Response to PB Associates Review of TransGrid's 2005 to 2009 Capital Expenditure Needs

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Attachment 4: Detailed TransGrid Responses to Specific Sections of the Report

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February 2005

ATTACHMENT 4

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5.2 MINOR PROJECTS

5.2.1 Substations Projects (Circuit Breakers)

Paragraph in Report:

However in reviewing a sample estimate used by TransGrid to determine the replacement costs, PB Associates has formed the view that as there are a large number of breakers in the replacement program hence there are opportunities for efficiencies of scale. In particular, in relation to the preliminary investigation and design areas, PB Associates has formed the view that bundling similar projects should result in at least a 20% saving in the time TransGrid have allocated for these functions, based on market information. This saving is equivalent to an average of 3.07% reduction in the total estimate for the two typical project estimates provided. Hence PB Associates has applied a 3.07% efficiency factor to the entire circuit breaker replacement estimate of $11,718,247. PB Associates believes that the time allocated by TransGrid for these aspects of the work more accurately reflect an estimate for a one off project, and there are efficiencies to be gained in bundling like projects to provide continuity of similar work either in house or externally.

TransGrid's Comments:

While TransGrid agrees that some saving will result from the bundling of circuit breaker projects, it is TransGrid's view that PBA has significantly overestimated the benefits that will accrue. Firstly it is not possible for the reasons given below to bundle all circuit breaker replacements into larger work packages; to achieve bundling of 50% of the identified work is the maximum that is likely to be achievable. Secondly, because work is being done in operating switchyards and the erection of new circuit breakers is already contracted by competitive tender with the circuit supply contract the indicated savings on labour on the bundled projects are not available.

Formal bundling of projects has been identified as a delivery mechanism primarily to address resource concerns, as it makes options to outsource the work more efficient. Whilst it is true that this should deliver some other efficiency improvements, there are significant impediments to achieving a 20% improvement in labour costs as suggested by the PBA Report. Projects can generally be bundled effectively if they are at the same site and can be arranged for continuous work. Efficiencies can be gained in mobilising to site and in project management and design. Projects involving similar work at a number of sites can also be bundled, with some efficiency in project management.

A major impediment to achieving the proposed efficiencies is the number of CB replacements for which the site work can be bundled. There are limited opportunities due to the absence of compatible work at the same site. There are also operational restrictions that prohibit providing continuous work at the same site (outage limitations) and remove the opportunity for savings in mobilising to site. Budgetary and supply constraints also affect the amount of work that can be bundled together, as some parts of the work may have to be spread over a number of years. It is estimated that less that 50% of planned circuit breaker replacements can be bundled up efficiently, with the majority of these being at the lower voltages where these impediments are less (46 of 97 circuit breaker projects).

Design and project management stand out as significant components of the total labour costs, but on brown field sites these costs are significant to ensure the security and reliability of the HV system. There is still specific documentation particular to the individual CB replacements that cannot be avoided without compromising existing systems. Connections to protection schemes need close review, as they often vary even at the same site depending on the requirements of the protected circuit. Similarly outages, materials and plant need to be arranged to suit minor differences in each specific CB replacement, even though existing efficiencies in the use of standard systems, and period order suppliers may be used. In most cases period order suppliers are used who have been selected by competitive tender including both supply and installation of circuit breakers, thus substantial efficiencies have already been achieved by the use of this process. For these reasons it is believed that an efficiency gain of 20% is unlikely without seeing the basis for the estimate, as this requires a reduction of 50% in design and project management. A 10% labour efficiency improvement for CB replacements that can be bundled is likely to be the maximum achievable.

Assuming that 50% of projects can be bundled and a 10% labour efficiency gain can be achieved for those projects, this reduces to an overall labour efficiency of 5% (making no allowance for the lower cost of the predominance of the lower voltage circuit breakers able to be bundled). This equates to a reduction of 0.77% on the overall circuit breaker expenditure.

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5.2.1 Substation Projects (Disconnector/ESW)

Paragraph in Report:

PB Associates has reviewed the Asset Maintenance Strategy S5.3.6 and also the specific information provided for each of the three types of disconnector included in the replacement program. A brief discussion of the faults currently being experienced for each type of disconnector and the recommended replacement strategy follows:

- 330kV ALM THDB 1273 Disconnector – in service for over 25 years, the operating system binds and contacts fail to make properly. Spares are difficult to source.
- 330kV Stanger disconnector – commissioned in 1968 – central pivoting assembly forms part of the HV path. Corrosion of stainless steel bolts in aluminium threads makes maintenance extremely difficult and the contact design is flawed and unreliable. Spares unavailable existing units cannot be repaired.
- Switchgear 330kV Disconnectors Vales Point – commissioned 1975, these disconnectors are of the centre break type and suffer from seizing of the pivoting assemblies due to ingress of moisture and lack of lubrication points.

PB Associates has formed the view that the ALM and Stranger disconnectors should be replaced as proposed by TransGrid. In regard to the disconnectors at Vales point, PB Associates suggest that only one unit be replaced in the first instance and that original unit be refurbished and used to replace the second unit, and that this process be repeated until
the remaining units in service have been refurbished, and the last unit retained as a spare. This process will reduce costs and in particular civil works. As replacement will be like for like (except for the first unit) PB Associates estimates that this should reduce the need to purchase six new disconnectors and estimates that the TransGrid estimate for the work at Vales Point could be reduced by $240,000.

TransGrid's Comments:

The Vales Point disconnectors suffer from design shortcomings, which results in binding of the pivot-moving arm from corrosion.

This inbuilt weakness can be minimised with extensive intrusive and long duration maintenance involving disassembly of components on a regular basis. TransGrid is seeking to reduce maintenance requirements on plant to improve availability and reliability and the impact on generators and distributors.

The requirement for more frequent maintenance will impose adverse impacts through increased moderate duration outages and reduced security of connection for generators at Vales Point. Maintenance of some of the disconnectors requires an outage of a generator to provide access. Refurbishment as proposed by PB Associates will not address the design shortcoming and would perpetuate the need for on-going maintenance that is not required for modern designs, reducing network security at that location on an on-going basis.

Therefore while it is possible to implement a strategy as proposed by PB Associates, impacts on the electricity market are such that the installation of new disconnectors is seen to be a substantially better alternative.

<u>Page No in Report:</u> 27 **<u>Report Section and Heading:</u>**

5.2.1 Substations Projects (Instrument)

<u>Paragraph in Report:</u>

However, in reviewing a sample estimate used by TransGrid to determine the replacement costs, PB Associates has formed the view that as there are a large number of instrument transformers in the replacement program there are opportunities for efficiencies of scale, particularly in the project management and design areas. PB Associates has formed the view that bundling similar projects should result in at least a 20% saving in the time TransGrid have allocated for these functions to each of the individual projects. This saving is equivalent to a 3% reduction in the average total estimate for 330, 132, and 66kV CT project estimates provided.

As a consequence, PB Associates has applied an average 3% efficiency factor to the entire instrument transformer replacement estimate of $25,895,475. PB Associates believes that the time allocated by TransGrid for these aspects of the work more accurately reflect an estimate for a one off project, and there are efficiencies to be gained in bundling like projects to provide continuity of similar work either in house or externally.

