Australian Competition and Consumer Commission (ACCC)

# Audit of EnergyAustralia Service Standards Performance Reporting

## PERFORMANCE RESULTS FOR 2004

- Final Report
- 1 April 2005

Australian Competition
and Consumer Commission

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## PERFORMANCE REPORTING FOR 2004

- Final Report
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# 1. Executive Summary

Sinclair Knight Merz (SKM) was engaged by the Australian Competition and Consumer Commission (ACCC) to conduct an audit of the first year performance report of EnergyAustralia under the ACCC Performance Incentive (PI) Scheme.

The PI scheme was released by ACCC in its draft determination[1] dated 28th April 2004 for EnergyAustralia.

In compliance with the PI scheme under the ACCC draft determination, EnergyAustralia submitted their 2004 performance report to ACCC on 16th February 2005.

The objective of the SKM audit is to focus on a review of the performance results submitted by EnergyAustralia, in particular:

- the adequacy and accuracy of the recording system used to measure performance
- the independent calculation of the performance bonus or penalty; and
- the force majeure events and other exclusions to ensure compliance with the revenue caps and ACCC service standards guidelines.

As the auditor, SKM met with EnergyAustralia staff in Sydney on 17th February 2005 to audit their data, systems and processes for gathering and processing the outage information. The integrity of the system established by EnergyAustralia for the purpose of reporting under ACCC PI Scheme was audited.

As a result of audit activities undertaken, Sinclair Knight Merz has formed an opinion that:

- EnergyAustralia has out-performed the 2004 performance target set under the ACCC PI Scheme, considering the measure of circuit availability (for feeders only);
- The ACCC PI scheme formula used to calculate the circuit availability is correctly applied;
- The current outage recording system that EnergyAustralia has put in place is largely manual and is prone to human error; and
- EnergyAustralia will need to invest in an automated recording system to ensure reliability of the data and compliance with the requirements of the ACCC PI Scheme.

[1] NSW and ACT Transmission Network Revenue Caps – EnergyAustralia 2004/05-2008/09

SKM recommends:

- The S-factor and performance penalty/bonus should be calculated and reported by EnergyAustralia in the next service standard performance report to ACCC. For completeness of this audit report, SKM has calculated the S-factor and performance incentive on a voluntarily basis. The SKM calculated figures have shown good correlation between the results produced by the SKM model and the S-factor formula stated in the ACCC draft determination. This confirmed that the SKM performance incentive calculation is consistent with the ACCC PI Scheme.
- The ACCC reviews the cap and collar values proposed in its draft determination. SKM is of the view that the collar and cap values (95.3% and 96.7% respectively) are too close to the performance target (96.1%). The consequence is that any minor variations to the performance or relatively minor events could produce a significant swift in the performance incentive results. This appears to contradict the original intent in the design of the PI Scheme, which sought to reward sustained and significant improvement in performance over historical trends. SKM's recommendation for the appropriate values of collar and cap is 93.6% and 98.6% respectively.
- The ACCC maintains the application of the 14 days cap to extended outage for the calculation of circuit availability. This would be consistent with the performance calculation for other TNSPs.
- The short duration unplanned outage (less than a day) should be included in the circuit availability calculation, even though they are typically insignificant in the number of incidents.
- The original target of 95.5 percent circuit availability was based on too little information due to the lack of historical performance data, and that the target should be re-visited now that at least three years history of consistent data is available.
- The performance bonus for EnergyAustralia under the ACCC PI Scheme for 2004 is $456,350, subject to the clarification of the following outstanding issues:
    - Impact of capital expenditure restrictions on future transmission performance.
    - Inclusion of reclassified assets (from distribution to transmission) in the performance calculation.
    - Exclusion of reactive plant/equipment and transformer in the performance calculation.

