PB ASSOCIATES

Service Target Performance Incentive Scheme Recommendations for

ENERGYAUSTRALIA

Prepared for

AUSTRALIAN ENERGY REGULATOR

***PB Associates** Quality System:*

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A service target performance incentive scheme was included in EnergyAustralia's revenue cap decision in April 2005. The scheme applied a financial incentive to only one performance parameter and included eight non-financial performance parameters.

The non-financial incentive parameters include several proposed by EnergyAustralia. These parameters have not previously been reviewed for consistency with the principles established by the AER for financial incentives or the principles of the recently released part 6A of the National Electricity Rules.

PB has been engaged by the AER to provide independent advice on the performance parameters outlined in EnergyAustralia's revenue cap determination. Specifically, PB is to review EnergyAustralia's existing non-incentive performance parameters and advise if they are appropriate for inclusion in a service target performance incentive scheme to apply to EnergyAustralia in its next regulatory period.

The parameters proposed by EnergyAustralia consist of six measures about security of supply (three based on circuit availability and three based on MVA days of availability), two measures about loss of supply and one measure about outage plans. Overall, PB found that the proposed parameters did not meet the principles set out in part 6A of the Rules in that they did not provide incentives for reliability at times of greatest value to users or incentives to improve/maintain reliability to elements important to spot prices.

Of the nine parameters proposed, eight were independent. Only the Loss of Supply parameters overlapped, with all events that reached the second (higher) threshold being included in both measures. PB considers that the number of independent parameters should be limited to a maximum of seven, so that the incentive applied is likely to affect distributors' behaviour.

The proposed 'MVA Days' parameters are not suitable for inclusion in the incentive scheme, meeting less of the required principles for incentive schemes than the circuit availability parameters (both being measures of network security).

The proposed 'Outage Plans' parameter is not able to be influenced by EnergyAustralia and does not form a key measure of service performance. It is therefore not suitable for inclusion in the incentive scheme.

The availability of reactive plant is less important than the availability of feeders or bulk supply transformers. The incentives for feeders and bulk supply transformers can be sharpened (within the overall scheme limit of 1% of revenue) by creating a total circuit availability parameter (including reactive plant, transformers and feeders) and incremental parameters for feeders and bulk supply transformer parameters. This approach provides a measure of overall network security as well as an increased relative weighting for the important areas of feeder and bulk supply transformers.

PB recommends that:

- The Circuit Availability parameters should be revised to include peak/off-peak periods as a proxy for providing reliability at times of greatest value to users.

- The Circuit Availability parameters should also be revised to include critical and non-critical circuit elements as a proxy for an incentive to improve/maintain reliability to elements important to spot prices. PB notes that EnergyAustralia does not have any circuit elements that, when constraints occur, affect spot prices. Hence, all of its circuit elements should be classified as non-critical.

- The 'MVA days' and 'Outage Plans' parameters should not be included in the incentive scheme.
- A total of six (four independent and two non-independent) parameters should be adopted as shown in the table.
- The weightings assigned to each parameter should place greatest revenue at risk for the a loss of supply event greater than y system minutes (45%) and circuit availability at peak times (40%). The recommended weightings are shown in the table.

Parameter	Weighting %
Circuit availability – total	25
Circuit availability – non-critical feeders	5
Circuit availability – non-critical feeders at peak times	15
Circuit availability – bulk supply transformers	10
Loss of supply events greater than x system minutes	15
Loss of supply events greater than y system minutes	30

1. INTRODUCTION

In this section we set out the background to the PB Associates (PB) review, the objectives of our task and the scope of our engagement. We also include a description of the PB approach to the project.

1.1 BACKGROUND TO THE REVIEW

Given the existing regulatory arrangements in the National Electricity Market (NEM) jurisdictions, service standards play an important role as part of the economic regulation of transmission network service providers (TNSPs) by linking investment in transmission infrastructure to service performance outcomes. They balance the incentive to reduce expenditure with the need to maintain and improve reliability for customers.

The ACCC released its service standards guideline in November 2003 setting out a financial based performance incentive scheme for TNSPs. The guidelines have since been included in the Australian Energy Regulator's (AER's) compendium of regulatory guidelines.

EnergyAustralia owns and operates both transmission and distribution network assets. This review is concerned only with EnergyAustralia's transmission assets[1].

A service target performance incentive scheme was included in EnergyAustralia's revenue cap decision in April 2005. It applied a financial incentive to only one performance parameter and included eight non-financial performance parameters against which EnergyAustralia is required to record and report its performance.

The non-financial incentive parameters include several proposed by EnergyAustralia. These parameters have not previously been reviewed for consistency with the principles established by the AER for financial incentives or the principles of the recently released part 6A of the National Electricity Rules (NER).

1.2 OBJECTIVE AND SCOPE OF WORK

PB has been engaged by the AER to provide expert and independent advice on the performance parameters outlined in EnergyAustralia's revenue cap determination 2004-05 to 2008-09, and specifically to:

- review EnergyAustralia's existing non-incentive performance parameters;
- advise if they are appropriate to apply service standards incentives to; and
- recommend a complete service target performance incentive scheme to apply to EnergyAustralia in its next regulatory period.

The outcomes of this advice will form the basis of the service target performance incentive scheme applied to EnergyAustralia in its next regulatory period.

Specific advice is required on the following topics:

i) Are the performance parameters consistent with the objectives of the service target performance incentive scheme outlined in clause 6A.7.4(b) of the NER?

[1] As listed and categorised in Appendix A

ii) Are these performance parameters consistent with the principles of the service target performance incentive scheme (January 2007)?

iii) Are the performance parameters appropriate for EnergyAustralia's transmission network?

iv) Is the combination of performance parameters appropriately structured to reflect the services which are highly valued by customers?

v) Are the performance parameters appropriately defined? If not, the consultant should provide variations to the definitions outlined in the revenue cap.

vi) Do these performance parameters provide incentives for EnergyAustralia to improve its delivery of services to customers?

Based on our review of the specific areas, PB is required to make recommendations for a complete service target performance incentive scheme to apply to EnergyAustralia in its next regulatory period. This should include:

i) applicable performance parameters;

ii) performance parameter definitions;

iii) parameter weightings.

Given PB's recommendations on the parameters proposed for EnergyAustralia's service target performance incentive scheme, PB is also required to investigate whether EnergyAustralia will have three to five years of data to support the revenue cap determination for 2009-10 to 2013-14.

1.3 PB APPROACH TO THE REVIEW

PB conducted a desktop review based on submissions made by EnergyAustralia to the review conducted by ACCC in 2003 that lead to the publication of the Service Standards Guidelines, statements made by EnergyAustralia in its annual performance reports and discussion of the key matters with EnergyAustralia staff.

PB previously conducted a review of EnergyAustralia's service performance for 2006. As part of the review, PB conducted an audit of the data collection and recording systems used by EnergyAustralia for its reporting to AER of its service performance. PB has relied on the information collected in that review.

1.4 REPORTING REQUIREMENTS

The existing service performance parameters for EnergyAustralia are defined in Appendix D of the ACCC revenue cap decision[2], as reproduced in Appendix B of this report. In summary, the measures applicable to EnergyAustralia over the current regulatory period are:

Measure 1a Transmission circuit availability

Sub-measures:

- transmission feeders;

[2] ACCC, 2005, *Decision, NSW and ACT transmission network revenue cap, EnergyAustralia 2004-05 to 2008-09*, File no: S2004/138.

- transmission transformers;
- transmission reactive.

