

- can be controlled or managed by the TNSP; and
- will respond to short term actions of the TNSP. That is, it is operational in focus rather than system design planning focused.

SPI PowerNet believes its proposed availability incentive scheme with VENCorp fulfils these criteria.

Therefore, SPI PowerNet proposes that its availability incentive scheme constitutes the initial incentive regime the Company faces under its revenue period 1 January 2003 to 31 March 2008. This scheme places around 2% of its proposed revenue at risk.

If the Regulator wishes to expand the number of measures which have incentives attached to them before the end of the current ACCC Revenue Determination this would require that SPI PowerNet's proposed revenue be adjusted once the costs of the risk of the new scheme is priced.

Changes to incentive schemes mid-term of a regulatory period are covered under the proposed pass-through provisions of the SPI PowerNet Application (Chapter 10, p. 70 – Service Standards Event).

A CRITICAL AND NON-CRITICAL CIRCUITS

All EHV (220 kV and above) lines, transformers (including 220/66&22 transformers), SVCs, capacitor banks, and synchronous compensators, are considered critical, except for the following (which are considered non-critical):

BTS-RTS cable

ROTS-RTS lines (2)

KTS-BLTS lines (2)

KTS-WMTS lines (2)

WMTS-FBTS lines (2)

FBTS-NPSD line

FBTS-BLTS line

BLTS-NPSD line

TTS-BTS lines (2)

TTS-ROTS line

TTS-KTS lines (2)

MBTS-DDTS lines (2)

MBTS-EPS lines (2)

KTS-GTS lines (3)

JLTS-HWPS lines (3)

HOTS and KTS SVCs

B POWERLINK ASSESSMENT OF SPI POWERNET DATA FOR MEASURE 3

Performance Measure	Unit of Measure	Historical Results						Historical Results to specified definitions (Y/N)	Data Confidence (High / Medium / Low)	Non-typical events effecting results	Comments
		1995	1996	1997	1998	1999	2000				
Measure 1 – Circuit Availability										Covered under Force Majeure	Excludes third party initiated construction and connection assets
Measure 1(a) – Critical (Peak)	%	99.98	99.95	99.94	99.90	99.94	99.95		High		
Measure 1(b) – Non-Critical (Peak)	%	99.96	99.93	99.90	99.75	99.97	99.96		High		
Measure 1(c) – Critical (Intermediate)	%	99.94	99.88	99.92	99.89	99.93	99.92		High		
Measure 1(d) – Non-Critical (Intermediate)	%	99.94	99.74	99.81	99.89	99.77	99.93		High		
Measure 1(e) – Critical (All year)	%	99.74	99.45	99.51	99.21	99.57	99.50		High		
Measure 1(f) – Non-Critical (All year)	%	99.64	99.10	99.08	98.85	99.27	99.35		High		
		1996	1997	1998	1999	2000	2001				
Measure 2 - Loss of Supply Event Frequency Index	No pa (0.05)	3	1	2	2	2	3		Low		Outages as a result of planning decisions
Measure 2 - Loss of Supply Event Frequency Index	No pa (0.30)	2	0	0	1	1	3		Low		
		1995/96	1996/97	1997/98	1998/99	1999/00	2000/01				
Measure 3 – Average Outage Duration – Lines	Minutes	3.72	6.32	24.14	14.46	7.52	6.41		High	Covered under Force Majeure	
Measure 3 – Average Outage Duration – Transformers	Minutes	15.6	6.93	8.52	3.13	5.92	3.97		High	Covered under Force Majeure	
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa	-	-	-	-	-	-	na	na		
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa	-	-	-	-	-	-	na	na		

Threshold values for Measure 2	Minutes	0.05
	Minutes	0.30

J:/QMEL/Jobs/QM43502/Appendix L3 (SPI PowerNet)

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Analysis of System Minute Data for SPI Powernet

Data Analysed

The data that has been analysed was –

Date	Sys Min	Date	Sys Min
Jan-96	1.17	Nov-99	0.07
Apr-96	0.9	Jun-00	0.006
Apr-96	0.05	Oct-00	0.05
Oct-97	0.01	Dec-00	0.31
Nov-97	0.1	Jul-01	0.36
Feb-98	0.05	Sep-01	0.01
May-98	0.16	Oct-01	0.51
Feb-99	0.02	Nov-01	0.93
Apr-99	0.007	Jan-02	0.02
Aug-99	0.37		

The total system minutes lost per calendar year is shown in Figure 1.

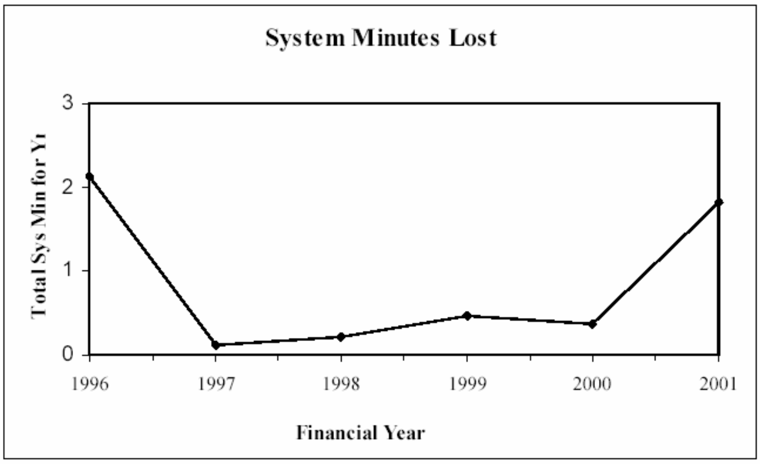


Figure 1 – System Minutes Lost per Calendar Year

As is typical for this statistic, there are no inferences that can be drawn from these results. There is a limited amount of data available to perform extreme value analysis. However, there is sufficient to confirm that the event pattern follows a Cauchy distribution, and that extreme value methods are appropriate. The extreme value plot is shown in Figure 2.

Based on monitoring return periods of 1 and 2 years for Poison event analysis, the number of event greater than 0.05 and 0.3 need to be monitored. These plots are shown in Figures 3 and 4.

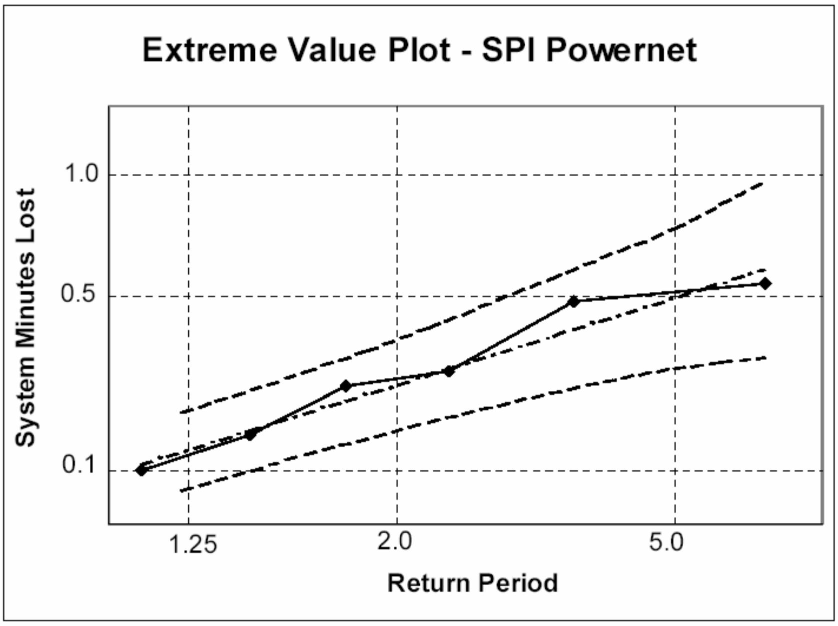


Figure 2 – Extreme Value Plot

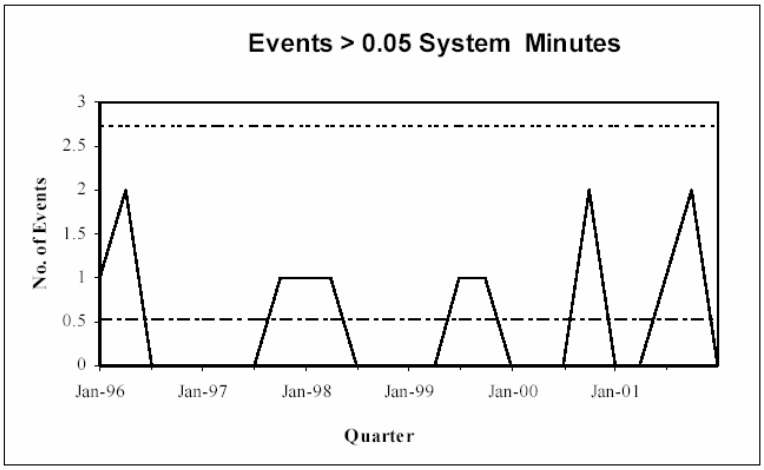


Figure 3 – Number of LOS Events per Quarter > 0.05 System Minutes

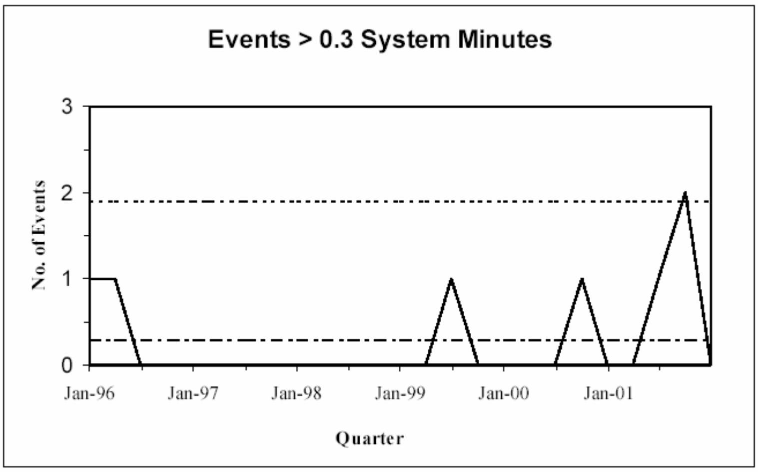


Figure 4 – Number of LOS Events per Quarter > 0.3 System Minutes

For events greater than 0.5 system minutes, the plot is stable, and the conclusion is that there is no trend.

For events greater than 0.3 system minutes, the number of events, at face value, appears to have increased. However, this is within the normal bounds of statistical variation. At this stage, there is no trend, but it requires watching. Another event before the end of the current financial year would suggest a trend had started.

For the period analysed, there have been 13 events greater than 0.05, and 7 greater than 0.3. Therefore, over a period analysed, the averages can be taken as –

For events > 0.05 sys min	2.2 per year
For events > 0.30 sys min	1.2 per year

Conclusions

The reliability data analysed presents a consistent picture of what has been occurring. In general, it can be concluded that:

1. Over the 6 year period from January 1996 to December 2001, there has been no change in system reliability.

2. The reliability of the SPI Powernet system can be monitored by comparing the actual number of events against the average figures of -

For events > 0.05 sys min	2.2 per year
For events > 0.30 sys min	1.2 per year

Appendix M Submissions – Snowy Hydro

Performance Measure	Unit of Measure	Historical Results					Historical Results to specified definitions (Y/N)	Data Confidence (High / Medium / Low)	Non-typical events effecting results	Comments
		1996/97	1997/98	1998/99	1999/00	2000/01				
Measure 1 – Circuit Availability (Total)	%	-	-	99.67	98.63	99.55	Y	H	-	-
*Measure 1(a) – Circuit Availability (Critical)	%	-	-	99.36	98.81	99.99	Y	H	-	3 Interconnectors
Measure 1(b) – Circuit Availability (Non-Critical)	%									Not Measured
Measure 1(c) – Circuit Availability (Peak)	%									Not Measured
Measure 1(d) – Circuit Availability (Non-Peak)	%									Not Measured
Measure 2 - Loss of Supply Event Frequency Index	No pa									Not Measured
Measure 3 – Average Outage Duration	Minutes									Not Measured
Measure 4 – Transmission Constraints (Intra-Regional)	Hrs pa									Not Obtained
Measure 5 – Transmission Constraints (Inter-Regional)	Hrs pa									Not Obtained

Threshold values for Measure 2	Minutes	
	Minutes	

* NOTE: - 3 Snowy interconnectors - not currently agreed with NEMMCO as critical circuits
- From a generator perspective connection circuits (eg lines between power stations and switching stations) are critical circuits

Appendix N Submissions – Transend

SKM

TRANSEND

TNM-SR-809-0020
Issue 1.0
July-02

ACCC : TNSP Service Standards Transend Report

APPROVED

CONTACT

This document is the responsibility of the Performance Improvement Department, Transend Networks Pty Ltd, ABN 57 082 586 892.

