# Audit of Directlink Service Standards Performance Reporting

## PERFORMANCE RESULTS FOR 2006

- Final Report
- 12 April 2007

# Audit of Directlink Service Standards Performance Reporting

## PERFORMANCE REPORTING FOR 2006

- Draft Report
- 12 April 2007

Sinclair Knight Merz
ABN 37 001 024 095
369 Ann Street, Brisbane 4000
PO Box 246
Spring Hill QLD 4004 Australia
Tel: +61 7 3244 7100
Fax: +61 7 3244 7301
Web: www.skmconsulting.com

# Contents

# Document history and status

| Revision | Date issued | Reviewed by | Approved by | Date approved | Revision type |
|---|---|---|---|---|---|
| A | 21.03.2007 | P Adams | J Butler | 21.03.2007 | For comment |
| B | 02.04.2007 | P Adams | J Butler | 02.04.2007 | For comment |
| 1.0 | 12.04.2007 | J Butler | G Edwards | 12.04.2007 | For issue |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## Distribution of copies

| Revision | Copy no | Quantity | Issued to |
|---|---|---|---|
| A | Electronic | 1 | AER |
| B | Electronic | 1 | AER |
| 1.0 | Electronic | 1 | AER |
| 1.0 | Electronic | 1 | Directlink JV |
| 1.0 | Electronic | 1 | Library |
| | | | |
| | | | |
| | | | |
| | | | |

| | |
|---|---|
| **Printed:** | 3 May 2007 |
| **Last saved:** | 3 May 2007 10:49 AM |
| **File name:** | I:\QHIN\Projects\QH43506\Deliverables\Reports\DirectLink\QH43506R073.doc |
| **Author:** | Peter Adams |
| **Project manager:** | Jeff Butler |
| **Name of organisation:** | Australian Energy Regulator (AER) |
| **Name of project:** | Audit of Directlink Service Standards Performance Reporting |
| **Name of document:** | Final Report |
| **Document version:** | 1.0 |
| **Project number:** | QH43506 |

# 1. Introduction

Sinclair Knight Merz (SKM) has been appointed by the Australian Energy Regulator (AER) to conduct an audit of the January to December 2006 performance report of Directlink under the AER Performance Incentive (PI) Scheme.

This review has included an examination of the accuracy and adequacy of the recording system for Directlink, together with an assessment of the application of force majeure and other exclusions.

Other issues that have been investigated and reported on include:

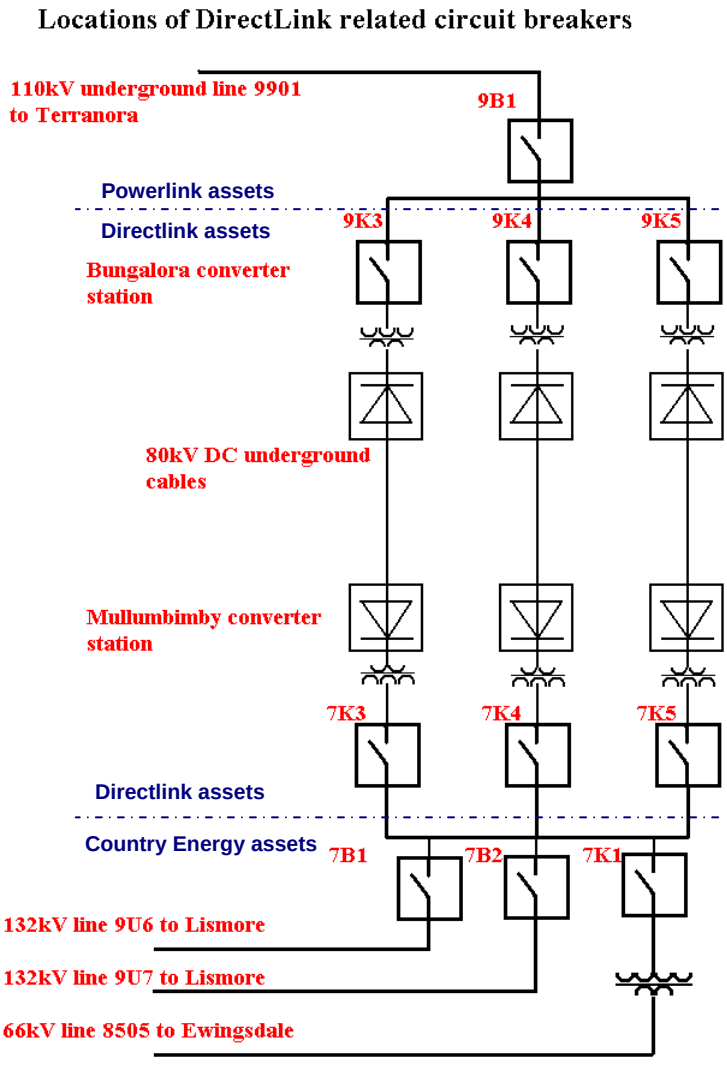
- whether the reporting complies with the requirements of Directlink's revenue cap decision and the AER Service Standards Guidelines;
- adequacy of recording systems and a review of any changes since previous audits;
- comparison of the actual results achieved relative to the targets set in the revenue cap decisions; and
- an independent validation, or otherwise, of the calculations and the S-factors.