Measure 1b Circuit availability

Sub-measures:

- MVA days of feeder availability;
- MVA days of transmission bulk supply transformers non-availability;
- MVAr days of reactive plant non-availability.

Measure 2 Loss of supply event frequency index

- Number of events exceeding 'x' system minutes
- Number of events exceeding 'y' system minutes

(the thresholds x and y were not set)

Measure 3 Hours that planned outage plans were in place.

Despite some minor differences in wording, EnergyAustralia has reported on these nine measures[3] for the 2006 calendar year, in alignment with its revenue cap decision, as shown in Figure 1-1.

Figure 1-1 2006 Performance measures and results reported by EnergyAustralia

Measure		Unit	2006 Performance	
			Without exclusions	With exclusions
1	*Transmission circuit availability*	%	97.74	97.74
2	*Transformer availability*	%	98.71	98.71
3	*Reactor availability*	%	98.60	98.60
4	*MVA days of feeder availability*	%	98.55	98.55
5	*MVA days of 'transmission bulk supply' transformers non-availability*	%	99.57	99.57
6	*MVAr days of reactive plant non-availability*	%	99.05	99.05
7	*Loss of supply due to forced transmission asset outages*		Tabulated separately	Tabulated separately
8	*Hours that planned outage plans were in place*	Hours	3108.9	3108.9

Note: Because thresholds had not been set for measure 7, all Loss of Supply events were reported.

EnergyAustralia has a Network Management System Procedure[4] in place to describe the data and information used and the process to produce the measures for the Service Standards Performance 2006 report. The document was issued on 23 January specifically for use by staff in compiling the report.

3 EnergyAustralia, 2007, *Transmission Service Standards, Reliability in 2006*.

4 EnergyAustralia, 2007, Network Management System Procedure, Document No. Sec11 Version 1.0 issued 23 January 2007 – *EnergyAustralia's Service Standards Performance 2006*.

Of the nine measures reported, only one – transmission circuit availability – is included in the financially based performance incentive scheme. The current target for this measure is 96.96 per cent. EnergyAustralia has outperformed this target during 2006, achieving 97.74 per cent.

1.5 STRUCTURE OF THIS REPORT

This report has been structured to address the terms of reference including the following sections:

SECTION 2 – Review of the existing performance parameters;

SECTION 3 – Recommendations for a service target performance incentive scheme to apply to EnergyAustralia over the next regulatory period; and

SECTION 4 – Data availability to support recommendations for the future incentive scheme.

2. REVIEW OF EXISTING PERFORMANCE PARAMETERS

This section of the report contains a review of the existing non-financial incentive performance parameters applicable to EnergyAustralia and advice as to whether it is appropriate to apply financial incentives to these performance parameters.[5]

2.1 CONSISTENCY OF PERFORMANCE PARAMETERS WITH NER CLAUSE 6A.7.4(B)

Are the performance parameters consistent with the objectives of the service target performance incentive scheme outlined in clause 6A.7.4(b) of the national electricity rules?

Part 6A.7.4(b) of the NER states:

> *The principles are that the service target performance incentive scheme should:*
>
> *(1) provide incentives for each Transmission Network Service Provider to:*
>
> *(i) provide greater reliability of the transmission system that is owned, controlled or operated by it at all times when Transmission Network Users place greatest value on the reliability of the transmission system; and*
>
> *(ii) improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices;*
>
> *(2) result in a potential adjustment to the revenue that the Transmission Network Service Provider may earn, from the provision of prescribed transmission services, in each regulatory year in respect of which the service target performance incentive scheme applies;*
>
> *(3) ensure that the maximum revenue increment or decrement as a result of the operation of the service target performance incentive scheme will fall within a range that is between 1% and 5% of the maximum allowed revenue for the relevant regulatory year;*
>
> *(4) take into account the regulatory obligations with which Transmission Network Service Providers must comply;*
>
> *(5) take into account any other incentives provided for in the Rules that Transmission Network Service Providers have to minimise capital or operating expenditure; and*
>
> *(6) take into account the age and ratings of the assets comprising the relevant transmission system.*

Table 2-1 compares each parameter against these principles and ranks the parameters according to their contribution. It is noted that each of the parameters address the same principles and that three of the seven principles are not captured through the existing scheme.

The following sections discuss these principles.

[5] The existing financial incentive parameter (for circuit availability) is also included in the review as some of the objectives and principles for the scheme require an assessment of the complete scheme.

Table 2-1 Comparison of parameters against NER clause 6A.7.4(b)

Parameter	Reliability at times of greatest value to users	Reliability of elements important to spot price	Apply annually	Operate within 1% to 5%	Take into account regulatory obligations	Take into account other incentives for capex/opex	Take into account asset age and ratings	Score
Circuit availability – feeders	X	X	✓	✓	✓	✓	X	4
Circuit availability – transformers	X	X	✓	✓	✓	✓	X	4
Circuit availability – reactive plant	X	X	✓	✓	✓	✓	X	4
MVA days – feeder availability	X	X	✓	✓	✓	✓	X	4
MVA days – bulk supply transformer availability	X	X	✓	✓	✓	✓	X	4
MVA days – reactive plant availability	X	X	✓	✓	✓	✓	X	4
Loss of Supply	X	X	✓	✓	✓	✓	X	4
Outage plans	X	X	✓	✓	✓	✓	X	4
All parameters	X	X	✓	✓	✓	✓	X	4 of 7

2.1.1 Reliability at times of greatest value to users

The principles state that the service target performance incentive scheme should provide incentives for greater reliability of the transmission system when users place greatest value on the reliability of the transmission system.

The use of the words 'greater reliability' implies that the scheme should be comprehensive (covering reliability in general and the entire period under consideration) but weighted towards those times users value most. None of the parameters currently used by EnergyAustralia contain such a weighting, and therefore do not address this principle.

To address this matter, typically, circuit availability measures would be specified for peak and off-peak times (with a greater amount of revenue at risk applied to the peak sub-measure) as a proxy for those times when customers value reliability. Defining peak times on a seasonal, as well as a time of day, basis improves the focus of the proxy.

In EnergyAustralia's network, it is difficult to define peak and off-peak times because of the nature of the elements forming EnergyAustralia transmission network. This is because many of the elements support the main transmission network that is owned by TransGrid and it is not clear how these network elements might be valued by users.

In its submission to the ACCC review of service performance measurement in 2002, EnergyAustralia stated that it considers approximately 20 occasions per year could be

classified as peak, with the remainder being off-peak. This would seem to be sufficient to define those times when customers value reliability the most. Establishing such times before they occur, however, is not possible. For the scheme to be predicable and forward looking, another (broader) approach is required.

At an aggregate level, the demand for electricity can be used to represent those times when consumers place greatest value on electricity supply. For some network elements, peak demands occur during the summer period, whereas other network elements incur peak demands in winter. Overall, EnergyAustralia advises that many elements of its network are moving from winter peaking to summer peaking as the penetration of air conditioning (in summer) and gas heating (in winter) grows.

To be useful as a proxy for the time users value most, PB considers that a definition of peak times should contain a seasonal element. Given that peak demands for electricity occur in both summer and winter, PB recommends that the definition for peak demand include both time periods, as follows:

> Peak periods is defined as weekdays from 7am to 10pm during the periods 1 December to 24 December, 2 January to 28 February, 1 June to 31 August inclusive, excluding weekends and public holidays.

This definition captures both the high demand periods associated with summer and winter, while excluding the lower demand period over the Christmas holiday period when most businesses are closed. EnergyAustralia has not confirmed the suitability of this definition, stating that it will make its proposals in the revenue cap submission.

