Australian Competition and Consumer Commission

TransGrid Regulatory Review

Capital Expenditure and Asset Base, Operational Expenditure and Service Standards

Final Report

April 2004

Contents

Table Index

Figure Index

Appendices

Executive Summary

The Australian Competition and Consumer Commission (the Commission) is conducting an inquiry into the appropriate revenue cap to be applied to the non-contestable elements of the transmission services provided by TransGrid Networks Pty. Ltd. (TransGrid) for the Regulatory Period (RP) from 1 July 2004 to 30 June 2009.

This report presents GHD's review of the TransGrid Revenue Reset Application in relation to Capital Expenditure (Capex), Asset Base, Operating Expenditure (Opex) and Service Standards, as part of the Commission's review process.

The review has been undertaken within the Commission's clarified scope and is to be used only for the purposes of the Commission's Revenue Cap Decision. The review relies on information provided by TransGrid with limited verification of the information by GHD.

TransGrid was provided with a draft copy of this report for review and comment on matters of fact. Subsequent to issue of the draft report, TransGrid provided further information as a response, and provided responses to earlier questions from both GHD and the Commission. Some of this information, GHD considers, should have been provided much earlier to clarify requests. GHD was unable to fully review or explore the implications of this documentation due to the short timeframe, and consequently the findings may be inconclusive in some cases.

The key findings of the review are:

Business Systems Efficiency

A brief review of the efficiency of business management systems has indicated that:

1. The majority of capital costs are from competitively tendered works, and hence are considered efficient for the scope of work specified.
2. There is potential to reduce costs of project investigation, design and project management through internal resource control and efficient use of external resources. This is difficult to quantify without a detailed review, and is beyond the scope of this assignment.
3. Extensive scope changes have occurred during project implementation over the current RP, due to various internal and external influences. TransGrid has recognised that improvements were required and restructured to provide a group which has improved the project development and scoping process. During the GHD review process, GHD found that TransGrid had some difficulty in providing concise documentation to support scope and cost increases from planning to final costs for projects undertaken.
4. The Network 30 Year Plan, the Network Management Plan and the Asset Management Strategies together provide a coherent and justifiable basis for proposed maintenance and refurbishment projects.

However, there was insufficient correlation between the projects and programs in the strategies and the budget costs provided for future refurbishment Capex. TransGrid provided other information at a late stage to support the budgets, and attempted to reconcile this with the strategies provided. Further review was undertaken by GHD, and findings are included below. GHD is of the opinion that the TransGrid Capitalisation Policy is consistent with Australian Accounting Standards.

Overall Historic Capex

This review component required a level of information from TransGrid which preferably tracked projects from the 1999 Decision to its completion, documenting cost and scope changes and their justification. TransGrid had not prepared information in this format although, in GHD's opinion, it would have been appropriate to do so and hence facilitate the review process. In addition, the task required assessment of the efficiency and prudency of decisions made during the current RP, after the investments had been made. This proved to be a difficult and time-consuming task and is "potentially an extremely intrusive form of regulation", as acknowledged by the Commission in its 10 March 2004, Supplementary Discussion Paper on the "Review of the Draft Statement of Principles for the Regulation of Transmission Revenues. Capital Expenditure Framework." Consequently, there are a number of instances where GHD was unable to draw an appropriate conclusion, either due to time and resource constraints, or the form of the information supplied by TransGrid to address the requirement.

The findings have been based on sampling a range of projects in each category of historic Capex. Total sampled project costs were $463 million, of which:

1. Even though the project need was established in most cases, no conclusion could be drawn on the efficiency of some $301 million due to insufficient information or a level of review by GHD, within the scope and resource constraints of the assignment, which could not adequately assess the efficiency.
2. Some $115 million was considered prudent and efficient.
3. $0.9 million Capex on private use vehicles was considered to be on unregulated assets, and should be removed.
4. $31.5 million was deducted for vehicle resale revenue ($25M) and unsubstantiated Other Projects ($6.5M).
5. One augmentation project (Orange substation - $14.7M) was not considered prudent, but other investment would have been required in its place, of possibly a lower cost.

Given the limited sample for which conclusions could be drawn and the complexities of the conclusions in each project reviewed, drawing wider conclusions on the overall historic Capex is not appropriate. However, it was clear from the assessment that TransGrid has some difficulty in tracking project costs from project inception to completion, undertaking and providing adequate economic project justifications, and reviewing project costs after approval. Summary findings for each category of historic Capex are provided below.

It was noted that the Commission was separately undertaking more detailed investigations of some of the projects for the purposes of its Decision.

Historic Capex - Augmentation

1. From the five projects sampled, GHD found that:
   - Kempsey – Nambucca – Coffs Harbour 132kV line. Final costs of $34.5M which are well in excess of original project estimate of $ 21.4M (excluding SVC not built) and significantly above costs in the economic evaluation. Following provision of further information by TransGrid, GHD considers that this project appears to be prudent, but submits that this should be subject to more detailed review by the Commission.
   - Orange Substation and Molong Substation (2 projects). Final cost of $14.7M was significantly more than in Regulatory Test ($9M) for implemented option, and alternative generation option could have been viable. Hence investment may not have been prudent. There is insufficient information to confirm project timing. Manildra 132kV line provided to benefit Country Energy initially, but funded by TransGrid on the basis it will later augment TransGrid's network to Parkes.
   - Reinforce Wagga area supply. Original 1999 Allowance of $92.9M. Project deferred by minor works and considered prudent.
   - Tuggerah-Sterland 330kV transmission line duplication. Not in 1999 Allowance but consistent with Regulatory Test and considered prudent.
2. A detailed overall review of Historic Augmentation Capex projects was not undertaken, but a general review indicated that:
   - Of the projects included in the 1999 Allowance and undertaken, the majority incurred actual costs in excess of the Allowance.
   - Of the projects included in the 1999 Allowance and not undertaken, these were deferred or not required due to other minor works. This was considered appropriate.
   - For projects undertaken but not in the 1999 Allowance, many of these could not have been foreseen in 1999.
   - Easement costs were more than double the 1999 Allowance. Within the scope of this review, GHD was unable to conclude on prudency.
3. From the projects sampled, a step appears to be missing in the TransGrid process, in that once a selected option is subject to detailed engineering costing it is not reassessed to ensure it is still the most economic. GHD considers it reasonable that the detailed engineering costs should be at least compared to the sensitivity test undertaken in the Regulatory Test to see if a review should occur. There does not appear to be any evidence of this occurring.
4. Projects can incur significant cost and scope changes from various factors during their development and implementation. Sampling indicates this has occurred on a number of projects and it has not been possible to determine within this review whether the expenditure is efficient.

A more detailed review of the projects would be required to confirm this. TransGrid advises that it manages expenditure and has strong cost and variation control processes, but these were not tested in this review.

5. The Commission's attention is drawn to the implications of TransGrid building transmission works that are used by DNSPs even though the DNSPs have made no capital contribution. While the augmentation works are considered least cost to the community it would appear that TransGrid customers are paying where some of the costs should go to the DNSP customers.

Historic Capex - Refurbishment

1. For Substations Projects, actual costs of $214.4M overall indicate potential overexpenditure of $140M compared to the 1999 Allowance and between $45M and $130M compared with TransGrid's long term plans and simple age-based replacement estimates. However, due to the inability to adequately categorise expenditure, and establish the actual total spend for each Asset Management Strategy, GHD was unable to conclude on a level of prudent and efficient expenditure in this category. Further information was provided by TransGrid is response to this (draft) report, which more clearly showed the categorisation of expenditure and the relationship between strategies and budgets. Unfortunately, this information was not able to be adequately reviewed or explored to be able to incorporate findings in this report. Further review may change some of the conclusions reached.

   The major project in this category, the Yass Substation, was supported by technical justification, but no evidence of economic analysis or detailed costing was provided and hence GHD was unable to conclude on prudency and efficiency.

2. For Transmission Line Projects, the actual cost of $21.7M was well above the 1999 Allowance of $1.1M, but below the Network 30 Year Plan expectation. Some $15.1M appears justified and efficient. Easement acquisitions and construction of $5.8 million were not considered refurbishment, and were not reviewed for justification.

3. For Communications Upgrades and Replacements, the historic cost of $46.6M compares to $65.9M in the 1999 Allowance, with a further $12.6M proposed in the future RP. The project need was established, and TransGrid provided information proposing a reduction of $2.0 million in the value of the investment for asset elements of the project scope provided for commercial gain. In the absence of understanding the potential for commercial benefit from these assets, GHD is unable to conclude on the prudent value of the regulated assets.

4. For Other Projects, an actual cost of $13.8M was incurred, of which $7.3M is considered justified. The remainder of $6.5M is for part of Other Sydney Projects, where no links can be provided to strategies or budgets, and TransGrid advises it is unlikely that the amounts will be spent in 2003/04.

Historic Capex – Support the Business

1. For Information Technology Projects, an actual cost for the period of $55.5 million significantly exceeded the 1999 ACCC Decision of $16.8 million. Many of the projects were not foreseen by TransGrid in 1999. GHD concludes that IT Capex for the period was justified in terms of need. Overall project costs were provided by TransGrid for selected projects, but were not sufficient to enable GHD to establish that the spend was efficient.
2. For Vehicles, the actual cost was $37.4 million compared to the 1999 Allowance of $30.9 million. GHD concludes that the **net** allowance for vehicles should be $11.5 million after deducting vehicle sales revenues ($25M, unless this is otherwise accounted for) and private use vehicles considered as unregulated assets ($0.9M).
3. For Miscellaneous Plant and Equipment, some $10.0 million was incurred compared to $7.5 million in the 1999 Decision. GHD did not undertake a detailed review of this category, but the costs are considered efficient as they are incurred through controlled procedures and standing supply contracts.

Review of Historic Regulatory Test– Sydney CBD Project

1. The project has significant cost overruns and the final project that was built is significantly different to that proposed in the Regulatory Test. This is evidenced by items such as larger capacity 330kV cable, third transformer and SF6 equipment.
2. As the project required in-depth analysis the Commission undertook detailed discussions with TransGrid. GHD did not take part in those discussions. As GHD has not carried out any in depth analysis it cannot make any meaningful comments on the prudency or application of the Regulatory Test.

Asset Lives and Depreciation Profiles

Asset lives and depreciation profiles proposed by TransGrid for the Asset Base Roll-Forward are reasonable and in accordance with industry practice.

Future Capex – Overall

The assessment of overall future Capex was based on reviewing adequacy of TransGrid's Capex methodologies, forecasts and impacts for specific sampled projects and Regulatory Test applications. GHD was not required to provide an overall assessment of future Capex.

Future Capex – Development

1. Future development Capex was determined by TransGrid using probability-weighted scenarios to define an aggregate program. The program does not specifically accord with any one scenario. The scenarios have been reviewed and it is difficult to understand and verify the details of the approach taken. However, it appears that they have reasonably covered the range of load growths and the likely generation scenarios based on the most likely projects to be undertaken in the future. GHD did not verify the accuracy of the probabilities as this was beyond the scope of this report.
2. Five projects were selected for more detailed review, and findings were:

- Supply to West and Central West, estimated cost $75.7 million. Supporting information was not provided to confirm timing. The Regulatory Test and latest cost estimate is considered reasonable.
- Dapto Transformer Addition/Replacement, estimated cost $7.0 million. Project need, preliminary options review and costing are reasonable. Load flow information was provided to confirm timing on the basis of high, medium and low load growth forecasts. This does not provide a definitive date.
- Liverpool Transformer Addition/Replacement, estimated cost $7.0 million. Need and selected option is appropriate.
- Glen Innes 132kV Busbar, estimated cost $4.0 million. Considered prudent and efficient, at current stage prior to detailed engineering.
- Coffs Harbour 330/132kV Substation, estimated cost $19.8 million. Project and timing are reasonable, but estimated costs have increased 22% from feasibility report. GHD has verified that the real increase is only 7% and is within the sensitivity analysis undertaken in the Regulatory test.

Regulatory Test Applications

Two Applications were selected by the Commission for review:

1. Mid North Coast Reinforcement. N-1 criterion, options evaluation and timing based on load forecasts are all considered prudent and appropriate. Estimated costs increased 22% since 2002 feasibility report GHD has verified that there is a scope change and the real increase is only 7% and is within the sensitivity analysis undertaken in the Regulatory test.
2. Central Coast Reinforcement. N-1 criterion appropriate. Timing of line works is appropriate. The Regulatory Test did not analyse non-network options, so need and/or timing of load-dependent second transformer could be reconsidered through a new Regulatory Test as the need approaches. TransGrid advised that this work would be subjected to a Regulatory test in due course.

Future Capex - Refurbishment

1. Security Capex of $50.0 million to upgrade security at all substations on a priority-ranked basis is considered prudent and efficient.
2. Substations Refurbishment of $108.5 million. TransGrid has developed appropriate strategic responses to substations refurbishment but presented a range of very inconsistent figures which did not adequately link the proposed strategies to the budgets. . Information was requested to support this link but was provided at a late stage and was unable to be adequately reviewed and verified prior to completion of this report. For example, some 40% of the proposed allocation to transformer replacements provides for unidentified transformer replacements and spares. TransGrid verbally advised that it would have been appropriate to provide a business case and/or strategy for these items.

Further information was requested to support this link but was provided at a late stage and was unable to be adequately reviewed and verified prior to completion of this report. Consequently, it has not been possible to form a view on the efficiency of TransGrid's proposal.

3. Transmission Lines Refurbishment of $15.3 million was considered prudent and efficient, and consists largely of wood pole replacements. GHD had a concern that insufficient expenditure was allocated to transmission lines and tower replacements. This was not borne out, as strategies indicated no significant issues with these assets which warranted Capex provision.
4. Technical Services Refurbishment of $12.7 million. TransGrid has developed appropriate strategic responses to these projects but has not established the link between the proposed strategies and the budgets. On the basis of the information provided, it is not possible to form a view on the efficiency of TransGrid's proposal.

Future Capex - Support the Business

1. Information Technology of $58.2 million. The proposed IT Capex is at a similar level to that of the past five years, and as a proportion of total Capex is relatively constant or slightly declining. The need for proposed IT projects was generally established. GHD considers that the implementation of a strong IT Management Framework initiated by TransGrid in 2003, including a more strategic approach to IT planning focussed on investment in improved business outcomes, and the development of sound business cases for all projects, should result in improved efficiency of investment. It is not possible at this stage to determine if these improvements could result in reductions in the future Capex required from that proposed in the Application, as detailed business cases have not yet been prepared.
2. Vehicle costs of $38.2 million. After deducting for private use vehicles considered to be unregulated assets ($0.9 million), the resulting efficient allowance is estimated at $37.3 million.
3. Miscellaneous Plant and Equipment of $10.2 million. No detailed review of this category has been undertaken, but the expenditure is normally incurred through controlled procedures and standing supply contracts. The level of Capex in this category is considered reasonable.

Historic Opex

1. The amount shown in the Application for the 2002/03 financial year for unregulated Opex of $113.8 million was able to be reconciled with TransGrid's audited financial accounts as at 30 June 2003.
2. Significant cost changes over the previous RP included a real increase in corporate and governance costs of $1.6 million, new environmental costs of $3.2 million (declining from a maximum of $3.9 million in 2002/03), and a real decrease in transmission operations costs of some 8%.

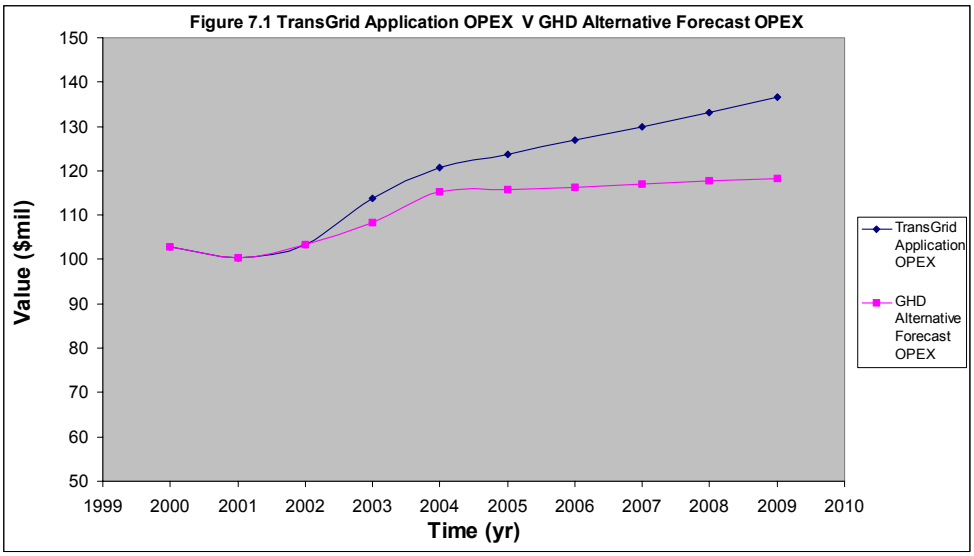
Future Opex

1. GHD on review and in light of interviews and the provision of additional information found that the TransGrid Application was deficient in a number of areas:

- The use of Maintenance Units as a basis of forecasting total Opex was not considered reasonable or appropriate.
- GHD's review indicated that there were some costs considered to be operating inefficiencies, which were carried through in the Application proposal to the future RP from previous years. GHD assessed that these comprised the cost of at least 50 non-core staff and expected reductions in overtime and allowances.

2. As TransGrid did not provide a financial Opex model that supported its Application, GHD reconstructed a TransGrid Opex Forecast Model (Table 8.3) in an attempt to quantify the various statements made in the Application and during interviews. This model reflects the values included in the Application. The model consequently includes all TransGrid's allowances for growth in the network and labour market costs, which are the main drivers for cost increases.
3. The reconstructed model was then used to develop a GHD Efficient Alternative Opex Model. This new model was adjusted for the non-core staff and an adjustment for overtime. In addition to these efficiency adjustments assessed by GHD for the starting Opex base, future efficiencies should also be possible, as a result of productivity and technology changes. A limited review indicated that efficiencies of 1% to 5% per annum should be possible, over and above those included by TransGrid in its information. Applying a nominal 2% compound efficiency target to the GHD Efficient Alternative Model it is possible that a total reduction in Opex from that stated in the TransGrid Application of $65.2 million.

TransGrid Application Opex Vs GHD's Alternative Forecast



The Figure highlights the significant increase in Opex in the TransGrid Application between the actual costs incurred in the current RP to 2002/03, to the expected starting Opex base in 2004/05. This increase is inconsistent with the Opex trends prior to 2002, and with those proposed by TransGrid from 2005. GHD has attempted to isolate these increases and has identified some for inclusion in the GHD Efficient Alternative model, however, the inconsistency indicates that potential for futher reductions may be possible.

Service Standards

TransGrid's service performance incentive scheme is based on placing 1% of Maximum Allowable Revenue (MAR) at risk. GHD has reviewed the incentive scheme proposed by TransGrid and found that it would in general deliver a bonus for TransGrid based on their historic level of performance.

GHD has developed a suggested incentive scheme that is primarily revenue-neutral when based on the historic performance of TransGrid. The GHD proposed incentive scheme is summarised in the following table.

Table 1 Summary of Service Standards proposed by GHD

Performance Measure	Unit of Measure	Revenue at Risk (%)	Collar	Dead Band Knee 1	Target	Dead Band Knee 2	Cap
Transmission Line Availability	%	0.2	99.0	-	99.5	-	99.7
Transformer Availability	%	0.15	98.2	-	99.0	-	99.7
Reactive Plant Availability	%	0.1	97.0	-	98.6	-	99.3
Reliability (Events >0.05 system minutes)	Number	0.25	8	-	5	-	3
Reliability (Events >0.4 system minutes)	Number	0.2	2	-	1	-	0
Average Outage Restoration Time (7 day cap per event)	Minutes	0.1	1800	1600	1500	1400	800

The GHD proposed incentive scheme would, if applied to historic performance, return a total bonus over the period reviewed of $3.584m, compared to the total bonus from the TransGrid proposed incentive scheme of $7.827m.TransGrid has expressed concern that this proposed incentive scheme exposes it to substantial downside risks. However GHD cannot identify these, as the proposed scheme is based on historical performance. The GHD proposed scheme aims to maintain asymmetric loading in favour of the bonus in recognition of the reasonably high levels of performance of TransGrid in most of the measured areas, and the difficulty in achieving further improvements.

1. Introduction

1.1 Introduction

Under the National Electricity Code (NEC), the Commission is responsible for regulating the non-contestable services of the transmission network service providers (TNSPs).

The Commission is conducting an inquiry into the appropriate revenue cap to be applied to the non-contestable elements of the transmission services provided by TransGrid for the period from 1 July 2004 to 30 June 2009, referred to herein as the Regulatory Period or RP.

TransGrid has made its application to the Commission in the form of its Revenue Reset Determination 1 July 2004 to 30 June 2009, dated September 2003, (the ”Application”), proposing a revenue cap.

To assess performance of TransGrid relative to the NEC, the Commission requires a capital expenditure (Capex), asset base, operational expenditure (Opex) and service standards review of the Application to be undertaken. In particular, Part B of Chapter 6 of the NEC requires, *inter alia*, that:

- In setting the revenue cap, the Commission must have regard to the potential for efficiency gains in expected operating, maintenance and capital costs, taking into account the expected demand growth and service standards.
- The regulatory regime seeks to achieve an environment, which fosters efficient use of existing infrastructure, efficient operating and maintenance practices and an efficient level of investment.
- In setting the revenue cap, the Commission must have regard to the provision of a fair and reasonable risk-adjusted cash flow rate of return on efficient investment including sunk assets
- The regulatory regime provides reasonable recognition of pre-existing policies of governments regarding transmission asset values, revenue paths and prices but with the limitation that such valuation must not exceed the deprival value of those assets.

In this context, GHD was engaged to inform the Commission on the:

- Adequacy and efficiency of TransGrid’s forecast Capex to meet its future service requirements, including the likelihood that proposed augmentation Capex will pass the *regulatory test*, and the appropriateness of non-augmentation Capex.
- The opening regulatory asset valuation as at 1 July 2004, including review of augmentation and non-augmentation Capex undertaken by TransGrid over the previous RP.
- Adequacy, efficiency and appropriateness of the Opex stated by TransGrid as being necessary to meet its present and future transmission service requirements.

- Appropriate service standards and performance targets to apply to TransGrid over the forthcoming RP.

1.2 Terms of Reference

The Terms of Reference for this review are provided in Appendix A. The Commission further clarified these Terms of Reference and the significant requirements are described below.

Capex Review

A specific requirement was to focus on the efficiency of proposed investment, and how TransGrid has taken account of the impact of endogenous and exogenous factors in future Capex. The principles of the *regulatory test* were to be used to assess the efficiency of augmentation investment, rather than specific application of the *regulatory test*. Non-augmentation Capex was required to be assessed to meet agreed needs, at least cost.

Asset Base and Historic Capex Review

Advice was required on asset lives and depreciation profiles to assist the Commission in undertaking an asset base roll-forward. The efficiency of TransGrid's historic Capex was to be reviewed overall, and advice provided in order for the Commission to compare TransGrid's Capex spent against the Commission's approved Capex program. Three *regulatory test* applications were to be reviewed in detail, especially relating to application of the planning standard, quality of analysis of costing and design of alternative projects, and appropriateness of timing of the project. For non-augmentation Capex, the focus was on TransGrid's methodology and approach to assessing the need for investment and then for choosing the investment to meet the need at least cost.

Opex Review

TransGrid's actual and projected Opex spend to June 2004 was to be reconciled with financial accounts and reviewed to identify endogenous and exogenous factors driving differences between the spend and the Commission's previously approved Opex program. Benchmarking of TransGrid's Opex forecast was to be undertaken by the Commission to provide input to the forecast Opex review. Forecast Opex was to be reviewed by GHD by evaluating TransGrid's proposed Opex model and developing an opinion of the necessary Opex for each year of the RP.

Service Standards

No change to the Terms of Reference.

1.3 Review Methodology

The review was undertaken in accordance with the clarified Terms of Reference (ToR) and on the basis of the general tasks outlined below:

- Review of application and appropriate Commission documentation.
- Provision of a questionnaire and information request to TransGrid.
- Review of documentation and responses provided by TransGrid.
- Conduct of discussions and interviews with relevant TransGrid staff to develop understanding and analyse the information provided to meet the ToR.
- Further communication and information requests to clarify and justify the information provided.
- Preparation of a draft report for review by the Commission and TransGrid.
- Consideration of review comments and incorporation of appropriate amendments into a final report.
- Communication with stakeholders and provision of responses as required.

1.4 Glossary of Terms

A Glossary of Terms and Acronyms is included as Appendix B.

1.5 Statement of Limitations

This report is only to be used for the exclusive purposes of the Commission's Revenue Cap Review of TransGrid and cannot be used or referenced for any other purpose. This report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. GHD accepts no responsibility whatsoever for any loss occasioned by any person acting or refraining from action as a result of reliance on the report, other than the Commission.

The review has relied upon the information supplied by TransGrid during the course of the review process. The review has not involved the verification by GHD of data or information supplied by TransGrid except in limited instances.

A list of reference material supplied by TransGrid is provided in Appendix C.

1.6 Acknowledgements

GHD acknowledges the assistance provided by the Commission and numerous senior staff of TransGrid in undertaking this review.

2. TransGrid and Its Application

2.1 External Operating Environment

TransGrid and EnergyAustralia were the first TNSPs to have revenue caps established under the Commission's 1999 Decision and the first to undergo the current "reset" of their revenue cap. Consequently there is some interest from stakeholders in the outcomes of this review, including from other TNSPs and customer groups in terms of the precedents that may be formed.

The regulatory regime has evolved considerably over the current RP, with the development of the Draft Statement of Regulatory Principles, now undergoing further review. The National Electricity Code and other State and national regulatory instruments have developed with numerous changes made. There are still uncertainties with numerous aspects of the regulatory regime, and further changes are expected. These are expected to include the formation of a National Energy Regulator encompassing both electricity and gas, and include regulation of transmission and distribution businesses nationally over a period of time.

The National Electricity Market (NEM) has developed significantly over the current RP, and now includes all Eastern States, the Australian Capital Territory and South Australia, with Tasmania proposed for connection with the completion of the Basslink project in 2005. It is recognised that TransGrid is a key TNSP in Australia, with its network being centrally located and the business involved in the interconnections to all the other States currently in the NEM, albeit indirectly in some cases. Inter-regional load flows are generally increasing and vary over a wide range, albeit of relatively small magnitude compared to NSW load flows.

Total electricity loads are steadily growing in all jurisdictions, and in NSW summer demand growth has outstripped winter demand growth to the extent that maximum summer demands are forecast to exceed maximum winter demand over the next RP. This shows a similar trend to other southern States, and is largely due to the increased demand for air conditioning.

The expected demand growth gives rise to a need for future generation capability, which will need to be located within NSW over the next RP. There is considerable uncertainty over the location of these future generators, hence creating significant uncertainty in planning for future transmission asset augmentations to connect these generators to the network.

There has been a continual increase in environmental and safety legislative requirements over the current RP, and these are expected to continue to evolve over the next RP. Infrastructure security has become a major concern since 2001. Managing and incorporating these requirements is considered a normal part of the operating environment for infrastructure businesses, although there may be scope and complexity increases in some cases.

Technology within the electricity transmission sector continues to develop to enable significantly improved efficiencies and improved decision making. The following technology developments are indicative of the common trend within this sector:

- Software and hardware advancements enabling improved network planning and monitoring.
- An industry wide focus on asset management, incorporating topics such as optimised renewal decision-making and the evaluation of optimal maintenance practices.
- Improved condition monitoring capabilities, e.g. continuous, in-situ circuit breaker condition monitoring provided just-in-time maintenance feedback.

Each TNSP has quite different operating conditions and as such TNSP specific efficiencies can only be identified through detailed TNSP reviews. It is not within the scope of this review to identify and quantify the specific efficiency opportunities of TransGrid.

Pressures to reduce costs for energy provision also continue in order to assist in maintaining Australia's competitive international trade position, recognising that energy costs vary widely as a proportion of industry production costs and are very significant for some industries, eg. mineral processing.

In summary and providing a brief context for this review, the external operating environment of TransGrid has considerably changed over the current RP and will continue to change over the next RP. However, TransGrid must meet these challenges while minimising costs and increasing efficiencies.

2.2 Corporate Environment

TransGrid is a State-owned company of the New South Wales government. It commenced operation in 1995 on separation of transmission services from Pacific Power. Over the period from 1995/96 to 2003/04, key statistics are (source: TransGrid):

- Annual energy delivered has increased from some 60,000 GWh to 73,000 GWH, a compound annual growth rate (CAGR) of 2.5%.
- Asset value has increased by about 50% from some $2 billion to around $3 billion, a real CAGR of some 2.0%.
- Capex has increased from around $50 million p.a. from 1995/96 to 1997/98, to an average of $250 million since 2001/02.
- Direct staff numbers have reduced from around 1250 in 1995 to less than 1000. This number is not expected to increase significantly in future.
- The delivered price of transmission services has fallen from around 0.62 cents/kWh (nominal in 1995, 0.77 cents/kWh real $2003/04) to around 0.56 cents/kWh in 2003/04, a real decrease of 3.9% per annum.

- Operating expenses fell from over $120 million in 1995 (nominal, $148 million real $2003/04) to some $100 million in 2000/01 (nominal, $113 million real $2003/04) before increasing again to over $120 million in 2003/04, a real average decrease of 2.4% p.a. over 8 years. Most of the gains occurred in the first 3 years.

The above statistics demonstrate that TransGrid has made progress in the past on improved efficiency that has been reflected in lower overall operating costs and transmission prices. The significant gains were made from 1995 to 1999 and the trend appears to have reversed since 2000/01.

The company is currently structured with the core process groups being Engineering, Network, System Operations, and support process groups being Business Resources, Corporate Development and Commercial.

This structure is similar to many major utility businesses and is considered to be an appropriate and efficient structure.

TransGrid provides some unregulated services to external bodies comprising:

- Maintenance services
- Consulting services

These services incurred costs in addition to base regulated operating costs. Only costs associated with regulated services and regulated assets are considered in this report.

2.3 The Application

TransGrid's Revenue Reset Application comprises:

- Revenue Reset Application for the period 1 July 2004 to 30 June 2009
- Supporting Appendices
- Application proformas in Excel spreadsheet form.

The Application generally provides an extensive description of the business, its service obligations, the service delivery capability and a descriptive basis for TransGrid's expenditure proposal over the future RP. The Application supplies information on historic and expected costs and revenues at a high level.

The Application did not include detailed breakdowns of historical or forecast costs to enable the reader to gain a strong appreciation of proposed cost element magnitudes, or the justification supporting projects and programs. This information was sought from TransGrid and a large amount of documentation responding to most requests was subsequently provided to GHD for the review. The Application was further supported by the Network Management Plan (as an Appendix), various planning reports, Asset Management Strategies for each major category of assets, and other strategies, plans and documents which assisted the review and analysis of the Application. On review, some of the documentation did not provide the required response or justification. These aspects are discussed in the relevant section.

2.4 Key Issues Summary

The challenge for TransGrid is to manage the growth and change while delivering a reliable and efficient service to the community.

Key issues to be considered in reviewing the Application, relating to TransGrid and its operating environment, include:

- Are recent significant gains in Opex justified and is TransGrid's starting point Opex for the future RP an efficient one?
- Has TransGrid provided consistent and adequate justification for its Application Opex proposal?
- How has TransGrid incorporated technological change to drive efficiency?
- How does TransGrid ensure planning for network augmentations for uncertain future generation is robust and flexible, while demonstrating that the proposed investments are prudent and efficient?
- How does TransGrid consider efficiencies and/or benefits to customers in its projects and programs?

3. Expenditure-Related Business Systems Review

3.1 Basis of Business Systems Review

This section reviews TransGrid's business systems and practices relating to the development of both Capex and Opex programs, and covers both historic and forecast expenditure. The focus is on whether the systems and activities within the business have delivered or will deliver the appropriate service levels in the most cost-efficient manner. This section is separate from the specific Capex and Opex review sections as it provides an overall business context and relevant inputs to each subsequent section, and specifically addresses those matters that contribute to both Capex and Opex.

Utility businesses have large infrastructure asset bases relative to other businesses, and hence asset-related expenditure dominates total corporate expenditure. The business systems review has thus considered relevant activities by TransGrid from inputs (business drivers, demand growth, existing asset base) to outputs (historic and forecast expenditures and strategies). The systems are reviewed for appropriate industry practice for a TNSP or more particularly for TransGrid, and whether they are considered "efficient".

Overall business systems and practice activities considered include:

- Efficiency of service/project delivery systems.
- Asset management strategies, including maintenance and renewal decision processes.
- Capitalisation Policy.
- Basis for growth planning (considered separately in Sections 5 and 6).

The review has been undertaken using information received from TransGrid, GHD's knowledge of business systems and practices relating to Capex and Opex program development, and relevant information from external sources.

3.2 Efficiency of Service / Project Delivery Systems

TransGrid recognised during the current RP that there were significant deficiencies in its planning over the past 5 years, in particular the way in which project costs were scoped and estimated prior to preparing regulatory test applications for augmentation Capex.

As a consequence, TransGrid restructured to provide a Project Development Group that developed and scoped the project prior to preparation of regulatory test applications, and subsequent design and consultation activities. This appears to be a significant improvement, which should provide a greater degree of confidence in the estimates provided in the future Capex proposal than could be seen from comparison of the actual Capex in the current RP with the 1999 Decision. This aspect is considered further in the current Capex sections of this report.

Project delivery methods used by TransGrid are summarised from TransGrid's advice as follows:

- Approximately 70% of investigation and design of projects is undertaken by TransGrid's internal resources with the remainder by consultants. The use of external consultants is expected in increase in future.
- The decision to use external resources is based on a formal process which reviews internal workloads and any need for specialist external skills. Control and protection and asset management skills are not considered by TransGrid to be readily available externally, and are necessary strategic skills for TransGrid. TransGrid also desires to maintain commonality of systems and equipment and prefers to use internal resources to ensure this.
- Consultants are selected from pre-qualified panels which are under two year contracts.
- There is a tendency towards less detailed design in-house, with contractors being required to provide detailed designs for the more standard project components (e.g. civil works and transmission towers).
- TransGrid desires to maintain control of project elements such as easement negotiations and acquisitions, design integration with existing systems and design impacts on outages.
- TransGrid has reviewed project delivering methods such as increasing use of design and construct (turnkey) or alliance-type contracts. A post-project review of turnkey contracting at Molong substation indicated that costs were similar to a traditional approach (internal detailed design, then tendering of construction) but that the delivery time was shorter.
- Some large current jobs, such as the Haymarket substation and MetroGrid (Sydney CBD) cable tunnel are being undertaken by turnkey contracts.
- Most capital works are undertaken by contract resources, with less than $5 million per annum being undertaken by the internal workforce. The non-contract work tends to be smaller projects, which require significant integration with existing systems and possibly staggered implementation. Contractor cost premiums for this type of work are perceived to be high.
- Procedures exist for all aspects of contract management. Quality assurance requirements for any contract are matched to the job size, complexity and risk associated with the work, and contract management varies from detailed site supervision to overview management and site and/or factory audits. Disconnections, reconnections and testing are all done by TransGrid staff to minimise risks to the supply system.
- Review of the appropriateness of the above practices has largely been internal, with some advisory services sought externally.
- There are some major gaps between planning budgets and eventual actual project costs. TransGrid recognised a need to improve and refine its budget control systems.

GHD's assessment of these practices is that:

- The majority of capital costs are from competitively tendered works, and hence are considered efficient for the scope of work specified.
- There could be potential to reduce costs by scope changes, but GHD has not reviewed projects down to a detailed design level and is not able to make an assessment.
- While recognising TransGrid's needs to maintain project control, there is potential to reduce costs of project investigation, design and project management through internal resource control and efficient use of external resources. It appeared that the justification for use of in-house resources in some cases was due to their availability rather that this being the most efficient approach.
- Extensive scope changes have occurred during project implementation over the current RP, due to various internal and external influences. TransGrid has recognised that improvements were required and restructured to provide a group which has improved the project development and scoping process. During the GHD review process, GHD found that TransGrid had some difficulty in providing concise documentation to support scope and cost increases from planning to final costs.

GHD concludes that there are cost inefficiencies in project investigation, design and project management. However, without a detailed review of efficiency it is difficult to assess the potential for cost reduction.

3.3 Asset Management Strategies including Maintenance and Renewal Decision Processes

Key asset management documentation provided was:

- Network 30 Year Plan;
- Network Management Plan 2001 – 2006; and
- Asset Management Strategies for Substations, Mains (Transmission lines and cables) and Secondary Systems (Communications and Control, Metering and Protection).