# 2. The Directlink system

Directlink is a High Voltage Direct Current (HVDC) transmission link which interconnects the Queensland and NSW power grids. The link connects Terranora in NSW at 132kV and Mullumbimby in Queensland at 110kV. The link is configured as 3 paralleled systems, with each system in basic terms consisting of a circuit breaker, transformer and AC to DC rectifier / converter at either end of 59 kilometre HVDC cable. The link's total capacity is 180MW with each cable being rated at 65MVA / 60MW.

A simplified single line diagram of the system is shown in Figure 1.

- **Figure 1 Directlink Single Line Diagram**

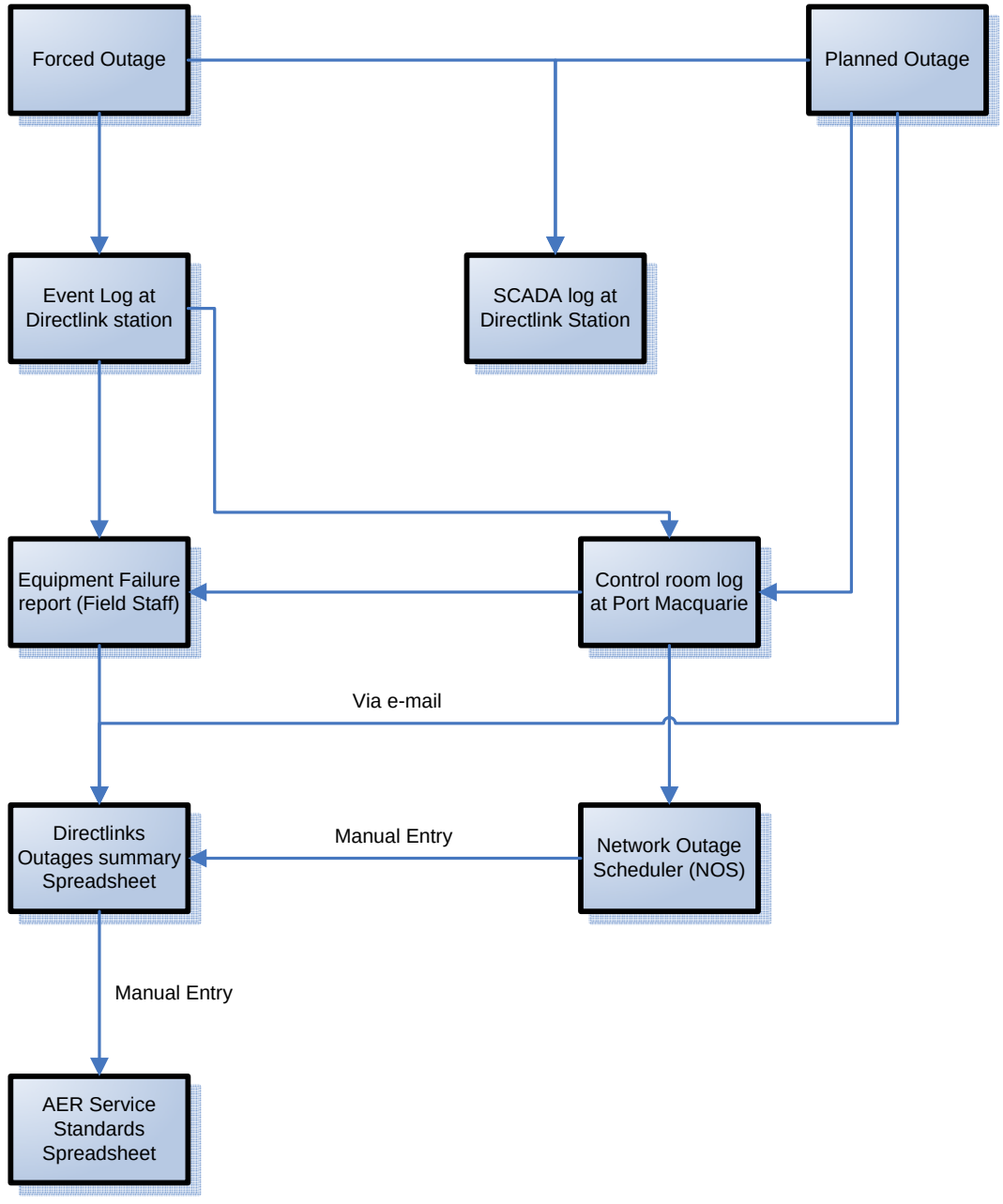


# 3. Recording System

## 3.1 Reporting

An overview of the existing Directlink PI reporting systems is shown in Figure 2.

**Figure 2 Directlink PI Reporting system**



### 3.2 Existing Recording Process

Directlink's PI reporting system presently relies on two elements to capture the information required for reporting under the service standards incentives scheme:

- e-mail communication between the field staff that operates and maintains Directlink and the office staff based at Port Macquarie of planned outage and equipment failure notice.
- information collected in the Network Outage Scheduler (NOS).

The NOS system is used by Directlink to register outages on Directlink's equipment with National Electricity Market Management Company (NEMMCO). NEMMCO then use the information in conjunction with power flow data to investigate any anomalies.

It can be seen from Figure 2 that as the Directlink has a SCADA system installed it is possible to check the values recorded by the existing recording process. At present, this has not been incorporated into the recording process.

