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REVIEW OF THE TRANSEND TRANSMISSION NETWORK REVENUE PROPOSAL 2009 - 2014

An Independent Review Prepared for the Australian Energy Regulator

101010-00242 – 02-EL-REP-001

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Disclaimer

PROJECT 101010-00242 - REVIEW OF THE TRANSEND TRANSMISSION NETWORK REVENUE PROPOSAL 2009 - 2014

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1.1 Scope of the WorleyParsons Review

WorleyParsons' Scope of Work for the Australian Energy Regulator (AER) in respect to the Transend's Revenue Proposal 2009-2014 was broadly as follows:

1.1.1 Capex

- Review Transend's capital governance framework to determine whether it:
  - Reasonably reflects the "capital expenditure objectives" and the "capital expenditure criteria" under clause 6A.6.7 of the NER;
  - Is based on sound principles that are in accordance with Capex strategies, policies and procedures;
  - Provides reasonable assurance for both historic and future Capex programs; and
  - Is effectively co-ordinated across the organisation.
- Assess the prudence of the Capex undertaken by Transend in the Current Regulatory Control Period to establish whether Transend made decisions at each stage of the investment process consistent with good industry practice.
- Review Transend's proposed forecast Capex. In particular, determine:
  - Whether Transend's probabilistic forecasting approach reasonable reflects a realistic expectation of the demand forecast and cost inputs required to achieve the "capital expenditure objectives";
  - Assess the adequacy of the Capex program and determine if the forecast reasonably reflects the "capital expenditure criteria"; and
  - Assess the reasonableness of the assumptions underlying the Capex forecast and determine whether the Capex program is deliverable.
- Review a representative sample of ex-post and ex-ante projects to assist in formulating views on the foregoing matters.
- Examine any contingent projects proposed by Transend and assess them in accordance with clause 6A.8.1 of the NER.

1.1.2 Opex

- Review Transend's Opex program for the Current Regulatory Control Period. In particular determine:
  - Whether the Base-Year in the Current Regulatory Control Period is an efficient point from which to forecast the Opex for the Next Regulatory Control Period;
  - Analyse and explain any variations between forecast and actual Opex;
  - Identify any trends and explanations as to possible drivers of the trends;
  - Assess whether the expenditure reasonably reflects the operating expenditure criteria under clause 6A.6.6 of the NER; and
  - Whether Transend's allocation of Opex costs to specific activities, including the distinctions between regulated and non-regulated activities, has been properly carried out.
- Review Transend's Opex program for the Next Regulatory Control Period. In particular determine:
  - The reasonableness of Transend's methodology to forecast its future Opex requirements;
  - The reasonableness of key internal and external factors underpinning the Opex forecasts;
  - The reasonableness of Capex/Opex tradeoffs;
  - The effectiveness of Transend's operating practices and asset management system in ensuring only prudent and efficient Opex occurs;
  - Undertake benchmarking of Transend's Opex performance against other Australian TNSPs; and
  - Recommend an efficient level of Opex.

1.1.3 Service Target Performance Incentive Scheme

Review Transend's proposals regarding the Service Target Performance Incentive Scheme (STPIS) and then recommend appropriate performance targets, caps and collars to be applied to Transend over the Next Regulatory Control Period.

1.2 Asset Management Framework

Transend Networks Pty Ltd (Transend) owns and operates the Tasmanian Transmission system. Transend transmits electricity from power stations to its substations around the State.

Transend owns some 3,650 circuit kilometres of transmission lines, 47 substations and nine switching stations. Further, unlike the majority of Australian transmission companies, Transend owns the high voltage assets that provide the connection to the customer's distribution feeders.

The Tasmanian transmission system is connected to the mainland Australian transmission system via a privately owned interconnector, Basslink. By virtue of this interconnector, Transend is a participant in the National Electricity Market (NEM) and transmits power to and from Basslink and not just from power stations in Tasmania.

Transend has developed a comprehensive asset management framework to ensure the most appropriate and effective transmission system performance. A key objective of the framework is to meet the required level of service in the most cost-effective manner through the prudent and efficient management of assets for the benefit of present and future customers.

Transend's asset management framework is supported and defined by an extensive suite of documentation. The documentation was modelled around the total management process as presented in the International Infrastructure Management Model (IIMM). Transend has advised that this asset management framework is consistent with Strategic Asset Management (SAM) principles.

Worley Parsons has examined many examples of the asset management documentation and is impressed with the quality and comprehensive coverage of it. WorleyParsons considers that the asset management documentation is at least the equal of any other current Australian TNSP of which WorleyParsons is aware. Whilst it is true that many of the documents have been produced recently, WorleyParsons believes that there is evidence that many of the recently produced documents are simply the formalisation of processes which are well embedded in the organisation.

1.3 CAPEX

WorleyParsons' scope of work was amended by the AER to exclude asset renewal projects. In line with this amended scope, WorleyParsons has not investigated or commented on asset renewal Capex in the course of this review.

1.3.1 Capital Expenditure Governance

WorleyParsons considers that Transend's capital governance framework is based on sound principles and WorleyParsons saw evidence that these were being applied in practice during the review of ex-post projects.

WorleyParsons found that there is a strong alignment between the assessment of individual projects and Transend's business objectives. This alignment was evident in the business cases sighted by WorleyParsons. Further, the Strategic Performance Objectives in Transend's Strategic Plan cover all four "capital expenditure objectives" under clause 6A.6.7 of the NER.

WorleyParsons endorses the key operating principles underpinning the investment decision-making and approval process and considers these to be appropriate for providing a sound basis for capital expenditure governance. Transend's Capex policies and procedures are aligned with these key principles.

Transend experienced a number of problems due to inaccurate project estimates. This resulted in a number of projects requiring re-authorisation for additional funding. This issue appears to have been addressed with an overhaul of the estimation process.

WorleyParsons considers that the capital governance framework provides a high level of assurance for future Capex and a reasonable level of assurance for past Capex. This opinion is based on the observed effectiveness of the processes followed and the quality of the documentation regarding policies and procedures.

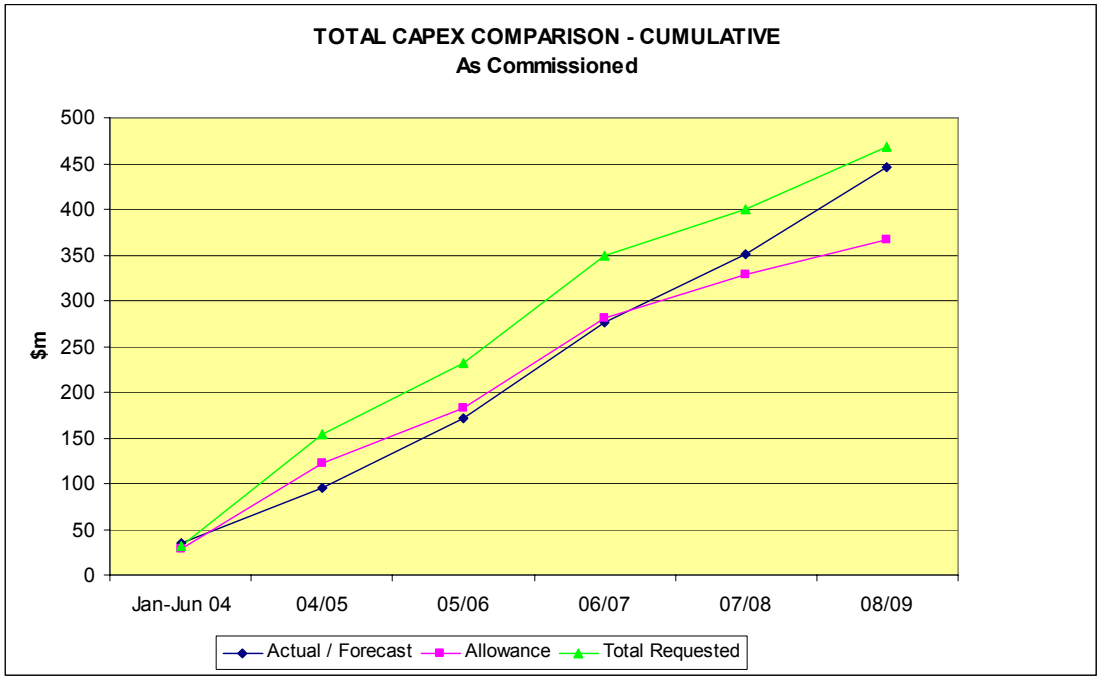
Transend's capital governance framework is effectively coordinated across the organisation through the following mechanisms:

- Clear documentation of policies and processes;
- Ease of access by all employees to documentation via the intranet; and
- Communication and training.

1.3.2 Comparison Actual Vs. Allowance

A comparison between the actual/forecast commissioned expenditure and the ACCC allowance for the Current Regulatory Control Period is shown on a cumulative basis in Figure 1-1.

Figure 1-1: Cumulative Expenditure Comparison for Current Period (June 09, $m)



It can be seen that Transend's cumulative actual/forecast expenditure aligns reasonably closely to the ACCC allowance, except for the final year of the period (2008-09). For the Current Regulatory Control Period, average commissioned expenditure is significantly more for development and renewal, and slightly more for non-network Capex than that allowed by the ACCC[1].

The differences between the actual/forecast Capex and the ACCC allowance have been caused by the following three key factors:

- Real cost increases;
- Estimating basis; and
- Changes to the capital program.

1.3.3 Work in Progress

Transend has identified $55.9m in Capex that it will incur for projects which will not be completed (and hence not capitalised) by the end of the Current Regulatory Control Period. Transend's original Revenue Proposal included an allowance of $57.9m for WIP, but this has been amended by Transend.

[1] Transend provided updated information too late for WorleyParsons to incorporate into this report.

WorleyParsons has no issues with Transend's methodology used to calculate the WIP for each year of the period 2006-07 to 2008-09. WorleyParsons has reviewed the application of the FDC rate to the individual projects within the works program and has concluded that the calculations are consistent and accurate. On this basis, WorleyParsons recommends that the AER accept the revised amount of $55.9m for WIP.

1.3.4 Demand Forecasts

Maximum demand is a key input into determining the need for and timing of transmission network augmentations. It is important therefore that the processes used to determine forecasts of maximum demand are robust and that the forecasts are as accurate as practicable.

WorleyParsons is not able to determine the level of accuracy of Transend's maximum demand forecasts, as neither Transend nor Aurora has conducted a statistical analysis to enable this to be done. The back forecasting undertaken by NIEIR provides a reasonable level of confidence in NIEIR's forecasts, and it is noted that Transend's forecasts are consistently below those of NIEIR over the Next Regulatory Control Period.

WorleyParsons notes that PBA concluded from its review that Transend's load forecast methodology is robust and in line with good industry practice. The key areas for improvement identified by PBA related to documentation, communication, model maintenance, model validation and reporting. None of these areas relate directly to concerns regarding the accuracy of the forecasts.

WorleyParsons considers that Transend's process for preparing its demand forecasts is sound, but could be enhanced by the implementation of PBA's recommendations. WorleyParsons saw no evidence to suggest that Transend has (unwittingly or otherwise) inflated its forecasts of maximum demand. WorleyParsons considers that Transend's demand forecasts form an appropriate input to the development of the Capex program.

1.3.5 Capital Cost Escalators

WorleyParsons has reviewed the cost inflation factors that Transend has applied to its base project estimates to develop its Capex forecasts. WorleyParsons notes that the AER has advised that it will undertake a detailed examination of the CEG approach to escalating price movements. That separate review may affect the final value of escalators of price movements adopted by the AER.

WorleyParsons has reviewed the risk factor applied by Transend and has concluded that Transend has applied a transparent process in line with good industry practice.

Transend has developed and applied a detailed model to apply inflators to its Capex forecasts for each year of the Next Regulatory Control Period. WorleyParsons considers the model to be robust and representative of good industry practice.

1.3.6 Network Development

To assist in long term network planning, Transend has developed a 30+ year vision for the Tasmanian Electricity Transmission network. A decision on the backbone voltage has not yet been made and it does not apply to projects in the Next Regulatory Control Period.

Transend has identified the constraints on the transmission network, taking note of the NER System standards and stability requirements and of the Network Performance Requirements.

In regard to breaches of the Network Performance Requirements, WorleyParsons considers that a reasonable approach would be for Transend to address, by the end of the Next Regulatory Control Period, all cases of current breach and those breaches predicted to occur during that period.

To assist Transend in identifying the likely areas requiring transmission network development over the Next Revenue Control Period, an assessment of potential generation developments for the Tasmanian region was undertaken by ROAM Consulting. The assessment involved the application of a probabilistic scenario analysis methodology to identify scenario theme sets defining the likely direction of the energy sector in Tasmania.

WorleyParsons is of the opinion that the analysis allowed the identification of contingent projects associated with likely generation developments. It is appropriate that these generation related augmentation projects are treated in this manner given the large uncertainty as to whether they will be required in the Next Regulatory Control Period.

1.3.7 Ex-Post Project Review

WorleyParsons reviewed ten ex-post projects, amounting to 24% of Transend's actual and forecast Capex for the Current Regulatory Control Period. Key conclusions from the review are:

- Transend adequately assessed the need for the capital projects in accordance with its regulatory and statutory obligations and the "capital expenditure objectives" under clause 6A.6.7 of the NER;
- Transend considered a reasonable range of investment alternatives, their feasibility and timing;
- The project costs were reasonable. In arriving at this conclusion, WorleyParsons reviewed the technical design (for network projects) and unit costs;
- The projects align with Transend's strategic plans, governance arrangements, and Capex policies and procedures;
- The information provided by Transend in regard to the projects reviewed was found to be accurate;
- WorleyParsons did not have any issues with the costs or timing of any of the projects reviewed and considers that the expenditure was prudent and efficient; and

- WorleyParsons is satisfied that the expenditure for the projects reviewed relates to prescribed transmission services.

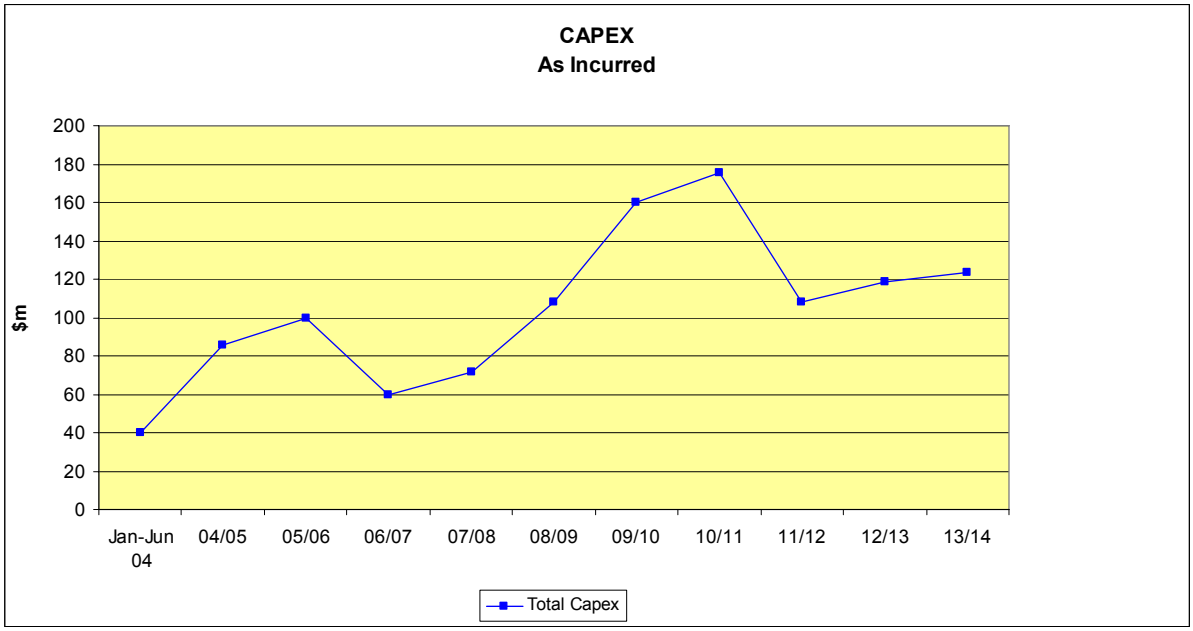
1.3.8 Proposed Program

Transend has amended its Capex forecast from that contained in its Revenue Proposal, to correct some errors and to include updated CPI information, resulting in an increase of $4.9m. Transend's forecast as-incurred Capex for the Next Regulatory Control Period is $685.6m, which represents an increase over the Current Regulatory Control Period of 62.5%, based on expenditure in the Current Regulatory Control Period of $421.8m (normalised to five years).

The significantly higher level of Capex is driven by increases in both the price of work and the volume of work.

The expenditure for the Current and Next Regulatory Control Periods is shown in Figure 1-2.

Figure 1-2: As Incurred Capex (June 09, $m)



The large increase in expenditure in 2009/10 an 2010/11 is largely due to the construction of the Waddamana-Lindisfarne 220kV transmission line.

1.3.9 Ex-ante Project Review

WorleyParsons reviewed ten ex-ante projects, amounting to one third of Transend's proposed Capex. Key conclusions from the review are:

- Transend adequately assessed the need for the capital projects in accordance with its regulatory and statutory obligations and the "capital expenditure objectives" under clause 6A.6.7 of the NER;
- The proposed project costs are reasonable;
- The timing of the proposed projects is reasonable;
- The projects align with Transend's strategic plans, governance arrangements, and Capex policies and procedures;
- The value and timing at which the projects should be included in the ex-ante cap are reasonable;
- None of the projects reviewed would be more appropriately classified as contingent projects, as there were no issues with uncertainty in project costs or timing; and
- WorleyParsons is satisfied that the expenditure for the projects reviewed relates to prescribed transmission services.

1.3.10 Contingent Project Review

WorleyParsons reviewed all of the nine proposed contingent projects and concluded that:

- None of the contingent projects proposed by Transend should be included in the ex-ante cap;
- The proposed trigger events meet the requirements under clause 6A.8.1(c) of the NER;
- Two projects (St Helens and Trevallyn) depend on high growth scenarios. The AER may wish to consider whether these projects should remain in the list of contingent projects, given the lower probability of a high growth scenario occurring; and
- There is a reasonable likelihood of the trigger events occurring in the Next Regulatory Control Period, although it should be noted that the timing for all of the proposed contingency projects is uncertain.

1.3.11 Capex Benchmarking

- In WorleyParsons' experience, benchmarking in general, while apparently offering a useful means of comparing the relative performance of TNSPs is often open to various interpretations.
- Differences in environment, network configurations, voltage levels, connected generation, connected loads and previous technical decisions, disallow definitive comparisons to be made.

- WorleyParsons considers that one area where benchmarking can be most relied upon is where a TNSP is compared with itself over time. Under these circumstances, and if the data definition has remained constant, then useful trends can be obtained.

1.3.12 Overall Capex Conclusions

WorleyParsons has reached the following conclusions in regard to the Capex proposed for the Next Regulatory Control Period:

- In reviewing the expenditure by category, projects having a major impact on changing expenditure patterns in the current and the Next Regulatory Control Period have generally been included in the ex-post or ex-ante project review. These projects, and all of the other projects subject to the ex-post and ex-ante reviews, have been found to be justified, prudent and efficient;
- WorleyParsons is satisfied that, in formulating its proposed program, the methodology applied by Transend is reasonable, taking into account the application of expenditure 'S'-curves, the breakdown into labour and non-labour, the application of CPI and the application of risk factors in the Capex Collector Model. WorleyParsons notes that the AER will separately review the capital cost escalators;
- WorleyParsons considers that the value and timing of expenditure for the ex-ante projects reviewed is reasonable and should be accepted by the AER as prudent and efficient; and
- Based on the project reviews, WorleyParsons considers that it is likely that the projects that make up the remainder of the proposed Capex would be prudent and efficient.

1.3.13 Capex Recommendations

WorleyParsons recommends that all of the actual/forecast Capex, contained in Transend's Revenue Proposal for the Current Regulatory Control Period, be accepted by the AER as prudent and efficient.

WorleyParsons recommends the level of forecast Capex for the Next Regulatory Control Period shown in Table 1-1, but that this be subject to verification of the labour escalation rate, as previously mentioned.

Table 1-1: Recommended Capex (June 09, $m)

Year	09/10	10/11	11/12	12/13	13/14	Total
Total Capex	160.009	175.788	107.870	118.586	123.310	685.563

WorleyParsons recommends that all of the nine contingent projects listed in Transend's Revenue Proposal be accepted by the AER, as contingent projects.

1.4 OPEX

1.4.1 Opex – Current Regulatory Control Period

In regard to the Current Regulatory Control Period, WorleyParsons is of the opinion that:

- The data for Opex work activities has been correctly classified.
- The data pertaining to regulated and non-regulated (or prescribed and non-prescribed) work activities has been correctly classified.
- The data conversion methodology (to convert data at one date to another date) carried out by Transend was accurately carried out in accordance with its stated methodology.
- The data conversion methodology used the Consumer Price Index (CPI) as published by the ABS and Labour Price Indices (LPI) as recommended by CEG.
- Actual Opex expenditure was compared with the Forecast (or Requested) Opex expenditure. Transend's Actual Opex expenditure was found to be as follows:
    - It appears to have tracked its Forecast spending reasonably well;
    - This comparison shows that Actual was less than Forecast at the start of the period and was in excess of Forecast at the end of the period; and
    - In WorleyParsons' experience, this type of expenditure pattern is fairly common. It shows that the TNSP applied appropriate management pressure to the accomplishment of the Works Coordination program over the Current Regulatory Control Period, and as a result, they started to make up the early short falls and recover lost ground. In the event they did not accomplish their total forecast amount of Opex works. WorleyParsons notes that the shortfall of about $20m was relative to a total Forecast Opex amount of about $240m (June 2009 dollars) that is, about 8%.
- In regard to the comparison between Opex Actual Vs ACCC Decision in the Current Regulatory Control Period, WorleyParsons notes as follows:
    - For the first 1.5 years of the Current Regulatory Control Period, Transend's Actual Opex expenditure was approximately equal to the ACCC decision;
    - For the last four years of the Current Regulatory Control Period, Transend's Actual Opex expenditure exceeded the ACCC decision by amounts of about, $2m, $4m, $12m and $15m (June 2009 dollars); and

- WorleyParsons has studied the ACCC Decision on the level of Opex expenditure in the Current Regulatory Control Period, and does not understand the basis for that Decision.

- A detailed dissection of Transend's Opex data (to level 4 dissection) was presented. At this level of detail, WorleyParsons has investigated the cost trends and associated cost drivers in the Current Regulatory Control Period.
- WorleyParsons concluded that the reasons given by Transend for the cost trends are reasonable and indicative of a well run organization, complying with its statutory obligations in a prudent and efficient manner.

1.4.2 Opex – The Base-Year

In respect to the Base-Year, namely 2006/07, which is the last year for which audited records are available:

- An examination of the audited Base-Year (2006/07) data showed that in every case, with the possible exception of "Substations", the Opex expenditure in the Base-Year was not exceptional, rather it was a conservative level of expenditure when compared to the two years before and the two years after it.
- In the case of Substations, which employs zero-base forecasting, the relativity of the level of expenditure in the Base-Year to other years in the Current Regulatory Control Period was not relevant to the forecasting methodology.
- In view of the above, WorleyParsons considers that there is no indication to suggest that the Base-Year data was inappropriate for its use in the forecasting methodology, rather it appears to be quite a conservative year from which to make forward projections.
- WorleyParsons made a physical inspection of the following Transend assets:
  - Creek Road Substation; and
  - Chapel Street Substation.

  During these visits, numerous examples of both past and planned maintenance work activities were pointed out to WorleyParsons. As a result of these visits, WorleyParsons formed the view that Transend's maintenance practices were in accordance with best industry practice, and therefore "prudent".
- Having regard for the above comparisons of the Base-Year audited data with other years in the Current Regulatory Control Period and in consideration of the Opex work activities sighted during the physical examination of assets, WorleyParsons formed the opinion that the audited Opex expenditure in the Base-Year was a suitable (and indeed

conservative) point from which to forecast the Opex expenditure for the Next Regulatory Control Period.

1.4.3 Opex – Next Regulatory Control Period

In respect to the Next Regulatory Control Period, namely 2009/10 to 2013/14:

- WorleyParsons has made a detailed examination of the methodology for forecasting the Opex in the Next Regulatory Control Period. WorleyParsons concluded that the forecasting methodology was philosophically appropriate (the method employed was correct) and that the calculations were performed accurately and in accordance with the stated assumptions.
- The breakdown between those elements of Opex which were subject to zero-based forecasting and those which were subject to estimation from the projection of expenditure from the Base-Year was found to be appropriate.
- The forecasting methodology was based on the following three escalation factors, namely CPI, a labour index (based on AWOTE) and asset growth factors (with associated economy of scale factors):
  - The CPI data was taken from the latest (July 2008) ABS data;
  - The LPI was taken from a CEG report, Appendix 15. (WorleyParsons has expressed concern about the comparison of parts of the CEG results with those of another forecasting body); and
  - The asset growth factors (with associated economy of scale factors) were consistent with the methodology employed elsewhere (and approved by the AER).
- The unit cost of planned Opex works (within the zero-based forecasting methodology) was found to be consistent with the unit prices agreed with the principal supplier of Opex labour, namely Aurora. Further, as the relationship between Aurora and Transend was determined to be “fully commercial” and therefore at “arms-length”, the basis of the unit pricing was found to be appropriate.
- Scope Changes were examined in detail and one proposed change, namely that of the requested appointment of two inventory officers was found to be inadequately supported by the supplied documentation. As a result, WorleyParsons was unable to recommend its approval by the AER and accordingly has removed the expenditure for part of this item (one position) from the level of Opex which is recommended for approval.
- The Base-Year was found to be an appropriate year from which to forecast the future expenditure of the nominated aspects of the future Opex.

- A physical examination of current and planned Opex works indicated that all actual or planned works were prudent and in accordance with industry best practice.
- The level of Controllable Opex which is recommended by WorleyParsons for approval by the AER is $54.9 million in the last year of the Next Regulatory Control Period, namely 2013/14 (June 2009 $). This represents a total increase (real growth) during the Next Regulatory Control Period of 17.8 % over five years, or 3.3% pa.

1.4.4 Opex – Benchmarking and Other Matters

- A range of Benchmarking parameters was derived for Transend and compared with other Australian TNSPs. In WorleyParsons' experience, benchmarking in general, while apparently offering a useful means of comparing the relative performance of TNSPs, is fraught with difficulties.
- In WorleyParsons' view, the inherent characteristics of the individual networks, which are the result of:
  - Geography;
  - The disposition of generation and loads;
  - The absolute size of the network;
  - The development history – the technical decisions which were made in the past; and
  - The maintenance history - how well the network has been maintained in the past;

  are all very important in determining the legacy with which the current management must work when planning current and future Opex activities. WorleyParsons considers that the influence of the above described inherent factors is so strong as to effectively mask the true efficiencies and therefore diminishes the results of the benchmarking (in respect to comparisons to other TNSPs).
- WorleyParsons considers that one area where benchmarking can be most relied upon is where a TNSP is compared with itself over time. Under these circumstances, and if the data definition has remained constant, then useful trends can be obtained. WorleyParsons notes that the ITOMS benchmarking can be used in this way. Viewing the ITOMS data from this perspective (and noting the rigour with which ITOMS data is defined) indicates that Transend has made continual improvements in its Opex performance over the past five (biennial) reporting periods. Further, when compared to the other participants in the Asia Pacific Region (these include most of the Australian and New Zealand TNSPs), Transend's Overall Composite Performance is superior in respect to both Opex cost and service level in 2007 (the date of the last ITOMS report).

- On the basis of the many projects which it investigated, WorleyParsons is of the opinion that in every case the Capex/Opex tradeoffs (including the Capex/Capex tradeoffs) were reasonable, prudent and efficient.
- Using the planning process and associated methodology as described above, WorleyParsons considers that Transend is employing an approach which ensures that any Opex reductions resulting from capital expenditure are realised. It therefore follows that if Opex increases after major capital expenditure that the reasons for such increases are not due to unrealised Opex reductions, rather they are due to:
  - an expansion of the Opex tasks required to operate and maintain a larger system;
  - Increased labour/unit prices of those tasks;
  - Maintaining the system to a higher (more appropriate) standard; or
  - A combination of the above.

1.4.5 Overall Opex Conclusions

- The Transend Opex Proposal, and the documentation including the strategies, procedures and planning tools which underpinned the Proposal, are the best example of planning which WorleyParsons has seen amongst current Australian TNSPs and DNSPs.
- Whilst WorleyParsons would expect Transend to comment that still more needs to be done, WorleyParsons hopes that Transend will employ its considerable knowledge to assist its peers to achieve the Transend level of planning excellence.

1.4.6 Opex Recommendations

- WorleyParsons recommends to the ACCC/AER that the level of Opex required for Transend to properly discharge its obligations to its shareholders and customers within its regulatory and legislative environment is as shown in Table 1-2 below.

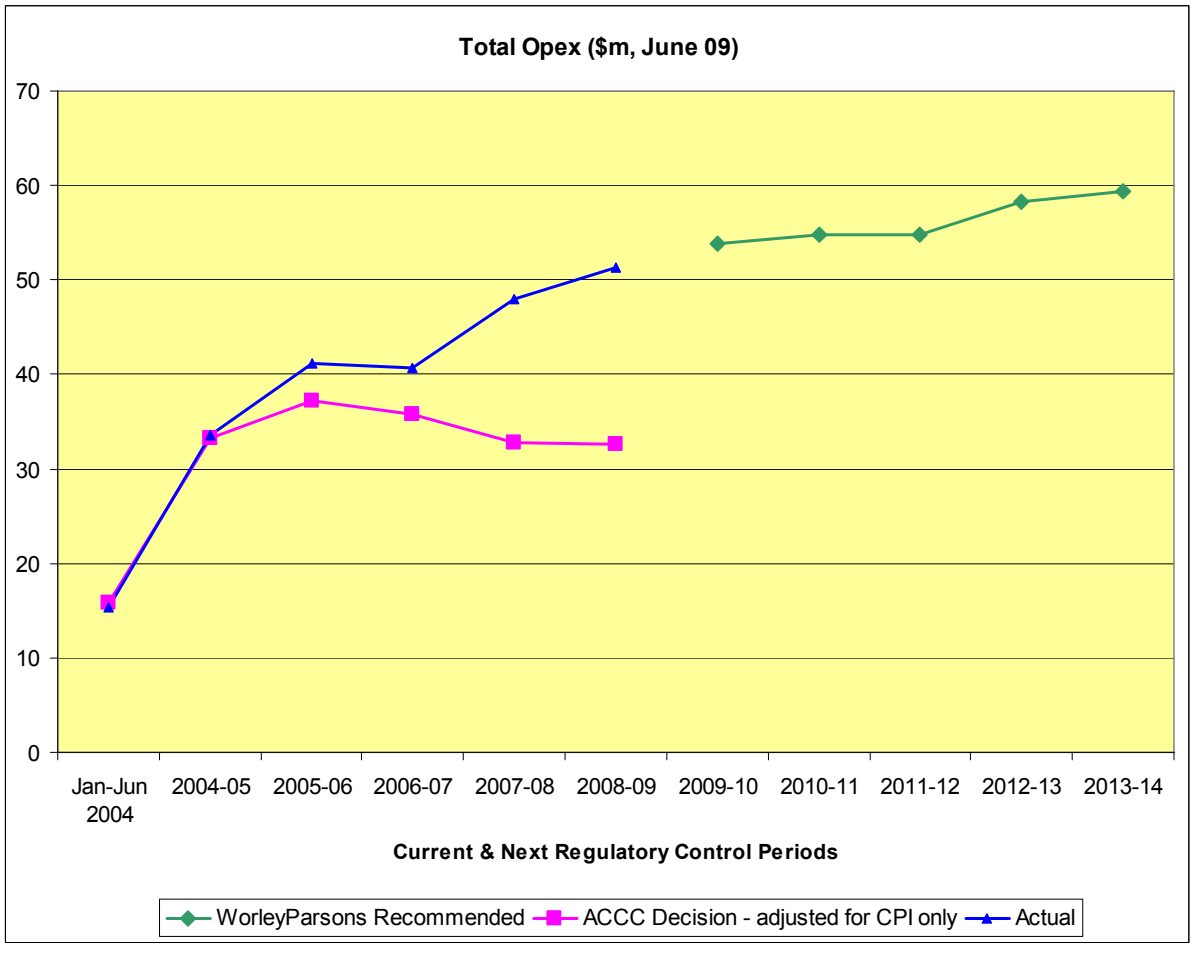
Table 1-2: WorleyParsons Recommended Level of Total Opex for Transend in the Next Regulatory Control Period (June 09, $m)

YEAR	09/10	10/11	11/12	12/13	13/14	Total
Total Opex Recommended by WorleyParsons	53.8	54.8	54.8	58.2	59.4	281.0

Total Opex Requested by Transend – With Latest CPI Data	**53.9**	**54.9**	**54.9**	**58.3**	**59.5**	**281.4**

- Apart from some very minor errors in Transend's calculations, the WorleyParsons' level of recommended Opex only differs from the level proposed by Transend (using the latest CPI figures) by virtue of the deletion of one position, namely one inventory control officer is recommended to be disallowed. This WorleyParsons' recommended Opex expenditure is graphed with the Actual level of expenditure and the ACCC decision for the Current Regulatory Control period in Figure 1-3 below.

Figure 1-3: WorleyParsons Recommended Level of Total Opex for Transend in the Next Regulatory Control Period (June 09, $m)



1.5 Service Target Performance Incentive Scheme

WorleyParsons' recommended parameters for the Service Target Performance Incentive Scheme are as shown in Table 1-3 below.

Table 1-3: WorleyParsons Recommended Collars, Targets, Caps, and Weightings

Sub-parameter	Collar	Target	Cap	Weighting
Transmission line circuit availabilty (Critical)	98.51%	99.13%	99.75%	20%
Transmission line circuit availabilty (Non-critical)	98.48%	98.97%	99.47%	10%
Transformer circuit availabilty	98.67%	99.28%	99.90%	15%
Loss of supply >0.1 system minute	21	15	8	20%
Loss of supply >1 system minute	4	2	0	35%
Average outage duration (Transmission Lines)	529	326	124	0%
Average outage duration (Transformers)	1070	712	354	0%

1.6 Resource Capability

Transend has developed a resourcing strategy, which includes maintaining the strong working relationships with existing service providers for operations and maintenance activities, and that a panel arrangement be established for substation design and construct projects, with appropriate contract conditions. The resourcing strategy also recommended that the fault response capability for secondary systems be in-sourced and that internal engineering capability and capacity be increased to better support transmission system asset management activities.

Transend has also developed a detailed resourcing plan which covers the internal and external resources required to deliver the Capex and Opex works program for prescribed transmission services for the Next Regulatory Control Period.

WorleyParsons considers that Transend has appropriately identified its likely resourcing gaps by skill set, taking into account increased workloads, natural attrition and retirements.

Transend has developed initiatives to bridge the resourcing gaps. WorleyParsons has reviewed the proposed initiatives and considers that it is probable that Transend will be able to fill the expected vacancies, albeit with some challenges in the "technical" areas.

Based on responses received from the contractor pool, the indications are that the necessary external resources are likely to be available to deliver the works program.

2. INTRODUCTION

2.1 WorleyParsons' Contract with ACCC/AER

On 25 March 2008, WorleyParsons Services Pty Ltd (WorleyParsons) signed a contract[2] with the Australian Competition and Consumer Commission (the ACCC) for the provision of certain services as specified in Schedule 1 of the aforementioned contract. For the purposes of this contract, the Australian Energy Regulator (AER) is the part of the ACCC which is managing the contract with WorleyParsons.

Schedule 1 of the Contract states: "The AER seeks the consultancy services of WorleyParsons Services Pty Ltd to provide technical and commercial advice and to review in detail Transend Networks Pty Ltd's (Transend's) capital expenditure, operating expenditure and service standards proposals in relation to one project:

> *"Inquiry into the appropriate revenue determination to be applied to the prescribed transmission services provided by Transend from 1 July 2009 to 30 June 2014."*

Schedule 1 states a number of key dates for the project, namely:

- 31 May 2008: Transend's Revenue Proposal is due to be submitted to the AER;
- June 2008. The AER must notify Transend if their Proposal is Compliant.
- 31 August 2008: WorleyParsons' Draft Report is due to be submitted to the AER; and
- 30 September 2008. WorleyParsons' Final Report is due to be submitted to the AER.

2.2 The Scope of Work

WorleyParsons' Scope of Work for the Australian Energy Regulator (AER) in respect to the Transend's Revenue Proposal 2009-2014 was broadly as follows:

Capex

- Review Transend's capital governance framework to determine whether it;
  - Reasonably reflects the "capital expenditure objectives" and the "capital expenditure criteria" under clause 6A.6.7 of the NER;

[2] Standard Form Contract between the Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract dated 25 March 2008.

  - Is based on sound principles that are in accordance with Capex strategies, policies and procedures;
  - Provides reasonable assurance for both historic and future Capex programs; and
  - Is effectively co-ordinated across the organisation.
- Assess the prudence of the Capex undertaken by Transend in the Current Regulatory Control Period to establish whether Transend made decisions at each stage of the investment process consistent with good industry practice.
- Review Transend's proposed forecast Capex. In particular, determine:
  - Whether Transend's probabilistic forecasting approach reasonable reflects a realistic expectation of the demand forecast and cost inputs required to achieve the "capital expenditure objectives";
  - Assess the adequacy of the Capex program and determine if the forecast reasonably reflects the "capital expenditure criteria"; and
  - Assess the reasonableness of the assumptions underlying the Capex forecast and determine whether the Capex program is deliverable.
- Review a representative sample of ex-post and ex-ante projects to assist in formulating views on the foregoing matters.
- Examine any contingent projects proposed by Transend and assess them in accordance with clause 6A.8.1 of the NER.

Opex

- Review Transend's Opex program for the Current Regulatory Control Period. In particular determine:
  - Whether the Base-Year in the Current Regulatory Control Period is an efficient point from which to forecast the Opex for the Next Regulatory Control Period;
  - Analyse and explain any variations between forecast and actual Opex;
  - Identify any trends and explanations as to possible drivers of the trends;
  - Assess whether the expenditure reasonably reflects the operating expenditure criteria under clause 6A.6.6 of the NER; and
  - Whether Transend's allocation of Opex costs to specific activities, including the distinctions between regulated and non-regulated activities, has been properly carried out.

- Review Transend's Opex program for the Next Regulatory Control Period. In particular determine:
  - The reasonableness of Transend's methodology to forecast its future Opex requirements;
  - The reasonableness of key internal and external factors underpinning the Opex forecasts;
  - The reasonableness of Capex/Opex tradeoffs;
  - The effectiveness of Transend's operating practices and asset management system in ensuring only prudent and efficient Opex occurs;
  - Undertake benchmarking of Transend's Opex performance against other Australian TNSPs; and
  - Recommend an efficient level of Opex.

Service Target Performance Incentive Scheme

Review Transend's proposals regarding the Service Target Performance Incentive Scheme (STPIS) and then recommend appropriate performance targets, caps and collars to be applied to Transend over the Next Regulatory Control Period.

2.3 The Review Process - Methodology

The review was conducted in five stages:

Stage one - Data Collection;

Stage two - "Desk Study" Review;

Stage three - Further Gathering of Information;

Stage four - Review of Significant Issues;

Stage five - Preparation of Draft Report; and

Stage six - Preparation of Final Report.

Unless stated otherwise, all expenditures figures in this report are in real 2008/09 dollars. WorleyParsons has used the escalation factors applied by Transend, which were derived from the

Australian Bureau of Statistics all groups, weighted average of eight capital cities CPI to convert historical expenditure to real 2008/09 dollars.

2.3.1 Data Collection

This stage involved gaining a detailed understanding of the operation of the Transend regulated electricity transmission business and its key processes. A wide range of information was collected, collated, reviewed and cross-referenced as the foundation for detailed analysis. A number of site visits were made and interviews held with key personnel within Transend.

2.3.2 "Desk Study" Review

This stage involved the detailed review of the information gained in Stage one. Factors considered included the following:

- Operating, maintenance, augmentation and replacement strategies;
- Asset details - numbers, types, ages, condition;
- Strategies, policies and processes;
- Network capacity and utilisation;
- Regulatory, safety and environmental compliance issues;
- Organisation and staffing;
- Performance standards;
- Comparisons with other electricity utilities; and
- Assumptions underpinning Transend's forecasts of Capex and Opex.

Outcomes from this stage were the identification of key issues, identification of areas requiring further information and identification of valid causes for significant differences between Transend and other utilities. In making comparisons with other utilities, WorleyParsons has utilised information that is available in the public domain, particularly on the Websites of the AER and utilities and also information made available by Transend in respect to the biennial International Transmission Operations and Maintenance Study (ITOMS).

2.3.3 Further Gathering of Information

This stage involved meetings with staff to assess processes and design, planning, operating and maintenance standards. It also involved audits of specific assets and systems to verify their condition

and operational risks. A detailed review of a range of capital projects was also undertaken to assess the prudency and efficiency of associated capital expenditure.

2.3.4 Review of Significant Issues

Significant issues identified in the earlier stages of the review were discussed with relevant managers within Transend to ensure that WorleyParsons correctly understood the issues and to gain further insights into the business.

2.3.5 Preparation of Draft Report

The findings, analysis and conclusions arising from the four preceding stages were collated and integrated into the draft report.

2.4 The Report Structure

The report was structured as follows:

- Chapter 1: Executive Summary;
- Chapter 2: Introduction;
- Chapter 3: Asset Management Framework;
- Chapter 4: Capital Expenditure – Capex;
- Chapter 5: Operational Expenditure – Opex;
- Chapter 6: Service Target Performance Incentive Scheme;
- Chapter 7: Resource Capability;
- Chapter 8: Glossary; and
- Appendices: Separate Volume.

3. ASSET MANAGEMENT FRAMEWORK

3.1 Introduction

Transend Networks Pty Ltd (Transend) owns and operates the Tasmanian Transmission system. Transend transmits electricity from power stations to its substations around the State.

Transend has stated[3] that it owns some 3,650 circuit kilometres of transmission lines, 47 substations and nine switching stations. Further, unlike the majority of Australian transmission companies, Transend owns the high voltage assets that provide the connection to the customer's distribution feeders (except in part of the Hobart area).

The Tasmanian transmission system is connected to the mainland Australian transmission system via a privately owned interconnector, Basslink. By virtue of this interconnector, Transend is a participant in the National Electricity Market (NEM) and is therefore required to operate in accordance with the National Electricity Rules (NER) in addition to the local jurisdictional requirements under the terms of its licence issued by the Office of the Tasmanian Energy Regulator (OTTER).

Transend has stated that it recognises that "the success of an asset–intensive regulated utility is based on a robust and detailed asset management framework."[4] It is the objective of this part of the report to describe that framework and to comment on its effectiveness.

3.2 Asset Management Framework and Systems - General

Transend has stated[5] that it has developed a comprehensive asset management framework and a series of systems to ensure the most appropriate and effective transmission system performance. A key objective of the framework is to meet the required level of service in the most cost-effective manner, through the prudent and efficient management of assets for the benefit of present and future customers.

Transend's asset management framework is supported and defined by an extensive suite of documentation. The documentation was modelled around the total management process as presented in the International Infrastructure Management Model (IIMM). Transend's asset management documentation, which closely mirrors the documentation requirements of the IIMM, is structured as set out below. Transend has advised that this asset management framework is consistent with Strategic Asset Management (SAM) principles.

[3] Transend Networks Transmission System Management Plan 2007-2012. Document prepared by Transend.
[4] Ibid p.14
[5] Ibid.

Strategic Plan

- Vision;
- Mission;
- Strategic Performance Objectives; and
- System Vision.

Policies

- Safety;
- Environment; and
- Risk Management.

Asset Management Policy

Transmission System Management Plan

- Transmission System Performance Objectives;
- Planning and Service Delivery;
- Asset Management Framework;
- Asset Management Support Systems;
- Existing Asset Class Profiles; and
- Asset Management Strategies.

Development Plan

- Drivers for Development;
- Regulatory Processes;
- Asset Creation;
- Asset Augmentation; and
- Capital Expenditure Profiles.

Asset Management Plans

- Asset Overview;
- Performance Issues and Strategies;
- Asset Life Cycle Management;
- Operating and Capital Expenditure Profiles; and

- Risk Management.

Asset Technical Standards

- Technical Information Standards;
- Maintenance Standards; and
- Condition Assessment Standards.

Integrated Investment Plans (Supported by Asset Management Information System - AMIS)

- Consolidation and Optimisation of Works Plan;
- Works Planning and Scheduling; and
- Outage Planning.

In the remainder of this section of the report, a number of key elements of the above asset management framework are described.

3.3 Strategic Asset Management

Transend has stated that its Strategic Asset Management aims at delivering asset management which is consistent with the following:

- The Corporate Strategic Plan;
- The Grid Vision; and
- The Development Plan.

This involves, amongst other things, the following:

- Adopting a whole-of-life approach with cost-risk optimisation;
- The development of asset plans based on a thorough knowledge of the system assets, including their condition over time, their performance and various other strategic factors.

SAM comprises eight inter-related processes, namely:

- Asset Information;
- Customer Considerations;
- Performance Monitoring;
- Network Strategy;
- Investment Program;
- Capital Works delivery;
- Sustaining Assets; and

- Operational Works delivery.

The implementation of these various plans is facilitated by the use of the Asset Management Information System (AMIS).

3.4 Asset Management Information System

AMIS is a software tool that interlinks asset management processes through the entire asset life cycle including asset creation, asset operation and maintenance, asset performance and asset decommissioning. It provides the data repository from which relevant asset information may be extracted to support the planning of activities relevant to the assets at any stage in their life cycle.

The purpose of AMIS is to deliver an integrated business system and suite of business processes for the management of Transend's transmission system assets. The program comprises the following major program elements, namely:

- Asset knowledge management;
- Financial management;
- Outage management;
- Performance management; and
- Work Plan management.

3.5 Safety and Environment Management

A key strategic performance objective for Transend is providing a healthy and safe work environment. Transend recognises its duty of care obligations and accordingly is developing and implementing a Safety Management System (SMS) to deliver its safety objectives. The plan includes a rigorous Contractor Management Plan which contains Contract Specification requirements, Tender Evaluation requirements and Contractor Management requirements.

Achieving environmental excellence is another of Transend's key strategic objectives. Transend has stated that it recognises its responsibilities to give appropriate consideration to, and minimise its impact on, the environment and to improve environmental outcomes where possible while managing its business risks. In order to conduct its operations in the above described manner, Transend has developed an Environmental Management System (EMS) which has been formally certified to the International management Standard ISO 14001. Recently the EMS was audited as part of the renewal process and the International Auditor stated "Transend's EMS is a mature suite of strategies, methodologies and process control documentation developed on a continual basis over several years. The environmental risks encountered at the various substations and facilities of Transend are considered generally low and quite well understood."[6] The report also stated that "While some power

[6] Transend Networks Transmission System Management Plan 2007-2012. Document prepared by Transend, p.20

and utilities companies on a global basis may have more extensive systems, none are documented as well, none are as intuitive to follow as those of Transend, making them more likely to be used properly as intended."[7]

3.6 Service Standards and Performance

Transend has stated that it is committed to providing levels of transmission system service that enable it to meet all of its agreed legal, regulatory and customer obligations. Transend is required to undertake performance monitoring and reporting to:

- The Australian Energy Regulator (AER);
- The Office of the Tasmanian Energy regulator (OTTER); and
- To customers through connection agreements.

Transend uses performance information, asset condition monitoring, system simulation studies and benchmarking activities as an important input to the asset management process. Transend monitors transmission system performance against four inter-related elements, namely:

- Supply availability;
- Plant availability;
- Supply security; and
- Supply Quality.

Transend's performance is described and discussed in more detail in Section 6 of this report.

3.7 Asset Profiles

Transend owns a diverse range of assets of varying technologies, complexity and age that operate in a wide range of service environments. These assets are classified in the following particular asset classes:

- Substation primary assets, for example transformers and circuit breakers;
- Substation secondary assets, for example protection equipment, control and metering;
- Transmission lines;
- Telecommunication equipment; and
- Supervisory Control and Data Acquisition equipment (SCADA).

WorleyParsons has examined typical examples of each of these asset classes with particular emphasis of the more important elements. For example, Transend has reported that it has a

[7] Ibid, p.20

population of 109 power transformers in service comprising 15 network transformers and 94 supply transformers. The age of these units is reasonably uniformly distributed between zero and 45 years of age, with very few (four units) in excess of 45 years of age. In regard to 220 kV circuit breakers, Transend has advised that it has 79 units with most (57units) less than 10 years of age and none over 45 years of age.

With some minor exceptions (such as the problems associated with the Sprecher and Schuh Type HPF 110 kV CBs) which problem Transend is actively addressing, WorleyParsons is of the opinion that the equipment owned and operated by Transend is appropriate to the task at hand and no better or worse than the equipment owned and operated by other Australian TNSPs.

3.8 Conclusions

Worley Parsons has examined many examples of the asset management documentation and is impressed with the quality and comprehensive coverage of it. Whilst it is true that many of the documents have been produced recently, WorleyParsons believes that there is evidence that many of the recently produced documents are simply the formalisation of processes which are well embedded in the organisation.

4. CAPEX

WorleyParsons' scope of work was amended by the AER to exclude asset renewal projects. In line with this amended scope, WorleyParsons has not investigated or commented on asset renewal Capex in the course of this review.

4.1 Capital Expenditure Governance

4.1.1 Scope of Works

Attachment 1 of Reference (1), "Services required" under the heading "Capital governance framework" sets out the AER's requirements in respect to Transend's capital governance framework. WorleyParsons is required to review the Transend Proposal in accordance with the following requirements:

The contractor is required to review and assess whether or not the Transend's capital governance framework:

a) Reasonably reflect the "capital expenditure objectives" and "capital expenditure criteria" under clause 6A.6.7 of the NER;

b) Is based on sound principles that are in accordance with capex strategies, policies and procedures;

c) Provides reasonable assurance for both historic and future capex programs; and

d) Is effectively coordinated across the organisation.

The contractor will need to:

a) Review the capital governance framework, including capex strategies, policies and procedures in place; and

b) Review the demand forecasts, methodology and information flow which feed into Transend's capex program.

The review should include an assessment of:

a) Long term network development strategies;

b) Policies and procedures for:

- Identifying network constraints, replacement of assets and non-network needs;

- Developing investment proposals once a need is established;
- Analysing alternative investment options and identifying the most cost effective option; and
- Ensuring that investment projects take place on a timely basis, with minimum network disruption and at least cost.

c) The integration and consistency of policies and procedures across investment categories.

The assessment of whether the capital governance framework and capex strategies, policies and procedures are applied in practice should be informed by the contractor's detailed reviews of a sample of investment projects for Transend discussed in the past and forecast capex sections of this document.

4.1.2 Organisation Structure

Transend underwent a major organisational restructure over the period July to November 2007. One of the main drivers behind the restructure was to establish clear accountabilities for the delivery of business objectives. Arising out of the review, three functional groups were established that are responsible for:

- Transmission system planning and development;
- Transmission works management and delivery; and
- Real time operation of the transmission network.

A further three groups provide essential business services, systems and processes.

Transend's board has reserved some items for its collective decision-making and/or monitoring. Board approval is required for significant new business proposals, including major capital programs, major capital projects and transactions involving the acquisition or disposal of major assets. Delegations of authority are clearly stated in Transend's Delegations Manual.

4.1.3 Capital Expenditure Governance

The process for the development of Transend's capital expenditure is specified in its Investment Process Governance Framework (the framework), which was introduced in August 2007. The framework includes all phases of the investment decision-making and approval process and encompasses the following key operating principles:

- All relevant investment factors including legislation, regulation, policies, service level outcomes, network availability and reliability and internal technical standards;
- Whole-of-life cost and benefit analysis including capital and operating trade-offs (using discounted cash flows);

- Asset replacement and augmentation investment optimisation;
- Opportunities to maximise synergies and efficiencies through the management of capital programs;
- Maintaining and, as appropriate, improving transmission services;
- Greater customer responsiveness and the long term interests of both customers and the power system;
- Efficiency and prudency; and
- Alignment with priorities and strategic performance objectives contained in the company's Strategic Plan.

WorleyParsons endorses these principles as being appropriate for providing a sound basis for capital expenditure governance. WorleyParsons found that Transend's Capex policies and procedures are aligned with these key principles.

Transend requires that investment in electricity transmission infrastructure be justified on safety, business, technical and economic grounds. Investments are monitored and subject to business controls with the aim of implementing and delivering projects in line with the objectives and conditions set out in their approvals. Consideration is given to the investment drivers, priorities and categories.

The framework establishes the following investment criteria, such that the investment will proceed if:

- The augmentation investment satisfies the regulatory test (where applicable); or
- The investment meets customer requirements in a way that does not compromise Transend's other obligations; or
- The investment is required to meet Transend's service obligations in a way that minimises the total life-cycle costs of electricity transmission in accordance with good electricity industry practice;
- The risk is manageable;
- The investment realises an opportunity to increase the scope of Transend's business; and
- The investment maintains or increases the shareholders' value of Transend.

In addition to the framework, the investment planning process is supported by a range of documents, including the following:

- The Grid Vision;
- Strategic Plan;
- Transmission System Management Plan;

- Regional Development Plans;
- Asset Management Plans;
- Project Initiation and Development Procedure;
- Delegations Manual; and
- Works Prioritisation Business Drivers and Criteria.

Overall accountability for the investment process resides with the Managing Director. Responsibility for the transmission system is delegated to the relevant group executives in accordance with specified functional responsibilities. Decisions regarding assets are made in accordance with approved policies, plans and guidelines. Other governance mechanisms include the following:

- Capital Review Team;
- Capital Working Team; and
- Project Steering Committees.

WorleyParsons notes that the Strategic Performance Objectives in Transend's Strategic Plan cover all four "capital expenditure objectives" under clause 6A.6.7 of the NER.

4.1.3.1 Capital Review Team

The CRT was established by the Managing Director in April 2005 to help Transend deliver its capital investment programs on schedule and within budget, and to facilitate the management of the integrated investment plan and associated investment decisions.

The CRT meets monthly and permanent members include:

- General Manager Customer and Asset Management (Chairperson);
- General Manager Transmission Services;
- Executive Manager Corporate Strategy and Compliance; and
- General Manager Business Services.

Manager System Development attends each meeting. Selected senior managers and specialist technical staff attend as required.

The charter of the CRT is to:

- Contribute to the improvement of Transend's corporate governance by reviewing capital business cases prior to board submission;
- Review the integrated investment plan on a quarterly basis;
- Assist with the prioritisation of individual capital projects; and

- Identify opportunities for improving the capital works delivery process.

By reviewing all asset management strategies and business cases prior to their consideration by the board, and providing a high level overview of the integrated investment plan and its delivery, the CRT ensures:

- The investment satisfies regulatory and compliance requirements;
- Financial modeling is done correctly;
- Customer management issues are addressed;
- Asset management issues are addressed;
- Business investment framework is satisfied (if applicable); and
- Consistency with business and strategic plans.

4.1.3.2 Capital Working Team

Critical to the effective execution of the investment governance process is the inclusion of all possible investment projects from all sources. Responsibility for ensuring that a fully integrated investment plan is developed and updated on an ongoing basis resides with Manager System Development, assisted by the Capital Working Team (CWT).

The CWT is expected to meet at least every two months and is responsible for the capital works program which is derived from:

- Integrating the development and renewal investment forecasts in support of the transmission system to form an integrated transmission investment plan for management review;
- Integrating the transmission investment plan with the non-transmission investment plan (which may include projects to increase business scope) to form a whole of business investment plan for management review and as input into the annual budgeting process;
- Reviewing the investment plan so that constraints to its delivery can be identified;
- Reviewing the investment plan so that priorities can be validated with any conflicts advised to management for final determination;
- Reviewing the investment plan so that opportunities for optimisation are identified; and
- Reviewing the integrated investment plan so that work schedules can be monitored and tracked.

The CWT is expected to provide regular reports to the CRT. The CWT membership includes:

- Manager System Development (Chairperson and Convenor);

- Manager Asset Strategy and Planning;
- Manager Project Delivery; and
- Manager Works Planning and Coordination.

Manager Strategic Grid Planning attends designated meetings when strategic and operational programs are included on the agenda. Manager Facilities and Administration, Corporate IT Manager and members of the executive (or senior managers) attend designated meetings to ensure non-transmission capital investment requirements are included and understood.

WorleyParsons notes that the CWT was formed in December 2007 and understands that it had held only one formal meeting (as of 27 June 2008), at which the CWT members decided to request the Capital Review Team to change the terms of reference for the CWT to be more on an input/output basis.

4.1.3.3 Project Steering Committees

Project steering committees perform the role of advisor to the project owner or delegate. The project steering committee comprises members of staff from various groups within Transend. Their most important function is to support project managers in resolving inter and intra-company coordination issues, oversight progress on the project and governance to ensure due process is followed.

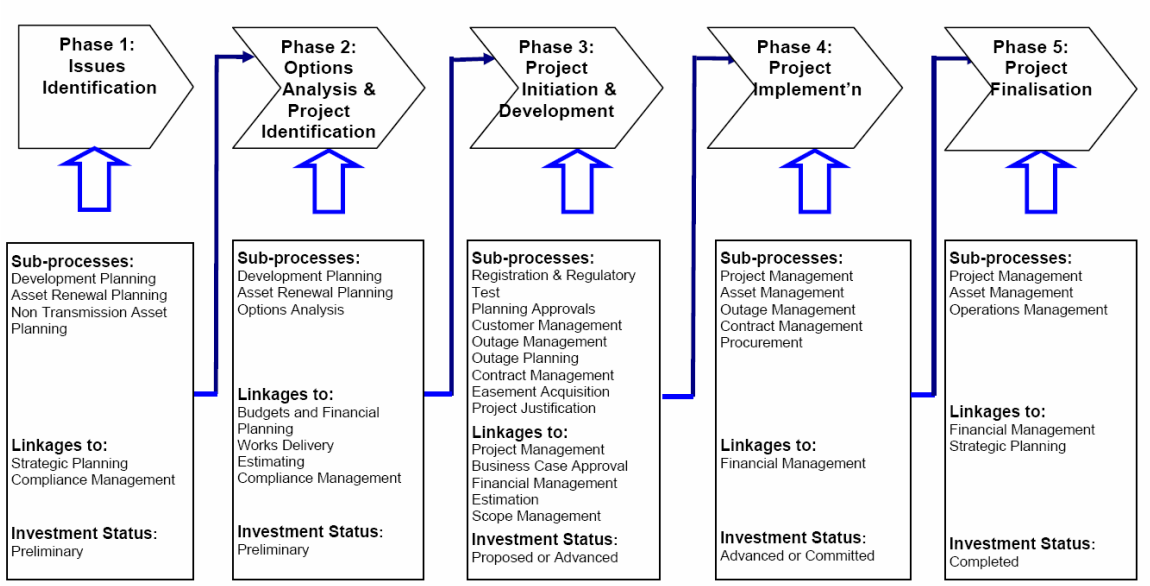
4.1.3.4 Prudency

Transend implements a prudency process to capture relevant information to demonstrate the prudency of its prescribed investments. This process is considered valuable, irrespective of the regulatory obligation, and resources to develop a template for services provided outside the revenue cap have been committed. The process provides a record of the business and regulatory approval and project management processes followed from project identification to finalisation. The prudency process is considered an important control activity within the management system.