The Network 30 Year Plan was prepared in July 2000 and provides a summary of the Asset Management Strategies and 30 Year financial projections to 2030 for each category of assets based on July 2000 dollars. Age profiles are provided for each category and manufacture.

Projected costs for replacement or refurbishment are determined using the expected life of the assets, which is based on TransGrid experience, and compared with CIGRE statistics. The selected treatment option is discussed including factors such as the economics of replace vs. refurbish, maintain, asset performance, failure risks, time period to achieve work and overall work priorities.

The 30 Year Plan refers to a number of areas where:

- Detailed studies were undertaken or still required to assess the most appropriate repair or replace treatment for assets.
- Provisions were made for replacement due to performance failure, lack of spares or safety.
- New technology may provide savings in the costs shown as well as reducing operating costs.
- Projects to cater for load growth may replace assets before they would normally be due for replacement. In the case of transformers, potential to relocate them was considered.

The 30 Year Plan aggregated all projected costs by asset group into 5-year investment blocks. The break up of costs for the first decade is shown in Table 3-1 below, along with the average 5 year costs over the 30-year period.

Table 3-1 30 Year Plan costs by Asset Category (in $M July 2000)

Asset Category	2000 – 2005	2006 - 2010	Average 5 yr exp over 30 yrs
Substations	60.4	54.6	49.8
Transmission Lines	24.9	27.7	29.8
Underground Cables	0.6	-	0.1
Protection	19.4	18.5	14.6
Metering	2.5	2.0	2.0
Communication	10.6	3.3	5.5
Total	**118.4**	**106.1**	**101.8**

The 30 Year Plan refers to 5 Year Plan Strategies and a 5 Year Budget Plan.

In summary, the Network 30 Year Plan provides a coherent and justifiable basis for the 30-year budget projections for refurbishment Capex. These budget projections, however, were significantly different from the historic or future RP refurbishment Capex. This issue is explored further and the above indicative costs are referred to by GHD in the review of historic and future refurbishment Capex.

The Network Management Plan (NMP) was originally prepared in 2001, and has become a requirement of the NSW Electricity Supply (Safety and Network Management) Regulation 2002. The NMP is an overview document and links to working documents including the Asset Management Strategies, Annual Planning Statements and maintenance policies.

TransGrid's network management model for strategic planning is based on the NSW Government Total Asset Management (TAM) guidelines. TransGrid supports its network management with certified systems for quality, health and safety and environmental management as well as an emergency management system.

TransGrid has developed extensive IT systems to manage assets, including drawing management, works management, records management and transmission outage management.

Based on this brief review, GHD is of the opinion that there is a high level of confidence in the technical basis or justification for undertaking maintenance or new works, as proposed in the NMP. This document does not provide costs.

The Asset Management Strategies provided information on strategies, maintenance policies, aggregated and broken down costs for the future RP, details outlining the proposed maintenance or capital investment in refurbishment or replacement, and some supporting information.

The strategies link to the Network 30 Year Plan and appear to provide a sound technical basis for maintenance and replacement / refurbishment. The strategy documents summarise the approach for each asset type and demonstrate that extensive review and evaluation of maintenance and renewal practices has taken place to arrive at the preferred technical solution.

An extensive range of Asset Management Manuals are referenced, indicating that the maintenance and renewal process is mature.

The evaluation process for maintenance or renewal projects covers:

- Demonstrate the need
- Cost-benefit analysis
- Risk assessment
- Quantities and costs
- Method proposed
- Time factor
- Priority rating

From the supporting information provided, the technical review of options and selection of the preferred solution is appropriate. Conversely, the cost-benefit analyses are brief and largely qualitative, and risk assessment is descriptive. The timing and rate of implementation appears to be practical but is not supported by any risk assessment that demonstrates the urgency of the need or optimum time to renew. Life-cycle costing was not normally undertaken.

Verbal advice from TransGrid was that the timing of projects was based on what work could be practically achieved, and on the management of required outages.

Improvements in justification of the proposed solution would require a move to more rigorous cost-benefit analysis using life cycle costing, and a numerical cost-based risk assessment process.

These tools are current best practice in major utility businesses, and especially in the electricity industry where failure risks and costs can be particularly high.

It is noted that evidence was provided in some specific cases of life cycle costing and long-term budgeting, for example, the wood pole replacement program.

From the Asset Management Strategies, the selected timing and projects detailed in the strategy and supplementary information was compared against the proposed refurbishment Capex budget. GHD found there was poor correlation for all sampled projects with budget Capex being well in excess of the project cost aggregates contained in the strategies. TransGrid provided other information to support the budgets, and attempted to reconcile this with the strategies provided. This aspect is considered further in Section 5.

3.4 Capitalisation Policy

GHD is of the opinion that the TransGrid Capitalisation Policy is consistent with Australian Accounting Standards.

3.5 Summary of Findings

A brief review of the efficiency of business management systems has indicated that:

- The majority of capital costs are from competitively tendered works, and hence are considered efficient for the scope of work specified.
- There is potential to reduce costs of project investigation, design and project management through internal resource control and efficient use of external resources. This is difficult to quantify without a detailed review, and is beyond the scope of this assignment.
- Extensive scope changes have occurred during project implementation over the current RP, due to various internal and external influences. TransGrid has recognised that improvements were required and restructured to provide a group which has improved the project development and scoping process. During the GHD review process, GHD found that TransGrid had some difficulty in providing concise documentation to support scope and cost increases from planning to final costs for projects undertaken.
- The Network 30 Year Plan, the Network Management Plan and the Asset Management Strategies together provide a coherent and justifiable basis for proposed maintenance and refurbishment projects. However, GHD found there was poor correlation between the projects and programs in the strategies and the budget costs provided for future refurbishment Capex. TransGrid provided other information to support the budgets, and attempted to reconcile this with the strategies provided. Further review is undertaken in Section 5.
- GHD is of the opinion that the TransGrid Capitalisation Policy is consistent with Australian Accounting Standards.

4. Historic Capital Expenditure

4.1 Basis for Review

This review component was required to ascertain the efficiency of TransGrid's historic Capex and provide advice in order for the Commission to compare TransGrid's Capex spent against the Commission's approved Capex program. This advice forms inputs to the Commission's PTRM model of the asset base roll forward, to establish the starting regulatory asset base (RAB) for the forthcoming RP. This review component also provides advice on asset lives and depreciation profiles to assist the Commission in undertaking the asset base roll-forward.

The review for this Section is based on assessment of information provided by TransGrid, including:

- Category break up of historic Capex amounts shown in the Application;
- Detailed listing of projects and actual or expected final costs;
- Project load forecasts and load monitoring;
- Overall strategies and programs for Capex;
- Individual sampled project planning and justification reports, regulatory test applications and project summaries;
- Support information and reports; and
- TransGrid responses to enquiries arising during the review.

The review process included:

- Reviewing adequacy of TransGrid's Capex methodology with a focus on efficiency of expenditure. Consideration was given to internal and external factors impacting on project development and implementation.
- Checking the link between TransGrid's load forecast, load monitoring and individual timing of implementation and the capacity of the augmentation.
- Specific review of regulatory test applications selected by the Commission for augmentation projects, including reviewing the application of the planning criteria, modeling, justification and assumptions in project selection, quality of analysis of options and costing, and appropriateness of timing of the projects.
- For non-augmentation projects, selecting key investment categories/projects and reviewing the relevant business case justification or asset management strategy from which the program/project derived.
- Checking the consistency between the historic Capex advised in the Application and the documentation supplied, including comparing the scope of the delivered project with that defined in the previous Decision, regulatory test application or project justification.

A sampling approach was generally used to select projects for review with projects selected from:

- Those in the Capex Allowance at the last Decision but which were significantly under/over approved amount,
- Those in the Capex Allowance at the last Decision but did not proceed, or proceeded under a different scope,
- Those not included in the Capex Allowance at the last Decision, but which have been implemented.

This review component required a level of information from TransGrid which preferably tracked projects from the 1999 Decision to its completion, documenting cost and scope changes and their justification. TransGrid had not prepared information in this format although, in GHD's opinion, it would have been appropriate to do so and hence facilitate the review process. In addition, the task required assessment of the efficiency and prudency of decisions made during the current RP, after the investments had been made. This proved to be a difficult and time-consuming task that was "potentially an extremely intrusive form of regulation", as acknowledged by the Commission in its 10 March 2004, Supplementary Discussion Paper on the "Review of the Draft Statement of Principles for the Regulation of Transmission Revenues. Capital Expenditure Framework." Consequently, there are a number of instances where GHD was unable to draw an appropriate conclusion, either due to time and resource constraints, or the form of the information supplied by TransGrid to address the requirement.

4.2 Overall Historic Capital Expenditure

Table 4-1 provides a summary of the TransGrid Application in comparison to the Commission's 1999 Decision. The Commission's 1999 Decision is based on an "as incurred, including interest during construction (IDC)" basis, while the TransGrid application and the majority of information provided was based on an "as incurred, excluding IDC" basis.

The Commission has provided GHD with its most recent estimate of a like-for-like comparison of the actual capex compared to the Commission's 2000 Decision. This shows that the rolled-forward value of the difference between the actual capex and the forecast capex is $312.36m. This is based on an estimate of the Commission's 2000 decision of $906.2m (including IDC) in 2004 dollars, compared to actual capex of $1218.5m (including the latest information of the actual costs of the MetroGrid and the SNI projects) also in 2004 dollars (including IDC).

It should be noted that the values provided in this table are for indicative comparative purposes only.

Table 4-1 Comparative Summary of TransGrid Application

	1999 Decision ($M as incurred including IDC)	Actual/projected ($M as incurred excluding IDC)	Approximated Actual/projected ($M as incurred including IDC)
Total	**885.6**	**1106.7**	**1218.5**

Further breakdowns of costs provided by TransGrid were on an "as incurred, excluding interest during construction (IDC)", basis, while the 1999 Decision was on an "as commissioned, including IDC" basis. As such further analysis has been undertaken based upon an "as incurred excluding IDC" basis.

TransGrid provided a more detailed breakdown of the historic capital expenditure, which is summarised in Table 4.2. Costs (note that this does not include the latest adjustment for the estimates of the actual costs of the MetroGrid and SNI project) are on an "as incurred, excluding IDC" basis.

Table 4-2 Summary of TransGrid Historic Expenditure ($M excluding IDC)

	1999/00	2000/01	2001/02	2002/03	2003/04	Total
Augmentation	125.1	102.8	170.7	175	124.2	697.8
Refurbishment, Communicn's & Other Projects	48.2	35.0	37.7	52.7	102.6	276.2
Support the business	14.5	17.5	20.8	15.5	24.6	92.9
Total	**187.8**	**155.3**	**229.2**	**243.2**	**251.4**	**1,066.9**

Each category of expenditure is separately considered below.

4.3 Augmentation Capex

4.3.1 TransGrid Systems

As part of the review GHD questioned TransGrid on the systems in place for augmentation Capex over the period under review.

The processes have been improving over the period 1999/00 to 2003/04. This has partly been driven by the change in the needs of the Regulatory Test and the more onerous environmental approval processes. The Application includes a diagram of the Planning Process that gets the project to the point of recommending the most appropriate option. The process is similar to planning processes used by other TNSPs.

For projects from 2001 onwards there is documentation in place that covers:

- Project Scoping Report
- Needs Statement
- Feasibility and Costing Report

- Project Justification Report
- Project Delivery Strategy
- Regulatory Test Approval
- EIS/Community Consultations
- Project Definition Report

Under the NEC, TransGrid is required to undertake an annual planning review with each DNSP connected to the transmission network. The minimum planning period for the purposes of the annual review for a TNSP is 10 years. TransGrid summarise the outcome of the annual planning reviews in a publicly available document titled Annual Planning Report. Prior to 2002 the document was titled Annual Planning Statement.

4.3.2 Projects selected for Detailed Review

Comparison was made between the TransGrid actual expenditure and the 1999 Decision allowance, on the basis of categorisation of Capex by TransGrid. Review indicated that there were inconsistencies with TransGrid's categorisation which made comparisons difficult.

The augmentation projects undertaken in the regulatory period 1999/00 to 2003/04 are significantly different to those in the 1999 Allowance. As would be expected by a company that has a minimum planning period of 10 years, required under the NEC, changes in the assumptions made will affect the network augmentations required as more detailed analysis is carried out. It appears that TransGrid has refined its planning processes over the period and has undertaken projects that it considers are necessary for the network and to meet NEM obligations. It also appeared from questioning that TransGrid did not use the 1999 Allowance as a base for its capital works program.

On a number of occasions GHD was advised that the details of the 1999 Allowance projects were not known and so comparison with projects implemented could not be easily made.

In the Application TransGrid has advised a number of reasons why the Capex spent in 1999/00 to 2003/04 is above the 1999 Decision allowance. TransGrid claims that it acted prudently and in accordance with good industry practice in undertaking the investment. Some of the reasons given for the difference include:

- Changes in the circumstances, not foreseen in 1999, causing variances in the projects undertaken changing timing, scope and cost
- Public consultation causing variations to projects due to environmental and community considerations
- Changes in the market for supply of equipment
- Achieving deadlines increasing costs where considered beneficial
- Increases in summer demand

While the overall total Capex compared with the 1999 Allowance is similar it can be seen that TransGrid has undertaken a number of projects that were not in the 1999 Allowance and has not undertaken a number of projects that were in the 1999 Allowance.

It appears that the projects planned by TransGrid in 1999 bear little resemblance to the Capital works programs subsequently put together as part of the 5 year budget process and detailed 12 month budgets. To further explore this a number of projects were sampled.

Table 4-3 summarises the projects sampled and their relationship with the 1999 Allowance. It should be noted that the basis for the TransGrid expenditure (as incurred, excluding IDC) and the 1999 Allowance (as commissioned, including IDC) are different and comparisons should be made with care.

Table 4-3 Summary of Augmentation Projects sampled for Review

Project	Brief Description of why selected for review	TransGrid Expenditure $M	1999 Allowance $M
Kempsey – Nambucca – Coffs Harbour 132kV line	In the 1999 Allowance. The final expenditure was greater than the 1999 Allowance	56.3 (34.5M project 21.8M easements)	31.6 (easement allowance separate)
Orange Substation	This project was in the 1999 Allowance but did not proceed. The Molong substation project deferred the need.	Nil	4.4M
Molong Substation	This project was not in the 1999 Allowance. By proceeding it allowed Orange substation augmentation to be deferred.	5.8	Nil
Reinforce Wagga area supply	This project was allowed in the 1999 Allowance with expenditure in 2003/04. The project has not occurred and is currently undergoing community consultation.	Nil	92.9
Tuggerah Sterland 330kV transmission line duplication	This project was not in the 1999 Allowance. Work has commenced.	11.9 spend predicted to end 2003/04	Nil

4.3.3 Findings

As indicated selected historic augmentation projects were reviewed in detail. Table 4-4 summarises GHD findings and comments on prudency of expenditure. Detailed notes on the review are included in Appendix D2.

Table 4-4 Review Findings on Sampled Historic Augmentation Projects

Project	Brief Description of Project key points	Prudency of TransGrid Expenditure
Kempsey – Nambucca – Coffs Harbour 132kV line	This project was driven by high load growth in the area. N-1 planning criteria applied The capital costs in the economic evaluation were $32.6M. A significant amount of the capital costs, $11.2M was allowed for a future SVC at Port Macquarie. As the SVC has not been installed, the final costs for the project at $34.5M are well in excess of original project estimate of $21.4M (minus SVC). Final easement costs were $21.8M, which represents some 40% of the final project costs. Regulatory test assumed $9M. One side of the new line is run at 66kV and operated by Country Energy. TransGrid paid for the all of the line construction costs and the relocation costs ($2M) of Country Energy assets.	The timing is considered appropriate. The built project capital cost is well above the 1999 Allowance and is significantly higher than in economic evaluation. An explanation was requested from TransGrid. The explanation provided details showing the reasons for cost increases including Board approvals. The evidence on final easement costs showed significant increase in real estate prices of 10% per annum. GHD considers that this project appears to be prudent, but submits that this should be subject to more detailed review by the Commission.
Orange Substation and Molong Substation	These projects have been considered together as Orange substation works did not proceed due to Molong substation being a better solution to overcome network constraints. Final costs were $14.7M, $5.8M for a 132/66kV Molong substation and $8.9M for Molong to Manildra 132kV line. The Regulatory test included a capital cost of $9M for these works. The Manildra 132KV line has been built to replace a Country Energy 66kV line. It has been built and paid for by TransGrid on the basis that it will later form a connection to Parkes to relieve constraints in that area, predicted in 2007/08. In the meantime it is solely used by Country Energy.	The load driver is largely Manildra flour mill and Cudal winery which will cause load problems on Orange – Molong and Molong – Manildra feeders. The actual max demand figures indicate Molong growth is zero. There is not enough data to confirm the timing of the project. This is partly out of TransGrid control due to Country Energy advising spot load timing. The final project costs are significantly more than those used in the Regulatory Test. If the final costs had been used in the Regulatory Test then the generation option could have been considered viable. Note GHD has not rerun the Regulatory test so other factors may have changed. Using the final costs in the original economic evaluation shows that this expenditure was not prudent.
Reinforce Wagga area supply	The need for this project is complex due to the interaction with State interconnectors. TransGrid have put	TransGrid has carried out the necessary works to help delay the need for the project in

Project	Brief Description of Project key points	Prudency of TransGrid Expenditure
	in place special network control schemes to allow load transfers under certain network outage conditions. This has delayed the need for the project. The 1999 Allowance was $92.9M and the current project cost, more accurately estimated, is $98.1M.	2003/04. These costs amount to less than 4% of the overall project cost. It is concluded that the TransGrid approach is prudent. The cost allocated as a future project is to reinforce Wagga by a Yass to Wagga 330kV line. This is still subject to a Regulatory Test.
Tuggerah Sterland 330kV transmission line duplication	TransGrid in consultation with EnergyAustralia have determined that the network augmentation required is to reconstruct the existing single circuit 330kV line as a double circuit and add a second transformer at Tuggerah. The line reconstruction is to be done in summer 2003/04 as due to increasing loads in the area an outage on the line after 2004 will result in other lines in the area being overloaded. The second transformer is not required until 2008/09 The Regulatory Test includes $12M for the line reconstruction. This is consistent with the $11.9M in the 2003/04 budget.	The load flows support the need for these works to be carried out now, otherwise load shedding may be necessary. While this project was not in the 1999 Allowance, the need to carry out the transmission line duplication work now is considered prudent, to avoid potential load shedding and the need in the future for a new 300kV line route.

As well as the detailed review of sampled projects, a review was taken of the information provided on the other historic Capex projects. Table 4-5 summarises findings and comments of the review. Detailed notes are included in Appendix D1.

Table 4-5 Summary Commentary on Historic Augmentation Projects

Category	General Comments[1]
A number of projects have a small amount of expenditure in the period 1999 to 2004 that is indicated to be from studies for a future project.	In most cases this would seem reasonable. Three projects have greater than $0.5M indicated for studies. Details were not available to consider their efficiency. The projects are: ◗ Protech steel ◗ SA interconnector ◗ Sydney area 132kV substation upgrades
Projects in the 1999 Allowance and have been undertaken.	The majority of these projects have incurred actual costs greater than the 1999 Allowance. Some significant ones are

[1] It was beyond GHD's scope to comment in detail on every project, so the comments above are based on the information provided by TransGrid to support its Application. Where more detail was required it was not requested by GHD. GHD was advised by the ACCC that it was pursuing more details as part of its review.

Category	General Comments[1]
	(increase % above Allowance - $M above): ◗ Canberra substation (80% - $3.5M) ◗ Koolkhan substation augmentation (32% - $1M) ◗ Sydney City CBD (38% - $62M) ◗ Misc. transmission projects (1480% - 16.3M) – considered further under Refurbishment ◗ System reactive plant (22% - $7M)
Projects in the 1999 Allowance but not undertaken.	A number of these were deferred to the future or not required due to other projects being undertaken. In a number of cases this it was clear that strategies were undertaken to defer projects by undertaking minor works. GHD considers this strategy to be prudent.
Projects not in 1999 Allowance but have been undertaken.	A number of these could not have been foreseen in 1999.
Easements	Actual easements costs are significantly more than in 1999 Allowance by $24M, nearly double. Within the scope of this review, there was insufficient information to comment on the prudency of TransGrid's expenditure.

4.4 Refurbishment, Communications and Other Projects Capex

This category of Capex includes network asset refurbishment or replacement, communications network upgrades or replacement, or other network-related projects including security. Table 4-6 shows the current RP Capex as provided by TransGrid, with the addition of Transmission Line Projects, which were allocated to Augmentation by TransGrid but were actually Refurbishment. The amounts are as-incurred, excluding interest during construction (IDC). The ACCC 1999 Allowance amounts (as-commissioned, including IDC) are shown for comparative purposes, but as the bases are different, comparisons should be made with care.

Table 4-6 Refurbishment Capex – Historic Summary

Category	Expenditure ($M nominal) by Year					Total	ACCC 1999 Allowance
	1999/00	2000/01	2001/02	2002/03	2003/04		
Network Refurbishment/ Replacement							
Armidale-Kempsey 132kV Restore Rating				0.3	1.1	1.4	0

Category	Expenditure ($M nominal) by Year					Total	ACCC 1999 Allowance
Circuit Breakers/Current Transformers	11.0	7.0	8.1	8.1	8.4	42.6	26.7
Substation Projects	20.8	9.4	11.4	12.3	12.2	66.1	40.1
Sydney West SVC			0.2	0.9	23.4	24.5	0
Tech. Service Projects	1.0	0.7	3.7	3.6	2.6	11.6	4.4
Transformer Additions & Replacements			2.7	16.9	18.2	37.8	2.3
Yass 330/132kV Substation		0.1	0.6	7.5	23.6	31.8	0
Transmission [2] Line Projects	1.5	1.2	8.3	3.0	7.7	21.7	1.1
SUBTOTAL[3]	**34.3**	**18.4**	**35.0**	**52.6**	**97.3**	**237.5**	**74.6**
Communications Upgrades & Replacement							
Telecomms. Netw'k Extension Electronics			0.1		1.7	1.8	54.9
Comms Network Upgrade					0.3	0.3	0
Northern Micro. Replacement	0.1	7.7	7.7	1.1		16.6	0
OPGW Backup Northern and Western				0.9		0.9	0
SCADA Replacement	2.3		2.0	0.6		4.9	11.0
	1999/00	2000/01	2001/02	2002/03	2003/04		

[2] Transmission Line Projects added in here but originally categorised as augmentation. Refer Section 4.4 for details.

[3] Totals include addition of Transmission Line Projects.

Category	Expenditure ($M nominal) by Year					Total	ACCC 1999 Allowance
Southern Microwave Replacement	7.6	8.0	0.7	0.5		16.8	0
Western Micro. Replacement	2.7	2.1	0.5			5.3	0
SUBTOTAL	**12.7**	**17.8**	**11.0**	**3.1**	**2.0**	**46.6**	**65.9**
Other Projects							
CAD/DMS Replacement	1.0					1.0	0
TAMIS System	1.7					1.7	4.5
Other Sydney Projects (Upgrade Security)					11.1	11.1	0
SUBTOTAL	**2.7**	**-**	**-**	**-**	**11.1**	**13.8**	**4.5**
TOTAL	**49.7**	**36.2**	**46.0**	**55.7**	**110.3**	**297.9**	**145.0**

Inspection of the above shows that Capex on this category was approximately double the 1999 Allowance. A number of projects that were initially aggregated e.g. telecommunications network extensions and upgrades, are separately shown in the table, consequently direct comparison of totals to the 1999 Allowance may not be appropriate. For the refurbishment undertaken with no allowance in 1999 nearly half relates to the Yass 330/132kV substation.

4.4.1 Network Refurbishment/Replacement

This category of expenditure showed actual costs of $237.5 million exceeding the 1999 Allowance of $74.6 million by a factor of more than 3.

All projects included in the 1999 Allowance incurred significant expenditure increases and some $57.7 million in additional projects (not in 1999 Allowance) was expended.

Major categories or projects selected for review included:

- Substation Projects
- Transformer Additions and Replacements
- Yass 330/132kV Substation
- Transmission Line Projects

Key impacts to the decision-making processes for the above projects are the:

- Network 30 Year Plan,

- Network Management Plan (2001-2006); and
- Asset Management Strategies for Substations, Mains (Transmission Lines and Cables) and Secondary Systems (Communications and Control, Metering and Protection).

These documents were reviewed and comments are provided in Section 3.3.

Substations and Transformer Additions and Replacements

A detailed review of cost breakdowns for the selected substation projects found that these breakdowns could not be readily reconciled to the Network 30 Year Plan or the relevant Asset Management Strategies (see notes in Appendix D3). TransGrid provided information which listed the strategies and costs for most of the 117 projects, but the costs could not be aggregated and compared at a strategy level.

Review of transformer additions and replacements (see review notes in Appendix D3) found that of the $37.8 million expenditure, GHD considered $26.7 million to be justified and efficient for transformer replacements which could be linked to the Asset Management Strategies. No details were provided by TransGrid to support the remaining $11.1 million.

While the transformer additions and replacements were reasonably clear, there was no clear link for the other substations components without more extensive review.

Consequently, an overall review of substations refurbishment Capex was made, using a range of approaches to assess the reasonableness of the spend. These included comparing the actual expenditure against the Network 30 Year Plan, the 1999 Allowance, the future RP proposed amount for Refurbishment, and simple age-based replacement calculations.

Table 4-7 Overall Review of Substations Refurbishment Expenditure

	Amount ($M)	Difference to Historical Actual ($M)	Basis for Amount
Historic Actual	214.4	-	Aggregating the historic Capex for substation related refurbishment Capex in Table 5-9 indicated a total cost of $214.4 million (comprising of $182.6 million in circuit breakers, current transformers, substation projects, transformer additions and replacements and technical services projects plus the Yass substation refurbishment of $31.8 million) excluding significant additional replacement works at substations undertaken as augmentation (eg. Canberra, Koolkhan).
Network 30 Year Plan	93.3	+ 130	Estimated costs in Network 30 Year Plan of $82.3M (2000's $) for substations, protection and metering, plus CPI.
1999 Allowance	73.5	+ 140	1999 ACCC Decision Allowance for substations, protection and metering.

	Amount ($M)	Difference to Historical Actual ($M)	Basis for Amount
Future RP Proposal	121.1	+ 90	Substation and technical services projects (secondary systems).
Age based (1999)	138	+ 75	Attachment 8 to the Application shows an opening RAB (ODRC valuation) as at 1 July 1999 of $462 million for substation assets (excluding Snowy assets) with average remaining life estimated at around 20 years and standard useful life of 40 years. A simplistic analysis of this would give a 1999 replacement cost for these assets of some $924 million (in 1999 $'s) with an estimated replacement annuity of around $23 million or $116 million over 5 years. Allowing for CPI to the end of the period increased this to some $138 million over 5 years.
Age based (2004)	167	+ 45	The opening RAB is shown in the Application as $873 million for substation assets (excluding Snowy assets) with average remaining life of 26 years and standard useful life of 40 years. Calculation gives a current replacement value of approximately $1343 million (in current $'s) with an estimated replacement annuity of around $33 million or $167 million over 5 years.

In summary, there appears to have been a significant additional investment in substations refurbishment Capex (including Yass substation) over the current RP, compared to any of the other overall approaches used. The additional investment could be justified in part by additional works for compliance, safety, security and site improvements. Further, some of the investment appears miscategorised and should be augmentation. Review of the details provided indicated that some $15 million could be categorised as other than refurbishment, of which major projects included $9.8M for "City Sub Property", $1.3M for "Operations Upgrade", $1.1M for new 132kV switchbay at Sydney West, $1.1M for "work associated with Snowy Hydro acquisition", for which no other details were supplied.

Conversely a number of augmentation projects also include replacements of substation equipment (this includes Armidale, Tumut, Queanbeyan and Sydney West transformer replacements- cost $10.1 million).

Due to the inability to adequately categorise expenditure, and establish the actual total spend for each Asset Management Strategy, GHD is unable to conclude on a level of prudent and efficient expenditure in this category. Overall comparisons with other approaches indicate additional expenditure of between $45M and $130M.

In responding to this (draft) report, TransGrid provided an alternative break-up of the refurbishment Capex spend, based on separating out “Asset Management Strategy linked expenditure”, and excluding “refurbishment projects managed through the major project investment process such as the Yass SS reconstruction and the Sydney West SVC which were provided for financially through Project Definition Reports rather than through the Asset Management Strategies and the 30-Year Plan.”

This break-up showed a reconciliation between the 30-Year Plan and the Asset Management Strategy linked expenditure.

Further, TransGrid’s response to the (draft) report provided a revised break-up of refurbishment expenditure. This break-up provided a more coherent link between the strategies and the incurred Capex, and more closely aligned with GHD’s comments relating to miscategorisation in the earlier information provided.

It was unfortunate that this categorisation was not provided earlier, and would have facilitated the review process considerably. More detailed review and exploration of this information may reveal some different conclusions.

Yass Substation

The information supplied by TransGrid was only technical support for the replacement. This appears to have been well researched. The selected option to build a new yard appears to have been only assessed from a technical risk perspective. There is no evidence of economic analysis. GHD had requested the economic analysis for justifying the decisions. This has not been sighted so GHD cannot comment on the efficiency of this expenditure. GHD has not been provided with any detailed costing to comment on the amounts spent to date.

Transmission Line Projects

An actual cost of $21.7 million is compared with the 1999 Decision allowance of $1.1 million.

Detailed review indicates that the major components were:

- Wood pole replacement program ($7.4 million). This was considered justified and efficient.
- Compensation for “coal sterilisation” under transmission lines ($5.4 million). This was considered justified and efficient. The expenditure is a one off cost.
- Easement work in QNI ($2.5 million). This work is not considered refurbishment.

Comparison with the Network 30 Year Plan shows an expected 5-year expenditure of some $24.9 million from 2000 to 2005, increasing over the 30-year period to an average of $29.8 million. The majority of the Capex was expected to be in wood pole replacement.

Some additional Capex was expected in the Network 30 Year Plan on transmission line insulators, towers and foundations, but review of the Asset Management Strategy indicates that there is no basis for investment at this time; hence the additional expenditure is not yet required.

In summary, expenditure on wood pole replacement, coal sterilisation and minor transmission line projects of $15.1 million appears justified and efficient. Easement acquisitions and construction of $5.8 million were not considered refurbishment, and were not reviewed for justification.

4.4.2 Communications Upgrades & Replacement

This category recorded actual costs of $46.6 million compared to a $65.9 million allowance in the 1999 Decision.

Most of the communications upgrades projects were completed by 2000 but current projects relate to OPGW Backup schemes and are largely not complete. These projects are for contingency purposes in the event of failure of the OPGW system, using microwave systems

TransGrid proposed further expenditure of $12.6 million in 2004/05 for completion, making a total expenditure of $59.2 million. This is below the overall 1999 Decision allowance by over $6 million.

The need for these projects is quite clear; the Australian Communications Authority required TransGrid to vacate portions of the microwave radio band used for its communications, as the band was to be occupied by mobile phone carriers.

Options for providing the required communications services included:

- Retuning system to non-affected frequencies, or
- Replacing the system with alternative communications systems, mainly dedicated optical fibre (OPGW) networks.

In addition backup was proposed via limited capacity microwave networks in the event of OPGW failure.

The information provided was largely a technical description of the works. Cost information was extremely limited and did not enable any tracking of project budgets from approval to completion, except for one small project of $0.2 million. Cost-benefit analysis was only provided in one case and was at a very preliminary level.

For the major OPGW links to the South and North, only 4 of 24 fibres installed were to be used by TransGrid initially, with the remainder retained to lease the OPGW network externally on a commercial basis. The extent of the provision for commercial opportunities in the Western OPGW link was not clear.

It is apparent that at least part of the Capex on these communication projects has been incurred on the expectancy of future commercial revenue. This is not considered inappropriate, but raises the potential for these assets, or part of, to be considered as unregulated assets. TransGrid was requested to provide further information in this regard, and responded by proposing a reduction in the value of the OPGW replacement program of $2.0 million (based on the cost difference between a 12 and 24 fibre installation), but requesting the addition of the marginal cost of additional fibres in the future when needed.

Firstly, it is GHD's view that the marginal cost of the additional fibres does not reflect the potential commercial benefit for the total investment. Secondly, the proposal to reinstate the marginal cost of additional fibres in the future is not considered appropriate as TransGrid expects to gain some (unquantified) benefit from commercial opportunity in the intervening period. GHD is not able to calculate the net benefits of this commercial opportunity, and strategies which analyse these benefits either do not exist or have not been provided.

In conclusion, the need for these communication projects is clear, and information provided by TransGrid proposes a reduction in the value of this investment of $2.0 million. In the absence of understanding the potential for commercial benefit from these assets, GHD is unable to conclude on the prudent value of the regulated assets.

4.4.3 Other Projects

Actual costs for this category were $13.8 million compared to a 1999 Decision allowance of $4.5 million. The additional costs are attributed to $11.1 million in other Sydney projects and identified as security upgrades. This project is part of a wider budget of $54.6 million for security works commenced in 2003/04. $50.0 million is considered in the future Capex section with $4.6 million shown as 2003/04 expenditure. TransGrid was requested to provide evidence to support the claimed amount of $11.1 million instead of the $4.6 million in the overall project budget.

This has not been provided. Of the claimed amount of $11.1 million for 2003/04, TransGrid has only been able to let contracts for $4.7 million and only $0.1 million was expended to November 2003, giving rise to concerns that the claimed amount of $11.1 million will not be spent.

The spend on CAD/DMS Replacement and TAMIS System has not been reviewed in detail, but the need has been established by TransGrid.

GHD considers that an appropriate allowance for this category is $7.3 million. The remainder of $6.5M is for part of Other Sydney Projects, where no links can be provided to strategies or budgets, and it is considered unlikely that the amounts will be spent in 2003/04.

4.5 Support the Business Capex

Support the Business Capex comprises three categories of investment, to which the following historic expenditure has been allocated by TransGrid, on an as-incurred, excluding interest during construction (IDC) basis. The ACCC 1999 Allowance amounts (as-commissioned, including IDC) are shown for comparative purposes, but as the bases are different, comparisons should be made with care. Even so, compared with the 1999 Commission Decision, TransGrid has spent almost double the allocation to this category of expenditure, largely in the IT category.

Table 4-8 Support The Business Capex – Historic Summary

Category	Expenditure ($M nominal) by Year					Total ($M)	1999 Allow. ($M)
	1999/00	2000/01	2001/02	2002/03	2003/04		
Information Technology (IT)	8.8	10.6	14.0	7.3	14.8	55.5	16.8
Vehicles	5.7	6.9	6.8	8.2	9.8	37.4	30.9
Misc. Projects & Equipment	1.3	1.9	1.8	1.4	3.6	10.0	7.5
Total	15.8	19.4	22.6	16.9	28.2	102.9	55.2

Major categories of expenditure and sampled projects are reviewed individually below.

4.5.1 Information Technology

Review of major projects in this category is summarised in Table 4-9.

Table 4-9 Review of Historic IT Projects

Spend (Nominal $M)	Project Description	Justification
8.0	Migration from VMS to Unix platform and upgrade business systems including Oracle Financials.	Obsolete and unsupported VMS platform.
1.9	Implement desktop management system.	Provide systems to remotely access desktop computers to ensure security, Licence management, virus control and problem rectification in all locations from a control service provider.
2.2	Partial implementation of Asset Management System Implementation Project (AMSIP) (currently in progress with Stage 1).	To standardise and improve business systems and processes for managing asset base.
9.6	Computers and printers across business.	Routine replacements as per purchasing policy.
3.7	Exchange mail system.	Maintain fully supported system as old system was VMS hosted.
1.9	Year 2000 compliance hardware and systems	Y2K compliance.
5.6	Corporate Data Network connections.	Connections to majority of TransGrid substation sites under new strategy, via public communication carrier, TransGrid optical fibre system, or microwave link.

Spend (Nominal $M)	Project Description	Justification
1.5	Local Area Networks	Provided at all TransGrid regional centres under new strategy.
2.2	Replace NT Alpha file servers.	Desupport of Windows NT4 on Alpha technology.
2.2	New DR Data Centre in Sydney West. (In progress).	To provide services for corporate applications and the high voltage control data acquisition system, due to inadequate existing facility without adequate security and fire protection.

Four projects were selected for more detailed review, namely:

- Asset Management System Implementation Project (AMSIP) implementation
- Corporate Data Network (CDN)
- Replacement of Standard Desktops
- Business Systems Upgrade

Detailed commentary on these projects, including specific further details requested and summarised responses, is provided in Appendix F.

TransGrid provided information which supported the technical basis for the above projects. During the period to 2000, the internal focus was on consolidating the legacy systems inherited from Pacific Power. Further activity to 2002 was on developing and exploiting these systems. For 2002 onwards, TransGrid had a coherent IT Strategic Plan 2002-2004, which outlined an integrated basis for future development of IT systems within TransGrid.