Please contact Transend's Manager-Performance Improvement with any queries or suggestions.

REVIEW DATE

This document does not have a periodic review date, but will be updated to reflect changes as Performance Improvement Department is made aware of such changes.

AUDITS

There are no audits associated with the contents of the document.

CONTENTS

LIST OF TABLES

1. PURPOSE

This report has been prepared in response to the Service Standards Project run by the Australian Competition and Consumer Commission (ACCC).

2. SCOPE

This document includes all regulated assets and regulated activities undertaken by Transend.

This document excludes assets and activities that are not "regulated" under Transend's Licence conditions.

3. TRANSEND'S REGULATORY FRAMEWORK

Transend was formed as a corporate entity on 1 July 1998. Prior to that date, much of the performance data on the reliability of the system, and other service measures was collected and recorded on the basis of a vertically integrated utility (generation/transmission/distribution).

Transend has a licence under the ESI Act 1995 (Tasmania), to operate the transmission system in Tasmania. As a condition of its transmission licence, Transend must develop and maintain a suite of Licence Plans, as follows:

- Asset Management Plan.
- Vegetation Management Plan.
- Service Plan (incorporates Service Standards).
- Compliance Plan.

These Licence Plans are submitted to the OTTER, under licence requirements.

A Reliability and Network Planning Panel (RNPP) has been established by OTTER in accordance with the TEC. Clause 4.2.1 of the TEC requires the RNPP to determine standards governing the power system security and reliability. OTTER has initiated a project to develop and implement service standards for various entities under the Tasmanian Electricity Code. OTTER proposed service standards in April 2002, and this includes standards for the following entities:

- Tasmanian System Controller – Transend (equivalent to NEMMCO under NEM)
- Generator – Hydro Tasmania
- Transmission Network Service Provider (TNSP) – Transend
- Distribution Network Service Provider (DNSP) – Aurora

The service standards proposed by OTTER for Transend will be incorporated in Transend's "Service Plan" once agreed. Under the TEC, Transend is obliged to report to OTTER annually, against service measures set out in the "Service Plan". There is no financial incentive scheme in place to reward improved performance or to penalise poor performance.

OTTER plans to get the four entities to propose "targets" for proposed service standards based on past performance. These will apply for the initial year (2002-2003). It is anticipated that based on the performance against these service standards, a more robust service standard scheme will be applied for subsequent years.

3.1. Service Standards Framework set up by OTTER

Measures of transmission system performance have been selected to provide an indication of the underlying 'health' of the transmission system. These measures aim to provide an indication as to whether requirements of the TEC and "Connection Agreements" are being met. Monitored over time, these measures will seek to provide a trend of the healthiness of the transmission system.

Under the existing performance monitoring framework, Transend measures its transmission performance in the following areas:

- Reliability,
- Availability,
- Quality, and
- Security.

Transmission system performance measures enable Transend to identify under-performing parts of the system and trigger further investigations aimed at improving service levels. Allied with advice from the System Controller, asset condition monitoring, system simulation studies and benchmarking activities, these performance measures are used by Transend to review and amend asset management plans, system augmentation plans and associated strategies.

3.2. Performance reporting to Transend Customers

Under the TEC, Transend has "Connection Agreements" with its customers namely Hydro Tasmania (Generator) and Aurora (DNSP). Under these connection agreements Transend is required to report on its performance in relation to its "connection points" with customers.

In regard to performance reporting to its customers, Transend reports on connection point basis and reports separately for "firm" (n-1) and "non-firm" (n) connection points. Further, Aurora performance reporting is split for two types of connection points:

- Direct Connect Connection Points (Major Industrial Customers)
- Distribution System Connection Points

It must be noted that the Direct Connect Connection Points comprise 5 major industrial customers and other industrial customers. These collectively make up approximately **58%** of the total load on the system, as measured by energy transported.

The reporting structure noted above has been specifically drafted to complement the structure of the Tasmanian Power System that is made up of a combination of dispersed (Hydro) generation and big industrial loads, along with domestic loads that are mostly located at large distances from generation.

3.2.1. Overview of Transend's Electrical Network

Transend's transmission lines carry electricity from 27 power stations to and between its substations around the state of Tasmania.

Power transmission system in Tasmania has been designed around dispersed generation (hydro) that includes small size generators spread around the state. Transend's transmission network comprises 220 kV transmission , 110 kV transmission and 88 kV transmission.

Power is drawn from the power stations at 220 kV or 110 kV voltage level. Transend does not own the step up transformers at the power stations. Power is delivered to load centres at varying voltage levels.

Transend has Direct Connect and Distribution System connection points at varying voltages namely, 220 kV, 110 kV, 44 kV, 33 kV, 22 kV, 11 kV and 6.6 kV. Transend owns the high voltage busbars at these connection points and associated feeder circuit breakers. It must be noted that Transend's performance reporting includes impact of outages on all these connection assets. This situation for a TNSP is unique to Transend, and may have an inflatory effect on Transend's performance when compared against the performance of other TNSP's.

3.3. Future directions

3.3.1. ACCC Price Determination and Service Standards

Tasmanian transmission price control will be regulated by the ACCC, under the provisions of the TEC, effective 1 January 2004. Transend is currently drafting its "Revenue Application" to the ACCC for the five and a half-year regulatory period commencing 1 January 2004.

The obligations of the ACCC, in respect of monitoring and regulating the TNSPs, are outlined in Clause 6.2 of the National Electricity Code (NEC). Further, the ACCC published on 27 May 1999, a draft "Statement of Principles for the Regulation of Transmission Revenues". This statement of principles document outlined in general terms the guidelines under which the ACCC proposed to "exercise its powers to regulate transmission revenues".

Within the statement of principles document, specific reference was made to the issue of service standards for TNSPs. In particular, under section 7 of the summary, the ACCC noted that "The Commission believes that effective incentive-based regulation should include an explicit level of service, for which the TNSP has been provided by the regulators sufficient income to maintain the assets necessary to provide that level of service". The Commission further noted that "*… the Commission required TNSPs to propose a single set of service standards, and proposed benchmarks for each standard, as part of their regulatory review application. The Commission will review the TNSP's application and establish a set of service standards with performance benchmarks, and a quality of service monitoring programme for each TNSP under its jurisdiction.*"

Finally, the ACCC noted that "Penalties for non-performance of service standards will be developed and will be imposed during a regulatory review for a TNSP that does not, in the opinion of the Commission, maintain its service to customers at the *benchmark level.*"

Under the above, Transend is yet to submit its application and is in the progress of drafting its revenue application for submission to ACCC in February 2003.

3.3.2. OTTER and Customer Reporting Regime

In future, even though the pricing determination and ongoing performance reporting is going to be under ACCC jurisdiction, Transend will have an obligation to report its performance to:

- OTTER
- Its Customers (Generator and DNSP)
- ACCC (under the new regime)

It is worthwhile to note here that the focus, intent and context of Transend's performance report to the ACCC, OTTER and Transend's customers will be different and hence leads to a complex performance reporting regime for Transend. This will be apparent not only on the set of performance measures, but also on how these three reports are analysed by different entities for differing purposes. This will introduce a complex decision making process for Transend, for example, a particular action by Transend can have a favourable impact on performance measure under the ACCC framework but an unfavourable impact on performance measures under the OTTER or Transend's customer frameworks.

4. SERVICE STANDARDS PROJECT RUN BY ACCC

In fulfilment of ACCC's obligations under the NEC, as stated under Section 3.3.1, the ACCC has proceeded to develop the framework of service standards for TNSPs. The ACCC has engaged Sinclair Knight Merz (SKM) to develop a set of service standards for TNSPs operating in the NEM.

There have been discussions between TNSPs and ACCC at various stages of the service standards project run by ACCC. ACCC defined three stages. These are indicated in Figure 1 and described below :

Stage 1 – Determination of the appropriate suite of performance measures, together with definitions. This stage also involved setting up the basic principles based on which the performance measures will be selected.

Stage 2 – Data collection of a suitable period (3-5 years) of historical results for the measures identified and defined in Stage 1. Establishment of appropriate forward looking targets for each TNSP.

Stage 3 – Development of the incentive framework of rewards/penalties for over-achievement/under-achievement of actual results, against the pre-determined targets.

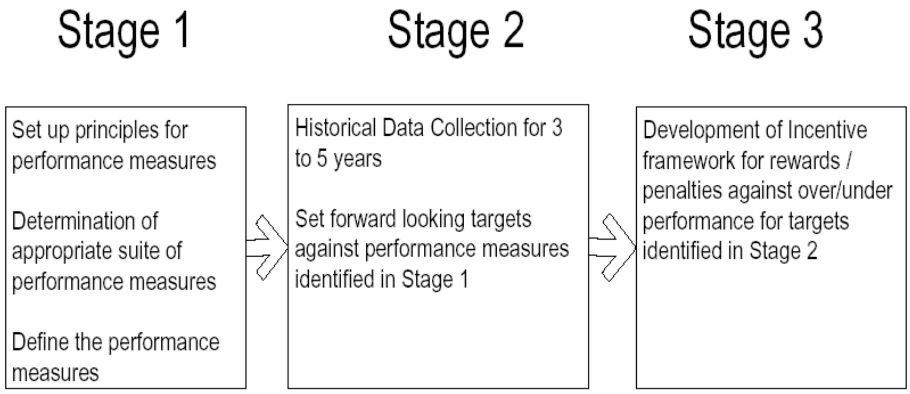


Figure 1 : Service Standards Project : Staged Approach

4.1. CURRENT STATUS OF THE SERVICE STANDARDS PROJECT

- ACCC has published a document titled "Transmission Network Service Provider (TNSP) Service Standards, Stage 1 : Discussion Paper" in March 2002 (hereafter referred to as "The Discussion Paper"). The Discussion Paper:
  - enlists the principles used to determine the performance measures;
  - provides a detail of the survey conducted by SKM; and
  - proposes a set of performance measures that may be considered.
- Subsequent to the Discussion Paper, based on experiences from mainland TNSPs, SKM has further refined the performance measures and issued a request for data collection in a document titled "Final Data Collection Against Recommended SKM Service Level Measures." dated 29 April 2002.

- A joint letter by all TNSPs was sent to ACCC from TransGrid dated 14 June 2002. TNSPs were to respond individually.
- SKM has advised the TNSPs, that ACCC has required work to be completed on Stage 2 and Stage 3 of the project and SKM essentially is working on completing this work.