### 3.3 Audit of the Recording System

SKM has carried out spot checks and a walk-though of Directlink's PI reporting process. This involved the correlation of Directlink's SCADA data with the values used in the Outage summary spreadsheet. SKM has also verified that the information recorded in the Outage summary correlated with the information contained in the control room logs.

SKM can confirm that the data included in the Directlink submission of 7 March 2006 is free from material errors.

# 4. Performance Measures

As set out in Appendix B of the AER "Directlink Joint Venturers application for conversion and revenue cap" of 3 March 2006, Directlink is required to report on the following measure and sub-measures:

- Circuit availability
  - Scheduled availability
  - Forced peak availability
  - Forced off peak availability

## 4.1 Inclusions

Sinclair Knight Merz has considered the inclusions in Directlink submission and can confirm that the inclusions are in line with those stated in the Service Standards guidelines.

## 4.2 Exclusion and Caps

The Service Standards guidelines contain provisions for certain defined events to be excluded from the calculated outage figures, on the basis that they are beyond the control of Transmission Network Service Providers (TNSPs) or consistent with historical reporting of outages. These exclusions are as follows:

- Unregulated transmission assets
- Outage shown to be caused by a fault or other event on a 'third party system'
- Force majeure events (defined in Appendix B)

Directlink have requested three exclusions, details of which are set out following section.