<u>TransGrid's Comments:</u>

While TransGrid agrees that some saving will result from the bundling of instrument transformer replacement projects, it is TransGrid's view that PBA has significantly overestimated the benefits that will accrue. Firstly it is not possible for the reasons given below to bundle all replacements into larger work packages; to achieve bundling of 50% of the identified work is the maximum that is likely to be achievable. Secondly, because work is being done in operating switchyards and there are significant protection variations from one instrument transformer to the next in bundled projects the indicated savings on labour on the bundled projects are not available.

Formal bundling of projects has been identified TransGrid as a delivery mechanism primarily to address resource concerns, as it makes options to outsource the work more efficient. Whilst it is true that this should deliver some other efficiency improvements, the impediments indicated below prevent achieving a 20% improvement in labour costs as suggested by the PBA Report.

A major impediment to achieving the proposed efficiencies is the limited number of projects that can be bundled. Projects can generally be bundled effectively if they are at the same site and can be arranged for continuous work. Efficiencies can be gained in mobilising to site and in project management and design. Projects involving similar work at a number of sites can also be bundled, with some efficiency in project management. There may be limited opportunities due to the absence of compatible work at the same site. There may also be operational restrictions that prohibit providing continuous work at the same site (outage limitations) and remove the opportunity for savings in mobilising to site. In addition CT replacements for reasons of high DGA will generally be monitored frequently, and changing condition may require that projects be accelerated out of alignment with other projects with which they may be bundled. It is estimated that significantly less that 50% of planned current transformer replacements can be bundled up efficiently.

Design and project management stand out as significant components of the total labour costs, but are required to be done thoroughly to ensure system security is maintained during the work. There is still specific documentation particular to the individual projects that cannot be avoided without compromising existing systems. Testing and other documentation associated with protection and metering is complex and is required to be highly accurate. Similarly outages, materials and plant need to be arranged to suit each specific project, even though existing efficiencies in the use of standard systems, and period order suppliers may be used. For these reasons it is believed that an efficiency gain of 20% is unlikely without seeing the basis for the estimate, as this requires a reduction of 33-40% (variation between 66kV and 330kV CT) in design and project management. A 20% improvement in design and project management is seen as possible. This will provide a 10-12% overall labour efficiency for those instrument transformer replacement projects that can be bundled.

Assuming that 50% of projects can be bundled and an average 11% labour efficiency gain can be achieved for those projects, this reduces to an overall labour efficiency of 5.5%. This equates to a reduction of 1.1% on the overall current transformer replacement expenditure, not 3% as recommended.

Page No in Report: 30 **Report Section and Heading:**

5.2.2 Mains Projects (Laser Profiling)

Paragraph in Report:

This project relates to a trial of laser profiling which can be used to determine conductor and vegetation height and ground features accurately, to a fraction of a meter, from an aircraft flying at moderate heights. TransGrid report that initial trials have been promising and that they wish to continue the trials to determine the relevance of the technology to their application.

PB Associates believes this to be of a more operational nature as it relates primarily to maintenance functions and there recommends that it not be included in the capital budget.

TransGrid's Comments:

TransGrid has accepted the PB Associates report in relation the operational nature of specific budgeted work. However TransGrid asserts that, in the appropriate circumstances such as capture of asset data that does not exist within existing corporate information systems and data for new or newly acquired lines, laser profiling may be of a capital nature. TransGrid seeks to have this principal acknowledged.

Supporting Arguments:
ALS can provide asset data that does not currently exist, and that can be used effectively to improve management of the transmission line assets. Data available from ALS such as accurate ground profile and attachment point data is information on the fixed asset itself and is required for accurate calculation of ratings for operating the asset. Ground profile and attachment point data will also be essential for implementation of a vegetation management system that will rely on accurate conductor to ground profiles for constructing tree-clearance tables.

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5.4 MAJOR AND COMBINED PROJECTS

5.4.1 Transformer Replacements

5.4.1.2 Transformers (Glen Innes No.2 Replacement)

Paragraph in Report:

The No.2 transformer at Glen Innes is a 30MVA ACEC transformer manufactured in 1961. The condition report indicates that the insulation resistance is good to fair, the HV windings have acceptable measured level of insulation resistance and DDF values and a fair PI value. All LV windings results were good. The Furan level indicates that there is about 60% of the insulations life remaining, and the oil condition is good.

DGA results show all gasses within policy and stable levels. The 132kV bushings are planned to be replaced as they have a DDF above policy limits but the 66kV bushings DDF results appear acceptable.

It is noted that the impedance, tapping ranges and tapping steps are different to TransGrid current design standards but the transformers can still be operated in parallel for changeover operations.

TransGrid have scheduled this transformer for replacement during the control period and have allowed an estimate of $990,030 for the work. PB Associates does not recommend that this transformer be replaced but that the 132kV bushings be replaced as planned and that the condition of the transformer continue to be monitored.

TransGrid's Comments:

TransGrid has had no intention to scrap Glen Innes No.2 Transformer but rather to relocate and use it at Narrabri 132kV Substation, where there is a need to replace No.3 Transformer due to a known type fault. There are two main factors that, together, strongly support this alternative use of the transformer.

1. The Glen Innes ACEC No.2 transformer is not compatible for parallel operation with the existing Glen Innes No.1 Transformer and will not be compatible with a new transformer in the new Glen Innes Substation, designed to current design standards. Normal TransGrid arrangements at a two-transformer substation require both transformers to be operated together in parallel for reliability. This requires both transformers to be of similar impedance and tapping range. If a new No.2 Transformer that can be operated in parallel with the new No 1 transformer is not installed, it will not be possible to operate the transformers at Glen Innes in parallel and realise the full desired improvements in the level of reliability at this location. This is because the load serviced by this substation would be subject to transient interruptions on changeover following a protection trip of either transformer.

2. The existing Elin No. 3 transformer at Narrabri Substation has been identified for replacement and this will occur early in the next revenue-reset period, subject to risk assessments and risk rankings determined at that time. Elin transformers of this type have a design fault called “solid type insulation” where the insulation arrangement results in disproportionate voltage distributions across oil and paper layers. This results in the oil carbonizing and the paper deteriorating until the insulation fails. A similar Elin transformer, also at Narrabri SS, failed in this manner in 1992.

Transformer arrangements at Narrabri are such that the Elin No.3 transformer would be best replaced by a similar 30MVA transformer that is compatible with the two other existing Narrabri transformers. The existing Glen Innes ACEC No.2 transformer meets these requirements. It is therefore proposed to NOT use the Glen Innes ACEC No.2 transformer in the new Glen Innes Substation but instead to relocate it to Narrabri SS to replace the Elin transformer. This proposal relies on proceeding with replacement of the Glen Innes ACEC No.2 Transformer with a new transformer, which would be included in the Glen Innes 132kV Substation rebuild.

Refer also:-

- Narrabri No.3 Transformer Condition Report (attached)
- Glen Innes No.2 Transformer Condition Report (previously supplied)
- “Review of Transformer Failures 1990-2001” (Transformer Failure Task Force Report)

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5.4.1.2 Transformers (Sydney West No.4 Replacement)

Paragraph in Report:

The No.4 transformer at Sydney West has separate tanks for each phase and the transformers were manufactured by Ferranti in 1967. The DDF readings for the windings are acceptable and stable for the three transformers. Moisture levels are around the 1.5% for the three transformers and in the “consider dry out” range in accordance with industry standards. Furans are at the concern level but the CO and CO2 levels are at, or below, policy levels indicating paper insulation degradation probably consistent with the age of the transformers. The Meyers Index is indicating that the oil is in bad condition. Combustible gas levels are all acceptable. Bushing DDF tests indicate that the results are stable and acceptable.