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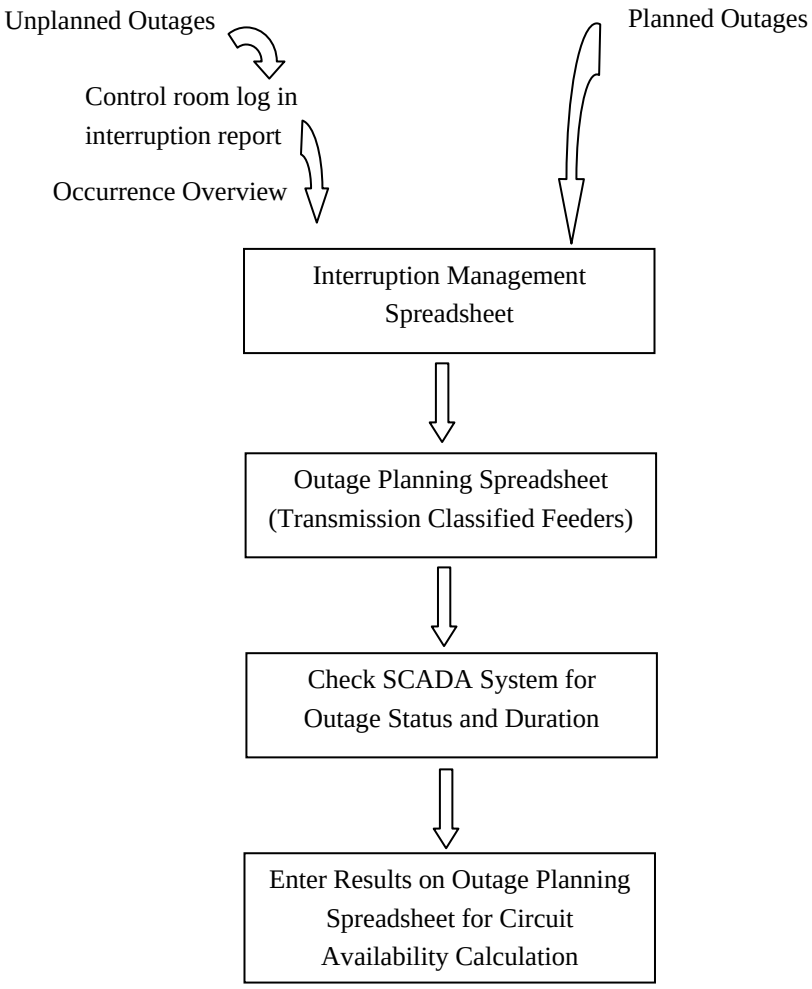
# 2. Recording System

The outage recording system described below is based on SKM's understanding of the information gathered from EnergyAustralia staff during the audit. It is presented in this report for the purpose of studying the existing recording process that EnergyAustralia has put in place.

## 2.1 Overview of EnergyAustralia outage recording system

An overview of the EnergyAustralia outage recording system for the PI scheme is shown in Figure 2-1.

- **Figure 2-1 Outage Recording System**



It should be noted that the outage recording system has been implemented for a number of years, and that the process is mainly manual because EnergyAustralia does not have an automated system for tracking the availability of specific transmission or distribution assets.

Both planned and unplanned outages are entered into one common interruption management spreadsheet. The outage information related to transmission-classified feeders is then retrieved from the interruption spreadsheet to form the outage-planning spreadsheet. The actual status of individual feeders is then checked against the SCADA system to verify the actual outage status and duration. Due to limited SCADA resolution, the recorded time of the feeder's de-energisation and re-energisation can only be within an accuracy of ±15 minutes.

The circuit availability is calculated using the outage planning spreadsheet once all 132kV feeders are verified by checking its load from the historical records captured in the SCADA system.

