Ref. 2/902/5

9 February 2007

Mr Mike Buckley
General Manager
Network Regulation North
Australian Energy Regulator
PO Box 1199
DICKSON ACT 2602

Dear Mike,

POWERLINK RESPONSE TO AER DRAFT DECISION of 8 DECEMBER 2006

The AER made its Draft Decision on 8 December 2006 in response to Powerlink's Revenue Proposal for the Queensland transmission network for the period 1 July 2007 to 30 June 2012 and called for submissions in response to its Draft Decision. Powerlink's response to the AER's Draft Decision is attached.

Powerlink has thoroughly reviewed each of the matters the AER has considered in making its Draft Decision. Powerlink considers that many of the adjustments made are inappropriate and has provided additional information, including from specialist consultants, to better inform the AER in making its Final Decision. The AER also requested additional information from Powerlink in relation to several matters on which it considered the prudency of proposed changes as a result of its consultants review were unclear. Powerlink has addressed these specific requests and can provide further clarification if required.

Powerlink has also included additional information in relation to the Supplementary Revenue Proposal submitted on 15 December 2006.

We would be happy to discuss the matters raised with the AER and its consultants or provide additional information if needed. We look forward to an outcome that will allow Powerlink to meet the needs of the fast growing Queensland economy.

Yours sincerely,

Gordon H. Jardine
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POWERLINK QUEENSLAND

QUEENSLAND TRANSMISSION NETWORK RESPONSE TO AER DRAFT DECISION of 8 December 2006

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Executive Summary

Whilst the AER has (correctly) not incorporated all the suggestions from its consultants, PB Associates, in its Draft Decision, the Draft Decision nevertheless includes a significant number of (downwards) adjustments to Powerlink's Revenue Proposal.

Powerlink has studied all these adjustments carefully, and has concluded that most are inappropriate. In several matters, Powerlink has engaged specialist consultants to review the Draft Decision, the PB report and Powerlink's data. All of these reviews strongly support the view that the AER should, in its Final Decision, undo various adjustments.

This response and its accompanying consultants reports are designed to better inform the AER in reaching its Final Decision.

Future capital expenditure

The future capex allowance in the Draft Decision is hopelessly inadequate to enable Powerlink to meet its obligations in Queensland's high load growth and high input cost environment. In addition to the need for the future capex to be increased as outlined in Powerlink's Supplementary Revenue Proposal (December 2006), there are compelling grounds for the AER to undo the adjustments made in formulating its Draft Decision.

1. **Replacement capex** – PB has substituted a rough rule of thumb plus arbitrary fudge factors estimate for Powerlink's detailed engineering-based replacement plan. The adoption of PB's approach constitutes poor regulatory practice. Powerlink engaged a specialist consultant to review the PB report and each item raised therein, and to review Powerlink's detailed replacement plan and supporting data.

   The consultant, Evans & Peck, concluded that:

   > *"Our review of Powerlink's detailed forecast results in a conclusion that is in line with PB – it is difficult to find justification for a reduction. However, we do not jump to the next step of discarding the bottom up forecast completely and substituting what can best be described as a rough rule of thumb"*[1]*;* and
   >
   > *"it is difficult (if not impossible) to support PB's conclusion that a generic rule of thumb methodology should displace the rigorous bottom up forecasting processes adopted by Powerlink."*[2]

   For the AER to persist with this arbitrary, back of the envelope approach in its Final Decision would set an unrivalled low water mark in Australian regulatory practice.

   The Evans & Peck review of replacement capex, which was substantially more thorough than PB's, concludes that the AER should adopt Powerlink's replacement plan.

2. **Load driven capex** - PB has deferred the timing of two projects (Larapinta to Goodna, Strathmore to Ross) on the basis of a highly speculative assumption about DSM being suddenly available in these locations. There is no additional, plausible, suitably sized DSM in these high load growth locations. The effect of the deferrals would be to place Powerlink in breach of its reliability obligations.

   The related adjustments should be undone in the Final Decision.

   In addition, PB has, in the case of 3 projects (Strathmore to Ross, Woolooga to North Coast, Larcom Creek substation) substituted lesser scope projects which have a lower

[1] Evans & Peck Report, Review of Replacement Network Capex, p3, (Appendix A).
[2] Evans & Peck Report, Review of Replacement Network Capex, p19, (Appendix A).

initial capital cost (but a higher long term cost) than the project scopes nominated by Powerlink, which, in all 3 cases, have the lowest long term NPV cost of all options. Powerlink has provided information herein to demonstrate this.

The NEM Objective, the Regulatory Test and regulatory framework require project selection on the basis of lowest long term cost, not lowest initial capital cost. PB has erred in proposing the latter.

In its Final Decision, the AER should include the project scopes which have been demonstrated to have the lowest long term NPV cost.

3. **Capital cost estimation factors** - In its Revenue Proposal, Powerlink identified the risk (especially in today's environment) for the actual capital cost of projects to be higher than, rather than lower than, the original cost estimate. This was supported by a report from consultants, Evans & Peck. Following the Draft Decision (in which the AER queried the empirical basis for the consultants analysis), Powerlink re-engaged Evans & Peck to review the actual data from Powerlink's projects. This analysis concluded that the cost estimation risk factor is actually higher than the factor sought by Powerlink in its original Revenue Proposal.

   Powerlink believes that, in its Final Decision, the AER should include at least the factor proposed by Powerlink.

   Powerlink also identified that its standard s-curves required adjustment to account for the earlier incidence of costs which have arisen due to the tight supply market. Again, Powerlink has provided additional clarification on the reasons and methodology, and believes that the AER should include this factor in its Final Decision.

4. **Labour cost escalation** - The AER has relied on a report from Access Economics to apply reduced labour cost escalations to Powerlink's capex (and opex) forecasts.

   Recognising that the propositions being advanced by Access Economics are not reflective of Powerlink's real-world experiences with labour costs in today's high growth Queensland economy, Powerlink engaged a specialist consultant with labour market expertise from Synergies to review the Access Economics report.

   Synergies concluded that the population set chosen by Access Economics (all utilities in Australia) is a poorer match to Powerlink's actual circumstances than data based on the mining/construction sector in Queensland. By way of background, Powerlink's largest element of labour costs (by far) occur in capex, and involve skills such as project managers, construction managers and riggers, and where the competition for such labour is the construction and mining sectors in the state. Powerlink's next biggest labour cost element is outsourced maintenance services from Ergon, whose "footprint" in regional Queensland has a high degree of overlap with the mining industry, which represents its real source of competition for labour.

   Synergies therefore sourced labour forecast data for the mining and construction sectors.

   Synergies also identified shortcomings in the Access Economics methodology and modelling, and challenged the notion that there will be a macroeconomic slowdown in the region where Powerlink primarily competes for labour.

   Synergies concluded that:

   > *"Moreover, if the National Institute and BIS Shrapnel are anywhere near to being proved correct and labour demand/skilled demand remain high until 2015, the wage adjustments recommended by the AER may well prove significantly inadequate …..we support the retention of a 5.6% wage*

adjustment factor over the period --- with the warning that this rate may prove to be too low [3]"

Interestingly, Access Economics in its September 2006 Investment Monitor[4] states:

"And this translates into worrying news for those reliant on the construction sector. A lack of skilled tradespeople to fill the growing number of jobs on offer means wages pressures in those industries….construction will continue to suffer the kind of cost blowouts that we have already begun to witness."

5. **Business IT** - Powerlink provided a detailed IT plan to support its future business needs. PB has applied an arbitrary reduction, based on past capex levels, decreased for "one off" projects.

   Powerlink's future needs are based on its future business plan, and are not related to past levels of expenditure. The exclusion of "one off" projects assumes (incorrectly) that "one off" projects will not occur in the future. Such projects typically arise when there is a material change in the external business environment. Powerlink is aware of at least three external events, all of which will give rise to a need for more robust, dynamic and responsive information systems: the AER work on market-related incentives for TNSPs, the AEMC congestion management review, and the ERIG proposals for more comprehensive information in Annual Planning Reports.

   The reduction to IT capex proposed by PB is not soundly based, and arbitrary.

   The AER should undo this adjustment in its Final Decision.

6. **Security capex** - Powerlink's proposal was based on meeting national and State security guidelines. PB has proposed an arbitrary deferral of some capex for lines security. There is no sound basis for such a deferral, which would create the risk of Powerlink being non-compliant with the established guidelines.

   The AER should undo this arbitrary adjustment.

7. **Easement acquisition delay** – PB has proposed a delay in the acquisition of a strategic easement on the Gold Coast, the sole objective being to push the capex across the time boundary into the subsequent regulatory period.

   Powerlink does not consider this to be prudent, given the region is Australia's fastest growing, with rapidly spreading urbanisation. A deferral of this acquisition may result in a longer route or more undergrounding, both of which will result in much higher costs to customers.

   The AER should undo this ill-founded adjustment.

Capex deliverability

Powerlink confirms its earlier advice that it is very confident it can deliver the total capex (adjusted Draft Decision plus Supplementary Revenue Proposal). Mechanisms are already in place to achieve this.

The total capex sought of approximately $2.7 billion equates to about $550 million per annum, which is similar to the level Powerlink is now delivering in 2006/07. Further, the future capex forecast contains more higher cost transmission line projects, which means that the annual capex will involve fewer projects than this year.

[3] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p36, (Appendix C).
[4] Access Economics Investment Monitor, September 2006, p6.

Operating expenditure

The Opex allowance provided in the Draft Decision is less problematic than the capex allowance, but there are a small number of important items which need to be reinstated.

1. **Condition-based maintenance costs -** On the (erroneous) assumption that new plant does not fail, PB excluded the network growth component from the condition-based maintenance costs.

   The reality is that new plant can, and does, fail. The condition of new plant must be monitored (from commissioning) and action taken when condition triggers an alarm.

   Powerlink engaged specialist asset management and reliability-centred maintenance consultants, The Asset Partnership, to review this element of the PB report. The Asset Partnership concluded that:

   > *"it is also known many electrical and electronic assets have an increased probability of failure or early life failure. The implication of early life failure is that with an increase in the number of assets which exhibit an early life failure pattern, an increased need for condition-based maintenance can be expected."*[5]

   The AER should reinstate the growth element of condition-based maintenance in its Final Decision.

2. **Labour cost escalators** – For the reasons outlined in capex item 4 above, Powerlink's labour cost escalators should be reinstated.

3. **Materials cost escalators** – Powerlink proposed an escalator of 4% per annum, whereas the AER has proposed CPI.

   Powerlink's materials costs contain elements of metal prices and oil prices (transport). These elements are escalating at levels well above CPI, and above the very conservative 4% proposed by Powerlink, which should be reinstated.

4. **Self insurance costs** – the Draft Decision, and in particular the pass through arrangements, do not include some items which have previously been included. Powerlink's approach to insurance coverage and self-insurance has assumed no change to the prior arrangements.

   Consequently, the self insurance allowance must be increased to cover these items.

Service standards

Powerlink has identified a number of methodological and modelling inconsistencies which need to be addressed.

Cost of capital

Powerlink has identified a number of items where there is inconsistency compared with past regulatory decisions, or where the decision does not reflect real-world circumstances. These include debt raising costs, debt refinancing costs, hedging costs and equity raising costs.

These items should be adjusted in the Final Decision.

[5] The Asset Partnership, PB Associates Review of Powerlink's Revenue Reset Operational Expenditure Submission, p3, (Appendix E).

Capex efficiency claim

Whilst Powerlink disagrees with PB's assessment, it has identified a subcomponent of the overall claim which clearly meets the necessary criteria. This subcomponent amount should be included in the Final Decision.

Supplementary submission

Powerlink believes that the AER's Final Decision also needs to include the future capex as outlined in Powerlink's Supplementary Revenue Proposal. All components reflect real world, current construction costs being experienced in Queensland and ever-increasing demand growth environment.

Pricing impacts

The adjustments to the Draft Decision being sought by Powerlink, combined with the additional capex in the Supplementary Proposal, will have only a modest impact on prices for customers.

These customer impacts are more than offset by the fundamental change which has occurred since the last regulatory period in the treatment of the RAB. In the prior period, the opening RAB was based on a DORC valuation, based on then-prevailing (2001) modern-day replacement costs. The RAB in this reset is based on a CPI-escalation of that 2001 figure, rather than 2007 modern day replacement costs.

Had the latter approach been applied in this reset, and given the high levels of modern day replacement costs (orders of magnitude above CPI), the opening RAB would have been at least $1.2 billion higher. This on its own would result in an annual revenue contribution of $105 million. The pricing impact would have been a 20% increase on average TUOS and 1.6% on customer prices, or $11.80 per annum.

In contrast, the impact of the total Revenue Proposal sought by Powerlink (including adjustments to the Draft Decision and the Supplementary Proposal), would increase average TUOS by 6.6%, and the average customer bill by only 0.5%, or $3.87 per year.

In short, the additional cost to customers of Powerlink's revenue request is only about one-third of the benefit which customers will receive from the fundamental change to valuation of the asset base.

AER capex accounting policy

Notwithstanding the pricing analysis above, Powerlink believes that the AER should drop or defer its proposed change from "as commissioned" to "as incurred" capex.

This policy change delivers no value to customers, just a cost.

Quick Reference Guide

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Future Capex				
Substituted a rough rule of thumb and arbitrary fudge factors estimate for Powerlink's detailed engineering based replacement capex forecast.	Substitution of detailed forecasts based on sound engineering principles with 'rule of thumb' guesstimates is unsatisfactory regulatory practice.	Use detailed bottom up engineering-based replacement capex forecast. Reinstate the $111 million capex in the Final Decision.	To follow sound engineering principles to determine appropriate allowances in accordance with previous decisions. To apply sound regulatory practice.	Section 2.1 plus independent consultant report, Appendix A.
Delay Larapinta-Goodna project one year.	Contravenes mandated reliability criteria (as there is no DSM as speculated by PB).	Retain original project timing. Reinstate $20 million capex in the Final Decision.	To comply with reliability obligations	Section 2.2.1.
Delete Strathmore to Ross from high growth scenarios	Contravenes mandated reliability criteria (as there is no DSM as speculated by PB).	Retain original project timing. Reinstate $7.1 million capex in Final Decision.	To comply with reliability obligations.	Section 2.2.2.
Reduce scope of Strathmore to Ross project based on lower initial capital cost.	Contravenes whole of life economic assessment process – substitutes a project with a lower initial cost but higher longer term cost for a project with lowest longer term cost.	Retain original project scope. Reinstate $6.7 million capex in Final Decision.	To comply with sound economic principles of lowest cost on whole of life basis (as per the Regulatory Test principles).	Section 2.3.1.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Reduced scope of Woolooga – North Coast project based on lower initial capital cost.	Contravenes whole of life economic assessment process – substitutes a project with a lower initial cost but higher longer term cost for a project with lowest longer term cost.	Retain original project scope. Reinstate $15.5 million capex in Final Decision.	To comply with sound economic principles of lowest cost on whole of life basis (as per Regulatory Test principles).	Section 2.3.2.
Reduced scope of Larcom Creek substation project based on lower initial capital cost.	Contravenes whole of life economic assessment process – substitutes a project with a lower initial cost but higher longer term cost for a project with lowest longer term cost.	Retain original project scope. Reinstate $0.4 million capex in Final Decision.	To comply with sound economic principles of lowest cost on whole of life basis (as per Regulatory Test principles).	Section 2.3.3.
Rejected cost estimation risk factor.	Ignores the real world of estimating and constructing assets.	Review in light of new analysis / report from consultant. Retain cost estimation risk factor. Reinstate $39 million capex in the Final Decision.	To take account of what actually happens in the provision of infrastructure.	Section 2.4 and independent consultant report Appendix B.
Substantial reduction of labour escalation rates.	Wage growth rates lower than average will not be sufficient to attract & retain labour resources. Independent consultant has identified modelling and methodological shortcomings in data relied upon by AER.	Adopt Powerlink's proposal for labour rate escalations. Reinstate $15 million capex in the Final Decision.	To ensure the allowance reflects Powerlink's specific circumstances, and to enable Powerlink to meet the Queensland market for labour.	Section 2.5.1 and independent consultant report Appendix C.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Rejection of s-curve adjustments.	Ignores the real world of lengthening lead times and pressure on resources.	Reinstate the $6 million capex in the Final Decision.	To account for costs being incurred earlier due to a tight supply market.	Section 2.5.2 and independent consultant report Appendix D.
Arbitrary reduction of Business IT capex.	Reduction was based on false premises and is arbitrary.	Use detailed IT capex forecast. Reinstate the $4 million capex in the Final Decision.	To follow appropriate IT expenditure to meet business needs as shown in detailed plans.	Section 2.6.1.
Reprofiling of the lines security upgrade to defer costs.	Deferring costs results in the imposition of inappropriate (and undiversifiable) risks on Powerlink. Costs deferral is arbitrary.	Restore the expenditure profile of the project to the original profile, which was based on the published security guidelines. Reinstate the $13 million capex in the Final Decision.	Exposes Powerlink to uncertain risks and may not comply with infrastructure guideline.	Section 2.6.2.
Delay acquisition of easement to south coast.	Arbitrary delay to a strategic easement acquisition in the fastest growing region in Australia.	Use original timing as it will be lowest cost to customers. Reinstate $11 million capex in Final Decision.	Acquiring strategic easements is good electricity industry practice. In this region, there is rapid urbanisation occurring – delays could result in longer most costly route (with more undergrounding)	Section 2.6.3.
Adopt CQ-SQ revised project timings.	No problem.	Adopt $41 million reduction in Final Decision.		Section 2.8.1.
Adopt specific locations for capacitor bank program.	May not reflect actual costs not costed.	Adopt $1 million reduction in Final Decision.		Section 2.8.2.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Transfer of undergrounding to contingent projects.	No problem.	Minimise any overhead and maintain reduction of $96 million.		Section 2.9.1.
Transfer of M50++ theme set to contingent projects.	Contingent project trigger incorrect.	Correct trigger and maintain reduction of $14 million.	To ensure Powerlink can maintain reliability of supply to customers.	Section 2.9.2.
Operating Expenditure				
Curtailment of growth in condition based maintenance forecast for the regulatory period.	Assets can, and do, fail early in life, sometimes with catastrophic consequences. Condition based monitoring and maintenance is needed on new assets. Thus, condition based maintenance does need to increase with a larger network.	Allow condition based maintenance escalation in line with network growth. Reinstate $11 million opex in Final Decision.	To manage assets in accordance with best practice asset management, and avoid the false premise upon which the reduction was based.	Section 3.1.1and independent consultant's report Appendix E.
Substantial reduction of labour escalation rates.	Wage growth rates lower than average will not be sufficient to attract & retain labour resources. Independent consultant has identified modelling and methodological shortcomings in data relied upon by AER.	Adopt Powerlink's proposal for labour rate escalations. Reinstate $11 million opex in the Final Decision.	To ensure the allowance reflects Powerlink's specific circumstances, and to enable Powerlink to meet the Queensland market for labour.	Section 3.1.2 and independent consultant's report Appendix C.
Reduction of maintenance materials escalation.	Material costs are linked to high input costs which are clearly exceeding CPI.	Adopt Powerlink's proposal for labour rate escalations. Reinstate $3 million opex in the Final Decision.	CPI escalation will not be sufficient to cover the full cost of maintenance material in the future.	Section 3.1.3.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Adjustment of opex allowance for asset growth.	No problem.	Reinstate opex associated with reinstated asset growth	Consistency between capex and opex forecasts.	Section 3.1.5.
Self insurance allowance too low.	Proposed allowance does not reflect pass through arrangements.	Additional allowance included to reflect items that used to be available as pass through. Increase self insurance allowance by $2.9 million.	To provide Powerlink with an appropriate self insurance allowance.	Section 3.3.
No allowance for capex efficiency on Gold Coast reinforcement.	Not recognising management induced efficiencies.	Recognise efficiencies, as a minimum, those associated with maintaining the ability to construct overhead transmission on an existing easement. Provide $8 million efficiency allowance.	Consistent application of the DRP regime for capex efficiency.	Section 3.4.
RAB Roll Forward				
Change to “as incurred” capex for coming regulatory period.	Imposes additional cost impact on consumers with no benefit.	Drop or defer the proposed capex accounting change. Maintain “as commissioned” recognition of capex.	To deliver a lower cost of transmission to customers.	Section 5.1.
Inclusion of WIP projects.	Projects approved up to the end of June 07 will incur expenditure under an “as incurred” capex model.	Use a forecast for the end of the final year of the current regulatory period.	Projects are approved every month in the real world.	Section 4.2.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Service Standards				
Inconsistent application of historical data.	The measures are not based on the same historical period.	Use the same historical period for all measures within the scheme.	Selecting different historic periods across the measures is inappropriate and arbitrary.	Section 6.1.
"Availability of critical elements" has a non-neutral target.	The opportunity to get a penalty is greater than the opportunity to earn a bonus.	Adjust the target to ensure the probability of a penalty is the same as that of a bonus.	Targets should result in a revenue neutral outcome.	Section 6.2.1 and independent consultants report Appendix F.
Proposed "loss of supply" targets are non-whole numbers.	LOS events can only be integers.	Round targets to the nearest whole number.	Targets reflect results that are credible.	Section 6.2.2.
Two LOS events >0.2 system minutes excluded incorrectly from the historical data set used to calculate the targets.	Excluding these two events inappropriately skews the historical data.	These two events should be included in the performance history.	Targets should be set based on actual history.	Section 6.3.
Collars & caps set at various ranges.	Lacks consistency across all measures when setting the range.	Basis of determining collars and caps applied consistently.	Creates a consistent and fair scheme.	Section 6.4.1.
Cost of Capital				
Debt raising cost allowance set at 8.1 bp.	Debt raising allowance is below regulatory benchmark.	Set debt raising allowance to 12.5 bp.	To align with regulatory benchmark.	Section 7.1 and independent consultant report Appendix G.
No allowance for debt refinancing costs.	Does not recognise response to the regulated environment.	Include an allowance of 7.5 bp.	To recognise real world circumstances.	Section 7.2.
No allowance for interest rate risk management costs.	Does not recognise response to the regulated environment.	Compensate for hedging against interest rate changes.	To recognise real world circumstances.	Section 7.3.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
No allowance for equity raising costs in 2001 opening asset base.	Inconsistent regulatory practice in recognising these costs.	Allow equity raising costs.	To compensate for non-inclusion in the 2001 RAB.	Section 7.4.
No allowance for equity raising costs – current regulatory period capex.	No problem.	ACG consider no allowance should be provided.	Consistent application of ACG advice.	Section 7.5.
No allowance for equity raising costs – coming regulatory period.	Equity raising requirement for benchmark company exists with large capex program.	Assess requirement on its merits in accordance with ACG advice.	To recognise benchmark company requirements.	Section 7.5 and independent consultant report at Appendix H.
Supplementary Revenue Proposal				
Additional capex for assets under construction.	Real world construction costs have increased.	AER to consider in Final Decision and include additional $156 million.	Increased costs on active projects.	Section 8.1.
Additional capex for future capital projects.	Real world construction costs have increased BPOs for future projects.	AER to consider in Final Decision and include additional $126 million.	Increased costs on future projects.	Section 8.2.
Zero probability of generation from PNG Gas Project.	Change in probabilities of scenarios used for capex forecast.	AER to consider in Final Decision and include additional $57 million.	To recognise shelving of PNG Gas Project.	Section 8.3.
Higher demand forecast since Revenue Proposal submitted.	Higher demand forecast requires earlier network augmentation to satisfy mandated reliability obligations.	AER to consider in Final Decision and include additional $129 million.	Higher 2006 demand forecast in Powerlink APR.	Section 8.4.

Decision Element / What the AER Did	The Problem	What Should Happen	Why	Reference for More Details
Other matters in Supplementary Revenue Proposal.	Additional requirements from NEMMCO. Commitment of Tugun desalination plant. Additional trigger possible for contingent project.	Adjustments to Final Decision required for NEMMCO high speed monitors, Tugun desalination plant and contingent project associated with supply to South East Queensland.	To recognise issues which have emerged since Revenue Proposal submitted.	Section 8.5.

1. Introduction

Powerlink has prepared this response to the AER's Draft Decision "Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12" dated 8 December 2006. Powerlink has also provided in this response comments on the merits of the PB Associates (PB) "Review of Capital Expenditure, Operating and Maintenance Expenditure and Service Standards" which was undertaken for the AER.

Under the arrangements implemented by the AER for Powerlink's revenue cap determination, this is the first opportunity for Powerlink and other interested parties to provide comment on the merits of the recommendations made in the PB Associates review. This is a change from previous revenue cap determination processes for electricity transmission businesses. Detailed comments on the PB Associates Review are included in the Appendix.

2. Forecast Capital Expenditure

Powerlink believes that the forecast capital expenditure allowed in the draft decision is very inadequate, and will not allow Powerlink to meet its obligations or to deliver the service standards set by the AER.

This section addresses specific shortcomings in relation to replacements, load-driven capex and non-network capex.

2.1 Replacement Capital Expenditure

In its Revenue Proposal Powerlink presented a comprehensive bottom up forecast of its replacement capex requirements over the coming regulatory period, using robust engineering principles and condition-based analysis to identify optimal replacement timing and scope. The AER engaged PB Associates to review the replacement program as part of the overall review of capital expenditure.

Without identifying any material flaws in Powerlink's approach, PB substituted a rough "rule of thumb" approach which applies arbitrary "fudge factors" to the total dollars, without consideration of different asset types or actual condition of the asset.

Powerlink strongly believes that the PB approach is unscientific and arbitrary, and a very poor substitute for the robust, detailed, engineering-based program submitted by Powerlink.

This view is supported by independent engineering consultants engaged by Powerlink to review this section of the PB report. In its overall conclusions, Evans & Peck found *"it is difficult (if not impossible) to support PB's conclusion that a generic rule of thumb methodology should displace the rigorous bottom up forecasting process adopted by Powerlink"*[6].

2.1.1 Powerlink approach

Powerlink's approach to developing its replacement program is a thorough, bottom-up approach whereby the drivers for asset replacement evolve from a large number of exogenous factors, which can be broadly summarised as Powerlink's statutory and code obligations, Australian standards and industry standards. Powerlink's objective of asset replacement planning is to identify when assets will reach the end of their technical life. At the end of their technical life, assets may be unreliable, obsolete, unsupported by their manufacturer, or may no longer be compliant with relevant legislation and standards.

Powerlink's replacement planning approach is to:

- Identify assets which are reaching the end of their technical and economic life or that are unreliable, obsolete or unsupported by manufacturer or vendor.
- Trigger consideration of the replacement, decommissioning or life extension of assets at the end of life.
- Identify options for replacement of assets as necessary, including available time windows if assets are to be out of service for a considerable time during replacement.

2.1.2 PB report

Following its review, PB reached a number of conclusions regarding the replacement program, some of which are perplexing and essentially contradict one another.

[6] Evans & Peck Report, Review of Replacement Network Capex, p19, (Appendix A).

PB's Report states:

> *"We assessed in some detail a range of asset replacement projects for this review… A discussion on each of the projects reviewed is included in Appendix I. …..*
>
> *In general, we found that there is a need for replacement work during the next regulatory period on all the projects reviewed. However, in many cases the project scope in which the forecast cost was based was greater than the level of replacement likely to be required."* [7]

Powerlink believes that PB's conclusion in relation to the scope of these projects is incorrect, and does not recognise the integrated nature of high voltage substations or the operational circumstances and consequences in relation to each project. More detail is provided in Section 2.1.4 below and in the Evans & Peck report.

PB's Report also states:

> *"While our detailed project reviews indicate that Powerlink's proposed capex on asset replacement is high, from the information available we were not able to form a view on the amount by which the replacement forecast should be reduced. We therefore believe that a top-down analysis is a better approach to addressing this issue…."*[8]

Powerlink refutes the suggestion of insufficient information. Powerlink uses a comprehensive and robust process for managing the replacement of its assets, which PB considered was in accordance with good electricity industry practice[9].

Powerlink's replacement forecast was entirely based on a bottom up approach whereby the condition of the asset is the primary driver for considering the need for replacement.

PB acknowledged that the notional asset lives assigned to Powerlink's assets does not impact the level of asset replacement required because age is only *"a trigger for a more in-depth condition assessment"*[10]. It is therefore surprising that PB concluded Powerlink's replacement forecast is "*at best, an upper bound to the range of possible replacement cost"*[11]. Hypothetically, an upper bound would be a replacement program based purely on asset age, by its economic life. Powerlink has not and would not adopt this approach, as a program based on age represents poor asset management practice.

Despite this, PB abandoned its detailed review in favour of an arbitrary top down assessment to determine its recommended level of replacement capex. Powerlink provided detailed information on a variety of subjects requested by PB and responded to all questions asked by PB in regard to replacement projects. In contrast, in its review, Evans & Peck was able to identify sufficient information. Further, the rough "rule of thumb" approach adopted by PB is a de-facto age-based approach, rather than a scientific condition-based methodology.

Powerlink categorically rejects a top down analysis forming the basis of setting revenue allowances.

[7] PB Report, p109.
[8] PB Report, p110.
[9] PB Report, p111.
[10] PB Report, p111.
[11] PB Report, p109.

2.1.3 Evans & Peck review

Due to the serious shortcomings evident in PB's review and recommendations, and in order to inform the AER, Powerlink engaged an independent consultant to undertake a review of Powerlink's bottom up replacement forecast and PB's findings. The review was conducted by Evans & Peck, whose report is attached as Appendix A.

Evans & Peck state that its review focused on *"forming a judgement on the quality of Powerlink's process, and whether it is appropriate to abandon this process in favour of the rule of thumb method"*[12]. Furthermore Evans & Peck state that:

> *"Our review of Powerlink's detailed forecast results in a conclusion that is in line with that of PB – it is difficult to find justification for a reduction. However, we do not jump to the next step of discarding the bottom up forecast completely and substituting what can best be described as a rough rule of thumb"*[13].

In conducting its review of Powerlink's replacement program, Evans & Peck considered that three questions need to be asked:

- *"Is the project warranted at the time proposed, and do reasonable processes exist for the prioritisation of work?*
- *Is the scope of work proposed the optimal solution when all issues, including costs, are considered?*
- *Is the budget forecast a reasonable estimate of the cost of completing the work?"*[14]

In summary this review concluded that:

- In all categories the primary driver of the identified need for replacement is condition;
- There were no significant line or substations projects that should be excluded;
- There were no obvious justifiable over-scoping or over costing of substation or lines projects;
- For secondary systems, that no significant whole of life cost reductions can be made by adopting a piecemeal approach within individual substations.

Evans & Peck finally conclude:

> *"We are therefore of the view that the Powerlink forecast for replacement capital, as submitted, should be used for the AER's decision"*[15].

The review undertaken by Evans & Peck is at the level of detail Powerlink expects the AER should be relying upon to make proper decisions, based on sound engineering information and judgements.

2.1.4 Detailed project assessment

PB states that it reviewed 45% of the forecast replacement capex. Based on three particular projects, PB concludes that *'in many cases the project scope on which the forecast cost was based was greater than the level of replacement likely to be required'*[16]. Powerlink considers PB has missed some critical information for each of

[12] Evans & Peck Report, Review of Replacement Network Capex, p4, (Appendix A).
[13] Evans & Peck Report, Review of Replacement Network Capex, p2, (Appendix A).
[14] Evans & Peck Report, Review of Replacement Network Capex, p6, (Appendix A).
[15] Evans & Peck Report, Review of Replacement Network Capex, p3, (Appendix A).
[16] PB Report, p109.

these three projects in reaching its erroneous conclusion. Powerlink has provided detailed reasons for the scope of these three projects in Appendix I.

- Powerlink proposed replacement of a double circuit line between Yabulu and Edmonton with another double circuit line. PB believed the alternative of initially only stringing one side of the replacement line should have been more seriously considered. Powerlink concluded that, based on reliability considerations and the specific circumstances, it was prudent to string both sides initially. The new line must be constructed on predominantly the same alignment as the existing line. This means that the existing circuit must be removed first. If one adopted an approach with only one circuit strung, the towns and communities serviced by this line would be supplied radially (on one circuit) for lengthy periods during construction. With the short dry (construction possible) season, and the series of lines to be constructed, these towns would be exposed to frequent blackouts extending over several years. In addition, a sustained outage of one of these radial lines could lead to long outages of these communities. It is not consistent with Powerlink's reliability obligations to plan network development in this manner.
- Powerlink proposed a "like for like" replacement of the Swanbank B switchyard. PB considered that adjustment to the scope was required as the Swanbank B power station was likely to be decommissioned. However, the Swanbank B switchyard is a critical switching and transformation node in the Brisbane area, and is not solely associated with the power station. The switchyard is still required whether or not the power station continues to operate. Therefore the asset replacements are still required.
- Powerlink proposed replacement of all Tarong secondary systems. PB identified that the condition of all of the equipment does not warrant a full replacement. Powerlink agrees with this. In fact, based on condition alone, replacement of 13% of the equipment could be deferred for a short time. However, by not replacing all the equipment up front, and in order to ensure Rules-compliant integrated protection systems, Powerlink would need to develop and maintain interfaces between the differing technologies for 87% of the assets which would be replaced, and the remaining 13% of assets. This clearly entails additional costs – both upfront and ongoing. Therefore, Powerlink undertook an economic comparison of two options – replacement of all equipment at the same time or replacement in two stages. This evaluation showed that, due to the high cost of interfacing secondary systems with different technologies, it is economic to replace all equipment at the same time, including the 13% which technically could be deferred.

Evans & Peck also reviewed these three projects and PB's conclusions in relation to them, and concluded that the scope of these projects was appropriate.

2.1.5 Integration with load growth capex

Powerlink's replacement planning also ensures the integration of the asset replacement requirements into the broader capital works program that is primarily driven by load growth. This ensures that the portfolio of projects delivered to Powerlink's network is both efficient and effective. In this way, Powerlink capitalises on opportunities to coordinate a range of similar projects (through work type, geographical location or timing) to achieve economies of scale and optimised delivery.

It appears that PB did not examine these vital steps in the process for delivering an effective and efficient outcome in sufficient detail and therefore reached incorrect conclusions. Detailed comments on other aspects of PB's conclusions are included in Appendix I.

2.1.6 Final decision

The AER should not substitute Powerlink's comprehensive, engineering-based replacement plan with a rough "rule-of thumb plus fudge factors" estimation. The AER should reject PB's recommendation and, informed by the independent review provided by Evans & Peck, should adopt Powerlink's detailed, bottom up forecast for its Final Decision in relation to replacement capex.

2.2 Reliability of Supply

Powerlink is the sole holder of an electricity Transmission Authority in Queensland which, among other things, imposes mandated reliability obligations that drive non-discretionary investments in grid augmentations as demand for electricity grows. The Queensland Electricity Act 1994, S34 includes a responsibility to:

> *"ensure, as far as technically and economically practicable, that the transmission grid is operated with enough capacity (and, if necessary, augmented or extended to provide enough capacity) to provide network services to persons authorised to connect to the grid or take electricity from the grid..."*

In addition, Clause 6.2 of Powerlink's Transmission Authority (No. T01/98) requires that:

> *"The transmission entity must plan and develop its transmission grid in accordance with good electricity industry practice such that power quality and reliability standards in the NER are met for intact and outage conditions, and the power transfer available through the power system will be adequate to supply the forecast peak demand during the most critical single network element outage, unless otherwise varied by agreement."*

Any suggestion that Powerlink should plan the development of its transmission network on the basis of it being acceptable to knowingly exceed a transmission limitation, following any credible contingency, is a clear violation of Powerlink's mandated reliability obligations, unless:

- A lesser standard is allowed for under a Connection Agreement with the directly affected customer; and/or
- Demand Side Management (DSM) is agreed with appropriately connected customers.

Powerlink has connection agreements with each of the parties connected to its transmission network. The connection agreements generally require that capacity be provided to a supply point or area such that forecast peak demand can be supplied with the most critical element out of service, without the necessity to interrupt customer load i.e. an N-1 requirement. The connection agreements therefore require Powerlink to plan and develop almost all of its network to the N-1 standard required in its Transmission Authority.

Due to the high demand growth in Queensland driving substantial investment in the network, Powerlink regularly undertakes consultation under the National Electricity Rules (NER) for augmentation of the network. Powerlink is therefore regularly seeking non-network solutions to meet forecast demand requirements, including seeking DSM. Powerlink is (by far) the largest user of non-network solutions in the National Electricity Market and has been since 2002. These non-network solutions have been used to defer network augmentation where they are available in the required timeframe, and it is economic to do so. Powerlink has considered the use of non-network solutions in its development plans and has already included their use where experience and local knowledge suggests they are likely to be available, and analysis indicates they would be economic. In this way, the use of non-network solutions including DSM has already been taken into account in Powerlink's network development plans and the resultant capex forecasts.

It should also be noted that the demand forecasts on which Powerlink has based its Revenue Proposal (including the update for the 2006 demand forecast included in its Supplementary Revenue Proposal) includes only those large industrial and mining developments which are committed at the time of the forecast. Any loads associated with large uncommitted industrial and mining developments are not included in the load forecasts, and any resultant grid development requirements have not been included in the ex-ante capex forecasts. This is particularly relevant in the current environment of the Queensland resources boom. Substantial projects are still underway and being committed despite the increases in capital costs which many projects are experiencing. The Rio Tinto coal mine at Clermont was recently given the go ahead despite the capital cost increasing from $440 million to $900 million since 2004. General demand growth is also continuing unabated. For instance, the monthly average number of new connections to Energex's network in 2006/07 is 3300, up from 2900 in 2005/06 (an increase of 14%).

PB reviewed 18 load driven projects totalling $449 million in value. Where PB identified a requirement to vary the timing of augmentation (compared to Powerlink's forecast) the AER sought further advice from CHC Associates (CHC). In general, the AER accepted PB's adjustments where CHC agreed with PB or where there existed uncertainty as to whether PB's recommended timing was more efficient.

Based on this information, the AER accepted Powerlink's forecast need and timing for network augmentation for all but 2 projects:

(a) 275kV Double Circuit Transmission Line into Larapinta - CP.01771/A. The AER adopted PB's recommendation to defer the timing by one year in the medium economic load growth scenarios; and

(b) Strathmore to Ross 275kV Double Circuit Transmission Line - CP.01512/A[17]. The AER adopted PB's recommendation that this was not required in the next regulatory period in 4 of the high economic load growth scenarios.

PB recommended changes to the timing of these projects on the (speculative) assumption that Powerlink could negotiate with one of its customers for a temporary lesser supply standard or find and apply a DSM solution. The merits of these recommendations as they apply to the two projects are discussed separately below.

2.2.1 Line into Larapinta

Appendix C4 of the AER's Draft Decision and Appendix H (page 74) of PB's Report provide a brief summary of the identified network limitation, and the timing and scope of works (that is CP.01771/A) that most efficiently overcomes the network limitation.

In general, the AER concluded that PB:

> *"considered that the scope of works and the costs associated with this project represented an effective and efficient approach to the forthcoming reliability constraints[18]".*

However, PB:

> *"considered that there may be an opportunity to defer the project by a further year by negotiating with one of its connected parties for a temporary lesser supply standard or through small scale demand side responses"[19].*

PB justified this on the basis that:

> *"the risk to Powerlink of deferring the project by one year would not be significant[20]".*

[17] This project is incorrectly listed as CP.01101 on p69 of the Appendices to PB's Report.
[18] AER Draft Decision, p187.
[19] AER Draft Decision, p187.
[20] AER Draft Decision, p187.

Powerlink considers PB's basis for the deferment of this project to be speculative and its assessment of the resultant risk to be incorrect. It demonstrates a lack of understanding of Powerlink's mandated reliability of supply obligations. PB's statement suggests that Powerlink is able to unilaterally decide to take some "risk" and not plan the development of its network to meet the forecast peak demand.

Simply taking that risk is clearly a violation of Powerlink's mandated reliability obligations.

In determining the timing of this project in the forecast plans, Powerlink had already considered demand reduction opportunities which would defer the need. In its Draft Decision, the AER acknowledged that the project had already been deferred one year through an assumed transfer of load on the distribution network in the event of a contingency. It also acknowledged that this may have:

> *"exhausted the negotiation option, as Energex also has an obligation to plan for full supply. CHC also considered that the other proposed demand side management option could be particularly difficult and expensive to acquire for just one year due to establishment costs"*[21].

Even with this information, the AER still recommended a further one year deferment unless Powerlink can provide evidence as to why further deferment is not possible by negotiating a temporary lesser standard with one of its customers through DSM.

Contrary to PB's suggestion, the risk of non-compliance with a mandated licence requirement is not insignificant. Such a non-compliance could lead to insurance cover being voided, and leave directors and officers liable to negligence claims.

Powerlink also does not consider it appropriate that the AER rely on the speculative assumption of a temporary lesser standard of supply being able to be negotiated through DSM to defer this project. Under the medium economic growth scenarios, Powerlink has forecast this project to be commissioned by September 2012. Given this timeframe the project has not undergone a regulatory test or any public consultation. However the project has been the subject of joint planning with Energex, and through that process Energex (the connecting customer) has confirmed that it expects Powerlink to meet the N-1 standard for the forecast peak demand. Based on Powerlink and Energex's experience to date, it is also considered highly unlikely that additional DSM (over and above that already included in the forecasts) will materialise at an economic cost to defer this project.

There is already a high level of DSM implemented within the Queensland load. This DSM includes ripple or time clock control of a range of loads such as hot water, pool filters, dryers and even some air conditioning. These initiatives have been in place for many years. Such load control significantly contributes to Queensland having the highest annual load factor in the NEM, and one of the highest in the world. Additionally, It is assumed that this practice will continue to grow into the future as load forecasts assume that the whole load curve increases. As a result, a high level of DSM is already being used to defer network augmentation for as long as practical.

In addition to the existing (and forecast to grow) DSM, Powerlink also publicly requests information on new DSM (along with other forms of grid support or non-network solutions) in the Requests for Information (RFI) document issued as part of the Powerlink regulatory test consultation process. This RFI is an added step that Powerlink voluntarily undertakes prior to preparing the Application Notice required by clause 5.6.6(b) of the NER. The RFI describes the network limitation in some detail and outlines the required characteristics for non-network solutions – e.g. size, location, operating characteristics, extent of commitment and other key contractual requirements. The RFI is specifically aimed at seeking submissions from potential non-network solution providers. Powerlink also approaches the Queensland retailers, acting as aggregators

[21] AER Draft Decision, p 187.

of DSM solutions and meets with customer groups to discuss whether they would be interested in offering new and additional DSM solutions.

This approach has been very successful in identifying potential non-network solutions where they genuinely exist. For example, in the consultation associated with reinforcement of supply to North and Far North Queensland, Powerlink received 15 submissions of which 9 contained potential non-network solutions. As part of its evaluation and assessment process, Powerlink issued all potential non-network solution providers with an information paper outlining the timeframe and criteria for assessment of their solutions. The evaluation of options resulted in contracts for provision of grid support from two non-network solution providers (both generators).

Despite these many consultations and meetings, limited customer demand reduction arrangements have been available. Most of these have only been suitable for very onerous situations to avoid severe restrictions or prevent cascading failures. Queensland retailers have not offered any interruption rights they have negotiated with customers for deferring network investment, rather such reductions are used to reduce demand during high price periods in the spot market as part of their hedging arrangements.

As part of its review, PB assessed Powerlink's approach and procedures to the identification, evaluation and procurement of non-network solutions and found them to be appropriate.

> *"In reviewing Powerlink's planning, project approval and regulatory test applications, we are generally satisfied that the identification, consideration and treatment of non-network options is appropriate. While the high growth characteristics of the Queensland power system and its demand profiles do not strongly favour such options, we consider Powerlink has endeavoured to overcome the technical and commercial complexities with the intent of deferring network augmentation."*[22]

The AER also noted that Powerlink is one of the largest purchasers of network support in the NEM and that Powerlink's existing planning, project approval and regulatory test applications ensure that non-network options are identified and considered appropriately. The AER also noted that the high growth characteristics of the Queensland power system and its demand profiles do not strongly favour such options, but still considered Powerlink had endeavoured to overcome the technical and commercial complexities with the intent of deferring network augmentation.

Notwithstanding the fact that Powerlink's procedures are "robust" and "prudent" (by the AER's and PB's own volition) and that Powerlink is the largest user of non-network solutions in the NEM, Powerlink has not been able to obtain new DSM solutions to defer network investment, particularly in the high growth south east Queensland area where the Larapinta project is located. Notably, the Larapinta project is in the high growth area of south west Brisbane supplying the planned "western corridor" of the South East Queensland Infrastructure Plan.[23]

Powerlink does not expect that the availability of DSM will change in the foreseeable future for the following reasons:

- Residential DSM is already widely used resulting in Queensland having the highest annual load factor in the NEM, and one of the highest in the world. The load forecast already assumes that this DSM grows as the load grows.
- The relatively flat daily demand profile means that any new DSM would need to be available for extended periods over the summer months.
- High load growth in SEQ means that the amount of DSM required must increase significantly each year. With the relatively flat daily load profile the hours of

[22] PB Report, p30.
[23] www.oum.qld.gov.au

exposure grows very quickly as the DSM required bites deeper into the load duration curve.

- Unless the DSM response is available at the optimal network connection point, the amount required to relieve the limitation is even greater (again further increasing the time of exposure).
- The DSM response must be available at call at the time of actual peak demand (regardless of any lost opportunity costs by the customer).
- Retailers preference has been to keep such services for hedging against large pool prices.
- With little or no prospect of new generation down stream of the limitation the violation of the network limitation grows continuously. Therefore, DSM does not offer the opportunity to avoid a short term limitation and thus significantly defer the network augmentation. Given the overheads associated with negotiating and implementing suitable DSM arrangements a one year contract is likely to be difficult and expensive to obtain.

Powerlink therefore considers there is a substantial weight of evidence against a suitable and cost effective DSM solution being available to defer the Larapinta project by one year, and that the AER/PB position is both speculative and incorrect in its risk assessment. Given the significant consequences of non-compliance, Powerlink does not consider it appropriate for the AER to use a speculative assumption to reduce its capital expenditure allowance. In addition, Powerlink notes that the current regulatory framework with an ex-ante allowance for capital expenditure naturally incentivises Powerlink to seek non-network solutions if they can be implemented at lower cost than the revenue associated with the capital expenditure.

The AER should therefore reverse its decision in relation to the deferment of the Larapinta project in its Final Decision[24].

2.2.2 Strathmore to Ross

Appendix C1 of the AER Draft Decision and Appendix H (page 69) of PB's Report provide a brief summary of the identified network limitation, and the timing and scope of works proposed by Powerlink to overcome the network limitation into north Queensland[25]. This project is required to be commissioned by October 2010 in 4 medium economic growth scenarios with a combined probability of 21.8%, and by October 2009 in 4 high economic growth scenarios with a combined probability of 6.3%.

PB was satisfied with the need and timing of augmentation under the medium economic growth scenarios. However, PB was not convinced of its need in the 4 high economic growth scenarios. The AER agreed with PB's recommendation that the project was not required in the next regulatory period in the 4 high economic growth scenarios. This recommendation was made on the basis that:

> *"a generator would commence operating in this area in the following year, removing any further benefits of the line until the next regulatory period. It did not consider that it was prudent or efficient for such a large project to be constructed to avoid one year of potential and marginal (approximately 107 per cent) overloads. PB indicated that should the high growth scenario be realised Powerlink could negotiate with one of its connected parties for a temporary lesser supply standard, implement a control scheme or consider various small scale demand side responses"[26].*

[24] It should be noted that this project also involved some undergrounding; thus reversing this decision in relation to the deferment has an impact of only $5 million ($06/07) instead of the $32 million included in the AER's Draft Decision.
[25] The total reduction in capex for the Strathmore-Ross project is $14m. Due to a transcription error Powerlink incorrectly advised the AER the reduction was $18m.
[26] AER Draft Decision, p182.

The basis for this recommendation raises three issues which are discussed in turn:

- The potential network violation, which quantifies the required level of DSM;
- The negotiation of a lesser supply standard with a connected customer; and
- The timing of the new generator in north Queensland.

Potential Network Violation and required DSM

In the 4 high economic growth scenarios, the augmentation was proposed prior to the 2009/10 summer. Under these scenarios PB considered the augmentation was being commissioned to alleviate only a potential "marginal" 7% overload during the 2009/10 summer. However that 7% overload has been summarised from more detailed studies and does not accurately represent the potential risk to Powerlink's plant, or the amount of DSM that Powerlink would need to contract for over the 2009/10 summer period in order to achieve a deferral.

The generating plant in north Queensland is characterised by energy limitations, and thus, the range in potential operable capacity from the north Queensland generators over the summer months is large. As a result, it is not possible to assess the adequacy of the transmission system, to meet mandated reliability of supply obligations, against a single generation dispatch. Instead, to identify any emerging reliability limitations in north and far north Queensland, Powerlink assesses the combined transmission and generation capacity across a number of different dispatch patterns. The 7% overload referred to by the AER represents an average of the potential overload measured across 6 different generation and demand combinations.

The different generation and demand combinations were developed by an independent consultant (Energy Market Services Pty Ltd) prior to Powerlink undertaking a systematic review of the transmission capability into north and far north Queensland as discussed in Powerlink's *Final Recommendation to Address Supply Requirements in North and Far North Queensland in 2007-10*[27]. Energy Market Services considered this approach was necessary given the age, mix and type of generation plant in north Queensland. As a result of these characteristics, the amount of available generation capacity (and energy) in north Queensland is subject to considerable uncertainty. Energy Market Services recommended that the adequacy of the transmission system be assessed across 6 generation and demand combinations, and that weighting be given to the number of cases approaching or exceeding the limitation. That is, the cumulative risk across all 6 cases is important[28].

Under the 4 relevant high economic growth scenarios, the network limitation was forecast to be exceeded over the 2009/10 summer in <u>all</u> 6 generation and demand combinations. The <u>average</u> network violation was 7%. Based on 7% overload, approximately 40MW of demand response would need to be contracted ("firm") for Powerlink to meet its mandated reliability of supply obligations. However, the maximum forecast violation over the 2009/10 summer is 19%, requiring in excess of 110 MW of demand response which must be located in or north of Townsville[29]. This is larger than any single load in this area.

Given Powerlink's mandated reliability obligations and the significant risks which emanate from non-compliance, it is inappropriate to rely on the average overload. There is a credible, much larger overload.

[27] November 2005.

[28] Further information on these generation scenarios, and how they relate to Powerlink's Planning Criteria, and associated comments by PB and the AER, can be found in Appendix I, Section 2.2.

[29] Network capability is forecast to be exceeded for only one of the six generation and demand combinations for the preceding 2008-9 summer and therefore does not constitute a reliability trigger. The forecast network capability violation is 11% and approximately 65MW of demand response would be required and a non-firm demand mitigation arrangement is in place.

A lesser standard of supply to connected customers

In order to assess whether a lesser standard of supply to connected customers is likely to be acceptable in any given circumstance, the characteristics of that lesser standard must first be determined.

In addition to thermal limitations, the maximum secure power transfer into north Queensland is limited by transient and voltage instability. These limiting criteria arise due to the length of the transmission system. The interaction between these limitations is complex and depending on the generation dispatch any one of them may determine the limit. The occurrence of limitations from voltage and transient instability means that demand side response to alleviate forecast violations must occur pre-contingent, i.e. the demand reduction must occur prior to a violation actually occurring to be effective. This increases the incidence of the demand response because it must reduce demand in case a contingency occurs rather than only when a contingency actually occurs.

Powerlink's actions to source and secure demand side response have been discussed in detail in section 2.2.1 above. Those matters which provide a substantial weight of evidence against a suitable demand side response being available in south east Queensland are also applicable to supply into north and far north Queensland. In addition, the requirement for pre-contingent demand reductions which increase its use dramatically, and the large size of the reduction (112MW) make demand response in north and far north Queensland even less likely to be feasible.

Over and above that, Powerlink has conducted several regulatory tests and associated consultations in relation to supply into north and far north Queensland[30], including one as recently as 2006. In every case no new suitable demand response has been identified. For example, Powerlink approached the Cairns Chamber of Commerce when planning augmentations in the Cairns area. The feedback was that it would not be practical due to the already flat load curve, the need for pre-contingent DSM due to the predominantly stability based limits on transmission capability, and the high load growth.

Timing of the New Generator in North Queensland

A distinguishing characteristic of the 4 relevant high growth scenarios is that those scenarios assume a new generator is commissioned in north Queensland in 2010/11. As a result, the network violation does not continue to grow as operation of the generator removes the violation in 2010/11 and it does not reappear until beyond the next regulatory period. PB and the AER cited the planting of this generator as pivotal to the justification for recommending this reliability augmentation was not required in the coming regulatory period.

As noted in Powerlink's Supplementary Revenue Proposal (December 2006), there has been a material change in the outlook for new generation in North Queensland, with the probability of generation from the PNG pipeline in the required timeframe now being zero. Powerlink considers there is also no likelihood of a generator based on CSM gas emerging in the required timeframe. To meet the reliability obligation in 2009/10, Powerlink would need to commit to construct the network augmentation by October 2007. The capacity of the only developed CSM production (Moranbah) is almost all committed to the existing Townsville power station, and it is highly unlikely that additional CSM can be bought to "bankable" status before a firm decision on network augmentation must be made.

Under these circumstances, it is highly speculative to rely upon a generator appearing in the previously-mooted timeframe. Powerlink has no option (under its Transmission Authority) other than commit to the construction of the network augmentation so as to maintain reliability standards.

[30] Six separate consultations have been carried out in 2000, 2001, 2003, 2005(July), 2005(Nov) and 2006.

Overall

Powerlink considers that the evidence presented demonstrates that no new DSM could be cost effectively contracted to meet its mandated reliability of supply obligations in 2009/10. History and the sheer volume of pre-contingent demand response required, rule this out as a viable option under these scenarios. As a result, Powerlink does not consider it appropriate for the AER to reduce Powerlink's capital expenditure allowance to account for such a deferral in the high growth scenarios. In addition, Powerlink notes that the current regulatory framework with an ex-ante allowance for capital expenditure naturally incentivises Powerlink to seek non-network solutions if they can be implemented at lower cost than the revenue associated with the capital expenditure.

Further, the recent change in outlook for new generation in north Queensland makes it highly speculative to rely on. It should be noted that even with the Strathmore – Ross augmentation in these four high growth scenarios the cumulative probability of the augmentation is still less than 50%.

Therefore, in its Final Decision the AER should reverse its decision in relation to the deferment of the Strathmore – Ross project in the high growth scenarios.