TransGrid have allowed $5,832,384 for replacement of the transformer with the majority of the expenditure occurring in 2006.

PB Associates acknowledges that the transformers are approaching the end of their service lives but is of the opinion that there does not appear to be any indications of imminent failure, nor has TransGrid provided information relating to similar transformers explosively failing such as is the case with the Tyree and Mitsubishi transformers.

Accordingly, PB Associates recommends that these transformers be scheduled for replacement in 2010 and that the ASEA transformer recovered during the replacement of Sydney West No.3 transformer be kept as a spare.

TransGrid's Comments:

The main issues with Sydney West No.4 Transformer are related to the tapchangers and the uniqueness of this design.

Tapchanger operations are in excess of 500,000 at this time, and represent a significant proportion of the life of the tapchanger. Operating duty requires approximately 16,000 operations per year necessitating annual maintenance and regular contact replacement for the diverter switch. The maintenance frequency is high compared to other diverter switch types. Spare contacts are no longer available from the manufacturer and TransGrid’s holdings at this time are insufficient for three-phase replacement. Future maintenance would require contacts to be manufactured locally without the benefit of the manufacturer’s experience and design detail resulting in significant possibility of being inadequate for the task.

There is a history of No.4 Transformer tapchanger problems with misalignments of tap positions between phases resulting in lockout of the tapchanger control scheme for the whole substation. The misalignment is caused by wear of the gearing mechanism and subsequent incorrect operation of the tapchanger with respect to the other phases, and by design locks out subsequent tapchanger control to prevent circulating currents through several transformers. This wear is not associated with the “consumable” parts of the unit such as contacts, and indicates that the tapchanger is approaching end of life. Options to correct the problem are limited to a retro-fit of a complete drive mechanism. Replacement of the tapchangers is not feasible economically.

Although, as PBA indicated, there has been no failure of this type of transformer or tapchanger in TransGrid, there have been a number of failures associated with diverter switches mounted on the top of LV bushings similar to the Sydney West No.4 transformer. Examples have been the failures of CGE transformers at Sydney West (2000) and Newcastle (2004).

This transformer is located at a critical site and experiences high duty, both in terms of loading and operation of the tapchanger. There are known problems with the tapchanger condition due to wear that cannot be repaired. This tapchanger also requires intrusive maintenance at a frequency higher than most similar equipment. The tapchanger is unique in TransGrid, and the tapchanger is obsolete. Spare parts and support no longer available from the manufacturer, TransGrid’s stocks are very low and another unit at a less critical site is not available from which to cannibalise parts in an emergency. For these reasons TransGrid recommends that the replacement of this transformer be included in the approved replacement expenditure.

Page No in Report: 40 **Report Section and Heading:**

5.4.1.2 Transformers (Sydney West No.3 Replacement)

Paragraph in Report:

PB Associates has reviewed the condition report for these transformers and recommends that due to the age and condition the No.3 transformer be replaced and the two Mitsubishi units be scrapped. PB Associates recommends that the ASEA unit be kept as a spare.

TransGrid's Comments:

TransGrid has prepared a separate business case detailing the generation of spare transformers for this group, with the initial spare transformer coming from No.1 Transformer in 2006-07. The order of replacement of the Sydney West transformers as proposed was to minimise risk of transformer failure, generate reasonable spare transformers, and also to maximise capacity at Sydney West during the replacements. Capacity is an issue, because the different impedances of some transformers constrain the load which will be critical during the replacement process. This is optimised in the proposed order. A recommendation that the ASEA unit from No.3 Transformer becomes the spare for this group will increase the time period where there is no spare available, or alternatively attract additional costs in double handling the spare transformers in the storage bay.

It is suggested that the report be silent on this issue, or nominate No.2 transformer Red Phase as the spare unit initially, which can be reviewed upon testing at the time of No.3 Transformer being decommissioned.

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5.4 MAJOR & COMBINED PROJECTS

5.4.4 Protection System Upgrades

<u>Paragraph in Report:</u>

Also, in reviewing a sample estimate used by TransGrid to determine the replacement costs, PB Associates has formed the view that as there are a large number of projects in the replacement program hence there are opportunities for efficiencies of scale, particularly in protection, panel design and WAE areas. PB Associates has formed the view that bundling similar projects should result in at least a 20% saving in the time TransGrid have allocated for these functions to each of the individual projects. This saving is the equivalent to an average of 7.8% reduction in the total estimate for the typical project estimate provided. Hence PB Associates has applied a 15% efficiency factor to the entire protection system upgrade program estimate of $5,850,000 which is $877,500. PB Associates believes the time allocated by TransGrid for these aspects of the work more accurately reflect an estimate for a one off project, and there are efficiencies to be had in bundling like projects to provide continuity of similar work either in house or externally.

<u>TransGrid's Comments:</u>

The PB Associates' report asserts that a 20% reduction in the labour cost can be achieved as a result of bundling similar projects.

The report, however, does not provide any details on how this 20% reduction was determined.

TransGrid has reviewed the labour components of the 132kV distance protection estimate and discussed the potential scope for reductions associated with bundling similar projects with each of the various service providers. The following efficiencies due to bundling of similar projects or economy of scale gains are assessed as being achievable:

- Protection Design (-5%)
- Panel Design (-20%)
- Field installation and commissioning activities (-5%)
- PMWI preparation (-10%)
- WAE activities (no savings)

HV system network constraints may also prevent some of these bundling savings from being realized, particularly where similar works cannot be assembled into contiguous projects.

This represents a maximum potential reduction of $2.2k (4.4%) of the estimated cost for each 132kV distance protection upgrade (103 in total) or $226,600.

The transformer protection system upgrades and 330kV protection system upgrades are unlikely to derive any real efficiency gains due to the small numbers being targeted at the various sites over the five year period. Bundling is not expected to achieve any reduction for these categories of protection changes.

Hence a net reduction of $226,600 is accepted as a more realistic assessment of efficiency gains from bundling similar projects for the specific types of work targeted. This would result in the overall budget for protection system upgrades being reduced from $5,850,000 to $5,623,400.

It is recommended that TransGrid's budget application for $5,850,000 for Protection System Upgrades be reduced to $5,623,400 as a result of cost savings that can be realized through bundling like projects, rather than $4,882,995 as recommended by PBA.

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5.4.4 Protection System Upgrades

Paragraph in Report:

PB Associates recommends that these individual projects be included in the current capital works program. However, PB Associates has noted that the estimate for a typical relay replacement program is $46,300 whereas $50,000 has been estimated for the majority of projects in this application. These costs are 7.4% lower than those included in this application.

TransGrid's Comments:

PB Associates has used the wrong estimate as the basis for its assessment.

$46,300 was the base estimate for replacing a 132kV distance protection prepared in July ’03 for the original ACCC submission tabled in September ’03.

This estimate was revised up to $50,000 as a consequence of the change from an ex-post to an ex-ante budget, and updated to a base date of July ’04 (the commencement of the revenue reset period), and accounts for movements in both labour and materials subsequent to the original July ’03 estimate.