4.1.3.5 Process Phases

Material investments progress through each of the five phases shown in Figure 4-1.

Figure 4-1: Investment Phases



Documentation for each phase of the process includes the following:

- A description of that phase of the process;
- The phase objective;
- The inputs required from stakeholders and process participants during that phase;
- Key work activities that are undertaken during that phase;
- Control activities employed during that phase;
- Treatment of costs;
- Outputs produced as a result of the work activities undertaken during that phase; and
- Other documentation supporting that phase.

Each process phase is supported by a responsibility matrix which lists the person accountable for the preparation and stewardship of the primary input, source document or deliverable. The matrix also lists who is accountable for approving the contents of the inputs or source documents, and where applicable, the stakeholders and process participants who may be consulted or informed.

An element of the project initiation stage of projects in excess of $100,000, or that have a material impact on Transend's network, is to hold a workshop that includes all relevant stakeholders, to ensure that the scope of the project, roles and responsibilities, and impacts and risks to the project are identified and fully understood by all stakeholders.

4.1.3.6 Changed and Unusual Investment Circumstances

All projects in the investment process are continually monitored. In some cases, as new or further information comes to hand, or as customer or the environment requirements change, a particular project may need to be re-evaluated and redefined. In these circumstances, the project may revert to an earlier phase in the process so that the new requirements can be fully assessed and the new options analysed before proceeding. The project may be re-scoped, reprioritised or deemed no longer feasible.

An unusual circumstance may arise where expenditure is required to be committed outside the normal investment planning process. In such circumstances where an investment is deemed necessary (for example, to preserve the security of the transmission system), a project is initiated, assigned the appropriate level of priority and fast-tracked with due consideration to need, solution, options analysis, risk and required authorisation.

4.1.3.7 Options Analysis and Risk Assessment

Where applicable, at least three feasible and practical options are analysed, with the first option being the “do nothing” case. For each option, considerations include the scope, an assessment of the business’ capability to deliver the option, costs, advantages and disadvantages.

Major risks associated with the proposed investment are identified and assessed in line with Transend’s risk management framework, having regard to the likelihood or frequency of such a risk occurring, the consequence and the effectiveness of risk mitigation strategies and controls which could be put in place to manage such a risk. Risk assessment is included in the business case.

4.1.3.8 Funding Approval

Transend utilises business cases to document the investment justification and to facilitate the allocation of capital. The business case must cover the following:

- Project rationale;
- Statement of need;
- Options considered;
- Financials (including project cost estimate breakdown against project scope of works);
- Project impact;
- Risks;
- Investment timing; and
- Implementation requirements.

The timing, content and scale of the business case reflects the priority, scale and complexity of the investment and the extent of the approvals required. Initial business cases for some projects may be

developed very early in the process to allow funding for design, easement acquisition and planning approval. Others may seek strategy approval and funds to allow for feasibility studies to be undertaken. If there is a material change to the basis on which funding approval was given (change in scope and/or price), a new business case seeking funding to reflect the changed circumstances must be prepared and approved.

The process is well documented in the Business Case Manual, and although this is a recent document, there is strong evidence from the large number of business cases sighted during the project review to suggest that this manual represents practices that have been in place for some years.

4.1.3.9 Budget Process

Each November the Board and executive attend a one to two day workshop in order to:

- Review progress against achieving the Strategic Performance Objectives (SPOs) included in the Strategic Plan;
- Analyse changes to Transend's external and internal environment;
- Raise, discuss and prioritise key strategic issues;
- Review the appropriateness of the current Strategic Plan and SPOs; and
- Consider other matters as necessary.

The workshop outcomes are reflected in the updated Strategic Plan, and also provide direction for the upcoming planning and budgeting process.

In late April the financial information for the Strategic Plan and the Budget Paper is finalised by inputting the final draft operating expenditure and capital expenditure forecasts into the corporate model to produce forecast profit and loss, balance sheet and cash flow statements.

In May each year the Budget Paper is finalised and submitted to the Audit and Risk Committee for their review and endorsement. The Strategic Plan and Budget Paper are submitted to the Board for approval at the May Board meeting.

Once approved by the Board the Strategic Plan and approved budget are released to Transend's executive managers and senior management team. The Strategic Plan is provided to the shareholders for their review.

The decision to approve or vary Transend's annual budget can only be made by the Board. The Managing Director (MD) has the authority to approve or vary group annual budgets, but only within the overall Transend annual budget.

4.1.3.10 Monitoring and Reporting

Management has access to financial information for operating and capital expenditure on a daily basis through a number of systems and tools. The reporting tool used to prepare monthly reports provides a drill-down capability to the lowest level of cost structures.

Financial reports and information are reviewed on a monthly basis as necessary at Group, Executive and Board level. Each Group undertakes several likely-end-of-year reviews throughout the year, including forecasts to the budget for executive review.

The presentation of a rigorous business case for each project provides a mechanism for monitoring the effectiveness of the capital governance framework. All projects are coordinated through the System Development Group, thus ensuring a consistent approach is taken and providing effective coordination across the organisation.

A further monitoring mechanism is the use of auditing. Transend has an Audit and Risk Committee which meets quarterly (or more often if necessary). Transend advises that auditing is taken very seriously by the MD and is driven down into the organisation. Some specific high risk projects are also subject to audit, for example AMIS. Issues continued to be reported to the audit committee until they are resolved.

KPMG (who were the auditors at the time) conducted an audit of project management processes in August 2005. A number of issues were identified which has led to refinements of the project management processes.

4.1.3.11 Estimating Basis

Until recently, Transend's estimates for many projects were based on costs prepared by SKM. This reflected work undertaken by SKM for Transend's Development Plan supporting the 2003 Revenue Application; however, these costs were found to be inappropriate as they were prepared for high level valuation purposes rather than project-specific cost estimating. Transend experienced a number of issues with estimate accuracy, including:

- Significant cost overruns on some projects;
- Lack of confidence in estimating process;
- Imbalance between contractor supply and demand;
- Commodity price variability; and
- Network access constraints.

This led to an audit of the estimating processes and the development of a new estimating strategy, which included an increased focus on identifying project contingencies, the establishment of a Works Delivery Group for project initiation and the development of a Project Estimating Manual.

WorleyParsons saw no evidence to suggest that issues with estimating early in the Current Regulatory Control Period have led to inefficient capital expenditure.

Transend applies three levels of project estimating, with the third level comprised of two stages. The three levels of estimating and their respective accuracies and normal applications are shown in Table 4-1:

Table 4-1: Estimating Levels

Level	Normal Application	Accuracy
Level 1	For project concept stage, comprising feasibility and option analysis, considering scope and time only	± 35%
Level 2	For project development stage, to evaluate preferred option, considering scope, time and contingent risk.	± 25%
Level 3A	For project implementation stage, to support business case approval, considering all project management elements	± 15%
Level 3B	Post-tender, incorporating tender prices to support effective cost control and reporting	± 10%

Revenue Proposal estimates were generally based on Level 1 estimates which are developed from a mix of Base Planning Rates (BPR) and Base Planning Objects (BPO). A BPR is a cost rate (per km) for an installed asset (eg. 110 kV transmission line or 110 kV conductor type stringing). A BPO is a unit cost for an installed asset assembly and/or functional element (eg. 110 kV feeder bay; lattice tower).

BPOs are applied to individual segments of a project, with costs including design, equipment procurement and supply, installation labour, protection and control and internal Transend labour costs. Transend has developed its BPOs primarily from bottom-up estimating, but also from historical data from similar projects.

BPOs and BPRs do not take into account consideration of project specific requirements. They are a “typical” cost for a group of defined elements or a length of line. Transend applies factors to the estimate (for example the cost impact of contract strategy, brownfield/greenfield, number of stages, location, strain/suspension ratio, ice exposure, soil type, vegetation type and terrain) as compared to that of the known BPO or BPR.

The building blocks for creating each level of estimate are made up of the following four separate components:

- The basic estimate (developed from BPOs and BPRs);
- An accuracy allowance;
- A contingency allowance; and

- Escalation.

The accuracy allowance is a factor that is applied to the base estimate, or individual elements of the base estimate, to reflect the level of certainty of the assessed cost. Accuracy factors are a guide to which elements of a project are subject to the risk of cost overruns. Estimate accuracy is evaluated on an estimate-by-estimate basis and includes inherent (or known) risks but excludes contingent (or unknown) risks (for example uncertainties in scope, quantities, rates, implementation strategy and contract strategy).

Transend has validated the accuracy of BPOs for various project types, broken into discrete items, by comparing detailed Level 3A with Level 1 estimates.

WorleyParsons notes that Transend engaged PBA early in 2008 to conduct a two stage review of Transend's cost estimating process:

- Stage 1: PBA generated independent costs for 10 project scopes; and
- Stage 2: individual costs were established for selected equipment items.

PBA found that the costs proposed by Transend in both stages reviewed came within the expected range and in PBA's view were reasonable. PBA's estimates were less than 5% lower than Transend's, which Transend attributes to the use by PBA of outdated costing data.

Transend updates its Level 1 unit rates by:

- Use of updated data from Rawlinsons Australian Construction Handbook, when new editions of this publication are released each January;
- Comparing estimated rates with actual costs for completed projects; and
- Use of tender information.

The estimates used for the Revenue Proposal consist of base Level 1 estimates, that is excluding the accuracy allowance, contingent allowance and escalation. For the Revenue Proposal, risk is taken into account by applying a risk factor across the suite of projects, as discussed in Section 4.3.3.5. As the Revenue Proposal forecasts are expressed in June 09 dollars, escalation is applied up to 2008/09, as discussed in Section 4.3.5.1.

4.1.3.12 Project Prioritisation

Transend is currently implementing a project prioritisation tool (Works Prioritisation System), and all capital projects are now scored using this tool during the project initiation phase. The Works Prioritisation System applies a Multi-attribute Utility Analysis technique, with each criterion assigned a weighting by the Executive Management Team, aligned with strategic performance objectives. This allows the priority score to be determined for each project, based on a variety of criteria (eg. financial and environmental benefits). WorleyParsons understands that SP AusNet have implemented much the same system.

The application of the Works Prioritisation System allows projects to be assessed consistently, in accordance with the strategic objectives of the business. Based on its experience with other electricity utilities, WorleyParsons considers the Works Prioritisation System to be a more sophisticated tool than those applied by many other utilities in the electricity power industry.

In assessing the overall scheduling of the Capital Works Program, the Capital Working Team considers a wide range of other factors, consisting of first and second order considerations.

The first order considerations are:

- Asset Management Plans:
  - Condition assessment reports;
  - Maintenance standards;
  - Performance reports;
  - Planned asset renewals; and
  - Incident/problem counts;
- Customer requirements:
  - Future demand forecasts;
  - Connection requests; and
  - Generation impacts;
- Regional development plans:
  - Compliance obligations – reliability and security of supply; and
  - Future demand forecasts.

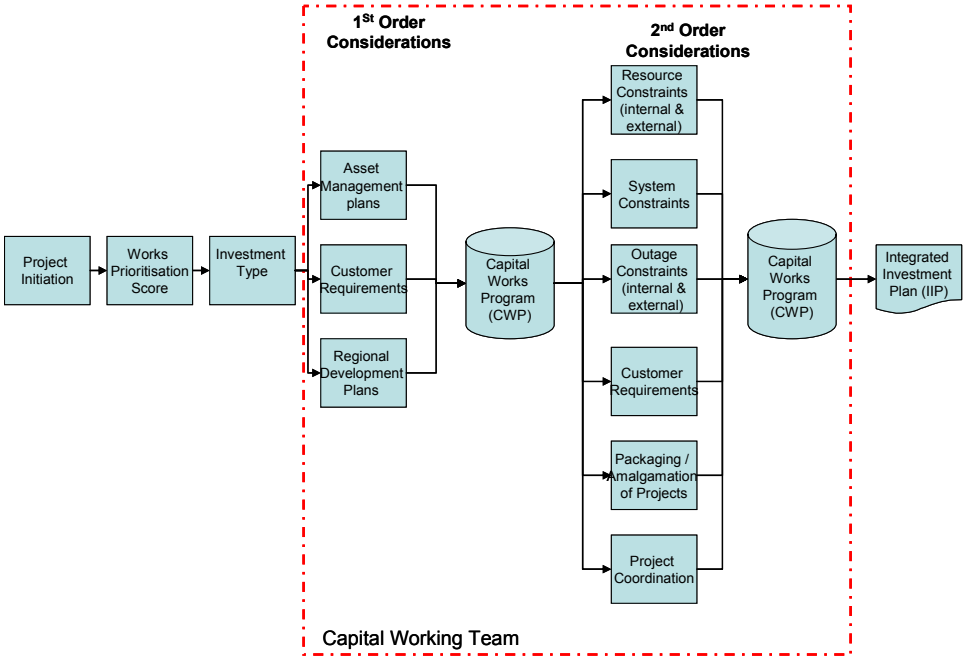
The second order considerations are:

- Transmission system constraints:
  - Performance and security of the system.
- Outage constraints:
  - Variability in system inflows significantly impacts on the operation of the transmission system; and
  - Operation and impact of outages are constantly under review.
- Customer requirements:
  - Major industrial customers – plant operations and maintenance; and
  - Generators – plant operations and maintenance.

- Non-transmission system constraints:
  - IT systems and overall data security; and
  - Facilities.
- Packaging/amalgamation of projects:
  - Efficiencies obtained through completing works in amalgamated work packages.
- Project coordination:
  - Multiple projects being undertaken at one site;
  - Staging of works; and
  - Multiple use of system outages.
- Resource constraints:
  - Internal and external.

The project prioritisation process is shown diagrammatically in Figure 4-2.

Figure 4-2: Project Prioritisation Process



WorleyParsons is satisfied that the approach taken by Transend to prioritise its capital projects is appropriate and is representative of good electricity industry practice.

4.1.3.13 Works Management

Transend's key asset management tool is the Asset Management Information System (AMIS). The AMIS represents the following:

- An integration of people, processes and technology supporting Transend's asset management functions;
- A set of philosophies and guiding principles for information management; and
- A capital development program.

The AMIS supports the various business processes concerned with asset management including asset records management, works management, works planning, performance reporting, and others. Within AMIS, the core works management software is the Works Assets Scheduling and Programming system (WASP) which contains both Capex and Opex works.

Historically, Transend separately managed each of its Opex, Capex and outage plans, potentially resulting in sub-optimised work plans and disparate works issued to contractors. Since 2007/08, Transend has developed a works program that integrates Capex and Opex activities, and customer and operational requirements.

A detailed list of planned outages is developed 13 months ahead and is discussed in detail with stakeholders. The program is also discussed with other market participants. Through its operational interfaces, Transend obtains detailed schedules from direct connect customers regarding their planned downtimes. Where practicable, advantage is taken of unplanned shutdowns of customer plant.

4.1.3.14 Policy and Procedure Documentation

Transend has a comprehensive suite of documented policies and procedures covering capital investment and governance.

WorleyParsons notes that the documentation for a number of Transend's processes have been issued only recently, with some examples being:

- Project Estimating Manual – July 2008;
- Allocation of Overhead Costs – June 2008;
- Investment Evaluation of Network Projects Guideline – July 2008;
- Asset Management Policy – June 2008; and
- Business Case Manual – July 2008.

WorleyParsons acknowledges that some of these recent documents may be replacements for previously documented processes.

Further, other processes have only recently been re-issued, with some examples being:

- Project Initiation and Development Procedure – June 2008; and
- Investment Process Governance Framework Overview – March 2008.

This gives rise to some concern as to whether the capital governance framework and Capex strategies, policies and procedures are being consistently applied in practice. Transend contends that although some of the documents are very recent, they basically reflect what was being done. WorleyParsons saw some evidence to support this contention during the capital projects review. For example, WorleyParsons found that estimates have been prepared in accordance with the Project Estimating Manual and business cases going back some years have been prepared in accordance with the Business Case Manual.

WorleyParsons identified two areas where current practices differ from the documented processes, as follows:

- The Investment Process Governance Framework states[8] that the CWT meets at least every two months, whereas WorleyParsons was advised that the CWT was formed in December 2007 and that it had held only one formal meeting as at 27 June 2008; and
- The Project Initiation and Development Procedure refers to the use of Prudency Checklists[9], whereas WorleyParsons has been advised the checklist has been replaced by the Capital Project Investment Review document.

Transend's policies and procedures are readily accessible by personnel via the intranet. The Systems Development Group attends team meetings and provides on the job training to other groups within Transend in regard to the processes underpinning the capital investment program.

WorleyParsons considers that Transend's documentation is comprehensive and to a high standard that puts it amongst the best encountered by WorleyParsons in the Australian electricity power industry.

4.1.3.15 Quality Systems

Transend's environmental management system is accredited to ISO 14001, covering the whole of Transend. Other than this, Transend does not have a formal quality system in place, but there is evidence of some quality system elements in place (eg. document control process).

4.1.4 Conclusions

WorleyParsons considers that Transend's capital governance framework is based on sound principles (refer section 4.1.3), and WorleyParsons saw evidence that these were being applied in practice, by means of the review of ex-post projects.

[8] Section 4.3, Page 14
[9] Section 3.10, Page 11

WorleyParsons found that there is a strong alignment between the assessment of individual projects and Transend's business objectives. This alignment was included in the business cases sighted by WorleyParsons (some of these go back as far as 1999). Further, the Strategic Performance Objectives in Transend's Strategic Plan cover all four "capital expenditure objectives" under clause 6A.6.7 of the NER.

As discussed in Section 4.1.3, WorleyParsons endorses the key operating principles underpinning the investment decision-making and approval process and considers these to be appropriate for providing a sound basis for capital expenditure governance. Transend's Capex policies and procedures are aligned with these key principles.

Transend experienced a number of issues with the accuracy of its project estimates, which has resulted in a number of projects requiring re-authorisation for additional funding. This issue appears to have been addressed with an overhaul of the estimation process.

WorleyParsons considers that the capital governance framework provides a high level of assurance for future Capex and a reasonable level of assurance for past Capex, based on the observed effectiveness of the processes followed and the quality of the documentation of policies and procedures.

Transend's capital governance framework is effectively coordinated across the organisation through the following mechanisms:

- Clear documentation of policies and processes;
- Ease of access by all employees to documentation via the intranet; and
- Communication and training.

4.2 Current Regulatory Control Period

4.2.1 Scope of Works

Attachment 1 of the contract[10], "Services required" under the heading "Past capex" sets out the AER's requirements in respect to Transend's capital expenditure in the Current Regulatory Control Period. WorleyParsons is required to review the Transend Proposal in accordance with the following requirements:

The contractor is required to assess the prudence of the Capex undertaken by Transend during 2004 to 2008–09 (the Current Regulatory Control Period). Transend's current revenue cap was determined in accordance with the ACCC's 1999 draft statement of principles for the regulation of transmission

[10] Standard Form Contract between the Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract dated 25 March 2008.

revenues (DRP). The regulatory arrangements provided for an ex post assessment of Capex undertaken by a transmission network service provider (TNSP) to determine if these expenditures were prudent. The DRP outlines the test for prudent investment as "…the amount that would be invested by a prudent TNSP acting efficiently in accordance with good industry practice". The AER understands that Transend's past capex program includes around 200 projects.

Further guidance on the process for reviewing past Capex is contained in the 2004 statement of principles for the regulation of electricity transmission revenues (SRP) and the AER's 2007 Powerlink and SP AusNet revenue cap decisions. Appendix B of the SRP sets out the prudency test for revenue caps operating under the DRP. The prudency test involves a systematic examination of the critical decisions made at the time Transend was selecting and delivering investments[11]. The purpose of the examination is to establish whether the TNSP made decisions at each stage of the investment process consistent with good industry practice. The examination consists of three consequential stages:

a) Assess whether there is a justifiable need for the investment;

b) Assuming the need for an investment is recognised, assess whether Transend proposed the most efficient investment to meet that need; and

c) Assess whether the project that was judged to be the most efficient was developed, and if not, whether the difference reflects decisions that are consistent with good industry practice.

The prudency test is to be applied to projects regardless of whether they have or have not been assessed under the regulatory test[12]. In consultation with the contractor, the AER will choose a suite of network and non-network (including augmentations, replacements, IT and support the business) projects that the contractor must review in detail and apply the prudency test outline above.

The contractor is also required to apply the prudency test to a sample of work-in-progress projects. These are projects which involve assets under construction in the Current Regulatory Control Period but will not be commissioned until the Next Regulatory Control Period. The regulatory tests, business cases and any other supporting documentation associated with these projects should enable the contractor to complete steps a) and b) of the prudency test as outlined above, and make an assessment as to whether the investment was the most efficient to meet the need as identified by the TNSP.

In undertaking the ex post prudency assessment of projects, and having regard to the information/analysis available to Transend at the time it made the decisions to invest, the contractor's task is to assess and comment on whether a prudent TNSP would have made the same decisions. If

[11] The prudency test is based on the information available to Transend at the time of making the investment.
[12] The regulatory test is an economic cost-benefit test used by transmission and distribution businesses in the NEM to assess the efficiency of network augmentations.

the contractor determines that different decisions would have been made by a prudent TNSP than those which were actually made by Transend, then the contractor is required to provide the AER with the quantified prudent level, and justification for this variance.

The contractor is also required to review:

a) The investment processes and procedures adopted by Transend for past capex and consider whether they have ensured only prudent capex was undertaken;

b) Any capex efficiency savings claimed by Transend and provide a recommendation on its reasonableness. This may include a review of individual projects; and

c) The reasonableness of finance costs during construction being applied to past capex.

4.2.2 Comparison Actual vs. Allowance

This section analyses Transend's actual expenditure for the Current Regulatory Control Period against the expenditure requested by Transend and the allowance made by the ACCC. Expenditure considered here is "as commissioned" (rather than "as incurred"), under an ex-post regulatory regime. Note that expenditure for the last two years of the Current Regulatory Control Period (that is, 2007/08 and 2008/09) is forecast rather than actual.

A comparison between the actual/forecast commissioned expenditure and the ACCC allowance for the Current Regulatory Control Period is shown in Table 4-2.

Table 4-2: Actual vs. Allowance (June 09, $m)

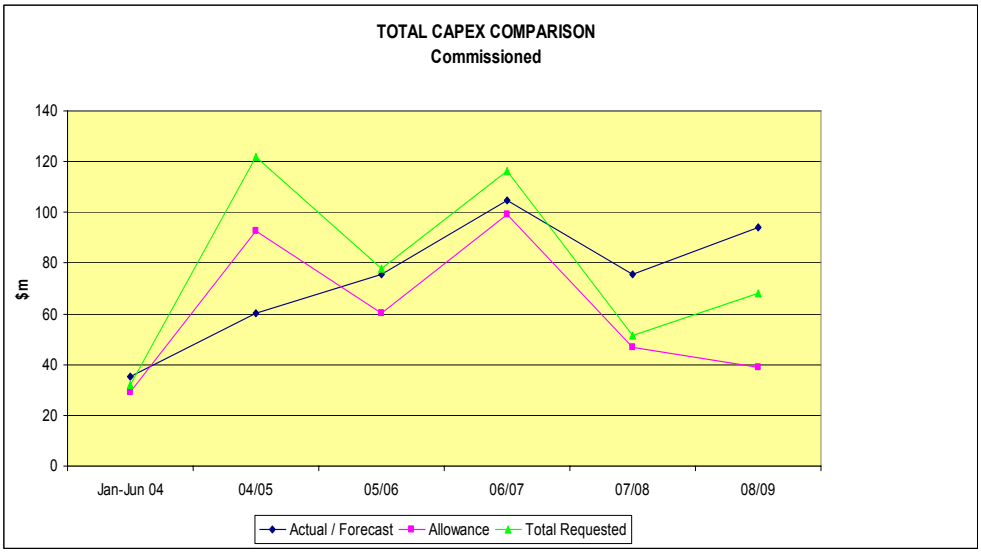
	Jan-Jun 2004	2004-05	2005-06	2006-07	2007-08[1]	2008-09[1]	Total
Actual/forecast	35.3	60.0	75.6	104.7	75.8	94.1	445.4
ACCC allowance	29.2	92.8	60.1	99.3	46.9	39.1	367.4

Note 1: Forecast expenditure

The ACCC made a Capex allowance of $367.4m, whereas Transend expects to commission $445.4m of Capex in the Current Regulatory Control Period, which is 21.2% higher than the allowance.

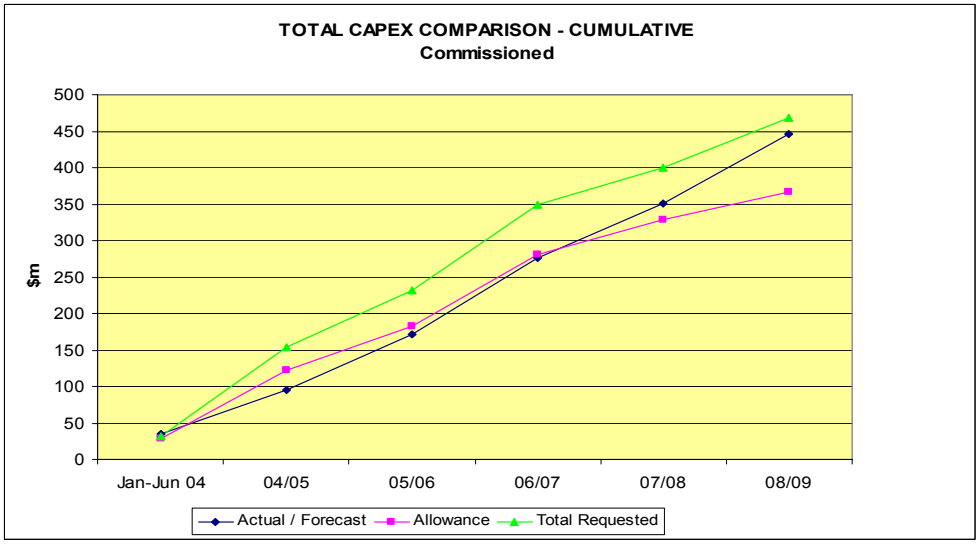
A comparison of the expenditure requested by Transend, the ACCC allowance and actual expenditure for the Current Regulatory Control Period is shown in Figure 4-3. It should be noted that the expenditure requested by Transend included variable Capex that is, expenditure for projects with probability between 10% and 80%.

Figure 4-3: Expenditure Comparison for Current Period (June 09, $m)



This expenditure is shown on a cumulative basis in Figure 4-4.

Figure 4-4: Cumulative Expenditure Comparison for Current Period (June 09, $m)



It can be seen that Transend's cumulative actual/forecast expenditure aligns reasonably closely to the ACCC allowance, except for the final year of the period (2008-09).

For the Current Regulatory Control Period, Transend's Capex was split into three categories[13]:

- Development - this capital expenditure is associated with augmentation of the existing network to meet security criteria, load growth, new customer connection requirements, and new generation and Code compliance requirements;
- Renewal - this capital expenditure involves the replacement, enhancement and refurbishment of existing transmission assets; and
- Non-network - this capital expenditure relates to non-network assets, such as information technology systems that are required to support the transmission business.

A comparison of average annual commissioned Capex, actual/forecast against the allowance[14], is shown in Table 4-3.

Table 4-3: Comparison of Averaged Expenditure by Category (June 09, $m)

Category	Allowance	Actual/Forecast
Development	24.0	20.8
Renewal	38.3	55.2
Non-network	4.8	5.0
Total	**67.1**	**81.0**

It can be seen that for the Current Regulatory Control Period, average commissioned expenditure is less for development, significantly more for renewal and marginally more for non-network Capex than that allowed by the ACCC.

This comparison is based on Transend's document "Capital expenditure profiles and variations for the period January 2004 to June 2014", Issue 0.3 and supporting spreadsheets. Transend provided an updated version of this document (Issue 0.4) late on 27 August 2008. The updated document presents revised allocations of expenditure between the development and renewal categories, taking into account secondary investment categories. The updated version of the document was received only two days prior to the submission of this WorleyParsons report to the AER, which left insufficient time for WorleyParsons to incorporate the changes into this report. The comments and comparisons made in the remainder of this section are based on earlier information provided by Transend.

There are three key factors that have caused the differences between the actual/forecast Capex and the ACCC allowance:

[13] Refer Transend Revenue Cap Application March 2003 Page 46
[14] The ACCC applied a 10% reduction across the board – it has been assumed that this applied equally to all categories.

- Real cost increases;
- Estimating basis; and
- Changes to the capital program.

In addition, there have been some minor scope changes.

4.2.2.1 Real Cost Increases

Real wage growth has been strong in the Current Regulatory Control Period, particularly in the latter years. Cumulative wage growth has exceeded inflation by 15.7% per cent over the five and a half year period[15]. The ACCC's capital expenditure allowance did not contemplate real increases in labour costs.

Significant cost increases in materials have also been experienced by Transend. This is largely the result of a strong global demand for commodities, exacerbated by the impact of the relatively small Tasmanian market. The extent of the increases in the prices of material used extensively by Transend has seen a cumulative real material cost escalation of 26.8 per cent above inflation over the five and a half year period.

The compounding effects in real wage and material escalations contributed to around $44.8 million (June 09, $) increase in capital expenditure commissioned above the ACCC's capital expenditure allowance for the Current Regulatory Control Period. This constitutes approximately 12.2 per cent of the capital expenditure over the ACCC's allowance.

4.2.2.2 Estimating Basis

Transend's development capital expenditure forecast for the Current Regulatory Control Period was prepared by SKM and was based on unit rates and adjustment factors that were developed for the Transend asset valuation carried out in 2002. Transend relied on the estimates provided by SKM, but the estimating methodology and assumptions used by SKM did not accurately reflect market prices. For this reason, in the majority of cases, the commissioned cost of the development projects was significantly higher than those estimated by SKM. At that time Transend's estimating process was in the early stages of development.

Concerns regarding the accuracy of Transend's estimates lead to an internal audit, following which Transend has made substantial improvements to its estimating processes.

4.2.2.3 Changes to the Capital Program

Development Capital Expenditure

Transend's 2003 Revenue Cap Application (Appendix 6) identified the fixed development projects, plus a number of variable projects that may need to be implemented over the Current Regulatory

[15] Based on the CEG report, Appendix 12 of Transend's Revenue Proposal.

Control Period. The development projects included in the revenue cap application were based on the analysis undertaken by Sinclair Knight Merz (SKM).

The augmentation and connections development projects that were included in Transend's revenue cap application are presented in Table 4-4 and Table 4-5. These tables also provide the original and revised commissioning dates and costs for each of the fixed projects and the variable projects that were completed in the Current Regulatory Control Period, together with supporting comments that detail the reasons for variances to the original timing and/or cost.

Table 4-4: Augmentation Projects in Current Period

Project ID	Title	Original commission. date	Revised commission. date	Original Estimate (08/09 $m)	Project cost (08/09 $m)	Comment
Fixed projects						
ND0432 ND0433 ND0544 ND0575	Southern augmentation project (outstanding project is the Waddamana– Lindisfarne 220 kV transmission line project[16])	2006-07	2011	66.3	166.7	This program included the Waddamana–Lindisfarne 220 kV transmission line project, Waddamana–Bridgewater 110 kV transmission line upgrade, Tungatinah–Lake Echo–Waddamana 110 kV transmission line upgrade, and the New Norfolk south transmission line development. Three of the four component projects have been completed. The Waddamana–Lindisfarne 220 kV transmission line project has been delayed because of the need to gain further regulatory and planning approvals. This project is currently being implemented and will be completed by 2011.
ND0519	Norwood–Scottsdale–Derby 110 kV transmission line project	2004-05	June 2007	20.9	40.1	This project has been completed in the Current Regulatory Control Period.[17] Additional project costs were incurred due to latent conditions identified during project implementation and the need for additional contingency planning.

[16] This project was included in WorleyParsons' review of ex-ante projects.
[17] This project was included in WorleyParsons' review of ex-post projects.

ND0436	Sheffield Substation 220 kV security upgrade	2005-06	2009	3.6	9.1	This project has been deferred because of the need to integrate with planned asset replacements, with detailed analysis and modelling to identify the least-cost option. This project is currently being implemented and will be completed by 2009.
ND0657	George Town Substation 220 kV security upgrade[18]	2006-07	2013	4.2	18.4	This project has been deferred to effectively coordinate with other project works at George Town Substation. This project has been coordinated with the installation of transformer T1, the replacement of transformers T2 and T3 and new transmission line bays for Gunns and Alinta. These projects incorporate certain works that make provision for the security upgrade project where appropriate. This project will be completed by 2013.
ND0438 ND0579 ND0629 ND0630	Reactive support – Burnie, New Norfolk and Sheffield substations and high voltage installations at various substations	2007-08	Various – HV capacitor banks will be commissioned in 2009.	8.3	17.1	The commencement of the high voltage capacitor bank installations project was deferred to ensure the optimal technical scope of the project and sites at which the capacitors are to be installed. This project will be completed by 2009.
ND0428	Smithton second circuit	2004-05	April 2004	1.9	8.3	This project was completed generally as planned. Only a small portion of this project was commissioned in the Current Regulatory Control Period.

[18] This project was included in WorleyParsons' review of ex-ante projects.

ND0522 ND0523	Tasmanian Wholesale Electricity Market (TWEM)	2005-06	June 2005	4.9	3.7	This project was completed to facilitate entry to the National Electricity Market. Only a portion of this project was commissioned in the Current Regulatory Control Period.
Variable projects						
ND0604	Burnie-Port Latta 110 kV transmission line reconductor	2005-06	April 2008	12.3	18.8	This variable project was required to cater for demand growth in the north-western Tasmania and was completed in the Current Regulatory Control Period.

Table 4-5:Connection Projects in Current Period

Project ID	Title	Original commission. date	Revised commission. date	Original Estimate (08/09 $m)	Project cost (08/09 $m)	Comment
Fixed projects						
ND0036	Mowbray Substation 110/22 kV development	2004-05	May 2006	9.3	11.8	Implementation of this project was delayed primarily because of the time required to attain planning approval.[19]
ND0511	Risdon Substation 110/33 kV development	2004-05	January 2007	10.8	10.3	This project was a critical part of the Hobart Area Supply Upgrade Program (HASU) and was deferred at Aurora Energy's request.
ND0452	Creek Road Substation 33 kV feeder cut-overs	2005-06	April 2004	0.3	0.3	This project was completed generally as planned
ND0679 ND0699	Electrona Substation redevelopment	2008-09	2009	11.8	8.7	This project was not included in Transend's 2003 Revenue Cap Application. It was required to meet an Aurora Energy request.
ND0681	Mowbray Substation stage 2 development	2008-09	2009	6.0	6.1	This project was not identified in Transend's 2003 Revenue Cap Application. It was required to meet an Aurora Energy request.
Variable projects						

[19] This project was included in WorleyParsons' review of ex-post projects.

Project ID	Title	Original commission. date	Revised commission. date	Original Estimate (08/09 $m)	Project cost (08/09 $m)	Comment
Fixed projects						
ND0036	Mowbray Substation 110/22 kV development	2004-05	May 2006	9.3	11.8	Implementation of this project was delayed primarily because of the time required to attain planning approval.[19]
ND0588	Hadspen Substation 110/22 kV development project	May 2007	April 2007	8.9	8.7	This project was completed generally as planned.
	Aurora Energy additional feeders	Various	Various	1.8	0.7	Additional feeders were provided to Aurora Energy as requested.

It can be seen that substantial progress has been made with regard to the implementation of the identified projects and that three variable projects (one augmentation and two connections projects) were completed.

Transend has completed or made substantial progress with each of the fixed development projects included in the 2003 Revenue Cap Application, with the exception of the Waddamana–Lindisfarne 220 kV transmission line project (that is currently being implemented) and the George Town Substation 220 kV security upgrade project.

Renewal Capital Expenditure

For the Current Regulatory Control Period, renewal Capex comprises capital expenditure involving the replacement, enhancement and refurbishment of existing transmission assets. Most of this expenditure is associated with asset renewal, which is outside the scope of this review by WorleyParsons.

Non-network Capital Expenditure

Non-network capital expenditure for the Current Regulatory Control Period comprises the operational support systems, information technology and business support categories. Transend's 2003 RCA identified Information Technology (IT), National Electricity Market (NEM) entry projects, Asset Management Information Systems (AMIS) and the need to consolidate accommodation in southern Tasmania as key drivers for non-network capital expenditure.

Average non-network capital expenditure for the Current Regulatory Control Period was marginally higher than that allowed by the ACCC. The cost increases are largely attributed to cost escalations and minor changes to the scope of certain non-network projects.

4.2.3 Work in Progress

The expenditure for the Current Regulatory Control Period was expressed on an "as-commissioned" basis, whereas the basis for expenditure in the Next Regulatory Control Period will be on an "as-incurred" basis. To provide the transition, expenditure incurred to the end of the Current Regulatory Control Period for projects commenced but not completed by the end of the Current Regulatory Control Period will be capitalised. This is known as "work in progress" (WIP).

Transend has applied a finance during construction (FDC) rate of 7.54% to the amount of Capex commissioned during the Current Regulatory Control Period for network projects, regardless of the construction period. This rate was determined based on a nominal project cashflow expenditure 'S'-curve for a project occurring over an 18 month period. This 'S'-curve is consistent with the range of 'S'-curves sighted by WorleyParsons in its review of the generic 'S'-curves developed for the 16 project types, as discussed in Section 4.3.5.1. The WACC used in the calculation is a nominal pre-tax WACC of 9.39% (as per the current Decision), as the project cash flows are expressed on a pre-tax basis.

Transend has identified $55.9m in Capex it will incur for projects that will not be completed (and hence not capitalised) by the end of the Current Regulatory Control Period. Transend's original Revenue Proposal included an allowance of $57.9m for WIP, but this has been amended by Transend due to the following factors:

- Expenditure for the substation security program is commissioned in the year in which it is incurred (reduction of $2.652m);
- Adjustment for actual June 2008 CPI (increase of $0.622m); and
- Change to the treatment of committed projects (increase of $0.066m).

The methodology used to calculate the WIP for each year of the period 2006-07 to 2008-09 is shown in Table 4-6. WorleyParsons has no issues with this approach.

Table 4-6: WIP Calculation

Year Capex occurred	Calculation
2006-07	Amount grossed up by $(7.54\%)^2$
2007-08	Amount grossed up by 7.54%
2008-09	No FDC applied

WorleyParsons has reviewed the application of the FDC rate to the individual projects within the works program and has concluded that the calculations are consistent and accurate. WorleyParsons recommends that the AER accept the revised amount of $55.9m for WIP.

4.2.4 Ex-post Project Review

Under its contract, WorleyParsons was required to conduct a detailed review of a suite of network and non-network projects to determine if Transend's Capex for the Current Regulatory Control Period reasonably reflected the "capital expenditure criteria" under clause 6A.6.7 of the NER.

Review Process

In conjunction with the AER, WorleyParsons selected ten projects for the detailed review, covering all capital investment categories, except asset renewal (which was outside the scope of this review). The projects were selected on the basis of:

- Ensuring a range of project types and sizes;
- Materiality;
- The mix of project drivers; and
- The type of work involved.

The projects reviewed are shown in Table 4-7.

Of the 298 projects and programs making up Transend's actual and forecast Capex for the Current Regulatory Control Period, the ten projects reviewed account for $99.2m or 24%.

Table 4-7: Ex-post Projects Reviewed

ID	DESCRIPTION	CATEGORY	TOTAL COST ($m)	REASON FOR PROJECT	REASON FOR SELECTION
ND0519	North East Transmission Line – Norwood-Scottsdale-Derby 110kV Transmission Line	Augmentation	34.1	Connection agreement; security & reliability	Materiality (largest project); mix of drivers; transmission line project
ND0036	Mowbray Substation	Augmentation	10.3	Connection agreement; security & reliability	Mix of drivers; substation project
ND0573	Upgrade of Creek Road-Risdon 110kV Transmission Line	Augmentation	0.3	Asset condition, load driven	Mix of drivers; small transmission line project
ND0511	Establishment of a 33kV Connection Point at Risdon Substation	Connection	6.8	Connection application (load growth)	Completed project which commenced in previous regulatory period
ND0705	Wesley Vale Substation: Additional 11kV circuit breaker installation	Connection	0.2	Connection application	Small project
ND0614	Asset Management Information system Phase 2	Operational Support System	4.8	Development of asset management system – program of work with modules – software development	Largest project in category; WIP component
ND0765	Secondary Equipment Store (construction)	Inventory/ Spares	3.0	Facility to house spare equipment	Largest project in category
ND0437, ND0827	Substation Security Upgrade	Physical security / compliance	30.3	Substation security and compliance	Materiality; WIP component
ND0393	Strategic Accommodation South	Business Support	6.8	Business operating efficiencies and corporate presence	Largest project in category
Various	IT and business applications	Information Technology	2.6	Business systems infrastructure	Largest project in category

The reviews covered the following matters:

- Project Description:
  - Project Identification;
  - CAPEX Category;
  - Brief Overview; and
  - Background.
- Project Need:
  - Drivers;
  - Timing; and
  - Strategic Alignment.
- Alternatives:
  - Options;
  - Options Analysis;
  - Consideration of Non-Network Solutions; and
  - Capex/Opex Trade-offs.
- Regulatory Considerations:
  - Alignment with NER Capital Expenditure Objectives; and
  - Regulatory Test.
- Governance:
  - Business Case Approvals;
  - Variations;
  - Assumptions;
  - Project Risks;
  - Conformance with Policies & Procedures; and
  - Post Implementation Review.
- Efficiency:
  - Estimating Basis;
  - Costs;

  - Design Considerations; and
  - Project Delivery.
- Assessment:
- Conclusion.

The detailed reviews are contained in Appendix 3.

General Observations

WorleyParsons' observations from the detailed review of ex-post projects are as follows:

- In all cases, Transend demonstrated that there was a justifiable need for the project;
- In all cases, the project drivers were clearly identified, together with the alignment to the NER "capital expenditure objectives";
- In all cases, there was clear alignment to Transend's strategic business objectives;
- In all cases, risks had been considered, but in some cases, this was confined to a consideration of the risks that the project would remove or mitigate, rather than the risks associated with the project itself;
- In most cases, a range of options was considered. In some cases, only the "do nothing" and the preferred option were considered, but in such cases, WorleyParsons was not able to identify any further viable options. Where appropriate, Transend has considered non-network solutions;
- In each case, WorleyParsons considers that Transend has chosen the appropriate option;
- Technical project designs were in line with good industry practice and there was no evidence of over-design in terms of both system capacity or optimisation of system componentry;
- In all cases, the projects conformed with Transend's policies and procedures;
- In all cases, the projects were part of an overarching asset management plan or strategy that was usually jointly developed with other stakeholders;
- There is evidence that Transend has considered Capex/Opex trade-offs but that this is not a primary consideration;
- There was no evidence that a formal and rigorous post implementation review process was in place. Project completion reports and capital project investment reports provided useful summaries of the projects, however a documented review of positive and negative aspects of the project for future project reference was missing. The absence of a formal

post implementation review process does not mean that the projects were not prudent; however the addition of this process should improve future project management;

- There were some issues with the accuracy of project estimates early in the Current Regulatory Control Period. This was recognised by Transend and there has been a substantial effort made to improve estimating processes; and
- Projects were assigned the appropriate expenditure classification.

Conclusions

Based on the review of proposed ex-post projects, WorleyParsons has reached the following conclusions:

- Transend adequately assessed the need for the capital projects in accordance with its regulatory and statutory obligations and the "capital expenditure objectives" under clause 6A.6.7 of the NER. The need for projects was developed in some detail, with project drivers clearly identified together with links to the "capital expenditure objectives";
- Transend considered a reasonable range of investment alternatives, their feasibility and timing. Generally, a range of options was considered, and in the few cases where only the "do nothing" and the preferred option were considered, WorleyParsons was not able to identify any further viable options. In each case, WorleyParsons considers that Transend chose the appropriate option;
- The project costs were reasonable. In arriving at this conclusion, WorleyParsons reviewed the technical design (for network projects) and unit costs;
- The projects align with Transend's strategic plans, governance arrangements, and Capex policies and procedures;
- The information provided by Transend in regard to the projects reviewed was found to be accurate. There were some minor inconsistencies in information provided, but these were generally explainable and not material;
- WorleyParsons did not have any issues with the costs or timing of any of the projects reviewed and considers that the expenditure was prudent and efficient; and
- WorleyParsons is satisfied that the expenditure for the projects reviewed relates to prescribed transmission services.

4.3 Capex – Forecast

4.3.1 Scope of Works

Attachment 1 of the contract[20], "Services required" under the heading "Forecast Capex" sets out the AER's requirements in respect to Transend's forecast capital expenditure. WorleyParsons is required to review the Transend Proposal in accordance with the following requirements:

The contractor will review Transend's proposed forecast capex over the Next Regulatory Control Period to ensure that it is in accordance with the requirements established under clause 6A.6.7 of the NER.

Transend has advised that it will adopt a probabilistic approach to determine its forecast Capex requirement as a result of the uncertainties involved in forecasting future customer demand and generation developments. It will develop a number of theme sets representing possible variations in the key drivers for the development of Transend's network over the Next Regulatory Control Period. The outcome of this forecasting approach is a probability weighted average capex requirement for each year of the regulatory control period.

The contractor is required to assess whether Transend's probabilistic forecasting approach reasonably reflects a realistic expectation of the demand forecast and cost inputs required to achieve the "capital expenditure objectives" under clause 6A.6.7 of the NER by:

a) Determining the reasonableness of the assumptions and inputs used for the theme sets (for example, economic growth expectations, load growth forecasts, generation scenarios and expected customer connections);

b) Assessing the resulting scenarios and their probabilities to determine if they are reasonable and appropriate; and

c) Undertaking a review of the transmission plans resulting from probabilistic scenarios to determine whether they are reasonable and appropriate.

The contractor must critically analyse and comment on the adequacy of Transend's capex program and determine if Transend's forecast capital expenditure reasonably reflects the "capital expenditure criteria" under clause 6A.6.7 of the NER taking into account:

a) The existing network capacity;

b) Asset utilisation;

c) Asset lives;

d) Asset conditions;

[20] Standard Form Contract between the Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract dated 25 March 2008.

e) Demand growth;

f) Trade-offs between capex and opex;

g) Information on historical and forecast capex trends

h) The need to meet specified service, network, environmental and other regulatory requirements under relevant jurisdictional or other laws; and

i) Any other internal or external factors that may be relevant.

The contractor should also assess the reasonableness of the assumptions underlying the capital expenditure forecast and determine whether the capex program is deliverable for the regulatory control period.

Included in the review of the Capex program will be the proposed non-network Capex. This involves a detailed review of a suite of network and non-network projects (including augmentations, replacements, IT and support) chosen by the AER in consultation with the contractor. This review will determine if Transend's capital expenditure forecast reasonably reflects the "capital expenditure criteria" under clause 6A.6.7 and include a critical evaluation of whether or not:

a) Transend has adequately assessed the need for the project in accordance with its regulatory and statutory obligations and the "capital expenditure objectives" under clause 6A.6.7 of the NER;

b) There is a need for the project;

c) Transend has considered a reasonable range of investment alternatives, their feasibility, costs and timing;

d) The proposed costs are reasonable;

e) The timing of the project is reasonable;

f) The project aligns with Transend's strategic plans, governance arrangements, and Capex policies and procedures;

g) The information provided by Transend is accurate; and

h) The value and timing at which the project should be included in the ex ante cap are reasonable.

The contractor will need to analyse information prepared by Transend, such as business cases including decision making documentation, and planning studies.

In making its recommendation on the Capex program, the contractor must take into consideration the review of the capital governance framework discussed in the section titled "Capital governance framework" of this document.

In the event the contractor is not satisfied that Transend's capital expenditure forecast reasonably reflects the "capital expenditure criteria" under clause 6A.6.7 of the NER, the contractor is required to

outline why the proposal is not in accordance with the NER, and provide the AER with an alternative proposal that satisfies the relevant criteria in the NER, outlining an alternative cost and timing for relevant projects.

If the contractor considers that the Capex program should be altered, the contractor is required to provide the AER with the quantified efficient Capex level, and justification for this variance.

4.3.2 Demand Forecasts

Maximum demand is a key input into determining the need for and timing of transmission network augmentations. It is important therefore that the processes used to determine forecasts of maximum demand are robust and that the forecasts are as accurate as practicable.

4.3.2.1 Methodology

To produce its maximum demand forecasts, Transend utilises a “top down” and “bottom up” approach. The “top down” element is provided by state-wide forecasts made by the National Institute of Economic and Industry Research (NIEIR). The “bottom up” element is provided by Aurora load forecasts and information provided by customers connected directly to the transmission network (direct connect customers).

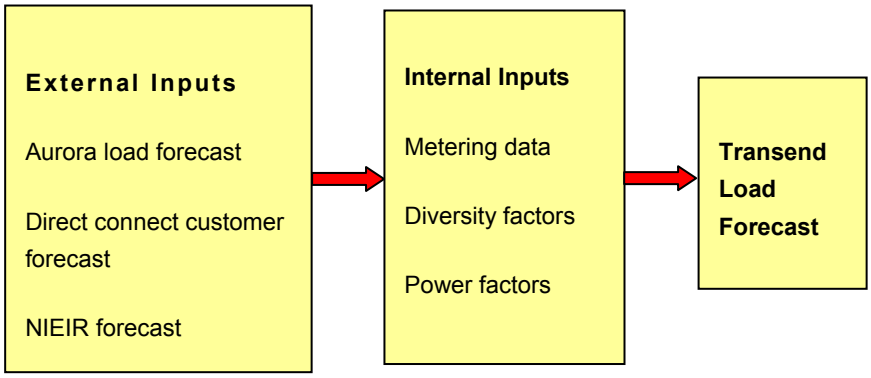
The NIEIR forecasts are based on a range of macro economic variables, such as Gross State Product (GSP), population growth, employment growth and interest rates. The forecasts produced using this approach are for State-wide energy consumption and maximum demand. The Aurora forecasts are based on metered energy and demand data at each connection point.

Transend has the equivalent of two and a half people employed as account managers, liaising with direct connect customers. These account managers obtain information regarding expected load increases and new connections, which can then be factored into the load forecasts.

Transend reviews the Aurora forecasts, adds the direct connect customer loads, applies diversity factors and takes into account power factors to produce its own regional and aggregated forecasts.

The process is shown in Figure 4-5.

Figure 4-5: Forecasting process



4.3.2.2 Aurora Forecast Methodology

Transend provides Aurora with ½ hour metering data for the previous year for each connection point, which is one of the inputs to Aurora's forecasting model. WorleyParsons has not reviewed Aurora's demand forecasting model, but notes that a detailed review was conducted by PB Associates[21] (PBA), on behalf of Transend. PBA reported that the Aurora model uses other data obtained from a number of sources, including ABS census data, GSP, consumption data from Aurora's retail database, meteorological data and distribution loss factors. Together with substation demand and power factor data provided by Transend, the various source data are modelled by a third party provider to produce Aurora's energy and demand forecasts.

In its report, PBA commented that[22]:

> "Aurora only produces 50% POE23 forecast and high and low growth forecasts. The high and low growth forecasts are not 10% and 90% POE forecasts as defined by NEMMCO although they attempt to align these high and low forecasts with a 10% and 90% POE. PBA is of the view that the medium or likely growth rates or trends that Aurora uses to forecast maximum demand and consumption are not related to a 50% POE forecast as defined by NEMMCO. Aurora acknowledges that there are some limitations on their 50% POE forecast as it is not based on a 50% POE temperature and is not temperature normalised. The rationale for using non-normalised data is that temperature variations are not prominent in Tasmania and that summer peak demand occurs on the coldest summer days. Aurora consider that the forecast they produce is probably on the high side of a true 50% POE forecast."

[21] Review of Transend Load Forecast Methodology, PB Associates, 18 June 2008
[22] Page 11
[23] Probability of Exceedance

Although it is not in a position to quantify the impact of variations from a true 50% POE forecast, WorleyParsons has made an engineering judgement that such variations are unlikely to be material, and are therefore even less likely to impact significantly on the need for or timing of augmentation projects.

In its report, PBA raised the following concerns in regard to Aurora's modelling process:

- Aurora and Transend have only a limited understanding of how the model works and no knowledge of the model's functional form or how it is specified;
- The model does not incorporate any particular procedure that allows for analysis of the statistical significance of the results, nor for hypothesis testing;
- There is a lack of documentation of the model;
- Neither Aurora nor the third party provider undertakes any formal error analysis; and
- There is no temperature normalisation of the input data, hence the variance in demand due to temperature is not taken into account.

PBA noted that Aurora conducts extensive verification and validation of the forecasts using expert assessment. PBA also made a number of recommendations to address the concerns raised, and it is understood that Aurora is implementing many of the recommendations made.

Notwithstanding the concerns raised by PBA, WorleyParsons considers that Aurora's forecasts provide a reasonable basis for Transend's bottom-up forecasts, and in any event, Aurora's forecasts are the best available at the local level.

4.3.2.3 Transend Forecast Methodology

In preparing its "bottom up" forecasts, Transend first reviews the Aurora forecasts which are provided for each connection point, looking back over the last three years. Inconsistencies are identified and taken up with Aurora for explanation – these are usually associated with load transfers made by Aurora on its distribution network.

Through its account managers, Transend identifies additional load for direct connect customers. All committed projects are included, together with most advanced projects (tempered by local knowledge). The forecast loads associated with direct connect customers are added to the Aurora forecasts. Diversity factors, loss factors and power factors are then considered and the results aggregated and reconciled with the NIEIR (State-wide) forecasts.

Transend uses only the 50% POE forecasts developed by Aurora, and applies the NIEIR forecasts to develop high and low scenarios. For planning purposes, Transend has split the State into five areas (West Coast, Northwest, George Town, Northern and Southern). Each area is further divided into smaller geographic sub-areas.

In its review of the load forecasting methodology, PBA raised the following concerns in regard to Transend's forecasting methodology:

- Lack of a business procedure on the forecasting process (Transend advise that this is being addressed);
- No historical error analyses; and
- Some communication gaps between Aurora and Transend, particularly in regard to interpretation of the forecast and its validity.

WorleyParsons understands that these issues are being addressed by Transend.

Notwithstanding the concerns raised by PBA in regard to the methodologies applied by Aurora and Transend, PBA concluded that the overall Tasmanian load forecasting process and methods are sound and represent good industry practice. PBA also noted that no attempt was made by them to examine the accuracy of the load forecasting results. Transend contend that the impact of any errors in the forecasting process are mitigated by the fact that many proposed Capex projects are not dependant on load forecasts as they have plant that is already overloaded or the projects have other drivers. WorleyParsons concurs with this contention.

4.3.2.4 Demand Forecasts

NIEIR predicts that the winter maximum demand growth for the base (medium) case is expected to increase by an average rate of 2.2% per annum over the period 2009 to 2021. Aurora predicts that the Tasmanian maximum demand (excluding direct connect customer demand) will increase by an average of 2.1% per annum over the next 10 years.

A comparison between the forecast NIEIR and Transend's winter maximum demand[24] is shown in Table 4-8.

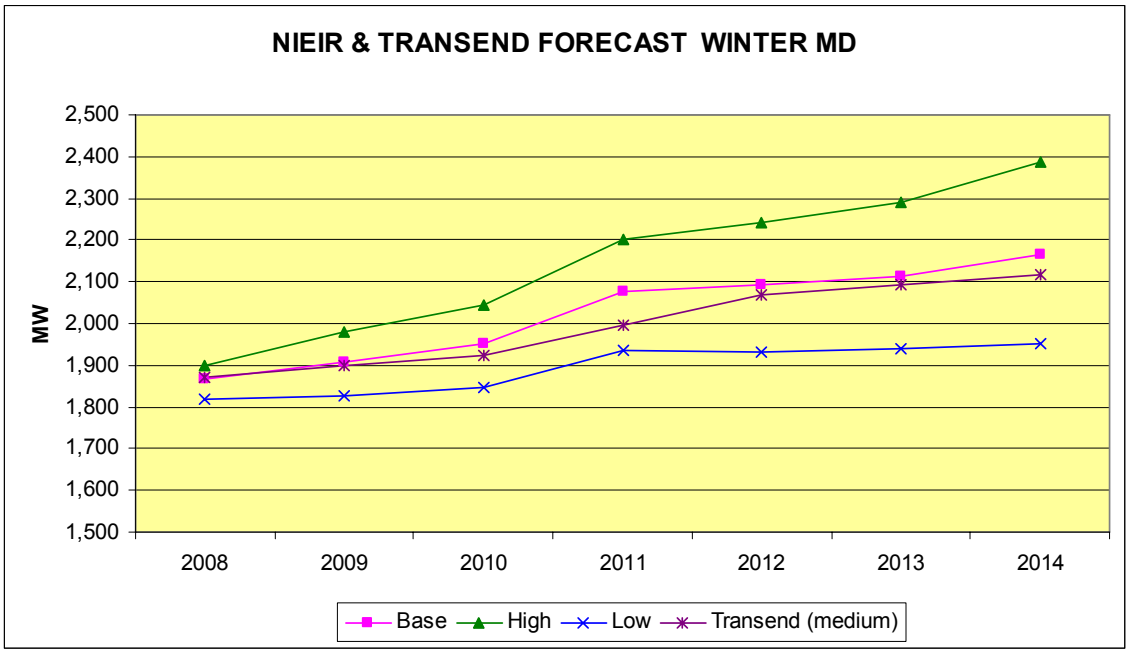
Table 4-8: NIEIR and Transend's Winter MD Forecasts

Growth scenario	2008	2009	2010	2011	2012	2013	2014
Base	1,866	1,909	1,951	2,077	2,092	2,114	2,164
High	1,901	1,979	2,043	2,201	2,241	2,291	2,388
Low	1,817	1,827	1,847	1,934	1,930	1,939	1,952
Transend (medium)	1,870	1,901	1,925	1,997	2,069	2,093	2,117

This is shown in the following Figure 4-6:

[24] Transend Revenue Proposal Page 72.