2.3 Short Term/Long Term Economics

PB reviewed 18 load driven projects totalling $449 million in value. Where PB identified a requirement to vary the scope of augmentation (compared to Powerlink's forecast), the AER sought further advice from CHC. In general, the AER accepted PB's adjustments where CHC agreed with PB or where there existed uncertainty as to whether PB's recommended scope was more efficient.

Based on this information the AER accepted that Powerlink's proposed scopes were appropriate and efficient for all but 3 projects:

(1) Woolooga to North Coast 275 kV Double Circuit Transmission Line and 275/132 kV transformer - CP.01264/A;

(2) Strathmore to Ross 275kV Double Circuit Transmission Line - CP.01512/A[31]; and

(3) Larcom Creek 275/132 kV Substation Establishment – CP.01958.

PB recommended reductions to the scope for each of these three projects. In each case, PB has considered short term economics in reaching its recommendations rather than considering the lowest cost solution based on a whole of life assessment. In developing its forecast development plans, Powerlink considered longer term economics with a view to delivering the lowest cost to customers over the life of the assets, consistent with the NEM Objective. It is Powerlink's understanding, which has been confirmed by the AER, that whole of life assessments are appropriate for the regulatory framework which applies to Powerlink.

The merits of PB's recommendations and the AER's decisions as they apply to the three projects are discussed separately below.

2.3.1 Strathmore to Ross

Appendix C1 of the AER Draft Decision and Appendix H (page 69) of PB's Report provide a brief summary of the identified network limitation, and the timing and scope of works proposed by Powerlink to overcome the network limitation into north Queensland[32]. Powerlink proposed a double circuit 275 kV line and provided an economic comparison of a variety of options, including single circuit lines and lines comprising double circuit towers but strung with lower capacity conductors. These

[31] This project is incorrectly listed as CP.01101 on p69 of the Appendices to PB's Report.
[32] The total reduction in capex for the Strathmore-Ross project is $14m. Due to a transcription error Powerlink incorrectly advised the AER the reduction was $18m.

options and the interaction with other limitations and further network development were discussed with PB during its review. Despite NPV analysis demonstrating that the double circuit option proposed by Powerlink is the lowest cost to consumers over the long term, PB considered that *"such an approach is not justified in the short term"*[33].

PB's recommended scope involved a transmission line with double circuit towers initially strung on one side with twin phosphorous conductor, combined with some additional shunt capacitor compensation. The initial capital cost of PB's recommended scope is $100 million, compared with $125 million for Powerlink's double circuit proposal. This PB option was not discussed with Powerlink during PB's review, and economic comparison of this option had not been undertaken by Powerlink.

CHC also reviewed these alternative options. CHC considered that it was unclear whether the savings from using a smaller conductor and deferral of stringing the second circuit would be greater than the resultant increase in grid support costs. CHC also believed that the future cost of the second circuit would need to be considered in any comparison. As a result, CHC considered that the prudence of the PB proposal was unclear. The AER acknowledged CHC's views and is seeking further information from Powerlink that its recommended option is more efficient than that proposed by PB.

As a result of PB's recommendation and the AER's Draft Decision, Powerlink has carried out an economic comparison of PB's and Powerlink's options. The comparison has been done using NPV analysis consistent with the requirements of the regulatory test and the regulatory framework. This necessarily involves longer term considerations than the initial capital cost.

There are two main factors which impact on the economics of these options. Foremost is the required timing of the second circuit on this route between Strathmore and Ross. In addition, the lower network impedance from using larger conductor and double circuit strung results in lower transmission losses and in higher transfer capacity and therefore lower grid support costs.

Timing of the Second Circuit

There are a number of limits which impact on supply into north and far north Queensland – thermal, voltage stability and transient stability. The thermal limitation can be addressed for a considerable time by constructing a single 275 kV circuit between Strathmore and Ross substations. However, the maximum secure power transfer into north Queensland will then be determined by transient instability and voltage collapse. In scenarios with no new generation plant in north Queensland in the required timeframe, these voltage and transient stability limitations would necessitate a second new circuit being strung (or individually switched if a double circuit was constructed initially) between Strathmore and Ross prior to summer 2017/18. Based on PB's proposal of constructing a double circuit line with one circuit strung, stringing of the second circuit during low load periods would need to occur one year earlier in 2016/17.

Grid support costs

The costs of grid support for supply into north Queensland are dependent on the transfer capability which in turn is dependent on the strength of the transmission system between the generation centres of central and north Queensland. The transfer limit for PB's option will be lower than the limit for Powerlink's proposal. The lower the transfer capability, the higher the grid support costs will be to ensure that NEMMCO maintains the north Queensland power system in a secure state.

Powerlink had previously calculated the relative costs of grid support for options involving the use of single circuit and also a double circuit paralleled single paw paw

[33] PB Report Appendix I, p 70.

conductor transmission line[34]. The transfer capability reduction was assessed as 50 MW and 35 MW respectively.

The one circuit strung twin phosphorous option recommended by PB would have an impact somewhere between these two values[35]. Powerlink has therefore conservatively used the grid support difference costs previously calculated for the double circuit paralleled single paw paw transmission line (35 MW) in the economic comparison of options.

It should be noted that under PB's recommended option, the long term network configuration cannot be the same as Powerlink's proposal. The smaller conductor used in the PB option has an ongoing impact of lowering the transfer limit and hence increasing grid support costs. In addition, transmission losses will be higher with the smaller conductor into the future. These cost differences which occur beyond 2016/17 have not been captured by this economic analysis. This understates the long term cost of the PB option.

Economic analysis

NPV analysis for the period to 2016/17 for the Powerlink and PB options are shown. The relative increase in grid support costs and the cost of differential losses have been included with the PB option.

		NPV
Powerlink Option		**$128.1M**
2010		
DCST 275 kV Strathmore-Ross (twin sulphur – parallel operation)		$125.4M
2016		
Individually switch twin sulphur circuits	$4.0M	$2.7M
PB Option		**$132.6M**
2010		
DCST 275 kV Strathmore-Ross (twin phosphorous – 1 circuit strung)		$103.4M
2016		
String second twin phosphorous circuits	$30.3M	$20.2M
NPV of differential grid support costs to 2016/17		$5.4M
NPV of differential losses to 2016/17		$3.6M

It can clearly be seen that, even excluding the higher costs of the PB option beyond 2016, the Powerlink option provides a lower NPV cost, even though the initial capital cost is higher.

Powerlink has also considered the possible impact of a generator locating in NQ prior to 2016/17, the date by which further augmentation between Strathmore and Ross is required (i.e. string the second twin phosphorus circuit - PB's option or individually switch the twin sulphur circuits – Powerlink's option). Additional generation in NQ would defer the need for the second stage augmentation between Strathmore and Ross. Economic comparison of the options with additional generation in NQ also demonstrates that the Powerlink option provides a lower NPV cost, through lower losses and reduced grid support.

[34] The cost of grid support for these options was quantified using the same grid support simulation model used in regulatory test evaluations.
[35] Based on a comparison of electrical parameters.

To be consistent with the NEM Objective and the regulatory framework, the AER should therefore reject PB's recommendation and reinstate Powerlink's proposed project scope in the Final Decision.

2.3.2 Woolooga to North Coast

This project overcomes forecast thermal and voltage limitations on the Energex 132 kV network supplying loads at Cooroy, Sunrise Hill and Noosaville. The project was planned jointly with Energex and involves constructing approximately 70 km of double circuit 275 kV line (initial parallel operation) to the North Coast area.

PB agreed with the need for the project and the timing but suggested that development to Gympie (about 30 km) instead of the north coast (70 km) would resolve the forecast reliability constraints. PB commented as follows (emphasis added):

> *"While we appreciate that North Coast is a more central and strategic injection point to the region, the development at this location does not appear efficient in the short term and based on the particular constraint that triggers the project need."*[36]

Therefore, the AER summarised PB's recommendation as:

> *"Powerlink's proposed capex for this project be reduced by $18 million to provide for the development of a 275 kV double circuit line from Woolooga to Gympie rather than to the North Coast and the installation of the transformer at this location. PB considered that a staged approach to the development would allow the remaining section of the line between Gympie and North Coast to be developed later, as economically and technically required."*[37]

During PB's review PB did not mention to, nor request information from, Powerlink on its recommended option of injection at Gympie.

Powerlink provided a detailed comparison of 3 options to PB during its review. Establishment of a substation at Gympie was considered in early option analysis during joint planning with Energex, but was discarded as it was not the lowest cost overall (i.e. long term) than other options. In addition, development at Gympie was strategically inferior for the ongoing network development of both organisations. PB also acknowledged that the North Coast is a more central and strategic injection point to the region.

In reviewing PB's recommendation, CHC stated that the reduced scope would have implications for Energex and that additional costs may arise for electricity consumers. CHC also thought that there was insufficient information about the nature of the constraints in the northern Sunshine Coast area to make an assessment of PB's recommendation. Therefore, the AER seeks further information on the nature of the constraints in the northern Sunshine Coast area and the impact on customers resulting from PB's recommendation.

As a result of PBs recommendation and the AER's Draft Decision, Powerlink has carried out an economic comparison of PB's and Powerlink's options. The comparison has been done using NPV analysis consistent with the requirements of the regulatory test and the regulatory framework. This necessarily involves consideration of both the initial augmentation and other developments which are forecast to be required in the longer term.

PB's recommendation establishes a 275/132 kV substation at Gympie in 2011. Easement and site acquisition constraints will not allow a 275/132 kV injection to be established at the existing Energex substation. However, initial assessments indicate it may be possible to establish a new 275/132 kV substation to the south of the town

[36] PB Report, Appendix I, p82.
[37] AER Draft Decision, p198.

without the need to underground the transmission lines. This would address the initial thermal and voltage limitation between Woolooga and Gympie.

However, with this option, overloads are forecast to occur between Gympie and Cooroy in 2016 following an outage of the parallel circuit. Energex has already uprated these circuits to their maximum possible design temperature of 100°C thereby deferring augmentation. PB's option therefore requires further transmission augmentation between Gympie and the north Coast in 2016.

NPV analysis for the Powerlink and PB options are shown. Establishing the injection at the North Coast instead of Gympie also results in lower transmission losses. These loss savings have not been included into the economic analysis shown here.

			NPV
Powerlink Option			**$64.4M**
2011			
	Woolooga to North Coast 275 kV Transmission Line		$56.3M
	New 275 kV bay at Woolooga New 275/132 kV North Coast	$60.2M	
	132 kV feeder bay at Cooroy (Energex works)	$1.3M	$1.2M
2016			
	North Coast second 275/132 kV transformer	$10.4M	$6.9M
PB Option			**$66.9M**
2011			
	Woolooga to Gympie South 275 kV Transmission Line		$38.9M
	New 275 kV bay at Woolooga New 275/132 kV at Gympie South	$41.6M	
2016			
	Gympie to North Coast 275 kV	$42.1	$28.0M
	132 kV feeder bay at Cooroy (Energex works) New 275/132 kV North Coast		

Including the future impacts on Energex's network in both options, the PB option has a higher NPV than Powerlink's proposal. PB's option is also strategically inferior for the longer term development and operation of both Powerlink's and Energex's networks, and has higher transmission losses.

The AER should therefore reject PB's recommendation and reinstate Powerlink's proposed project scope in the Final Decision.

2.3.3 Larcom Creek substation

Appendix C4 of the AER's Draft Decision and Appendix H (page 71) of PB's Report provide a brief summary of the identified network limitation, and the timing and scope of works (that is CP.01958) that most efficiently overcomes the network limitation.

The project involves the construction of a new 275/132 kV substation with two 275/132 kV (375 MVA) transformers. It also includes the establishment of a 132 kV switchyard site connected via 7.7 km of double circuit transmission line.

Powerlink's design of the substation took account of the expected industrial developments in the Gladstone State Development Area (GSDA). Given the size of the GSDA industrial precinct, load in the Gladstone area could increase by as much as 2500 MW above the current forecast demand levels over the next 15 to 20 years. To accommodate this potential growth Powerlink provided for 3 key strategic aspects in the design of the substation:

- developing transmission to the remote 132 kV substation at 275 kV but operating initially at 132 kV (7.7 km);
- building Larcom Creek across eight switch bays to allow for ease of future augmentation; and
- installing high capacity 375 MVA transformers.

PB acknowledged that

> *"While each of these strategic decisions reflects good consideration of future requirements, we consider the likelihood of the other projects proceeding in the next regulatory period is low and that only some aspects of Powerlink's proposed scope are efficient at this point in time."*[38]

As a result, PB recommended a capex allowance based on:

- 132 kV transmission designed for 132 kV operation;
- the 275 kV switchyard developed with only 3 switchbays and 7 circuit breakers; and
- The transformer capacity reduced to 200 MVA rather than 375 MVA.

Powerlink had considered the option of developing Larcom Creek substation over 3 switchbays but this was not discussed in detail during PB's review. In determining the substation layout Powerlink considered the potential load growth in the GSDA and the impact this would have on the future development at Larcom Creek substation.

If a smaller initial substation development is implemented the cost of the required expansion is higher when it is required. The exact date at which expansion is required is uncertain. Some of these cost components include:

- Re-establishment of a civil earthworks contractor;
- Removal of the original line entry diversion (Bouldercombe – Larcom Creek 275 kV line); and
- Substation panel modifications for the original line bay adjusted to suit a new configuration.

When these additional costs of later expansion are taken into account the break even time between the Powerlink and PB options is approximately 5 years. Given the potential load developments anticipated in the GSDA Powerlink considers it is both prudent and efficient to construct the larger substation layout initially thereby also avoiding outages for further work.

With respect to the Larcom Creek transformers PB recommended that the transformer capacity be reduced to 200 MVA rather than 375 MVA. PB considered that this would be adequate for a radially supplied load that could range from 40 MW to 200 MW, and would:

> *"provide sufficient headroom for local load growth and the reasonable connection of some new customers to this new radial network."*[39]

Powerlink is in regular formal and informal discussions with proponents of large projects within the GSDA that could potentially become large future electricity users. No large projects have fully committed at this stage (in addition to Wiggins Island) and there is uncertainty regarding the location, size and timing of any additional load. However, the size of the GSDA area suggests enormous potential for load growth in the area.

With only 200 MVA transformers Larcom Creek would have a firm capability of approximately 250 MVA. Ignoring the cost of differential losses, approximately 12 years

[38] PB Report, Appendix H, p72.
[39] PB Report, Appendix H, p72.

is the breakpoint beyond which the smaller transformers are more economical. Given the focus on development in this specially designated area, exceeding 250MVA within the next 10 to 15 years would not seem unreasonable.

With respect to the transformer size CHC agreed with Powerlink and concluded that the choice of 375 MVA transformers appears prudent as follows:

> *"….changing transformers to a larger design is not a trivial exercise, as foundations are built specifically for each design and auxiliary plant and cabling would also need to be changed. Powerlink indicated that the larger size should be used if it will be needed in 12 years and this appears reasonable. The critical total demand to require this larger capacity would be only 200 MW and this seems very likely to be exceeded."*[40]

As a result, the AER rejected PB's recommendation for the smaller transformer and has adopted Powerlink's scope regarding transformer size in its Draft Decision. Powerlink agrees with and supports the AER's draft decision in this regard.

In addition, Powerlink considers the original scope should be retained for the substation layout as it is both prudent and efficient given the likely development in the GSDA area. The AER should reject PB's recommendation in its Final Decision.

2.4 Cost Estimation Risk Factor

In developing the capital expenditure forecasts for its Revenue Proposal, Powerlink recognised that, in the real world, cost outcomes for capital projects are higher than estimated costs more often than they are lower than estimated costs, i.e. the cost outcome versus estimated costs are asymmetrical. At the time of the Revenue Proposal, Powerlink had not collected sufficient historical data to allow statistical analysis of this to be undertaken and as a result requested Evans & Peck to develop typical distributions for projects and to calculate a factor to be applied based on Monte Carlo analysis applied to Powerlink's portfolio of projects.

PB reviewed the inclusion of this risk factor and concluded that there was insufficient evidence to establish that a material costing risk exists and therefore it would be inefficient to include the risk factor in Powerlink's capital expenditure allowance. The AER accepted this recommendation in its Draft Decision.

Since Powerlink submitted its Revenue Proposal, it has collected data on the majority of its projects completed over the current regulatory period. Powerlink re-engaged Evans & Peck to analyse this data on actual project costs against estimated project costs. The analysis involved categorising the actual projects into high, medium and low risk categories and identifying a best fit curve for the distribution of actual versus estimated costs for these project categories. Using these distributions based on actual data with Monte Carlo analysis Evans & Peck determined the most likely outcome for the portfolio of projects in Powerlink's future capex forecast. The analysis undertaken by Evans & Peck is included in Appendix B.

The AER identified a number of reasons for rejecting the cost estimation risk factor proposed by Powerlink. Each of these is discussed in turn.

No actual evidence that the risk is of the magnitude proposed

Analysis shows that Powerlink's actual project costs have been 9.4% higher than estimated costs over the current regulatory period. This is substantially higher than the 2.6% proposed by Powerlink in its Revenue Proposal. TransGrid identified a similar risk in its 2004 Revenue Cap Application. TransGrid referred to this as a scoping factor of 10% based on analysis of its historical tender and delivered costs. This is substantially

[40] AER Draft Decision, p185.

higher than Powerlink's proposed 2.6%. The ACCC allowed TransGrid this factor in its Final Decision[41].

Risk is already captured in Powerlink's BPOs

While it is true that Powerlink's BPO process utilises historical project information as well as first principle "bottom up" estimates to produce the BPOs, they are explicitly designed not to contain risks such as wet weather, latent soil conditions, access restrictions and other factors. Powerlink fits these risks to the BPO model afterwards, based on information about the project such as more refined route knowledge, preliminary geotechnical surveys, likely commissioning timing and coincidence with wet seasons etc. Given the timing of many of the projects in the Revenue Proposal capex forecast, many of the risks noted above were not known at the time of formulating the estimates.

In short, these risks are not included in the BPOs nor in the updating process of the BPOs. They therefore need to be explicitly modelled in the capex accumulation process.

Risks included in the escalation factors

The Pert distributions and the Monte Carlo method used to determine the risk factor recognise that the project outturn costs could be higher or lower than the estimated costs. Inherent in this approach is the fact that input costs will be different to those assumed. There is no assumption that the escalation parameters are systematically over or under estimated.

Cost estimation risk transfers the risk to customers

This comment from the AER appears to be based on a lack of recognition of the realities of constructing infrastructure projects. It is accepted throughout the construction industry that there is not an equal probability of a project coming in X % under its budget rather than X % over budget. This is the reason projects are approved with a contingency allowance. For the purposes of this exercise, Powerlink did not include a contingency allowance in its individual project estimates. Thus, there is a residual need for Powerlink to include a cost estimation risk allowance in its overall capex forecast. Based on historical data, the 2.6% proposed is extremely modest. Powerlink will rightly be managing risks of project overruns in excess of this modest allowance.

Not clear what cost estimates were used – mode or mean

The report prepared by Evans & Peck documented the basis of the analysis. The cost estimates used by Evans & Peck are the most likely cost outcome for each project, consistent with the intended use of the data.

Risks identified were minor cost elements

Evans & Peck's report identified some example risks that were intended to be captured by the risk factor applied to the projects. This is not, and was never intended to be, a definitive list of the uncosted risks associated with constructing electricity transmission infrastructure. In addition, the cost impact of the listed risks are unknown which is the reason for undertaking Monte Carlo analysis to ensure that cost overruns and cost under runs across the portfolio of projects are diversified, and the total risk adjustment identified is not systematically too high or too low.

Overall

Powerlink has provided historical information which clearly demonstrates the difference that Powerlink has been experiencing between estimated and actual costs. It is clear from this data that a risk adjustment factor is warranted and that Powerlink has been extremely conservative in its Revenue Proposal.

The AER should therefore reverse its decision in relation to the risk adjustment factor in its Final Decision.

[41] ACCC Final Decision NSW and ACT Transmission Network Revenue Cap TransGrid 2004-05 to 2008-09, 27 April 2005, p 110.

2.5 Current Economic Environment for Construction

2.5.1 Labour escalation factors

In its Revenue Proposal, Powerlink adopted a number of escalation factors for capex and opex forecasting. One of these escalators applied to labour costs. Powerlink considered the same escalation rates should apply to both the capex and opex forecasts because wage equity is required across employees who perform similar roles, irrespective of whether the roles are associated with opex or capex. In addition, it is critically important that Powerlink 'meet the market' so that employees can be attracted and retained by both Powerlink and its contractors. The escalation rates were reviewed by PB Associates as part of its review of the capex and opex forecasts.

The AER also engaged Access Economics to provide advice on wage growth forecasts for the utilities sector across all of the states and territories of Australia. The Access Economics report considered inflation, productivity and cyclical factors in reaching its forecast, but the details of how these matters were taken into account by Access Economics in making its forecast and why other matters were not taken into account was not provided in the report prepared for the AER.

The AER's Draft Decision regarding labour escalation factors adopts Powerlink's forecast for the first year of the coming regulatory period, which was also recommended by PB. The AER has adopted the Access Economics forecast[42] for the Queensland utilities sector for the other four years of the regulatory period.

Powerlink's experience (and those of its contractors) are materially different from the outlook portrayed by Access Economics. The economic outlook for Queensland is also stronger, and the State is presently experiencing its lowest unemployment rate in 30 years.

Indeed, Access Economics, in its latest Investment Monitor[43] points out:

> *"….the strength of demand for workers is spilling over beyond those unemployed or who could be readily drawn into the labour force, and the level of job vacancies is now growing. That is seeing wages in key occupations being pushed up."*

This backdrop creates significant concerns about the plausibility of the outcomes suggested by the Access Economic report prepared for the AER.

Powerlink engaged independent economic consultants, Synergies Economic Consulting, to review the Access Economics report and its application to Powerlink for the coming regulatory period[44].

Synergies identified a number of significant shortcomings in the Access Economics analysis, particularly in relation to its applicability to Powerlink.

Powerlink's competitors for labour

About 60% of Powerlink's maintenance work is undertaken by Ergon, which is located in regional Queensland, in a "footprint" which has significant overlap with the mining industry. It is mining, rather than other utilities such as water and gas, or other States, which represents the most significant competitor for this labour.

In addition, Powerlink is undertaking a major capital works program, which overlaps with both the mining and construction sectors in Queensland. This represents the main competitors for capital works labour (such as project managers, construction managers and riggers etc).

[42] Access Economics, Wage Growth Forecasts in the Utilities Sector, 17 November 2006.
[43] Access Economics Investment Monitor, September 2006, p6.
[44] The Synergies work was undertaken by labour market specialist Professor John Mangan and Euan Morton.

Thus, mining and construction in Queensland represents a much better fit for analysing Powerlink's labour cost trends than utilities such as water and gas elsewhere.

Synergies support this view that grouping all utilities together is not the best reference point for the labour cost challenges which face Powerlink in Queensland.

> *"…the Access Economic report fails to distinguish between electricity workers and other workers in the utilities which significantly limits the relevance of its findings in regard to the electricity supply industry in Queensland (a geographic region in which mining activity is concentrated)."*[45]

Future labour demand

Synergies strongly disagree with Access Economics regarding its forecast easing of the labour market post 2008/09 and provide evidence which refutes those findings. Synergies has used a range of external sources to reach its conclusions and provides references to those sources (in contrast to the Access Economics report).

Synergies cites the National Institute of Labour Studies Report into labour market conditions 2005 – 2015 which concludes that labour shortages, particularly in skilled and semi-skilled areas will continue, particularly in the mining areas in Western Australia and Queensland. Synergies also cites BIS Shrapnel who argue that mining companies in particular will be aggressive in their attempts to attract labour at least until 2015.

Powerlink is aware that coal mining expansions in Queensland are committed for well beyond 2008, and that other infrastructure providers such as rail and ports in Queensland are planning on further growth in export volumes over the next 5 to 8 years. There is little evidence to support a major slowdown in Queensland in the relevant timeframes.

According to coal industry experts, Barlow Jonker Pty Ltd, under a high growth scenario, Queensland saleable production is forecast to increase from 173.2 Mtpa in 2005 to 242 Mtpa in 2012. Under a low growth scenario, saleable production is still forecast to increase to a level of 205 Mtpa by that time.

Synergies states:

> *"…our fundamental disagreement is over (Access Economics) analysis of the likely state of the labour market acing the utilities and related industries post 2008/09, at least for that part of the sector that affects Powerlink* [emphasis added]*. We find no evidence to support their conclusions and strong evidence to refute them."*[46]

> *"…we strongly disagree with the Access Economics conclusion that the tight labour market currently facing the Utilities industry will ease to the point that real wages growth in this sector (at least for electrical trades and construction workers in Queensland) will be forced down to below the average rate of wages growth across the economy."*[47]

Indeed, Powerlink notes that Access Economics, in its latest Investment Monitor[48], states:

> *" And this translates into worrying news for those reliant on the construction sector. A lack of skilled tradespeople to fill the growing number of jobs on offer means wages pressures in those industries. Mining companies need to pay higher labour costs, thereby adding to the overall construction bill…….construction will continue to suffer the kind of cost blowouts and time delays that we have already begun to witness in many projects around Australia."*

[45] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p13, (Appendix C).
[46] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p35, (Appendix C).
[47] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p44, (Appendix C).
[48] Access Economics Investment Monitor, (September 2006), p6.

Further, the focus of labour escalation rates applicable to Powerlink should be those based on skilled workers. PB recognised Powerlink's employee profile of skilled workers and discussed development programs for such workers through apprenticeships etc. This was a valid concept, although PB's conclusions regarding the speed with which these programs will increase the labour supply levels are incorrect. Synergies considered the potential impact of increased apprenticeships.

> *"Recent research has confirmed the belief that apprentices are a long term investment. Their productivity levels are such that they are not a substitute for qualified tradespersons, and the very high attrition rates for apprentices in Queensland make them an unreliable supply source."*[49]

Like many electricity industry businesses Powerlink also has an ageing workforce. Managing the impact of this will necessary require wage growth levels that maintain the attractiveness of Powerlink as an employer. Powerlink does not consider this is achievable at the Access Economic wage forecast growth levels.

Methodological factors

Synergies has identified that the wages growth (contraction) model proposed by Access Economics has no apparent recognition for institutional factors:

> *"While we agree that former institutional buffers such as union power have reduced in significance, other institutional barriers such as enterprise agreements, historical wage differentials coupled with standard economic theory suggests that the Access Economic findings that wages growth will fall by 33% between 2008/09 and 2009/10 implausible…."* [50]

> *"This error in the conceptual aspects of their modelling leads them into making the unlikely claim that wages growth in the Utilities sector (with its high proportion of skilled and semi-skilled workers) will lag behind the All Industries rate of wages growth for a 4 years (at least) period. We can find no example where such behaviour has occurred in the Australian economy."*[51]

That said, Synergies also considered the Access Economics forecast to be something of a 'black box', without any discussion of the methodology applied or the basis of its applicability to Powerlink. In this sense Powerlink concurs that the AER's use of the Access Economics forecast lacks transparency.

Overall

Synergies has reviewed the plausibility of the Access Economics forecast of wage growth prepared for the AER and the validity of applying that forecast to Powerlink. Through an evidence based review, Synergies fundamentally disagrees with the findings of Access Economics in relation to forecast wages growth, particularly in the context of its application to Powerlink which operates in the mining-centric Queensland economy.

> *"In reviewing the Access Economics report we find strong disagreement with some key assumptions of the Access Economics analysis and as a result, with their conclusions on likely wages growth in the electricity supply industry."*[52]

As a result Synergies reject the AER's adoption of the Access Economics forecast over the last four years of the next regulatory period. Synergies consider the labour escalators used by Powerlink are appropriate or even too low for their evidence based outlook.

[49] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p36, (Appendix C).
[50] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p35, (Appendix C).
[51] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p35, (Appendix C).
[52] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p34, (Appendix C).

> *"Moreover if the National Institute and BIS Shrapnel are anywhere near to being proved correct and labour demand/skilled demand remain high until 2015, the wage adjustments recommended by the AER may well prove significantly inadequate and if implemented by Powerlink management would put the company at a serious recruitment disadvantage in relation to their likely competitors in mining and infrastructure companies…….we support the retention of a 5.6% wage adjustment factor over the period --- with the warning that this rate may prove to be too low."*[53] [emphasis added]

Mathematical error

Notwithstanding Powerlink's view that the Access Economics forecast should not be adopted by the AER in its Final Decision, there would appear to be an error in its application by the AER in the Draft Decision. The Access Economic report presents a nominal wage forecast, based on assumptions which include forecast CPI.

Real wage growth is the difference between nominal wage growth and inflation.

The regulatory framework for electricity transmission businesses includes a CPI forecast used in determining revenue allowances. The AER has made a forecast of CPI of 3.15%[54] for the purposes of its Draft Decision for Powerlink. This is different to the CPI used by Access Economics in its labour cost forecasts, thereby creating an internal inconsistency in the Draft Decision.

Final decision

The AER should not rely upon the Access Economics wage growth forecast for the last four years of Powerlink's next regulatory period. Synergies has reviewed the forecasts prepared by Access Economics and consider them to contain modelling and methodological shortcomings and to be a poorer match to Powerlink's specific circumstances than information pertaining to the mining and construction sectors in Queensland. The AER should therefore, in its Final Decision, use labour escalation factors which are not lower than those proposed by Powerlink.

2.5.2 S-Curve adjustments

In its Revenue Proposal, Powerlink used 's-curves' to forecast the incidence of expenditure on its capital projects over the next regulatory period. It should be noted that s-curves were not used for active projects (those already approved and under construction) as the incidence of expenditure on those projects was based on the implementation project plan. Powerlink used 10 different historic s-curves to forecast the incidence of expenditure. PB and the AER accepted the use of historic s-curves in forecasting capital expenditure.

Powerlink proposed adjustments to four of the s-curves in an effort to take account of the tightened supply conditions being experienced. PB reviewed the mechanism proposed by Powerlink to reflect the current conditions as part of its review of capital expenditure. Powerlink analysed two possible mechanisms for adjusting the s-curves – early ordering and a notional pre-payment. Powerlink's proposal was based on the adjustment through a notional pre-payment. In its review, PB does not appear to have recognised that the pre-payment was simply a notional adjustment intended to capture the range of outcomes caused by the tight supply conditions. At the time Powerlink was preparing its Revenue Proposal it was not apparent what would actually occur to the incidence of expenditure on projects that were being constructed under the tightened supply conditions.

PB recommended the removal of the pre-payment adjustment to the four s-curves calculated from notional pre-payments, stating a variety of reasons. The AER agreed with PB in its Draft Decision.

[53] Synergies Consulting, Review of Wage Growth Forecasts, February 2007, p36, (Appendix C).
[54] AER Draft Decision, p101.

Powerlink considers PB and the AER did not understand Powerlink's approach in adjusting the s-curves. Powerlink therefore engaged independent consultant Evans & Peck to provide greater detail in regard to this issue and to comment on the extent to which the current tight supply conditions need to be captured in adjustments to the s-curves used in the capex forecasting. Evans & Peck concluded that tight market conditions do indeed exist and that historic s-curves need to be adjusted to accurately model efficient project delivery in the current market. A report documenting the findings of Evans & Peck is attached to this response as Appendix D.

While Evans & Peck agreed that some adjustment was required, it did not concur with Powerlink's proposed modifications to all of the four s-curves. Evans & Peck has determined appropriate adjustments to lines (same as Powerlink) and substation (80% of Powerlink) projects, but has concluded that adjustments are required for transformer and capacitor bank projects.

Powerlink has examined Evans & Peck's findings and believes that the analysis and the principles used are sound and based on lead times not prepayments. Further, Evans & Peck confirmed that the generic s-curves could not capture the current market issues as they were produced from projects completed prior to the current volatile period. Evans & Peck also noted the assertion by PB that pre-payments may not be an efficient mechanism for delivery and stated that pre-payments are found in other areas of industry and are a common delivery mechanism. However, Evans & Peck has based its analysis on substantiated lead time increases rather than pre-payment mechanisms. In the analysis, Evans & Peck noted the particular issue of line insulator delivery. In order to ensure on time delivery of the extensive program of capital works, Powerlink has purchased insulators in bulk earlier in the project implementation timeline than reflected in the generic s-curves. This is a real example of expenditure occurring earlier on projects.

Powerlink used the s-curves determined by Evans & Peck in the capex accumulation process. These s-curves result in a higher capital expenditure in the coming regulatory period than the adjusted s-curves which Powerlink used in its Revenue Proposal. While this may seem counterintuitive, the profile of expenditure from the Evans & Peck analysis is lower at the start but substantially higher part way through[55] thereby bringing expenditure forward. Due to the mix of Powerlink's portfolio of projects adoption of the Evans & Peck s-curves would require the AER to allow higher capital expenditure than Powerlink originally requested.

In its Final Decision the AER should, as a minimum, use Powerlink's adjusted s-curves.

2.6 Other Adjustments

2.6.1 Business IT

Powerlink submitted a detailed business IT plan for 5 years. Forecasting IT expenditure beyond this time was not considered practical due to the rapid development of IT technology. PB recommended a 15% reduction in Powerlink's Business IT capex to reduce it to *"a level more commensurate with the long-run average"*. The AER has adopted this recommendation from PB.

PB's recommendation appears to be based on the (unsound) assumption that Business IT expenditure should be based on historical averages, over a selective period and the selective exclusion of so-called "one off" projects (such as re-cabling offices). PB has not provided any evidence in support of its conclusion that the average used by Powerlink is incorrect.

[55] Expenditure is higher in months 6 – 11 for transmission line projects and months 4 – 9 for substation projects.

In particular, PB's "long run average" ignores the comprehensive Business IT plan provided to PB covering 2005/06 to 2008/09 demonstrating the need for the projects listed in the plan. This is akin to setting future network capex by using a historical average and ignoring future network plans and underlying investment drivers.

Neither the AER nor PB would consider such an approach valid for assessing network capex. Why is it a valid approach for IT capex? Surely one must base the capex on a plan, which itself must be based on a series of drivers and desired outcomes. Powerlink has provided a comprehensive IT plan, soundly based on key drivers and on expectations on TNSPs in today's (and tomorrow's) NEM. For example, the oft-heard request for TNSP's to align their operational decisions more closely with the needs of market participants can only be addressed by having high quality, readily accessible information.

The projects in the plan enable Powerlink to manage the ever-increasing asset base and data requirements in operating the Queensland transmission system. Powerlink is continually seeking ways to improve its business operation which necessarily involves better analysis and decision-making from improved data-gathering and information systems. Combined with a significantly increasing asset base and greater demands for information from regulators and legislators, Powerlink's need for expenditure in IT is clearly growing significantly, which is reflected in the plan.

It is noted that PB has not identified any shortcomings in Powerlink's comprehensive plan, or its drivers or objectives.

Indeed, PB "*consider the range of projects to be comprehensive in nature and that a reasonable approach has been taken to establish the forecast*"[56]. While PB recognise *"the difficulty in forecasting IT projects due to the rapidly changing nature of information technology products and solutions"*[57], the suggestion that "one-off projects" in the IT plan should be discarded when projecting forward is basically unsound. "One off" projects are inevitably required when a business is undergoing change, and there are expected changes for the transmission sector in the coming regulatory period emanating from, inter alia, the AER's market-based performance measures, the AEMC's review of congestion management and the ERIG review. Given that the nature of these changes is as-yet undetermined, it is unsurprising that some IT project scopes are necessarily very general. What we do know is that changes will arise from these sources, responding to those changes will require improved information systems, and capex will have to be invested in IT. There will still be "one off" projects – different to those in the past.

Powerlink's forecast IT capex has been extensively investigated and rigorously prepared taking into account its growing business requirements, including the high likelihood of externally-imposed changes on information systems. Under the circumstances, the PB adjustment borders on being arbitrary. It is clearly unrealistic. PB did not mention any reduction in Business IT nor request information regarding its recommendation during its review. The capex reduction would leave Powerlink ill-equipped to successfully meet the changes which we are convinced are coming from the sources identified above.

The AER should therefore reverse its decision in relation to reducing the level of Business IT capex in its Final Decision.

2.6.2 Lines security upgrade

Powerlink included in the capex forecast in its Revenue Proposal a program of investment to satisfy the obligations of both the "National Guidelines for Protecting Critical Infrastructure from Terrorism" and the "ENA Guidelines for Prevention of Unauthorised Access to Electrical Infrastructure". Powerlink has a commitment to the safety of the public, Powerlink staff, protection of the Powerlink network and ensuring

[56] AER Draft Decision, p72.
[57] PB Report, p117.

business continuity. To manage Powerlink's National Critical Infrastructure obligations, Powerlink developed a policy to improve the security of transmission infrastructure to:

- Ensure the safety of the public and Powerlink employees;
- Protect Powerlink's business against acts of terrorism;
- Mitigate the potential for attacks on Powerlink's property & information technology facilities; and
- Protect confidential data within a secure framework.

Further, Powerlink's asset management strategy identifies that Powerlink is committed to the following objectives:

- Identification of vulnerabilities;
- Risk mitigation strategies;
- Deterrence arrangements;
- Detection;
- Response; and
- Corporate communications in the event of a security breach.

Powerlink considers that the investment included in its capex forecast to manage these security and compliance obligations is prudent, effective and efficient. The projects and scope of works are outcomes from diligent evaluation and scoping processes to ensure the above obligations were met.

In its review of security and compliance projects, PB concluded that the '*need for investment was genuine*' and that Powerlink had '*taken reasonable steps to identify a number of alternate developments and that its cost estimates appear reasonable and efficient*'[58]. However, PB also considered that '*the timing of some of the investment could be modified without increasing Powerlink's risk profile*'[59] (emphasis added). In doing so, PB proposed a redistributed expenditure profile for the Transmission Line Structure Security Upgrade project that defers approximately $13 million out of the 2007/12 regulatory period.

PB did not provide any analysis of its proposed changes and its impact on Powerlink's risk and did not discuss these suggested changes with Powerlink during its review. Powerlink is therefore unclear as to what changes PB is actually proposing, which PB believes will not increase risk. In the absence of identified shortcomings in the Powerlink plan, and the risk details of PB's alternative, the capex reduction has to be regarded as arbitrary.

Contrary to PB's assertion, there are considerable risks to Powerlink, its directors and officers, and its insurance program if arbitrary reductions are made to a plan based on the relevant standards and guidelines.

This recommendation from PB does not seem to take into account the careful process that Powerlink undertook to establish the scope of works required to address security concerns. As background to arriving at the proposed transmission line security upgrade project, Powerlink had already implemented a three tier corporate model for security that places focus on three primary security aspects:

- Physical – denoting the physical measures applied to buildings, control centres, communications facilities and transmission infrastructure (transmission lines and substations).
- Technology – applies to security implemented in digital technology areas to prevent unwarranted external or internal access (e.g. firewalls, intrusion detection, secure access gateways, etc) and the dissemination of viruses.

[58] PB Report p.116
[59] Ibid p.116

- Information – consideration must be given to the secure administration of data, with respect to access privileges, documentation classification frameworks, user profiles.

Powerlink therefore considers that it is not appropriate to arbitrarily cut funding for this project and strongly advocates that full funding for this project is required in order to mitigate the risks, in line with the plan based on relevant standards and guidelines.

The AER should therefore reverse its decision in relation to the line security project in its Final Decision.

2.6.3 South Coast easement

Appendix C10 of the AER Draft Decision and Appendix H (page 85) of PB's Report provide a brief summary of reasons for this project. This is a strategic easement acquisition to extend the width of an existing easement within the Moreton South zone to meet future load growth in the Gold Coast, Coomera and Beenleigh areas.

PB concluded that:

> *"given the strategic nature of this project, we consider it prudent to defer it by one year such that more accurate information can be used at the time of Powerlink's next revenue review. This will have the influence of deferring the most expensive easement project out of the last year of the review period and provide for a much more even easement expenditure profile over the entire review period[60]".*

CHC and the AER supported PB's recommendation on the basis of its strategic nature, its proximity to the end of the regulatory period and its relatively high cost. Deferral of this project reduces the forecast capex by $11 million.

Powerlink considers that the reasons given for this deferral are arbitrary and are contrary to the needs to secure long term reliability of supply to this rapidly growing area. PB's stated objective of smoothing the easement expenditure profile is totally irrelevant and devoid of merit. The fact that it is smooth does not make it right and has no relevance to what is needed.

Whilst embracing irrelevant matters, PB has not given due recognition to the relevant considerations, including:

- the areas high load growth (the Gold Coast is one of the fastest growing regions in Australia);
- rapidly changing land use patterns within a high growth environment (including urban spread);
- the need to give the community certainty with regard to future land use; and
- the South East Queensland Regional and Infrastructure Plans, which require the designation of future infrastructure requirements.

The South East Queensland Regional and Infrastructure Plans were released by the Queensland Government in July 2005 and identified the South Coast area as one of the highest growing areas in Australia with significant population and activity growth. The South Coast load is expected to continuously increase at an average annual growth above 3% over the next two decades. In order to meet reliability obligations, significant reinforcement of the transmission network will be necessary in the long-term.

PB's recommendation in relation to this project also appears to be in direct contradiction to its conclusions on Powerlink's capex efficiency claim for supply to the Gold Coast. In relation to that easement acquisition, PB commented:

[60] PB Report, Appendix H, p86.

> *"We therefore consider that the acquisition of the easements in the 1980s for augmentation of supply to an obvious growth area such as the Gold Coast, in an obvious growth corridor is consistent with accepted and good electricity industry practice in Australia…"*[61]

Powerlink requires this strategic acquisition to avoid future difficulties in obtaining land for the establishment of new infrastructure in a high residential growth area. This area is designated within the urban footprint and strategic land acquisition will provide certainty for the entire community consistent with the South East Queensland Regional and Infrastructure Plans.

This area falls within the Mount Lindsay North Beaudesert Area identified as a special investigation area within this plan. The Regional Plan for the area proposes to phase out the current proliferation of rural residential subdivisions in favour of the development of urban communities. Such a change will make it increasingly difficult to build new transmission infrastructure. Acquiring the additional easement width early will provide land use planning certainty for the community, secure the development capability and hence secure the future reliability of supply. This urban planning is a key objective of the SEQ Plan. Failure to secure this easement will lead to less optimal network solutions in the future. This could include a significant requirement for underground transmission, the costs of which would greatly overshadow the proposed easement costs.

The capex reduction is based on irrelevant considerations, and largely ignores real needs.

The AER should therefore reinstate the South Coast 500kV Double Circuit Easement Acquisition costs in its Final Decision.

2.7 Deliverability

In its Revenue Proposal, Powerlink provided information regarding initiatives which were either already in place or being implemented to deliver its larger capex program over the next regulatory period. Information regarding deliverability of the capex program was also provided to PB Associates during its review of forecast capex. Updated information was subsequently provided to the AER in relation to deliverability initiatives.

The delivery initiatives which Powerlink has put in place are aimed at ensuring the capital plans can be delivered to maintain reliable electricity supply to Queensland consumers in accordance with Powerlink's obligations. Powerlink has highlighted that, with these initiatives implemented, and by meeting Queensland market rates for labour and services, it has been able to ramp up its capital program to a level similar to that required over the coming regulatory period. Queensland is experiencing considerable pressure on many aspects of construction and electricity industry resources, including availability of skilled workers, plant and equipment, accommodation, etc. This is occurring against a backdrop of the unemployment rate in Queensland being at a 30 year low. It is clear, therefore, that continuing to meet the going rates for labour and services is pivotal to ensuring that the deliverability success being achieved now can be maintained.

The ongoing pressure on costs – materials and labour costs as well as contracting rates – is a key reason that Powerlink had to make a Supplementary Revenue Proposal. Section 8 of this response includes information regarding the matters which have impacted on the cost of providing electricity infrastructure in the current Queensland environment. All businesses undertaking construction activities in Queensland are experiencing significant cost blowouts compared with previously determined estimates. In this sellers' market for construction services, businesses which are not prepared to meet the market in terms of price and conditions will simply not be able to meet their construction targets.

[61] PB Report, p169.

Such an outcome is incompatible with Powerlink's mandated obligations for reliability of supply. Powerlink has therefore put arrangements in place which ensure the necessary infrastructure can be constructed.

As advised previously to the AER, Powerlink has increased its capex by 65% between 2004/05 and 2005/06. Much of the 2005/06 capex was incurred on projects commissioned in the current regulatory period or presently under construction. Those projects were therefore part of the prudency review undertaken by PB Associates. PB's past capex review concluded that Powerlink's project evaluation and implementation procedures were generally well followed and consistent with good industry practice. Powerlink is on track to deliver its much higher capital expenditure level in excess of $500 million in 2006/07. It is noted that Powerlink's new total capex request for the coming regulatory period (including the supplementary submission is $2.75 billion ($06/07), which represents an annual average of about $ 550 million. This is not materially different to what is already being delivered in 2006/07. The $ increases are largely associated with increases in input costs and include several major transmission line projects, each of relatively high $ value. The future annual average number of projects is not materially different to what is being achieved in 2006/07.

In summary, Powerlink continues to have a high degree of confidence in the deliverability of the total capex program, with the proviso that Queensland market rates for construction labour and services can continue to be met.

2.8 Other Capex Issues

2.8.1 CQ-SQ Powerlink initiated review

Subsequent to Powerlink's Revenue Proposal on 3 April 2006, Powerlink reviewed the development plans associated with the Central Queensland-Southern Queensland (CQ-SQ) grid section. This review identified and corrected an inconsistency in modelling the balance of flows on QNI and Directlink in the planning analysis and how this impacted on the required central to southern Queensland transmission capability required to meet mandated reliability of supply standards to southern Queensland. The proposed changes to the development plans and associated capital expenditure forecasts were discussed with PB Associates during its review of Powerlink's Revenue Proposal.

Detailed network planning studies were undertaken to assess the CQ-SQ augmentation requirements for each of the 40 scenarios taking into account the appropriate balance of transfer capability on QNI and Directlink. Depending on the scenario, transmission capacity upgrades of the CQ-SQ grid section are required from 2009/10. The relevant scenario dependent projects for each generation scenario involve expenditure over the regulatory period for one or a combination of the following:

- Dynamic compensation at Palmwoods or Gin Gin;
- Auburn River Switching Station; and/or
- Calvale to Halys 275kV Double Circuit Line.

The development plan for each scenario takes into account the most economic outcome for development in that particular scenario. Hence, the augmentation solutions vary both in timing and quantum across the 40 scenarios.

The table below compares the probability of the various CQ-SQ projects required under the original Powerlink Revenue Proposal with the outcome of this review. This information was provided to PB Associates.

Table 2.1: Impact of CQ-SQ Grid Section Review on the Project Probability[62]

Project	Original Proposal	Review
Establish Halys 275kV Substation and Calvale to Halys 2nd 275kV double circuit (single circuit strung)	25.1%	16.5%
Calvale to Halys 2nd 275kV double circuit (single circuit strung) Halys already Established	0%	0.3%
Establish Halys 275kV Substation and Calvale to Halys 2nd 275kV double circuit (both circuits strung)	18.6%	3.3%
Gin Gin 250MVAr SVC	43.2%	9.6%
Auburn River Switching Station (2 switched circuits)	3.4%	23.2%
Auburn River Switching Station (3 switched circuits)	1.9%	0.8%
Auburn River Switching Station (4 switched circuits)	3.7%	0%
Easement Acquisition for Calvale to Halys 2nd 275kV double circuit line (TE)	51.6%	20.4%
Easement Acquisition for Calvale to Halys 2nd 275kV double circuit line (Compensation)	51.6%	20.4%

The review reduced the probability weighted capex by $41.03 million ($2006/07) compared to the original Revenue Proposal. This was raised in Powerlink's Supplementary Revenue Proposal. However, it has already been taken into account in the AER's Draft Decision, and therefore does not require any further consideration.

2.8.2 Capacitor bank locality factors

During its review, PB Associates noted that the locality factor used for the generic capacitor bank requirements was 1.05, whereas many of the generic capacitor banks were to be installed in the SEQ region which has a locality factor of 1.00. Powerlink has now re-estimated the costs of these capacitor banks based on the locations at which they are currently anticipated to be installed. In addition, the locality factor of 1.05 initially used would have allowed for site specific factors which have not been included in the generic capacitor bank cost estimates. Following a request from the AER, Powerlink identified the adjustment to the capex forecast associated with this more detailed identification of the location of the numerous capacitor banks included in its capex forecast.

Powerlink accepts the AER's Draft Decision in relation to this matter.

2.9 Contingent projects

Under the contingent projects regime, it is necessary that Powerlink's transitional revenue determination contains arrangements to be followed in the event that a contingent project trigger is activated during the next regulatory period.

In relation to this issue, the AER has decided to apply the relevant clauses of the new Chapter 6A Rules to the extent these are consistent with Powerlink's transitional provisions. In particular, this specifies the threshold to apply to contingent projects and the administrative process to be followed if a contingent project trigger occurs within-period (with the exception of a repeat threshold test), and the consequential amendment of its revenue cap.

Powerlink believes that this is a reasonable approach to the requirements in relation to, and the practical operation of, the contingent project provisions under its transitional revenue determination. This approach also provides significant alignment with the required future treatment of other TNSPs.

2.9.1 Undergrounding approach

Powerlink believes that undergrounding of selected sections of transmission lines in particular locations will be required for certain transmission line developments in the coming regulatory period. The primary reason for an increase in the amount of

[62] All probabilities in this table assume 50% probability for the PNG theme set.

undergrounding is emerging changes in land use, particularly increased urbanisation. The south east Queensland area is particularly susceptible to increased undergrounding requirements, especially in the areas identified as the "urban footprint" in the Queensland Government's SEQ Regional Plan.

Due to the substantially higher costs associated with undergrounding (about 15 times as much as conventional overhead line), Powerlink included undergrounding amounts for particular locations in its capital expenditure forecasts. Powerlink considered this was an important aspect of its capital expenditure forecast, particularly with the new ex-ante capex framework. The AER has recognised that the forecasts of undergrounding requirements are based on Powerlink's experience and best judgment, and that, as a result of the normal planning approval processes, the actual requirements for undergrounding may turn out to be different to these initial assumptions. Planning approvals from the relevant authorities would need to be obtained to determine the location and amount of undergrounding required.

The AER has therefore proposed not to apply the ex-ante framework to Powerlink in relation to the costs of undergrounding transmission lines during the coming regulatory period. Rather, the AER wishes to review each requirement to underground any section of a transmission line via the contingent project framework.

Powerlink is willing to accept the AER's use of the contingent project category for undergrounding provided the arrangement for assessing each instance of undergrounding is effective. In particular, the arrangements must not require Powerlink to take any actions it does not consider appropriate, and must not delay the project approval process. Powerlink considers the process outlined by the AER in Appendix E of the Draft Decision should, if implemented effectively, be able to meet this requirement.

2.9.2 M50++ Theme set as a contingent project

ROAM Consulting identified that there may be a major new industrial load introduced into Central Queensland within the next decade. If this were to occur, it would most likely be located around Gladstone where the Queensland Government is progressing the GSDA (Gladstone State Development Area). The GSDA is being set up with the necessary port, rail and associated infrastructure to attract energy intensive industry.

There have been a number of different projects mooted for development in Gladstone over the past 5 years with demands ranging from under 100MW to approximately 1000MW. It was not possible for ROAM Consulting to provide a definitive assessment of the likelihood of each of these potential projects proceeding. Rather, in the interests of highlighting to Powerlink the impact a substantial load increment would have on generation development patterns, and hence network utilisation, the new load development was modelled as 1000MW, first introduced in 2009 at 500MW with the remainder following a year later. The possibility of this point load proceeding was assigned a probability of 10% by ROAM Consulting.

PB concluded that while this load theme did capture the sensitivity, the M50++ theme would be better addressed through contingent projects. PB therefore recommended that:

> *"eight projects unique to the M50++ sub-theme be treated as a single contingent project and therefore be excluded from the ex-ante allowance."*[63]

PB estimated that this would result in a $16 million reduction to Powerlink's ex-ante allowance.

Powerlink is not philosophically opposed to the movement of these projects into the contingent category. However, PB has proposed, and the AER has accepted for its Draft Decision, the following nominated trigger for this contingent project.

[63] AER Draft Decision, p87.

> "*The AER accepts PB's recommendation to include these projects as a single contingent project with a trigger of a 500 MW industrial development in the Gladstone area."*[64]

Powerlink does not believe that the nominated trigger for this contingent project is correct.

PB identified a number of transmission projects that only occurred under the M50++ sub-theme. These projects are defined in Table 4.29 on page 123 of PB's Report, and include the establishment of the Auburn River Switching Station, a Gladstone zone capacitor bank and the Calvale 275kV substation replacement.

The needs for these projects are not as a direct result of the point load in the GSDA. These projects are driven by the impact of generation development in Central Queensland, which ROAM Consulting planted there as a result of the additional Gladstone demand in the theme. The M50++ sub-theme was the only sub-theme where ROAM Consulting's modelling planted extra base load generation in the Callide/Stanwell area within the regulatory period. This was not necessarily by design, just a consequence of the number of scenarios that could be practically considered.

The extra generation in CQ drives higher transfers from Central Queensland to southern Queensland, and hence the need for transmission augmentation. The Auburn River projects and the Gladstone zone capacitor bank are required to ensure a certain level of power transfer capability between central and southern Queensland, so that mandated reliability of supply obligations can be met in southern Queensland. The extra generation in CQ also increases fault levels in the area and triggers the need for the Calvale 275kV substation replacement.

Therefore, the projects identified in PB's Report (Table 4.29) are actually triggered by either a large industrial development in the Gladstone area, or by two or more additional generating units in central Queensland. Thus, the definition of the trigger needs to be expanded accordingly.

In addition, in the case of additional load, the AER has nominated that the contingent project be triggered with the commitment of a 500MW industrial load development in the Gladstone area. It is Powerlink's firm belief that the commitment of a point load in the Gladstone area much less than 500MW would trigger the need for the Gladstone Area Transmission and Larcom Creek developments (CP.01280 and CP.01971). Powerlink therefore believes that the trigger for the contingent project should be lowered to 250MW.

The AER should therefore modify its decision in relation to the Gladstone major industrial development (M50++) contingent project to reflect two possible triggers – an additional 250 MW industrial load development in the Gladstone area that has not been included in the 2005 APR, or 2 or more additional generating units in central Queensland.

[64] AER Draft Decision, p87.

3. Operating Expenditure

Powerlink has already demonstrated in the current regulatory period that it can deliver highly effective and efficient opex performance. Benchmarked performance comparisons between Powerlink and other transmission entities, both within Australia and internationally, confirms that Powerlink is well positioned in the 'best performer' quartile. The ACCC/AER developed indicators also show that Powerlink performs well against other similar Australian entities.