To some extent, TransGrid needed to respond to a changing external environment, with old systems and hardware becoming obsolete and unsupported by suppliers and service providers. Charges by public communications carriers for landline and microwave links necessitated a review of network connections, with extension of the TransGrid optical fibre (OPGW) network providing some opportunities to reduce costs.

In terms of detailed business case justification for the expenditure to date, there were no examples for implemented projects, which analysed costs and benefits of proposals. One justification report included costs for the Unix to VMS migration, but without any defined benefits. Justification was largely driven by routine replacement, obsolescence, standardisation and developing network connections and web-based systems.

A 2003 IT Governance and Strategy Review (Business Catalyst International) concluded that the past focus on the objectives of rationalisation of IT infrastructure and legacy systems and improving service delivery had largely been achieved or were being addressed by current projects. However, TransGrid had not progressed to achieving improved business performance from IT investment and that the IT Infrastructure group delivered minimal business improvement.

From this review, an IT Management Framework was recently developed which will provide an integrated basis for IT governance and ensure future IT services meet TransGrid's business objectives.

A 2002 IT Benchmarking Study of Utilities (KPMG, comprising 13 Australian water, electricity and gas businesses) noted that TransGrid's IT proportion of total Capex was slightly below average for the group (5.3% vs 6.5%) and that TransGrid had a high proportion of the total IT budget allocated to Capex compared to others (52% vs 28%).

Some other key findings of this study relevant to Capex were that:

- TransGrid had a higher level of servers per administrator, laptop computers and printers than others in the group and a lower level of mobile phones.
- TransGrid was one of two in the group not performing formal project prioritisation.

From the information reviewed, we conclude that, for the period 1999 to 2004:

- TransGrid's IT Capex for the period of $55.5 million significantly exceeded the 1999 ACCC Decision of $16.8, by a factor of more than 3.
- Projects implemented during the period were justified in terms of the need, largely for hardware replacement and upgrades due to obsolescence to ensure continuity, improve system integration and system response and resolve problems.
- Formal business cases were largely absent and projects did not undergo cost-benefit analysis.
- Opex cost efficiencies of projects were not identified in dollar terms and there has been no monitoring of business benefits of IT projects.
- IT Capex costs overall as a proportion of total Capex are comparable to other utility businesses, although TransGrid had a higher density of some hardware items than other utility businesses in a benchmarking study.
- The linkage was not established between the reported total costs for each project in the summary table and the information provided for each project.

In summary, GHD concludes that IT Capex for the period was justified in terms of need. Overall project costs were provided by TransGrid for selected projects, but were not sufficient for GHD to establish that the spend was efficient.

4.5.2 Vehicles

The vehicles category comprises vehicles and mobile plant for business and personal use by staff, managed internally in accordance with TransGrid policy. Vehicles are acquired largely under State Government pricing contracts, and sold at market value through auction. Standard vehicles are disposed of in accordance with government purchasing rules of a minimum of 40,000 km or 2 years, whichever is the lesser. Mobile plant and special vehicles are replaced at the end of their economic life, as determined by the relevant controlling officer in TransGrid.

TransGrid reviewed this policy internally in 1998/99 to determine if it was the most cost-effective fleet management option, and no change was made due to the advantage of Government purchasing direct by TransGrid.

The cost of this category over the period was $37.4 million compared to the 1999 Decision allowance of $30.9 million, an increase of 21%. Given that staff numbers have remained relatively constant over the period, we are unable to establish the reason for this increase.

It should be noted that the overall cost in this category should be partially offset by an amount of some $25 million for vehicle sales revenues, which does not appear to have been accounted for under this cost category, or separately as an offset. The net cost is thus around $12.4 million for the current RP ($37.4 million claimed less $25.0 million resale revenue).

Vehicles for private use and funded through salary sacrifice arrangements are also included in the amount for vehicles. GHD considers that private use vehicles should be unregulated assets and the value excluded from the approved amount. Information provided by TransGrid indicates the net reduction (purchase costs less trade-in value) is of the order of $0.9 million

GHD concludes that the **net** allowance for vehicles should be $11.5 million after deducting vehicle sales revenues and private use vehicles.

4.5.3 Miscellaneous Plant and Equipment

This category comprised capitalised items of minor plant and equipment such as photocopiers, fax machines and field plant and equipment with minimum values of $1000 and operational lives over one year, generally 5 to 7 years. Purchases were managed through standard procedures and capitalised in accordance with TransGrid's Capitalisation Policy. Purchases are also made through standing contracts for supply, which are considered efficient.

This category incurred some $10 million in cost compared to the 1999 Decision allowance of $7.5 million, an increase of 33%.

The level of costs represents an annual Capex of around $2000 per staff member.

No detailed review of this category of Capex has been undertaken, but the costs are considered efficient as they are incurred through controlled procedures and standing supply contracts.

4.6 Review of Regulatory Test Applications

GHD reviewed one past regulatory test application selected by the Commission, comprising the Sydney CBD project. This was the only selected project actually implemented in the current RP, the other two projects being reviewed under forecast Capex.

With a view to assess the prudency of projects and the application of the Regulatory test the aspects that GHD focussed on were:

- Does the project relate to an objective criteria set out in schedule 5.1 of Code? What planning criteria were applied and how was the assessment of network capacity carried out?
- Quality and objectivity of analysis underlying costing and design, network and non-network options considered.
- Appropriateness of timing of the project, could it be deferred?

TransGrid and EnergyAustralia have referred to clause S5.1.2 of the Code that allows for higher standards to be applied where there is an issue of size and importance of customers. The standard adopted has been referred to as a modified N-2 criterion. This includes:

- A simultaneous outage of cable 41 or any future 330kV cable plus any 132kV feeder or 330/123kV transformer; or
- Outage of any section of 132kV busbar.

The modified N-2 criterion has been independently assessed by consultants to be in line with world practices.

TransGrid and EnergyAustralia use the same load flow models. The load data was supplied by EnergyAustralia.

The final solution cost (as estimated by TransGrid in March 2003 and excluding IDC) of $235.8 million ($225.3 works + $10.5 easements) is significantly more than the 1999 Allowance of $154.9 million ($137.8 million in 1999 adjusted for CPI).

A total of 14 options including 2 identified during community consultation were considered. 5 were network solutions, 4 were non-network solutions, the remainder a combination of network and non-network solutions.

TransGrid's final report says joint planning studies with EnergyAustralia show that by 2003/04 the existing supply system to Sydney CBD will not meet appropriate reliability standards. Failure of cable 41 and any one of the other 30 key transformers or circuits will mean that the peak summer load could not be supplied.

Comments:

1. This project has significant cost overruns and the final implemented project is significantly different to that proposed in the Regulatory Test. This being evidenced by items such as larger capacity 330kV cable, third transformer and SF6 equipment.
2. As the project required in depth analysis the ACCC undertook detailed discussions with TransGrid. GHD did not take part in those discussions.
3. As GHD has not carried out any in depth analysis it cannot make any meaningful comments on the prudency or application of the Regulatory Test.

4.7 Asset Lives and Depreciation Profiles

Information on asset lives and depreciation profiles used by TransGrid was required by the Commission as inputs to the Asset Base Roll-Forward determination.

A schedule of assets was determined by NERA for TransGrid, categorised into classes, including relevant asset lives and depreciation profiles. This is provided in Table 4-10 below.

Table 4-10 Schedule of TransGrid asset lives and depreciation profiles

Asset Class	Remaining Asset Life (yrs)[4]	Depreciation Profile (yrs)[5]
Lines	28.4	50
Underground cables	44.1	50
Substations	26.0	40
SCADA	7.2	10
Non network	8.0	10.41
Non depreciable assets	N/A	N/A
Southern NSW	13.1	40

GHD notes that both the remaining asset lives and the depreciable profiles are reasonable for a business of the type and nature of TransGrid.

4.8 Summary of Findings

Overall Historic Capex

The summary findings below have been based on sampling a range of projects in each category of historic Capex. Total sampled project costs were $463 million, of which:

1. Even though the project need was established in most cases, no conclusion could be drawn on the efficiency of some $254 million due to insufficient information or a level of review by GHD, within the scope and resource constraints of the assignment, which could not adequately assess the efficiency.
2. Some $161 million was considered prudent and efficient, but with the Kempsey-Coffs-Nambucca project and OPGW projects submitted for further review by the Commission.
3. Some $2.9 million ($2.0 million on Communications Projects, and $0.9 million on private use vehicles) was considered to be on unregulated assets.

[4] Weighted average remaining asset life at the beginning of 2004/05

[5] This Depreciation profile is utilised by TransGrid as the expected life of new assets, and thus the depreciable life

4. $31.5 million was deducted for vehicle resale revenue ($25M) and unsubstantiated Other Projects ($6.5M).
5. One augmentation project (Orange substation - $14.7M) was not considered prudent, but other investment would have been required in its place, of possibly a lower capital cost.
6. Given the limited sample for which conclusions could be drawn and the complexities of the conclusions in each project reviewed, drawing wider conclusions on the overall historic Capex was not appropriate. However, it was clear from the assessment that TransGrid has some difficulty in tracking project costs from project inception to completion, undertaking and providing adequate economic project justifications, and reviewing project costs after approval. Summary findings for each category of historic Capex are provided below.

Augmentation

1. From the five projects sampled, GHD found that:
   - Kempsey – Nambucca – Coffs Harbour 132kV line. Final costs of $34.5M are well in excess of original project estimate of $ 21.4M (excluding SVC not built) and significantly above costs in the economic evaluation. TransGrid supplied evidence of reasons for costs increases including Board approvals. GHD considers that this project appears to be prudent, but submits that this should be subject to more detailed review by the Commission.
   - Orange Substation and Molong Substation (2 projects). The final cost of $14.7M was significantly more than in Regulatory Test ($9M) for implemented option, and an alternative generation option could have been viable. Hence investment may not have been prudent. Insufficient information has been provided to confirm project timing. This is partly beyond TransGrid's control due to the advice coming from Country Energy of large spot loads at Manildra and Cudal. The Manildra 132kV line was provided to benefit Country Energy initially, but was funded by TransGrid on the basis it will later augment TransGrid's network to Parkes.
   - Reinforce Wagga area supply. Original 1999 Allowance of $92.9M. Project deferred by minor works and considered prudent.
   - Tuggerah-Sterland 330kV transmission line duplication. Not in 1999 Allowance but consistent with Regulatory Test and considered prudent.
2. A detailed overall review of Augmentation Capex was not undertaken, but a general review indicated that:
   - Of the projects included in the 1999 Allowance and undertaken, the majority incurred actual costs in excess of the Allowance.
   - Of the projects included in the 1999 Allowance and not undertaken, these were deferred or not required due to other minor works. This was considered appropriate.
   - For projects undertaken but not in the 1999 Allowance, many of these could not have been foreseen in 1999.

- Easement costs were more than double the 1999 Allowance. Within the scope of this review, GHD was unable to conclude on prudency.

3. From the projects sampled, a step appears to be missing in the TransGrid process, in that once a selected option is subject to detailed engineering costing it is not reassessed to ensure it is still the most economic. GHD considers it reasonable that the detailed engineering costs should be at least compared to the sensitivity test undertaken in the Regulatory Test to see if a review should occur. There does not appear to be any evidence of this occurring in a formalised way.
4. Projects can incur significant cost and scope changes from various factors during their development and implementation. Sampling indicates this has occurred on a number of projects and it has not been possible to determine within this review whether the expenditure is efficient. A more detailed review of the projects would be required to confirm this. TransGrid advises that it manages expenditure and has strong cost and variation control processes, but these were not tested in this review.
5. The Commission's attention is drawn to the implications of TransGrid building transmission works that are used by DNSPs even though the DNSPs have made no capital contribution. While the augmentation works are considered least cost to the community it would appear that TransGrid customers are paying where some of the costs should go to the DNSP customers.

Refurbishment

1. For Substations Projects, actual costs of $214.4M overall indicate additional expenditure of $140M over the 1999 Allowance and between $45M and $130M over TransGrid's long term plans and simple age-based replacement estimates. However, due to the inability to adequately categorise expenditure, and establish the actual total spend for each Asset Management Strategy, GHD was unable to arrive at a conclusion on a level of prudent and efficient expenditure in this category. Further information was provided by TransGrid is response to this (draft) report, which more clearly showed the categorisation of expenditure and the relationship between strategies and budgets. Unfortunately, this information was not able to be adequately reviewed or explored to be able to incorporate findings in this report. Further review may change some of the conclusions reached.

   The major project in this category, the Yass Substation, was supported by technical justification, but no evidence of economic analysis or detailed costing was provided and hence GHD is unable to conclude on prudency and efficiency.

2. For Transmission Line Projects, the actual cost of $21.7M was well above the 1999 Allowance of $1.1M, but below the Network 30 Year Plan expectation. Some $15.1M appears justified and efficient. Easement acquisitions and construction of $5.8 million were not considered refurbishment, and were not reviewed for justification.

3. For Communications Upgrades and Replacements, the historic cost of $46.6M compares to $65.9M in the 1999 Allowance, with a further $12.6M proposed in the future RP. The project need was established, and TransGrid provided information proposing a reduction of $2.0 million in the value of the investment for asset elements of the project scope provided for commercial gain. In the absence of understanding the potential for commercial benefit from these assets, GHD is unable to conclude on the prudent value of the regulated assets.
4. For Other Projects, an actual cost of $13.8M was incurred, of which $7.3M is considered justified. The remainder of $6.5M is for part of Other Sydney Projects, where no links can be provided to strategies or budgets, and it is unlikely that the amounts will be spent in 2003/04.

Support the Business

1. For Information Technology Projects, an actual cost for the period of $55.5 million significantly exceeded the 1999 ACCC Decision of $16.8 million. Many of the projects were not foreseen by TransGrid in 1999. GHD concludes that IT Capex for the period was justified in terms of need. Overall project costs were provided by TransGrid for selected projects, but were not sufficient to enable GHD to establish that the spend was efficient.
2. For Vehicles, the actual cost was $37.4 million compared to the 1999 Allowance of $30.9 million. GHD concludes that the **net** allowance for vehicles should be $11.5 million after deducting vehicle sales revenues (unless accounted for elsewhere) and private use vehicles considered as unregulated assets.
3. For Miscellaneous Plant and Equipment, some $10.0 million was incurred compared to $7.5 million in the 1999 Decision. GHD did not undertake a detailed review of this category, but the costs are considered efficient as they are incurred through controlled procedures and standing supply contracts.

Review of Historic Regulatory Test Project – Sydney CBD

1. The project has significant cost overruns and the final project that was built is significantly different to that proposed in the Regulatory Test. This is evidenced by items such as larger capacity 330kV cable, a third transformer and SF6 equipment.
2. As the project required in-depth analysis, the Commission undertook detailed discussions with TransGrid. GHD did not take part in those discussions. As GHD has not carried out any in depth analysis it cannot make any meaningful comments on the prudency or application of the Regulatory Test.

Asset Lives and Depreciation Profiles

Asset lives and depreciation profiles proposed by TransGrid for the Asset Base Roll-Forward are reasonable and in accordance with industry practice.

5. Forecast Capital Expenditure

5.1 Basis for Review

The review for this Section is based on assessment of information provided by TransGrid, including:

- Category break up of Capex amounts shown in the Application;
- Detailed listing of projects and amounts;
- Load forecasts;
- Overall strategies and programs for Capex,
- Individual sampled project planning and justification reports, regulatory test applications and project summaries,
- Support information and reports, and
- TransGrid responses to enquiries arising during the review.

The review process included:

- Reviewing the adequacy of TransGrid's Capex methodology with a focus on efficiency of expenditure. Consideration was given to internal and external factors impacting on future Capex requirements.
- Checking the link between TransGrid's load forecast and individual growth projects, and how this affects the timing of implementation and the capacity of the augmentation.
- Specific review of regulatory test applications selected by the Commission for augmentation projects, including reviewing the modeling, justification and assumptions in project selection, cost and timing of the projects.
- For non-augmentation projects, selecting key investment categories/projects and reviewing the relevant business case justification or asset management strategy from which they derive and whether this meets needs at least cost.
- Checking the consistency between the Capex allowance provided in the Application and the documentation supplied.

GHD was not required to provide an overall assessment of future Capex. The process also did not include independent analysis or verification of TransGrid's load forecasts. These forecasts were developed by TransGrid based on information provided by the NSW electricity Distribution Network Service Providers and TransGrid's own information on economic growth and other demand drivers. The load forecasts are supplied to NEMMCO and used in producing a Statement of Opportunities each year.

A sample of projects was selected in each project category.

5.2 Regulated and Non-regulated Expenditure

There is no non-regulated expenditure proposed in the future RP.

5.3 Overall Capital Expenditure in Revenue Application

TransGrid requested an allowance for future Capex ($M) as summarised in Table 5-1.

Table 5-1 TransGrid's Application for Future Capex ($M)

Category	2004/05	2005/06	2006/07	2007/08	2008/09	Total
Development Capex	168	219	271	240	222	1,121
Refurbishment Capex	46	33	37	35	37	186
Support the Business	23	21	20	18	25	107
Total	237	272	328	294	282	1413

5.4 Efficiency of Capex Processes

The Application includes a diagram of TransGrid's planning process from project inception to the point of recommending the most appropriate option. The processes have been improving over the last regulatory period. This has partly been driven by the change in the needs of the Regulatory Test and the more onerous environmental approval processes.

The Development Capex forward planning process is similar to planning processes used by other TNSPs and is considered appropriate. It clearly identifies system constraints and uses inputs from the DNSPs. There are regular joint planning meetings to identify these constraints and needs. While TransGrid accepts the data from the DNSPs it carries out independent checks of load forecasts provided by DNSPs. As indicated above, the DNSP needs are then put through the TransGrid planning process to identify the most appropriate option. The engineering assessments and cost estimating methods used in the current planning process are considered adequate for proceeding to the next step of detailed engineering and costing.

In GHD's view there has been evidence of project economic evaluation using an estimated cost determined by the planning process being less than the amount included in the Application Development Capex. A brief comparison of the costs in the Application and the 5-year budget also indicates that there are some inconsistencies in costs. Each year, around March, TransGrid submits a 5-year forecast for use by Treasury. This includes the latest costs as determined by project scope refinements. TransGrid has advised that the costs in the Application are generally in line with the latest 5-year budget and inconsistencies arise from timing differences and/or more detailed costing being carried out.

5.5 Development Expenditure

TransGrid advised that due to uncertainties in the NEM it approached its Development Expenditure requirements by using a probability/scenario approach, recently also used by other TNSPs in their Applications.

TransGrid carried out its network planning using its normal planning basis and produced an Annual Planning Report in 2003 as required under the NEC. TransGrid also engaged ROAM Consulting to assist with a probability approach to the Development expenditure requirements as part of the Application process. ROAM Consulting identified 16 different scenarios relating to different levels of growth, location of generation and other market influences such as greenhouse gas abatement. ROAM Consulting calculated the probabilities of occurrence of each the scenarios. TransGrid advised that it considered the project requirements to achieve an adequate transmission network to meet the requirements under each of the scenarios. The project costs were summed for each scenario, the total cost of each scenario was multiplied by the probability of the occurrence of the scenario and all of these summed to determine the probability weighted expenditure for the overall Capex requirements.

TransGrid used the projects from its annual planning process, developed other projects where a ROAM Consulting scenario required additional network augmentation not identified as part of TransGrid's normal planning process, and determined the timing or need under each scenario. GHD understands that TransGrid looked at the timing of projects under the ROAM Consulting scenarios where the project was load and/or generation dependent. Any other projects were left as per the timing and need identified in TransGrid's normal planning process. This was due largely to a project being committed or needed in the immediate future. The projects that were retimed total approximately two thirds of the overall probability weighted Capex sought in the Application.

From information supplied by TransGrid the following average total of augmentation Capex occurs under the different growth scenarios. Totals differ in each group depending on the location of generation, green house gas abatements measures. The standard deviation in each group is between 5 to 9% of the shown average Capex.

ROAM Scenario Group	Average Capex for all Augmentation $M
Low load growth 10% POE	649
Medium load growth 50% POE	950
Medium load growth 50% POE + 1000MW extra load	1,198
High load growth 10% POE	1,319

As can be seen the amount of Capex in the Application approximately lines up with the ROAM scenario of medium growth and 1000MW of extra network load.

The ROAM scenarios as presented in the report have been reviewed. It is difficult to understand and verify the details of the approach taken from the detail contained in the documentation. However, it appears that they have reasonably covered the range of load growths and the likely generation scenarios based on the most likely projects to be undertaken in the future. GHD cannot determine the accuracy of the probabilities without a detailed assessment of all planning assumptions and understanding of load flows. The probabilities add to unity and there are no overlaps that we can detect, so they can be used in the way that TransGrid, to arrive at a probability-weighted expenditure.

To test the future Capex a sample of projects were looked at in relation to:

- Planning Criteria
- Timing
- Options considered for augmentation
- Costing

The projects selected are summarised in Table 5-2.

Table 5-2 Summary of Development Expenditure Projects sampled for Review

Project	Project Cost $M	Project Cost in Regulatory Period $M	Timing as per Annual Planning Report 2003
Supply to West and Central West (Wollar – Wellington 330kV line)	75.7	73.3	2007/08
Dapto – transformer addition and replacement	7.0	7.0	2007/08
Liverpool – transformer addition and replacement	7.0	4.2	2004/05
Glenn Innes 132kV busbar	4.0	4.0	2006/07
Coffs Harbour 330/132kV substation	19.8	18.6	2005/06

Table 5-3 summarises GHD findings and comments on prudency of expenditure. More details on the review are included in Appendix E to this report.

Table 5-3 Review Findings on Sampled Future Augmentation Projects

Project	Brief Description of Project key points	Prudency of TransGrid Expenditure
Supply to West and Central West (Wollar – Wellington 330kV line)	Outage of the 330kV line between Mt Piper and Wellington could lead to voltage problems in Country Energy network during periods of high demand. Wellington is the area of particular concern.	GHD sighted voltage studies that confirm the timing of this project. The timing is considered appropriate. The study has appropriately looked at the costs of losses and

Project	Brief Description of Project key points	Prudency of TransGrid Expenditure
	Through the joint planning process with Country Energy it was agreed that a N-1 criteria was not appropriate but a less risk-averse criteria basis on expected energy not supplied would be applied. The project scope includes a switching station at Wollar, the cost of which depends on whether the Bayswater to Mt. Piper transmission line operates at 500 kV. The regulatory test application considers operation with and without the need to convert in the future to 500kV. The timing is based on the criteria not being met from 2002 onwards.	unserved energy. GHD has not seen the planning studies so we are unable to comment on the quantum used however the source explanation in the regulatory test appears valid Based on the information in the regulatory test, the timing and option studies are considered appropriate. GHD carried out a check of the initial estimates based on the scope details and diagrams contained in the regulatory test. They are considered reasonable. GHD requested details on the latest project costs (12% increase) to determine if they are appropriate. TransGrid advised that the amount in the 5-year budget inadvertently included IDC. Taking this out the project increase is not significant.
Dapto – transformer addition and replacement	Based on current load forecast, the firm transformer capacity is expected to be exceeded by 2007/08. N-1 criteria planning criteria applies. This project has not yet been subject to detailed analysis.	GHD has sighted estimated load information demonstrating the need for this project, but the timing depends on the load growth. Under the probability based approach to future development Capex used by TransGrid this project has been timed appropriately according to the high, medium or low load scenarios. The costing basis used for the project estimate is appropriate.
Liverpool – transformer addition and replacement	Firm capacity at Liverpool substation will be exceeded in Summer 2002/03. Both Integral Energy and TransGrid separately requested public solutions for either local generation or demand management. No proposals were received. The option selected was installation of a third transformer.	This project is committed and work is starting this year. The timing would appear to be correct based on the actual load figures supplied showing that the firm rating was exceeded in 2002/03. GHD considers the options looked at are reasonable and that the selected option is appropriate. The project revised cost is a 21% increase on the previous estimate based on more detailed study. The cost basis is reasonable although the contingency appears high given that a detailed cost study was undertaken.
Glenn Innes	Country Energy indicates that the	Country Energy as at December

Project	Brief Description of Project key points	Prudency of TransGrid Expenditure
132kV busbar	load in the area is increasing such that an N-1 criterion is required under their connection agreement. To achieve N-1 the tee arrangement needs to be modified so that supply can come from either Armidale or Tenterfield. This can be achieved by modifying the busbar at Glenn Innes and the nearby 132kV line.	2003 was seeking public consultation on the project and may find some opportunities to delay the timing of the project. Country Energy is yet to confirm this to TransGrid. This project is being driven by the N-1 planning criteria as required by Country Energy for loads above a threshold of 15MW. GHD has sighted the load forecasts and considers the project to be prudent on this basis. As this project has not yet been subject to detailed engineering the estimated cost on the generic basis used by TransGrid is considered reasonable.
Coffs Harbour 330/132kV substation	Increasing loads have resulted in unacceptable low voltages at Coffs Harbour when one of the critical 132kV feeder outage occurs at times of high load. Reinforcement to the network is required, with the network solution determined by TransGrid being a 330/132kV substation at Coffs Harbour.	The timing of the project is supported by the load flow diagrams supplied by TransGrid. The original cost estimate is considered reasonable. The estimated project costs have increased 22% from the 2002 feasibility report to the 2003 five-year budget. TransGrid provided high-level details to explain the difference. GHD calculates a 7% increase, which is within the sensitivity test carried out in the Regulatory test. TransGrid also explained that the latest project costs are as a result of scope refinement and input into the 5-year budget submitted to NSW Treasury around March each year.

While the project costing basis appears reasonable at the planning stage (i.e. based on similar previous work or generic costs), from the few projects sampled the trend appears to show that the capital costs allocated in the budget are increasing as the project costs are refined by detailed assessment. GHD has requested more details for specific project cost increases to try and understand the reasons behind this and has generally found the increases are due to project scope refinement and detailed costing. The recent improvements in project development and costing as discussed in Section 3.2 should address these problems and provide more confidence in the future project cost estimates. TransGrid is in the best position to control these cost estimates.

5.6 Regulatory Test Applications Review

Two regulatory test applications for future investment were selected by the Commission for review by GHD:

- The Mid North Coast Reinforcement
- The Central Coast Reinforcement

With a view to assess the prudency of projects and the application of the Regulatory Test the aspects that GHD focussed on were:

- Does the project relate to an objective criteria set out in schedule 5.1 of Code? What planning criteria were applied and how was the assessment of network capacity carried out.
- Quality and objectivity of analysis underlying costing and design, network and non-network options considered.
- Appropriateness of timing of the project, could it be deferred?

Mid North Coast Reinforcement

GHD had understood that this covered two projects:

- Coffs Harbour 330/132kV substation, and
- Kempsey - Port Macquarie 330kV line and associated projects.

The only project that has been subject to a Regulatory Test is the Coffs Harbour 330/132kV substation. The other project is forecast for 2007/08 and has not yet been looked at in any detail by TransGrid.

The project relates to the N-1 criteria as set out in NEC clause S5.1.2.2 b 4. The agreement between Country Energy and TransGrid is:

- All elements in service loading not to exceed any element
- One element out the loading on remaining elements not to exceed emergency rating
- With an element out, network voltages at end users are within acceptable levels.

TransGrid has followed the Regulatory test procedure, and arrived at the least cost network option. Non-network options were hypothetically applied in the public consultation paper. However there were no proponents of non-network solutions (embedded generation), so the final test was done on the basis of the network solution options only.

The timing is said to be due to:

- Unacceptable low volts at Coffs Harbour by winter 2005 with 1000MW import on QNI. Export on QNI will change date to winter 2007
- Unacceptable low volts at Kempsey by Winer 2003 with 1000MW import on QNI. Export on QNI will change date to winter 2005
- Unacceptable volts at Port Macquarie by winter 2004.

Comments:

- The N-1 criterion used is considered appropriate and has been used adequately in the Regulatory test analysis.
- The options in the Regulatory test are considered adequate. The lack of proponents for non-network solutions has been covered by assuming hypothetical solutions. The magnitude and costing of those options appears appropriate given the lack of alternate fuels in the area.
- The timing due to load forecasts used appears appropriate given the historic trends.
- The estimated project costs have increased 22% from the 2002 feasibility report to the 2003 five-year budget. The project scope has changed with an additional switchbay at Armidale and inclusion of IDC in the 5-year budget. The regulatory test used a 20% costs escalation as sensitivity, so the latest estimate an increase of 7% is inside that range. The original estimate is considered reasonable. There is not enough detail to comment on the subsequent cost increases.

Central Coast Reinforcement

The project relates to the N-1 criteria as set out in NEC Clause S5.1.2.2 b 4. The agreement between EnergyAustralia and TransGrid is:

- All elements in service loading not to exceed any element
- One element out the loading on remaining elements not to exceed emergency rating
- With an element out, network voltages at end users are within acceptable levels.

Non-network solution analysis has been in the form of demand-side management (DSM). The amount of demand reduction was indicated to GHD to be less than 6 months of load growth, so its impact on the outcome was not of significance. EnergyAustralia found possible demand management of around 3 – 6 MVA summer demand where there is an annual load growth of 14 to 20MW so the demand reduction was not included in the analysis.

The project has been split into two components: reconstruct the existing 330kV line to double circuit by 2004, and install a second transformer into Tuggerah by 2008/09. The driver for the reconstruction is the expectation that the loads will be too high by summer 2004 to allow an outage of the 330kV line without compromising the supply integrity to the area.

Comments:

- The timing of the 330kV line works appears to be appropriate given the constraints that will occur from 2004 onwards. The timing of the remainder of the works is based on load predictions by EnergyAustralia. The forecast loads in the Regulatory test line up with the information obtained by TransGrid from EnergyAustralia.
- The N-1 criterion appears appropriate.
- The Regulatory test did not include any non-network solutions on the basis that no proponents responded in the consultation period.

- As the timing of the second transformer is dependent on load growth, it would appear that there might be scope to reconsider this work in detail and review non-network solutions closer to the project need. TransGrid advised that this work would be subjected to a Regulatory Test in due course.

5.7 Refurbishment Capex

TransGrid provided a break-up of future refurbishment Capex as shown in Table 5-4. Each category of expenditure is considered separately below.

Table 5-4 Refurbishment Capex – Future Summary

Category	Expenditure ($M nominal) by Year					Total
	2004/05	2005/06	2006/07	2007/08	2008/09	
Security	10.0	10.0	10.0	10.0	10.0	50.0
Substations	27.9	18.1	21.8	20.7	20.0	108.5
Transmission Lines	3.9	2.9	3.1	2.3	3.1	15.3
Technical Services Projects	4.1	2.0	2.1	2.3	2.2	12.7
TOTAL	**45.9**	**33.0**	**37.0**	**35.3**	**35.3**	**186.5**

5.7.1 Security

This category of projects was commenced in 2003/04 following identification of increased risk of unauthorised access to TransGrid assets. TransGrid has developed a Network Security Plan aligned with initiatives of the Federal Government and the NSW Government Critical Infrastructure Committee, actions by the NSW distributors, and in accordance with the requirements of the draft ESAA “Guideline for Prevention of Unauthorised Access to Electricity Networks.”

TransGrid has completed a risk assessment and prioritised work at substations to be undertaken over the future RP. Work commenced in the Sydney area in 2003/04 and implementation is progressing in accordance with priority rankings.

Cost estimates were based on budget estimates and using rates for tendered works. The cost breakdowns were reviewed by GHD and found to correlate with the overall budget.

Based on current rates for this work, the allocation for this category is reasonable. However, it could be expected that rates for this type of work may reduce as the market increases, and the volume of work required by TransGrid is relatively high and may contribute to cost reductions. Conversely, there are no contingency allowances in the estimates and additional expenditure may be likely.

It is considered from the information provided that the Capex proposed by TransGrid in this category is justified and efficient.

5.7.2 Substations

The Asset Management Strategy for Substations provides aggregated costs, project / program costs and supporting information for all proposed projects. Reference is made to Section 3.3 for the assessment of quality of information in the Asset Management Strategies and supporting information.

There is a high level of confidence in the most appropriate solution applied to the improvement need, however, review of the strategies and annual replacement or renewal rate provided in the 30 Year Plan, and comparing this with the financial figures for selected projects revealed a poor correlation between the two.

Significant proposals (for example the allocation of $37.2 million for transformer replacements (strategy S5.3.1.12)), have been provided with minimal cost correlation to the relevant strategy. While some transformer replacements can be traced from the strategies to the Capex allocation, about 40% of the total budget is providing for unidentified transformer replacements and spares.

Further explanation was requested from TransGrid, but has not been provided to date. TransGrid verbally advised that it would have been appropriate to provide a business case and/or strategy for these items.

Comparison of the overall Application proposal for substations refurbishment Capex ($108.5 million) with the Network 30 Year Plan ($54.6 million from 2006 to 2010 in July 2000$'s or approximately $60 million in current $'s) indicates a major unexplained addition in the substations category. Alternatively, this Application proposal of $108.5 million compares to the simplistic estimate (Section 4.4.1) of the replacement annuity of $33 million or ($167 million over 5 years) based on remaining life and expected life, which indicates that the allocation is probably reasonable. The 5-year budget shows an allowance of $148.9 million for substations in the **four** years to 2007/08, some $40 million over the Application proposal.

In summary, TransGrid has developed appropriate strategic responses to substations refurbishment but has presented a range of inconsistent figures which do not fully link the proposed strategies to the budgets. Information has been requested to support this link but has not been provided to date. On the basis of the information provided, it is not possible to form a view on the efficiency of TransGrid's proposal.

5.7.3 Transmission Lines

This strategy is broken down to the following projects.

Transmission lines / towers	$ Nil
Wood pole replacement	$13.7 M
TAMIS and emergency structures	$1.6 M
TOTAL	**$15.3 M**

Zero Capex on transmission towers and lines was checked against the various strategies. This indicated that all activities associated with maintaining transmission towers and lines was to be undertaken within operating budgets. Monitoring of the condition of towers and lines has indicated that there were no significant issues which TransGrid considered warranted provision for Capex.

The wood pole replacement strategy was discussed in Section 4.4.1 and is considered justified and efficient.

In summary, the proposal for transmission lines is considered justified and efficient.

5.7.4 Technical Services Projects

The Asset Management Strategy for Secondary Systems provides aggregated costs, project / program costs and supporting information for all proposed technical services projects comprising Communications and Control, Metering and Protection. Note that this category of Capex excludes the continuation of OPGW Backup projects included under development Capex. Reference is made to Section 3.3 for the assessment of quality of information in the Asset Management Strategies and supporting information.

There is a high level of confidence in the most appropriate solution applied to the improvement need, however, review of the strategies and comparing this with the financial figures for selected projects reveals a poor correlation between the two. No further information was sought for this category. The same difficulties apply as for the substations projects.

5.8 Support the Business Expenditure

Support the Business Capex comprises three categories of investment, to which the following proposed expenditure has been allocated by TransGrid.

Table 5-5 Support the Business Capex – Summary for 2004 to 2009

Category	Expenditure (in 2003/04 $M) by Year					Total ($M)
	2004/05	2005/06	2006/07	2007/08	2008/09	
Information Technology (IT)	11.9	10.5	11.5	10.5	13.8	58.2
Vehicles	8.5	7.6	6.9	6.2	9.0	38.2
Misc. Plant & Equipment	2.7	2.5	1.3	1.2	2.5	10.2
Total	23.1	20.6	19.7	17.9	25.3	106.6

5.8.1 Information Technology

The basis for future IT Capex was provided to GHD by TransGrid in the form of a presentation, supported by TransGrid's IT Management Framework and 2002-2004 IT Strategic Plan, an independent IT Strategy and Governance Review report (Business Catalyst International) and a 2002 IT Benchmarking Study for the Utilities Industry (KPMG for 13 electricity, gas and water utilities in Australia). Additional information was provided on sampled projects including:

- AMSIP, the Asset Management System Implementation Project,
- Corporate Data Network (CDN), and
- Replacement of Standard Desktop Infrastructure.

Detailed commentary on these projects, including specific further details requested and summarised responses, is provided in Appendix F.

Key findings from the review of this documentation are:

- The proposed IT Capex is at a similar level to that of the past five years, and as a proportion of total Capex is relatively constant or slightly declining. Given that TransGrid has largely replaced its legacy systems and it progressing towards business improvements, this is to be expected.
- The IT Strategy and Governance Review found that TransGrid must make a major shift in its IT focus towards investment in "applications which deliver improved business processes and which result in either reduced costs of operations or improved operational measures of performance." This Review has resulted in the implementation of the IT Management Framework, including recent improvements to processes for assessing and approving IT projects to ensure sound business case development. These improvements have yet to impact significantly on investment decisions for IT.
- TransGrid has made a decision in its IT Strategy to follow a "Value Driven" approach to IT, rather than an "Infrastructure and Cost Reduction" approach, interpreted to mean that the preference is to focus on delivering business improvement rather than rationalisation and managing for costs.
- Future investment will be directed towards implementing the IT Strategy, of which some 75% of future investment in IT is expected to be in upgrades and computer replacements (largely on a 3 year cycle) and 25% in new business initiatives to improve workflow, provide training applications, improve business reporting, centralise servers associated with upgrades, and adopt mobile computing.