## 2.2 System upgrade

EnergyAustralia recognise that the process of reviewing the outage planning spreadsheet, searching the SCADA system for load details and manually entering the result in the final spreadsheet for each feeder is time consuming. SKM considered that the current manual process of collecting data for circuit availability calculation is prone to human error because there is a lack of proper quality assurance process in place. There were two incidents of data entry error found in the SKM audit - one was associated with inconsistent date entry; and the other was related to incorrect feeder entry as mentioned in 3.1.

As a result of the SKM audit, this manual recording process is currently being reviewed by EnergyAustralia. It is possible that with a new Distributed Network Management System (DNMS), introduced to replace the aging SCADA, the collection and the computation of transmission circuit availability could be automated. According to EnergyAustralia, the DNMS is expected to be commissioned in approximately two years' time.

# 3. Establishment of EnergyAustralia Targets

The ACCC PI scheme is based on a consultancy report produced by SKM[2] dated March 2003.

## 3.1 Original SKM recommendation based on one year data

In the original ACCC PI scheme, SKM recommended a target of 95.5 percent for EnergyAustralia's transmission circuit availability. This recommendation was based on just one year of historical data (2000/01). It was reported in the ACCC draft determination that EnergyAustralia considers that this target may not represent its performance appropriately and that the target is invalid due to the inclusion of transformers and reactive plant, and the inclusion of re-classified assets from distribution to transmission.

SKM agrees that the original target of 95.5 percent circuit availability was based on too little information due to the lack of historical performance data, and that the target should be re-visited now that at least three years history of consistent data is available.

## 3.2 GHD new recommendation based on three years data

In their March 2004 report[3] to ACCC, GHD has recommended new targets based on more information received from EnergyAustralia (three years of historical data). The new targets have the configuration of caps, collars and deadbands shown in table below:

**Table 3-1 New targets recommended by GHD**

| Performance measure | Unit of measure | Revenue at risk | Collar | Dead band Knee 1 | Target | Dead band Knee 2 | Cap |
|---|---|---|---|---|---|---|---|
| Transmission circuit availability | % | 1.00 | 95.3 | - | 96.1 | - | 96.7 |

In the draft determination, the ACCC has adopted the new targets recommended by GHD for the 2004-2009 regulatory period.

[2] SKM, Transmission Network Service Providers – Service Standards, March 2003

[3] EnergyAustralia Regulatory Review - Capital Expenditure and Asset Base, Operational Expenditure and Service Standards, March 2004

## 3.3 Historical Performance of EnergyAustralia

The EnergyAustralia's historical performance data for the regulatory period (1999 – 2003) is summarised in Table 3.2. It should be noted that the availability data is for transmission feeders only (i.e. it does not include the availability of transformer and reactive plant).

**Table 3-2 Historical performance of EnergyAustralia**

| | Historical Performance | | | | Current Performance |
|---|---|---|---|---|---|
| Measure | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 |
| Transmission circuit availability (%) | NA | 96.55 | 94.60 | 96.30 | 98.57 |

NA = Not Available

## 3.4 SKM's recommendation

SKM recommends that the ACCC reviews the cap and collar values proposed in its draft determination.

SKM is of the view that the collar and cap values (95.3% and 96.7% respectively) are too close to the performance target (96.1%). The consequence is that any minor variations to the performance or relatively minor events could produce a significant swing in the performance incentive results. This appears to contradict the original intent in the design of the PI Scheme, which sought to reward sustained and significant improvement in performance over historical trends.

For EnergyAustralia, SKM's recommendation for the appropriate values of collar and cap is 93.6% and 98.6% respectively.

# 4. Audit Findings

There are a total of 57 feeders (132 kV) classified as transmission assets, including those assets re-classified from distribution to transmission during the 1999-2004 regulatory period.

EnergyAustralia has provided availability figures for all 57 feeders in accordance with the ACCC PI scheme.

After some adjustments for inclusion of short duration (less than 1 day) unplanned outages, the SKM audit concluded that EnergyAustralia has correctly applied the PI scheme formulas in relation to calculating the circuit availability on transmission feeders.