### 4.2.1 Third Party Inter-trips

Two separate outages have been attributed to the TransGrid inter-trip system:

- Directlink system 2 on 25 April 2006 between the hours of 07:30 and 08:52; and
- Directlink system 3 between 07:30 on 25 April 2006 and 20:04 on 26 April 2006.

For both outages, DJV has proposed excluding the events in accordance with the definition of a third party outage event.

SKM has discussed these outages with TransGrid and reviewed the relevant SCADA data to attempt to verify that the outages were caused by TransGrid. However, TransGrid does not have records of these events being caused by their system.

Whilst SKM accepts the outages have occurred, it is not immediately apparent where the events proposed for exclusion by Directlink have been included, were appropriate[1], in the TransGrid performance calculations, or if they resulted from normal network operations. As a result, SKM is unable to confirm that this outage should be treated as a third party exclusion and therefore recommends that these outages are not excluded from the Directlink performance calculations.

SKM is of the view that all outages and events on transmission networks that result in outages should be reported so that the appropriate TNSP accepts the accountability for the event in its performance calculations. To this end, SKM would recommend that this situation be reviewed by Directlink and TransGrid to put in place a recording and reporting arrangement that adequately captures the cause and responsibility for these inter-trip events.

### 4.2.2 Bangalora Transformer Failure

A transformer core failure at the Bungalora substation caused an outage on Directlink system 1 commencing at 12:40 on 20 November 2006 and continued through into the 2007 calendar year. The transformer required off-site repair.

The DJV has proposed this exclusion in accordance with Appendix B of the "DJV application for conversion and revenue cap – decision" document that contains, in the definition of a force majeure event, the possibility of including damage to a transformer where the damage is not repairable on site.

SKM have considered the treatment of this proposed exclusion under the definition set out above and is of the opinion that the exclusion satisfies the requirements as defined by the document for a forced majeure event. However, SKM does not consider this to be consistent with other TNSPs force majeure definitions and the original premise of the Service Standards and considers that some clarification is required by the AER.

In evaluating this exclusion, SKM has drawn on its previous experience in auditing other TNSPs and the original premise of the Service Standards.

SKM considers that the event should be included and have a cap applied for the first fourteen days, and thereafter be excluded to be consistent with other TNSPs. This ensures that this single event does not distort the overall results. SKM believe that the fourteen day cap reflects the time required by Directlink to determine that the transformer required off-site repair.

[1] Momentary interruptions and instances where a successful reclose has occurred will not affect the performance calculations for TransGrid - only sustained planned or forced outages.

It has been noted by SKM that the present Directlink decision does not expressly mention capping for outages and Directlink have not applied caps to any outage in the 2006 service standards submission. However, SKM believes this approach to this exclusion is consistent with other TNSPs.

The capping of this event reduces the Directlink performance by the following:

- S1 Scheduled availability 0.00%
- S2 Forced peak availability 0.81%
- S3 Forced off-peak availability 0.46%

### 4.2.3 Caps

As discussed previously, Directlink's present submission has not allowed for capping of outages. However, to be consistent with other TNSPs within the service standards scheme SKM considers that two events should have a fourteen day cap applied, as follows:

- 21 March 2006 to 11 April 2006 - System 3 Cable failure presently 21.54 days; and
- 5 April 2006 to 5 May 2006 - System 1 Cable failure presently 30.38 days.

SKM has considered both of these events for capping due to the specialist nature of HVDC jointing. At present, this process is out-sourced to ABB and suitable staff are not always available to carryout the work when faults occur. The situation can also be compounded as part of the DC link runs parallel to a rail line which results in any repairs requiring a planned outage on the rail system and railway staff supervision.

In capping such events SKM considers that caps should be proportional to the number of "peak" and "off peak" hours in the original event. The capping of these events improved the results for Directlink by the following:

- S1 Scheduled availability 0.00%
- S2 Forced peak availability 1.42%
- S3 Forced off-peak availability 0.77%

# 5. Calculation of S-factors

SKM has checked Directlink's calculation of its S-factors for 2006, and re-calculated the S-factors taking into account its recommendations regarding each of Directlink's requested exclusions and the capping of outages.