It is recommended that TransGrid’s budget application for $5,850,000 for Protection System Upgrades should not be reduced by 7.4% for the PB Associates assumed error in relay replacement base estimates.

Page No in Report: 58 **Report Section and Heading:**

6.3 MAIN SYSTEM BACKBONE AUGMENTATIONS REVIEW

6.3.4 Generation/Interconnection Backgrounds

Paragraph in Report:

The new generation development location and size may well be partly driven by the forecast network limitations, and commercial benefit that may exist in placing the generation in appropriate location to leverage this benefit. This impact does not appear to have been considered in the TransGrid background development. The impact of generation . . .

TransGrid's Comments:

The statement implies that TransGrid has not adequately considered possible generation developments. As TransGrid has reliability obligations, it is appropriate to consider the possibility that generation in beneficial locations may not emerge and that TransGrid may therefore have to implement network solutions.

Page No in Report: 59 **Report Section and Heading:**

6.4 CUSTOMER DEMAND (LOAD) DRIVEN AUGMENTATION REVIEW

6.4.2 Planning Criteria

Paragraph in Report:

(Last paragraph) It is noted that the low voltage condition, which is a driver for a many proposed projects, does not appear to be defined via the connection agreement, and as such, TransGrid have some latitude in applying this planning criteria. The actual worst case low voltage condition would be related to the distribution network and the voltage drops through its system. The actual optimal timing for the TransGrid project should, therefore, be determined via the joint planning process. In the absence of a codified low voltage condition or those defined in a connection agreement, the 1.0 per unit criteria does not appear unreasonable.

TransGrid's Comments:

The PB Associates text includes factual errors which were brought to their attention.

Minimum acceptable voltage levels at points of supply to TransGrid customers are generally not specified in Connection Agreements as they can vary as loads grow and developments occur within customers' networks. Instead, they are agreed, on a case by case basis, with customers as part of the joint planning process. In cases where they have not yet been determined, TransGrid uses a generic minimum acceptable voltage level of 1.0 per unit to assess the likely timing of projects.

Contrary to PB Associates assertion, the timing of TransGrid projects affecting connected customers is determined during joint planning and TransGrid does not have latitude in applying minimum voltage level criteria once they have been agreed with customers.

Page No in Report: 60 **Report Section and Heading:**

6.4.2 Planning Criteria

Paragraph in Report:

The method of deferring projects and accepting load at risk appears somewhat subjective with respect to the major projects in the TransGrid application. However, this may be partly due to the preliminary stage of planning for these projects which tend to occur in the later years of this regulatory period. PB Associates was not provided with any formal economic evaluation of major projects and load at risk.

TransGrid's Comments:

Assessments were not requested and it is unreasonable to imply that TransGrid was remiss in not providing them.

Assessments can be provided if required. Those for two recently committed projects, the Wollar – Wellington 330 kV line and Coffs Harbour 330/132 kV substation, are readily available. Both consider the cost of unserved energy. They are public documents and have previously been provided to the ACCC.

It is interesting to note that the ACCC has recently changed the reliability limb of the regulatory test to exclude consideration of benefits such as reductions in unserved energy.

Page No in Report: 63 **Report Section and Heading:**

6.5 NETWORK LIMITATIONS AND PROPOSED PROJECTS

6.5.1 Transfers to Sydney/Newcastle Load Centre

Paragraph in Report:
The last sentence of footnote 30 on Page 63 reads: “TransGrid studies indicate for certain dispatch conditions, this kneepoint is approximately 5% of the nominal voltage and increasing approximately 1% per year.”

TransGrid's Comments:

This appears to be a factual error. It should read either:

“…, this kneepoint is approximately 95% of the nominal voltage …”.

or

"…, this kneepoint is within approximately 5% of the nominal voltage …”.

Page No in Report: 63 **Report Section and Heading:**

6.5.1 Transfers to Sydney/Newcastle Load Centre

Paragraph in Report:

(3rd paragraph) Both limitations are sensitive to the demand in the Sydney and Newcastle area, and the location of the dispatched generation. Increased generation at the outer of the main transfer routes, particularly to the North (e.g. Hunter valley, Mt Piper, Queensland imports) worsens the problems. Increased generation in the Central Coast region (e.g. Tomago, Eraring, Vales point, Munmorah), and/or Wollongong / Sydney region, and VIC/Snowy imports to NSW that offset northern generation, relieve the problems.

TransGrid's Comments:

PB Associates has made comments about the impact of generation on the main system supplying the major load centres of Newcastle, Sydney and Wollongong, which warrant clarification. The following clarifications are provided to redress this.

Generation in the North or West:
The report states that "increased generation at the outer of the main transfer routes, particularly to the North (e.g. Hunter Valley, Mt Piper, Queensland imports) worsens the problems".

With respect to the line loading limitations between the Hunter Valley and Newcastle/Tomago such increased generation would increase the competition for the available capacity and hence it is expected that the frequency of limitations being reached would rise significantly.

With respect to the reactive power limitations, the Mt Piper development being west of Sydney may not necessarily worsen the problem, providing the generation has adequate reactive capability.

Generation on the Coast:
The report also states that "increased generation in the Central Coast region (e.g. Tomago, Eraring, Vales Pt, Munmorah), and/or Wollongong/Sydney region, and Vic/Snowy imports to NSW that offset northern generation, relieve the problems".

The Central Coast generation could relieve the line loading limitation. Generation at Tomago is not likely to significantly relieve the reactive limitation.

Generation in the South:
The studies have indicated that the reactive deficiency is relieved by increased NSW import from the south, but only up to a point. Very high import from the south also leads to reactive deficiencies.

Page No in Report: 68 **Report Section and Heading:**

6.5.2 Supplies from Sydney West

Paragraph in Report:

(under "Identification of need on page 68)

The Holroyd complex relates to two main needs:

1. Integral Energy require additional supplies to Parramatta, however the Guildford substation cannot accommodate additional cable circuits; and
2. the 330/132 kV transformers at Sydney West are forecast to become overloaded under contingency conditions.

Holroyd is also related to the Mason Park 330/132kV project. This project … Haymarket and Sydney North.

Although the IE and EA supply needs . . . could be extended to supply the EA network.

TransGrid's Comments:

The Holroyd project involves three considerations:

1. Integral Energy 132 kV cables to Parramatta (for which a 132 kV busbar at Holroyd is required);
2. A 330/132 kV substation at Holroyd to partially off-load Sydney West; and
3. Possible provision of an additional 330 kV supply to the inner metropolitan area from Holroyd.

PB Associates has addressed the latter two considerations and recommended that the Holroyd project be an excluded project.

However, it is important that Integral Energy's requirements for supply to the Parramatta area are not overlooked. Those requirements are independent of the latter two consideration. [Holroyd 132 kV switching station was separately costed for this reason].

Establishment of a 132 kV switching station at Holroyd to connect Integral Energy cables supplying the Parramatta area is required in the current regulatory period and should not be an excluded project.

It should be noted that if replacement of #4 transformer at Sydney West is delayed until 2010 (as recommended by PB Associates), the mismatch in transformer impedances would limit the Sydney West transformer capacity to less than 1300 MVA (assuming no cyclic overloading of the aging #4 transformer). This is considerably less than the forecast loading on Sydney West in summer 2009/10 (even allowing for load transfers). Should replacement of the Sydney West single phase transformers be unduly delayed, it would be necessary to develop Holroyd 330/132 kV substation to relieve the loading on Sydney West.