5. PRINCIPLES OF ACCC SERVICE STANDARDS

In the Discussion Paper high level principles that would be applied in developing the service standards against which the TNSPs will be measured are noted. These principles are listed below:

- Principle 1 : Sound Accountability Regime
- Principle 2 : Recognition of Individual TNSP Accountabilities and Limits on "Powers to Act"
- Principle 3 : Commensurate Rewards for New Risks and Costs
- Principle 4 : Emphasis should be on providing Positive Incentives
- Principle 5 : Statistical Soundness
- Principle 6 : Auditable Measures
- Principle 7 : Alignment with Desired Outcomes
- Principle 8 : Key Measures
- Principle 9 : Legal Context

Transend is in agreement with the high level principles that are proposed, however it must be noted that:

- In terms of Principle 2, care must be exercised and proper analysis be undertaken to ensure that the "performance measures" recommended for Transend reflect the structural differences and "powers to act".
- In terms of Principle 2, Transend agrees that a TNSP must be only accountable for outcomes that they can control, or which it is best placed to manage.
- In terms of Principle 5 in relation to the measures recommended it must be noted that Transend is in the process of ensuring that all its transmission system is maintained in accordance with the established industry practices and also that the under performing assets are replaced. This means a heavy load of work having an adverse effect on measures like availability.
- In terms of Principle 7, the "desired outcome" is yet to be annunciated / documented. It is Transend's belief that progress on this project without adequately defining the "desired outcome" within the principles is risky and ACCC must propose the "driver" for the process. This principle requires that the performance measures be linked with the desired outcomes. As noted earlier, Transend will need to ensure that appropriate balance is established between the various performance measurement and reporting it has to undertake (with OTTER, Customers and ACCC) and ensure that all Transend works are aimed at delivering good performance. It is Transend's view that all performance reporting that Transend undertakes be guided to a "common" goal.
- Transend would like to bring Principle 9 to specific attention of ACCC. It is Transend's assumption that the service measures proposed and their construction will mesh coherently with other legal and regulatory requirements that Transend is exposed to.

- Transend also believes that the performance measures made applicable to Transend must encourage Transend to be innovative in its operations to improve performance and reduce costs that will ultimately render economic benefits as a whole.

6. STAGE 1 : SERVICE MEASURES AS PROPOSED BY SKM

- In this document, Transend is providing commentary and its interpretation on each of the proposed Performance Measures. Included in this document is also provided as much data as is available at this time.
- Of key concern to Transend is the apparent lack of a clearly defined framework for each of the terms used for defining each Performance Measure. For example there are no fewer than seven undefined terms used for classifying events that have an impact on performance, being
  - Forced
  - Fault
  - Planned
  - Unplanned
  - Emergency
  - Extreme
  - Forced Majeure (defined but not conclusive)
- Transend uses the following classifications of causes of an outage:
  - **Planned** - means an outage arising from works that have been scheduled in advance; for example, as part of Transend's annual maintenance or capital investment programme.
  - **Emergency** - means an outage arising from works that have not been scheduled in advance (excluding work arising from fault outages). In determining whether the work was scheduled or not, all works that are organised less than 24 hrs prior to the outage are classified as "emergency".
  - **Fault** - means an outage arising from automatic tripping due to failure of or fault on a transmission element.

7. MEASURE 1 : CIRCUIT AVAILABILITY

7.1. COMMENTS ON DEFINITION / STRUCTURE OF THE MEASURE

- There is no definition on what is meant by "transmission circuit".
- Transend understands ACCC's reasoning behind the proposed categories of peak, off-peak periods and critical, non-critical circuits. Conventional wisdom would suggest that circuit outages during off-peak periods would have a lesser impact on the market and customer service levels than during peak demand periods. Also, on the face of it, there should be incentives to undertake planned work during off-peak periods on the grounds of less reduction in service levels where as detailed analysis may suggest that this is not the most efficient approach.

  It must be recognised that the Tasmanian transmission system has been designed to cater for dispersed hydro based generation which results in a huge variety of possible generation dispatch patterns for each season and under all load demands. Thus the network can be under high stress on a hot summer day during Tasmania's lowest demand period. Similarly, on a cold winter day the generation dispatch can be such as to represent a low stress network.

Similarly, if there were network elements that could be considered as non-critical, it may be sensible to permit a lower level of performance. We have not defined what may be considered to be a non-critical element in the Tasmanian context, as for system security, supply availability, and operational flexibility reasons we consider that all circuits are critical.

There is an apparent absence of a clear framework for establishing definitions for arriving at a list of agreed critical circuits with the System Controller (TEC) or NEMMCO (NEC). In any event an element that could be considered non-critical at one point in time would most likely be critical at another point in time. Unless this is the case then the need for the element would be in doubt.

- Transend notes that the nominated list of critical circuits / system components will be reviewed annually. The concern that Transend has to this is that, over a period of time it will not be easy to trend the availability plots as these plots for each year could be based on a substantially different set of circuits.
- The definition as proposed, requires exclusion of unregulated transmission assets. It is assumed that the unavailability of the "regulated" transmission assets, due to impact of "unregulated" transmission asset will not be reported. It must be noted that while it is much easier to classify an asset as regulated / unregulated, it is impractical to split the power system in terms of regulated and unregulated activity and where there are physical links between the two asset categories, it will complicate the entire performance measurement framework.

7.2. Circuit Availability as monitored by Transend

7.2.1. Definition

- Transend interprets this measure as including unavailability arising from planned, emergency, and fault outages.
- Transend's historical performance data is based on the definition noted below.

  "The availability of "plant" for service is defined as being the actual plant hours available, meaning the plant is either in service or readily capable of being placed into service, divided by the possible plant hours available and is displayed as a percentage. Availability provides a measure of the time that plant is fit for purpose and conversely unavailability is an indication of the level of the time that plant is not fit for purpose due to planned, emergency and fault outages. *As it is a time indicator, it does not take into account, nor is influenced by, any consequential impacts on energy supply to customers associated with these outages.*"
- Transend monitors and reports on the availability of its transmission system for the following "plants":
  - total transmission circuit availability, including transmission circuits (overhead and underground transmission conductor circuits) for
    - network; and
    - connection assets.
  - total transformer circuit availability including all transformer circuits
    - Network 220 kV/110 kV and 110 kV/88 kV auto transformers
    - Supply(Connection) 220 kV/22 kV, 110 kV/44 kV or 33 kV or 22 kV or 11 kV or 6.6 kV
  - total reactive plant (capacitor bank) availability. Currently only four capacitor banks at 110 kV and one capacitor bank at 220 kV.

- Transmission, transformer and capacitor bank circuit availability include all network and connection assets. It must be noted that although Transend's past performance information may be used to split the performance further into asset categories (like transformers into Network transformers and Supply (connection) transformers), Transend is still analysing the use of this and will come to a conclusion before it makes the revenue application to ACCC. Transend may also be able to report on "overall" circuit availability that includes ALL circuits (transmission, transformer and capacitor bank). Transend is still analysing the utilisation of this "overall" circuit availability and its usefulness in relation to the "principles" of service standards as established by ACCC. Transend may be able to extract information on circuit unavailability due to "planned", "emergency" and "fault" outages, however has not provided / used this information.
- For reasons noted earlier in this document, Transend has neither collected nor reported availability under the categories of:
  - Critical circuit
  - Non-critical circuit
  - Peak
  - Off-peak.
- Transend has not made adjustments to historical data to take account of force majeure events as proposed under ACCCs very wide definition. For example, the data provided by Transend includes all storm-related outages as well as an outage when a transmission tower was accidentally pulled over by a farmer's plough.

7.3. Data Source

Transend uses its "Plant Restriction and Outage Management System" (PROMS) and faults database, to calculate the availability of the circuits. The PROMS has a list of all planned and emergency outages on the transmission system and the faults database has information on all the fault outages. Process for entry of information in PROMS is manual and involves entering of time and date when the plant was physically taken out of service and when it was put back into service. The physical elements of a circuit (circuit breaker, current transformer transmission line, transformer etc.) appear separately and it requires manual efforts to align these while collecting and reporting on availability.

7.4. Data Confidence

Transend is reviewing its processes with regards to calculation of availability data and is more likely to make this function a part of the "Network Operation Control System" linked with its PROMS. This is likely to enhance the quality and confidence of data for this measure.

Data confidence for data reported against this measure is "medium to high".

7.5. Historical circuit availability data

Taking into consideration the definition noted by Transend above and other specific issues identified, data has been provided as below on circuit availability performance. This data may not wholly align with the definition as proposed by SKM/ACCC.

Table 1 : Circuit Availability from June 1998 - June 2002

Circuit Type	Availability in % for financial years from June 'xx – June 'yy			
	1998-1999	1999-2000	2000-2001	2001-2002
Transmission Line	99.13	99.17	98.96	99.17
Power Transformer	99.14	98.70	99.17	99.13
Reactive (Capacitor Banks)	99.93	99.61	99.92	98.83

7.6. Proposed Definition for Performance Measure 1 : Circuit Availability

This measure is to be reported under three (3) categories of plant: transmission circuit, transformers and reactive plant. The performance results are to include availability of transmission circuits, and items of major plant (transformers, SVC's, etc).

Table 2 : Proposed Definition for Performance Measure 1 : Circuit Availability

Measure	Circuit Availability
Sub-measures	❖ Transmission Line Circuit Availability ❖ Power Transformer Circuit Availability ❖ Reactive Plant Circuit Availability
Unit of Measure	Actual plant hours available as a percentage (%) of total plant hours possible
Source of Data	❖ TNSP outage management system ❖ TNSP faults / outage database ❖ Operation Control System
Definition / Formula	Formula: $\frac{\text{Number of hours per annum plant circuits are available}}{\text{Total possible number of plant service hours}} \times 100$ Definition: The plant circuit hours available for transmission plant (meaning the plant is either in service or readily capable of being placed into service) divided by the total possible plant circuit hours.
Exclusions	❖ Exclude unregulated transmission assets. ❖ Exclude from "circuit unavailability" any outages shown to be caused by a fault or other event on a "3rd party system" or on unregulated assets eg. intertrip signal, generator outage, customer installation (TNSP to provide list). ❖ Outages due to opening of a circuit for system security or power transfer purposes. ❖ Outages due to operation of load shedding scheme or generation short falls. ❖ Customers exceeding the contracted demand or load on equipment

	more than the rating prescribed by the TNSP. ❖ Force majeure events.
Inclusions	❖ "Circuits" includes all network and connection assets including 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 (TNSP to provide lists). ❖ Transmission line circuits includes all transmission lines including overhead lines and underground cables that are owned by TNSP (note that Transend owns transmission circuits at 220 kV, 110 kV and 88 kV). ❖ Power Transformer circuits includes all network and supply transformers. ❖ Reactive Plant circuits includes all SVCs, capacitors and reactors. ❖ Outages due to fault or other event on connection and network assets owned by TNSP. ❖ Circuit "unavailability" to include outages from all causes including planned, emergency and fault events.

8. MEASURE 2 : LOSS OF SUPPLY EVENT INDEX

8.1. COMMENTS ON DEFINITION / STRUCTURE OF THE MEASURE

- The current definition of system minutes as proposed by ACCC does not exclude energy not taken following restoration of supply by TNSP. There are instances when transmission plant is ready and in service but the load is still to be energised or restored to its original level.
- The present definition includes energy not supplied as a result of an event in the regulated power system caused by faults on an "unregulated" asset.
- There is no definition in terms of "unplanned" outages and we assume that unplanned outages include:
  - emergency outages (outages planned within 24 hrs of the outage); and/or
  - fault outages.
- In terms of threshold levels for monitoring this measure there must exist a sense of commonality of principles of how the thresholds are selected. It is noted that each TNSP has to propose thresholds applicable to its system. There are however, no set principles on which these thresholds are to be set.
- The definition as proposed, requires exclusion of unregulated transmission assets. It is assumed that the loss of supply, due to impact of "unregulated" transmission assets will not be reported. It must be noted that while it is much easier to classify an asset as regulated / unregulated, its impractical to split the power system in terms of regulated and unregulated activity and where there are physical links between the two asset categories it will complicate the entire performance measurement framework.