2.1.2 Improve/maintain reliability to elements important to spot prices

The principles state that the service target performance incentive scheme should provide incentives that improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices. Spot prices are typically set through the supply and demand balance which is influenced by network constraints. Hence the inclusion in the scheme of some parameters that relate to network constraints would be likely to meet this principle. PB notes that none of the parameters used by EnergyAustralia directly relate to network constraints.

This principle is typically addressed in service performance schemes by defining circuit availability sub-measures for critical and non-critical circuit elements as a proxy for the importance of circuits to spot prices. While this approach does not consider the influence of time of day/season, PB considers that the proxy is reasonable. EnergyAustralia has not defined its circuits as critical or non-critical.

While the loss of supply parameters could also be defined to have sub-measures for critical and non-critical circuit elements, PB notes that they would not provide a proxy for the impact on spot prices. This is because the number of loss of supply events does not affect the spot price (spot prices are impacted by constraints in connecting generators to loads). The loss of supply parameter is therefore not an appropriate parameter for this purpose.

2.1.3 Apply annually

This principle requires that the service target performance incentive scheme should be able to be applied annually. PB confirms that all of the existing parameters can each be calculated and applied annually.

2.1.4 Operate within 1 to 5% of revenue

The principles state that the maximum revenue increment or decrement as a result of the operation of the service target performance incentive scheme must fall within a range that is between one per cent and five per cent of the maximum allowed revenue for the relevant regulatory year.

The sum of the weightings assigned to the parameters determines the overall change in revenues. EnergyAustralia has one per cent of its revenue at risk under the current incentive scheme containing one parameter – circuit availability.

EnergyAustralia has not proposed weightings for the existing non-financial incentive parameters, should they be included in the financial incentive scheme in future. Clause 2.6 of the service target performance incentive scheme guideline, however, requires that the maximum revenue increment or decrement attached to a TNSP's performance against its parameters and values is one per cent of the maximum allowed revenue for the relevant calendar year.

PB has proposed weightings for the recommended parameters in section 3.3 of this report that place one per cent of revenue at risk for performance below the targeted level and a maximum one per cent bonus for out performance. These weightings will ensure that the proposed scheme meets the requirements of this principle.

2.1.5 Take account of regulatory compliance obligations

The principles require that the service target performance incentive scheme should take into account the regulatory obligations with which TNSPs must comply. In effect, this principle can be satisfied if the scheme does not prevent or provide conflicting requirements to the TNSP to meet its other regulatory obligations.

All of the proposed parameters are about reliability and security of supply. TNSP's in NSW are not licensed, however, EnergyAustralia states that the reliability planning and service standard requirements introduced by the NSW Minister for Energy in August 2005 apply equally to those assets which have been classified as transmission assets under the NER.[6] Obligations for reliability and security also arise through the NER.

The ministerially imposed obligations specifically include in the definition of 'sub-transmission' those assets that 'may also fulfil a transmission role by operating in parallel to, and providing support to, the higher voltage transmission network'. Hence they require EnergyAustralia to meet planning criteria for security standards and maximum customer interruption times for new network elements from 1 July 2007and for all network elements from 1 July 2009.[7] They also require that the reliability of all EnergyAustralia's assets be included in performance reporting and when determining whether performance targets for reliability of supply have been achieved.

In PB's view, the existing financial and non-financial parameters in the incentive scheme do not prevent or provide conflicting requirements to EnergyAustralia to meet these ministerially imposed obligations. PB notes that the reliability standards specify minimum average reliability for each type of distribution feeder (CBD, urban, short-rural and long-rural) and the individual feeder standards specify minimum standards of reliability performance for individual distribution feeders. While outages of transmission circuit elements that result in a loss of supply to end users add to this reliability performance at the downstream distribution feeder level, the contribution of outages on the transmission circuit elements to the overall reliability performance is small when compared to the

6 EnergyAustralia, 2006, *Review of the Electricity Transmission Revenue and Pricing Rules*, p.26

7 Minister for Energy and Utilities, NSW, 2005, *Design, reliability and performance licence conditions imposed on distribution network service providers by the Minister for energy and utilities*, p.4.

contribution of the distribution network.[8] This is because the transmission network forms only a small portion of EA's assets (about 12 per cent) and has high reliability when compared to the distribution network. Hence, reliability performance is largely driven by the performance of the distribution network and the incentive to improve reliability of the transmission network is small.

PB also notes that none of the performance parameters specified by the ministerially imposed obligations are included in a financial incentive scheme, although the jurisdictional regulator (IPART) is currently undertaking a paper trial of a financial incentive scheme that may apply to EnergyAustralia in future.

The NER also contains obligations in respect of security and reliability of supply. Because the service target performance incentive scheme is also a requirement of the NER, it is unlikely that parameters for reliability and security would conflict with other parts of the rules. For instance:

- Part 4 of the NER sets out the requirements for system security, including obligations for TNSPs (clause 4.3.4). Because NEMMCO is responsible, these obligations for TNSPs are general requirements to maintain certain amounts of interruptible load and to cooperate with NEMMCO and the System Operator. In PB's view, the existing parameters do not conflict with the achievement of these obligations.

- A TNSP is required to document its level of service in its connection agreements with connected participants (in the NEM). In PB's view, the existing parameters do not conflict with the achievement of these obligations.

2.1.6 Take account of other incentives to minimise capex/opex

The principles state that the service target performance incentive scheme should take into account any other incentives provided for in the NER that TNSPs have to minimise capital or operating expenditure.

In its determination establishing the new part 6A, the AEMC discusses the incentives for opex and capex. The incentive for minimising opex is described as a benefit sharing mechanism (or efficiency carry-over mechanism).[9] For capex, the AEMC has sought to provide incentives for efficient, adequate and timely investment by reducing the regulatory risk faced by TNSPs when investing in transmission capacity.[10] Key mechanisms for managing the investment risk include:

- a 'lock-in' and roll forward of the RAB from one regulatory period to the next (i.e. the RAB would not be subject to optimisation);

- TNSPs to retain the benefit of any underspend, or incur the cost of any overspend, compared to the capital expenditure forecast for the remainder of the relevant five year regulatory control period (with the benefit or cost being determined by applying the return on capital to, and depreciation on, the amount of under or overspend);

- removal of the ex post review of the prudency of capital expenditure;

8 Exclusions apply to outages on the shared transmission network but not on the transmission assets owned by EnergyAustralia.

9 AEMC, November 2006, *Rule Determination, National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No.18*, p. 95

10 Ibid p. 97

- adopting a 'contingent project' regime for large capital projects that are planned but uncertain as to timing or cost;

- reopening of the revenue cap determination if the TNSP is obliged to invest in a major project (at least five per cent of the value of the RAB) and that investment would cause the TNSP to exceed its capital expenditure allowance for the entire regulatory period;

- an incentive for TNSPs to seek to protect their assets against commercial stranding risks by entering into commercial agreements to avoid these situations or to recover losses from these critical customers should their disconnection cause stranding of assets primarily built to serve their needs.

The service target performance incentive scheme is based on reliability of supply. In PB's view, the incentives for capex and opex in the Rules (as described above) are not directly related to reliability and, hence, only the general form of incentive regulation (CPI-X) is relevant in assessing whether the proposed parameters act to diminish other incentives. This aspect is discussed further in section 2.2.4.

Implicitly, each of EnergyAustralia's existing parameters and the scheme in general assists in the setting of efficient capital and operating expenditure allowances in transmission determinations by balancing the incentive to reduce actual expenditure with the need to maintain and improve reliability for customers.