Powerlink's actual controllable opex expenditure for 2005/06 was slightly higher than the forecast in its Revenue Proposal in April 2006 (2%). The drivers forcing Powerlink to require additional opex are real and Powerlink is not merely pushing up operating expenditure with a view to 'gaming' the regulatory process (as was suggested by the EUAA[65]). Powerlink categorically refutes any suggestion that this has occurred.

Table 3.1: Controllable operating expenditure comparison of 2001 decision and actual

Controllable Opex $m nominal	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Decision*	65.64	71.97	76.43	80.40	84.51	89.43
Decision - CPI adjusted	65.64	72.41	77.72	81.49	85.69	90.84**
Actual	69.66	73.20	78.31	87.50	97.31	107.42**

* Decision opex does not include grid support or the QNI capex efficiencies included in the opex allowance in the 2001 revenue determination.
** Forecast.

Powerlink undertakes the management of its assets through implementation of an Asset Owner/Asset Manager/Service Provider business model for strategically managing the delivery of network services to the required standards. This process has a particular focus on the efficient operation and maintenance of existing assets. Powerlink considers that the AO/AM/SP model remains an essential element in managing the complex, and sometime conflicting, environment in which it operates. The model delivers an integrative and responsive management structure, capable of reconciling complex issues through well-defined responsibilities coupled with collaboration to ensure all relevant information is available.

Powerlink's application of Reliability Centred Maintenance (RCM) has been successful in providing a framework for analysing plant maintenance requirements to maximise plant reliability and availability while optimising ongoing maintenance costs. RCM offers a framework for logically analysing the potential failure modes of plant, equipment and systems, and to determine the potential effects and consequences of these failures. In relation to evaluating Powerlink's plant management approach, PB concluded that:

> *"Powerlink has applied and used the RCM2 process in a systematic and structured manner and that this produces appropriate, robust and cost-effective asset management programs."* [66]

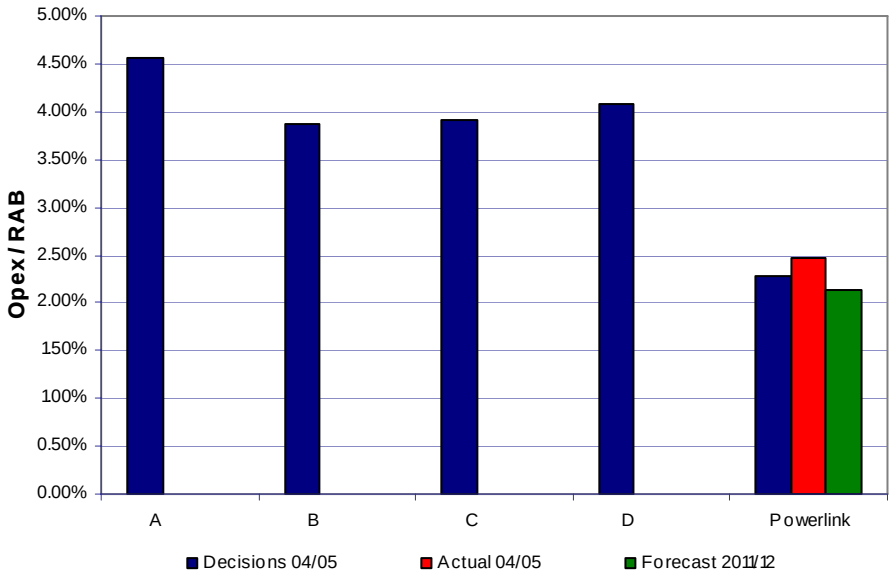
Powerlink's model for operating cost management is highly effective in the monitoring and control of operating costs, and in ensuring that maintenance strategies are optimised through the analysis of maintenance expenditures in their respective categories. Powerlink maintains a strong focus on the control of direct operating costs, ensuring the implementation of maintenance and refurbishment strategies is efficient, and that maintenance services are provided efficiently. PB evaluated Powerlink's opex performance of 2004/05 and determined that:

[65] EUAA submission to the AER on Powerlink's Revenue Cap Proposal for 2007/08 to 2011/12, p20.
[66] PB Report p140.

"Powerlink's actual opex for the 2004/05 financial year, after adjustments for one-off costs, to be efficient and an appropriate base from which forecast opex can be projected".[67]

Furthermore, Powerlink's proposed opex forecast shows that by the end of the upcoming regulatory period, it is likely to retain this efficient opex performance, as demonstrated by Figure 3.1 below.

Figure 3.1: Normalised Opex/RAB for NEM Transmission Businesses



Source: Queensland Transmission Network Revenue Proposal 3 April 2006

This forecast opex performance is achieved by applying efficiency initiatives and economies of scale, to an already efficient base reference, that result in operating costs forecast to increase at a slower rate than the rate of growth of network being managed.

Benchmarking and other opex performance comparisons confirm that Powerlink's proposed controllable operating expenditure is at an efficient level, with the outcomes of Powerlink's proposed opex forecast delivering a continued overarching efficiency benefit to consumers.

3.1 Opex Issues Requiring Review

Powerlink considers that there are misunderstandings in some aspects of PB's review, and subsequently in the AER's Draft Decision in relation to operating expenditure. These are discussed in turn.

3.1.1 Condition based maintenance

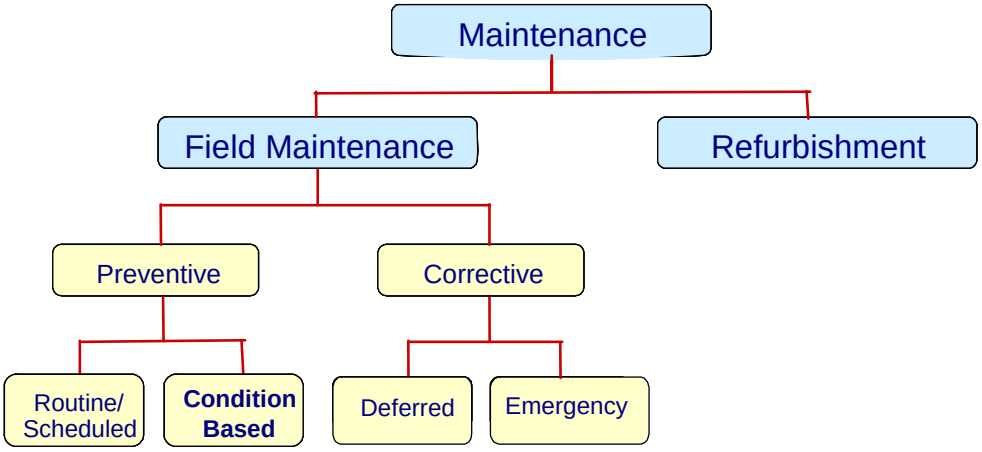
PB's review of Powerlink's opex forecast process included assessing the impact of a larger network on future opex requirements. PB confirmed Powerlink's approach was reasonable and accepted asset growth escalation for all aspects of the operations and maintenance forecast, apart from condition based maintenance. In this instance, PB asserted that asset growth escalation is not applicable to condition based maintenance for the five years of the regulatory period.

Powerlink considers that PB reached an incorrect conclusion, possibly attributable to a misunderstanding of what is included in the category of condition based maintenance. Additional information is therefore provided here.

[67] PB Report, p154.

Maintenance Categories

Powerlink has a consistent and practical means of categorising types of maintenance work, and collecting the costs of work done on each maintenance job. Maintenance tasks are separated into a number of categories that reflect the type of maintenance being performed, as shown below:



In line with traditional maintenance theory, Powerlink has two major classifications – preventive maintenance (to prevent equipment failure/breakdown), and corrective maintenance (to repair or restore equipment back to serviceable status after a breakdown or failure).

Preventive maintenance is carried out at either predetermined intervals or corresponding to prescribed condition criteria, and is intended to reduce the probability of failure or minimise performance degradation of an item. Routine scheduled maintenance is an interval based method, whereas condition based maintenance is initiated as a result of knowledge, or to gain knowledge, of the condition of an item of plant. The condition of an item of plant can be assessed through various methods including physical visual inspections, workshop testing, and remote (automated) condition monitoring. Powerlink undertakes reliability centred maintenance (RCM) studies, based on potential failure modes, to optimise the performance of plant by identifying the appropriate monitoring and preventive techniques to implement.

Condition based maintenance for new assets

PB's assertion that newly commissioned assets do not require condition based maintenance is not consistent with current equipment performance. In fact, RCM identifies that there are many failure modes during the life cycle of the equipment, including during the early part of the life cycle. A common misperception is that newly installed assets will operate at a particular level of performance (ideally at its design requirements) and throughout its operating life the asset degrades (uniformly), without any failures. Experience shows that this is not the case. RCM identifies that a significantly high proportion of equipment failures are random. This being the case, the most important issue is to detect the loss-in-condition of the asset prior to the potential failure, which in some cases can be a catastrophic failure mode which creates safety risks. This necessarily requires that the condition be monitored from the time the equipment is installed, and that action be taken when an abnormal condition is detected, regardless of when this occurs in the lifecycle.

Powerlink sought an independent check on its proposal regarding condition based maintenance for new assets. The Asset Partnership is the Australasian expert in RCM implementation, having worked with many industries and sectors including mining and minerals processing, defence, power generation, utilities, aerospace, food and beverage

and transport.[68] The Asset Partnership advice is attached as Appendix E. It concludes that condition based maintenance is required for assets of all ages including new assets, and that condition based maintenance levels will increase as the size of the network grows. In its explanation of failure types, The Asset Partnership states *"it is also known that many electrical and electronic assets have an increased probability of failure or early life failure. The implication of early life failure is that with an increase in the number of assets which exhibit an early life failure pattern, an increased need for condition based maintenance can be expected.*[69]

Both Powerlink and The Asset Partnership have clearly identified that condition based maintenance is required throughout the entire life of the asset and commences very early in the life cycle. New equipment may experience 'teething' problems, often referred to as 'infant mortality'. Powerlink has real life examples of actual condition based maintenance activities to manage performance issues affecting assets in early life. These maintenance activities would fall within the period suggested by PB as being immune to growth in condition based maintenance:

- New transmission lines:
  - Thermoscanning of transmission lines to identify potential 'hotspots' that might ultimately result in an early failure resulting in either earthwire or conductor failure. An earthwire or conductor failure (e.g. due to incorrect installation or inherent material faults) could result in a conductor dropping, with the potential consequences of a loss of supply event, starting a bushfire or creating some other threat to public safety.
  - Composite insulator populations are regularly scrutinised due to bird attacks.
  - Areas identified as potential fire hazards are inspected and controlled dependent on seasonal conditions.
  - Annual investigation of transmission lines are undertaken in areas where under-average rainfall has fallen e.g. natural insulator washing inadequate, which prompts insulator washing.
  - Non-periodic monitoring is undertaken where performance issues have been identified e.g. infant mortality in glass disc insulator strings are investigated to establish cause of failures.
- Substation primary plant:
  - Powerlink commonly performs condition based assessments on newly installed plant items such as power transformers and instrument transformers, including oil sampling and analysis which can minimise potential catastrophic failures in early life.
  - Specific problems that require early condition based work are:
    - High moisture in oil levels on some new current transformers, and
    - Partial discharge on new power transformers from design and manufacturer defects.
  - Premature failure of PASS switchgear[70] and associated components such as position encoders due to design not taking environmental conditions into account. These electronic devices exhibit early life failure caused by thermal runaway. Condition based maintenance activities include increased inspection and analysis to gain knowledge of failure modes and root cause to minimise early failures which may result in potential loss of supply events.
- Other hidden failures – Powerlink uses its Asset Monitoring Team to perform remote condition assessments and subsequently initiate field condition based maintenance activities resulting from their findings. This is frequently related to the electronic-based assets such as telecommunications and secondary systems. These condition based assessments often identify potential failures in early life.

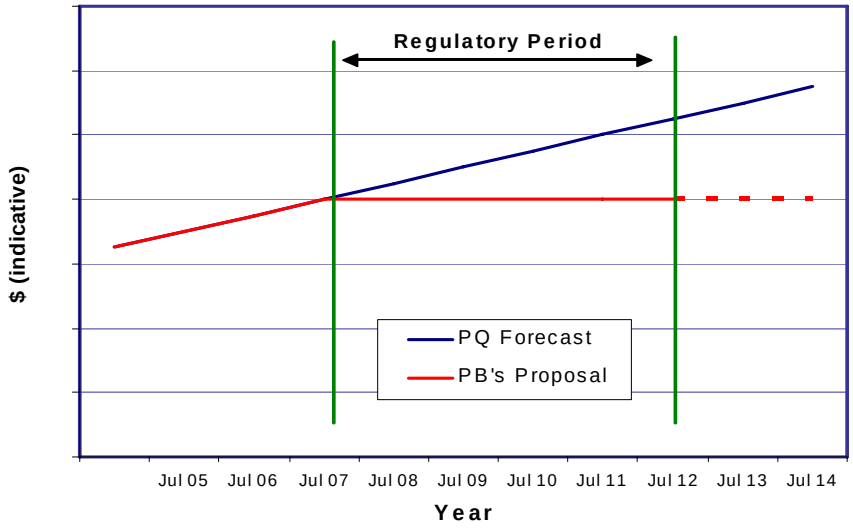
[68] www.assetpartnership.com
[69] The Asset Partnership, paper on "PB Associates Review of Powerlink's Revenue Reset Operational Expenditure Submission, 18 January 2007, p3, (Appendix E).
[70] PASS equipment supplied by ABB.

Items such as battery chargers have displayed potential early life failure and are managed using condition based maintenance.

An additional benefit of performing condition based maintenance from an early phase in an asset's life is that base line data or information is gained about the item of plant from new. The benefit of this aspect is that subsequent measurements and data can be compared with this known reference.

Powerlink believes that PB's recommendation of not increasing condition based maintenance with network growth for the period of the coming five year regulatory period is not acceptable. Given the reality of early life failures and the potential consequences (e.g. threats to public safety), an approach of no increase in condition based maintenance on a continually growing network is clearly unsustainable. PB has not identified an alternative time at which condition based maintenance would be increased to reflect the increased network size – would that be at the beginning of the following regulatory period? If not then, when? Powerlink has difficulty in believing there is any linkage between condition based maintenance requirements and the timing of Powerlink's regulatory periods.

Figure 3.2: Condition Based Maintenance Trend (indicative)



PB has also not identified what alternative maintenance methods and costs should be substituted for condition-based maintenance. Given that early life failure is a reality, and that in some cases the failure mode can be catastrophic, with public safety implications, there would be an increased need for higher-cost corrective work to repair the failure and repair any "collateral damage". Such an approach would also lead to higher insurance costs.

The reality of early life failure means that there is no viable "do nothing" option.

The AER should therefore reject PB's recommendation and reinstate Powerlink's forecast for condition based maintenance in its Final Decision. Alternatively, the AER should include (all) the costs associated with an alternative viable maintenance/insurance strategy, together with a relaxation of the service standards to allow for a higher level of unplanned outages.

3.1.2 Labour rates

In its Revenue Proposal, Powerlink adopted a number of escalation factors for opex and capex forecasting. One of these escalators applied to labour costs. Powerlink considered the same escalation rates should apply to both the opex and capex forecasts because wage equity is required across employees who perform similar roles,

irrespective of whether the roles are associated with opex or capex. In addition, it is critically important that Powerlink 'meet the market' so that employees can be attracted and retained by both Powerlink and its contractors.

The escalation rates were reviewed by PB Associates as part of its review of the capex and opex forecasts. The AER also engaged Access Economics to provide advice on wage growth forecasts for the utilities sector in the states and territories of Australia. The AER adopted Access Economics' forecast[71]. Powerlink's experience (and those of its contractors) are materially different from the outlook portrayed by Access Economics. Powerlink subsequently engaged independent economic consultants, Synergies Economic Consulting, to review the Access Economics report and its application to Powerlink for the coming regulatory period. Synergies' report concerning the wage growth forecasts suitable for Powerlink is in Appendix C.

Section 2.5.1 of this document (*Labour escalation factors*) considers the issue of labour escalation rates in significant detail. Powerlink strongly believes that the wage growth forecasts proposed by Access Economics are not appropriate and have been inappropriately applied to Powerlink. The Synergies report confirms Powerlink's views in this regard.

The AER should not rely upon the Access Economics wage growth forecast for the last four years of Powerlink's next regulatory period. Synergies has reviewed the forecasts prepared by Access Economics and consider them to contain modelling and methodological shortcomings. Synergies are also of the view that they are a poorer match to Powerlink's specific circumstances than information pertaining to the mining and construction sectors in Queensland. The AER should therefore, in its Final Decision, use labour escalation factors which are not lower than those proposed by Powerlink.

3.1.3 Maintenance materials

In its Revenue Proposal, Powerlink included escalation of maintenance materials at a rate of 4% per annum. PB reviewed this aspect and considered escalation of maintenance materials at CPI to be more appropriate on the basis that Powerlink had escalated its capex forecast at CPI and that other electricity businesses also used CPI for materials escalation. The AER agreed with PB and reduced the escalation factor to CPI.

Maintenance materials are made up of a variety of plant items which have varying rates of escalation. Some typical components and their historic increases are as follows:

- Aluminium – 19% per annum since 2002, steeper in the last 12 months;
- Oil prices (fuel) – 12% per annum over last 10 years; and
- Electrical equipment – major supplier indicating increases between 1% and 10% per annum.

Powerlink did not attempt to determine a weighted average of items which make up maintenance materials. Such an exercise would be extremely data and resource intensive.

With respect to the apparent inconsistency between materials escalation factors used for capex and opex, PB and the AER should note that a different base year has been used for capex and opex. The opex forecast starts from the 2004/05 base year, that being the last year of audited operating expenditure prior to the submission of the Revenue Proposal. Capex estimates for projects are prepared in current $ at the time of estimating. This was 2005/06 in Powerlink's Revenue Proposal. The 2004/05 opex year could not have included the large increases in the cost of many components of the maintenance materials mix, because they primarily occurred during the 2005/06 year.

[71] Access Economics, Wage Growth Forecasts in the Utilities Sector, 17 November 2006.

These increases were well above CPI. On reflection, escalation at 4% is unlikely to have captured the full extent of maintenance materials increases let alone CPI.

In addition, the data for aluminium, copper and zinc quoted by the AER[72] are in $US. Powerlink purchases its maintenance equipment in Australian dollars. The relevant price of these materials is therefore in $A. Access Economics recognised this in its report[73]:

> *"The bad news is that we think most industrial commodity prices are close to peaking – and that, as and when they fall, the $A will slide alongside them in sympathy"* [emphasis added].

Powerlink therefore considers the AER should apply escalation of maintenance materials of at least 4% per annum in its Final Decision.

3.1.4 Vegetation management

In its Revenue Proposal, Powerlink included escalation of land management activities to reflect the additional obligations and resultant long-term additional effort. Both the AER and PB acknowledge that changes required in response to the Vegetation Management Act and the Electrical Safety Act will require Powerlink to increase its work effort to effectively manage land issues. Powerlink's modelling included a forecast of the additional effort estimated to be required, and specific efficiency factors Powerlink was anticipating would be delivered in this rapidly growing work area.

PB disagreed with Powerlink's proposed profile based on larger work effort and efficiencies, suggesting an alternative profile which has rapid increases at the beginning, and smaller increases towards the end of the next regulatory period.

Powerlink is concerned about the very low level of work effort increases forecast by PB in the last four years of the next regulatory period (just 1% each year). Powerlink considers it unlikely that this will be sufficient to meet the observable ever increasing requirements associated with land management activities.

3.1.5 Asset growth adjustment

The opex forecast used in Powerlink's Proposal, incorporates various input cost drivers and efficiency initiatives. One such input is the volume of assets and equipment to be maintained which takes into account asset growth. The volume of assets to be maintained is derived from the asset base in 2004/05 with additions from the capital program. As confirmed by PB, in its opex forecast Powerlink "*increases the total asset base only as new assets are commissioned (using capitalisations rather than as incurred capex) because there is no impact on maintenance when the assets are still under construction*"[74]. In its Draft Decision, the AER correctly adjusted the opex allowances on the basis of changes to the capital expenditure allowances and the resulting capitalisations.

The AER will again need to adjust the opex allowances on the basis of capital expenditure and resulting capitalisations in the Final Decision.

3.2 Operational Refurbishment

In its review PB considered that some of Powerlink's operating expenditure for operational refurbishment was capital in nature and recommended it be transferred to the future capex allowance. Following a review of Powerlink's practice since its inception in 1995, the AER did not adopt this recommendation. Powerlink concurs with the AER's decision.

[72] AER Draft Decision, Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12, 8 December 2006, p130.
[73] Access Economics, "Wage Growth Forecasts in the Utilities Sector", 17 November 2006, p13.
[74] PB Report p160.

3.3 Self Insurance

PB reviewed Powerlink's suggested allowance for self insurance and found them to be reasonable. The AER accepted PB's recommendations.

Powerlink's Revenue Proposal was prepared on the basis of the SRP and previous revenue cap decisions from the ACCC. Powerlink proposed a self insurance allowance for the following risks:[75]

- uninsurable risks associated with Powerlink's network; and
- insurable items on which premiums are not considered cost effective.

Powerlink did not include a self insurance allowance for risks associated with below deductible claims, instead Powerlink proposed a pass through arrangement for "*any material deductible incurred by Powerlink as no allowances for deductibles are included either in the insurance premiums or self insurance allowance*"[76].

The AER have noted that the transitional provisions in the NER applicable to Powerlink's revenue cap decision apply the pass through arrangements in the new Rules. The new Rules have a materiality threshold of 1% of MAR to trigger a pass through.

An actuarial study prepared by Finity contained estimates of the annual cost of:

- uninsurable risks associated with Powerlink's network; and
- uninsured losses – below deductible claims.

Both the AER and PB reviewed the Finity report and found the levels of self insurance allowances proposed for both these risk areas to be reasonable. As the self insurance amount for uninsured losses was not included in the self insurance allowance in Powerlink's Revenue Proposal and a pass through arrangement is no longer suitable to manage this risk (due to the threshold in the new Rules), Powerlink requests that the AER increase the self insurance allowance by the amount determined in the Finity Report.

The self insurance forecast determined by Finity for uninsured losses in shown in Table 3.2.

Table 3.2: Uninsured losses forecast

$06/07	07/08	08/09	09/10	10/11	11/12	Total
Uninsured Losses	0.46	0.49	0.54	0.56	0.59	2.64

In addition Powerlink incorrectly applied de-escalation to the self insurance allowance for insurable items on which premiums are not considered to be cost effective. The total amount of Powerlink's self insurance taking into account the uninsured losses forecast and the de-escalation correction is shown in Table 3.3.

Table 3.3: Self insurance forecast

$06/07	07/08	08/09	09/10	10/11	11/12	Total
Self Insurance	1.73	1.80	1.88	1.92	1.97	9.30

Given the changes in the pass through arrangements since Powerlink prepared its Revenue Proposal, and the acceptability of the Finity forecast of the self insurance amount for uninsured losses, the AER should increase Powerlink's self insurance allowance in its Final Decision to that shown in Table 3.3.

[75] Powerlink Revenue Proposal, 3 April 2006, p 107.
[76] Powerlink Revenue Proposal, 3 April 2006, p 108.

3.4 Gold Coast Reinforcement Capex Efficiency Claim

In its Draft Decision the AER decided not to allow Powerlink's capex efficiency claim. This decision is based on the AER's view that:

- the savings are not based on a reduction in the amount of capex that was forecast to be required;
- the savings do not result from efficiencies that are within Powerlink's control and not simply a by-product of management acts; and
- Powerlink has not demonstrated that its action resulted in the efficiency gain.

In its review for the AER, PB considered that early acquisition of an easement between Brisbane and the Gold Coast (an obvious growth area) was consistent with accepted good electricity industry practice in Australia and that savings should therefore not be attributed to a particular management efficiency or innovation.

Powerlink does not agree with the contention that the savings should not be attributed to management efficiency. Under the DRP, there are two parts to demonstrating that a management induced efficiency gain has occurred.[77]

Capital expenditure below forecast levels

The DRP established benefit sharing provisions which are designed to provide incentives for the TNSP to maximise efficiencies. This benefit sharing arrangement was the only incentive associated with capital expenditure.

Powerlink's forecast for capex, which was included in the ACCC's 2001 Decision for the current regulatory period, was based on entirely different assumptions regarding demand growth and input costs. These differences need to be accounted for in comparing actual expenditure in the current regulatory period with the forecast expenditure, either by adjusting the forecast upwards to account for the additional demand and higher input costs, both of which would increase the efficient level of capex required; or by reducing the actual to that which would have been required for the levels of demand and input costs which existed at the time of the revenue cap decision.

PB undertook such a comparison at a high level in its past capex prudency assessment. PB's report included the following[78]:

> *"There is no doubt that Powerlink's demand, equipment and labour costs over the current five year regulatory period have been higher than assumed in 2001. However our analysis indicated that these increases were only partly reflected in project costs at completion and <u>were largely absorbed by efficiency gains made by Powerlink (emphasis added).</u> Had the assumptions in respect of demand and input costs that were used as the basis for the 2001 Decision turned out to be accurate, we think Powerlink's actual capex for the current regulatory period would have been significantly lower than the amount allowed in the Decision."*

If a reasonable (apples vs apples) comparison of forecast and actual capital expenditure is undertaken, i.e. one using the same input assumptions, then the only conclusion which can be reached is the one reached by PB, namely, that Powerlink's expenditure is below forecast.

The first part of the DRP test to demonstrate that a management induced efficiency gain has occurred is therefore satisfied.

[77] ACCC, Draft Statement of Principles of the Regulation of Transmission Revenues, 27 May 1999, p97.
[78] PB report, p3.

Capex savings have occurred as a result of management actions.

If Powerlink did not have a policy of identifying, obtaining and maintaining the ability to construct on strategic easements, then the cost of reinforcing supply to the Gold Coast would have been substantially higher. As the lowest cost alternative identified independently by the consultants engaged by Powerlink would have satisfied the regulatory test as the lowest cost solution available at the time, that solution would have been included in Powerlink RAB, at that estimated cost, under the prudency assessment undertaken.

The lower amount which has actually been included in Powerlink's RAB is therefore a direct result of actions by Powerlink including:

- having a policy for proactive acquisition of strategic easements;
- implementing that policy in the case of future reinforcement to the Gold Coast; and
- managing the strategic easement to maintain the rights to construct on it when that became necessary.

It is not simply fortuitous that Powerlink acquired this easement which would now be very costly to acquire. And it is not simply fortuitous that Powerlink maintained the right to construct an overhead transmission line on the acquired easement. This required a persistent and directed effort to ensure local government bodies, the community and individual property purchasers were aware of the easement and its intended use. This is anything but a by-product of actions taken at an earlier time. If Powerlink management had adopted an attitude of doing nothing once the easement had been acquired, then a more expensive solution would have had to be constructed, even with the early acquisition of the easement.

Powerlink therefore considers that the second part of the DRP test to demonstrate that a management induced efficiency gain has occurred is also satisfied.

Alternative efficiency claim

Should the AER not be convinced of Powerlink satisfying the requirements in the DRP for the management induced efficiency put forward by Powerlink in its 3 April 2006 Revenue Proposal because the easement was already acquired prior to the start of the current regulatory period, then at the very least the AER should acknowledge that Powerlink's actions in proactively managing that easement have resulted in a lower construction cost than would have otherwise occurred. The efficiency claim could therefore be recalculated without the difference in easement acquisition costs, i.e. it would be based only on the difference in the cost of constructing the assets which is $6.26 million lower.

Based on an equal sharing of this efficiency between Powerlink and customers, and spreading the amount evenly during the next regulatory period as part of Powerlink's opex allowance, the efficiency allowance attributable to Powerlink for the lower cost construction of the assets on the easement only would be $1.59 per annum ($06/07).

Powerlink believes that its capex efficiency claim does satisfy both parts of the DRP test and should therefore be included in the AER's Final Decision. Alternatively, as a minimum, the management-induced efficiency in construction costs should be included.

4. Past Capital Expenditure

4.1 Prudency Check

The AER is required to assess Powerlink's past capital expenditure (that is, capital expenditure capitalised or expected to be capitalised in the current regulatory period) under the ex-post prudency framework set out in the *Draft Statement of Regulatory Principles*. To assist in meeting this requirement, the AER engaged PB Associates to undertake a very detailed and rigorous three-stage prudency review of some 40 capital projects undertaken by Powerlink during the 2002-2007 regulatory period. Specifically, PB's review was designed to inform the AER as to whether Powerlink's expenditure represented:

> *"… the amount that would be invested by a prudent TNSP acting efficiently in accordance with good industry practice."*

PB investigated projects across a range of project categories (augmentations, replacements, easements, connections, security and compliance, IT and support the business) and dollar values to test, among other things, the robustness of Powerlink's approach to the conduct of the Regulatory Test and project evaluation and implementation processes and procedures.

Overall, PB's review concluded that the project evaluation and implementation procedures used by Powerlink for the evaluation and implementation of projects were consistent with good electricity industry practice and were generally followed. As argued by Powerlink, PB also found that demand growth and input costs were higher during this regulatory period compared to those assumed in its 2001 Decision. PB went on to say that the extent of these cost increases had been tempered by Powerlink through gains in efficiency.

In relation to project budget overruns, PB concluded that these were primarily the result of resolving legal easement acquisition disputes and changes to project scope after initial approval is obtained. Powerlink accepts PB's conclusion in relation to legal costs associated with easements, but disputes its analysis on the prevalence of changes to project scopes. PB's own analysis identified that more than half of the projects reviewed were delivered on budget – that is, within the sensitivity of the Regulatory Test cost estimates or approval estimates. Therefore, these projects should not be at issue. Of the remaining projects, Powerlink maintains that, in terms of the number of projects, unforseen changes to scope were no more frequent than legal/easement related issues or increases in input costs.

In its report, PB also suggested that some amendments could be made to particular aspects of Powerlink's processes and recommended a total prudency adjustment of $8.5 million in relation to three commissioned projects ($6.1 million adjustment) and one Work in Progress (WIP) project ($2.4 million adjustment). Powerlink strongly disagrees with the prudency adjustments suggested by PB, and has provided its response to these specific projects in Appendix I.

Having considered PB's recommendations, the AER concluded that the review provided sufficient evidence to demonstrate the veracity of Powerlink's management practices and that systematic failings were not endemic to the business. As a result, the AER decided that the full amount of $1,165 million in capital expenditure on projects commissioned during this regulatory period should be rolled into the starting RAB for the 2007-12 regulatory period.

Powerlink strongly supports the AER's position on this issue and believes that the AER has not only been pragmatic in its approach, but mindful of the need to perform its functions in a manner that provides certainty to TNSPs and facilitates efficient investment in electricity transmission services. Powerlink also considers that the AER

was well-placed to reach its own conclusions on the prudency of Powerlink's past capital expenditure. In particular, throughout PB's review of past capital expenditure, the AER were kept abreast of all information provided by Powerlink to support each individual project and correspondence between PB and Powerlink. In addition, AER representatives were present during face-to-face discussions and were able to see and hear first-hand, the nature and context of PB's lines of inquiry as well as the preparedness and capability of Powerlink to respond to these issues.

4.2 WIP Projects

In addition to an assessment of projects commissioned (or scheduled to be commissioned) during this regulatory period, PB Associates undertook a similar detailed review of 20 projects included in Powerlink's Work in Progress (WIP) list. WIP projects comprise those that are either under construction, or are due to commence construction prior to the end of June 2007, but are not scheduled to be commissioned until the 2007-12 regulatory period.

The necessity for PB to investigate and assess the prudency of WIP projects is due *only* to the AER's change of approach to recognise assets in the roll-forward of Powerlink's regulated asset base from the start of the next (2007-12) regulatory period on an 'as-incurred' (or 'as spent') basis, as opposed to the 'as commissioned' approach that applies to assets constructed in the current regulatory period.

Having undertaken its assessment of Powerlink's WIP projects, PB concluded that eight projects in the amount of $111.01 million (or 23 per cent of the total estimated WIP value) should not be included in Powerlink's opening RAB for the 2007-12 regulatory period. The basis of PB's recommendation was its finding that these projects had not been approved for implementation at the time of its review. PB did not have concerns with the prudency of these projects, only with the timing of the expenditure relative to the commencement of the next regulatory period. It therefore considered that instead of inclusion in the WIP amount to be included in the RAB, this expenditure could be included in the forecast capex for the next regulatory period. PB suggested that this issue be revisited closer to the end of the current regulatory period.

Powerlink now believes that seven of these eight projects will be approved by the end of the current regulatory period. Two of the projects were approved during the course of PB's review - namely, CP1313 Ross-Chalumbin OPGW Retrofit and CP1198 Wide Bay Transmission Reinforcement. Powerlink advised PB of these approvals, but PB did not update its report to reflect these changes although PB acknowledges this discrepancy in its report[79]. Two other projects have already been approved, and approval for three projects is imminent, as part of the normal course of business.

Table 4.1: Status of Approval – WIP Projects

Project No.	Description	$m (excl contingency)	Approval Date
Approved at the time of PB's Review			
CP.1198	Wide Bay Transmission Reinforcement	37.6	May 2006
CP.1313	Ross-Chalumbin OPGW Retrofit	8.4	Jun 2006
Approved after PB's Review			
CP.1137/B	Ross-Yabulu Transmission Reinforcement	42.3	Nov 2006
CP.1531	Bundamba 110/11kV Transformer	6.1	Jul 2006
To be approved in February 2007			
CP.1101	North Queensland Transmission Reinforcement Stage 2	132.2	Feb 2007
CP.1134	South Pine 110kV Substation Refurbishment	38.3	Feb 2007
CP.1177	Belmont 110kV Substation Refurbishment	33.7	Feb 2007
Not Yet Approved			
CP.1265	Bowen Transmission Reinforcement	-	-

[79] PB Report, pages 55 and 62

Given that seven of the projects identified above have now been approved and are underway, or approval is imminent, Powerlink sees no reason for PB or stakeholders to be concerned about the AER's decision to also include updated expenditure levels for these projects in the 2007-12 opening RAB consistent with the AER's change to 'as-incurred' recognition of capital expenditure. Powerlink has already provided updated data to the AER in relation to the "assets under construction" forecast.

The eighth project, the Bowen Transmission Reinforcement, is a Powerlink-Ergon Energy Joint Planning project that was originally expected to be commissioned in 2008. Recent discussions with Ergon Energy indicate that while the project is scheduled to go ahead, due to delays associated with final commitment to extend the coal-handling facility at Abbott Point, the project is now targeted for commissioning one year later (in October 2009). Consequently, no expenditure is now forecast to be incurred on this project in the current regulatory period and the total capital cost should be transferred into future capex.

The AER should, in its Final decision, include the updated capex for the above seven projects in the WIP. Capex for the Bowen project ($56.7 million, nominal) should be included in future capex as shown in Table 4.1.

Table 4.1: Capex for CP.1265-Bowen Transmission Reinforcement

$m,(nom)	07/08	08/09	09/10	10/11	11/12	Total
	9.2	40.9	6.6	-	-	56.7

5. Opening Asset Base

The AER's Draft Decision notes that Powerlink's proposal to lock in and roll forward its RAB, with the inclusion of prudent expenditure on assets under construction, is consistent with the DRP and the SRP[80]. Powerlink has reviewed and corroborated the results of the roll forward calculations in Table 3.2 of the Draft Decision.

Powerlink observes that electricity consumers have benefited significantly from the change to the roll forward provisions under which network assets are now rolled forward at an indexed historical valuation, rather than the previous arrangement in which the asset valuation was based on modern day replacement costs.

Given the recent escalation in construction input costs, a valuation based on modern day replacement costs (DORC) would be substantially higher than the value which has actually been rolled forward in the Draft Decision.

Thus, the changed arrangements effectively deliver a large windfall gain (forever) for electricity consumers. The AER should be cognisant of this in its deliberations.

5.1 Change to AER Capex Accounting Methodology

While the roll forward of the RAB is technically in accordance with the Rules, Powerlink is concerned with the perceptions, impacts, and sensitivities that arise from the changes in regulatory accounting methodologies imposed on Powerlink by the AER. As highlighted in Powerlink's Revenue Proposal, because of the significant volume of capital works that Powerlink has underway at the present time to meet the high demand growth in Queensland, the change from a capitalisation-based RAB under the DRP to a capex-based RAB under the SRP will bring forward revenue associated with that expenditure by 1 – 2 years, while delivering no benefit to consumers and end users. Such a step change with no corresponding benefit will naturally draw the ire of those that have to fund the change, and they will seek reductions elsewhere in order to offset the price impact of the (discretionary) regulatory accounting change.

One potential target is the capital expenditure allowance. Such a response is a high-risk strategy given the requirement for Powerlink to maintain reliability standards in the current Queensland environment of a booming economy with high demand growth and high construction costs. Such an approach is effectively trading off reliability for a no-value regulatory accounting change – in essence, it treats the no-value regulatory accounting change as sacrosanct, whilst sacrificing reliability in order to deliver a "palatable" price path.

Powerlink understands that the AER has not reached a final position on the regulatory accounting change, and has, in the Draft Decision, used a "hybrid" approach which lessens the price impact of the regulatory accounting change by a small amount. However, the majority of the price impact remains.

Powerlink believes that, because of prevailing circumstances – high demand growth and high input costs, the AER should seriously consider either abandoning or deferring to the next period this no-value regulatory accounting change in its entirety. That decision would give primacy to reliability over a discretionary regulatory accounting change, and provide customers with the same level of reliability at a lower price.

Powerlink urges the AER to do so.

[80] AER Draft Decision, p 42.

6. Service Standards

A performance incentive scheme was developed by Sinclair Knight Merz (SKM) in 2003, when the service standards arrangements were first developed by the ACCC. As that work was relatively recent, the data had been checked by SKM and since Powerlink had never been subject to the measures and targets developed by SKM, Powerlink proposed that the SKM scheme be applied as part of this revenue cap determination.

PB's review of the service standards arrangements included consideration of additional data, in particular more recent data collected by Powerlink. PB and the AER rejected any consideration of applying the scheme developed by SKM, despite it never having been applied to Powerlink. PB's analysis of the data and recommendation regarding the targets, collars and caps have resulted in many of the recommended targets being more onerous than those determined by SKM in 2003. In particular, the network availability targets are significantly more onerous (up to 2%). Powerlink has been disadvantaged compared to other network businesses by the timing of its revenue cap determinations and the resultant timing of the performance incentive scheme being applicable to it. If more onerous targets are applied to Powerlink based only on recent historical data, then Powerlink's service performance levels have improved without it receiving the financial benefit of a performance incentive scheme. This makes it more difficult for Powerlink to continue to improve and makes Powerlink more susceptible to moving towards its previous performance levels. This should be taken into account in determining the targets for the service standards arrangements which will apply to Powerlink during the coming regulatory period.

A crucial principle of establishing a fair performance incentive scheme is using consistent data sets across the various measures. It is inappropriate to selectively use one approach for one measure, and a different approach for another measure, simply because the results do not align with expectations. For example, if historical averaging is the overall selected approach, then this approach should be applied to all measures within the scheme's development.

PB reviewed the scheme proposed by Powerlink and proposed alternative targets to be applied to Powerlink in the coming regulatory period. The AER accepted PB's recommendations in its Draft Decision. If the service standards targets, collars and caps are to be based on recommendations put forward by PB, then several aspects of the proposed scheme need specific attention and adjustment. Each of these is discussed in turn.

6.1 Historical Data Range

PB used historical data to determine the targets for each of the measures in the performance incentive scheme. PB's approach was based on averaging data from the four calendar years that Powerlink reported to the ACCC/AER[81], and applying offsets to account for the difference in the amount of project work Powerlink has to undertake in the two regulatory periods. PB selectively deviated from this approach in relation to the targets for loss of supply events. For this measure, PB used a longer period of historical data (nine years). Powerlink does not consider this difference in period for averaging of data is appropriate. Rather the period of historical data should be consistent for all measures – in this case the most recent four years.

PB's approach is inconsistent with the First Proposed Service Target Performance Incentive Scheme[82] which states that, *"proposed performance targets must be equal to the TNSP's average performance history over the most recent five years"*. The guideline issued by the AER clearly states that the data range for all measures should be the

[81] The data was provided to the ACCC/AER through regulatory reporting obligations even though the performance incentive scheme did not apply to Powerlink.
[82] First Proposed Service Target Performance Incentive Scheme, 31 January 2007, p5.

same period of time, i.e. the most recent five years. To determine a target for loss of supply events over a longer period than allowed for in the AER's own guideline would be inappropriate and inconsistent.

In addition, averaging over a longer period of time is inappropriate. Historical data prior to 2002 is not relevant to the current regulatory/electricity market or network/operating environment being faced by Powerlink. The performance incentive scheme is aimed at incentivising Powerlink to improve its performance and to respond to the present needs of users of its network. It must therefore reflect recent performance and drive changes which Powerlink can implement in a short timeframe.

Powerlink submits that consistency across the determination of the targets is appropriate. In setting Powerlink's targets for Measure 2 (frequency of loss of supply), the AER should use the same data period as the other measures: that is, the most recent four years. Targets based on this data are included in table 6.2.

6.2 Targets Capable of Being Achieved

6.2.1 Neutral outcomes

Based on PB's approach of determining the measure target by averaging historical performance, the target for the critical circuit availability measure is 99.37%. Due to the very high performance of this measure relative to the absolute maximum of 100%, Powerlink examined this measure in more detail. Statistical expertise was engaged to analyse the historical data and the targets proposed based on averaging. A normal distribution fit of Powerlink historic performance for critical circuit availability is such that a significant part of the distribution is higher than 100%.

Powerlink engaged statistical expertise from the Queensland University of Technology (QUT) to analyse the data for availability and provide advice on the neutrality of using historical averages for setting targets. The result of QUT's analysis is included in Appendix F[83]. QUT assessed that 13.62% of the distribution for critical circuit availability exceeded 100% resulting in a higher probability of getting a penalty than getting a bonus[84]. Powerlink considers this outcome would be inconsistent with the AER's aim of a revenue neutral outcome[85].

Powerlink also requested QUT determine an adjustment mechanism for critical circuit availability which would result in a revenue neutral outcome. QUT's proposed adjustment is shown in Table 6.1 and documented in their report[86]. Powerlink proposes that this offset be applied to the target for critical circuit availability.

The target based on this data is detailed in the table below.

Table 6.1: Adjustment to Measure 1a. Critical elements availability

Measure	Average 2002-05 %	Neutrality Adjustment %	Allowance for New Works %	Proposed Target %
Availability – Critical Elements	99.36	0.10	0.24	99.02

6.2.2 Meaningful targets

In the development of targets, PB has used a pure averaging calculation of historical performance. This calculation results in non-whole numbers as the targets. In the case of Measure 2 (frequency of the loss of supply – LOS), there cannot be a fraction of an

[83] QUT Paper – Proposed Change to Service Standards Sub-measure 1a Transmission Circuit Availability – Critical elements, February 2007, (Appendix F).
[84] QUT Paper – Proposed Change to Service Standards Sub-measure 1a Transmission Circuit Availability – Critical elements, February 2007, p3. (Appendix F).
[85] AER Draft Decision Queensland Transmission Revenue Cap 2007-08 to 2011-12, p158.
[86] QUT Paper – Proposed Change to Service Standards Sub-measure 1a Transmission Circuit Availability – Critical elements, February 2007, p3. (Appendix F).

event. Either an event occurs, or not. Therefore, annual performance outcomes will always be, and have always been, whole numbers of events. Powerlink therefore considers that the targets for the two LOS measures should be rounded to the nearest whole number.

With the inclusion of all historical events >0.2 system minutes and the allowance for new works, the average of the past four years equals 6.67. Rounding results in a target value of 7. While this target represents an accurate mathematical result, Powerlink considers that an alternative method would be to re-introduce a deadband into this measure. Powerlink proposes that a deadband range of 6 to 7 produces a fair outcome for this measure. In line with PB's approach, a symmetrical collar and cap is proposed to apply.

Targets based on this data are included in table 6.2.

6.3 Data Exclusion

In their evaluation of Powerlink's historical data, PB identified two LOS events greater than 0.2 system minutes that, in their opinion, complied with the criteria of excluded events under the current Service Standards Guidelines[87]. Both of these events occurred during the calendar year of 2003. Powerlink's interpretation and subsequent application of the current Guidelines differ from PB's, with Powerlink considering that these events were not extraordinary and were correctly included in the performance history. A summary of the details is provided below:

- February 2003 – Collinsville - Mackay Tee Proserpine 132KV Feeders tripped during a thunderstorm. Loss of supply to T39 Proserpine Substation.

  The February 2003 LOS event was not excluded from the results as Powerlink considers that transmission line outages due to storm and lightning activity are a common occurrence and that while a double circuit outage is unusual, it does happen. This issue is more related to the probability of an occurrence as opposed to accountability. In Queensland, it is not unusual for storm (lightning) activity to cause the de-energisation of an intact transmission line (e.g. with effective overhead earthwires). In this particular event, both circuits were de-energised simultaneously. If this event is excluded, then all lightning-related LOS events should be excluded, irrespective of the configuration of the network (i.e. single or double circuit). Accordingly, Powerlink does not consider that this event should be excluded.

- March 2003 – Inadvertent operation of protection scheme. Loss of supply to Gympie substation.

  The March 2003 LOS event involved the performance of Powerlink's network impacting on the capability to supply Energex's Gympie substation. Powerlink's methodology of attributing events is that if Powerlink equipment is the root cause of the event, regardless of what made it operate, then the event is attributed to Powerlink. This premise underlies the historic data for all measures within the performance scheme. Powerlink considers that this is a reasonable approach for accountability.

PB[88] discusses in some detail the issues of accountability of calculating events, under the aspect of network availability. PB appears to have applied the same logic to exclude loss of supply events. Powerlink considers availability and loss of supply have fundamentally different calculation methods and therefore the logic for excluding events is different.

Measuring availability and measuring loss of supply events has one significant difference – availability is based on calculations using the total number of circuit elements available as a denominator whereas LOS events have no such calculation. To clarify, when

[87] AER Compendium of Electricity Transmission Regulatory Guidelines, August 2005.
[88] PB Report, p170.

calculating the availability measure it is important to identify only network circuit elements owned by Powerlink to be included in the calculation. When determining the LOS event measure, the issue is whether Powerlink fulfilled its obligation to supply a load, not whether the circuit element affected was Powerlink's or a third party's. Furthermore, using PB's logic, whether a LOS event was attributed to Powerlink depends on which circuit breaker operated (which depends on the protection scheme). This introduces variables which Powerlink believe are beyond the intent of the incentive scheme. That is, that a TNSP should be held accountable and measured for performance for the way it operates and maintains its network. PB's approach in this instance does not align with this premise.

Powerlink considers that it is not appropriate to exclude the two loss of supply events recommended by PB. Those events should be included in the Powerlink historical data used to derive the service level targets. Alternatively, the AER should provide Powerlink with future exclusions for similar events. Either of those approaches is internally consistent – the approach in the Draft Decision is not.

6.4 Overall Scheme

6.4.1 Setting collars and caps

Powerlink's proposal for the service standards scheme included targets, collars and caps, and deadbands that were in line with the scheme parameters established by SKM, as previously discussed. PB has proposed removal of all deadbands from the measures' parameters. While Powerlink is not opposed to the removal of the deadbands it should be noted that this potentially removes some neutrality from the measures and increases the 'sharpness' of the impact of the measures. Powerlink considers the use of a dead band in relation to the frequency of 0.2 system minute loss of supply events is appropriate given Powerlink's performance history.

Additionally, as a result of PB's review into target setting, the collars and caps have also been recalculated by PB. Overall, the approach taken by PB in setting the collars and caps seems reasonable. However, there are some inconsistencies in the manner in which PB determined the collars and caps. In relation to ramping factors[89], PB recommends using *"about two standard deviations of the historical data"* to avoid natural variations leading to significant revenue swings[90]. PB also advises that *"to use a lesser standard deviation is not recommended"*[91]. However, it appears that PB has proposed collars and caps at values lower than two standard deviations. Powerlink has therefore recalculated collars and caps based on two standard deviations as discussed by PB. These are included in the summary table 6.2.

[89] PB Report, p189.
[90] PB Report, p189.
[91] PB Report, p189.

6.4.2 Proposed measures

Powerlink's proposed scheme for service standards is shown in Table 6.2 below. These targets, collars, caps and weightings should be adopted by the AER in its Final Decision.

Table 6.2: Powerlink's proposed service standards measures

Measure	Unit	Weighting %	Max Penalty	Start Penalty	Target	Start bonus	Max Bonus
1a. Availability – Critical Elements	%	15.5	97.89	99.03	99.03	99.03	99.60
1b. Availability - Non-critical Elements	%	8.5	98.17	98.53	98.53	98.53	98.88
1c. Availability Peak Hours	%	15.5	97.89	98.27	98.27	98.27	98.66
2a. Loss of Supply > 0.2 sys mins		15.5	10	7	7	6	3
2b. Loss of Supply > 1.0 sys mins	No.	30.0	4	1	1	0	0
3. Average Outage Duration (capped 7 days)	Min	15.0	1714	940	940	940	166

7. Cost of Capital

7.1 Debt Raising Costs

In its Draft Decision, the AER decided that an allowance of 8.1 basis points per annum for debt raising costs was a reasonable benchmark for Powerlink. The AER reached this conclusion on the basis of the Allen Consulting Group (ACG) methodology provided in a report to the ACCC in December 2004[92], updated for current publicly available data.

Powerlink maintains that such an allowance is too low and is clearly contrary to overwhelming recent regulatory practice.

Table 5.1 of Powerlink's Revenue Proposal contained information on recent Australian regulatory decisions in relation to debt raising costs. This table, reproduced below (table 7.1), highlights a clear inconsistency/disconnect between recent regulatory allowances for BBB+ rated entities of 12.5 basis points and the AER's draft allowance for Powerlink of 8.1 basis points – also a BBB+ rated entity for the purposes of its revenue cap determination. As indicated, the majority of the regulatory decisions provided below were made subsequent to the AER's decision to apply the new methodology.

The AER's lower draft allowance for Powerlink suggests that the evidence considered by five other state regulators was incorrect, that these regulators reached decisions that did not reflect good regulatory practice, or both.

Table7.1: Recent Australian Regulatory Decisions – Debt raising Costs

Regulator/Year	Service	Allowance	Credit Rating
ERA (Jul 2005)	Gas distribution (AlintaGas)	12.5	BBB+
ICRC (2004)	Gas distribution (ActewAGL)	12.5	BBB+ to A
IPART (Apr 2005)	Gas distribution (AGL)	12.5	BBB to BBB+
IPART (Nov 2005)	Gas distribution (Country Energy)	12.5	BBB to BBB+
ESC (Oct 2005)	Elect distribution (5 businesses)	12.5	BBB+
ESCOSA (Apr 2005)	Elect distribution (ETSA Utilities)	12.5	BBB+
ICRC (2004)	Elect distribution (ActewAGL)	12.5	BBB+
IPART (2004)	Elect distribution (4 DBs)	12.5	BBB to BBB+
QCA (Apr 2005)	Elect distribution (Energex/Ergon)	12.5	BBB+
ACCC (2005)	Elect transmission (TransGrid)	8	A
ACCC (2005)	Elect transmission (EnergyAustralia)	9	A
QCA (May 2006)	Gas distribution (Allgas)	12.5	BBB+
QCA (May 2006)	Gas distribution (Envestra)	12.5	BBB+
ERA (Nov 2005)	Gas transmission (DBGNP WA)	8-12.5	BBB+
ERA (May 2005)	Gas transmission (Goldfields Gas)	8-12.5	BBB+
ACCC (2003)	Elect transmission (Transend)	10.5	A
ACCC (2002)	Elect transmission (SPI Powernet)	10.5	A
ACCC (2002)	Elect transmission (ElectraNet)	10.5	A

[92] Allen Consulting Group (2004), Debt and Equity Raising Transaction Costs, Final Report, Report to the Australian Competition and Consumer Commission, December.

Powerlink requested ACG to review the methodology to update the benchmark allowance and the conclusions reached by the AER from the ACG report. The advice from ACG is attached in Appendix G. As acknowledged by ACG itself in both its 2004 report and the attached advice, the empirical analysis upon which the debt raising cost benchmark was based was subject to a number of important limitations. In particular, these included that:

- a very small number of observations were used to derive the benchmark;
- there was an absence of reliable and publicly available information on fees and other costs associated with raising bond market debt;
- the information upon which the benchmark was based related to US, not Australian, data; and
- the analysis assumed that Australian fee structures were not materially different to that in the US.

Powerlink also notes that since completing the 2004 study, ACG has continued to recommend that the regulatory benchmark of 12.5 basis points for debt raising costs be applied and that there is no compelling basis for departing from this allowance.

In light of recent evidence, a lack of persuasive evidence to the contrary and the attached recommendation from ACG, Powerlink remains of the view that the AER should adopt a benchmark debt raising cost allowance of 12.5 basis points per annum.

The AER should therefore adopt a benchmark debt raising cost allowance of 12.5 basis points per annum in its Final Decision.

7.2 Debt Refinancing Costs

Powerlink's Revenue Proposal argued that it is prudent for a regulated business to refinance its existing debt portfolio over the same period as that used to set the risk-free rate to ensure that the business' actual and regulated cost of debt are closely aligned. In support of this concept, Powerlink provided independent advice from Westpac which estimated that an additional 5 to 10 basis points premium would be required to achieve a debt refinancing deal size of $1.5 billion, as would be required to be undertaken by Powerlink. This range was based upon Westpac's analysis of 59 *actual* book build deals undertaken between 2002 and 2005. Consistent with this analysis, Powerlink added a 7.5 basis point margin to the debt margin.

In its Draft Decision, the AER disallowed Powerlink the additional 7.5 basis points clearing spread on the grounds that the 8.1 basis points per annum allowance for debt raising costs already includes a component for gross underwriting fees. Specifically, the AER claimed that:

> *"… ACG stated that the underwriting fee represents a reward for risk taken by the underwriter. The underwriting would involve a book build to determine the market clearing price. If the issues were not sold or cleared, the underwriter would take it up and guarantee proceeds to the issues.*[93]*"*

Powerlink contends that the AER has materially misunderstood the information provided in ACG's report, and that the underwriting fees included in the 8.1 basis points allowance *do not* relate to underwriting in the sense of risk taking. ACG was explicit on this issue in its explanation of the capital markets debt fee structure, where it stated that:

> ***"Underwriting Fee:*** *This component can be specified separately or expressed together with the lead manager/arranger fee. Traditionally, as in stockbroking, the underwriting fee represented a reward for risk taking. If the issue were not sold, the underwriter would take it up and guarantee*

[93] AER (2006), Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12, Draft Decision, p106.