8.2. Loss of Supply Events as monitored by Transend

8.2.1. Definition

- Historically Transend has reported on "System Minutes" and "Unserved Energy (USE)" measures. Transend believes that system minutes read *in isolation* as a number, does not give a true reflection of the performance of a TNSP. This thought has been further reinforced by the fact that SKMs consultant while working for ACCC noted that "the measure of System Minutes Lost is not a statistically valid method of measuring transmission system performance". Transend supports reliability measure methodologies based upon the number or frequency of energy not supplied events as proposed by SKM/ACCC.
- The definition of "System Minutes" used by Transend is noted below.

  System Minutes is the amount of unserved energy (MWh) normalised by dividing by the system maximum demand (MW) and multiplied by 60 to convert from system hours to system minutes. It is calculated as follows:

$$System\ Minutes = \left(\frac{Unserved\ Energy\ (MWh)}{System\ Maximum\ Demand\ (MW)}\right) x \left(\frac{60}{1}\right)$$

  It is important to note that the unserved energy attributable to Transend does not include:

  - energy not supplied because of generation shortfalls or failure of generation assets; and
  - energy not delivered by the Distribution Network Service Provider (DNSP) or the electricity retailer, following restoration of supply to Transend's connection points with the electricity retailer.
  - energy beyond the contracted demand to the customer.
- Transend believes that the loss of supply events must be calculated and reported for ALL loss of supply events due to emergency and/or fault outages.
- Transend has not made adjustments to historical data to take account of force majeure events as proposed under ACCCs very wide definition. For example, the data provided by Transend includes all storm-related outages as well as an outage when a transmission tower was accidentally pulled over by a farmer's plough.

8.3. Data Source

Transend uses its fault database, to calculate the "System Minutes". Whereas the data accuracy is considered as high, while calculating this measure, there have been a lot of discussions in the past about:

- What the load might have been (post event) (Note that this is used to calculate unserved energy data). This has normally been done using the load profiles from past weeks for similar period of time and similar weather conditions and based on the information available from Network Operations Centre on projected loads.

8.4. Data Confidence

Data confidence for data reported against this measure is "high".

8.5. Historical data on Loss of Supply Event Index

Taking into consideration the definition noted by Transend above and other specific issues identified, data has been provided as below on loss of supply event index. This data may not wholly align with the definition as proposed by SKM/ACCC.

Table 3 : Loss of Supply Event Index from June 1998-June 2002

System Minute Range	Loss of Supply Events for financial years from June 'xx – June 'yy			
	1998-1999	1999-2000	2000-2001	2001-2002
>0.01 and <0.2	12	8	11	21
0.2-1.0	8	10	6	9
>1.0	2	4	3	2

8.6. Proposed Definition for Performance Measure 2 : Loss of Supply Event Frequency

Table 4 : Proposed Definition for Performance Measure 2 : Loss of Supply Event Frequency Index

Measure	Loss of Supply Event Frequency Index
Unit of Measure	Number of loss of supply events per annum
Source of Data	TNSP faults / outage database
Definition / Formula	Number of events below "aa" system minutes Number of events between "aa" and "bb" system minutes Number of events greater than "bb" system minutes Formula for system minutes: $System\ Minutes = \left(\frac{Unserved\ Energy\ (MWh)}{System\ Maximum\ Demand\ (MW)}\right) x \left(\frac{60}{1}\right)$
Exclusions	❖ Exclude unregulated transmission assets. ❖ Exclude from "system minutes" any outages shown to be caused by a fault or other event on a "3rd party system" or on unregulated assets eg. intertrip signal, generator outage, customer installation (TNSP to provide list). ❖ System minutes due to energy not delivered, following restoration of plant / supply by TNSP. ❖ Outages due to opening of a circuit for system security or power transfer purposes. ❖ Outages due to operation of load shedding scheme or generation short falls. ❖ Customers exceeding the contracted demand or load on equipment more than the rating prescribed by the TNSP. ❖ Force majeure events.
Inclusions	❖ Include fault outages on all parts of the transmission system. ❖ All emergency outages. ❖ Outages due to fault or other event on connection and network assets

	owned by TNSP.

- Proposed Threshold Level ("aa", "bb")
  - Transend has historical information on its system minutes data for last four years. It is noted that each TNSP has to propose thresholds applicable to its system. Transend is in the process of coming to some conclusion regarding the threshold levels and will include this as a part of its revenue application (Stage 2). However, there is a need for a set of common principles on which these thresholds can be selected.
  - As noted earlier about **58%** of Tasmanian load is for major industrial customers.
  - Transend has conducted an analysis of its load centres and notes that five major industrial load centres and one major retail load centre contribute to **56%** load on its transmission system. A loss of supply to any of these load centres could lead to substantial system minutes, even within a interruption period of 15 to 30 minutes. This is noted in the Table 5. It must be noted that in accordance with recommended good industry practice it is expected that the re-energisation of plant post fault must wait for a minimum of 15 minutes for analysis (ref "National Guidelines for Manual Reclosing High Voltage Electrical Apparatus following a Fault Operation", published by Electricity Supply Association of Australia (ESAA)).

Table 5 : Analysis of Connection Points for System Minutes

Load Centre	System Minutes at average load for Outage Duration of	
	15 Minute	30 Minute
Major Industrial Direct Connect : A	2.57	5.14
Major Industrial Direct Connect : B	0.99	1.98
Major Industrial Direct Connect : C	0.81	1.62
Major Industrial Direct Connect : D	0.66	1.32
Distribution System : E	0.57	1.14
F (All remaining)	range 0.34 – 0.005	range 0.67 - 0.01

Based on the information provided above, Transend believes that the threshold levels must be decided based on the system design conditions.

9. MEASURE 3 : AVERAGE OUTAGE DURATION

9.1. COMMENTS ON DEFINITION / STRUCTURE OF THE MEASURE

- In the definitions table the Average Outage Duration has been defined as "Average Outage Restoration Time". We assume that what is required to be monitored is "Average Outage Duration".
- The term "Outage Duration" can be misinterpreted as including "all outages" unless someone goes into the definition that requires only emergency and fault outages. The measure must be renamed to be more clear on what is being monitored.
- The term "Average Outage Duration" needs to be expanded to indicate, Average Outage Duration of "what?", example circuit, connection point.

- There is no definition in terms of "unplanned" outages and we assume that unplanned outages include:
  - emergency outages (outages planned within 24 hrs of the outage); and/or
  - fault outages.
- The definition allows exclusion of momentary interruptions (< 1min). Transend agrees to this proposal so that the measure is not distorted due to events that may be restored automatically due to automatic reclosure.
- There are some issues with the way the measure is defined:
  - TNSP "A" has autoreclosure installed on its circuits and hence post a transitory fault, the circuit gets closed within 1 min and hence the event is not counted.
  - TNSP "B" does not have autoreclosure installed OR the autoreclosure has been disabled by System Controller / NEMMCO and hence post a transitory fault, the circuit does not get closed within 1 min and hence the event is counted.
  - TNSP "C" has distribution level bus bars and associated transformers and hence every fault / emergency outage will last for at least 15 minutes and hence each such event gets counted.

  The above stated example needs to be analysed to ensure a consistent framework is applied to all TNSPs.
- Transend believes that more work is required to ensure that the measure is applied to its intent and the reporting does not get distorted. One proposal could be to include thresholds and count the number of events rather than duration in isolation eg. as per system minutes, in bands of duration. However, Transend does not have sufficient information on this measure to be able to come to propose any changes at this stage.
- It must also be noted that certain outages may not result into loss of supply and based on "risk analysis" may be attended to in a longer time. This will have an inflatory effect on the performance reported against this measure. Further as well certain outages (like power transformer outages / due to fire) may cause extensive outage duration times. This may require a cap to be placed on the outage duration time events that must be reported or may be reported in different threshold levels like "loss of supply event frequency" measure.
- The definition as proposed, requires exclusion of unregulated transmission assets. It is assumed that the average outage duration of the "regulated" transmission assets, due to impact of "unregulated" transmission asset will not be reported. It must be noted that while it is much easier to classify an asset as regulated / unregulated, it is impractical to split the power system in terms of regulated and unregulated activity and where there are physical links between the two asset categories, it will complicate the entire performance measurement framework.

9.2. Circuit Outage Duration as monitored by Transend

9.2.1. Definition

Historically, as a service measure, Transend reports on outage duration for connection points, but not for transmission circuits. For transmission circuits Transend reports on Circuit availability as noted earlier.

9.2.2. Data Source

Transend uses its "Plant Restriction and Outage Management System" (PROMS) and fault database, to calculate the outage duration of the connection points. The PROMS has a list of all planned and emergency outages on the transmission system and the faults database has information on all the fault outages. Process for entry of information in PROMS is manual and involves manual entering of time and date when the plant was physically taken out of service and when it was put back into service. The physical elements of a circuit (circuit breaker, current transformer transmission line, transformer etc.) appear separately and it requires manual efforts to align these with respect to availability while collecting and reporting on outage duration.

9.2.3. Data Confidence

Transend is reviewing its processes with regards to calculation of outage duration data and is more likely to make this function a part of the "Network Operation Control System" linked with its PROMS. This is likely to enhance the quality and confidence of data for this measure.

Data confidence for data that will be reported against this measure is "low".

9.2.4. Historical Circuit Outage Duration Average Data

Taking into consideration the definition noted by Transend above and other specific issues identified, data has been provided as below on circuit outage average duration. This data may not wholly align with the definition as proposed by SKM/ACCC.

Table 6 : Average Circuit Outage Duration from June 1998-June 2002 (to be provided at a later date)

	Financial years from June 'xx – June 'yy			
	1998-1999	1999-2000	2000-2001	2001-2002
Total Circuit Outage Duration (mins)	55436	120828	45518	31754
Number of Events	100	130	121	121
Circuit Outage Average Duration (min/event)	554	929	376	261

9.3. Proposed Definition for Performance Measure 3 : Circuit Outage Average Duration

Table 7 : Proposed Definition for Performance Measure 3 : Circuit Outage Average Duration

Measure	Circuit Outage Average Duration
Unit of Measure	minutes / event
Source of Data	❖ TNSP outage management system ❖ TNSP faults / outage database
Definition/Formula	Formula: $\frac{\textit{Aggregate mitutes duration of all emergency outages}}{\textit{Number of events}}$ Definition: The cumulative summation of the outage duration time for the period, divided by the number of outage events during the period.

Exclusions	❖ Exclude unregulated transmission assets. ❖ Planned Outages (Outages planned more than 24 hrs in advance). ❖ Momentary interruptions (<1min). ❖ Exclude outages of secondary assets (like protection, SCADA etc.) or secondary plant (like circuit breaker, bus bar etc.), unless they cause outage of the circuits. ❖ Exclude from "outage duration" any outages shown to be caused by a fault or other event on a "3rd party system" or on unregulated assets eg. intertrip signal, generator outage, customer installation (TNSP to provide list). ❖ Outages due to opening of a circuit for system security or power transfer purposes. ❖ Outages due to operation of load shedding scheme or generation short falls. ❖ Customers exceeding the contracted demand or load on equipment more than the rating prescribed by the TNSP. ❖ Force majeure events.
Inclusions	❖ Include all emergency / forced outages of primary plant (transmission line, power transformer, reactive plant). Where the primary plant requires an outage due to secondary plant or secondary asset, the event must be included. ❖ Includes outages on all parts of the transmission system (connection assets, interconnected system assets). ❖ Includes all emergency and fault outages whether or not loss of supply occurs.

10. MEASURE 4 : TRANSMISSION CONSTRAINTS (INTRA-REGIONAL)

10.1. COMMENTS ON DEFINITION / STRUCTURE OF THE MEASURE

- The definition as in its present state is not robust enough to be applied in order to identify the "primary cause" for the constraint and whether TNSP is accountable for the cause or not.
- The definition of the cause of a constraint needs to be sure that the Performance Incentive (PI) scheme is restricted to those events under the control of the TNSP. It would be unreasonable to penalise a TNSP for constraints arising from the historical design of the network and the power system as a whole.
- The definition as proposed, requires exclusion of unregulated transmission assets. It is assumed that the transmission constraints, due to impact of "unregulated" transmission assets will not be reported. It must be noted that while it is much easier to classify an asset as regulated / unregulated, its impractical to split the power system in terms of regulated and unregulated activity and where there are physical links between the two asset categories it will complicate the entire performance measurement framework.