Figure 4-6: NIEIR & Transend Forecast Winter MD

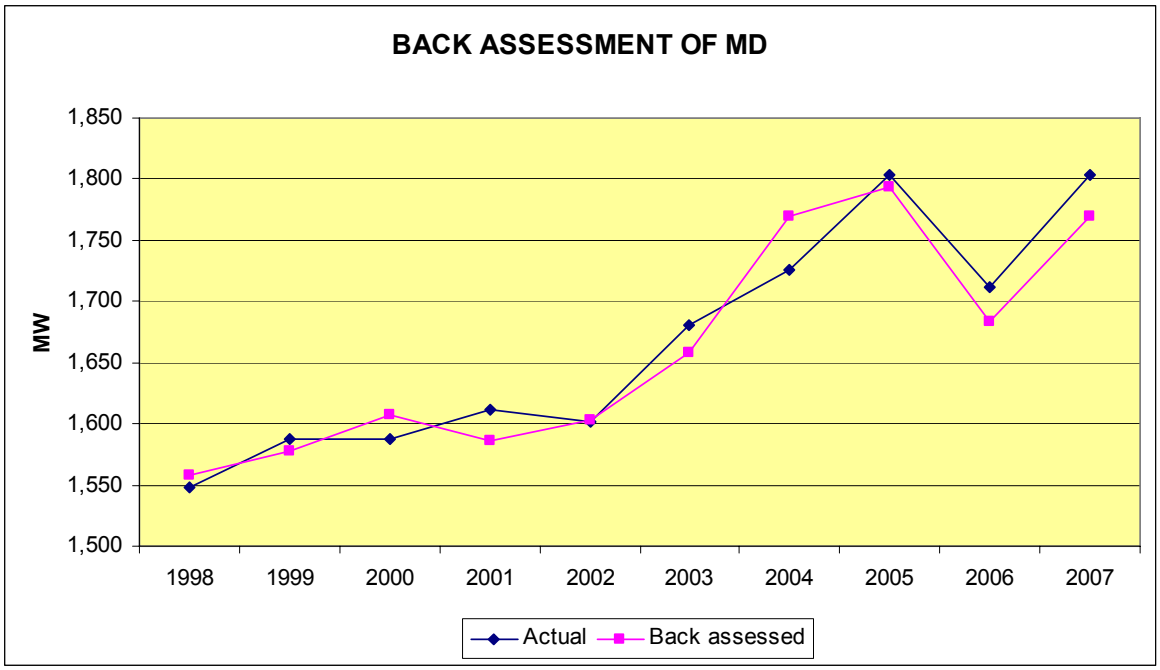


It can be seen that Transend's forecast MD is lower than that of NIEIR for the Next Regulatory Control Period by an average of about 40 MW (2%).

NIEIR has conducted a back assessment of its forecasts to check their validity, looking back over a ten year period. The back assessment is based on actual data and economic conditions to replicate the past forecasts. The comparison[25] is shown in Figure 4-7.

[25] From NIEIR Electricity sales and maximum demand forecasts for Tasmania to 2022, Page 73

Figure 4-7: Back assessment of MD



It can be seen that there is a reasonably close alignment between the forecasts and the back assessment, with actual MD exceeding the forecast more often than not. The variation averages around 20 MW but has been as high as 43 MW (3%). The average discrepancy is around half the difference between the NIEIR and Transend forecasts as shown in Figure 4-6. These comparisons provide a reasonable level of confidence in the forecasting methodology utilised by Transend.

4.3.2.5 Carbon Pollution Reduction Scheme

The Federal Government has proposed the introduction of a Carbon Pollution Reduction Scheme to commence in 2010. Such a scheme can be expected to impact on the demand for electricity.

There are a number of uncertainties relating to the introduction of the Federal Government's proposed Carbon Pollution Reduction Scheme, including:

- The timing of the scheme (although it is currently proposed for introduction in 2010, there is pressure to delay this to allow more time to work through the details of the scheme);
- The extent to which various industries may be subsidised or issued with free trading permits, particularly in the transitional stage; and
- The price of trading permits.

Such uncertainties make it difficult to evaluate the likely impact that the scheme would have on MD.

At the public forum held in Hobart on 6 August 2008, it was contended that Transend had not taken sufficient account of the impact on MD that the introduction of the proposed Carbon Pollution Reduction Scheme would have. In raising this concern, reference was made to increases in MD forecast by NIEIR and quoted in Transend's 30 Year Grid Vision report prepared by The NOUS Group, included as Appendix 8 in Transend's Revenue Proposal.

WorleyParsons notes that the NIEIR forecast quoted in The NOUS Group report dates from 2006, whereas Transend has utilised a more recent NIEIR report (2008) as input into its MD forecasts – this later NIEIR 2008 report has lower forecasts of MD than those contained in the 2006 report.

The impact on MD of changes in load of major customers was highlighted in The NOUS Group report[26]:

> "The other important factor influencing demand levels, given Tasmania's load profile, is the presence or absence of major industrial customers. Supply contracts for all five major industrial customers are due for renewal by 2014 and departure of one or more of these loads would have a major impact on both overall demand and the 'peakiness' of the load curve. The plants being supplied are small when considered on an international scale, so their long term viability may be open to question. Balanced against this, these customers' existing sites have an incumbency value and may be prime assets, given the worldwide difficulty of establishing new green-field sites in these industries. There is also the possibility of increasing mining activity in the West and North-West, particularly if demand for minerals continues to be strong over the long term. This may have the potential to offset loss of other industrial customers should this occur."

Transend has actively sought input from direct connect customers and other major customers to take account of changes in major customer loads.

In preparing its forecasts, NIEIR has assumed that a carbon levy, probably in the form of an emissions trading scheme, will be introduced by 2010-11, with the levy initially set at $10/tonne CO2e, rising to $20/tonne CO2e by 2020.

4.3.2.6 Conclusion

WorleyParsons is not able to determine the level of accuracy of Transend's maximum demand forecasts, as neither Transend nor Aurora has conducted a statistical analysis to enable this to be done. The back forecasting undertaken by NIEIR provides a reasonable level of confidence in NIEIR's forecasts, and it is noted that Transend's forecasts are consistently below those of NIEIR over the Next Regulatory Control Period.

WorleyParsons notes that PBA concluded from its review that Transend's load forecast methodology is robust and in line with good industry practice. The key areas for improvement identified by PBA

[26] Section E: Factors that will shape transmission development, Page 18

related to documentation, communication, model maintenance, model validation and reporting. None of these areas relate directly to concerns regarding the accuracy of the forecasts.

WorleyParsons considers that Transend's process for preparing its demand forecasts is sound, but could be enhanced by the implementation of PBA's recommendations. WorleyParsons saw no evidence to suggest that Transend has (unwittingly or otherwise) inflated its forecasts of maximum demand. WorleyParsons considers that Transend's demand forecasts form an appropriate input to the development of the Capex program.

4.3.3 Capital Cost Escalators

In developing its forecast Capex, Transend has included a number of cost escalators to reflect its view that costs will increase at a rate greater than inflation in some key areas. Transend has proposed cost escalators for the following:

- Labour;
- Land; and
- Non-labour.

In addition to these cost escalators, Transend has applied a risk factor to recognise the inherent uncertainties in the cost estimating process and that there is generally a higher probability that costs will increase rather than decrease.

The cost escalators and the risk factor are discussed in the following sections, together with how they are applied by Transend in the development of its Capex forecasts.

4.3.3.1 Labour Cost Escalation

In its Revenue Proposal[27], Transend states that:

> "Labour cost increases have a significant influence on Transend's capital expenditure forecast. Wages growth has been strong in the Current Regulatory Control Period, particularly in the latter years, and this is expected to continue into the future."

Transend engaged Competition Economists Group (CEG) to provide forecasts of real wages growth (amongst other things) for the period 2008 to 2014. The CEG report[28] analysed forecasts in the growth of Average Weekly Ordinary Time Earnings (AWOTE) for the electricity, gas and water (EGW) sector. Two forecasts were analysed by CEG: Econtech (Australia wide) and Macromonitor (Tasmania). CEG proposed that an appropriate escalation factor for the EGW sector in Tasmania

[27] Section 5.6.4, Page 76
[28] CEG, Escalation factors affecting expenditure forecasts, A report for Transend, April 2008

was an average of these two forecasts, as shown in Table 4-9, but did not explain why such an approach is appropriate.

Table 4-9: Growth in AWOTE in the EGW sector (per cent real)

	2007/08	2008/09	2009/10	2010/11	2011/12	2112/13	2113/14	Average Reg Period
Econtech	2.0	2.8	5.6	5.0	3.9	3.4	3.1	4.2
Macromonitor*	2.4	3.6	2.4	0.5	2.3	4.3	4.9	2.9
CEG	2.2	3.2	4.0	2.7	3.1	3.9	4.0	3.5

Note: * productivity adjusted

Transend is proposing a 3.5% real growth over the Next Regulatory Control Period, which is higher than the 3% allowed by the AER in its recent ElectraNet decision. Transend contends that wages growth in Tasmania is expected to be higher than for Australia as a whole, due to the constrained labour market.

Transend also engaged CEG to review historic labour costs. In its report[29], CEG compared the growth in wages between Tasmania and Australia, for all industries and the EWG sector. Comparisons were made for AWOTE and the ABS Labour Price Index (LPI), except for LPI where the LPI for Tasmania is not available for the EGW sector. The results are shown in the following table:

Table 4-10: Historical measures of nominal wage growth 2003-2007

AWOTE				LPI		
All industries Australia	All industries Tasmania	EGW Australia	EGW Tasmania	All industries Australia	All industries Tasmania	EGW Australia
4.5%	5.0%	4.0%	4.6%	3.8%	3.9%	4.7%

From this information, CEG concluded that:

> "…wage growth, as measured by AWOTE, in Tasmania has outstripped wages growth in Australia during this period – both at the level of 'all industries' and specifically in the EGW sector. Similarly, wages growth as measured by LPI for all industries, has been higher in Tasmania…"

[29] CEG, Historic Labour costs growth, A report for Transend, 14 May 2008.

Although the values quoted in Table 4-10 are in nominal terms, they indicate that Tasmania has experienced real wage growth around 0.5% higher than all Australia, based on AWOTE. Transend contend that the strong wages growth that has applied during the Current Regulatory Control Period, particularly in the latter years, can be expected to continue well into the future.

Although detailed wages growth modelling is not part of WorleyParsons' core competencies, WorleyParsons is concerned about the appropriateness of Transend's forecast of wages growth. WorleyParsons notes the report[30] by Access Economics in April 2007 forecast growth in LPI in the utilities sector in Tasmania to be lower than in any other State whereas the CEG Report (relied upon by Transend) considered that Transend's LPI growth rate would be high relative to other States. WorleyParsons understands that the AER has engaged a consultant to investigate this matter, which action WorleyParsons supports.

The process adopted by Transend to allow for increased labour costs in its Capex forecasts is described in Section 4.3.3.4.

4.3.3.2 Land Escalation

Transend engaged the services of a property valuer, Brothers and Newton, to advise on movements in real land prices for the period 1 July 2007 to 30 June 2014. In its report[31], Brothers and Newton highlighted a lack of statistical data available for property markets, so the forecasts are based on general economic trends and experience. Brothers and Newton have forecast movements in property values for the following land types:

- Industrial;
- Commercial;
- Residential;
- Rural residential;
- Rural (grazing);
- Rural agricultural (cropping); and
- Rural forestry.

Forecasts have been provided for three regions;

- South;
- North; and
- North-west.

[30] Labour Cost Indices for the Energy Sector, Report produced by Access Economics for the AER, 12 April 2007, p25.
[31] Brothers and Newton, Escalation Forecasts for Land Values in Tasmania, 24 April 2008

Transend has applied the Brothers and Newton regional forecasts to derive weighted average escalations based on the proportion of planned land and easement acquisitions in each region. The Regional land value escalation factors forecast by Brothers and Newton and the weighted averages derived by Transend are shown in the following table.

Table 4-11: Land value escalation factors

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
South	3.9	3.8	3.5	3.3	2.6	2.5	3.1
North	5.7	5.6	5.9	5.3	4.8	4.2	4.4
North-west	6.4	6.2	5.8	4.7	4.2	3.8	4.3
Weighted average	5.3	5.2	5.1	4.1	3.5	3.2	3.7

WorleyParsons notes that the AER allowed an escalation rate of 4.73 per cent real for land and easements in its recent determination for ElectraNet[32], which is higher than the weighted average of 3.9 per cent, averaged over the regulatory period, proposed by Transend.

Although concerned at the lack of historic data contained in the report by Brothers and Newton, WorleyParsons has no basis to suggest that the forecasts provided are not reasonable. WorleyParsons recommends that the AER accept the proposed escalators for land and easements. The process adopted by Transend to allow for increased land costs in its Capex forecasts is described in Section 4.3.3.4.

4.3.3.3 Non-Labour Escalation

Transend engaged CEG to advise on the development of annual escalation factors. In its report[33], CEG has developed forecasts for the movements in the price of the following:

- Labour in the Tasmanian EGW sector (discussed in Section 4.3.3.1 of this report);
- Copper;
- Aluminium;
- Crude oil;
- Fabricated steel;
- General labour;
- Producer margin; and

[32] AER Final Decision, ElectraNet transmission determination 2008-09 to 2012-13, 11 April 2008, p35
[33] CEG, Escalation factors affecting expenditure forecasts, A report for Transend, April 2008

- Construction costs.

To derive escalation factors for these items (other than labour), CEG has had to review the price of inputs used in the production of goods and services directly purchased by Transend, as forecasts do not exist for these items. The approach taken by CEG involved two steps:

- Break down the Capex program into different cost categories for which there are unit cost forecasts or for which unit cost forecasts can be derived; and
- Source or derive the relevant unit cost forecasts.

The process adopted by Transend to allow for the movement in these unit costs in its Capex forecasts is discussed in Section 4.3.3.4 of this report.

Copper and Aluminium

CEG contends that the most reliable forecast for commodity prices (such as copper and aluminium) is provided by prices in the futures market. CEG have used forecast prices on the London Metals Exchange (LME) over various time frames to develop forecasts to June 2010. There are no futures forecasts beyond this date, so CEG has relied on an average of forecasts made by professional forecasters and collated by Consensus Economics. CEG has used the Consensus Economics long term forecast (with an adjustment derived from the futures price) to arrive at a forecast for 2018, and then used a linear interpolation for the intervening years. CEG have also factored in forecasts for the AUD/US exchange rate.

WorleyParsons notes that during the review of ElectraNet's recent Revenue Proposal, SKM was generally supportive of CEG's approach but was critical of three aspects. Two of these related to time frames over which information is taken, and it is WorleyParson's view that both the approaches adopted by CEG in this regard and those suggested by SKM can be considered to be reasonable (CEG takes a similar view).

The third area of difference related to the use by CEG of a mixture of futures market prices and the Consensus Economics forecasts (CEG adjusted the Consensus Economics long term forecast to reflect the higher futures prices). CEG's response to the views expressed by SKM are contained in Section 3.5 of CEG's report. WorleyParsons has formed the view that the approach taken by CEG is reasonable, in that WorleyParsons accepts that the most reliable forecast for commodity prices is provided by prices in the futures market. As such information is not available for the long term, other information has been utilised, with some adjustments.

Crude Oil

CEG has taken the same approach for crude oil as it used for copper and aluminium. Historical data on crude oil prices have been sourced from the US Department of Energy and crude oil futures have been sourced from the Commodity Charts and Quotes website.

Fabricated Steel

In its analysis, CEG has determined from ABS data that for fabricated steel, the cost of the steel itself amounts to around 15% of the total costs, labour is around 25% and profits and taxes around 10%. CEG have forecasted the price of steel (using the same methodology as that for copper and aluminium), forecasted the cost of labour required to fabricate the steel and assumed that the other cost components do not change in real terms.

General Labour

In addition to commodity costs, Transend's suppliers use other important inputs, one of which is labour. CEG has split equipment purchased by Transend into the following broad groupings:

- Primary plant and materials;
- Secondary systems and material;
- Transformers;
- Aluminium conductor; and
- Copper cable.

By use of industry coding and ABS data, CEG have calculated that the proportion of labour for each of these equipment groupings is 27%. CEG recommended that this weighting be used to develop forecast movements in equipment purchases. CEG also recommended use of Econtech's forecast AWOTE across the Australian economy as the basis for general labour increases. This appears to be a reasonable approach for equipment produced in Australia, but as much of the equipment purchased by Transend will presumably be manufactured overseas, the use of Australian wages growth is questionable. WorleyParsons is not in a position to provide a more appropriate forecast, so has accepted the CEG approach.

Producers' Margins

A further important input used by Transend's suppliers is producers' margins. CEG expects these to increase over the Next Regulatory Control Period, driven by the balance between supply and demand in world equipment markets being tipped in favour of producers. CEG has used forecasts of changes in profits, made by JP Morgan and Goldman Sachs, for a range of electrical equipment suppliers, to arrive at a forecast of increases in producers' margins. CEG has assumed that the margin increases are zero after 2011 as there are no financial analysts' forecasts beyond that date.

CEG contend that their forecasts for producers' margins are likely to be conservative, due to the method of calculation and the relatively small size of Transend as a customer.

Construction Costs

CEG have used two sources of data – Econotech and Macromonitor – to derive forecasts of movements in construction costs. CEG considered that the total engineering construction cost category was the most appropriate for the consideration of "construction related" expenditure, and has taken an average of the two data sources for this category.

Conclusions

WorleyParsons has reviewed the approach taken by CEG in developing its forecasts of movements for non-labour cost components. By necessity, a number of assumptions have been made by CEG in arriving at its conclusions, and in some areas alternative approaches could have been taken (for example, time frames for futures market information). WorleyParsons notes that the AER has advised that it will undertake a detailed examination of the CEG approach to escalating price movements. That separate review may affect the final value of escalators of price movements adopted by the AER.

4.3.3.4 Cost Escalation Model

Summary of Input Cost Escalators

In line with comments made by the AER in the SP AusNet draft decision[34], Transend has applied a one year time lag for copper, aluminium and crude oil, recognising that changes in the price of these commodities will not immediately feed through to higher equipment prices.

The escalators Transend has applied as inputs to its cost escalation model are shown in Table 4-12.

Table 4-12: Summary of Input Cost Escalators (per cent real)

Input Costs	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Tas. EGW labour	2.2	3.2	4.0	2.7	3.1	3.9	4.0
Land (S)	3.9	3.8	3.5	3.3	2.6	2.5	3.1
Land (N)	5.7	5.6	5.9	5.3	4.8	4.2	4.4
Land (NW)	6.4	6.2	5.8	4.7	4.2	3.8	4.3
Aluminium	11.6	-5.6	3.5	-0.5	-0.2	0.3	0.0
Copper	30.5	-0.4	-3.7	-6.3	-4.2	-2.8	-3.1
Crude oil	-2.6	24.5	12.4	-3.8	-1.3	-0.5	-2.0
Fabricated steel	0.2	0.1	0.3	0.2	0.2	0.2	0.2

[34] AER, SP AusNet Transmission Determination 2008-09 to 2013-14, August 2007, Page 90

General labour	1.8	1.6	2.4	1.9	1.8	2.0	2.0
Producers' margin	9.5	5.4	6.1	7.6	0.0	0.0	0.0
Construction costs	2.3	2.1	0.9	0.7	1.1	1.9	2.6

Transend has developed a cost escalation model to derive weighted average cost escalators for labour, non-labour construction, land and non-network capital projects to apply to the Capex forecast.

In essence, the model has two steps:

1) The Capex program is broken down into a number of generic project types, and each project type is broken down into key component costs.
2) The component costs by estimate types are mapped against input component costs (summarised in Table 4-12), leading to the derivation of weighted averages.

The Project types used for the first step are as follows:

- Small brownfield transmission line development (TL-S);
- Medium brownfield transmission line development (TL-M);
- Large brownfield transmission line development (TL-L-Br);
- Large greenfield transmission line development (TL-L-Gr);
- Transmission cable, new easement (TC);
- Transmission line refurbishment (TL-Refurb);
- Greenfield substation development without transformers (SS-Gr);
- Greenfield substation development with GIS and without transformers (GIS);
- Partial brownfield substation redevelopment, single stage without protection & control (SS-Br-Sgle);
- Partial brownfield substation redevelopment, single stage with GIS and without protection & control (GIS);
- Brownfield substation redevelopment, multi stage without protection & control (SS-BR-Mult);
- Network transformer (Net-TF);
- Supply transformer (Supp-TF);
- Protection & control replacement, single stage (P&C-Sgle);
- Protection & control replacement, multi stage (P&C-mult);

- Capacitor banks (Cap bank); and
- Land & easements.

Each of these estimate types is then weighted for each year by the Capex for that type of project as a proportion of the total Capex, as shown in Table 4-13.

Table 4-13: Estimate Type Weighting (per cent)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	5 Year Total
TL-S	0.0	2.3	5.8	6.0	4.1	2.7	1.2	4.2
TL-M	0.0	0.0	0.0	0.0	0.0	0.6	9.1	1.7
TL-L-Br	27.1	20.6	39.1	31.3	0.0	0.0	0.0	17.4
TL-L-Gr	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC	0.0	0.8	0.8	8.9	9.9	0.0	0.0	4.0
TL-Refurb	0.0	3.7	2.2	2.7	13.8	12.5	6.4	6.6
SS-Gr	2.6	7.5	17.4	17.6	29.2	14.9	10.1	17.6
(GIS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SS-Br-Sgle	0.5	1.5	2.6	5.3	3.7	20.3	10.8	7.9
(GIS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SS-Br-Mult	44.0	35.5	7.0	7.3	20.6	23.2	27.7	15.6
Net-TF	0.4	2.5	3.1	0.0	0.0	0.0	0.4	0.8
Supp-TF	6.9	2.4	0.0	1.9	5.4	1.6	3.6	2.3
P&C-Sgle	0.0	0.5	0.6	1.0	1.1	0.7	0.3	0.8
P&C-Mult	0.0	1.6	5.8	7.1	0.1	1.6	5.8	4.5
Cap bank	5.2	6.0	1.4	2.3	0.1	1.7	3.8	1.9
Land/easement	0.0	0.0	0.0	0.0	0.0	8.3	7.6	2.7
Non-network	9.2	15.2	14.0	8.6	12.0	11.8	13.2	11.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Each estimate type is then broken down into a series of cost components, as shown in Table 4-14, with a percentage of total project cost allocated to each cost component.

Table 4-14: Cost Components

		PROCUREMENT (%)									INSTALLATION (%)					LAND (%)	
Project Type	Estimate Type	Aluminium	Steel	Copper	Concrete (foundation)	Buildings & demolition	Producers' labour	Producer's margin	Transport	Material - others	Plant hire & establishment	Labour-External-civil & general	Labour-External-EGW	Labour-Internal	Labour-other	Land	Total
TL-S	1	8	10	0	3	0	3	3	1	3	9	24	30	5	1	0	100
TL-M	2	9	11	0	3	0	3	3	1	5	8	25	27	4	1	0	100
TL-L-Br	3	9	11	0	3	0	3	3	1	5	8	27	25	4	1	0	100
TL-L-Gr	4	9	11	0	3	0	3	3	1	5	9	28	23	4	1	0	100
TC	5	0	4	28	2	0	5	10	1	9	9	24	5	2	1	0	100
TL-Refurb	6	6	5	0	8	0	3	1	1	9	14	12	21	19	1	0	100
SS-Gr	7	2	5	4	8	7	7	6	2	5	5	10	28	10	1	0	100
(GIS)	7a	1	8	6	1	15	10	6	4	12	6	8	17	5	1	0	100
SS-Br-Sgle	8	2	5	4	8	8	8	6	2	6	4	7	28	11	1	0	100

(GIS)	8a	1	7	5	1	12	10	6	4	4	4	6	28	11	1	0	100
SS-Br-Mult	9	1	4	3	5	4	6	6	1	4	7	7	35	16	1	0	100
Net-TF	10	0	11	9	6	0	27	19	8	4	1	10	3	1	1	0	100
Supp-TF	11	0	11	9	4	0	27	15	8	4	1	11	8	1	1	0	100
P&C-Sgle	12	0	2	6	0	2	10	6	0	12	1	6	40	14	1	0	100
P&C-Mult	13	0	2	6	0	2	10	6	0	12	1	6	35	19	1	0	100
Cap bank	14	6	5	7	10	4	5	6	2	15	4	7	20	8	1	0	100
Land/easement	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100

A significant item is labour, which appears in four of the columns ("producers' labour", "labour - external - civil & general", "labour - internal" and "labour - other") and varies widely over these four areas. When combined, the total labour percentages range from 40% to 70%. The bottom end includes the installation of capacitor banks and GIS switchgear – WorleyParsons would expect a lower labour component for these types of projects. The top end includes protection and control projects, and WorleyParsons would expect a higher labour content for these projects. The labour contents align with what WorleyParsons would expect, based on experience.

WorleyParsons has reviewed the cost components and is satisfied that the allocations are reasonable.

The contents of Table 4-13 and Table 4-14 are then combined to give the component weights, as shown in Table 4-15.

Table 4-15: Component Weights (per cent)

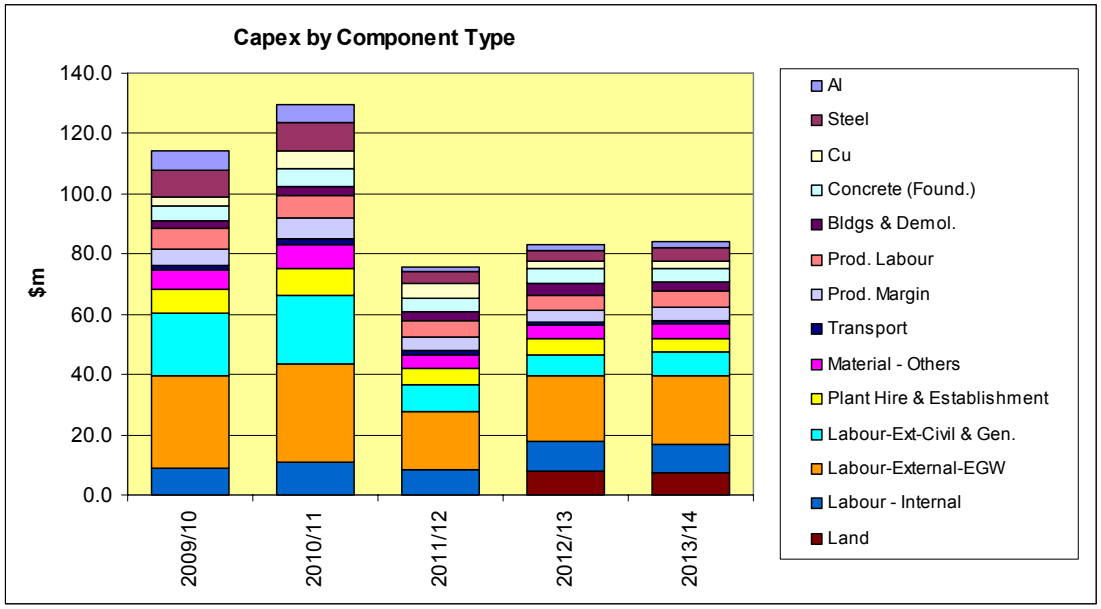
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	5 Year Total
Aluminium	3.6	3.1	4.7	4.1	2.0	2.1	2.2	3.2
Steel	6.4	5.5	6.9	6.5	4.6	4.0	4.3	5.5
Copper	2.5	2.6	2.0	4.5	5.3	2.5	2.7	3.4
Concrete (foundation)	4.2	4.3	3.8	4.0	5.3	5.3	4.4	4.5
Buildings & demolition	2.2	2.3	1.9	2.2	3.2	3.7	3.0	2.7
Producers' labour	6.1	5.4	4.9	5.2	6.2	5.3	5.6	5.4
Producers' margin	5.2	4.8	4.1	4.8	5.4	4.2	4.5	4.6
Transport	1.5	1.3	1.2	1.2	1.6	1.3	1.3	1.3
Material-others	4.6	4.7	4.8	5.7	5.1	4.7	4.8	5.1
Plant hire & establishment	6.0	5.7	5.6	6.0	6.3	5.3	4.9	5.7
Labour-external-civ & gen	12.9	11.1	15.6	15.8	10.3	7.3	8.1	12.1
Labour-external-EGW	25.6	23.8	22.7	23.1	22.0	22.9	22.9	22.8
Labour-internal	9.1	9.1	6.8	7.4	9.9	10.5	9.8	8.6
Labour-other	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.9
Land	0.0	0.0	0.0	0.0	0.0	8.3	7.6	2.7
Non-network	9.2	15.2	14.0	8.6	12.0	11.8	13.2	11.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The Cost Escalation Model takes account of the varying mix of project types each year when calculating the component weights, which differ from year to year as can be seen from Table 4-15. The model does not attempt to vary the mix of components each year at the individual project level that is, the component mix is assumed to be constant for each project over the life of the project. This approach is supported by WorleyParsons, as to include variations to the component mix over time for each project would add a significant degree of complexity to the model.

The only project where a more exacting approach might possibly have a material impact on the Capex forecasts would be the Waddamana-Lindisfarne 220 kV transmission line. WorleyParsons is not in a position to develop a year-by-year component mix for this project and hence quantify the impact on the total Capex.

The apportionment of the weighted components across the un-escalated and un-risked Capex forecast is shown in Figure 4-8.

Figure 4-8: Capex by Component (June 07, $m)



The cost components are then mapped against the input costs, using qualified judgement. The results are shown in Table 4-16.

Table 4-16:Component Input Escalator Mapping (per cent)

	Aluminium	Copper	Crude oil	Fabricated steel	General labour	Producers' margin	Construction costs	TAS EGW labour	Land & easements	Land & easements	Land & easements
Aluminium	100										
Steel				100							
Copper		100									
Concrete (foundation)			20				80				
Buildings & demolition							100				
Producers' labour					100						
Producers' margin						100					
Transport			100								
Material-others			20		80						
Plant hire & establishment							100				
Labour-external-civil & general							100				
Labour-external-EGW								100			
Labour-internal								100			
Labour-other					100						
Land (north-west)									100		
Land (north)										100	
Land (south)											100

In reviewing the resulting component input cost escalator mapping, WorleyParsons notes that a simplified approach has been adopted, with most items being allocated a percentage based on a single (major) cost component. For example, transport has been assigned 100% to crude oil, whereas it could be argued that a component could also be allocated to labour. Nonetheless, WorleyParsons considers that the allocation as shown in Table 4.16 are not unreasonable.

Base escalators are derived by applying the component input mapping in Table 4-16 with the input cost escalators contained in Table 4-12, as shown in Table 4-17.

Table 4-17: Base Escalators (per cent)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Aluminium	11.6	-5.6	3.5	-0.5	-0.2	0.3	0.0
Steel	0.2	0.1	0.3	0.2	0.2	0.2	0.2
Copper	30.5	-0.4	-3.6	-6.3	-4.2	-2.8	-3.1
Concrete (foundation)	1.3	6.6	3.2	-0.2	0.6	1.4	1.7
Buildings & demolition	2.3	2.1	0.9	0.7	1.1	1.9	2.6
Producers' labour	1.8	1.6	2.4	1.9	1.8	2.0	2.0
Producers' margin	9.5	5.4	6.1	7.6	0.0	0.0	0.0
Transport	-2.6	24.5	12.4	-3.8	-1.3	-0.5	-2.0
Material-others	1.0	6.1	4.4	0.7	1.1	1.5	1.2
Plant hire & establishment	2.3	2.1	0.9	0.7	1.1	1.9	2.6
Labour-external-civ & gen	2.3	2.1	0.9	0.7	1.1	1.9	2.6
Labour-external-EGW	2.2	3.2	4.0	2.7	3.1	3.9	4.0
Labour-internal	2.2	3.2	4.0	2.7	3.1	3.9	4.0
Labour-other	1.8	1.6	2.4	1.9	1.8	2.0	2.0
Land (NW)	6.4	6.2	5.8	4.7	4.2	3.8	4.3
Land (N)	5.7	5.6	5.9	5.3	4.8	4.2	4.4
Land (S)	3.9	3.8	3.5	3.3	2.6	2.5	3.1

Weighted escalators are then obtained by multiplying the component weights in Table 4-15 by the base escalators in Table 4-17, with the results shown in Table 4-18.

Table 4-18: Weighted Escalators (per cent)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Aluminium	0.42	-0.18	0.16	-0.02	0.00	0.01	0.00
Steel	0.01	0.01	0.02	0.01	0.01	0.01	0.01
Copper	0.76	-0.01	-0.07	-0.28	-0.22	-0.07	-0.08
Concrete (foundation)	0.06	0.28	0.12	-0.01	0.03	0.08	0.07
Buildings & demolition	0.05	0.05	0.02	0.02	0.03	0.07	0.08
Producers' labour	0.11	0.08	0.11	0.10	0.11	0.10	0.11
Producers' margin	0.49	0.26	0.25	0.36	0.00	0.00	0.00
Transport	-0.04	0.32	0.15	-0.05	-0.02	-0.01	-0.03
Material-others	0.04	0.29	0.21	0.04	0.06	0.07	0.06
Plant hire & establishment	0.14	0.12	0.05	0.04	0.07	0.10	0.13
Labour-external-civ & gen	0.30	0.23	0.14	0.11	0.11	0.14	0.21
Labour-external-EGW	0.56	0.76	0.91	0.62	0.68	0.89	0.92
Labour-internal	0.20	0.29	0.27	0.20	0.31	0.41	0.39
Labour-other	0.02	0.01	0.02	0.02	0.02	0.02	0.02
Land (NW)	0.00	0.00	0.00	0.00	0.00	0.05	0.05
Land (N)	0.00	0.00	0.00	0.00	0.00	0.09	0.09
Land (S)	0.00	0.00	0.00	0.00	0.00	0.12	0.13

Final weighted escalators are then calculated from the data in Table 4-15, Table 4-17 and Table 4-18, giving the results in Table 4-19.

Table 4-19: Final Weighted Escalators

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Labour	2.2	2.8	2.7	1.9	2.4	3.3	3.6
Non-labour	5.2	3.2	2.9	0.5	0.0	0.8	0.7
Land	5.3	5.2	5.1	4.1	3.5	3.2	3.7

These final weighted escalators for labour, non-labour and land have been applied to Transend's Capex forecast. Before applying these escalators to its Capex forecast, Transend obtained validation

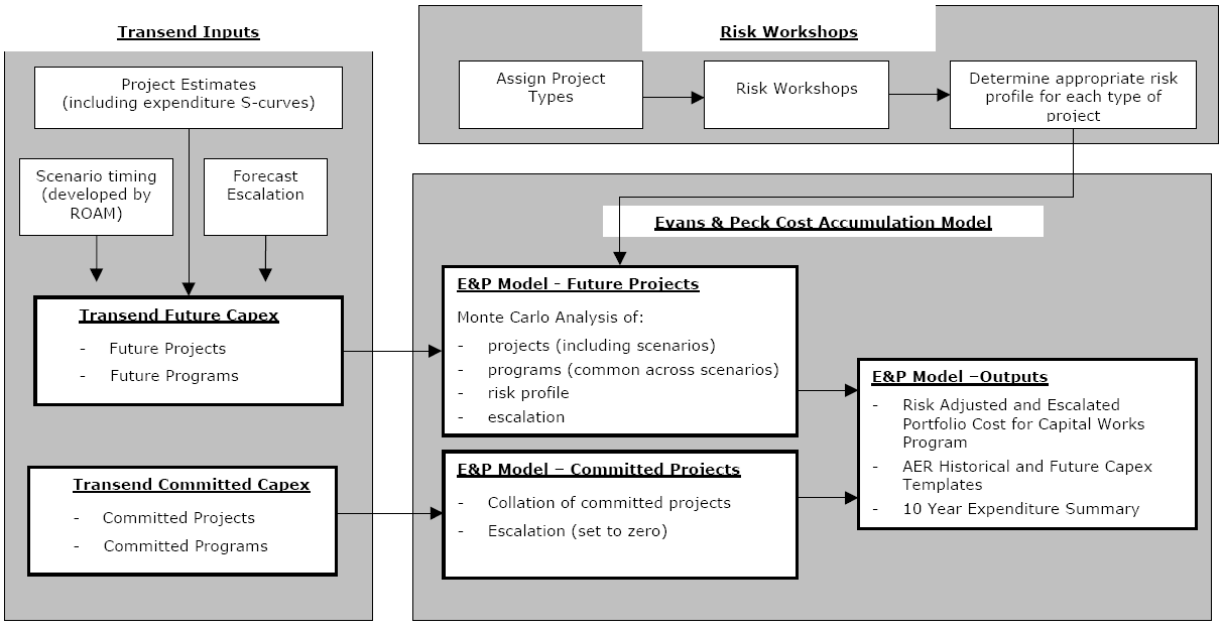
of the process from CEG. CEG proposed some modifications to the model and Transend has incorporated these into the model.

4.3.3.5 Risk Factor

Rather than applying a contingency to each project to allow for unforseen cost increases (which results in an excessive contingency amount at an aggregated project level), Transend has applied a systematic risk-based evaluation developed by Evans and Peck. Evans and Peck was engaged to conduct a cost estimation risk analysis of Transend's forecast Capex projects, with the aim of developing a number of risk factors that can be applied to the estimated costs of projects such that the probability of cost outcomes exceeding the forecast is no higher than the probability of cost underrun.

The approach taken is summarised in Figure 4-9.

Figure 4-9: Evans & Peck Cost Accumulation Model



The Cost Accumulation Model (CAM) consists of three parts:

- Committed projects and programs;
- Future projects and programs; and
- Outputs.

Essentially, Evans and Peck's process involves the following steps:

- Group types of projects with similar risk profiles and obtain detailed cost estimation data for representative projects within each group;
- Determine the key risks likely to impact on the cost, and the range of potential cost outcomes, of each cost component for each of the representative projects;
- Assess the probability of each identified risk occurring;
- Develop outturn cost profiles for each representative type of project, capturing the diversification of risk between the individual component items for each project;
- Apply the appropriate cost profile from the suite of representative projects to each project in the Capex program; and
- Model the entire Capex program using Monte Carlo simulations to develop a likely range of costs for the total project portfolio.

Transend and Evans and Peck conducted risk workshops to cover the first three steps, involving a broad cross section of personnel with different experience and knowledge. The validity of the output from these workshops (and hence on the final risk factors developed by Evans and Peck) is highly dependant on the quality of the input provided at the workshops. WorleyParsons is not in a position to verify and quantify the outputs from this process, but considers that the approach taken is fairly common and therefore not unreasonable.

Inherent risks and opportunities represent the uncertainty in the pricing of a defined scope of work, and are due to uncertainties in either the quantities or unit costs rates adopted in preparing the best estimate of cost. Inherent risks can include uncertainty in:

- Contractual arrangements (this can impact quantity and rate);
- Market conditions (this can impact quantity and rate); and
- The construction method that will be adopted (this can impact the rate).

Contingent risks and opportunities are unplanned events (subject to external influences over which Transend has little or no control) resulting in a final project scope that differs from that on which the initial estimate was based. Contingent risks may include:

- Varied conditions of consent from Approval Authorities;
- Change in Statutory Legislation (law);
- Latent ground conditions, such as contamination, asbestos or Acid Sulphate Soils, which have not been priced in the original estimate;
- Identifying major, unexpected, Aboriginal Cultural Heritage items during construction;
- Occurrence of an unplanned or unforeseen event such as an extreme weather event or major safety incident;

- Stakeholder issues that result in changes to the scope of the project or method of delivery of the project;
- Relocation of unidentified services;
- Industrial relations external to the project that nevertheless influence the cost of delivering the project;
- Theft of materials;
- Vandalism of equipment; and
- Restrictions on available time for outages requiring modified work practices (changed estimate basis).

Appendix 3 of the Evans and Peck report[35] includes a list of the most significant uncertainties in elemental costs for each of the projects selected for detailed assessment. WorleyParsons notes that some of the risk items listed are contingent risks, and notes that the Evans and Peck report specifically states that a "review of the contingent (unplanned) risk was also undertaken which tested the assumptions and external variables associated with the project scope". In response to a direct question as to whether any contingent risks had been included, Transend responded as follows:

"Transend only used inherent risks in its capital expenditure forecast. Contingent risks were identified but not included."

WorleyParsons has no evidence to suggest that this statement is not correct.

Evans and Peck recommended a global risk adjustment of 3.14% applicable to the total value of all projects and programs, and developed a risk adjustment factor for each type of project. WorleyParsons notes that the risk factor allowed in the AER's Final Decision for ElectraNet was 2.6%.

In its report, Evans and Peck comment as follows[36]:

> "Transend has a different make-up of projects than the TNSP's on the mainland, a smaller network, and is operating with a different labour force. These factors combine to provide Transend with a smaller portfolio with less diversity than Electranet, SP Ausnet or Powerlink. (Powerlink has over four times the forecast capex of Transend).
>
> A portfolio with less diversity assumes a higher risk. Less diversity in projects, and less projects, means that the impact of realised risks on a single project will have more of an impact on the overall portfolio of projects. (This only applies for project-specific risks, and not for common risks such as labour strikes). With a smaller number of projects, Transend

[35] Evans and Peck, Risk Assessment of Transend Capital Works Program for 2009-2014 Regulatory Reset Period 30 May 2008 (unabridged version)
[36] Page 33

> has less scope to divert resources and equipment to other projects in the event of a realised risk.
>
> The higher risk profile for Transend could be expected given the difference in project portfolio size and diversity between Transend and the other TNSP's."

WorleyParson's concurs with Evans and Peck's assertion that Transend could be expected to have a higher risk factor than its mainland counterparts, due to the lower diversity and number of projects.

WorleyParsons considers that Transend has applied a transparent process in line with good industry practice to arrive at its risk factors and recommends that the factors be accepted by the AER.

4.3.3.6 Conclusions

WorleyParsons has reviewed the cost inflation and risk factors that Transend has applied to its base project estimates to develop its Capex forecasts.

WorleyParsons considers that the average growth in real land costs proposed by Transend are not unreasonable. WorleyParsons notes that the AER has advised that it will undertake a detailed examination of the CEG approach to escalating price movements. That separate review may affect the final value of escalators of price movements adopted by the AER.

WorleyParsons is concerned about the appropriateness of Transend's forecast of wages growth, and supports the initiative by the AER to separately review this area.

Transend has developed and applied a detailed model to apply inflators to its Capex forecasts for each year of the Next Regulatory Control Period. WorleyParsons considers the model to be robust and representative of good industry practice.

With the exception of real wages growth, WorleyParsons considers that the application of the cost escalators and the risk factor will reasonably reflect the efficient costs that a prudent TNSP operating under the circumstances of Transend would require to achieve the Capex objectives.

4.3.4 Network Development

4.3.4.1 System Planning

The planning for transmission development projects is undertaken with consideration to the following national and state network performance criteria.

NER- System standards & stability requirements:

Thermal criteria:

- N-1 transmission security at maximum demand without exceeding continuous and emergency ratings; and
- Contingency events – ensure stable island.

Voltage - For loss of a transmission circuit or an auto-transformer:

- 220 kV & 110 kV >0.9 p.u. after taps operation (+/-10% of nominal);
- Supply buses controlled by tap changers +/-5% of nominal; and
- Reactive power margin >1% of maximum fault level at each bus.

Stability:

- Transient stability;
- Oscillatory (or small signal stability); and
- Voltage stability.

Electricity Supply Industry (Network Performance Requirements) Regulation 2007;

A planned power system must meet - in respect of an intact transmission system:

- No more than 25 MW of load is to be capable of being interrupted by a credible contingency event; and
- No more than 850 MW of load is to be capable of being interrupted by a single asset failure; and
- Load that is interrupted by a single asset failure is not to be capable of resulting in a black system; and
- The unserved energy to load that is interrupted consequent on damage to a network element resulting from a credible contingency event is not to be capable of exceeding 300 MWh at any time; and
- The unserved energy to load that is interrupted by a single asset failure is not to be capable of exceeding 3,000 MWh at any time.

A planned power system must meet - in respect of a transmission system that is not an intact transmission system:

- The active energy exposed to interruption by a credible contingency event is not to be capable of exceeding 18,000 MWh at any time.

For the purpose of calculating unserved energy any replacements or repairs undertaken must be taken to not exceed:

- 48 hours to repair a transmission line; or
- 8 days to replace a transformer; or
- 18 days to replace an autotransformer.

In meeting the minimum network performance requirements TNSP may use load shedding:

- To control network load after a non-credible contingency event; and
- As specified in a contract, agreement or arrangement entered with the customer.

A transmission network service provider must seek Ministerial approval for proposed augmentations to the transmission system to meet the Minimum Network Performance Requirements where the present value of the costs of constructing, operating and maintaining the proposed augmentation exceeds $15 million.

Planning Process Summary

Transend's Annual Planning Report is published in June of each year and Regional Plans are published in December.

Options are developed for all development projects and the basic process is:

- Investigate distribution (Aurora) options;
- Options are based on high level (Level 1) estimates;
- Do a regulatory test for each preferred option;
- Conduct options analysis using reliability tools;
- Cost benefit analysis – Use discounted cash flow over a 10 or 15 year period;
- Identify preferred option (Usually the cheapest); and
- Feed back into Regional Plans.

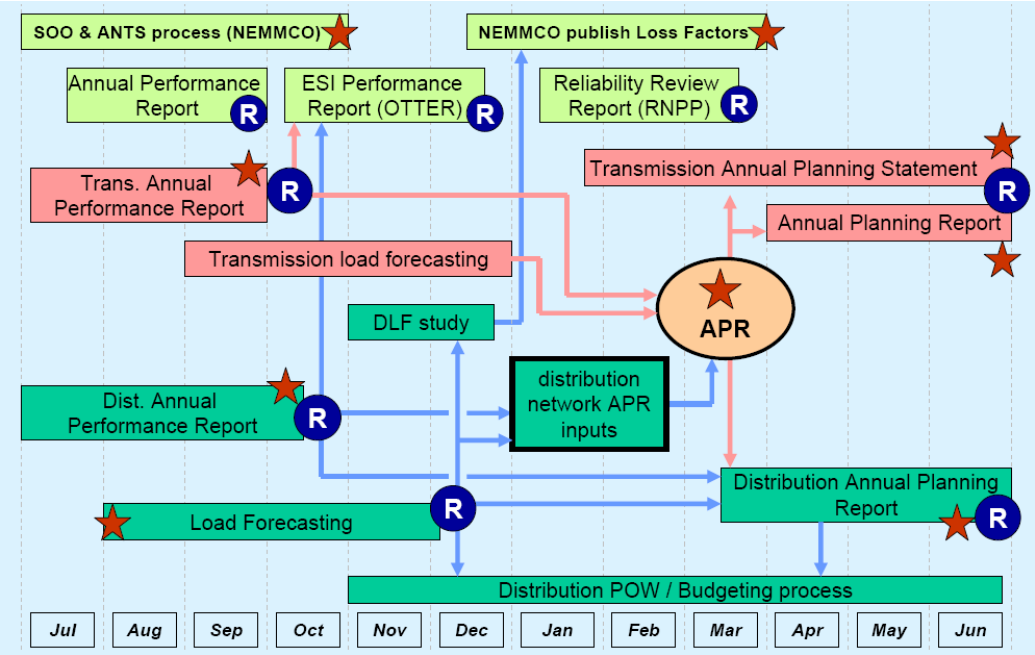
Options are tested against likely generation scenarios to see if the solution is still valid and dynamic ratings are now applied to all backbone 220 kV and 110 kV transmission lines and some radial 110 kV transmission lines.

The Annual Planning Review allows for a forum to provide input from external parties. Transend has considered gas fired generation in lieu of transmission line development; however this has generally been found to be too expensive.

A high level of integrated planning is undertaken with Aurora and there is evidence that both the distribution and transmission networks are considered in the design of transmission projects.

Planning is a continuous process and the annual planning cycle between Transend, Aurora and their various regulatory bodies is depicted below in Figure 4-10.

Figure 4-10: Annual Planning Cycle



4.3.4.2 Grid Vision Project

Overview

To assist Transend in long term network planning, a 30+ year vision for the Tasmanian Electricity Transmission network was developed following a project jointly undertaken by Transend and the NOUS Group in 2007.

In consultation with external stakeholder organisations in the Tasmanian Government sector and electricity markets at state and national levels, scenario planning and network modelling was undertaken to investigate a range of possible challenges in long term network development.

The outcomes of the project were recommendations to strengthen some key business response capabilities and identification of the key strategic issues that must be addressed for efficient and flexible long term development of the network.

Stakeholder Requirements

The consultation with stakeholders identified their following key requirements and expectations:

- Reliability of Supply;
- Network Pricing;
- Responsive Project Facilitation; and
- Industry Leadership.

Transmission Investment Shaping Factors

The project researched and reviewed the following investment shaping factors:

- Context
  - Two major load centres;
  - Modest demand growth projections;
  - Relatively flat demand duration curve;
  - Hydro generation domination;
  - Single North-South backbone transmission line; and
  - Interconnected to mainland via Basslink.
- Demand (Modest growth but could be affected by):

- Climate change;
- Increased adoption of air conditioning;
- Departure of major industrial load; and
- New mining activity.

- Supply:
  - Potential for approximately 260 MW of additional hydro generation (and pumped storage);
  - Potential for 600-1000 MW of wind generation; and
  - Bass Strait gas pipeline has capacity for gas generation beyond Alinta's announced Tamar Power development.
- Environmental:
  - Climate change and government action will create industry uncertainty;
  - Demand curves are likely to become peakier; and
  - A carbon price would advantage Tasmania's hydro and wind resources.
- NEM Connection:
  - Basslink has benefits for Tasmania;
  - Drought proofing Tasmania;
  - Market access for Tasmanian generators;
  - Improved flexibility of operation of hydro schemes;
  - In the long term a second link may be required for redundancy; and
  - Single link may place restraints on access to transmission assets.

Transmission Network Capacity Requirements

The project developed four scenarios to allow transmission network capacity modelling to be undertaken:

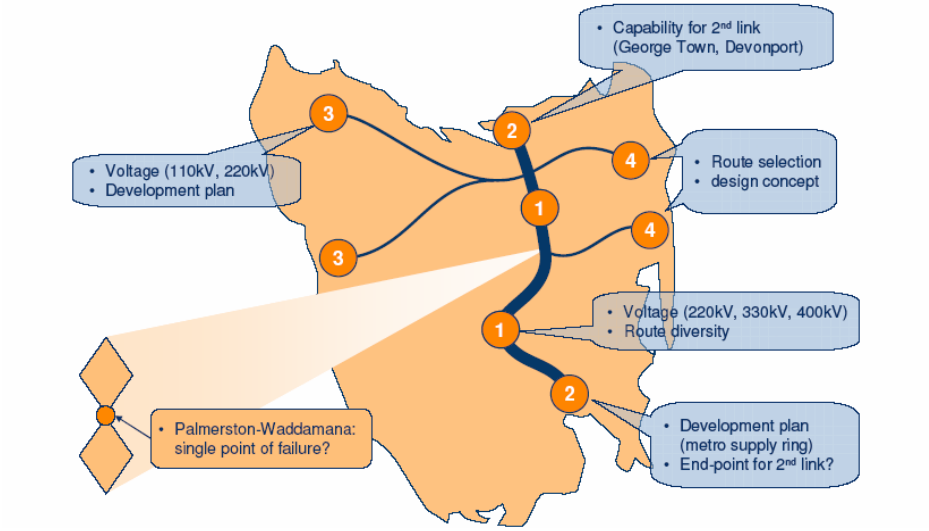
- Growth – Higher demand growth than current forecast;
- Import – Tasmania relying on electricity imports via increased Bass Strait transfer capacity;

- Export - Tasmania exporting 'green' peaking power via increased Bass Strait transfer capacity; and
- Business as usual – Tasmania's current situation continues.

Potential Transmission Network Development

The modelling revealed that four key areas of network development strategy will be required as indicated in Figure 4-11.

Figure 4-11: Four Key Areas of Network Development Strategy



1. Transmission Network Backbone Strategy:

The easement between Palmerston and Waddamana substations and the substations themselves will remain potential single points of failure in the long term and should be designed for high reliability against major events.

Voltage level selection for the long term development of the backbone network is a key strategy decision and options range from the current 220 kV up to 400 kV. The optimum strategy is likely to be:

- Build all new backbone lines for later operation at the selected voltage; and
- Upgrade lines and substations to the selected voltage only when justified by actual demand growth.

2. **Major Northern & Southern Load Centre Strategy:**

   A strategic development plan is required for the Hobart region and a planning study should be developed in conjunction with local planning authorities.

   Transmission planning for the North and South load centres should encompass a potential future requirement to connect a second Bass Strait link.

3. **North West & West Coast Strategy:**

   Strategic development plans for these regions are required and a study is needed to identify the optimum voltage level for future development of the North West and West Coast network.

4. **East Coast Strategy:**

   A strategic development plan is required that identifies the optimum line configuration for this region and local planning authorities should be involved in production of the high level plan.

Recommendations of the Project

It was recommended that Transend proceed with the following:

1. Develop a stakeholder consultation document:
2. Produce long term network plans:
   a) Select the optimum voltage for future backbone network development;
   b) Produce development plans for Hobart and the North West and West Coast regions;
   c) Produce a design concept and then a development plan for the East Coast region;
   d) Identify options to ensure capability to connect a second mainland link; and
   e) Develop a detailed yearly list of initiatives for progress from status quo to vision.

Comments

The NOUS report was a very practical document for determining where the focus of long term planning should lie and which appropriate scenarios should be taken into consideration. The strong customer consultation emphasis in the documentation should, if applied, build Transend's reputation as a key industry player.

A decision on the backbone voltage has not yet been made and it does not apply to projects in the Next Regulatory Control Period. It may however apply to some contingent projects and this may

result in transmission lines being constructed with insulation to the new backbone voltage but energised at a lower level for an extended period of time.

4.3.4.3 Network Constraints

General

Network constraints are identified from a number of sources including the Annual Planning Review, at project sign-off and at monthly meetings with Aurora.

The Regional Plans are also used to determine the impact of taking various network items (generators, busses, transformers, transmission lines, etc) out of service to identify constraints.