  The replacements will occur on a cyclic basis in accordance with established policies, while the business initiatives will require extensive business case analysis.
- TransGrid appears to have allowed in its future IT Capex program for most contingencies and risks that could occur over the future period, including projects for replacing systems that are unlikely to be supported beyond five years and projects to develop new or improved systems.

- Some of the costs included in the future Capex summary appear to be indicative estimates as the strategy and scope of some projects is not well defined. For example, there is still a significant amount of uncertainty over future directions for major initiatives such as the Corporate Data Network and AMSIP. At this stage there are few business cases developed for major projects to confirm that they are justified economically and/or on efficiency grounds.

The information provided showed overall project costs for each of the sampled projects. The basis of all project strategies was explained and is outlined in the IT Strategy, and the project need appears to be reasonable. However, the absence of business cases does not provide a high level of confidence in the overall amounts, and some change could be expected as business case assessments were prepared.

Conversely, uncertainties could result in the need for unidentified projects, although GHD's assessment is that most of these contingencies have been provided for.

Overall, GHD considers that the implementation of a strong IT Management Framework as initiated by TransGrid in 2003, including a more strategic approach to IT planning focussed on investment in improved business outcomes, and the development of sound business cases for all projects, should result in improved efficiency of investment. It is not possible at this stage to determine if these improvements could result in reductions in the future Capex required from that proposed in the Application, as detailed business cases have not yet been prepared.

5.8.2 Vehicles

This category is proposed to cost $38.2 million in real terms over the future RP, compared to actual of $37.4 million in nominal terms in the current RP. This represents a small decrease in real terms.

The overall cost in this category is partially offset by an amount of some $25 million for vehicle sales revenues, which has been accounted for separately in the Application.

The allowance amount should be reduced by the net value of private use salary packaged vehicles ($0.9 million), which are considered to be unregulated assets. The reduced allowance is consequently $37.3 million.

5.8.3 Miscellaneous Plant and Equipment

This category comprises capitalised items of minor plant and equipment such as photocopiers, fax machines and field plant and equipment with minimum values of $1000 and operational lives over one year, generally 5 to 7 years. Purchases are managed through standard procedures and capitalised in accordance with TransGrid's Capitalisation Policy.

The proposed Capex of $10.2 million in real terms in this category compares to $10.0 million in the current RP in nominal terms, which is a small decrease in real terms.

No detailed review of this category has been undertaken, but the level of Capex in this category is considered reasonable.

5.9 Capability to Deliver Capex Program

TransGrid has applied for a Capex expenditure of over $1,400 million compared with $1,067 million spent in the 1999 to 2004 regulatory period. The support the business amounts are similar. The main difference is in the development and refurbishment Capex projected spends. This represents an increase in the order of 30% or $330 million.

The Refurbishment Capex is predicted to be spent at similar levels to the last 5 years, with the exception of the additional Security projects. There is no reason to indicate that TransGrid will not be able to deliver the Refurbishment Capex.

For the Development projects, TransGrid have been looking at different delivery methods such as Design and Construct packaging. With these changes in delivery method and TransGrid's in-house resources there is no reason to indicate that the expenditure levels will not be achieved.

The timing of delivery is also influenced by exogenous factors including availability of major suppliers and contractors, community opposition, gaining project approvals, latent conditions, and weather.

5.10 Summary of Findings

Augmentation

1 Future development Capex was determined by TransGrid using probability-weighted scenarios by ROAM Consulting to define an aggregate program. The program does not specifically accord with any one scenario. The scenarios have been reviewed and it is difficult to verify the details of the approach taken. However, it appears that they have reasonably covered the range of load growths and the likely generation scenarios based on the most likely projects to be undertaken in the future. GHD did not verify the accuracy of the probabilities as this was beyond the scope of this report.

2 In applying the ROAM Consulting probabilities, GHD understands that TransGrid has looked at the timing of projects under each scenario where the project is load and/or generation dependent. For the approach to be used to support future Capex GHD believes that full modelling would be required under each scenario to determine the augmentation required. As this does not appear to have been done then the probability weighted approach using ROAM probabilities is not considered to be valid.

3 While the project costing basis appears reasonable at the planning stage i.e. based on similar previous work or generic costs, from the few projects sampled the trend is that the capital costs allocated in the budget will continue to be refined, usually upwards, as more detailed designs and tender prices are obtained. If this trend was repeated in the future, this would give rise to significant cost increases over the proposed budget. The recent improvements in project delivery processes within TransGrid, as discussed in Section 3.2, should address these problems in part.

There is also scope for review of the capital cost sensitivities used in the Regulatory Tests. If costs increase as indicated by actual project costs then the selected option may change. More rigorous assessment of costs at an early stage would improve the confidence in the selected outcomes.

Regulatory Test Applications

Two Applications were selected by the Commission for review:

1. Mid North Coast Reinforcement. N-1 criterion, options evaluation and timing based on load forecasts are all considered prudent and appropriate. Estimated costs increased 22% since the 2002 feasibility report. GHD has verified that there is a scope change and the real increase is only 7% and is within the sensitivity analysis undertaken in the Regulatory test.
2. Central Coast Reinforcement. N-1 criterion appropriate. Timing of line works is appropriate. The Regulatory Test did not analyse non-network options, so the need and/or timing of a load-dependent second transformer could be reconsidered through a new Regulatory Test as the need approaches, and if non-network options became feasible. TransGrid advised that this work would be subjected to a Regulatory Test in due course.

Refurbishment

1. Security Capex of $50.0 million to upgrade security at all substations on a priority-ranked basis is considered prudent and efficient.
2. Substations Refurbishment of $108.5 million. TransGrid has developed appropriate strategic responses to substations refurbishment but has presented a range of inconsistent figures which do not fully link the proposed strategies to the budgets. Information was requested to support this link but was provided at a late stage and was unable to be adequately reviewed and verified prior to completion of this report. For example, some 40% of the proposed allocation to transformer replacements provides for unidentified transformer replacements and spares. TransGrid verbally advised that it would have been appropriate to provide a business case and/or strategy for these items. Further information was requested but has not been provided to date. On the basis of the information provided and reviewed, it is not possible to form a view on the efficiency of TransGrid's proposal.
3. Transmission Lines Refurbishment of $15.3 million was considered prudent and efficient, and consists largely of wood pole replacements. GHD had a concern that insufficient expenditure was allocated to transmission lines and tower replacements. This was not borne out as strategies indicated no significant issues with these assets which warranted Capex provision.
4. Technical Services Refurbishment of $12.7 million. TransGrid has developed appropriate strategic responses to these projects but has not established the link between the proposed strategies and the budgets. On the basis of the information provided, it is not possible to form a view on the efficiency of TransGrid's proposal.

Support the Business

1. Information Technology of $58.2 million. GHD considers that the implementation of a strong IT Management Framework, a more strategic approach to IT planning focussed on investment in improved business outcomes, and the development of sound business cases for all projects, should result in improved efficiency of investment. It is not possible at this stage to determine if these improvements could result in reductions in the future Capex required from that proposed in the Application, as detailed business cases have not yet been prepared.
2. Vehicle costs of $38.2 million. After deducting for private use vehicles considered to be unregulated assets ($0.9 million), the resulting efficient allowance is estimated at $37.3 million.
3. Miscellaneous Plant and Equipment of $10.2 million. No detailed review of this category has been undertaken, but the expenditure is normally incurred through controlled procedures and standing supply contracts. The level of Capex in this category is considered reasonable.

6. Historic Operational Expenditure

6.1 Basis for Review

This review component is required to reconcile TransGrid's actual and projected Opex spend to June 2004 with financial accounts and to identify endogenous and exogenous factors driving differences between the spend and the Commission's previously approved Opex program.

6.2 Overall Historic Expenditure

Before commencing the review a reconciliation was undertaken to compare the 2003 Financial Report to the historical Operating Expenditure 2002/03 provided by TransGrid.

The results of this reconciliation of the Financial Statement with the actual expenditure is set out below in Table 6-1 below. That is, the reconciliation was made between the $113.80 million included in the Table 6.4 (Comparisons of Efficient and Actual Expenditure, Page 82) of TransGrid's Application and the audited financial accounts as at 30 June 2003. The reconciliation confirms that the actual costs identified in the Application comply with Australian Accounting Standards as attested by the Auditor General's letter 15 September 2003.

Table 6-1 Reconciliation Financial Accounts 2003 and Revenue Reset Application 2004, Actual Expenditure 2003

Transmission Electricity Expenses (Regulated Services)	**$221.15 M**
Less Depreciation	$108.46 M
As per Financial Statement 2003	$112.70 M
Add Back Unregulated Depreciation	$ 1.10 M
	$113.80 M
As per Revenue Reset Application, Page 82	$113.80 M

Having reconciled the Operating Expenses for 2003 with the Audited Financial Accounts for the same period, a review can be undertaken to consider the efficiency of the historic Opex and assess its appropriateness as a basis to project future Opex for the forthcoming revenue reset period 2005/09.

6.3 Historic Cost Break-up

TransGrid has provided the historical Opex categorised by functions for the period 1999/00 to 2002/03 plus the budgeted forecast for 2003/04. These expenses are shown in the following Table 6-2.

Table 6-2 Operating Expenses 1999/00 to 2002/04 Actuals by Function ($ million).

Function	Actual		Actual		Actual		Actual		Budget	
	1999/00	%	2000/01	%	2001/02	%	2002/03	%	2003/04	%
Compliance & Governance	15.6	15.2%	16.6	16.5%	16.8	16.3%	18.9	16.6%	18.0	14.9%
Environmental	0.0	0.0%	0.0	0.0%	0.5	0.5%	3.9	3.4%	3.2	2.7%
HR	5.1	5.0%	5.3	5.3%	5.6	5.4%	5.8	5.1%	6.1	5.1%
Insurance	1.7	1.7%	-0.9	-0.9%	-3.5	-3.4%	1.3	1.1%	0.0	0.0%
IT	6.9	6.7%	8.0	8.0%	11.1	10.7%	11.7	10.3%	10.9	9.0%
Logistics	2.1	2.0%	2.5	2.5%	2.1	2.0%	2.0	1.8%	2.4	2.0%
Vehicles and Plant Management	2.1	2.0%	2.2	2.2%	2.0	1.9%	1.7	1.5%	1.6	1.3%
Transmission Operations	59.8	58.2%	59.8	59.6%	61.8	59.8%	61.7	54.2%	70.6	58.5%
R&D	0.4	0.4%	0.4	0.4%	0.2	0.2%	0.1	0.1%	0.4	0.3%
Transmission Support	7.3	7.1%	4.8	4.7%	5.5	5.4%	5.5	4.9%	6.4	5.3%
Telecommunications	1.7	1.7%	1.7	1.7%	1.2	1.2%	1.2	1.1%	1.1	0.9%
	102.8	**100.0%**	**100.3**	**100.0%**	**103.4**	**100.0%**	**113.9**	**100.0%**	**120.7**	**100.0%**

Source: TransGrid

During this period total Opex increased from $102.8 million p.a. to $120.7 million p.a., an increase of 17.4%. In real terms, this was an increase of 5% (117 – 112 CPI Factor) over the period. The material increases are analysed by function below:

6.3.1 Compliance and Governance (C&G)

In this function the increase in costs over the historical RP is $3.3 million ($18.9 million - $15.6 million). The increase in C&G function was primarily due to the costs associated with the preparation of the Revenue Reset Application 2004 and reporting on compliance with other legislation. The total cost increase in this category was $2.1 million in 2002/03. Other costs decreased marginally while inflation accounted for an estimated $1.9 million. The net real increase in C&G costs was some 1.7% per annum.

Summary

Compliance and Regulatory Costs Increase	$2.1 M
Inflation accounted for	$1.9 M
Other underlying costs declined marginally	$(0.5 M)
TOTAL	$3.3 M

6.3.2 Environmental and Easement Management

During the historical RP, management of vegetation on easements and the associated environmental compliance issues took on a more significant role. Key factors included:

- NSW Regulatory requirement for network owners to establish and implement a Bush Fire Risk Management Plan and to have this plan externally audited
- Easement clearing in 2001 that contravened the NSW Protection of the Environment Act
- Extreme bushfire conditions causing numerous trips on the high voltage network

As a result of these incidents and an absolute need to ensure all work on TransGrid's easements complied with the relevant legislation there was an increase in focus on easement management. This included establishment of Property and Environment Groups in each Network Region, increased environmental protection controls on easement work and the establishment of an employee environmental certification system.

Following a lengthy dry spell and the recognition that increased work needed to be done on vegetation management to ensure sustainable compliance with Regulatory requirements there has been an increase in costs associated with easement maintenance. The majority of this maintenance is externally sourced on a competitive basis.

Because of the above reasons environmental and easement maintenance costs were aggregated into one cost centre beginning in 2000/01. Costs of $3.9 million were incurred in 2002/03 reducing to $3.2 million in 2003/04.

6.3.3 Transmission Operations

Overall, this function's cost, after allowing for inflation, declined by approximately 8% in real terms between 1999/2000 and 2002/03. This excludes the projection for 2003/04, which shows a substantial increase in these costs.

Although costs declined in real terms, implying improved efficiency, it is worth noting that some significant expenditure was incurred during this period.

For example, routine maintenance expenditure remained fairly constant. Non-routine/defects expenditure increased each year from a base of $9.6 million in 2000 to $13.4 million in 2001, $13.3 million in 2002 and $14.6 million by 2003.

Non Routine Maintenance is budgeted to increase further to $15.3m in 2004. This increase is primarily attributable to an increased expenditure on vegetation management on easements. The increase in expenditure is associated with removing tall growing timber and to reduce the bulk of vegetation under transmission lines.

The increase arising from non-routine maintenance was by and large off-set by a decrease in expenditure on asset project management, down from $15.0 million to $8.6 million in 2003 and is budgeted to decline to $6.1 million in 2004.

6.4 Exogenous and Endogenous Cost Influences

Operating costs are influenced by a broad range of factors (drivers) originating from either external and internal company sources, each of which may have a significant impact on the efficient and effective operation of TransGrid. While the impacts vary and over the RP, the primary external drivers are expected to be:

6.4.1 Consumer Price Index (CPI)

While for example CPI continues to have a lower profile than it did 20 years ago, it is nevertheless an ongoing issue that persists in growing and draining productivity. As discussed elsewhere costs are expected to increase by at least 10% over the RP because of inflation.

6.4.2 Legislation

The increase in legislation, in a variety of areas continues to grow at a rapid pace in both scope and complexity. Much of this, while worthwhile, is often burdensome in compliance. This inevitably increases costs which TransGrid must incur to comply with legislation. However, while legislation may be in place, it is still incumbent upon management to undertake risk assessments to ensure that compliance with legislation is undertaken in the most cost-effective and efficient manner.

6.4.3 Environment

The general community has become aware of many of the issues surrounding TransGrid's operations. In addition to evolving legislative requirements, the company faces pressure from a number of external environmental pressure groups e.g. The Total Environmental Centre (TEC).

The EPA and environmental pressure groups will continue to place cost of management burdens on TransGrid, often for factors that do not directly contribute to the efficiency or effectiveness of the supply of electricity. However, as good corporate citizens, TransGrid must and should cost-effectively manage this element. In 2004, for example, environmental management and training represents approximately 4% of the cost of operating TransGrid. This can be expected to grow in the future. GHD is of the opinion that to better manage this significant cost, TransGrid should introduce a system to track all costs associated with environmental issues and make these project costs transparent and available to the community.

6.4.4 Managing External Politics

As a monopoly supplier and a wholly owned government enterprise, TransGrid may be constrained in some instances in its ability to undertake the most cost-effective approach to management and operation of its business. We have not been provided with evidence to demonstrate that TransGrid is placed under pressure to be cost-effective. While management has introduced many changes that have effectively reduced costs by up to 25% from the time of its initial structuring as TransGrid in 1995, it is now at a point where the past five years costs have in real terms only marginally declined, i.e. no significant improvements have been made. TransGrid management cited many “unforseen events” that prevented meaningful cost reductions, such as the retention of the additional functions and costs associated with informing the single shareholder of any significant issues that may arise with a positive or negative impact.

6.4.5 Workforce

In its Application (Page 74), TransGrid cited the ageing workforce as a contributing factor to increased costs. Actual weekly wages, in theory and practice, should reduce as younger employees move into the workforce. On the other hand, training and inefficiencies, that often includes additional overtime to make up for the loss of experience, tends to increase costs.

TransGrid advised that the availability of highly skilled technical staff in some areas of the operation are often not available in Australia and need to be seconded from international sources that may, in turn, increase costs.

6.5 Summary of Findings

For the historic Opex, GHD found:

- The amount shown in the Application for the 2002/03 financial year for regulated Opex of $113.80 million was able to be reconciled with TransGrid’s audited financial accounts as at 30 June 2003.
- Significant cost changes over the previous RP included a real increase in corporate and governance costs of $1.6 million, new environmental costs of $3.2 million (declining from a maximum of $3.9 million in 2002/03), and a decrease in transmission operations costs of some 8% from 1999/2000 to 2002/03.

7. Future Operational Expenditure

7.1 Basis for Review

The Opex review was undertaken in accordance with the Terms of Reference outlined in Section 1.2 and with reference to the requirements set out in the NEC.

In this context, GHD is required to inform the Commission on TransGrid's ability to meet its current and future transmission service obligations, considering endogenous and exogenous factors impacting on Opex, the efficiency of operating and asset management practices, and the potential for future efficiency gains.

The initial focus was on assessing the basis for the Opex forecast in Part 111 Section 6 of the Application. This has provided significant insight into the forecast. However, the Application provided limited detailed financial data to enable an appropriate review to be undertaken. This shortcoming is further compounded by the introduction of a Maintenance Unit (MU) formula to forecast Opex. GHD has reviewed this methodology and believes that while in the short term (i.e. the Application Period) a direct relationship between the Maintenance Unit (MU) and Opex has not been established, GHD acknowledges that over the long term there tends to be a strong relationship between the non-current capital employed and the operating costs. The MU formula is discussed in more detail below.

As a consequence of a detailed assessment GHD is of the opinion that there is a significant disconnect between the Application Opex forecast and the narrative. The misalignment between narrative and financial impact extended to the information provided by TransGrid on business unit strategies and cost forecast.

Therefore an alternative approach was required to assess the appropriate level of forecast Opex. The alternative review included:

- Review of historical trends and patterns in expenditure;
- Determining an appropriate base year and starting Opex which was considered efficient;
- Analysis of proposed cost category breakdowns and more detailed review of selected expenditure groups;
- Trade-offs between capital and operating investment;
- Assessing the extent of implementation of cost efficiencies in the past and the potential for further cost efficiencies in future; and
- Consideration of industry benchmarks.

7.2 Accounting Practices

As stated above the Financial Accounts conform to the Australian Accounting Standards (AAS). Wherever possible to ensure the integrity of data used in this review GHD has reconciled data provided by TransGrid back to the audited accounts. Where GHD has recommended an alternative forecast or given an opinion then these conform to the relevant AAS.

7.3 Separation of Regulated and Non-Regulated Expenditure

In developing the proposed operational expenditure model, the accounts of the 2002/03 financial year were reviewed in detail. Actual Opex spend was reconciled to the 2002/03 financial accounts. Regulated and non-regulated operating expenditure is identified and recorded separately. An appropriate system is in place to manage the ongoing split in an effective manner.

We have reviewed the TransGrid "Ring Fencing of Unregulated Activities" policy and believe that the regulated and non-regulated activities are appropriately ring-fenced.

7.4 Selection of Base Year and Efficient Starting Opex

Having confirmed the relationship between the 2002/03 historical Opex of $113.8 million and the financial accounts, a review of the reasonableness and efficiency of these costs was undertaken. This part of the review included interviews with senior staff and requests for additional data to assist in the analysis of the $113.8 million. The high level summary of this information is set out in the following Table 7-1.

Table 7-1 2002/03 Opex Analysis

TransGrid Opex 2002/03	$ million
Salaries	65.2
Outsourced Services	23.5
Overtime	10.1
	98.8
Plant and Equipment	6.0
Insurance	5.1
Property Costs	3.6
Computer Costs	3.3
Communications	2.1
Other (1.)	6.9
TOTAL	125.8

TransGrid Opex 2002/03	$ million
Expenses Capitalised [1].	(12.1)
	113.7
Rounding	0.1
Total Opex	113.8

1. Expenses directly attributable to the acquisition and implementation of non-current assets are capitalised as per Accounting Standards.

From the assessment and review, it is believed that the following costs may be considered inefficient and should therefore be excluded from being carried forward as a base for the Opex forecasts.

7.4.1 Workforce

From discussions with the TransGrid senior management, it was established that TransGrid maintains approximately 50 staff surplus to core requirements. TransGrid acknowledges this surplus, brought about by the restructuring of business operations in 1999. The estimated cost of the non-core staff is estimated at $3.38 million p.a.

TransGrid's stated strategy to address these surplus staff is: "…to reduce an estimated 50 non core staff through natural attrition…these staff were gainfully employed on routine maintenance and minor capital works which would be outsourced as they left…staff numbers would not reduce overall by a similar number as there would be an increase in core specialist staff to reflect…the significant short term increase in the asset base."

Nevertheless, GHD is of the opinion that these staff are non-essential and surplus to requirements and recommends that these costs are deducted to provide an efficient cost base. This is reflected in the GH Alternative Opex Model.

The following Table 7-2 represent TransGrid's estimated future staff requirements during the Application period.

Table 7-2 Estimated Future Staff Numbers

Estimated Future Staff Numbers [1]	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Network	564	560	556	552	548	548	548
Engineering	110	114	116	120	120	120	120
Systems Operations	71	73	75	76	77	77	78
Business Resources	88	87	87	86	86	85	85
Commercial	88	87	86	85	84	83	82
Corporate Development	58	60	62	64	65	65	65
	979	981	982	983	980	978	978
movement		2	1	1	-3	-2	0
FTE	964 [2]						

Source

1 TransGrid, Revenue Reset Submission-Operating Expenditure-Supplimentary Information page 8

2 FTE (Full Time Equivalents) as per Annual Report 2002/03 page 95

TransGrid forecasts an increase from 979 (964 FTE) in 2002/03 workforce rising to 983 by 2005/06. The workforce is then projected to decline to 978 by 2008/09. However, within each function there are some significant variations, the largest being the Network Group which is projected to fall by 14 staff.

During the same period this rise is primarily offset by an increase of the number of engineering staff which is projected to increase by an additional 10 staff. The latter reflects the need for increased engineering staff as the Network is augmented. The number of Network staff during the same period will fall as the need for maintenance is reduced by augmentation and refurbishment with more efficient equipment.

7.4.2 Overtime and Allowances Review

Set out below is the Overtime Expenditure incurred over the previous five years.

	1999/00	2000/01	2001/02	2002/03	2003/04
Overtime/Allowances	$7.9 M	$7.9 M	$8.3 M	$10.1 M	$7.3 M*

*Note: Reduction partially attributed to transfer of $2.4 million of contract staff benefits to other classifications.

In 2002/03 TransGrid operated with 964 FTEs. In addition, the employees undertook a significant amount of overtime. The $10.1 million (2002/03) is made up of: $5.2 million ($2.8 million is directly attributable to paid overtime the remainder as salary sacrifice), $0.9 million to travel time, $3.2 million to sustenance/accommodation and meal allowances, plus a further $0.8 million for other miscellaneous allowances. The significant increase in this cost category is attributable, in the main, to two factors:

- The bushfires over the summer 2002/03; and
- To minimise disruption to customers, critical maintenance was rescheduled to off-peak periods.

During the 3-year period 1999/03, overtime and allowances averaged $8.0 million. In 20032/03 this increased to $10.1 million largely as a result of the significant bushfires and other non-routine maintenance. GHD was unable to identify where these extraordinary costs were removed from RP forecast Opex.

Accordingly GHD is of the opinion that TransGrid's Opex should be reduced by at least $2.1 million.

GHD concludes that the Revised Efficient Opex Base is therefore:

Opex Base	$ million
Opex 2002/03	113.80
Less non-core workforce	(3.38)
Less overtime adjustment	(2.10)
Efficient base	108.32

It is also noted that during the same period, 1999/03, TransGrid outsourced a significant amount of work, averaging approximately $24.0m p.a. This was forecast to increase in 2003/04 to $29.2m. TransGrid, on review, reported that these increases were due to increased use of Outsourced Services for Environmental and Vegetation Control, Transmission Equipment Services, Taxation and Audit Services and Security Services, as well as a general increase in wage levels in NSW. GHD accepts this increase.

The above supports the approach of establishing an efficient base in 2002/03 as the starting point.

7.5 Application Forecast Opex

In the Application TransGrid nominated two main cost drivers that would influence the Opex over the future RP: wage cost index and growth in a unit of measure TransGrid referred to as 'Maintenance Units'. These are considered separately:

- Wage cost index (WCI)

  TransGrid in the Application applied a 4.1% WCI to its workforce costs claiming research indicates that wages will continue to grow in real terms at a higher real rate than forecast CPI over the RP. GHD has reviewed these conclusions and is of the opinion that these assumptions are reasonable.

- 'Maintenance Unit' (MU) as a basis for the forecast of Opex across the entire TransGrid regulated business

  TransGrid on page 82 has put forward a MU value methodology as a basis for the forecasting of Opex that assumes that there is a correlation between the Asset Base (specifically ten times the number of switchbays plus the number of circuit kilometres of line) and the total Opex. GHD is of the opinion that in the broadest terms a "general rule of thumb" could be inferred that Opex tends to increase as the capital base increases. However, GHD is of the opinion that this relationship does not stand up to scrutiny over a short period such as the RP. During interviews with senior management, attempts were made to establish the basis and reasonableness of the MU methodology.

After extensive discussions, it was conceded by TransGrid that the MU methodology had been an extrapolation of an industry 'rule of thumb' often used for benchmarking by network managers to gauge how the costs of the network function were comparable to other TNSPs. However, the MU methodology did not take into account the variable nature of other transmission operating costs such as administration, human resources and corporate development, each of which are not directly correlated to the increase in the size of the network.

TransGrid, during interviews, conceded that the MU methodology was not a reasonable basis to forecast Opex in the short term as it did not fully reflect the 'bottom up' review claimed in the Application (page 82). In essence, there is a disconnection between the discussions used to explain and justify the Opex forecast and the MU methodology used to calculate the forecast Opex. In addition, the MU methodology proposed by TransGrid did not compute correctly with the Application. To make the MU balance back to the application Opex an arbitrary $7.0 million was deducted from 2008/09 (page 82).

Realising that further clarification on Opex forecasting was necessary, TransGrid wrote a letter to the ACCC 19th December 2003 in which it argued that the Opex requirements were in fact on "a similar top down assessment" as used in the 1999 ACCC ruling.

GHD has developed a TransGrid Revised Opex (see below) using the new information contained in TransGrid's supplementary report in an attempt to create a meaningful link between the qualitative and quantitative data and the financial forecasts.

GHD concludes that there is a significant disconnect between the Application and the initial information provided by TransGrid. Of the two bases for the Application forecast, the Wage Cost Index was accepted but the Maintenance Unit approach to forecasting total Opex was not. However, supplementary information provided by TransGrid enabled GHD to develop a financial model that was within $5 million of the total Application Opex.

7.6 Influencing Factors in Forecast Costs

When forecasting Opex there is a complex interplay of cost drivers that need to be assessed. These were elaborated under the sub-heading Exogenous and Endogenous Cost Influences. These may be summarised into the following cost drivers:

- Growth in peak demand – complexity of operation
- System growth
- Other scope changes
- Labour cost changes
- Labour mix changes

As outlined above TransGrid in the Application - Operating Expenditure – Supplementary Information (SI) provided additional information. The SI states “in broad terms the cost drivers for each category has been limited to inflation” with the following exceptions:

- Corporate Development and Network

  Overhead Recovery up 5%
- Network Operations

  Overtime up 5%
- Corporate

  Insurance up 1% above CPI

  Legal expenses up 5% above CPI

  Outsourced services up 5%
- Other

  Salaries and Oncosts up 5%

7.7 TransGrid Reconstructed Forecast

TransGrid’s Application Opex for the future RP is $650.3 million (in 2004 dollars). This is an average of $130.06 million p.a. During the current RP the actual Opex for period 1999/2000 to 2002/03 is $420.5 million or an average of $105.13 million, which, after allowing for inflation, is approximately a 20% increase in real terms over 5 years.

Using TransGrid’s own data a reconstructed forecast has been developed to reflect the impact of the above cost. This is set out in the following Table 7-3. The calculation starts from TransGrid’s actual 2002/03 data and allows for all TransGrid forecast increases. In this way, all of TransGrid’s allowances for growth in the network are accommodated.

GHD was not provided with an alternative cost benefit analysis that supported TransGrid management’s decision to increase the outsourced services in real dollar terms without a corresponding decrease in wages and associated costs.

Therefore, as TransGrid was unable to provide a financial Opex model that supported its Application, GHD reconstructed an Opex Forecast model in an attempt to quantify the various statements made in the Application and during interviews. This model reflects the values included in the Application (refer Table 7-3).

Table 7-3 TransGrid Reconstructed Opex Forecast

Table: TransGrid Reconstructed with Opex Forecast					2004 Real							
					[based on TransGrid's Regulatory Reset Submission - Supplementary Information December 2003							
Elements	Source	Base	Change	Above	Real cost	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
		Calcs	Factor	CPI	increase	Actual	Forecast	Projected	Projected	Projected	Projected	Projected
Consumer Price Index (CPI)			2.00%									
Labour all sources						$65.20	$ 4.86					
Efficiency adjustment : surplus workforce												
Efficiency adjustment : excess overtime & allowance												
Labour Base						$65.20	$70.06	$70.06	$70.06	$70.06	$70.06	$70.06
Headcount increase 2004	2						$0.14	$0.14	$0.14	$0.14	$0.14	$0.14
2005								$0.07	$0.07	$0.07	$0.07	$0.07
2006									$0.07	$0.07	$0.07	$0.07
2007										-$0.20	-$0.20	-$0.20
2008											-$0.14	-$0.14
2009												$0.00
Labour cost increase C/F								$0.70	$1.41	$2.13	$2.85	$3.58
Labour cost increase	1			1.00%	1.00%		$0.70	$0.71	$0.72	$0.72	$0.73	$0.74
Total Labour Costs						**$65.20**	**$70.90**	**$71.67**	**$72.46**	**$72.98**	**$73.57**	**$74.31**
Efficiency forecast 2%					0%		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total efficient labour forecast						$65.20	$70.90	$71.67	$72.46	$72.98	$73.57	$74.31
Efficient Opex- Other costs						$60.70	$61.91	$61.91	$61.91	$61.91	$61.91	$61.91
Forecast increase												
Insurance	2	$ 5.10		1.00%	1.00%		$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
Legal Expenses	2	$ 1.30		5.00%	5.00%		$0.07	$0.07	$0.07	$0.07	$0.08	$0.08
Overtime Allowance	2	$ 7.10		5.00%	5.00%		$0.36	$0.37	$0.39	$0.37	$0.41	$0.45
Outsourced Services	5	$ 23.50		5.00%	5.00%		$5.70	$5.99	$6.28	$6.60	$6.93	$7.27
Travel Costs	1	$ 0.40		2.50%	2.50%		$0.01	$0.01	$0.01	$0.01	$0.01	$0.01
Other Opex		$23.30			0.00%		-$5.80	-$3.25	-$0.60	$2.48	$5.43	$8.45
Opex Costs - other		$ 60.70				$60.70	$62.30	$65.15	$68.12	$71.50	$74.82	$78.24
Total Labour and other Opex Costs						**$125.90**	**$133.20**	**$136.83**	**$140.58**	**$144.47**	**$148.39**	**$152.54**
Less Overheards Recovered	1	-$ 12.10	0.00%	5%	5%	-$12.10	-$12.50	-$13.13	-$13.78	-$14.47	-$15.19	-$15.95
TransGrid Reconstructed Forcast Opex						**$113.80**	**$120.70**	**$123.70**	**$126.80**	**$130.00**	**$133.20**	**$136.59**
TransGid Application								$123.70	$126.80	$130.00	$133.20	$136.60
GHD Recommended Adjustment								$0.00	$0.00	$0.00	$0.00	-$0.01
Revenue Application Cum. Adjustment												**$0.00**
		2	Headcount increase				2	1	1	-3	-2	0
Source:												
1: GHD TransGrid Regulatory Review 2003 for the ACCC, section 8.4						4: Transgrid Annual Report 2003 page 95						
2: TransGrid, Revenue Reset Submission-Operating Expenditure-Supplimentary Informat						5: TransGrid response to GHD 04012 0 -104-3						
3: TransGrid Operating Costs (1999/00 to 2003/04) document ACCC-031010-10						6: TransGrid 2004 Revenue Reset Application						
						7 Westpac Forecast March 19 2004						

7.8 GHD Efficient Alternative Opex Model and Analysis

TransGrid in its Application estimated forecast Opex to increase by a constant 2.5% p.a. To justify this increase TransGrid has presented an argument based on a series of unsupported assumptions and claims of "built-in efficiencies" and the setting of "highly challenging targets". As discussed earlier, the method of extrapolation in the Application is an attempt to imply that the only drivers for Opex are wage costs and the growth in the grid size (represented by maintenance units (MU)). While the grid size inevitably has an important relationship to Opex, it is by no means the only factor, as the Application is attempting to emphasise elsewhere in TransGrid's report.

GHD agrees with TransGrid when it says on page 45 of the Application that salaries and wages in NSW have increased at a rate greater than CPI and that this is likely to continue in the foreseeable future. Therefore, accepting TransGrid's assessment that 80% of its Opex costs are attributable to wages, both internal and external, we can then surmise that the base costs before allowing for growth will be as set out in Table 7-4. GHD Efficient Alternative Model.

This recast forecast implies that the TransGrid Application is overstated by approximately $47.88 million over the RP. This model builds on Table 7.3 TransGrid's Reconstructed Opex Forecast that has been adjusted for GHD's efficiency assessment to deduct the cost of the 50 non-core staff and the reduction in overtime and allowances to establish the efficient base starting Opex.

In addition to the adjustment for efficiencies, a future efficiency target is considered warranted. A target was derived after taking the following into consideration:

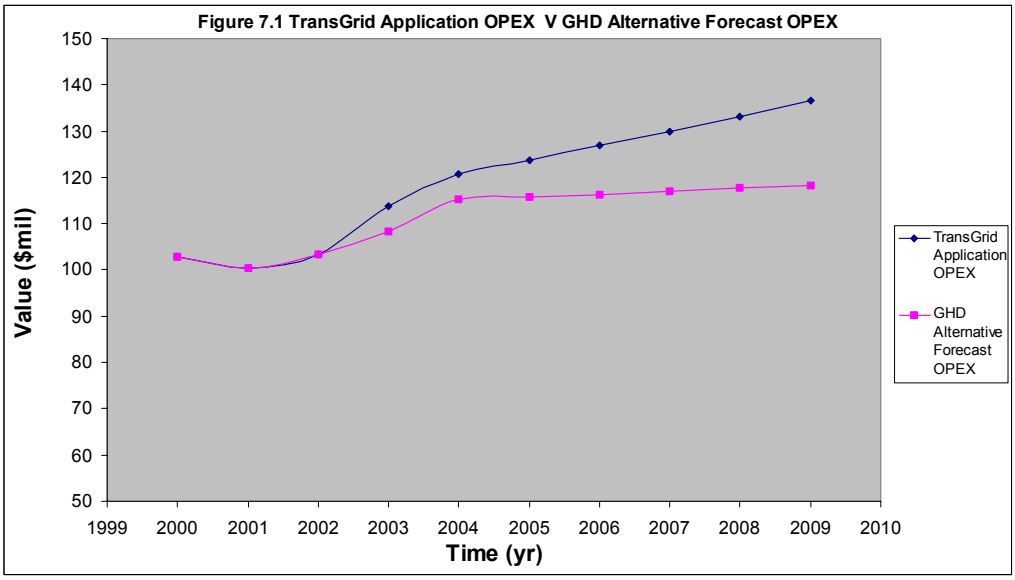
- In response to GHD's inquiry, TransGrid acknowledged that its 2002/03 target of 0% real increase in controllable costs was not achieved and that the actual result was a 2% increase in these costs. Therefore, GHD believes that it is reasonable to reinstate the Board's original target by seeking a 2% reduction in costs each year over the RP.
- A range of efficiency improvements for the future was identified by TransGrid, including those as a result of IT improvements and technology applications. In particular, significant future IT investment is intended to produce efficiency benefits, e.g. new systems for asset management (AMSIP), which have not been identified in TransGrid's forecast.
- In the recent Commission Decision for Transend Networks in Tasmania an efficiency factor of 2% was applied to future Opex. Future efficiency gains were expected even though it is acknowledged that historical differences in Opex and past efficiencies apply.
- National Grid UK and USA have announced that they are on target in the Third Regulatory Review Period to reduce their Opex by more than **5% p.a. compounding.**

On a limited review and without the benefit of benchmarking, GHD is of the opinion that a target of between 1 and 5% per annum is not unreasonable. Table 7-4 is based on applying an estimated 2% efficiency improvement per annum compound to the GHD Efficient Alternative Model. On the basis of this estimate, the TransGrid Application is estimated to be $65.2 million overstated.

