APPENDIX O

Powerlink Service Target Performance Incentive Scheme Target, Caps, Collars and Weighting Methodology

May 2011

Powerlink Service Target Performance Incentive Scheme

Targets, Caps, Collars and Weighting Methodology

1 July 2012 to 30 June 2017
Regulatory period

1. Document Purpose

Section 3.3 of the Service Target Performance Incentive Scheme ("Scheme") Guideline requires a TNSP to propose targets, caps, collars and weightings in its Revenue Proposal. This document provides further information to support the targets, caps, collars and weightings (for the 1 July 2012 to 30 June 2017 regulatory period) proposed in Powerlink's Revenue Proposal.

2. Approved Scheme

The AER released Powerlink's approved STPIS on 31 March 2011 . It provides Powerlink with an incentive or penalty of 1% of MAR under the network component, and an incentive of up to 2% of MAR under the market component. The scheme will measure performance against eight parameters, these are:

- Transmission Lines Availability;
- Transformer Availability;
- Reactive Plant Availability;
- Peak Transmission Availability;
- Frequency of Large Loss of Supply Events greater than 0.75 system minutes;
- Frequency of Moderate Loss of Supply Events greater than 0.10 system minutes;
- Average Outage Duration; and
- Market Impact Transmission Congestion.

The AER approved Scheme is included in Appendix 1 of this document.

3. Transmission Circuit Availability

Recent revenue determinations have set the target for the transmission circuit availability sub parameter as an average of the five most recent years of performance data. This is consistent with section 3.3 (g) of the STPIS Guideline. In addition, the cap (maximum bonus) and the collar (maximum penalty) have been set at two standard deviations either side of the target. Powerlink proposes to apply this methodology to the transmission circuit availability parameters.

3.1. Transmission Lines Availability

Powerlink's Transmission Lines Availability performance history is included in Table 1.

	2006	2007	2008	2009	2010
Transmission Lines Availability	99.00%	99.37%	99.41%	97.97%	98.92%

Table 1 - Transmission Line Availability Performance 2006 – 2010 Source: Powerlink

Powerlink is proposing to undertake a program of capital and operational refurbishment tower painting works in the 2012/13 to 2016/17 regulatory period. These works have not previously been undertaken by Powerlink and will require substantial outages to Powerlink's transmission line infrastructure. As such, these outages have not been captured in Powerlink's performance history.

Section 3.3(k)(2) of the Service Target Performance Incentive Scheme Guideline allows a TNSP to reasonably adjust the performance target for the expected increase in the volume of capital works. To take account of these works, and in line with the Guideline, Powerlink has calculated the annual availability impact to be 0.26%. Appendix 2 provides further of the details of the transmission line unavailability offset calculation.

Powerlink's Transmission Line Availability performance target, cap and collar calculations are detailed below.

Average/Target	μ	98.94%
Standard Deviation	σ	0.58%
Offset	β	0.26%
Revised Target	μ-β	98.67%
Collar (2σ)	(μ-β) - 2 x σ	97.51%
Cap (2σ)	(μ-β) + 2 x σ	99.83%

Powerlink therefore considers that a cap, performance target and collar of 99.83%, 98.76% and 97.51% respectively are suitable values for the Transmission Line sub parameter.

3.2. Transformer Availability

Powerlink's Transformer Availability performance history is included in Table 2.

	2006	2007	2008	2009	2010
Transformers Availability	98.52%	98.68%	99.14%	98.61%	98.83%

Table 2 - Transformer Availability Performance 2006 – 2010 Source: Powerlink

Powerlink is proposing to undertake a program of operational transformer refurbishment works in the 2013 to 2017 regulatory period. These works have not previously been undertaken by Powerlink and will require substantial outages to Powerlink's transformer infrastructure. As such, these outages have not been captured in Powerlink's performance history.

Similar to the tower painting for transmission lines, Powerlink is proposing an annual unavailability offset of 0.17% for these transformer refurbishment works. Appendix 3 provides further of the details of the transformer unavailability offset calculation.

Powerlink's Transformer Availability performance target, cap and collar calculations are detailed below.