The following specific network constraints are currently identified:

Table 4-20: West Coast Constraints

Network Element		Constraint	When
1	WarratahTee - Savage River 110 kV transmission line	Overload	Currently (during extreme summer conditions)
2	Farrell – Que Tee 110kV transmission line	300 MWh criteria	Currently
3	Farrell – Rosebery 110 kV transmission line	300 MWh criteria 25 MW criteria	Currently 2008
4	Transformers 1 & 2 at Rosebery 110 kV Substation	Non firm	2008
5	Transformers 3 & 4 at Queenstown 110 kV Substation	Nonj firm	Currently
6	Farrell – Queenstown 110 kV transmission line	300 MWh criteria 25 MW criteria	Currently Currently

Figure 4-12: West Coast Constraints

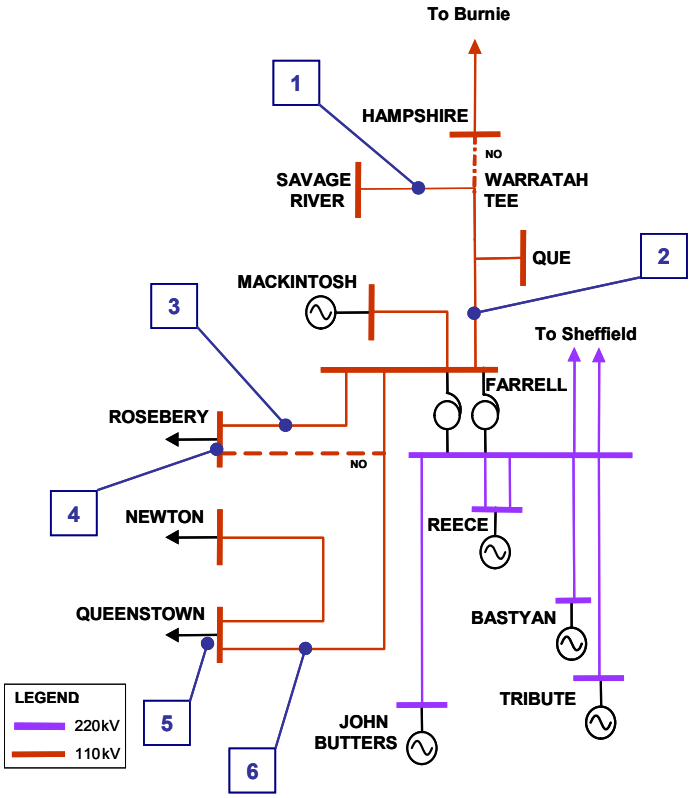


Table 4-21: North West Constraints

Network Element		Constraint	When
1	Sheffield – Burnie 110 kV transmission line	Non firm	Currently
2	Transformers 1 & 2 at Railton 110 kV Substation	Non firm	2008
3	Transformers 6 & 7 at Burnie 110 kV Substation	Non firm	2013
4	Transformers 1, 2 & 3 at Devonport 110 kV Substation	Non firm	2013
5	Transformers 1 & 2 at Sheffield 220 kV Substation	Non firm	2014

Figure 4-13: North West Constraints

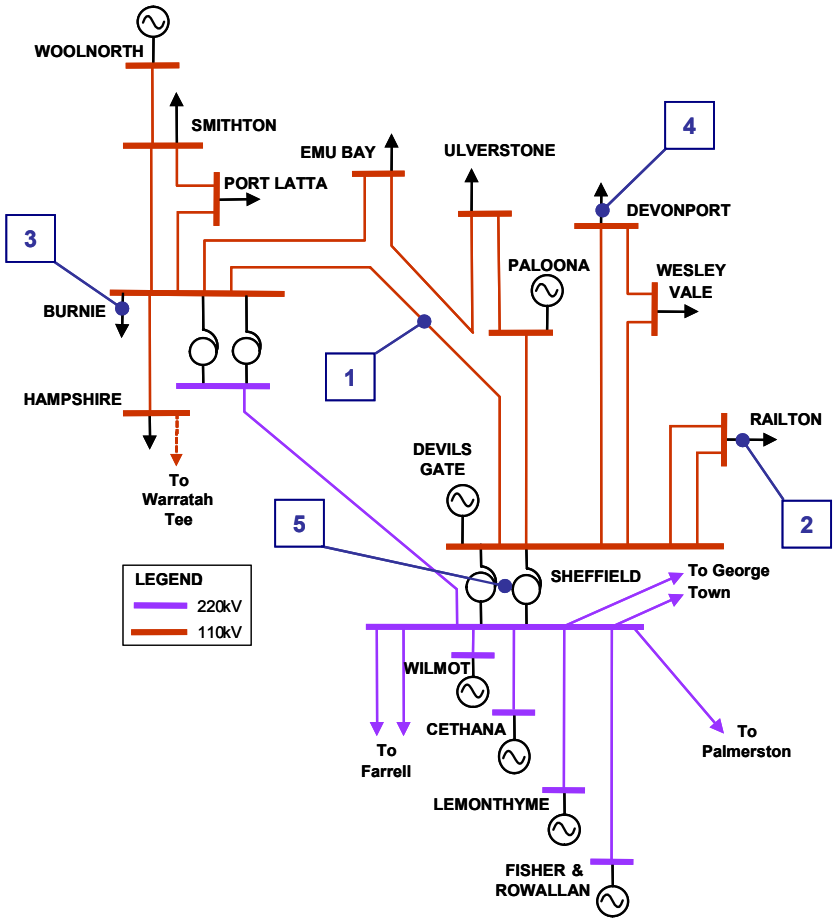


Table 4-22: Northern Constraints

Network Element		Constraint	When
1	Palmerston – Arthurs Lake 110kV transmission line	300 MWh criteria	Currently
2	Palmerston – Avoca Tee 110kV transmission line	300 MWh criteria	Currently
3	Avoca Tee – St Marys 110kV transmission line	300 MWh criteria	Currently
4	Transformers 1 at Avoca 110 kV substation	300 MWh criteria Overload	Currently 2016
5	Transformers 1 & 2 at St Marys 110 kV Substation	Non firm 300 MWh criteria Voltage Issues	2010 2010 2011
6	Derby 110 kV substation	300 MWh criteria	Currently
7	Transformers 1 & 2 at Norwood 110 kV substation	Non firm 300 MWh criteria	Currently Currently
8	Mowbray 110 kV substation	Non firm	2011
9	Common tower on the Hadspen – Trevallyn 110 kV transmission line	3,000 MWh criteria	Currently
10	Common tower on the Hadspen – Norwood 110 kV transmission line	3,000 MWh criteria	Currently

Figure 4-14: Northern Constraints

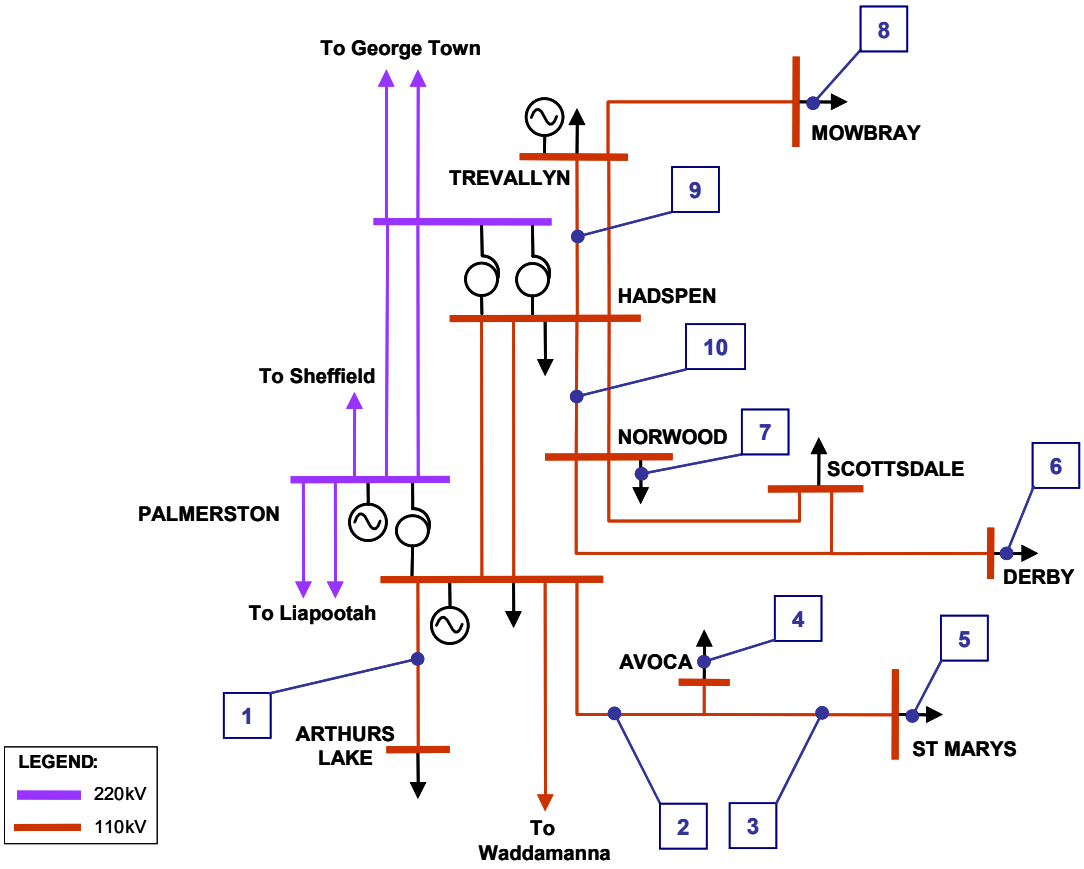


Table 4-23: George Town Constraints

Network Element		Constraint	When
1	George Town – Temco Lake 110kV transmission line	Non firm	Currently
2	George Town – Comalco 110 kV transmission line	N security	Currently
3	George Town 110 kV substation	Voltage control	Currently
4	George Town 220 kV substation	18,000 MWh criteria	Currently

Figure 4-15: George Town Constraints

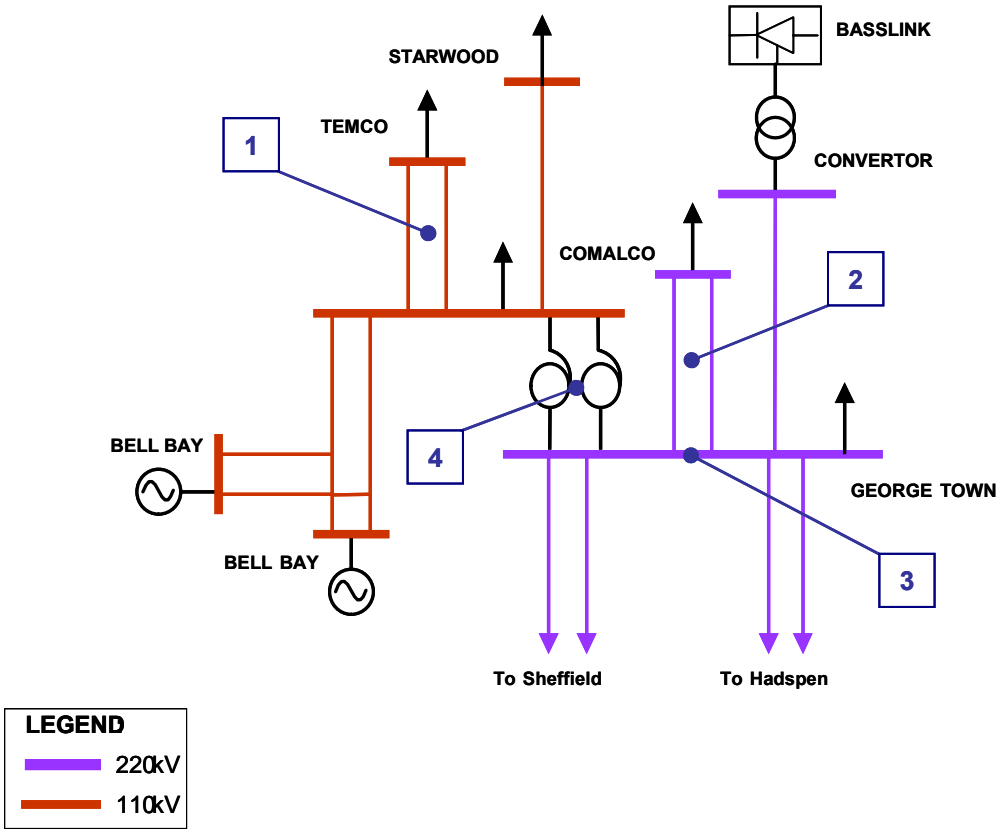
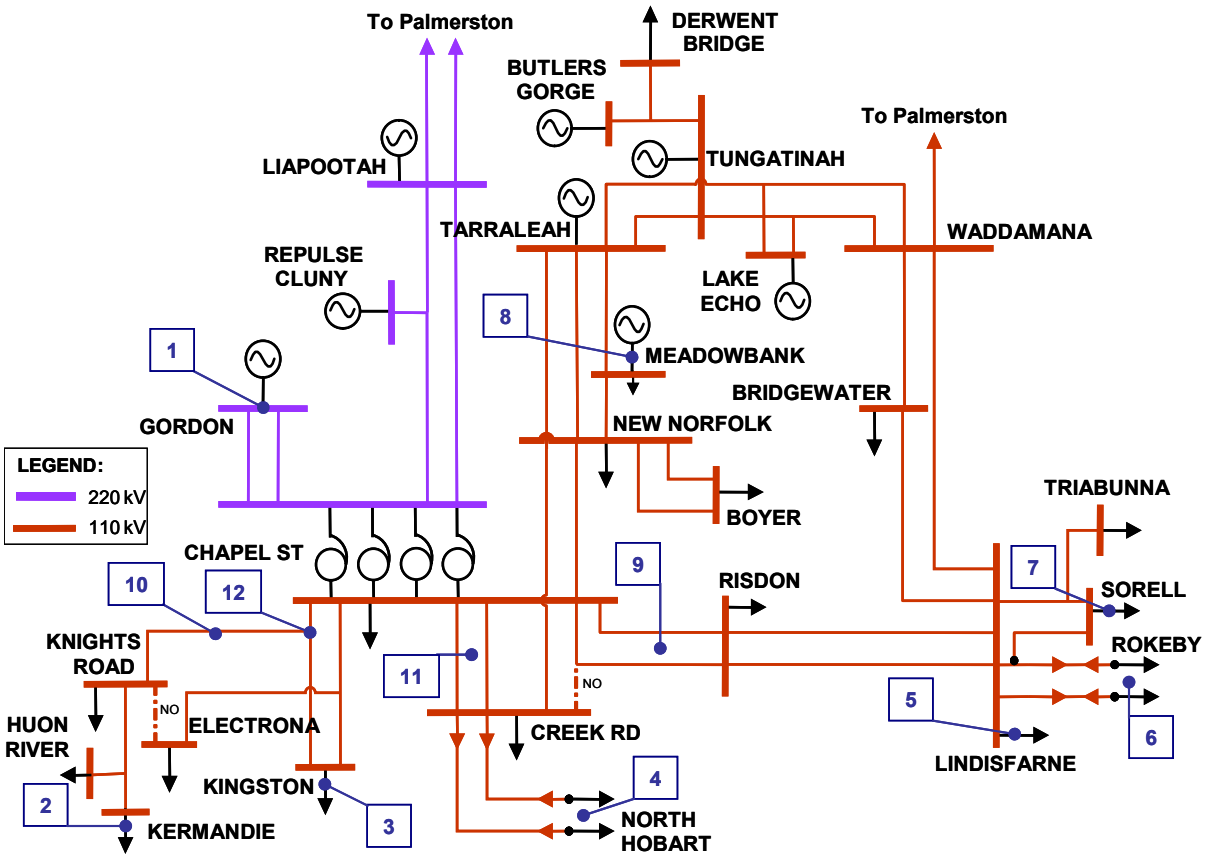


Table 4-24: Southern Constraints

Network Element		Constraint	When
1	Gordon 110 kV substation	Voltage Support	Currently
2	Transformers 1 & 2 at Kermandie 110 kV substation	No firm	Currently
3	Transformers 1 & 2 at Kingston 110 kV substation	Non firm 300 MWh criteria	Currently Currently
4	Transformers 1 & 2 at North Hobart 110 kV substation	Non firm	Currently
5	Transformers 2 & 3 at Lindisfarne 110 kV substation	Non firm 300 MWh criteria	Currently Currently
6	Transformers 1 & 2 at Rokeby 110 kV substation	Non firm 300 MWh criteria	Currently Currently
7	Transformers 1 & 2 at Sorell 110 kV substation	Non firm 300 MWh criteria	Currently Currently
8	Meadowbank 110 kV substation	300 MWh criteria	Currently
9	Chapel Street – Risdon 110 kV transmission line	Non firm	pre Lindis/Wadd 220kV line (after 110kV line is decommissioned)
10	Chapel Street – Knights Road 110kV transmission line	25 MW criteria	2009
11	Chapel Street – Creek Road 110 kV transmission line	Non firm	2010
12	Chapel Street – Knights Road - Kingston 110kV transmission line	Voltage Level (Contingency)	2014

Figure 4-16: Southern Constraints



Comments

In analysing the transmission network constraints identified in this section the following was observed:

- 16 cases where the NER System standards & stability requirements are currently breached or are expected to be breached in the Current Regulatory Control Period;
- 9 cases where the NER System standards & stability requirements will be breached at some time during the Next Regulatory Control Period if no action is taken;
- 20 cases where the Network Performance Requirements are currently breached or are expected to be breached in the Current Regulatory Control Period; and
- 1 case where the Network Performance Requirements will be breached at some time during the Next Regulatory Control Period if no action is taken.

The requirements of the Tasmanian Office of Energy, as articulated at the AER public forum in August 2008, are:

- The regulations set the standards that Transend as the transmission network service provider in Tasmania needs to meet in “planning” the transmission system; and
- The MNPRs are not directly related to the current operational status of the system, that is, Transend must plan to meet them.

Transend is currently planning to meet these requirements; however the appropriate timing of projects to remedy cases of current breach and predicted breach is in question. Projects to remedy instances of current breach should take priority; however cases of predicted breach should also receive consideration so that the issue does not perpetuate.

WorleyParsons considers that a reasonable approach would be for Transend to address, by the end of the Next Regulatory Control Period, all cases of current breach and those breaches predicted to occur during that period. In this way, projects to remedy cases of predicted breach post 2014 can be planned for and executed before the breach occurs.

4.3.4.4 Prospective Generation Developments

To assist Transend in identifying the likely areas requiring transmission network development over the Next Revenue Control Period, an assessment of potential generation developments for the Tasmanian region was undertaken by ROAM Consulting[37]. The assessment involved the application of a probabilistic scenario analysis methodology to identify scenario theme sets defining the likely direction of the energy sector in Tasmania.

Theme Sets

The following table summarises the scenario theme sets analysed by ROAM Consulting, which were developed with consideration of the Grid Vision project consultation undertaken by Transend.

Table 4-25: Scenario Theme Sets

Load Growth		Water Availability		Greenhouse Policy	
Low (L10) AP = 15%	Low economic growth, with10% probability of exceedance demand	Business as usual (BAU) AP = 80%	Hydro inflows maintain long-term average levels, with yields at approximately 9,500 GWh per annum	Business as usual (Low CO2) AP = 40%	Current State and Federal greenhouse policies are maintained consistent with present arrangements. No significant incentives exist for large scale renewable developments
Medium (M10) AP = 70%	Medium economic growth, with 10% probability of exceedance of demand	Low inflows (Low H2O) AP = 20%	Hydro inflows are lower than long term averages, matching closer to drought levels. Yields vary but average approximately 8,500 GWh per annum	Increased carbon trade (High CO2) AP = 60%	Significant change in greenhouse policy, with the introduction of a nominally $35/t equivalent CO2 trading scheme. Additional gas supplies made available. Increased incentive for renewable technologies
High (H10) AP = 15%	High economic growth, with 10% probability of exceedance of demand				

AP = Assigned Probability

[37] Appendix 11, Transend Revenue Proposal for the Period 1 July 2009 to 30 June 2014

Scenario Probabilities

Using the combinations of the above seven themes, twelve different scenarios were constructed encompassing a range of differing market development paths. Where publicly known, likely generation projects were identified or they were assumed based on the need identified during the scenario analysis, and the output of the process was a set of scenarios with assigned probabilities and the generation developments necessary to meet each scenario.

The initial and final probabilities for each scenario are shown below:

Table 4-26: Scenario Probabilities

Scenario	Scenario Theme Combination	Initial Scenario Probability	Final Scenario Probability
1	L10 * AVG H_2O * LOW CO_2	5.96%	5.99%
2	L10 * AVG H_2O * HIGH CO_2	7.09%	7.13%
3	L10 * LOW H_2O * LOW CO_2	1.43%	1.44%
4	L10 * LOW H_2O * HIGH CO_2	!.77%	1.78%
5	M10 * AVG H_2O * LOW CO_2	25.44%	25.58%
6	M10 * AVG H_2O * HIGH CO_2	33.21%	33.40%
7	M10 * LOW H_2O * LOW CO_2	5.28%	5.22%
8	M10 * LOW H_2O * HIGH CO_2	7.66%	7.57%
9	H10 * AVG H_2O * LOW CO_2	3.45%	3.48%
10	H10 * AVG H_2O * HIGH CO_2	6.09%	6.12%
11	H10 * LOW H_2O * LOW CO_2	0.98%	0.79%
12	H10 * LOW H_2O * HIGH CO_2	1.64%	1.50%

Scenario 6 was determined to be the most likely of the twelve at 33.4%. Compared with Scenario 5, which was determined to be the second most likely outcome, Scenario 6 features significantly more wind and hydro development which is to be expected under the higher CO2 cost theme.

New Generation Developments

The analysis determined that the generation development projects that had a greater than 80% probability of proceeding were:

- The Meander 1.9 MW mini-hydro – 100%;
- The Gunns Pulp Mill 122 MW cogeneration facility – 93%;
- Alinta's Tamar Valley gas generation developments – 100%;
- Lake Margaret Hydro redevelopment (nominal 10 MW) – 92%; and
- The Musselroe 129 MW wind project in North East Tasmania – 90%.

Major projects that had a greater than 60% probability of proceeding were:

- The Trevallyn 14 MW upgrade – 69%; and
- The Poatina Hydro power station efficiency upgrade - 65%.

Major projects that had a greater than 30% probability of proceeding were:

- Waddamana 100 MW Wind Farm - 54%; and
- Winnaleah 1.32 MW Hydro - 47%.

New Wind Generation

When the total amount of new wind generation required was analysed against each scenario, there was a high degree of volatility ranging from zero to 600 MW.

The two highest probability scenarios include around 130 to 230 MW of new wind generation.

Data Assumptions

ROAM used the NIEIR load forecasts as published in the 2007 NEMMCO Energy and Demand Projections in order to determine the level of generation required for each of the load growth scenarios. The NIEIR forecasts include the low, medium and high forecasts used in the theme sets which had assigned probabilities of 15%, 70% and 15% respectively.

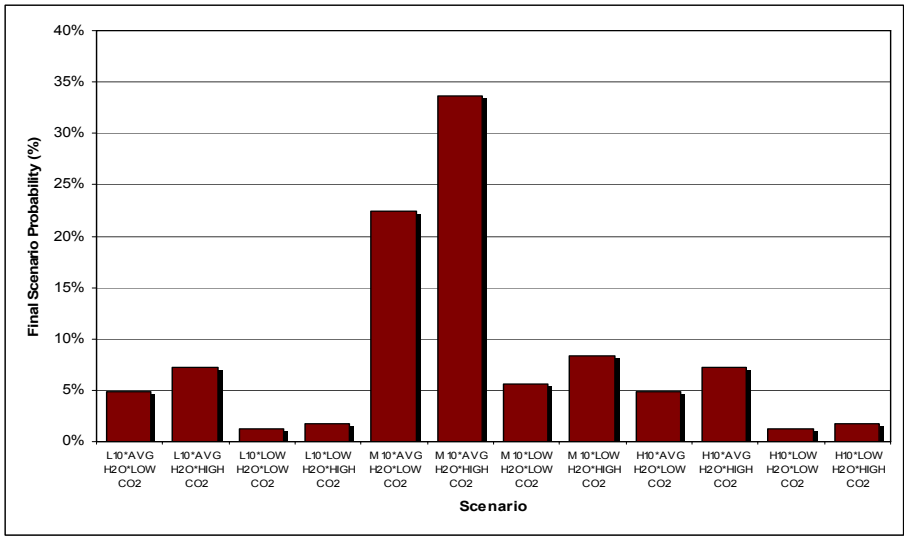
In regard to the water availability themes, ROAM assigned a probability of 80% to the likelihood that inflows recover to the long term average of approximately 9,500 GWh of hydro yield, and a probability

of 20% to the likelihood that present drought conditions persist for the duration of the Next Regulatory Control Period.

In regard to the carbon value themes, ROAM assigned a probability of 40% to the likelihood of a carbon price of $15/tonne implied through state based schemes, and a probability of 60% to the likelihood of a carbon price of $35/tonne introduced over time.

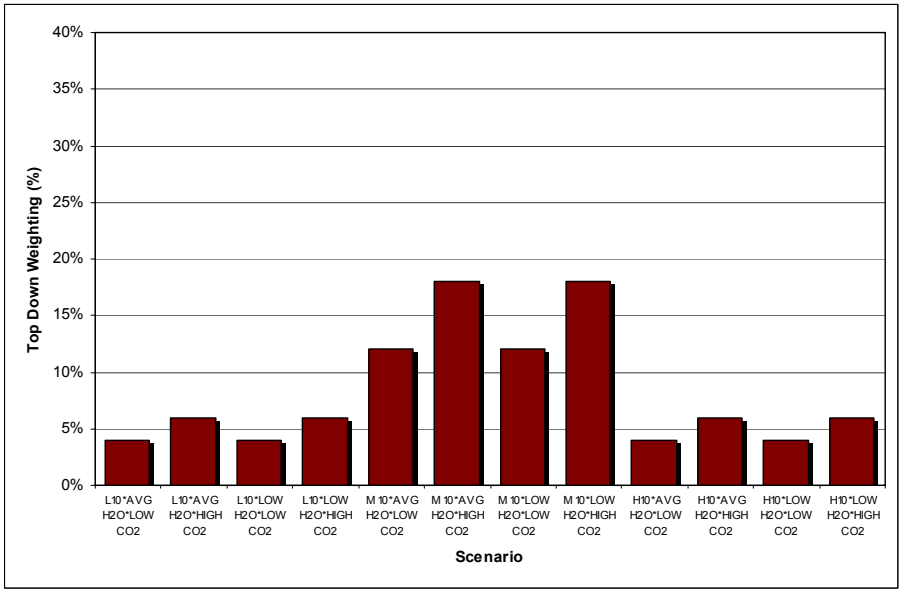
Scenarios 5 and 6 dominate the top down weighting because they contain both the medium load growth theme set (70%) and the average water availability theme set (80%). This domination continues throughout the moderation and final scenario probabilities phases. The final scenarios probability relativities are shown in the following graph (Figure 4-17);

Figure 4-17: Final Scenario Probabilities



Whilst recognising that final scenario probabilities were slightly different to Top Down Weightings, a sensitivity can be done changing, for example, the medium load growth theme set probability from 70% to 60% and the average water availability theme set probability from 80% to 50%. The results are shown in Figure 4-18 below:

Figure 4-18: Reduced Probability Results



The above example shows that subtle yet realistic changes in the assignments of probabilities of the theme sets is likely to significantly alter final scenario probabilities. This has the effect of altering the likelihood and timing of individual projects from the pool of identified potential generation developments.

WorleyParsons does not challenge the probabilities assigned to the individual theme sets. Rather, the assumption of uncertainty in these assignments highlights the appropriateness of the contingent project approach when likelihood and timing of projects are changeable.

Comment

The ROAM report identified potential generation development projects for Tasmania over the next ten years and assessed them through the application of a scenario analysis methodology.

This methodology was based on the identification of three separate “theme sets” relating to:

- Three alternate load growth rates;
- Two water availability possibilities; and,
- Two emissions trading carbon prices.

WorleyParsons is of the opinion that the analysis allowed the identification of contingent projects associated with likely generation developments. It is appropriate that these generation related augmentation projects are treated in this manner given the large uncertainty as to whether they will be required in the Next Regulatory Control Period.

4.3.4.5 New Connections

Distribution Reliability

Capacity constraints have traditionally been the key driver of new connections to the Transend transmission network; however the requirements to achieve reliability standards have now emerged as an additional key driver.

New reliability standards for the Aurora distribution system are now based on area (discrete communities), rather than feeder based as it is thought that this better represents customer reliability expectations.

Feeder reliability categories have now been replaced with the categories of:

- Critical Infrastructure;
- High Density Commercial;
- Urban and Regional Centres;
- Higher Density Rural; and
- Lower Density Rural.

Reliability performance improvements to these new reliability categories will require the development of a number of protection and distribution system automation initiatives; however a key impact on transmission connection points is that it will also require additional distribution feeders.

It is recognised that reliability improvements can be achieved by shortening the length of distribution feeders. This has the effect of reducing the amount of feeder exposed to potential outage factors such as airborne debris, wildlife, lightning, vehicle to pole collisions, etc, resulting in a reduction of the number of customers exposed to a single outage event.

Reliability improvements can also be achieved by providing some level of load transfer between distribution feeders so that in the event of an outage to a particular feeder, some portion of customers on that feeder can be transferred to another feeder so that some level of supply on the effected feeder can be maintained whilst repair works are undertaken.

Both of these reliability improvement initiatives will require additional distribution feeders. This can be achieved by installing extra distribution feeder points at existing connection points; however this can be limited by:

- The transformer and main bus capacity at the existing connection point;
- Only a limited number of distribution feeders can emanate from the one connection point without significant installation of underground cable; and

- Extra feeders from an existing connection point will not reduce the length of feeders to the further most customers.

The other option to providing additional feeders is the construction of additional connection points.

Connection Point Planning

All new connections must meet both quality of supply and performance standards. The demand assumptions placed on new connections are:

- Medium, 50% POE for local issues; and
- Medium growth 10% POE for core grid studies.

Joint planning for new connections is undertaken by Transend with Aurora.

Network Configuration Impact

The Hobart area is the only area in Tasmania where a sub-transmission network (33kV) is installed between the transmission network (110kV) and the Distribution network (11kV). For the rest of Tasmania the transformation is from the transmission voltage directly to the distribution voltage except for some direct connection customers. In general, in the north of Tasmania this distribution voltage is 22kV and in the south it is 11kV.

This is an unusual network configuration when compared to the rest of Australia where it is common to have an intermediate sub-transmission network with voltages levels typically ranging from 33kV to 66kV. Under this configuration, the DNSP is usually responsible for both the sub-transmission and the distribution systems and when quality of supply (capacity, voltage level, reliability, etc) issues develop in localised pockets of the distribution network, the sub-transmission system can usually be extended and a zone substation installed (transforming sub-transmission voltage to distribution voltage) to remedy these issues.

When these new zone substations supply incremental growth load, the developments can have very little impact for the TNSP as there is no overall step change in load and no augmentation to the transmission network is usually required. Often there is sufficient capacity within the sub-transmission network to cater for these relatively small increases.

This is not the situation in Tasmania because if a quality of supply issue develops in a localised pocket of the distribution network that cannot be remedied from within the distribution network, a new connection point is required. This has significant impact on Transend as all new connection points (shared assets) are funded by Transend and the installation of a new connection point does not always represent a significant increase in the energy delivered through the transmission network.

As a result, Transend is likely to require the establishment of more connection points than would typically be required by other Australian TNSPs and relatively small increases in distribution system load can have significant network connection impact on Transend.

4.3.5 Proposed Program

4.3.5.1 Methodology

In developing its forecast Capex for the Next Regulatory Control Period, Transend has applied the following steps:

- Forecast the demand growth, taking into account Aurora and direct-connect customers (refer to Section 4.3.2);
- Apply probabilistic theme sets to forecast prospective generation developments (refer to Section 4.3.4.4);
- Identify the projects required to meet the forecast increases in demand and prospective generation developments;
- Develop project scopes and cost estimates;
- Apply standard 'S-curves' to determine the fall of expenditure;
- Breakdown the estimates into labour and material;
- Determine and apply escalation rates for labour, non-labour and land (refer to Section 4.3); and
- Undertake cost estimate risk analysis and apply risk factors (refer to Section 4.3.5).

S-curves and Breakdown of Labour/Non-labour

Estimates for a project are prepared by entering data into the relevant Project Estimate Templates (noting that it is common for more than one estimate to be required for a single project). The Project Estimate Template automatically calculates the breakdown of costs into labour and non-labour, based on the project type. The templates also automatically calculate the fall of expenditure, based on the project type and generic S-curves developed. Where a project involves more than one project type, the breakdown of costs and the fall of expenditure are assigned based on the project type with the highest cost component for that project.

Generic S-curves have been developed for 16 project types (these align with the project types utilised in the development of risk factors). The S-curves have been developed by analysing the fall of

expenditure for a number of recent projects in each project type. WorleyParsons has reviewed this analysis and is satisfied that the S-curves adopted are reasonable.

CPI Escalation

Transend has applied the ABS CPI for All Groups Australia, Weighted Average of Eight Capital Cities, together with forecast CPI[38] for the remainder of the Current Regulatory Control Period, in order to escalate the allowance in the Price Determination for the Current Regulatory Control Period and to escalate actual expenditure in nominal dollars, to June 2009 dollars. The conversion to June 2009 dollars allows ready comparison with the forecast values for the Next Regulatory Control Period, which are all expressed in June 2009 dollars. The CPI and conversion factors are shown in Table 4-27.

Table 4-27: CPI Conversions

	Dec-03	Dec-04	Dec-05	Dec-06	Dec-07	Dec-08	Jun-09
CPI	142.8	146.5	150.6	155.5	160.1		

	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Jun-09
Per annum	2.37%	2.59%	2.80%	3.25%	2.96%	2.90%[1]	1.40%[1]
Cumulative	1.0237	1.0502	1.0796	1.1147	1.1477	1.1810	1.1975
Nominal $ to Real $ 08-09	1.170	1.140	1.109	1.074	1.043	1.014	

Note 1: Forecast values for Dec07 to Dec08 and from Dec08 to Jun09

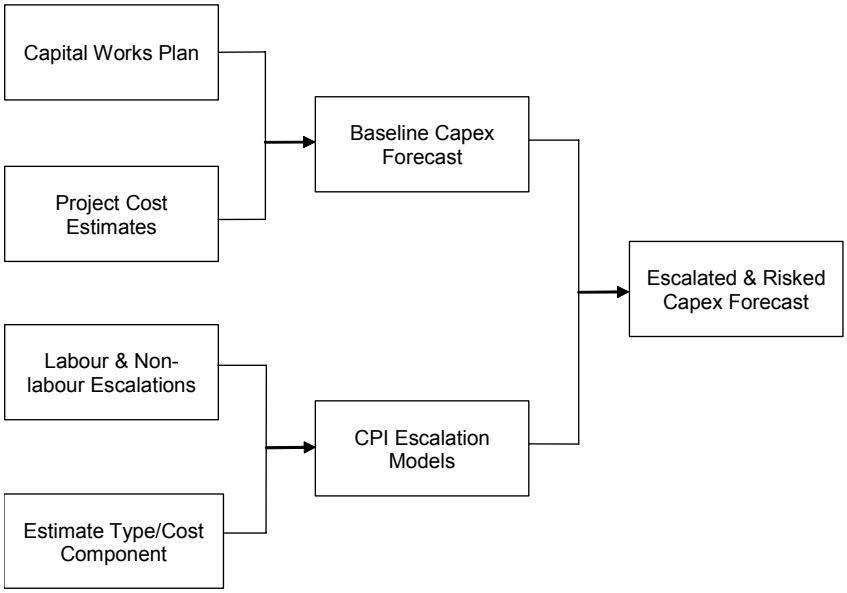
WorleyParsons has reviewed the conversion calculations performed by Transend and is satisfied that they are accurate and represent a reasonable method for escalating the costs.

Application of Escalators and Risk Factors

Transend has developed a sophisticated spreadsheet to apply the escalation and risk factors (Capex Collector Model), based on the processes in the Cost Accumulation Model (CAM) developed by Evans and Peck. Key inputs into the model are the project data contained in the capital works program and the breakdown and fall of expenditure, which are extracted from a source directory. The process is shown diagrammatically in Figure 4-19.

[38] CEG report (Appendix 15 of Transend's submission).

Figure 4-19: Capex Collector Model



The project estimates feeding into the model are based on June 2007 costs, and exclude any allowances for risk and real price increases above CPI. Within the model, costs are escalated by CPI to June 09 dollars. The model also applies real price escalators to labour, non-labour and land, based on the forecasts made by CEG (as discussed in Section 4.3.1) and the breakdown obtained from the Project Estimate Templates.

For committed projects, the costs are based on approved business cases and are not escalated for real price increases or risk (the exception is the Waddamana-Lindisfarne 220 kV line, due to the size and duration of the project).

From the Evans and Peck risk model (refer to Section 4.3.5), a risk factor is applied to each project, depending on the project type.

The model provides summaries by category and by asset class.

WorleyParsons has reviewed the Capex Collector spreadsheet and is satisfied that it is accurate (noting that some errors were detected by Transend and corrected, as discussed in Section 4.3.5.2) and represents a consistent and reasonable basis for the preparation of Transend's Capex forecasts.

Capital Expenditure Categories

Transend has assigned its expenditure into nine categories and has linked these to the categories of Transmission services to which the expenditure relates, as shown in Table 4-28.

Table 4-28: Categories of Capital Expenditure

Investment type	Category	Definition	Prescribed transmission services
Network			
Development	Augmentation	Works to enlarge the transmission system or to increase the capability of the transmission system to transmit or distribute active energy, as defined in the Rules	TUOS services
	Connection	Works to either establish new prescribed connections or to modify existing prescribed connections	Exit services
	Land and easements	Land and easement acquisitions for future prescribed transmission system augmentations or connections	TUOS services and exit services
Renewal	Asset renewal	Works to replace or refurbish prescribed transmission system assets to maintain reliability and quality of supply	TUOS, entry, exit and common Transmission services
	Physical security/compliance	Works to improve the physical security of transmission system assets and/or compliance with technical, safety, environmental and other relevant obligations	TUOS, entry, exit and common Transmission services
	Inventory/spares	Transmission system assets acquired to enable timely response to asset failures in accordance with the network performance requirements and good electricity industry practice	Common transmission services
	Operational support systems	Works required to create or replace operational IT support systems, required for efficient operation of the transmission system	Common transmission services
Non-network			
Support the business	Information technology (IT)	Works to develop and maintain corporate IT capacity and to improve the functionality of IT systems to support business needs in line with good electricity industry practice	Common transmission services
	Business support	Works to procure, replace or upgrade non-transmission system assets including land, buildings, vehicles and minor assets in line with business needs	Common transmission services

WorleyParsons notes that the categories proposed by Transend are very similar to those adopted by ElectraNet and by Powerlink in their recent revenue proposals, and on this basis, WorleyParsons considers that these categories meet the requirements of schedule S6A.1.1(1) of the NER.

4.3.5.2 Proposed Forecast

Transend's Revenue Proposal forecast "as incurred" Capex by category is shown in Table 4-29:

Table 4-29: Revenue Proposal Forecast Capex by Category (real 08/09 $m)

Category	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Augmentation	70.8	82.7	29.4	16.1	28.6	227.6
Connection	31.5	35.0	37.0	16.5	1.7	121.8
Land and Easements	0.0	0.0	0.0	10.5	10.3	20.9
Asset Renewal	29.8	39.4	25.7	62.4	69.3	226.6
Physical security/compliance	5.1	2.0	2.4	0.8	0.4	10.7
Inventory/spares	9.6	0.4	0.5	0.2	1.0	11.7
Operational support systems	4.6	4.8	3.2	3.6	6.1	22.3
Total network	**151.4**	**164.2**	**98.3**	**110.2**	**117.5**	**641.6**
Information technology	2.7	5.1	3.6	4.0	5.9	21.3
Business support	3.9	4.1	4.5	4.3	1.0	17.8
Total non-network	**6.6**	**9.2**	**8.2**	**8.3**	**6.9**	**39.1**
Total	**158.0**	**173.4**	**106.5**	**118.5**	**124.3**	**680.7**

During the course of the review by WorleyParsons, Transend discovered some errors in the spreadsheet used to calculate the forecasts. One of these errors was that some incorrect data had been entered, resulting in a reduction of $4.6m in an IT project. Transend also discovered that CPI escalation had not been applied to committed projects (which are assumed to be in nominal dollars) to convert the costs to June 09 dollars – this applies only to forecast expenditure for the last two years of the Current Regulatory Control Period. The other errors related to the "as-commissioned" costs and works in progress (WIP).

During the course of the review, updated CPI figures were released by the ABS. Transend has prepared an amended Capex forecast based on the updated CPI information. The amended forecast (picking up errors and the latest CPI figures) is shown in Table 4-30. WorleyParsons has utilised this amended forecast in its analysis of Transend's submission.

Table 4-30: Amended Forecast Capex by Category (real 08/09 $m)

Category	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Augmentation	71.9	83.9	29.9	16.3	29.0	230.9
Connection	31.8	35.4	37.6	16.8	1.8	123.3
Land and Easements	0.0	0.0	0.0	10.7	10.5	21.2
Asset Renewal	30.3	40.0	26.1	63.3	70.4	229.9
Physical security/compliance	5.1	2.0	2.5	0.8	0.4	10.8
Inventory/spares	9.7	0.4	0.5	0.2	1.0	11.9
Operational support systems	4.7	4.8	3.2	3.7	6.2	22.6
Total network	**153.4**	**166.5**	**99.7**	**111.8**	**119.2**	**650.6**
Information technology	2.7	5.1	3.6	2.4	3.1	16.9
Business support	3.9	4.1	4.6	4.4	1.0	18.0
Total non-network	**6.6**	**9.3**	**8.2**	**6.8**	**4.1**	**34.9**
Total	**160.0**	**175.8**	**107.9**	**118.6**	**123.3**	**685.6**

Transend's forecast as-incurred Capex for the Next Regulatory Control Period is $685.6m, which represents an increase over the Current Regulatory Control Period of 62.5%, based on expenditure in the Current Regulatory Control Period of $421.8m (normalised to five years).

The significantly higher level of Capex is driven by increases in both the price of work and the volume of work.

Increase in Price of Work

The cost drivers contributing to increases in the price of work include real increases in the cost of labour, non-labour construction and land, and these are discussed in detail in Section 4.3.3.1, 4.3.3.2 and 4.3.3.3. These price of work increases amount to $111.4m of the total Capex forecast (16. 3 %) which represents 42.2% of the increase over the normalised expenditure for the Current Regulatory Control Period. Excluding the costs associated with the Waddamana-Lindisfarne 220 kV transmission line project, these price of work increases amount to $93.6m of the total Capex forecast (13.7%)

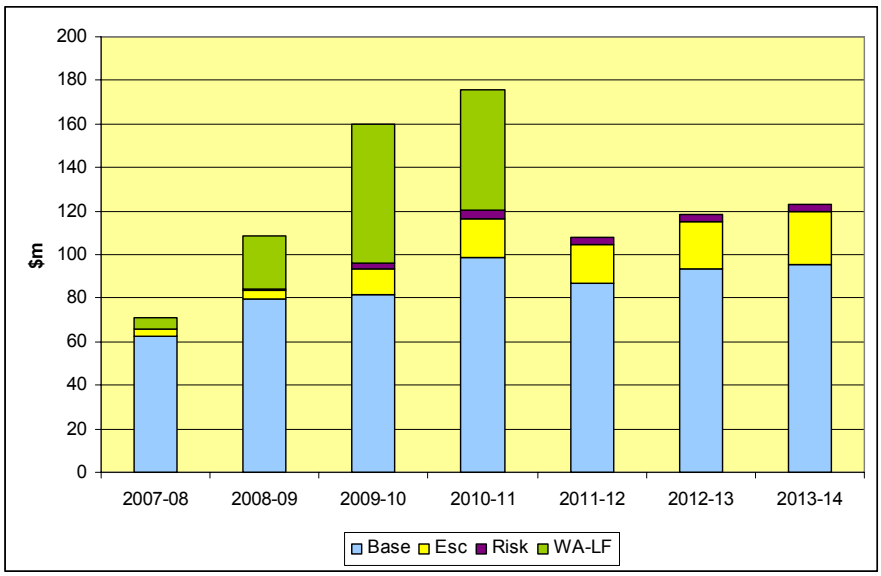
Also discussed in detail in Section 4.3.5 is the application of a risk factor amounting to $21.0m, which represents 7.9% of the increase over the normalised expenditure for the Current Regulatory Control Period.

Increase in Volume of Work

A major contributor to the increased volume of work is the Waddamana-Lindisfarne 220 kV transmission line project, with forecast expenditure of $119.9m in the Next Regulatory Control Period. There is also a significant increase in asset renewal and connection expenditure (this is discussed further in Section 4.3.5.3.

The impact of the key cost drivers on the Capex forecasts is shown in Figure 4-20.

Figure 4-20: Impact of Key Cost Drivers



It can be seen that the most significant factor is the inclusion in the works program of the Waddamana-Lindisfarne 220 kV transmission line, followed by increases in the base volume of work and real price escalation.

4.3.5.3 Category Review

This section provides information about the capital expenditure forecast and the differences between capital expenditure incurred in the Current Regulatory Control Period and that forecast for the next period. All capital expenditure data is presented on an “as incurred” basis.

Augmentations

The Waddamana–Lindisfarne 220 kV transmission line project is the largest project included in the augmentation category and comprises approximately 52% of the augmentation capital expenditure for the Next Regulatory Control Period. This project is an exceptionally large project in the context of Transend’s business operations and is almost four times larger (in dollar terms) than any other project completed by Transend to date. A business case has been approved for this project, a project team has been established and the project is currently being implemented. This project was included in WorleyParsons’ review of ex-ante projects (refer to Section 4.3.5.4).

Excluding the Waddamana–Lindisfarne 220 kV transmission line project from both the Current and Next Regulatory Control Periods, augmentation Capex is expected to average $22.2 million per annum, compared to an average of $16.2 million over the Current Regulatory Control Period. Including the Waddamana–Lindisfarne 220 kV transmission line project, the annual average

augmentation Capex is expected to be $46.2m, compared to $22.6m in the Current Regulatory Control Period.

Other material projects in the capital works program for the Next Regulatory Control Period are:

- Norwood–Mowbray 110 kV transmission line;
- George Town Substation 220 kV security upgrade;
- Sheffield–Burnie 110 kV transmission line augmentation; and
- Kingston–Huon area transmission line augmentation.

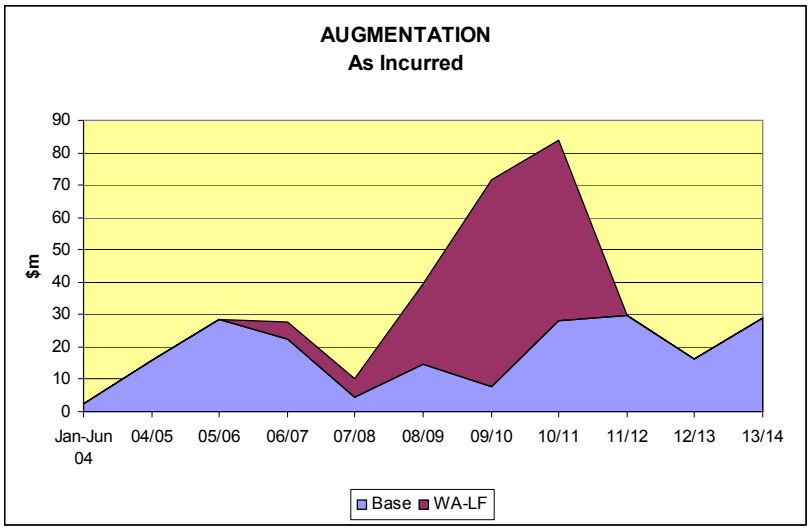
The George Town Substation 220 kV security upgrade was also included in WorleyParsons' review of ex-ante projects (refer to Section 4.3.5.4).

Other projects identified are predominantly required to comply with the Electricity Supply Industry (Network Performance Requirements) Regulations 2007 and to continue the reactive support program. The timing of these projects has been determined by detailed system modelling, coordination with other planned works and access to the transmission system.

Details regarding the investment needs for augmentation projects that have a capital cost greater than $10 million (June 09, $) are provided in Appendix 17 of Transend's Revenue Proposal.

The augmentation capital expenditure for the period 2004 to 2014 is shown in Figure 4-21. It clearly shows the impact that the Waddamana–Lindisfarne 220 kV transmission line project has on the capital expenditure profile and demonstrates that, with the exception of that project, the augmentation capital expenditure profile is generally consistent to that of the Current Regulatory Control Period.

Figure 4-21: Augmentation Expenditure (June 09, $m)



Connections

New or developed connection sites at Creek Road, Electrona, Hadspen, Mowbray and Risdon substations have been established for Aurora Energy over the Current Regulatory Control Period.

Analysis of the demand forecasts and the joint planning process with Aurora Energy has identified a number of key areas where connection site capacity and capability needs to be increased to meet customer demand over the Next Regulatory Control Period. The connections capital expenditure for the period 2004 to 2014 is shown in Figure 4-22.

Figure 4-22: Connection Capex (June 09, $m)

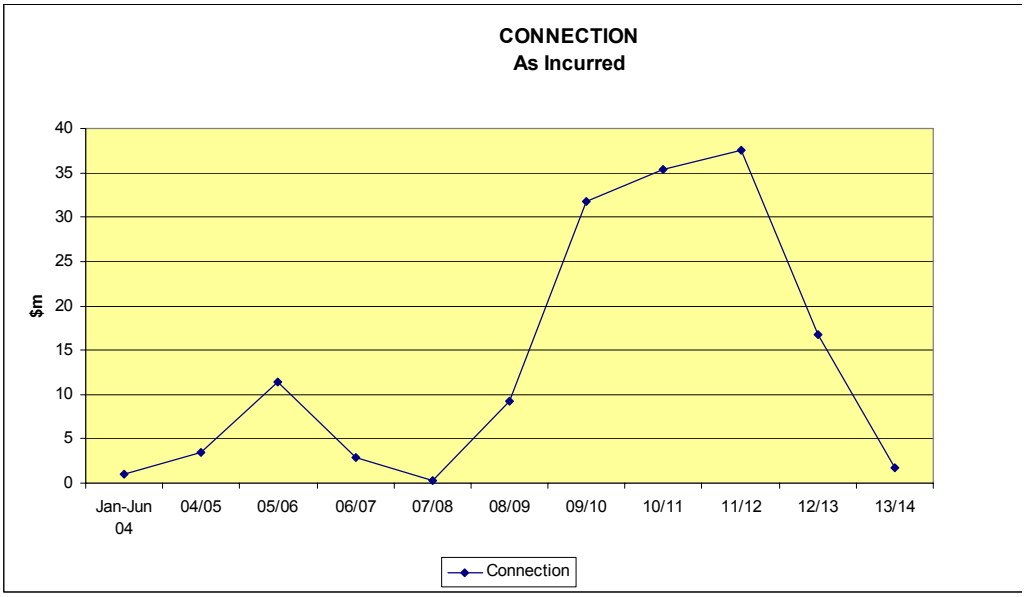


Figure 4-22 shows a significant increase in capital expenditure for new connections over the Next Regulatory Control Period. It should be noted that the new connection site at Mowbray Substation ($11.1 million June 09) and the developed connection site at Electrona Substation ($8.7 million June 09) have been categorised as augmentation and asset renewal projects respectively in Transend's revenue proposal and therefore the costs for these projects are not reflected in Figure 4-22.

The capital expenditure forecast for the connections category for the Next Regulatory Control Period is dominated by the need to commission five new connection sites and commence the establishment of two new connection sites for Aurora Energy. This represents an increase of only one new commissioned connection site compared to the Current Regulatory Control Period. Details of the required new connection sites and the planned commissioning year for each site are contained in Table 4-31.

Details regarding the investment need for each connection site are provided in Appendix 17 of Transend's Revenue Proposal. Transend has received a connection enquiry or application as appropriate for each of the identified projects. The Newstead Substation new connection site was included in WorleyParsons' review of ex-ante projects.

Table 4-31: New Connection Sites

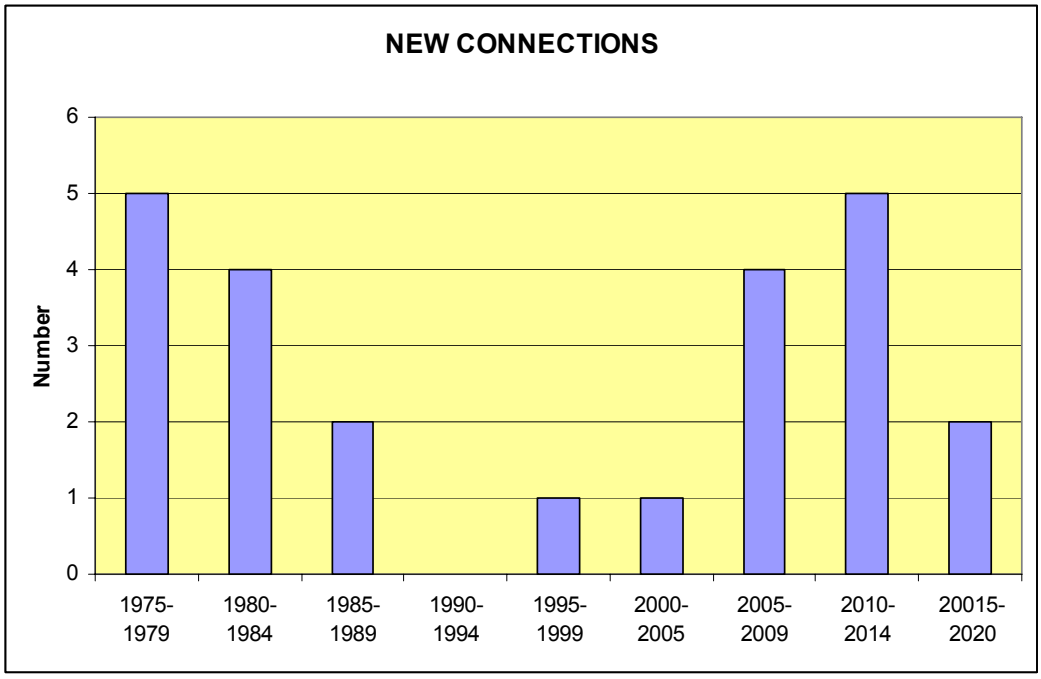
No.	Project	Commissioning year
1	Hobart Eastern Shore new 110/33 kV connection site	2011
2	Kingston Substation new 110/33 kV connection site	2011
3	Newstead Substation new 110/22 kV connection site	2012
4	Wesley Vale Substation new 110/22 kV connection site	2013
5	Wynyard Substation new 110/22 kV connection site	2013
6	Bridgewater Substation new 110/33 kV connection site	2016
7	Penguin Substation new 110/22 kV connection site	2016

The capital expenditure forecast also includes the replacement of four transformers with larger units at two connection sites and continuation of the high voltage feeder protection upgrade project.

The number of new connection sites established since 1975 and forecast to 2020[39] is shown in Figure 4-23. It demonstrates the high variability with regard to the establishment of new connection sites. It also demonstrates that the proposed number of new connection sites included in Transend's Revenue Proposal is in keeping with the normal fluctuations observed since 1975.

[39] The number of connections site commissioned between 2015 and 2020 is indicative and may change.

Figure 4-23: Number of New Connections

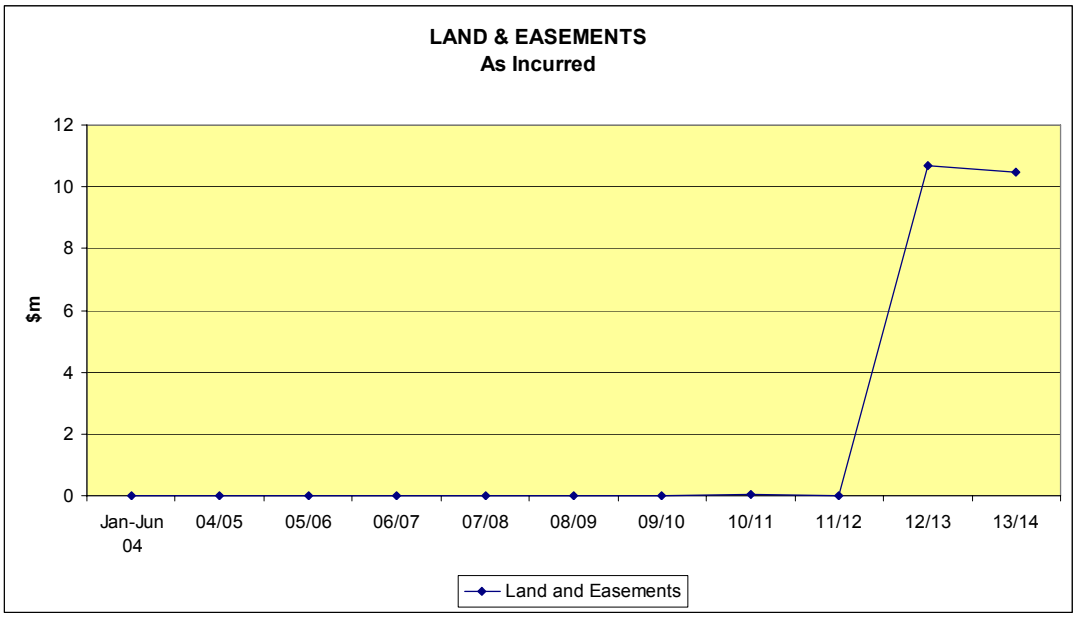


Land and Easements

Transend has not invested in any strategic land and easements procurements in the Current Regulatory Control Period and does not plan to do so until 2012-13. Land and easement procurements to date have been included in the cost of the respective project.

Approximately 94% of the capital expenditure required for the strategic land/easements category is for the Sheffield–Burnie new transmission line project. The remaining balance is for investigations that will be undertaken for planned transmission line and substation projects. The land and easements capital expenditure for the period 2004 to 2014 is shown in Figure 4-24.

Figure 4-24: Land and Easements (June 09, $m)

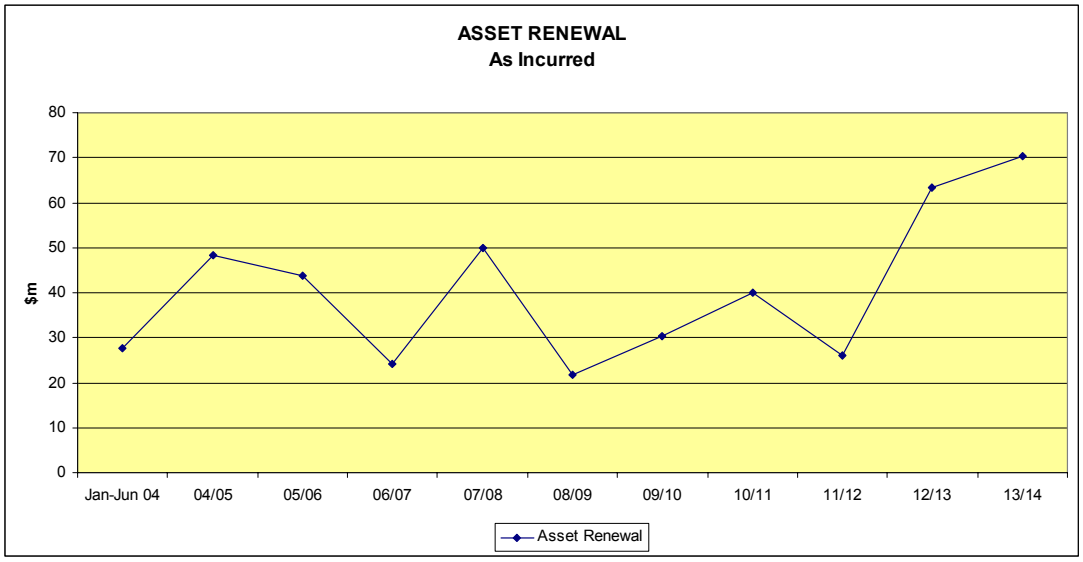


The expenditure for land and easements was included in the WorleyParsons' review of ex-ante projects (refer to Section 4.3.5.4).

Asset Renewal

Note that asset renewal expenditure falls outside the scope of this review, as discussed at the start of Section 4. The historical and forecast expenditure for this category are shown in Figure 4-25 for completeness.

Figure 4-25: Asset Renewal (June 09, $m)



Physical Security/Compliance

Transend has developed a comprehensive asset security strategy that will address the issue of physical asset security and commensurate business risk exposure. The successful implementation of the asset security strategy will mitigate business risk by minimising the exposure to litigation and negative publicity as a consequence of an unauthorised intrusion and by reducing the likelihood of interruption to electricity supply due to malicious intent.

The works completed in the earlier stages of the Current Regulatory Control Period predominantly included the replacement of non-compliant security fences. The majority of the remaining works in the program have been included in a “design and construct” contract that is currently being implemented. The major components of the project are:

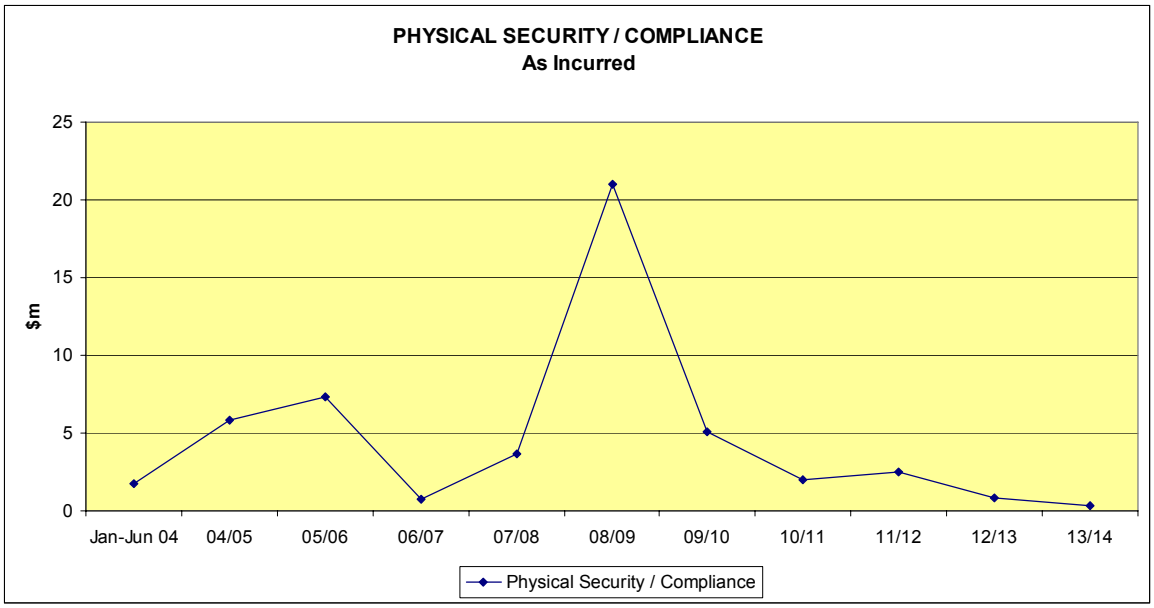
- Security fencing upgrades;
- Security fencing replacements;
- Substation building upgrades;
- Provision of access control systems;
- Provision of intruder detection systems (including powered fencing); and
- Installation of visual monitoring systems.

The timing of this project has largely been governed by the opportunity to cost-effectively scope the identified works in a manner that enables compliance with the Energy Networks Association document 015-2006 “National Guidelines for Prevention of Unauthorised Access to Electricity Infrastructure” where appropriate. Funding provision has also been made in the Next Regulatory

Control Period to cater for additional visual monitoring systems as the need arises (the need is determined by regular asset security risk reviews).

The physical security / compliance capital expenditure for the period 2004 to 2014 is shown in Figure 4-26. It shows the impact of the implementation of the asset security strategy over the period 2007-08 to 2010-11, including the significant increase in expenditure in 2008-09. The Substation Security Upgrade program was included in the ex-post project review. No risk allowance has been applied to physical security/compliance capital expenditure.