2.1.7 Take into account asset age and ratings

The principles state that the service target performance incentive scheme should take into account the age and ratings of the relevant transmission system.

A guide as to the meaning of this obligation can be gained by reference to the AEMC's proposed rule:

> *However, at a minimum TNSPs should have clear incentives to plan outages having regard to providing greater reliability of the system at times when the system is most valued and in relation to those elements that are most important to determining spot prices.*
>
> *Within this context, the Commission considers it appropriate that the AER has broad discretion in developing the form and application of TNSP incentive schemes. The principles contained in the Draft Rule ensures that the scheme covers a significant but not excessive share of a TNSP's regulated revenues and* ***takes account of*** *the TNSP's regulatory obligations and other incentive schemes as well as* ***the age and ratings of its equipment****.*

Within this context, PB considers that it is the limitations imposed by age and ratings that must be taken into account in the incentive scheme. For instance, older assets might require more frequent outages for maintenance work resulting in reduced availability or ratings might restrict operational flexibility leading to loss of supply events with larger impacts or extended outage durations.

None of the proposed parameters directly take the age or ratings of assets into account. The parameters might indirectly take the age or ratings of assets into account through the setting of appropriate targets within a price/service decision. Hence, PB considers that the proposed parameters may meet this principle to some extent if targets are based on recent historical performance (adjusted to account for any step changes that have or are expected to occur).

PB notes, however, that the service target performance incentive scheme states that the setting of targets is to be based on the average of recent performance, adjusted to allow

for statistical outliers, changes in capital works programs and material changes to applicable regulatory obligations. It does not currently allow for adjustments due to other factors that might result in material step changes, such as a material change to the age profile of assets over a short period of time.

PB concludes that the proposed parameters within the current scheme do not materially take age or ratings into account.

2.2 CONSISTENCY WITH PRINCIPLES OF SERVICE TARGET INCENTIVE SCHEME (JANUARY 2007)

Are the performance parameters consistent with the principles of the service target performance incentive scheme (January 2007)?

The principles (expressed as objectives) are listed in section 1.4 of the AER Guideline *Service target performance incentive scheme*. They are:

- contribute to the achievement of the national market objective (clause 1.4(a));
- consistent with principles in 6A.7.4(b) (clause 1.4(b));
- promote transparency in: (1) the information provided by a TNSP to the AER and (2) the decisions made by the AER (clause 1.4(c)); and
- assist in the setting of efficient capital and operating expenditure allowances in its transmission determination by balancing the incentive to reduce actual expenditure with the need to maintain and improve reliability for customers (clause 1.4 (d)).

Table 2-2 compares each parameter against these principles and ranks the parameters according to their contribution. The maximum value able to be assigned for each principle has been determined by separating the principle into its parts and assigning points for each part. Assigning half a point to each part of the national market objective and one point to each part of the other principles, a maximum value of seven has been assigned to each of the first three principles and two to the final principle. While this assignment is made arbitrarily, it should allow the required assessment to be made.

The ranking of each parameter against each of these principles is discussed below.

2.2.1 Principle 1.4(a) – contribute to the achievement of the national market objective

The objective of the National Electricity Market, as stated in the National Electricity Law is:

To promote efficient investment in, and efficient use of, electricity services for the long-term interests of consumers of electricity with respect to price, quality, reliability, and security of supply of electricity and the reliability, safety and security of the national electricity system.[11]

[11] Objective is stated in section 7 (page 15) of National Electricity Act located at: http://www.legislation.sa.gov.au/LZ/C/A/NATIONAL%20ELECTRICITY%20(SOUTH%20AUSTRALIA)%20ACT%201996/CURRENT/1996.44.UN.PDF

Table 2-2 Comparison of parameters against guideline

Parameter	National market objective (1-7)	Principle of NER 6A (1-7)	Transparency (1-7)	Assist in setting revenue caps (1-2)	Score
Circuit availability –feeders	2	4	7	2	15
Circuit availability –transformers	2	4	7	2	15
Circuit availability – reactive plant	2	4	7	2	15
MVA days – feeder availability	2	4	6	2	14
MVA days – bulk supply transformer availability	2	4	6	2	14
MVA days – reactive plant availability	2	4	6	2	14
Loss of Supply	2	4	7	2	15
Outage plans	0	4	3	2	9

Table 2-3 Contribution of parameters to national market objective

Parameter	Efficient investment							Efficient use							Score
	Price of electricity supply	Quality of electricity supply	Reliability of electricity supply	Security of electricity supply	Reliability of national system	Safety of national system	Security of national system	Price of electricity supply	Quality of electricity supply	Reliability of electricity supply	Security of electricity supply	Reliability of national system	Safety of national system	Security of national system	
Circuit availability –feeders	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
Circuit availability –transformers	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
Circuit availability – reactive plant	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
MVA days – feeder availability	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
MVA days – bulk supply transformer availability	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
MVA days – reactive plant availability	x	x	x	✓	x	x	✓	x	x	x	✓	x	x	✓	2
Loss of Supply	x	x	✓	x	✓	x	x	x	x	✓	x	✓	x	x	2
Outage plans	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0

The objective has several parts. In order to facilitate the assessment of how the service target performance incentive scheme parameters contribute to the achievement of the national market objective, PB has compared each parameter against the parts of the objective. Half a point has been assigned for each part, giving a maximum score of 7 points.

As shown in Table 2-3, all of the proposed parameters score 2 out of 7, except for the 'Outage Plans' parameter, which does not contribute to any of the parts of the market objective. None of the parameters contributes to the price or quality parts, as is expected in a scheme focused on reliability and security of supply.

2.2.2 Principle 1.4(b) – consistent with principles in 6A.7.4(b)

The requirements of NER clause 6A.7.4(b) are listed and evaluated in section 2.1 of this report.

2.2.3 Principle 1.4(c) – promotes transparency in: (1) the information provided by a TNSP to the AER and (2) the decisions made by the AER.

PB considers that transparency in the information provided by a TNSP is promoted when information about service performance:

- is able to be clearly (pre-)defined;
- is capable of being understood by an average person and not require specialist knowledge or unique skills to interpret; and
- is auditable.

Similarly, PB considers that transparency in the decisions made by the AER is promoted when the service performance information:

- relates to a key aspect of service performance;
- is able to be published without damaging the regulated business;
- the measured quality is able to be affected by the TNSP; and
- is robust, replicable, reproducible and not open to abuse by the TNSP.

Table 2-4 compares each of the proposed parameters against these items. The table shows that the circuit availability parameters satisfy all of the items, while the 'Outage Plans' parameter satisfies only 3 of the 7 items.

The 'MVA Days' parameters only fail to satisfy the requirement of not requiring specialist knowledge. PB considers this is because the assessment of variations in performance against this parameter would require a detailed understanding of network operations and design. The outcomes of performance reported for this measure is a complex function of the size (capacity) of the equipment, the outage duration and the exclusion of certain events based on equipment recall to service times.

Table 2-4 Transparency in information provision and decisions of AER

Parameter	clearly defined	not require specialist knowledge	auditable	key aspect of performance	able to be published	able to be affected	robust	Score
Circuit availability – feeders	✓	✓	✓	✓	✓	✓	✓	7
Circuit availability – transformers	✓	✓	✓	✓	✓	✓	✓	7
Circuit availability – reactive plant	✓	✓	✓	✓	✓	✓	✓	7
MVA days – feeder availability	✓	x	✓	✓	✓	✓	✓	6
MVA days – bulk supply transformer availability	✓	x	✓	✓	✓	✓	✓	6
MVA days – reactive plant availability	✓	x	✓	✓	✓	✓	✓	6
Loss of Supply	✓	✓	✓	✓	✓	✓	✓	7
Outage plans	✓	✓	x	x	✓	x	x	3

2.2.4 Principle 1.4 (d) – assist in the setting of efficient capital and operating expenditure allowances in its transmission determination by balancing the incentive to reduce actual expenditure with the need to maintain and improve reliability for customers.