This is made up as follows:

Overtime Reduction	$10.50 million
Non-core Staff Reduction	$18.02 million
Efficiency Reduction	$36.68 million
Total estimated Opex reduction from TransGrid Application	$65.20 million

Figure 7-1 TransGrid Application Opex Vs GHD's Alternative Forecast



The Figure highlights the significant increase in Opex in the TransGrid Application between the actual costs incurred in the current RP to 2002/03, to the expected starting Opex base in 2004/05. This increase is inconsistent with the Opex trends prior to 2002, and with those proposed by TransGrid from 2005. GHD has attempted to isolate these increases and has identified some for inclusion in the GHD Efficient Alternative model however, the inconsistency indicates that potential for futher reductions may be possible.

Table 7-4 GHD Reconstructed with an Efficient Opex Forecast

Table: GHD Reconstructed with an Efficient Opex Forecast	2004 Real											
			[based on TransGrid's Regulatory Reset Submission - Supplementary Information December 2003									
	Source	Base	Change	Above	Real co	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
		Calcs	Factor	CPI	increas	Actual/Effici	Forecast	Projected	Projected	Projected	Projected	Projected
Consumer Price Index (CPI)			2%									
Labour all sources						$65.20	$ 4.86					
Efficiency adjustment : surplus workforce						-$ 3.38						
Efficiency adjustment : excess overtime & allowance						-$2.10						
Labour Base						$59.72	$64.58	$64.58	$64.58	$64.58	$64.58	$64.58
Headcount increase	2						$0.14	$0.14	$0.14	$0.14	$0.14	$0.14
2005								$0.07	$0.07	$0.07	$0.07	$0.07
2006									$0.07	$0.07	$0.07	$0.07
2007										-$0.20	-$0.20	-$0.20
2008											-$0.14	-$0.14
2009												$0.00
Labour cost increase C/F								$0.65	$1.30	$1.96	$2.63	$3.30
Labour cost increase	1			1.00%	1.00%		$0.65	$0.65	$0.66	$0.67	$0.67	$0.68
Totals						**$59.72**	**$65.36**	**$66.08**	**$66.81**	**$67.27**	**$67.81**	**$68.49**
Total efficient labour forecast						**$59.72**	**$65.36**	**$66.08**	**$66.81**	**$67.27**	**$67.81**	**$68.49**
Efficient Opex- Other costs						$60.70	$61.91	$61.91	$61.91	$61.91	$61.91	$61.91
Insurance	2	$ 5.10		1.00%	1.00%		$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
Legal Expenses	2	$ 1.30		5.00%	5.00%		$0.07	$0.07	$0.07	$0.07	$0.08	$0.08
Overtime Allowance	2	$ 7.10		5.00%	5.00%		$0.36	$0.37	$0.39	$0.37	$0.41	$0.45
Outsourced Services	5	$ 23.50		5.00%	5.00%		$5.70	$5.99	$6.28	$6.60	$6.93	$7.27
Travel Costs	1	$ 0.40		2.50%	2.50%		$0.01	$0.01	$0.01	$0.01	$0.01	$0.01
Other Opex		$23.30			0.00%		-$5.80	-$3.25	-$0.60	$2.48	$5.43	$8.45
Opex Costs - other		$ 60.70				$60.70	$62.30	$65.15	$68.12	$71.50	$74.82	$78.24
Total Labour and other Opex Costs						**$120.42**	**$127.66**	**$131.23**	**$134.94**	**$138.77**	**$142.63**	**$146.73**
Less Overheards Recovered	**1**	**-$ 12.10**	**0.00%**	**5%**	**5%**	-$12.10	-$12.50	-$13.13	-$13.78	-$14.47	-$15.19	-$15.95
Forcast Opex						**$108.32**	**$115.16**	**$118.11**	**$121.15**	**$124.30**	**$127.44**	**$130.77**
Efficiency forecast					**2%**			**-$2.36**	**-$4.79**	**-$7.27**	**-$9.82**	**-$12.44**
								$115.75	**$116.37**	**$117.03**	**$117.62**	**$118.34**
TransGid Application								$123.70	$126.80	$130.00	$133.20	$136.60
GHD Recommended Adjustment								-$7.95	-$10.43	-$12.97	-$15.58	-$18.26
Revenue Application Cum. Adjustment												**-$65.20**
		2	Headcount increase				2	1	1	-3	-2	0
Source:												
1: GHD TransGrid Regulatory Review 2003 for the ACCC, section 8.4						4: Transgrid Annual Report 2003 page 95						
2: TransGrid, Revenue Reset Submission-Operating Expenditure-Supplimentary Inform						5: TransGrid response to GHD 04012 0 -104-3						
3: TransGrid Operating Costs (1999/00 to 2003/04) document ACCC-031010-10						6: TransGrid 2004 Revenue Reset Application						
						7 Westpac Forecast March 19 2004						

7.9 Summary of findings

GHD on review and in light of subsequent interviews and the provision of additional information is of the opinion that the TransGrid Application is deficient in a number of areas as outlined above. The main conclusions are:

- The use of Maintenance Units as a basis of forecasting Opex is not considered reasonable.
- TransGrid included the cost of at least 50 staff that it, during interviews, acknowledged are non-core staff who will not be replaced when they leave or retire.
- TransGrid has not undertaken an independent workforce efficiency review across the whole operation to assess whether or not the workforce strength, deployment or training is appropriate. For example, staffing levels have remained marginally below 1000 FTE over the review period and overtime equates to an additional average 100 FTE staff each year. From a review of selected international operations in the UK and USA significant efficiencies are still being forecast for operations that are in their second and third Regulatory Period. As TransGrid has acknowledged, 80% of its operating costs are directly the result of its workforce size, and GHD is of the opinion that a review of the efficiency of the workforce is an integral part of improving the overall Opex cost structure.
- Because TransGrid was unable to provide a financial Opex model that supported its Application, GHD reconstructed a TransGrid Opex Forecast Model (Table 7.3) in an attempt to quantify the various statements made in the Application and during interviews. This model reflects the values included in the Application.

The reconstructed model was then used to develop a GHD Efficient Alternative Opex Model. This new model was adjusted for the cost of the 50 non-core staff and an adjustment for overtime. In addition to these efficiency adjustments assessed by GHD for the starting Opex base, future efficiencies should also be possible, as a result of productivity and technology changes. A limited review indicated that efficiencies of 1% to 5% per annum should be possible, over and above those included by TransGrid in its information. Applying a nominal 2% compound efficiency target to the GHD Efficient Alternative Model the difference shown is a total reduction in Opex from that stated in the TransGrid Application of $65.2 million.

8. Service Standards and Performance Incentives

8.1 Basis for Review

GHD has been tasked with the recommendation of appropriate service standards and performance targets based upon the following information:

- Information provided by TransGrid as part of its Application;
- Supplementary information provided by TransGrid following an interview process and documentation review;
- Report titled 'The Commission Network Service Provider (TNSP Service Standards), March 2003[6]';
- Statement of Principles for the Regulation of Transmission Revenues. Service Standards Guidelines – released by the Commission in November 2003[7]

In undertaking this review, the measures proposed by TransGrid were evaluated against actual performance over the previous regulatory period to evaluate the reasonableness of the proposed measures. This evaluation took into consideration the targets as set by SKM in the "Transmission Network Service provider – Service Standards – Final Report (March 2003) and the principles set out for collars, caps and deadband knee points in SKM's "Service Standards Guidelines" (November 2003).

In addition to this, matters identified within this report or advised by TransGrid in its Application that are expected to impact upon the future performance of TransGrid were taken into account when developing a recommended set of service standards.

8.2 Selection of Service Indicators

TransGrid has proposed service measures that focus on three core areas as follows:

- ***Circuit Availability***. This is further broken down into three measures:
  - Transmission line availability (%);
  - Transformer availability (%); and
  - Reactive plant availability (%).
- ***Reliability***. In the form of loss of supply event frequency, this is split into two separate measures reflecting different magnitudes of the event as follows:
  - Number of events greater than 0.05 system minutes
  - Number of events greater than 0.4 system minutes
- ***Average Outage Restoration Time***. Measured in minutes, with a seven-day cap per event.

These measures are summarised in Table 8-1, and appropriate definitions are provided in the SKM report.

[6] Report by Sinclair Knight Merz, available on the ACCC website

[7] Available from the ACCC website, www.accc.gov.au

Table 8-1 Service Standards proposed by TransGrid

Performance Measure	Unit of Measure	Revenue at Risk (%)	Collar	Dead Band Knee 1	Target	Dead Band Knee 2	Cap
Transmission Line Availability	%	0.2	98.9	-	99.4	-	99.7
Transformer Availability	%	0.15	98	-	99	-	99.5
Reactive Plant Availability	%	0.1	97	-	98.5	-	99.3
Reliability (Events >0.05 system minutes)	Number	0.25	4	-	6	-	9
Reliability (Events >0.4 system minutes)	Number	0.2	0	-	1	-	3
Average Outage Restoration Time (7 day cap per event)	Minutes	0.1	2400	1800	1500	1200	800

The cap proposed by TransGrid aligns closely with the Draft Service Standards, exposing ± 1 percent of their maximum allowable revenue (MAR) at risk.

TransGrid proposed a cap of 7 days for any single event impacting upon the average outage duration, this differs from value stated in the Draft Service Standards Guidelines (14 days), however it is consistent with a previous TransGrid submission to the commission in a letter dated 16 July 2000.

General Observations:

- SKM and the Commission propose the same targets
- The Commission recognises that TNSPs may be operating at high-levels of performance and as such an asymmetric performance incentive can help balance the risk associated with achieving performance targets in some cases. TransGrid have proposed asymmetric incentive schemes.
- Commission and SKM documents propose measures and targets only, but don't propose details on specific caps, collars or deadbands.

8.3 Historic Performance Comparison

Table 8-2 and Table 8-3 show the performance of TransGrid based upon the measures proposed by TransGrid against the actual performance over the past eight years for the available data for that period.

Table 8-2 Historic Service Standards Performance of TransGrid

Performance Measure	Unit of Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
Transmission Line Availability	%	99.49	99.45	99.26	99.31	99.55	99.63	NA	NA
Transformer Availability	%	98.26	99.18	98.74	99.16	99.10	99.47	NA	NA
Reactive Plant Availability	%	98.30	99.09	98.44	96.97	97.72	98.97	NA	NA
Reliability (Events >0.05 system minutes)	Number	4	6	5	6	5	3	7	NA
Reliability (Events >0.4 system minutes)	Number	0	0	0	2	0	0	2	NA
Average Outage Restoration Time (7 day cap per event)	Minutes	2143	1540	1241	1769	793	873	NA	NA

Table 8-3 Summary of Associated Bonus'/Penalties (%MAR)

Performance Measure	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	Sum of Bonus/Penalties
Transmission Line Availability	0.060	0.033	-0.056	-0.036	0.100	0.153			0.255
Transformer Availability	-0.111	0.054	-0.039	0.048	0.030	0.141			0.123
Reactive Plant Availability	-0.013	0.074	-0.004	-0.100	-0.052	0.059			-0.037
Reliability (Events >0.05 system minutes)	0.250	0.000	0.125	0.000	0.125	0.250	-0.083		0.667
Reliability (Events >0.4 system minutes)	0.200	0.200	0.200	-0.100	0.200	0.200	-0.100		0.800
Average Outage Restoration Time (7 day cap per event)	-0.057	0.000	0.000	0.000	0.100	0.082			0.125
Annual totals (max +/_ 1%)	0.328	0.361	0.226	-0.188	0.503	0.885	-0.183	0.000	
								Total Bonus / Penalty during period	**1.932**

Two measures are further discussed below.

Average Outage Restoration Time

TransGrid proposed a 7-day cap differing from the 14-day cap documented within the SKM and ACCC documents, stating that its annual target of 1500 minutes is firmly linked to the 7-day cap. This is consistent with other documentation provided by TransGrid and sighted by GHD The implication of this variation is that all events that causing outages between the 7 and 14-day range are additionally incorporated into this measure as 7-day events, thus the target that is set should allow for this.

Reliability Measures

The reliability performance measures are divided into two segments:

- Events greater than 0.05 system minutes, and
- Events greater than 0.4 system minutes.

These reliability measures are allocated 45% of the revenue that is put at risk in this process. Based upon the historic comparison in the previous tables, TransGrid would have received 72.6% of its bonus for the period through these reliability measures calculated on its proposed performance incentive scheme. This indicates the importance of these measures to the overall performance incentive scheme, based upon historical data.

It is noteworthy that both of these measures would have recorded losses in 2002/03, It is not clear whether these results include impact of the bushfires experienced as “force majeure” events are excluded from the definitions for these measures.

Other Considerations

There is a potential impact of future investment on reliability and outage measure performance. Given the increased capital investment planned, if the majority of outages are due to planned work, these will have to be appropriately managed in order to deliver the same levels of performance TransGrid advises that appropriate outage coordination methods will be employed to achieve its proposed target levels of performance.

Financial Impact for TransGrid

The following calculation method is identified within the Commissions draft service standards guidelines.

$$FI_{ct} = \left[\frac{\left(AR_{t-1} + AR_{t-2} \right)}{2} \times S_{ct} \right]$$

$$i.e. FI_{01January2004} = \left[\frac{\left(AR_{01July04} + AR_{01July03} \right)}{2} \times S_{01January04} \right]$$

Where:

FI = Financial Incentive
AR = Annual Revenue
ct = performance - calendar year
t = time - financial year

The results of applying this equation against the one available data point for TransGrid is summarised in the following table. Note that only those periods with a full set of results have been included into this table

Table 8-4 Summary of TransGrid Historic Performance against proposed service standards

Six months beginning	1 % of Averaged Annual Revenue[8] 'AR' $M	Performance 'S'	Financial Incentive 'FI', for TransGrid $M
01 July 1997	3.7		
01 January 1998		-0.328	1.215
01 July 1998	3.7		
01 January 1999		0.361	1.3357
01 July 1999	3.7		
01 January 2000		0.228	0.8436
01 July 2000	3.7		
01 January 2001		-0.188	-0.6956
01 July 2001	3.7		
01 January 2002		0.503	1.8611
01 July 2002	3.7		
01 January 2003		0.885	3.2745
01 July 2003	3.7		
01 January 2004			

8.4 Suggested Performance Incentive Scheme

TransGrid in general has high levels of performance in the measured areas. As such asymmetric performance incentives are reasonable in many cases. It is also noticeable that TransGrid often has higher targets than some other TNSPs.

The underlying intent of the incentive system is that a bonus should be provided to the TNSP if the level of performance is improved and if the level of performance deteriorates a penalty should apply. Thus it is GHD's view that the performance levels should be set so that they are close to revenue neutral against current levels of performance, subsequently providing a clear and tangible incentive for improved performance beyond historical levels.

[8] Note that for simplicity an indicative averaged revenue has been used, developed by averaging the annual revenues of TransGrid available within Annual Reports from 1999 to 2003, then divided by 100

With this in mind GHD recommends the following modifications to TransGrid's proposed incentive scheme:

- **Transmission line availability (%)**
  Collar: Increased from 98.9 to 99
  Target: Increased from 99.4 to 99.5
  Cap: No change
- **Transformer availability (%)**
  Collar: Increased from 98 to 98.2
  Target: No change
  Cap: Increased from 99.5 to 99.7
- **Reactive plant availability (%)**
  Collar: No change
  Target: Increased from 98.5 to 98.6
  Cap: No change
- **Number of events greater than 0.05 system minutes**
  Collar: Decreased from 9 to 8
  Target: Decreased from 6 to 5
  Cap: Decreased from 4 to 3
- **Number of events greater than 0.4 system minutes**
  Collar: Decreased from 3 to 2
  Target: No Change
  Cap: No change
- **Average Outage Restoration Time**
  Collar: Decreased from 2400 to 1800
  Dead Band Knee 1: Decreased from 1800 to 1600
  Target: No Change
  Dead Band Knee 2: Increased from 1200 to 1400
  Cap: No Change

The following table clarifies the performance incentive scheme suggested by GHD for the upcoming regulatory period.

Table 8-5 Summary of Service Standards suggested by GHD

Performance Measure	Unit of Measure	Revenue at Risk (%)	Collar	Dead Band Knee 1	Target	Dead Band Knee 2	Cap
Transmission Line Availability	%	0.2	99.0	-	99.5	-	99.7
Transformer Availability	%	0.15	98.2	-	99.0	-	99.7
Reactive Plant Availability	%	0.1	97.0	-	98.6	-	99.3
Reliability (Events >0.05 system minutes)	Number	0.25	8	-	5	-	3

Performance Measure	Unit of Measure	Revenue at Risk (%)	Collar	Dead Band Knee 1	Target	Dead Band Knee 2	Cap
Reliability (Events >0.4 system minutes)	Number	0.2	2	-	1	-	0
Average Outage Restoration Time (7 day cap per event)	Minutes	0.1	1800	1600	1500	1400	800

This incentive scheme would return a total bonus over the 1996/97 – 2003/04 period based on the data made available, of 0.602%, compared to the total bonus from the TransGrid proposed incentive scheme of 1.932% for the same period. This is summarised and discussed in the following section.

8.5 Performance Incentive Scheme Comparison

To facilitate better understanding of the impact of the GHD proposed incentive scheme compared to the TransGrid proposed incentive scheme, the following table has been developed.

Table 8-6 Comparison of Historic Returns to TransGrid

	Total performance over period (S) [9]	$M Bonus / Penalty[10]
TransGrid Proposed Scheme	1.932	7.827
GHD Proposed Scheme	0.602	3.584

Of the 0.602 performance (S) achieved by TransGrid within the GHD scheme, 0.600 of this results from the reliability measure for events > 0.4 system minutes. With this particular measure, GHD was unable to develop a reasonable cap, target and collar arrangement that would return a near revenue neutral result.

TransGrid has expressed concern that this proposed incentive scheme exposes it to substantial downside risks. However GHD cannot identify these, as the proposed scheme is based on historical performance. The GHD proposed measures aim to maintain asymmetric loading in favour of the bonus in recognition of the reasonably high levels of performance of TransGrid in most of the measured areas.

[9] Based on the six years containing full data for all measures

[10] Based on 1% of Averaged Annual Revenue as in **Error! Reference source not found.**

Appendix A

Terms of Reference

Consultancy Terms of Reference

TransGrid - capital expenditure, asset base, operating and maintenance expenditure and service standards review

Background

The Australian Competition and Consumer Commission (Commission), in accordance with its responsibilities under the National Electricity Code (code), is currently conducting an inquiry into the appropriate revenue cap to be applied to the non-contestable elements of the transmission services provided by TransGrid, from 1 July 2004.
To assess the performance of TransGrid relative to the requirements of the code, the Commission requires reviews of:

- capital expenditure (Capex)
- the asset base
- operational and maintenance expenditure (opex) and
- service standards

In particular, Part B of Chapter 6 of the code requires *inter alia* that:

- in setting the revenue cap, the Commission must have regard to the potential for efficiency gains in expected operating and maintenance costs, taking into account the expected demand growth and service standards
- the regulatory regime seeks to achieve an environment which fosters efficient use of existing infrastructure, efficient operating and maintenance practices and an efficient level of investment
- in setting the revenue cap, the Commission must have regard to the provision of a fair and reasonable risk-adjusted cash flow rate of return on efficient investment including sunk assets
- the regulatory regime provides reasonable recognition of pre-existing policies of governments regarding transmission asset values, revenue paths and prices but with the limitation that such valuation must not exceed the deprival value of those assets.

Terms of reference

Capital expenditure

The consultant is to review the capex proposal by TransGrid for the forthcoming regulatory period and is required to:

- review the adequacy of TransGrid's methodology and planning processes in arriving at a forward estimate of the efficient level of future investment needs, looking at the exogenous and endogenous factors affecting projected future capex performance

- assess the assumptions underlying any trade-offs between capex and opex

- compare TransGrid's capex proposal, asset management policies and quality of service standards, with industry best practice

- assess the likelihood that proposed non-reliability augmentation capex will pass the regulatory test including:

  - the benefits
  - the costs
  - probability of proceeding and
  - timing of construction

- assess the likelihood that proposed reliability augmentation capex will pass the *regulatory test* including:
  - demonstrated need for such investment to meet the requirements set out in schedule 5.1 of the code and/or relevant legislations and regulations in NSW
  - the costs
  - probability of proceeding and
  - timing of construction

- assess the need for proposed non augmentation capex works as well as consider:

  - the costs
  - probability of proceeding
  - timing of construction

- review the allocation of capital expenditure between contestable and non-contestable services.

Asset base

The consultant must advise on an opening regulatory asset valuation to apply to TransGrid as at 1 July 2004. This should be done by rolling forward the asset base by using the Commission's PTRM electricity model; the actual rate of inflation during the appropriate period and efficient capex. The consultant will also consider alternative approaches to asset valuation as required.

The consultant must provide a schedule listing the assets categorised into classes, their standard replacement costs, relevant asset lives and depreciation profiles. In determining an opening asset valuation to apply to TransGrid, the consultant is required to review augmentation and non-augmentation capital expenditure undertaken by TransGrid over the previous regulatory period. In particular the consultant must:

1. Undertake a review of 3 (three) regulatory test applications, as directed by the Commission, conducted by TransGrid during the previous regulatory period and advise the Commission on whether the regulatory test application was conducted in accordance with the process outlined in the Code and methodology outlined in the regulatory test. In particular, the review must advise the Commission on:

    a. In the event that the reliability augmentation was proposed to meet an objectively measurable service standard linked to the technical requirements set out in schedule 5.1 of the code and/or relevant legislations and regulations in NSW at the time that the regulatory test was undertaken, in particular:

        i. Whether the augmentation relates to an objective criteria set out in schedule 5.1 of the code and/or relevant legislations and regulations in NSW

        ii. Whether the alternatives were justifiably excluded

        iii. Whether the costing for the alternative projects (including embedded generation, cogeneration, demand side responses and other non-build options) was in accordance with industry practice;

        iv. Whether the timing of the construction was appropriate

        v. Whether the market development scenarios were reasonable

2. As set out in statement 5.1 of the draft Regulatory Principles, undertake an audit of 1 (one) non-augmentation capital expenditure, as directed by the Commission, and advise whether:

    a) the amount invested by TransGrid exceeded the amount that would be invested by a prudent TNSP acting efficiently in accordance with good industry practice and to achieve the lowest sustainable cost of delivering services
    b) In the event that it does not the consultant must advise the Commission on whether
        i. the anticipated incremental revenue generated by the capital expenditure exceeds the investment cost;
        ii. the capital expenditure has system wide benefits
        iii. the new capital expenditure is necessary to maintain safety, integrity or is approved under the code and/or the relevant legislations and regulations in NSW.
3. The consultant is to compare TransGrid's capex program approved by the Commission at the previous regulatory reset with TransGrid's actual capex spent during the regulatory period and identify the endogenous and exogenous factors driving differences between the two.

The consultant is also to provide advice on other such matters as are necessary to enable the Commission to make a valuation of the non-contestable assets of TransGrid expected to be in service on 1 July 2004.

Operating and maintenance expenditure

The consultant is to analyse and comment on the following matters in relation to the contribution of opex to TransGrid's delivery of transmission services:

- benchmarking TransGrid's opex forecasts against other transmission network service providers both national and internationally
- conducting an assessment of TransGrid's forecast opex costs for each year of the regulatory period, looking at endogenous and exogenous cost drivers and whether there is scope for additional efficiency gains
- comparing TransGrid's opex program approved by the Commission at the previous regulatory reset with TransGrid's actual opex spent during the regulatory period and identify the endogenous and exogenous factors driving any differences between the two
- reviewing TransGrid's allocation of opex costs to specific activities, including the distinctions between regulated and non-regulated activities, between routine maintenance and renewals, and the treatment of joint and common costs, especially corporate administration expenses, financing charges and depreciation
- assessing the efficiency of TransGrid's operating practices and asset management systems in ensuring that only necessary and efficient opex expenditure occurs, with reference to the acceleration or deferral of capital expenditure

Service Standards

The consultant must recommend appropriate service standards and performance targets, based on TransGrid's historical performance and the previous review by Sinclair Knight Merz, [11] and other obligations contained in legislation, the Code, regulations and directions or licence requirements issued as provided for within such instruments.

Consultation Process

The consultant will be required to consult extensively with TransGrid during the course of the review. These consultations will involve the consultant requesting information from TransGrid which is in addition to that submitted in TransGrid's original application as well meetings with TransGrid and possible site visits, expected to be a minimum of three days duration.

The Commission is simultaneously conducting an inquiry into the appropriate revenue cap to be applied to the non-contestable elements of the transmission services provided by EnergyAustralia, from 1 July 2004. Given the similar inquiry timeframe, the need to ensure a consistent approach and the shared network planning and development undertaken by the two companies, the consultant reviewing TransGrid's application will be required to work closely with the consultant chosen to review EnergyAustralia's application. In addition, the consultant may be required to liaise with EnergyAustralia as directed by Commission staff.

[11] Sinclair Knight Merz, *The Commission Network Service Provider (TNSP – Service Standards)*, March 2003, ACCC website

Source Materials

In undertaking the review the consultant source materials must include the following documents:

- The Commissions responsibilities as set out in the Code, in particular Chapter 6 Part B;
- Commission's previous revenue cap decision for TransGrid from 1999-2004 and its other recent revenue cap decisions;
- Commission's *Draft Statement of Principles for the Regulation of Transmission Revenues (Draft Regulatory Principles);* and
- Commission's *Discussion Paper 2003 – Review of the Draft Regulatory Principles*
- *The Regulatory test for new interconnectors and network augmentations* – 15 December 1999
- Sinclair Knight Merz, *The Commission Network Service Provider (TNSP – Service Standards)* - March 2003
- Other relevant legislation, Codes, regulations and directions issued in accordance with such instruments that set our and/or determine TransGrid's performance obligations.

Timing and outcomes

The successful consultant will be required to sign the Commission's standard contract.

The Commission expects to receive TransGrid's application in mid September 2003.

The Commission expects to release a draft decision in March 2004. Given this timeline the draft consultancy report must be provided to the Commission no later than 17 November 2003 and the final report no later than 8 December 2003.

The final consultancy report will be made available to the public. It will also form the basis of a discussion to be held with key stakeholders, which is expected to take place in March 2004. The consultant is to be available for this discussion.

The consultant should also expect to make a number of presentations to staff of the Commission and TransGrid regarding the contents of the report.

The Commission may need to discuss issues with consultants after the consultant's final report.

Appendix B

Glossary of Terms

Glossary of Terms and Acronyms

Acronym	Term
AMSIP	Asset Management System Implementation Project
Capex	Capital Expenditure
CBA	Condition Based Assessment
CBD	Central Business District
CDN	Corporate Data Network
Commission	The Australian Competition and Consumer Commission
DMS	Data Management System
DNSP	Distribution Network Service Provider
ESAA	Electricity Supply Association of Australia
KPI's	Key Performance Indicators
NEC	National Electricity Code
NEM	National Electricity Market
NEMMCO	National Electrical Market Management Company
NPC	Net Present Cost
Opex	Operating Expenditure
OPGW	Optical Fibre Ground Wire
PI	Performance Incentive
QNI	Queensland – New South Wales Interconnector
RAB	Regulatory Asset Base
RP	Regulatory Period
SKM	Sinclair Knight Merz
TG	TransGrid
TNSP	Transmission Network Service Provider
ToR	Terms of Reference

Acronym	Term
TPA	Trade Practices Act 1974
TUOS	Transmission Use of Service Charge
WACC	Weighted Average Cost of Capital

Appendix C

Reference Material

No.	Document Title	Description	Date entered into GHD register	Source
001	ACCC Cover 1 C 199903_1.tif	Front cover for TransGrid Application document	29/09/2003	TransGrid
002	ACCC Cover 1 C 199903_2.tif	Rear cover page for TransGrid Application document	26/09/2003	TransGrid
003	2004 Revenue Reset App Version 12h.pdf	Initially submitted TransGrid Appliation document	26/09/2003	TransGrid
004	A1-Code provisions.pdf	Appendix to submission	02/10/2003	TransGrid
005	A2-Draft SRP.pdf	Appendix to submission	02/10/2003	TransGrid
006	A3-Extract from Energy Services Corporations Act.pdf	Appendix to submission	02/10/2003	TransGrid
007	A4-Annual Planning Report 2003.pdf	Appendix to submission	02/10/2003	TransGrid
008	A5-Network Management Plan 2001-2006.pdf	Appendix to submission	02/10/2003	TransGrid
009	A6-Credible contingency events.pdf	Appendix to submission	02/10/2003	TransGrid
010	A7-NEM Code Changes since market commencement.pdf	Appendix to submission	02/10/2003	TransGrid
011	A 8-Roll Forward 2000-4.pdf	Appendix to submission	21/10/2003	TransGrid
012	A9-Asset average lives.pdf	Appendix to submission	16/10/2003	TransGrid
013	A10-Use of TFP in CPI-X Regulation.pdf	Appendix to submission	02/10/2003	TransGrid
014	A11-eansw_environmental law manual.pdf	Appendix to submission	02/10/2003	TransGrid
015	A12-Major capital works project pre-planning.pdf	Appendix to submission	02/10/2003	TransGrid
016	A13-Cost Pass-throughs Mechanism.pdf	Appendix to submission	02/10/2003	TransGrid
017	A14-TransGrid Submission Service Standards Guidelines.pdf	Appendix to submission	02/10/2003	TransGrid
018	A-15-Service Standards Measures Final.pdf	Appendix to submission	23/10/2003	TransGrid
019	A16-International vs Domestic CAPM.pdf	Appendix to submission	02/10/2003	TransGrid
020	A17-The value of Gamma.pdf	Appendix to submission	02/10/2003	TransGrid
021	2002 TG Annual Report	Annual Report	03/10/2003	TransGrid
022	TransGrid Revenue Reset Workshop	Kickoff meeting presentation	15/10/2003	TransGrid
023	ROAM Response 21.May.03 ACCC-031010-9,pdf	TransGrid response to the 1st round of questions by ACCC	28/10/2003	TransGrid
024	ROAM Trg00007 Report ACCC-031010-9.pdf	TransGrid response to the 1st round of questions by ACCC	29/10/2003	TransGrid
025	Substation Projects summary ACCC-031010-4 $66m SS.xls	TransGrid response to the 1st round of questions by ACCC	30/10/2003	TransGrid
026	Transformer Reps and Additions $37m ACCC-031010-4.doc	TransGrid response to the 1st round of questions by ACCC	30/10/2003	TransGrid

027	TransGrid Planning Criteria Review ACCC-031010-8.pdf	TransGrid response to the 1st round of questions by ACCC	30/10/2003	TransGrid
028	Motor Vehicle Costs - TransGrid ACCC 0301010-4.xls	TransGrid response to the 1st round of questions by ACCC	30/10/2003	TransGrid
029	Motor vehicles - Cost Allocation - ACCC-031010-4.doc	TransGrid response to the 1st round of questions by ACCC	30/10/2003	TransGrid
030	1999-00 to 2003-04 Capital Projects for ACCC v3.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
031	1 (c) (iv) Armidale to Kempsey 132kV Line.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
032	1 (c) (iv) CAD-EDMS.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
033	1 (c) (iv) Circuit Breakers and Current Transformers.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
034	1 (c) (iv) SCADA Replacement.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
035	1 (c) (iv) TAMIS System.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
036	1 (c) (iii) Substations Projects Response.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
037	2 (a) Projects which may be commissioned in the Period July 2004 to June 2009 (Rev 2).pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
038	2 (a) Support forecast capex ACCC-031010-7.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
039	2 (a) IT Management Framework.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
040	3 (a) Opex 2000 - 2004 as sent for October 29 2003.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
041	Attachment A_4(a)_4(b) ACCC-031010-14 & 15.pdf	TransGrid response to the 1st round of questions by ACCC	03/11/2003	TransGrid
042	Annual Planning Report 2002.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
043	Annual Planning Report 2003.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
044	Annual Planning Statement 1999.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
045	Annual Planning Statement 2000.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
046	Annual Planning Statement 2001.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
047	Attachment 8 - Roll Forward 2000-4.xls	Supplemented by ACCC	05/11/2003	TransGrid
048	Balranald Cost Effectiveness Analysis Figs 0-10.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
049	Balranald Cost Effectiveness.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
050	Balranald Final Report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
051	Powerlink Needs Statement.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
052	TransGrid Needs Statement Far North Coast.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
053	Liverpool Area DM Request.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
054	Molong Consultant's progress report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
055	Molong Consultation Paper.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid

056	Molong Final Report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
057	South West Needs Statement.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
058	South West Preliminary Analysis.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
059	cbd_final_report_2000.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
060	NERA - CBD Report - Appendices A & B.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
061	NERA - CBD Report - Appendix C.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
062	NERA - CBD Report - Executive Summary.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
063	NERA - CBD Report - Main Report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
064	Consultation Paper_Rev 0_.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
065	Final Report_Rev 0_.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
066	NST 01 Central Coast Needs Statement Rev 1.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
067	mid_north_coast_consultation_paper.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
068	mid_north_coast_DM_RFP.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
069	mid_north_coast_needs_statement.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
070	GPS Revised Report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
071	NERA Prelim CEA Report - Appendix B.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
072	NERA Prelim CEA Report - Main Text.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
073	NST 03 Western Area Needs Statement Rev 0.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
074	Western Area Consultation Paper.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
075	Western Area Final Report.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
076	TransGrid Asset Management Strategies Secondary Systems - Communication & Control, Metering, Protection. Policy, budgets, initiatives and details.	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
077	Index. Accc-031010-5 "Pre-NEW" Projects - Attachment A - 1. (c)(v) Additional information for Index Item 9 - LISMORE SVC	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
078	TransGrid Major Customer Accounts - Supply to the Western Metropolitan Area	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
079	Asset Management Strategies Substations - Policy, budgets, initiatives and details	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
080	Reconstruction of Yass 330/132kV Substation	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid

081	Index ACCC-031010-4: Transformer additions and Replacements - Attachment A - 1.b ACCC-031010-5: "Pre-NEM" Projects - Attachments A - 1. (c)(v)	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
082	Index ACCC-031010-5 "Provide documentation justifying the expenditure undertaken on non-augmentation projects"	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
083	Asset Management Strategies Mains - Overhead Transmission Lines, Underground Cables. Policy, budgets, initiatives and details.	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
084	Reg Test Spread Sheet Q 1(b).pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
085	1999-00 to 2003-04 Capital Projects for ACCC v2.pdf (SUPERCEDED BY DOCUMENT 030)	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
086	Other Sydney Projects $11m ACCC-031010-4 - 1_b_.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
087	Miscellaneous Transmission Lines ACCC -031010- 4 1_b_.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
088	ISG Capital Expenditure 1999 2004.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
089	Easements acquired - ACCC-031010-6 1(d)(I).pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
090	Easements - Future valuation method ACCC-031010-6 - 1(d)(ii).pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
091	TransGrid labour costs - ACCC-031010-13.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
092	Risks_TransGrid_Confidential Report_FINAL Trowbridge 15-09-03.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
093	Risks_TransGrid_Main Report_FINAL Trowbridge 15-09-03.pdf	TransGrid response to the 1st round of questions by ACCC	05/11/2003	TransGrid
094	annrpt_2001.pdf	Annual Report	06/11/2003	Website
095	ar00_1.pdf	Annual Report	06/11/2003	Website
096	ar00_2.pdf	Annual Report	06/11/2003	Website
097	ar00_3.pdf	Annual Report	06/11/2003	Website
098	TransGrid_Reportdraft.pdf (2002/03 Annual Report)	Annual Report	06/11/2003	Website
099	Other capital projects work completed or in progress.doc	Information from TransGrid	14/11/2003	TransGrid
100	System Reactive Plant (Rev 1).xls	Information from TransGrid	14/11/2003	TransGrid
101	Email re CPI calculations and 'as commissioned' Capex figures	Information from TransGrid	14/11/2003	TransGrid
102	ACCC-031103-23 - Capex based on IDC	Information from TransGrid	19/11/2003	TransGrid
103	Executive.pdf	Exec level org chart	20/11/2003	TransGrid
104	GM-Business-Resources.pdf	Org Chart Info	20/11/2003	TransGrid