Average/Target	μ	98.76%
Standard Deviation	σ	0.24%
Offset	β	0.17%
Revised Target	μ-β	98.59%
Collar (2σ)	(μ-β) - 2 x σ	98.11%
Cap (2σ)	(μ-β) + 2 x σ	99.08%

Powerlink therefore considers that a cap, performance target and collar of 99.08%, 98.59% and 98.11% respectively are suitable values for the Transformer Availability sub parameter.

3.3. Reactive Plant Availability

As part of the STPIS review, the AER approved Powerlink's proposal to exclude capacitor banks during off-peak periods from 1 April through to 31 October. Powerlink's reactive plant availability performance has been adjusted to account for this exclusion and is included in Table 3.

	2006	2007	2008	2009	2010
Reactive Plant Availability	95.85%	97.73%	95.75%	97.47%	98.93%

Table 3 Reactive Plant Availability Performance 2006 – 2010 Source: Powerlink

Powerlink's Reactive Plant Availability performance target, cap and collar calculations are detailed below.

Average/Target	μ	97.15%
Standard Deviation	σ	1.35%
Collar (2σ)	$\mu - 2 \times \sigma$	94.45%
Cap (2σ)	$\mu + 2 \times \sigma$	99.84%

Powerlink therefore considers that a cap, performance target and collar of 99.84%, 97.15% and 94.45% respectively are suitable values for the Reactive Plant Availability sub parameter.

3.4. Peak Transmission Availability

The Peak Availability Parameter applies to all individual plant of transmission lines, transformers and reactive plant. The peak period refers to the months from November to March, with a time period from 07:00 to 22:00 (not including weekends and public holidays). This period complements the "off-peak" months of April to October (accepted by the AER for the exclusion of capacitor banks). Powerlink's Peak Transmission Availability performance history is included in Table 4.

	2006	2007	2008	2009	2010
Peak (Nov-Mar)	98.70%	98.85%	98.70%	98.47%	99.07%

Table 4 Peak Transmission Availability Performance 2006 – 2010 Source: Powerlink

Powerlink's Peak Circuit performance target, cap and collar calculations are detailed below.

Average/Target	μ	98.76%
Standard Deviation	σ	0.22%
Collar (2σ)	$\mu - 2 \times \sigma$	98.31%
Cap (2σ)	$\mu + 2 \times \sigma$	99.20%

Powerlink therefore considers that a cap, performance target and collar of 99.20%, 98.76% and 98.31% respectively are suitable values for Peak Circuit availability sub parameter.

4. Frequency of Loss of Supply Events

Powerlink has calculated a frequency of loss of supply performance target based on the average performance history over the most recent five years. This is consistent with section 3.3(g) of Powerlink's approved Scheme.

Cap and collars values have been evaluated (at the 10th and 90th percentiles) with the "best-fit" curves using ten years of history. The "best-fit" curves have been evaluated using standard "goodness-of-fit" tests to evaluate how well the model fits a set of observations.

This is consistent with the methodologies previously accepted by the AER for other TNSPs with a similar number of events[1]. A ten year time period ensures that the inherent variability of the Loss of Supply data is taken into account and provides a larger number of events on which to establish cap and collar values.

Powerlink has also rounded the loss of supply frequency parameters to the nearest integer number. This is consistent to section 3.3(l) of the Scheme[2].

4.1. Frequency of Loss of Supply Events greater than 0.75 system minutes

Powerlink's Loss of Supply events greater than 0.75 system minutes performance for the last ten years is included in Table 5.

Powerlink has had three events greater than 0.75 system minutes from 2006 to 2010. Averaging this performance over the five years results in a target of 0.6, rounded to 1 event.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
> 0.75 System Minutes	1	4	2	0	1	1	1	0	1	0

Table 5 - Loss of Supply Events > 0.75 System Minutes 2001 – 2010 Source: Powerlink

Powerlink's Loss of Supply events greater than 0.75 system minutes target, cap and collar for the best fit curve (at the 5th, 10th, 90th and 95th percentiles) for the last ten years is included in Table 6.