10.2. Transmission Constraints as monitored by Transend

10.2.1. Definition

- Historically, Transend has not conducted formal monitoring or reported on this measure.
- Transend does not have historical information on this measure.
- In the absence of a market in Tasmania, the "Generator" in Tasmania has the right to generate power as they see fit (Generators "preferred generating regime"). Normally when a system state or system configuration at any one time requires modifications to the generation patterns constraint notices are issued. These constrain notice take into consideration the system configuration, load profile and other aspects to maintain the security and integrity of the power system. As it is, these constraint notices do not identify whether the constraint has been due to TNSP or otherwise.
- Under the NEM environment, we understand that the transmission constraint process is going to include issuing of changes to transmission limit equations that effect the generator and a constraint notice will be issued accordingly to the TNSP (depending upon the outage).

10.2.2. Data Source

- Transend does not have historical information identifying generation dispatch that has been impacted by transmission constraints. It would be fair to say that any restrictions on customer demands would be accounted for under "Loss of Supply Events".
- Transend will need to establish a framework for identifying reportable constraints and the associated data collection systems and procedures.

10.2.3. Data Confidence

Not applicable as no data is being reported for this measure.

10.3. Historical Transmission Constraints data

Not applicable as no data is being reported for this measure.

10.4. Proposed Definition for Performance Measure 4 : Transmission Constraints

Transend believes that it requires a discussion with SKM / ACCC to discuss the definition and come to a much better understanding of what is expected from Transend, so that we can work towards gathering the data for the measure. Not withstanding other issues the definition must take into account the constraints due to design and constraints due to outages (planned or emergency).

11. DEFINITION OF FORCE MAJEURE

The definition of the "Force Majeure" as proposed by SKM/ACCC is very wide. The definition in its present form is very open and contentious. Transend has noted the definition on force majeure as proposed by TransGrid in their report dated 26 June 2002 and believe that this definition is more definitive than the one proposed by SKM/ACCC. However, the definition is still not clear as to how much time after the event can an outage be excluded. As an example, failure of a transformer weeks after a lightning storm could be counted in.

The definition as recommended by TransGrid is requoted below. Further discussion with ACCC is required to come to a conclusive definition of "Force Majeure" event.

"For the purposes of the TNSP Service Standards Incentive Scheme, Event of Force Majeure could mean any event, act or circumstance or combination of events, acts and circumstances (notwithstanding the observance of good electricity industry practice) that are beyond the reasonable control of the party affected by any such event (the "Affected Party"), which may include, without limitation the following:

- ❖ Riots, civil commotion, malicious damage, declared 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, Government Agency (including denial, refusal or failure to grant any Authorisation, despite timely best endeavor to obtain same);
- ❖ Strikes, lockouts, industrial and/or labour disputes and/or difficulties, work bans, blockades or picketing."

Transend also notes that information is being supplied to SKM for SPI Powernet and Vencorp in relation to force majeure provisions, that specifies a range of events or impacts on the power system for which the TNSP is expected to have contingency plans prepared and those larger events that could be considered force majeure. Transend is interested in exploring the possibility of this approach being applied in relation to service standard measures. The principal advantage of this approach is seen to be the clearer allocation of accountability to TNSPs for those events it is expected to manage.

"An alternative manner of dealing with force majeure provisions is to consider capping the impact of any one event on performance measures and hence to appropriately limit their impact on incentive schemes."

12. MEASURE 5 : TRANSMISSION CONSTRAINTS (INTER-REGIONAL)

Refer Clause 8.2 of the Discussion Paper :

"There is currently no interconnector between Tasmania and Victoria, and when Basslink becomes a reality, it is likely to be an unregulated interconnector subject to separate performance contracts, and unlikely to become subject to ACCC regulation."

Refer Appendix C of the Discussion Paper it states that this measure is not going to be applicable to Transend.

Transend therefore, has not commented on this measure and its proposed definition at this stage.

13. STAGE 2 AND STAGE 3 OF SERVICE STANDARDS PROJECT

Transend has provided as much data as available at this time. Transend is currently preparing its Revenue Application to the ACCC for the five and a half-year regulatory period commencing January 2004 and as part of that we assume that the Stage 2 and Stage 3 of the PI scheme for Transend will be negotiated. Whilst Transend will be pleased to continue to participate in the process of defining the framework for TNSP Service Standards and the PI scheme, at this stage we believe that is premature to establish the PI scheme specific to Transend.

14. TRANSEND'S COMMENTS ON THE PROGRESS OF THE PROJECT

Transend fully supports the objective of ACCC Service Standards Review for TNSPs. The progress on a project of this nature of complexity is to be praised, but it is of some concern that there have been certain critical aspects that have been left unattended while moving on to next stages of the project. The concerns with the project so far and in specific for Transend are noted below:

- ❖ Lack of a clear definitional framework for various performance measures.

- Lack of definition of objectives defined as "desired outcome" in Principle 7 (refer Section 5 of this report). The entire service standards project needs to flow from this definition.
- Lack of "auditable" link with the "Principles" (refer Section 5 of this report). This needs further emphasis in terms of relating each proposed measure to the Principles and demonstrating how the "desired outcome" can be reached by monitoring the proposed measures.
- There is a lot of double counting of events in each of the measure. Whereas this may be OK, but then it needs to be realised that each event will impact more than one measure and thus if a PI scheme is built up using these measures performance of two measures will be impacted due to a single event. Transend believes that with a good definitional framework, double counting can be avoided.
- There is a lack of identification of how "structural differences" in terms of jurisdictional and design of the system have been factored in designing the service measures. (refer Principle 3, Principle 7 and Principle 9, Section 5 of this report).
- The service standards do not recognise the "system design" impacts on performance. The system design and the load configuration can lead to substantial volatility in the performance against a service measure and therefore these factors need to be considered while designing the service measures, the associated targets and the PI scheme. In particular consideration must be given to
  - the design of the electricity network;
  - network composition (elements that make up the transmission network); and
  - requirements of specific customers.
- The proposed service standards do not factor the customer requirements as may be evident in the "connection agreements" that a TNSP has with a customer.
- Classifying circuits as critical and non-critical and annual variations in circuit classifications means that it is not clear whether the measures will be useful for "trend analysis" in the way they are proposed.
- For a company like Transend that has a "stressed" transmission system and a "backlog" of maintenance, refurbishment and replacement work, the associated outages will have a significant impact on the performance against the proposed service measures. This aspect needs to be factored while designing the targets and PI scheme for the proposed service measures. At the moment there is no recognition of the "amount of work done" and performance impact due to the same.
- Given that the definitional framework is flexible and so are the ways each TNSP monitors and reports against the service measures, it is inappropriate to compare TNSP with TNSP.
- In terms of implementation of the scheme, Transend is not sure as to who (ACCC or NEMMCO) will be providing clarifications on specific events that occur during the course of implementation of the scheme (i.e. whether the event needs to be included within the performance reporting or not).

INFORMATION TO SKM

Notes on Transend's proposed measures:

- *Availability* measures are generally of most significance to the electricity market (which will be of specific interest to Transend following its entry to the NEM). Availability targets for transmission lines and transformers should be applied to Transend.

- *Supply Availability* measures are of predominant interest to end users and electricity retailers. To reflect the characteristics of the Tasmanian customer load, a loss of supply index should be applied with thresholds of 0.1 system minutes and 2.0 system minutes respectively. These proposed thresholds differ slightly from the approach suggested by SKM.

- *Restorations Times Following Outages* are of interest to all users, but as a secondary matter to supply and plant availability measures. However, historic data indicates that performance is volatile as a result of a small number of significant events. An appropriate target and incentive mechanism cannot be developed at this time.

- *Intra- and inter-regional constraint* targets cannot be applied to Transend because of insufficient historic data on performance. It is also noted that Transend has limited ability to control performance.

In summary, Transend has concluded that its service incentive scheme should be based solely on measures of supply and plant availability, namely:

- Transmission circuit availability;
- Transformer availability; and
- Loss of Supply Event Frequency Index:
  - Number of events where loss of supply exceeds 0.1 system minutes.
  - Number of events where loss of supply exceeds 2.0 system minutes.

Notes on Transend's proposed performance indicators:

The performance indicators and targets have been incorporated in a performance incentive scheme which is designed to share risks and rewards between Transend and its customers. In Transend's view, customers place a higher value on supply availability measures compared to those relating to plant availability. It is therefore appropriate to place a greater weighting on supply availability in the service incentive scheme. Therefore, Transend has proposed the scheme so that:

- 0.6% of Transend's revenue is at risk against supply availability performance; and
- 0.4% of Transend's revenue is at risk against plant availability performance.

Appendix XXX – Transend's proposed performance incentive scheme

This appendix refers to chapter 5 of the main submission. The table below shows:

- the service indicator and the associated measure;
- the maximum revenue at risk applied to each service indicator;
- the maximum penalty level at which the total revenue ascribed to that service measure is lost;
- the penalty trigger level – at which penalties will be paid by Transend;
- the bonus trigger level penalty payments – at which bonuses will be received by Transend; and
- the maximum bonus level at which the total revenue ascribed to that service measure is gained.

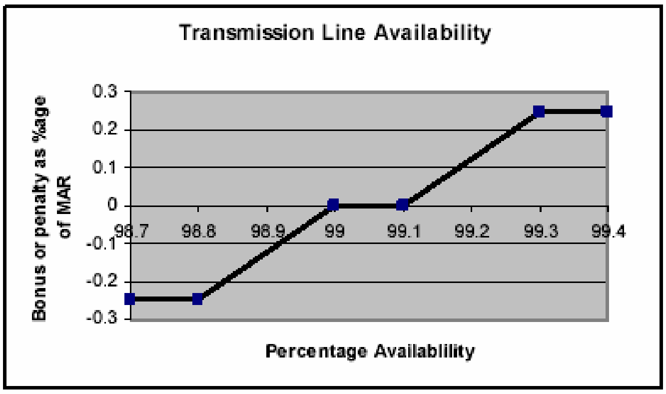
Table A1 – Proposed service indicators and targets – (Note: Very aggressive targets and Transend has not had the opportunity to check that these are revenue neutral)

Service Indicator	Measure	Maximum revenue at risk	Maximum Penalty level	Penalty Trigger	Bonus Trigger	Maximum Bonus level
Transmission line availability	Percentage availability	0.25%	98.8%	<99.0%	>99.1%	99.3%
Transformer availability	Percentage availability	0.15%	98.8%	<99.0%	>99.1%	99.5%
Supply Availability a	Number of events where loss of supply exceeds 0.1 system minutes	0.2%	20 events	>16 events	<14 events	10 events
Supply Availability b	Number of events where loss of supply exceeds 2 system minute	0.4%	5 events	>3 events	<2 events	0 events

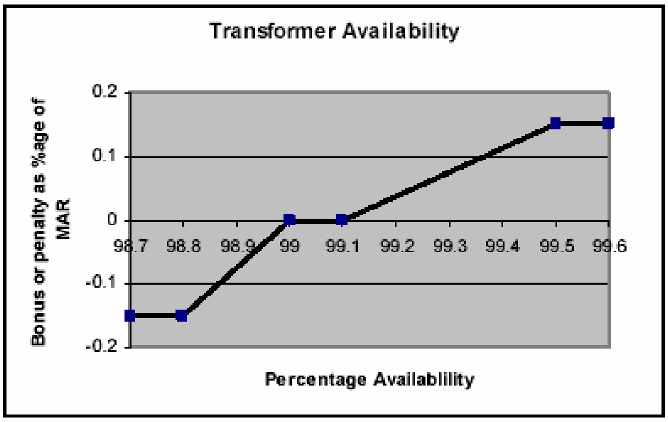
These proposed service indicators and targets are shown in diagrammatic form below.