> *proceeds to the issuer. With 'best efforts' underwriting, a 'bookbuild' is undertaken to determine the market-clearing price …. The underwriting fee will have some fixed elements, such as the writing of an IM. However, there will also be variable cost elements that rise with the difficulty of the deal. Larger transactions will require greater effort as there will be more parties involved in terms of selling agents and investors.*[94]*"*

ACG's discussion of underwriting fees clearly indicates that pricing pressure created by a very large bond issue in the Australian market was *not* considered in its analysis and that there are likely to be diseconomies of scale in making bond issues. Consequently, this would cause large bond issues to have a higher transaction cost than optimally sized bond issues.

The AER has also failed to acknowledge that one of the major shortcomings of the derived benchmark 'gross underwriting fee' is that it was based on Bloomberg data for Australian company issues in the US market - where a $1.5 billion issue would not present market pressure problems that would be evident in the Australian market. In other words, the benchmark does not capture the effects associated with the relative small size, lack of depth and constraints experienced in the Australian debt market.

In contrast to the AER's view, Westpac's analysis of Australian book builds of bond issues is *not* a transaction cost charged by investment banks, ratings agencies and lawyers to undertake bond issues. Instead, the market clearing prices attained through book builds for optimally sized bond issues are akin to points on the fair yield curve estimated by CBASpectrum and Bloomberg. The fair yield curve is based upon all bonds being traded in the market and assumes that no market pressure is being exerted. Therefore, the additional clearing spread margin of 5-10 basis points represents an adjustment to the fair yield curve and not the debt raising transaction cost allowance as is suggested by the AER.

Powerlink is strongly of the view that the AER has incorrectly interpreted ACG's methodology for establishing 'gross underwriting fees'. Having demonstrated that the AER's benchmark does not incorporate costs associated with determining a market clearing price for large bond issues, Powerlink remains of the view that an upwards adjustment of 7.5 basis points to the debt margin is both appropriate and required.

The AER should therefore include an upwards adjustment of 7.5 basis points to the debt margin in its Final Decision.

7.3 Interest Rate Risk Management (Hedging) Costs

In its Draft Decision, the AER decided not to provide an allowance for future interest rate risk associated with the progressive borrowing of funds as it considered that interest rate risk was already factored into the equity beta.

Powerlink acknowledges that, under the CAPM framework, investors are compensated for market (non-diversifiable or systematic) risk by means of beta. The model also assumes that investors will not be compensated for risks they can cost effectively avoid through diversification. Therefore, in theory, to the extent that interest rate risk is considered non-diversifiable, this risk should be captured in the WACC. However, in practice, Powerlink is not aware of any evidence that demonstrates the CAPM framework appropriately values interest rate risk, particularly in the case of regulated utilities.

Powerlink notes that a recent empirical investigation of traded property stocks which applied the Arbitrage Pricing Model (APT) concluded that:

> *"… the interest rate risk of property stocks is systematic and is priced in the APT framework.*[95]*"*

[94] Allen Consulting Group (2004), Ibid, p37-38.
[95] K H Liow, J Ooi and L K Wang (2003), 'Interest Rate Sensitivity and Risk Premium of Property Stocks', *Journal of Property Research*, Volume 20, No. 2, June, p117.

A study of stock returns by Professor Michael Ehrhardt also found that while interest rate sensitivity is present in virtually every industry, it is particularly strong in utilities and financial institutions. Professor Ehrhardt concluded that:

> *"In particular, interest rate sensitivity is related to systematic market risk, as measured by CAPM beta. Because interest-rate sensitivity is related to beta, naïve ranking on the basis of beta will not diversify away interest-rate risk. Cross-sectional tests are performed to identify any premium for bearing interest-rate risk. The results of these tests are inconclusive.[96]"*
>
> *"It is not clear, then, whether securities are also compensated for bearing interest-rate risk. However, results from this study period do not provide evidence that securities are compensated for interest rate risk.[97]"*

The results showed that over the 16-year study period, the inclusion of interest rate risk *as well as* beta risk was superior in explaining the distribution of share price movements. This implies that if only the CAPM beta was relied upon in conjunction with a market risk premium to define required returns, the calculated required return for investment is not likely to be sufficient to attract investment.

The aforementioned study by Liow et al demonstrates that the APT model *does* appear to price interest rate risk, at least for real estate stocks whose prices (like regulated utilities) are inversely related to interest rates. However, there is no evidence specifically in relation to regulated utilities which shows that the framework which underpins energy infrastructure regulation in Australia – the CAPM framework - actually does the same.

In the absence of any evidence to verify the ability of the CAPM framework to adequately compensate regulated businesses for interest rate risk, Powerlink believes that that AER must make allowance for costs associated with hedging against interest rate changes. As provided in its Revenue Proposal, Powerlink seeks compensation in the amount of $4.98 million total ($06/07) to be treated as an additional operating cost line item.

The AER should therefore include an allowance for interest rate risk management costs in its Final Decision.

7.4 Equity Raising Costs – 2001 Opening Asset Base

The AER considers it is not appropriate to provide Powerlink with an equity raising cost allowance associated with its 2001 regulated asset base (RAB) on the grounds that Powerlink did not request such an allowance in its 2001 revenue cap application and that it proposed to lock-in and roll forward its 2001 RAB in its current revenue proposal. These issues are addressed in turn.

2001 Revenue cap application

For clarification, Powerlink did not seek an allowance for equity raising costs in its 2001 revenue application as the *Draft Statement of Regulatory Principles* (the regulatory framework under which the application was prepared), provided no mention or avenue upon which such costs could be sought. Similarly, ElectraNet did not seek an allowance for equity raising costs (or debt raising costs) in its last revenue application. ElectraNet did seek an allowance for equity raising costs as a result of the timely release of the ACCC's decision on GasNet – which occurred between the release of, and ElectraNet's response to, the ACCC's draft decision on ElectraNet's revenue cap application. In this instance ElectraNet's failure to include such allowances in its revenue application did not pose a problem for the ACCC, who subsequently decided to include an allowance of 0.207 per cent per year of regulated equity (or $0.748 million over the regulatory period) in ElectraNet's final revenue decision. It is inconsistent that the AER would now choose not to consider an allowance for Powerlink on the basis that it was not included in Powerlink's 2001 revenue cap application.

[96] Michael Ehrhardt (1991), 'Diversification and Interest Rate Risk', *Journal of Business Finance and Accounting*, Volume 18, January, p43.
[97] Ibid, p56.

Powerlink proposal to lock in and roll forward asset base

In response to the AER's second point above, Powerlink agrees that a reopening of its capital base would create uncertainty for investors. This is precisely why it proposed that such costs be compensated by means of an additional allowance within operating costs. Given the AER's initial position not to re-open the RAB, the issue of whether compensation could be provided through an alternative mechanism was not explored.

The AER justified its position not to re-open the RAB on the basis that its view was supported by ACG's report. In particular, that once the regulated RAB had been established that this value be preserved, nothwithstanding current views on equity raising transaction costs. To put the ACG comments cited by the AER (underlined) in context, the full text is provided as follows:

> *"If the regulatory asset value for a regulated entity has already been established, we do not consider it necessarily appropriate to now include an allowance for the transaction cost of raising equity in the starting asset value, but rather consider that it is a matter that the Commission would need to consider on its merits. By way of example, if a regulatory asset value had been established in a previous regulatory decision and a clear signal was provided that the starting value would just be 'rolled-forward', then it would be appropriate to preserve the starting value rather than reopening it – including to reopen it to reflect current views on the transaction costs of raising equity.*[98]*"*

The AER has failed to acknowledge that ACG also considered that where the RAB has already been established, the regulator would need to consider the issue on its merits. Where there was justification for an equity raising transaction cost allowance to be made, ACG's preference was for equity raising transaction costs to be capitalised and subsequently amortised. However, ACG also acknowledged that the same result could be achieved through a direct allowance in the cashflows.[99] Powerlink also notes that the ACCC's previous decisions in relation to ElectraNet and SP AusNet also treated equity raising costs as an operating cost allowance.

The AER has also ignored ACG's reference to situations where the RAB had been established:

> *'… and a clear signal was provided that the starting value would just be rolled-forward ….'*

No such signal was provided to Powerlink at the time of its 2001 revenue determination. The decision to lock-in and roll-forward the RAB was not made until December 2004, with the finalisation of the *Statement of Principles for the Regulation of Electricity Transmission Revenues*.

Powerlink considers that the AER's reasons for not allowing an equity raising transaction cost allowance at all, including by way of an operating expenditure allowance, are not valid. Consistent with its Revenue Proposal, Powerlink firmly believes that it is entirely appropriate and reasonable for it to be compensated for the non-inclusion of equity raising costs in its 2001 RAB through an annual operating cost allowance consistent with ACG's 3.83% transaction cost benchmark.

The AER should therefore reverse its decision in relation to equity raising costs on Powerlink's 2001 opening asset base in its Final Decision.

[98] Allen Consulting Group (2004), Debt and Equity Raising Transaction Costs, Final Report, Report to the Australian Competition and Consumer Commission, December, pix.
[99] Ibid, px.

7.5 Equity Raising Costs – Subsequent Capex

In its Draft Decision, the AER has disallowed any provision for equity-raising costs associated with Powerlink's capital expenditure in either the current or next regulatory periods. The reasons given by the AER for this decision are set out below:

- that, consistent with the 'Pecking Order Theory' of capital structure, the necessity for equity to be issued would only occur in circumstances where the debt capacity of the business had been exhausted and financial distress threatened;
- that there is no (*actual*) evidence to suggest that Powerlink will face financial distress during the current and next regulatory periods; and
- that Powerlink's *actual* gearing and financing behaviour in the past is well below the regulatory benchmark of 60 per cent.

First and foremost, Powerlink is very concerned that the AER has introduced evidence of Powerlink's actual financial position and actual financing behaviour in justifying its position on this issue. Within the context of a benchmark regulatory framework, it is fundamental that Powerlink's (or for that matter, any other regulated entity's) actual financing arrangements are irrelevant.

To provide expert opinion on this matter, Powerlink commissioned ACG to test the validity of the 'Pecking Order Theory' in relation to its regulated business. Specifically, Powerlink requested ACG to determine:

- the quantum of equity funds a transmission business in its position would need to raise to finance its capital expenditure program in the next regulatory period consistent with the AER's benchmark financing arrangements; and, if so,
- the transaction costs that would be incurred to raise the equity funds.

ACG's advice in relation to this matter is attached to this response as Appendix H. An initial and important observation made by ACG was that the forecast increase in Powerlink's capex program over the next regulatory period ranged between 14.1-6.8 per cent of RAB. Therefore:

> *"Given the relatively fast rate of growth of capex relative to RAB, it is not obvious that a firm with benchmark financing arrangements could raise the required capital without new issues.*[100]"

To determine whether equity funds would be required by Powerlink over the next regulatory period, ACG developed a model which applied the regulatory asset base, cost and revenue allowances contained in the AER's Draft Decision. A benchmark gearing assumption of 60 per cent was also applied as well as tax liabilities consistent with a gamma of 0.5 and a cost of debt of 6.82 per cent, as provided in the Draft Decision. ACG's analysis also assumed a benchmark dividend yield of 8 per cent calculated with reference to regulated utility performance statistics.

The results of ACG's modelling showed that:

> *"A firm with benchmark financing arrangements and with Powerlink's capital expenditure program would exhaust internal equity funds over the next regulatory period and be required to raise between $60 and $158 million annually from external sources, totalling $541 million over the next regulatory period.*[101]"

Having established that Powerlink would require total equity funding of $541 million during the next regulatory period, ACG estimated that total equity raising transaction costs in the amount of $16.2 million would be incurred. This estimate was based on the

[100] Allen Consulting Group (2007), Estimation of Powerlink's SEO Transaction Cost Allowance, Memorandum to Powerlink Queensland, January, p5.
[101] Allen Consulting Group (2007), Estimation of Powerlink's SEO Transaction Cost Allowance, Memorandum to Powerlink Queensland, January, p1.

assumption that equity funds would be raised through a Seasoned Equity Offering (SEO) and that an SEO transaction cost benchmark of 3 per cent would be applied, consistent with its previous advice to the ACCC.

In terms of how the transaction costs of raising the required equity could be recovered, ACG considered that this could occur by way of an addition to the regulated asset base or, alternatively, as an annuity equivalent stream included as an operating expense item.

In light of ACG's advice, Powerlink considers there is clear evidence before the AER to demonstrate that retained earnings and additional borrowings are insufficient to fund its significant capital works program in the next regulatory period. Therefore, consistent with the benchmark approach, Powerlink believes the AER must provide for full recovery of equity raising transaction costs associated with the capital expenditure values determined in its Final Decision.

Based upon the advice and modelling applied by ACG in relation to capital expenditure requirements in the coming regulatory period, Powerlink applied the same approach to its capital expenditure program during the current regulatory period. The analysis indicated that an SEO transaction cost allowance would not be required for the current period. Therefore, Powerlink no longer seeks an equity raising cost allowance in relation to capital expenditure undertaken during this regulatory period.

7.6 Inflation

The AER and other regulators have historically derived inflation rate forecasts on the basis of the difference between the Commonwealth nominal bond rate and inflation indexed bond rate. Consistent with this approach, the AER has derived an inflation forecast of 3.15 per cent for Powerlink's Draft Decision.

However, Powerlink notes that there is growing concern among the economics and financial community that the methodology employed by regulatory authorities may not provide an accurate estimate of forecast inflation. For example, in its *Statement of Monetary Policy*, the Reserve Bank of Australia noted the tendency for inflation forecasts developed under this approach to be an overestimate, as follows:

> *"The implied medium-term inflationary expectations of financial market participants have traditionally been calculated as the difference between nominal and indexed bond yields. This measure has continued to edge higher since the February Statement, to be around 3.2 per cent in early May. However, this rise in part reflects developments in the indexed bond market that are unrelated to inflation expectations. In particular, the limited supply of indexed securities and increasing institutional demand for these securities has pushed down their yields relative to those on conventional bonds."* [102]

Analysis by independent experts to identify the extent of any bias in regard to this issue is currently being sought, with an expected timeframe for completion of mid-April 2007. This information will be provided to the AER once it becomes available.

Given that this new development could potentially have significant implications for Powerlink's final revenue determination, Powerlink believes the AER should give due consideration to this issue in reaching its Final Decision.

[102] RBA (2006), Statement on Monetary Policy, 5 May.

8. Supplementary Revenue Proposal

On 15 December 2006, Powerlink submitted a Supplementary Revenue Proposal to the AER. The proposal contained new and relevant information related to Powerlink's future expenditure requirements which must be considered by the AER in reaching its Final Decision on Powerlink's revenue cap for the coming regulatory period.

Powerlink had to take the unusual step of submitting a Supplementary Revenue Proposal. The combination of the current volatile market for construction costs and changes to critical assumptions, combined with the ex-ante capex framework, has given rise to Powerlink's need to have the matters in the Supplementary Revenue Proposal taken into account by the AER in it's Final Decision. The supplementary proposal identifies the need for capital and operating expenditure changes arising as a result of the following factors:

- higher input costs on assets under construction – additional $156 million;
- higher input costs on future capital projects – additional $126 million;
- changes in timing of future capital projects resulting from a higher 2006 load forecast – additional $129 million;
- changes in the probability of network upgrades due to delayed generation from the PNG pipeline – additional $57 million;
- expenditure to provide high speed monitoring facilities for NEMMCO – additional $2 million; and
- central – southern grid section changes to development plan provided to PB – reduction of $41 million.

It is important that these matters are addressed by the AER in determining Powerlink's revenue cap for the coming regulatory period. Other relevant information is provided here to inform the AER, other interested parties and consultants engaged by the AER to review these proposed adjustments.

8.1 Assets Under Construction

The construction industry in Queensland is currently experiencing a period of very high activity. There are daily reports of cost blowouts brought about by increased input costs, both materials and labour. Many organisations are continuing with projects despite the large increases in costs of construction presumably because they are still delivering the required returns through higher revenues.

There is regular reporting of recent cost blowouts in the current construction environment. Some examples are:

- Ipswich motorway – 19 km for $1.1 billion in 2004 versus 8km for $1.1 billion in 2007;
- PNG pipeline (now shelved) - $US4 billion June 2006 following FEED investigations up 37% to $US5.5 billion in February 2007 (8 months later);
- BHP Yabulu nickel refinery under construction – 20% cost blowout to $556 million;
- Rio Tinto Clermont coal mine - $440 million in 2004, now more than double at $950 million in early 2007;
- BHP Billiton Ravensthorpe nickel project is about 100% over budget;
- Alcan Gove alumina refinery – capital cost up $500 million, 25% increase on the $2 billion project despite sourcing components from low cost countries;

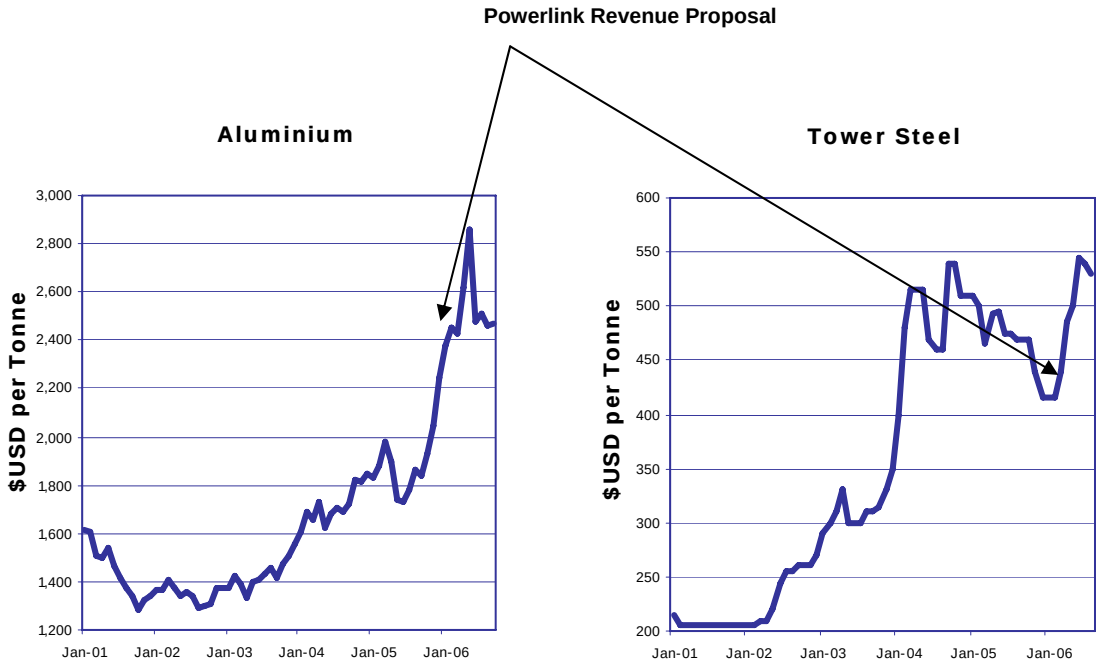
- Woodside Petroleum Karratha LNG – up $420 million, 20% rise despite efforts to source plant off shore; and

- Oxiana's Prominent Hill mine – up $370 million, a 100% increase on 2004 estimate and 50% increase on 2005 estimate.

Powerlink has updated its expected final cost estimates to reflect increases in input costs experienced since the original cost estimates were prepared (in the latter part of 2005). The level of increases being experienced by Powerlink vary but are within the range of increases being reported by other organisations. During this period, the market has seen significant increases in a number of input materials central to the construction of electricity transmission infrastructure. For example, the cost of tower steel has increased by at least 15%, copper by 100% and aluminium (used to manufacture conductor) has risen by 40%.

To illustrate the extent to which Powerlink is exposed to higher input costs, Figure 8.1 below show movements in the cost of tower steel and aluminium since submission of its revenue proposal in April 2006. These input cost increases are particularly relevant since aluminium and steel comprise approximately 25% and 33% of transmission line costs, respectively.

Figure 8.1: Aluminium and Tower Steel prices



In addition to materials cost increases, Powerlink and its contractors are encountering upwards pressure in labour costs in order to attract and retain the skilled labour resources necessary to construct its projects, particularly those in areas where mining, rail and port upgrades are underway. The impact of the construction boom on labour costs is real and is now being widely and frequently reported.

Access Economics Investment Monitor September 2006 reported:

> *"A lack of skilled tradespeople to fill the growing number of jobs on offer means wages pressures in those industries. Mining companies need to pay higher labour costs, thereby adding to the overall construction bill, or simply extend the timeframe of construction owing to unavailability of resources. Either way, construction will continue to suffer through the kind of cost blow-*

outs and time delays that we have already begun to witness in many projects around Australia."[103]

As noted by the Reserve Bank in its November 2006 *Statement on Monetary Policy*[104]:

'… while labour shortages remain most pronounced among skilled workers in the non-residential construction, resource and business services sectors, shortages are widespread across most industries and skill levels'; and

'According to the NAB survey, concerns about the availability of suitable labour intensified further in the September quarter and this remains a greater constraint on firm activity than the more traditional concern of lack of demand. These conditions are prompting firms to offer a range of non-wage incentives to attract and retain staff.'

National Australia Bank's Monthly (Nov 2006) Business Survey[105] also reported that:

'… in the year to November, wage growth has accelerated to 7.2 per cent in both mining and communications. Construction also continues to report rapid wages growth of around 6.4 per cent per annum ….'

Like many other industries, the widespread skills shortage has meant that Powerlink and its contractors have had to meet the market in terms of wage rates to ensure that its projects can be constructed in the timeframes required to maintain reliability of supply. This is not to say that labour is secured at any cost. However, by necessity, this means that Powerlink must meet the prevailing labour costs in the current sellers market.

8.2 Future Capital Projects

As a result of Powerlink's recent experience in obtaining capital cost estimates on transmission line and substation projects, there has been an obvious and genuine need to revise its unit costs for future capital projects. This exercise is particularly necessary given the ex-ante framework under which Powerlink's revenue proposal is being assessed, as there is no practicable opportunity to re-open the revenue cap for cost increases sustained within-period.

In the context of the current escalating cost environment, which shows no sign of abating, coupled with the high population and economic growth rates facing Queensland, Powerlink must ensure that it takes all reasonable and prudent measures to ensure that its mandated reliability and other legislative obligations can be met.

Powerlink believes that the ex-ante capital expenditure framework requires that adequate provision for cost escalation be incorporated for the whole regulatory period.

8.3 Generation from PNG Gas Pipeline

The PNG Gas Project has recently been shelved following a period of review following AGL's decision to withdraw from the Front End Engineering and Design (FEED) activities on the Australian component of the gas pipeline.

A press release on 1 February included the following statement from the participants:

"The PNG Gas Project participants have recently completed an intensive review of the development options for the PNG Gas Project …. In light of the superior returns that may be achieved from these alternative opportunities, the PNG Gas Project participants have agreed to suspend work on the Project …"[106]

[103] Access Economics Investment Monitor, September 2006, p6.
[104] Reserve Bank of Australia (2006), Statement on Monetary Policy, November.
[105] National Australia Bank (2006), *NAB's Monthly Business Survey – November 2006*.
[106] Oil Search web site www.oilsearch.com, Press Release, 1 February 2007.

There has been widespread reporting of the suspension of the PNG Gas Project, including in a joint statement from Peter Beattie, Premier of Queensland and Minister for Trade and Anna Bligh, Deputy Premier, Treasurer and Minister for Infrastructure.

The PNG project is now not expected to result in any associated generation developments in the Townsville area during the next regulatory period. The implication of this new information is that Powerlink believes the PNG theme set contained in its probabilistic capital project scenarios should be assigned a zero per cent (as opposed to the assumed 50 per cent) probability of occurrence in the next regulatory period. It should be noted however that this does not result in no generation in Townsville or north Queensland being considered as part of the scenario based capital expenditure forecast undertaken by Powerlink. There are still some high growth scenarios which include generation planting in Townsville and all carbon tax themes have widespread generation in north Queensland at sugar mills.

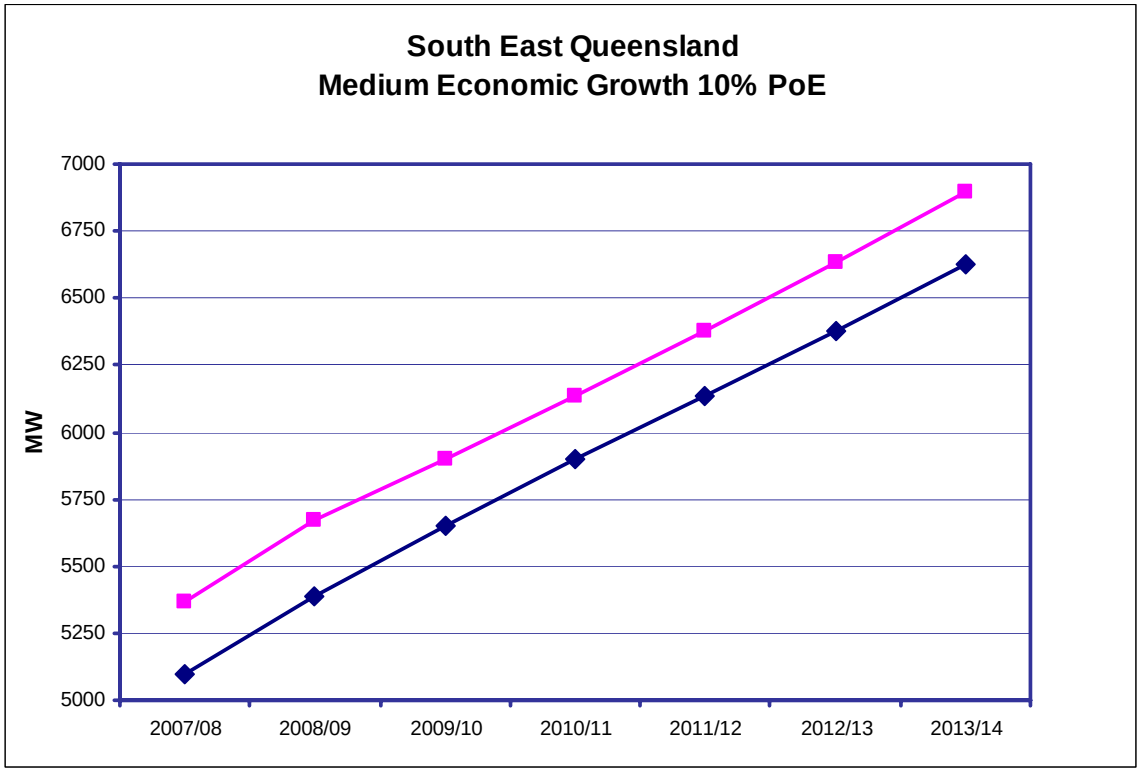
The impact of this revised assumption has been determined by changing the probabilities of the scenarios only. No changes have been made to the development plans within scenarios as a result of the change in the PNG Gas Project. The impact of the changes in the probabilities on the total probability weighted capex is an additional requirement of $57 million over the next regulatory period.

8.4 2006 Load Forecast

Powerlink's Revenue Proposal was formulated on the 2005 demand forecast. Since then, Powerlink has received and published in its 2006 Annual Planning Report, new information from the Queensland distributors, generators and other connecting parties on the 2006 demand forecast.

The upshot of the 2006 demand forecast is that there is approximately one-year advancement in demand levels in some sections of Powerlink's network. In other words, for some areas of the State a certain level of peak demand now occurs one year earlier in the 2006 forecast than it did in the 2005 forecast (see Figure 8.2 below). Consequently, there is a need for Powerlink to change the timing of certain network augmentation works compared to its original revenue proposal. Some projects come forward in time and other projects are delayed depending on the exact nature of the limitations, the forecast demand growth and the economics of the solutions.

Figure 8.2: South East Queensland Medium Economic Growth 10% PoE



Powerlink has reviewed the major grid sections and revised the network development plan for each generation scenario on the basis of the 2006 demand forecast. A full review of the plan down to the level of each connection with the distributors was not undertaken as part of this review. As a result of the 2006 demand forecast review the revised probability weighted capex forecast is $129 million higher.

8.5 Other Matters

Powerlink has also provided information regarding other matters in its Supplementary Revenue Proposal. In particular:

- additional requirements to provide high speed monitors required by NEMMCO;
- capital expenditure associated with the Tugun desalination plant; and
- changes to the trigger associated with changing generation which changes the requirements for augmentation of supply to south east Queensland.

These matters also need to be included in the AER's Final Decision.

Appendix A

Review of Replacement Network Capex

POWERLINK REVENUE CAP 2007-08 TO 2011-12

AER DRAFT DECISION

REVIEW OF REPLACEMENT NETWORK CAPEX

January 2007

Table of Contents

1 EXECUTIVE SUMMARY

The Australian Energy Regulator (AER) has released a draft decision in which the expenditure sought by Powerlink for replacement assets during the 2007-08 to 2011-12 regulatory period is reduced by $111 million, or 14%. This draft decision was largely based on recommendations contained in a report by Parsons Brinkeroff Associates (PB).

Powerlink has asked Evans & Peck to review the relevant sections of both the AER Draft Decision and PB report to provide an independent view of the issues.

At the heart of the issue is the decision by the AER to accept PB's recommendation to reject a forecast based on detailed engineering and condition assessment, specific project scoping and costing and substitute a top down "rule of thumb" approach that included , inter alia, that replacement capex should about equal depreciation. That is not to say that fault was found with the detailed forecast. PB examined it in some detail, but was not able to find significant fault with it. To the contrary, PB was largely complimentary about both the process and costings used. Notwithstanding, this review was abandoned in favour of a "rule of thumb". In our view, this potentially sets the drivers for responsible utility management, regulatory forecasting and decision making back considerably.

93% of Powerlink's replacement capex forecast relates to lines, substations and secondary systems. We have examined these categories in some detail.

Our approach has been to review the process behind selection of projects for inclusion in the forecast, the options considered and the process for costing of solutions. The overriding observation that we make is that a lot of detailed information has been taken into account in developing Powerlink's forecast. This is aided by the relatively small number of large assets that Powerlink has.

In all categories, the primary driver of the identified need for replacement capex is condition. Certainly age contributes, but only to the extent that condition deteriorates, manufacturer support and serviceability decline, operational capability does not keep up with requirements or overall system development leaves assets technically incapable of performing (e.g. fault level).

In order to achieve a $111 million reduction in forecast, we would have had to find significant line or substation projects that should be excluded from the forthcoming regulatory period. We have not been able to find such projects.

To go part way to addressing the $111 million forecast reduction, we needed to find significant over-scoping or over costing of substation or line projects. Whilst impossible to duplicate every step of the decision process adopted by Powerlink in arriving at its forecast, we have reviewed the processes applied and options considered and found them to be of a high standard, perhaps higher, than might be expected for projects 5 – 6 years away. We have therefore not been able to identify obvious justifiable cuts in this regard.

In the case of substation secondary systems (control and protection), Powerlink is in a technology transition period brought on by a need to modernise its systems to the "digital age". Our review has found that projects in this category are primarily prioritised

according to factors such as condition, reliability, serviceability and manufacturer support rather than a philosophical bent to modernise for the sake of it. Whilst there is scope for argument around the margin about bringing uniformity of technology within individual substations (or retaining hybrid systems) we do not believe that significant whole of life cost reductions can be made by adopting a piecemeal approach within individual substations.

Our review of Powerlink's detailed forecast results in a conclusion that is in line with that of PB – it is difficult to find justification for a reduction. However, we do not jump to the next step of discarding the bottom up forecast completely and substituting what can at best be described as a rough rule of thumb.

To the contrary, we believe that there are reasons why expenditure in this period should exceed that indicated by the rule of thumb. For example, the withdrawal of manufacturer support for the ABB manufactured IPASS technology has accelerated expenditure into this period. It is also arguable that the fact that fault levels are being managed through operational means to remain below equipment ratings in some substations represents a risk necessitating some catch-up.

We are therefore of the view that the Powerlink forecast for replacement capital, as submitted, should be used for the AER's decision.

2 BACKGROUND

On 8 December 2006, the Australian Energy Regulator released its "Draft Decision - Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12". A key driver of the AER's position and decision in relation to expenditure was a report prepared by Parsons Brinkerhoff Associates (PB) on behalf of the AER. In Section 4.6.5 of its report PB recommended that the allowance for "replacement assets" be reduced from the $813 million ($2006/07) sought by Powerlink to $702 million. The AER accepted this recommendation. Powerlink has requested Evans & Peck to provide an independent[1] review of both the relevant section of the PB report and the AER's draft decision.

This report has been prepared for Powerlink on the basis that it may be used internally within Powerlink or released to the AER as part of the review process, at Powerlink's discretion.

PB has chosen to override Powerlink's bottom up capital forecasting process with a "top down" economic rule of thumb. Evans & Peck firmly supports the use of rules of thumb in situations where time is short, data is sparse and project specifics are scant. The appropriateness of such an approach to override a detailed, well structured bottom up development of a capital program on a project specific basis must be seriously questioned. Adoption of this approach represents a significant backward step in regulation,

[1] Whilst acknowledging Powerlink engagement, at no stage have we assisted Powerlink in determining policy relating to these projects, the inclusion or exclusion of projects, the options presented or the costing thereof.

encouraging broad brush rule of thumb budgeting by utilities to support their submissions, rather than structured engineering and commercial assessment of the specific needs of the electricity supply system.

Our focus in this review is therefore in forming a judgement on the quality of Powerlink's process, and whether it is justifiable to abandon this process in favour of the rule of thumb method.

3 OUR UNDERSTANDING OF PB'S APPROACH

In deciding to reduce Powerlink's allowance for replacement projects by $111 million (from $813 million), the AER has accepted at face value PB's methodology and conclusions. In summary:[2]

> "*PB undertook a detailed review of 13 replacement projects. These projects have a total value of $364 million and equate to approximately 45% of the total value of replacement projects forecast for the next regulatory period." Overall PB found that:*
>
> - *Powerlink has procedures for identifying and prioritising its replacement requirements which are consistent with good industry practice*
> - *The level of asset replacement expenditure in the current regulatory period is not sustainable and a significant increase is justified going forward as the number of lines and substations are only now reaching the end of their expected lives.*
> - *There was a need for replacement work during the next regulatory period on all projects reviewed, however the project scope on which the forecast was based was often greater than justified by condition assessments.*
> - *There was little evidence that Powerlink had considered any other measures apart from asset replacement, as a strategy for mitigating the identified risks.*
> - *Powerlink's replacement forecast should be considered, at best, an upper bound to the range of possible replacement expenditure…..."*

PB went on to conclude:

> *"whilst our detailed reviews indicate Powerlink's proposed capex on asset replacement is high, from the information available we were not able to form a view on the amount by which the replacement forecast should be reduced. We therefore believe that a top down analysis is a better approach to addressing this issue …"*[3]

Unable to reach a conclusion from detailed analysis, PB reverted to a top down approach as follows:

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[2] Draft Decision P69

[3] P:158408/Final Report Rev 3 December 2006 P110

> "A *useful rule of thumb for determining an appropriate level of asset replacement is that expenditure on asset replacement should reflect the depreciation cost since, if the age profile of an asset is flat, this will ensure that there is no increase in the average age of the asset base"*.

A 20% premium was then added based on "*the need to maintain supply and work around existing live infrastructure"*, with a further 20% "*augmentation premium*"[4]. "

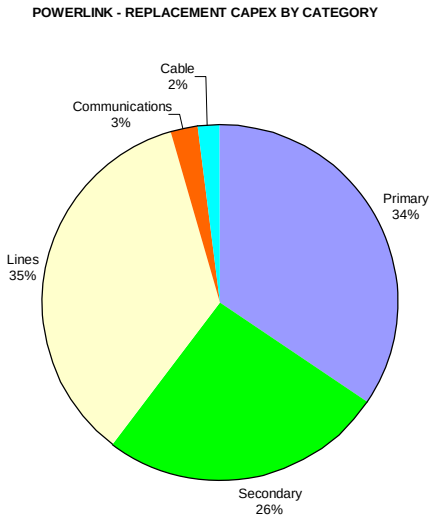
In essence, an inability to quantify deficiencies in a detailed project by project review of a structured condition / risk based methodology, has justified reversion to what essentially constitutes an age based replacement budget, with arbitrary add ons. In our view, validation of this approach sets responsible asset management, based on structured condition assessment, risk analysis and detailed project scoping / budgeting back some decades.

4 POWERLINK'S REPLACEMENT FORECAST

Powerlink included approximately 80 projects as part of its proposed replacement program with target delivery dates between October 2008 and October 2013 in the following categories:

- Substation Replacement
- Secondary System Replacement
- Lines Replacement
- Telecommunications Replacement
- Underground Cable Replacement
- Other Projects.

Total expenditure is approximately $813 million, allocated between categories as follows:



[4] Op cit p 112

95% of expenditure in is in 3 categories:

- Lines
- Substation Primary
- Substation Secondary

Virtually all of this expenditure is associated with specific projects at specific locations. Given the time available for this review, our approach is to concentrate on these dominant categories.

In conducting a review of this nature, three questions need to be asked:

- Is the project warranted at the time proposed, and do reasonable processes exist for the prioritisation of work?
- Is the scope of work proposed the optimal solution when all issues, including cost are considered?
- Is the budget forecast a reasonable estimate of the cost of completing the work?

Our review has primarily focused on the first two points. Powerlink builds its budget from a series of standard "Base Planning Object" costs. We note the AER's comment[5] that:

> *The AER accepts PB's advice that Powerlink's BPO's are reasonable and provide it with an appropriate basis on which to estimate the cost of its forecast capital works program.*

This was based on PB's assertion that:

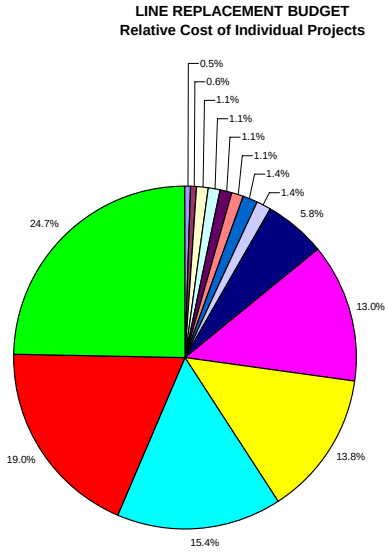
> *"PB generally found that Powerlink's BPO costs to be within the benchmark range and that the majority of BPO's were either close to the average benchmark cost or below it. PB therefore considered each of Powerlink's key BPO's to be reasonable."*

We have therefore not revisited the unit cost assigned to constructing projects.

[5] Draft Decision P76

5 LINE REPLACEMENTS

Line replacements account for some 31% of the replacement capital forecast. 6 projects (out of 14) represent over 90% of the program, as shown below.



One of PB's key observations is that Powerlink failed to consider measures other than replacement. We find this generalised observation a little perplexing in the case of line replacements. Of the 14 line replacement projects, 10 are in fact condition based life extension projects. Only four projects (representing 75% of expenditure) involve the replacement of complete lines or sections of lines. It is difficult to comprehend how such projects can be considered symptomatic of a "replace only mentality". PB reviewed the justification of one of these projects (an overhead earth-wire replacement) in detail. This project represented 48% of the total cost of the life extension options. Based on the information supplied PB concluded:

> *"we are of the opinion that Powerlink's decision to replace these earth wires is prudent"*[6].

No further commentary was made in relation to scope or cost. Evans & Peck has no grounds to question PB's finding.

We have reviewed the risk assessments on the remaining 9 projects[7]. The majority of these lines are in metropolitan Brisbane. The need for life extension projects has resulted from two key drivers:

- the need to replace some key components such as the overhead earth wire, tension and suspension insulator strings and some earthing following condition assessment.

[6] PB Report Appendix I P90
[7] Network Non Load Driven Development Plan

- the need to increase the fault rating of the overhead earth wire due to general increases in fault levels.

These lines are typically 35 - 40 years old. Powerlink has confirmed their sustained future need, and the objective of the refurbishment is to extend operational life by over 20 years. Based on our review of the processes applied to the assessment of project need and the replacement options canvassed, the remaining 9 life extension projects appear prudent. Collectively they represent only 14% of the forecast capital in this category.

The four projects requiring full replacement all relate to 132kV transmission lines in North/ Far North Queensland. On an age basis, these lines are beyond their expected 50 year life. Even though they operate in an exceedingly harsh environment, Powerlink's justification for replacement is not based on age. It is as the result of a detailed assessment of the condition of the assets, including independent expert opinions from a reputable engineering company.

PB's discussions relating to Powerlink's use of lower asset ages than other TNSP's[8] is therefore irrelevant in this category when the actual assets being replaced in this regulatory determination are considered.

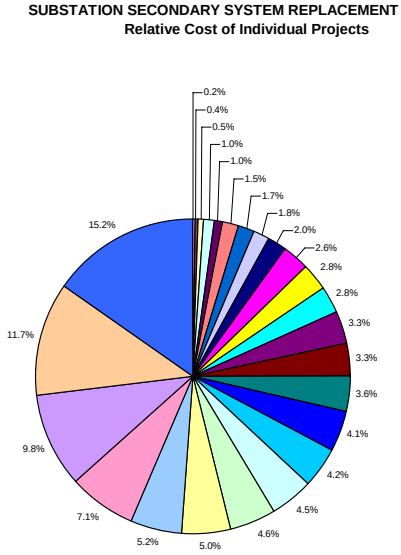
PB reviewed these projects in some detail. Whilst expressing a philosophical[9] view that some of the project should have been scoped as augmentation (and therefore subject to the Regulatory Test under the National Electricity Rules), and that the possibility of a part build should have been more fully investigated, PB endorsed the replacement of these assets. PB also accepted that even if the project had been scoped in this way, it is probable that the regulatory test would have confirmed the option selected by Powerlink[10]. On this basis PB's recommendation should relate to the transfer of capital from one category to another, not its elimination from Powerlink's overall allowance.

Having specifically reviewed and agreed 5 projects relating to 86% of expenditure in this category, PB was unable to quantify any reduction in budget. Given that the remaining projects on average only represent 1.5% each, it is difficult to attribute any significant part of PB's "across the board" cut of $111 million (14%) to this category.

[8] PB Report p101
[9] PB P105
[10] *PB Report P105*

6 SECONDARY SYSTEMS

The size distribution of individual Substation Secondary Systems projects is more uniform than in the case of Lines. As shown below, 13 of 25 projects represent 80% of expenditure.



Given the larger number of smaller projects, Evans & Peck has focused its review on the process used to identify and include or exclude projects. It order to assess how Powerlink has set the threshold for inclusion of a project in this capital forecast, it is also important to assess those projects that have not been included.

The AER, based on PB's report[11], states:

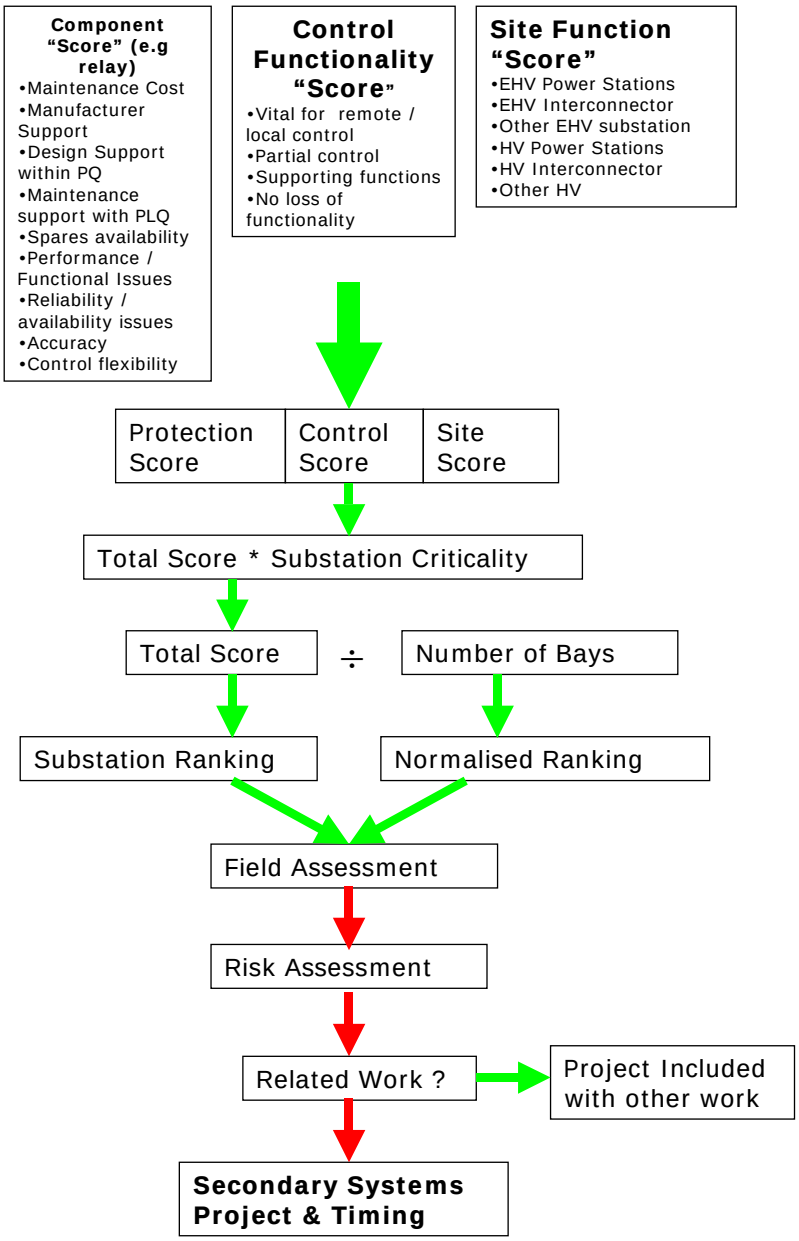
> *Powerlink's replacement policy identifies four factors that may result in the need for asset replacement: age, capacity, capability, and compliance, Powerlink stated that these factors trigger an assessment of an asset's condition or further analysis to determine whether the asset requires replacement or refurbishment. Powerlink then uses a risk management matrix to determine the priority of assets for replacement."*[12]

As part of this assignment, Evans & Peck reviewed Powerlink's Replacement Plan documentation (which we understand was made available to PB as part of its review of Powerlink's proposal). Our initial reaction to this document, particularly in the case of substation secondary systems, was that the risk justifications for all of the proposed projects looked "repetitive". This caused us to question how rigorous the "bottom up"

[11] Op cit, p107-109
[12] Draft Decision p66-67

approach actually was. We therefore sought documentation and detailed discussions with engineering managers responsible for replacement strategy within Powerlink.

The risk approach outlined by PB is the last step in a comparatively complex decision chain. We have documented the process, as we understand it, in the following diagram.



The process builds from specialist knowledge on individual component types. Factors such as failure rate, modes and serviceability feed into this matrix. Whilst age may be a driver of such outcomes, it does not form the foundation of Powerlink's screening tool. The process is multi-faceted in that it examines secondary systems from both a protection and control perspective. The process then weights these ratings according to both the functionality of the substation (for example a 275kV substation on the Qld NSW interconnector rates more highly than one on a 132kV parallel transmission path) and the relative impact in the event of the loss of the substation.

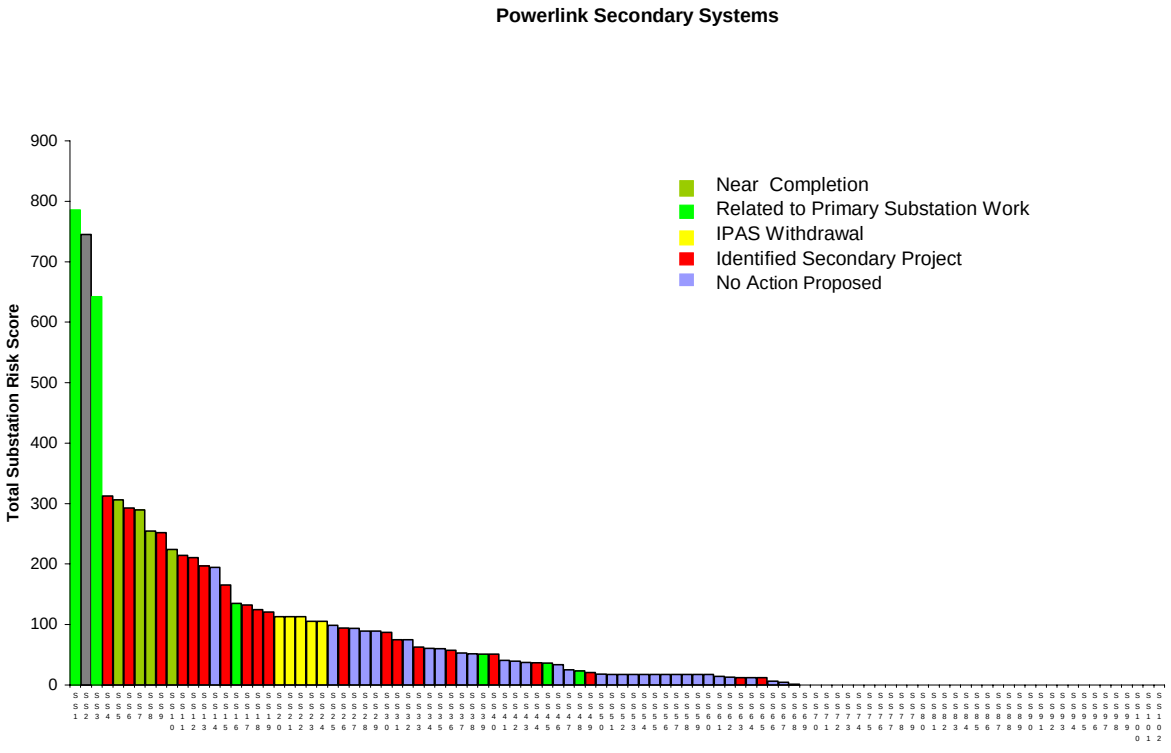
Substations are ranked according to both overall score and the average score on a feeder bay basis (to avoid high risk substations with only a few bays being missed in favour of low risk substations with many bays).

Secondary Systems at substations that, based on this desktop analysis, are considered to require further investigation are then field assessed to determine their overall condition. This shows that some secondary systems are in much better condition than may be indicated from initial screening, and only minor remedial work will be initiated (e.g. specific relay replacement). In other cases, the field assessment may indicate that the secondary systems are in worse condition than notionally expected. Factors such as the embrittlement of PVC wiring, poor condition of terminals and safety concerns are established in this process. This analysis then feeds into the overall risk assessment described by PB.

To the extent that the process combines fact based quantitative factors, qualitative analysis and field assessment by specialists, with a common sense based risk review, Evans & Peck is of the view that the process is robust and likely to provide reasonable balance in the identification of projects.

We have sought and obtained access to the base information used in assessing the risk weighting for each substation secondary system replacement trigger. Clearly, we have not completed a detailed analysis of individual components or conducted field visits.

As detailed in the process map above, Powerlink assigns risk weighting based on both total substation weighting, and average bay weighting. Calculated total substation weightings are shown below.



We make the following observations:

- Out of 102 systems, 37 (36%) have some form of secondary system project – either in process, planned in conjunction with other work, or planned as a stand alone secondary system project. On casual observance, this may seem high. However, given that secondary system projects have a life cycle of some two years from inception to completion, this "snapshot" effectively captures projects over the period 2005 to 2013 inclusive, a period of 9 years. Given that the economic / operation life of electronic secondary systems is generally considered to be between 15 and 20 years, and acknowledging that some secondary systems are still based on electromechanical devices with a notional technical life of 40 years, it is conceivable that between 45% (20 years) and 60% (15 years) of substation secondary systems could require replacement during the period covered by Powerlink's plan.
- Intuitively, the increase in the number of secondary systems in the high risk category appears sensible. The specific mathematics above aside, we would expect to see about a third of systems with little or no risk, about a third starting to ramp up, and about a third requiring replacement in some form.
- Withdrawal of manufacturer support for the IPASS system (a highly integrated proprietary protection and control system from reputable supplier ABB which was introduced in the late 1990's as the future direction in secondary systems) contributes significantly to Powerlink's need to replace secondary systems (as shown in yellow). "One offs" like this are not captured by PB's rule of thumb approach. We have sighted the formal notice from the manufacturer to Powerlink notifying withdrawal of support for this product in 2013.
- The projects included in Powerlink's capital forecast generally correlate well with the calculated risk weightings. High risk projects are currently in the process of being completed, or have been deferred to align with other substation primary work. Notwithstanding, we have challenged Powerlink as to why a number of projects appear to be "out of merit'. Responses include:
    - SS31, SS36 and SS40 rank relatively lowly on an overall substation basis, but rank 6th, 4th and 11th on a "bay" weighted basis.
    - SS14 ranks highly, but has been pushed **out** of the current period to align with primary work.
    - There is significant work at substations directly connected to SS26, and the timing of this project has been aligned to recognise the highly interrelated nature of protection systems.

- The condition of the secondary wiring at SS30 is extremely poor due to ultra violet degradation. This is not picked up in the weighting system.
- SS33 and SS49 are highly impacted by work at remote ends of connecting feeders.
- SS44 has works tied to primary plant, but also has flood zone issues that are not picked up in the weighting system.
- SS63 is related to the major line project in North Queensland and is relatively small. This is an "opportunistic" replacement.
- SS65 has minimal secondary systems, and significant associated primary work is required.

In a review of this type, it is impractical for us to second guess the detailed knowledge of specialists with day to day responsibility for assessing details relating to each specific circumstance. What we do observe here however, is that a logical quantitative process has been followed, tempered by commonsense adjustments on a one on one basis to prioritise, reject, include or de-prioritise projects. The approach appears balanced and rigorous, and whilst we may be able to question project inclusion or exclusion on the margin, we have not detected systematic deficiencies in the process that would lead to over-inclusion of projects.

As outlined, PB has questioned whether full replacement is an appropriate option, expressing a preference for the retention of much of the existing panel work and wiring[13]. In the majority of these projects, Powerlink has canvassed three options:

- In situ replacement (panel by panel replacement of the existing protection / control cubicles)
- Partial Replacement (new standalone panels)
- Complete replacement (generally involving a new demountable building)

Powerlink has selected complete replacement in about 2/3rds of cases. We consider PB's observation regarding use of existing steelwork and wiring is overly simplistic in the context of factors such as:

- The transition from multiple discrete relays with limited communication and fault interrogation capability to highly integrated multifunction relays results in significant changes in the wiring and panel layouts.
- The modern need to air condition control / protection equipment to ensure reliability.
- The fundamental change in communication technology from paired copper wires to sophisticated digital communication, including fibre optic networks.
- The relatively poor condition of much of the existing wiring due to PVC embrittlement.