It is also worth noting that emissions to the greater Sydney air-shed are tightly controlled by the EPA. Broadly, emissions from any new industrial developments must be offset by reductions in present emissions. This tends to limit new developments to locations where existing plant (such as gas fired boilers) can be retired. Thus opportunities for even small scale generation plants are very limited.

In addition, Integral Energy has issued a number of requests for demand management and/or local generation which have had limited success.

Page No in Report: 69 **Report Section and Heading:**

6.5.2 Supplies from Sydney West

Paragraph in Report:

The IE requirement for the 132 kV switching station at Holroyd to improve its supplies to Parramatta also appears to be at a preliminary stage of joint planning (see footnote 33). We would consider that the prudency of the construction of this stage of the project would have to be justified with respect to the likely date for the 330 kV works and other options available to IE.

TransGrid's Comments:

Reference is made by PBA, in footnote 33, to a letter from Integral Energy requesting TransGrid to investigate the Holroyd project.

PB Associates appears to have misinterpreted the Integral Energy letter. That letter refers to joint planning for Holroyd which TransGrid and Integral Energy have been pursuing "… for some time", as well as "target dates of 2007 to 2010" having been discussed.

Integral Energy had been investigating remedial works on the existing cables which it hoped would delay the need for new cables. The letter advises that, as those remedial measure have not been practical, it is necessary to revert to the previously discussed commissioning dates. In this regard, it states:

"…We note that Holroyd is still part of the TransGrid 2004 Annual Planning Report for "constraints emerging within 5 years" and suggest that this strategy continue".

Essentially, Integral Energy is notifying TransGrid that the 132 kV switching station is expected to be required within the next five years and requesting joint investigations to refine the commissioning date. Consequently, the expenditure associated with establishment of the 132 kV switching station should be included in the capital works program.

Page No in Report: 69 **Report Section and Heading:**

6.5.2 Supplies from Sydney West

Paragraph in Report:

Initial studies conducted by TransGrid indicate that the Sydney West 330/132kV transformers could become overloaded under N-1 contingency conditions by around 2009/10 and the Sydney South 330/132kV transformers under N-2 contingency conditions by around 2008/09. Further analysis requested by PB Associates of Sydney West, considering available transfers and cyclic loading of transformers, indicates that the overload may be able to be managed well into the next regulatory period.

TransGrid's Comments:

The further analysis of Sydney West from which PB Associates draws the conclusion that "… the overload may be able to be managed well into the next regulatory period" was predicated on replacement of the banks of single phase transformers at Sydney West in an expeditious manner.

The banks of single phase transformers at Sydney West have a lower impedance than the three phase transformers with which they are to be replaced. Consequently, the old single phase banks of transformers carry a disproportionately high share of the load.

As advised to PB Associates, retention of the #4 bank of single phase transformers (or any of the single phase banks, for that matter), as recommended by them, severely limits the overall transformer capacity at Sydney West, which would advance the requirement of another 330/132 kV transformation point (most probably at Holroyd).

In TransGrid's opinion, expeditious replacement of the banks of single phase transformers at Sydney West is preferable to advancing establishment of 330/132 kV substation at Holroyd.

Page No in Report: 69 **Report Section and Heading:**

6.5.2 Supplies from Sydney West

Paragraph in Report:

(last paragraph under "PB Associates comments)
If the possible distribution works are also included, both projects would require significant levels of capital expenditure. Add to this the possible deferral benefits for the other transmission works for the supplies to the Sydney/Newcastle load centres, and there would appear to be significant commercial incentives for DSM or suitably located embedded generation in the Parramatta and inner Sydney area. Although large scale generation plants are unlikely to be able to sited in these areas, it does not appear unreasonable to assume that smaller plants (<50 MW) may be feasible in certain urban industrial locations. A plant of this size may defer the Holroyd works ($60 million) by up to 2 years.

TransGrid's Comments:

On the basis of the above, PB Associates concludes that the timing of works at Holroyd is uncertain.

PB Associates analysis is deficient in that it ignores network support payments (the "commercial incentives") payable to the proponents of DSM and local generation. These payments would be up to the deferral benefits achieved.

Summary:
Irrespective of whether expenditure is for transmission works or for network support payments to defer those transmission works, similar levels of expenditure would be required. As indicated above, expenditure for establishment of Holroyd 132 kV switching station should be included in the capital works program.

Provided that the banks of single phase transformers at Sydney West are replaced expeditiously, a 330/132 kV substation at Holroyd may not be required until the next regulatory period. However, expenditure in this regulatory period associated with the initial stages of the project will be required. This expenditure would cover activities such as securing of line routes (particularly in the area near Sydney West which is presently being developed).

Page No in Report: 71 **Report Section and Heading:**

6.5.3 Mid North Coast development

Paragraph in Report:

Whole section under "PB Associates comments" on pages 71 and 72.

TransGrid's Comments:

Summary of the Mid North Coast Development issue:
PB Associates has recommended that lesser expenditure than requested by TransGrid be allowed. The amount recommended is purported to be a probability weighted average expenditure. It has been calculated by assuming that there are equal probabilities of; the works proceeding as expected by TransGrid, the works being delayed one year and the works being delayed two years. No basis for the assumption of equal probabilities has been provided.

PB Associates acknowledges the need for works on the mid north coast: but expresses concerns that the timing of those works is not sufficiently certain. The reasons for this uncertainty appear to relate to:

- The possibility of generation in the area (although PB Associates considers this to be unlikely).
- The possibility that a control scheme may be able to be developed to allow facilities in the Lismore area, such as Directlink or new sugar mill generation, to support the mid north coast area. This control scheme would coordinate the operation of reactive plant and transformer tapchangers at Lismore and the future Coffs Harbour 330 kV substations under some line outage conditions.

If it is possible to develop the control scheme (which is by no means certain), during outages of the section of 330 kV line between Armidale and Coffs Harbour, the section of 330 kV line between Coffs Harbour and Lismore would be able to be retained in service. This would aid in managing voltage levels on the mid north coast.

PB Associates has made a number of errors in their assessment, which are discussed below.

1. <u>There is No Sound Basis for Assuming that the Works can be Delayed</u>

PB Associates treats the works a single “package” and assumes that the whole package may be able to be delayed. This is not correct. The works proposed are:

- Construction of a second line between Kempsey and Port Macquarie. On outage of the existing 132 kV line between Kempsey and Port Macquarie, Taree and Port Macquarie would be supplied from Newcastle. At times of high load, it would not be possible to maintain adequate voltage levels at Port Macquarie.

As there is presently a relatively small exposure to load interruptions for this outage, the need for a new line (or other measures to reduce the load) is clear. It should be noted that this requirement is independent of support which may be able to be provided (from Directlink or generation) to the Lismore area.

Consistent with the longer term requirements, it is proposed that the new line be mostly of 330 kV construction. However, it may initially operate at 132 kV.

- Construction of a 330 kV line to the mid north coast. This line would most probably utilise parts of the route of the existing 965 Armidale – Kempsey 132 kV line. Once completed, it and the new line between Kempsey and Port Macquarie would be used to supply a 330/132 kV substation in the Port Macquarie area.