105	GM-Commercial.pdf	Org Chart Info	20/11/2003	TransGrid
106	GM-Corporate-Development.pdf	Org Chart Info	20/11/2003	TransGrid
107	GM-Engineering.pdf	Org Chart Info	20/11/2003	TransGrid
108	GM-Network.pdf	Org Chart Info	20/11/2003	TransGrid
109	GM-System-Operations.pdf	Org Chart Info	20/11/2003	TransGrid
110	Org Chart - Meetings with GHD.xls	People/Meetings Agenda - superceded	20/11/2003	TransGrid
111	Trg00007- Respond to the ACCC Request-25Nov03.pdf	TG response to previous ACCC questions. ROAM Report, Description of 'Bottom-Up' Approach for Scenario Analysis	01/12/2003	TransGrid
112	ACCC Request for Information - 20 November 2003 : Documents for Attachment C 1 recasting Capex Information Questions (e)	TG Response to ACCC questions of 20 Nov 2003	02/12/2003	TransGrid
113	Action by TransGrid-ACCC.doc	Action items from interviews on Friday 5th December (updated in docs 235 & 236)	11/12/2003	TransGrid
114	ACCC031120_25_1_.pdf	Response to RFI Q25_1 from ACCC: Have we properly described your approach to the establishment of the starting point?	12/12/2003	ACCC
115	ACCC031120_25_2_.pdf	Response to RFI Q25_2 from ACCC: Why do you think that the Commission's 1999 estimate of the "efficient" expenditure in 2003/4 is a reasonable place to start?	12/12/2003	ACCC
116	ACCC031120_25_4_.pdf	Response to RFI Q25_4 from ACCC: If self-insurance and exogenous costs are proposed to be separately "passed-through" in future, why have they been included in the estimation of the starting point for the efficient level of opex for the coming period?	12/12/2003	ACCC
117	ACCC031120_28_1_.pdf	Response to RFI Q28_1 from ACCC: TransGrid has supplied a Board Paper dealing with self-insurance. TransGrid will need to supply Board resolution for their claim to be further considered.	12/12/2003	ACCC
118	ACCC031120_28_2_.pdf	Response to RFI Q28_2 from ACCC: The Trowbridge Deloitte report states that due to the uncertainty surrounding easement disputes a pass through mechanism would be more appropriate. Will TransGrid be claiming this as a pass through event in Attachment 13? If so, the Commission will require an amended version of that Attachment giving full details of the proposed pass through event.	12/12/2003	ACCC
119	ACCC31120_28_3_.pdf	Response to RFI Q28_3 from ACCC: Referring to TransGrid's email of 24 October, will TransGrid be including a Change in Accounting Standards Event in Attachment 13, or major projects such as NewVic 3500? If so, the Commission will require an amended version of that Attachment giving full details of these proposed pass through events.	12/12/2003	ACCC
120	ACCC031120_29_2_.pdf	Response to RFI Q29_2 from ACCC: On page 3 of the Meritec report it is stated that "TG aim to cover the 1 0% forecast with the most adverse generation/interconnection flow pattern under n-l ". Can you help us to understand more precisely what this means. In particular, with respect to your largest single proposed network augmentation can you demonstrate in detail how this criteria has been applied?	12/12/2003	ACCC

121	ACCC031120_29_3_.pdf	Response to RFI Q29_3 from ACCC: On page 4 of the Meritec report, it is claimed that the impact of contingency levels that exceed n-l are assessed for major and sensitive loads. What precisely does this mean and which of your proposed investments reflect this assessment? Please identify specific investments and quantify them. In addition, does TransGrid have any connection agreements that guarantee higher security of supply than provided in the planning standard? If so, please describe these contracts to us and how the additional costs (including more general network reinforcement) are calculated under those contracts. **Similar to Q206**	12/12/2003	ACCC
122	ACCC031120_29_4_.pdf	Response to RFI Q29_4 from ACCC: On page 4 of the Meritec report, the planning criteria for urban and suburban areas are described. Is any of your forecast capital expenditure affected by these criteria? If so, please identify specific projects and quantify the amount. **Similar to Q 199**	13/12/2003	ACCC
123	ACCC031120_29_5_.pdf	Response to RFI Q29_5 from ACCC: On pages 5 and 6 of the Meritec report, it is stated that "the requirement to schedule maintenance outages may also be a driver for transformer augmentation or increased load transfer capacity". Can you identify and quantify)' which proposed investments reflect this consideration? **Similar to Q201**	14/12/2003	ACCC
124	ACCC031120_29_6_.pdf	Response to RFI Q29_6 from ACCC: On page 6 of the Meritec report it is stated that "various low probability events are considered". However it is not clear what impact this has on your investment proposals. Can you specifically describe how you have taken into account these low probability events and identify and quantify their impact on your capex proposal? **Similar to Q200**	15/12/2003	ACCC
125	ACCC031120_29_7_.pdf	Response to RFI Q29_7 from ACCC: On page 6 of the Meritec report (and again on page 14) it is stated that for non-urban areas, where n-l capacity is exceeded, an agreed level of risk of non-supply may be accepted and that augmentations would only be undertaken when the forecast load exceeds the firm capacity by an agreed amount or length of time. Specifically what metrics are used to measure the amount of time and agreed level of risk, and how has this been reflected in the investment plans? **Similar to Q202**	16/12/2003	ACCC
126	ACCC031120_29_8_.pdf	Response to RFI Q29_8 from ACCC: On page 6 of the Meritec report, transient stability standards are described. Can you specifically identify which investments have been proposed in order to meet these standards? **Similar to Q203**	17/12/2003	ACCC
127	ACCC031120_30_10_.pdf	Response to RFI Q30_10 from ACCC: Second how the expected load flows compare to the presumed capacity of the network.	18/12/2003	ACCC
128	ACCC031120_30_11_.pdf	Response to RFI Q30_11 from ACCC: Third, how TransGrid's planning criteria have been practically applied for each investment. In this analysis we would also like to see how you have taken account of changes to the operations and maintenance regime (for example increased live-line working, altered maintenance arrangements), operating standards (for example short-term line ratings); and use of network control technologies (for example inter-tripping etc.) to augment the capacity of the	19/12/2003	ACCC

		network other than through additional investment. **Similar to Q205**		
129	ACCC031120_30_12_.pdf	Response to RFI Q30_12 from ACCC: Fourth where there is a demonstrated need for investment, we would need to understand whether the investment that you have proposed is the most efficient. In this regard we would need to understand your approach to the design of the investment needed to meet the planning standard. We will also need to understand the alternatives that you have considered and your project costing data. **Similar to Q198**	20/12/2003	ACCC
130	ACCC031120_30_13_.pdf	Response to RFI Q30_13 from ACCC: Fifth, we would like to understand how your "likelihood of proceeding" criteria have been applied. In particular, how were these probabilities calculated and how do they relate to the probabilities in the ROAM analysis for their 16 scenarios? **Similar to Q207**	21/12/2003	ACCC
131	ACCC031120_30_15_.pdf	Response to RFI Q30_15 from ACCC: Second can you identify (and quantify) projects for which the Regulatory Test has already been applied, or is currently in the process of application. **Similar to Q208**	22/12/2003	ACCC
132	ACCC031120_30_16_.pdf	Response to RFI Q30_16 from ACCC: Third can you identify (and quantify) investment from 2004 that is currently being developed, or which follows-on directly from projects currently under way. **Similar to Q209**	23/12/2003	ACCC
133	ACCC031120_30_18_.pdf	Response to RFI Q30_18 from ACCC: Fifth, can you separately identify "non-network" generation and demand related investment such as in easements, communication equipment etc. **Similar to Q210**	24/12/2003	ACCC
134	ACCC031120_30_9_.pdf	Response to RFI Q30_9 from ACCC: First how the expected generation/demand developments impact load flows through-out your network. **Similar to Q204**	25/12/2003	ACCC
135	ACCC031120_31_19_.pdf	Response to RFI Q30_19 from ACCC: The ROAM Report refers to taking a "Bottom-Up approach" that it undertook which included probabilities of retirement and refurbishment for existing plant. The Commission requests the information that relates to this bottom-up approach as it relates to both forward capex and refurbishment. **Similar to Q211**	26/12/2003	ACCC
136	ACCC031120_31_20_.pdf	Response to RFI Q31_20: The Commission requires elaboration and substantiation of TransGrid's claim for the refurbishment category of "Asset Security".	27/12/2003	ACCC
137	ACCC031120_32_21b_.pdf	Response to RFI Q32_21b from ACCC: Information required by the Commission to assess TransGrid' s claim will include: b) A more detailed explanation of the "miscellaneous equipment" category.	28/12/2003	ACCC

138	ACCC031120_33_a_.pdf	Response to RFI Q33_a from ACCC: A classification of total capex investment from 1999 to 2004 ($1066 million) into three categories: i. augmentation investment; ii. investment to refurbish or replace existing assets; and iii. investment to support the business.	29/12/2003	ACCC
139	ACCC031120_33_b_.pdf	Response to RFI Q33_b from ACCC: For the augmentation and refurbishment/replacement categories, can you aggregate this expenditure into the minimum number of independent projects. This is so that elements of a common project (such as the reinforcement of a transmission line and commensurate transformer, switchgear) are aggregated and we are therefore left with a more manageable and logically grouped set of projects to assess. **Similar to Q214**	30/12/2003	ACCC
140	ACCC031120_33_e_.pdf	Response to RFI Q33_e from ACCC: For refurbishment/replacement projects, can you describe for each (group of) projects how you assessed the need for those projects. We appreciate that your asset management documentation sets out, in principle, how the need for refurbishment is assessed, and the basis upon which investment is capitalised or expensed. However, we are concerned to understand more precisely how you have applied this for the investments that you have made.	31/12/2003	ACCC
141	ACCC031120_33_g_.pdf	Response to RFI Q33_g from ACCC: As noted previously, we have found it difficult to ascertain the status of the projects identified in the Master Spreadsheet and how these projects are linked to forecast capex. Could TransGrid specify the status (complete/finalised, incomplete and the amount TransGrid are proposing to spend on this project in the next period (2004/05-2008/09) of the projects identified in the Master Spreadsheet.	01/01/2003	ACCC
142	ACCC031120_33_h.pdf	Response to RFI Q33_h from ACCC: Can you link the incomplete projects identified in the Master Spreadsheet to the forecast capex investment proposed in the spreadsheets that TransGrid provided to the Commission (doc reference ACCC-031 0 1 0-7). **Similar to Q212**	02/01/2003	ACCC
143	ACCC031120_33_i_.pdf	Response to RFI Q33_I from ACCC: In relation to augmentation projects for which the regulatory test has been applied (and identified in the Master Spreadsheet and "complete ACCC Spreadsheet previously requested"), can you clarify whether the regulatory test cost only represents the cost/works to TransGrid's network, or whether this incorporates investment costs to DNSPs/other TNSP's network. **Similar to Q213**	03/01/2003	ACCC
144	Amended- 1999-00 to 2003-04 Capital Projects to ACCC v5- 28-11-03.pdf	Capital Projects 99/00-03/04 item	04/01/2003	ACCC
145	electricity supply to sydney's cbd and inner suburbs- final report	electricity supply to sydney's cbd and inner suburbs- final report	15/12/2003	ACCC
146	Incorrect Document Filed here- been moved to EA Register			
147	ACCC031120_25_3_.pdf	Response to RFI Q25_3 from ACCC: Why do you think that the WCI is a suitable index to apply to describe the inflation of all of your opex? In particular we are aware of your statement that around 80% of your total opex is spent on wages. Could you expand on this to provide a more precise substantiation of this	17/12/2003	ACCC

		contention?		
148	ACCC031120_29_1_.pdf	Response to RFI Q29_1 from ACCC: On page 3 of the Meritec report it is stated that "there are some instances where TransGrid's criteria exceed those of NEMMCO". With specific reference to your proposed investments, can you identify which investments will result from this criterion and quantify this.	17/12/2003	ACCC
149	ACCC031120_30_17_.pdf	Response to RFI Q30_17 from ACCC: Fourth can you separately identify (and quantify) investment in connection assets (including radial extensions) directly attributable to expected new generation and load connections.	17/12/2003	ACCC
150	ACCC031120_32_21a_.pdf	Response to RFI Q32_21a from ACCC: Information required by the Commission to assess TransGrid' s claim will include: a) An explanation as to the drivers of these costs such as their relationship to network expansion (if any), operating expenditure required (if any) or other factors.	17/12/2003	ACCC
151	ACCC031120_32_21c_.pdf	Response to RFI Q32_21c from ACCC: Information required by the Commission to assess TransGrid' s claim will include: c) A more detailed explanation of TransGrid's computer related expenditure will be required, for example providing a distinction between "Computer Application Enhancements" and "Storage, Server and PC upgrades".	17/12/2003	ACCC
152	Ltr to Sebastian Roberts 15 Dec 03.doc	Ltr to Sebastian Roberts 15 Dec 03.doc	19/12/2003	ACCC
153	Letter to Sebastian Roberts 18 Dec 03.doc	Letter to Sebastian Roberts 18 Dec 03.doc	19/12/2003	ACCC
154	letter_Kym Tothill_18-12-03.doc	letter_Kym Tothill_18-12-03.doc	19/12/2003	ACCC
155	The Audit Office of New South Wales	Letter Re: Client Service Report for Year ended 30June 2003	19/12/2003	ACCC
156	GHD-031209_83	Budget spreadsheet and external cost build-up- Examples	19/12/2003	ACCC
157	GHD-031210-88	Executive Paper on review of telephone carrier arrangements- example of outsourcing	19/12/2003	ACCC
158	GHD-031210-89	Paper on TG's insurance costs	19/12/2003	ACCC
159	GHD-031209-82	Provide copy of the Substation Technology and Design Review Report- 5Feb 2002	19/12/2003	ACCC
160	GHD-031203_6	Actions arising form Discussions with GHD on 3 December 2003	19/12/2003	ACCC
161	GHD-031210-87	Examples of post project review	20/12/2003	ACCC
162	ACCC_031120_27accountscat.pdf	TransGrid Operating Expenditure 1999-2000 to 2003-2004 (Rounded to $Millions) Actuals and 2005 - 2009 Forecast	22/12/2003	ACCC
163	ACCC_031120_27funccat.pdf	TransGrid Operating Expenditure 1999-2000 to 2003-2004 (Rounded to $Millions) Actuals by Function	22/12/2003	ACCC
164	ACCC_031120_27outsourced.pdf	OUTSOURCED SERVICES - Expenditure Projections	22/12/2003	ACCC

165	ACCC_031120_27text.pdf	Attachment B – Response to Information Requests ACCC-031120-1, ACCC-031120-2, GHD-031210-91, GHD-031210-93	22/12/2003	ACCC
166	Attachment A_1.pdf	Topdown Analysis of Opex_1	22/12/2003	ACCC
167	Attachment A_2.pdf	Topdown Analysis of Opex_2	22/12/2003	ACCC
168	GHD-031208-69.pdf	Organisational efficiency review Final Report (PWC)	22/12/2003	TG
169	Industry Wage Comparisons for ACCC.pdf	NSW Power Industry Award Increases	22/12/2003	ACCC
170	Letter to SC Opex Needs 19 Dec 03.pdf	Re: TransGrid Revenue Reset Application for 004 to 2009 - Operating Expenditure Requirements	22/12/2003	ACCC
171	GHD-031208-71 Network Operating Expenditure.pdf	Presentation by John Byrne	22/12/2003	TG
172	GHD-031209-74 Network Operating Expenditure.pdf	Copy of Kevin Murrarys Presentation	22/12/2003	ACCC
173	GHD-031204-53 ACCC - Capex Refurbishment.pdf	An Overview of TransGrid's Capex - Refurbishment 4/12/2003	22/12/2003	ACCC
174	GHD-031204-53 ACCC - Current Transformer Failures.pdf	Current Transformer Replacements 4/12/2003	22/12/2003	ACCC
175	GHD-031204-53 ACCC - TransGrid's 30 & 5 Year Plan.pdf	TransGrid's 30 Year Plan 2001-2030 4/12/2003	22/12/2003	ACCC
176	GHD-031204-53 ACCC - Wood Pole Replacement Strategy - Final.pdf	Wood Pole Replacement Strategy 4/12/2003	22/12/2003	ACCC
177	GHD-031204-53 ACCC AM Process.pdf	Asset Management in TransGrid	22/12/2003	ACCC
178	GHD-031204-53 ACCC Capital Refurb Expenditure.pdf	Capital Refurb Expenditure	22/12/2003	ACCC
179	GHD-031204-53 ACCC Condition Monitoring Review v2.pdf	Condition Monitoring Review	22/12/2003	ACCC
180	GHD-031204-53 ACCC Security.pdf	TransGrid ACCC Secrity Presentation 4/12/2003	22/12/2003	ACCC
181	GHD-031204-53 AMSIP Presentation Maint P Phillips.pdf	TransGrid Asset Management Systems Improvement Program	22/12/2003	ACCC
182	GHD031203-33GHD Future Capex Questions 1 and 2 of 28-11-2003 (Rev 03).xls	YTD Project costs for Projects which Carry-over from the Current Reset Period to the 2004/05 to 2008/09 Reset Period	22/12/2003	ACCC
183	GHD031203-12	Standard Desktop Computer Infrastructure	22/12/2003	ACCC
184	GHD031203-1	NSW Consolidated Acts, Energy Services Corporations Act 1995 - SECT 6B	22/12/2003	ACCC
185	GHD-031204-48	Condition Monitoring Working Group Report June 2002	22/12/2003	ACCC
186	GHD031203-12	CAPEX Supporting the Business IT Systems	22/12/2003	ACCC
187	GHD-031209-73	Accounts Payable, Fianancial Management	22/12/2003	ACCC
188	GHD-031209-75	Circuit Breaker Savings 1998-2003	22/12/2003	ACCC
189	GHD-031205-65	NSW Works Associated with SNOVIC - $2.6 million	22/12/2003	ACCC
190	GHD-031204-56	Making Incentive Regulation For Electricity Transmission Work (and Workable)	22/12/2003	ACCC
191	GHD-031204-51	Asset Security Response to ACCC RFI Attachment B - Refurbishment Capex Q20	22/12/2003	ACCC

192	GHD-031204-46	Asset Management Strategy - Substations	22/12/2003	ACCC
193	GHD031203-19, GHD031230-20, GHD031203-21, GHD031203-22	Motor Vehicle and Mobile Plant Data, Capex Info, Asset Procedures, Expenditue Capitalisation Procedure	22/12/2003	ACCC
194	GHD-031204-47	Network 30 Year Plan	22/12/2003	ACCC
195	GHD-031204-44	ACCC Consultants Meeting Refurbishment CAPEX Asset Management Process	22/12/2003	ACCC
196	GHD031203-10,GHD031203-11, 14, 15, 17, 18	IT Strategic Plan 2002/04, TG Internal Memo	22/12/2003	ACCC
197	Intentionally Blank			
198	ACCC-031120-30(12).pdf	Response to RFI Q30(12) from ACCC: Fourth where there is a demonstrated need for investment, we would need to understand whether the investment that you have proposed is the most efficient. In this regard we would need to understand your approach to the design of the investment needed to meet the planning standard. We will also need to understand the alternatives that you have considered and your project costing data. **Similar to Q129**	22/12/2003	ACCC
199	ACCC-031120-29(4).pdf	Response to RFI Q29(4) from ACCC: On page 4 of the Meritec report, the planning criteria for urban and suburban areas are described. Is any of your forecast capital expenditure affected by these criteria? If so, please identify specific projects and quantify the amount. **Similar to Q122**	22/12/2003	ACCC
200	ACCC-031120-29(6).pdf	Response to RFI Q29(6) from ACCC: On page 6 of the Meritec report it is stated that "various low probability events are considered". However it is not clear what impact this has on your investment proposals. Can you specifically describe how you have taken into account these low probability events and identify and quantify their impact on your capex proposal? **Similar to Q124**	22/12/2003	ACCC
201	ACCC-031120-29(5).pdf	Response to RFI Q29(5) from ACCC: On pages 5 and 6 of the Meritec report, it is stated that "the requirement to schedule maintenance outages may also be a driver for transformer augmentation or increased load transfer capacity". Can you identify and quantify)' which proposed investments reflect this consideration? **Similar to Q123**	22/12/2003	ACCC
202	ACCC-031120-29(7).pdf	Response to RFI Q29(7) from ACCC: On page 6 of the Meritec report (and again on page 14) it is stated that for non-urban areas, where n-l capacity is exceeded, an agreed level of risk of non-supply may be accepted and that augmentations would only be undertaken when the forecast load exceeds the firm capacity by an agreed amount or length of time. Specifically what metrics are used to measure the amount of time and agreed level of risk, and how has this been: reflected in the investment plans? **Similar to Q125**	24/12/2003	ACCC
203	ACCC-031120-29(8).pdf	Response to RFI Q29(8) from ACCC: On page 6 of the Meritec report, transient stability standards are described. Can you specifically identify which investments have been proposed in order to meet these standards? **Similar to Q126**	24/12/2003	ACCC
204	ACCC-031120-30(9).pdf	Response to RFI Q30(9) from ACCC: First how the expected generation/demand developments impact load flows through-out your network.	24/12/2003	ACCC

205	ACCC-031120-30(11).pdf	Response to RFI Q30(11) from ACCC: Third, how TransGrid's planning criteria have been practically applied for each investment. In this analysis we would also like to see how you have taken account of changes to the operations and maintenance regime (for example increased live-line working, altered maintenance arrangements), operating standards (for example short-term line ratings); and use of network control technologies (for example inter-tripping etc.) to augment the capacity of the network other than through additional investment. **Similar to Q128**	24/12/2003	ACCC
206	ACCC-031120-29(3).pdf	Response to RFI Q29(3) from ACCC: On page 4 of the Meritec report, it is claimed that the impact of contingency levels that exceed n-l are assessed for major and sensitive loads. What precisely does this mean and which of your proposed investments reflect this assessment? Please identify specific investments and quantify them. In addition, does TransGrid have any connection agreements that guarantee higher security of supply than provided in the planning standard? If so, please describe these contracts to us and how the additional costs (including more general network reinforcement) are calculated under those contracts. **Similar to Q 121**	24/12/2003	ACCC
207	ACCC-031120-30(13).pdf	Response to RFI Q30(13) from ACCC: Fifth, we would like to understand how your "likelihood of proceeding" criteria have been applied. In particular, how were these probabilities calculated and how do they relate to the probabilities in the ROAM analysis for their 16 scenarios? **Similar to Q130**	24/12/2003	ACCC
208	ACCC-031120-30(15).pdf	Response to RFI Q30(15) from ACCC: Second can you identify (and quantify) projects for which the Regulatory Test has already been applied, or is currently in the process of application.	24/12/2003	ACCC
209	ACCC-031120-30(16).pdf	Response to RFI Q30(16) from ACCC: Third can you identify (and quantify) investment from 2004 that is currently being developed, or which follows-on directly from projects currently under way. **Similar to Q132**	24/12/2003	ACCC
210	ACCC-031120-30(18).pdf	Response to RFI Q30(18) from ACCC: Fifth, can you separately identify "non-network" generation and demand-related investment such as in easements, communication equipment etc. **Similar to Q133**	24/12/2003	ACCC
211	ACCC-031120-31(19).pdf	Response to RFI Q31(19) from ACCC: The ROAM Report refers to taking a "Bottom-Up approach" that it undertook which included probabilities of retirement and refurbishment for existing plant. The Commission requests the information that relates to this bottom-up approach as it relates to both forward capex and refurbishment. **Similar to Q135**	24/12/2003	ACCC
212	ACCC-031120-33(h).pdf	Response to RFI Q33(h) from ACCC: Can you link the incomplete projects identified in the Master Spreadsheet to the forecast capex investment proposed in the spreadsheets that TransGrid provided to the Commission (doc reference ACCC-031 0 1 0-7). **Similar to Q142**	24/12/2003	ACCC

213	ACCC-031120-33(I).pdf	Response to RFI Q33(I) from ACCC: In relation to augmentation projects for which the regulatory test has been applied (and identified in the Master Spreadsheet and "complete ACCC Spreadsheet previously requested"), can you clarify whether the regulatory test cost only represents the cost/works to TransGrid's network, or whether this incorporates investment costs to DNSPs/other TNSP's network. **Similar to Q143**	24/12/2003	ACCC
214	ACCC-031120-33(b).pdf	Response to RFI Q33(b) from ACCC: For the augmentation and refurbishment/replacement categories, can you aggregate this expenditure into the minimum number of independent projects. This is so that elements of a common project (such as the reinforcement of a transmission line and commensurate transformer, switchgear) are aggregated and we are therefore left with a more manageable and logically grouped set of projects to assess. **Similar to Q139**	24/12/2003	ACCC
215	ACCC-031120-33(14).pdf	Response to RFI Q33(14) from ACCC: Firstly please aggregate related projects. For example a project that involves a new line as well as substation work should be collected under one heading. The criteria for the aggregation should be simply that where one investment is contingent on another, such investment should be grouped under a common heading. The resulting collection of projects should therefore represent the minimum number of groups that are independent of one another. For each group of aggregated projects can you then provide a narrative description of the main drivers for that investment, commenting on the predictability of those drivers.	25/12/2003	ACCC
216	ACCC-031120-33(k).pdf	Response to RFI Q33(k) from ACCC: Could you identify the level of "spares", both "general spares" and specific spares items such as transformers that TransGrid hold and relate it to the capex items identified in the Master Spreadsheet.	26/12/2003	ACCC
217	ACCC-031120-34(b).pdf	Response to RFI Q34(b) from ACCC: could you provide the following information: i. Identify which projects were included in the Commission's 1999 determination that were not undertaken by TransGrid at all. For each project, please describe why it was not undertaken; ii. Identify which projects were included in the Commission's 1999 determination that were undertaken by TransGrid but which cost less to develop than provided-for in the Commission's 1999 determination; and explain (in detail) why TrasnsGrid was able to spend less than the Commission allowed; iii. Identify which projects were included in the Commission's 1999 determination that were undertaken by TransGrid but which cost more to develop than the Commission had envisaged, and explain why (in detail) the target was not met; iv. Identify which projects were not described in the Commission's 1999	27/12/2003	ACCC

		determination, but that were developed. Please explain (in detail) why this investment was undertaken with reference to planning criteria and how TransGrid a		
218	ACCC031120_25_5.pdf	Response to RFI Q25(5) from ACCC: Starting Point (Opex) 5. Why, precisely, does the increase in the network size over the last period justify an increase in opex? It would be helpful if you could justify this specifically with reference to projects that you have developed over this period.	31/12/2003	ACCC
219	ACCC031120_25_6_.pdf	Response to RFI Q25(6) from ACCC: Starting Point (Opex) 6. If the Commission's 1999 estimate is proposed as the starting point, then why does this not already take account of the expected expansion of the network i.e. why is an additional uprating of this starting point provided for?	31/12/2003	ACCC
220	ACCC031120_26_1_.pdf	Response to RFI Q26(1) from ACCC: Relationship between operating costs and new investment 1. Why have you adopted a different approach to the estimation of the impact of network investment on opex for the previous regulatory period, to what you have proposed for the coming period.	31/12/2003	ACCC
221	ACCC031120_26_2.pdf	Response to RFI Q26(2) from ACCC: Relationship between operating costs and new investment 2. What justification can you produce that the total O&M budget is linearly proportional (albeit lagged by two years) to the expansion of the network? Can you provide historical evidence to support this relationship in TransGrid and possibly also in other TNSPs?	31/12/2003	ACCC
222	ACCC031120_26_3_.pdf	Response to RFI Q26(3) from ACCC: Relationship between operating costs and new investment 3. Can you provide your detailed calculations to demonstrate that the forecast expansion of the network from 2004 to 2009 is consistent with the increase in the number of maintenance units that you suggest?	31/12/2003	ACCC
223	ACCC031120_26_4_.pdf	Response to RFI Q26(4) from ACCC: Relationship between operating costs and new investment 4. What justification can you produce for your definition of maintenance units (for example why switch bays, rather than say transformers, why the proposed proportion of switch bays to length of line, why no differentiation for different types/sizes of lines/switch bays etc.)? Can you point to evidence of the use of your definition of "maintenance units" in	31/12/2003	ACCC

		other transmission utilities?		
224	ACCC031120_27_3_.pdf	Response to RFI Q27(3) from ACCC: For exogenous cost-drivers that are likely to lead to increased expenditure could you describe the options available to TransGrid to mitigate the impact of such exogenous changes.	31/12/2003	ACCC
225	ACCC031120_28_4_.pdf	Response to RFI Q28(4) from ACCC: Self Insurance 4. If TransGrid's estimate of self-insurance and exogenous costs are to be the subject of a separate pass-through mechanism in the future, why are they to be included in the calculation of the efficient level of opex (excluding these pass-though costs) for the coming period?	31/12/2003	ACCC
226	AttachmentA_1.pdf	Top-Down analysis of Opex	31/12/2003	ACCC
227	AttachmentA_2.pdf	Top-Down analysis of Opex	31/12/2003	ACCC
228	GHD-031208-71jb.pdf	Copy of Presentation - Accounting, Benchmarks, Revenue, Opex, Asset Value, Capex, Staff numbers, Review Process	31/12/2003	TG
229	GHD-031208-71.pdf	Copy of Presentation from Phil Gall - Opex starting point justification	31/12/2003	TG
230	GHD-031204-46	Asset Management Strategy - Substations	22/12/2003	ACCC
231	ACCC031120_33_j_.pdf	Response to RFI Q33(j) from ACCC: If the regulatory cost includes investment costs to DNSP's/TNSP's network, for each regulatory test assessment could you identify and cost the portion of the regulatory test cost which relates to TransGrid's network compared to the portion relating to the DNSPs (intra-regional augmentations, eg Sydney CBD), and other TNSPs (for inter-regional augmentations, eg SNI and SNOVIC 400) network.	31/12/2003	ACCC
232	Amended- - 1999-00 to 2003-04 Capital Projects for ACCC v5 - 28-11-03.pdf	Update of Doc 030. Significant spreadsheet detailing captial projects.	31/12/2003	ACCC
233	ROAM ACCC-031211-37 and Mid North Coast ACCC-031212-36.pdf	Letter to Sarah Clancy from TransGrid regarding 'TransGrids' Revenue Cap Reset 2004/2003: Information Requests-ROAM Consulting Report (ACCC-031211-37), and Mid North Coast and Central Coast (ACCC-031212-36)	08/01/2004	ACCC
234	C LC - Organisational Review report sent 8.1.04.pdf	Organisational efficiency review Final Report by PricewaterhouseCoopers dated September 1998	08/01/2004	ACCC
235	Actions By TransGrid-ACCC.doc	TransGrid Revenue Reset Project, Actions Arising from Discussion with GHD from 3.12.2003	08/01/2004	ACCC
236	Actions bBy Transgrid-ACCC.doc	TransGrid Revenue Reset Project, Actions Arising from Discussion with GHD from 4.12.2003	08/01/2004	ACCC
237	GHD-040113-100 Economic briefing Dec-03.pdf	Project Development Economic Briefing(12.2003), covering *World Economy turns the corner, *RBA siezes oppourtunity to raise interest rates, *Mortgage fears- are fixed rates the answer, *Australian doller to appreciate further, * NSW growth below average in 2002-03, *Latest economic forecasts	14/01/2004	ACCC
238	letterkym_tothill_metrogrid_6-1-04.doc	Letter to Kym Tothill regarding TransGrid's Revenue Cap Reset 2004/2009: Sydney CBD Project	14/01/2004	ACCC

239	Full chart of accounts GHD-040112-99.pdf	TransGrid Enabled Chart of Accounts (as at 12-JAN-04)	15/01/2004	ACCC
240	Register of requests C Peile V2 8.1.04.doc	Revenue Reset Register of Requests for Information (Headings: Letter/email dated; Reference No.; Request Details	16/01/2004	ACCC
241	Status - GHD requests for Information 8 Jan 04.pdf	Update from TG on the status of information requested by Garry Taylor on the 8th of Jan - SEE UPDATE: DOC 247 &252	16/01/2004	TG
242	GHD031203-16 ACCC IT CAPTIAL EXPENDITURE 2005 - 2009V1.pdf	Response to questions during interviews	15/12/2003	TG
243	GHD031208-71 Opex PG Presentation - Basis of Application 2.pdf	Response to questions during interviews	15/12/2003	TG
244	GHD-031204-55 Property Build Sec Fire Capital.pdf	Response to questions during interviews	15/12/2003	TG
245	Attachment 2.pdf	Attachment mentioned in letter to commission dated 15th December	19/12/2003	TG
246	Attachment 3.pdf	Attachment mentioned in letter to commission dated 15th December	19/12/2003	TG
247	Attachment - GHD Request for Information 8 Jan 04 - Status of Response.pdf	Update of the status of TG's responses to the RFI GHD sent through on 8th Jan 04. UPDATE OF DOC 241 - UPDATED BY DOC 252	27/01/2004	TG
248	Response GHD-031210-86	Response to GHD request for an example of KPI inclusion in Senior Contract Officer Performance Agreement, requested on 10 December 2003.	27/01/2004	TG
249	Response to GHD-040108-98	Response to RFI 8th Jan 04 for Garry Taylor	27/01/2004	TG
250	PSR 39 - Glen Innes.pdf	Project Scoping Report for Glen Innes 132/66kV substation	27/01/2004	TG
251	TG System Planning GHD-040108-98.pdf	Example of system plan diagrams	27/01/2004	TG
252	Status - GHD requests for Information 8 Jan 04.pdf	UPDATE OF DOC 247 & 241	27/01/2004	TG
253	Response to GHD-040113-102.pdf	Details re: overtime & allowances	27/01/2004	TG
254	Response to GHD-040116-103.pdf	Details re: overtime & allowances	27/01/2004	TG
255	Response to GHD-040120-104-1abc.pdf	Opex reslated re: PWC consultancy in 1998	27/01/2004	TG
256	Response to GHD-040120-104-5 i j.pdf	KPI targets for Board	27/01/2004	TG
257	Response GHD-040116-103 Unreg Assets.pdf	Info re: Unregulated Assets	27/01/2004	TG
258	Grid Standard GD FN G2 047.pdf	Document re: Ring Fencing of Unregulated Assets	27/01/2004	TG
259	Response GHD-040120-104-3.pdf	Info re: outsourced work drivers	27/01/2004	TG
260	TF Central Coast-21.pdf	EA Load Flow Information	27/01/2004	TG
261	TF Feeder21-summary.pdf	EA Load Flow Information	27/01/2004	TG
262	ACCC Opex presentation GHD031209_77.pdf	Copy of Opex, IT presentation	27/01/2004	TG
263	Response GHD-040108-98 revised final.pdf	revised version of document 249	28/01/2004	TG
264	ACCC Capital Refurb Expenditure GHD031204_49.pdf	Historic & Future Capital Refurb Expenditure by category	28/01/2004	TG
265	Summary of Capex for Scenarios (Rev 09, NEWVIC 3500 passthrough).xls	Spreadsheet that came via Garry Taylor to Don Vincent	28/01/2004	TG