These results are shown in the tables below. SKM considers Directlink has calculated its S-factors accurately and in accordance with the PI Scheme Guidelines, except where requested exclusions have not been included by SKM and 14 day caps should have been applied (refer section 4.2.3).

- **Table 1 Performance Results**

| No | Performance Measure | Target | Directlink Without Exclusions | Directlink With All Requested Exclusions | SKM Without Exclusions | SKM With Recommended Exclusions |
|---|---|---|---|---|---|---|
| S1 | Scheduled Circuit availability | 99.45% | 99.75% | 99.75% | 99.75% | 99.75% |
| S2 | Forced outage circuit availability in peak periods | 99.23% | 92.66% | 95.12% | 92.66% | 95.67% |
| S3 | Forced outage circuit availability in off-peak periods | 99.23% | 95.48% | 96.95% | 95.48% | 97.16% |

- **Table 2 Calculated S-factors**

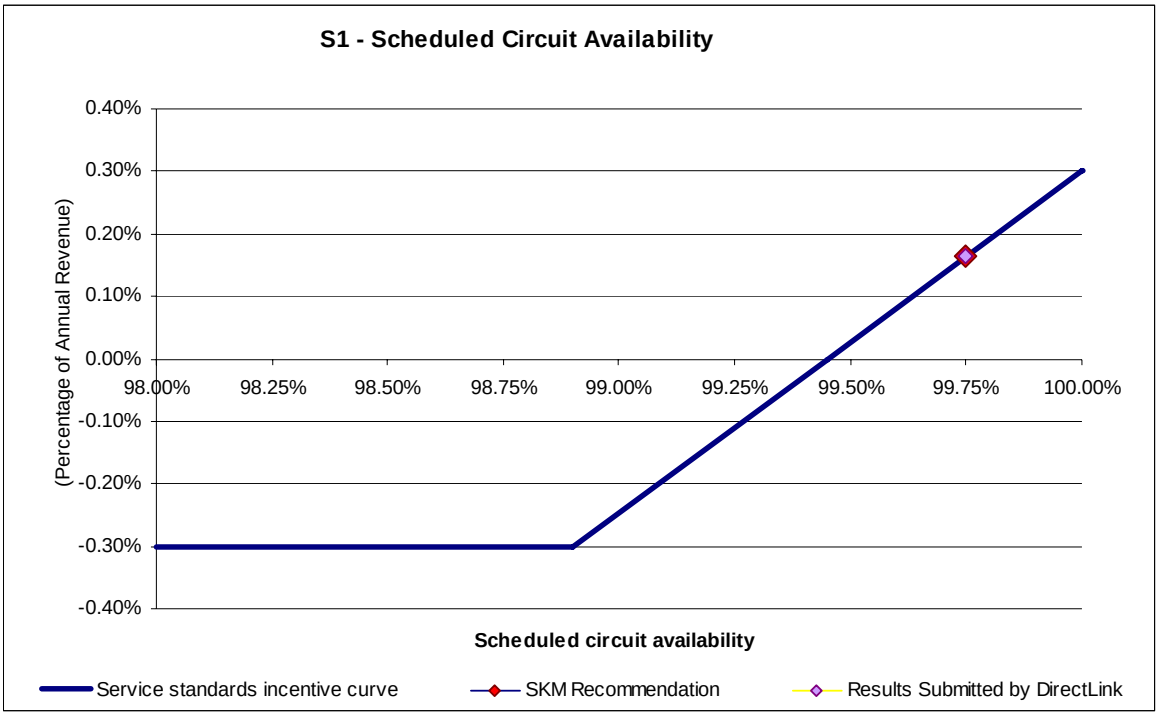
| No | Performance Measure | Directlink Without Exclusions | Directlink With Exclusions | SKM Without Exclusions | SKM With Exclusions |
|---|---|---|---|---|---|
| S1 | Scheduled Circuit availability | 0.1632% | 0.1632% | 0.1632% | 0.1632% |
| S2 | Forced outage circuit availability in peak periods | (0.35%) | (0.35%) | (0.35%) | (0.35%) |
| S3 | Forced outage circuit availability in off-peak periods | (0.35%) | (0.35%) | (0.35%) | (0.35%) |
| | **Total** | **(0.536744%)** | **(0.536744%)** | **(0.536744%)** | **(0.536744%)** |