It should be noted that the choice of targets reflects Transend's historic performance. The overall objective is for the performance incentive scheme to be revenue neutral. Most of the graphs are symmetrical in that performance above and below the trigger levels are treated on the same basis. However, with respect to transformer availability, performance which is better than the bonus trigger is valued less highly than performance which is worse than the penalty trigger. This reflects Transend's historic performance which has exceeded the bonus trigger level in two of the last three years.

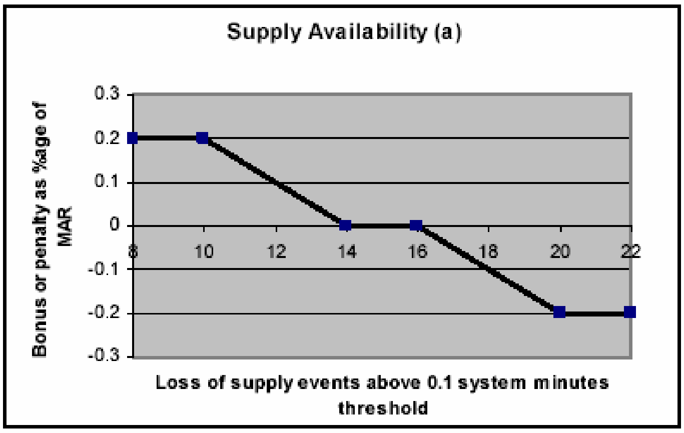
Transmission line availability



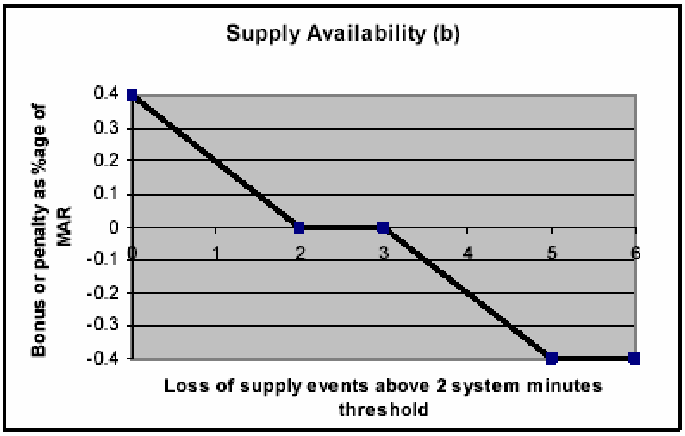
Transformer Availability



Supply availability (a) loss of supply above 0.1 system minutes threshold



Supply availability (b) loss of supply above 2 system minutes threshold



SKM

ACCC'S PERFORMANCE INCENTIVE/SERVICE STANDARDS SCHEME

COMMENTS TO SKM MARCH 2003-03-21

Table 1-1 The performance targets indicated in this table are not clear if they are 'mid-points' or the dead band numbers of the PI scheme. This has not been mentioned anywhere in the discussion. The targets shown do not illustrate the proposed dead bands. This proposal is a part of Transend's revenue application to ACCC.

Page 3,Transend Measure 1. Description should read "Circuit Availability (Trans lines)"

Page 3, Transend Measure 1 and 1a. Target is shown to two decimal places. Transend believes that targets proposed as apart of the PI scheme should be to first decimal place and not second decimal place. In both these instances based on analysis of Transend's past performance the dead band of the PI scheme is from an availability of 99.0 % to 99.1 %.

Page 3, Transend Measure 2a. The target in this case is the centre of the dead band proposed by Transend. The dead band proposed is between 14 and 16 events.

Page 3, Transend Measure 2b. The target in this case is not in the centre of the dead band proposed by Transend. The dead band proposed is between 2 and 3 events. The target of 2 events proposed by SKM is at the extreme of the dead band and hence returns a revenue neutral result from the PI scheme.

Page 4, Transend Measure 3. The average outage duration measure has been indicated as N/A. In its earlier submission to SKM/ACCC Transend indicated that the definition of this measure and its application needs thorough analysis and review before it is included in PI scheme. Transend has not proposed inclusion of this measure in the PI scheme, however in the due course of time if work is done in refining the definition Transend is prepared to include this measure in future. This measure must therefore be indicated as "F" and not "N/A". Note that this measure has been indicated as applying to Transend in Table 3-1 on Page 14.

Page 4, Transend Measure 5. This measure should be N/A as the Bass Strait interconnector will be an unregulated transmission asset. The measure is shown correctly as N/A in Table 3-1 on Page 14.

Page 24, Section 5.6, Third bullet point Measure 2. Data is also available for >0.1 and >2.0 mins which are the thresholds proposed in as in Table 1-1 for Transend measure 2a and 2b.

Page 44, Transend Measure 1. Description should read "Circuit Availability (Trans lines)"

Page 44, Appendix D The performance targets indicated in this table are not clear if they are 'mid-points' or the dead band numbers of the PI scheme. This has not been mentioned anywhere in the discussion. The targets shown do not illustrate the

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proposed dead bands. This proposal is a part of Transend's revenue application to ACCC.

Appendix N, Page 12. Power Transformer Availability for 1998-1999 should read "98.47". Transend has noted that the information it supplied on this measure for 1998-1999 was incorrect. For other measures the correct information as applicable has been a subject of Transend's revenue application.

Appendix N, Page 15. Table 3 was submitted on break points of 0.2 and 1.0 system minutes. As these break points are no longer proposed, the figures shown have not been confirmed.

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Appendix O Submissions – TransGrid

Response to SKM Data Collection Pack

Service Standards

TransGrid Submission

26 June 2002

1. Introduction

This submission is in response to SKM's document "Final Data Collection Against Recommended SKM Service Level Measures" of 29 April 2002. It is provided in addition to the comments from TransGrid to the ACCC in our letter dated 14 June 2002 on behalf of NEM TNSPs.

TransGrid is committed to the objective of the ACCC Service Standards Review for TNSPs. The development of relevant service standards and the introduction of appropriate incentive schemes within a low risk framework are supported.

TransGrid considers that its performance on a number of metrics can be shown to be of superior nature. Accordingly, any incentive scheme needs to recognise this achievement and the diminishing opportunities for further improvements. It is essential that the proposed incentive scheme take full account of this position and provides an appropriately balanced risk-reward trade off. It is considered that maintenance of superior performance on certain metrics should be sufficient to allow TransGrid to earn incentives above the regulated revenue cap.

TransGrid broadly agrees to a number of the proposed measures and has provided requested data where available. Certain proposed modifications to the measures have been provided, and in these cases data for the modified measures is also provided. The proposed modified measures align better with the principles outlined within the document "Service Standards for TNSPs – some High Level Principles".

Recommended changes to definitions of specific measures have also been marked up for clarity.

Performance data for measures Transmission Circuit Availability and Average Outage Restoration Time are affected strongly by the definition of force majeure. Specific comments on force majeure are provided in Section 3.1 of this submission.

2. Performance Measures

2.1 Performance Measure 1 – Transmission Circuit Availability

Data has been provided for Total Circuit Availability. The accuracy of this data is considered high, however it has been collated including outages of TransGrid primary plant from all causes. The most significant factor to note is the inclusion of many forced outage events considered as force majeure according to SKM's definitions of 29 April 2002.

The events have been included for two reasons. Firstly, transmission systems are designed and maintained to account for the effects of most weather conditions (including storms and lightning) and accordingly it is considered appropriate to monitor service standards including events caused by routine weather-related events. Secondly, the exclusion of an inappropriately high number of events under force majeure provisions could have the tendency to affect the setting and achieving of meaningful targets by the inherent increased volatility associated with data sets of reduced size.

TransGrid does not support the proposed sub-measures relating to "critical circuits" and "peak-periods", as the process for identifying these appears somewhat arbitrary and may not be consistently applied across TNSPs. Additionally, the actual criticality of given circuits will vary considerably with respect to season and time of day. Current controls with respect to NEMMCO's responsibility for system security and TransGrid's obligations with respect to system reliability are considered sufficient drivers at this stage to ensure plant outages are only taken at appropriate times. Appropriate performance measures of system reliability and market constraint applied in tandem should be considered sufficient to initially address concerns about the timing of outages in relation to market impacts.

Recognising that TransGrid's service measure for availability under its current revenue determination is limited to only transmission lines, and the expectation from the market for drivers on the availability of a wider range of plant, sub-measures are proposed for transmission lines, power transformers and system reactive plant. Data is provided for each of these alternative sub-measures. Data accuracy, in accordance with the revised availability definition (see Section 3.2), is considered high.

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Circuit Availability (Total)	%	98.84	99.32	98.47	99.07	99.23
Sub-measure 1(a) Circuit Availability (Critical)	%	n/a	n/a	n/a	n/a	n/a
Sub-measure 1(b) – Circuit Availability (Non-Critical)	%	n/a	n/a	n/a	n/a	n/a
Sub-measure 1(c) – Circuit Availability (Peak)	%	n/a	na	n/a	n/a	n/a
Sub-measure 1(d) – Circuit Availability (Non-Peak)	%	n/a	n/a	n/a	n/a	n/a
Proposed sub-measure 1(a) – Transmission Circuits	%	99.57	99.54	99.37	99.42	99.62
Proposed sub-measure 1(b) – Transformers	%	98.26	99.18	98.73	99.16	99.10
Reactive Plant Availability	%	98.30	99.09	96.00	98.17	98.71

Caution needs to be applied with respect to setting future availability targets based closely on historical TNSP performance. Availability is affected by a number of factors, principal among which are forced and emergency outages, planned outages for maintenance work and planned outages for capital work.

Whilst outage requirements for planned maintenance work are largely predictable, planned outage requirements for capital, and especially network augmentation works, will be highly variable over time.

Since 1996/97 TransGrid capital work has consisted of predominately green-field projects, with a resultant minimal impact on plant availability. TransGrid is planning a significantly larger capital works programme over the next five to ten years. A number of these projects are anticipated to involve the uprating or rebuilding of transmission lines on existing corridors, due to the difficulty in obtaining new line routes. It is expected this work may have a significant impact on achievable network availability.

2.2 Performance Measure 2 – System Minutes Lost

TransGrid supports the current move by SKM and the ACCC to the use of reliability measure methodologies based upon the number or frequency of energy not supplied events, as proposed by Powerlink Qld.

It should be noted however that the threshold levels (and associated targets) established for Powerlink Qld based on loss of supply events greater than 0.2 and 1.0 system minutes are applicable only to the Queensland system. Additional work using TransGrid's data would be required to establish appropriate frequency and event size benchmarks for application to TransGrid.

TransGrid has supplied the requested data recognising it may not be appropriate to define the reliability performance of TransGrid's system. Also supplied is additional information in relation to the total number of loss of supply events per annum, and the number above a threshold level of 0.1 system minutes.

Over the past ten years, the average number of energy not supplied events per annum has been 13.6, with the average number of events over 0.1 system minutes of 3.7 per annum.

Accuracy of all data is high.

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Energy Not Supplied Events > 0.2 system minutes	Number	1	2	1	2	1
Energy Not Supplied Events > 1.0 system minutes	Number	0	0	0	2	0
Energy Not Supplied Events (All events)	Number	10	17	9	10	8
Energy Not Supplied Events > 0.1 system minutes	Number	2	4	5	5	2

2.3 Performance Measure 3 – Average Outage Restoration Time

SKM's proposal for a measure of outage restoration time refers to restoration of the system to its "normal state" following an unplanned outage.

This definition is considered too onerous and has not been justified in terms of benefit to end users or the market. TransGrid's position is that the measure should relate to the restoration time of the primary plant required for the operation of the network. In this respect, it is proposed the plant to be measured should be that already identified in the availability measure ie. transmission lines, transformers and major reactive plant.