Figure 4-26: Physical Security/Compliance (June 09, $m)



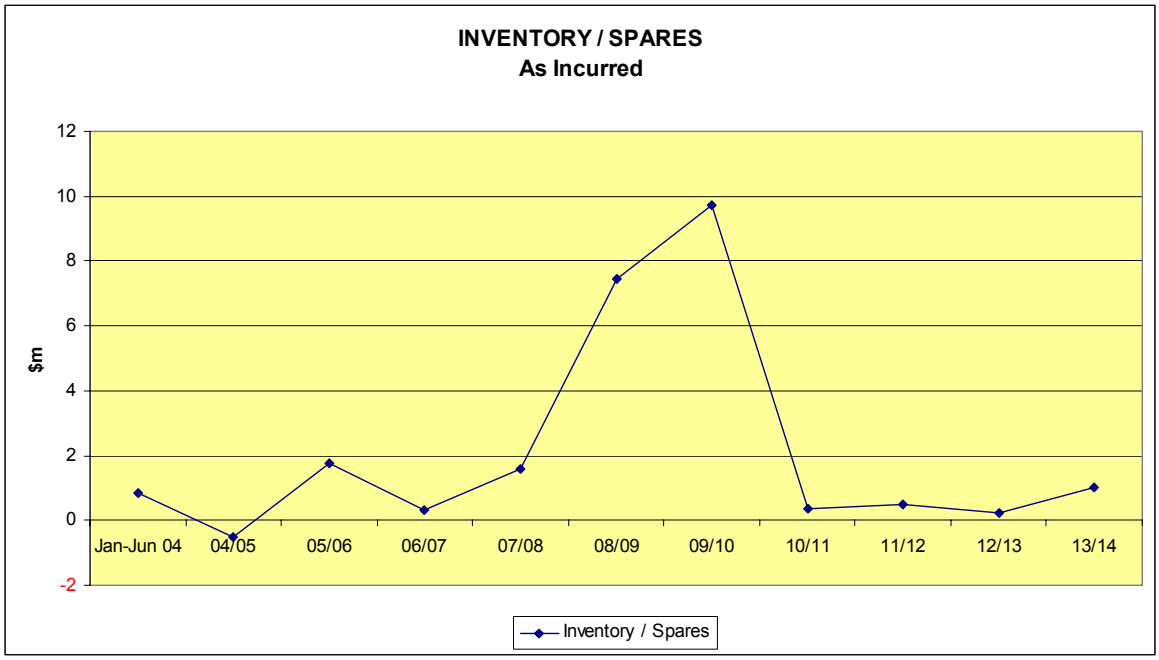
Inventory/Spares

Approximately 36% of the capital expenditure from 2008 to 2014 is required to cater for the need to establish primary and secondary storage facilities. The bulk of this expenditure will be incurred over the 2008-09 and 2009-10 financial years. The secondary storage facilities project amounts to around $3m, and this project was included in the WorleyParsons' ex-post project review. WorleyParsons concluded that the expenditure for this project was prudent and efficient.

A new spare 200 MVA network transformer is required in 2008-09 to replace the existing spare unit that was placed into permanent service at George Town Substation. The remainder of the capital expenditure is required to purchase spares to ensure ongoing compliance with Transend's System Spares Policy.

The inventory/spares capital expenditure for the period 2004 to 2014 is shown in Figure 4-27. No risk allowance has been applied to inventory/spares capital expenditure.

Figure 4-27: Inventory/Spares (June 09, $m)



Operational Support Systems

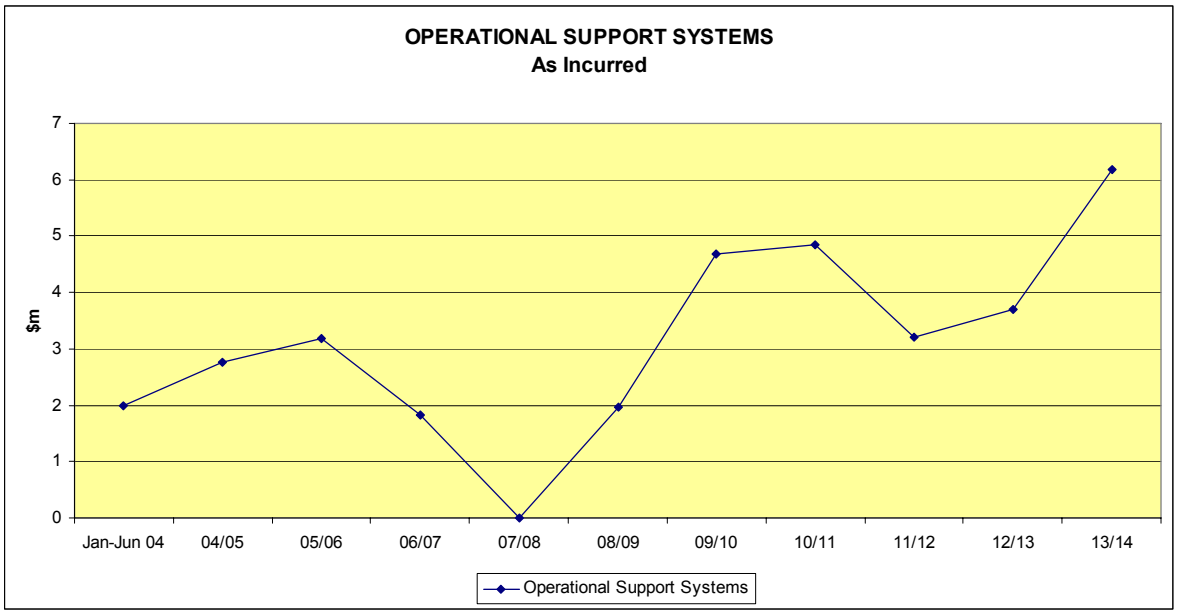
Operational support systems expenditure is required to develop or enhance the systems that support the real-time operation and monitoring of the Tasmanian power system, asset management information systems (AMIS) and other operational systems that support asset management functions.

The Network Operations Control System (NOCS) requires regular enhancement to ensure that it meets business needs and its performance meets the requirements prescribed by the National Electricity Market Management Company (NEMMCO). The NOCS will also reach the point in its life-cycle (2013-14) where substantial investment will be needed to either carry out a significant upgrade of the existing system or to replace the system.

Transend is committed to continuing the development of its AMIS program over the Next Regulatory Control Period to facilitate the ongoing improvement of the asset management functions. AMIS underpins all aspects of the asset management process. The further development of AMIS was included in WorleyParsons' ex-ante project review. WorleyParsons concluded that this project was prudent and efficient.

The operational support systems capital expenditure for the period 2004 to 2014 is shown in Figure 4-28. It should be noted that system replacement and enhancement (including NOCS, market system, system for main control centre and asset management system) totalled to slightly more than $1 million was included as IT expenditure; hence the zero expenditure in 2007-08. Therefore the cost of these projects is not reflected in Figure 4-28. No risk allowance has been applied to operational support systems capital expenditure.

Figure 4-28: Operational Support Systems (June 09, $m)



Information Technology

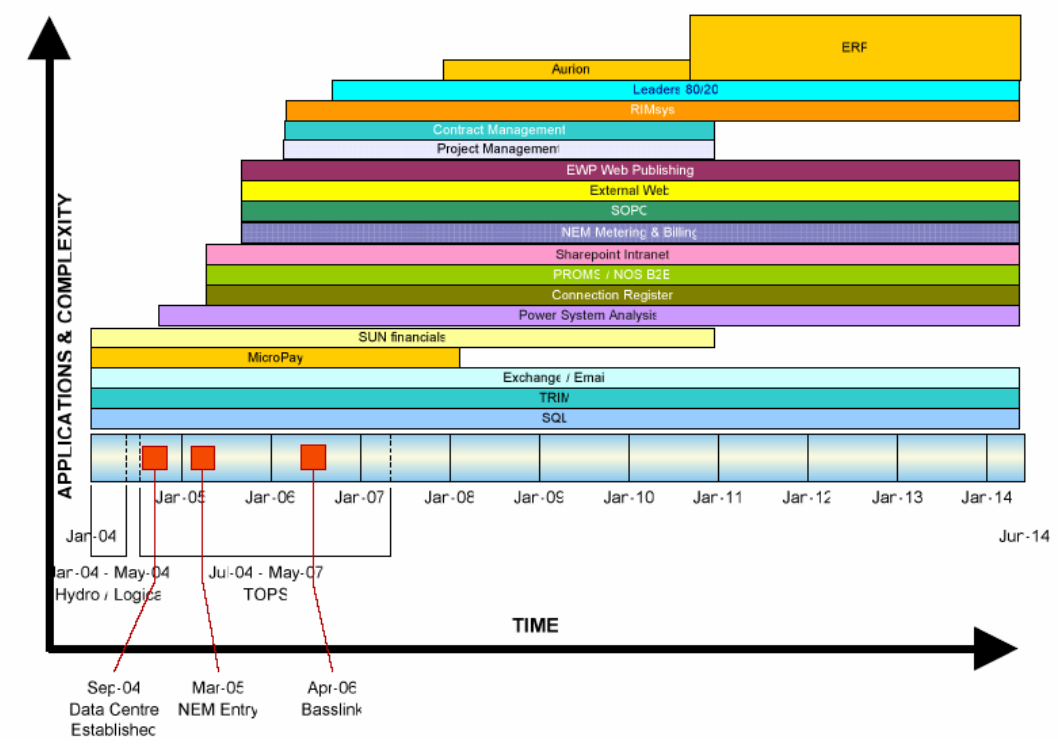
Information technology (IT) capital expenditure comprises the systems that support a broad range of business operations and includes large scale systems to desk-top computers and equipment.

Transend's operating environment has changed significantly over the Current Regulatory Control Period. In particular, Tasmania's entry into the NEM has created the need for new IT systems and the need to fully separate IT systems from Hydro Tasmania. Transend's resourcing levels have also increased over the Current Regulatory Control Period, creating the need for additional IT infrastructure and systems.

The majority of the IT capital expenditure for the Next Regulatory Control Period is required to enhance or replace IT systems that will reach the point in the life-cycle where their capability, capacity and performance needs to be assessed. In 2010-11, it is likely that Transend will procure an enterprise resource planning system that will provide a whole-of-business platform that will allow a number of disparate IT systems to be decommissioned.

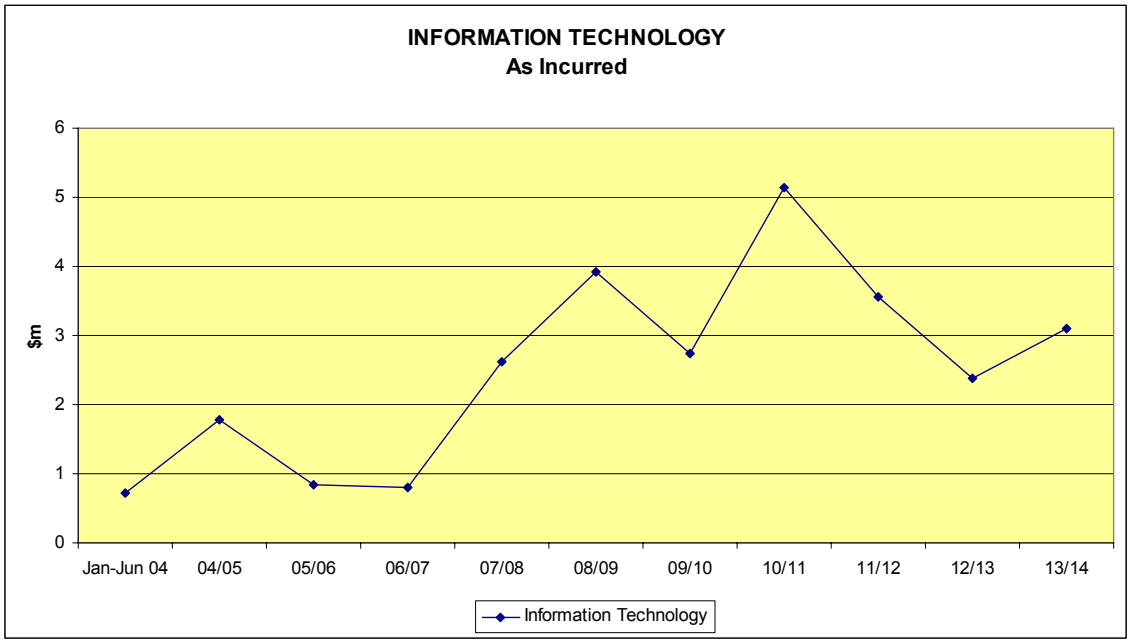
Figure 4-29 provides an overview of the IT applications that have been developed over the 2004-14 period. It demonstrates the significant increase in the number and complexity of the IT systems and shows the likely rationalisation of a number of IT systems in 2010-11 following the commissioning of an enterprise resource planning system.

Figure 4-29: IT Application Timeline



The IT capital expenditure for the period 2004 to 2014 is shown in Figure 4-30. No risk allowance has been applied to IT capital expenditure.

Figure 4-30: Information Technology (June 09, $m)



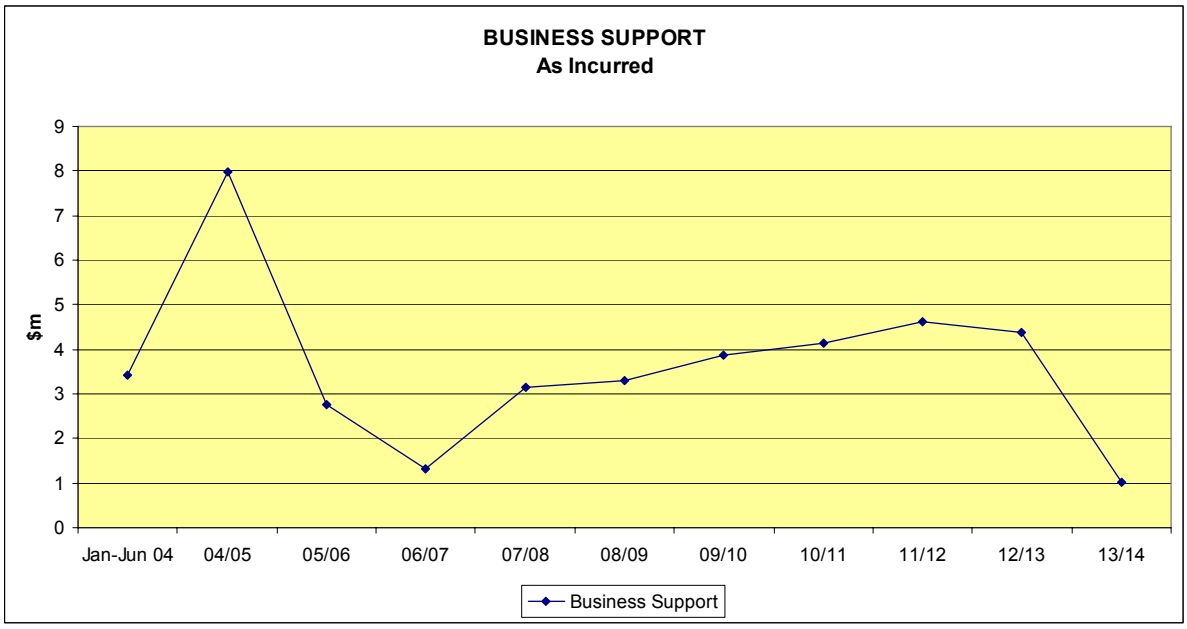
A program consisting of a number of corporate IT package systems was included in WorleyParsons' ex-ante project review (refer to Section 4.3.5.4).

Business Support

Business support costs are predominantly required for vehicles and the development of facilities and infrastructure. The new or modified facilities are required to cater for increased resourcing levels and the need to ensure adequate disaster recovery facilities and systems are in place.

The business support capital expenditure for the period 2004 to 2014 is shown in Figure 4-31. It shows the significant capital investment made in 2004-05 associated with the establishment of new accommodation facilities at Creek Road. Figure 4-31 also demonstrates a reduction in business support capital expenditure for the Next Regulatory Control Period in comparison to the Current Regulatory Control Period (annualised expenditures of $3.6m and $4.0m respectively). No risk allowance has been applied to business support capital expenditure.

Figure 4-31: Business Support (June 09, $m)



4.3.5.4 Ex-ante Project Review

Under its contract, WorleyParsons was required to conduct a detailed review of a suite of network and non-network projects to determine if Transend's Capex forecast reasonably reflects the "capital expenditure criteria" under clause 6A.6.7 of the NER.

The detailed project review was an important part of WorleyParsons' assessment of the forecast Capex and served to test at a detailed level the application of Transend's capital investment governance framework.

Review Process

In conjunction with the AER, WorleyParsons selected ten projects for the detailed review, covering all capital investment categories, except asset renewal (which was outside the scope of this review). The projects were selected on the basis of:

- Ensuring a range of project types and sizes;
- Materiality;
- The mix of project drivers; and
- The type of work involved.

The projects reviewed are shown in Table 4-27.

Of the 122 projects and programs making up Transend's forecast Capex for the Next Regulatory Control Period, the ten projects reviewed account for $204.9m or 33%.

Table 4-32 : Ex-ante Projects Reviewed

ID	DESCRIPTION	CATEGORY	TOTAL COST $m	REASON FOR PROJECT	REASON FOR SELECTION
ND0575	Waddamana - Lindisfarne 220kV Transmission line & Substation	Augmentation	119.9	Security of Supply, Capacity Issues	Materiality (largest project in Capex program)
ND0657	George Town Substation 220kV security upgrade	Augmentation	18.4	Compliance, asset condition and management	Reconfiguration project; mix of drivers
ND0967	Electrona Substation Stage 2 Development	Augmentation	1.5	Customer Requirements, Security of supply	Mix of drivers; small substation development project
ND0931	Newstead Substation new 110/22kV connection point	Connection	20.8	Customer requirements, capacity constraints and reliability of supply	Mix of drivers; range of options considered; new connection point
ND0729-3	New Norfolk Substation HV Protection Upgrade	Connection	0.9	Customer Requirements, Reliability	Small connection project; part of larger program; mix of drivers
ND1001	Strategic Easement Acquisition	Land and easements	21.2	Land purchases to address augmentation, development and connection requirements	Materiality; nature of project
ND1043-1	Asset Management Information Systems	Operational support systems	7.2	Network Management, process improvement	Largest project in category
ND1002	Substation Asset Condition Monitoring Enhancement Program	Physical security / compliance	4.5	Asset condition and reliability	Largest project in category; On-going program

ND1040	Chapel Street Control Centre Backup	Business support	6.3	Business needs	Largest project in category
ND1011	Corporate IT – Package Systems	Information technology	4.2	Reliability, functionality, process improvement	Largest project in category

The reviews covered the following matters:

- Project background and description;
- Project drivers;
- Project timing;
- Alignment with Transend's strategic business objectives;
- The alternative options considered (including non-network solutions);
- The alignment with the NER "capital expenditure objectives";
- Project approval;
- Assumptions made;
- Risk assessment;
- Capex/Opex trade-offs;
- Conformance with policies and procedures; and
- Costs, including estimating basis, design considerations and project delivery.

The detailed reviews are contained in Appendix 4.

General Observations

WorleyParsons' observations from the detailed review of ex-ante projects are as follows:

- In many cases, a business case had not yet been prepared as the project was in an early stage of development. Where business cases existed, they were prepared to a high standard and in conformance with Transend's Business Case Manual;
- In all cases, the project drivers were clearly identified, together with the alignment to the NER "capital expenditure objectives";
- In all cases, there was clear alignment to Transend's strategic business objectives;
- In all cases, risks had been considered, but in some cases, this was confined to a consideration of the risks that the project would remove or mitigate, rather than the risks associated with the project itself. There is strong evidence to suggest that this issue would be addressed at the time of presentation of the business case;
- In most cases, a range of options was considered. In several cases, only the "do nothing" and the preferred option were considered, but in such cases, WorleyParsons was not able to identify any further viable options. Where appropriate, Transend has considered non-network solutions (for example, gas-fired generation in lieu of construction of the Waddamana-Lindisfarne line);

- In each case, WorleyParsons considers that Transend has chosen the appropriate option;
- In all cases, the costs included in Transend's Capex forecast were consistent with the project estimates provided;
- Technical project designs were in line with good industry practice;
- Project costs were based on Level 1 estimates, then escalated to June 09 $s, escalated for real cost increases and a risk factor applied;
- In all cases, the projects conformed with Transend's policies and procedures, although it was noted that most projects were at a very early stage of development;
- Transend effectively coordinates projects that have a direct inter-dependency or which require common interruptions;
- There is evidence that Transend has considered Capex/Opex trade-offs but that this is not a primary consideration;
- None of the projects reviewed would be more appropriately classified as contingent projects;
- One project (Strategic Easement Acquisition) contains expenditure relating to the Sheffield-Burnie new transmission line, which has been included as a contingent project (the rationale for including the easement acquisition in the ex-ante cap is discussed further under the Strategic Easement Acquisition in Appendix 4); and
- Projects were assigned the appropriate expenditure classification.

Conclusions

Based on the review of proposed ex-ante projects, WorleyParsons has reached the following conclusions:

- Transend adequately assessed the need for the capital projects in accordance with its regulatory and statutory obligations and the "capital expenditure objectives" under clause 6A.6.7 of the NER. The need for projects was developed in some detail, with project drivers clearly identified together with links to the "capital expenditure objectives";
- Transend considered a reasonable range of investment alternatives, their feasibility and timing. Generally, a range of options was considered, and in the few cases where only the "do nothing" and the preferred option were considered, WorleyParsons was not able to identify any further viable options. In each case, WorleyParsons considers that Transend chose the appropriate option;
- The proposed project costs are reasonable. In arriving at this conclusion, WorleyParsons reviewed the technical design (for network projects) and unit costs. Level 1 estimates

were available for each project and formed part of the assessment of whether the costs are reasonable;

- The timing of the proposed projects is reasonable. For the connection projects, the timing is driven by the customer requesting the connection. For the augmentations, the timing is driven by market benefits (in the case of the Waddamana-Lindisfarne project), current and forecast failure to comply with the performance requirements of the ESI Regulations, and coordination with other projects. For the Land and Easements project, WorleyParsons calculated that the proposed timing offers the least cost. WorleyParsons considered that the proposed timing was appropriate for the remaining projects reviewed;
- The projects align with Transend's strategic plans, governance arrangements, and Capex policies and procedures. The alignment with Transend's strategic plan was clearly identified for each project. Most of the projects reviewed are at a very early stage of development, so the assessment of conformance with policies, procedures and governance arrangements rests on limited information. In contrast, there is a lot of information to make the assessment for the Waddamana-Lindisfarne project. WorleyParsons did not identify any misalignments;
- The information provided by Transend in regard to the projects reviewed was found to be accurate. There were several minor inconsistencies in information provided, but these were not material;
- The value and timing at which the projects should be included in the ex-ante cap are reasonable. WorleyParsons did not have any issues with the costs or proposed timing of any of the projects reviewed and considers the expenditure to be prudent and efficient;
- None of the projects reviewed would be more appropriately classified as contingent projects, as there were no issues with uncertainty in project costs or timing; and
- WorleyParsons is satisfied that the expenditure for the projects reviewed relates to prescribed transmission services.

4.3.6 Contingent Projects

4.3.6.1 Scope of Works

Attachment 1 of the contract[40], "Services required" under the heading "Contingent projects" sets out the AER's requirements in respect to contingent projects proposed for the Next Regulatory Control

[40] Standard Form Contract between the Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract dated 25 March 2008.

Period. WorleyParsons is required to review the Transend Proposal in accordance with the following requirements:

The contractor is required to examine any contingent projects proposed by Transend and assess them in accordance with clause 6A.8.1 of the NER. The contractor is to assess whether each contingent project is reasonably required to be undertaken during the regulatory control period in order to achieve any of the "capital expenditure objectives" as outlined at clause 6A.6.7 of the NER.

The contractor is also required to assess the following in accordance with clause 6A.8.1 of the NER.

a) Whether the contingent project should be included in the ex ante cap and, if so, determine the timing given Transend's use of a probabilistic model for forecasting capex;

b) Whether the proposed trigger events are appropriate and, if not, what the trigger events should be

c) Whether there are investments in the ex ante cap that would be more appropriately classified as contingent projects and recommend appropriate trigger events for these projects; and

d) The likely occurrence in the Next Regulatory Control Period of the trigger events associated with any proposed contingent projects.

4.3.6.2 NER Requirements

Broadly, the NER requirements for a contingent project are that:

- The project is reasonably required in order to achieve any of the "capital expenditure objectives";
- The project expenditure is not otherwise provided for (in part or in whole) in the forecast Capex;
- The project expenditure reasonably reflects the "capital expenditure criteria", taking into account the "capital expenditure factors";
- The project exceeds the cost threshold (in Transend's case, $10m); and
- The project trigger event is appropriate.

The NER requirements for an appropriate trigger event are:

- The trigger event to be reasonable specific and capable of objective measurement;
- The trigger event, if it occurs makes the contingent project reasonably necessary to achieve any of the "capital expenditure objectives";
- The trigger event to generate increased costs or categories of costs that relate to a specific location rather than the transmission network as a whole;

- The trigger event to be described in such terms that the occurrence of the event is all that is required for the revenue determination to be amended; and
- The trigger event to be probable during the regulatory control period, but inclusion in the ex-ante cap is not appropriate because of:
  - The project timing is uncertain; or
  - The project cost is uncertain.

4.3.6.3 Review of Contingent Projects

In its revenue proposal, Transend proposed nine projects as contingent projects, amounting to $509m (indicative costs). Transend subsequently presented more detailed information, including Level 1 estimates, which reduced the total to $412m. There were significant reductions in two projects – the Sheffield-George Town new transmission line and the Sheffield-Burnie new transmission line. The proposed contingent projects and costs are shown in Figure 4-33.

Table 4-33: Proposed Contingent Projects

Project	Indicative cost ($m) Proposal	Indicative cost ($m) Revised
Sheffield-George Town new transmission line	147	70
Burnie-Smithton new transmission line	85	88
Sheffield-Farrell new transmission line	80	79
Sheffield-Burnie new transmission line	77	52
St Helens new 110/22kV connection site	43	47
Palmerston-Sheffield transmission line augmentation	22	22
Waddamana-Lindisfarne 220 kV transmission line second circuit	22	22
Trevallyn Substation new 220/110 kV injection point	21	21
Queenstown Substation security upgrade	12	11
TOTAL	509	412

WorleyParsons conducted a detailed review of each of the nine projects, and the details are contained in Appendix 5. The reviews covered the following matters:

- Project background and description;
- Project drivers;
- Options considered;

- Project timing;
- Alignment with Transend's strategic business objectives;
- Alternative options considered (including non-network solutions);
- NER requirements;
- Project costs; and
- Trigger event;

General Observations

WorleyParsons' observations from the detailed review of contingent projects are as follows:

- In all cases, a business case had not yet been prepared as the project was in a very early stage of development;
- In all cases, the project drivers were clearly identified, together with the alignment to the NER "capital expenditure objectives";
- In all cases, the project would reasonably be required to meet one or more of the "capital expenditure objectives" should the trigger event occur;
- None of the projects had been included (in whole or in part) in Transend's forecast Capex (refer to comments in Section 4.3.5.4 and in Appendix 4, Strategic Easement Acquisition);
- In all cases, the alignment to Transend's strategic business objectives has not yet been articulated;
- In all cases, at least three options were considered, and estimates prepared based on what appears to be the appropriate option (given that limited information is available at this point);
- Project costs were based on Level 1 estimates in June 2007 dollars; WorleyParsons has escalated these to June 09 dollars;
- None of the projects reviewed would be more appropriately included in the ex-ante revenue cap, due to the uncertainty in timing and cost; and
- Transend had proposed non-specific trigger events, which rested primarily on the successful application of the regulatory test. After discussions between Transend, the AER and WorleyParsons, Transend modified the trigger events to contain more specific conditions, as well as the successful application of the regulatory test.

Conclusions

- None of the contingent projects proposed by Transend should be included in the ex-ante cap;

- The proposed trigger events meet the requirements under clause 6A.8.1(c) of the NER;
- Two projects (St Helens and Trevallyn) depend on high growth scenarios – the AER may wish to consider whether these projects should remain in the list of contingent projects, given the lower probability of a high growth scenario occurring; and
- There is a reasonable likelihood of the trigger events occurring in the Next Regulatory Control Period, although it should be noted that the timing for all of the proposed contingency projects is uncertain.

4.3.6.4 Conclusions

WorleyParsons has reached the following conclusions in regard to the Capex proposed for the Next Regulatory Control Period:

- WorleyParsons is satisfied that, in formulating its proposed program, the methodology applied by Transend is reasonable, taking into account the application of expenditure 'S'-curves, the breakdown into labour and non-labour, the application of CPI and the application of the cost escalators and risk factors in the Capex Collector Model.
- In reviewing the expenditure by category, projects having a major impact on changing expenditure patterns in the Current and the Next Regulatory Control Period have generally been included in the ex-post or ex-ante project review. These projects have been found to be justified, prudent and efficient.
- WorleyParsons considers that the value and timing of expenditure for the ex-ante projects reviewed is reasonable and should be accepted by the AER as prudent and efficient;
- Based on the project reviews, WorleyParsons considers that it is likely that the projects that make up the remainder of the proposed Capex would be prudent and efficient.

4.4 Capex Costs Benchmarked

4.4.1 Introduction

This section presents a high level comparison of Transend with other Australian TNSP's in relation to simple Capex metrics. WorleyParsons notes that because of differences in environment, network configurations, voltage levels, connected generation, connected loads and previous technical decisions, caution needs to be exercised when comparing performance to standard industry benchmarks and the benchmarks of other Australian TNSPs.

4.4.2 Benchmarks Defined

The benchmarking measures that have been used in this report to compare Transend with other Australian TNSPs are:

- Capex / Peak Demand;
- Capex / Transmission Line Length;
- Capex / Average RAB; and
- Average RAB / Transmission Line Length.

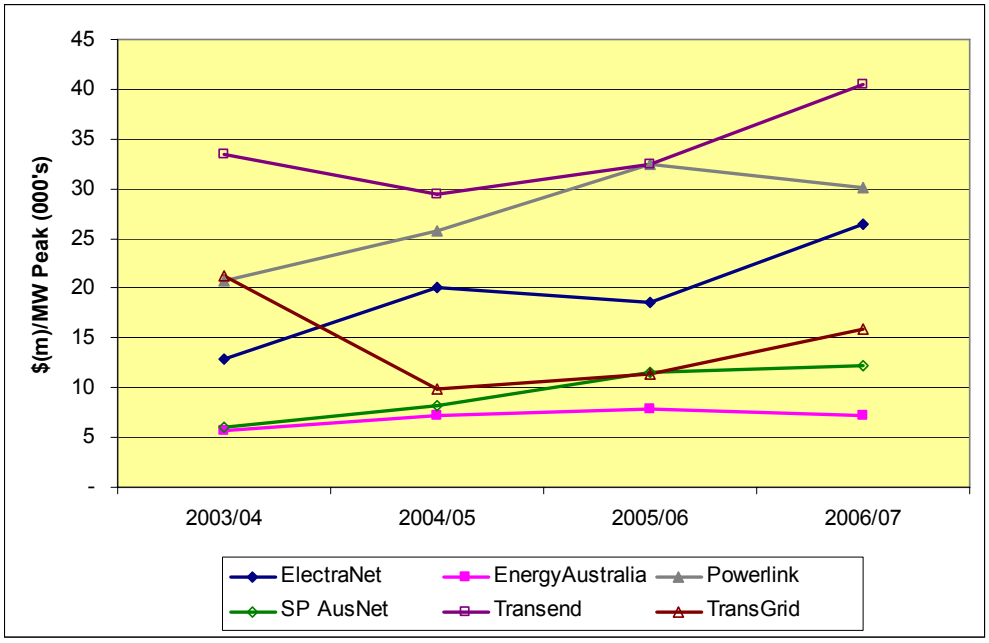
The data has been sourced from the AER's 2005/06 TNSP Regulatory Report and from recent TNSP decisions and proposals.

4.4.3 Australian TNSP Benchmarking

Capex / Peak Demand

In Figure 4-32, Transend's performance is compared with the performance of five other major Australian mainland TNSPs in respect to Capex/Peak Demand.

Figure 4-32: Actual Capex/Peak Demand for the period 2003/04 to 2006/07



Observations

(i) In comparison to the other TNSPs, Transend has a higher level of Capex per unit MW Peak Demand. The increase in this indicator in the 2006/07 period was due to a 45% increase in capital expenditure over the previous year corresponding with an increase in peak demand of 16% for the same period.

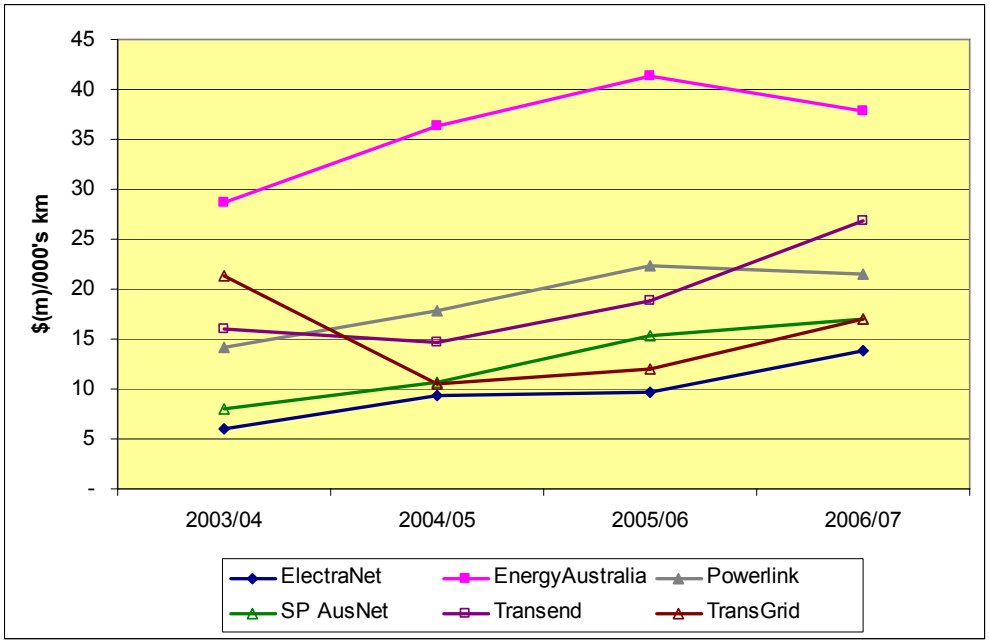
(ii) The spread of results varies from year to year and significant changes can occur from one period to the next. Note that both positive and negative slopes appear in every period depicted.

(iii) It is difficult to draw conclusions from this indicator as the Transend Peak Demand is very low (2.4GW in 2006/07) when compared to other TNSPs (for example, SP AusNet – 9.1GW in 2006/07).

Capex / Transmission Line Length

In Figure 4-33, Transend's performance is compared with the performance of five other major Australian mainland TNSPs in respect to Capex/Transmission Line Length

Figure 4-33: Actual Capex/Transmission Line Length for the period 2003/04 to 2006/07



Observations

(i) In comparison to the other TNSPs, Transend has a similar level of Capex per unit Transmission Line Length however the 45% increase in capital expenditure for the 2006/07 period (corresponding with a 2% increase in line length) pushes this indicator over a unit rate of 25 for this period.

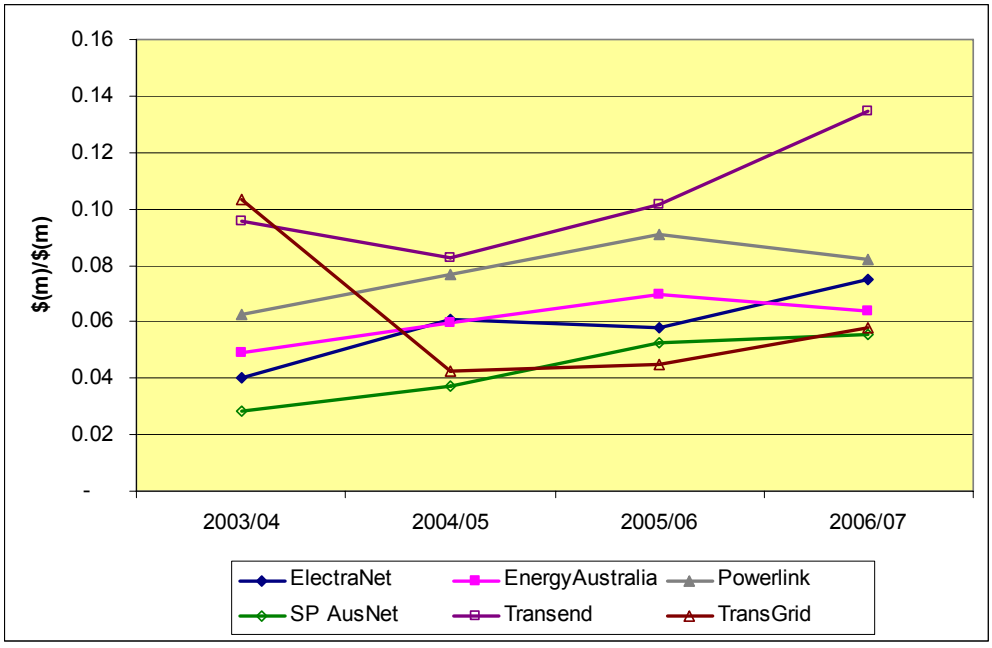
(ii) The spread of results varies from year to year and significant changes can occur from one period to the next.

(iii) It is difficult to draw conclusions from this indicator as the TNSPs have mature networks where the line lengths will not alter significantly from year to year, however levels of capital expenditure may.

Capex / Average RAB

In Figure 4-34, Transend's performance is compared with the performance of five other major Australian mainland TNSPs in respect to Capex/Average Regulated Asset Base.

Figure 4-34: Actual Capex/Average RAB for the period 2003/04 to 2006/07



Observations

(i) In comparison to the other TNSPs, Transend has a higher level of Capex per unit of Average RAB and again, the 45% increase in capital expenditure in the 2006/07 has had significant impact.

(ii) The spread of results varies from year to year and significant changes can occur from one period to the next.

(iii) It is difficult to draw conclusions from this indicator as the Average RABs for the TNSPs can be very different depending and the age of the network assets and these values will also fluctuate over time.

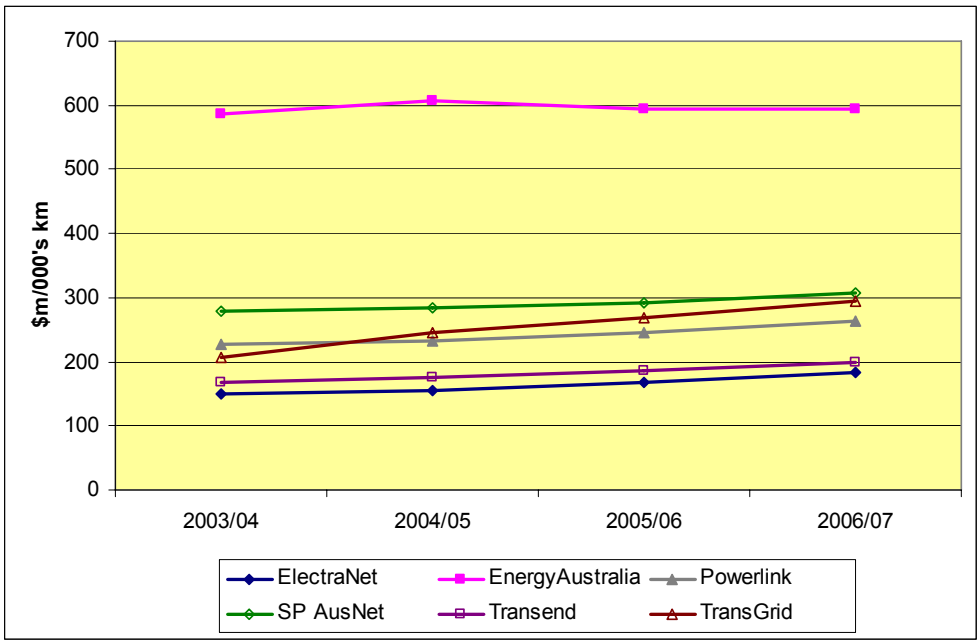
(iv) If the Average RABs were normalised by some factor, then it may be possible to achieve a more meaningful comparison.

(v) The only common normalising factor that can be used for this exercise is the Transmission Line Length and this is discussed in the next section.

Average RAB / Transmission Line Length

In Figure 4-35, Transend's performance is compared with the performance of five other major Australian mainland TNSPs in respect to Average Regulated Asset Base/Transmission Line Length.

Figure 4-35: Actual Capex/Average RAB for the period 2003/04 to 2006/07



Observations

(i) In comparison to the other TNSPs, Transend has a low level of Average RAB per unit Transmission Line Length.

(ii) This low valuation of RAB could explain why Transend's Capex/Average RAB result is high when compared to other TNSPs.

(iii) Whilst this result represents an attempt at normalisation, the results still vary widely. As an example, if an arbitrary level of 300 is selected for this indicator then the relativities for each TNSP around this level (in 2006/07) are:

ElectraNet	Energy Australia	Powerlink	SPAusNet	Transend	TransGrid
61%	198%	88%	102%	67%	98%

4.4.4 Benchmarking Conclusions

(i) In WorleyParsons' experience, benchmarking in general, while apparently offering a useful means of comparing the relative performance of TNSPs is often open to various interpretations.

(ii) Differences in environment, network configurations, voltage levels, connected generation, connected loads and previous technical decisions, disallow definitive comparisons to be made.

(iii) WorleyParsons considers that one area where benchmarking can be most relied upon is where a TNSP is compared with itself over time. Under these circumstances, and if the data definition has remained constant, then useful trends can be obtained.

4.5 Overall Capex Conclusions & Recommendations

WorleyParsons has reached the following conclusions in regard to the Capex proposed for the Next Regulatory Control Period:

- In reviewing the expenditure by category, projects having a major impact on changing expenditure patterns in the Current and the Next Regulatory Control Period have generally been included in the ex-post or ex-ante project review. These projects, and all of the other projects subject to the ex-post and ex-ante reviews, have been found to be justified, prudent and efficient;
- WorleyParsons is satisfied that, in formulating its proposed program, the methodology applied by Transend is reasonable, taking into account the application of expenditure 'S'-curves, the breakdown into labour and non-labour, the application of CPI and the application of the cost escalators and risk factors in the Capex Collector Model (with the exception of labour escalation);
- WorleyParsons considers that the value and timing of expenditure for the ex-ante projects reviewed is reasonable and should be accepted by the AER as prudent and efficient; and
- Based on the project reviews, WorleyParsons considers that it is likely that the projects that make up the remainder of the proposed Capex would be prudent and efficient.

4.5.1 Capex Recommendations

WorleyParsons recommends that all of the actual/forecast Capex, contained in Transend's Revenue Proposal for the Current Regulatory Control Period, be accepted by the AER as prudent and efficient.

WorleyParsons recommends the level of forecast Capex for the Next Regulatory Control Period shown in Table 4-34, but that this be subject to verification of the labour escalation rate.

Table 4-34: Recommended Capex (June 09, $m)

Year	09/10	10/11	11/12	12/13	13/14	Total
Total Capex	160.009	175.788	107.870	118.586	123.310	685.563

WorleyParsons recommends that all of the nine contingent projects listed in Transend's Revenue Proposal be accepted by the AER, as contingent projects.

5. OPERATIONAL EXPENDITURE - OPEX

5.1 The Broad Scope of Works

As described in Section 2.1 above, WorleyParsons Services Pty Ltd (WorleyParsons) entered into a contract[41] with the Australian Competition and Consumer Commission (the ACCC) for the provision of certain services as specified in Schedule 1 of the aforementioned contract. For the purposes of this contract, the Australian Energy Regulator (AER) is the part of the ACCC which is managing the contract with WorleyParsons.

Schedule 1[42] states: "The AER seeks the consultancy services of WorleyParsons Services Pty Ltd to provide technical and commercial advice and to review in detail Transend Networks Pty Ltd's (Transend's) capital expenditure, operating expenditure and service standards proposals in relation to one project:

> *"Inquiry into the appropriate revenue determination to be applied to the prescribed transmission services provided by Transend from 1 July 2009 to 30 June 2014."*

This part of the report deals with Transend's operational expenditures, in both the Current Regulatory Control Period (from 1 January 2004 to 30 June 2009) and forecast for the Next Regulatory Control Period (from 1 July 2009 to 30 June 2014).

Attachment 1[43], "Services required" under the heading "Forecast Opex" sets out the AER's requirements in respect to both Forecast Opex, Past Opex and the tradeoffs between Opex and Capex. In summary WorleyParsons is required to review the Transend Proposal in accordance with the requirements set out below. The "Attachment 1" requirements have been slightly rearranged by WorleyParsons to provide an improved ordering of tasks for the completion of all the requirements, that forms the basis of the WorleyParsons' Review Methodology which is described below.

The Current Regulatory Control Period

- Review of Opex for prescribed transmission services in the Current Regulatory Control Period. In this part of the report Transend's performance during the Current Regulatory Control Period, that is, from 1 January 2004 to 30 June 2009 is examined. It is noted that although the performance for the 2008/09 year is "forecast" or predicted, this year which is part of the Current Regulatory Control Period is described as "Historical" in the Proposal.

[41] Standard Form Contract between the Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract dated 25 March 2008.
[42] Ibid
[43] Ibid

- Compare Actual and Forecast Opex throughout the Current Regulatory Control Period and identify and analyse any long term trends and possible drivers for same.
- Determine the reasonableness of the cost allocations of specific activities to specific categories.

The Base Year

- Examine in detail the Base Year, namely the 2006/07 year. This is the most recent year where full audited records are available, to determine whether it represents an efficient starting year for predicting the performance of the Next Regulatory Control Period, namely from 1 July 2009 to 30 June 2014. In particular, WorleyParsons is required to determine whether the Opex expenditure in this year reasonably reflects the operating expenditure criteria set out in the NER.

Forecast Opex - Next Regulatory Control Period

- Review of Forecast Opex for prescribed transmission services in the Next Regulatory Control Period, that is, from 1 January 2009 to 30 June 2014. This will involve a detailed consideration of the forecast methodology and the data employed.
- Determine whether Transend's proposed Opex program reasonably meets its obligations under Clause 6A.6.6 of the NER. That is, whether the forecast Opex for the subject regulatory period:
  - Meets the expected demand for prescribed transmission services;
  - Complies with all regulatory requirements;
  - Maintains the quality, reliability and security of the system;
  - Complies with the submission guidelines;
  - Properly allocates prescribed Opex expenditure in accordance with the principles and policies set out in the Cost Allocation Guidelines for TNSPs[44]; and
  - Defines the total forecast Opex expenditure for each year of the subject regulatory period and the total for all such years.
- Determine whether the forecast Opex expenditures for the subject regulatory period reasonably reflects:
  - The efficient costs of achieving the Opex objectives;
  - The costs that a prudent operator would require; and

[44] AER Final Decision, Electricity transmission network service providers – Cost Allocation Guidelines. September 2007

- A realistic expectation of the demand forecast and cost inputs required to achieve the Opex objectives.

- In determining the matters of efficiency, prudency and realism, as required above, WorleyParsons should have regard for:
  - The information in the Proposal and submissions received during the course of the consultancy;
  - Opex/Capex tradeoffs and associated costs of same;
  - The performance of Transend when benchmarked against other Australian TNSP and other appropriate bodies;
  - The extent to which Opex expenditure is undertaken by bodies which do not appear to have an arm's length relationship with Transend; and
  - Whether the forecast Opex includes amounts which should more properly be included as a "contingent project".

The structure of the remainder of this chapter on Operational Expenditure follows closely the broad Scope of Works defined above, namely:

Section 5.2, The Current Regulatory Control Period Assessed;

Section 5.3, Forecast Opex For the Next Regulatory Control Period Assessed;

Section 5.4, Opex Costs Benchmarked;

Section 5.5, Capex/Opex Tradeoffs;

Section 5.6, Conclusions; and

Section 5.7, Recommendations.

5.2 Current Regulatory Control Period

5.2.1 Classification of Data

5.2.1.1 Introduction

Before undertaking a comparison of the Opex data provided by Transend to consider the differences between Actual, Requested and the ACCC Decision, it was first considered necessary to assess whether the data had been properly classified. That is, was the Transend data properly classified having due regard for the distinctions between:

(a) Opex and Capex activities; and

(b) Work activities in respect to Regulated and Non-Regulated assets?

5.2.1.2 Distinction Between Opex and Capex Activities

In regard to the distinctions between Opex and Capex, the Transend data for the Base-Year (2006/07) has been audited by Deloitte. They stated in the Audit Plan for that year[45] that their Scope of Works would include a Focus Area on "Capitalisation and Depreciation of Fixed Assets". They went on to say that "some items capitalised should have been expensed." In a later document[46] Deloitte stated that these particular problems related to an "Entertainment Expense" of $277.10 and a "Work Wear" expense of $463.84, both of which were incorrectly capitalised.

WorleyParsons notes that if that was the extent of the problems related to the distinctions between Opex and Capex, then the data below can be relied upon.

5.2.1.3 Distinction Between Regulated and Non-Regulated Activities

Similarly to the distinctions between Transend's data regarding Opex and Capex work activities, the distinctions between the data applying to "Regulated" and "Non-Regulated" work activities (or "Prescribed" and Non-Prescribed" work activities) has been audited by Deloitte for the Base-Year (2006/07). Deloitte stated[47] that "We will conduct the audit of Transend's regulatory reporting requirements for the 2007 financial year and ensure the statements are in accordance with the Australian Electricity Regulator guidelines." Later in the same report they also note that a Regulatory Requirement is for them to sight "Evidence classification criteria applied to identify prescribed, non-prescribed and not allocated."

[45] Client Service Plan for 2007 Financial Year, dated December 2006, prepared by Deloitte.
[46] Transend Networks Pty Ltd – Management Letter for the Year Ended 30 June 2007, dated 2 October 2007, prepared by Deloitte.
[47] Client Service Plan for 2007 Financial Year, dated December 2006, prepared by Deloitte.

WorleyParsons notes that as no mention was made about problems in regard to the classification of prescribed and non-prescribed work activities in Deloitte's report[48] to management, it can be taken that Deloitte does not consider that the subject data for the Base-Year contains any such problems.

WorleyParsons notes that the Tasmanian Audit Office also conducted an independent audit of the regulatory financial statements and other required statements in order to express an opinion on them to the Australian Energy Regulator for every year during the Current Regulatory Control Period. This audit has been undertaken in accordance with the TNSP Information Requirements Guidelines,[49] dated 5 June 2002.

The Tasmanian Audit Office conducted the audit[50] in accordance with Australian Auditing Standards to form an opinion whether, in all material circumstances, the regulatory accounting statements and other required statements are presented fairly in accordance with the abovementioned Guidelines. Section 2.6 of those Guidelines regarding Audit Assurance requires "The scope of any audit or the form of independent assurance about the regulatory information that the Commission may require, must comply with any requirements set out later in these guidelines."

Section 3 of the Guidelines sets outs the principles that a TNSP must follow to complete the regulatory financial statements. Section 3 covers a number of relevant areas including allocation principles (Section 3.3) and accounting principles and policies (Section 3.5). As per their Audit Report the procedures adopted include examination, on a test basis, of evidence supporting the amounts and other disclosures in the regulatory financial statements.

It is Transend's view that the audit of the regulatory financial statements by the Tasmanian Audit Office in accordance with the TNSP Information Requirements Guidelines dated 5 June 2002 demonstrates the requirement that costs from the audited financial statements were appropriately allocated between prescribed and non prescribed services.

WorleyParsons agrees with Transend's viewpoint.

5.2.1.4 Conclusions Re Data Classification

On the basis of the above Deloitte Audit report, the Tasmanian Audit Office Report and the lack of any evidence of data classification problems encountered by WorleyParsons in its investigations, WorleyParsons concludes that the data used to analyse the Current Regulatory Control Period, up to and including the Base-Year (2006/07) is free of classification errors. Beyond this year, no audit reports are available, however WorleyParsons has encountered no such problems in any of the subject data.

Accordingly WorleyParsons concludes that the subject data is free from classification errors.

[48] Transend Networks Pty Ltd – Management Letter for the Year Ended 30 June 2007, dated 2 October 2007, prepared by Deloitte.
[49] TNSP Information Requirement Guidelines.
[50] Independent Auditor's Report to the Australian Energy Regulator and the Directors of Transend Networks Pty Ltd, dated 29 October 2007.

5.2.2 Data Provided

As mentioned above, WorleyParsons is required to assess Transend's Opex program in the Current Regulatory Control Period, that is, from 1 January 2004 to 30 June 2009. In this assessment, WorleyParsons is required to:

> *Compare Actual Expenditure against Forecast (that is the amount claimed by Transend in the previous submission) and each of these amounts against the AER's Decision (10 Dec 2003) for the same period.*

In Table 5-1, the following data is provided in respect to the Current Regulatory Control Period:

- Actual Opex expenditure by financial year (excluding pass throughs) expressed in nominal dollars (that is, the dollars of the year in question);
- Actual Opex expenditure expressed in June 2009 dollars;
- Transend's Forecast Opex Expenditure by Financial Year. The Forecast was the amount "Requested" in Transend's 2003 Proposal. The amounts are in nominal dollars;
- Transend's Forecast Opex Expenditure by Financial Year. The amounts are in June 2009 dollars;
- The AER's Decision with regard to total Opex expenditure (excluding pass throughs) as set out in the December 2003 Decision. These amounts are expressed in June 2003 dollars;
- The AER's Decision with regard to total Opex expenditure (excluding pass throughs) as set out in the December 2003 Decision. These amounts are expressed in nominal dollars; and
- The AER's Decision with regard to total Opex expenditure (excluding pass throughs) as set out in the December 2003 Decision. These amounts are expressed in June 2009 dollars.

The data sources for the data in Table 5-1 are identified in footnotes to the Table.

Table 5-1: Comparison of Total Opex for Current Regulatory Control Period – Actual, Forecast and ACCC Decision

Row	Category	Jan 04 to Jun 04	2004-05	2005-06	2006-07	2007-08	2008-09
1	Transend's Actual Opex (nominal $m)	13.03	29.03	35.63	37.04	42.86	46.70
2	Transend's Actual Opex (June 09, $m)	15.24	33.10	39.52	39.79	44.72	47.35
3	Transend's Forecast Opex (nominal $m)	16.50	35.37	40.20	42.80	42.72	44.96
4	Transend's Forecast Opex (June 09, $m)	19.30	40.33	44.59	45.98	44.57	45.59
5	ACCC Decision – Total Opex (June 03, $m)	13.30	28.10	31.45	30.28	27.73	27.64
6	ACCC Decision – Total Opex (Nominal, $m)	13.56	29.13	33.52	33.32	31.42	32.23
7	ACCC Decision – Total Opex (June 09, $m)	15.86	33.22	37.18	35.80	32.79	32.68

Notes:

1. Total Opex figures in this table exclude Pass-Throughs.
2. Transend's "Requested" amount in the Proposal was subsequently adjusted by Transend to correct a minor error in the Proposal.
3. Data from rows 1, 3, and 6 were from the Proposal.
4. Data from rows 2, 4, and 7 were calculated by WorleyParsons using CPI figures given in Table 5.2.
5. Data for row 5 is from the ACCC Decision, dated 10 Dec 2003.

Table 5-2: CPI Escalators

DATE	Jun-03	Dec-03	Mar-04	Dec-04	Dec-05	Dec-06	Dec-07	Dec-08	Jun-09
CPI	141.3	142.8	144.1	146.5	150.6	155.5	160.1	164.7	167.0

Notes:

1. The CPI figures up to Dec 07 are from the ABS statistics.
2. The CPI figures after Dec 07 have been estimated, see current Transend Proposal, CEG Report in Appendix 15.

5.2.3 Data Conversion Methodology

- Transend converted its June 2003 estimate of Requested Expenditure (in June 2003 dollars) to nominal dollars (dollars of the year that the expenditure is due to be made) by separately escalating the labour and the non-labour components of their annual request figures.
- Transend used the following escalators for each of the labour and non-labour components:

- In respect to the non-labour components, Transend used the CPI (ABS figure for All Groups Australia) for historical levels of CPI and a CEG Report[51] for forecast figures of CPI for the remainder of the Current Regulatory Control Period); and
- In respect to the escalators for labour, Transend relied upon another CEG Report[52] for historical escalation figures and the first above mentioned CEG report[53] for forecast figures of LPI for the remainder of the Current Regulatory Control Period.

- Transend used a historically-based split[54] between labour and non-labour costs. For example, Transend used an 80/20% split for Transmission Operations, see Figure 5-9.
- To convert the ACCC Decision (in June 2003 dollars) to nominal dollars, Transend advised that they used the above described CPI escalator. They correctly applied the escalation factors in accordance with the AER formula for allowable revenue (AR)[55]. WorleyParsons notes that this formula (part of the December 2003 Decision) did not permit the escalation of the labour component at a rate other than CPI. WorleyParsons understands that real escalation of the labour component has been accepted by the AER in more recent determinations for other TNSPs.
- To convert ACCC Decision for Opex Expenditure in June 2003 dollars to June 2009 dollars). Transend advised that they used the above described CPI escalators.

WorleyParsons' Comment on Conversion Methodology

(i) WorleyParsons has reviewed the above described conversion calculations performed by Transend that were used in Table 5.1 and is of the opinion that they are accurate and in accordance with the methodology (including the associated CPI and LPI escalation factors) as described.

(ii) Notwithstanding (i) above, the cost escalators depend on CPI and LPI data. WorleyParsons has confirmed the CPI figures from the ABS and notes that the LPI figures are in accordance with the above mentioned CEG report (Appendix 15 of Proposal). Elsewhere in this report (see Section 4.3.3.1), WorleyParsons notes some concerns regarding the LPI data.

(iii) The comparison of the above predicted and actual figures with the ACCC Decision would be significantly affected (as noted below in Section 5.2.4.3) if the AER now accepted real

[51] Transend Transmission Revenue Proposal, prepared by Transend Networks Pty Ltd, dated May 30 2008 – Appendix 15. (CEG Report "Escalation factors affecting expenditure forecasts.")
[52] Ibid, Appendix 12. (CEG Report "Historic Labour costs growth.")
[53] Ibid, Appendix 15.
[54] Operations Expenditure Cost Template Assumptions – Revenue Proposal 2009-14. Document dated 12 June 2008, prepared by Transend.
[55] Decision. Tasmanian Transmission Network Revenue Cap 2004 – 2008/09. Report prepared by AER, dated 10 December 2003. (See page 95).

labour escalation for Transend. Such a revised position appears to be consistent with more recent ACCC and AER Decisions for other TNSPs.

5.2.4 Comparison of Opex in Current Regulatory Control Period - Forecast, Actual and ACCC Decision

5.2.4.1 Total Opex for Current Regulatory Control Period Graphed

Using the data in Table 5-1, two graphs are presented below, namely:

- Figure 5-1; This shows in nominal dollars:
  - Transend Requested (Forecast) Opex (adjusted for labour and CPI increases);
  - The ACCC Decision; and
  - The Actual Opex expenditure.