Under CPI-X incentive regulation, TNSPs are encouraged to reduce expenditure so as to maximise profits. The service target performance incentive scheme supports this general incentive by penalising service performance below the nominated targeted level. The scheme returns to customers (through lower prices) an amount recognising the poor performance. The scheme also rewards out-performance and provides a cost recovery path for the expenditure assumed needed to achieve the service improvements.

PB is of the view that the proposed parameters (based on reliability) of the service target performance incentive scheme compliment the CPI-X form of regulation by providing a disincentive to reduce expenditures below efficient levels by penalising reductions in performance. All of the parameters contribute to the scheme meeting this principle, except for the 'Outage Plans' parameter, the outcome of which is not able to be influenced by EnergyAustralia.

2.3 APPROPRIATENESS OF PERFORMANCE PARAMETERS FOR ENERGYAUSTRALIA

Are the performance parameters appropriate for EnergyAustralia's transmission network?

EnergyAustralia is unique in the NEM because it is responsible for only a small section of the shared transmission network in the NSW jurisdiction. All other TNSPs in the NEM are responsible for the entire network within a jurisdiction except for TransGrid who is responsible for the majority of the transmission system in NSW and some companies in Victoria who own specific items of equipment (transformers and reactive plant) that is embedded in the transmission network owned by SP AusNet.

Because of the unique arrangement that applies to EnergyAustralia, it is important that the performance parameters proposed are appropriate for the portion of the NSW transmission network that is owned by EnergyAustralia.

EnergyAustralia is a TNSP because it operates assets considered by the NER to be transmission assets. It meets the NER definition of transmission because parts of the network operate in parallel and provide support to other transmission assets. EnergyAustralia's network is unique because:

- Some of the transmission assets operate as distribution assets for much of the time, supporting the transmission system only under certain operating conditions.
- EnergyAustralia's transmission network is largely in an urban environment, supplying the greater Sydney area.
- A larger proportion of the network is meshed when compared to other TNSPs networks.
- A larger proportion of the network is underground when compared to other TNSPs networks.
- Outages on EnergyAustralia's network do not have a direct impact on market outcomes because they do not directly affect the dispatch of generators on to the national electricity grid.

The affect of these factors on the proposed parameters is discussed below.

Circuit Availability

For the purposes of recording circuit availability, EnergyAustralia has defined its network elements as feeders, transformers and reactive plant since 2005. PB considers that the 'distribution' nature of some assets (those that in other networks would be classified as subtransmission feeders supplying zone substations) means that the parameter targets may be different to other TNSP's networks. Targets set on historical performance would be appropriate.

PB considers that the unique factors do not impact on the circuit availability parameters and that they are suitable for use in describing EnergyAustralia's network performance.

MVA Days

In its service performance report for 2004[12], EnergyAustralia noted that the existing circuit availability parameters did not take into account the relative size of equipment, for

12 EnergyAustralia, 2005, *EnergyAustralia's report to Australian Competition & Consumer Commission, Service Standard 2004 – Audit.*

instance, reporting the same outcome for the loss of a small transformer as for a large transformer. It proposed that the circuit availability parameter be altered so that it is weighted to provide a measure of the impact of the particular element that is out of service, adopting equipment rating (capacity) as a proxy for the impact. It believed that this would better describe the service performance of its network.

PB notes that the EnergyAustralia network is highly meshed and that the loss of one circuit element generally does not impact on performance (except at peak times).

The circuit availability parameter is a measure of supply security. PB considers that, while the relative size of equipment can be used as a proxy for the impact on the security of the network when a circuit element is taken out of service, it is less important than the location of that element in the network, considering the degree of redundancy and operational flexibility at the time of day/season. Other TNSP's capture these factors through defining critical and non-critical circuits and for peak and off-peak times. PB considers that such sub-measures are more appropriate than the relative size of equipment and therefore that the 'MVA Days' parameter is not a suitable parameter for use on EnergyAustralia's network.

Loss of Supply

Loss of supply is a measure of network reliability and in PB's opinion is appropriate for use on EnergyAustralia's network.

Other parameters - Average restoration time

A parameter that applies to other TNSPs under the service target performance incentive scheme guideline is the average restoration time.

In its submission to the 2004-09 revenue reset decision, EnergyAustralia stated that it did not believe that outage duration is a meaningful measure of performance for its transmission network due to a number of factors including:

- Average restoration period does not impact on EnergyAustralia's customers because of the inherent security of the network (use of double circuits etc).
- The repair times for assets such as underground cables can be significant (weeks or months) and can vary substantially depending on the type of cable. EnergyAustralia has a large proportion of underground cable in its network and is not able to easily control the incidence of outages on underground cables through changes to operational and maintenance programs.
- The long duration of repair times could introduce significant volatility in the measurement of outage duration from year to year (ie a single incident could dramatically changed the performance measure). This was evident in the ACCC's draft decision on the service standard guidelines where no target was set for EnergyAustralia due to the volatility of the data available.

PB concurs with the view and considers that average restoration time is not a suitable parameter for inclusion in a service target performance incentive scheme for EnergyAustralia.

2.4 VALUE TO CUSTOMERS

Is the combination of performance parameters appropriately structured to reflect the services which are highly valued by customers?

In discussions with PB, EnergyAustralia stated that it understands customers' expectations though its discussions with customers and the negotiation of connection

agreements. In its view, the services highly valued by customers are continuity of supply, followed by security of supply and quality attributes. EnergyAustralia has not provided evidence to support this view, but general literature available and PB's own experience supports that these services are typically highly valued by customers. This is evidenced in the responses by customers and consumer groups to distribution prices reviews; in customer willingness to pay studies carried out in South Australia (KPMG, Australia, 2003, *Assessment of the Value of Customer Reliability*) and in studies conducted by VENCorp about the value of customer reliability (CRA, Australia, 2002, *Assessment of the Value of Customer Reliability*); and in other TNSPs publications (for example, ElectraNet, 2006, *Network 2025 Vision, Consultation Paper*, p. 5).

Table 2-5 Comparison of parameters against services valued by customers

Parameter	Continuity of supply	Security of supply	Quality of supply
Circuit availability	x	✓	x
Transformer availability	x	✓	x
Reactive plant availability	x	✓	x
MVA days of feeder availability	x	✓	x
MVA days of 'bulk supply' transformer availability	x	✓	x
Loss of Supply	✓	x	x
Hours that planned outage plans were in place	x	x	x

Table 2-5 shows that all of the proposed performance parameters are concerned with the services that EnergyAustralia believe are the services which are highly valued by customers, except for the 'Outage Plans' parameter.

2.5 APPROPRIATENESS OF PERFORMANCE PARAMETER DEFINITIONS

Are the performance parameters appropriately defined? If not, the consultant should provide variations to the definitions outlined in the revenue cap.

The definitions of the performance parameters have been extracted from the *NSW and ACT transmission network revenue cap EnergyAustralia 2004-05 to 2008-09 Appendix D* and have been included in Appendix B of this document.

PB notes that the definitions omit some formulae and descriptions for terms used in the definition. These omissions have been corrected and revised definitions provided in Appendix C.