The fundamental reason for TransGrid's position in this respect is that other plant such as busbars and circuit breakers only provide a means for the interconnection of other primary plant. Substation design typically provides redundancy of connection options. For example, a problem with a circuit breaker in a breaker-and-a-half scheme may cause a forced outage. In terms of determining the average outage restoration time, it should be the return of the line or transformer to service that is the determining factor, even if the circuit breaker causing the outage of the primary plant remains out of service for an extended period.

Data provided for average outage restoration times is based on the return of the nominated primary plant only. With this proviso, the data is in accordance with SKM's definition and data accuracy is considered high.

TransGrid considers in some isolated cases that restoration times may be very long. Examples of this could be major cable repairs or the replacement of a transformer where a suitable spare has been already used for an unrelated plant failure and has not been able to be replaced due to long production lead times.

In these cases, it is possible that a small number of events can have significant impact on achieved average restoration times, and in terms of an incentive scheme could conceivably drive a TNSP's performance to a "penalty limit". In such a circumstance, incentives under the service standards incentive scheme would be effectively lost and not serve to function as intended to the benefit of end users or the market.

To alleviate this possibility, one approach is to specify those events beyond which the TNSP is not expected to have specific contingency plans for and remove such events from consideration in calculation of performance against this measure (refer comments also on force majeure on section 3.1 of this document).

An alternative approval proposed by TransGrid is to cap the impact of any specific event. This approach penalises a TNSP for major outages but could be selected so that it should not provide inappropriate and unintended drivers of TNSP behaviour. A maximum outage cap of 7 or 14 days may be considered reasonable for this purpose.

An additional data set on TransGrid's historical performance has been provided below to an alternative definition of average outage restoration time which includes a 14 day cap per event. The accuracy of this data is also high.

It should be noted that capping of individual event durations in determining this performance measure reduces the variability of historical performance significantly, and could be expected to allow easier development of appropriate targets and incentives.

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Average Outage Duration	Minutes	9,379	1,855	3,140	5,223	934
Proposed Alternative Average Outage Duration Measure (capped)	Minutes	3,155	1,759	1,540	2,205	910

2.4 Transmission Constraints

TransGrid is prepared to develop and implement service standard measures in relation to transmission constraints. Data on transmission constraints has been collected by TransGrid since July 2000, and accordingly this data is provided below. Data prior to this date is not available. The accuracy of the data is high.

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Transmission Constraints (Intra-Regional)	Hrs pa	n/a	n/a	n/a	n/a	373.3
Transmission Constraints (Inter-Regional)	Hrs pa	n/a	n/a	n/a	n/a	322.0

A significant issue in relation to transmission constraints is determining the contributory causes for given constraints and therefore the degree to which a TNSP should be held accountable for the constraint. The data provided incorporates constraints due to all causes. In addition, inter-regional constraints have not been categorised to align with attributed constraints to the "importing TNSP" as yet.

As expressed previously in our correspondence of 14 June 2002 to the ACCC, TransGrid considers it imperative that the ACCC determine whether market participants favour "responsiveness" to market conditions or "predictability" in timing of outages as the primary objective of TNSPs in managing constraints. Only once this matter is clarified should service standards for constraints be developed.

To assist SKM on this issue, TransGrid is prepared to meet and discuss the issue further and to make available for SKM review more detailed information TransGrid holds on constraints on its network.

3. Definitions

3.1 Force Majeure

TransGrid considers that for the purposes of the TNSP Service Standards Incentive Scheme, Event of Force Majeure could mean any event, act or circumstance or combination of events, acts and circumstances which (notwithstanding the observance of good electricity industry practice) that is beyond the reasonable control of the party affected by any such event (the "Affected Party"), which may include, without limitation the following:

a) Riots, civil commotion, malicious damage, declared 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;

b) Action or inaction by a court, Government Agency (including denial, refusal or failure to grant any Authorisation, despite timely best endeavour to obtain same);

c) Strikes, lockouts, industrial and/or labour disputes and/or difficulties, work bans, blockades or picketing.

TransGrid also notes that information is being supplied to SKM for SPI Powernet and Vencorp in relation to force majeure provisions, that specifies a range of events or impacts on the power system for which the TNSP is expected to have contingency plans prepared and those larger events that could be considered force majeure. TransGrid is interested in exploring the possibility of this approach being applied in relation to service standard measures. The principal advantage of this approach is seen to be the clearer allocation of accountability to TNSPs for those events it is expected to manage.

An alternative manner of dealing with force majeure provisions is to consider capping the impact of any one event on performance measures and hence to appropriately limit their impact on incentive schemes.

3.2 Transmission Circuit Availability

Measure	Transmission Circuit Availability
Sub-measures	☐ Transmission circuit availability (critical circuits) ☐ Transmission circuit availability (non-critical circuits) ☐ Transmission circuit availability (peak periods) ☐ Transmission circuit availability (off-peak periods) Alternatives proposed: ☐ Transmission line availability ☐ Power transformer availability ☐ Reactive plant availability
Unit of Measure	% of total possible hours available.
Source of Data	☐ TNSP outage reports and system for circuit availability ☐ Agreed Schedule of Critical Circuits ☐ Nominated peak / off-peak hours – Currently peak – 7:00 am to 10:00 pm weekdays – Or as otherwise defined by the TNSP/NEMMCO – Off peak – all other times – May include intermediate time periods and seasonal periods
Definition/Formula	Formula: No hours pa defined (critical / non-critical) circuits are available x 100 Total possible no of defined circuit hours Definition: The actual circuit hours available for defined (critical/non-critical) transmission circuits divided by the total possible defined circuit hours available, for each measure in aggregate or the relevant sub-category as applicable. Note that there shall be an annual review of the nominated list of critical circuits / system components
Exclusions	☐ Exclude unregulated transmission assets (eg. same connection assets). ☐ Exclude from "circuit unavailability" any outages shown to be caused by a fault or other event on a "3rd party system" eg. intertrip signal, generator outage, customer installation (TNSP to provide list) ☐ 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 (TNSP to provide lists) ☐ Transmission lines includes all overhead lines and underground cables at 132kV and above ☐ Power transformers include all power and tie transformers, but excludes substations auxiliary transformers and SVC transformers (which are included in SVC availability) ☐ System reactive plant includes all SVCs, Syncons and capacitors and reactors installed at 66kV and above ☐ Circuit "unavailability" to include outages from all causes including planned, forced and emergency events, including extreme events

3.3 Loss of Supply Event Frequency Index

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 system for circuit availability
Definition/Formula	Number of events greater than 0.2 minutes pa Number of events greater than 1.0 minutes pa (Refer Powerlink detailed methodology) An alternate definition based all frequencies of all loss of supply events (zero threshold) and events >0.1 system minute may be more appropriate.
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
Inclusions	☐ All unplanned outages exceeding the specified impact (ie. 0.2 minutes and 1.0 minutes) ☐ Includes outages on all parts of the regulated transmission system ☐ Includes extreme events

3.4 Average Outage Duration

Measure	Average Outage Restoration Time
Unit of Measure	Minutes
Source of Data	TNSP Outage Reporting System
Definition/Formula	Formula: $\frac{\text{Aggregate minutes duration of all unplanned outages}}{\text{No of events}}$ Definition: The cumulative summation of the outage duration time for the period, divided by the number of outage events during the period The definition is based upon return to service of the primary plant i.e. line, transformer or reactive plant at 132kV and above, and does not consider busbar, circuit breaker or auxiliary plant status. The proposed alternative measure has the maximum duration of restoration time capped at 14 days when calculating averages.
Exclusions	☐ Planned outages ☐ Momentary interruptions (< 1 min) ☐ Force majeure events ☐ Busbars, circuit breakers, auxiliary plant, secondary systems and the like
Inclusions	☐ Includes faults on all parts of the transmission system (connection assets, interconnected system assets) ☐ Indicator applies to return of transmission lines, power transformers, SVCs, Syncons, and reactors and capacitors connected at 66kV and above ☐ Includes all forced and fault outages whether or not loss of supply occurs

TransGrid

Service Standards - Response to SKM Performance Incentive Scheme Proposal

TransGrid Comments

1 November 2002

1. Introduction

This submission is in response to SKM's Performance Incentive (PI) scheme proposal sent to TransGrid on 17 September 2002.

TransGrid remains committed to the objective of the ACCC Service Standards Review for TNSPs. The development of relevant service standards and the introduction of appropriate incentive schemes within a low risk framework are supported.

TransGrid's position with respect to a PI scheme associated with service standards is that transmission companies should be rewarded for achieving and maintaining "best practice" and should only be penalised when performance falls below "acceptable practice".

TransGrid understands that the current proposal from SKM does not attempt to establish best practice benchmarks, nor to compare the performance between TNSPs.

The practical issues associated with benchmarking, such as definitional variations and the availability of reliable and consistent data between TNSPs, are understood and appreciated.

TransGrid also understands that the PI scheme currently being developed by SKM is established around the following principles:

- TNSPs should be exposed to a fair balance of upside and downside risk;
- Targets are being developed around the historical performance of each TNSP (using their own data definitions and data) with the incentive scheme designed to maintain or improve performance;
- Targets will be chosen to be reasonably achievable and will not be "stretch" targets; and
- Where incremental performance improvements are more difficult to achieve than declines in service levels, asymmetric caps, collars and ramping factors will be applied to the design of the PI scheme.

Given the present difficulties associated with the development of a PI scheme based around "best practice" benchmarks, TransGrid is prepared to contribute to the development of a PI scheme established around the principles listed above.

TransGrid's position is, however, that the ultimate development of a PI scheme tied more closely to "best practice" benchmarks should be further considered. TransGrid remains willing to participate in the development of such a scheme, and would urge the ACCC to consider the process for achieving this outcome.

TransGrid would also like to note two significant factors that it considers would have an impact on the future use of a PI scheme based upon TransGrid's historical performance. These are that:

- Sufficient revenue for operating and capital works needs to be approved as part of revenue resets in order to continue to maintain and develop the network to standards consistent with historical practice, and
- The responsibility for network planning remains with TransGrid.

Whilst TransGrid acknowledges that these issues are peripheral to the current service standards project, any material change in respect of these factors will potentially impact on TransGrid's capacity to commit to a PI scheme based on historical performance.

2. Data

This section provides amended or additional data to that provided in our submission dated 26 June 2002.

2.1 Transmission Circuit Availability

Historical transmission line availability figures have been amended. This has occurred following work undertaken to ensure historical consistency of the treatment of the availability of lines with tee segments, and the alignment of historical data with TransGrid's current data definition for the availability of teed circuits. The amendments are of a minor nature, reducing transmission line availability from the previously reported average figure for the period of 1996/97 to 2000/01 from 99.50% to 99.42%.

Amended transmission line availability figures are provided below:

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Transmission Line Availability	%	99.50	99.46	99.27	99.32	99.56

2.2 Reliability Measure - Energy Not Supplied

As noted in our submission of 26 June 2002, TransGrid supports the use of reliability measure methodologies based upon the number or frequency of energy not supplied events above specific threshold levels, as originally proposed by Powerlink Qld.

TransGrid noted in our earlier submission that the targets established for Powerlink Qld based on the number of loss of supply events greater than 0.2 and 1.0 system minutes are applicable to the Queensland system, but not necessarily to other networks.

Additional work has now been completed to establish appropriate frequency and event size benchmarks for application to TransGrid.

This analysis has determined that the most appropriate threshold levels with which to characterise the performance of TransGrid's network are levels of 0.05 and 0.4 system minutes.

Over the past ten years, the average number of energy not supplied events per annum greater than 0.05 system minutes has been 6.1, with the average number of events over 0.4 system minutes being 0.84 per annum.

2.3 Performance Measure 3 – Average Outage Restoration Time

The average restoration time for all forced and emergency outages has been recalculated with the maximum contribution to accumulated restoration times for any given event capped at 7 days (10,080 minutes). Historical data for this measure is shown in the table below. For comparative purposes, the data for average restoration times previously supplied (for event durations both uncapped and capped at 14 days) is also provided. It is noted that application of a 7-day cap appears to reduce data volatility associated with this measure.