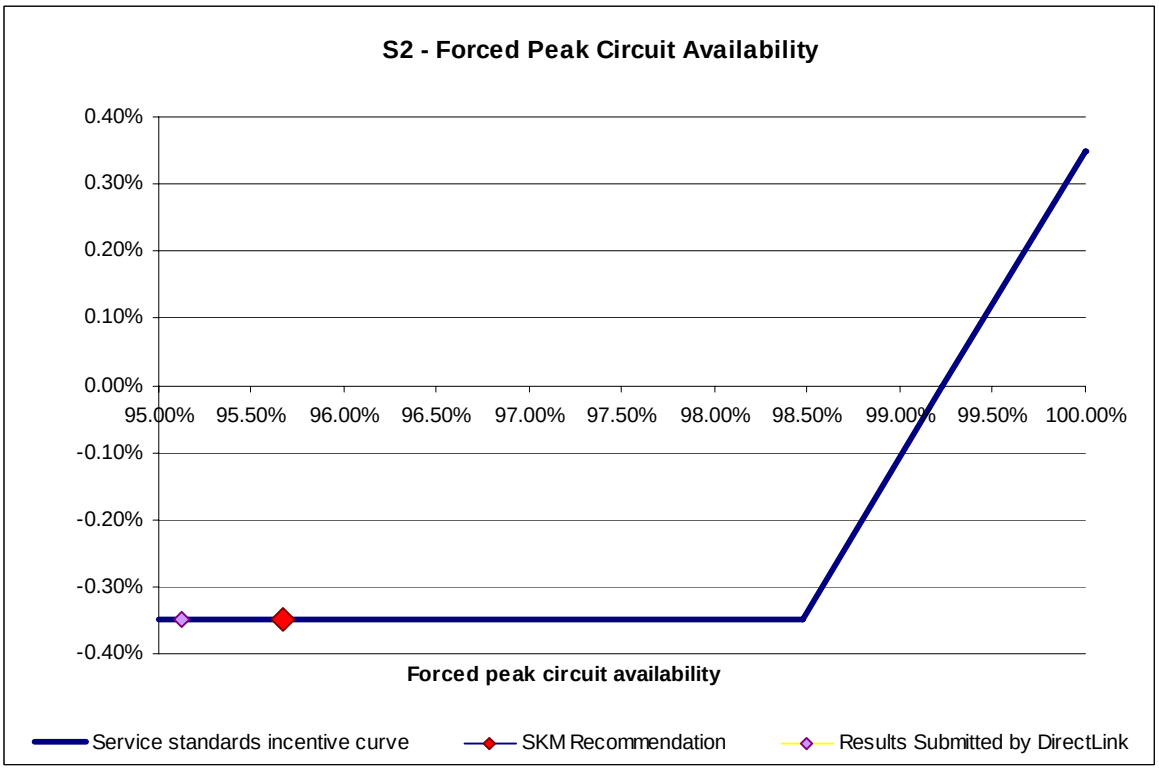
*Note that the Measure S2 & S3 are at the lower collar limit*