2.6 INCENTIVE TO IMPROVE SERVICE DELIVERY

Do these performance parameters provide incentives for EnergyAustralia to improve its delivery of services to customers?

PB considers that an incentive to improve the delivery of services to customers is provided when:

- the parameters of the incentive scheme relate to service performance to customers;
- the TNSP can affect the performance outcome; and
- the monetary value of the reward for outperformance of historical performance levels is material.

The last criterion is a function of the overall design of the scheme (that is, the number of parameters, weightings and monetary value attached to the scheme) while the first two criterion affect the choice of individual parameters.

Table 2-6 compares the proposed parameters against the first two criteria. It shows that the parameters for circuit availability, 'MVA Days' and loss of supply meet these criteria. The 'Outage Plans' parameter does not meet the criteria.

To meet the third criterion, the weightings assigned to individual parameters must be sufficient to provide an incentive, while the difference in weightings assigned to the individual parameters of the scheme should reflect the value customers place on each of the individual parameters. With the overall incentive set at 1% of revenue, a weighting per parameter of less than 10% is considered to be too weak to provide an incentive. Hence, with seven parameters in the scheme, the maximum weighting that can be applied to any one parameter is 40%, given that the other six parameters must have a weighting of 10% each. This provides sufficient scope to adopt different weightings that reflect the value of the individual parameters to customers.

Table 2-6 Comparison of parameters against criteria for incentives to improve performance

Parameter	Relates to service performance	TNSP can affect outcome
Circuit availability	✓	✓
Transformer availability	✓	✓
Reactive plant availability	✓	✓
MVA days of feeder availability	✓	✓
MVA days of 'bulk supply' transformer availability	✓	✓
Loss of Supply	✓	✓
Hours that planned outage plans were in place	x	x

PB considers that a scheme with more than seven parameters will not provide a sufficient diversity of weightings and would require the scheme to affect more than 1% of revenue in order to be effective.

3. RECOMMENDATIONS FOR A SERVICE TARGET PERFORMANCE INCENTIVE SCHEME

Based on the assessment in section 2, this section of the report provides PB's recommendations for a complete service target incentive scheme to apply to EnergyAustralia in its next regulatory period.

3.1 PERFORMANCE PARAMETERS

The parameters proposed by EnergyAustralia in its last revenue cap determination consist of six measures about circuit availability, two measures about loss of supply and one measure about outage plans.

Overall, the number of parameters in the scheme will determine the amount of revenue associated with each parameter. For the reasons set out in section 2.6, PB is of the view that a scheme with more than seven parameters will not provide a sufficient diversity of weightings and would require the scheme to affect more than 1% of revenue in order to be effective. With nine parameters, the proposed scheme contains too many for each parameter to contribute effectively.

The 'Outage Plans' parameter is a measure of risk of a loss of supply from EnergyAustralia's network resulting from TransGrid activities on the main NSW transmission system. This measure cannot be influenced by EnergyAustralia and, as discussed in section 2, does not meet the majority of the principles of the service target performance incentive scheme guideline. PB recommends that the 'Outage Plans' parameter not be included in the service target performance incentive scheme.

The loss of supply parameters represent a measure of the loss of supply to electricity network users. They are consistent with the measures established under the former ACCC Service Standards Guideline (2003) for other TNSPs. They also meet all of the principles of the service target performance incentive scheme guideline that relate to reliability of supply. PB recommends the inclusion of these measures in the service target performance incentive scheme. PB further recommends that the reporting threshold values of x and y should be set using the most recent historical performance, that is, they should be set at the time of the revenue reset decision.

All of the remaining parameters relate to transmission circuit availability. Three are measures of total circuit availability (for feeders, transformers and reactive plant) and three are measures of capacity availability for feeders, transmission bulk supply transformers, and (MVAr days) of reactive plant availability (collectively referred to as 'MVA Days'). The total circuit availability parameters are consistent with the measures established under the former ACCC Service Standards Guideline (2003) for other TNSPs. The 'MVA Days' parameters, however, were not considered in the SKM review[13] on which the ACCC Service Standards Guideline (2003) were based.

EnergyAustralia proposed the 'MVA Days' parameters because it was of the view that they better described the service performance of its network, considering that it is only a small portion of the transmission network in NSW.

The 'MVA Days' parameters are defined as the equipment rating (in MVA or MVAr as appropriate) times the outage duration (in minutes) divided by the sum of equipment ratings times the number of minutes in a year. Planned outages with a recall time of less than 24 hours are excluded from the calculation of this indicator. PB has identified a number of issues with regard to the inclusion of this parameter in the financial incentive scheme:

[13] SKM, 2003, *Transmission Network Service Provider (TNSP) Service Standards, Final Report.*

- The inclusion of this parameter may provide an incentive to plan a larger number of small outages in order to maintain a recall time of less than 24 hours, even when it is not efficient to do so.

- Because the parameter is based on the size of the equipment, the adoption of the 'MVA Days' parameters might provide an incentive to install a larger number of smaller capacity equipment items. Hence, it is uncertain whether the incentive would encourage efficient expenditures.

- The parameters require specialist knowledge to understand, as discussed in section 2.2.3.

- The parameters are not in use elsewhere in Australia or in common use internationally. Conversely, the total circuit availability parameters are in common use.

Further, as discussed in section 2.3, the circuit availability parameter is a measure of supply security. PB considers that the relative size of equipment is less important than its location in the network, considering the degree of redundancy and operational flexibility at the time of day/season. Other TNSP's capture these factors through defining critical and non-critical circuits and for peak and off-peak times. PB considers that such sub-measures are more appropriate than the relative size of equipment and therefore that the 'MVA Days' parameter does not provide a suitable parameter to describe EnergyAustralia's network.

PB recommends that 'MVA Days' parameters not be included in the service target performance incentive scheme.

Further, considering the circuit availability parameters as a group, they do not meet all of the principles of the service target performance incentive scheme. In section 2 of this report, PB concluded that the proposed parameters did not provide incentives to:

- provide greater reliability of the transmission system at all times when Transmission Network Users place greatest value on the reliability of the transmission system; and

- improve and maintain the reliability of those elements of the transmission system that are most important to determining spot prices.

In order to meet these principles, the parameters would need to include sub-measures for peak and off-peak periods and for critical and non-critical circuit elements. The existing six circuit availability parameters could be further categorised into these four sub-measures, resulting in 24 potential parameters. PB considers that this number of parameters is unnecessary to describe service performance and too many for individual parameters to provide a material financial incentive.

For the reasons set out in section 2.1.1, PB recommends that the following definition for peak periods be adopted; Peak periods is defined as weekdays from 7am to 10pm during the periods 1 December to 24 December, 2 January to 28 February, 1 June to 31 August inclusive, excluding weekends and public holidays.

With respect to the elements of the transmission system that are most important to determining spot prices, PB considers that a guide to the classification of particular circuit elements can be obtained from the pre-defined constraint criteria contained in the dispatch engine managed by NEMMCO. The dispatch engine contains equations that describe the constraints of certain network elements. In effect, the dispatch engine selects generation to balance demand taking into account network constraints. PB considers that a reasonable approach would be to classify a network element as critical if a constraint exists containing any aspect of EnergyAustralia's asset base within the dispatch engine.

None of EnergyAustralia's network elements are defined in the dispatch engine. Hence, EnergyAustralia has only non-critical feeders. If at any time an element was captured in the dispatch engine, then the critical feeders sub-measure should be established.