[13] PB Report p102

- The NER requirement that protection systems taken off line for work must be restorable within 8 –16 hours if primary equipment is to remain in service.
- The safety issues associated with working in "tunnel type" boards with adjacent equipment live.
- The poor condition of basic items such as current transformer, voltage transformer and trip isolating links.
- The need to minimise field based activities because of travel time and cost.
- The need to capture "efficiencies of learning" by applying production line techniques in the manufacture and wiring of panels.
- Recognition that the previous generation panels were generally production line manufactured in a workshop, and delivered to site pre-manufactured in the first place.

We note that in a number of cases where in situ replacement has been recommended, this has been identified as the higher cost alternative, dictated by physical limitations that do not allow complete replacement into a demountable building. We therefore conclude that in general terms, the option selected is the lowest cost alternative.

PB has raised concerns in relation to Powerlink's replacement of the Tarong Substation secondary system. PB expressed a preference for phased replacement of panels on the basis that there is a combination of relatively old and relatively new equipment. They conclude:

> *".. the forecast capex is excessive. However, on the basis of the information made available for this review, any estimate of the amount by which the required capex has been overstated would only be speculation*."

Powerlink has provided Evans & Peck with a document titled "TARONG SECONDARY SYSTEMS REFURBISHMENT OPTIONS" which provides a discounted cash flow analysis of two options:

- Option 1 – Refurbish entire secondary system
- Option 2 - Staged replacements (with stage two 5 years after stage one.)

It is our understanding from Powerlink that this document was available to PB, but was not used. The analysis shows that, based on the scenario outlined, the staged approach would result in a NPV cost approximately 13% higher than Option 1. The analysis shows that Option 2 would only be superior (on an NPV basis) if the second stage could be deferred 8 years. A contributing factor is that some work will be required on the Stage 2 panels during stage 1 to enable interfaces to function and to provide integrated protection systems. Given that the first stage is not scheduled to 2011, an 8 year deferral would extend the second stage to 2019, which is unacceptable to Powerlink from a risk perspective (and would still leave a hybrid arrangement due to technology changes to be dealt with in the future).

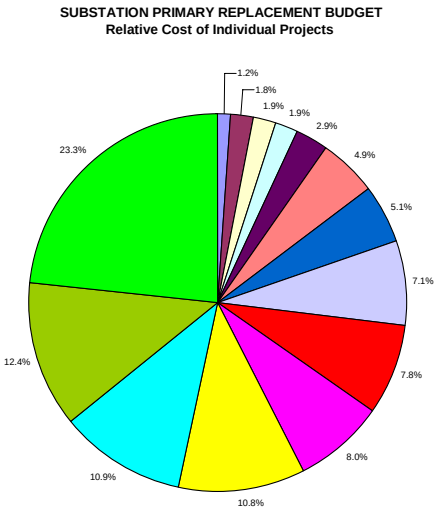
Whilst full details of PB's concerns are not provided, our review suggests that the main difference between PB's position and Powerlink's position is the cost of keeping the newer existing panels in service for a number of years. Powerlink believe that the cost of

integrating an existing system into a new system is as high as 40% of the cost of replacing the panels completely. On relatively short life assets (that is 15 years), unless the newer panels are quite new, retention is unlikely to give the lowest life cycle cost. Intuitively this makes sense, but in the time available we are not in a position to verify the percentage allocated. In such situations, we err in favour of the practitioners with day to day responsibilities for preparing such estimates.

The budgeting and options analysis on these projects (bearing in mind that they are some 5 years away) is still at a relatively high level. However, it is our view that the process adopted by Powerlink in selecting projects for inclusion and assessing the optimal implementation strategy is detailed and robust, and commensurate with the level that would be reasonably expected as support for a regulatory determination. Whilst arguments may be possible on marginal issues, we find it difficult to find process deficiencies which would justify assignment of any of the 14% across the board cut recommended by PB to the secondary systems project category.

7 SUBSTATION PROJECTS

The substation primary replacement program encompasses 14 projects. 7 of these projects account for over 80% of the forecast capital requirements.



Powerlink completes a detailed condition assessment of all substations when they reach 80% of their economic life. An assessment is then undertaken to score 20 elements of the substation. These elements include Buildings, Fences, Foundations, Structures, Busbar, Earthing, Cables and Ducts, Circuit Breakers, CT's and VT's, Transformers, Isolators, Surge Diverters, Marshalling Cubicles, Overhead Earth-wires, Control and Protection Cabinets, Metering, Load Control, Auxiliary supplies, AC Board, Batteries and Charger.

Whilst this mechanism is applied as a screening tool, actual project selection appears to be strongly influenced by the structured risk assessment process outlined in detail in Section

4.5.1.2 of PB's reports[14]. Of the 14 projects in this category, 10 are ranked as Very High risk (almost certain likelihood, major consequences). 3 are ranked High risk and 1 Medium risk. The medium risk project involves supply to a major customer, and we note that the replacement strategy has been negotiated in conjunction with that customer. As the customer will ultimately be responsible for the annualised cost of that project, we are of the view that the negotiated outcome should stand.

As a starting point, we have examined the "lower priority" High Risk projects (which only represent 8% of the expenditure in this category). These projects involve:

- Replacement of a single 43 year old transformer in poor condition at one substation
- Replacement of a number of bays of 40 plus year outdoor switchgear (poor condition, inadequate fault duty) and removal of redundant bays at one substation
- Replacement of a number of 44 year old circuit breakers (obsolete, no spares, poor condition) within one substation to extend its life by 20 years.

It is hard to conclude that these projects are unwarranted, or represent a "replace only" mentality.

In the case of the 10 "Very High" risk projects, 2 involve the replacement of single transformers in poor condition. This is to be expected in a system the size of Powerlink's. One project involved replacement of equipment in a 40 – 50 year old substation that is simply worn out, has high failure rates and deteriorated insulation.

The remaining 7 'High Risk" projects, representing nearly 80% of the total expenditure for primary substation work, involve the replacement of components in substations that have low design fault ratings that are either already being managed by operational means or are forecast to be exceeded. Obsolescence and poor condition is also an issue with these components. All substations form critical infrastructure in the supply of Brisbane and Gladstone. Fault levels have risen as the size of the overall system has increased. Whilst building adjacent substations can relieve load limitations, fault levels are a characteristic of the overall system and substations that will not have adequate ratings must be replaced. In the short term it may be possible to overcome the problem by implementing some operational measures (such as not operating feeders in parallel), but these solutions often give rise to other problems and in many cases, have already been implemented by Powerlink. Put simply, exceedance of fault rating is a prime indicator that a substation has reached the end of its operational life, irrespective of age. Exceedance represents a significant threat to safety, can result in catastrophic failure with long rebuilding times and should not be tolerated.

[14] PB Report P103

One of the (many) deficiencies of the PB top down approach, is that it fails to recognise that there may have been under expenditure in the past. The fact that some fault levels are already being managed by operational means may indicate that some catch-up is required.

PB completed a detailed analysis of one substation primary project – Rebuilding of Swanbank B substation. PB concluded[15]:

> *"a major rebuild could be warranted in conjunction with the fault level upgrade."*

PB also suggested that the budget should be reduced by $7.5 (in $37.5) million on the basis that Swanbank B power station, which is connected to this substation, may close (though no firm decision has been made). PB conclude that[16]:

> *"..it would be reasonable to provide only $30 million in the next regulatory period. If Swanbank B is not decommissioned, and more funds are required to complete the work, then the balance of cost can be provided in the first year of the 2012 – 17 regulatory period."*

The estimates provided by Powerlink are its best estimate of outcomes. The decision of the AER in relation to a revenue cap does not constitute approval for expenditure on a project by project basis. It remains the responsibility of Powerlink's management and Board to approve individual projects as and when they are required. In the case of the Swanbank B project, this will be sometime in 2010. If the closure of Swanbank B were confirmed by that time, Powerlink would be negligent in its duties if it incurred unnecessary expenditure. However, for the purpose of the AER decision, forecasts must be made at this point in time based on the best available information. At this point in time, that suggests that Swanbank B will still be in service and, in Evans & Pecks view, it is reasonable to include the related assets in this forecast.

As is characteristic of both the lines and secondary systems projects, we cannot find fault with Powerlink's logic for project inclusion, or the scope of works proposed. Certainly, we cannot find a basis for reducing the forecast by 14%. To the contrary, we are surprised that there is no additional allowance sought for other small unspecified projects of a replacement nature that will almost certainly arise over the next 5 – 6 years.

8 OTHER REPLACEMENT PROJECTS

As outlined, we have focussed our analysis primarily in three project categories – Lines, Secondary Systems and Substations that constitute 95% of the overall replacement forecast. We have not reviewed in detail Telecommunications Replacement, Underground

[15] PB Report appendix I p 10
[16] PB Report Appendix I p11

Cable Replacement or Other Projects that make up the remaining 5% of the replacement forecast.

We do note that PB examined the justification for 4 (of 19) Telecommunication Replacement projects and accepted

> *"that they (microwave communication links) do have a comparatively short life and that the capital expenditure forecast should include a provision for the ongoing replacement of existing equipment"*

Based on this assertion and the absence of cost reduction recommendations, and the overall thoroughness we have observed in Powerlink's project identification and scoping processes, we assume that the opportunity to find contributions to the proposed $111 million / 14% reduction in replacement capital is limited in this category.

9 OVERALL CONCLUSIONS

In order to complete this assignment, we have examined the underlying processes Powerlink applies to identify projects for inclusion in its Replacement Capital Program, and the solutions proposed in each instance. We have then examined the justification for the specific projects included in the 2007-08 to 2011-12 forecast.

Our overall conclusion is that, apart from arguments around the margin in the secondary systems category, the processes applied to determination of projects for inclusion, scope of solutions and costs are robust.

Given the relatively small number of relatively large projects included in the forecast, and the lack of evidence supporting a view that the projects are unnecessary or over scoped, it is difficult (if not impossible) to support PB's conclusion that a generic "rule of thumb" methodology should displace the rigorous bottom up forecasting process adopted by Powerlink.

Appendix B

Risk Adjustment of Capital Budget

POWERLINK REVENUE CAP 2007-08 TO 2011-12

AER DRAFT DECISION

RISK ADJUSTMENT OF CAPITAL BUDGET

January 2007

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1 BACKGROUND

On 8 December 2006, the Australian Energy Regulator released its "Draft Decision - Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12". A key driver of the AER's position and decision in relation to expenditure was a report prepared by Parsons Brinkerhoff Associates (PB) on behalf of the AER. In Section 4.8.6 of its report, PB recommended that the Risk Adjustment Factor sought by Powerlink to reflect variation between budget costs and outturn costs be rejected. This recommendation was accepted by the AER. Evans & Peck assisted Powerlink in the calculation of an appropriate Risk Adjustment Factor. Powerlink has sought further input from Evans & Peck on this issue.

This report has been prepared for Powerlink on the basis that it may be used internally within Powerlink or released to the AER as part of the review process, at Powerlink's discretion.

2 BASIS OF REJECTION

Details relating to the basis for rejection are set out on Page 79 and 80 of the Draft Decision. In summary (in rearranged order):

- There appears to be some confusion in relation to the application of mean or mode to project input and portfolio output costs.
- PB were of the view that the uncertainty in costing projects is already captured to some extent in Powerlink's BPO's.
- The inclusion of a cost escalation risk factor effectively transfers risks to Powerlink's customers.
- The AER considered that the application of input rates already factors in these risks and do not systematically under or over estimate them.
- PB's notation that many of the risks identified by Evans & Peck was associated with relatively minor components of the project.
- Evans & Peck did not provide any evidence that Powerlink's actual overruns are material or of the magnitude indicated – the risk profiles were based on judgement rather than on actual historical data.

We will address each of these issues separately.

3 CONFUSION OVER STATISTICAL APPROACH

In completing our previous analysis, we adopted the following approach.

- For each project, we were given a single cost that Powerlink advised was the most likely project cost (i.e. the mode).
- An individual factor was applied to each project (in the form of a PERT based statistical distribution) to reflect possible out-turn costs as a ratio of budget cost. In all cases, the mode of the factor was one, but in high

and medium risk projects the distribution was asymmetric to the right, with the characteristic that the mean value was higher than the mode.

- Multiple Monte Carlo simulations were run across the entire portfolio of projects to determine the risk adjustment relevant to the total cost of the portfolio projects.

This is absolutely consistent with the PB / AER assertion that

> *"The logic is sound if the cost estimate for each project is the mode and the distribution of cost estimates has the property that the mean is greater than the mode.*

We do not fully understand the source of confusion on this issue, but apologise if it is in any way attributable to Evans & Peck.

4 INCLUSION OF UNCERTAINTY IN POWERLINK'S' BPO ESTIMATES

Powerlink's project estimates were a single value estimate representing the most likely value. Evans & Peck was advised, and has since confirmed, that the BPOs and estimates did not include any contingency. It is unclear to us how the AER or PB concluded that BPOs incorporated an allowance for uncertainty. Normal commercial practice is to include a project specific contingency that in Powerlink's case would be in addition to the BPO estimate. In some cases, we understand adjustments were made to allow for site-specific factors, but this is not an allowance for uncertainty.

Project estimates were built up from Base Planning Objects (BPO)s. We note the AER's comment[1] that:

> *"PB generally found that Powerlink's BPO costs to be within the benchmark range and that the majority of BPO's were either close to the average benchmark cost or below it. PB therefore considered each of Powerlink's key BPO's to be reasonable. In addition it found no evidence that Powerlink had inflated its BPO's significantly from those used in the current regulatory period."*

It is not apparent to us how the estimates incorporate an allowance for uncertainty.

5 TRANSFER OF RISK TO POWERLINK'S CUSTOMERS

Evans & Peck supports the view that unreasonable risk should not be transferred to customers. However, outturn cost in excess of budget is a real cost of doing business, even in a well-run business. Allowances for reasonable risks should be built into budgets. Our approach to diversification of that risk explicitly results in a reasonable value and, importantly, a value that can be benchmarked across utilities.

[1] Draft decision p 76

We believe that an undesirable alternative is to implicitly weight BPO prices to incorporate a risk premium. As noted above, Powerlink's BPO prices tend to be lower than average. This fact, and the request for a risk adjustment, should not be treated in isolation.

6 FACTORING OF RISK INTO INPUT ESCALATION FACTORS

The comment that the input rates already factor in risk, and do not systematically under or over estimate them, indicates a failure to understand the concept of risk. The estimates may provide the most likely value, but the reality is that the forecasts are unlikely to be perfectly correct.

To demonstrate this point, we note from Powerlink's supplementary submission[2] that over the 15 – 18 months since project estimates were prepared, tower steel increased 15%, copper 100% and conductor 40%. We also note that the price of oil has dropped significantly. It is difficult to see how such risks of variation are captured in a single value estimate without introducing systematic bias.

In our process, we have not applied a separate risk distribution around the input cost functions, instead capturing such risks in the overall factor applied to each project to determine the spread of outturn costs over budget costs across each entire project.

7 APPLICATION OF RISK FUNCTIONS TO RELATIVELY MINOR COMPONENTS

Our risk distributions are only applied at a total project level. At no stage do we apply the distributions to individual components. Every project has a portfolio of risks. We have quoted some examples only to aid understanding of the range of possible issues that contribute to risks implicit in projects. It is an error in logic to go to the next step, as PB appear to have done, and associate particular project risk distributions with any single component within a project, irrespective of how large or small it is. Conversely, a small project will receive a small weighting in the overall portfolio of projects (in proportion to cost).

Our methodology is based on the premise that **at a project level**, there is a tendency for outturn costs to be different to budget costs due to the emergence of conditions which were not foreseen at the time of preparing the estimate. Experience suggests that on balance over large numbers of projects over a long period of time, there is a tendency for outturn costs to exceed budget costs. The risk factor is applied to the budget cost.

8 USE OF HISTORICAL DATA

In preparing our original report, we acknowledged that the preferred approach would have been to base the analysis on Powerlink's historical performance. At that point in time,

[2] Powerlink Supplementary Revenue Submission for the period 1 July 2007 to 30 June 2012 p3

Powerlink was not able to provide data for a large enough sample of projects to constitute a sufficiently robust sample on which to base the analysis.

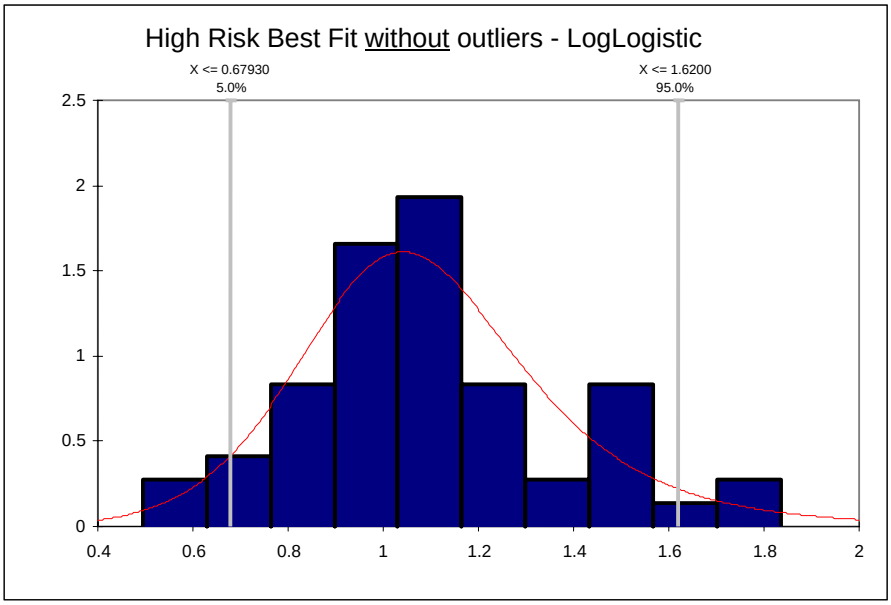
We therefore prepared an analysis based on the experience of our company. In adopting such an approach, we were at pains to be extremely conservative in our assessment so as not to overstate the risk adjustment.

Powerlink has now provided us with project budget and outturn costs on 119 actual projects representing $927 million in capital expenditure. We are of the view that this represents a sufficiently large sample to be statistically relevant.

Powerlink has also advised that both budget and outturn costs are on the same basis - that is, the budget was for the expected completion cost, and the basis for calculation of the outturn to budget cost ratio is identical to that used in our analysis. Projects have been categorised as “high”, “medium” and “low” in accord with our previous approach.

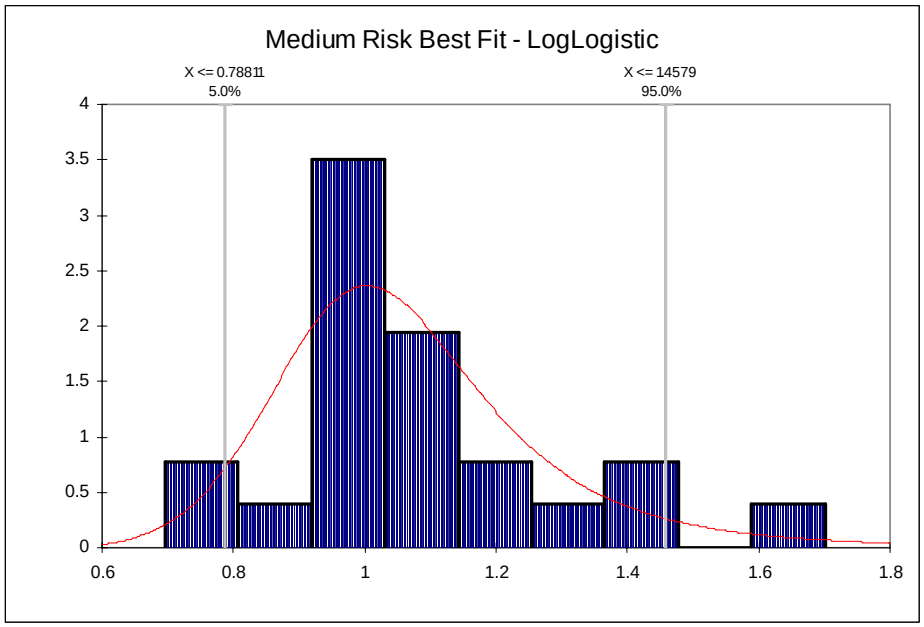
In the case of the “high” risk category, we have removed two projects that we consider statistical outliers, which would bias the adjustment factors to an inappropriately high level.

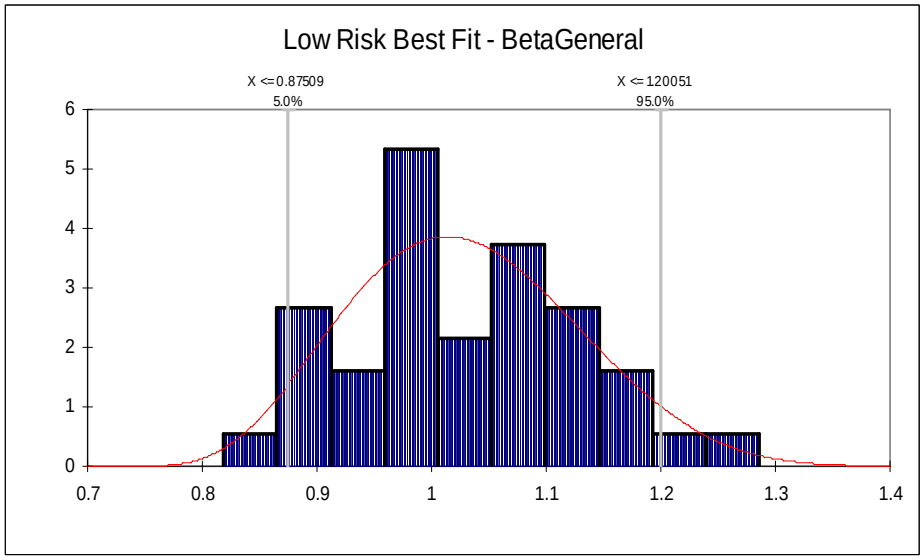
A comparison of the outturn cost against the budget cost of 119 historical Powerlink projects revealed the “best-fit” distributions below. These historical distributions have been applied using the same high, medium and low risk categories as for the remainder of the analysis.



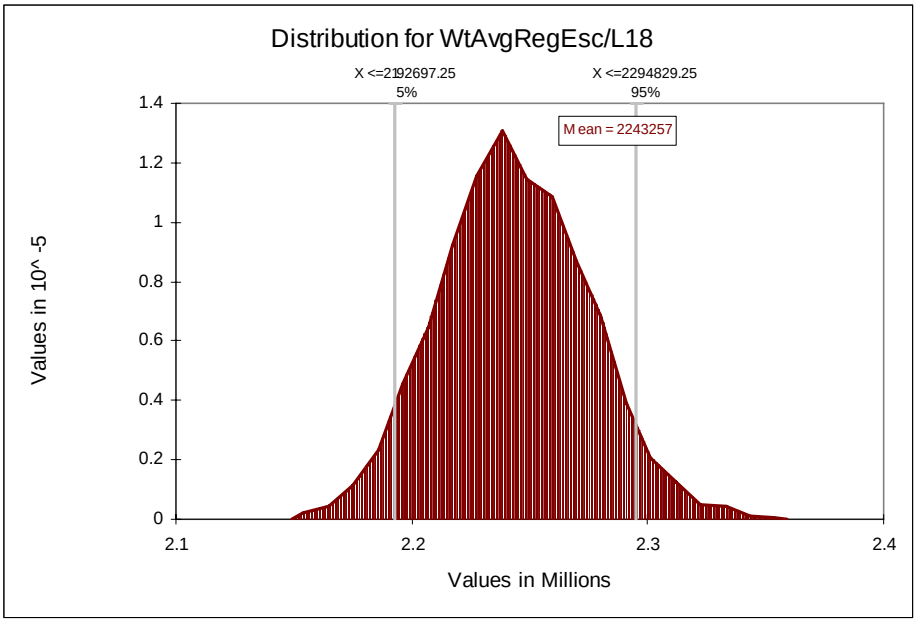
It will be noted that the best-fit curve is not specifically a PERT distribution. On a range of statistical measures, the best fit is of a log logistic characteristic. It is similar in form to the PERT distribution and asymmetric. The log-logistic distribution is continuous to infinity. In completing this analysis we have restricted the useable range to be consistent with historic outcomes.

The same general form provided the best fit to medium risk projects, whilst a more symmetrical Beta General (which is a generalised form of the PERT distribution) provided the best fit to low risk projects.





Evans & Peck has replaced the PERT distributions used in our original analysis with those outlined above, and re–run the simulation. Application of the Monte-Carlo technique to Powerlink's 500 projects using historical distributions, rather than estimated PERT curves, results in a risk-adjusted output distribution as shown in the following graph.



Our original model indicated a risk-weighted value of $2.104 billion, 2.6% higher than the non – risk adjusted value. This was the value rejected by the AER.

The mean of the distribution using the historical best-fit curves is $2.243 billion, 9.4 % higher than the non-risk adjusted estimate of $2.051 billion.

It is our view that Powerlink has made, and can continue to make improvement in its outturn to budget ratio. However in the absence of deliberate overstating of budgets, or specific inclusion of contingency amounts in each project budget, it is unlikely to eliminate them. In essence, even with best practice budgeting and project management, some risk premium is still applicable. We have not advised on whether a revised value for risk adjustment based on the historical data should be submitted to the AER.

Appendix C

Review of Wage Growth Forecasts

Powerlink

Review of Wage Growth Forecasts

February 2007

Synergies Economic Consulting Pty Ltd
www.synergies.com.au

Disclaimer

Synergies Economic Consulting (Synergies) has prepared this advice exclusively for the use of the party or parties specified in the report (the client) and for the purposes specified in the report. The report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. Synergies accepts no responsibility whatsoever for any loss suffered by any person taking action or refraining from taking action as a result of reliance on the report, other than the client.

In conducting the analysis in the report Synergies has used information available at the date of publication, noting that the intention of this work is to provide material relevant to the development of policy rather than definitive guidance as to the appropriate level of pricing to be specified for particular circumstance.

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1 Introduction

The AER decision to reduce the labour cost inflators for the final 4 years of the Powerlink's upcoming regulatory period from 5.6% to 5.3%, 3.5%, 3.5% and 4% was principally based on the recommendations of Access Economics and, to a lesser extent, those of PB Associates.

This report reviews these recommendations. We find that some of the important premises on which the Access Economics modelling is based are incorrect in fact and as a consequence, introduce a downward bias in their estimates of wage pressure in the electrical and related trades industry and in particular in the labour segments affecting Powerlink. We find the Powerlink estimate to be reasonable and on the conservative side given likely production and labour demands in this industry, and for Powerlink.

Our report proceeds as follows:

- section 2 summarises the central arguments of Access Economics and PB Associates;
- section 3 reviews the Access Economics arguments in more detail and considers the modelling assumptions and methodology;
- section 4 considers future labour demand in the industry;
- section 5 addresses supply side issues associated with the supply shortfall; and
- section 6 concludes this report and confirms our support for the original wage cost estimate of 5.6% submitted by Powerlink, on the basis of our assessment of the likely economic conditions in Queensland over the next 5-7 years.

2 Factors influencing the AER Draft decision

In reaching its draft decision, the AER relied on reports from consultants Access Economics and PB Associates. The AER placed most emphasis on the Access Economics report although both reports share some commonalities (as well as some important distinctions):

- central to both reports is the belief that the boom economic conditions in Australia will ease after 2008, with the result that the excess labour demand that has characterised the Utilities industry, as well as other industries, will reduce;
- as a result, the skilled labour constraint, which has driven wages in this sector to above average growth will ease, both because of the national macroeconomic effect and because of industry specific reductions in labour demand in Utilities and related industries such as Mining and Construction; [1]
- the argument is also made (especially by PB Associates) that the current skilled labour demand shortages will lead management to make more efficient human resource management decisions such as the more effective use of current staff and the increased use of cheaper forms of substitutable labour such as apprentices; and
- the upshot here is that the boom times of the last decade will inevitably slow and that the forward wage cost estimates of Powerlink after 2008 should be reduced to reflect this decline.

[1] Note, the Mining and Construction Industries are singled out for attention because it is believed that these industries complete with the Utilities industry particularly in Queensland for the same classes of labour, especially skilled labour; and because of the labour segments which affect Powerlink.

3 The Access Economics Paper

3.1 Overview of the Access Economics Report

The Access Economics findings result from the application of its economic model which was informed by a number of assumptions:

- Wages in Utilities – 2002-2005 experienced a large cyclical element caused by high demand and skill shortages. This was reinforced in Utilities by labour competition with Mining and Construction and in Queensland by the need to gain parity with utility workers in other States;
- Utility workers in all states benefited from the labour shortages but the wage increases in Queensland were slightly less productivity based and more inflation based;
- these forces will lead wages in utilities to exceed all industries till 2007/8 (when they peak);
- however, the slowdown in mining and construction (largely explained by the slow down in mineral exports demand growth from China and elsewhere) will release the pressure to competitively recruit skilled workers;
- as a consequence the 3 wage growth factors (underlying inflation, productivity and cyclical factors) that previously worked in favour of wages growth in the Utilities sector will now work against workers in that sector exerting downward pressure on wage increases; and
- the high cyclical component of utility sector wages, the drop in labour market pressure and general macro economic demand, will significantly affect the Electricity supply labour market, causing wage growth in this sector to drop below the all industries level from 2009 and stay there until 2015 (where modelling ends).

3.2 Issues with the Access Economics methodology

As will be appreciated modellers need to inform their models with case-specific assumptions prior to each application. They then rely upon the general structure of the model to interpret this information and provide results. Therefore, in general, errors in

the predictions of economic models can arise from two particular sources, either separately or in combination. These are:

- the use of incorrect information or assumptions being fed into the model run[2]; and/or
- a misspecification of the model, whereby the structure of the model is not suited to accurately monitoring the economy in question.

If either or both of these factors present the predictions of the model (outputs) would be unreliable. In this report we primarily restrict our discussion on the Access Economics report to the first point only, that is the input assumptions, because no model can perform successfully if the assumptions fed into its scenario testing are incorrect.

We believe that the fundamental assumptions concerning the easing of the skilled labour constraint, the behaviour of skilled versus unskilled wages and the hypothesised slowdown of the Australian economy are wrong, within the period under consideration, and as a result make the model conclusions misleading and unreliable.

To some extent the decision to concentrate upon the assumptions and outputs and not examine the structure of the modelling tools themselves results from the fact that the Access Economics Report provided by AER is a high level document, with little in the way of information regarding the structure of the model or the estimation procedures used.

In other words, reliance upon a report that merely contains a relatively high level discussion of the outputs of a macro-economic model means that the underlying basis for the AER's decision making on this issue lacks transparency. This is because it provides any reviewer with little scope to evaluate the econometric procedures used in the model or the crucial econometric assumptions that underpin it.

The results reported by Access Economics are merely a mechanistic outcome of the equations embedded in a macro-economic model – we have no way of assessing:

- the realism of those equations that determine the outcomes (for example, whether they incorporate a realistic wage adjustment process);
- the specifics of the input assumptions that are relied upon; or

[2] For example, it is common for modellers to impose what they consider to be feasible limits on what their model can predict, such as maximum price elasticity values or constraints on the extent of economic growth .

- the impact changes to input assumptions will have on the model predictions.

Nevertheless, the AER seems content to rely upon the outputs of a proprietary macroeconomic model – without:

- any consideration of the specifics of the circumstances confronting the entity whose revenue are being regulated and
- even basic analysis of the sensitivity of those outcomes to changes in assumptions.

It is submitted that such an approach:

- undermines the legitimate interests of the regulated business as it is deprived of the right to respond to the detailed assumptions that are embedded in the modelling; and
- increases the risk of regulatory error – which is a particular concern given the asymmetric consequences of regulatory error.

It is further submitted that this lack of transparency means that reliance upon macro-economic modelling outcomes is not a desirable model to use as a principal source of information to underpin regulatory decision making.

Turning now to the specifics of the Access Economics report and model, several points relevant to its conclusions should be made.

- the Access Economics report analyses the Utilities sector as a whole, rather than considering the specific labour market circumstances that Powerlink confronts in Queensland; and
- second, the longevity of the buoyant conditions in the Australian Economy has undermined the performance of many of the autoregressive based economic models in Australia, because past events in the economy, especially in the labour market, cannot be seen as good predictors of current events.

Utilities wide assessment

The Access Economics report analyses the Utilities sector as a whole probably because the Australian Bureau of Statistics data are normally only available at this level of disaggregation. However, there exist considerable differences in the labour force requirements, particularly in skilled labour, between Electricity, Gas and Water.[3]

[3] See, Tunny G (2003) , "Fields of Study and Employment Outcomes: An Analysis of TAFE Outcomes in Queensland, Labour Market Research Unit no. 14 Brisbane and Tunny, G (2002) The Demand for Skilled Labour in Queensland ,

For example, according to the Australian Bureau of Statistics' (ABS) *Australian and New Zealand Standard Industrial Classification* (ANZSIC), the *Electricity, Gas & Water Supply* industry division consists of two industry subdivisions: *Electricity & Gas Supply* (including electricity distribution, generation and transmission, and fuel gas, coal gas, liquefied petroleum gas, natural gas distribution and manufacturing groups) and *Water Supply, Sewerage and Drainage Services* (including the storage, purification or distribution of water, drainage system operation, pumping station operation, sewerage treatment plant and stormwater drainage system operations).[4]

The largest subsector is the Electricity and Gas subcomponent, which across Australia, make up about 60 % of the total workforce in Utilities and within this group, Electricity workers comprise between 35% to 40%. The significant point here is that the use of the aggregated industry group "Utilities" does not necessarily give a good guide to the labour market position of Electricity workers in isolation.[5]

Skilled workers in the Electricity supply industry are much closer in skill set to skilled workers in Mining and Construction than to skilled workers in Gas or Water. The cross–elasticity of supply between Electricity supply workers and Mining and Construction workers is well known demonstrated by recent market outcomes and acknowledged in the PB Associates report.[6]

A large proportion of Powerlink's operational labour costs are attributable to maintenance work undertaken by Ergon Energy in regional Queensland. There is a significant overlap in the "footprint" of the mining industry and Ergon. In addition, a significant proportion of Powerlink's capital costs are attributable to construction activities involving mainstream construction skills (e.g. riggers and construction managers) as well as skilled electrical workers. There is also some "footprint" overlap with many Powerlink construction projects underway in mining regions.

This is an important point because it allows movements in the demand for skilled labour in mining to be used as a proxy for predicting likely events and outcomes in the labour market for Electricity supply workers, which presents particular issues relative to Utilities workers as a cohort.

Labour Market Research Unit Working paper no. 8 , Brisbane for a discussion of skill differences across occupations within the same broad industry group..

4 See, Australian Bureau of Statistics (1993) "Australian and New Zealand Standard Industrial Classifications" (ANZIC) Cat. No. 1292.0

5 For further break up of the Utilities Workforce see, ABS (2004) Labour Force, Australia Cat. 6291.0.55.001 and unpublished data and the South Australian Electricity Commission's review of the characteristics of their workforce ; http://www.training.sa.gov.au/tasc/files/links/Electricity_Gas_and_Water.pdf

6 See, pages 154-157.

Accordingly, the Access Economics report fails to distinguish between electricity workers and other workers in the utilities which significantly limits the relevance of its findings in regards to the electricity supply industry in Queensland (a geographic region in which mining activity and construction is concentrated).[7]

Economic modelling in current environment

The current economic climate has not proven a very fertile climate for economic modelling in general. The buoyant conditions that have prevailed in Australia have continued unabated for the last 15 years with the downturns predicted in the late 1997/98 and 2001/02 not eventuating.

This has meant that most models that have had this pattern of regular downturns programmed into them have performed poorly, particularly in predicting the labour market. Specifically, they have systematically and dramatically understated the strength of the labour market because the autoregressive nature of these models relies on past events in the economy (cyclical downturns) reoccurring, which has not happened.

Put simply the economy has done much better than some of the well known models predict because these models rely heavily on the assumption of the reoccurrence of historical patterns of economic behaviour which has failed to be repeated in the current Australian Economy.[8]

Whilst we cannot comment specifically on the performance of the Access Economics model, we note that examples of models where this has occurred are the TRYM Model[9], which has been shut down to allow for model re-specification and the CEPM model operated by the University of Queensland. In both these cases, previously well performing models have needed substantial modifications due to underestimating labour demand conditions.

We do not know the predictive performance of the economic model relied upon by Access Economics – we simply note that the predictive capacity of similar models have long been called into question. This is especially the case in the current environment, as the current Australian economy is something of an enigma - it continues to perform above expectations.

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[7] It should also be remembered that the decentralised nature of Queensland and its large physical distances provides a point of differentiation between Australian averages and the Queensland situation.

[8] Essentially trade cycles were seen as occurring every 5-7 years.

[9] One of the macro economic models used by the Australian Government

In such a climate any predictions from economic models about future macro economic variables can be hazardous. A more reliable form of forecasting in the current climate is to operate at a disaggregated level, such as the industry level, where those intimately involved in the industry have a good working knowledge as to likely events, especially in the short to medium run. This is especially the case for regulatory processes, on account of the asymmetric consequences of regulatory error.

In other words, we believe that considering the specifics of the environment confronting Powerlink provides a far more reliable basis to assess the reasonable revenue requirements for the business for the upcoming regulatory period than reliance upon general (and proprietary) macro-economic modelling.

In this regard, the Access Economics report may assist in informing a general impression for utilities across the nation (although, for the reasons set out in this report, we do not believe that exclusive reliance should be placed upon such an instrument for regulatory decision making). However, it does little to inform the circumstances confronting Powerlink – especially since it does not allow for consideration of the conditions of how the Queensland mining industry is likely to affect the labour supply conditions for skilled electrical workers and construction workers; given:

- the substitutability of skills presents Powerlink's labour force with different opportunities relative to those available to other workers in the Utilities industry; and
- the physical proximity of those workers to those alternative opportunities – being in Queensland, with significant "footprint" overlap with the mining industry and construction work.

3.3 Labour market wage adjustment mechanisms

Declining skill shortages and their role in the wage growth process in the Electricity supply industry is a central plank in the Access Economics report. Their wages growth model is based on the interaction of three factors:

- on the upswing cyclical pressure, expressed in localised excess labour demand, produces upward pressure on wage rates and competition (on the demand side) for labour[10];

[10] See, Borjas (2001) Labor Economics, Irwin McGraw Hill pp 284-86 for a discussion of demand and the wages of skilled workers

- inflationary pressure, whereby workers either build inflationary expectations into wages claims and/or increase wage claims to regain lost purchasing power[11]; and
- productivity issues, whereby some of the gains from productivity are distributed in the form of higher wages.

While most economists would agree that these three factors would be influential in the wage adjustment process, the Access Economics report doesn't spell out the nature of the inter-relationships between these three factors or the exact mechanism by which wages in the Electricity and related industries are formed.

There are a number of possibilities. For example, excess demand in the labour market, unless highly localised, would feed into and perhaps lead, inflationary pressure in the economy. As well, productivity led wage increases in one labour group may, in the presence of wage leadership mechanisms, fuel wage increases in other areas independent of productivity, at least in the short run.[12]

Specification of the nature of this relationship is important to our understanding of the reverse process, when, according to the Access Economics Report, wages growth starts to slow in the Utilities sector. For example, if strong institutional pressures do exist, these pressures will make wages sticky (in the sense that there is resistance to downwards movement) both in terms of absolute amounts and rates of change.[13] For example, as Hyclak, Johnes and Thorton argue, under a real wage rigidity model wage adjustment (especially in relation to real wage relativities) occurs over a relatively long time horizon:[14]

> real wages are unresponsive to excess supply or demand for labour in the short run. The importance of wage rigidity in this scheme has led to a number of theoretical attempts to explain why real wages levels do not restore equilibrium in the short run.

[11] The Access report appears to discount wage pressure as a source of inflation because there does not appear to be a link mechanism between the cyclical and inflationary component of their wages growth model. This appears to be consistent with what, we believe, is a lack of recognition of institutional factors in the economy expressed in their analysis.

[12] See, Hyclack,T., Johnes, G. and Thorton R (2005) Fundaments of Labour Economics, Houghton Mifflin, Boston

[13] Hyclack,T., Johnes, G. and Thorton R (2005), outline the various complexity that beset skilled labour markets and reduce the power of short run excess demand to influence wage outcomes. In particular, see their arguments pp. 436-441.

[14] Ibid, p 436.

A recent illustration of the power of real wage rigidity in skilled labour markets is the behaviour of wages and wage relativities in United States academic labour markets.[15] In this example the level of excess supply in academic labour markets increased substantially between 1999-2003 to the point where potential supply exceeded new hires by 4 to 1. At the same time real wages rose by an average of 4% annually (2001-2003) and wage relativities with other groups actually increased.[16] The reason for this seemingly perverse behaviour was the institutional pressures that decided wages on the principle of established wage relativities based upon education levels and custom.

As a result:

- wages will not rapidly adjust downwards and at a slower rate than the change in the level of excess demand (or supply) itself; and
- attempting to predict wage movements by aggregate demand factors alone will produce incorrect and misleading conclusions

Most emphasis in the Access Economics model is placed on the role of cyclical fluctuations in demand for skill workers. Up to 2008 these work in favour of Electricity supply workers and drive their relative wages up pre-2008. However, post 2008 lower labour demand slows down the wages growth and (according to Access Economics), interacts with other factors to actually drive wages growth in Electricity related skilled and semi skilled wages *below* that of the all industries wages growth.

What Access Economics appear to be suggesting is a relatively straight forward wage adjustment mechanism in a competitive market, perhaps of the form:

$$q_d = D(p_{t-1}) \quad (1)$$

$$q_s = S(p_{t-2}) \quad (2)$$

$$dp/dt = f(E) \quad (3)$$

$$E = \alpha(q_d - q_s) \quad (4)$$

Where q_d and q_s relate to demand and supply of the labour (either in aggregate or for individual skill groups), E is the level of excess demand , p is the real wage or price of

[15] The US example is a powerful one in that labour markets are generally thought to adjust much more rapidly in the US than Australia, but even in this market powerful real wage rigidity exists

[16] See www.uark.edu/depts/cberinfo/aea or see a summary of the results in Hyclak et.al (2005) p. 439.

labour, dp/dt measures the rate of change in real wages and α is the reaction function which translates excess demand into wage increases.

In such a stylised labour market model (which we submit is divorced from reality for the reasons set out in this report), the relationship is symmetrical, labour shortage and labour surplus work in the same, albeit, opposite directions on wage growth. The central point of this argument is that movements in wages up or down are solely a function of the level of excess demand and the size of the reaction coefficient (the speed in which excess demand (supply) translates into wage inflation (deflation)). However, in reality, even in a market as flexible as the current Australian labour market we see the continuance of significant institutional barriers to this process.

The wages growth decomposition model that appears to have been used in the Access Economics model is one of a number of similar models that have been proposed elsewhere. For example, Yashiv uses a wages decomposition model with similar features to that suggested by Access Economics.[17] He finds real and expected productivity and the level of unemployment are the main drivers of wage behaviour. As well, he finds the role of cyclical factors of less importance, and acting in an anti-cyclical rather than a pro-cyclical manner:[18]

> We look at two cyclical indicators – real business sector GDP and business sector employment….. When measuring the cycle using business sector employment wages, either de-trended or labor share are counter cyclical, albeit some times very weakly…..using business sector employment the relationship is weakly pro-cyclical

Economists often disagree about determining factors in the economy, but it is difficult to find modern references or empirical findings that point to the same strength in cyclical factors that are suggested in the Access Economics wage growth model

If this is the form of adjustment being suggested by Access Economics, in the case of the Electricity supply industry it raises a few issues. For example, wages growth in Utilities falls rapidly from over 5.3% in 2008/09 to 3.5% in 2009/10, a 33% fall in wages growth over a 12 month period.

This rapid pattern of wage adjustment is unusual. For example Abraham and Haltiwanger found that real wage adjustment lags the business cycle for a considerable

[17] Yashiv, E. (2003) Bargaining, the Value of Unemployment and the Behaviour of Wages, Centre For Productivity Research, Tel Aviv

[18] ibid p. 25

period and was more muted than the business cycle and similarly Hall highlighted this lagged and more moderate response of wages and wage relativities.[19]

In the system of equations above, lag structures are built into the equations based upon plausible wage adjustment scenarios for skilled labour.[20] The shortest lags are in labour demand followed by labour supply (due to rigidities in training times and worker mobility) and the longest lags are normally associated with the reaction mechanism itself.

In other words the eventual change in the rate of wage growth is normally significantly after the real change in demand conditions and by less of a degree. The reason for this lies in the nature of the reaction function and its decomposition between market forces and institutional features.

In essence the reaction function coefficient α may be decomposed into two factors:

- the pure excess demand factor β; and
- an institution factor δ, which is a function of institutional pressures in the wages market such as minimum wages, enterprise bargaining awards, historic wage differentials (for example, between skilled labour and semi-skilled labour).

As the δ component changes less rapidly than the excess demand, the reaction function is reduced. Failure to take into account institutional factors will overstate, by definition, the importance of cyclical (excess demand) factors

Oaxaca first introduced a technique for decomposing wage changes into those changes due to demand and institutional factors.[21] The method of decomposition was designed to detect labour market discrimination but applies equally to the detection of any "non-market" influences on wages.

For example, in examining the Black-White wage differential he found that of the 21% wage differential over 13% was driven by institutional factors[22] - the argument is the same in the current situation. We do not know the importance of institutional factors in deciding wages and wages growth in Utilities but we know it is far from zero as implied in the stylised example

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[19] See, Abraham, K and Haltiwanger, J (1995) "Real Wages and the Business Cycle" Journal of Economic Literature 33: 1215-1264 and Hall, R.E (2000) "Wage Determination and Economic Fluctuations" National Bureau of Economic Research no. 9967. In all of these sources, the reluctance of skill differentials to contract even in recessionary times is discussed

[20] See, Borjas (2001) pp. 182-187

[21] Oaxaca, R. "Male-Female Wage Differentials in Urban Labor Markets" International Economic Review9:693-709

[22] Cited in Altonji, and Blank, R) "Race and Gender in the Labor Market in Ashenfelter, O and Card, D (1999) The Handbook of Labor Vol 3 North Holland

This being the case and, irrespective of the merits of the downward shift in demand, the speed of downward adjustment in wages growth in Utilities predicted by Access Economics appears to be overly rapid with no apparent consideration of the institutional factors that would mitigate against and slow any such downwards adjustment.

Both common sense and economic theory would suggest that a shift of 33% in the wage adjustment process for a relatively skilled workforce over a 12 month period is too rapid an adjustment to reflect the realities of a segmented labour market[23].

The backdrop of Queensland experiencing its lowest level of unemployment in 30 years raises further substantive doubts about the plausibility of a very rapid downwards change in wage trends.

More importantly, there is considerable doubt over the validity of the key Access Economics assumption that post 2008/09 there will be significantly reduced demand for skilled workers in the Utilities and related sectors, especially in the context of a sector that is particularly exposed to the Queensland mining industry and related construction activities (e.g. rail, ports, etc).

[23] Particularly if this is driven by cyclical factors, refer back to the quote by Yashiv on the strength of cyclical factors in modern labour markets as well see, Kaufman, B and Hotchkiss, J (2006) The Economics of Labor Markets Thomson South Western, especially pp 270-272. In this section they advance the argument that "most real-world labour markets feature imperfections and non-maximizing behaviour, limited information and heterogeneous workers that prevent the forces of competition and labour mobility from eliminating wage differentials".

4 Future labour demand in the sector

4.1 National Institute of Labour Studies review

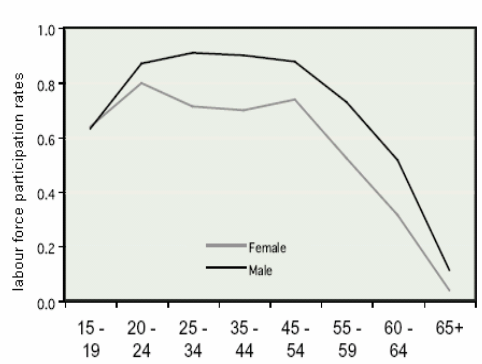
In a recent study of the Australian Labour Market the National Institute of Labour Studies (NILS) based at Flinders University reaches conclusions as to the likely state of the Australian labour market that are significantly different to those drawn by Access Economics.

Significantly the NILS study concentrates on labour demand within the Mining Industry; an industry where there are close cross elasticities with the relevant sectors of the Utilities labour market.

The NILS report begins with an overall picture of their view of labour market behaviour in Australia, 2006-2015. They suggest a scenario of general labour market tightness, primarily due to buoyant demand exaggerated by a slow down in the rate of labour supply growth.

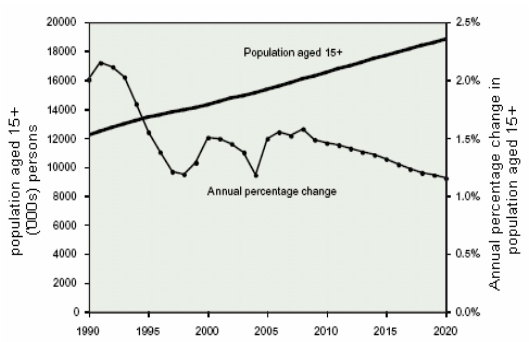
Figure 1 and Figure 2 indicate their view of aggregate labour market behaviour in Australia

Figure 1 Labour force participation rates by sex (January 2005)



Data source: Calculated from ABS Labour Force, Australia (Detailed cat no. 6291.0.55.001)

Figure 2 Total working age population and annual percentage change 1990 to 2015



Data sources: Population projections of the Productivity Commission (2005) for 2004 to 34; ABS Population Statistics (cat.no. 3105.0.65.001) for earlier years.

Figure 1 and Figure 2 paint the current labour supply problem that will face Australia; a slow down in the growth of the working age population (Figure 1) and an increasing rate of labour market withdrawal as the population ages (Figure 2). Specifically:

- between 2005 – 2015, there will be a net growth in the working age labour force (15-64 years) of 2.4 million persons but after 2007 the rate of labour force growth will fall to below the rate of growth in population;
- the rate of growth in labour supply will decline from 1.5% in 2005 to 1.3% in 2015; which, in the absence of increased migration, reduced retirement rates or significant technical change will fall well below anticipated labour demand of approximately 1.91 % in key industries; and[24]
- one major component of the decline in labour supply is the aging of the population and the slowdown and eventual decline in female participation. In the last decade increasing female participation has bolstered up overall participation but female participation is expected to drop back to 56.8 from 59.6%; and
- overall, on a national scale NILS predict "a widening gap between aggregate demand and supply" over the period 2005-2015. [25]

According to the NILS report the issue of labour shortages is much more pressing in the Queensland Mining and Related industries, which we argue is the labour force cohort that most closely approximates the specific conditions in which Powerlink must operate.[26] The findings of NILS, using actual and expected minerals sales data surveyed from the major producers, is that skilled vacancies in Mining over the period will increase dramatically over the period.

At first glance, this prediction of the strength of labour demand may seem at odds with the widespread belief that Australia's minerals boom may have run its course and will begin to contract after 2008. This is the view of Access Economics and PB Associates. However the NILS view of continued strong demand is also supported by BIS Shrapnel. For example, BIS Shrapnel's view as to the medium term future of demand in the minerals industry is: [27]

> While mining output growth may start to slow by 2008 as the boom in Australia may be replicated overseas resulting in a potential oversupply, Australia has some of the largest and richest commodity reserves in the world, and the longer term outlook remains very positive for Australia's minerals industry. Continued

[24] This estimate of labour demand growth is across 6 distinct occupational groupings; Managers, Professionals; Technicians, Tradespersons, Semi-skilled and Labours and related

[25] See, NILS (2006) p. 17

[26] See also, Lowry, D., Molloy, S. and Tan, Y. (2006) " The Labour Force Outlook in the Minerals Resources Sector 2005-2015" National Institute of labour Studies, Flinders University

[27] BIS Shrapnel (2006), Mining in Australia, 2006-2021.

> investment, efficient mining operations and vast minerals augur particularly well for medium to long-term outlook

BIS Shrapnel also state that the impact of growth in demand for minerals and related commodities has implications for continued employment growth:

> Increased output is projected for all commodity groups, with nickel, bauxite, copper and iron ore respectively having a significantly higher level of predicted output in 2015 as global process and export quantities in Australia have expanded in response to surging demand from China which is forecast to increase over the next decade

An Australian National University study by Tyers and Golley (2006) used a GTAP-Dynamic Global Model to investigate constraints on growth in the Chinese economy to 2030. GTAP-Dynamic is a multi-region, multi-product dynamic simulation of the world economy. The study was intended to examine the potential impact upon the Chinese economy of the slow down in its population and labour force growth. The modellers conclude that while the potential for a slow down of the Chinese economy did exist, financial reforms in China plus its large supplies of foreign exchange suggest that the Chinese economy will continue on its current growth path until 2030.

China's capacity to grow further was itself confirmed by Access Economics in its Minerals Monitor (March 2006):[28]

> Hence the consensus view is that China's rapid growth will continue for some time yet perhaps two decades or more.

Indeed, it is understood that committed infrastructure investment in Queensland (mines, rail, ports) has been based on the expectation of confirmed growth, particularly in coal.

The NILS forecast the following labour demand outcomes for Mining 2005-2015, with particular concentration of this skilled labour demand on Western Australia and Queensland:

- by 2015, the minerals sector will need to create 70,00 more full time jobs to meet anticipated demand increases;
- the largest shortages are in tradespersons (additional 27,000) and semi-skilled (22,000) – tradespersons being the sector of greatest interest to Powerlink in the context of its labour supply;

[28] Access Economics, Minerals Monitor, March 2006, Page 8.

- labour supply projections indicate that these areas will see the slowest growth in supply indicating that the minerals sector will need to be increasingly aggressive in trying to recruit staff;
- the most rapid growth in demand will be in the 2006-2010 period indicating that there is potential for the rapid onset of labour shortages;
- most job pressure will be concentrated in Western Australia (42000 new skilled and semi-skilled workers) and Queensland (15,000 new skilled and semi-skilled workers).

The report utilises the concept of demand/supply ratios (DSR's) whereby it compares the expected labour demand (by category) in Mining with anticipated supply to the 2015. The importance of DSRs is that they provide a good indication of the state of the specific labour market facing employers at any point in time. In a situation where DSR's are rising there is difficulty in both recruitment and some upward wage pressure. Just as importantly the retention of existing workers is also made more difficult.