266	Response GHD-040123-105-2-1.pdf	Response to request for information on 23 January 2004 for question 1 of section 2 titled IT Opex.	29/01/2004	TG
267	IT Capex GHD-040123-105.pdf	Details of TG's IT spend including Opex Costs	02/02/2004	TG
268	ISSC030800.pdf	Information Systems Steering Committee minutes	02/02/2004	TG
269	VMS to Unix migration approval request.pdf	Business case with Cost/Benefit analysis for IT expenditure	02/02/2004	TG
270	040202 Comments on GHD presentation.doc	Letter to Don Vincent from Bruce Mountain dated 2/2/2004, Regarding 'Comments on GHD's presentation to the ACCC on 2 Feb 2004.	02/02/2004	TG
271	Response GHD-040116-103.pdf	Response to RFI - GHD Q "RE: Proposed service standards -could annual performance figures please be provided for the years 1999-2002 for the following categories (%transmission line, % transformer availability, % reactive plant availability, no of events . 0.05 system minutes etc), [2] could a list be provided that identifies the key items that will impact upon TG performance on the above crit)	19/01/2004	TG
272	Resposne GHD-040212-106-1.pdf	Response to RFI GHD "Accounting for motor vehicles - please provide sample journal entries for each transaction relating to an Executive Vehicle including Depreciating, treatment of Operating Costs and Salary Sacrifice etc.	23/01/2004	TG
273	Response GHD-040212-106-4.pdf	Response to RFI, GHD "EPA court case - Please provide the incremental costs associated with the above court case seperately outlining any penaltieis, legal defence costs and any labour incurred"	23/01/2004	TG
274	Response GHD-040212-106-5.pdf	Response to RFI, GHD " Legal expenses - over the five years of the historical opex there has been legal costs incurred ranging between $1 and $2m p.a. Would you please provide details of this expenditure?	23/01/2004	TG
275	Response GHD-040212-106-7.pdf	Response to RFI, GHD "Fringe Benefits Tax - Why is FBT shown as a cost each year? The breakdown of historic costs by cost category includes $0.m FBT as part of the total $113.8m actual for 2003"	23/01/2004	TG
276	Response GHD-040212-106-6.pdf	Response to RFI - GHD Q " RE: Regulated and non-regulated expenditure. Please provide the total regulated and non-regulated historic expenditures for each year of the previous regulatory period for the whole business. Also, please include the portions for the expenditure that are allocated to Opex."0	24/01/2004	TG
277	648971 - bm comments.doc	ACCC, TG Regulatory Review, CAPEX and Asset Base OPEX and Service Standards- DRAFT REPORT by GHD	03/03/2004	TG
278	Response GHD-040220-107-2.1, 2.2, 2.3.pdf	Response to GHD RFI regarding 'capex of $5.4M was for 'coal sterilisation' compensation. Describe reason? Breakdown costs. Indicate amount capitalised.	04/03/2004	TG
279	Attachment - GHD Request for Information 8 Jan 04 - Status of Response.pdf	Matrix displaying dstatus of response- (Page ref, GHD Q, Comments from 13/1/04 form GHD TG ACCC, status ofresponse,GHD No)	13/03/2004	TG
280	Response ACCC-040225-50k.pdf	Response to RFI- ACCC request- Q re the reconstruction of the YASS substation.	13/03/2004	TG
281	Response ACCC-040525-50l.pdf	Response to RFI- ACCC request- Q re the reconstruction of the YASS substation. (different from above question)	13/03/2004	TG

282	Response ACCC-040205-43e (dot point 2).pdf	Response to RFI ACCC Request- Kempsey - Coffs Harbour (2) dot point (2); The commisssion wanted a cleaer understanding of the extra compensation and transaction costs associated with the acquistion of easements... etc	03/03/2004	TG
283	Response ACCC-040206-44e.pdf	Response to RFI ACCC Req 'The treasury complex in trhe master spreadsheet refferred to as SCADA Replacement shows an expenditure of $4.3 m for the period 1999-2000 to 2003-04 what is this?	03/03/2004	TG
284	Response ACCC-040108-39-2a ACCC-040203-40hklmn.pdf	Metrogrid sup report - draft for ACCC review - 'Cost changes in metrogrid project since regulatory approval'	03/03/2004	TG
285	Resposne GHD-040212-106-1.pdf	Response to RFI GHD Request 'Accounting for motor vehicles - Please provide sample journal entries for each transaction relating to an executive vehicle including depreciation, treatment of op costs and salary sacrifice etc.'	03/03/2004	TG
286	Resonse ACCC-040225-50i.pdf	Response to Rfi ACCC request 'If it is proposed to replace 330/132kV transformers w 375MVA is the increased capacity req for load growth in the area or to increase import capacity into victoria and the tiems when this increased capacity is required.'	03/03/2004	TG
287	Response ACCC-040225-50h.pdf	Response to RFI ACCC request 'If two existing 330/132kV Transformers at YASS substation are rated at 150MWA. Is it proposed to replace these transformers with two 200MWA transformers or two 375 MVA transformers'	03/03/2004	TG
288	Response ACCC-040225-50j.pdf	Could you advise the cost of 330/132kV, 200MVA and 375MVA transformers?	03/03/2004	TG
289	Transgrid.pdf	App 3 Security Implementation report spreadsheet from TG	03/03/2004	TG
290	Transgrid 1.pdf	Circuit breakers and Current Transformers- analysis of variance bw ACCC 1999 and TG Expenditure.	03/03/2004	TG
291	Resonse ACCC-040225-50i.pdf	Response to Rfi ACCC request 'If it is proposed to replace 330/132kV transformers w 375MVA is the increased capacity req for load growth in the area or to increase import capacity into victoria and the tiems when this increased capacity is required.' ANS: Q is NA since replacement 330/132kV transformers for YASS substation are 200MVA	03/03/2004	TG
292	Response ACCC-040204-42b c.pdf	Response to RFI ACCC request - 42(b)/ 42(a)	03/03/2004	TG
293	Response ACCC-040204-42o.pdf	Provide info on the Wood Pole replacement strategy. Refer to the presentation by GHD by Vic Galea	03/03/2004	TG
294	Response ACCC-040205-43f.pdf	Response to RFI and ACCC- where have the costs been included in the past Capex figures for the capacitor banks installed at Macquaire?	03/03/2004	TG
295	Response ACCC-040212-46d.pdf	Provide a copy of the presentation on Supporting the Business Capex.	03/03/2004	TG
296	Response ACCC-040204-42b c.pdf	Response to RFI, ACCC's request 42(b), - Tuggerah Sterland project: provide data re the need for the total project e.g. load data, overloads during critical outages and also noting EA work regulatory test for $5m, 42 (c)- In the response to ACCC on Central Coast highlight the alternative options considered transversed national parks and rough country and thus very more expensive and other optoins.	03/03/2004	TG
297	Response ACCC-040204-42o.pdf	Response to RFI, ACCC's request - Provide information on the Wood Pole replacment strategy. Refer notes to the presentation to GHD by Vic Gala	03/03/2004	TG

298	Response ACCC-040225-50m & ACCC-040205-43k.pdf	Response to RFI ACCC's request - Could you advise if the 330kV switchbay and switchgear for the proposed 330kV Yass - Wagga line is included in the reconstruction of the Yass substation, and if so the cost for these works?	03/03/2004	TG
299	Response ACCC-040204-42s.pdf	Response to RFI - ACCC's request "Provide an overview of the asset management process and the process for the planning maintenance work."	03/03/2004	TG
300	Response ACCC-040204-42t & ACCC-040205-43l.pdf	Response to RFI - ACCC's request 42(t)- "Provide a description of the substation projects (as per schedule of $66.1m; 43(l) "The schedule showing the brak-up of the $66.3m of misc substation works was briefly discussed. The linkages between the costs in that schedule and the relevant asset management strategies was not clear. Could TG please provide copies of the relevant capital costs associated with each asset mgt strategy in a way that can be linked back to the misc substations total cost of $66.3m	03/03/2004	TG
301	Response ACCC-040204-42w.pdf	Response to RFI - ACCC's request "Provide an analysis of Sydney city projects, security strategy, including- ACCC#031010-4; ACCC#031010-5	03/03/2004	TG
302	Response - ACCC-040204-42f.pdf	Response to RFI - ACCC's request "Provide a copy of the pre-planning project process and the associated key outputs.	03/03/2004	TG
303	GHD-040220-107-3.1 & 3.2.pdf	Response to RFI - Historic Capex - Support the Business- (3.1) We note the vehicle costs include the purchase price for all vehicles including thise for private use under salary package arrangements. Our view is that private use vehicles should not form part of the asset base and recieve a return- pls prov comment on this. (3.2) Pls prov a separation of both historic and future vehicle costs for vehicles under salary arrangements from other vehicles.	03/03/2004	TG
304	Response ACCC-040204-42j, k, l.pdf	Response to RFI - ACCC's request (42j)- "Provide copy of the planning report for the CBD project, (42k) "Provide printouts of the 1998/99 load flows for the CBD project (42l) " Provide copy of the reports setting out the planning decision for CBD"	03/03/2004	TG
305	Response ACCC-040205-43c.pdf	Response to RFI - ACCC's request "Yass 330kV refurbishment; provide a summary of the project components showing the cost of each component. This break-up schould include the most recent estimate for the items and the expenditure to be carried out this year (2004) and in future years."	03/03/2004	TG
306	Reponse GHD-040212-106-1 final.pdf	Response to RFI GHD's Request " Accounting for motor vehicles "Please provide sample journal entries for each transaction relating to an Executive Vehicle including Deprciation, treament of Operating Costs and Salary Sacrifice etc."	03/03/2004	TG
307	Response - ACCC-040204-42m.pdf	Response to RFI ACCC's reuest - "Provide cost break-up of the South Australia Inter-connector, ($10.7m)	03/03/2004	TG
308	Response - ACCC-040204-42n & ACCC-040212-46b.pdf	Response to RFI - ACCC's request "Provide analysis of motor vehicles and associated costing via discussions with ACCC and refer to the information provided to GHD, Provide a copy of Motor Vehicles costing details.	03/03/2004	TG
309	Response - ACCC-040227-51-1-5.pdf	Response to RFI - ACCC's request "Has TG acquired easement or land relating to the SNI project? If so, could TG specify where the easements or land have been acquired and the copst of the land and/or easements?	03/03/2004	TG

310	Response - ACCC-040227-51-1-7.pdf	Response to RFI ACCC's request "How advanced is TG in obtaining environmental approval for this project. Has TG received EIS approval for this project? If no, what ae the difficulties or issues being encountered by TG?	03/03/2004	TG
311	Response ACCC-040205-43d.pdf	Response to RFI ACCC's request "Kempsey - Coffs Harbour (1) The cost difference between the initial estimates and construction costs I.e. the comission estimated from TG documents that the Regulatory Test value of this project not including the SVC and easement acquisition costs was $21.44m compared with an actual spend on the same basis of $34.7m. Please xplain.	03/03/2004	TG
312	response ACCC-040227-51-1-2.pdf	Response to RFI ACCC's request "Could TG verify whether the $10.7m spent on the SNI project in the current regulatory Period (1999/00-2003/04) is incorporated into the $109.2m project cost quoted in TG future capital expenditure spreadsheets?"	03/03/2004	TG
313	Capital Works Program 6 March 2003.pdf	TG (2/3/2003) To the Board Issue: 'Approval of the five-year capital works programs"	17/03/2003	TG
314	Response ACCC-040203-40j.pdf	Response to RFI - ACCC's request "Provide the info for when the pricing f the CBD project jumped to $227m and before TG had signed any contract. What did TG do to evaluate / think about other options. ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
315	Response ACCC-040210-45a.pdf	Response to RFI ACCCs request "Prepare a list of projects planned for 2004-2009 and show the current stage in the pre-planning process" ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
316	Response ACCC-040210-45h.pdf	Response to RFI ACCC's "ACCC-040210-45h "Provide details or Paramatta load growth rates" ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
317	Response ACCC-040217-47-1.pdf	Response to RFI ACCC's "(1) Regardingthe water supply to West and Central West forward Capex project, we would like to see the claimed interest component of this project of approximately $7m quantified and for TG to provide the correct estimate for inclusion in its application" ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
318	Response ACCC-040225-50 f.pdf	Response to RFI ACCCs request "Section 7 conclusions the report indicates that overloads under system normal and "N-1" conditions have been corrected until summer 2004/05 by the combined actions 'o': *Cable connection Kurnell to Bunnerong * Closing 910 and 911 to Chullor etc etc. The comission understands that all these actions were completed prior to summer 2003/04 with the exception of the cable connection Kurnel to Bunnerong ad that if this cable was commissioned then n-1 realiability standards could have been maintained until the following summer....etc etc ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
319	Response ACCC-040225-50g.pdf	Response to RFI ACCCs request "The commission understands that load uptake on the Haymarket Substation is dependant on cable and substation works currently being carried out by EA for scheduled completion by May 2005. Could TG advise the proposed timing of the load uptake and when the Haymarket substation is expected to be fully loaded" ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG

320	Response ACCC-040227-51-1-4.pdf	Response to RFI ACCCs request "(4) Could TG provide the following information * The individualworks and costs for the upstream works associated with SNI excludign the physical interconnector between Buronga to Robertsown, * The cost of the physical interconnector between Buronga to Robertstown, whether TG have carried out any works associated with the upstream part of SNI in anticipation of SNI. If yes, could TG specify what these works works are and their respective costs." ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
321	Response ACCC-040227-51-1-6.pdf	Response to RFI ACCCs request "(6) What is the probability of this projct proceeding? What is the probability of the upstream works proceeding wo the physical interconnector (that is the transmission line bw Buronga to Robertstown?" ***NOT DIRECTLY RELATED TO GHD'S COMISSIONS***	11/03/2004	TG
322	Response ACCC-040204-42aa.pdf	Response to RFI - ACCC's request "Provide detailed cost breakdown of circuit breaker and current transformer replacement program"	15/03/2004	TG
323	Response ACCC-040204-42x.pdf	Response to RFI - ACCC's request "Provide analysis of the IT Capital Spend eg. Leasing of assets v ownership"	16/03/2004	TG
324	Response GHD-040220-107-5.2.pdf	Response to RFI - GHD's Request "The information in GHD - 311204-54 for transformers (55.3.1.12) provides for unidentified "Transformer Replacments" of $6m and "Spare Transformers" of $8.5m comprising about 40% of the total budget. The total amount of $37m is well beyond the 5yr allocation iin the Network 30yr plan of $12m... etc	17/03/2004	TG
325	Response GHD-040220-107-4.2.pdf	Response to RFI "GHD's request - "We have reviewed the aggregation of individual projects and programs into the refurbishment budget. There does not seem to appear to be any evidence of rationisation of this budget, or indication of the risks to the business of any particular program. Can TG demonstrate the impact on the business if the lower priority refurbishment projects/ programs were deferred?"	18/03/2004	TG
326	Response GHD-040212-106-3.pdf	Response to RFI -GHD's request "Expenditure as a result of bush fire- pls provide a best assessment of the incremental cash incurred as a result of the bush fire in terms of labour, overtime and allowances and other direct operating expenses and any external costs incurred directly in the 2002/03 financial year"	19/03/2004	TG
327	Response GHD-040220-107-4.1.pdf	Response to RFI - GHDs request "We have reviewed the aggregation of individual projects and programs into the refurbishment budget. There doesn't appear to be any evidence of the rationisation of this budget, or indication of the risks to the business of deferral of any particular program. What processed exist in TG for budget rationisation and can you demonstrate how it has been applied?	20/03/2004	TG

Appendix D

Historic Augmentation Capex

Detailed Notes

D1 Historic Augmentation Capex - General Review Notes

As indicated not all the historic augmentation projects were reviewed in detail. However the following comments, in tabular form, are based on a high level review of the information provided. It was beyond GHD's scope to comment in detail on every project, so the comments are based on the information provided by TransGrid to support its Application. Where more detail was required it was not requested by GHD. GHD was advised by the Commission that they were pursuing more details as part of its review.

Project	1999 Allowance $M	Costs in 1999 – 2004 (excluding easements) $M	Status (TransGrid advice)	Comments
ANM – Albury 132kV line	Nil	1.0	N-1 driver, being watched and became necessary	Only information is in Planning reports. 1999 report indicates load increases by 2001/02, not sure why not in 1999 Allowance. Cost estimate was $0.75M.
Armidale – Koolkhan 132kV line uprating	Nil	0.1	Study costs for a future project	Project forecast to occur until 2006/07. Appears reasonable to start study.
Balranald 220/66kV substation	6.1	6.3	Works complete. Don't know 1999 scope allowance, possible reason for overrun is remote location.	Documentation indicates sound option analysis and selection. Capex cost details not available so can't comment on efficiency.
Canberra Substation	4.4	7.9	Work complete, addition of 4th transformer. Don't know 1999 scope allowance, possible reason for overrun is additional site refurbishment costs included in project costs.	Only information is in Planning reports. 1999 report indicates load driven, required by winter 2001, 2001 report says winter 2002. Cost estimate increased from $4 M to $5M. Would appear reasonable to do works based on being in 1999 Allowance. No final cost details so can't comment on efficiency.
Coffs Harbour 330/132kV substation	Nil	1.2	Regulatory test done	See details in the report on future development Capex
Holroyd – Mason Park 330kV cable	Nil	Nil Note 0.2 spent on easements	Future project 2008/09	Only reason in 1999 to 2004 period is due to easements. Could be prudent to purchase for future project.
Holroyd 330/132kV sub and line diversion	Nil	0.1	Study costs for future project	Project forecast to occur until 2006/07. Appears reasonable to start study.

Project	1999 Allowance $M	Costs in 1999 – 2004 (excluding easements) $M	Status (TransGrid advice)	Comments
Inverell – Moree 132kV line	7.7	0.2	Project complete in 1999 so majority of costs not in Revenue period.	No detail seen but small cost most likely from Project closure would appear reasonable.
Kemps Creek – Sydney south 330kV line	12.9	0.1	In 1999 allowed for rebuild of lines on loading opportunity basis. Now believe can get new routes. Costs relate to study.	The planning reports indicate the changes in options being considered. Latest cost estimate is $86.8M with works in 2006/07. Study costs appear reasonable for a future project.
Kempsey – Nambucca –Coffs harbour 132kV line	31.6	34.5	Complete. Advise majority of cost difference is due to easement acquisition costs.	See details in the report on historic Capex
Koolkhan substation augmentation	2.8	3.7	Complete. Original costs on basis of roll in and roll out for transformer replacement. Due to outage issues had to build new bay.	Only information is in Planning reports. Can't comment on the final costs or timing without details.
Liddell – Muswellbrook line	9.1	Nil	Deferred indefinitely by Redbank power station.	It is not clear as to the timing of this project in 1999 Allowance, but as Redbank started in 1999 it could be that there was enough uncertainty that this project was left in.
Lismore SVC	13.0	8.6	Work complete in 1999, so a major portion of costs was incurred before Revenue period.	Review of documentation indicates selected option and timing is reasonable. It is not clear with work complete in 1999 as to what final cost was in relation to 1999 Allowance.
Mid north coast 330kV supply	Nil	Nil Note 0.2 spent on easements	Future Project	Only reason in 1999 to 2004 period is due to easements. Could be prudent to purchase for future project.
Misc equipment	7.5	9.3	Minor projects	No details in supplied documentation to enable comment.
Misc projects	Nil	0.7	Minor projects	No details in supplied documentation to enable comment.

Project	1999 Allowance $M	Costs in 1999 – 2004 (excluding easements) $M	Status (TransGrid advice)	Comments
Molong 132/66kV substation	Nil	5.8	Complete	See details in the report on historic Capex
Molong Manildra 132kV line	Nil	6.4	Complete	See details in the report on historic Capex
Munmorah substation	Nil	6	Complete	It is not clear as to why the 1999 Allowance is nil as 1999 Planning report indicates project is committed. It appears this is part of Tuggerah supply upgrade works – see later in this table. Documentation would indicate the option selected was reasonable. Capital cost details are not known, however study had $5M in 1998 for both Tuggerah supply upgrade and Munmorah.
Orange substation	4.4	Nil	Deferred by building Molong substation	See details in the report on historic Capex
Protech steel	Nil	1	Project not known about in 1999, costs for studies.	As project not known in 1999 it appears reasonable to carry out study for future project. No details on costs but seem high for a study.
QNI	201.9	210.6	Complete. Cost difference principally attributable to acceleration payments to ensure scheduled completion after EIS delays.	
Regentville sub augmentation	Nil	3.8	Second transformer added as the original one transformer solution no longer deemed appropriate	
Reinforce south west area	13.2	Nil	Project need delayed by installation of additional capacitors at Finley and Deniliquin. Options presently being evaluated for additional line Darlington point – Finley 132kV.	No costs in 1999 – 2004 as now a future project

Project	1999 Allowance $M	Costs in 1999 – 2004 (excluding easements) $M	Status (TransGrid advice)	Comments
Reinforce western area	30.1	1.7	Original project was new substation and line. More appropriate option has been developed as future project Supply to West and Central West. Most of costs shown are predicted for 2004, rest for studies.	See details in the report on future development Capex
Reinforce north coast	Nil	0.1	Study costs for future project	See details in the report on future development Capex
Richmond Vale 330kV switching station	Nil	Nil Note 0.2 spent on easements	Future project	Only reason in 1999 to 2004 period is due to easements. Could be prudent to purchase for future project.
SA interconnector	Nil	7.8	Future project. Regulatory test applied.	There are no cost details in documentation supplied. This is required before commenting.
SNOVIC 400	Nil	2.6	Complete, regulatory test by VENCorp	There are no cost details in documentation supplied. This is required before commenting.
Sydney area 132kV substation upgrades	Nil	0.7	Future works fault level exceedence	Project forecast to occur until 2006/07. Appears reasonable to start study. No details on costs but appear high for study.
Sydney City CBD upgrade	163.5	225.3	Complete	See details in this report on historic Capex
System reactive plant	32.6	39.8	Complete. Do not know basis for 1999 Allowance so can't comment on cost difference.	Cost and timing details not in available documentation.
Tamworth substation	6.8	7.9	Complete. Complexity exceeded original estimate, outage constraints and work staging being cause of extra costs.	Cost and timing details not in available documentation.
Misc transmission line projects	1.1	17.4	Complete breakdown supplied	Considered in more detail under Refurbishment.
Tuggerah supply upgrade	6.9	2.3	Complete.	It appears the 1999 Allowance also covers Munmorah substation

Project	1999 Allowance $M	Costs in 1999 – 2004 (excluding easements) $M	Status (TransGrid advice)	Comments
				works – see comments in this table. Documentation would indicate the option selected was reasonable. Capital cost details are not known, however study had $5M in 1998 for both Tuggerah supply upgrade and Munmorah.
Tuggerah Sterland 330kV duplication	Nil	11.4	Complete in 2004	See details in the report on historic Capex
Transmission line Eraring	Nil	0.2	Future project study costs	Appears reasonable to start study for future project.
Vales point – Munmorah 330kV line upgrade	Nil	0.1	Minor project	No details so not clear if more costs to be incurred.
Vineyard 132kV line bays and transformer	Nil	4.0	Load growth in area greater than seen in 1999 cause overload on transformer, IE wanted two more 132kV lines. Regulatory test has been carried out.	Regulatory test has not been sighted. It is noted that further works are forecast in future Capex bringing total Capex to $9.6M
Visy (regulated)	Nil	2.1	Visy requested a connection at Tumut	Very few details given. The customer needs agreed in 1997, so it is not clear why this was not in 1999 Allowance.
Waratah west substation	12.0	11.3	Project underway, complete 2004. Being re-evaluated as a large area network asset.	Planning reports indicate a change in the scope of works from 2002 to 2003. The Regulatory test will need to be redone. It is not clear whether the predicted 2003/04 ($10.8M) will occur.
Yass – Wagga 330kV line	92.9	2.2	This is now as future project. It has been delayed by additional capacitors and special control scheme. Regulatory test underway for future project.	See details in the report on future development Capex
Easements	29.6	53.6		There is not enough information to comment on prudency of this over expenditure.

D2 Historic Augmentation Capex - Selected Project Review Notes

A number of sample projects were reviewed with emphasis on the following aspects:

- Planning criteria that applied to the project's need
- The timing of the project
- The options considered in relation to network and non-network solutions
- The cost of the project

The projects were chosen from the following categories:

1. Those in the Capex Allowance at the last Decision but which were significantly under/over approved amount,
2. Those in the Capex Allowance at the last Decision but did not proceed, or proceeded under a different scope,
3. Those not included in the Capex Allowance at the last Decision, but which have been implemented

D2.1 Kempsey – Nambucca, Coffs Harbour 132kV transmission line

Reason for review:

This project fell into category 1. The project 1999 Allowance was $31.62M (excluding easements). The final spend of $56.3M ($34.5M project and $21.8M easements).

Data source:

ACCC-031010-5 item 6, GHD-031205-67 map, discussions between GHD and TransGrid

Brief Description:

Load growth in Coffs Harbour, Kempsey and Port Macquarie area had been particularly high. A 132kV transmission line was required to overcome inadequacies in 66kV system stability under certain outage conditions during high load periods.

The Project was largely completed in 2001/02.

Planning Criteria, type, timing:

- N-1 criteria applies to supply to the area
- Thermal rating of existing 66kV between Coffs harbour and Kempsey exceeded with outages in Country Energy's (was Northpower's at the time of the planning) network
- Outages of 132kV lines in the area results in uncontrollable low voltages at connection points

Country Energy advised TransGrid on the loads as part of the normal planning processes. TransGrid used TUOS metering as a check. Early report claim is 2 to 3% for population with slightly lower for electricity. In the 1999 report it says growth in energy sales was 4% over the last five years compared with NSW growth of 2 to 3%. Figures in graphs show 1986 to 1996 average growth in max demand to be 3.5 to 4.5%.

The timing was determined to be that Kempsey to Nambucca was required by early 2001 and Nambucca to Coffs Harbour in late 2001.

Options considered:

The April 1999 report looked at 6 alternative projects:

- Do nothing
- Construct double circuit 132kV line from Coffs Harbour to Kempsey
- Construct double circuit 132kV line from Coffs Harbour to Kempsey, with one side only initially and other side in 2008/09
- Reconstruct existing 66kV line between Coffs Harbour and Kempsey as double circuit 132kV line
- Construct single circuit line from Coffs Harbour to Kempsey and new line in 2008/09 from Armidale to Port Macquarie
- Construct single circuit line from Coffs Harbour to Kempsey and new SVC in 2008/09 at Port Macquarie
- New SVC at Port Macquarie, reconstruct 66kV line Newee Creek to Kempsey as 132kV, new 132kV line from Coffs Harbour to Newee Creek by 2009.

An earlier report confirms verbal advice from TransGrid that high cost options such as duplicate 132kV Armidale to Kempsey and Kempsey to Newcastle were looked at on a high level basis but were discarded due to high cost.

Non-network options were considered in an earlier report. These included

- Demand management. An independent report was carried out for Northpower and TransGrid and NSW Government. It concluded that there wasn't enough to defer augmentation works.
- Different forms of generation. The report appears to consider all these but only at a high level.

The conclusions re lack of local fuel sources, environmental impacts and developing technologies would appear to be reasonable considering the date of the analysis.

Costing:

The capital costs for the project in the economic evaluation were $32.6M (excluding easements). An allowance of $9.6M was also made for easements in the economic evaluation. A significant amount of the capital costs, $11.2M was allowed for a future SVC at Port Macquarie. As the SVC has not been installed, the final costs for the project at $34.5M are in excess of original project estimate of $21.4M (adjusted as SVC work not done). TransGrid were asked to provide more information on the final costs. The details provided were a few one-line explanations.

The non-network options are not viable in the area as there are no significant alternative fuel sources. Demand management has been in place for some time. This is reflected in the historic load data that is used for future forecasting.

While the chosen option did not achieve the maximum cost benefit it was the preferred solution as an outcome of the Community consultation.

The other significant changed factor since 1999 Allowance is that the final easement costs were $21.8M, which represents some 40% of the final project costs. The original easement allowance in the economic evaluation was less than half of the final costs. TransGrid were asked to provide more detail as to when the easement cost issue was known and whether the economic options were reassessed.

The response from TransGrid was that the final easement costs for the options considered to be economic were similar so the final costs would not have affected the outcome.

The final project involved the rebuild of a new double circuit 132kV line along the existing Country Energy 66kV line easement. One side of the new line is run at 66kV and operated by Country Energy. TransGrid paid for the line construction costs and the relocation costs ($2M) of Country Energy assets affected by the construction of the new line. The final solution appears to be the least cost to the community, however what is not clear is whether the final cost allocation being all to TransGrid customers is the most appropriate.

Regulatory test – comparison of final build with that defined:

Project predated the Code requirements for the current form of Regulatory test. The project built was the same as that considered in the economic evaluation.

Questions to TransGrid and their Response after Initial Review

Q. Load growth – it is not clear as to what load growth figures TransGrid used in its assessment and its relationship to thermal limitations of the network. GHD would like to sight the actual max demand figures for Kempsey/Port Macquarie and Coffs Harbour going back 7 years (documentation given to GHD has figures from 86 to 96). GHD would also like to sight the planning model that confirmed the thermal limitations that caused the augmentation.

A. TransGrid supplied information that showed actual load growth from 1997 to 2003 on average 3.2% pa with increases above 6% for the last two years. The thermal limitations diagrams indicate a problem in winter 2000.

Q. Economic evaluation report says demand management by Northpower is committed and common to all options and has a large impact on the load forecast which is an input into the technical evaluation of options. It is not clear how this is actually done. GHD would like to sight how TransGrid include the impact of demand management on the load forecasts and in technical assessment.

A. TransGrid advised demand management, mainly hot water off peak has been in place for a number of years. Historic load data includes the affects of demand management and therefore are included.

Q. How has TransGrid justified the final selected option in terms of economic cost and other factors? Did this include easement costs (comprising some 40% of the final project cost)? Our objective is to determine the prudency of this spend and how the project costs have been justified as the lowest long term cost meeting the need.

A. TransGrid pointed out that the economic evaluation used $9.6M for option 5A easement costs. All the options included a similar easement allowance so that if the final easements costs were used it wouldn't change the order of options. The final choice for reconstruction of existing 66kV line to 132kV was eventually driven by community consultation.

Q. GHD requires more information on the costing as the reports given to GHD indicate option 5A had total cost of $27.64M plus design and EIS costs of $3.8M. It indicates that $10M of this would be spent in 2008/09 on SVC at Port Macquarie. This is not consistent with the final cost of $34.5M assuming that the SVC has not yet been installed.

A. TransGrid confirmed that the SVC had not been installed. They also advised the following in relation to the cost differences

- Inflation
- Contract prices, done on a competitive basis were what market determined at time of works
- Staging of works to maintain supplies to Country Energy
- Additional line foundation works
- Access difficulties due to flooding

Q. GHD requests information on the cost allocation between TransGrid and Northpower for this project.

A. TransGrid verbally advised all project costs paid for by them. This included paying Country Energy $2M to relocate their assets. TransGrid also advised that their view is the impact on cost allocation on DUOS would be negligible and costs allocation to TransGrid is appropriate as the project is delivering reliability.

Comments

1. The cost overruns compared with the original selected solution are 60% over. Without details of the final costs it is not possible to conclude whether the capital expenditure is prudent.
2. There are not enough details on easement costs to comment on prudency.
3. ACCC will need to further assess whether TransGrid should be paying all the capital costs for a 132kV double circuit line that has one circuit used by Country Energy and not at this stage benefiting all TransGrid customers. This may change in the future when TransGrid take back the line from Country Energy and operate at 132kV.

D2.2 Orange Substation – Molong Substation

These projects have been considered together as TransGrid advised that Molong substation installation relieved Orange substation of load and so delayed the Orange substation works.

Reason for review:

This project fell into categories 2 and 3. The 1999 Allowance was $4.41M for Orange substation. The project did not proceed. Molong substation was not in the 1999 Allowance but an expenditure of $5.8M occurred.

Data source:

Consultation and final reports on Development of Electricity in Molong etc, GHD-031205-59 to 63, discussions between GHD and TransGrid.

Brief Description:

At the last determination the transformers at Orange were indicated to be overloaded by 02/03 and needed to be replaced. In October 1999 Country Energy (was Advance Energy at the time) were notified of a large load at Manildra Flour mill. A look at the supply options showed that the load could be fed by building a 132kV supply into the area from TransGrid's network. This took load off the 132/66kV Orange transformers due to the existing supply being from the 66kV network and as such the need to augment the Orange transformers in the time frame envisaged at last determination was deferred.

Planning Criteria, type, timing:

At the time Country Energy criteria for loads had N criterion for loads less than 10MVA and N-1 for loads above 10MVA. The load in the area was around 10MVA at time of the Regulatory test. For the test, planning criterion set was at N but it was stated that there was a preference for a N-1 solution where the NPC of two or more options were similar.

The Country Energy forecast for the area 1-2% pa with a step increase of 3.5MW for the Manildra mill in December 2000.

Options considered:

Network and non-network solutions were considered. Non-network included demand management and local generation.

Costing:

The final costs were $14.7M, $5.8M for a 132/66kV substation at Molong and $8.9M for a transmission line from Molong to Manildra. The Regulatory test included a capital cost of $9M for these works and the 1999 Allowance only allowed $4.4M for Orange Substation. The substation works and associated transmission line to Manildra were completed as per the Regulatory test with the exception that a second hand transformer was used.

The NPC of the non-network (gas generation) option was $11.5M compared with the selected network solution NPC of $7.2M. Costs for non-network solutions came from Country Energy's demand management report for the western area.

If the final capital cost for the selected option is included in the analysis then the gas generation option and the selected option will have a similar NPC.

The other aspect of this project is that a 132KV line has been built to Manildra to replace a Country Energy 66kV line that was overloaded. It has been built and paid for by TransGrid on the basis that it will later form a connection to Parkes to relieve constraints in that area, predicted in 2007/08. In the meantime Country Energy is using it.

Regulatory test – comparison of final build with that defined:

The only difference between the final project and that proposed in the regulatory test is the use of a second hand transformer at Molong substation. The Regulatory test included for a new unit.

Questions to TransGrid and their Response after Initial Review

Q. Load growth – the final report says TransGrid accepts the load growth forecast of 1-2% plus timing of Manildra mill. GHD would like further explanation as to what the acceptance means. What did TransGrid do to satisfy itself the information was correct? Can TransGrid supply actual load data for the years covered in the final report 1998/99 to 2002/03?

A. TransGrid carry out 'sanity checks' on supplied figures by supply point metering reconciliation. Actual load figures for last 7 years were supplied. These indicate over 3% average for last two years for Orange area but stable 0% growth for Molong.

Q. Why was Orange transformer replacement considered for 2005 but not included in the recommended option? Orange substation transformer replacement does not appear to be in future Capex. GHD would like to see load for Orange substation for the period 1998/99 to 2002/03.

A. TransGrid verbally advised that the Molong Transformer delays the need for the transformer upgrade at Orange by removing load from the 66kV system supplied from Orange.

Q. TransGrid to confirm that the built project is the same as that recommended in the regulatory test with the exception that a second hand transformer was used.

A. TransGrid confirmed this.

Comments

1. There seems to be a step missing in the process that once a selected option is subject to detailed engineering costing it is not as to whether it is still the most economic. In this case the generation option may have been the better solution.
2. The timing of the project does not appear clear from the load information supplied. The timing also relies on the Manildra load, which is not clear as to when it will occur. There is not enough information to support the reasoning behind the further delay on Orange transformer as the Regulatory test indicates a 2005 need.
3. The final project cost for Molong substations appears high based on typical costs and the use of a second hand transformer. However, GHD cant' make a final assessment as the costs details have not been provided.
4. ACCC will need to further assess whether TransGrid should be paying all the capital costs for a 132kV line that is used by Country Energy and not at this stage benefiting all TransGrid customers.

D2.3 Reinforce Wagga

Reason for review:

This project fell into category 2. The 1999 Allowance was $92.88M for this project with timing of 2003/04. The project has not occurred but is currently under consultation.

Data source:

Emerging Transmission network Limitations in the South West of NSW – September 2002, Supply to South West NSW – March 2003, discussions between GHD and TransGrid.

Brief Description:

Under conditions of high load in the Wagga – Yass area and high Victoria import of power the following critical contingencies become critical:

- An outage on the Lower Tumut – Wagga 330kV results in high loading on Yass transformers and 132kV lines from Yass to Wagga
- An outage of one of the Yass transformers causing high loading on other
- An outage of Lower Tumut – Wagga line leads to low voltages in Wagga area
- An outage of Murray – Dederang line results in high loading in lower Tumut – Wagga line

Planning Criteria, type, timing:

N-1 criterion for both supply to the south west area and power transfer to Victoria. The need for this project is complex due to the interaction with State interconnectors. TransGrid have put in place special network control schemes to allow load transfers under certain network outage conditions. This has delayed the need for the project.

Options considered:

TransGrid originally installed a special network control scheme that tripped the 132kV line at Yass to protect lines and transformers from thermal constraints. They also installed capacitor banks as Wagga and Darlington Point to reduce voltage problems. TransGrid have further refined the special network control scheme so that trips now occur at Wagga. This work has delayed the project to final commissioning in 2007/08.

A needs document was released for non-network options. This resulted in a proposal for demand management and local generation.

The network option being considered is a 330kV line from Wagga to Yass.

Costing:

The future development Capex shows project costs of $98.05M. Costs to the end of 2003/04 are predicted to be $3.7M.

Regulatory test – comparison of final build with that defined:

Future project not yet built. Regulatory test is underway.

Questions to TransGrid and their Response after Initial Review

Q. One of the reasons for the project requirement is loading increase. The Capex spreadsheet shows no change in project timing for each of the ROAM scenarios, which look at low, medium and high growth and generation in the south of NSW. GHD wants to understand the reasoning behind this conclusion.

A. TransGrid advised the need for the project is complex due to the interconnector flows. They also explained that the difference between low and high load growth scenarios was not large enough to impact on timing.

Q. The Capex cost for the project is $98.05M compared with $92.88M Capex in 1999 decision. What is reason for difference in costs? Has the cost increase been justified and how?

A. TransGrid advised that their costing improves as the project definition develops. They advised that they do not know the breakdown of the 1999 figure so can't compare. The surmise that as the 1999 Allowance had easements and property separately identified it is likely the $92.88M did not include an amount for the land. The $98.05M does include 15% of the total cost for property.