[1] AER, Draft decision, TransGrid transmission determination 2009-10 to 2013-14, 31 October 2008, page 117.
[2] AER, Electricity transmission network service providers – Service Target Performance Incentive Scheme, March 2008, page 8

	10 Year History[3]	
	Actual	Rounded
Collar – 90th percentile	2.7167	3
Collar – 95th percentile	3.1872	3
Cap – 10th percentile	0.6234	1
Cap – 5th percentile	0.4739	0

Table 6 - Loss of Supply Events > 0.10 System Minutes Performance Targets, Caps and Collars for 5 and 10 years. Source: Powerlink

Powerlink propose that the collar be set at the 90th percentile (2.7167) of the best fit curve. When rounded this results in a collar of 3 events.

It is proposed that the cap should be set at the 10th percentile (0.6234); however, this will result in a rounded value of 1 event which is equal to the performance target. Under the Scheme, this outcome is nonsensical as it would result in a situation where Powerlink could receive both the financial reward associated with the cap (maximum bonus) and target (no bonus or penalty). In consideration of this result, Powerlink have set the cap at the 5th percentile (0.4739) with a value of 0 events.

Powerlink therefore considers that a cap, performance target and collar of 0, 1 and 3 events respectively are suitable values for the large loss of supply events greater than 0.75 system minutes parameter.

4.2. Frequency of Loss of Supply Events greater than 0.10 system minutes

Powerlink's Loss of Supply events greater than 0.10 system minutes performance for the last ten years is included in Table 7.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
> 0.10 System Minutes	7	12	12	5	3	3	4	5	3	3

Table 7 - Loss of Supply Events > 0.10 System Minutes 2001 – 2010 Source: Powerlink

Powerlink has had eighteen events greater than 0.10 system minutes from 2006 to 2010. Averaging this performance over the five years results in a target of 3.6, rounded to 4 events.

Powerlink's Loss of Supply events greater than 0.10 system minutes cap and collar for a normal approximation and best-fit curve (for 5th, 10th, 90th and 95th percentiles) incorporating the last ten years of performance data is included in Table 8.

	10 Year History[4]	
	Actual	Rounded
Collar – 90th percentile	9.5535	10
Collar – 95th percentile	12.0289	12
Cap – 10th percentile	2.6579	3
Cap – 5th percentile	2.3027	2

Table 8 - Loss of Supply Events > 0.75 System Minutes Cap and Collar 10 years. Source: Powerlink

[3] The ten year best-fit curve for LOS > 0.75 system minutes was based on Gamma distribution
[4] The ten year best-fit curve for LOS > 0.10 system minutes was based on a Pearson5 distribution

Powerlink propose to set the cap and collar at 10th (2.6579) and 90th (9.5535) percentiles respectively. When rounded, this results in a cap of 3 events and a collar of 10 events.

Powerlink therefore proposes to use a cap, performance target and collar of 3, 4 and 10 events respectively for the moderate loss of supply events greater than 0.10 system minutes parameter.

5. Average Outage Duration

Similar to the Transmission Circuit Availability sub parameters, recent revenue determinations have set the:

- performance target for the Average Outage Duration parameters as an average of the five most recent years of performance data; and
- cap and collar at the normal approximation of two standard deviations from the performance target.

Powerlink have applied this methodology to the Average Outage Duration parameter.

As discussed previously, capacitor banks during the off-peak months from April to October are excluded from the Average Outage Duration calculation. Powerlink's Average Outage Duration performance history (with off-peak capacitor banks excluded) is included in Table 9.

	2006	2007	2008	2009	2010
Average Outage Duration (excluding off peak capacitor banks)	1183	753	973	606	779

Table 9 - Average Outage Duration 2006 – 2010 Source: Powerlink

Powerlink's Average Outage Duration performance target, cap and collar calculations are detailed below.

Average/Target	μ	859
Standard Deviation	σ	223
Collar (2σ)	$\mu + 2 \times \sigma$	1306
Cap (2σ)	$\mu - 2 \times \sigma$	412

Powerlink therefore considers a cap, performance target and collar of 412, 859 and 1306 minutes respectively are suitable values for the Average Outage Duration parameter.

6. Market Impact of Transmission Congestion

The market component of the STPIS has a single Market Impact of Transmission Congestion (MITC) parameter that incentivises TNSPs to minimise transmission outages that can affect the dispatch of generation in the National Electricity Market (NEM). This is measured by a count of the number of five-minute Dispatch Intervals (DIs) where an outage on the transmission network results in a network outage constraint with a marginal value greater than $10/MWh.