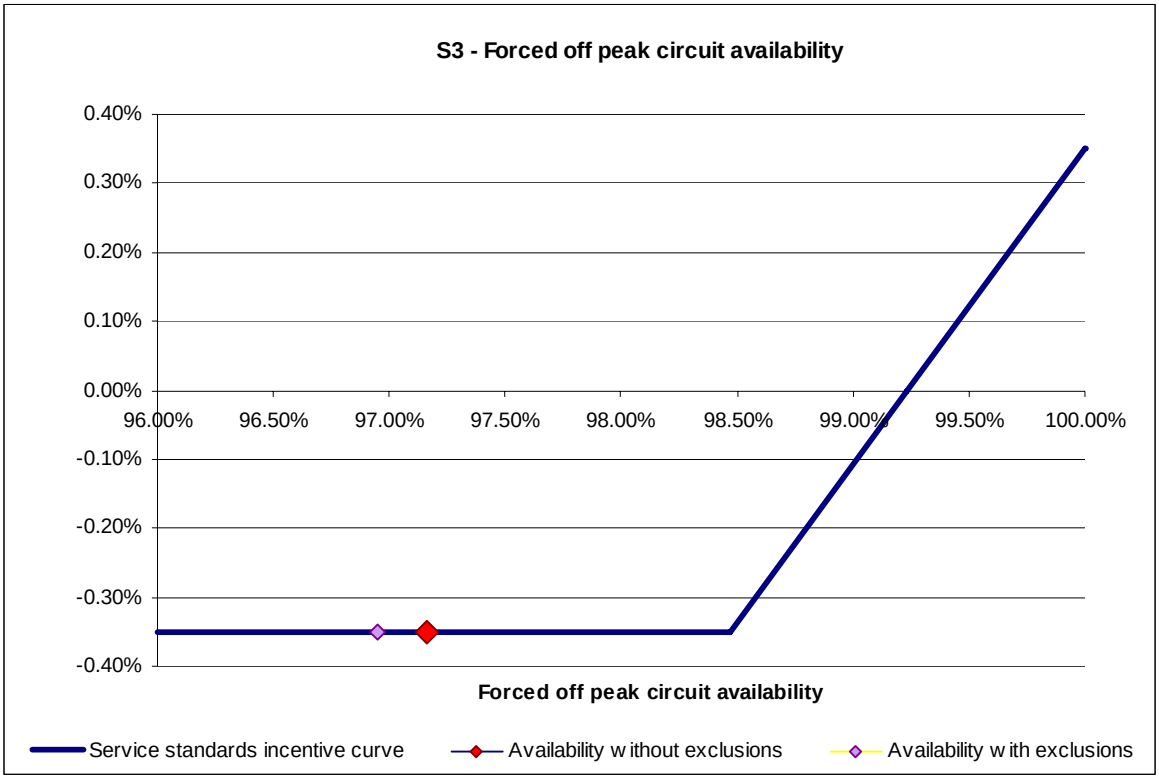
The profiles for each of the applicable measures are shown in Appendix A to illustrate the performance in graphical terms.

Based on these results, SKM recommends the penalty for Directlink should be **(0.536744%) of the agreed Annual Revenue for 2006**.

# Appendix A 2006 Performance Measure Profiles




S3 - Forced off peak circuit availability
0.40%
0.30%
0.20%
0.10%
0.00%
-0.10%
-0.20%
-0.30%
-0.40%
96.00%
96.50%
97.00%
97.50%
98.00%
98.50%
99.00%
99.50%
100.00%
Forced off peak circuit availability
Service standards incentive curve
Availability without exclusions
Availability with exclusions

# Appendix B Definition of force majeure

(a) 'Force majeure events' means any event, act or circumstance or combination of events, acts and circumstances that (despite the observance of good electricity industry practice) is beyond the reasonable control of the party affected by any such event, which may include, without limitation, the following:

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

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

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

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

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

(b) To avoid doubt, the following may be 'force majeure events' depending on the circumstances at the time:

the loss of, or damage to, 11 or more control or secondary cables

the loss of, or damage to, two or more transformers and capacitor banks, either single or three phase, connected to a bus

the loss of, or damage to, a transformer, capacitor bank or reactor where the loss or damage is not repairable on site according to normal practice.

(c) Words appearing in italics have the meaning assigned to them from time to time by the National Electricity Rules.