The results are shown in Table 1 below.

Table 1 Economy-wide capacity to respond to demand for labour from the minerals sector (number of persons)

2005-2015	Managers	Professionals	Tradespersons	Semi-skilled workers	Labourer & related workers	Total
Projected economy-wide employment growth (proxy of effective supply)	198,738	410,140	96,296	6,207	-16,621	1,049,825
Projected growth in labour demand in minerals sector	2,930	7,659	26,983	22,058	6,377	70,161

Source: NILS, Staffing the Supercycle, August 2006

The important features here are that Mining, by itself, will account for 29% of all tradesperson vacancies. This is indeed stark given that the mining sector accounts for less than 2% of employment in the economy.[29] In other words, the NILS predict that a sector of the economy which is collectively responsible for less than 2% of employment will account for nearly 30% of the available supply of tradespersons over the period under consideration.

In the presence of such clear labour supply constraints, adjustments will take place through capital/labour substitution and increases over time and increased

[29] See, Australian Bureau of Statistics, Labour Force Cat.6202.0 for a breakdown of the relative contribution of each sector the overall labour market.

productivity. However, the picture painted by NILS and BIS Shrapnel is of a strong Mining sector facing labour supply constraints in trades and semi–skilled workers and being willing to act aggressively to attract this labour.

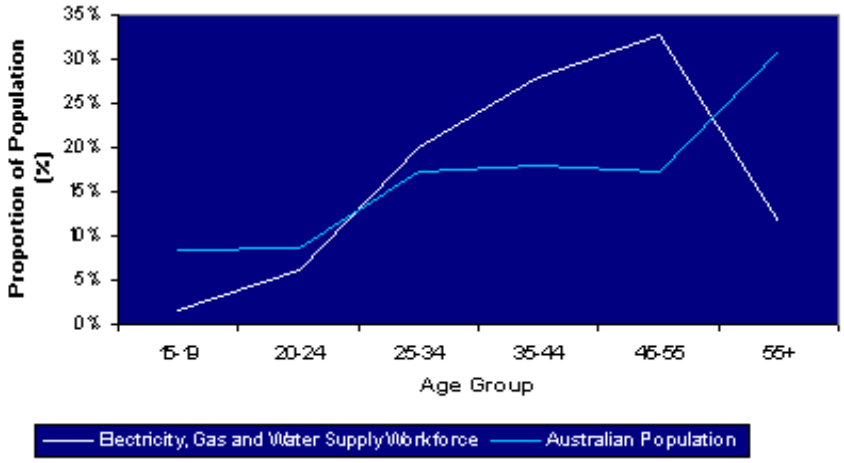
This is the labour market subgroup where Powerlink will seek to retain its present workforce and attract others. This is a picture very much removed from the labour surplus scenario suggested in the Access Economics report. This is especially the case once the age profile of the electricity supply industry is taken into account. It is a picture which accurately reflects Powerlink's present day actual experience.

4.2 Supply problems and an aging workforce.

Age issues will become a common concern for employers in most industries over the next decade but this is particularly true within Utilities. As can be seen from Figure 3 the Utilities workforce is older than the Australian population by virtue of the fact that it has a much higher proportion of persons in the 35-55 years age group. As well the retirement pattern is much sharper with a lot of retirements at 55 and 60 years.

This being the case the labour supply to the industry will be very susceptible to ageing and to interruption in the inflow of new workers. It will face a very difficult recruitment problem if the NILS and BIS Shrapnel predictions of excess demand in skilled labour markets proves to be accurate. Even leaving that excess demand aside, Powerlink is likely to face a challenging recruitment task over the coming years.

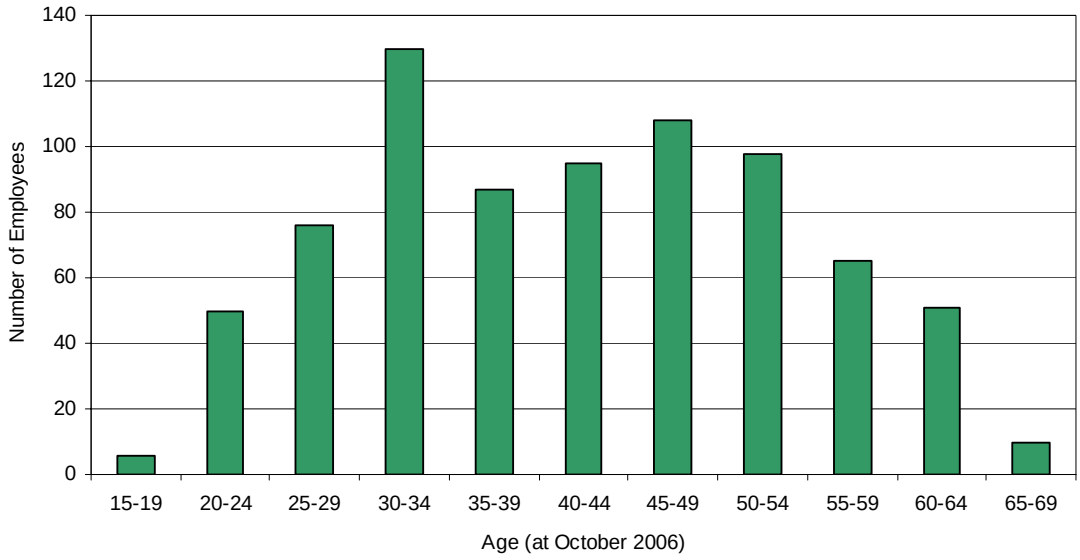
Figure 3 Electricity, Gas and Water Supply Workforce Population Age Profile Year 2004



Data source: ElectroComms and EnergyUtilities Qualifications Standards Body of Australia (2004) EE-Oz National Vet Plan For Industry 2003-2006/8

This pattern is reflected in Powerlink's age profile. Figure 4 shows that the majority of the Powerlink workforce are over 39 and exceed the Australian average age for the workforce of 38.6 years[30]. The median age group is aged 50 and the age cohort 45-55 years comprises 30% of the total workforce. The other distinguishing feature of the Powerlink workforce is that the age distribution tails off rapidly after the age of 60 years, with only 45 persons being aged 61-65 years (approximately 6%). This suggests a pattern of early retirement in the industry.

Figure 4 Powerlink age profile



Data source: Powerlink

The combination of these two aspects of the Powerlink workforce suggests two distinct and important human resource problems faced by Powerlink:

- first is the attraction of younger workers to a workforce that has a tendency to exit before the normal retirement age; and
- second is the increased retention of the existing workforce through to the normal retirement age.

These human resource issues take place against a backdrop of the likelihood of increased difficulty in the recruitment of skilled and semi-skilled workers and intense competition from Mining and Construction and from infrastructure (including rail and ports) as well as other public works programs that have been committed to in Queensland.

[30] See, Australian Bureau of Statistics The Labour Force Cat. 6202.0 August 2005

A key ingredient in a successful human resource strategy in these circumstances is the payment of competitive wages. For the reasons set out in this report, we believe that likely future demand conditions, particularly in Queensland, will place a strain on Powerlink's ability to attract and retain staff on the basis of their current wages budget, any lowering of that projected wage bill will be likely to seriously impede their human resource strategies and their ability to compete in the labour market.

4.3 The Behaviour of skilled and unskilled wages

A second issue of contention is the behaviour of wages growth in Utilities vis a vis the All Persons wages growth in the period 2010-2015 as shown in the diagram of page 3 of the Access report. Given the greater skilled and semi-skilled characteristics of the Utilities workforce, it would be normally expected that they would maintain a wage differential over the workforce as a whole.

The relative skill advantage enjoyed in the Utilities industry compared to the labour market as a whole may be shown by reference to a several factors. The level and currency of post-secondary qualifications held by workers within Electricity, Gas and Water Supply demonstrates the ability of the industry to sustain its productivity into the future. More than 66 % all workers in Electricity, Gas and Water Supply have post-secondary education, which compares to the all persons average of approximately (46% per cent).[31]

Table 2shows the typical skill level distribution of the Utilities industry in Australia.

Table 2 Highest Post-secondary Qualification by Age- Utilities

Highest Qualification	15 to 44yrs	45yrs and over	Total
Postgraduate Degree Level	4.3%	2.3%	3.4%
Graduate Diploma and Graduate Certificate Level	1.9%	1.5%	1.7%
Bachelor Degree Level	16.5%	13.9%	15.4%
Advanced Diploma and Diploma Level	11.2%	11.7%	11.4%
Certificate Level	34.8%	35.0%	34.9%
No Post-secondary Education	28.7%	32.7%	30.4%
Other	2.7%	3.0%	2.8%
Total	100.0%	100.0%	100.0%

Source: ElectroComms and EnergyUtilities Qualifications Standards Body of Australia (2003) EE-Oz National Vet Plan For Industry 2003-2006/8

[31] See, *ElectroComms and EnergyUtilities Qualifications Standards Body of Australia (2003) EE-Oz National Vet Plan For Industry 2003-2006/8.*

As well the workforce has a far higher percentage of full time workers than the all persons category; the respective percentages of casualisation are 11% and 30% respectively. By and large, the greater the degree of casualisation in an industry, the lower the wages and the skill level.[32]

Accordingly, it is clear that the Utilities workforce may be judged to have a higher education and skill level than the all persons category.

However, to justify a post 2009 wage growth rate of 3.5% for the Utilities workforce the Access Economics projections require the wage rate increase in Utilities to drop below the 4% level of increases suggested by the ABS for the trend in average wages over this period.

According to the Access Economics conclusions, wages for Utility workers, who in general are more skilled than the average workforce as a whole, rise more slowly than less skilled workers for at least a 4 year period in what is presented as a post-minerals boom slowing of the economy, or at least that part of the economy relevant to Powerlink's cost structure.

While wage growth for less skilled may rise more rapidly than skilled workers for one-off periods, for this to continue over so long a period appears highly unlikely and any analysis that predicts such a result should fully specify why such unusual conditions should prevail.

Even if that is correct, it seems even more unlikely an outcome in an environment in which more detailed studies of industry specific labour demand project ongoing supply shortfalls in demand for relevant tradespersons throughout the period under consideration.

Access Economics account for this unusual occurrence as a correction for excessive wage increases in the Utilities industry due to high cyclical demand and competition for labour from Mining and Construction during the 2002-2006 period. They argue that the removal of these conditions will lead to a decline in the bargaining power and relative scarcity of utilities workers leading their wages growth to temporarily drop below the rate of increases for average wages.

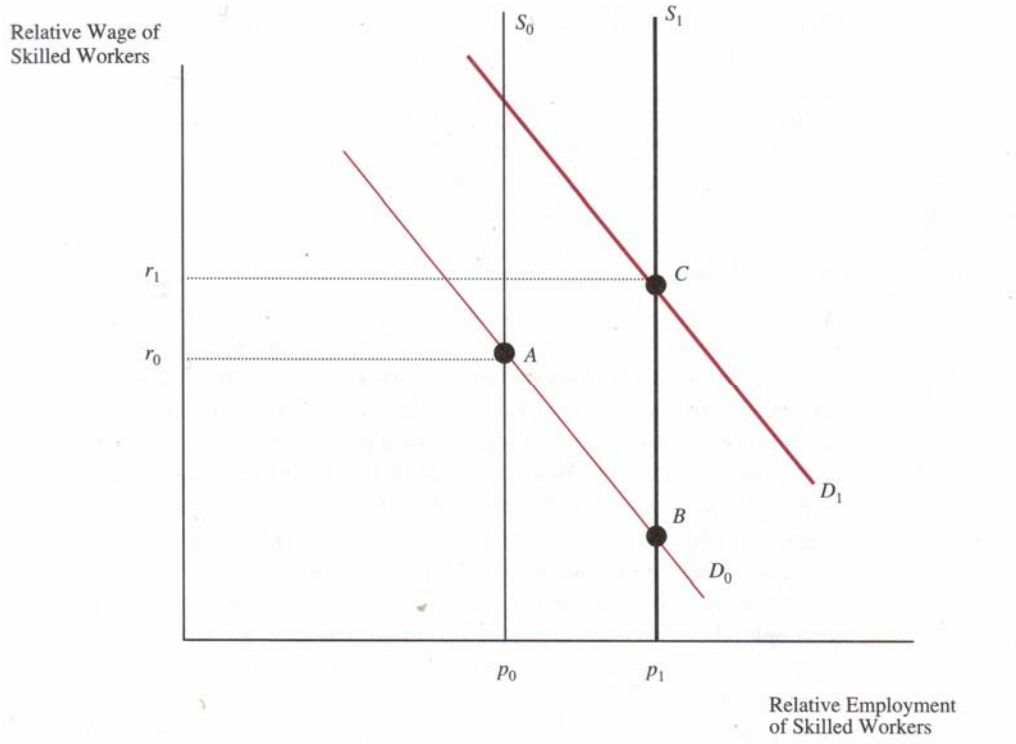
The behaviour of the skilled labour/unskilled labour differential has been analysed in a number of places and is illustrated in Figure 5. Figure 5 illustrates a relationship where wage relatives between skilled and unskilled workers have increased (from r0 to

[32] See, ABS Trade Unions Australia for data on casualisation across industries

r1) despite the fact that the rate of growth in the supply of skilled workers has exceeded the rate of growth in supply of unskilled workers.

This represents the labour market outcome that has been seen in most countries in recent decades (shown by the shift in supply from So to S1). In other words there has not been a lessening of the skilled differential despite the large increase in supply. This is because of very strong increases in the demand for skill workers.

Figure 5 Relative skilled wages



Source: Borjas, G (2000) Labour Economics ,Irwin-McGraw Hill p. 285

Similarly, Hyclak, Johnes and Thorton argue:[33]

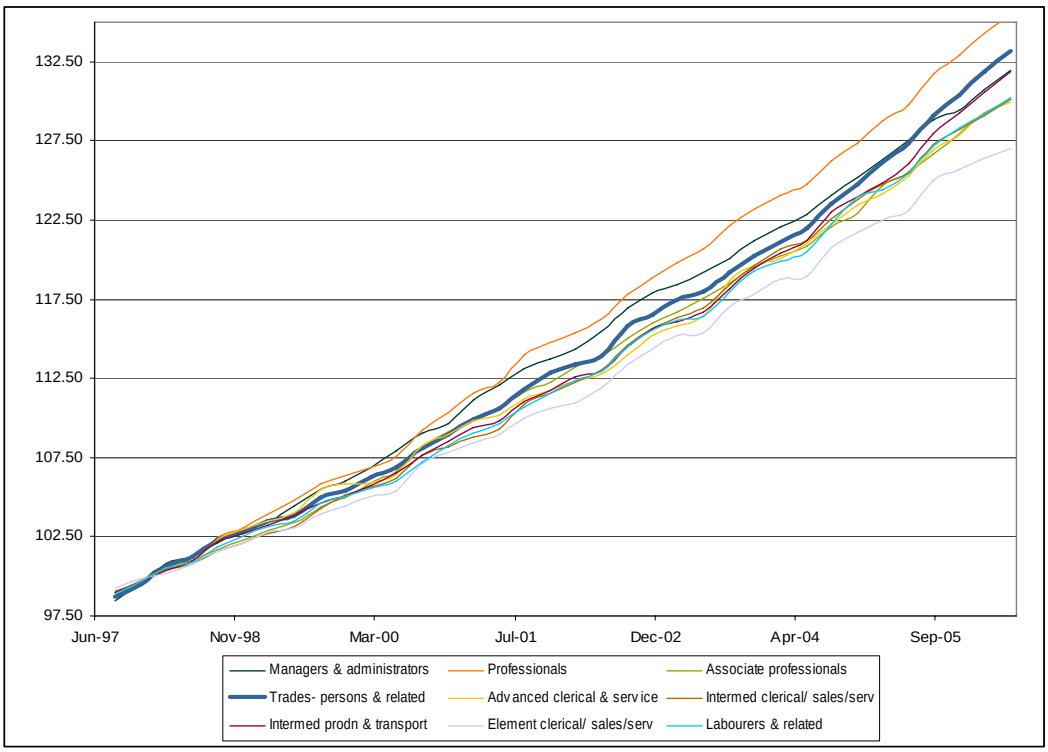
> There is very strong evidence of rising wage differentials for skilled workers relative to unskilled workers ……..along with rising relative wages the employment of college educated workers has increased as a fraction of employment.

An inspection of relative wage growth in Australia shows that the wages for Tradespersons outstripped wages growth for all but Professional categories over the period 1997 to 2006 (the total period of available data). Not once did the rate of wage

[33] Ibid, p 479.

increases for semi-skilled and unskilled rise above that for skilled workers. . The time path for occupational wages in the major occupations is shown in Figure 6.

Figure 6 Wage price index – total hourly rate excluding bonuses – Private sector Australia



Data source: ABS Labour Force

This confirms the dominant performance of wages in the trades sector and highlights the fact that, in growth rate terms, unskilled or all persons wage growth indices have not exceeded those for Tradespersons for this period. Moreover, they are unlikely to do so in an economy that is supposed to be slowing. The normal pattern of downward adjustment in wages growth following a slowing down in economic activity is for the burden to fall first on unskilled labour and then flow on to skilled labour but by a lesser amount.

In other words unskilled and less skilled labour acts as a buffer for the semi and skilled workers and absorbs the recessionary shock first. In some cases skill wage differentials actually expand. Tradespersons, although a member of the skilled worker group are not immune to downward shifts in demand but it is hard to imagine a higher skill group like Utilities workers slipping behind a lower skill group in wages growth for any length of time.

However, the Access Economics report (page 3, summary of results) suggests the opposite result with wages growth in the Utilities sector wages falling behind the rate of growth in All industries for the period 2009/10 to 2015/16 (at least). As mentioned

above this is a crucial condition if their predictions of wage growth in the Utilities industry is to be achieved.

Accordingly, on the basis of economic theory and a consideration of the recent behaviour of wages in Australia the scenario suggested by Access Economics appears

5 Can apprentices fill the skilled shortage gap?

The PB Associates report took a different tack from the Access Economics by suggesting that Powerlink should recruit and train more apprentices as a means of lowering labour costs. For this to be feasible, it would require a high degree of substitutability of skills between apprentices and qualified tradespersons, a stable supply of apprentices in the electrical trades as well as some protection for the training organisation from having skilled staff being attracted to other employers. None of these conditions is likely to hold in Queensland in the foreseeable future.

5.1 Skills substitutability

Mangan and Trendle (2006) investigated the productivity levels and drop-out rates for Queensland apprentices across the traditional trades of foods (ASCO 45), construction (ASCO 44), electrical (ASCO 43), engineering (ASCO 42) and other trades and related workers (ASCO 49). It was found that apprentices had low productivity for at least 2 years of their 4 year training period. Productivity estimates for apprentices are set out in Table 3 below.

Table 3 Productivity of apprentices relative to tradespersons

	1st year	2nd year	3rd year	4th year
Year 10	14.2	23.6	28.1	60.0
Year 12	15.2	27.0	34.7	87.5
Over 21	24.6	39.4	51.3	69.4
Award	40.0	55.0	75.0	90.0

Source: Mangan and Trendle (2006) p. 41. [34]

It can be seen that productivity levels differ slightly by education level (and age) of entry but that prior to the end of year 3 apprentices are relatively unproductive. The award row indicates their rate of pay in comparison to qualified tradesmen. Based on this it can be seen that for all years of training, apprentices are over-paid in comparison to their productivity levels.[35]

The best performing apprentices, the over 21 years, reached no more than half the productivity of a qualified tradesperson, with younger entrants failing to get above

[34] Mangan, J and Trendle, B (2006) " Surviving Apprenticeship Training; A Duration Analysis of the 2001 Cohort", LMRU working paper , forthcoming Education Economics

[35] In the sense that their wage is greater than their marginal value product

35% of the productivity level of a qualified tradesmen. The data in table 2 confirms what is already well known; apprentices are a long term investment in training and employers can not expect to get much in the way of short term productivity from them.

5.2 Availability of supply

Another major problem is availability of supply. Table 4 sets out the intake, cancellation and success rates for Queensland apprentices using the intake cohort from 2001. Under normal circumstances this group would be expected to finish in 2005.

Table 4 Training commencements and outcomes by 2 digit ASCO occupations 2001-2005

ASCO 2	Active	Withdrawn	Completed	Expired	Cancelled	Total
41	4,143	384	1,213	75	1,787	7,602
42	5,252	520	1,460	73	2,754	10,059
43	**5,324**	**290**	**903**	**96**	**1,785**	**8,398**
44	8,588	1,221	1,596	145	4,516	16,066
45	2,791	973	1,153	101	4,622	9,640
46	102	8	82	7	38	237
49	4,260	848	1,395	68	3,347	9,918
Total	30,460	4,244	7,802	565	18,849	61,920

Source: DELTA database, Department of Employment and Training

The data in this Table 4 confirm the very high withdrawal and cancellation rates associated with apprenticeship training in Queensland. The real extent of this cancellation rate may be seen by reference to Figure 7 showing the hazard of cancellation. [36]

[36] A hazard function is a form of duration modelling which shows the hazard or risk of individual changing situations in this case the hazard or risk of quitting.

Figure 7 Hazard of cancellation, by ASCO occupation (2 digits)

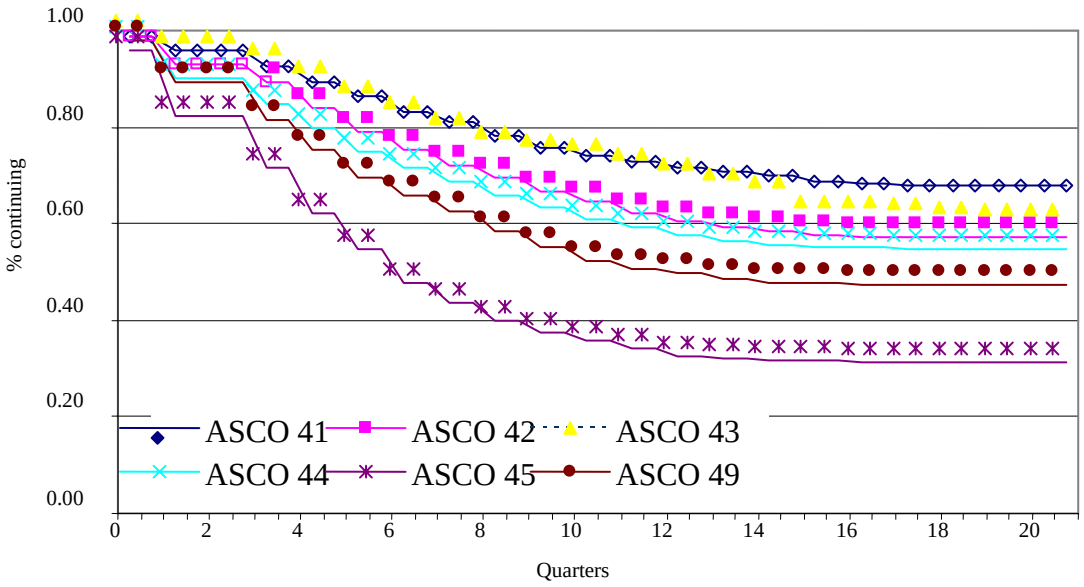


Figure 7 provides details of hazard rates for each of the minor trade occupations (2 digit codes 41 to 49). Here considerable variation in the completion rates can be observed – even though ASCO 43, Electrical and Electronics Tradespersons had the second highest completion rate (60.3%) still approximately 40% of the cohort intake cancelled. Therefore in terms of both substitutability and reliability of supply, increasing the emphasis on apprentices would appear not to be a sound option. At best the apprentice program could be a small part of the overall human resources program.

Moreover, even if this were not a concern, there remains the issue of the demand for these workers once they complete their training. In short, merely training more staff is not a panacea for an organisation such as Powerlink – it still must be able to compete with alternative employers for qualified staff. Even with a successful training program – Powerlink must compete with the wider market to retain those workers.

6 Conclusions

This report considered the economics behind the AER draft decision on wage adjustment costs in the case of Powerlink. The decision found that the Powerlink estimates of 5.6% for wage adjustments in the later years of the regulatory period were too high and recommended a lower rate of 5.3%, 3.5%, 3.5% and 4% for the last 4 years of the regulatory period.

They did this primarily on the advice of Access Economics, with some input from the PB Associates. In reviewing the Access Economics report we report strong disagreement with some key assumptions of the Access Economics analysis and as a result, with their conclusions on likely wages growth notably in the Electricity supply industry and for Powerlink in particular.

In general terms, we are concerned that the AER seems content to rely upon the outputs of a proprietary macroeconomic model – without:

- any consideration of the specifics of the circumstances confronting the entity whose revenue are being regulated and
- even basic sensitivity analysis of the sensitivity of those outcomes to changes in assumptions.

It is submitted that such an approach:

- undermines the legitimate interests of the regulated business as it is deprived of the right to respond to the detailed assumptions that are embedded in the modelling; and
- increases the risk of regulatory error – which is a particular concern given the asymmetric consequences of regulatory error.

It is further submitted that this lack of transparency means that reliance upon macro-economic modelling outcomes is not a desirable model to use as a principal source of information to underpin regulatory decision making.

Specifically we strongly disagree with the Access Economics conclusion that the tight labour market currently facing the Utilities industry will ease to the point that real wages growth in this sector (at least for electrical trades workers in Queensland) will be forced down to below the average rate of wages growth across the economy.

This is seen as both a correction to the high rates of growth 2002-2006 in the industry and as a direct consequence of general economic slow down and in particular

economic slow down in the Mining industry post 2008. The Mining and Construction industries being seen in the analysis as potential competitors with the Electricity supply industry. We disagree with this scenario in an absolute sense and in terms of mechanism and timing.

The first point of departure is mechanism; the wages growth (contraction) model proposed by Access Economics has no apparent recognition for institutional factors in wages determination. While we agree that former institutional buffers such as union power have been reduced in significance, other institutional barriers such as enterprise bargaining agreements, historical wage differentials coupled with standard economic theory suggests that the Access Economics findings that wages growth in the Utilities sector will fall by 33% between 2008/09 and 2009/2010 implausible, even if one accepts the fundamental argument of significant easing in labour market tightness post 2008.

This is because the wages demand model formulated by Access Economics, we believe, overstates the role and speed of excess demand pressures (cyclical factors) and understates the role of institutional barriers and wage agreements. As a result we believe their model overstated the role of cyclical factors in wages growth in the Utilities industry pre 2008 and also overstates their role in easing wages growth post 2008.

This error in the conceptual aspects of their modelling leads them in to making the unlikely claim that wages growth in the Utilities sector (with its high proportion of skilled and semi-skilled workers) will lag behind the All industries rate of wages growth for a 4 year (at least) period. We can find no example where such behaviour has occurred in the Australian economy.

Conversely the data presented in our report indicates the normal behaviour of wages in Australia with Tradespersons having a relatively high rate of growth over the observed period 1997-2006. Again, even if the fundamental claim of a significant decline in labour market tightness is true, the normal pattern of economic adjustment is for lower skilled workers to be effected first and for skilled/unskilled wage differentials to be maintained(and possibly even increased) not the reverse.

For these reasons we disagree with the Access Economics conclusions on conceptual grounds, but our fundamental disagreement is over their analysis of the likely state of the labour market facing the Utilities and related industries post 2008/09, at least for that part of the sector that affects Powerlink. We find no evidence to support their conclusions and strong evidence to refute them.

The National Institute of Labour Studies Report into labour market conditions 2005-2015, concludes that labour shortages, particularly in skilled and semi-skilled areas will

continue. Significantly, because of the close inter-relationships between labour demand in Utilities and those in Mining and Construction, the NILS report concentrates on labour force outcomes in Mining. Rather than reduced demand and labour surpluses they find very heavy demand for skilled workers in the Mining industries of Western Australia and Queensland. They are supported in these conclusions by BIS Shrapnel who argue that Mining companies in particular will be aggressive in their attempts to attract labour at least until 2015.

Powerlink's labour costs derive from segments which have "footprint" overlap with mining and construction (e.g. regional Queensland0, and include some mainstream construction skill sets (e.g. riggers, construction managers) which are in demand from mining and related activities.

It has been suggested that Powerlink might seek to reduce labour costs by increasing their use of apprentices. Recent research has confirmed the belief that apprentices are a long term investment. Their productivity levels are such that they are not a substitute for qualified tradespersons and the very high attrition rates for apprentices in Queensland make them an unreliable supply source.

Finally, we should go back to the central concern of Powerlink management in this matter. The basic aim of management is to secure a skilled workforce sufficient to complete a required work program in an essential industry. The Access Economics report and the AER deliberations that flow from it are treating employment and wages as spot estimates. For example, if macro economic conditions were to change in the way predicted by Access in 2009, there appears to be a belief that wage relatives and wages growth would immediately respond.

Economics, both theory and empirics both show that worker expectations take a longer time to adjust. The discrete (one-off) adjustment may be an adequate analogy for new workers (if there was in fact a significant labour surplus) but existing workers take a longer perspective and seek to lock in wage increments in agreements. Therefore in a conceptual sense, allowing for the realities of the labour market, we do not accept their analysis.

Moreover if the National Institute and BIS Shrapnel are anywhere near to being proved correct and labour demand/skilled demand remain high until 2015, the wage adjustments recommended by the AER may well prove significantly inadequate, especially given the age profile of workers in the industry. If implemented by Powerlink management, we believe that it would put that company at a serious recruitment disadvantage in relationship to their likely competitors in Mining and infrastructure/construction companies in Queensland. For this reason we support the

retention of a 5.6% wage adjustment factor over the period ---- with the warning that this rate may prove to be too low.

Appendix D

Adjustment of Historic "S" Curves to Reflect tight Market Conditions

POWERLINK REVENUE CAP 2007-08 TO 2011-12

AER DRAFT DECISION

ADJUSTMENT OF HISTORIC "S" CURVES TO REFLECT TIGHT MARKET CONDITIONS

January 2007

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1 BACKGROUND

On 8 December 2006, the Australian Energy Regulator released its “Draft Decision - Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12”. A key driver of the AER’s position and decision in relation to expenditure was a report prepared by Parson’s Brinkerhoff Associates (PB) on behalf of the AER. In Section 4.8.3 of their report PB considered a proposal by Powerlink to adjust the historic “S” Curves relating to:

- Line Projects
- Transformer Projects
- Substation Projects
- Capacitor Projects

This adjustment was sought to reflect the impact of tighter market conditions on supply and delivery of major components and services. PB recommended this proposed S-curve adjustment be rejected. The recommendation to reject these adjustments was accepted by the AER. Powerlink has sought Evans & Peck’s view on this issue.

This report has been prepared for Powerlink on the basis that it may be used internally within Powerlink or released to the AER as part of the review process, at Powerlink’s discretion.

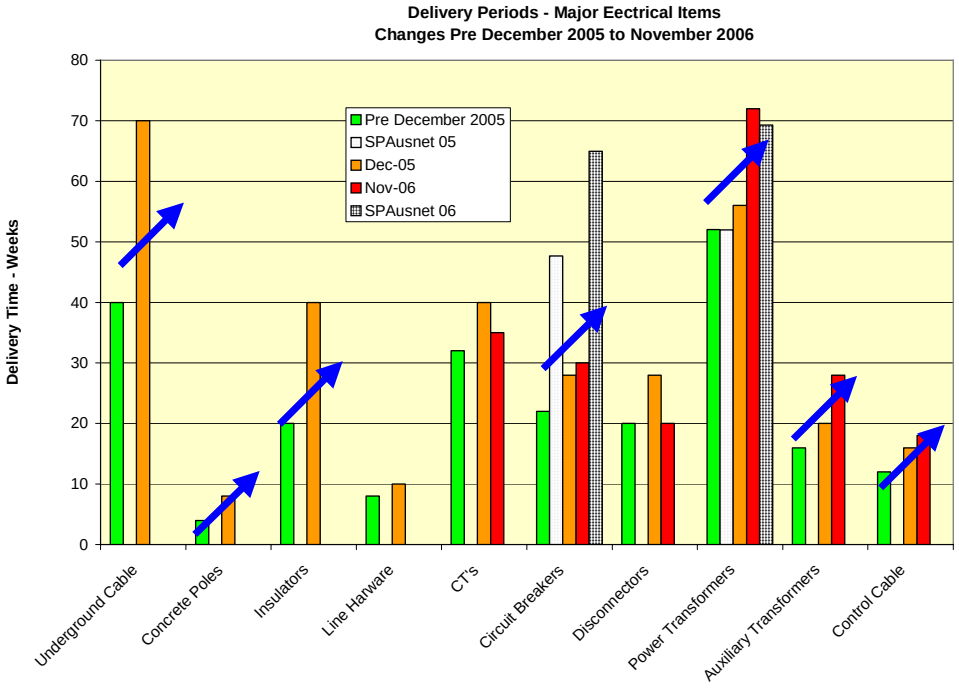
2 REVIEW OF LEAD TIMES FOR MAJOR PLANT ITEMS

Powerlink has provided data on changes in lead times in major plant items. This is in the form of a presentation prepared by their “Procurement Business Unit” in December 2005, which tabulated changes in delivery times in the period leading up to December 2005, and an update on those values prepared in November 2006. The data is graphed below. We have also overlaid data extracted from SPAusnet’s submission[1] to the AER in relation to Powerlink’s Revenue Proposal.

Independently, we have verified with a number of power transformer manufacturers that the current lead-time on a major power transformer (i.e. 275kV) is in the range 60 to 70 weeks, has increased considerably over the last year or so, and is still increasing.

There seems little dispute that the lead times on most major electrical plant items have increased significantly during 2005, and this trend continued in 2006. The lead-time for Power Transformers, for example, has increased by approximately 4 months. Similar increases have occurred for other major items of substation plant such as circuit breakers and auxiliary transformers, and line construction items such as insulators and cables. Given that there is such a long lead-time, these are almost certainly critical path items on major projects.

[1] SPAusNet letter to AER dated 8 June 2006
http://www.aer.gov.au/content/item.phtml?itemId=702344&nodeId=c395ae27510a72d8618596a4a3767b35&fn=SP%20AusNet%20(8%20June%202006).pdf



3 PB’S REASONS FOR NOT ACCEPTING PROPOSED ADJUSTMENTS TO POWERLINK’S “S” CURVES

PB has reviewed and agreed to the methodology used by Powerlink to calculate their historic “S” curves. However, they have not agreed that they should be adjusted to reflect longer lead times due to tight market conditions:

> *While it acknowledged the tight supply conditions raised by Powerlink, PB recommended the removal of the pre-payment adjustment to the four S-curves on the basis that:*
>
> - *The risks envisaged by Powerlink are already captured in the historic S – curves to some extent as they are based on current market conditions. PB did not expect that all historic project procurements reflected just in time procurement.*
> - *Pre-payments may not be an efficient or appropriate method to mitigate the risk of manufactured items not being delivered on time*
> - *It was unclear whether pre-payments would be necessary for all projects of the nominated type, or that they would be required for the duration of the period*
> - *Powerlink used long term-high volume supply contracts to ensure timely delivery of long lead critical items.*

Prior to expressing Evans & Peck’s views on the appropriateness of “S” curve adjustment, some comment on each of PB’s reasons for not accepting any adjustment is warranted and is dealt with in the following sections.

3.1 INCLUSION OF TIGHT MARKET CONDITION RISKS IN CURRENT “S” CURVES

In order to assess whether or not Powerlink has already built the increase in delivery times into their historic “S” curves, Evans & Peck sought data on the commencement date on the projects used to make up the “S” curves agreed to by PB. These details are shown below. With 1 exception, all projects commenced in or before 2003.

Category	Start Year
Lines	2003
	2002
	2002
	2003
	2002
Substations	2003
	2000
	2003
	2005
Capacitors	2003
	2003
Transformers	2002

Given that the historic “S” curves are restricted to a 24 month period, it is difficult to support PB’s assertion that these curves incorporate the tight market conditions encountered in 2006.

3.2 PRE-PAYMENTS MAY NOT BE AN EFFICIENT MECHANISM

Whilst largely agreeing with PB’s observation, we also note that pre – payments are a reality in some sectors of the power industry. They are typically applied where specialist products are required in a global market, with manufacturers having limited recourse to transfer the product to another project if the order is cancelled. Examples may include specialised batches of transformer core steel and winding conductor. The reality is manufacturers and services suppliers are taking advantage of market conditions to apply this mechanism, and Powerlink does not have sufficient market leverage to stop it.

It is our understanding that the “pre payment” approach adopted by Powerlink is a “catch all approach” to simulate the effect of a range of items including pre-payment, but more particularly longer lead times. Whilst agreeing with PB that prepayments may not be efficient or occur in all cases, Evans & Peck believe the issue is symptomatic of a larger problem that does warrant further consideration by the AER. There has been a material change in market conditions since the “S” curves were developed.

3.3 APPLICATION OF ADJUSTMENT TO ALL PROJECTS

Powerlink has developed its cash flow model based on average “s” curves. Clearly, some projects will take less time than dictated by the “S” curve, some projects will take longer. PB, and subsequently the AER, has agreed to the “average” approach.

Since the development of the curves, tight market conditions have emerged. On average, this has resulted in increased lead times or the need to apply other mechanisms to compensate on some projects. This has resulted in a systematic change in the average “S” curve. The question as to whether the adjustment should apply to all projects is therefore somewhat rhetorical, and also represents an admission that tight market conditions are certainly impacting some projects. The argument should therefore be about how much the average curve should be adjusted by, rather than the “all or nothing” approach apparently adopted by PB.

The issue of how long these conditions will apply for is similar in nature, and more challenging. What is clear is that the tight market conditions are a reality, and deteriorating at the moment. It is also clear that the infrastructure boom in Queensland generally, and the power industry nationally is likely to continue for the foreseeable future. Based on best available information at the time of the AER making their decision, this issue is likely to continue over the period 2007-08 to 2011-12.

3.4 USE OF LONG TERM CONTRACTS TO MANAGE LEAD TIMES

Powerlink has advised that this mechanism has been used in some cases to ensure delivery of major components such as insulators. However, whilst an effective means of ensuring supply, it has given rise to some of the impacts that the adjustment in the “s” curves is meant to capture. In the case of insulators for example, the long-term contract resulted in earlier deliveries. Powerlink has confirmed that these deliveries are assigned to the project expenditure (rather than taken into inventory). As a consequence, some project expenditure has accelerated.

Whilst PB are correct is identifying long-term contracts as an effective mechanism for ensuring delivery (in an absolute sense), they do not necessarily mitigate the “S” curve impact associated with tight market conditions.

4 EVANS & PECK’S ASSESSMENT OF IMPACT OF TIGHT MARKET CONDITIONS ON S-CURVES

Powerlink has provided Evans & Peck a copy of:

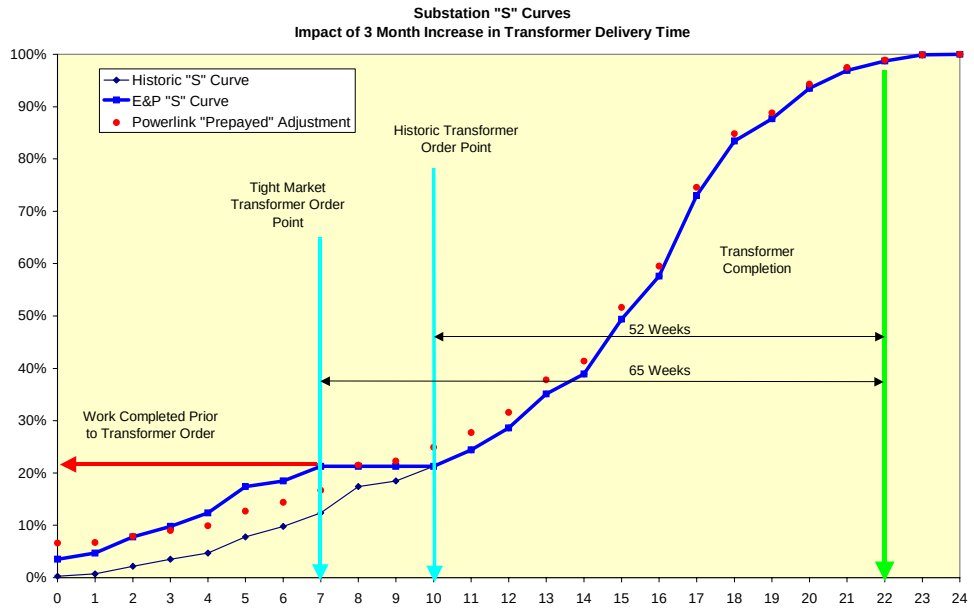
Task Report No: TR00356 – Modifications to Project S-curves due to tight Market Conditions” prepared in January 2006. This report outlines the S-curve modifications used by Powerlink in the following categories:

- Substations
- Lines
- Transformers
- Capacitors

Our approach to completing this assignment is to examine the likely impact of increased lead times from first principles, and to then compare our expectations with those adopted by Powerlink.

4.1 SUBSTATIONS

We have plotted the historic S curve utilised by Powerlink to model cash flows associated with substations in the following graph.



Evans & Peck provided assistance to Powerlink in the development of their project cost accumulation model as part of the related risk analysis / Monte Carlo simulation. In preparing the capital accumulation model, a decision was made to limit “S” curve durations to 24 months in order to keep data management within reasonable bounds. Our general observation is that, based on project start and completion dates provided as part of the historical analysis of budget performance, this 24 month window is tight for many substation projects, with average completion times commonly in excess of 24 months. As a consequence, increased lead times are intuitively likely to result in expenditure spilling ahead of the 24-month window.

In order to assess the likely impact of increased delivery times, we have assumed that transformer installation is a critical path item in the majority of substation projects, and should be complete 2 months prior to commissioning to allow associated works to be completed. With a 52-week delivery period, this would necessitate an order in month 10, as shown above. At this point, approximately 22% of expenditure has been incurred[2]. As a worst case, assuming that all of this 22% expenditure is a prerequisite to transformer order, an extension of delivery to 65 weeks would result in Powerlink reaching the 22% level, and holding at that point for 3 months. The “blue” line in the above graph demonstrates this. Clearly, the “Tight Market” “S” curve moves to the left, with increased expenditure at an earlier time. The extent of the earlier expenditure is captured by the area between the “Historic” (black) “S” curve and the blue curve.

[2] This is consistent with the hold point that Powerlink used in the “Task Report”

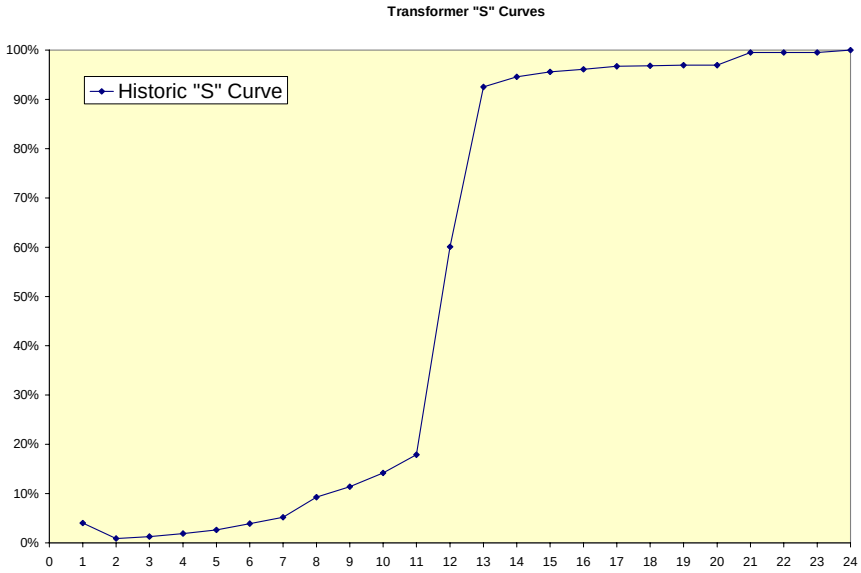
We have also plotted Powerlink’s “Prepayment” curve in red. Visually, the area between the red “Prepayment” curve and the “historic” black curve is similar to the area between the “Tight Market” blue curve and the historic “S” curve. Detailed calculations show that there is approximately 24% more area associated with Powerlink’s “prepayment” curve. This is more representative of a 4-month acceleration of ordering.

Based on this somewhat simplified analysis we therefore conclude that in the case of substations:

- Some adjustment to the “s” curve is warranted to reflect tight market conditions.
- Powerlink’s “Prepayment” adjustment is at the higher end of expectations, commensurate with the upper end of expected delivery times. We would recommend an adjustment about 80% of that proposed by Powerlink.

4.2 TRANSFORMER PROJECT S-CURVES

We have examined the historic “S” curves provided by Powerlink for Transformer Projects. This is shown in the following chart.



We note that the majority of expenditure is in months 12 and 13 of the 24-month program. Whilst acknowledging that transformer delivery times have increased by 3 to 4 months we believe that, based on this “S” curve and a number of supporting transformer project schedules[3], there is sufficient float in the back end of this program to enable

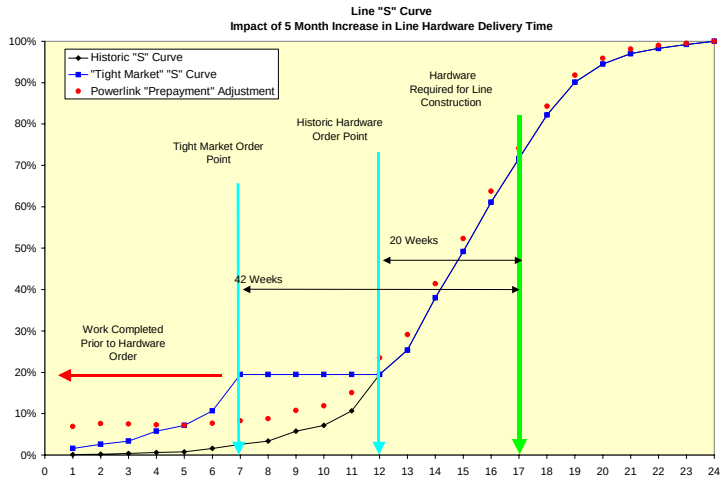
[3] See for example CP.00879 Dan Gleeson Tx 2 and CP.01256 Belmont Tx 3 which both have 14 month programs based on 52-week deliveries.

Powerlink to mitigate increased delivery times. We would suggest that the “historic” “S” curve (which we recognise was calculated from a small number of samples) is actually slightly biased to early expenditure and already captures the effect of prepayments arising from tight market conditions.

In the case of transformer projects at this stage therefore, we do not support an adjustment to historic “S” curves to reflect tight market conditions.

4.3 LINE PROJECTS

In order to assess the reasonableness of Powerlink’s “prepayment” adjustment to the lines “S” curve, we have completed a similar analysis to that above relating to substations. We do not believe that there is significant float in the backend of this “S” curve to mitigate the longer delivery times. We also make the same general observation that we made relating to lines projects – the 24 month window is tight for lines project, even before the increased delivery times.



We note from section 2 of this report that lead times on items such as insulators have increased by approximately 20 weeks from 20 to 40 weeks. We have assumed that most of the line hardware is required approximately half way through the construction phase (after easement clearing and tower construction for example). Based on 20-week hardware deliveries, approximately 20% of the expenditure is incurred at the time orders are placed[4]. We have advanced this 5 months to compensate for the 20-week increase in delivery times.

The resultant changes are shown in the chart above. We have again shown the Powerlink “Prepayment” curve and compared this with our “Tight Market” curve. In this case, the area between Powerlink’s curve and the historic “S” curve is very similar to that between

[4] This is significantly earlier than the hold point shown in the Task Report. In this report, the hold point is made at month 14 in the original program equating to 38% expenditure. With 20 weeks

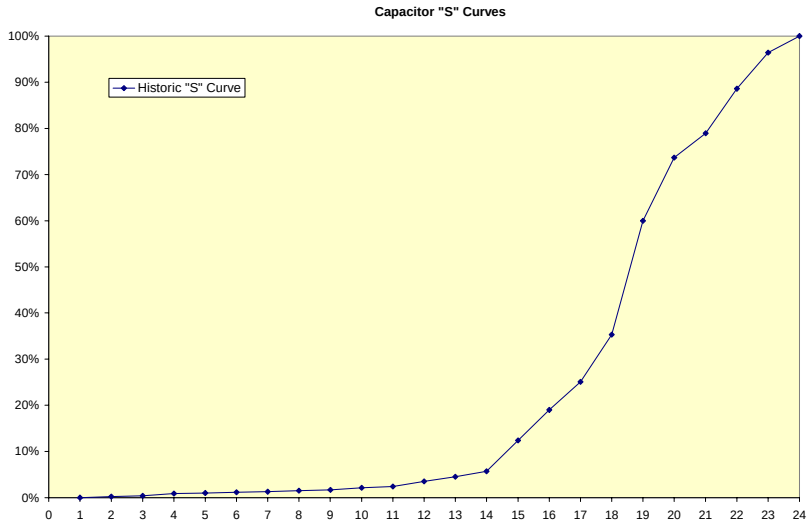
our “Tight Market” curve and the historic “S” curve. Once again, this represents the upper limit on the assumption that all of the expenditure leading up to the hold point has to be incurred.

Based on this analysis, Evans & Peck considers:

- That there should be an adjustment to the historic “S” curves in the case of line projects to reflect tight market conditions.
- Powerlink’s Prepayment adjustment is at the higher end (but within the range) of expected adjustments required to compensate for longer lead times.

4.4 CAPACITOR PROJECTS

We have approached Capacitors in the same way as our analysis relating to substations and lines. At this stage we have not been provided with specific details relating to long lead items that are in fact on the critical path. Capacitor projects tend to be of relatively short duration in comparison to the 24 month “S” curve used, with minimal expenditure in



the first 12 months. We also note that the rate of increase in expenditure in the first 12 months is quite low, so any acceleration in this period would be at relatively low cost. At this point in time therefore, we cannot support an adjustment to the capacitor “s” curve to reflect tight market conditions.

5 OVERALL CONCLUSION

Data from a number of sources verifies that there has been a significant increase in lead-time on a number of major plant items associated with electricity transmission.

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delivery, components would not arrive until month 19 by which time the “s” curve expenditure has reached 92%. This seems late in a line project. We have initiated the hold point 2 months earlier.

The cash flow associated with Powerlink’s capital budget has been prepared based on data that does not reflect this increase. Powerlink has proposed an adjustment to the historic “s” curves in the form of a prepayment adjustment. This adjustment does not reflect that a prepayment will be made in every circumstance. Rather, it is a “catch all” mechanism to reflect the impact of program acceleration to enable advanced ordering, and other mechanisms that may be required to ensure timely project delivery.

Evans & Peck’s preference is to consider the impact of longer lead times on project "S" curves, rather than pre payments. On the basis of our analysis, we conclude:

- An adjustment to historic “S” curves is warranted in the case of substation projects and line projects.
- The adjustment to “S” curves proposed by Powerlink in the case of substations is at the higher end of our expectations and we would suggest about 80% of the level proposed by Powerlink.
- The level suggested by Powerlink in relation to Lines is at the higher end, but in the range, of expected outcomes.
- Based on current available information, we have not been able to support an adjustment to the Transformer or Capacitor project “S” curves.

Appendix E

Comment on PB Associates Review of Powerlink's Revenue Reset Operational Expenditure Submission

The Asset Partnership

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18 January 2007

Merryn York
Manager, Revenue Reset Team
Powerlink Queensland
PO Box 1193
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Dear Ms York

Re: PB Associates Review of Powerlink's Revenue Reset Operational Expenditure Submission

Thank you for the opportunity to review section 5.5 to 5.5.9 of PB Associates' Review of Powerlink's Revenue Reset Capital Expenditure, Operating and Maintenance Expenditure and Service Standards Submission.

We generally agree with the comments made by PB Associates however we believe PB Associates have seriously misunderstood the context in which Condition Based Maintenance is applied within Powerlink.

The Asset Partnership is the recognised Australasian authority on the application of Reliability Centred Maintenance (RCM) as a reliability engineering tool. The Asset Partnership has worked with Powerlink over many years to provide RCM training, analysis facilitation, and asset strategy development and as such, we believe we have a sound understanding of Powerlink's maintenance methods and processes applied. The application of RCM and the benefits the process generates was the primary driver for making use of Condition Based Maintenance within Powerlink.

Upon reading selected sections of PB Associates report, we believe PB Associates may not have fully appreciated the implications of some of the failure characteristics managed through Condition Based Maintenance, the term used in the Powerlink submission.

Importantly we believe the conclusions reached based on this misunderstanding will seriously undermine Powerlink's ability to remain an industry leader.

The misunderstanding is developed in Section 5.5.7. paragraph 2 of PB Associates report which states:

"…that new assets should not impact condition based maintenance expenditure for some time, and certainly not during the same regulatory period in which the assets were commissioned."

This statement appears to reflect a very narrow interpretation of Condition Based Maintenance and certainly not one with which we can concur.

Condition Based Maintenance in the Powerlink context is used to address failures which have:

- a constant probability of failure for their entire existence as shown in Figure 1 below;
- a period of random failure for an asset which has a defined life;
- a high incidence of early failure, which drops eventually to a constant conditional probability of failure as shown in Figure 2 below; or
- a defined wear out zone but where there is some doubt about when the increased probability of failure occurs as shown in Figure 3 below.

Figure 1. Random Failure Pattern

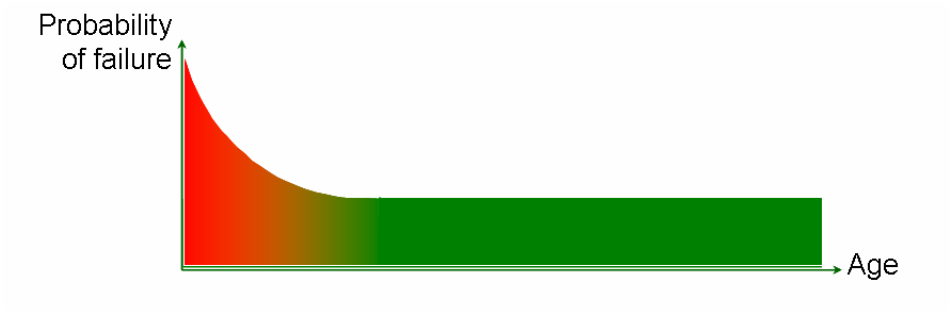


Figure 2. Early Life Failure Pattern

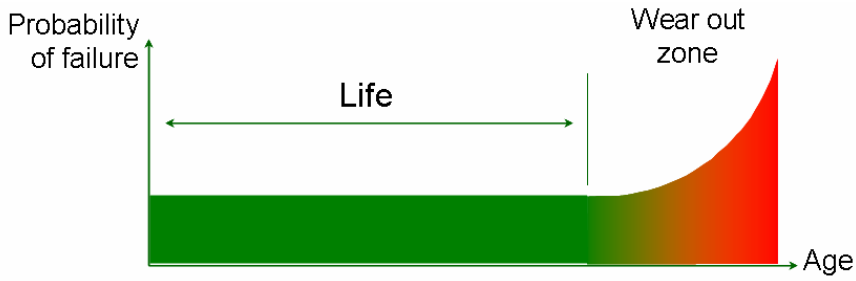


Figure 3. Age Based Pattern

It appears that PB Associates have only considered this last scenario and in doing so, have dismissed Powerlink's proposition that Condition Based Maintenance costs will increase as a result of an increase in the number of assets.