Notwithstanding any potential impacts on spot prices, EnergyAustralia may have other criteria (such as voltage level, connection arrangement, potential numbers of customers affected, etc) that could be used to differentiate and categorise elements between critical and non-critical elements within its asset base. PB does not recommend that such factors be used to categorise feeders as 'critical' because this would lead to the guideline being applied inconsistently across TNSPs, which is not considered to be consistent with the objectives of the scheme.

Energy Australia notes that the data for the circuit availability (reactive plant) parameter is not as robust as the other parameters and is time consuming to compile. It would prefer to not include this parameter in the incentive scheme. PB considers that the availability of reactive plant is less important in the incentive scheme than other parameters, given that reactive plant is required to maintain voltage standards and power flow capabilities, both of which are subject to operational scrutiny by NEMMCO and transmission customers. However, circuit availability is about security of supply and the loss of reactive plant can result in a loss of security of the network. Hence PB recommends that the parameter not be incorporated in its own parameter, but in an overall parameter circuit availability – total. This approach reduces the risk should the data prove to be inaccurately maintained in a particular year and allows higher weightings on other parameters, sharpening the focus of the scheme on the most important parameters.

Similarly, the security of bulk supply transformers is more important than for other transmission transformers. PB recommends that the circuit availability – transformers parameter be limited to bulk supply transformers, with transmission transformers included in the circuit availability – total parameter only.

In summary, PB recommends that the proposed circuit availability parameters be rejected and that sub-measures be established that include peak/off-peak and critical/non-critical sub-measures based on circuit availability for feeders, transformers and reactive plant. The recommended parameters are:

- Circuit availability – total (including all feeders, transmission transformers and reactive plant)
- Circuit availability – non-critical feeders
- Circuit availability – non-critical feeders at peak times
- Circuit availability – bulk supply transformers
- Loss of supply events greater than x system minutes
- Loss of supply events greater than y system minutes.

3.2 PERFORMANCE PARAMETER DEFINITIONS

Definitions for the recommended parameters are provided in Appendix C.

3.3 DATA AVAILABILITY

The AER has asked whether EnergyAustralia will have three to five years data for the proposed parameters by the time of the revenue cap determination for 2009-10 to 2013-14. Given that the regulatory period begins 1 July 2009 and that performance data is

reported on a calendar year basis, the last year of reporting prior to the determination is 2008.

Table 3-1 sets out the data that would be available at the time of the revenue cap determination. It shows that more than 3 years data will be available for all parameters except 'circuit availability – feeders at peak periods'. Given that EnergyAustralia compiles its service performance manually from basic data records, it is possible for data to be extracted in a form suitable for use in informing an appropriate target for this parameter.

Table 3-1 Years of data availability prior to revenue cap determination

Parameter	Data available from	Derived data available from	Number of years
Circuit availability – total	2005	-	4
Circuit availability – non-critical feeders	2003	-	5
Circuit availability – non-critical feeders at peak times	2008	2003	5
Circuit availability – bulk supply transformers	2005	-	4
Loss of supply events greater than x system minutes	2005	-	4
Loss of supply events greater than y system minutes	2005	-	4

3.4 PARAMETER WEIGHTINGS

PB considers that the following factors are important in setting appropriate weightings:

- Weightings should provide a material incentive. With the aggregate incentive set at between 1% and 5% of revenue, a parameter specific weighting of less than 10% is considered to be too weak to provide an incentive.
- The 'loss of supply greater than y system minutes' should be allocated the highest weighting so as to match customers' high expectations regarding reliability of supply.
- Similarly, circuit availability on feeders at peak times should be weighted higher than at off-peak times in order to meet the principles of the NER part 6A.

Where the parameters are not independent, weightings for a sub-measure can be less than 10%. For instance, a circuit availability parameter for feeders may be set at 5% and a circuit availability parameter total (including all equipment) may be set at 25%. Under this arrangement, a feeder outage would incur a 30% penalty (5 plus 25).

Applying these requirements across the recommended parameters leads to the weightings shown in Table 3-2.

Table 3-2 Parameter weightings

Parameter	Weighting %
Circuit availability – total	25
Circuit availability – non-critical feeders	5
Circuit availability – non-critical feeders at peak times	15
Circuit availability – bulk supply transformers	10
Loss of supply events greater than x system minutes	15
Loss of supply events greater than y system minutes	30
All parameters	100

APPENDIX A
List of transmission assets to be included in reporting

Transmission Feeders

Identifier	From	To
202	Drummoyne	Rozelle
203	Mason Park	Drummoyne
204	Mason Park	Drummoyne
860	Kurri	Stroud Road
900	Mason Park	Rozelle
910	Sydney South	Canterbury
911	Sydney South	Canterbury
926	Sydney North	Mason Park
927	Sydney North	Homebush Bay
935	Homebush Bay	Mason Park
951	Ourimbah	West Gosford
956	Gosford	West Gosford
957	Vales Point	Ourimbah
958	Tuggerah	Gosford
962	Waratah Sw Stn	Tomago
963	Tomago	Taree
908/909	Canterbury	Bunnerong
90F	Mason Park	Chullora
90J	Mason Park	Chullora
90T	Green Square	Haymarket
90W/4	Rozelle	Pyrmont
90X	Meadowbank	Mason Park
91A/1	Beaconsfield West	St Peters
91A/2	Chullora	St Peters
91B/1	Beaconsfield West	St Peters
91B/2	Chullora	St Peters
91F	Sydney South	Peakhurst
91J	Sydney South	Peakhurst
91L	Peakhurst	Bunnerong
91M/1	Peakhurst	Beaconsfield

Identifier	From	To
91M/3	Bunnerong	Beaconsfield
91X/1	Beaconsfield West	Marrickville
91X/2	Chullora	Marrickville
91Y/1	Beaconsfield West	Marrickville
91Y/2	Chullora	Marrickville
92A	Sydney North	Lane Cove
92B	Sydney North	Lane Cove
92F	Lane Cove	Mason Park
92J	Lane Cove	Meadowbank
95C	Tuggerah	Ourimbah
95E	Gosford	Somersby
95L	Capral	Kurri
95Z	Somersby	Mt Colah
96A	Newcastle	Kurri
96B	Newcastle	Capral
96F	Stroud	Beresfield
96U	Newcastle	Kurri
96W	Newcastle	Capral
97E	Charmhaven	Munmorah PS
98B	Wyong	Charmhaven
98R	Tomago	Beresfield
99C	Tuggerah	Wyong
99Y	Beresfield	Kurri STS
9NA	Beresfield	Newcastle
9S2	Beaconsfield	Haymarket
9S6/1	Haymarket	Pyrmont
9S9/1	Haymarket	Pyrmont
9SA	Beaconsfield	Campbell St
9SC	Haymarket	Campbell St
9SE	Beaconsfield	Green Square

Transmission Transformers

Substation
Beresfield TX1
Beresfield TX3
Bunnerong TX1A
Bunnerong TX1B
Bunnerong TX1C
Bunnerong TX2
Bunnerong TX3
Bunnerong TX4
Campbell St TX1
Campbell St TX2
Canterbury TX1
Canterbury TX2
Canterbury TX3
Canterbury TX4
Charmhaven TX1
Charmhaven TX2
Drummoyne TX1
Drummoyne TX2
Gosford TX1
Gosford TX2
Gosford TX3
Gosford TX4
Green Square TX1
Green Square TX2
Homebush Bay TX1
Homebush Bay TX2
Kurri TX1
Kurri TX2
Kurri TX3
Macquarie Park TX1