Reconstruction of 965 line would be undertaken during a number of lower load periods over spring and autumn. 965 line would be returned to service over the higher load periods of summer and winter.

Prior to taking 965 line out of service for reconstruction, It would be necessary to convert the circuit of the existing Coffs Harbour – Nambucca – Kempsey 132 kV line which presently operates at 66 kV, to 132 kV operation. This would entail, inter alia, establishment of new 132 kV substations in the Sawtell, Raleigh and Macksville areas to replace existing Country Energy 66 kV substations.

This would provide two 132 kV circuits between Coffs Harbour and Kempsey. Without these works an outage of the existing Coffs Harbour – Nambucca circuit, during reconstruction of 965 line, would result in Taree, Port Macquarie, Kempsey and Nambucca being supplied from Newcastle. Under these conditions, it would not be possible to maintain adequate voltage levels in the Port Macquarie/Kempsey/Nambucca area.

As indicated above, the need for and the timing of construction of a second Kempsey – Port Macquarie line is independent of support which may be able to be provided from the Lismore area. Consequently, the expenditure requested for construction of this line should be included in the capital works program.

The timing of operation of both circuits of the Coffs Harbour – Nambucca – Kempsey line at 132 kV and reconstruction of 965 line does depend on whether it is possible to develop the control scheme coordinating operation of reactive plant and transformer tapchangers at Lismore and Coffs Harbour 330 kV substations. If it is not possible, then the need for these works is pressing and expenditure as requested by TransGrid should be included in the capital works program.

If the control scheme can be implemented, reconstruction of 965 line must be completed by early in the next regulatory period. As indicated above this may take a number of spring/autumn periods to complete. Thus, expenditure will be required in the current period. It will also be necessary to complete the works to allow both circuits of the Coffs Harbour – Nambucca – Kempsey 132 kV line to operate at 132 kV in this regulatory period to permit 965 line to be taken out of service for reconstruction. Thus the expenditure requested by TransGrid, which is based on completing reconstruction of 965 line early in the next regulatory period, should be included in the capital works program.

2. Implicit Assumption that Non-Network Solutions Require No TransGrid Expenditure

PB Associates mentions the possibility of generation on the mid north coast and support from Directlink in its discussion on the uncertainty of the timing of network developments.

The implicit assumption is that such eventualities would enable the works proposed to be delayed, at no cost to TransGrid. This ignores the fact that network support payments (up to the value of the deferral benefits achieved) would be required by those providing the network support. The reality is that expenditure to either undertake the works or to provide network support payments to developments which may defer the works, would be required. In either case, the quantum of expenditure would be similar.

PB Associates' calculation of the probability weighted average expenditures is deficient in that it does not include the cost associated with delaying the mid north coast works.

To enable the works to be undertaken or network support payments to be made, the expenditure requested by TransGrid should be provided.

Page No in Report: 71 **Report Section and Heading:**

6.5.3 Mid North Coast development

Paragraph in Report:

(2nd para under "PB Associates comments")
Further studies performed by TransGrid at the request of PB Associates indicate that, if it is possible to implement the control scheme, the contingent overloads and low voltages could be managed via dispatch of generation at Lismore or import from Queensland through Directlink, and provision of some additional reactive support. At this stage, it is not certain that the control scheme will be able to be implemented although we do not see any significant technical difficulty with implementing a control scheme of this type.

TransGrid's Comments:

It is not certain that the complex control scheme (coordinating operation of reactive plant and transformer tap changers at Coffs Harbour and Lismore 330/132 kV substations) can be effectively implemented. The present wording could be read to imply that the control scheme definitely can be implemented and TransGrid's studies were deficient.

There is also a possible inconsistency between the statement that additional reactive support would be required and the recommendation that the Nambucca capacitors not be included in the capital works programme.

Page No in Report: 72 **Report Section and Heading:**

6.5.3 Mid North Coast development

Paragraph in Report:

(3rd para under "PB Associates comments")
The assumed location of new generation in the TransGrid backgrounds do not impact the needs for Mid North Coast as it is considered unlikely that significant new generation will connect in the area. This may be true for coal or gas type generation of significant size, however, there may be interest in smaller scale wind or biomass type plants. The most appropriate location for these plants would probably be around Kempsey or Port Macquarie. It should also be noted that the reactive capability of these generators or even the ability to locate additional reactive plant in their substations may be a significant advantage to the security of supply in this region.

TransGrid's Comments:

Over recent years TransGrid and Country Energy have jointly published a Requests for Proposals and other consultation documents which sought, inter alia, demand management and/or local generation on the mid north coast. Those documents were:

· A Request for Proposals for Demand Management or Local Generation published in June 2002.
· A "Needs Statement" outlining emerging network constraints published in July 2002.
· A Consultation Paper which was part of the regulatory approval process for Coffs Harbour 330/132 kV substation, published in July 2003.
· A Final Report which was also part of the regulatory approval process for Coffs Harbour 330/132 kV substation, published in October 2003.

No demand management proposals have been received and the sole generation project (which involved diesel fuelled generation and was at a very preliminary stage of consideration by the proponent) has not proceeded. It is therefore unlikely that significant demand management or local generation will emerge.

It is also worth noting that:

· The Mid North Coast is not a particularly prospective area for wind generation.
· Wind generation, due to its intermittent nature, is not well suited to provision of network support.
· Within NSW no large scale commercial wind farm has achieved financial close or committed status. This is indicative of the poor viability of wind resources in NSW.
· The availability of biomass fuels is limited. In particular, the Mid North Coast is too far south for sugar cane production (and bagasse fuelled generation).

In any case, if network support was to be provided by local generation or demand management, it would be necessary to provide funds (up to the deferral benefits achievable) to enable TransGrid to make network support payments.

PB Associates appear to be selecting the preferred option. The Code clearly provides for this to be a TNSP obligation rather than the ACCC or its consultants.

Page No in Report: 72 **Report Section and Heading:**

6.5.3 Mid North Coast development

Paragraph in Report:

(Last 4 para's under "PB Associates comments)
With respect to the solutions considered, TransGrid appears to have only performed a preliminary assessment of the options. This is possibly due to the timing of these projects near the end of the regulatory period. Some technical analysis has been performed but a more detailed PV least cost analysis does not appear to have been performed to more critically assess the most appropriate optimum staging, the use of the generation at Lismore or Directlink and the economic worth of the risk of loss of load.

Due to the above factors … to be significant.

The suggested assessment criteria …

It is important to note …

TransGrid's Comments:

As acknowledged by PB Associates, the need has been demonstrated as has the effectiveness of the network developments proposed.

It should be noted that the options are very limited. To date, despite a number of requests, demand management and local generation options have not emerged. It is therefore considered to be unlikely that they will emerge in the future.

Transmission options are limited by availability of new line routes. Experience with the Coffs Harbour – Nambucca – Kempsey 132 kV line shows that new line routes are very unlikely to be available where reconstruction of an existing line is feasible. Thus, it is highly probable that reconstruction of 965 line and operation of both circuits of the Coffs Harbour – Nambucca – Kempsey line at 132 kV will be the only environmentally acceptable options. As there is no lower voltage line between Kempsey and the Port Macquarie area which it is feasible to reconstruct as a 330 kV line, a new line route would be required in this area. Whilst there is some uncertainty about the exact route of that line, the need for a second line, the timing of that need and the wisdom of 330 kV construction (compatible with longer term requirements) is clear. [Note that the need for this line is independent of Directlink, Lismore area generation, Lismore/Coffs Harbour control schemes, etc.