  This graph replicates Figure 4.2 on page 47 of Transend's Proposal.
- Figure 5-2 presents the graphs in Figure 5-1 again, but this time in June 2009 dollars.

The reason why the data is presented in June 2009 dollars is to provide the link to the next part of WorleyParsons' presentation, where a dissection of the Actual Opex expenditure is presented in June 2009 dollars. Forecast data for the Next Regulatory Control Period is also presented in June 2009 dollars in a later part of the report. (See Section 5.3.12 for recommended level of Opex in the Next Regulatory Control Period).

Figure 5-1: Current Regulatory Control Period ($m nominal)

Refer to Table 5-1 for data.

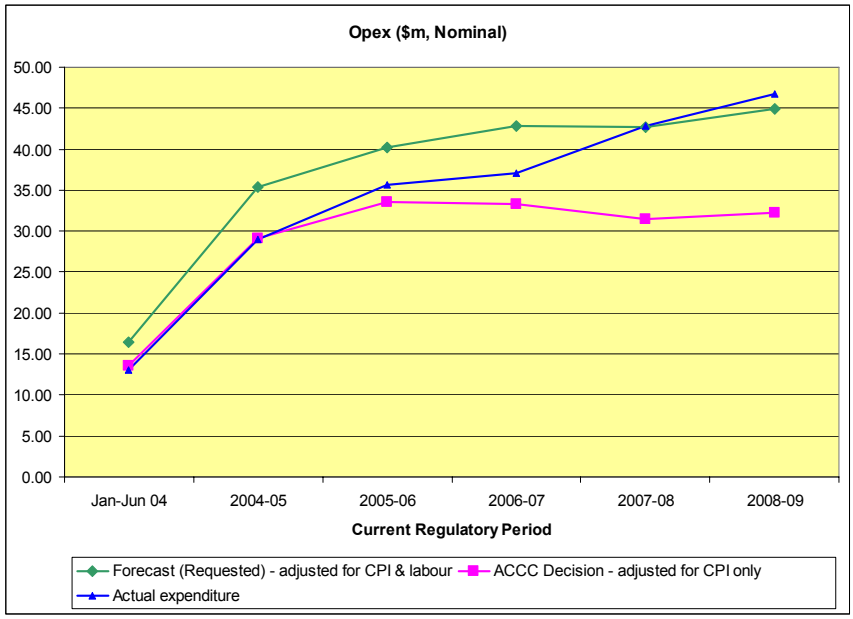
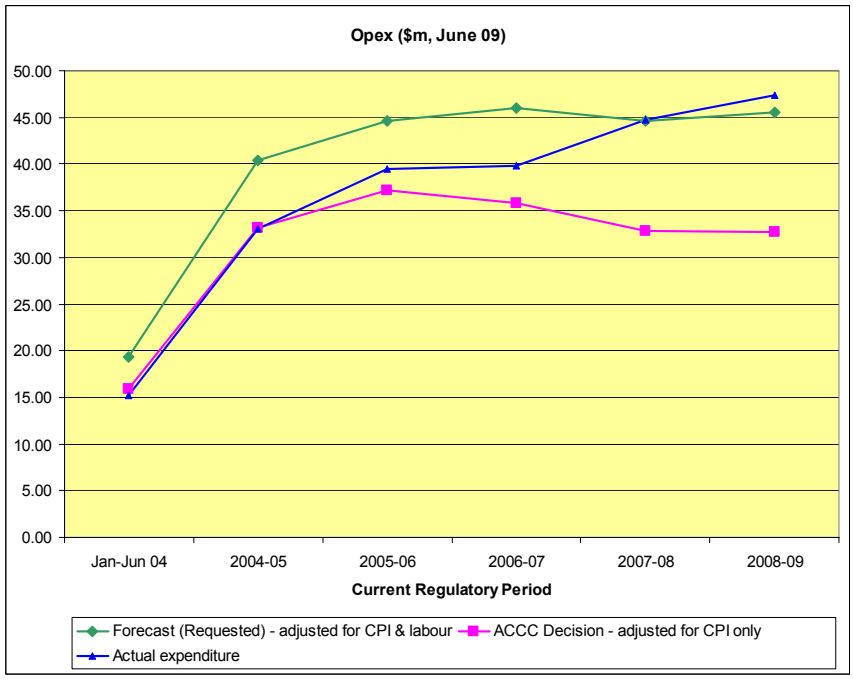


Figure 5-2: Current Regulatory Control Period (June 09, $m)

Refer to Table 5-1 for data.



5.2.4.2 Comparison of Actual Vs Forecast

From Table 5-1, the following data was extracted:

Table 5-3: Actual Vs Forecast Opex – Current Regulatory Control Period (June 09, $m)

CATEGORY	Jan 04 to Jun-04	2004-05	2005-06	2006-07	2007-08	2008-09
Actual	15.24	33.10	39.52	39.79	44.72	47.35
Forecast	19.30	40.33	44.59	45.89	44.57	45.59
Difference	-4.06	-7.23	-5.07	-6.10	0.15	1.76

The above data shows, that in the Current Regulatory Control Period, Transend's total Actual Opex was as follows:

- At the start of the Regulatory Period, that is, for the first 3.5 years, its Actual Opex spend was less than its Forecast;
- For the 2007/08 year, Transend expects to spend an amount about equal to its Forecast;
- For the last year of the Current Regulatory Control Period, Transend expects to spend $1.76m (or about 4%) more than its Forecast amount; and
- In total, Transend underspent its Actual Opex by about $20.6m against Forecast over the Current Regulatory Control Period.

5.2.4.3 Comparison of Actual Vs ACCC Decision

From Table 5-1, the following data was extracted:

Table 5-4: Actual Vs ACCC Decision Opex – Current Regulatory Control Period (June 09, $m)

CATEGORY	Jan 04 to Jun-04	2004-05	2005-06	2006-07	2007-08	2008-09
Actual	15.24	33.10	39.52	39.79	44.72	47.35
ACCC Decision	15.86	33.22	37.18	35.80	32.79	32.68
Difference	-0.62	-0.12	2.34	3.99	11.93	14.67

The above data shows that in the Current Regulatory Control Period, Transend's total Actual Opex expenditure was as follows:

- At the start of the Regulatory Period, that is the first 1.5 years, it spent less than the ACCC Decision;
- For the last four years of the Current Regulatory Control Period it spent (or expects to spend) considerably more than the ACCC Decision. For example in the year (07/08) it

expects to spend $11.9m (36%) more than the ACCC Decision and in the final year of the Current Regulatory Control Period, it expects to spend $14.7m (45%) more than the ACCC Decision;

- In total, Transend's Actual Opex exceeded the ACCC Decision by about $32.2m over the Current Regulatory Control Period; and
- WorleyParsons notes that if real labour escalation had been permitted in respect to Transend, as has been allowed in more recent ACCC Decisions, the total amount by which Transend's Actual Opex exceeded the ACCC Decision would be reduced by about $10m. That is, Transend's Total Actual Opex over the Current Regulatory Control Period would have exceeded the ACCC Decision by about $22m.

5.2.4.4 Comments on Comparisons

In regard to the comparison of Opex Actual Vs Forecast in the Current Regulatory Control Period, WorleyParsons notes as follows:

- Transend's Actual expenditure appears to have tracked its Forecast spending reasonably well;
- This comparison shows that Actual was less than Forecast at the start of the period and was in excess of Forecast at the end of the period; and
- In WorleyParsons' experience, this type of expenditure pattern is fairly common. It shows that the TNSP applied appropriate management pressure to the accomplishment of the Works Coordination program over the Current Regulatory Control Period, and as a result, they started to make up the early short falls and recover lost ground. In the event they did not accomplish the forecast expenditure of their total Opex works. WorleyParsons notes that the shortfall of about $20m was relative to a total Forecast Opex amount of about $240m (June 2009 dollars) that is, about 8%.

In regard to the comparison between Opex Actual Vs ACCC Decision in the Current Regulatory Control Period, WorleyParsons notes as follows:

- For the first 1.5 years of the Current Regulatory Control Period, Transend's Actual Opex expenditure was approximately equal to the ACCC decision;
- For the last four years of the Current Regulatory Control Period, Transend's Actual Opex expenditure exceeded the ACCC decision by amounts of about, $2m, $4m, $12m and $15m (June 2009 dollars); and
- WorleyParsons has studied the ACCC Decision on the level of Opex expenditure in the Current Regulatory Control Period, and does not understand the basis for that Decision.

5.2.5 Dissection of Actual Opex for Current Regulatory Control Period

As noted previously, WorleyParsons' contract with the AER requires it to:

- Analyse and explain any variations between the Forecast and Actual Opex for the Current Regulatory Control Period; and
- Identify any trends (by category and in total) and explanations as to the possible drivers of the trends.

This part of the report addresses this requirement.

To undertake this assessment, WorleyParsons employed the following methodology. A detailed dissection of the total Opex was sought and obtained from Transend which provided an appropriate level of dissection of the Opex expenditure. The data in question is presented in a spreadsheet in Appendix 1 and the categories into which it is dissected are shown in Table 5-5.

Table 5-5: Dissection of Opex Data for Current Regulatory Control Period

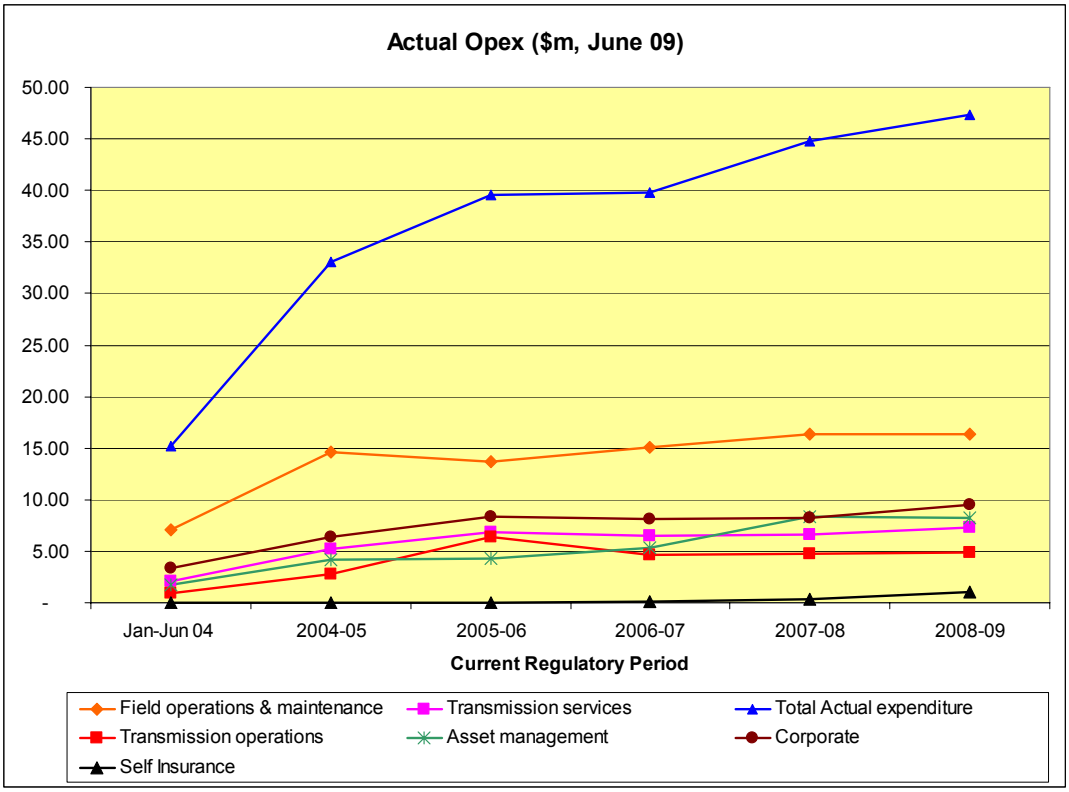
Level of Data Dissection						Methodology Applied
0	1	2	3	4	5	
Total Opex	Controllable Opex	Direct Operating & Maintenance	Field Operations & Maintenance	Substations	Labour	Zero base
					Non Labour	Zero base
				Protection & Control	Labour	Zero base
					Non Labour	Zero base
				Communications	Labour	Zero base
					Non Labour	Zero base
				Transmission Lines	Labour	Zero base
					Non Labour	Zero base
				Easements	Labour	Zero base
					Non Labour	Zero base
			Transmission Services	Engineering Services		Base year
				Works Planning & Coordination		Base year
			Transmission Operations	Transmission Operations		Base year
		Other Controllable	Asset Management	Customer & Asset Management		Base year
				Regulation & Compliance		Base Year
			Corporate	Business Services		Base Year
				Corporate Governance & Planning		Base Year
				Insurance		Zero base
	Other Operating Expenditure	Benchmark Allowances	Equity Raising			Zero base
			Debt Raising			Zero base
		Other	Network Support			Zero base
			Self Insurance			Zero base

For the purposes of the assessing expenditure trends, WorleyParsons has graphed each of the individual cost components which together sum to the total Opex. These graphs are presented below as follows:

In Figure 5-3, Actual Opex (in June 2009 dollars) is dissected into its six major components (see data dissection level 3 in Table 5-5), namely:

1) Field Operations and Maintenance;
2) Transmission Services;
3) Transmission Operations;
4) Asset Management;
5) Corporate; and
6) Other (which for the Current Regulatory Control Period only includes Self Insurance).

Figure 5-3: Actual Opex Expenditure for the Current Regulatory Control Period Dissected into the major components.



The total of the individual components, see blue curve in Figure 5-3, is identical to the Actual Opex expenditure (in June 09 dollars), presented in the blue curve in Figure 5-2, thus demonstrating the consistency of the data.

Next, WorleyParsons has graphed each of the component elements which together make up each of the above six major Opex components. That is, a further level of data dissection level (to level 4 in Table 5-5) is provided.

This data is provided as follows:

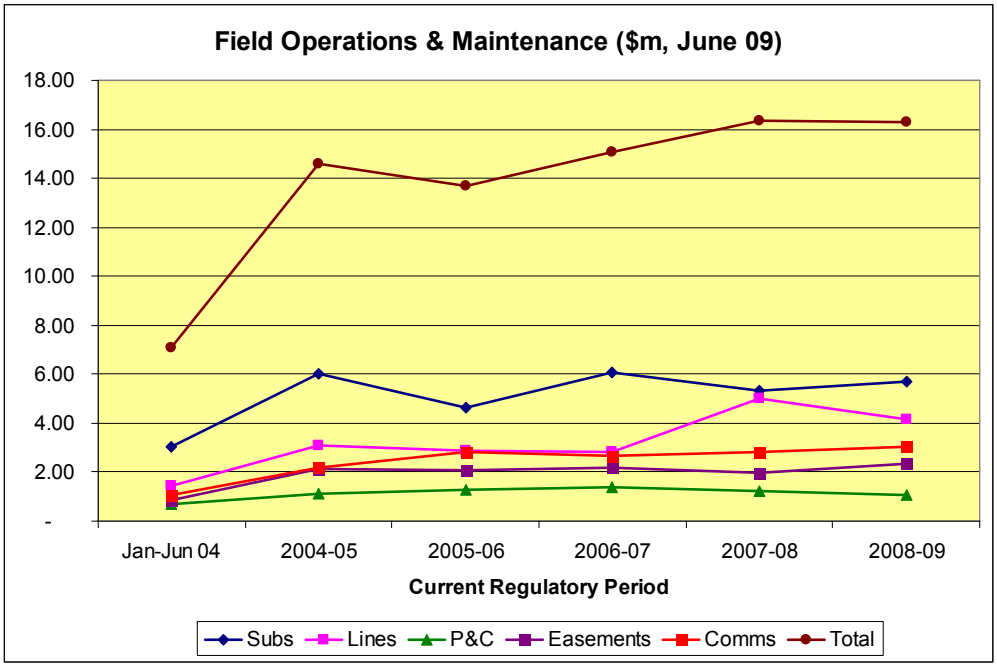
- Figure 5-4 provides the components of the actual Opex expenditure (in June 09 dollars) which together make up Field Operations and Maintenance;
- Figure 5-5 provides the corresponding components for Transmission Services;
- "Transmission Operations" is not graphed because in the current dissection it consists of only one element, namely Transmission Operations. This has already been graphed in Figure 5-3;
- Figure 5-6 provides the corresponding components for Asset Management;
- Figure 5-7 provides the corresponding components for Corporate; and
- "Other" is not graphed, because it only consists of one element, namely Self Insurance. This has already been graphed in Figure 5-3.

In respect to the cost trends in this data, WorleyParsons makes the following general comments:

- Increases in labour costs at rates above CPI are an industry-wide trend which applies across all cost categories;
- Transend's asset management strategies are outlined at a high level in the Transmission System Management Plan[56] and in more detail in the Asset Management Plans[57] for each asset category;
- Transend's has demonstrated to WorleyParsons that their field operations and maintenance program is consistent with its strategies and that it is consistent with industry best practice; and
- All the component elements that comprise the field operations and maintenance program are undertaken using contracted service providers. (The contracts with the main service providers are discussed in more detail in Section 5.3.7.2 "Works Coordination Program".)

[56] Transmission System Management Plan – 2007-2012. Prepared by Transend.
[57] An example of an Asset Management Plan is: Condition Assessment Report. Reyrolle Type 110/OS 110 kV Circuit Breaker. Prepared by Transend, dated June 2008.

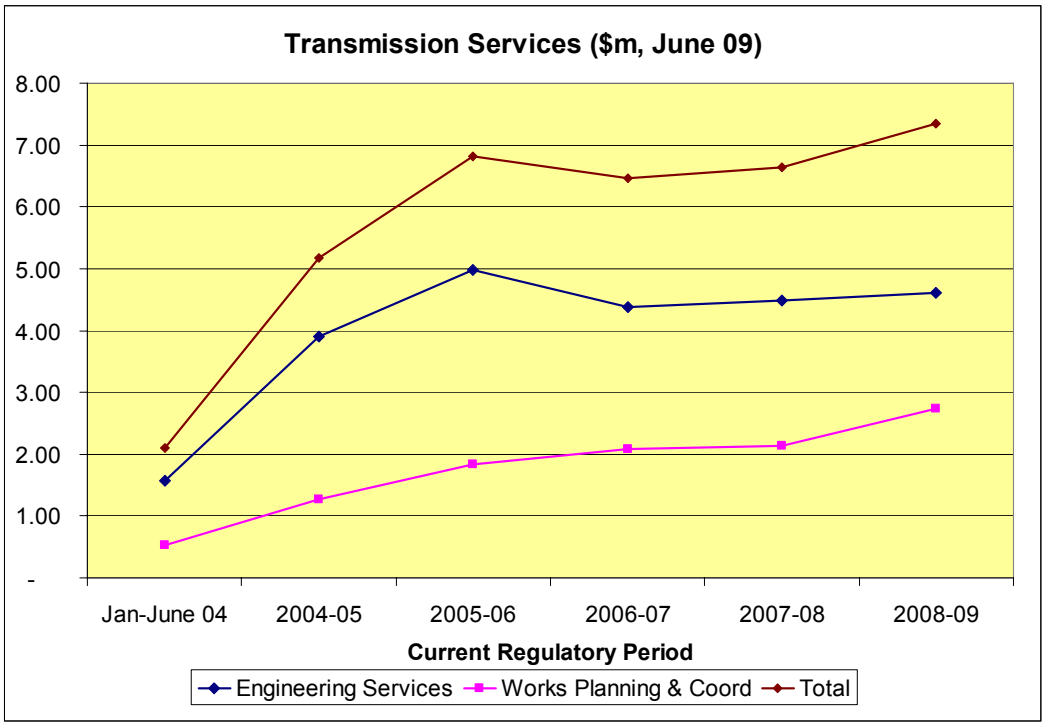
Figure 5-4: The Actual Opex Expenditure components (in June 2009 dollars) of Field Operations and Maintenance



The component elements of Field Operations and Maintenance are shown in Figure 5-4, namely:

- Substations;
- Transmission lines;
- Protection and Control;
- Easements; and
- Communications.

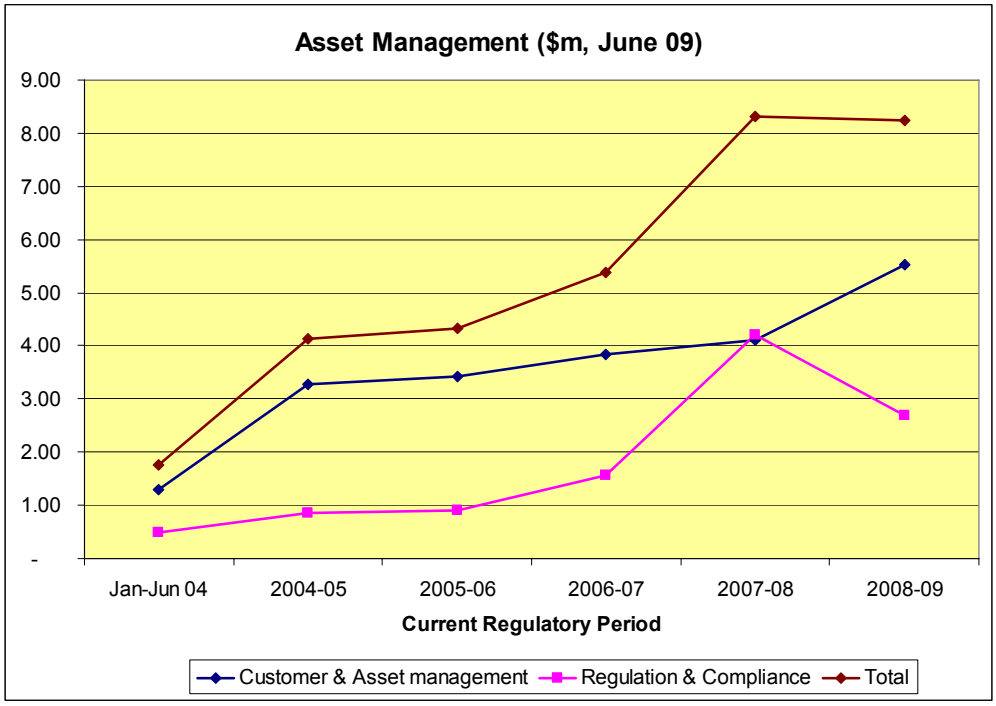
Figure 5-5: The Actual Opex Expenditure components (in June 2009 dollars) of Transmission Services



The component elements of Transmission Services shown in Figure 5-5 are:

- Engineering and Asset Services; and
- Works Planning and Coordination.

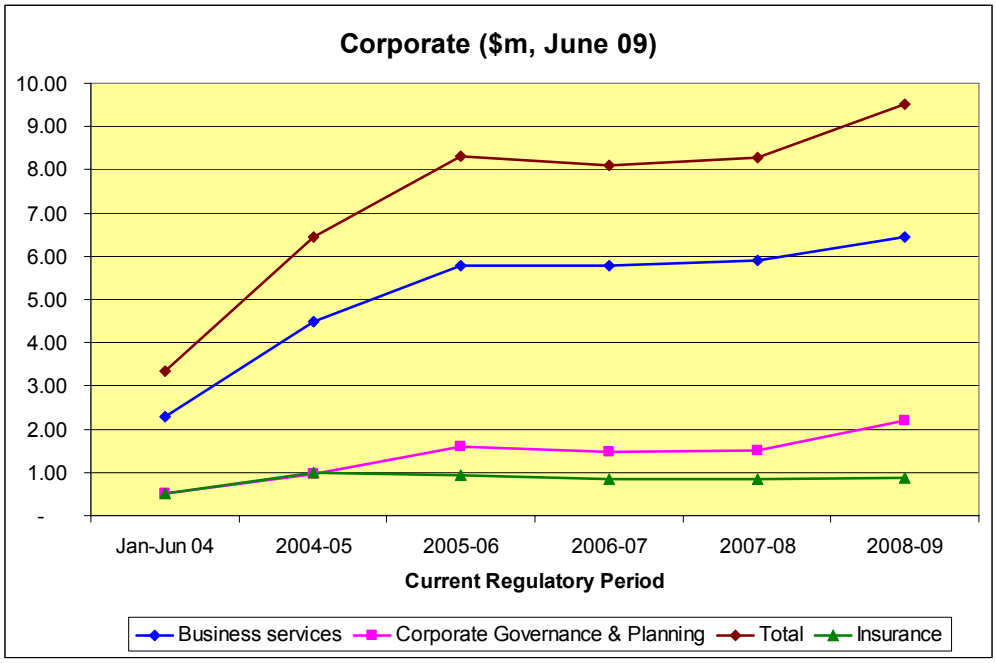
Figure 5-6: The Actual Opex Expenditure components (in June 2009 dollars) of Asset Management



The component elements of Asset Management shown in Figure 5-6 are:

- Customer and Asset Management; and
- Regulation and Compliance.

Figure 5-7: The Actual Opex Expenditure components (in June 2009 dollars) of Corporate



The component elements of "Corporate" shown in Figure 5-7 are:

- Business Services;
- Corporate Governance and Planning; and
- Insurance.

5.2.6 Assessment of Opex Components in Current Regulatory Control Period

WorleyParsons' assessment of the trends and drivers in the Current Regulatory Control Period is based on a qualitative assessment of the reasons for Opex expenditure changes which occurred in each of the following 14 categories of Opex expenditure. The qualitative reasons reported below were as advised to WorleyParsons by Transend.

Note; all of the dollar amounts quoted in this section are in June 2009 values.

5.2.6.1 Substations

The Opex expenditure profile has varied from year-to-year due to maintenance and condition assessment cycles. Operating expenditure has averaged approximately $5.5 million per annum over the Current Regulatory Control Period.

Transend advised that a revised practice in the 2005-06 year resulted in the reallocation of identified Field Operations and Maintenance costs pertaining to substations work undertaken by internal labour to the Engineering and Asset Services component element ($0.3 million). This change is reflected in a corresponding increase in expenditure in the Engineering and Asset Services component element expenditure for the same year.

5.2.6.2 Transmission Lines

The Opex expenditure profile has remained relatively stable at about $3.0 million per annum. Transend advised that additional expenditure of $2.3 million and $0.5 million in the years 2007-08 and 2008-09 respectively was required to dismantle decommissioned transmission lines.

5.2.6.3 Protection and Control

Opex expenditure over the Current Regulatory Control Period was planned by Transend, and executed by Hydro under contract to Transend.

The Opex expenditure was almost constant over the Current Regulatory Control Period (see Figure 5-4) at about $1.2 million per year, indicating an almost constant flow of work.

5.2.6.4 Easements

Opex expenditure on Easements (see Figure 5-4) remained relatively constant over the Current Regulatory Control Period at about $2.1 million per year.

5.2.6.5 Operational Communications

Opex expenditure on Operational Communications (see Figure 5-4) has remained relatively constant over the Current Regulatory Control Period at approximately $2.7 million per annum.

5.2.6.6 Engineering and asset Services

Opex expenditure on Engineering and Asset Services (see Figure 5-5) over the Current Regulatory Control Period has been relatively constant apart from an increase in expenditure in the 2005-06 financial year. Transend advised that this was mainly due to:

- The need for additional resources to strengthen the management of the substation and protection & control functions; and

- A revised practice in the 2005-06 year which resulted in the reallocation of identified Field Operations and Maintenance costs pertaining to substations works undertaken by internal labour to the Engineering and Asset Services component element, as noted above.

5.2.6.7 Works Planning and Coordination

The Opex expenditure on Works Planning and Coordination (see Figure 5-5) increased almost linearly over the Current Regulatory Control Period from about $1.3 million in 2004/05 to about $2.7 million in 2008/09.

Transend advised that the increases were driven by the need to:

- Meet compliance obligations associated with operating in the National Electricity Market (NEM);
- Increase the capacity to undertake project scoping and project estimation for the increased works program;
- Coordinate the implementation of Transend's integrated works program that has increased in volume and complexity over the Current Regulatory Control Period;
- Better comply with statutory and industry obligations, in particular the areas of safety and the environment; and
- Strengthen the contract account management function to oversee major operating and maintenance contracts, and major equipment procurement and contractor panels associated with the efficient delivery of the works program.

5.2.6.8 Transmission Operations

The Opex expenditure on Transmission Operations increased over the Current Regulatory Control Period (see Figure 5.3) from about $2.8 million in 2004/05 to a peak of about $6.4 million in 2005/06 before dropping back to just under $5 million for the remainder of the Current Regulatory Control Period.

Transend advised that the Opex expenditure increases in 2004-05 and in 2005-06 were largely due to costs associated with preparing for Tasmania's entry into the NEM. The operating expenditure was relatively constant over the remainder of the Current Regulatory Control Period but includes an ongoing requirement for meeting compliance obligations associated with operating in the NEM, including an interface with NEMMCO's operational and communications systems, and the obligation to retain a residual power system security competence and capability.

5.2.6.9 Customer and Asset Management

The Opex expenditure on Customer and Asset Management increased almost linearly over the Current Regulatory Control Period (see Figure 5-6) from about $3.3 million in 2004/05 to about $5.5 million in 2008/09.

Transend advised that the increasing costs were driven by the need to:

- Strengthen Transend's mid-term and strategic planning, and strategic and asset management capacity and capability;
- Formulate medium-term and long-term regional development plans for the Tasmanian transmission system;
- More customers entering direct contractual relationships with Transend over the Current Regulatory Control Period;
- Undertake compliance obligations that were fulfilled by the System Controller prior to NEM entry, such as preparation of incident reports and annual planning statements; and
- Meet compliance obligations associated with operating in the NEM, such as metering obligations.

5.2.6.10 Regulation and Compliance

The Opex expenditure on Regulation and Compliance increased over the Current Regulatory Control Period (see Figure 5-6) from about $0.9 million in 2004/05 to a peak of about $4.2 million in 2007/08 before dropping back to about $2.7 million in 2008/09.

Transend advised that the increased costs in the latter part of the Current Regulatory Control period were largely driven by the increased resource requirements (internal labour and external specialist consultants) required to prepare and support a NER-compliant revenue proposal. The expenditure profile reflects the cyclical nature of revenue reset costs.

5.2.6.11 Business Services

The Opex expenditure on Business Services increased over the Current Regulatory Control Period (see Figure 5-7) from about $4.5 million in 2004/05 to a level of about $6 million where it remained relatively constant for the remainder of the Current Regulatory Control Period.

Transend advised the increases were largely driven by the increased resources required to support a growing business operating in a more complex NEM environment. In particular, expenditure increased in the early part of the Current Regulatory Control Period due to:

- The delivery of the IT strategy;
- Systems to support NEM entry; and
- Business requirements, such as IT disaster recovery.

The increase in the Opex expenditure in the latter part of the Current Regulatory Control Period reflects expenditure that supported Transend's delivery of its more complex works program. This included increases in skills development and training, and operating costs associated with new facilities and communications infrastructure, including the new secondary systems equipment stores.

5.2.6.12 Corporate Governance & Planning

The Opex expenditure on Corporate Governance & Planning increased in an approximately linear manner over the Current Regulatory Control Period (see Figure 5-7) from about $1.0 million in 2004-05 to about $2.2 million in 2008-09.

Transend advised that this expenditure category includes expenditure associated with the board, managing director and company secretary functions, legal services and corporate planning. Expenditure for these services over the Current Regulatory Control Period was almost constant. The increase in 2008-09 was largely due to the separation cost associated with the departure of a number of senior staff.

5.2.6.13 Insurance

The Opex expenditure on Insurance (which should be distinguished from “Self Insurance” which is not included in the “Insurance” category), remained virtually constant over the Current Regulatory Control Period (see Figure 5-7) at about $0.9 million.

5.2.6.14 Self Insurance

The Opex expenditure on Self Insurance over the Current Regulatory Control Period was zero for the first 2.5 years, was $0.08 million in 2006-07, $0.33 million in 2007-08 and $1.02m in 2008-09 (see Figure 5-3).

Transend advised that the expenditure in the latter part of the Current Regulatory Control Period related to remedial foundation works for six transmission towers affected by (uninsurable) sink hole problems. The total cost of the works was about $1.43 million and was spread over three years namely, expenditure of $0.08 million in 2006-07, $0.33 million in 2007-08 and $1.02 million in 2008-09.

5.2.6.15 General Conclusions

As described above, WorleyParsons has investigated the cost trends and associated cost drivers in the Current Regulatory Control Period.

WorleyParsons concludes that the reasons given by Transend for the cost trends are reasonable and indicative of a well run organization, complying with its statutory obligations in a prudent and efficient manner.

5.2.7 Conclusions – Current Regulatory Control Period

In this section of the report, WorleyParsons has examined Transend’s performance over the Current Regulatory Control Period. WorleyParsons has concluded as follows:

- The data corresponding to Opex and Capex work activities has been correctly classified.

- The data pertaining to regulated and non-regulated (or prescribed and non-prescribed) work activities has been correctly classified.
- The data conversion methodology (to convert data at one date to another date) carried out by Transend was accurately carried out in accordance with its stated methodology.
- The data conversion methodology used the Consumer Price Index (CPI) and a Labour Price Index (LPI), as recommended by CEG.
- Actual Opex expenditure was compared with the Forecast (or Requested) Opex expenditure. Transend's Actual Opex expenditure was found to be as follows:
    - It appears to have tracked its Forecast spending reasonably well;
    - This comparison shows that Actual was less than Forecast at the start of the period and was in excess of Forecast at the end of the period; and
    - In WorleyParsons' experience, this type of expenditure pattern is fairly common. It shows that the TNSP applied appropriate management pressure to the accomplishment of the Works Coordination program over the Current Regulatory Control Period, and as a result, they started to make up the early short falls and recover lost ground. In the event they did not accomplish their total forecast amount of Opex works. WorleyParsons notes that the shortfall of about $20m was relative to a total Forecast Opex amount of about $240m (June 2009 dollars) that is, about 8%.
- In regard to the comparison between Opex Actual Vs ACCC Decision in the Current Regulatory Control Period, WorleyParsons notes as follows:
    - For the first 1.5 years of the Current Regulatory Control Period, Transend's Actual Opex expenditure was approximately equal to the ACCC decision;
    - For the last four years of the Current Regulatory Control Period, Transend's Actual Opex expenditure exceeded the ACCC decision by amounts of about, $2m, $4m, $12m and $15m (June 2009 dollars); and
    - WorleyParsons has studied the ACCC Decision on the level of Opex expenditure in the Current Regulatory Control Period and does not understand the basis for that Decision.
- A detailed dissection of Transend's Opex data to level 4 dissection (see Table 5-5) was presented. At this level of detail, WorleyParsons has investigated the cost trends and associated cost drivers in the Current Regulatory Control Period.
- WorleyParsons concluded that the reasons given by Transend for the cost trends are reasonable and indicative of a well run organisation, complying with its statutory obligations in a prudent and efficient manner.

5.3 Forecast Opex - Next Regulatory Control Period

5.3.1 Overview of Transend's Opex Forecast Methodology

Transend states[58] that the operating expenditure methodology which they employed to forecast their Opex in the Next Regulatory Control Period consists of a three step process; namely:

Step 1: Derive the Controllable Operating Expenditure Forecast

i) Commence with the actual controllable operating costs for the 06/07 year (the Base-Year). (Step 1(a)).

ii) Deduct non-recurrent operating expenditure items, which are not reflective of future expenditure requirements and should therefore be subject to a zero-based (bottom-up) forecast. (Step 1(b)).

iii) Add the cost of Scope Changes in the years that the scope change expenditures are forecast to be required. (Step 1(c)).

iv) Scale up the sub-total annually by using the applicable growth factors, which reflect the increase in operating expenditure requirements driven by the growth of the business. (Step 1(d)).

v) Add to that scaled-up sub-total the non-recurrent operating expenditure for the items deducted in Step 1(b) (using zero-based cost estimates) for each year of the Next Regulatory Control Period. (Step 1(e)).

vi) Scale up the total obtained in Step 1(e) annually by using applicable labour and non-labour escalation factors to derive the forecast of Controllable Operating Expenditure for the Next Regulatory Control Period. (Step 1(f)).

Step 2: Derive the Other Operating Expenditure Forecast

vii) Forecasts of each of the four elements (namely Network Support, Self-Insurance, Debt-Raising and Equity-Raising) are developed by adopting a separate forecasting approach, appropriate to each element.

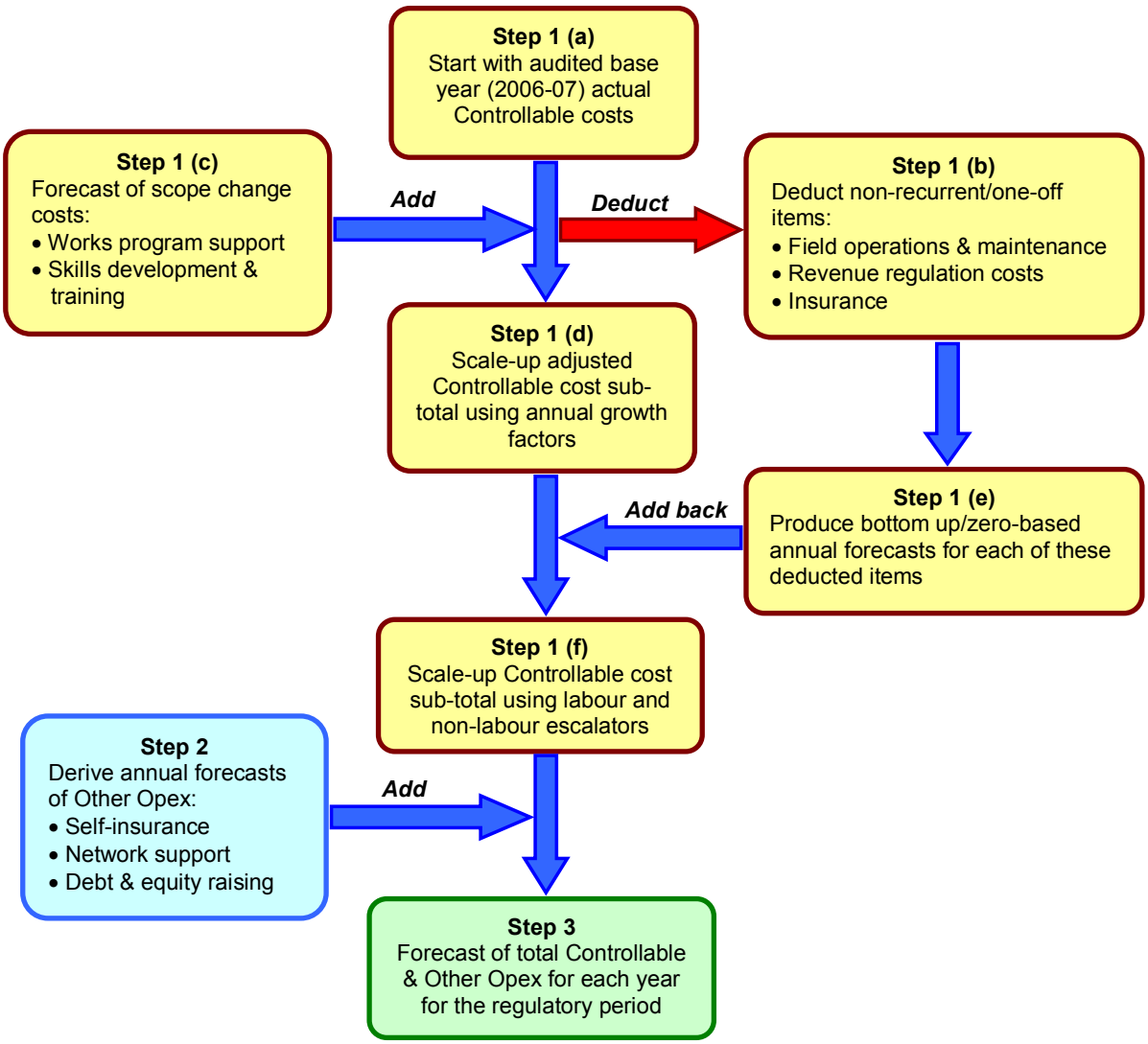
Step 3: Derive the Operating Expenditure Forecast

viii) Controllable Operating Expenditure and Other Operating Expenditure annual forecasts are summed to provide the total Operating Cost forecast for each year of the Next Regulatory Control Period.

[58] Transend Transmission Revenue Proposal – for the Next Regulatory Control Period 1 July 2009 to 30 June 2014. Document prepared by Transend, dated 30 May 2008, Section 6.4, page 110.

Transend stated that a pictorial overview of this process was provided in Figure 6.2 (from its Revenue Proposal[59]), which is reproduced below as Figure 5-8.

Figure 5-8: Transend's Operating Expenditure Forecasting Methodology



59 Ibid.

WorleyParsons has conducted a detailed investigation of the above methodology and makes the following specific comments about the key features in the various steps of this methodology.

5.3.2 Comments on the Methodology

5.3.2.1 Escalation Factors

As stated above, Transend's forecasting methodology is a multi-step process. This process was subject to a detailed examination by WorleyParsons as described below. However, before that process is described, it is necessary to describe the three escalation factors which the multi-step forecasting employs, the Economy of Scale factors which relate to the calculation of assets growth and aspects of the Valuation of the Assets.

The three escalation factors are:

- Consumer Price Index (CPI). This was used to escalate the time value of money and to escalate "non-labour" cost components;
- Average Wage Ordinary Time Earnings (AWOTE). This was used to escalate the cost of "labour" over time; and
- Asset Growth Index (AGI). This was used to increase the forecast costs proportionate to annual asset growth.

Consumer Price Index

As stated in Section 5.2.3 above, the CPI escalators used in the Transend forecasting methodology were shown in Table 5-2. It should be noted that CPI figures beyond June 2009 are not required, because all of the Next Regulatory Control Period is reported in June 2009 dollars.

Average Wage Ordinary Time Earnings

The AWOTE in the forecasting methodology were derived from the labour year-on-year growth rates shown in Table 5-6. These latter figures are the growth rates to December. These predicted figures were derived from the CEG Report (Transend Proposal - Appendix 15) from growth predictions which were to June. That is, the December figure for say December 2010 was interpolated between the June 2010 and June 2011 CEG figures on the basis of a geometrical progression.

Table 5-6: Growth Rates used in the Transend Forecasting Model

Inputs	07/08	08/09	09/10	10/11	11/12	12/13	13/14
Substation growth	0.0%	2.7%	0.1%	8.1%	2.6%	5.3%	0.5%
Transmission lines growth	0.0%	0.0%	0.0%	7.8%	2.3%	1.5%	0.0%
Protection & Control growth	0.0%	4.0%	0.1%	10%	3.0%	6.4%	0.9%
Easements growth	0.0%	0.0%	0.0%	1.2%	4.8%	18.7%	16.3%
Land & Buildings	0%	13.3%	37.2%	24.4%	0%	9.7%	0%
Labour growth	3.2%	2.7%	3.6%	3.3%	2.9%	3.5%	3.9%

Asset Growth Index.

The asset growth rates for a range of asset types are shown in Table 5-6. These rates were derived by Transend from the predicted cost of net new augmentations of the system. To derive the listed growth rates, the cost of the net new (commissioned) augmentations in each particular category of assets was divided by the value of the total assets in that category in the Transend System at the particular date. WorleyParsons notes this valuation of the system assets relies on the optimised replacement cost (ORC) given in the SKM valuation[60] of all transmission assets, less Easements and Land & Buildings. (The valuation of these latter assets relies on statutory valuations).

The June 09 valuation of a particular transmission asset class (for example lines) was derived from the ORC SKM (1 July 2006) valuation, escalated to June 09 dollars by CPI and "effective" labour and non-labour cumulative escalators as per CEG report (Appendix 15, Transend Proposal).

An example of the calculation of an asset growth rate for transmission lines is as follows:

- In 2010/11, the net new augmentation for transmission lines = $119.189m (in Jun 09 $).
- The value of old assets being replaced by new = $ 30.748m (in Jun 09 $).
- The net new augmentations = $ 88.441m (in Jun 09 $).
- The value of the total transmission line assets = $1132.964m (in Jun 09 $).
- Therefore transmission line Growth Factor = 88.441/1132.964

  = 7.81%

Conclusions re Escalation Factors

WorleyParsons has made a detailed investigation of the growth factors employed in the Transend Forecasting Methodology and is satisfied that the calculation of growth factors now accurately reflects the referenced source material.

[60] SKM Report titled: Asset Valuation for Financial Reporting Purposes. Report dated 3 August 2007.

Economy of Scale Factors

Transend stated that it is widely accepted that asset growth does not result in a one-for-one increase in operating expenditure. This is because transmission businesses are able to realise the benefits of economies of scale, where marginal costs are lower than average costs. The extent of scale economies differs across expenditure categories. Transend stated that it has employed its experience to develop the Economy of Scale factors listed in Table 5-7 below.

Table 5-7: Economy of Scale Factors for Asset Growth[61]

Category	Scale factor (%)	Rationale
Field operations & maintenance	N/A	New asset growth and associated maintenance effort is already captured in the works planning system.
Operational communications	N/A	Essentially and outsourced activity to Hydro Telecommunication Group. Forward estimates are based on requirements and negotiated price.
Transmission services	25	Significant economies of scale are possible through efficient management of this activity.
Transmission operations	25	Significant economies of scale are available and recognised.
Asset management	25	Significant economies of scale are available and recognised. (includes grid planning)
Corporate	10	Substantial economies of scale are available and recognised.
Insurance	N/A	Not applicable as insurance costs are based on a broker estimate.
Network support	N/A	Not applicable as costs are based on a separate zero base forecast.

[61] Operating Expenditure Scale Factors, TNM-GR-809-0815, Transend, June 2008

WorleyParsons notes that the above Transend Economy of Scale factors are aligned (for these categories) to those previously accepted by the AER for Powerlink[62] and ElectraNet[63]. In view of these precedents, WorleyParsons accepts these factors.

Valuation of the Assets

WorleyParsons notes as follows:

i) The above SKM valuation includes both prescribed and non-prescribed assets and therefore tends to understate the asset growth rate for prescribed assets only. However, WorleyParsons notes that:

- The value of non-prescribed assets included in the ORC valuation of Transend's assets is very small (about $8m); and
- The SKM valuation is greatly in excess of the Regulated Asset Base (RAB) valuation ($1132.96m Vs about $880m).

Conclusions re Valuation of Assets

WorleyParsons therefore concludes that the use of the very conservative asset value (SKM valuation rather than RAB) means that the calculated asset growth rates are substantially below the value which could be calculated for them using the RAB for prescribed assets only. On this basis, WorleyParsons considers the Transend methodology to be conservative because it forecasts future Opex expenditure that is less than could otherwise be justified.

ii) An error was found in Transend's valuation spreadsheets, resulting from a CPI and a LPI table not being updated. The effect of the error was to understate the value of transmission assets by about $39m. This had the effect of slightly overstating the asset growth factors and so slightly overstating some forecast Opex expenditure elements. WorleyParsons is of the opinion that the error was due to an oversight and Transend re-ran the model. The figures which appear in this report are the revised figures. The overall effect of the errors was so small as to be almost immaterial.

5.3.3 Step 1(a) – Actual Controllable Opex in the Base-Year

Transend selected the 2006/07 financial year as the Base-Year for determining the recurrent expenditure component of the Controllable operating expenditure forecast because it is the most recent financial year for which audited financial accounts were available. This approach, which WorleyParsons considers is consistent with recent AER decisions, assumes that the 2006/07 year represents expenditure that is prudent and efficient and is therefore a suitable year from which to project future costs.

[62] Powerlink Revenue Proposal, page 134, Table 6.11.
[63] ElectraNet Revenue Proposal, page 83, Table 6.6.

WorleyParsons notes that it is Transend's stated opinion that the financial incentive to minimise operating expenditure provides a reasonable assurance that the Base-Year is efficient, however to formulate its own view on this matter, WorleyParsons considered the following two aspects of Opex expenditure:

a) Did any of the elements of the total Opex expenditure during the Base-Year exhibit any inconsistency as compared to other years during the Current Regulatory Control Period? And,

b) Did a physical examination of current Opex works (2007/08 year) reveal any imprudent work activities, that is, was there any evidence of "gold-plating"?

5.3.3.1 Assessment of the Elements of Opex in the Base Year

For the purposes of this comparison, WorleyParsons used the 14 Opex expenditure categories at the Data Dissection Level 4 (see Table 5-5). These are the same categories of Controllable Opex plus Self Insurance (other Operating Expenditure) as have previously been considered in Section 5.2.6, when conducting an assessment of the components of the Current Regulatory Control Period.

The expenditure in the Base-Year (2006/07), as compared to the two full years on either side of the Base-Year is tabulated in Table 5-8. The expenditure is in June 2009 dollars.

Table 5-8: Comparison of the Components of Opex Expenditure in the Base-Year (2006/07) against other years in Current Regulatory Control Period (Jun 09 $m)

OPEX COMPONENT $m	04-05	05-06	06-07	07-08	08-09
Substations	6.04	4.64	6.05	5.30	5.68
Lines	3.10	2.85	2.82	5.01	4.17
Protection & Control	1.11	1.26	1.39	1.22	1.08
Easements	2.15	2.10	2.17	1.98	2.36
Operational Communications	2.19	2.82	2.66	2.85	3.03
Engineering Services	3.90	4.97	4.37	4.49	4.61
Works Planning & coordination	1.27	1.84	2.09	2.14	2.74
Transmission Operations	2.77	6.41	4.67	4.80	4.93
Customer & Asset Management	3.27	3.42	3.83	4.11	5.53
Regulation & Compliance	0.86	0.91	1.56	4.21	2.70
Business Services	4.48	5.78	5.77	5.91	6.44
Corporate Governance & Planning	0.96	1.60	1.48	1.51	2.18
Insurance	1.00	0.93	0.84	0.86	0.88
Self Insurance	0.00	0.00	0.08	0.33	1.02
TOTAL OPEX (Excl Self Insurance)	**33.10**	**39.53**	**39.70**	**44.39**	**46.33**

Notes:
1. Data coloured yellow is Base-Year
2. Expenditure categories coloured Green is subject to zero-base forecasting.
3. Self-Insurance is a pass-through.

5.3.3.2 Conclusions Re Audited Base-Year Data:

1. An examination of the audited Base-Year (2006/07) data in Table 5-8 (coloured yellow) and the graphical representation of the data (see Figures 5.3 through to 5.7 inclusive), shows that in every case with the possible exception of “Substations” the Opex expenditure in the Base-Year was not exceptional, rather it was a conservative level of expenditure when compared to the two years before and after it;

2. In the case of Substations, which employs zero-base forecasting, the relativity of the level of expenditure in the Base-Year to other years in the Current Regulatory Control Period was not relevant to the forecasting methodology; and

3. In view of the above, WorleyParsons considers that there was no indication to suggest that the Base-Year data was inappropriate for its use in the forecasting methodology, rather it appeared to be quite a conservative year from which to make forward projections.

5.3.3.3 Physical Examination of Current Opex Works

On 27 June 2008, WorleyParsons made a physical inspection of the following Transend assets:

- Creek Road Substation; and

- Chapel Street Substation.

During this visit, numerous examples of both past and planned maintenance work activities were pointed out to WorleyParsons. These included:

- Five year old 33 kV indoor switchgear, which was not planned to be maintained for another 10 years;
- Protection and Control equipment which was planned to be maintained on a six year cycle;
- Outdoor control cabinets with rust spots on them which were not planned to be maintained until the next scheduled maintenance;
- Isolators which had had their support insulators replaced with an improved design, rather than being scrapped and replaced with new equipment; and
- Plans for a number of highly innovative schemes to implement improved condition monitoring, the better to be able to respond to emerging problems and thereby improve system reliability and security.

In the discussions with the Senior Asset Officer (SAO) from Transend who showed WorleyParsons over the facilities, WorleyParsons formed the view that Transend:

- Was very cost conscious, that is the SAO was very familiar with the individual cost (hours) of maintaining the subject equipment;
- Did what was absolutely necessary, in accordance with manufacturer's recommendations and good industry practice;
- Maintained a very disciplined maintenance regime in accordance with their published asset management plans;
- Did not do the things which are "nice-to-do" out of the regular maintenance cycle, for example, fix the rust spots on the outdoor cubicles; and
- Did not replace old equipment with new if the old could be satisfactorily "fixed", for example the replacement of the isolator bushings.

Conclusions Re Inspections:

Overall, WorleyParsons formed the view that Transend's maintenance practices, as demonstrated by the examples shown to WorleyParsons during the above mentioned physical inspections, were in accordance with best industry practice, and therefore "prudent".

5.3.3.4 Conclusions re Use of Base-Year in Forecasting Methodology:

Given the above conclusions regarding:

- The comparisons of the Base-Year audited data with other years in the Current Regulatory Control Period; and
- Consideration of the Opex work activities sighted during the physical examination of assets;

WorleyParsons formed the opinion that the audited Opex expenditure in the Base-Year was a suitable (and indeed conservative) point from which to forecast the Opex expenditure for the Next Regulatory Control Period.

5.3.4 Step 1(b) – Deduct Non-Recurrent One-off Items

The following components of Opex Controllable Expenditure (see Table 5-5 for Controllable Expenditure components) are considered by Transend to be either one-off costs or costs that should be subject to a zero-based (bottom-up) forecast. See those components coloured green in Table 5-8, namely:

- Field Operations & Maintenance – Substations;
- Field Operations & Maintenance – Lines;
- Field Operations & Maintenance – Protection & Control;
- Field Operations & Maintenance – Easements;
- Field Operations & Maintenance – Communications;
- Asset Management – Regulatory & Compliance; and
- Corporate – Insurance.

Accordingly, in Step 1(b) of Transend's forecasting methodology, the cost components for these items (in June 2009 dollar values) were deducted from the Controllable Opex costs, as indicated in Figure 5-9.

5.3.5 Step 1(c) – Forecast the Scope Changes

In this step, Transend forecast their future requirements for additional staff and identified the costs for same (in June 2009 dollar values). These additional costs, which were identified in Table 5-9, were added back to the Controllable Opex costs, as indicated in Figure 5-8.

WorleyParsons makes a detailed assessment of the Scope Changes proposed by Transend in this Table and this assessment is reported in Section 5.3.11.

In this part of the report, the forecasting methodology only is being assessed.

Table 5-9: Transend's Forecast Scope Changes

TRANSEND OPERATING EXPENDITURE SCOPE CHANGES (Dec 07 $m)

AREA	Actual numbers	COST OF ADDITIONAL RESOURCES (Dec 07 $m)							Explanation of Resources	Start Year
		07-08	08-09	'09-10	10-11	11-12	12-13	13-14		
Transmission Services - Engineering and Asset Services	3 positions		0.20	0.17	0.17	0.17	0.17	0.17	1 Substation Engineer 1 Engineering Officer Transmission Lines 1 Engineering Officer Transmission Lines (transition)	2008/09 2008/09
Transmission Services - Works Planning & Coordination	6 positions		0.30	0.50	0.50	0.50	0.50	0.50	1 Safety Officer 1 Environmental Coordinator 1 Contract Account Manager (Panel contracts) 3 Inventory Officers	2008/09 2008/09 2008/09 2009/10
Customer & Asset Management - Strategic Grid Planning	4 positions plus consultancies	0.17	0.70	0.78	0.74	0.71	0.61	0.64	1 Grid Vision Manager 3 Grid Vision Strategy Engineers Consultantancy provision	2007/08 2008/09 2007/08 - 2013/14
Customer & Asset Management - Connections, System Development, and Asset Strategy & Planning	8 positions		0.70	0.70	0.70	0.70	0.70	0.70	1 AMIS Support Officer 1 Customer Account Manager 1 Pricing Compliance Analyst 1 Asset Strategy Engineer 1 Asset Strategy Engineer 1 Senior Network Development Engineer 1 Network Development Engineer 1 Project Development Officer	2008/09 2008/09 2008/09 2008/09 2008/09 2008/09 2008/09 2008/09
Business Services - HR	2 positions plus consultancies		0.20	0.20	0.20	0.20	0.20	0.20	1 Training and Development Officer 1 Business Support Officer Consultancy provision	2008/09 2008/09
Business Systems - Business Telecommunications costs	nil - all non labour, business telecomms		0.11	0.67	0.47	0.33	0.33	0.33		2008/09
Corporate Governance - separation costs			0.60						2007 restructure abolished two executive positions	2008/09
TOTAL		**0.2**	**2.8**	**3.0**	**2.8**	**2.6**	**2.5**	**2.5**		
CPI to June 2009	1.051	0.2	3.0	3.2	2.9	2.7	2.6	2.7		

Notes
Above figures are in Dec 2007 $m
Figures exclude asset and wage growth.

5.3.6 Steps 1(d) and 1(f) – Scale up the Annual Sub-totals Using the Applicable Escalation Factors

Two examples of this scaling process which were presented by Transend are reproduced below; namely:

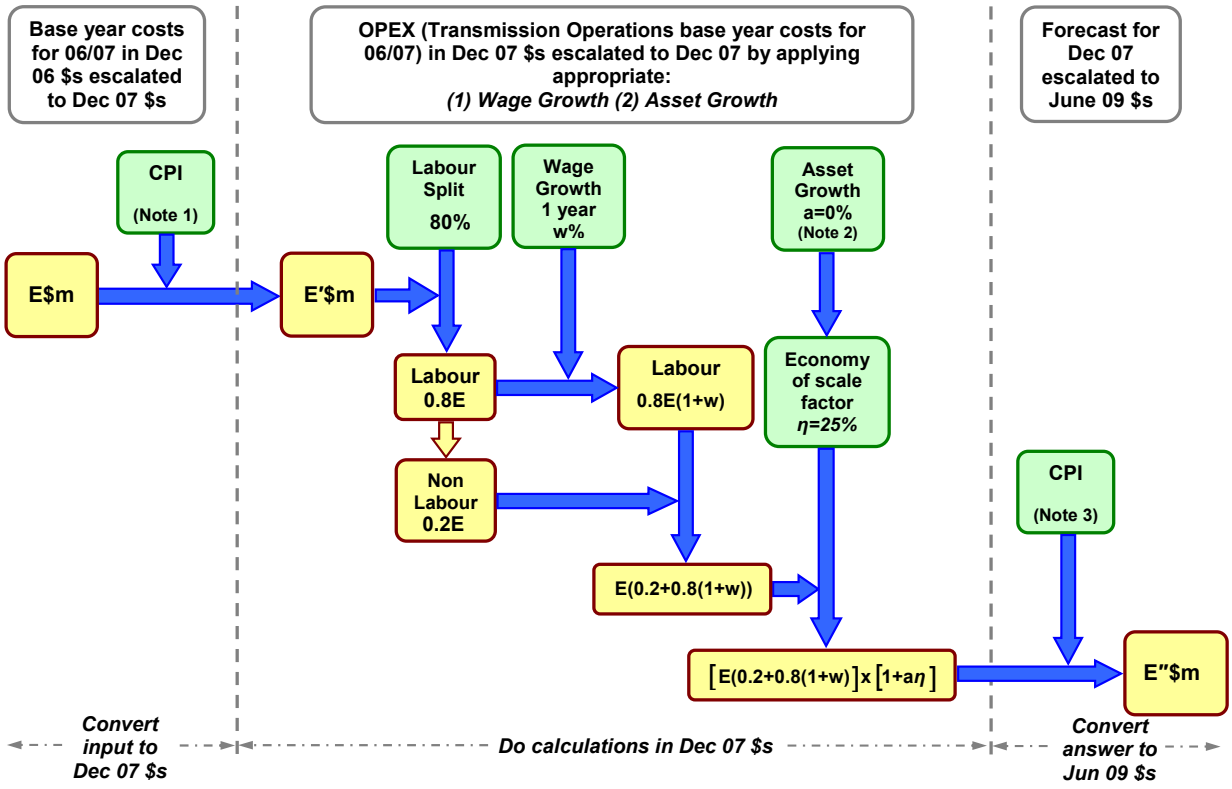
5.3.6.1 A Forecast Projection from the Base-Year:

In this example, a forecast was required for the 07/08 year (that is December 07) and the result was required to be presented in June 09 dollars. The starting point was the expenditure in the Base-Year, which in this example was given in December 07 dollars.