This belief is confirmed in section 5.5.7. paragraph 2 goes on to state:

"This view is based on the premise that new assets require inspection, testing, operation and may require emergency maintenance but should not require any condition based maintenance for at least the first five years of service." .

We believe this statement illustrates PB Associates misunderstanding of the terminology and has assumed that Powerlink will only use Condition Based Maintenance for assets as they approach an age in which there is an increased probability of failure.

Powerlink use Condition Based Maintenance to manage all failures (including random) where it is both technically feasible and worth doing so.

Random failures by their very nature have no relationship to the age of the asset but relate to the probability of failure as expressed by the equation:

$$R=e^{-\lambda t}$$

where t = time and λ= failure rate or 1/MTBF

This equation means that for random failures, the probability of failure remains constant from time zero and to ensure the high levels of system reliability, Powerlink must conduct the conditioning monitoring assessments of individual assets from the time of installation.

As illustrated in Figure 4 below, Condition Based Maintenance assesses the condition and performance of an asset allowing action to be taken before the full functional failure occurs. It is this very behaviour of monitoring the performance of assets at a frequency based on the PF interval, which has contributed to Powerlink being an industry leader in asset performance, reliability and cost.

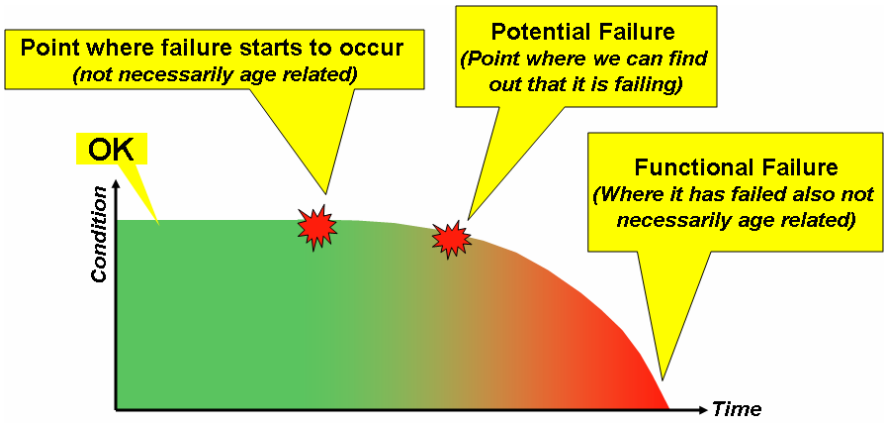


Figure 4. P-F Curve

It is also known that many electrical and electronic assets have is an increased probability of failure or early life failure as illustrated earlier in Figure 2.

The implication of early life failure is that with an increase in the number of assets which exhibit an early life failure pattern, an increased need for condition maintenance can be expected.

Further compounding the misunderstanding by PB Associates as detailed above, we understand Powerlink also include functional checks of Hidden Failures in their submission as Condition Based Maintenance.

The management of Hidden Failures, which typically include almost all of Powerlink's protection systems, back up systems and similar protection equipment can usually only be managed by some sort of functional check. For simplicity, Powerlink classify these checks as Condition Based Maintenance with the implication that an increase in asset numbers will definitely result in an increase in the number of functional checks.

Hidden failures by their very nature are failures which will not become evident until some other failure occurs. For example, the failure of a circuit breaker to trip and isolate a fault may not become a problem until a fault occurs and the circuit breaker is unable to operate. The detection of this potential problem can only be achieved through some sort of functional check which is classified as Condition Based Maintenance.

The frequency of functional checks (Condition Based Maintenance) for hidden failures under the RCM process is determined mathematically using the equation

$$FFI = \frac{2 \times M_{tive} \times M_{ted}}{M_{MF}}$$

Where:

FFI = Failure Finding or Functional Check interval
M_{tive} = Reliability of the Protective Device expressed as MTBF
M_{ted} = Reliability of the Protected Function express as MTBF. This number equates to the demand rate for the protective device
M_{MF} = probability for the Multiple Failure which Powerlink is prepared to tolerate. This probability will be a function of the seriousness of the effects in the event of the multiple failure.

Certainly many of the modern control systems are self checking but the ability of a mechanical mechanism to operate still requires inspection and often testing. The conclusion to be reached is that an increase in assets requiring function checks will require an increase in the allocation for Condition Based Maintenance. We believe PB Associates may not have appreciated this subtle distinction.

In conclusion, it appears PB Associates have misunderstood Powerlink's use of the term Condition Based Maintenance which in Powerlink's context includes:

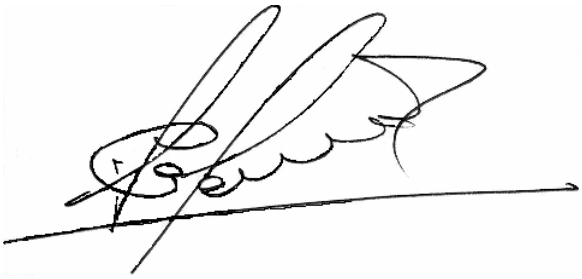
- all inspections and checks used to manage purely random failures
- all inspections and checks used to manage early life failures
- all inspections and checks used to manage age related failures in the period of random failures up to the point where a rapid increase of probability occurs and the asset is replaced or refurbished
- all inspections and checks used to manage age related failures where the age of failure is not known and the check is used to better determine the age for replacement or refurbishment.

- all functional checks of protective devices to determine if the device can operate as intended

In failing to appreciate the full meaning of Condition Based Maintenance, we believe PB Associates have come to an incorrect conclusion. We are confident that with a full understanding of the meaning of Condition Based Maintenance in the context of Powerlink, PB Associates will support the proposal to increase Condition Based Maintenance allocation proportional to an increase in assets under management.

Should you wish to further discuss this review or should you wish us to discuss this letter with PB Associates, please do not hesitate to contact me by letter to the letterhead address, by phone on 0407 469 991 or by email at stephen.young@assetpartnership.com.

Yours sincerely



Stephen Young
Director

Appendix F

Proposed change to Service Standards Sub-measure 1a
Transmission Circuit Availability – Critical Elements

Proposed Change to Service Standard Sub-measure 1a
Transmission Circuit Availability
– Critical Elements

Report Number CR0107R1 Rev 0

A brief report for Powerlink Queensland

February 2007

Revision	Comment	Authorised	Date
A	Original issue	L. Ma	25/01/2007
0	State recommended target setting. Delete figure 4.	L. Ma	5/02/2007

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Report QA Release

Report Title

Proposed Change to Service Standard Sub-measure 1a Transmission Circuit Availability – Critical Elements

Report Number and Revision:	*CR0107R1 Rev 0*
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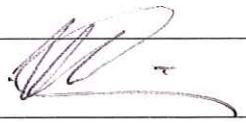
Authorised: ***Lin Ma***	Signature:		date:	5 February 2007

Background

In December 2006 researchers from Queensland University of Technology (QUT) were requested to examine the proposed Powerlink service standard for "Transmission Circuit Availability – Critical Elements" otherwise known as "Sub-measure 1a" with a view to establishing its neutrality or otherwise.

Since the target value of sub-measure 1a was found not being neutral, QUT was requested to recommend neutral settings and provide the supporting analysis for the same.

This document details the analysis for sub-measure 1a, recommends settings that are neutral and provides supporting analysis and diagrams for the recommended settings.

Analysis

A detailed analysis of the historical data and the service standards for sub-measure 1a provided by Powerlink, reveals the non-neutrality of that measure. The reasons are as follows:

- The Normal distribution can best describe the distribution of the historical data of sub-measure 1a. We shall call this the theoretical distribution of best fit (TDoBF).
- However, there is a problem in that 13.62% of the upper tail of the TDoBF exceeds 100% availability – which is physically impossible (see the red area in Figures 1 to 3).
- Therefore, when calculating the actual probabilities based on this distribution, we suggest that 13.62% should be deducted from the theoretical results.
- The calculation indicates that the probability for Powerlink to **receive a bonus is lower** than **the probability of receiving a penalty** (the green area versus the yellow area in Figure 1).
- The probability for the company to achieve the Cap is also much lower than the theoretical one (see the orange area in Figure 2).
- Therefore, **the current target value setting is not neutral** and **should be modified**.

Recommendations

We recommend the target value from this distribution be set such that the probability of receiving a bonus is equal to the probability of receiving a penalty, taking into account the achievable range of outcomes i.e. those up to 100%. This can be achieved by adjusting the target as shown in Figure 3. The probability of achieving a bonus and penalty are equal at 43.19%. To achieve this, the target value needs to be lowered by 0.1%.

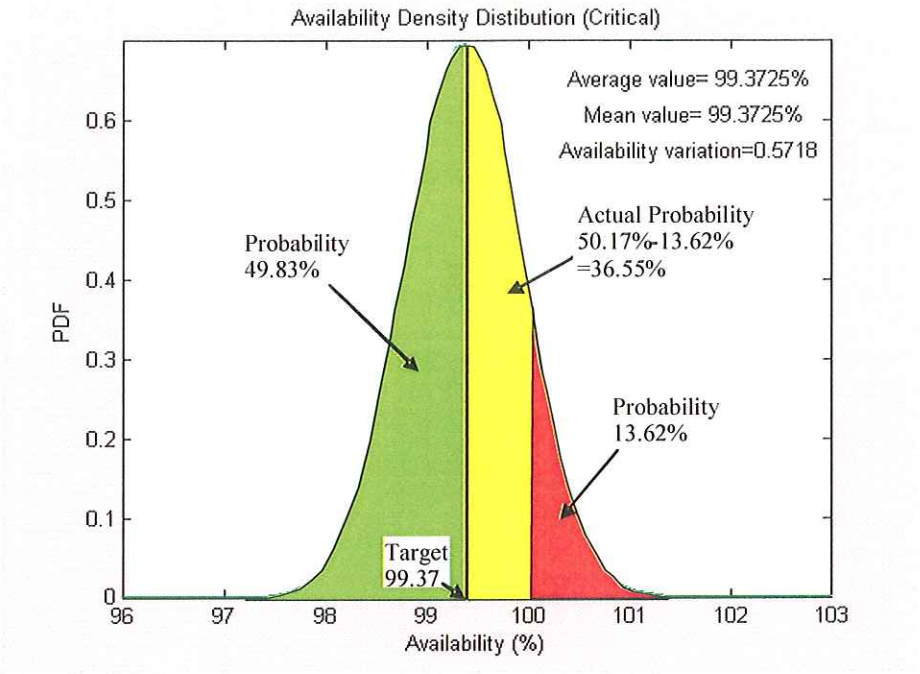


Figure 1. Theoretical and actual probability for reaching the original Target (Start-bonus-point and Start-penalty-point)

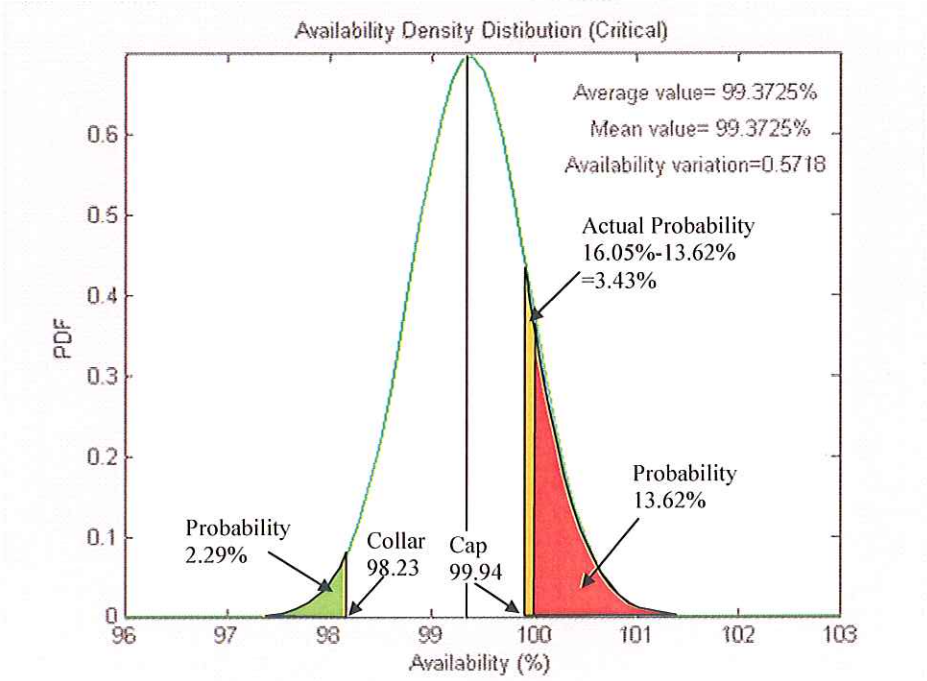


Figure 2. Theoretical and actual probability for reaching the original Cap and the Collar

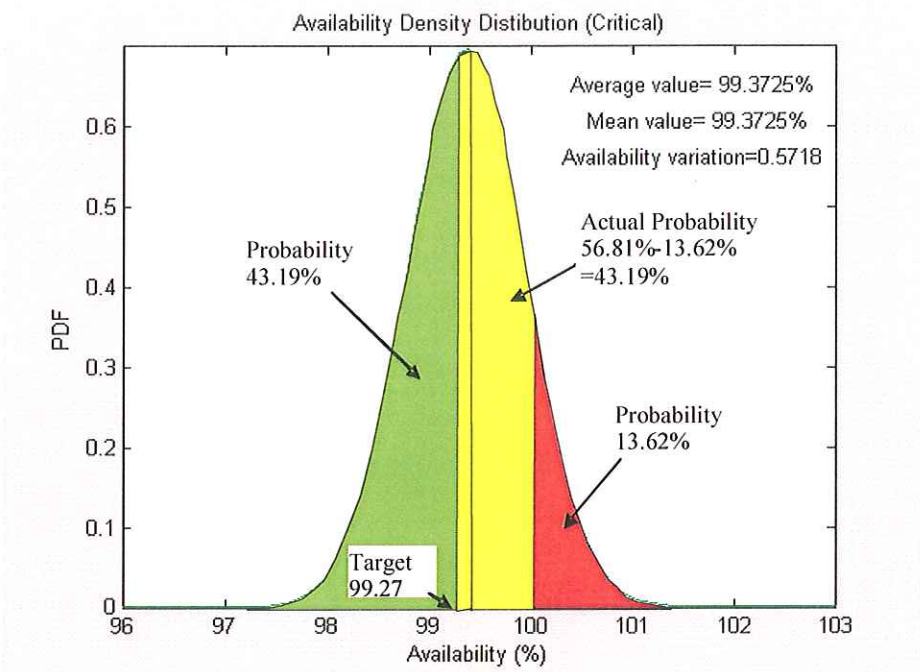


Figure 3. Recommended Target (Start-bonus-point and Start-penalty-point) and the corresponding probability

Appendix G

Recommendation on regulatory debt raising transaction cost allowance

The Allen Consulting Group

MEMORANDUM

To: Ms. Jennifer Harris, Manager, Revenue Regulation, Powerlink Queensland

From: The Allen Consulting Group

Date: 23 January, 2007

Re: Recommendation on regulatory debt raising transaction cost allowance

The Brief

Powerlink Queensland (Powerlink) has engaged the Allen Consulting group (ACG) to provide a recommendation on the regulatory debt raising transaction cost allowance. Powerlink's revenue proposal to the Australian Energy Regulator (AER) for the five-year regulatory period 1 July 2007 to 30 June 2012 included a debt raising transaction cost allowance of 12.5 basis points. On 8 December, 2006 the AER issued a Draft Decision, which included a debt-raising transaction cost allowance of 8.1 basis points per annum.

Background

ACG has previously undertaken research relating to the cost of raising debt finance by regulated companies. In particular, ACG prepared a report entitled *Debt and Equity Raising Transaction Costs* for the ACCC in December 2004. The methodology applied by ACG to construct a benchmark model was to:

- establish a standard size debt issue by Australian infrastructure companies ($175 million);
- assume that each issue is for 5 years (the regulatory period);
- calculate the number of issues required to finance the debt component of the RAB;
- estimate the 'gross underwriting fee' component of debt raising transaction costs based on evidence taken from prospectuses issued by Australian companies selling corporate bonds in the US market (5.5 basis points per annum);
- estimate other transaction costs such as legal fees, corporate credit rating fee, and bond rating fee (estimated at $100,000, $50,000 and 3.5bp respectively); and,
- estimate what the total cost of the standardised bond issuing program would be in basis points per annum (bppa).

ACG's 2004 report was prepared after the Australian Competition Tribunal (ACT) had heard an Appeal from GasNet in relation to debt raising transaction costs and was required to raise its previous allowance of 10.5 to 12.5 basis points (depending on

credit rating) to 25 basis points.[1] The Tribunal's decision was not supported by a careful assessment of empirical evidence on the size of debt transaction costs, which provided a key driver for the empirical analysis that we undertook. ACG's evidence and analysis showed that the most likely level of debt-raising transaction costs was in the range of 8.0 to 10.4 basis points, implying that the previous regulatory standard that had been established by the ACCC was not materially different to the levels indicated by the evidence, and that the ACT's decision to raise the allowance was not well-founded.

In subsequent decisions, the ACCC applied the benchmark model in determining debt raising transaction costs:

- In the April 2005 Energy Australia transmission revenue cap decision, a notional debt component of around $381 million was determined, and 9 basis points were allowed;[2]

- In the April 2005 Transgrid transmission revenue cap decision decision, a notional debt component of around $1,781 million was determined, and 8 basis points were allowed;[3] and

- In the 2006 Roma to Brisbane Pipeline decision, with a notional debt level of around $150 million, 10.4 basis points were allowed.[4]

In the AER's Draft Decision relating to Powerlink's revenue application, the ACG methodology was updated by the AER, with the standard issue size increasing to $200 million and the 'gross underwriting fee' increasing to 6 basis points. On this basis, assuming 11 issues raising $2.2 billion, the AER arrived at a transaction cost estimate of 8.1 basis points.

ACG's previous recommendations on debt raising transaction costs

ACG notes that the AER's provision of an allowance of 8.1 basis points to Powerlink is less than the allowance of 12.5 basis points that has in recent years become a *de facto* regulatory standard among state-based regulators. Details of recommendations made by the state-based regulators since 2004 are displayed in Table 1. In advice to state-based regulators since the work that we undertook for the ACCC, ACG has recommended that the pre-existing regulatory benchmark of 12.5 basis points continue to be applied. Although our own work demonstrated that there is evidence that the debt raising transaction costs may be less than 12.5 basis points, we do not consider the difference between the central estimate of the debt raising costs and the regulatory benchmark of 12.5 basis points to be material, and consider the objective

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1 See *Application by GasNet Australia (Operations) Pty Ltd [2003] AcompT 6 (23 December 2003).*

2 ACCC (2005), NSW and ACT transmission network revenue cap Energy Australia 2004-05 to 2008-09, 27 April, p. 82.

3 ACCC (2005), NSW and ACT transmission network revenue cap Transgrid 2004-05 to 2008-09, 27 April, p. 145.

4 ACCC (2006), Revised access arrangement by APT Petroleum Pipelines Ltd for the Roma to Brisbane Pipeline, 20 December, p. 97.

of regulatory stability to outweigh any potential benefit from a small revision to this allowance.

We also note that our empirical analysis did suffer from a number of empirical shortcomings, which we acknowledged in the study. There is no reliable and publicly available information on fees and other costs associated with raising bond market debt in Australia, and so all of the information relied upon in our analysis was drawn from the US. ACG's research found very few instances in recent years where information on the 'gross underwriting fee' was publicly disclosed in prospectuses. In the few instances where fees were disclosed, they were for Australian companies raising debt in the US, which required an additional assumption that Australian fee structures are not materially different.[5] It was concluded that the benchmark would be 'a reasonable proxy for Australian bond underwriting fees'.[6]That said, we consider that our empirical analysis justifies not applying the 25 basis point allowance determined by the ACT. For example, in the recent case of Envestra and Allgas, ACG made the following recommendation to the Queensland Competition Authority:[7]

> Recent research suggests that the common allowance of 12.5 basis points may be considered an upper bound. ACG conducted a comprehensive study on debt raising transaction costs for the ACCC in 2004 and concluded that debt raising transaction costs based on one bond issue of $175 million would be around 10.4 basis points, while six issues totalling $1 050 million would cost around 8 basis points. … ACG also recommends that an allowance of 12.5 basis points be provided for debt raising costs. The cost of raising debt is a necessary cost of providing the regulated services, and hence appropriately included in the revenue caps for the regulated entities. We note that 12.5 basis points exceeds the amount suggested by ACG in a recent detailed study. The difference, however, is marginal and an allowance of 12.5 basis points provides for regulatory consistency and errs on the side of conservatism.

In Table 1 below we show that if the benchmark methodology applied by the AER in the case of Powerlink were to be applied to recent decisions by state-based regulators, the allowances could have varied between 8.1 basis points in the case of ETSA Utilities (ESCOSA) and 12.2 basis points in the case of ActewAGL gas distribution (ICRC). In every case the state-based regulator applied the regulatory standard of 12.5 basis points instead. We believe there is no compelling basis for departing from this allowance.

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5 It should also be noted that ACG cross-referenced the range of fees derived from Australian US bond issues with estimated fees for Australian revolver and term debt, which was sourced from *Basis Point*. That data also indicated a debt raising transaction fee structure of less than 12.5 basis points. Hence we concluded that bond raising transaction fees are likely to be less than 12.5 basis points.

6 ACG (2004), *Debt and Equity Raising Transaction Costs, Final Report*, Report to the Australian Competition and Consumer Commission, December, p. 53.

7 ACG (December 2005), *Cost of Capital for Queensland gas distribution*, Report to the Queensland Competition Authority, pp. 37-38.

TABLE 1: RECENT REGULATORY DECISIONS – ALLOWED DEBT RAISING TRANSACTION COSTS VS ESTIMATED USING THE BENCHMARK MODEL

Regulator	Service	RAB	Debt (60% of RAB)	Actual allowance (bppa)	Implied benchmark allowance (bppa)
QCA (2006)	Gas distribution - Allgas	303.2m	181.9m	12.5	10.7
QCA (2006)	Gas distribution - Envestra	228.4m	137m	12.5	12.0
ERA (2005)	Gas distribution - AlintaGas	658.6m	395.2m	12.5	9.1
ICRC (2005)	Gas distribution – ActewAGL	225.9m	135.5m	12.5	12.2
ESC (2005)	Electricity distribution – AGL	578.4m	347m	12.5	9.5
	Electricity distribution – Citipower	990.9m	594.5m	12.5	8.7
	Electricity distribution – Powercor	1626.5m	975.9m	12.5	8.4
	Electricity distribution – SP AusNet	1307.2m	784.3m	12.5	8.5
	Electricity distribution – United Energy	1220.3m	732.2m	12.5	8.7
IPART (2005)	Gas distribution - AGL	1969.3m	1181.6m	12.5	8.3
ESCOSA (2005)	Electricity distribution – ETSA Utilities	2466m	1479.6m	12.5	8.1

Source: Regulatory decisions and ACG analysis based on AER assumptions

Conclusion

ACG has previously recommended an allowance of 12.5 basis points be provided for debt raising costs. We would recommend its ongoing application in the case of Powerlink's revenue determination for the five-year regulatory period 1 July 2007 to 30 June 2012 to provide for regulatory consistency. While there is some evidence to suggest 12.5 basis points may exceed the cost, we do not consider that there can be sufficient confidence in the data to recommend a departure from the pre-existing standard and do not consider that any potential revision would be material in any event. That said, we do consider that the empirical evidence justifies not applying the 25 basis point allowance that was determined by the Australian Competition Tribunal.

Appendix H

Estimation of Powerlink's SEO transaction cost allowance

The Allen Consulting Group

MEMORANDUM

To: Ms. Jennifer Harris, Manager, Revenue Regulation, Powerlink Queensland

From: The Allen Consulting Group

Date: 5 February, 2007

Re: Estimation of Powerlink's SEO transaction cost allowance

Executive Summary

Powerlink Queensland (Powerlink) engaged the Allen Consulting Group (ACG) to provide it with a report estimating:

- the quantum of equity funds that a transmission business in the position of Powerlink, but with benchmark financing arrangements, would need to raise to finance its capital expenditure (capex) program in the next regulatory period; and
- the transaction costs that would be incurred to raise those funds.

The 'Pecking Order Theory' dictates that the cheapest forms of finance would be exhausted first, which means that internal equity funds (i.e. retained earnings) would be used in preference to raising equity funds from outside sources. However, our modelling indicates that a firm with benchmark financing arrangements and with Powerlink's capital expenditure program would exhaust internal equity funds over the next regulatory period and be required to raise between $60 million and $158 million annually from external sources, totalling $541 million over the next regulatory period.[1]

Regarding the transactions costs that would be incurred to raise these equity funds from external sources, we have assumed that these funds are raised through a 'Seasoned Equity Offering' (SEO), which in turn assumes that the firm is already listed on a stock exchange and hence is already well known by the market. Assuming an SEO transaction cost of 3% consistent with our previous work on this matter, we estimate that $16.2 million would be incurred to raise the required equity funds. There are at least two mechanisms through which an allowance for this cost could be provided – either to treat the transaction cost as part of the capital expenditure and add to the regulatory asset base, or to convert the transaction cost into an annuity-equivalent stream and to include it in operating expenses. These two

[1] We have assumed that debt levels remain constant at 60% of the regulatory asset value, consistent with the standard assumption of Australian energy regulators. While it may be possible for a transmission business to raise additional debt (and hence maintain a higher level of gearing for a period) to address short term increase in capital expenditure requirements, such an assumption would have implications for the debt margin, equity beta and also justify an increase in the transaction cost allowance that is provided in respect of debt finance.

mechanisms should deliver an allowance with an identical value, provided that the calculations are undertaken consistently.

1. The Brief

Powerlink Queensland (Powerlink) engaged the Allen Consulting group (ACG) to provide an estimate of the allowance for Seasoned Equity Issue (SEO) transaction costs that can be justified as a component of its capital expenditure (capex) program in the next regulatory period. It was envisaged that this would require modelling of the potential need for the benchmarked Powerlink entity to undertake notional equity issues (and therefore require an allowance for equity transaction costs) as a result of the large capex program relative to its current RAB.

2. Background

Powerlink submitted a revenue proposal to the Australian Energy Regulator (AER) for the five-year regulatory period 1 July 2007 to 30 June 2012, which included an allowance for equity raising costs. Powerlink requested an annual equity raising cost allowance of $1.5 million on the existing equity component of the Regulatory Asset Base (RAB), $370,000 per annum on capex in the current regulatory period, and $600,000 per annum on the capex to be undertaken in the next regulatory period. The submission was as follows:[2]

> Based upon a total forecast capital spend of $1,274.11 million in the current regulatory period (from Chapter 3) and $2,449.24 million in the next regulatory period, Powerlink seeks recovery of an average annual equity-raising transaction forecast of $0.37 million and $0.60 million ($06/07), respectively. Recovery of these costs as an opex item requires that an allowance be provided for the remaining life of the assets.

On 8 December, 2006 the AER issued a Draft Decision, which did not allow any of the equity raising transaction costs claimed by Powerlink. In considering Powerlink's submission, and rejecting Powerlink's claims, the AER made reference to the 'pecking order theory', and observations about Powerlink's actual gearing and dividend payments to its shareholder.

3. Equity transaction cost allowance

In our 2004 study of debt and equity transaction costs undertaken for the ACCC, ACG recommended that for ongoing regulated businesses, 'whether an allowance should be made for transaction costs associated with subsequent equity raisings turns on whether there is a requirement for funding that exceeds the amounts provided by retained earnings combined with debt issues'.[3] That is, we believed that there may be a legitimate case for an allowance for equity raising transaction costs in the future, with this matter dependent upon an empirical assessment of the expected future cash

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2 Powerlink Queensland (2006), *Queensland Transmission Network Revenue Proposal for the period 1 July 2007 to 30 June 2012*, p. 51.

3 ACG (2004), *Debt and Equity Raising Transaction Costs*, report to the ACCC, December, p. 64.

flows of the entity (and, in particular, its expected capital expenditure requirements). We concluded that:[5]

> Accordingly, external injections of equity for subsequent capital expenditure should only be assumed where a case can be made that, given the assumed gearing level (i.e. a stock of debt equal to say, 60% of RAV) and assumptions about other financing decisions (e.g. dividend payout ratio) that are consistent with the regulatory benchmarks, there would be insufficient retained cash flow to finance the equity share of the value of capital expenditure. As cash flow is expected to fluctuate from year to year, such an analysis should be undertaken over a reasonable period of time (such as looking at the average over the regulatory period).

We made clear that it was our expectation that in most situations it would be difficult to demonstrate that new equity would have to be raised in order to finance additional capital expenditure. This was because for most infrastructure businesses, the capital expenditure requirement is around 3% to 5% per annum, and this level of growth can almost certainly be accommodated through a combination of internal equity sources (retained earnings) and new benchmark debt issues (i.e. from the assumption that 60% of capital expenditure would be financed through debt).

With respect to the transaction costs associated with raising equity from external sources, we concluded that it was appropriate to assume that the funds were raised through 'seasoned equity offerings' (SEO), that is, a call for equity funds by an existing entity that is listed on a stock exchange and hence already well known by the market. We examined transaction costs incurred by a sample of 30 Australian SEOs over the period between 1998 and 2004, and found that both the average and median total costs as a percentage of total proceeds were 3%. There was some evidence that the figure of 3% might be slightly higher than would be experienced by a benchmark regulated utility, as three companies raising money to retire debt rather than make acquisitions had lower issue costs. Nevertheless, ACG's conclusion was:[6]

> Thus, whilst ACG concludes that an SEO transaction cost benchmark of 3% is appropriate for regulated infrastructure companies, this should be viewed as an upper limit of the likely cost of an SEO associated with capital expenditure within existing regulated activities.

4. AER's position on Powerlink's equity raising cost allowance

In rejecting Powerlink's proposal with respect to an SEO cost allowance, the AER discussed the application of the 'Pecking Order Theory' and Powerlink's actual financial position. 'Based on the material before it', the AER concluded that it would not be appropriate to provide an allowance for equity raising costs associated with Powerlink's capex.[7] However, the AER did not undertake modelling of Powerlink's benchmark financial situation.

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5 ACG (2004), p. xiii.

6 ACG (2004), p.65.

7 AER (2006), *Draft Decision, Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12*, 8 December, p. 112.

The 'Pecking Order Theory'

The AER's rejection of Powerlink's submission for an allowance for the transaction costs incurred in raising equity funds was based on the 'Pecking Order Theory':[8]

> If Powerlink's retained earnings are not sufficient and external financing is required, the pecking order theory of capital structure states that firms choose debt over equity (Myers and Majluf, 1984). Furthermore, pecking order theory states that equity will be issued only when the debt capacity of a firm has been exhausted and financial distress threatens.

Accordingly, the AER concluded that even if Powerlink had exhausted its internal funds, then it would be appropriate to assume that it then raised additional debt until the point at which financial distress threatened. Implicit in the AER's reasoning is that it considered that Powerlink had the capacity to raise debt finance in addition to the regulatory benchmark of 60% of the regulatory asset base to finance the required capital expenditure.

We consider this line of argument by the AER to be problematic, however. While we accept that the 'Pecking Order Theory' is well supported by empirical evidence and that firms will choose internal sources over external sources, care is required when applying the theory to regulated businesses.

- First, a number of the assumptions that are reflected in the regulated WACC – such as the debt margin and equity beta – are based on a gearing assumption of 60% debt-to-assets, and so it would be inconsistent to assume elsewhere a different level of gearing (noting that the AER is required to apply a gearing level of 60% debt-to-assets under the transitional arrangements applicable to Powerlink).

- Secondly, if it was to be assumed that Powerlink had a higher level of debt than the regulatory standard over the next regulatory period, then the transactions costs incurred in debt raising would also be higher. The AER's draft decision has not provided an increased allowance for debt raising costs. Moreover, analysis would be required to ensure that the higher debt level remained sustainable, and this analysis has not been undertaken.

Our view is that a more defensible approach when testing whether a regulated entity may require external equity funds to support its capital expenditure program is to assume that the regulatory standard level of gearing prevails over the regulatory period, at least on average, hence preserving consistency with the regulatory WACC (and the mandatory requirements thereto).

Once the gearing level is held constant, then external sources of equity would be required after internal retained cash flow sources have been exhausted (and after 60% of new capital expenditure had been debt financed). It is not necessary to demonstrate the threat of 'financial distress' in a benchmark framework before external equity

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[8] AER (2006), p.111.

should be assumed. Other modelling assumptions are also required to test the sufficiency of the sources of internal cash flow, which are discussed further below.

Powerlink's actual financial position

The AER also alluded to Powerlink's actual financial position in the following terms:[9]

> Powerlink's actual gearing has ranged from 44 per cent to 47 per cent, which is well below the regulatory benchmark ratio of 60 per cent. Also, for the same period, Powerlink has returned a substantial amount of dividends to its shareholder, with the payout ratio ranging from 79 per cent to 95 per cent.

Again, in the context of benchmark regulation, the actual financial position of the regulated entity should be of no relevance. The fact that Powerlink is not geared in the manner assumed by the benchmark should not be considered in any modelling of Powerlink with respect to allowances for equity raising costs. Using benchmark financing assumptions has been a fundamental component of price regulation in Australia.

Absence of financial modelling by AER

Powerlink has a relatively large capex program compared with its existing RAB and compared with other regulated businesses. Over the next regulatory period, taking the figures allowed by the AER's Draft Decision, Powerlink's capex program grows at up to 14.1% of the opening RAB. Given the relatively fast rate of growth of capex relative to RAB, it is not obvious that a firm with benchmark financing arrangements could raise the required capital without new equity issues.

The AER did not appear to explicitly address this question, as there is no indication in the Draft Decision of modelling having been undertaken. In the next section we address this question by modelling the AER's Draft Decision on Powerlink.

5. Modelling Powerlink's benchmark equity raising costs

Modelling methodology and assumptions

Our modelling has assumed the same RAB, cost and revenue allowances provided in the AER's Draft Decision. The asset and capex program assumptions are set out in Table 1 below. This shows that capex growth is expected to range from 14.1% in 2007/08 to 6.8% in 2011/12. There is a general decline in the forecast capex spend over the period.

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[9] AER (2006), p.111.

TABLE 1: POWERLINK: REGULATORY ASSET BASE AND CAPITAL EXPENDITURE, 2007/08 TO 2011/12

	2007/08	2008/09	2009/10	2010/11	2011/12
Opening RAB	3,781.37	4,273.00	4,688.92	5,061.44	5,508.45
Closing RAB	4,273.00	4,688.92	5,061.44	5,508.45	5,835.91
Capex	**531.85**	**464.93**	**415.47**	**493.13**	**373.84**
Capex growth rate	14.1%	10.9%	8.9%	9.7%	6.8%

Source: AER Draft Decision, p.173. Note: Capex growth rate based on opening RAB.

Assumptions that were applied in ACG's modelling are as follows:

- Debt gearing of 60% of the RAB in line with the AER's Draft Decision (p.113);
- Tax paid is twice the AER's 'Net Taxes' (p.113), based on a gamma of 50%;
- The interest rate on debt is 6.82% in line with the AER's Draft Decision (p.113);
- Dividends are paid to maintain a constant (benchmark) dividend yield, and more specifically
  - the payment of interim dividends is based on the assumed dividend yield and the average (mid-point) RAB of the period;
  - the payment of final dividends is based on the assumed dividend yield and the closing RAB of the period; and
- The transaction cost of an SEO is assumed to be 3%, as recommended to the ACCC in our 2004 report.

The assumption about the quantum of dividends paid was the only assumption required in addition to the assumptions that were already reflected in the AER's analysis. In the modelling it was necessary to either hold the payout (or retention) ratio constant or hold the dividend yield constant. ACG considers that it is more appropriate to hold the dividend yield constant, as there is more objective evidence on this variable. Thus, a key assumption in the modelling is the benchmark yield that should be applied.

We have assumed that the benchmark entity will need to maintain a benchmark dividend yield of 8%. This benchmark has been calculated with reference to UBS regulated utility performance statistics shown in Table 2 below.

TABLE 2: AUSTRALIAN REGULATED UTILITIES – NET DIVIDEND YIELD AS AT 30 JUNE, 2006

Alinta Infrastructure Holdings	8.7%
Australian Pipeline Trust	5.6%
Babcock & Brown Infrastructure	9.1%
Challenger Infrastructure Fund	8.8%
DUET	8.8%
Envestra	7.8%
GasNet	7.0%
Hasting Diversified Utilities Trust	8.4%
SP AusNet	8.6%
Average	**8.1%**

Source: UBS Investment Research, Australian Infrastructure & Utilities Index, 6 October, 2006

The overall methodology applied in the modelling was to:

1. Determine the dividend that would need to be paid by the benchmark entity to maintain the dividend yield of 8%;

2. Subtract the required dividend from the internally generated cash flow to determine forecast retained cash flow;

3. Apply the retained earnings calculated above to fund the equity component of new capex before undertaking a notional SEO to fund the remainder of the equity component;

4. In keeping with the 'Pecking Order Theory' carry over any unutilised retained earnings to the following year and apply it to raise the required equity component of the capex before necessitating an SEO.

5. Calculate the total SEO allowance required in each year by multiplying the required notional SEO amount by the assumed cost of 3% of proceeds.

Modelling the benchmark Profit and Loss as a cross-check

Table 3 displays the results of the benchmark modelling of Powerlink's forecast Profit & Loss statements for the next regulatory period. This exercise was performed as a cross-check in order to see what level of pay-out ratios would be implied by the assumption of a benchmark dividend yield of 8%. The Profit and Loss modelling is not critical to the demonstration of an SEO requirement.

Revenue, operating cost (opex), depreciation and interest assumptions are as discussed above. NPAT is seen to rise steadily on a higher asset base from $147.65 million to $226.91 million, and the dividend rises with it. However, the implied

payout ratio falls almost continuously from a high of 90% in 2007/08 to 81% in 2011/12. The effective tax rate implied in the model averages at 18.5% of Profit Before Tax.

TABLE 3: POWERLINK BENCHMARK PROFIT & LOSS, 2007/08 TO 2011/12 $ MILLION

	2007/08	2008/09	2009/10	2010/11	2011/12
Revenue	536.05	592.59	637.59	670.95	719.58
Less, Opex	145.49	148.42	163.12	159.30	166.68
Gross Margin	390.56	444.17	474.47	511.65	552.90
less, Depreciation	40.22	49.01	42.95	46.11	46.38
less, Interest	164.79	183.36	199.49	216.26	232.41
Profit Before Tax	185.55	211.80	232.03	249.28	274.41
Tax Expense/Payable	37.90	41.36	41.18	43.90	47.50
Net Profit After Tax	**147.65**	**170.44**	**190.85**	**205.38**	**226.91**
Dividend @ 8% yield	132.80	146.72	158.99	172.69	184.13
Payout Ratio	90%	86%	83%	84%	81%

Source: AER Draft Decision, p.174, and ACG analysis

ACG believes that a payout ratio in the order of 80% to 90% or more must be assumed for a regulated benchmark entity. If the payout ratio were assumed by the AER to be any lower, it would imply lower dividend yields and lower annual SEOs than the ones calculated below. However, in that case it would be difficult for the AER to propose that a gamma of 0.50 is appropriate to apply in the WACC as an input to the revenue formula.[10] This is because researchers Neville Hathaway and Bob Officer, in one of the key studies that has estimated gamma empirically, have estimated that the 'theta' component of the gamma equation is around 0.50, but on average payouts have been around 70%. In that case, Hathaway and Officer have held that the average firm could experience a gamma of around 0.35 (i.e. payout ratio times theta). This implies that regulated entities would be required to have a payout ratio in well excess of 0.70 to justify a gamma of 0.50.

[10] Neville Hathaway and Bob Officer (2004) *The value of imputation credits – update 2004*, Capital Research Pty Ltd. At an average payout ratio of 0.85, which applies in the SEO modelling undertaken by ACG, the implied gamma would be only 0.425 under the Hathaway and Officer findings.

Modelling the benchmark Cash Flow

Table 4 displays ACG's estimates of the cash flows of the benchmark Powerlink entity. The 'Internal Cash Flow' was calculated by subtracting the expected opex, regulatory interest and regulatory tax from the AER's revenue allowance, and is the cash flow that the benchmark entity could have available to pay dividends and retain the residual within the entity to potentially fund capex. Estimated dividends (on the basis of an 8% dividend yield assumption) were then subtracted from the available internal cash flow to estimate the 'Retained Cash Flow', which is a key input to the SEO requirement calculations below. The level of retained cash flow was found to rise from a level of $55.06 million in 2007/08 to 89.16 million in 2011/12. This raises an expectation that the SEO requirement would fall over time as the capex program falls, and retained cash flows increase.

TABLE 4: POWERLINK BENCHMARK CASH FLOW, 2007/08 TO 2011/12 $ MILLION

	2007/08	2008/09	2009/10	2010/11	2011/12
Revenue allowance	536.05	592.59	637.59	670.95	719.58
less, Opex	145.49	148.42	163.12	159.30	166.68
less, Regulatory Interest	164.79	183.36	199.49	216.26	232.41
less, Regulatory Tax	37.90	41.36	41.18	43.90	47.50
Internal Cash Flow	187.87	219.45	233.80	251.49	273.29
less, Dividends	132.80-	146.72	158.99	172.69	184.13
Retained Cash Flow	**55.06**	**72.73**	**74.81**	**78.80**	**89.16**

Source: Table 2 above, AER Draft Decision, p.173, and ACG analysis

Modelling Outcomes for benchmark SEO requirements

In Table 5 we show that the outcome of the financial modelling employing the 'pecking order theory' results in a requirement for the notional Powerlink entity to make annual new equity issues (SEOs) of between $60.37 million and $157.68 million over the next five years. The total notional new equity raising required for the regulatory period from 2007/08 to 2011/12 is $541 million. As would be expected, the size of the SEO requirement falls as the percentage growth rate of capex falls.

TABLE 5: POWERLINK BENCHMARK SEO FUNDING OF CAPEX, 2007/08 TO 2011/12 $ MILLION

	2007/08	2008/09	2009/10	2010/11	2011/12
Funding required for Capex	531.85	464.93	415.47	493.13	373.84
Less, Debt component	319.11	278.96	249.28	295.88	224.30
Equity requirement	**212.74**	**185.97**	**166.19**	**197.25**	**149.54**
Less, Retained Earnings	55.06	72.73	74.81	78.80	89.16
Equity Required (SEO)	**157.68**	**113.24**	**91.38**	**118.46**	**60.37**

Source: AER Draft Decision and ACG modelling results

Assuming that SEO transaction costs are 3%, consistent with the recommendation of ACG's report to the ACCC, the amount of SEO allowance required to fund the capital expenditure in the next regulatory period is $16.23 million (3% times the total SEO requirement of $541 million for the period). The next issue to be considered by the AER is how to compensate Powerlink for this notional benchmark expenditure requirement. There are two equivalent approaches that could be adopted:

1. In our report to the ACCC, our recommendation was as follows:[11]

   > If the regulator has determined that an allowance for the SEO cost of raising equity for ongoing capital expenditure should be provided for, we recommend that this amount be added to the RAV (i.e. included as part of the capital expenditure cost) and depreciated over the life of the relevant assets.

2. An alternative approach would be to convert the transaction cost of $16.23 million into an annuity-equivalent stream and to include it in operating expenses.

We understand that the latter approach is favoured by the AER.

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[11] ACG (2004), p. xiii.

Appendix I

Powerlink response to PB Associates Report

Appendix I - Response to PB Associates Report

Review of Capital Expenditure, Operating and Maintenance Expenditure and Service Standards

1. Introduction

The AER engaged PB Associates to review Powerlink's Revenue Proposal of 3 April 2006 in relation to:

- capital expenditure – both past and future;
- operating and maintenance expenditure; and
- service standards.

It had previously been the practice of the Regulator (ACCC) to seek comments from the business being regulated and other interested parties in relation to the recommendations made by the consultant in its review prior to the Regulator making its Draft Decision. The consultation arrangements implemented by the AER for the Powerlink revenue cap review did not include seeking comments on the substance of matters in the PB Report provided to the AER prior to the Draft Decision. Therefore, this is the first opportunity Powerlink and other interested parties have had to provide comments on the basis of, and merits of, the recommendations made by PB in relation to the aspects of Powerlink's Revenue Proposal reviewed by PB.

This appendix contains comments on PBs report and recommendations. The comments in this report are additional to those provided on specific matters included in the main sections of Powerlink's response to the AER Draft Decision.

2. Future Capital Expenditure

2.1 Statutory obligations

PB reviewed Powerlink's obligations in relation to reliability of supply. Powerlink, as a registered TNSP in the NEM, must comply with the requirements of Schedule 5.1 of the National Electricity Rules (NER) and in relation to reliability, clause S 5.1.2.1. In addition, Powerlink has connection agreements which specify the level of reliability for that grid customer. Powerlink also has a Transmission Authority issued by the Queensland Government (No. T01/98). That Transmission Authority includes obligations in respect of supply levels which Powerlink is required to meet which has the effect of imposing mandated reliability obligations.

PB has made some observations in its report regarding the levels of supply reliability required under each of the items which Powerlink must comply with. The AER summarised that PB made the following observation:

> *"The reliability requirements in Powerlink's Transmission Authority are more onerous than those contained in Schedule 5.1.2.2(b) of the rules. The rules permit a reduction in power transfer capacity of the network following the loss of a network element but Powerlink's Transmission Authority requires it to provide full power transfer capability to all loads following the most critical network element outage. Hence the Transmission Authority requires Powerlink to apply a lower threshold for grid augmentation in some areas than would necessarily be required under the rules."*[1]

PB's assertion in the final sentence is incorrect. Schedule 5.1.2.2 of the Rules specify a minimum standard, whereas the Rules also require Powerlink to meet the reliability

[1] AER Draft Decision, p63.

level in its connection agreements (which correspond to the reliability level in the Transmission Authority).

Thus, the Transmission Authority applies the same threshold (not a lower one) than the Rules. Powerlink advised the AER of the incorrectness of PB's assertion, prior to PB finalising its report.

PB recognises that Powerlink is obliged to comply with its Transmission Authority.

> *"Powerlink must plan its network to comply with the NER, the Queensland Electricity Act 1994 and the Transmission Authority issued to Powerlink under Part 4 of this Act."*[2]

Hence, even if the Transmission Authority imposed a less or more onerous obligation than the Rules, connection agreements or the Electricity Act (Queensland), Powerlink must comply with all these aspects. PB's role, as set out in the Terms of Reference from the AER[3], was to assess whether projects were required in accordance with Powerlink's regulatory and statutory obligations.

Thus, PB's comments on comparative reliability standards are out of scope, irrelevant and incorrect.

2.2 Planning Criteria

PB reviewed Powerlink's obligations and the Planning Criteria Policy provided by Powerlink. The Policy document describes the way in which the transmission network is modelled in the detailed planning studies undertaken. These studies determine the timing of triggers for some form of corrective action will be required to maintain reliability of supply in accordance with Powerlink's obligations.

PB reviewed Powerlink's planning criteria and found them to be reasonable given the obligations Powerlink has in relation to reliability of supply. PB's report included the following comment:

> *"We have reviewed Powerlink's planning criteria and consider them to be generally reasonable, given its obligation to comply with the NER and the additional constraints imposed by its Transmission Authority."*[4]

It should be noted that Powerlink has to comply with all of its reliability of supply obligations. In that regard, the Transmission Authority is NOT an additional constraint. PB's language and perspective on this matter are incorrect.

North Queensland

While PB accepted the planning criteria were generally reasonable, it offered the following observation on the central to north Queensland grid section.

> *"… when applied to the Central Queensland - North Queensland load transfer, the planning criteria appear conservative and we consider this is likely to advance the need for augmentations."*[5]

Powerlink believes that PB did not fully understand the way in which Powerlink applied the planning criteria to identify the reliability trigger, and did not completely grasp how the high load growth and limitations associated with the capabilities of north Queensland generation combine to present unique reliability of supply issues in north Queensland.

Underpinning the planning criteria in north Queensland is the use of several plausible generation sub-scenarios. These different generation dispatches originated from an independent consultant (Energy Market Services Pty Ltd) prior to Powerlink

[2] PB Report, p17.
[3] PB Report, Appendix A, p5.
[4] PB Report, p 35.
[5] PB Report, p 35.

undertaking a systematic review of the transmission capability from Broadsound to Ross (discussed in *Powerlink's Final Recommendation to Address Supply Requirements in North and Far North Queensland in 2007-10*).

Energy Market Services considered such an approach was necessary given the age, mix and type of generation plant in north Queensland. As a result of these characteristics (limitations), the amount of available generation capacity (and energy) is subject to considerable uncertainty. These uncertainties exist individually at the different power stations (e.g. water limitations, fuel storage limitations) but there are also linkages, primarily through the hydrology of north Queensland, that compound the risk to the overall generation capability in north Queensland. These capability limitations and uncertainties pertain to 615MW of the installed generation capacity in north Queensland. Generation in north Queensland therefore requires special consideration compared to other parts of the Queensland region.

The potential exists for several of the power stations in north Queensland to be energy constrained at the same time through water requirements and rainfall patterns. Such severe constraints have actually occurred for several consecutive summers. In order to maintain reliable supply to north and far north Queensland, these inter-relationships must be taken into account in the assessment of supply reliability. If the electricity supply system (combined network and generation) is not capable of meeting these scenarios the region would experience high consequence, long duration load shedding events.

Energy Market Services recommended Powerlink assess the adequacy of the transmission capability against the generation capacity "sub-scenarios" shown in table 1.

Table 1: Reliability Case Analysis for North Queensland

		Sub-Scenario 1	Sub-Scenario 2	Sub-Scenario 3
Electricity Demand		Zone Peak Demand	95-100% of Zone Peak Demand	90-95% of Zone Peak Demand
Scenario Duration (Largest generator out of service for this period)		One Day	One Week	One Month
Generation Capacity (range due to possible constraints)	Barron Gorge	13-30MW	13MW	13MW
	Kareeya	43-86MW	43-86MW	43-86MW
	K5	4MW	4MW	4MW
	Mt Stuart	144-288MW	144-288MW	60-120MW
	Collinsville	177MW	117-177MW	117-177MW
	Mackay GT	0-33MW	0-33MW	0-33MW
	Townsville	Out of Service	Out of Service	Out of Service
Capacity on Forced Outage		20-45MW	20-40MW	10-20MW

Energy Market Services considered that there was insufficient data to support a preference for any particular generation capability level above the other levels within the identified range in each scenario. It was also noted that because of the linked dependencies between all of the power stations, there may be higher than normal probabilities of the likely outcome being towards either the maximum or the minimum in the supply capability range of each sub-scenario.

Energy Market Services recommended that each year be assessed on the basis of the potential risks, and that a decision made on reliability of supply limitation timing when the cumulative risk level would be more than what would be accepted as "good industry practice". The following criteria were recommended to be used when assessing supply capability:

Criterion 1. Supply capability should be considered inadequate and augmentation warranted in any year in which the maximum supply capability is less than the maximum identified electricity demand for that sub-scenario.

Criterion 2. When the difference between the maximum electrical demand and the minimum identified supply capability in a sub-scenario approaches the size of the largest generating set in the region, there is a clear additional risk that should not be countenanced (i.e. failure to supply with all operable units in-service).

Applying the two criteria across the three sub-scenarios results in a total of 6 separate cases to be assessed. Energy Market Services did not recommend a limitation be triggered at the first instance of a mismatch under any one of these six cases. Rather weighting is given to the number of cases approaching or exceeding the above criteria. That is, the cumulative risk across all the cases is important. Powerlink has adopted the Energy Market Services criteria for assessing supply capability into north and far north Queensland.

Table 1 gives the impression that the largest generating unit is considered out of service in all of the 6 generation sub-scenarios considered. However, it is important to note that for criterion 2, all operable units are modelled in-service. As a result, the N-G-1 planning criterion only applies to half the generation dispatches assessed. PB's statement below is therefore an oversimplification / misrepresentation of the process adopted by Powerlink to plan the transmission system into north Queensland and is factually incorrect.

> *"the need for the project is driven by Powerlink's mandated reliability obligations to supply demand under N-G-1 conditions in the Ross and Far North zones"*[6]

Powerlink consulted openly on this methodology for planning to north and far north Queensland through the Regulatory Test code consultation undertaken in late 2005[7]. Only one submission was received in relation to these criteria from a party which was seeking to provide grid support from a non-committed power station proposal (which is still not committed).

Despite these comments, PB was "*satisfied of the need for the project*"[8] in the medium economic growth scenarios and did not recommend any adjustments to projects in this area on the basis that the planning assumptions were too conservative.

2.3 Probabilistic Planning Approach

Considerable uncertainty exists with respect to generation developments that will emerge to meet the forecast load growth in the NEM. The capacity, plant type and location of future generation plant depend on many economic and environmental factors. These developments together with the uncertainty in the forecast load growth (function of economic growth) impact on the utilisation of transmission assets and therefore the required level of network augmentation. To deal with this, and other uncertainties, Powerlink has developed its required capital expenditure forecast using a probabilistic approach. Powerlink engaged the services of ROAM Consulting to assist it develop the scenarios for the probabilistic model including identification of key capex drivers and new generation developments.

PB reviewed the probabilistic planning approach and concluded that the overall process, from theme and scenario identification by ROAM, to the process and analysis adopted by Powerlink to identify the required load driven network expenditure for each individual scenario was "*systematic, thorough and of a very high standard*"[9].

[6] AER Draft Decision, Appendix C, p181.
[7] Powerlink's "Final Recommendation to address supply requirements in North and Far North Queensland in 2007-10".
[8] PB Report, Appendix H, p69.
[9] PB Report, p90.