The major uncertainty is the timing of reconstruction of 965 and associated works to enable this. It is possible that a control scheme which coordinates the operation of reactive plant and transformer tap changers at Lismore and Coffs Harbour 330/132 kV substations, will be able to be implemented (although this is not certain). If it is not possible to implement that control scheme, the need for these works is pressing. If the control scheme can be implemented, there is still a need to undertake works to facilitate reconstruction of 965 line (operation of both circuits of the Coffs Harbour – Nambucca – Kempsey line at 132 kV) in the current regulatory period and to initiate (but not necessarily to complete) reconstruction of 965 line.

It is important that construction of the Kempsey – Port Macquarie 330 kV line and operation of both circuits of the Coffs Harbour – Nambucca – Kempsey line at 132 kV not be delayed by uncertainty about the timing of reconstruction of 965 line.

Inclusion of the mid north coast works in the capital expenditure program provides an incentive for TransGrid to undertake other cost effective developments which may defer those works.

Page No in Report: 74 **Report Section and Heading:**

6.5.4 Canberra & Cooma Supply

Paragraph in Report:

TransGrid has provided load flow studies indicating that the needs related to the low voltage conditions around the Cooma area. The studies show that the new switching station will relieve low voltages in the Cooma area.

Studies performed by TransGrid indicate that the low voltage conditions around Cooma and the levels of load at risk can be maintained at existing levels past winter 2009 with the installation of additional capacitor banks in this region plus the construction of the Country Energy 2nd 132kV line from Cooma to Bega.

TransGrid's Comments:

TransGrid has provided load flow studies indicating that the needs relate to the low voltage conditions in the Cooma/Bega area. The studies show that the following works are required to manage voltage conditions in this area over the present regulatory period:

- Installation of additional capacitors at Cooma 132/66 kV substation.
- Installation of additional capacitors in the Bega area by Country Energy.
- Establishment of a Cooma North 132 kV switching station which would have additional capacitors and would connect a new Country Energy 132 kV line to Bega.
- Establishment of a 132 kV switching station at Royalla.

PB Associates acknowledge that establishment of Royalla 132 kV switching station is a component of longer term supply arrangements for the Cooma region. The amounts recommended for inclusion in the capital expenditure program however are based on a so called "probability weighted average" calculation. This calculation assumes equal probabilities for three alternative options, viz. the 132 kV switching station proceeding as expected by TransGrid; it being deferred one year; and it being deferred two years. No basis for the assumption of equal probabilities is given.

The calculation is flawed in that it assumes that the deferments can be achieved at no cost to TransGrid. Whilst the possibility of support from generators and provision of further reactive plant are mentioned by PB Associates as possibly allowing a deferment, no provision is made for either network support payments to those generators or for installation of additional reactive plant.

Page No in Report: 76 **Report Section and Heading:**

6.5.5 Interconnectors

Paragraph in Report:

(under "PB Associates comments")
PB Associates considers that TransGrid have adequately demonstrated the need for the QNI upgrade. However, we do not consider that the timing of this project is sufficiently certain due to the issues discussed above, and there appears a reasonable likelihood that the project could be deferred.

TransGrid's Comments:

Armidale – Kempsey 132 kV Line - Phase Angle Regulator:

PB Associates has suggested that this project may be able to be delayed. In the absence of committed new generation projects, TransGrid considers that it is important that the project proceed to enable the import capability of QNI to be maintained at around the present level.

The rating of the Armidale – Kempsey 132 kV line has imposed a limitation on the NSW import capability over QNI since uprating of the line was undertaken. The limitation in the present summer will become more restrictive over subsequent summers as the mid north coast load grows.

It should be noted that the limitation on NSW import over QNI will be significant from summer 2005/6. It is understood that this has not been reflected in NEMMCO's assessment of longer-term reserve plant margins for NSW.

The installation of the Phase Angle Regulator would allow the NSW import capability on QNI to be maintained at about present levels and this capability could be relied on to meet the minimum NSW supply reserve level requirements.

An upgrade of QNI has undergone a preliminary economic evaluation (TransGrid – Powerlink public document 2004) and the preliminary indication is that the project would satisfy the Regulatory Test. Kogan Creek generation has been committed since that economic evaluation suggesting increased economic benefits from the work.

Page No in Report: 80 **Report Section and Heading:**

6.6 SMALL AUGMENTATIONS

6.6.2 New Lines - Upgrade 966 line

Paragraph in Report:

PB Associates has reviewed the information provided and has formed the view that this project can be deferred by Directlink well past the present regulatory period and hence should not be included in the current capital works program.

TransGrid's Comments:

This conclusion appears to be based on the assumption that Directlink will convert to regulated status (and therefore network support payments to Directlink will not be required).

The Directlink Joint Venture has applied to the ACCC for Directlink to be granted regulated status. The application process is currently at the public consultation stage and the outcome is uncertain. [No offer has been made to the Directlink Joint Venture and it is not certain that an offer, once it is made, would necessarily be accepted].

Rather than pre-empting the outcome of the process, it would be prudent to also cater for the situation where Directlink does not become a regulated asset. In this case, provision should be made for either:

- network support payments to Directlink (up to the deferral value achieved); or
- the uprating works to be completed (if it is not possible to negotiate a network support agreement).

The most appropriate way to achieve this is to include the expenditure requested by TransGrid, with a provision for it to be removed if Directlink accepts regulated status.

Page No in Report: 85 **Report Section and Heading:**

6.6.4 Reactive Plant - Nambucca 66kV

Paragraph in Report:

TransGrid has provided additional planning studies that indicate the capacitor banks would provide voltage support on the combined outages of both 89 line Armidale – Coffs Harbour and the control scheme proposed for the area but PB Associates considers this to be a N-2 situation and providing a level of service in excess of the regulatory N-1 standard.

Accordingly PB Associates has formed the view that this project should not be included in the current capital works program.

TransGrid's Comments:

PB Associates was advised that this statement is incorrect. The additional planning studies considered an outage of the Armidale – Coffs Harbour 330 kV line in the situation where it is not possible to implement the control scheme coordinating operation of reactive plant and transformer tap changers at Lismore and Coffs Harbour 330 kV substations. PB Associates has noted (top of Page 72) that it is not certain that the control scheme can be implemented.

The additional planning studies demonstrate that the Nambucca capacitors are essential if the control scheme cannot be implemented.

Turning to the case where the control scheme can be implemented, PB Associates acknowledges that the Nambucca capacitors would provide voltage support. We note that on Page 71 and 72 PB Associates state:

"Further studies performed by TransGrid at the request of PB Associates indicate that, if it is possible to implement the control scheme, the contingent overloads and low voltages could be managed via dispatch of generation at Lismore or import from Queensland through Directlink, and provision of additional reactive support. ..."

Thus, even if the control scheme can be implemented, additional reactive support (such as would be provided by the Nambucca capacitors) is still required.

In short, there is no reason to remove the Nambucca capacitors from the capital works program.

We note that while PB Associates state that major works on the mid north coast may be able to be delayed, not only they do not provide any funding for the (unspecified) works to permit that deferment, they recommend that the Nambucca capacitor banks (which would help to provide voltage support to the area) not be installed.