Transend's methodology to do this is shown in Figure 5-9.

Figure 5-9: Example 1

A Base-Year Expense in Dec 06 dollars is Escalated to form an 07/08 Forecast and the result is presented in June 09 dollars



Notes **1.** CPI adjustment from Dec 06 to Dec 07
2. Asset growth is zero as no augmentations commissioned in 07/08
3. CPI adjustment from Dec 07 to Jun 09

In this example, the computational steps were:

- The Base-Year cost in December 06 dollars was converted to December 07 dollars by applying the appropriate CPI escalation.
- The expense (in December 07 dollars) was split into labour and non-labour components.
- The split percentages were based on historical costs.
- The labour component (in December 07 dollars) was escalated by an amount representing the AWOTE, as described previously, see Section 5.2.3, and added back to the unchanged non-labour component. This latter Total therefore includes labour escalation and the result at this point is in December 07 dollars.

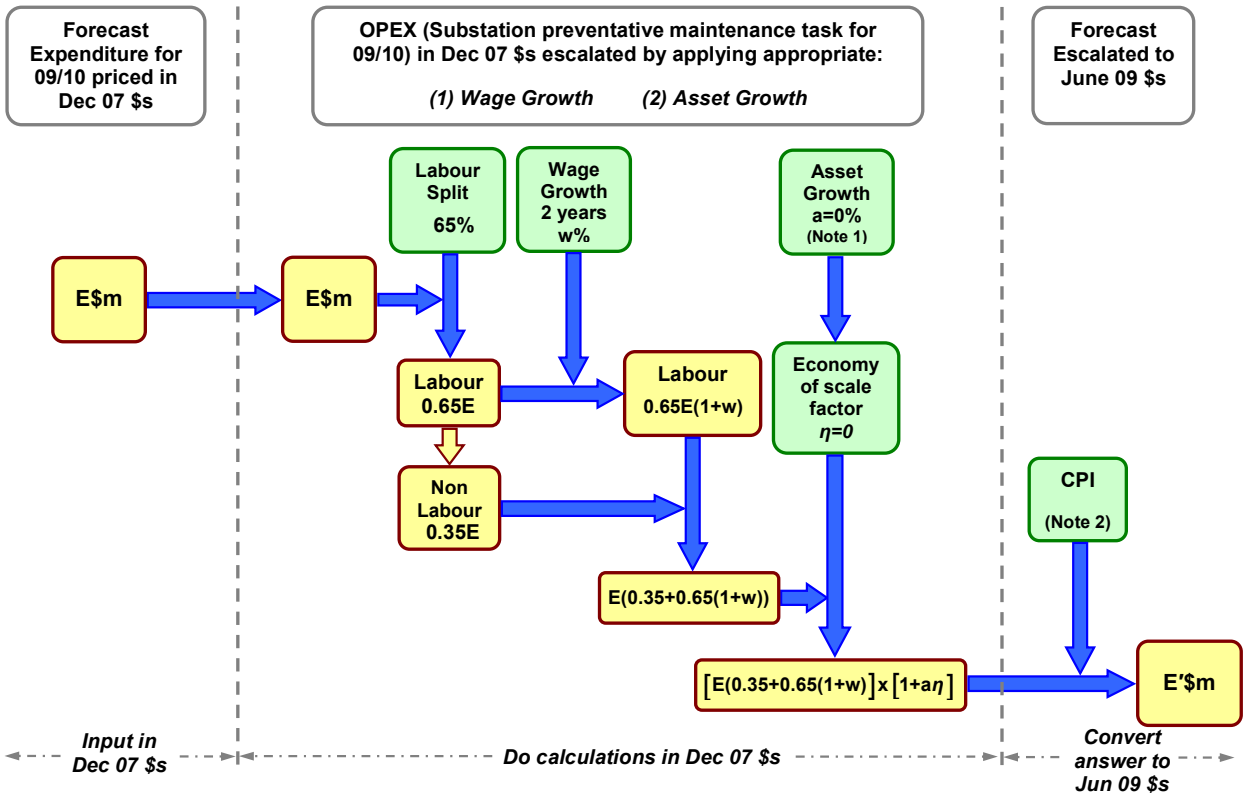
- Asset growth in this particular example was zero because the net augmentations in 07/08 were zero.
- Had the asset growth factor been non-zero, the efficiency factor η would have been introduced at this point.
- As the Total was required in June 09 dollars, it was necessary to escalate the Total in December 07 dollars to an equivalent June 09 amount using the appropriate CPI escalators.

5.3.6.2 A Preventative Maintenance Task is Scaled

In this next example, namely Example 2, the cost of a Substation preventative maintenance task for 2009-10 estimated in 2007/08, that is in December 07 (and costed in December 07 dollars) is required to be escalated to December 09 and reported in June 09 dollars. Transend's methodology is shown in Figure 5-10.

Figure 5-10: Example 2

A Substation Expense estimated for 09/10 in Dec 07 $s is required to be escalated to June 09



Notes **1.** Asset growth and economies of scale factors are zero because forecast is zero-base for each year.
2. CPI adjustment from Dec 07 to Jun 09

In this example, the computational steps are:

- A zero base forecast for the substation maintenance expense for 09/10 in December 07 dollars was determined.
- The expense (in December 07 dollars) was split into labour and non-labour components.
- The split percentages were based on historical costs.
- The labour component (in December 07 dollars) was escalated by an amount representing the AWOTE, as described previously, see Section 5.2.3, and added back to the unchanged non-labour component. This latter Total therefore includes labour escalation and the result at this point is in December 07 dollars.

- Asset growth in this particular example of zero base forecasting was zero because asset growth is already included in the forecast.

5.3.7 Step 1(e) – Produce Zero-Based Annual Forecasts for Deducted Items

As advised above in Step 1(b), the following components of Opex Controllable Expenditure were considered by Transend to be either one-off costs or costs that should be subject to a zero-based (bottom-up) forecast:

- Field Operations & Maintenance – Substations;
- Field Operations & Maintenance – Lines;
- Field Operations & Maintenance – Protection & Control;
- Field Operations & Maintenance – Easements;
- Field Operations & Maintenance – Communications;
- Asset Management – Revenue Regulation; and
- Corporate – Insurance.

In this step in the Forecast Methodology, new zero-based forecasts for each of the above items were made and added back into the total.

5.3.7.1 Field Operations & Maintenance Forecast

The Field Operations & Maintenance forecasts for:

- Substations;
- Lines;
- Protection & Control;
- Easements; and
- Communications;

were determined by a zero-based (bottom-up) process which began with the collection of all the work tasks required to maintain each subject asset class over the Next Regulatory Control Period. This collection of work tasks was performed in the Works Coordination Program – AMIS (Asset Management Information System). Before continuing with the results of WorleyParsons' investigation into the forecasting methodology, it is first necessary to comment on aspects of the Works Coordination Program and its function.

5.3.7.2 Works Coordination Program

Transend has developed a highly sophisticated works coordination software package, AMIS[64], which is based on a WASP core and which integrates all future Opex and Capex works. In regard to Opex works, Transend planners in each of the key Field Operations and Maintenance work areas plan their Preventive and Corrective works programs over the Next Regulatory Control Period, as described below:

Preventive Works Planning

- Bottom-up works items are planned at individual asset and work task level. For example, a Class 1 maintenance could be required on a particular 220 kV circuit breaker at George Town in say 2010-11. This task would be added to the Works Coordination Program for the particular year. The individual tasks for the particular maintenance would be determined having regard for:
  - The Asset Management Plan;
  - Condition Monitoring reports;
  - The manufacturer's recommendations; and
  - Industry best practice.
- Planners consider the above "baseline" asset management plans and also all other works (including capital works) planned to be carried out on the particular asset (for example, 220 kV instrument transformers at George Town) at the subject time and coordinate works to minimise outages. They also ensure that unnecessary works, such as the scheduled maintenance of plant which will shortly be replaced are deleted (or appropriately reduced) in the Works Coordination Program.
- WorleyParsons has undertaken a detailed review of work tasks entered into the Works Coordination Program, for example all 220 kV and 110 kV CBs, including maintenance works and condition monitoring works, and has concluded that the works listed in the Works Coordination Program are prudent and consistent with industry best practice.
- The work is assumed to be undertaken by Aurora and would be priced at the current Aurora unit rate. The total cost of all work activities for the subject year would therefore be determined in current dollars and later converted to a component of the 2010-11 total Opex forecast by converting this component to a June 09 cost (all data in the Next Regulatory Control Period is calculated and presented in June 09 dollars) using the above described data conversion methodology. (Refer to Example 2, Section 5.3.6.2 above).

[64] Transend Networks Transmission System Management Plan – Chapter 2.

- WorleyParsons has undertaken a review of aspects of the contractual arrangements between Transend and its key service providers namely Aurora Energy Pty Ltd (Aurora) and Hydro Consulting Services (Hydro). WorleyParsons notes that KPMG was engaged by Transend to conduct a detailed review of the commerciality of their relationship with each of these two companies and that KPMG noted as follows:
  - In respect to Aurora: "Transend has an effective commercial relationship with Aurora" and elsewhere "it appears that the outsourcing model is more cost effective than an in-house resourcing model"[65]; and
  - In respect to Hydro: "Transend has a relationship management structure that effectively manages the value offered by Hydro while maintaining a cost structure that is competitive[66].
- Without wishing to become a contributing factor in the Transend/service provider pricing negotiations, WorleyParsons notes that it has seen no evidence to suggest that Transend is operating in a manner which is other than "efficient" in its commercial dealings with Aurora and Hydro.

Corrective Works Planning

- Corrective work items are estimated using "bucket" amounts for the period in question. These amounts are based on historical costs. This expenditure was then converted to a June 09 valuation and added into the total Opex sub-total for the subject year to form a baseline plan. (Refer to Example 2 above).

WorleyParsons is of the opinion that the Transend's Works Coordination Program provides a highly disciplined way of estimating future Opex costs. In fact WorleyParsons considers that it is the best such tool it has seen used by current Australian TNSPs for objectively forecasting future zero-based, optimised Opex works.

5.3.7.3 Asset Management – Revenue Regulation

Transend has advised that the Revenue Regulation (which is a component of Regulation and Compliance) costs are cyclical, reflecting the timing and varying resource requirements to meet the Rules obligations associated with the revenue regulation process. To ensure that the forecast Opex properly reflects an appropriate estimate of revenue regulation costs, and the likely profile of operating expenditure, Transend has adopted a zero-based approach to forecasting this expenditure. WorleyParsons considers that this is an appropriate approach.

[65] KPMG, Supplier arrangements, Review of Commercial Relationship between Transend Networks Pty Ltd and Aurora Energy Pty Ltd, June 2008, p3.
[66] KPMG, Supplier arrangements, Review of Commercial Relationship between Transend Networks Pty Ltd and Hydro Consulting Services, June 2008, p4.

5.3.7.4 Insurance

Transend has advised that Insurance cost estimates are provided to Transend through an insurance broking company. They further advised that these costs are highly dependent on market conditions, and accordingly, vary over time. Transend has sourced its forecast insurance premiums from a qualified insurance broker – Marsh Pty Ltd.[67]

WorleyParsons confirms that Transend's forecast is consistent with the report from the above mentioned broker.

5.3.8 Step 2 – Derive Annual Forecast For "Other Opex"

In Table 5.5, "Other Opex" was shown to include the following categories:

- Equity Raising;
- Debt Raising;
- Network Support; and
- Self Insurance.

In regard to these elements, WorleyParsons makes the following comments:

- Transend had advised that its forecast methodology for Equity Raising is consistent with recent AER Decisions for both SP AusNet and ElectraNet. In view of this advice, and having no information to the contrary, WorleyParsons accepts Transend's forecast expenditure in regard to this item.
- Transend has advised that they have adopted CEG's advice[68] to calculate its debt raising allowance. In view of this advice, and having no information to the contrary, WorleyParsons accepts Transend's forecast expenditure in regard to this item.
- Transend has advised that the AER has previously examined the proposed Network Support expenditure and found that it was prudent. As the transaction was arms-length with Hydro, and having no evidence to the contrary, WorleyParsons accepts Transend's forecast expenditure for this item.
- Transend had advised that they retained an insurance specialist, Marsh Risk Consulting Services, to advise on the risks and corresponding insurance premium[69]. In view of this expert assessment and the corresponding Board Resolution[70], and having no evidence to the contrary, WorleyParsons accepts Transend's forecast expenditure for this item.

[67] Marsh, Five year Insurance Premium Trends – Indicative Forecasts, dated May 2008.
[68] Transend Proposal 2009-14, Appendix 19.
[69] Transend Proposal 2009-14, Appendix 21.
[70] Ibid, Appendix 22.

5.3.9 Step 3 – Derive Annual Forecast For Total "Controllable" and "Other Opex"

In this step, the various Opex elements were added together to provide the Total Forecast Opex for each year of the Next Regulatory Control Period. As required, all results were reported in June 2009 dollars. The updated Opex Forecast results, using the latest CPI figures (published on Wednesday 23 July 2009), together with the results for the Current Regulatory Control Period, are presented together in Table 5.10. The complete spreadsheet supporting the calculation of the Forecast Opex for the Next Regulatory Control Period (as recommended by WorleyParsons) is presented in Appendix 2.

5.3.10 Transend Adjusted Opex for the Next Regulatory Control Period

The Opex expenditure for the Next Regulatory Control Period requested by Transend in the Proposal was based on:

- CPI data which was current at the time of the Proposal; and
- Asset Growth Factors which were calculated from the above CPI figures.

Since that time the ABS has published new CPI data for June 2008. This required Transend to recalculate the Opex Forecasts for the Next Regulatory Control Period. The up-dated Transend forecast (including minor corrections to the Asset Growth Factors) is presented below in Table 5-10. The data has been presented in the same format as Transend's Table 6.23 from their Proposal.

Observation

The differences between the Total Operating Expenditure in each year as shown in Table 5-10 (the recalculated data based on latest CPI figures) and the data in Table 6.23 in Transend's Proposal (dated 30 May 2008) are generally less than $0.3 million per year.

Table 5-10: Transend's Opex Forecast Recalculated by Transend following Publication of Latest CPI Data (June 2009 $m)

Category	Jan-Jun 2004	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Field operations and maintenance	7.1	14.7	13.8	15.2	16.5	16.4	16.5	17.7	18.0	18.5	19.5
Transmission services	2.1	5.2	6.9	6.5	6.7	7.4	7.8	8.2	8.4	8.7	9.0
Transmission operations	1.0	2.8	6.5	4.7	4.8	5.0	5.1	5.3	5.5	5.7	5.9
Asset management	1.8	4.2	4.4	5.4	8.4	8.3	6.6	6.9	8.6	10.6	9.7
Corporate	3.4	6.5	8.4	8.1	8.3	9.5	9.8	9.9	10.1	10.5	10.9
Total Controllable	**15.4**	**33.4**	**39.8**	**40.0**	**44.7**	**46.6**	**45.9**	**48.0**	**50.6**	**54.0**	**55.0**
Network support	0.0	0.3	1.4	0.7	3.0	3.6	3.9	2.6	0.0	0.0	0.0
Debt raising costs	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.0	1.1	1.2	1.2
Equity raising costs	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	2.4	2.4
Self-insurance	0.0	0.0	0.0	0.1	0.3	1.0	0.8	0.8	0.8	0.8	0.8
Total operating expenditure	**15.4**	**33.6**	**41.2**	**40.7**	**48.1**	**51.3**	**53.9**	**54.9**	**54.9**	**58.3**	**59.5**

5.3.11 Assessment of Justification for Scope Changes

In Table 5-9, Transend's forecast Scope Changes were presented in the context of a discussion regarding forecasting methodology. In this section, the justification for each of the Scope Changes is examined.

The Scope Changes relate to the employment of additional resources which Transend has stated are required in seven different area of the business. Each of these claims is examined below.

5.3.11.1 Engineering & Asset Services

In this case, the Acting General Manager Transmission Services recommended[71] an additional two full-time positions and one temporary position as follows:

- One full-time position in transmission lines in order to be able to deliver the full range of functions and activities;
- One full-time position in substations in order to be able to deliver the full range of functions and activities; and
- An additional person who would be the successor to the present Transmission Line Engineer. This latter position was required to facilitate a smooth transition when the incumbent retires.

WorleyParsons accepts the reasons for these three positions and the estimated expenditure.

5.3.11.2 WORKS PLANNING & COORDINATION

In this case, Transmission Services – Works Planning & Coordination is seeking six additional positions as described below.

(i) Safety Officer Position

In this case, the Acting General Manager Transmission Services recommended[72] an additional Safety Officer position. In the referenced document, it was stated that contractor incidents have doubled over a three year period and that, with the current resources, Transend's performance in this important area is inadequate.

In view of Transend's heavy dependence on contractors, WorleyParsons accepts the reasons for this position and the estimated expenditure.

[71] Additional resources for Engineering and Assets Services Group. Document prepared by Transend, dated 6 June 2008.
[72] Creation of a Safety Officer position. Document prepared by Transend, dated 28 May 2008.

(ii) Environmental Coordinator

Transend has stated[73] that it has a requirement for an Environmental Coordinator. The subject documentation lists a range of duties including:

- Ensuring that Transend's transmission projects meet the requirements of Transend's Environmental Management Plans (EMPs) and provides the necessary reports to stakeholders, including Transend's Board; and
- Reporting to the Tasmanian and Australian Governments on a range of matters related to climate change.

WorleyParsons accepts these reasons for the new position, particularly given the projected increase in the capital works program and the increased national focus on climate change.

(iii) Contract Account Manager

Transend has stated[74] that it has a requirement for a Contract Account Manager. The subject documentation lists a range of duties including:

- Develop and manage contracts and associated relationships with key contractors engaged under panel relationships; and
- Provide a competitive tension with all panel contractors to provide best outcomes for Transend.

WorleyParsons accepts these reasons for the new position, particularly given the projected increase in the capital works program and the projected use of panel relationships with key contractors.

(iv) Senior Inventory Officer

Transend has stated[75] that it has a requirement for a Senior Inventory Officer. The subject documentation lists a range of duties including:

- Responsible for the effective management of all Transend's primary and secondary systems spares at the new store at Bridgewater.

WorleyParsons accepts these reasons for the new position given that Transend has to move out of the present store at Moonah which is managed by Aurora.

[73] Request for New Position – Environmental Coordinator. Document produced by Transend, dated 30 June 2008.
[74] Request for New Position – Contract Account Manager. Document produced by Transend, dated 30 June 2008.
[75] Request for New Position – Senior Inventory Officer. Document produced by Transend, dated 30 June 2008.

(iv) Inventory Officer – 2-positions

Transend has stated[76] that it has a requirement for two Inventory Officers. The subject documentation lists a range of duties including:

- Issuing and receiving stores;
- Inspections on delivery;
- Stocking and flagging inventory related issues; and
- Operation of the proposed Inventory Management System.

WorleyParsons is of the opinion that the subject documentation made an inadequate effort to support two Inventory Officer positions. WorleyParsons accepts that the scope of work of the Inventory Control staff at the new Bridgewater store will increase as compared to the old store at Moonah but does not accept that three new personnel (one senior plus two officers) are required at this time.

Accordingly, until it sees evidence which convinces it that the volume of work justifies two Inventory Officers, WorleyParsons recommends that only one Inventory Officer position be accepted in the Next Regulatory Control Period. In WorleyParsons' experience, two persons, namely the Senior Inventory Officer plus one Inventory Officer should be adequate to control a store of the projected size.

5.3.11.3 Grid Vision

In this case, the General Manager Customer and Asset Management recommended[77] an expenditure totaling $4.4 million over the period from November 2007, when the Strategic Grid Planning Department was established, until the end of the Next Regulatory Control Period, namely June 2014. The expenditure was stated to be required for the following four positions, namely:

- Manager Strategic Grid Planning;
- Strategic Grid Planning Engineer – Transmission Corridors;
- Senior Strategic Grid Planning Engineer – Systems Analysis; and
- Strategic Grid Planning Engineer – Systems Analysis.

In addition to the expenditure required for these permanent positions, additional expenditure is requested for some minor consultancies and support services.

WorleyParsons supports this expenditure. In its experience, the matter of long term planning is generally very poorly managed in Australian TNSPs and it is refreshing to see one TNSP, namely Transend, that is tackling the matter in a professional manner with appropriately planned resources.

[76] Request for New Position – Inventory Officer – 2 positions. Document produced by Transend, dated 30 June 2008.
[77] 30+ year Grid Vision - Further development and budget requirements. Document prepared by Transend, dated 13 June 2008.

5.3.11.4 Connections, System Development & Asset Strategy

In this case, Customer & Asset Management – Connections, System Development, and Asset Strategy & Planning is seeking eight additional positions as described below.

(i) AMIS Support Officer

Transend has stated[78] that it has a requirement for an AMIS Support Officer. The subject documentation lists a range of duties including:

- Day-to-day management of AMIS; and
- Providing user support, particularly in regard to the new applications which are currently being developed.

The position is to be filled on 1 July 2012.

WorleyParsons supports this expenditure on the basis of the importance of AMIS to the effective planning within the organisation and the increasing volume of work which will likely have developed by the subject operational date.

(ii) Customer Account Manager

Transend has stated[79] that it has a requirement for a Customer Account Manager (CAM). The subject documentation lists a range of duties including:

- Customer relationship management;
- Connection agreement renegotiation; and
- New connections.

There are presently three CAMs. Transend has advised that one is primarily involved in revenue metering issues and compliance, a second is fully involved with generators and the third position is fully involved with load customers. The new position is required to assist on the load customer side as Transend now has 10 Connection Agreements to manage and it is currently negotiating with three others with the expectation of more to follow.

On the basis of a detailed assessment of the work load involved, WorleyParsons accepts the necessity for this position and supports the associated expenditure.

[78] Request for New Position – AMIS Support Officer. Document produced by Transend, dated 30 June 2008.
[79] Request for New Position – Customer Account Manager. Document produced by Transend, dated 30 June 2008.

(iii) Pricing Compliance Analyst

Transend has stated[80] that it has a requirement for a Pricing Compliance Analyst. The subject documentation lists a range of duties including:

- Determining prices for prescribed transmission services;
- Preparation of monthly transmission service invoices;
- Assisting to maintain processes to ensure that the activities undertaken by the Connections Department are compliant with the Rules; and
- Assisting the Pricing Officer in addressing customer demands for pricing information.

Transend has advised that existing resourcing levels in the Connections Department are inadequate and that they are currently unable to meet the increasing pricing and compliance obligations in the manner expected of a customer focussed and proactive organisation. They also advised that the appointment of this additional resource will allow Transend to provide more timely response to the increasing pricing requests from customers, facilitate more timely compliance of the Connections Department's significant number of connection agreement and Rules obligations, and remove the current single person dependencies in both areas.

On the basis of the documentation provided, WorleyParsons accepts the necessity for this position and supports the associated expenditure.

(iv) Asset Strategies Engineer (2 positions)

Transend has stated[81] that it has a requirement for two Asset Strategy Engineers. The subject documentation lists a range of duties including:

- Sustain transmission network performance by developing and implementing asset management policies, standards, strategies and plans to maximise asset performance at the lowest life-cycle cost;
- Review and prepare documentation regarding asset management frameworks as required to demonstrate the transmission network assets are being managed in accordance with good electricity industry practice; and
- The production and on-going management of critical asset management documentation such as the Transmission System Management Plan (TSMP), Asset management Plans and the significant number of technical standards that define Transend's equipment and associated work requirements.

[80] Request for New Position –Pricing/Compliance Analyst. Document produced by Transend, dated 30 June 2008.
[81] Request for New Position – Asset Strategies Engineer – 2 positions. Document produced by Transend, dated 30 June 2008.

In addition to the above detail regarding the range of duties, Transend has advised, inter alia, that:

- The provision of two additional Asset Strategies Engineer resources within the Network Performance and Strategies Department will provide sufficient capacity to proactively manage the strategic asset management function and technical standards development and review. This need has arisen as the present resourcing level of three approved Asset Strategies Engineers has proven to be significantly below the resource level required to proactively manage the volume of work expected from these positions.
- The volume of work has recently increased considerably with the development and present introduction of 36 comprehensively detailed asset management plans for each equipment asset class comprising the transmission system. These asset management plans require annual update by the Asset Strategies Engineers and are a key layer of documentation within Transend's documentation framework to support its extensive operating and capital works programs. This documentation is considered vitally important in providing prudent, efficient and effective management of Transend's assets (currently valued at over $1billion) throughout their life-cycle to enable Transend to meet its strategic performance objectives, and provide evidence thereof within a highly regulated environment.
- The volume of work also includes the development and review of technical standards documentation. This presently involves over 135 technical policy, strategy, standards and procedure documents that require regular review and updating. Past experience has shown the present level of resourcing to be insufficient in providing proactive management of this considerable magnitude of technical documentation, with a considerable level of documentation being overdue for review. This documentation, and its accuracy, is vitally important to the efficient delivery of Transend's extensive operating and capital works program, and the present lack of resourcing has the potential to adversely impact the program.

On the basis of a detailed assessment of the volume of work required to be undertaken by the subject positions, and in consideration of the vital importance of this function to the prudent and efficient operation of both the capital and operational work programs, WorleyParsons accepts these positions and the associated expenditure.

(v) Senior Network Development Engineer

Transend has stated[82] that it has a requirement for an additional Senior Network Development Engineer. The subject documentation lists a range of duties to support the intensive network development program which is expected to continue for the foreseeable future, including:

- Improved mid-term planning and the production of supporting documentation;

[82] Request for New Position – Senior Network Development Engineer. Document produced by Transend, dated 30 June 2008.

- Project definition, detailed scoping and estimation for the increased volume of capital works projects; and
- Other activities, including customer initiated works.

WorleyParsons accepts the reasons for the subject position which it regards as particularly important in view of the proposed capital works program. WorleyParsons accepts the proposed expenditure for this position.

(vi) Network Development Engineer

Transend has stated[83] that it has a requirement for an additional Network Development Engineer. The subject documentation lists a range of duties to support the intensive network development program which is expected to continue for the foreseeable future, including:

- Improved mid-term planning and the production of supporting documentation;
- Project definition, detailed scoping and estimation for the increases volume of capital works projects; and
- Other activities, including customer initiated works.

WorleyParsons has assessed the volume of work involved and accepts the reasons for the subject position which it regards as particularly important in view of the proposed capital works program. WorleyParsons accepts the proposed expenditure for this position.

(vii) Project Development Officer

Transend has stated[84] that it has a requirement for an additional Project Development Officer. The subject documentation lists a range of duties which include:

- Manage, monitor and coordinate the achievement of required approvals and agreements to facilitate the construction of new projects or undertake modifications to existing assets;
- Manage the preparation and submission of development applications of capital projects identified within the Capital Work Program;
- Manage, monitor and coordinate Transend's strategic position with regard to Resource Management and Planning System;
- Prepare summaries of the planning implications and considerations during the Project Concept Stage; and

[83] Request for New Position – Network Development Engineer. Document produced by Transend, dated 30 June 2008.
[84] Request for New Position – Project Development Officer. Document produced by Transend, dated 30 June 2008.

- Communicate project related activities to internal and external stakeholders and complete project reporting and administration.

WorleyParsons has assessed the volume of work involved and accepts the reasons for the subject position which it regards as important in view of the proposed capital works program. WorleyParsons accepts the proposed expenditure for this position.

5.3.11.5 Training & development

In this case, Business Services - Human Resources is seeking two additional positions plus consultancies, as described below.

(i) Training and Development Officer

Transend has stated[85] that it has a requirement for a Training and Development Officer. The subject documentation lists a range of duties which include:

- Establish a core competencies framework for the majority of positions within the business;
- Build a training records structure and database within the HRMIS that provides position and staff based training information;
- Identify training providers and programs, and engage providers to ensure quality training outcomes are delivered to the business and its staff;
- Build relationships and promote the industry as an employer of choice through schools, scholarships, career advisors and the community;
- Validate existing employee training, performing gap analysis; and
- Work with other HR staff and managers to define position-based competencies that will assist in the alignment of workforce planning and recruitment initiatives.

WorleyParsons has assessed the difficulties experienced by Transend in attracting and retaining suitable staff and considers that an appointment to this position should proceed in order for Transend to be able to compete more effectively in the tight labour market.

(ii) HR Business Support Officer

Transend has stated[86] that it has a requirement for an HR Business Support Officer. The subject documentation lists a range of duties which include:

- Provide administrative support to the Manager Human Resources and HR team generally;

[85] Scope Change – Skills Development and Training. Document produced by Transend, Reference D08/59327.
[86] Ibid.

- Provide payroll support – to ensure payroll processing capacity (beyond one (1) key person) is maintained and that payroll services are not interrupted by unexpected absences;
- Coordinate HR records management – including file room and review of existing documentation (hard and soft copy) to ensure it complies with new standards (policies and procedures);
- Human Resources intranet site management – including recruitment and remuneration administration support, and training coordination;
- Coordinate Transend's induction program for new staff; and
- Provide support within the HR department in relation to basic HR processes.

On the basis of the documentation provided, WorleyParsons accepts the necessity for this position and supports the associated expenditure.

5.3.11.6 Business Communications

Transend does not own a telecommunications network. It purchases its operational and business telecommunications services from Hydro Tasmania. Transend has advised that in the Next Regulatory Control Period, it requires a number of additional business telecommunications services. That is, it requires business communications to service the following locations:

- Primary equipment and system spare store at Bridgewater;
- Secondary systems equipment store at Maria Street;
- Maria Street administration building extension;
- Northern administration building accommodation;
- Transend's contribution to the PABX network upgrade;
- Back-up control facility at Chapel Street; and
- Minor works.

In the Transend document[87], the planned expenditure is supported with a detailed costing of this item provided by Hydro Tasmania. The document states that capital and operating costs (in December 2007 dollars) have been separated to provide appropriate estimates of only the Opex components.

WorleyParsons accepts this forecast expenditure on the basis that the quotations were provided by Hydro, which is effectively at arms-length from Transend.

WorleyParsons notes that the subject forecast Business Communications expenditure is based on a status quo continuation of the relationship between Transend and Hydro. WorleyParsons is aware

[87] Telecommunications Project Costs. Document prepared by Transend, dated July 2008.

that negotiations are in progress between Transend and Hydro which may lead to Transend purchasing part of the communications system which is currently owned and operated by Hydro, If such an outcome were to occur, then clearly the basis of the above forecast expenditure would be invalid and this item would need to be re-estimated and resubmitted by Transend. There would also be an associated changed Capex requirement.

5.3.11.7 Separation Costs

Following a recent re-organisation, a number of employees were made redundant and left the organisation. The separation costs paid to these employees is shown at this item. WorleyParsons accepts this expenditure.

5.3.11.8 Summary

On the basis of the investigation which is described above, WorleyParsons recommends to the AER that Transend's proposed expenditure on Scope Changes be reduced by deleting the following position, namely; 1 * Inventory Officer.

This involves reducing the Scope Change expenditure (see Table 5-9 by an amount of $1k in 2008/09, and $75.6k per year from 2009/10 to the end of the Next Regulatory Control Period.

5.3.12 WorleyParsons' Recommended Opex for the Next Regulatory Control Period

WorleyParsons has recalculated Transend's Opex Forecasts using the recommended Scope Changes (see Section 5.3.11.8). The results for both "Controllable" and "Total" Opex are tabulated in Table 5-11 below. In Figure 5-11 below, the key elements of the Controllable Opex (corresponding to Table 5-11) are graphed. In both Table 5-11 and Figure 5-11, the results are given for both the Current and the Next Regulatory Control Periods.

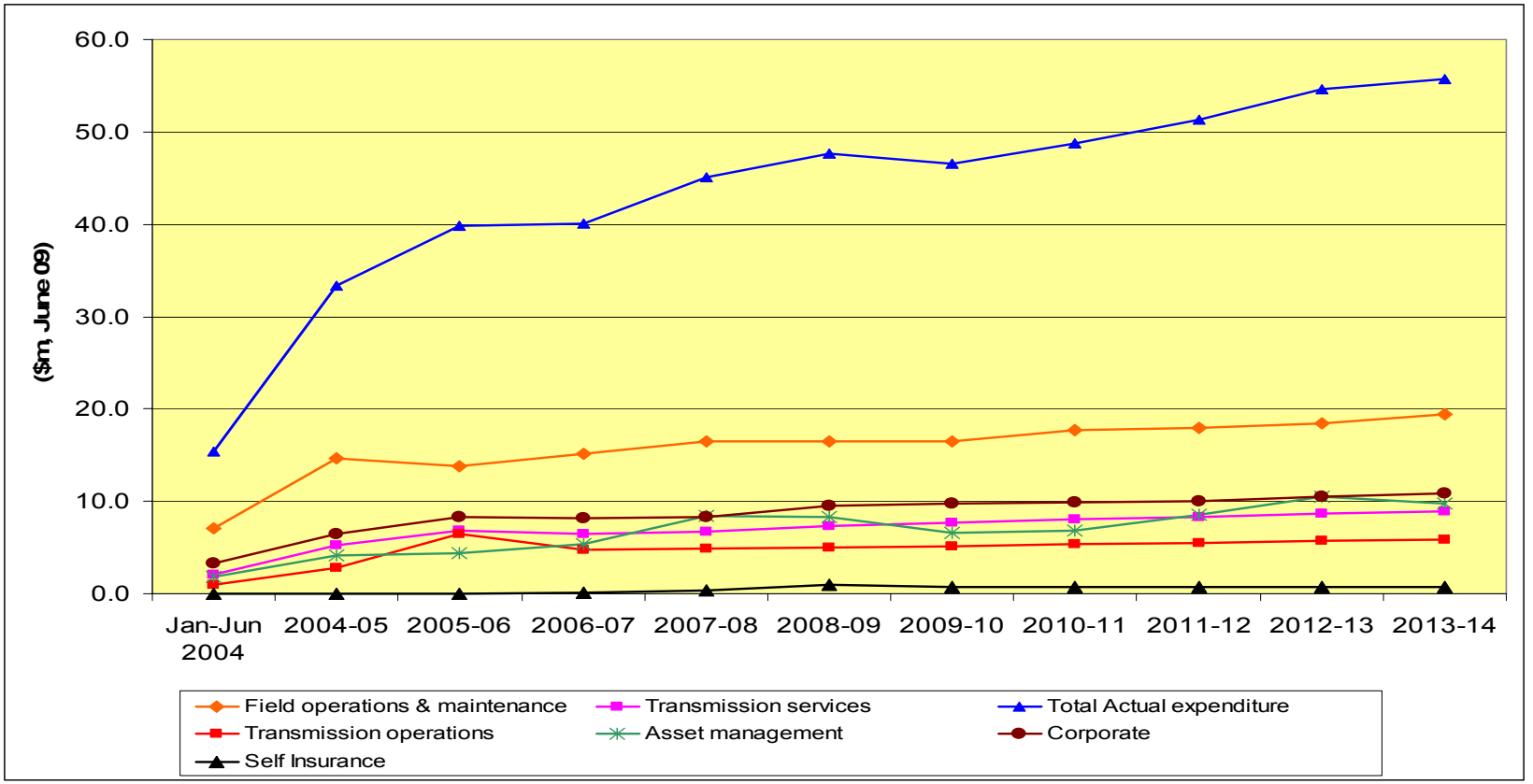
Observations – Re Controllable Opex (June 09 $s)

1. The level of Controllable Opex at the start of the Next Regulatory Control Period is forecast to be $45.8 million (in 2009/10) as compared to $46.6 million at the end of the Current Regulatory Control Period (2008/09).
2. The level of Controllable Opex is forecast to grow from $46.6 million at the end of the Current Regulatory Control Period (2008/9) to $54.9 million at the end of the Next Regulatory Control Period (2013/14). This represents a total increase (real growth) during the Next Regulatory Control Period of 17.8 % over five years or 3.3% pa.
3. It is noted that over the same five year period the real growth in labour is forecast to be 18.4 % and the total cumulative net asset growth is forecast to be 16.9 %.

Table 5-11: WorleyParsons Recalculation of Transend's Opex Forecast following Modification of Scope Changes (June 09, $m)

Category	Jan-Jun 2004	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Field operations and maintenance	7.1	14.7	13.8	15.2	16.5	16.4	16.5	17.7	18.0	18.5	19.5
Transmission services	2.1	5.2	6.9	6.5	6.7	7.4	7.7	8.1	8.3	8.7	8.9
Transmission operations	1.0	2.8	6.5	4.7	4.8	5.0	5.1	5.3	5.5	5.7	5.9
Asset management	1.8	4.2	4.4	5.4	8.4	8.3	6.6	6.9	8.6	10.6	9.7
Corporate	3.4	6.5	8.4	8.1	8.3	9.5	9.8	9.9	10.1	10.5	10.9
Total Controllable	**15.4**	**33.4**	**39.8**	**40.0**	**44.7**	**46.6**	**45.8**	**47.9**	**50.5**	**53.9**	**54.9**
Network support	0.0	0.3	1.4	0.7	3.0	3.6	3.9	2.6	0.0	0.0	0.0
Debt raising costs	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.0	1.1	1.2	1.2
Equity raising costs	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	2.4	2.4
Self-insurance	0.0	0.0	0.0	0.1	0.3	1.0	0.8	0.8	0.8	0.8	0.8
Total operating expenditure	**15.4**	**33.6**	**41.2**	**40.7**	**48.1**	**51.3**	**53.8**	**54.8**	**54.8**	**58.2**	**59.4**

Figure 5-11: Actual/Forecast Total Controllable Opex Expenditure for Current/Next Regulatory Control Period Dissected



5.4 Opex Costs Benchmarked

5.4.1 Introduction

Transend's transmission system is characterised by a backbone network consisting of 220kV and 110kV lines. They connect geographically dispersed power stations and load centres. In particular, a number of generators are located at remote sites that require extensive transmission infrastructure that traverses through challenging terrain and environmentally sensitive areas. Further to this Transend, unlike most other TNSPs owns, operates and maintains sub-transmission and HV (high voltage) assets that operate at voltages of 6.6kV, 11kV, 22kV, 33kV and 44kV. The combination of the geography, remote generation locations, load centre locations and the large number of lower rated high-voltage and sub-transmission assets results in Transend incurring unavoidably higher operating and maintenance costs as compared with other Australian TNSPs.

WorleyParsons notes that because of the atypical nature of the Transend system, caution needs to be exercised when comparing Transend's performance to standard industry benchmarks and the benchmarks of other Australian TNSPs.

5.4.2 Benchmarks Defined

The benchmarking measures that have been used in this report to compare Transend with other Australian TNSPs are:

- Actual and Projected Opex / Average RAB;
- Opex / Transformer Capacity (MVA);
- Opex / Transformer;
- Opex / Demand Peak (MW); and
- Opex / Kilometre (000s km's).

The data has been sourced from the AER's 2005/06 TNSP Regulatory Report[88] and from recent TNSP decisions and proposals. The Opex expenditure referred to in this benchmarking study is the Controllable Opex.

In addition to the above benchmarking exercise, the following ITOMS[89] benchmarking scatter plots are reproduced in this report:

- Overall;

[88] Transmission Network Service Providers Electricity Regulatory Report for 2005/06, AER, June 2007
[89] ITOMS masked data provided by Transend, dated 2007.

- Substation Maintenance; and
- Overhead Transmission Line Maintenance.

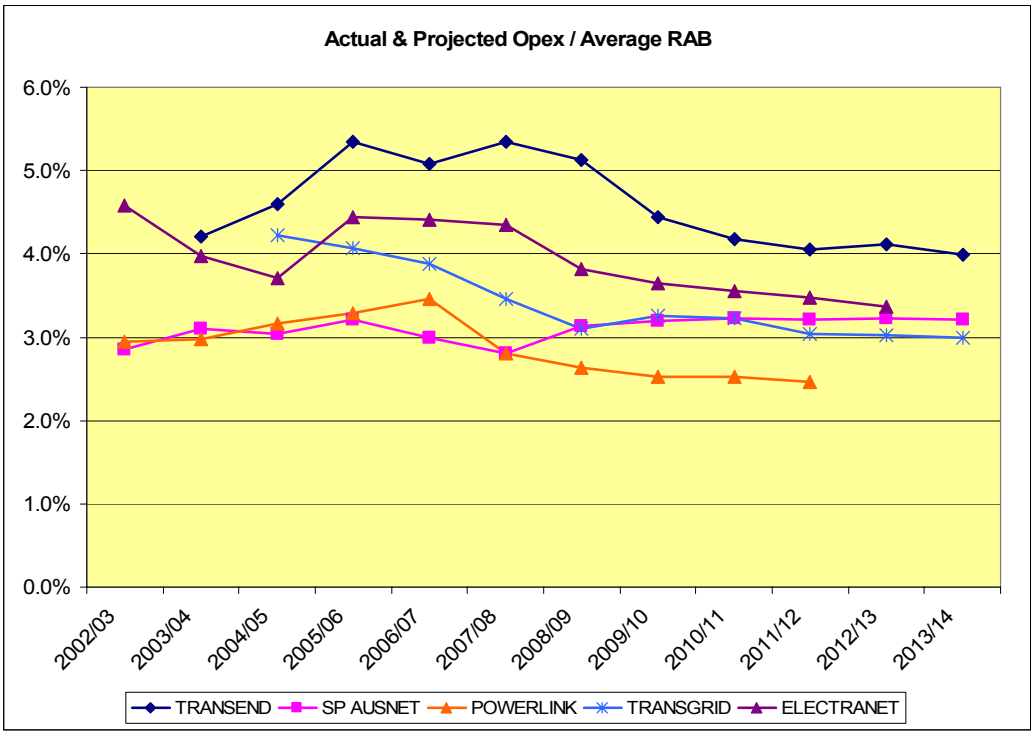
5.4.2.1 Australian TNSP Benchmarking

Actual-Projected Opex/Average RAB

In Figure 5-12, Transend's performance is compared with the performance of the four major Australian mainland TNSPs in respect to:

- (Actual Opex / Average RAB) for the Current Regulatory Control Period; and
- (Forecast Opex / Average RAB) for the Next Regulatory Control Period.

Figure 5-12: Actual & Projected Opex / Average RAB



Observations

(i) In comparison to the other TNSP's, Transend has a higher level of Opex per unit RAB. However, WorleyParsons considers that this is due to the unique or atypical nature of the Transend network (and possibly a low valuation of the RAB) rather than poor efficiency.

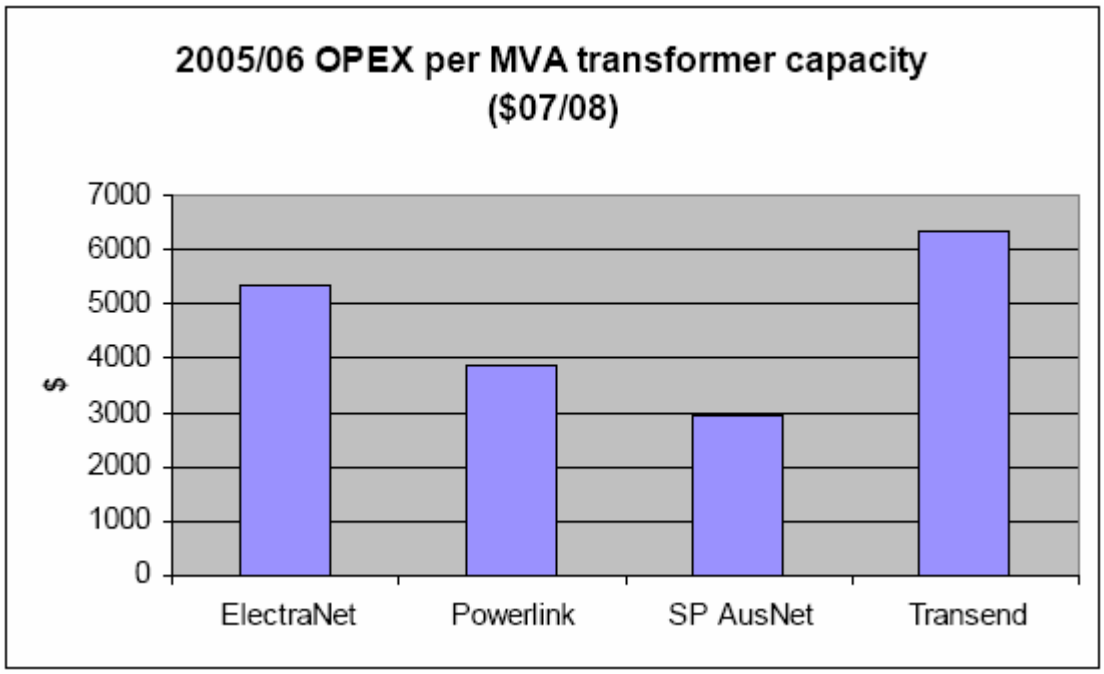
(ii) It should be noted that the data for Transend is not entirely consistent across both the Current Regulatory Control Period and the Next Regulatory Control Period. The inconsistency (which is quite minor) arises because of a changed AER ruling. That is, in the Current Regulatory Control Period, Capex is on an "as commissioned" basis whereas Capex in the Next Regulatory Control Period is on an "as incurred" basis. However, given the amount of WIP as compared to the total RAB, this inconsistency is not material for the purposes of the above comparisons.

(iii) Transend's forecast Opex as compared to the average RAB shows an efficiency improvement of about 1.1%, that is, a reduction from 5.1% to 4%.

Opex/Transformer Capacity

In this part of the benchmarking exercise, Transend's Opex per MVA of transformer capacity are compared with the four mainland Australian TNSPs. The results are shown below in Figure 5-13.

Figure 5-13: Opex per Transformer Capacity (MVA)



Observations

(i) Transend has the highest value of the subject parameter.

(ii) Transend's performance appears more comparable with ElectraNet's performance as opposed to Powerlink and SP AusNet. WorleyParsons considers that the superior performance of the larger TNSPs is directly attributable to the

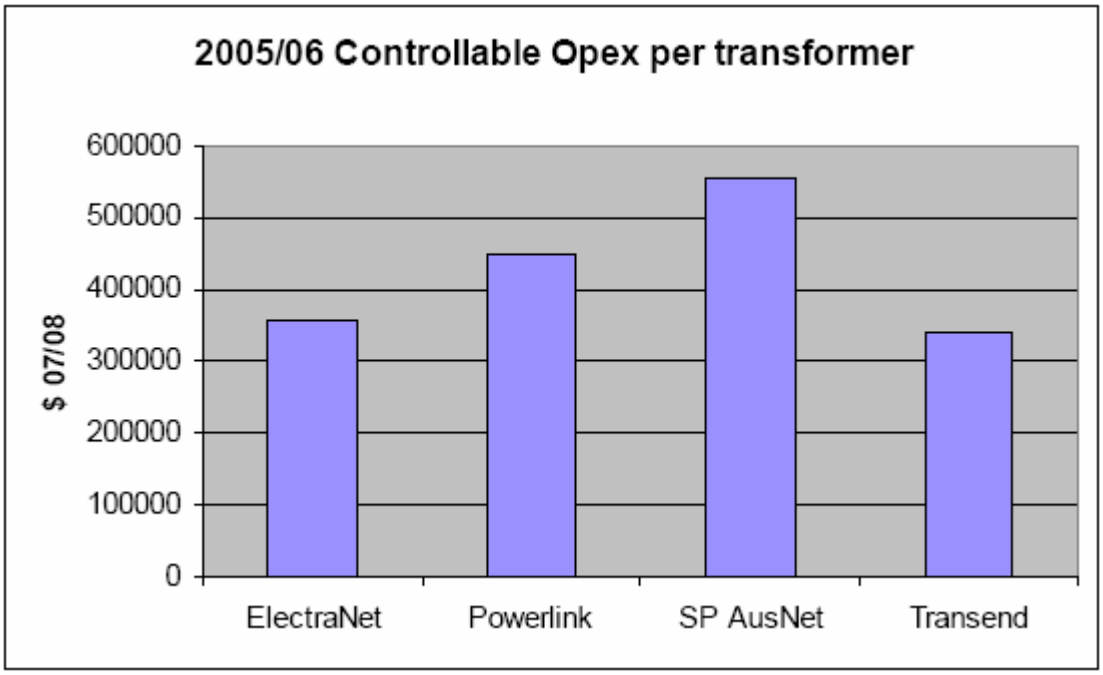
higher and denser loads that they supply, rather than to superior operational efficiency.

(iii) Transend and ElectraNet both have comparably low load densities resulting in higher benchmark figures.

Opex per Transformer

In this part of the benchmarking exercise, Transend's Opex per transformer was compared with the four mainland Australian TNSPs. The results are shown below in Figure 5-14.

Figure 5-14: Opex / Transformers Installed



Observations

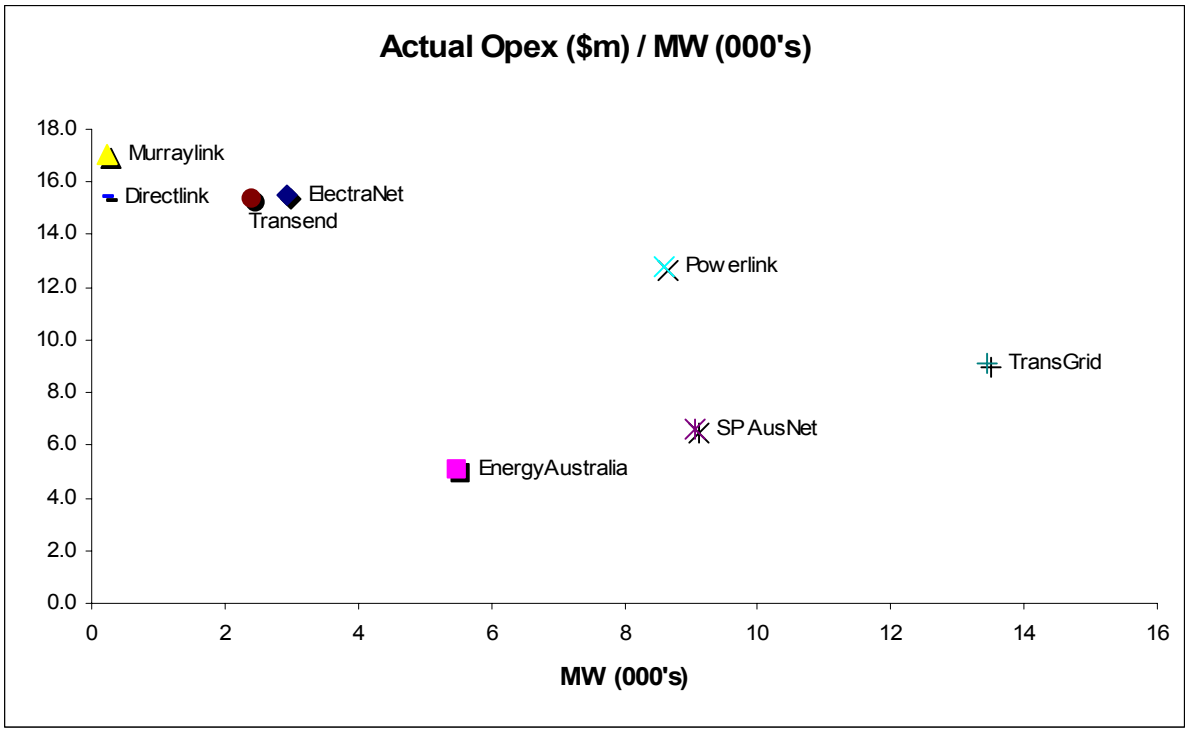
(i) From Figure 5-14, Transend's benchmark value is lowest when compared to its peers. WorleyParsons considers that this is mainly due to the large number of smaller capacity transformers on the network. It also highlights that the inherent nature of the networks has more of an influence on the benchmark results than relative operational efficiencies.

(ii) In WorleyParsons considered opinion, the obvious similarity between Transend and ElectraNet reflects the similarities in equipment size rather than operational efficiency.

Actual Opex per Peak Demand (MW)

The benchmark graph of Figure 5-15 provides a representation of 2006/07 Actual Opex ($m) / Peak Demand MW (000s) for the Base-Year of 2006/07.

Figure 5-15: Actual Opex / Demand Peak MW



Observations

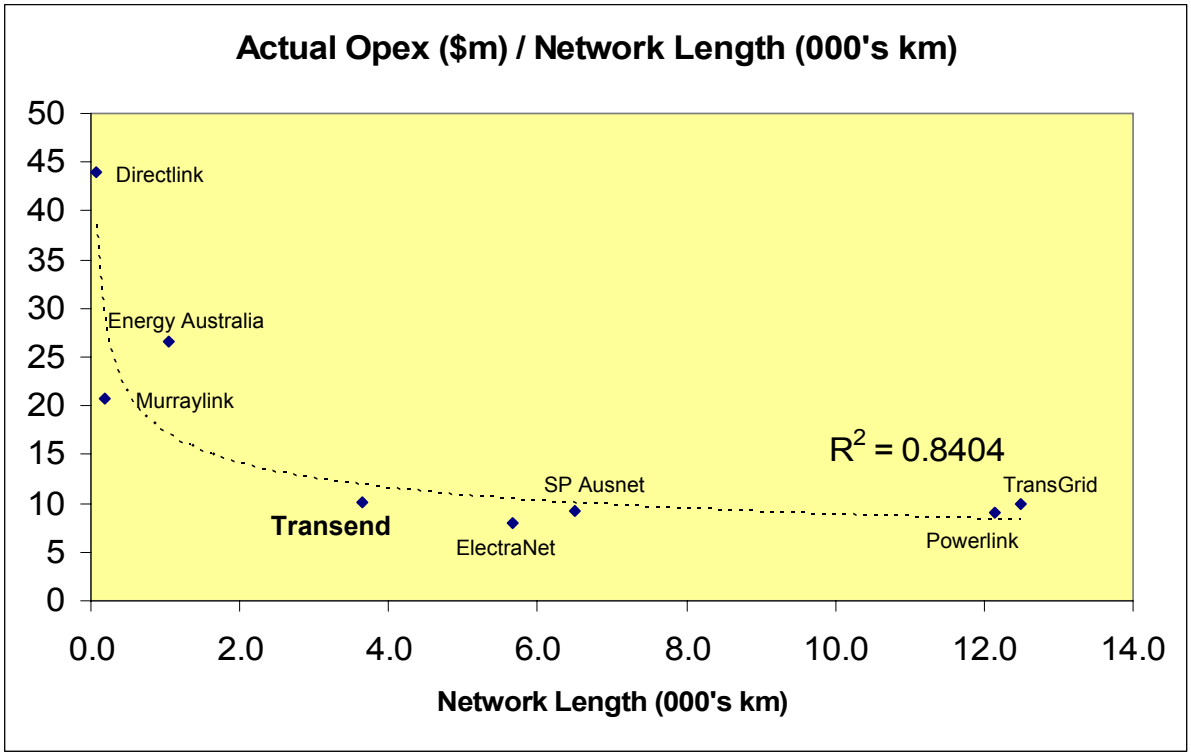
(i) Murraylink and Directlink are both DC links using ABB's HVDC Light technology and are therefore quite dissimilar to the other TNSPs shown on the graph. For this reason WorleyParsons excludes them from the following comparison.

(ii) Transend and ElectraNet have approximately the same value for this parameter (that is, Actual Opex / Peak Demand MW). Additionally both these TNSPs have the highest value of this parameter within the group of Australian TNSPs compared. As previously stated, WorleyParsons considers that the similarity between Transend and ElectraNet and the differences between them and the other Australian TNSPs has more to do with the inherent qualities of the individual networks, rather than operational efficiencies.

Actual Opex/Circuit Length

Figure 5-16, provides a comparison for the year 2006/07 of the Actual Opex per circuit kilometre (that is, it includes both overhead and underground lines) for each of the TNSPs.

Figure 5-16: Actual Opex / Network Length



Observations

(i) A trend line has been drawn for the plotted points. The degree of fit ($R^2 = 0.8404$) is quite high indicating a good fit. This indicates that the correlation between Actual Opex and circuit kilometres is a strong one.

(ii) Transend is below the trend line indicating its Opex is lower that the typical value for the group of TNSPs. This suggests that Transend is somewhat more efficient than what would be expected given the network length.

5.4.2.2 ITOMS Benchmarking

Introduction

Transend participates in the biennial International Transmission Operations and Maintenance Study (ITOMS). It is a consortium of international transmission companies that work together comparing performances and work practices and identifying best transmission industry practices worldwide. The study also provides the participating companies with the opportunity to continually improve their performance by implementing performance improvement initiatives and providing a measure of efficiency. This study is regarded as an industry-accepted performance measuring tool.

Benchmarking has been carried out on an "Overall" basis and on the sub-function level. Examples of the sub-function levels are "Overhead Transmission Line Maintenance" and "Substation Maintenance". Each sub-function has its own associated activities that are used to form the resulting benchmarking measures. The key performance indicators are presented as a measure of both composite cost and composite service levels. These measures are presented in scatter plots with the results of other TNSPs (see Figures 5.17, 5.18 and 5.19 below) where the best performing TNSPs are situated in the top right quadrant. The top right quadrant signifies a tendency towards strong service levels and low costs.