Q. There only appears to be one network option in the March 2003 report. Why is this the case? Which option is included in the Capex budget?

A. TransGrid advised the Regulatory test would include all network options that have been considered.

Q. Is there an update on the economic analysis of the March 2003 report?

A. Will be part of Regulatory test.

Comments

1. At the 1999 Allowance this project was forecast to occur at the end of the regulatory period. It appears that TransGrid have carried out the necessary works to help delay the need for the project while consultation is undertaken. It is concluded that the TransGrid approach is prudent.

D2.4 Tuggerah to Sterland 330kV transmission line duplication

This project is one part of two components of the Central Coast reinforcement Regulatory test. The two components are reconstruct the existing 330kV Tuggerah to Sterland line to double circuit by 2004 and install a second transformer into Tuggerah by 2008/09. The driver for the reconstruction is the expectation that the loads will be too high by summer 2004 to allow an outage of the 330kV line without compromising the supply integrity to the area.

Reason for review:

This project fell into category 3. There was no allocation in the 1999 Allowance. $11.9M has been spent to date. 2001 APR says opportunity to rebuild line in 2003 before load increases.

Data source:

GHD031203-25

Brief Description:

The network has capacity for next 10 years to supply if all elements are in service. The network is expected to be constrained in this period if first contingency outages occur. TransGrid in consultation with EnergyAustralia have determined that the network augmentation required is to reconstruct the existing single circuit 330kV line as a double circuit and add a second transformer at Tuggerah. The line reconstruction is to be done in summer 2003/04 as due to increasing loads in the area an outage on the line after 2004 will result in other lines in the area being overloaded.

Planning Criteria, type, timing:

N-1 criteria. Expected maximum demand growth of 4.5% pa for summer and 3% pa for winter. TransGrid have supplied information from EnergyAustralia that supports the need to undertake the feeder work now.

Options considered:

Network solutions included a second 330kV connection, a new 330/132kV substation and reconstruction of the existing 132kV line. The latter option was not looked at in detail due to the high cost of construction in comparison with the other options.

Non-network solutions advised for consideration in the consultation brief are demand management and local generation.

Costing:

The regulatory test final report has cost for the line reconstruction at $11 to $12M. This is consistent with the $11.9M in the 2003/04 budget.

Regulatory test – comparison of final build with that defined:

TransGrid have noted that the Regulatory approvals and Environmental processes will need to be run in parallel to ensure the completion date of 2003/04 is not delayed.

Preliminary application of the Regulatory test did not include demand management options. As no comments were received to the preliminary Regulatory test the final test was identical.

The project is underway with completion due in 2004. The project being constructed is as in the Regulatory test for the Tuggerah to Sterland line duplication.

Questions to TransGrid and their Response after Initial Review

Q. Load growth – Need to sight planning models that show that the optimum time to build the line is this summer as loads are increasing to a point where the line can not be taken out of service for the duplication works.

A. TransGrid advised the studies were undertaken by EnergyAustralia. TransGrid supplied data they obtained from EnergyAustralia. TransGrid installed 40MVAr capacitors at Tuggerah to improve voltage conditions as indicated in the EnergyAustralia studies.

Q. Is project that is being constructed the same as that used in the regulatory tests?

A. TransGrid confirmed the line works are as those in the Regulatory test.

Comments

1. This project was not in the 1999 Allowance as it was not required and is still not required until 2006/07. The costs in the current Regulatory period relate to the need, due to increasing loads, to undertake part of the future Capex project now. The need to carry out the transmission line duplication work now is considered prudent.

D3 Historic Non – Augmentation Capex – Detailed Review Notes

D3.1 Substation Projects

Actual cost $66.1 million compared with 1999 Decision allowance of $40.1 million.

GHD was provided with the following references for these projects:

- Substations Projects Summary (ACCC 031010-4)
- Asset Management Strategies – Substations (GM AS S5 001 Issued 30 May 2003)
- Network 30 Year Plan

The total amount of $66.1 million included a wide range of projects undertaken at substations, mainly labelled as refurbishment, replacement and maintain. It was not clear from the Substation Project Summary as to what substations strategy each project relates, hence it was not possible to review their justification or the efficiency of their costs at an individual project level. Some projects were labelled as augmentation or part of the Queensland interconnectors, indicating that they are not refurbishment Capex and were miscategorised. Further, other projects relate to safety, security, site improvements, property and office extensions. These amount to a total of around $15 million including $9.8 million in property.

An overall indicative cost review was considered necessary.

D3.2 Transformer Additions and Replacements

Actual cost $37.8 million compared with a 1999 Decision allowance of $2.3 million.

Information provided:

- Summary of transformer additions and replacements
- Folder containing details of Tumut, Queanbeyan, Armidale and Sydney West #5 Transformer, largely from Annual Planning Reports.

Review of the information indicates that Tumut, Queanbeyan, Armidale and Sydney West projects totalling $10.1 million were all required to be replaced due to reaching capacity rather that potential asset failure.

Sydney South #5 and #6 transformers, Taree and Port Macquarie required replacement due to “service life expired” total cost $13.8 million.

$2.8 million was expended for spare transformers (330/132kV and 132/66kV).

No details were provided for an expected $10.0 million in 2003/04 for “Metropolitan Area Transformer”, or a further $1.1 million undefined.

In summary, costs for $26.7 million appear to be justified and efficient, although $10.1 million of this was required for augmentation purposes. No details were provided to support the remaining $11.1 million.

D3.3 Communications Upgrade and Replacement Projects

Documentation reviewed:

- Development and Implementation of Communication Asset Strategies – Sydney West / Vineyard Microwave Replacement.

- Telecommunications Network Extensions and Electronics
  - Northern, Southern and Western Microwave Replacements and OPGW Backup – Northern and Western.

Sydney West – Vineyard Microwave Equipment Replacement

The documentation demonstrated the process by which a project is developed and implemented. The cost-benefit analysis and risk assessments viewed were very brief and did not enable a comparison of costs and risks between the options. Options included Do Nothing, Refurbish or Replace with the selected option being to replace. Priority was rated 2 on a scale of 1 to 5.

Western Microwave Replacement

Estimated cost $7.02 million compared to final cost of $5.3 million. The project involves OPGW line from Sydney West to Kemps Creek, Wallerawang and Mt Piper, and microwave from Carlingford to Sydney West and Wallerawang to Mt Lambie.

Planning report provided by TransGrid (TSP.001, 30/08/1999) but not an options analysis. Information indicates the original approval was significantly varied but no information was provided as to whether this was evaluated economically. The report notes that the proposed OPGW is not rich in commercial opportunities and the 24 fibres planned to be strung on this path are considered adequate for known and future development. It was apparent that provision was to be made for future client leasing of OPGW.

Southern OPGW Project

Planning reports (TSP. 002, 15/06/1999 and 02/05/2000) provided. Project comprises OPGW communications between Kemps Creek and Sydney South to Yass, Canberra, Wagga, Tumut and other areas, necessitating complete replacement of existing microwave equipment. No cost details or cost-benefit analysis provided. 24 fibres were proposed of which 4 were reserved for TransGrid and the remainder made available for commercial opportunities. The project design was to be consistent with providing for future client leasing without including specific facilities. Early completion was noted as assisting commercial opportunities.

Northern OPGW Project

Planning reports (TSP. 004, 06/09/1999). Project involved 24 fibre OPGW communications between Tamworth and Newcastle to Sydney West. 4 fibres were to be used by TransGrid with the remainder available for commercial opportunity. Associated spur microwave links were intended to be retuned to non-affected microwave frequencies.

Ancillary Works Associated with Microwave Replacement

Project planning report (TSP. 020, 27/12/2000). Technical description of project components to provide links to other OPGW projects. No cost details or cost-benefit analysis provided.

OPGW Backup Project

Project planning report (TSP.022, 22/6/2001). Describes work to establish OPGW Backup Network in accordance with Telecommunications Strategy Plan. The backup strategy is required to provide communications via microwave radio networks in the event of failure of the OPGW network.

Further questions were asked relating to these communications projects, as follows:

Q1. Please provide a copy of the Telecommunications Strategy Plan.

Q2. Please provide details of potential or estimated commercial revenue from this communications network.

Q3. Please provide justification as to why these assets should not be considered as unregulated assets, either in whole or in part.

Q4. Please supply cost-benefit analyses for the OPGW projects, including current OPGW backup projects.

To date, no response has been received to these questions.

D3.4 Transmission Line Projects

The actual expenditure of $21.7 million includes major projects:

- Wood pole replacement program - $7.4 million
- Compensation for coal sterilisation - $5.4 million
- Easement work on QNI - $2.5 million

A range of minor projects were for continuing or new strategies, but most of these were not identified in the 1999 Decision.

Specific review comments for the major items of expenditure listed above are provided below.

Wood pole Replacement Program

Documentation reviewed:

- Copy of presentation to GHD / ACCC
- Wood Pole Replacement Program – Application of TransGrid AM Strategy process
- Response to ACCC (ACCC – 031120-33)

The information demonstrated an economic case for replacing wood poles with concrete or steel. Wood poles have an average age of 30 years with an anticipated life of 55 years for natural and pre-1970's pressure-impregnated and 25 years for post-1970's pressure-impregnated.

The replacement strategy and program is based on replacing composite wood poles first, which have a higher defect rate. The proposed future replacement rate is approximately 500 poles p.a. or 1.25% of the population of 40,000 poles. Expenditure to date has been confined to those replaced due to defects at a considerably lower rate than proposed in future.

The replacement rate and costs to date are considered reasonable and efficient.

Compensation for Coal Sterilisation

Documentation reviewed:

- Miscellaneous Transmission Line Expenditure (ACCC – 030101-4.1(b))

The documentation indicated three projects comprised a total of $5.4 million in compensation to Ivanhoe Coal and Newstan Colliery.

A number of questions arose:

Q1. What is the reason for this expenditure?

Q2. What is the cost break-up (e.g. compensation, legal fees, internal costs etc)?

Q2. What is the basis for capitalisation of this expenditure?

TransGrid responded that some Central Coast transmission lines had an unacceptable risk of failure due to expected ground subsidence from proposed coal mining activities underneath the towers. Relocation of the lines was not considered appropriate or cost-effective, and TransGrid requested that coal mining not proceed under the towers. A claim from the mine owners was received which was settled for $5 million. Capitalisation of the claim costs and associated investigations was supported by the NSW Audit Office and will be depreciated over thee remaining life of the transmission line assets. The expenditure is considered necessary and efficient.

Easement Work on QNI

Documentation reviewed:

- Miscellaneous Transmission Line Expenditure (ACCC – 030101-4.1(b))

This work was designated Post-Commissioning Work on QNI, and is in addition to the $210.6 million in augmentation Capex for the QNI project. This project was not reviewed in detail.

D3.5 Review of Yass Substation Project

This project has been listed in the Historic Capex with an expenditure of $31.8M. This project does not appear to be included in the 1999 Allowance.

As well as the historic Capex there is also an amount in the future Capex for $2.63M to be spent in 2004/05. It is shown in future as development Capex, however TransGrid claim that as Yass substation is refurbishment it has been removed from the Development Capex in the Application.

TransGrid for this project supplied the following information.

- Annual Planning Report references for 1999 to 2003
- Folder titled Reconstruction of Yass 330/132kV Substation, which contains a number of documents relating to the project.

The annual planning reports give the following details:

Source	Description	Estimate of Works $M
1999 Annual Planning Statement 5.3.23	Considerable difficulty being experienced on maintaining equipment. Strategic substations so considered necessary as well as economic to replace 330kV equipment.	34
2000 Annual Planning Statement 5.3.23	Considerable difficulty being experienced on maintaining equipment. Strategic substations so considered necessary as well as economic to replace 330kV equipment. Works programmed to be complete 2004.	34
2001 Annual Planning Statement 5.3.2	Considerable difficulty being experienced on maintaining equipment. Strategic substations so considered necessary as well as economic to replace 330kV equipment.	34

Source	Description	Estimate of Works $M
	Works programmed to be complete 2004.	
2002 Annual Planning Report 5.2.8	Considerable difficulty being experienced on maintaining equipment. Strategic substations so considered necessary as well as economic to decommission existing 330kV and 132kV yard and build a new yard on adjacent land. Works programmed to be complete 2004.	27
2003 Annual Planning Report 5.2.5	Considerable difficulty being experienced on maintaining equipment. Strategic substations so considered necessary as well as economic to decommission existing 330kV and 132kV yard and build a new yard on adjacent land.	No estimate given

A condition assessment was carried out in 2001 with an assessment as at December 2001 and concludes that the substation should be reconstructed. Three options were looked at:

- Continue to operate the existing substation by maintenance and defect repair
- Progressively replace plant on an individual basis
- Replace whole substation

Comments:

The information supplied by TransGrid was only technical support for the replacement. This appears to have been well researched. The selected option to build a new yard appears to have been only assessed from a technical risk perspective. There is no evidence of economic analysis. GHD had requested the economic analysis for justifying the decisions. This has not been sighted so GHD cannot comment on the efficiency of this expenditure. GHD has not been provided with any detailed costing to comment on the amounts spent to date.

Appendix E

Future Development Capex Review Notes

A number of sample projects were reviewed with emphasis on the following aspects:

- Planning criteria that applied to the project's need
- The timing of the project
- The options considered in relation to network and non-network solutions
- The cost of the project

Supply to West and Central West (Wollar – Wellington 330kV line)

Brief Description:

Outage of the 330kV line between Mt Piper and Wellington could lead to voltage problems in Country Energy network during periods of high demand. Wellington is the area of particular concern. To overcome this a 330kV line is proposed between Wollar and Wellington with a switching station at Wollar.

Planning Criteria:

Through the joint planning process with Country Energy it was agreed that a N-1 criteria was not appropriate but a less risk-averse criteria basis on expected energy not supplied would be applied. This criterion shows acceptance that there will be some risk of supply interruptions.

Timing:

The timing is based on the criteria not being met from 2002 onwards. Load growth has been looked at and it has been determined that the thermal limitations on equipment will not likely to be breached in the 10 year planning horizon. The conversion of Wollar to 500kV will only be required if the Bayswater – Mt Piper line is changed to operate at 500kV.

Options Considered:

The Regulatory test considered various network options and theoretical non-network options as no responses were received from consultation process.

Cost of the Project:

The capital costing in the economic analysis for the selected option was $67.7M in May 2003. In the Application the allowance is $75.7M.

Regulatory Test:

As the need is driven by expected energy not supplied a probability method has been developed to determine the amount of energy to be costed.

Questions to TransGrid and their Response after Initial Review

Q. GHD would like to sight the load studies and forecasts that confirmed the project timing. How does TransGrid verify the Country Energy load forecasts?

A. TransGrid advised that they review the forecasts through ongoing joint planning processes and through their own forecasting process.

Q. Final report August 2003 shows the capital costs for selected option is $67.7M. This differs from the $75.7M included in the future Capex. What is reason for the difference? The Capex spreadsheet rev 09 says updated in accordance with revised 2003 capital budget. GHD would like to see a copy of the revised 5-year capital budget.

A. As projects are developed the costs estimates are progressively refined. $67.7M based on June 2003 engineering feasibility. $75.7M based on the revised 2005 budget with main areas of cost changes being line construction, Wollar switching station and line easements.

Q. GHD understands that this project is required to commence in 2004 due to voltage issues under outage of Mt Piper and Wellington line. GHD would like to confirm the reasoning behind no changes to the timing and costs of this project under the different ROAM scenarios.

A. TransGrid advised that the load at risk even now for N-1 criterion. This is with mutual agreement with Country Energy. Then need for the project is now and therefore doesn't change under the ROAM scenarios.

Comments

1. The use of an expected energy not supplied criterion is reasonable given the alternative of N-1 criterion, which could have been applied, would be much more costly to implement.
2. GHD has not sighted the planning studies that confirm the timing of this project. Therefore no conclusion can be made.
3. The study has appropriately looked at the costs of unserved energy, but GHD has not sighted the basis of the losses so can't comment on the levels used. The study has also considered the need for a new 550kV substation in the long term if Bayswater - Mt Piper line is upgraded. The study has assumed no improvement in losses so is conservative in this assumption. The option analysis is appropriately carried out with and without the need to convert in the future to 500kV.
4. Provided the information in the regulatory test is correct then the timing and option studies are considered appropriate.
5. Based on the scope details, diagrams contained in the Regulatory test the cost estimates are considered appropriate.
6. There has been a change of 12% in the project capital costs from the economic evaluation in May 2003 to November 2003. GHD has not received enough details on the latest project costs to determine if they are appropriate.

Dapto – transformer addition and replacement

The 2003 Annual Planning Report indicates that based on current load forecast the firm transformer capacity is expected to be exceeded by 2007/08. N-1 criteria planning criteria applies.

This project has not yet been subject to detailed analysis. Preliminary options considered include network and non-network options. There is local generation planned in the area however indications are that it will not be secure due to the use of only one large unit rather than a number of smaller units. This will not delay the need for the project as TransGrid will have to provide supply if the generation is down.

The cost included in the future Capex is $7M. This is based on similar projects undertaken by TransGrid in the past.

Questions to TransGrid and their Response after Initial Review

Q. GHD would like to sight the load forecasts that show the different project timings under the ROAM low, medium and high growth scenarios.

A. TransGrid supplied the 50% POE summer and winter forecasts for high, medium and low growth. The loads used are based on Integral Energy advice.

Q. In the APR it mentions a substantial local generation project in early stages of development. The APR indicates that this project may advance the onset of the constraint at Dapto. GHD would like to understand why this is the case.

A. There is local generation planned in the area however indications are that it will not be secure due to the use of only one large unit rather than a number of smaller units. This will not delay the need for the project as TransGrid will have to provide supply if the generation is down.

Q. Costing basis to be confirmed, GHD had understood that the switchgear is in place as transformer moved to Vales Point.

A. The cost estimate was based on other broadly similar recent projects. More refined costs will be done when engineering feasibility is undertaken.

Comments:

1. GHD believes the project is justified, however, the timing of this project depends on the load forecasts. Under the medium forecast used by TransGrid, 3.7% per annum up to 2007, the timing is 2007/08. If the load growth is low, 3.1% per annum up to 2007, then the project will not be needed until 2010, which is outside the regulatory period. Under the probability based approach to future development Capex used by TransGrid this project has been appropriately timed.
2. The costing basis used for the project estimate is considered appropriate.

Liverpool – transformer addition and replacement

The 2003 annual planning report indicates firm capacity at Liverpool substation will be exceeded in Summer 2002/03. Integral Energy load figures indicate future summer loads will be higher. The project is indicated to be completed by summer 2004/05 based on the current load forecast.

N-1 planning criteria applies.

Options considered were:

- Replacement of existing transformers by larger units
- Installation of a third transformer
- Transfer of loads to other substations during a transformer outage
- Reduction of loading via power factor correction
- Reduction of transformer loading by demand management

The option selected was installation of a third transformer. Both Integral Energy and TransGrid separately requested public solutions for either local generation or demand management. No proposals were received.

The cost in the Application is $7M. TransGrid advise a more detailed costing has since been done and the cost is now $8.5M.

Questions to TransGrid and their Response after Initial Review

Q. GHD would like to sight the load forecasts that confirmed the project timing. How does TransGrid verify the Integral Energy load forecasts?

A. TransGrid explained ongoing joint planning and its own forecasting checks.

Q. Costing basis to be confirmed. Is the project being built to the same scope as that defined in project definition T.2062?

A. TransGrid provided the cost breakdown for the project most recent cost estimate of $8.53M

Comments:

1. This project is committed and work is starting this year. The timing would appear to be correct based on the actual load figures supplied showing that the firm rating was exceeded in 2002/03 summer and loads will continue to increase.
2. GHD considers the options looked at are reasonable and that the selected option is appropriate.
3. The project-revised cost is a 21% increase on the previous estimate. The more recent cost is understood to be from a more detailed analysis now that the scope of works is known. The cost basis is considered reasonable except GHD notes that the most recent estimate includes a contingency amount of 13%. This appears large considering advice that the cost is from a detailed analysis.

Glenn Innes 132kV busbar

The Glen Innes substation was developed in 1970 as a temporary substation. It is connected as a tee on the Armidale to Tenterfield 132kV line. The load at Glenn Innes is around 20MW. An outage on the line results in loss of supply to Tenterfield.

Country Energy indicates that the load in the area is increasing such that an N-1 criterion is required under their connection agreement. They are planning to add a second 66kV line to Glenn Innes substation. Country Energy is currently carrying out an economic analysis for their second 66kV line and don't expect to connect until 2005. The growth rate figures supplied by Country Energy to TransGrid show a rate of 1.8% per annum.

To achieve N-1 the tee arrangement needs to be modified so that supply can come from either Armidale or Tenterfield. This can be achieved by modifying the busbar at Glenn Innes and the nearby 132kV line.

The estimated capital cost is $4M with the project timing of 2006/07. The capital cost allowed is based on TransGrid's experience on similar projects and reuse of the existing transformers.

Questions to TransGrid and their Response after Initial Review

Q. TransGrid to confirm the driver for this project. Is it to meet Country Energy requirement for N-1 now that load is increasing or is it to bring the temporary substation up to current design standards?

A. TransGrid confirmed driver is Country Energy criterion for N-1 reliability as load has exceeded their 15MW threshold. Country Energy made formal request for connection to TransGrid.

Q. TransGrid to confirm the costing used.

A. Project scoping report supplied. The costing used in ROAM analysis was generic. A more detailed costing will be done in due course.

Q. GHD would like to sight the load forecasts that confirmed the project timing.

A. TransGrid referred to the 2003 APR which \gives latest load forecast fro Glenn Innes.

Comments:

1. This project is still subject to Country Energy carrying out an economic analysis for their second 66kV line.
2. This project is being driven by the N-1 planning criteria as required by Country Energy for loads above a threshold of 15MW and appears to be prudent on this basis.
3. The basis of the estimate and its quantum is considered reasonable.

Coffs Harbour 330/132kV substation

Increasing loads have resulted in unacceptable low voltages at Coffs Harbour when one of the critical 132kV feeder outage occurs at times of high load. Reinforcement to the network is required, with the network solution determined by TransGrid being a 330/132kV substation at Coffs Harbour.

The planning criterion is N-1. The network constraints are expected to occur from Winter 2004, with further constraints occurring up to 2007 depending on QNI flows. The timing for the project is 2005/06.

The only feasible network option considered by TransGrid was the building of a substation in the Coffs Harbour area. So all the options considered in detail are positioning of the substation. Other options considered, according to TransGrid reports, but not looked at in detail, due to excessive costs, were building new or rebuilding 132 or 330kV lines from Armidale. This would have required additional line routes. Rebuilding of existing lines could not occur due to the loads already on them.

A consultation paper was prepared to obtain non-network solutions. No proponents came out of the consultation process. The economic evaluation included hypothetical demand management and local generation.

Information from TransGrid shows the project cost is $19.8M including the $1.1M expected to occur in 2003/04. The feasibility study in 2002 showed the preferred option to be $16.3M. The project being implemented is that considered in the Regulatory test but the costs were further refined as the project definitions were undertaken.

Questions to TransGrid and their Response after Initial Review

Q. Load growth – GHD would like to sight the actual demands for 2002 and 2003.

A. TransGrid supplied data.

Q. GHD would also like to sight the planning model that confirmed the network constraint timing causing unacceptably low voltages. This would include the rationale behind the costing of options that show building local generation would only delay project by one year. How was demand management and generation modelled?

A. TransGrid supplied data. There were no respondents to request for demand management. The generation was based on the largest diesel unit, no other economical forms of fuel readily available in the area.

Q. GHD would like TransGrid to explain how the project cost in the planning spreadsheet of $19.82 is determined. This is more than the 2002 feasibility report figure of $16.25M. Is the final project that has been approved for starting in 2004 the same as that used in the regulatory tests?

A. TransGrid advised that as projects are developed the costs are refined. $16.25M was developed in 2002. $19.82M based on 2003 five-year budget. Regulatory test included 20% cost sensitivity. The project to be built is as per the Regulatory test.

Comments:

1. The timing of the project is supported by the load flow diagrams supplied by TransGrid. The loads used are those supplied by Country Energy and in the APR 2003. The growth rate is consistent with the historical growth rate.
2. The estimated project costs have increased 22% from the 2002 feasibility report to the 2003 five-year budget. The project scope is the same in both cases. The regulatory test used a 20% costs escalation as sensitivity, so the latest estimate is outside that range. The original estimate is considered reasonable. There is not enough detail to comment on the subsequent cost increases.

Appendix F

Support the Business Capex GHD Questions and TransGrid Responses

1. Support the Business Capex

Background.

We have reviewed the documentation provided by TransGrid on IT projects for both the past and future Capex. Key information has included:

- 1999 to 2004 IT Capex summary along with brief justification.
- 2004 to 2009 IT Capex summary with very brief justification.
- Specific information on selected past Capex projects.
- IT Management Framework.
- Catalyst IT Strategy and Governance Review
- KPMG IT Benchmarking Study

We note the need to now provide a business case justification for all projects, and the Governance Review recommends a strategy focus on IT applications which deliver reduced costs or improved operational measures. We wish to follow up on the specific project justification for each of the selected projects/programs below.

Review comments are provided below and relate to further questions.

A. Asset Management System Implementation Project (AMSIP)

Stage 1 costs are shown as $3.7 million in the Business Case, of which $2.1 million is allocated to the past Capex period in 2003/04.

The future Capex costs for AMSIP are shown as $5 million. By deduction, this amount includes $1.6 million to complete Stage 1 and the balance of $3.4 million to undertake future Stages. All of these costs are to be incurred in 2005 as shown on the presentation.

Indicative costs of $6.2 million for future Stages were included in the Stage 1 Business Case, but require further justification at the appropriate time. The benefits of Stage 1 were also to be evaluated prior to proceeding with later stages. (Q1 and Q2).

Benefits of Stage 1 were identified as $3.7 million p.a. commencing in late 2004/05, for avoided costs of managing an expanded asset base. It is not clear how these and other tangible but unquantified benefits identified in the Business Case translate into efficiencies built into the Opex forecast. (Q3 and Q4).

B. Corporate Data Network (CDN).

Review of the Network Strategy Plan (Oct, 2002) for the CDN Stage 2 indicates it is largely a technical analysis of requirements. It sets out a proposed set of principles on how the network should be operated into the future, but with no analysis of the risks, costs and benefits or any form of business case. The IT Strategic Plan (Feb, 2002) provides some context, but the future role of the CDN was still to be defined. Other documentation appears to provide detail on some components of the project (Fujitsu hardware for Connection to Fibre Project for $2.4 million, CDN Program which does not provide any costs but outlines some savings, Fujitsu approval for project services of $0.2 million, Project End Report for same project stating budget of $3.2 million and actual cost of $3.1 million on completion at 1/4/03) but these are difficult to link into the overall project. We are unable to establish a link between these documents and the $5.6 million past Capex amount and $5.4 million for the future Capex amount. (Q5 and Q6). We have been unable to locate any documentation which supports justification of the future Capex amount.

C. Replacement of Standard Desktops

This project is shown as costing $8 million Capex over the 5 year future period. The Standard Desktop Computer Infrastructure document provided as justification for this project (GD IS G2 017) outlines approval to some $1.0 million in 2002/03 and shows anticipated replacement expenditure for standard hardware of $1.0 to $1.2 million p.a., which could be extended to support Capex of some $5 to $6 million over the future period. We are unable to establish the basis for the $8 million future Capex for the Desktop Replacement. (Q7).

D. Business Systems Upgrade

The project charter for Stage 1 showed budget costs of $3.8 million, implemented by June 2001. Stage 2 Project Brief identifies costs at $3.4 million with completion by June 2002. This appears to give a total past Capex value of $7.2 million. Total costs for BSU in the past period summary are shown as $8 million. We are unable to reconcile the documentation provided to the total cost of $8 million in the summary. (Q8).

The Project Brief for Stage 2 refers to approval of the project and overall budget estimate by the ISSC and TransGrid Executive in 1999. We wish to review this document. (Q9).

It is noted that the Project Management Plan for Oracle 11i Upgrade provided in support of this project, does not contain any information on the project costs including the split between contract costs and internal costs, or any plan to control or manage the project costs. This is considered a serious deficiency. (Q10).

Questions and Summarised Answers

A. AMSIP

Q1. Please clarify if we have deduced the correct figures for the future AMSIP Capex of $1.6 million for Stage 1 and $3.4 million for future stages.

Q2. Please advise how the $3.4 million for future AMSIP stages has been derived, compared to $6.2 million in indicative costs. How are these costs justified, as it appears no business case has yet been prepared?

A for Q1 & Q2: Stage 1 will cost a total of $4 million ($2.2 million in 2003/04 & $1.8 million in 2004/05). Estimated value for stages 2 & 3 (Detailed estimates still under way by TransGrid) is $3.7 million. All up total of $7.7 million.

Q3. How are the substantial financial benefits of Stage 1 of AMSIP included in the Opex forecast?

A3: The benefits consist of 2 main areas – avoidance of future additional expenditure & risk minimisation. TransGrid state that these have been incorporated into the Opex forecasts, reflected by the constant 'cost per maintenance unit' being used (the increasing environmental compliance and vegetation management costs being partially offset by keeping labour numbers relatively static).

Q4. How are these AMSIP benefits to be monitored?

A4: An early deliverable of the AMSIP project is a 'Benefits Realisation Plan' which will list the expected benefits for the whole project. For each benefit the following will be detailed:

- Description of the proposed benefit
- Description of the current situation/performance of the business process

- Baseline measure, method of calculation and current cost
- Changes required for the delivery of the benefit
- Proposed target after the planned change
- Assessed value of the benefit or saving
- Accountability for driving the benefit and recipient of the benefit
- Target date for the benefit to be realised

Once the project has been implemented, benefits will be measured against targets, along with identifying beneficiaries. Many of the initiatives of the AMSIP program aim to improve productivity associated with processes and business systems, and minimise risks.

B. CDN

Q5. Please provide information that establishes the basis of the costs for the overall CDN project included in Capex for both the past ($5.6 million) and future ($5.4 million) periods.

A5: $2.5 million (of past Capex undertaken in 1998) relates to:

- Procurement of 38 Teltrend routers across the organisation to enable the implementation of a Wide Area Network to support distributed corporate services
- Building and fitting out of a data centre and re-cabling within Head Office to support the growing requirements of the business

$3.1 million (of past Capex undertaken on 2003) relates to:

- Relocation of CDN services from TG Microwave bearers (due to government decommissioning of frequencies) and connect to the POGW network
- Procurement of Cisco hardware to replace the ageing Teltrend routers and upgrade the CDN to meet the CDN 5-year Capacity Plan
- Connection of an additional 31 substations to the Wide Area Network

Total past expenditure is $5.6 million.

Q6. Please provide a justification of the future Capex for the CDN project, following on from the recommendations in the IT Strategic Plan.

A6: Future Capex of $5.4 million relates to cyclical replacement of Cisco hardware according to de-support timeframes, (generally 5 years). The CDN equipment is distributed across 31 substations, 5 regional centres, 4 floors of Elizabeth Street and Data Centres across the network.

C. Desktop Replacements.

Q7. Please provide the basis for the $8 million future Capex amount for Desktop/Laptop replacements.

A7: The response did not fully address the make up of the $8.0 million future Capex amount.

D. Business Systems Upgrade.

Q8. Please reconcile the amounts for each stage of this upgrade to the total cost of $8 million.

A8: Stage 1 = $4.9 million (Feb 2001 – Oct 2002), Stage 2 = $3.1 million (2003/04)

Q9. Please provide a copy of the original budget estimate for the overall BSU in 1999.

A9: Original estimate of between $3.8 million and $5.0 million, comprising:

- $1.1 million-$1.4 million for financials
- $1.5 million - $1.8 million for UNIX
- $0.4 million - $0.6 million for Project Management & other
- $0.8 million - $1.2 million for infrastructure

Q10. What systems does TransGrid have to ensure project costs are controlled on all IT jobs, and how well are they implemented?

A10: Systems in place to ensure IT project cost control include:

- IT Management Framework which identifies responsibilities and governance
- IT Projects Methodology
- Project budget tool for tracking and forecasting expenditure on time an material projects
- Monthly Oracle financial reporting including Discoverer reports
- Operational handover sign-offs
- Post implementation reviews
- ISG Project Methodology

Appendix G

Opex Related GHD Questions and TransGrid Answers

IT Opex

Background

The BCI IT Strategy and Governance Review made recommendations such as:

- Recent investments in the rationalisation of IT infrastructure and legacy systems has resulted in the improvement of service delivery, but these have only delivered minimal business improvements.
- Transgrid must make a major shift in its strategy focus and invest its IT dollars in Applications that improve business processes that result in either reduced costs of business processes or improved operational measurement of performance.

The BCI report recommended a change of strategy focus in a number of areas.

Questions

Q1: How has or does Transgrid respond to the suggestions made in the BCI report, including?

- Reshape and strengthen current governance mechanism

A: Changed the IT governance mechanisms as follows:

- Information Systems Steering Committee reformed into Information Technology Executive Committee with higher level members (General Managers & CIO)
- IT working groups were introduced to each Business Unit who prioritise IT projects within their business unit and are a project filter prior to those projects being submitted to the IT Executive Committee
- Introduced a single Architecture working group to develop a common framework for IT infrastructure and application. Chaired by the CIO
- Prioritise IT investments to maximise benefits for least financial outlay – align these priorities with the overall corporate strategy

A: The approval process has been re-designed. Activities to date include:

- Current & urgent projects reviewed to ensure they were appropriate & develop a short term plan
- Implement a new project approval process through ITEC (including prioritization processes covering financial/cost-benefit analysis, strategic assessment, Business risk & technology risk)
- Develop business case requirements for new projects
- Improve/Redesign “Project Planning and Approval Process” – optimise business case development process that focus on a Cost Benefit Analysis (CBA)

A: New project planning and approval process has been implemented, consisting of:

- Development of project briefs for all projects greater than $50,000 when preparing yearly IT project plan
- Development of full business case for appropriate approval of projects in yearly project plan prior to commencement of projects
- Redefine IT structure and roles

A: Role of ‘Manager – Information Systems’ broadened with greater focus on advising re: business value of information technology investments, and a more proactive role in identifying and utilising systems and

technologies – the title of this role has been changed to CIO. The role of the Information Systems Group was identified as too narrow and too focused on Service Delivery and Infrastructure, hence a sub-team (Enterprise Systems) was modified to assist the business in developing system requirements and business cases.

- Re-scope the Network Business System Project into three streams to focus on core asset management processes to optimise the use of MIMS existing functionality – also requires replanning to bring up to operational standards that optimise investment opportunities and achieve targeted benefits

A: Recommendations from the report have been implemented

- The TRIM Project needs to be reviewed in the context of Transgrid's overall priorities – if TRIMs priority is confirmed, then a proper pilot and metrics needs to be conducted to establish benefits and firm up total costs.

No answer provided

Q2. Whereabouts in the table "TransGrid Operating Expenditure" (Document # ACCC-031010-10) does the fees charged by Oracle appear? I.e. is it under outsourced services or some other category?

Note: answer provided as part of draft document review by TransGrid

A: The trim phase 3 implementation has been reviewed and it has been decided not to proceed with it at this stage. The project has been determined to be justified however the change management issues associated with its implementation put the benefits realisation at considerable risk. The project has not been included in the 2004/05 IT Plan and it will be reassessed for the 2005/06 Plan in accordance with the prioritisation process set out in the IT Management Framework.

Regulated and Non-Regulated Expenditure

Please provide the total Regulated and Non-Regulated historic expenditures for each year of the previous regulatory period for the whole business. Also, please include the portions of this expenditure that are allocated to Opex.

Note: answer provided as part of draft document review by TransGrid

A:

Year	2000	2001	2002	2003
Regulated Expenditure	102.9	100.4	103.4	113.8
Unregulated Expenditure	5.4	7.5	6.4	7.5

All amounts are in $millions.

TransGrid's operating expenditure includes both regulated and unregulated expenditure. All unregulated expenditure is ringfenced from regulated expenditure to ensure cross-subsidisation does not occur. Unregulated Opex does not appear in TransGrid's regulated Opex accounts or balances.

This expenditure does not include expenditure associated with capital works. Those costs are either capitalise with the asset to which they relate. These assets may be either regulated or unregulated and are also similarly ringfenced.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	D. Vincent, R.Shaw, G. Taylor, C.Peile.	D. Vincent	*	D. Vincent	*	19/2/04
B	D. Vincent, R.Shaw, G. Taylor, C.Peile.	D. Vincent	*	D. Vincent	*	19/3/04
0	D. Vincent, R.Shaw, G. Taylor, C.Peile	D. Vincent	*	D. Vincent	*	8/4/04

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