<u>Page No in Report:</u> 91 **<u>Report Section and Heading:</u>**

6.6.5 Substations - Syd East, North, West Duplicate Breakers

<u>Paragraph in Report:</u>

PB Associates has reviewed the need for this project and considers that it involves increasing the reliability standard above the statutory requirement of N-1 and hence recommends that this project should not be included in the capital works program for the current control period.

<u>TransGrid's Comments:</u>

PB Associates has recommended that this not be included in the capital works program as they consider it to involve increasing the reliability standard above N-1.

At Sydney South, Sydney East, Sydney North, Sydney West and Newcastle, coupling between the 330 kV busbars is provided by transmission lines which have connections to both busbars ("double breakered" lines). During the most recent major bushfires, the connection between the 330 kV busbars at Sydney South was lost when bushfires caused concurrent outages of both double breakered lines.

Works are required at these substations to provide coupling between the 330 kV busbars, independent of any transmission lines, to remove the risks posed by bushfires (or other adverse events).

This is a system security issue. Unintended "splitting" of 330 kV busbars has occurred during recent adverse system events, with associated risks to system security. TransGrid believes that it is good industry practice to heed the warnings of recent experience.

Page No in Report: 94 **Report Section and Heading:**

6.6.6 Transformers - Koolkhan 132kV transformer

Paragraph in Report:

PB Associates has reviewed the information supplied . . . and has formed the view that this project is not required until the summer of 2010/11 and hence . . .

TransGrid's Comments:

PB Associates has recommended that a number of transformer augmentation works not proceed as they consider that works are not required within the current regulatory period. PB Associates was advised that their view is incorrect.

Based on the current forecast (published in the 2004 APR), augmentation of the Koolkhan transformer capacity is required by summer 2009/10 assuming that two 10 MVAr 66 kV capacitor banks have been installed and are in service and that the transformers have 10% cyclic overload capability in summer.

Works will be required within the current regulatory period to enable either larger transformers or a third transformer to be installed at Koolkhan prior to summer 2009/10.

Page No in Report: 94 **Report Section and Heading:**

6.6.6 Transformers - Kempsey 132kV transformer

Paragraph in Report:

PB Associates has reviewed the load growth forecasts and have formed the view that the project is not required until winter of 2010 and hence does not need to be commenced until the second half of 2009 and therefore can be deferred until the next regulatory period.

TransGrid's Comments:

PB Associates has recommended that a number of transformer augmentation works not proceed as they consider that works are not required within the current regulatory period. PB Associates was advised that their view is incorrect.

Whilst installation of larger transformers at Kempsey is not required to be completed within the current regulatory period, some expenditure will be required. For example, an order for the transformers will have to be placed and initial design work undertaken.

The expenditure requested by TransGrid should be included in the capital works program.

Page No in Report: 94 **Report Section and Heading:**

6.6.6 Transformers - Dapto additional transformer

Paragraph in Report:

PB Associates has reviewed the information supplied by TransGrid and as the statutory reliability standards are currently being met does not recommend that this project be included in the current capital works program.

TransGrid's Comments:

PB Associates has recommended that a number of transformer augmentation works not proceed as they consider that works are not required within the current regulatory period. PB Associates was advised that their view is incorrect.

The Dapto transformers supply important industrial and commercial loads which have a high load factor. Difficulties in scheduling transformer maintenance have progressively increased as the load has grown. It is now necessary to arm load shedding schemes during major maintenance of the transformers.

TransGrid believes that it is not good industry practice to knowingly perpetuate a situation where major maintenance activities can only be carried out by placing large amounts of load at risk. Consequently, a fourth transformer is proposed.

Page No in Report: 94 **Report Section and Heading:**

6.6.6 Transformers - Cowra Replacement

Paragraph in Report:

PB Associates has formed the view that the project is not required until 2010/11 and does not need to be commenced till 2009/10. We recommend that it should not be included in the current capital works program based on the load growth projection in the relevant planning report.

TransGrid's Comments:

PB Associates has recommended that a number of transformer augmentation works not proceed as they consider that works are not required within the current regulatory period. PB Associates was advised that their view is incorrect.

Based on the current load forecast (published in the 2004 APR), the firm capacity of the Cowra transformers will be exceeded in summer 2009/10, assuming that capacitors are installed to fully compensate the reactive load and the transformers have 10% cyclic overload capability in summer.

Works will be required within the current regulatory period to enable larger transformers to be installed at Cowra prior to summer 2009/10.

Page No in Report: 103 **Report Section and Heading:**

6.6.8 Technical Services - Misc. (Communications)

Paragraph in Report:

In discussion with TransGrid, it has been acknowledged . . . likely in our view that the terms would cost less than the full cost of the Lismore to Dumaresq link ($5.5m).

TransGrid's Comments:

Initial enquiries have been made with Powerlink but no formal analysis of either the available capacity or of the methods for interconnection have taken place. The costs associated with this option have not yet been fully analysed. TransGrid has no information of the latency within the Powerlink network between Dumaresq and Lismore. Excessive instances of drop/insert at the 2Mb level may raise the latency to the point where such an interconnection is not satisfactory for a backup for protection signalling functions. If Powerlink cannot provide an effective connection, a number of efficiencies within the existing OPGW/microwave network will be compromised.

Page No in Report: 104 **Report Section and Heading:**

6.6.8 Technical Services - Misc. (Communications)

Paragraph in Report:

In determining whether the amount for inclusion in TransGrid's capital expenditure proposal . . . PB Associates recommends that this project not be included in the proposed capital program for TransGrid as it does not represent in our view the most efficient solution.

TransGrid's Comments:

Negotiations with Powerlink are at present preliminary only. No information is available on the latency within Powerlink's network between Dumaresq and Brisbane. Powerlink have currently (2004) quoted $98k p.a. for 5 x 2Mb channels between Brisbane and Dumaresq with $67k set-up costs. The equipment already in place between Lismore and Brisbane should be recovered for re-use within the TransGrid network, either as spares or to maintain commonality of equipment within a particular network area.

Page No in Report: 117 **Report Section and Heading:**

7.1 SUPPORT THE BUSINESS

7.1.1 Information Technology

7.1.1.2 IT Governance

Paragraph in Report:

PB Associates has discussed the issue of dual Enterprise Resource Planning (ERP) platforms with TransGrid management and is in general agreement with the TransGrid position that the current situation is not optimal and that the move to a single ERP platform (e.g. Oracle, MIMS, SAP, etc) should occur during the next replacement/upgrade cycle. TransGrid considers that the cost of the move to a single ERP platform will require expenditure approximately equivalent to the cyclical replacement of the current systems and has not included any additional costs for this transfer.

TransGrid's Comments:

TransGrid is misquoted on the cost of a ERP replacement. $6.8 million would be totally inadequate to implement a single ERP solution.

TransGrid documentation prepared for upgrade option analysis estimates a new ERP implementation would be in the order of $10-15 million. The TransGrid IT strategy approved in December 2004 says “TransGrid will move towards the adoption of a single ERP and Project Management solution by reviewing options and selecting a preferred platform”.

The estimates submitted to the ACCC did not provide funding for the ERP replacement as the strategy was not finalised at that stage. The reductions to funding recommended in the PB Associates report would now make this project impossible to fund during the current regulatory period.