## 4.1 Feeder Availability

The feeders in Sydney and Central Coast have no auto-recloser features installed. The re-close is carried out remotely after the feeder has been patrolled. In Newcastle, the majority of the feeders have auto-reclose to help to improve availability of feeders. This means that if a feeder trips off, the circuit breaker controlling the feeder will re-close after 10-15 seconds.

EnergyAustralia does not distinguish between planned or unplanned outages on feeders in the recording process. Based on SKM's understanding and clarifications with EnergyAustralia during the audit process, the recording system currently put in place is intended for the purpose of planning. Any prolonged outage that is more than a day, regardless of planned or unplanned, is naturally captured in the system once the outage status, as well as its duration, is verified in the SCADA system.

The unplanned outages or interruptions that last less than a day are generally not recorded in the system because of the design of the manual recording process. The audit found seven such incidents in 2004 that have total circuit outage duration of 70 hours. These outages were subsequently included in the availability calculation. The calculated result has shown minor material impact to the performance measure (<0.02%).

The audit also found one data entry error associated with the outage of No.910 feeder recorded on 1st May 2004. Three outages associated with feeder No.900 were inadvertently copied from feeder 910. EnergyAustralia has rectified the error and re-calculated the availability figures. The calculated result has shown minor material impact to the performance measure (< 0.04%).

## 4.2 Reactive Plant Availability

EnergyAustralia provided SKM with reactive plant availability for 2004 during the audit.

However, it should be noted that the reactive plant availability is calculated based on 'MVA days', which is an alternative measure proposed by EnergyAustralia in their performance submission to ACCC. This alternative measure is one of the issues being negotiated between EnergyAustralia and ACCC under the draft determination and that the extent of this issue is beyond the scope of the SKM audit.

Although the reactive plant availability calculated is not consistent with the circuit availability calculation under the ACCC PI scheme, there is little difference in the calculated result. The calculated reactive plant availability based on the ACCC PI scheme is marginally higher (97.78%) than the alternative measure based on 'MVA days' (97.66%) proposed by EnergyAustralia

The information related to reactive plant availability is contained in a separate outage database. The process of collating the data involved looking at the planned outage spreadsheet and the defective mains and apparatus sheet records. The planned outage spreadsheet only includes plant outages due to, for instance, routine maintenance. The Defective Mains and Apparatus sheet records are updated weekly and they include reactive plant that is defective or plant that has failed (i.e. not available for service).

The SKM audit found that the control room operators only record the date of equipment failure, without specifying the date of equipment back in service. As a result, the reactive plant availability provided is estimated to have an accuracy of within ± 3 to 4 days. SKM considered that on the basis of this accuracy, the outage database is not reliable and therefore the performance standard measure determined is unlikely to be credible. Moreover, the application of the 14 days cap for prolonged outage will be hard to determine.

In their 2004 performance submission to ACCC, EnergyAustralia has reported the circuit availability on transmission feeders only. If the availability of reactive plant is considered in the circuit availability calculation, the overall performance will improve marginally without much material impact on the final performance calculations.

### 4.3 Transformer availability

EnergyAustralia has no process in place to record availability of transformers.

### 4.4 Outage Duration

EnergyAustralia does not currently record outage duration.

## 4.5 Extended Outage

In the ACCC draft determination, EnergyAustralia has been requested to cap their outage events at 14 days. The last paragraph of clause 8.5 in the ACCC draft determination states:

*'The ACCC assumes that EnergyAustralia reported their transmission feeder availability data in accordance with the service standards guidelines, therefore the maximum impact of any single event was capped at 14 days. For the purpose of the 2004-2009 regulatory period, the ACCC requests EnergyAustralia to continue to cap their events at 14 days.'*

In their submission, EnergyAustralia has identified four extended outage incidents that should be capped at 14 days (per incident) when calculating their performance measure. These incidents are summarised below:

**Table 4-1 Extended Outage Incidents**

| Feeder name | Duration of extended outage | Cause of outage |
|---|---|---|
| 908/909 | Almost two months | Cable failure |
| 90X | 17 days | Maintenance – Oil leak correction |
| 91B/1 | 18 days | Maintenance – Oil leak correction |
| 9S6/1 | Almost three months | Reconstruction work during commissioning of Haymarket |

These extended outage incidents reported by EnergyAustralia have no material impact on the final outcome of the performance bonus/penalty. This is because, without considering the 14 days cap, the availability result is already beyond the upper bound target set by the ACCC in its draft determination.