PB made a comment that the probabilistic technique:

> *"has specifically been used a tool for the purposes of producing Powerlink's regulatory capex forecast and that it does not form part of Powerlink's ongoing business planning processes."*[10]

Powerlink would like to put on record that this is not correct. Powerlink advised PB that it prepares the Main Grid Plan based on scenario analysis as a matter of practice. The Main Grid Plan is required as input to the Annual Planning Report, NEMMCO's Statement of Opportunities, and for internal Powerlink planning and budgeting purposes. It also provides a framework for Engineering Project resource and procurement planning, and detailed transmission planning studies to be undertaken.

PB also investigated the sensitivity of Powerlink's probabilistic weighted capex expenditure forecast to variation in the input probabilities. From these investigations PB made a number of observations and conclusions as follows:

> *"The probabilistic weighted network capex sought by Powerlink is slightly lower than that which would be realised under a deterministic medium load growth, 50% POE approach (that is, $2,346 million compared with $2,498 million for Scenario 9, respectively). In our view this provides further evidence that the approach appears to produce a reasonable outcome. The low sensitivity of change in the weighted capex for changes in theme set weighting also indicates the robustness of the outcome."*[11]

Powerlink does not believe that the fact that the probability weighted average capex is less than the capex for medium economic growth scenarios justifies the reasonableness of the process. The weighted average capex is less than all medium economic growth scenarios except for Scenario 23 where the weighted average is greater by $3m or 0.13%. This result is due in large to the asymmetrical probabilities between the low and high load themes (23.9% and 7.3% respectively). In fact, Powerlink's proposed probabilistic weighted network capex forecast ($2,345.5 million) is $92 million less than the weighted average network capex for only the medium economic growth scenarios ($2,437 million).

This is a clear indication that Powerlink has not attempted to influence the probabilities of the individual themes. It indicates that Powerlink would actually have insufficient capex to cover the most likely load growth theme. The shortfall may be on average $92 million.

If anything, Powerlink considers PB should have concluded that the probabilistic approach may have in fact underestimated the level of capex that Powerlink needs to meet the most likely (i.e. the medium) demand growth outlook. The AER should be cognisant of this when setting the ex ante capex allowance in its Final Decision.

2.4 Selection of Options for network development

As part of its review of past and future capex, PB considered the options identified and evaluated by Powerlink in determining the development to be included in the capital expenditure forecast. PB made the following comment in relation to Powerlink's identification of options:

> *"While Powerlink's grid planning analysis contains a comparison of options in nearly all cases, Powerlink appears to have assessed and documented relatively few alternatives, in particular for transmission line projects. Options considering the use of lower capacity or single circuit designs, or projects related to improving the capability of existing assets were rare and*

[10] PB Report, p91.
[11] PB Report, p98.

> *Powerlink adopted an approach of building high capacity double circuit lines for a large number of its projects."*[12]

Powerlink's capital expenditure forecast for its Revenue Proposal included over 400 individual projects. In the comment above, PB acknowledges that Powerlink presented some options for each of these 400 projects in nearly all cases. It must be remembered that analysis and comparison of options for a Revenue Proposal is not the analysis undertaken to actually make an investment decision. By necessity, the former will be less detailed than the latter and the AER should expect this to be so. In many cases the analysis is carried out well in advance of the project. This is particularly the case for capital expenditure in the latter part of the regulatory period where projects to be commissioned as late as 2014 need to be considered.

Powerlink considers that a range of appropriate options to the projects included were presented for comparison purposes. There is also no risk that the most efficient alternative could be overlooked, because any options which were close in NPV terms were carried through the full analysis process. Only those which are not close to lowest cost or have technical "showstoppers" (i.e. are infeasible in practice) are discarded early in the analysis. PB appeared to expect to see a full list of options considered and the reasons for any rejection documented in the Grid Plan – even for projects with commissioning dates of 2014.

With regard to high capacity double circuit lines, PB needs to be cognisant of the nature of Queensland transmission system and the high load growth, social and land use environment in which Powerlink must operate. These characteristics have become more stringent in recent times, and now shape the genuine options that Powerlink can consider when addressing network limitations. This change in environment was explained in some detail to PB, who appeared not to be familiar with today's real world limitations on obtaining easements and constructing transmission lines. In Powerlink's view, PB was suggesting theoretical, rather than real-world options. The detailed information provided by Powerlink regarding its selection of options was included in PB's Report as Appendix F.

Powerlink considers it has appropriately identified, selected and evaluated feasible and practicable options for network development in its forecast capital expenditure documentation. Powerlink appreciates that the AER engaged CHC to provide a "second opinion" on a number of projects, and the practical experience which this captured.

Powerlink considers it is not practical for a regulator or its consultants to expect that a detailed assessment of all possible options over the 400 projects could be undertaken for the purposes of a revenue cap determination. Indeed, adopting a proactive approach, Powerlink had discussed this very issue with the AER in advance of submitting its Revenue Proposal. The AER concurred that a reasonable range of options would be included for the purposes of the revenue cap evaluation. Powerlink was therefore surprised that PB was not sufficiently cognisant of the nature of the review, nor the amount of additional work associated with those expectations.

Powerlink regards those expectations as unrealistic, and a matter on which the AER should guide its consultants in the future.

2.5 Delivering the project program

PB's Report includes the following comment

> *"… as Powerlink acknowledges in its proposal, the level of capex proposed for the next regulatory period will stretch available resources and will only be implemented with difficulty".*[13]

[12] PB Report, p102.
[13] PB Report, p110.

Powerlink would like to put on record that it has not made this statement in its Revenue Proposal, and that PB's statement is a significant misrepresentation. Powerlink has consistently advised both PB and the AER that it is confident of delivering the capex program. Powerlink has acknowledged that its capex program is a large increase, a large amount of which is driven by additional costs of projects, rather than simply a larger amount of work. Powerlink has provided detailed information regarding the mechanisms in place to ensure delivery of the capital program. Powerlink has already increased its capex program from $187M in 2004/05 to $308M in 2005/06, a 65% increase and is on track for capex in excess of $500 million for 2006/07 (an annual level which is consistent with Powerlink's total capex ask for the coming 5 years).

2.6 Consideration of Other Measures to Defer Replacements

As part of its review of forecast capex, PB reviewed the processes Powerlink uses to plan its network replacement capex. From this review PB considered there was little evidence that Powerlink considered other mechanisms which would avoid or defer replacement of assets. Powerlink considers PB did not make sufficient enquiry to understand the alternate measures used by Powerlink to mitigate the need to replace, or to defer replacement when possible. Relevant information is therefore provided here.

Powerlink uses a variety of measures to manage assets that are at, or near, the end of their technical life due to a range of reasons (including assets being unreliable, obsolete, unsupported by the manufacturer, or no longer compliant with legislation). Where possible and economic to do so, Powerlink implements measures to defer replacement of assets such as:

- additional or increased maintenance practices;
- operationally funded refurbishment; and
- altered work practices.

Each network asset class is inherently different and therefore different considerations apply.

Substation primary plant is a mechanical, compact asset (i.e. within a substation compound) which operates at high voltages in an outdoor environment with an asset life around 40 years. Techniques which Powerlink uses to defer asset replacements include:

- Replacing failing equipment with "pre-used" equipment;
- Getting the most out of existing equipment by carrying out type tests to extend fault and continuous current ratings;
- Operating the transmission network in such a way as to restrict fault levels by limiting system voltages and opening feeders when personnel are in the substation; and
- Operationally funded refurbishment prior to the end of its notional life if that is assessed as economic.

Transmission lines are physical and structural assets of a linear nature (many 100s of kilometres), operating at high voltages, exposed to harsh and damaging external environment with an asset life around 50 years. Powerlink has completed a range of special operational activities to defer replacements and maintain the asset in a serviceable condition until it is no longer practical. The scope of these projects is directed at component level works whereby highly corroded tower bolts & nuts were replaced. Similarly, condition assessments identified corroded grillage foundations requiring significant and concerted work to ensure they met the required design capability. These works enabled replacement of these lines to be delayed as long as possible.

Operational refurbishment is Powerlink's primary mechanism to avoid or defer replacement. Operational refurbishment is generally restricted to part of the asset, e.g. replace a tapchanger, re-gasket to stop oil leaks, or carry out corrosion protection. In each case only one part or system is refurbished and the remaining parts have not been changed. This is aimed at achieving the original life of the asset, thus avoiding an early replacement. As an example, Powerlink uses a complex algorithm to determine whether to refurbish or replace power transformers. A 'spend limit' for refurbishment is determined based on factors such as the probability of failure of a refurbished versus a new transformer.

Powerlink refutes any suggestion that it does not seriously consider alternatives to asset replacement as part of its asset management practices. Powerlink's past and existing practice demonstrates otherwise. PB's comment that its review of selected replacement projects showed little evidence of such considerations is more likely to result from PB not asking about it, than Powerlink not doing it. From the information provided above, it is clear that Powerlink does engage in serious consideration of options to avoid and defer replacement of assets.

We would note that Evans & Peck's recent review of this matter reached a similar conclusion.

2.7 Role of Risk Assessment in Replacement Planning

As part of its review of network replacement capex, PB considered that

> *'the process of risk determination is still inherently subjective'*[14]*.*

Powerlink's replacement planning process uses risk assessments to assist in determining whether projects should be included in the replacement plan. The risk assessment framework used is the Australian Standard AS/NZS 4360:2004 Risk Management. This process involves applying a logical and systematic method to establish the context and to identify, analyse and evaluate the risks associated with particular network assets.

Powerlink considers that its approach to identify candidate replacement projects based on the above Australian Standard in fact minimises the subjectivity, and that this process is both comprehensive and defendable. Some stated objectives of the Standard[15] are to provide guidance to achieve:

- a more confident and rigorous basis for decision-making and planning:
- better identification of opportunities and threats:
- gaining value from uncertainty and variability;
- pro-active rather than re-active management.

All of these objectives align with Powerlink's requirements to better plan and manage its asset replacement program.

Aligning the assessment processes with an Australian Standard achieves a more objective, confident and rigorous basis for decision making and planning. The implementation ensures that comprehensive and accurate information is sourced and utilised, as the process defines the parameters within which the risks must be evaluated. Detailed condition assessments, technical reviews and operational assessments (including fault analysis) are undertaken to fulfill the obligations of the process.

In contrast to PB's conclusion that this approach is inherently subjective, Powerlink considers this is a rigorous approach whereby assets are evaluated for aspects of likelihood and consequence against a known set of risk criteria. As per Powerlink's

[14] PB Report, p109.
[15] AS/NZS 4360:2004 Risk Management, pp1-2.

replacement policy, triggers of age (condition), capacity, capability and compliance initiate assessment of an asset's ability to continue to perform its intended function. Asset condition assessments and maintenance records (where applicable) assist to validate the resultant risk scores. Every assessment results in individual risk scores for each risk criteria, which is combined into a single risk result (low, medium, high, very high). The risk analysis identifies those replacement projects requiring action or initiation within set timeframes.

Indeed, if PB was concerned about subjectivity, how could it possibly recommend the rough rule-of-thumb plus fudge factors approach as a substitute for Powerlink's rigorous methodology?

What PB has not identified, or seemingly understood, is that the replacement projects included in the forecast for the next regulatory period (2007-2012) are only a subset of a much larger and extensive program of replacements that go beyond 2012. The asset replacement framework, as detailed in Powerlink's replacement policy, considers all Powerlink assets to identify when assets will reach the end of their technical life. At the end of their technical life assets may be unreliable, obsolete, unsupported by their manufacturer, or may no longer be compliant with various legislation and standards.

PB correctly confirms that Powerlink does not replace assets due to age and that age is trigger for condition assessment and not justification for replacing an asset. By assessing the assets against a known set of triggers, consideration can be given to the appropriate action for those assets. For those assets requiring action, options include replacement, decommissioning or life extension. As such, those projects submitted to the AER required action during the next regulatory period. There were many assets that require action, but timing is beyond the upcoming regulatory period. This assessment was completed under the rigorous framework described.

Powerlink's overall network development plans include coordination of the asset replacement requirements with the broader capital works program that is primarily driven by demand growth. Synergies between projects from different triggers may arise through work type, geographical location or timing and may result in economies of scale and optimised delivery. This optimisation sometimes involves refining the timing of replacement activity by either delaying or bringing forward project timing.

3. Detailed project reviews – future capex

PB reviewed a number of projects in detail as part of its review of future capex. Comments on some of those project reviews are provided in the main part of Powerlink's response to the AER's Draft Decision. This section provides other comments Powerlink considers relevant.

3.1 CP.01875 (Halys to Blackwall 500kV Transmission Line Operating at 275 kV)

Appendix C4 of the AER's Draft Decision and Appendix H (page 80) of PB's Report provides a brief summary of the identified network limitation, and the timing and scope of works (that is CP.01875) that most efficiently overcomes the network limitation.

This project is required to maintain reliability of supply to south east Queensland. A large percentage of the south east Queensland load is supplied via the Tarong grid section. The Tarong grid section is defined as the power transfer across the following seven 275 kV circuits:

- Tarong to South Pine (1 circuit);
- Tarong to Mt. England (2 circuits);
- Tarong to Blackwall (2 circuits); and
- Middle Ridge to Greenbank (2 circuits – commissioned late 2007).

The maximum secure power transfer across the Tarong grid section may be limited by

(a) voltage stability, following loss of one of these seven circuits or a 275 kV circuit between CQ-SQ, and

(b) thermal limits on the parallel circuit for loss of a Millmerran-Middle Ridge or Middle Ridge-Greenbank circuit.

After reviewing the forecast power flows across the Tarong grid section, PB was satisfied with the need for augmentation between south west and south east Queensland. To address this need, Powerlink proposed constructing a 500 kV double circuit transmission line between Halys and Blackwall substations, initially operated at 275 kV. Expenditure within the next regulatory period occurred in 12 of the 40 scenarios, with a cumulative probability of 19%.

However, PB considered that insufficient technical or economic justification was given for construction at 500 kV. The PB Report suggested other options such as construction at 275 or 330 kV, or even construction of a 500 kV double circuit line with only a single circuit strung may provide considerable reprieve from further constraints. PB recommended that pending further detailed studies including the identification of the need for a fourth circuit and the reduction in transmission losses that a more efficient project alternative is a 275 kV twin sulphur double circuit line.

Regarding PB's suggestion of a 500 kV double circuit with one circuit strung, Powerlink had provided additional information to PB illustrating clearly that stringing one circuit only (or stringing both circuits but parallel operation) would only temporarily relieve the constraint. Powerlink considered this option was clearly uneconomic in the context of a regulatory framework which aims to minimise the NPV of costs over the long term.

Regarding construction at lower voltages, Powerlink acknowledges that the network between south west and south east Queensland may, in theory (i.e. considering electrical engineering factors only and ignoring environmental and land use planning matters) be able to continue to be developed at 275 kV, up to the point where technical limitations (e.g. fault levels becoming unmanageable). Such an approach would require a plethora of lines, side by side, across the landscape.

The rationale for balancing technical and economic factors with community and environmental concerns in transmission line planning is a universal challenge. For example, in 2006, the New Zealand government issued a new policy on electricity transmission which includes, inter alia:

> *"To the extent that the Commission considers the environmental effects of new lines, it should also take into account any longer term benefits that larger capacity lines may provide by avoiding multiple smaller lines "*[16]

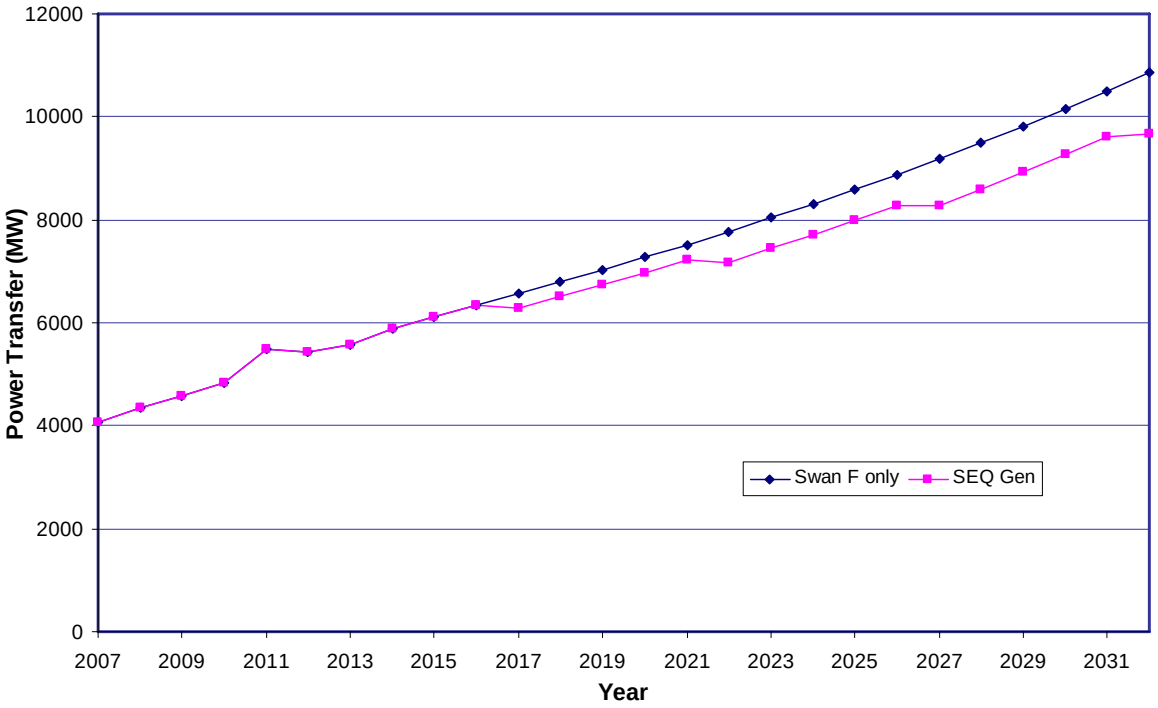
Powerlink's 2005 Grid Plan highlighted that there is very strong community and environmental pressure against the acquisition of additional easements in this corridor. Between south west and south east Queensland, two double circuit EHV easements remain between Halys (near Tarong) and Springdale. These are the sole remaining easements for bulk power transmission into SEQ. Consistent with the technical and economic development plan for the region (and taking into account the community and environmental impacts) these easements have been acquired, and the environmental approvals obtained, on the basis of construction of two 500 kV lines, as opposed to up to six 275kV lines (which would have approximately the same thermal power transfer capability).

In determining that 500 kV should be constructed on these easements, the indicative future power transfer across the Tarong grid section such that reliability of supply to SEQ is maintained is shown in Figure I1. These transfers are based on medium economic growth and assumes Swanbank B retires in 2011 followed by the planting of

[16] Government Policy Statement on Electricity Governance, October 2006, Section 88E. www.med.govt.nz

a 400MW CCGT in SEQ by 2012 (Swanbank F). Beyond the 10 year load forecast (> 2016/17) power transfers have been increased at 3.4% per annum based on trends. Two traces are shown – one with no additional significant generation within SEQ beyond that in 2012, and the second with 300MW installed every 5 years within SEQ.

Figure I1: Tarong grid section power transfer for scenario 9, medium economic growth



The figure shows that power transfer on the Tarong grid section is likely to increase to about 10000 MW by approximately 2030. The actual transfer will vary depending on load growth and the planting of future generation in SEQ. Even allowing for optimistic (based on current intelligence) planting of 1600 MW within SEQ by 2030, the Tarong transfer could still exceed 10000 MW before 2035. This transfer requirement will require substantial augmentation of the transmission system.

Further augmentation at 275 kV provides diminishing return. It is well known that the transmission capability at any voltage level is dependent on circuit length. The Tarong grid section has a typical circuit length of 150 km. Based on engineering fundamentals, the maximum capability for a 150 km twin sulphur 275 kV transmission circuit approaches 900 MW. Assuming all circuits share optimally under contingency conditions[17] the remaining two spare double circuit 500 kV easements would be exhausted well before 2030 if construction occurs at 275 kV. Any further augmentation would then be extremely expensive requiring underground or similar. Such a decision would clearly be short sighted and not in the best long term interests of the community and environment. In addition, such a decision would be inconsistent with experience elsewhere in the NEM such as Sydney and Melbourne where 500 kV has been constructed to undertake bulk transfer of the magnitude of supply into south east Queensland across the Tarong grid section.

In any event, Powerlink believes that, with the easement already designated for two 500kV lines, the likelihood of instead successfully obtaining approval for a much wider easement for eight 275kV lines is negligible.

[17] Equal sharing across all circuits in unlikely to occur in practice.

Overall, CHC and the AER agreed with Powerlink that as there are only two easements available they must be utilised at 500 kV construction. CHC noted that

> *"500 kV is the natural choice for an 'overlay' voltage for a system with 220, 275 or 330 kV as the current maximum voltage. It stated that the staging for introduction of an overlay is always difficult and requires a long-term view."*[18]

CHC considered PB's argument, which would result in building 275 kV circuits in addition to the seven circuits already in place would be hard to sustain. This is an example of a matter where CHC's real-world experience was important. Powerlink agrees with and supports the AER's draft decision in this regard.

3.2 CP.01528/A (Molendinar 275/110 kV Transformer Augmentation)

Appendix C4 of the AER's Draft Decision and Appendix H (page 75) of PB's Report provides a brief summary of the identified network limitation, and the timing and scope of works (that is CP.01528/A) that most efficiently overcomes the network limitation.

PB concluded that the Molendinar 275/110 kV transformer augmentation represented an effective and efficient approach to the forthcoming reliability constraints into the Gold Coast/Tweed area. PB was satisfied with the need and general timing of the project. The specific project timing of March in each of the commissioning years is driven by the high load growth scenarios. Under high economic growth, the third transformer is required to maintain reliability of supply during the rebuild of a Greenbank to Mudgeeraba 275kV single circuit line to double circuit construction. This rebuild must be performed during off-peak load conditions and hence the pre-requisite timing for the 3rd Molendinar transformer is March.

PB considered that

> *"it would be more efficient if the specific project timing was deferred by seven months in each of the scenarios so that the timing is aligned with 32 of the 40 scenarios rather than the 8 high load growth scenarios."*[19]

CHC did not agree with PB's recommendation to defer the project to October. CHC agreed with Powerlink that there is a practical necessity to stagger the commissioning of lower value projects throughout the year. This is necessary to ensure that critical resources (e.g. commissioning and testing engineers) are available when required to meet the overall capital program. CHC considered that Molendinar falls within this class of project that could be advanced and therefore recommended that the project not be deferred. The AER has adopted CHC's recommendation.

Powerlink agrees. The strategy of staggering commissioning dates is both practical and necessary to drive overall efficiencies (particularly in a high growth environment). The proposed modification by PB was also inconsequential as it did not result in a material change to the forecast capex.

3.3 CP.01195/A (Larapinta 275/110 kV Substation Establishment)

Appendix C4 of the AER's Draft Decision and Appendix H (page 72) of PB's Report provide a brief summary of the identified network limitation, and the timing and scope of works (that is CP.01195/A) that most efficiently overcomes the network limitation.

Joint planning with Energex identified the need for a new 275/110 kV substation at Larapinta and 6 km of 110 kV transmission out of Larapinta to reinforce supply to South West Brisbane by 2010/11 in the medium economic scenarios.

[18] AER Draft Decision, p191.
[19] PB Report, Appendix H, p75.

PB was satisfied with the need and timing of the project, given the technical complexity of the network, the various constraints and general load growth in the fast developing southern Brisbane area.

In general, PB found

> *"that the scope of works was an effective and efficient approach to the forthcoming reliability constraints but that the cost of the 110 kV line out of Larapinta was too high. ….. PB also recommended that the BPO for the 110 kV line be reduced by 13 per cent to bring it into line with its estimate of a reasonable cost for a high capacity double circuit 110 kV line."*[20]

The AER did not adopt PB's recommendation regarding the cost of the 110 kV line. CHC observed that Powerlink proposed pole construction for the line, instead of cheaper lattice steel towers, and this may explain the higher cost of the 110 kV line. CHC agreed with Powerlink that poles rather than towers are socially responsible (and consistent with good industry practice) in a space restricted residential area where reducing visual impact is important.

The site for the proposed Larapinta substation has been acquired, and is located about 20 km south west from the Brisbane CBD under an existing 275 kV transmission line connecting substations at Swanbank and Belmont. The site is in the Motorway Business Park, which is a new industrial area being developed at Larapinta in close proximity to interstate rail and road corridors. ENERGEX also proposes to use the site to build a future 33/11 kV substation.

There is currently no easement for the required 110 kV transmission line from Larapinta. Powerlink engaged environmental consultants Natural Solutions to identify a "study corridor" for the future transmission line. The area around Larapinta has a variety of land uses including industrial, residential, rural-residential, open lands, and rail and road corridors. The line route is entirely flanked to the east by established suburbs. The route itself is through an environmentally sensitive Oxley Creek flood plain and Riparian Zone.

Natural Solutions advised that it is not physically and technically feasible to build overhead for the entire route of this transmission line. Given the varied land use and physical constraints in the area, Natural Solutions recommended placing a portion of this line underground. The AER has proposed treating undergrounding costs as contingent projects, with the trigger being the provision of a legal, regulatory or administrative requirement for the undergrounding and commitment to construct the asset.

It is clear from the land usage in this area that lattice steel towers are not an acceptable solution for construction of an overhead transmission line through this area. Powerlink therefore supports CHC and the AER's draft decision not to adjust the cost of the 110 kV line BPOs for this project.

3.4 CP.01985 (CQ No.1 132/33 kV Transformer)

Appendix C4 of the AER's Draft Decision and Appendix H (pages 84 and 85) of PB's Report provide a brief summary of the need, timing and scope of CP.01985.

Joint planning with Energex and Ergon concentrates solely on the medium economic outlook. As a result, there is a natural gap in the specific connection projects required towards the end of the next regulatory periods for the high growth scenarios. Powerlink and the distributors used trending techniques based on similar projects from the medium growth scenarios to identify the likely requirement of projects towards the end of the next regulatory period in the high growth scenarios. The result was the development of 11 generic bulk supply point and connection class projects. These projects are required under high economic growth scenarios only towards the end of

[20] AER Draft Decision, p186.

the next regulatory period. The probability weighted value of these projects in Powerlink's revenue application is $4.8 million.

PB made the following comment in regard to this approach for developing projects in the latter part of the high growth scenarios:

> *"While we appreciate Powerlink's and the DNSP's attempts to capture risks associated with the high load growth scenario, we do not think there is sufficient supporting evidence on either the need or timing of the projects nor the efficiency of this approach."*[21]

PB therefore recommended that none of the eleven generic connection projects included in the high demand growth scenario be retained in Powerlink's capex forecast. Powerlink considers PB's justification ill founded and therefore the recommendation incorrect. The high growth scenarios are the only place Powerlink has used trending analysis to determine likely projects – and these projects contribute only $4.8 million of Powerlink's entire capex forecast. Powerlink's approach is reasonable in the circumstances and it is totally unreasonable to expect specific triggers and project solutions to be identified at the interface with the DNSPs for the years at the end of the regulatory period under high economic growth conditions.

The regulatory framework requires all expenditure within the regulatory period to be captured. Due to the spend profile, this requires projects commissioned out to 2014 to be considered. For the high load growth scenarios this is equivalent to approximately 2018 to 2020 under medium growth conditions. This is far beyond what is practically achievable through joint planning.

In removing these projects, PB is effectively suggesting that load growth (under the high economic scenarios towards the end of the regulatory period) does not result in any investment at the interface with the DNSPs. The removal introduces asymmetry between the capex forecasts of the 40 scenarios, inappropriately biasing the weighted average down. This is inappropriate under a probabilistic weighted capital expenditure forecast revenue application.

CHC also did not agree with PB's recommendation to remove these generic projects. CHC considered that

> *"…. these generic projects recognise that load growth is likely to be uneven across Queensland and therefore it is not possible to be definitive as to where the augmentations will be required."*[22]

The AER agreed with CHC on the basis that

> *"…. it is a reasonable methodology to trend the medium growth generic projects to capture the additional capex that would be required under the high growth scenario and that these projects should form part of the probabilistic forecast."*[23]

Powerlink strongly disagrees with PBs assessment regarding the use of trending for this capex and supports CHC and the AER's draft decision to include these projects in the probabilistic capex forecast.

3.5 High level capex adjustment

Based on PB's review of selected load driven projects, it recommended an 'across the board' reduction be made to the capex allowance. The detailed project reviews by PB did not find Powerlink had systematically overstated project needs in terms of timing or

[21] PB Report, Appendix H, p 85.
[22] AER Draft Decision p193.
[23] AER Draft Decision p193.

scope. In addition, PB did not undertake any analysis which concluded that Powerlink had systematically overstated its capital expenditure requirements[24].

The AER considered this reduction and did not consider it appropriate because the issues identified by PB were not systematic failings, some of the reduction would have applied to projects which had already been confirmed as prudent and the projects reviewed had not been targetted to identify issues within Powerlink's portfolio of projects[25].

Powerlink agrees with the AER that the matters raised by PB were not indicative of systematic failings. The PB recommendation therefore appears more of the nature of an arbitrary cut than one determined by sound engineering based analysis. Powerlink therefore supports the AER's decision to reject the PB recommendation.

3.6 Far North Queensland 132 kV Line replacement

Appendix I (pages 88-90) of PB's Report provides some information regarding the need for this series of projects, and the timing and scope of works that most efficiently addresses the identified replacement need. The replacements referred to are a series of line replacements between Yabulu (on the northern side of Townsville) and Edmonton (on the southern side of Cairns).

PB has suggested that the forecast cost of the Yabulu – Edmonton 132 kV line replacement was substantially increased by the decision to provide for a third 275 kV supply to Cairns. In the PB report, this project is referred to as an example where the project scope on which the forecast cost was based, was greater than the level of replacement likely to be required. Powerlink finds this comment inconsistent with the remainder of PB's commentary in relation to this project where it considers it *"probable that the regulatory test and consultation process would have confirmed the option selected by Powerlink"*[26].

In addition, PB suggested that the project as scoped should have been classed as a major transmission system augmentation and subject to the NER regulatory test and consultation requirements. This is an inaccurate representation of what Powerlink has done and the information Powerlink provided to PB during its review. The clear primary reason for the project is end of life replacement of the assets. Powerlink provided detailed photographic information regarding the condition of these lines in addition to independent assessments of the condition of these lines. It is appropriate for Powerlink to consider the longer term needs of far north Queensland in determining the scope of works which will be carried out to achieve the lowest total cost of delivering transmission services to consumers. Although the initial trigger is an end of life replacement based on poor condition of these assets, there is an augmentation component in the series of projects. Powerlink has conducted a regulatory test analysis in its economic comparison of options that confirms the option selected. It is arguable whether the augmentation component should have been subjected to a consultation process, given that the augmentation component for the series of projects was assessed as less than the $10 million threshold for a large augmentation, as defined in the Rules.

Appendix I includes a comment by PB that *"Powerlink acknowledged in its economic planning study that the decision to treat the project as an asset replacement was a regulatory risk"*[27]. This is also an inaccurate representation of Powerlink's study outcomes. The risk identified by Powerlink in its economic analysis was only associated with the augmentation component which, at the time, was assessed as $7M across these projects, and thus below the threshold for a large augmentation.

[24] PB Report, p102.
[25] AER Draft Decision, p67.
[26] PB Report, p109.
[27] PB Report Appendix I, p89.

Powerlink did not consider that the entire series of projects would be subject to regulatory risk, only that the regulator might not recognise the broad benefits (economic, environmental, community) of the augmentation component delivered by managing for future growth at the same time as the replacement. That said Powerlink considered even this an unlikely outcome given the clear economic case for the projects and the environmental and topographic limitations in this region.

Furthermore, PB indicated that the cost of replacing the Kareeya – Tully line should not have been included in the base case analysis used to assess the augmentation component because this line is to be removed and not replaced. In addition, PB suggested that the cost of acquiring the easement between Tully and Innisfail for the replacement line should have been included in the base case analysis. Powerlink disagrees with these suggestions as they do not reflect the nature of the projects proposed. It is not appropriate to discard the cost of replacing the Kareeya - Tully line from the base case. As noted above, the base case involved like for like replacement of the existing configuration (which obviously includes the Kareeya – Tully line). A variety of alternative options were considered including a modified configuration with some higher capacity circuits which did not include the Kareeya - Tully line. In relation to the easement from Tully to Innisfail, the bulk of the costs had already been expended and were thus "sunk costs". Further, because the Tully to Innisfail line is a replacement for the Kareeya to Innisfail line, the Tully to Innisfail easement is a replacement for the Kareeya to Innisfail easement (through the World Heritage area) which will be surrendered. Consequently, the Tully to Innisfail easement is not part of the augmentation component - it would be needed even if the Tully to Innisfail line was to be a like for like replacement of the Kareeya to Innisfail line.

Powerlink considers PB's assessment and conclusions in relation to this project to be flawed and should be disregarded.

3.7 Swanbank B Substation Rebuild

PB's Report[28] provides information regarding a project to replace Swanbank B substation with a commissioning date of 2012 and the scope of works proposed to address the identified replacement need.

PB considered the project from both a condition and fault level perspective and concurred with Powerlink's outcome stating that *"a major rebuild could be warranted in conjunction with the fault level upgrade"*.[29]

PB also considered the likelihood of Swanbank B power station being decommissioned at some time during the next regulatory period. While it was considered reasonably likely, PB acknowledged there was no firm decision as yet. Irrespective of whether and when Swanbank B power station is decommissioned, the Swanbank B substation will be required as it is an integral part of the transmission system supplying south east Queensland. It includes connection of six 275 kV transmission lines and two 275/110 kV transformers in addition to the four generators currently located in the power station.

PB has estimated the reductions in project costs as a result of a future decommissioning. PB's approach seems to adopt a subjective discounting approach, recommending a reduction of 20% or '*savings of around $7.5 million*".[30]

Powerlink considers this approach is too simplistic. At no stage did PB request Powerlink to provide information regarding a slightly reduced project scope, i.e. one without the connections to the power station replaced. However, Powerlink has undertaken an assessment of cost impacts on the project should the connections to Swanbank B power station not be required at the time that the substation is rebuilt.

[28] PB Report, Appendix I, pp91-92.
[29] PB Report, Appendix I p91
[30] Ibid p91

The capex required during the next regulatory period could be reduced by $2.6 million if an assumption is made that Swanbank B power station connections do not need to be replaced. However, we must emphasise that there is no certainty that the decommissioning of the power station will occur in this regulatory period.

3.8 Tarong Secondary Systems Replacement

Appendix I (pages 92-93) of PB's Report provides information regarding a project to replace the secondary systems at Tarong with a commissioning date of 2011 and the scope of works proposed to address the identified replacement need.

In its review of the project to replace the secondary systems at Tarong, PB asserts that "*much of the equipment to be replaced has only recently been installed*"[31]. The ages and type of the relays installed at Tarong as at December 2006 are provided in table 2.

Table 2: Age and type of relays installed in secondary systems at Tarong substation.

Relay Type	Quantity	Avg. Age in 2010/11	% of Population
Digital (1998-2006)	21	10.8	13.1%
Electronic (1986-1997)	104	19.8	65.0%
Electro-mechanical (1983-1988)	35	26.9	21.9%
TOTAL	**160**	20.2	100%

As can be seen by the table above, digital relays contribute to only 13% of the total population at Tarong substation. The reality is that the majority of relays are not new and have reached their 'use by' date. Only 13% can be considered as relatively un-aged. Powerlink advises that PB did discuss its concerns regarding the apparent replacement of "recently installed" equipment with Powerlink during its review.

Had PB discussed this with Powerlink, it would have found that Powerlink had considered two options for this project implementation – a full replacement (including the "early" replacement of 13% of the assets, or a partial replacement (of 87% of the assets), with the remaining 13% replaced at the end of their economic life[32]. The partial replacement option includes the costs of developing and maintaining interfaces between the two different technologies.

The NPV analysis of these options identified that full replacement (option1) was the lowest overall cost with the break even timing for the staged approach (option 2) slightly greater than 8 years. As noted, the staged approach included the technical complexities and costs relating to 'interfacing' different technologies and technical standards, network access and greater outage requirements. A number of factors contributed to Powerlink's proposal to adopt the full replacement (option 1) in its capital forecast including needing to replace the majority of systems due to condition, technical aspects associated with staging the replacement works, and the economic efficiency based on a lower NPV cost than staged replacement.

Powerlink is generally concerned with PB's suggestion that partial replacements are viable and that they are cost effective, particularly suggestions that relays can simply be replaced in existing panels with the remainder of the panel continuing in operation. The PB suggestion creates a range of technical issues including:

- Design will be much more customised, which greatly increases design and construction time including more staging costs and a "one off" rather than standardised design. Integration between old and new secondary systems contributes greatly to the cost of any partial replacement because "hand built"

[31] PB Report, p109.
[32] The technical end of life for the remaining secondary systems was forecast to be five years later than the initial partial replacement.

integration must take place in order for the systems to successfully function together.

- Integration issues continue over the life of the asset. This will impact if any augmentation is required at the site, which has a high likelihood in the high growth environment in Queensland.
- The existing panels at Tarong contain a known safety issue associated with the panel wiring. The condition of the red panel wiring degrades to such a point that it is considered unsafe to reuse, and electrical rules (OH&S, AS Wiring Rules, etc) dictate that standards must be maintained for safe maintenance practice. At the time of the replacement project occurring, it will not be possible to re-use the cable as its condition will not support its reuse.

Powerlink considers PB's assessment and conclusions in relation to this project to be flawed and should be disregarded. Powerlink had information which could readily have been made available to PB during the review of this project had the concerns raised in the report been discussed with Powerlink during the review.

4. Detailed project reviews – past capex

As Powerlink was subject to a prudency review of capex during its current regulatory period, PB reviewed a number of projects in detail in accordance with the prudency criteria established by the ACCC/AER. PB recommended minor reductions in the allowable capex to be rolled into Powerlink asset base on a number of projects. The AER, in some cases on the basis of advice of CHC, did not adopt these reductions in its Draft Decision. This section provides comments Powerlink considers relevant to those projects.

4.1 CP.1087 Bohle River to Townsville GT Line

Appendix C (pages 45) of PB's Report provides information regarding this project to replace a section of 132 kV transmission line between Bohle River in Townsville and the Townsville GT power station switchyard. While PB considered that the need to replace the Bohle River to Townsville GT line had been demonstrated, it recommended that a prudency adjustment of $2.4 million be made due to Powerlink's decision to re-route sections of the line for "prudent avoidance" reasons.

At the time of making its decision to invest, Powerlink considered that the most efficient option to replace the section of line from Bohle River to the Townsville Power Station was to build a new line along the existing alignment for part of the route, then a southern deviation to avoid:

- a significant number of residential properties already impacted by the existing 20 metre easement;
- additional residential properties impacted by widening of the easement; and
- other child-related facilities.

This decision was consistent with ESAA policy on EMF and the Draft State Transmission Code[33]. The difference of $2.4 million between this and the alternative option (which provided unsatisfactory clearances) was considered modest to avert the possible risk to the health of the public, particularly children, from exposure to the high voltage transmission line. Based on the information before it, Powerlink strongly believed that its decision to implement this option was prudent.

PB claims that "*the current prudency test does not specifically provide for policy advice by an industry body to be included as justification*"[34]. Powerlink considers that the three stage prudency test outlined in the *Statement of Regulatory Principles* does not

[33] The Draft State Transmission Code is currently being considered for implementation under the Electricity Act (Qld) 1994.
[34] PB Report, p45.

specifically exclude policy advice by an industry body as justification for investment, particularly where that policy is directly relevant to, and represents a requirement of, good industry practice. In the absence of any other national standards, ESAA policy at that time (and ENA policy more recently) represented good industry practice. Notwithstanding this, under its Transmission Authority, Powerlink is required to plan and develop its transmission grid in accordance with good electricity industry practice. It is reasonable for Powerlink to assume that good electricity industry practice requires that reasonable care be exercised in meeting its legal obligations and that account be given to the potential risks of EMF posed to local residents, notwithstanding that health effects from EMF are uncertain.

The ACCC acknowledged the practicalities of making an assessment of good industry practice, which "*necessarily requires the exercise of judgement, taking account of the specific engineering and economic facts and circumstances of the investment*"[35]. In particular, the SRP notes that:

> *'… the ACCC needs to weigh the political, organisational, environmental, strategic and administrative constraints facing the TSNP when making decisions and delivering on a project. In the ACCC's view, a simplistic and doctrinaire interpretation of good industry practice that fails to take account of the real world constraints faced by the TNSP is contrary to the spirit and letter of the code.'*[36]

PB went on to say that "*we were unable to establish what constituted good industry practice as practices across industry varied*"[37]. Powerlink is very concerned that despite PB's inability to determine the composition of 'good industry practice' and with no evidence to substantiate its claim that practices across industry varied at all or to what extent, PB arbitrarily recommended that the full amount of the difference between the two options on this project be disallowed in the regulatory asset base. In effect, PB's recommendation could be interpreted by Powerlink and other transmission (and distribution) network service providers as assuming that the potential risks of EMF to the public is not considered efficient or prudent to *any extent* and, therefore, should not be taken into account *at all* in designing and siting future electricity infrastructure. Powerlink considers that this is *inconsistent* with good industry practice.

In addition, Powerlink's position on prudence to minimise public exposure to EMF is consistent with legislation being developed by the Australian Government in relation to radiation protection, which provides that precautionary measures be implemented to minimise exposure to EMFs at reasonable expense. In December 2006, the Australian Radiation Protection and Nuclear Safety Agency published its report on exposure limits for EMFs.

Given the individual circumstances of this particular project and the information available at the time of the investment decision, Powerlink considers that it acted prudently to implement the most efficient option, taking into consideration (Australian) good industry practice.

Having reviewed independent advice from CHC on this issue, the AER agreed that Powerlink followed good industry practice and that PB's recommended prudency adjustment should not be applied. Powerlink supports the AER's decision in respect of this project.

[35] ACCC (2004), Statement of Regulatory Principles, p131.
[36] ACCC (2004), Statement of Regulatory Principles, p131.
[37] PB Report, p45.

4.2 CP.98201 Virginia Office Complex

Appendix B (page 34) of PB's Report provides information regarding this project to provide additional office accommodation at Powerlink's Virginia site. PB considered that, while the need for additional accommodation was justified, that it could not verify that Powerlink had undertaken the most prudent option (construction of a new building). As a result, PB recommended that a prudency adjustment of $5.2 million be applied to this project.

During its review of past capital expenditure projects, at the request of PB, Powerlink provided additional explanatory information to PB and the AER to substantiate its reasons for deciding to continue with construction of the new building, even after having received higher than expected tender proposals for construction. It is clear from that information, that the additional structural and infrastructure works required to be undertaken were necessary to implement security requirements. These were not, in any way, due to housing general office staff.

As with many other construction projects, part of the increase in the building construction tenders reflected the upwards trend in materials and labour costs, as well as construction margins in Queensland.

Powerlink considered the economics of relocating part of the workforce in alternative premises off-site had not substantially changed as a result of the increased costs. That said, Powerlink has undertaken further analysis of alternative rental accommodation and compared the costs of constructing the building at Virginia with the combination of the cost of NEMMCO's new (high security) building in NSW (relevant to the secure area part of the Powerlink building) and up-to-date costs for office accommodation in Brisbane (relevant to the remainder of the building). This comparison demonstrates that Powerlink's provision of office accommodation at its Virginia site was the lowest cost option and therefore prudent, even at the higher than initially estimated construction costs.

Rental Alternative

Recent leasing transactions have revealed that the Brisbane CBD office market is tight and rentals are increasing. Much of the space being released to the market is pre-committed and with strong absorption over the last two years, the market is experiencing record low vacancy rates. Research indicates that gross face rents for Premium and A grade buildings broadly range from $450 to $525/$m^2$ per annum as at July 2006.

Powerlink has calculated that the equivalent rental rate for a commercial return on the actual cost of the new Virginia office would range from $270/$m^2$ per annum to $340/$m^2$ per annum, depending upon what assumptions are made for annual rental increases. This is about 40% lower than the alternative of renting space in Brisbane.

NEMMCO Building Comparison

For high-level comparative purposes, Powerlink notes that the new NEMMCO Sydney Control Centre is expected to be completed for a total cost of $21.2 million (construction only). Powerlink submits that on a $/$m^2$ basis, the Virginia Office Complex compares very favourably to the Sydney Control Centre. More details can be provided on a confidential basis.

Having also reviewed any information provided by Powerlink to PB during PB's review, and in light of PB's assessment of a selection of past capital projects, the AER concluded that Powerlink had sound management practices and that these were applied generally. As a result, it did not consider that a prudency adjustment to this project (or any other project recommended by PB), was appropriate. Powerlink believes that the additional information provided above gives further weight to the AER's decision in this regard.

4.3 CP.836 Cairns 132kV Substation Rebuild

Appendix B (page 22) of PB's Report provides information regarding this project to rebuild the 132 kV substation at Cairns. PB Associates recommended a prudency adjustment of $0.7 million in relation to this project on the basis that, at the time of its review, no approval was given for this amount of additional expenditure. PB also acknowledged that given the project had yet to be commissioned (in October 2006), this situation may be addressed.

This project was commissioned in August 2006 on a reduced scope at $11.9 million, which is within the current approval of $12.1 million. Due to the impact of Cyclone Larry on related network elements, it is now not possible to complete the original scope of works without first reinforcing of the transmission system into Cairns. At this stage, the remaining scope of works is expected to be undertaken in conjunction with the necessary additional reinforcement in 2009, under a separate project.

4.4 CP.1092 South Pine 275kV Substation Refurbishment

Appendix B (page 23) of PB's Report provides information regarding this project to undertake a major capital refurbishment of the 275kV switchyard at South Pine. In relation to this project, PB concluded that the most efficient long term option had been implemented. However, PB also noted that, at the time of its review, the estimated project cost was higher than the approved funding. On this basis, a prudency adjustment of $0.2 million was recommended.

Consistent with Powerlink's normal business practices, the additional costs for this project were approved by the Powerlink Board in July 2006. Due to the significant complexity of refurbishing a substation of this size (for example, with eighteen 275kV and 110kV lines radiating from it) and importance of maintaining a reliable supply to the major section of Brisbane supplied from South Pine, it has been necessary to increase the scope of this project to manage plant condition, outages and adequate protection and control. Therefore, Powerlink's revised, approved cost at commissioning is $20.7 million.

5. Other issues

5.1 OR transfer to capex

Powerlink classifies expenditure as opex or capex in line with Australian accounting standards. Compliance with the accounting standards is reviewed annually by Powerlink's external auditor. One of the accounting criteria in classifying expenditure depends on the nature of the expenditure as to whether it embodies *future economic benefits* or, in more practical terms, whether it enlarges the capability, prolongs the life, or improves the performance of an asset to enhance its value.

In its Draft Decision the AER notes Deloitte's advice that "*the components that comprise recorded assets would need to be reviewed to see if they are significant, whether their cost can be reasonably measured, and whether they have useful lives different to the broader asset to which they relate*"[38].

One of the issues to consider in determining the level at which an item is recognised as an asset is the scale of the operation. For instance, a mining company connected to the power supply by a number of steel towers may recognise each tower, the conductors, the insulators, and various equipment at levels lower than a transmission system owner who has tens of thousands of towers, hundreds of thousands of insulators, and thousands of kilometres of conductor. The magnitude of Powerlink's infrastructure in operating such a vast transmission network is such that asset classification must necessarily be at a level consistent with the manner in which the system is managed.

[38] AER Draft Decision, p139,

Powerlink uses integrated business systems that link the financial assets with the plant maintenance equipment and the database used to accumulate project scopes. The plant maintenance equipment is structured to provide for efficient operation and maintenance of the transmission system. In this way, the asset classifications marry with the plant and project classifications used to plan, construct, operate and manage Powerlink's transmission system. Consequently, the asset classifications are appropriate for the way Powerlink operates and manages its business, and Powerlink has consistently applied these asset classifications since its inception.

The AER notes that "operational refurbishment involves activities that return an asset to its pre-existing condition or function, or activities undertaken on part of an asset to return that specific component to its pre-existing condition or function. Operational refurbishment is more extensive than general maintenance and is often undertaken as a preventative measure to reduce ongoing maintenance needs"[39]. Powerlink agrees with this view and notes that, implicit in it, is the concept of whether the expenditure enlarges the capability, prolongs the life, or improves the performance of an asset to enhance its value. If not, the expenditure is opex, and if so, it is capex. The operational refurbishment expenditure proposed by Powerlink does not extend the service life of the overall asset, it just maintains operation of the asset for the remainder of its life. Operational refurbishment is therefore operational expenditure.

Powerlink concurs with the AER's Draft Decision not to require Powerlink to capitalise any of its operational refurbishment expenditure.

5.2 Inclusion of Scenario Projects in WIP

The Draft Statement of Regulatory Principles, under which Powerlink's last regulatory determination was decided, allowed for revenue to be determined on the basis of the value of assets in service within an *ex post* regime. The current *ex ante* regime under the Statement of Regulatory Principles provides for revenue to be determined on the basis of the total value of capital expended, including assets under construction.

Powerlink has proposed 113 projects to be included in the RAB as assets under construction to enable it to move from the *ex post* to the *ex ante* regulatory model. Of those projects, 38 were included in the probabilistic analysis of forecast capex.

PB concluded[40] that these 38 projects, worth $7.01 million, should be excluded from the WIP component of the RAB roll forward as Powerlink "*has no plans for expenditure on any of the 38 projects in this regulatory period*". Nor has PB made provision in its recommendations for this expenditure to be included elsewhere.

The probabilistic forecasting approach takes into account the considerable uncertainty inherent in planning transmission networks that arises from

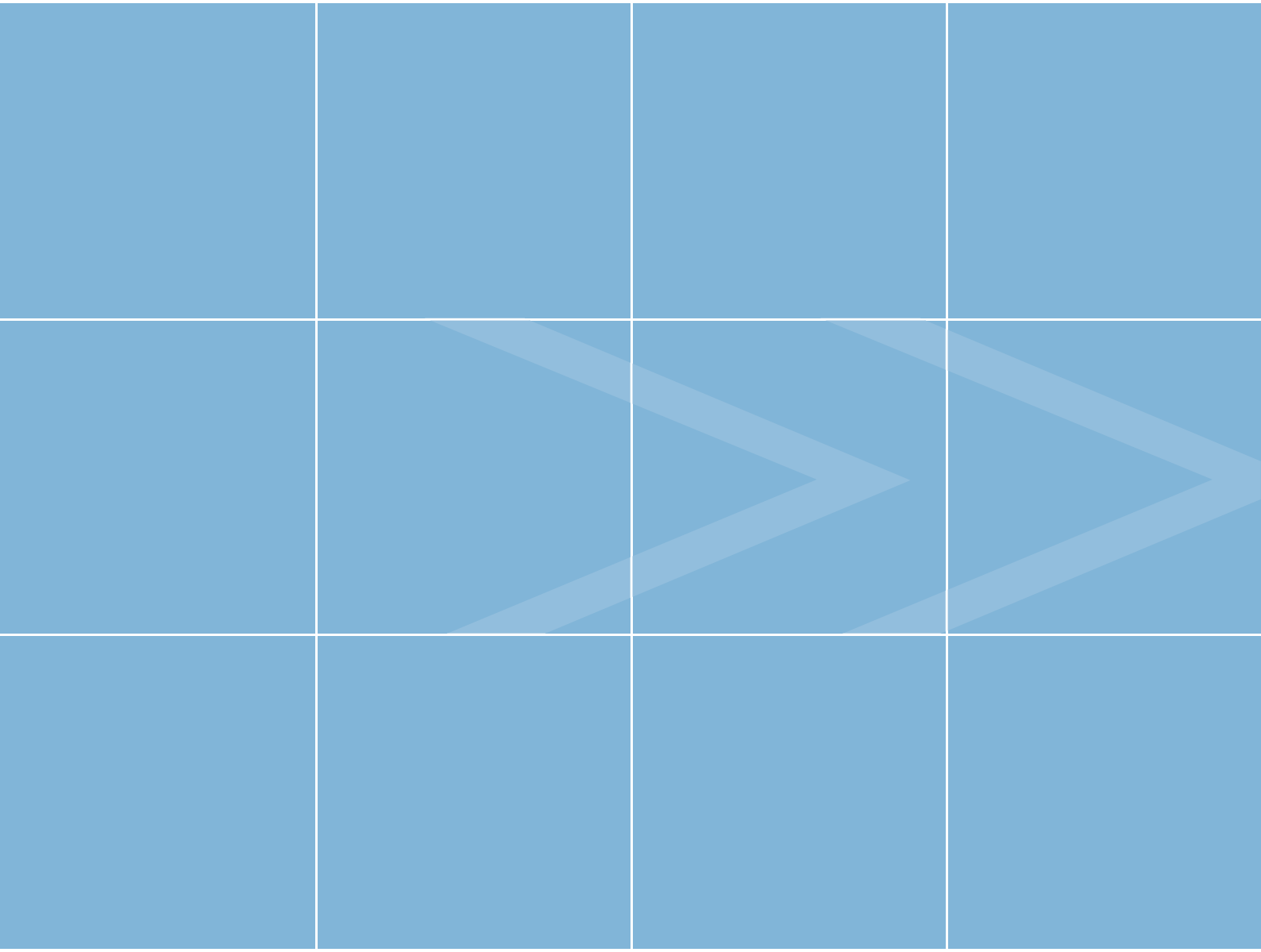
- forecasting future customer demand,
- the location, capacity, timing, and expected operation of generation, and
- prediction of future loadings on the transmission network.

A number of plausible scenarios have been developed that incorporate the uncertainties above. These scenarios have been identified by independent consultants. Each scenario has a development plan and that development plan is fully costed such that the capital expenditure for high, medium and low growth scenarios can be determined. The probabilistic capex forecasting approach then takes the probability weighted average of all the scenarios. Non inclusion of forecast spends resulting from this analytical approach undermines the consistency of the whole approach and therefore should not be contemplated.

[39] AER Draft Decision, p138.
[40] PB Report, p 63.

No concern has been raised over the value or need for the projects for which the expenditure is required. It is therefore illogical and inconsistent to exclude this portion of the expenditure simply on the basis of its timing, when the value and the need for expenditure have been accepted. If PB and the AER do not include this forecast expenditure in the WIP allowance, then the high and low growth scenario capex forecasts should be removed, and the capex should only be assessed on the basis of medium outlooks.

It is understood that the AER will be revisiting this issue as part of its Final Decision.



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