Substation
Macquarie Park TX2
Marrickville TX1
Marrickville TX3
Marrickville TX4
Meadowbank TX1
Meadowbank TX2
Meadowbank TX3
Ourimbah TX1
Ourimbah TX2
Ourimbah TX3
Peakhurst TX2
Peakhurst TX3
Peakhurst TX4
Pyrmont TX1
Pyrmont TX2
Pyrmont TX3
Rozelle TX1
Rozelle TX2
Somersby TX1
Somersby TX2
St Peters TX1
St Peters TX2
St Peters TX3
St Peters TX4
Tomago TX1
Tomago TX2
Tomago TX3
West Gosford TX11
West Gosford TX13
Wyong TX1
Wyong TX2

Transmission Bulk Supply Transformers

Substation
Beresfield TX1
Beresfield TX3
Bunnerong TX1A
Bunnerong TX1B
Bunnerong TX1C
Bunnerong TX2
Bunnerong TX3
Bunnerong TX4
Canterbury TX1
Canterbury TX2
Canterbury TX3
Canterbury TX4
Gosford TX1
Gosford TX2
Gosford TX3
Gosford TX4
Kurri TX1
Kurri TX2
Kurri TX3
Ourimbah TX1
Ourimbah TX2
Ourimbah TX3
Peakhurst TX2
Peakhurst TX3
Peakhurst TX4
Pyrmont TX1
Pyrmont TX2
Pyrmont TX3
Rozelle TX1
Rozelle TX2
Tomago TX1
Tomago TX2
Tomago TX3

Transmission Reactive Plant

Substation
Bunnerong Cap1
Bunnerong Cap2
Bunnerong Cap3
Bunnerong Cap4
Bunnerong Cap5
Canterbury Cap1
Canterbury Cap2
Canterbury Cap3
Chullora Reactor 1
Chullora Reactor 2
Gosford Cap2
Gosford Cap3
Gosford Cap4
Mason Park Reactor 1
Ourimbah Cap1
Ourimbah Cap2
Peakhurst Cap1
Peakhurst Cap3
Peakhurst Cap4
Pyrmont Cap1
Pyrmont Cap2
Tomago Cap
Kurri Cap

APPENDIX B
Service standards definitions from NSW and ACT transmission network revenue cap EnergyAustralia 2004-05 to 2008-09 (Appendix D)

The following definitions have been extracted from the NSW and ACT transmission network revenue cap EnergyAustralia 2004-05 to 2008-09, Appendix D.

Appendix D Service standards

Measure 1a Transmission circuit availability (ACCC's measure)

Sub-measures	Transmission feeders Transmission transformers Transmission reactive
Unit of measure	Percentage of total possible hours available.
Source of data	TNSP outage reports and system for circuit availability
Definition/formula	Formula: $\left(\frac{\text{No. hours per annum defined (critical/non - critical) circuits are available}}{\text{Total possible no. of defined circuit hours}}\right)\times 100$ Definition: The actual circuit hours available for defined transmission circuits divided by the total possible defined circuit hours available. Events will be capped at 14 days.
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' e.g. intertrip signal, generator outage, customer installation (TNSP to provide list) Excluded 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 1b Circuit availability (EnergyAustralia's proposed measure)

Sub-measures	MVA days of feeder availability MVA days of transmission bulk supply transformers non-availability MVAr days of reactive plant non-availability
Unit of measure	Percentage of MVA days of availability.
Source of data	TNSP outage reports and system for circuit availability
Definition/formula	Formula: $\left(\frac{\text{MVA days available}}{\text{Total MVA days}}\right)\times 100$ Definition: Total number of days that assets are unavailable for service: Where there is no recall capability due to equipment defect, or When a transmission reactive plant is taken out of service due to planned work, where the recall is greater than 24 hours. After calculating the non-availability of transmission bulk supply of transformers, EnergyAustralia proposes to translate it to a measure of availability. Events will be capped at 14 days.
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' e.g. intertrip signal, generator outage, customer installation (TNSP to provide list) Excluded 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 (EnergyAustralia's proposed measure)

Unit of measure	Number of incidents and/or MVA lost load and/or minutes or hours.
Source of data	TNSP outage reports and system for circuit availability
Definition/formula	Number of events greater than x system minutes per annum Number of events greater than y system minutes per annum Such that: - a x system minutes event has a return period of one year - a y system minutes event has a return period of two years
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 'third party system', e.g. intertrip signal, generator outage, customer installation Exclude planned outages Excluded force majeure events
Inclusions	Includes all unplanned outages exceeding the specified impact (that is, x minutes and y minutes) Includes outages on all parts of the regulated transmission system Includes extreme events

Measure 3 Hours that planned outage plans were in place (EnergyAustralia's proposed measure)

Unit of measure	Hours and MVA/MWh
Source of data	TNSP Outage Reporting System
Definition/formula	Formula: $\frac{\text{Aggregate minutes duration of all unplanned outages}}{\text{No. of events}}$ Definition: Hours that plans were in place, and MVA/MWh that would have been shed in the event of a further contingency.
Exclusions	Planned outages Excludes momentary interruptions (< one minute) Excluded 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

APPENDIX C
Revised service standards definitions

Parameter 1: Circuit availability	
Sub-parameters	Transmission feeders – total* Transmission feeders – non-critical* Transmission feeders – peak periods* Transmission bulk supply transformers*
Unit of measure	Percentage of total possible hours available.
Source of data	TNSP outage reports and system for circuit availability
Definition/formula	Formula: $\frac{\text{No. hours per annum defined circuits are available}}{\text{Total possible number of defined circuit hours}} \times 100$ Definition: The actual circuit hours available for defined transmission circuits divided by the total possible defined circuit hours available. Events will be capped at 14 days. Total means all non-critical feeders, transmission transformers and reactive plant* Non-critical means all feeders (EA does not have any critical feeders)* Peak periods is defined as weekdays from 7am to 10pm during the periods 1 December to 24 December, 2 January to 28 February, 1 June to 31 August inclusive, excluding weekends and public holidays*
Exclusions	Unregulated transmission assets 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 (TNSP to provide list) Force majeure events per Service Target Performance Incentive Scheme guideline Any outage not affecting the TNSP's primary transmission equipment*
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 list) Outages from all causes including planned, forced and emergency events, including extreme events

Notes: Items marked * were not included in original definitions of Service Standards Guidelines, 2003

Parameter 2: Loss of supply event frequency index	
Sub-parameters	Number of events greater than x system minutes per annum Number of events greater than y system minutes per annum
Unit of measure	Number of significant events per annum
Source of data	TNSP outage reports and system for circuit availability
Definition/formula	Formula: $\text{System minute} = \frac{\text{Customer outage duration (minutes)} * \text{load lost (MW)}}{\text{System maximum demand (MW)}}$ Definition: A count of the number of events in a year that have an impact of more than x or y system minutes as appropriate. A system minute for an event is the customer outage duration (in minutes) times the load lost (in megawatts) divided by the highest system maximum demand (in megawatts) that has occurred prior to the time of the event.* The load lost is to be a reasonable estimate considering time of day/season.* x and y are set such that: • a x system minutes event has a return period of one year • a y system minutes event has a return period of two years
Exclusions	Unregulated transmission assets (e.g. some connection assets) Outages shown to be caused by a fault or other event on a 'third party system' e.g. intertrip signal, generator outage, customer installation Planned outages Force majeure events per Service Target Performance Incentive Scheme guideline
Inclusions	All unplanned outages exceeding the specified impact (that is, x system minutes and y system minutes) All parts of the regulated transmission system Extreme events

Notes: Items marked * were not included in original definitions of Service Standards Guidelines, 2003