It is noted that the recording system captured only the type of failure e.g. busbar or feeder. There is no further categorisation based on the nature or reason of the outage.

## 4.6 SKM's recommendation

SKM recommends that the application of the 14 days cap to extended outage for the calculation of circuit availability be maintained by the ACCC[4].

The short duration unplanned outage (less than a day) should be included in the circuit availability calculation, even though they are typically insignificant in number of incidents.

[4] Capping the effect of events to 14 days was not included in the original ACCC PI Scheme, but its application in this instance would be consistent with performance calculation for other TNSPs.

# 5. Calculation of Performance Measure Results

## 5.1 Circuit Availability Calculation

The circuit availability (feeders only) reported by EnergyAustralia is 98.57%. This figure is calculated on the basis of the following considerations:

- The exclusion of the performance of transformer and reactive plant
- The inclusion of new 132kV lines and other equipment, resulting from the re-classification of some assets from distribution to transmission during the 1999-2004 period.
- Maximum impact of any single event was capped at 14 days
- Circuit availability data from July 2004 to December 2004.

## 5.2 S-factor and financial incentives calculations

In the performance standard submission to ACCC and during the SKM audit process, EnergyAustralia did not provide the S-factor and the performance bonus/penalty calculations. For the completeness of this audit, SKM has voluntarily undertaken to calculate the S-factor and performance bonus/penalty using the S-factor equations defined in the ACCC draft determination – Appendix C (Figure C.1 Financial incentive curve).

As the transmission feeder availability exceeded the upper bound target of 96.70%, the S-factor is determined as one percent (0.01).

The performance bonus is calculated based on half of 04/05 allowable revenue ($91.27M) as this performance audit report reflects the relevant period of the determination, namely July – December 2004. On this basis, the performance bonus that is calculated under the ACCC PI Scheme is $456,350.

## 5.3 Other circuit availability results

EnergyAustralia also reported availability figures of transmission assets prior to re-classification in July 2004, with and without the single event cap of 14 days. The SKM audit found that EnergyAustralia is consistent in the calculation of these availability figures and they are summarised below:

- **Table 5-1 Summary of feeders availability figures submitted by EnergyAustralia**

| Assets (Feeders only) considered for availability calculations: | With 14 days cap | | Without 14 days cap | |
|---|---|---|---|---|
| | Jul-Dec 04 | Jan-Dec 04 | Jul-Dec 04 | Jan-Dec 04 |
| - Exclusion of reclassified assets | 98.35% | NA | 96.65% | NA |
| - Inclusion of reclassified assets | 98.57% | NA | 97.36% | 97.34% |

* NA – Not available

If the performance audit is based on 6 months' period from 1st July 2004 – 31st Dec 2004, and availability of 96.65%, SKM calculated that the performance bonus is approximately $418,470 (compare to $456,350 for availability of 98.57%).

The calculation of performance bonus is based on the following S factor equation:

$$S = S_1 = Gradient \times Availability + Intercept$$

where the constant values for Gradient and Intercept are selected based on higher precision to avoid the rounding off error.

In this case, SKM calculated the total S factor to be 0.00917.

There is a good correlation between the calculated results based on ACCC's S-factors in the draft determination and the results produced by the SKM model. This confirmed that the SKM performance calculation is consistent with the PI scheme.

# Appendix A Performance Measure Profiles