Powerlink's Market Impact of Transmission Congestion performance history is included in Table 10.

	Actual Performance (Calender Year)				
	2006	**2007**	**2008**	**2009**	**2010**
Binding Intervals	4133	3479	1574	1298	1556
Exclusions	460	1777	1395	1155	138
Contribution to Performance Target	3673	1702	179	143	1418
Offset	254	454	886	1051	4
Actual MITC Performance	3927	2156	1065	1194	1422

Table 10 - Market Impact of Transmission Congestion Performance 2006 – 2010 Source: Powerlink

To efficiently facilitate future prescribed capital augmentations to support increasing loads in south west Queensland, Powerlink will be acquiring existing network assets currently owned by a DNSP prior to the commencement of the next regulatory period. Therefore, to adequately reflect appropriate targets for the next regulatory period, the performance history of these assets needs to be taken into consideration when calculating performance targets for the 2013 to 2017 period. These additional dispatch intervals are detailed under the "Offset" line in Table 10. Powerlink has calculated the performance target for the MITC parameter using the average 2006 to 2010 performance.

The average of the actual MITC performance is 1952.8, rounded to 1953 dispatch intervals. Powerlink therefore considers a performance cap of 1953 dispatch intervals is suitable for the MITC parameter. This will result in Powerlink receiving a maximum bonus of +2% of MAR for an annual performance of 0 DIs and no bonus for an annual performance of 1953 DIs or greater.

7. Weightings

Section 3.5 of the Scheme Guideline, requires Powerlink to propose weightings for each of the service component parameters. Table 11 details Powerlink's proposed weightings under the service component of the Scheme.

Parameter	Weighting (% of MAR)
Transmission Lines Availability	0.175
Transformer Availability	0.115
Reactive Plant Availability	0.090
Peak Availability	0.070
Loss of Supply > 0.75 system minutes	0.300
Loss of Supply > 0.10 system minutes	0.150
Average Outage Duration	0.100
Total	1.000

Table 11 Proposed Weighting for Powerlink's Scheme Source: Powerlink

7.1. Transmission Circuit Availability Weighting

Powerlink has increased the total transmission circuit availability weighting (from 0.395% of MAR in the existing Scheme) to 0.45% of MAR to accommodate the additional transmission circuit availability sub parameter. This ensures that availability parameters are not diluted and continue to provide financial incentive under the Scheme.

The proportion breakdown (for each transmission circuit availability sub parameters), calculation and proposed weighting are detailed in Table 12. The three plant sub

parameters (Transmission Lines, Transformers and Reactive Plant) availability have been weighted to reflect the number of plant elements in each particular availability sub parameter. The peak availability sub parameter has been allocated a weighting that reflects the period that it will apply (November to March).

Availability Sub Parameter	Proportions (%)	Normalised (%)	Weighted to 45%	Proposed (% of MAR)
Transmission Lines	46.00	38.98	17.54	0.175
Transformers	30.00	25.42	11.44	0.115
Reactive	24.00	20.34	9.15	0.090
Peak	18.00	15.25	6.86	0.070
	118.00	100.00	45.00	0.450

Table 12 - Powerlink Transmission Elements and Weighting Calculation Portion Source: Powerlink

7.2. Loss of Supply Frequency Weighting

Powerlink's customers and Queensland industry place large importance on the reliability of electricity supply. Consequently, Powerlink proposes to maintain the weighting for the large loss of supply sub parameter at 0.30% of MAR. Powerlink intends to slightly reduce the moderate loss of supply sub parameter by 0.005% to 0.15% of MAR. At 0.45% of MAR, Powerlink will continue to have one of the highest frequency of loss of supply parameter weightings in the NEM.

7.3. Average Outage Duration Weighting

It is proposed that the remaining weighting be allocated to Average Outage Duration. The Average Outage Duration reduced weighting is reflective of Powerlink's improved performance over the last five years. This is in accordance with Section 3.5(d)(3) of the STPIS Guideline which requires the weighting to take in account the potential scope for improvement for parameter.

8. Summary of Powerlink's proposed performance targets, caps, collars and weightings

Powerlink's proposed performance targets, caps, collars and weightings are summarised in Table 13.