Performance Measure	Unit of Measure	Historical Results				
		1996/97	1997/98	1998/99	1999/00	2000/01
Average Outage Restoration Time (uncapped)	Minutes	9,379	1,855	3,140	5,223	934
Average Outage Restoration Time (14 day cap)	Minutes	3,155	1,759	1,540	2,205	910
Average Outage Restoration Time (7 day cap)	Minutes	2,143	1,628	1,241	1,769	793

3. Comments on Targets Proposed by SKM

3.1 Transmission Line Availability

TransGrid notes that the target proposed by SKM for transmission line availability corresponds to the average availability (99.5%) that TransGrid previously reported it achieved for the data collection period. Following TransGrid's review of its line availability data (refer section 2.1 of this report) the average historical availability has been amended to 99.42%. Accordingly, it is proposed that target, cap and collar levels are each reduced by an amount of 0.1%.

An amended target of 99.4% is considered to be the highest target that could reasonably be assigned based upon consideration of historical performance and taking account of the following observations:

- An unavailability of approximately 0.25-0.3% is required for the completion of routine maintenance activities within a "best practice" maintenance regime, including some allowance for defect work.
- A similar provision for line unavailability in the longer term needs to be made for capital works and major asset refurbishment activities. It should be noted that TransGrid has experienced an unusually low requirement for major refurbishment outages on transmission lines over recent years (for such activities as insulator type replacements). Historical experience and TransGrid's current long-term asset management plans suggest this is unsustainable in the longer term.
- There is an increasing pressure on TNSPs to reconstruct existing transmission lines in preference to the construction of new lines so as to avoid the need for taking additional easements and to minimise environmental impacts. TransGrid's current medium term plans identify a number of line reconstruction projects that will impact on achievable line availabilities.

3.2 Transformer Availability

TransGrid considers the target for transformer availability should be more closely aligned with our historical performance than the proposal put forward by SKM. This position is consistent with one of the key principles of the incentive scheme, that is to underpin TNSP performance at levels consistent with that achieved historically and to provide appropriate incentives for further improvement.

On this basis, it is recommended that a target no higher than 99.0% be recommended for transformer availability. To achieve this, it is proposed that target, cap and collar levels are each reduced by an amount of 0.1%.

3.3 Reactive Plant Availability

TransGrid considers the targets proposed by SKM for reactive plant availability are reasonable and accordingly no changes are sought in relation to this measure or its targets.

3.4 Aggregate Availability

The use of an aggregated availability target is not considered necessary when the availability of all primary plant is being measured through specific availability measures for each class of plant. Accordingly, it is recommended that this measure be deleted from the scheme.

In order to account for the removal of this measure from the scheme, it is necessary to reallocate relative weightings between the performance measures. TransGrid's position on an appropriate weighting between measures is provided in section 4 of this document.

3.5 Reliability – Energy Not Supplied

As noted in section 2.2 of this document, appropriate energy not supplied event threshold levels for TransGrid's network have been derived. These levels are 0.05 and 0.4 system minutes.

Taking account of the historical performance achieved against these thresholds of 6.1 and 0.84 events per annum respectively, targets of 6 and 1 events per annum are proposed as reasonable and appropriate.

It should be noted that TransGrid's reliability performance using this measure could never be simply compared to the performance of other TNSPs. The selection of the lower (than 0.2 and 1.0 system minute) event thresholds was found to be necessary to provide a statistically sound basis for the implementation of this scheme to TransGrid. This reflects the higher standard of reliability achieved in NSW, and expected by NSW consumers, in comparison to that delivered in the majority of other Australian states.

TransGrid has an historically strong performance in the area of reliability of supply, and there is no evidence that the community requires higher levels. It is argued that further incremental improvements against the targets for these parameters will prove challenging and potentially poses an unbalanced and inappropriate risk exposure for the organisation. Accordingly, it is proposed that an asymmetric cap and collar arrangement is essential with respect to this measure. Additional details with regards to TransGrid's proposal are contained in section 4.

It should also be noted that TransGrid prefers the relative weighting of these two sub-measures to be changed from SKM's original proposal to reflect slightly higher weighting towards the measure of events exceeding 0.05 system minutes, as this measure better captures the impact on the broadest range of customers i.e. both large urban and industrial loads as well as smaller load blocks.

3.6 Average Outage Restoration Time

TransGrid has a strong preference for a 7-day cap being applied for any given event when calculating average restoration times. This approach helps to reduce data volatility and provides some reasonable degree of consistency of performance, and hence TNSP controllability, over time.

The use of such a cap also ensures that a single or small number of major events in a given year will not drive a TNSP's measured performance prematurely to the application of a maximum penalty. This is important in that the application of such a penalty following a limited number of events could potentially remove all financial incentives from a TNSP to continue to improve performance during that year.

Referring to the data provided in section 2.3 it can be seen that even with the use of a 7-day event cap this measure is still the most variable of all measures proposed for TransGrid within the PI scheme. Accordingly, it is recommended for this measure alone, that a deadband be applied and that the deadband be sufficiently wide to reduce the "random" application of incentives and penalties. Given the degree of variability of historical performance, a deadband of ± 300 minutes is proposed.

The use of this measure without a 7-day event cap and a sufficiently wide deadband could not be supported.

With respect to the selection of cap and collar values, it is recommended that a reasonable approach to establish these levels is based upon a consistent percentage improvement or deterioration in performance by comparison with the associated knee point at the two ends of the deadband.

It is recommended that since this measure is apparently more variable by comparison to the other proposed service measures, and that it is necessarily a "secondary" measure (in so far as performance on this measure will potentially reflect also in availability and reliability performance) the weighting associated with the measure be reduced from 20% to 10% of the overall amount of revenue at risk.

Details of the TransGrid's proposed implementation of this measure are given in section 4.

3.7 Constraints

In relation to incentives on TNSPs to manage outages to minimise their impact on transmission constraints and the wholesale market TransGrid recognises the importance of this issue to a number of Participants. In particular, there remains a widespread concern that TNSPs will take outages to minimise their own costs regardless of the impact on the trading position of Market Participants. It is for this reason that TNSPs are committed to work together (through the TNSP co-operation charter) and with the ACCC to progress this challenging aspect of the performance incentive scheme.

At least two important issues remain to be resolved in developing these incentives.

Firstly, the relative importance of transmission outages being taken with advance warning to the market rather than having the timing of outages respond to spot prices needs to be established. Participant consensus on this issue has not been established and some Participants have indicated strongly to TransGrid that they prefer advanced predictability of transmission outages in order to enter into forward contract positions.

Secondly, transmission companies can control the timing of many (but not all) outages. However, they cannot control the resulting pool price changes, and certainly can't respond to spot prices before the event. Pool prices often change after an outage commences as a direct result of generator bidding behaviour, and probably, in many cases, because of strategic behaviour associated with market conditions created by the outage. In this regard transmission businesses should not be directly exposed to price outcomes, as they cannot control the bidding behaviour of generators. In addition, there should also be consideration of using pre-dispatch prices as a basis for an incentive scheme.

In any event, TransGrid recognises both the challenges faced by the ACCC on this matter, and the need to make meaningful progress. Accordingly, TransGrid supports continuing work with the ACCC, and the other TNSPs, to reach an appropriate and timely resolution.

In relation to the PI scheme currently being developed, TransGrid has strong reservations about the implementation of measures on the number of hours of binding constraint, irrespective of whether there is any revenue at risk in relation to the measure. The acceptance of such a measure implies a degree of responsibility or control over outcomes in relation to the hours of binding constraint that TransGrid does not have.

It is proposed that no measure on constraints be implemented within a PI scheme until the key issues identified in this response have been considered by the ACCC and the TNSPs and a resolution reached that is acceptable to all parties.

4. TransGrid's Proposal for Targets and Incentives

TransGrid's proposal in relation to the performance incentive scheme are summarised in the table below:

Performance Measure	Unit of Measure	Weighting %	Collar	Deadband Knee 1	Target	Deadband Knee 2	Cap
Transmission Line Availability	%	20	98.9	n/a	99.4	n/a	99.7
Transformer Availability	%	15	98.0	n/a	99.0	n/a	99.5
Reactive Plant Availability	%	10	97.0	n/a	98.5	n/a	99.3
Reliability (Events >0.05 system minutes)	Number	25	9	n/a	6	n/a	4
Reliability (Events >0.4 system minutes)	Number	20	3	n/a	1	n/a	0
Average Outage Restoration Time (7 day cap)	Minutes	10	2400	1800	1500	1200	800

5. General Comments

TransGrid considers that the definition of force majeure events needs to be extended to include actions by generators, distributors or customers in denying or failing to grant outages necessary to perform necessary maintenance, refurbishment or plant replacement works, despite TransGrid's best endeavours to obtain same.

Definitions associated with the range of measures have been updated and are included in the Appendix to this document.

TransGrid would appreciate details of the final PI scheme developed by SKM and submitted to ACCC, in so far as it is intended to apply to TransGrid, being provided to TransGrid.

Appendix Definition of Measures

Measure 1 – Transmission Plant Availability

Measure	Transmission Circuit Availability
Measures	□ Transmission line availability □ Power transformer availability □ Reactive plant availability
Unit of Measure	% of total possible hours available.
Source of Data	□ TNSP outage reports and system for circuit availability
Definition/Formula	Formula: $\frac{\text{No hours pa defined plant is available} \times 100}{\text{Total possible no of hours defined plant could be available}}$ Definition: The actual plant hours available for defined classes of transmission plant divided by the total possible defined planned hours available.
Exclusions	□ Exclude unregulated transmission assets (eg. some connection assets). □ Exclude from "circuit unavailability" any outages shown to be caused by a fault or other event on a "3rd party system" eg. intertrip signal, generator outage, customer installation (TNSP to provide list) □ 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 (TNSP to provide lists) □ Transmission lines includes all overhead lines and underground cables at 132kV and above □ Power transformers include all power and tie transformers, but excludes substations auxiliary transformers and SVC transformers (which are included in SVC availability) □ System reactive plant includes all SVCs, Syncons and capacitors and reactors installed at 66kV and above □ Circuit "unavailability" to include outages from all causes including planned, forced and emergency events, including extreme events

Measure 2 – Loss of Supply Event Frequency Index

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 system for circuit availability
Definition/Formula	Number of events per annum greater than 0.05 system minutes Number of events per annum greater than 0.4 system minutes
Exclusions	☐ Exclude unregulated transmission assets (e.g. some connection assets). ☐ Exclude any outages shown to be caused by a fault or other event on a "3rd party system" e.g. intertrip signal, generator outage, customer installation
Inclusions	☐ All unplanned outages exceeding the specified impact (i.e. 0.05 system minutes and 0.4 system minutes) ☐ Includes outages on all parts of the regulated transmission system ☐ Includes extreme events

Measure 3 – Average Outage Duration

Measure	Average Outage Restoration Time
Unit of Measure	Minutes
Source of Data	TNSP Outage Reporting System
Definition/Formula	Formula: $\frac{\text{Aggregate minutes duration of all unplanned outages}}{\text{No of events}}$ Definition: The cumulative summation of the outage duration time for the period, divided by the number of outage events during the period. The maximum duration for any given outage to be accumulated in the annual summated outage duration is 7 days i.e. a cap per event of 10,080 minutes is to be applied. The definition is based upon return to service of the primary plant i.e. line, transformer or reactive plant at 66kV and above, and does not consider busbar, circuit breaker or auxiliary plant status.
Exclusions	□ Planned outages □ Momentary interruptions (< 1 min) □ Force majeure events □ Busbars, circuit breakers, auxiliary plant, secondary systems and the like
Inclusions	□ Includes faults on all parts of the transmission system (connection assets, interconnected system assets) □ Measure applies only to the return of transmission lines, power transformers, SVCs, Syncons, and reactors and capacitors connected at 66kV and above □ Includes all forced and fault outages whether or not loss of supply occurs