Parameter	Unit	Collar	Target	Cap	Weighting (%)
Transmission Lines Availability	%	97.51	98.67	99.83	0.175
Transformer Availability	%	98.11	98.59	99.08	0.115
Reactive Plant Availability	%	94.45	97.15	99.84	0.090
Peak Availability	%	98.31	98.76	99.20	0.070
Loss of Supply > 0.75 system minutes	Events	3	1	0	0.300
Loss of Supply > 0.10 system minutes	Events	10	4	3	0.150
Average Outage Duration	Minutes	1306	859	412	0.100
Market Impact of Transmission Congestion	Dispatch Intervals		1953	0	2.000

Table 13 - Powerlink Proposed Target, Cap, Collar and Weightings Source: Powerlink

Appendix 1 – Powerlink's Approved Service Standard Performance Incentive Scheme

Part 2—Powerlink

Parameter 1	Transmission circuit availability
Sub-parameters	peak transmission circuit availability transmission line availability transformer availability reactive plant availability
Unit of measure	percentage of total possible hours available
Source of data	TNSP outage reports and system for circuit availability agreed schedule of critical circuits and plant peak period – 7:00 am to 10:00 pm weekdays, excluding public holidays, from 1 November to 31 March off peak all other times
Definition/formula	formula: $\frac{\text{No. of hours per annum defined (critical/non-critical/peak) circuits are available} \times 100}{\text{Total possible no. of defined circuit hours}}$ definition: the actual circuit hours available for defined (critical/non critical/peak) transmission circuits divided by the total possible defined circuit hours available a critical circuit element is an element of the 330kV network, the 275 kV interconnected network that forms the backbone of the transmission system and interconnections to other jurisdictions. All other circuits are non-critical Powerlink should submit a list of critical circuits/system components annually as part of the AER's compliance review winter off-peak season is 1 April through to 31 October
Inclusions	'circuits' includes overhead lines, underground cables, power transformers, phase shifting transformers, static var compensators, capacitor banks and reactors, and any other primary transmission equipment essential for the successful operation of the transmission system but does not include individual circuit breakers and isolators or secondary systems outages from all causes including planned, forced and emergency events, including extreme events
Exclusions	unregulated transmission assets (e.g. some connection assets). 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

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force majeure events	
any outage not affecting Powerlink's primary transmission equipment	
faults originating from Powerlink owned equipment that affect primary plant or equipment owned by a distributor, connected customer or a generator	
capacitor banks in the winter off-peak period	
NOTE: under section 3.5 of the AER's Information Guidelines, the TNSP must provide a list to the AER each year of the events that the TNSP considers should be excluded from performance results, including reasons and how the event meets the relevant exclusion definition	

Parameter 2	Loss of supply event frequency
Sub-parameters	frequency of events where loss of supply exceeds x system minutes frequency of events where loss of supply exceeds y system minutes
Unit of measure	number of significant events per annum.
Source of data	TNSP outage reporting system
Definition/formula	number of events greater than x system minutes or y system minutes where: $\text{System minute} = \frac{\text{Customer outage duration (minutes)} \times \text{load lost (MW)}}{\text{System maximum demand (MW)}}$ definition of system minute: 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. period of the interruption starts when a loss of supply occurs and ends when Powerlink offers supply restoration to the customer an interruption >y system minutes also registers as a >x system minutes event x = 0.10 y = 0.75
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
Exclusions	unregulated transmission assets (e.g. some connection assets) 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 planned outages *force majeure events* NOTE: under section 3.5 of the AER's Information Guidelines, the TNSP must provide a list to the AER each year of the events that the TNSP considers should be excluded from performance results, including reasons and how the event meets the relevant exclusion definition

Parameter 3	Average outage duration
Unit of measure	minutes
Source of data	TNSP outage reporting system
Definition/formula	formula: $\frac{\text{Aggregate minutes duration of all unplanned outages}}{\text{Number of events}}$ definition: the cumulative summation of the outage duration time for the period, divided by the number of outage events during the period the start of each outage event is the time of the interruption of the first circuit element. The end of each outage event is the time that the last circuit element was restored to service the impact of each event is capped at seven days winter off-peak season is 1 April through to 31 October
Inclusions	faults on all parts of the transmission system (connection assets, interconnected system assets) all forced and fault outages whether or not loss of supply occurs
Exclusions	planned outages momentary interruptions (duration of less than one minute) *force majeure events* capacitor banks in the winter off-peak period 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 NOTE: under section 3.5 of the AER's Information Guidelines, the TNSP must provide a list to the AER each year of the events that the TNSP considers should be excluded from performance results, including reasons and how the event meets the relevant exclusion definition

Appendix 2 – Transmission Line Availability Offset

Powerlink is proposing to undertake a program of capital and operational refurbishment tower painting works in the 2012/13 to 2016/17 regulatory period. These works have not previously been undertaken by Powerlink and will require substantial outages to Powerlink's transmission line infrastructure. As such, these outages have not been captured in Powerlink's performance history.

Section 3.3(k)(2) of the Service Target Performance Incentive Scheme Guideline allows a TNSP to reasonably adjust the performance target for the expected increase in the volume of capital works.

Powerlink has identified the proposed transmission life extension and tower projects that will occur in the future regulatory period. Individual outage times have been calculated for each project. From this, the total duration of transmission line outages for the additional works can be determined. The following assumption has been made when estimating outage duration:

- all towers would require blasting and three coat paint system;
- single feeder outages only, no overnight return to service;
- no work in the November to March period;
- 2 work groups consisting of 3 teams – ground crew, blasting and painting; and
- allowance made for bolt/member replace.

The total outage time for the transmission lines works over the next regulatory period is 32923 hours, which equates to 6584 hours per year.

Powerlink has estimated the likely transmission line availability based on the historic growth rate of transmission lines. This resulted in a total availability over the 5 year period of 12454134 hours or 2490827 hours annually.

The additional unavailability resulting from the transmission line works is:

$$\frac{\text{Annual Transmission Line Unavailability}}{\text{Annual Transmission Line Availability}} = \frac{\text{6584 hours}}{\text{2490827 hours}} = 0.26\%$$

Powerlink therefore proposes to apply an unavailability offset of 0.26% to account for the transformer refurbishment projects.

Appendix 3 – Transformer Offset

Similar to the Transmission Line Availability Offset detailed in Appendix 2. Powerlink is proposing to undertake a program of capital and operational refurbishment tower painting works in the 2012/13 to 2016/17 regulatory period. These works have not previously been undertaken by Powerlink and will require substantial outages to Powerlink's transformer infrastructure. As such, these outages have not been captured in Powerlink's performance history.

The transformer refurbishment projects can be differentiated based on the requirement to replace the transformer bushing, level of tank drain, seal/gasket replacement and painting requirements. The transformer refurbishments have been catergorised into large, medium and small projects based on the work required.

Discussion with maintenance service providers has indicated that large transformer refurbishment projects will have an expected outage duration of 6 weeks, the medium projects 4 weeks and small projects 3 weeks.

Powerlink's 2010 Operational Refurbishment Plan details that in the 2012/13 to 2016/17 regulatory period, Powerlink proposes to undertake:

- 5 large (1 with a small portion of works in the 12/13 to 16/17 regulatory period);
- 9 medium (2 with a large portion of works in the 12/13 to 16/17 regulatory period); and
- 6 small (2 with a large portion of works in the 12/13 to 16/17 regulatory period).

This results in the following unavailability:

5 large projects	X	6 weeks	x	7 days	x	24 hours	=	5040 hours
9 medium projects	X	4 weeks	x	7 days	x	24 hours	=	6048 hours
6 small projects	X	3 weeks	x	7 days	x	24 hours	=	3024 hours
Total Transformer Unavailability over 5 year Period							=	14112 hours
Annual Transformer Unavailability							=	2822.4 hours

Powerlink has estimated the likely transformer availability based on the historic growth rate of the transformer fleet. This resulted in a total availability over the 5 year period of 8372299 hours or 1674460 hours annually.

The additional unavailability resulting from the transformer refurbishment projects is:

$$\frac{\text{Annual Transformer Unavailability}}{\text{Annual Transformer Availability}} = \frac{\text{2822.4 hours}}{\text{1674460 hours}} = 0.17\%$$

Powerlink therefore proposes to apply an unavailability offset of 0.17% to account for the transformer refurbishment projects.