Due to confidentiality, all TNSP peers have their measures masked, however regional measures are displayed as the following:

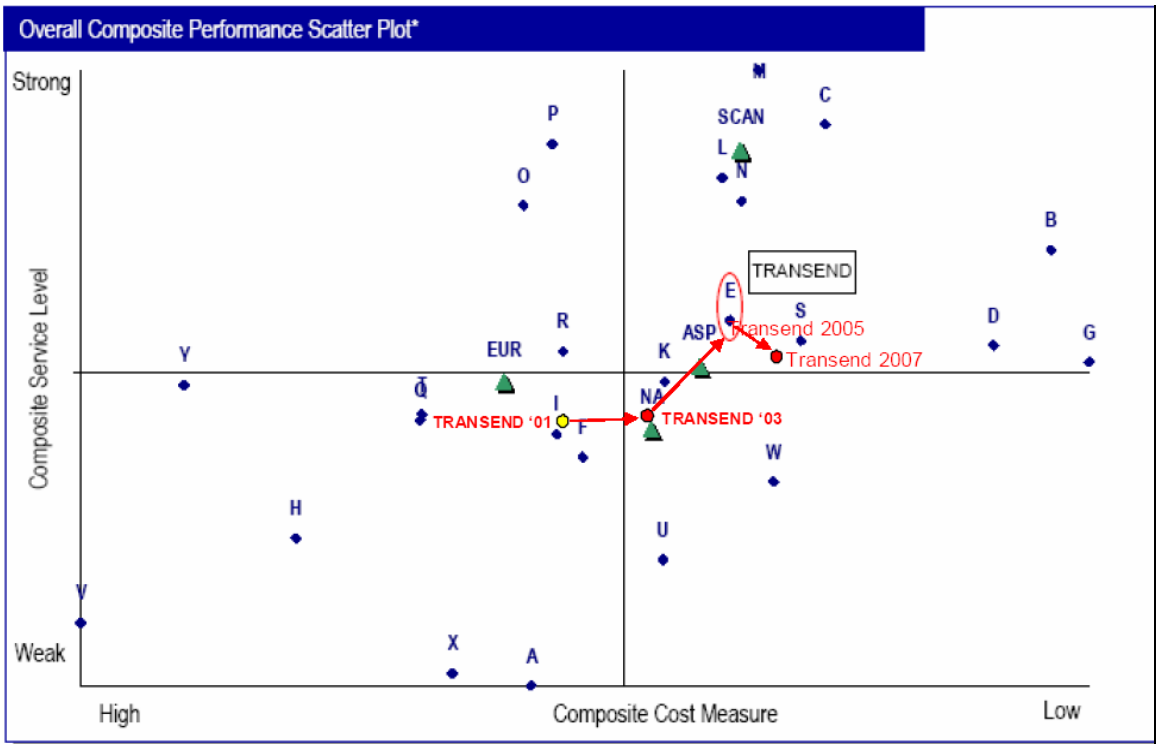
- ASP – Asia South Pacific;
- SCAN – Scandinavia;
- EUR – Europe; and
- NA – North America.

Note; these regional measures all relate to the 2007 year.

Overall Composite Performance

In Figure 5-17, Transend's overall performance is compared with all of the ITOMS participants.

Figure 5-17: Overall Composite Performance – ITOMS 2007



Observations

(i) Transend's overall performance has been benchmarked for the last four reporting periods.

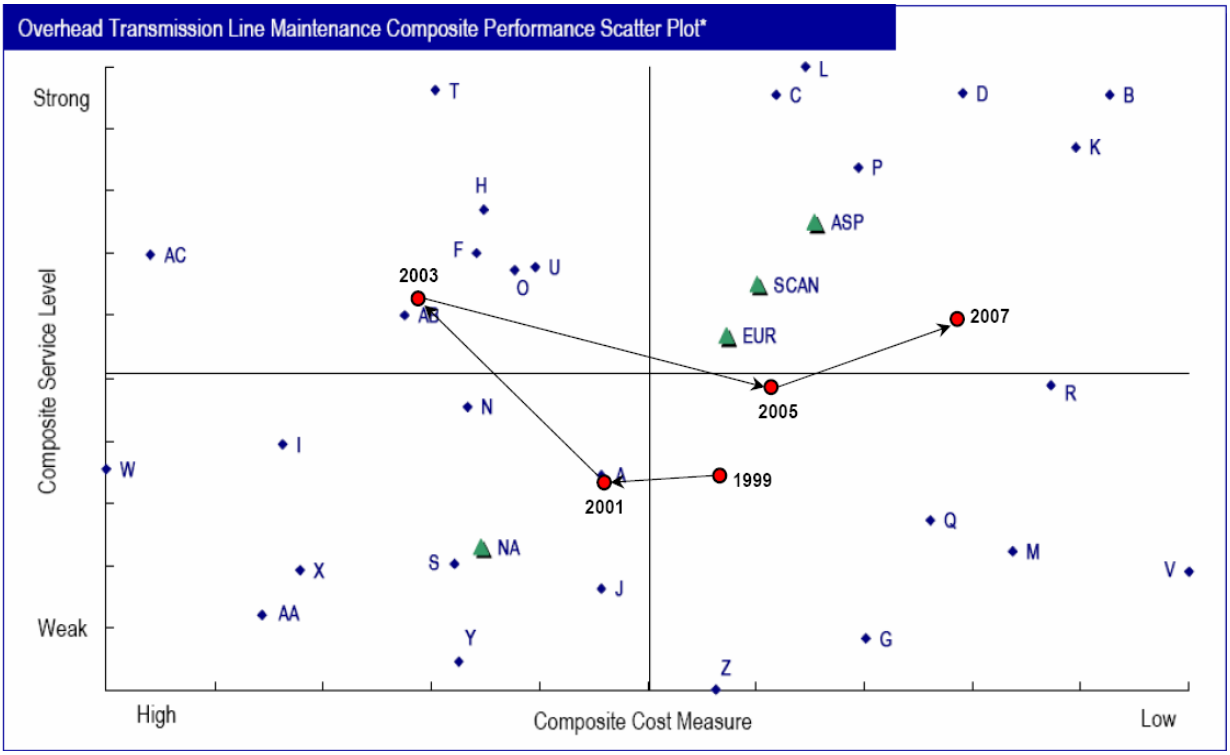
(ii) From 2001 through to 2007, Transend has consistently improved its benchmarked cost performance and has generally maintained its service levels.

(iii) This performance measure places Transend in the top right-hand quadrant and above the regional average measure for the Asia South Pacific region.

Overhead Transmission Line Maintenance

Figure 5-18, Transend's overhead transmission line maintenance performance is plotted over five reporting periods against a 2007 background.

Figure 5-18: Overhead Transmission Line Maintenance Composite Scatter Plot – ITOMS 2007



Observations

(i) In this figure, Transend has shown improvement in costs from 2003 and service levels from 2005.

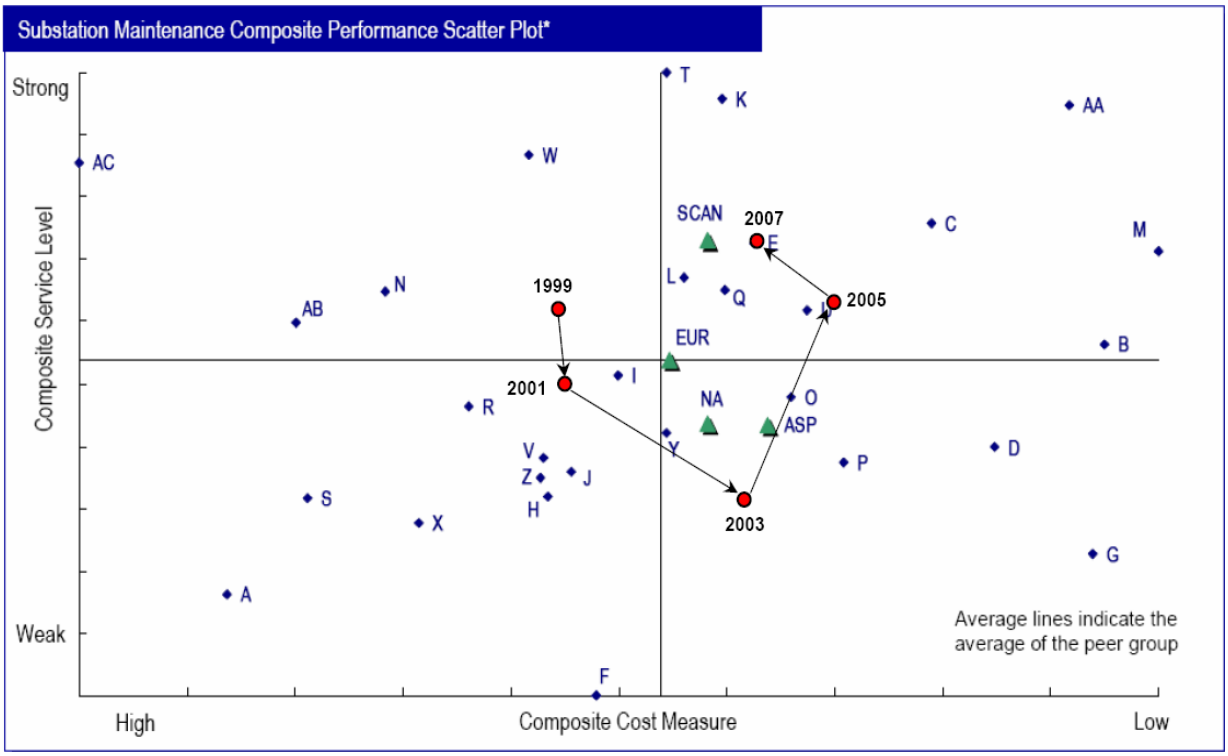
(ii) In 2007, Transend's cost measure was better than (that is, lower cost) than that of the four regional measures, whilst maintaining acceptable service levels.

(iii) Transend was in the top right-hand quadrant indicating strong performance overall in this area.

Substation Maintenance

In Figure 5-19, Transend's substation maintenance composite performance has been compared over five reporting periods to its peers.

Figure 5-19: Substation Maintenance Composite Performance Scatter Plot – ITOMS 2007



Observations

(i) The results for Transend show a continual improvement over the last five reporting periods.

(ii) No doubt this result was in large part due to the use of Transend's well developed and continually optimised asset management plans delivered by their Works Co-ordination Program.

(iii) Transend was in the top right-hand quartile which indicates its strong performance particularly in its service level measure.

(iv) In 2007, Transend's service levels was better than the all regional averages and were relatively comparable to the Asia South Pacific region in cost.

5.4.2.3 Benchmarking Conclusions

(i) In WorleyParsons' experience, benchmarking in general, while apparently offering a useful means of comparing the relative performance of TNSPs is fraught with difficulties. This was well illustrated by the above comparison between Opex per transformer MVA where Transend was the worst performer of the group of Australian TNSPs and Opex per transformer, where Transend was the best performer.

(ii) In WorleyParsons' view, the inherent characteristics of the individual networks, which are the result of:

- Geography;
- The disposition of generation and loads;
- The absolute size of the network;
- The development history - the technical decisions which were made in the past; and
- The maintenance history - how well the network has been maintained in the past;

are all very important in determining the legacy with which the current management must work when planning current and future Opex activities.

(iii) Obviously, the efficiency with which the current management undertakes its current and future Opex activities also affects the overall benchmarking results. However, WorleyParsons considers that the influence of the above described inherent factors is so strong as to effectively mask the true efficiencies and therefore diminishes the results of the benchmarking (in respect to comparisons to other TNSPs).

(iv) WorleyParsons considers that one area where benchmarking can be most relied upon is where a TNSP is compared with itself over time. Under these circumstances, and if the data definition has remained constant, then useful trends can be obtained.

(v) WorleyParsons notes that the ITOMS benchmarking can be used in this way. Viewing the ITOMS data from this perspective (and noting the rigour with which ITOMS data is defined) indicates that Transend has made continual improvements in its Opex performance over the past five (biennial) reporting periods. Further, when compared to the other participants in the Asia Pacific Region (these include most the Australian and New Zealand TNSPs), Transend's

Overall Composite Performance was better in respect to both cost and service level in 2007 (the date of the last ITOMS report).

5.5 Capex/Opex Tradeoffs

5.5.1 Introduction

In the course of its investigation, WorleyParsons came across many examples where either new Capex had affected the level of Opex which would have been required in the absence of the new Capex or where planned or actual Opex had (or was expected) to affect Capex. In this part of the report, three examples are provided to illustrate:

(i) Where new capital expenditure was undertaken for a number of reasons and where it also had the effect of reducing operational expenditure;

(ii) Where additional operational expenditure was undertaken to defer capital expenditure; and

(iii) Where, in addition to the above Capex/Opex tradeoffs, another related matter, that is a Capex/Capex tradeoff, was employed to reduce capital expenditure.

In its contract with the AER, WorleyParsons was required to examine Capex/Opex tradeoffs to ensure that:

(i) Every Capex/Opex tradeoff was reasonable, and

(ii) For every Capex investment or Opex activity, ensure that no doubling up occurred. That is, did the planning processes employed by Transend ensure that when a new Capex investment was made, that appropriate recognition was made of this decision when planning Opex activities?

5.5.2 Examples of Opex/Capex Tradeoffs

Example 1 – Condition Assessment of Sprecher and Schuh Circuit Breakers

Transend has stated[90] that it has a population of some 23 Sprecher and Schuh Type HPF 110 kV circuit breakers installed in its transmission system. They further stated that:

- These circuit breakers are the most unreliable 110 kV circuit breakers on the system;

[90] Sprecher and Schuh Type HPF 110 kV Circuit Breaker – Condition Assessment Report. Document prepared by Transend, Issue 1.0, dated June 2008.

- They are in poor physical condition;
- They have a number in inherent major technical design deficiencies;
- They are maintenance intensive and expensive to maintain as compared to modern equivalent units;
- They are no longer supported by the manufacturer; and
- They have reached the end of their useful lives.

In view of these deficiencies, Transend has advised that they have undertaken an investigation as to how to deal with this problem. They considered three options, namely:

Option 1 – Maintain the circuit breakers and defer replacement;

Option 2 – Refurbish the circuit breakers; or

Option 3 – Targeted replacement program.

After consideration of these options, Transend decided to undertake Option 3, a targeted replacement program. However, in order to ameliorate the risk of forced outages, they issued a directive that each such CB was to be inspected after each operation.

Transend has estimated that Option 3 will involve a capital expenditure of some $6.3 million ($2008) spread over a five year program and that it will reduce operational expenditure by an amount of between $20,000 and $50,000 per year.

Transend did not suggest that the Capex of $6.3 million should be spent to save up to $50,000 Opex per year, rather that the targeted replacement of the CBs, which was required for the totality of the above mentioned reasons, has as one of its consequences that there will be a reduction in Opex as specified.

WorleyParsons considers that this was the correct decision and that it was both prudent and efficient, given that the manufacturer would no longer support the CB with vital parts such as seals, gaskets and linkages etc which could not be obtained in a serviceable condition from retired assemblies.

Example 2 – On-Line Insulating Oil Analysis Systems

Transend has stated[91] that they are undertaking a raft of condition monitoring initiatives in substations wherein additional Opex and minor Capex will be incurred to defer major Capex. One such example relates to On-Line Insulating Oil Analysis Systems. In this example, minor Capex of $420,000 ($2007) is proposed to be spent to provide the equipment required to provide continuous monitoring of the insulating oil quality of seven unique and/or highly loaded network transformers installed in the transmission system. The use of this equipment,

[91] Substation Condition Monitoring – Additional Information. Document prepared by Transend, Issue 0.1, dated July 2008.

involving an incremental increase in Opex, is aimed at the early detection and possible prevention of a major asset failure. Transend has stated that the overall effect will be to reduce the likelihood and hence the costs of a major catastrophic failure.

WorleyParsons considers that this is a prudent and efficient initiative and consistent with industry best practice on a world-wide basis.

Example 3 – Dynamic Rating of Transmission Lines

Transend has stated[92] that it has developed a Dynamic Rating System for major transmission lines within its system. The principle underpinning Transend's Dynamic Rating System is that for much of the year, the actual rating (or dynamic rating) of any individual transmission line exceeds its static design rating because of a number of environmental conditions, such as wind and ambient temperature. Therefore in order to safely load lines beyond their static or design level, Transend measures the actual environmental conditions, calculates the safe dynamic loading level and operates the transmission line to that level if such operation is required.

Transend has stated that Dynamic Rating System is a cost effective alternative to building new transmission lines where only a modest increase in capacity (say up to 20%) is required. To operate this scheme, and other similar schemes such as transmission line de-icing, Transend has spent of the order of $2 million and avoided (or deferred) the major capital expenditure associated with the construction of new transmission which currently costs about $1 million per kilometre for a single circuit 220 kV line.

WorleyParsons considers that this is an innovative and cost effective approach to providing a small increment in transmission capacity for much of the year at almost zero cost. Essentially it is a Capex/Capex tradeoff, that is a small amount of capital is spent to save or defer a large amount of capital. WorleyParsons notes that a similar scheme was developed for the Victorian-NSW 330 kV interconnectors in the 1970s to provide similar low cost benefits.

Conclusion

On the basis of the many projects which it investigated (including the above three examples), WorleyParsons is of the opinion that in every case the Capex/Opex tradeoffs (including the Capex/Capex tradeoffs) were reasonable, prudent and efficient.

[92] Dynamic Rating of Transmission Lines. Submission to Engineers Australia for an Engineering Excellence Award in 2007.

5.5.3 Appropriate Adjustment of Opex Following Capex

A continuing concern of regulators and customers alike can be expressed as follows: *How can I be sure that, following major Capex for equipment, Opex requirements will be appropriately reduced?*

In the case of Example 1 above, some $6.3 million is proposed to be spent on new CBs with a reduced maintenance requirement of up to $50,000 per year. With examples such as this in mind, it is often argued that following major Capex, the Opex should show a reduction. If such a reduction is not apparent, how can regulators and customers be certain that the Capex works program is in fact delivering the Opex benefits which were stated to accompany the Capex?

WorleyParsons is of the opinion that the answer to this question has two parts. Firstly, as illustrated in the above example, Capex is almost never justified on the basis of Opex savings, as the annual Opex saving is typically only a very small part of the Capex expenditure. Secondly, the amount of Opex is the sum of a myriad of tasks which are required to operate and maintain the system to some particular standard and/or service level. It is only affected to a very small degree by the Opex reductions which might apply as a result of current major Capex expenditure.

Of much greater importance in determining the level of Opex, and whether that level is efficient, is the process by which the TNSP firstly develops the list of Opex tasks which are required to be carried out to operate and maintain the System, and then secondly, the basis upon which the tasks are costed.

As explained in Section 5.3.7.2, “Works Coordination Program”, Transend has developed a highly sophisticated works coordination software package, AMIS, which integrates all future Opex and Capex works. In regard to Opex works, Transend planners in each of the key Field Operations and Maintenance work areas plan their Preventative and Corrective works programs over the Next Regulatory Control Period using a zero-base methodology. This list forms a “baseline” plan. Planners carry out regular reviews of the baseline plans to ensure that unnecessary works, such as the scheduled maintenance of plant which will shortly be replaced are deleted (or appropriately reduced) in the Works Coordination Program. They also group tasks, as appropriate, to coordinate works in order to minimise outages.

In regard to costing the individual work tasks in the Opex works list, Transend has assumed that the work will likely be undertaken by Aurora and therefore, it is priced at the current Aurora unit rate.

Using this planning process and associated methodology, WorleyParsons considers that Transend is employing an approach which ensures that the Opex reductions resulting from capital expenditure are realised. It therefore follows that if Opex increases after major capital expenditure that the reasons for such increases are not due to unrealised Opex reductions, rather they are due to:

- an expansion of the Opex tasks required to operate and maintain a larger system;
- Increased labour/unit prices of those tasks;
- Maintaining the system to a higher (more appropriate) standard; or
- A combination of the above.

5.6 Conclusions

5.6.1 Current Regulatory Control Period

WorleyParsons has examined Transend's performance over the Current Regulatory Control Period. WorleyParsons has concluded as follows:

1. The data corresponding to Opex and Capex work activities has been correctly classified.
2. The data pertaining to regulated and non-regulated (or prescribed and non-prescribed) work activities has been correctly classified.
3. The data conversion methodology (to convert data at one date to another date) carried out by Transend was accurately carried out in accordance with its stated methodology.
4. The data conversion methodology used the Consumer Price Index (CPI) and a Labour Price Index (LPI) as recommended by CEG.
5. Actual Opex expenditure was compared with the Forecast (or Requested) Opex expenditure. Transend's Actual Opex expenditure was found to be as follows:
    - It appears to have tracked its Forecast spending reasonably well.
    - This comparison shows that Actual was less than Forecast at the start of the period and was in excess of Forecast at the end of the period.
    - In WorleyParsons' experience, this type of expenditure pattern is fairly common. It shows that the TNSP applied appropriate management pressure to the accomplishment of the Works Coordination program over the Current Regulatory Control Period, and as a result, they started to make up the early short falls and recover lost ground. In the event they did not accomplish their total forecast amount of Opex works. WorleyParsons notes that the shortfall of about $20m was relative to a total Forecast Opex amount of about $240m (June 2009 dollars) that is, about 8%.
6. In regard to the comparison between Opex Actual Vs the ACCC Decision in the Current Regulatory Control Period, WorleyParsons notes as follows:

- For the first 1.5 years of the Current Regulatory Control Period, Transend's Actual Opex expenditure was approximately equal to the ACCC decision.
- For the last four years of the Current Regulatory Control Period, Transend's Actual Opex expenditure exceeded the ACCC decision by amounts of about, $2m, $4m, $12m and $15m (June 2009 dollars).
- WorleyParsons has studied the ACCC Decision on the level of Opex expenditure in the Current Regulatory Control Period and does not understand the basis for that Decision.

7. A detailed dissection of Transend's Opex data to level 4 dissection (see Table 7.5) was presented. At this level of detail, WorleyParsons has investigated the cost trends and associated cost drivers in the Current Regulatory Control Period.
8. WorleyParsons concludes that the reasons given by Transend for the cost trends are reasonable and indicative of a well run organization, complying with its statutory obligations in a prudent and efficient manner.

5.6.2 Base-Year

9. An examination of the audited Base-Year (2006/07) data showed that in every case, with the possible exception of "Substations", the Opex expenditure in the Base-Year was not exceptional, rather it was a conservative level of expenditure when compared to the two years before and the two years after it.
10. In the case of Substations, which employs zero-base forecasting, the relativity of the level of expenditure in the Base-Year to other years in the Current Regulatory Control Period was not relevant to the forecasting methodology.
11. In view of the above, WorleyParsons considers that there is no indication to suggest that the Base-Year data was inappropriate for its use in the forecasting methodology, rather it appears to be quite a conservative year from which to make forward projections.
12. WorleyParsons made a physical inspection of the following Transend assets:
    - Creek Road Substation; and
    - Chapel Street Substation.

    During these visits, numerous examples of both past and planned maintenance work activities were pointed out to WorleyParsons. As a result of these visits, WorleyParsons formed the view that Transend's maintenance practices were in accordance with best industry practice, and therefore "prudent".

13. Having regard for the above comparisons of the Base-Year audited data with other years in the Current Regulatory Control Period and in consideration of the Opex work activities sighted during the physical examination of assets, WorleyParsons formed the opinion that the audited Opex expenditure in the Base-Year was a suitable (and indeed conservative) point from which to forecast the Opex expenditure for the Next Regulatory Control Period.

5.6.3 Next Regulatory Control Period

14. WorleyParsons has made a detailed examination of the methodology for forecasting the Opex in the Next Regulatory Control Period. WorleyParsons concluded that the forecasting methodology was philosophically appropriate (the method employed was correct) and that the calculations were performed accurately and in accordance with the stated assumptions.

15. The breakdown between those elements of Opex which were subject to zero-based forecasting and those which were subject to estimation from the projection of expenditure from the Base-Year was found to be appropriate.

16. The forecasting methodology was based on three escalation factors, namely CPI, AWOTE and asset growth factor (with associated economy of scale factors).

    - The CPI data was taken from the latest (July 2008) ABS data.
    - The AWOTE was taken from a CEG report, Appendix 15. (WorleyParsons has expressed concern about the comparison of parts of the CEG results with those of another forecasting body).
    - The asset growth factors (with associated economy of scale factors) were consistent with the methodology employed elsewhere (and approved by the AER).

17. The unit cost of planned Opex works (within the zero-based forecasting methodology) was found to be consistent with the unit prices agreed with the principal supplier of Opex labour, namely Aurora. Further, as the relationship between Aurora and Transend was determined to be “fully commercial” and therefore at “arms-length”, the basis of the unit pricing was found to be appropriate.

18. Scope Changes were examined in detail and one proposed change, namely that of the requested appointment of two inventory officers was found to be inadequately supported by the supplied documentation. As a result, WorleyParsons was unable to recommend its approval by the AER and

accordingly has removed the expenditure for this item from the level of Opex which is recommended for approval.

19. The Base-Year was found to be an appropriate year from which to forecast the future expenditure of the nominated aspects of the future Opex.

20. A physical examination of current and planned Opex works indicated that all actual or planned works were prudent and in accordance with Industry best practice.

21. The level of Controllable Opex which is recommended by WorleyParsons for approval by the AER is $54.9 million in the last year of the Next Regulatory Control Period, namely 2013/14 (June 2009 $). This represents a total increase (real growth) during the Next Regulatory Control Period of 17.8 % over five years or 3.3% pa.

5.6.4 Other Opex Matters

22. A range of Benchmarking parameters was derived for Transend and compared with other Australian TNSPs. In WorleyParsons' experience, benchmarking in general, while apparently offering a useful means of comparing the relative performance of TNSPs is fraught with difficulties.

23. In WorleyParsons' view, the inherent characteristics of the individual networks, which are the result of:

    - Geography;
    - The disposition of generation and loads;
    - The absolute size of the network;
    - The development history – the technical decisions which were made in the past;
    - The maintenance history - how well the network has been maintained in the past;

    are all very important in determining the legacy with which the current management must work when planning current and future Opex activities. WorleyParsons considers that the influence of the above described inherent factors is so strong as to effectively mask the true efficiencies and therefore diminishes the results of the benchmarking (in respect to comparisons to other TNSPs).

24. WorleyParsons considers that one area where benchmarking can be most relied upon is where a TNSP is compared with itself over time. Under these circumstances, and if the data definition has remained constant, then useful trends can be obtained. WorleyParsons notes that the ITOMS benchmarking can be used in this way. Viewing the ITOMS data from this perspective (and noting the rigour with which ITOMS data is defined) indicates that Transend has made continual improvements in its Opex performance over the past five (biennial) reporting periods. Further, when compared to the other participants in the Asia Pacific Region (these include most of the Australian and New Zealand TNSPs), Transend's Overall Composite Performance is superior in respect to both Opex cost and service level in 2007 (the date of the last ITOMS report).

25. On the basis of the many projects which it investigated, WorleyParsons is of the opinion that in every case the Capex/Opex tradeoffs (including the Capex/Capex tradeoffs) were reasonable, prudent and efficient.

26. Using the planning process and associated methodology as described above, WorleyParsons considers that Transend is employing an approach which ensures that any Opex reductions resulting from capital expenditure are realised. It therefore follows that if Opex increases after major capital expenditure that the reasons for such increases are not due to unrealised Opex reductions, rather they are due to:

    - An expansion of the Opex tasks required to operate and maintain a larger system;
    - Increased labour/unit prices of those tasks;
    - Maintaining the system to a higher (more appropriate) standard; or
    - A combination of the above.

5.6.5 Overall Conclusions

27. The Transend Opex Proposal and the complete suite of Transend documentation including the strategies, procedures and planning tools which underpinned the Proposal, are the best example of planning which WorleyParsons has seen amongst current Australian TNSPs and DNSPs.

28. Whilst WorleyParsons would expect Transend to comment that still more needs to be done, WorleyParsons hopes that Transend will employ its considerable knowledge to assist its peers to achieve the Transend level of planning excellence.

5.7 Recommendations

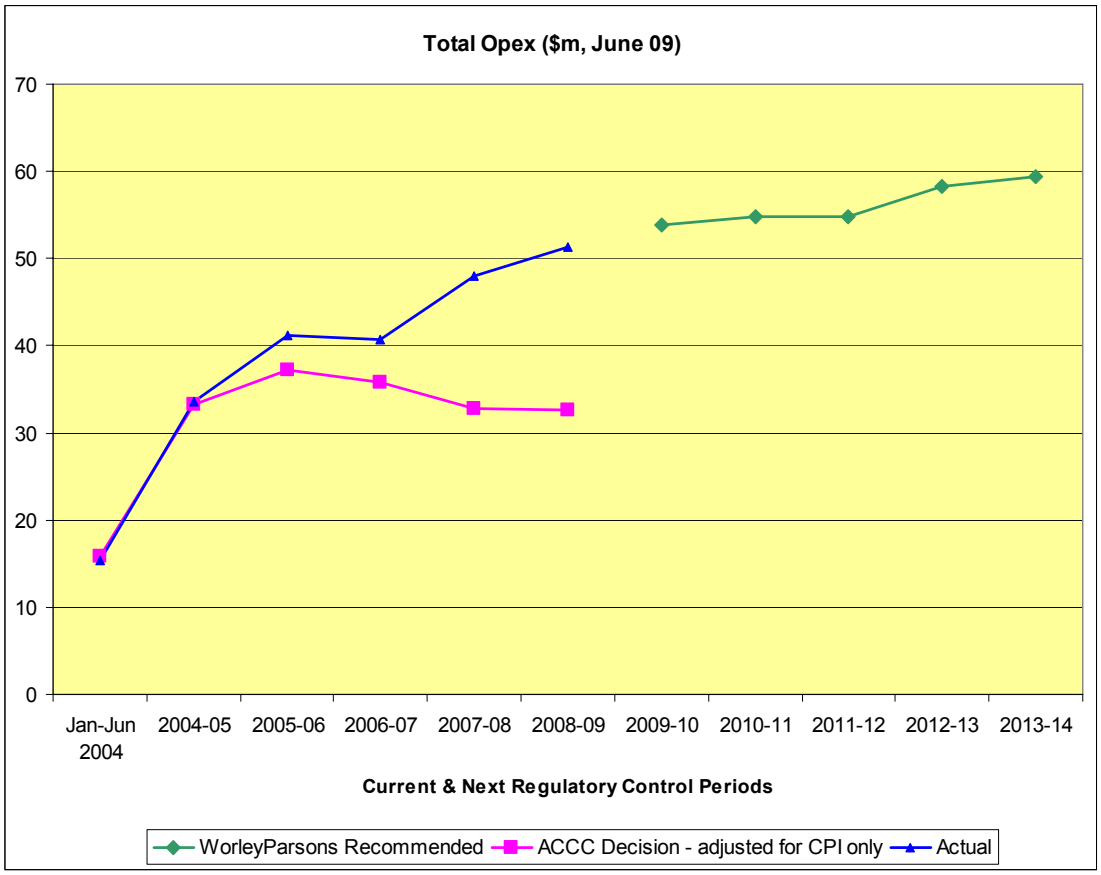
1. WorleyParsons recommends to the ACCC/AER that the level of Opex required for Transend to properly discharge its obligations to its shareholders and customers within its regulatory and legislative environment is as shown in Table 5-12 below.

Table 5-12: WorleyParsons Recommended Level of Total Opex for Transend in the Next Regulatory Control Period ($m June 2009)

YEAR	09/10	10/11	11/12	12/13	13/14	Total
Total Opex Recommended by WorleyParsons	53.8	54.8	54.8	58.2	59.4	281.0
Total Opex Requested by Transend – With Latest CPI Data	53.9	54.9	54.9	58.3	59.5	281.4

2. Apart from some very minor errors in Transend's calculations, the WorleyParsons' level of recommended Opex only differs from the level proposed by Transend (using the latest CPI figures) by virtue of the deletion of one position, namely one inventory control officer is recommended to be disallowed. This WorleyParsons' recommended Opex expenditure is graphed with the Actual level of expenditure and the ACCC decision for the Current Regulatory Control period in Figure 5-20 below.

Figure 5-20: WorleyParsons Recommended Level of Total Opex for Transend in the Next Regulatory Control Period (June 09, $m)



6. SERVICE TARGET PERFORMANCE INCENTIVE SCHEME

6.1 Introduction

Under the terms of its contract[93] with the AER, WorleyParsons is required to assess the service standard proposals submitted by Transend in their Revenue Proposal. Additionally, WorleyParsons is required to recommend appropriate performance targets, caps, and collars that are to be applied to Transend over the Next Regulatory Control Period.

The AER's requirements with respect to the Service Target Performance Incentive Scheme (STPIS) are described under the heading "Service Standards" in Attachment 1 of the contract[94]. The principles for the STPIS are outlined in Clause 6A.7.4 of the NER and in the AER's STPIS guidelines[95]. These requirements and WorleyParsons' Review Methodology are described below.

WorleyParsons Methodology

- Review of the historical performance target parameters;
- Assess the STPIS targets, caps, collars and weightings proposed by Transend against the principles outlined in the aforementioned STPIS guidelines;
- Review the recording and reporting systems and processes implemented to record service standards performance;
- Ensure that the data has been appropriately classified and calculated in accordance with Transend's service standard parameters as defined in Appendix B of the STPIS guidelines;
- Have regard to the impact that Capex and Opex may have on performance; and
- Recommend appropriate targets, caps, collars and weightings for Transend's STPIS scheme.

[93] Standard Form Contract between The Australian Competition and Consumer Commission and WorleyParsons Services Pty Ltd in relation to services establishing the appropriate revenue determination to be applied to Transend Networks Pty Ltd. Contract, 25 March 2008.
[94] Ibid, page 29.
[95] AER, Final Electricity Transmission Network Service Providers – Service Target Performance Incentive Scheme, March 2008.

6.2 Service Standard Guidelines

6.2.1 Current Regulatory Control Period Performance Incentive (PI) Scheme

During the Current Regulatory Control Period, Transend's performance has been measured by the parameters set out in both the initial PI scheme[96] guidelines and as published in the revenue cap determination[97] for that period. Transend had five reportable performance measures, four of which were employed to calculate whether either a financial reward or penalty should be applied to Transend, on the basis of their performance. The five reportable measures were:

1. Circuit Availability (Transmission lines);
2. Circuit Availability (Transformers);
3. Loss of Supply Event Frequency Index – number of events > 0.1 system minutes;
4. Loss of Supply Event Frequency Index – number of events > 2 system minutes; and
5. Average Outage Duration - minutes.

The Average Outage Duration measure did not contribute to the reward/penalty as it was deemed by the AER to be unsuitable for inclusion in the existing PI scheme due to the parameter being highly variable and therefore capable of distorting the performance measure. However reporting of this measure was considered necessary by the AER.

The performance results for Transend over the most recent five years are shown in Table 6-1.

Table 6-1: Historical Annual Service Performance

Parameter	Annual Target		Annual Performance				
	Lower deadband	Upper deadband	2003	2004	2005	2006	2007
Circuit Availability (Transmission lines)	99.10%	99.20%	98.84%	99.34%	98.66%	99.21%	98.99%
Circuit Availability (Transformers)	99.00%	99.10%	99.55%	99.31%	99.20%	98.80%	99.55%
Loss of supply > 0.1 system minute	16	13	17	18	13	16	10
Loss of supply > 2 system minutes	3	2	0	0	0	1	0
Average outage duration minutes	NA	NA	-	465	430	333	1251

[96] ACCC, Statement of Principles for the Regulation of Transmission Revenues – Service Standards Guidelines, 12 November 2003.
[97] ACCC, Tasmanian Transmission Network Revenue Cap 2004-2008/09, 10 December 2003.

It should be noted that the performance data collated for 2003 was not subject to external audit as this was prior to the introduction of the PI scheme[98].

The corresponding S-factor, that is the percentage of the Maximum Allowable Revenue (MAR) results are shown in Table 6-2 below.

Table 6-2: Historical Annual S-Factor PI Scheme Results

Parameter	%MAR	S-factors (%MAR)					Total
		2003	2004	2005	2006	2007	2003-07
Circuit Availability (Transmission lines)	±0.25	(0.2500)	0.1750	(0.2500)	0.0125	(0.1375)	(0.4500)
Circuit Availability (Transformers)	±0.15	0.1500	0.0788	0.0375	(0.1500)	0.1500	0.2663
Loss of supply > 0.1 system minute	±0.20	(0.0500)	(0.1000)	0.0000	0.0000	0.1500	0.0000
Loss of supply > 2 system minutes	±0.40	0.4000	0.4000	0.4000	0.2000	0.4000	1.8000
Total	±1.00	0.2500	0.5538	0.1875	0.0625	0.5625	1.6163

In accordance with the PI scheme[99] for the Current Regulatory Control Period the maximum financial reward or penalty was capped to ±1 per cent of the MAR. This was decided by the ACCC when the scheme was in its early stages and the ACCC was cautious about exposing TNSPs and customers to excessive risk and uncertainty[100]. Under the new service guidelines the same financial incentive/penalty shall remain for the Next Regulatory Control Period.

6.2.2 Next Regulatory Control Period Service Target Performance Incentive Scheme

The service parameters and sub-parameters categories which the AER decided are to be measured in the Next Regulatory Control Period, and from which Transend's performance will be determined, were published in Appendix B of the present STPIS guidelines[101]. They are summarised below:

- Transmission Circuit Availability:
  - Transmission line circuit availability for critical circuits;
  - Transmission line circuit availability for non-critical circuits; and
  - Transformer circuit availability.
- Loss of Supply Event Frequency:
  - Frequency of events where loss of supply exceeds 0.1 system minutes; and

[98] Revenue Proposal, Appendix 10, section 2.2, pp 5.
[99] ACCC, Statement of Principles for the Regulation of Transmission Revenues – Service Standards Guidelines, 12 November 2003.
[100] Ibid.
[101] AER, Final Electricity Transmission Network Service Providers – Service Target Performance Incentive Scheme, March 2008.

- Frequency of events where loss of supply exceeds 1 system minute.

- Average Outage Duration:
  - Transmission line circuits; and
  - Transformer circuits.

Transend has proposed values for the above listed STPIS sub-parameters, and these are shown in Table 6-3 below. These parameters are consistent with the requirements of clauses 3.3(b) and 3.4(a) of the STPIS guidelines. In summary, these clauses state that a TNSP must submit, in its revenue proposal its proposed values for each service parameter, including the target, collar, cap, and weightings. It is also noted that the AER has accepted that no revenue will be at risk as a result of the Average Outage Duration parameter, however they have stated that it must be reported in the forthcoming period.

Table 6-3: Transend's Proposed STPIS Sub-Parameter Values for Evaluating Performance

Sub-parameter	Collar	Lower deadband	Target	Upper deadband	Cap	%MAR
Transmission line circuit availabilty (Critical)	98.36%	98.94%	99.13%	99.32%	99.89%	±0.20
Transmission line circuit availabilty (Non-critical)	98.54%	98.95%	98.99%	99.03%	99.43%	±0.10
Transformer circuit availabilty	98.82%	99.23%	99.28%	99.33%	99.75%	±0.15
Loss of supply >0.1 system minute	20	16	15	14	10	±0.20
Loss of supply >1 system minute	5	3	2	2	0	±0.35
Average outage duration (Transmission Lines)	387	304	276	248	166	-
Average outage duration (Transformers)	1085	595	541	487	118	-

These parameters proposed by Transend were recommended by SKM in Appendix 10 of the Revenue Proposal where the methodologies used to calculate the performance targets, caps, collars, and deadbands were discussed in detail. The "Loss of Supply" and "Average Outage Duration" parameters have been rounded to the nearest integer number. These values with the exception of Average Outage Duration (transformers) are symmetrical in nature, meaning that the expected value of the reward is equal to the expected value of the penalty.

6.2.3 Data Recording and Validation

An essential element of the STPIS performance evaluation methodology is the historical data itself and the accuracy with which it was compiled. This data was used to calculate the targets, collars, and caps for each of the performance parameters. This requirement is outlined in the following two clauses from the STPIS guidelines:

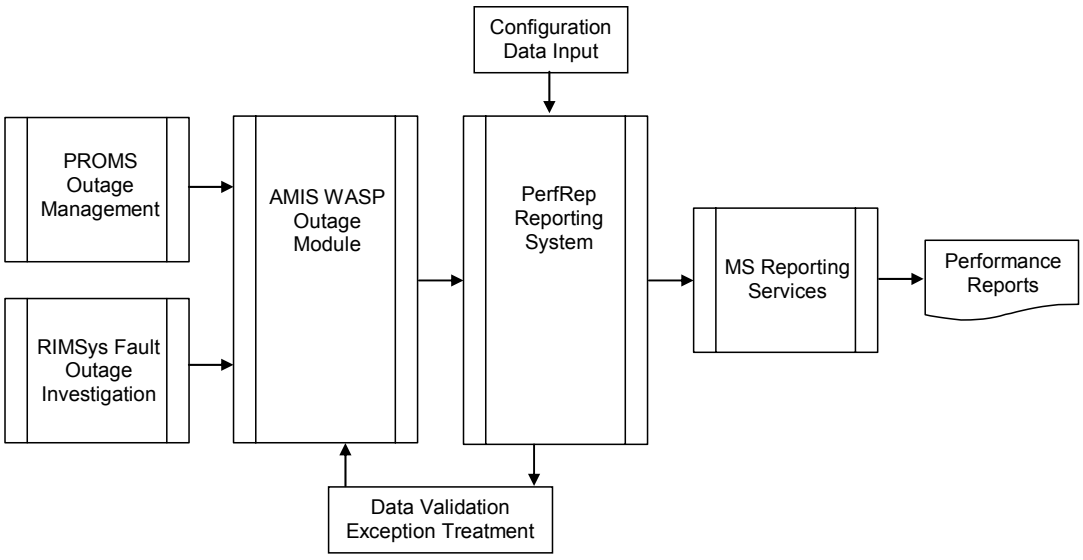
> 3.3(d) Data used to calculate proposed values must be accurate and reliable.

> 3.3(g) … proposed performance targets must be equal to the TNSPs average performance history over the most recent five years. The data used to calculate the performance target must be consistently recorded based on the parameter definitions that apply to the TNSP under this service component of the scheme.

Since 2004, the AER has annually audited the Transend performance data which has been used to calculate the applicable service parameters. WorleyParsons notes that the data collection and reporting methodology employed by Transend has undergone several improvements. Specifically in 2004 and 2005, this process relied on several disparate spreadsheets and systems that had to be manually processed to obtain the relevant service parameters. Since then, Transend has refined the data validation and collection process using the AMIS system.

The current data collection and reporting system is shown in Figure 6-1.

Figure 6-1: Transend's Transmission Network Performance Reporting System[102]



The input data into the AMIS outage module is sourced from the Plant Restriction and Outage Management System (PROMS) database and the Reliability Incident Management System (RIMSys). These two systems are the primary source of all planned, unplanned, and outage

[102] SKM for AER, Audit of Transend Service Standards Performance Reporting – Results for 2006, 4 April 2007.

data associated with faults. The inputs for the calculation of the "system minutes" for the Loss of Supply Events parameters are entered in the "Configuration Data Input".

All of the data was collected, validated, and reported at the end of each month and was then subjected to a monthly internal audit by Transend Network Performance and Strategy staff. Also, as previously mentioned, the data was also audited annually by the AER.

On this basis of its review of the reporting data, WorleyParsons is satisfied that the data is accurate and reliable, and includes all exclusions in accordance with Appendix B of the STPIS guidelines.

The historical data used by WorleyParsons to derive the new sub-parameter values is summarised in Table 6-4.

Table 6-4: Historical Annual Service Performance

Sub-Parameter	Annual Performance				
	2003	2004	2005	2006	2007
Transmission line circuit availabilty (Critical)	98.47%	99.33%	98.47%	99.70%	99.66%
Transmission line circuit availabilty (Non-critical)	98.98%	99.35%	98.74%	99.04%	98.76%
Transformer circuit availabilty	99.55%	99.31%	99.20%	98.80%	99.55%
Loss of supply >0.1 system minute	17	18	13	16	10
Loss of supply >1 system minute	2	1	3	3	1
Average outage duration (Transmission Lines)	288	304	367	197	476
Average outage duration (Transformers)	674	1033	244	511	1098

6.2.4 Targets

As previously stated in Section 6.2.3, the performance targets must be equal to Transend's average performance history over the most recent five years and have been recorded consistently, based on the relevant parameter definitions. On the basis of its investigation, WorleyParsons is satisfied that the data (see Table 6-4) for the last five years (2003-2007) is accurate and reliable. Accordingly, this data has been employed by WorleyParsons to calculate the recommended targets and these recommended targets are shown in Table 6-5 below.

Table 6-5: WorleyParsons' Recommended Targets for Transend

Sub-Parameter	Target
Transmission line circuit availabilty (Critical)	99.13%
Transmission line circuit availabilty (Non-critical)	98.97%
Transformer circuit availabilty	99.28%
Loss of supply >0.1 system minute	15
Loss of supply >1 system minute	2
Average outage duration (Transmission Lines)	326
Average outage duration (Transformers)	712

6.2.5 Caps and Collars

In recent AER determinations and consultant reviews, the methodology that seems to have been accepted and implemented to calculate the appropriate sub-parameter caps and collars has been the application of normal distribution statistics. WorleyParsons considers that five data points are inadequate to determine, with a high degree of confidence, that the datasets have normal distributions. Notwithstanding this concern, WorleyParsons after discussions with the AER has also employed this assumption.

SKM stated in their report to Transend[103] that they calculated the caps and collars by applying ±1.5 standard deviations from the mean and that this approach appeared to provide a "better intuitive fit". SKM further claimed that by using 5% and 95% values from the generated normal distribution curves that they were effectively "simulating the effect of two (2) standard deviations either side of the target"[104].

WorleyParsons is concerned about aspects of the SKM methodology. Rather, WorleyParsons considers that the view expressed by PBA in its review of SP AusNet's performance (and concurred by the AER) is more appropriate. The essence of this latter methodology was described by PBA as follows[105]:

> "…the difference between the cap and collar values should be significantly wider than the natural fluctuation in measure that might arise due to exogenous events. Otherwise, natural variations in performance could lead to significant revenue swings and/or the cap/collar values being exceeded. To avoid this effect, the cap

[103] Revenue Proposal, Appendix 10.
[104] Revenue Proposal, Appendix 10, section 3.3.2, pp 14.
[105] PB for AER, SP Ausnet Revenue Reset - An Independent Review, 16 August 2007, pp 217.

> and collar values should ideally be about two standard deviations of the historical data, that is, if the natural variation is a normal distribution, one year in twenty would be expected to reach the cap or collar through natural variation. Use of a lesser standard deviation is not recommended, for instance, a standard deviation of 1.5 would lead to a probability of the cap/collar being reached approximately one in every seven years"

WorleyParsons' approach has been to use ±2 standard deviations from the mean to determine the caps and collars. However, when the application of this methodology resulted in a cap exceeding 100%, WorleyParsons reduced the cap to an appropriate threshold. This occurred for the Transmission Line Circuit Availability (critical) thresholds where a value of ±1 standard deviation was arbitrarily applied to obtain this cap/collar. (Note, to ensure an equitable result, both the cap and collar were symmetrically changed to ensure that the probability of a reward equalled the probability of a penalty).

WorleyParsons' recommended caps and collars with the applied percentiles on the normal distribution curve are shown in Table 6-6 below.

Table 6-6: WorleyParsons Recommended Caps and Collars for Transend

Sub-parameter	Collar Percentile	Collar	Target	Cap	Cap Percentile
Transmission line circuit availabilty (Critical)	15.90%	98.51%	99.13%	99.75%	84.10%
Transmission line circuit availabilty (Non-critical)	2.50%	98.48%	98.97%	99.47%	97.50%
Transformer circuit availabilty	2.50%	98.67%	99.28%	99.90%	97.50%
Loss of supply >0.1 system minute	97.50%	21	15	8	2.50%
Loss of supply >1 system minute	97.50%	4	2	0	2.50%
Average outage duration (Transmission Lines)	97.50%	529	326	124	2.50%
Average outage duration (Transformers)	84.10%	1070	712	354	15.90%

6.2.6 WorleyParsons' Recommended Weightings

WorleyParsons' sees no reason to change the existing weightings and therefore recommends the weightings to be as from Table 6-7.

Table 6-7: WorleyParsons' Recommended Weightings for the Next Regulatory Control Period

Sub-parameter	Weighting
Transmission line circuit availabilty (Critical)	20%
Transmission line circuit availabilty (Non-critical)	10%
Transformer circuit availabilty	15%
Loss of supply >0.1 system minute	20%
Loss of supply >1 system minute	35%
Average outage duration (Transmission Lines)	0%
Average outage duration (Transformers)	0%

6.2.7 Deadbands

Transend has proposed that deadbands be included for each of the sub-parameters. The performance deadband is defined as "…a performance target that is set over a range of values, within which a TNSP neither receives a financial penalty nor financial reward in the regulatory year"[106]. The precedents from the most recent determinations for other TNSPs was that deadbands were omitted and were not seen to have a great impact on the performance.

SKM proposed the use of deadbands.

The deadband calculation methodology that SKM used appears to have been derived from obtaining the variance from the historic data set, dividing it by two then adding and subtracting the value from either side of the target (mean).

WorleyParsons does not like this method because it involves adding/subtracting numbers with different units. That is, "variance" has different units to the "mean". WorleyParsons considers that a more appropriate (and mathematically correct) measure would be to employ the "standard deviation" in these considerations.

[106] AER, Final Electricity Transmission Network Service Providers – Service Target Performance Incentive Scheme, March 2008, Glossary, pp 14.

Notwithstanding the problems with SKM's methodology, WorleyParsons has no strong views as to whether or not deadbands should be employed in the calculation of rewards/penalties. WorleyParsons considers that if the AER wants to define a range of "normal" performance wherein no financial reward/penalty is applicable then it should define and use deadbands. However, if in its philosophical judgement it is more appropriate to draw attention to system performance every year through the calculation of a reward/penalty – even though this might involve some considerable volatility - then it should remove deadbands.

6.2.8 Capex/Opex Impact

As part of the STPIS review, SKM reviewed the effect on Transend's performance of the current and forecast capital and operational works programs. Standard outage times were estimated based on different project activities. SKM found that their estimates were comparable with Transend's Outage Duration Model and initially recommended that Transend adjust their caps, collars, and targets because of the expected impact on circuit availability due to Transend's Capital Works Program. Since this SKM report was written, the Capital Program was reduced in size, resulting in Transend not making any adjustments as they considered that there were no material impacts on the duration of outages associated with the forecast Capital Program as compared to that of the Current Regulatory Control Period.

This approach was similarly applied to the Opex program. It was found that the number of outage hours associated with the planned Opex remained reasonably constant over the Current and Next Regulatory Control Periods, therefore not requiring any adjustments to the targets, caps, and collars.

6.3 Recommendations

WorleyParsons recommended STPIS targets are presented in Table 6-8. These targets do not include deadbands, consistent with the AER's more recent decisions.

Table 6-8: WorleyParsons Recommended Collars, Targets, Caps, and Weightings

Sub-parameter	Collar	Target	Cap	Weighting
Transmission line circuit availabilty (Critical)	98.51%	99.13%	99.75%	20%
Transmission line circuit availabilty (Non-critical)	98.48%	98.97%	99.47%	10%
Transformer circuit availabilty	98.67%	99.28%	99.90%	15%
Loss of supply >0.1 system minute	21	15	8	20%
Loss of supply >1 system minute	4	2	0	35%
Average outage duration (Transmission Lines)	529	326	124	0%
Average outage duration (Transformers)	1070	712	354	0%

7. RESOURCE CAPABILITY

An important consideration in reviewing Transend's revenue proposal is whether Transend could resource its proposed works program. This section discusses Transend's ability to obtain the required resources (internal and external labour, and materials).

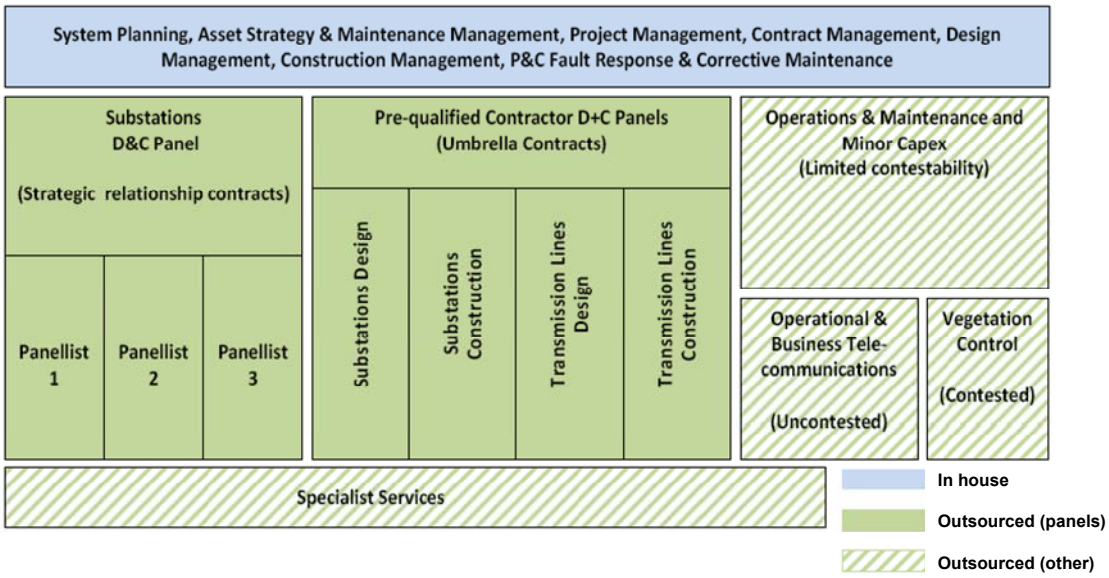
7.1 Resourcing Strategy

Transend's board and executive management team identified the resourcing strategy as a key strategic initiative at its workshop in November 2006, concluding that Transend should review its resourcing model taking into account market changes and the appropriateness of the current strategies.

The resourcing strategy was subsequently developed following extensive consultation with key internal staff, external stakeholders, service providers and representatives from national and international transmission companies. A structured approach was then used to define and assess the current state and to identify future resourcing needs. Actions to address the identified risks and issues and subsequently improve Transend's ability to achieve the forecast works program were also recommended.

The service provision model proposed in the strategy was developed taking into account current industry practice and Transend's particular circumstances. Transend recognises that the model will need to be reviewed as necessary to ensure it remains appropriate for Transend's needs. Figure 7-1 depicts the proposed service provision model.

Figure 7-1: Service Provision Model



At a high level, the resourcing strategy recommended that the strong working relationships with existing service providers be maintained for operations and maintenance activities, including with Aurora Energy (Aurora) and Hydro Tasmania (Hydro), and consolidated where necessary. It also recommended that a panel arrangement be established for substation design and construct projects, with appropriate contract conditions.

This resourcing strategy also recommended that the fault response capability for secondary systems be in-sourced to ultimately improve transmission system performance and reduce business risk. The strategy also recommended that internal engineering capability and capacity be increased to better support transmission system asset management activities.

The establishment of a panel of service providers for substation design and construct (D&C) projects was also proposed. This approach is consistent with industry practice and will enable the identified capital works program to be implemented in an efficient manner whilst providing sufficient certainty to all parties involved. The panel would be selected through a competitive process. Transend did not identify a need to change the service provision strategy for separate design and construct projects.

A key objective of Transend's recent reorganisation was to provide a clear delineation in accountability through logical functional groupings. For this objective to be achieved, the new organisational structure needs to be effectively resourced. A major outcome of the resourcing strategy project is to ensure that internal resource levels are sufficient to successfully deliver Transend's future works program in a timely and efficient manner.

Further work is necessary to successfully implement each of the recommendations made in the resourcing strategy. In particular, effectively managing the in-sourcing of fault response capability for secondary systems will be vitally important. It is also imperative that a sound contractual framework and a clear methodology for the allocation of work for the panel arrangement for substation design and construct projects be developed and communicated.

The resourcing strategy was accepted by Transend's board at its meeting on 22 November 2007.

7.2 Resourcing Plan

Transend has developed a detailed resourcing plan which covers the internal and external resources required to deliver the Capex and Opex works program for prescribed transmission services for the regulatory period 1 July 2009 to 30 June 2014.

The resourcing plan has the following objectives:

- To ensure the resources required to meet business requirements for prescribed services and customer expectations are identified and forecast in a planned, timely and systematic manner;
- To examine the projects required to be delivered in a given time period;
- To identify the knowledge, skills and abilities (competencies) required to deliver the works program;
- To identify the source of those resources (internal and/or external); and
- To outline supporting initiatives to ensure that necessary resources are available when required.

The resourcing plan was developed (and will be reviewed and managed) in accordance with the following principles:

- Giving priority to retaining existing resources and exploring opportunities for existing resources to remain available and accessible;
- Securing and attracting new resources including graduates and technical trainees;
- Driving improvements to deliver increased productivity;
- Identifying development opportunities for internal resources;
- Exploring productivity implications and performance incentives to encourage longevity of service and reduce staff turnover;
- Augmenting in-house capability by partnering with external resources to leverage existing skills and resources; and
- Establishing competitive long-term relationship arrangements with preferred partners, suppliers, contractors and service providers.

The following challenges were recognised by Transend in developing the resourcing plan:

- The need to deliver a larger works program in real terms;
- Retaining staff and reducing turnover caused in part by the competitive nature of the labour market and the trend for younger workers to shun longer term employment;
- Availability of engineering professionals and para-professionals in a tight and more costly labour market;
- Maturing workforce and resultant loss of knowledge through staff retirements;
- Developing a sustainable local service provider market;
- Developing strong working relationships with key service providers; and
- Application of historic resourcing data in the context of the new organisation.

In determining the resources required to deliver the proposed works program, Transend has considered the following (for each of network capital, non-network capital and operating works):

- The project category;
- The organisational group of the business;
- Project phase; and
- Required timeframe.

Essentially the process consists of evaluating the work required, identifying the current resources, factoring in natural attrition and retirements, identifying the resource gaps and developing actions to fill the gaps. Resource requirements in each area have been calculated to the nearest 0.5 full time equivalent position (FTE).

7.2.1 Internal Labour

The requirements for internal labour have been identified by:

- Occupation group – a skill-based classification used to classify all occupations and jobs in the Australian labour market; and
- Skills – broader occupations grouped on the basis of skill level, skill specialisation, similarity of skills and scarcity.

Transend's current internal resources consist of 217 FTE positions as at 30 June 2008. Transend has taken into account its natural attrition, consisting of resignations and retirements.

Transend has an average annual attrition rate of approximately 10% (up from around 7%). Experienced project managers and engineers remain the most difficult positions to recruit, particularly when detailed technical, planning and economic analysis skills are required. Staff movement by occupation group for the 2007–08 period is shown in Table 7-1. This table indicates that despite increased attrition levels, Transend has managed to grow internal resource levels over the past year.

Table 7-1: 07–08 staff movement by occupation group

Occupation Group	Recruitment	Separation
Manager	3	4
Professional–engineer	12	7
Professional–other	18	4
Para-Professional	4	2
Trade Related Worker	0	2
Clerical & Associated Worker	12	5

Transend has prepared age profiles by occupation group, to assist in forecasting the likely retirements over the Next Regulatory Control Period. Based on the assumptions of an annual average attrition rate of 10% p.a. and retirement at age 60, Transend has forecast that, over the period 2008-09 to 2013-14:

- 24 employees will retire; and
- 121 employees will leave the organisation before retirement age.

In analysing the required internal positions to directly deliver the works program, to support the works program and to undertake general business obligations, Transend has made the following assumptions:

- Growth in positions required by the business are predominantly in the direct works program;
- From 2008-09, nine additional positions have been identified by the business, namely two Human Resource training and development positions, and seven positions that indirectly support the works program, namely three Strategic Grid Planning, one AMIS and three inventory officer positions; and
- In addition to the positions specifically identified above, growth in "positions available" across the organisation is aligned with the Opex growth factor included in Transend's Revenue Proposal – equating to approximately two new positions per annum.

Each of the positions available has been categorised into one of the internal skill categories. The skill categories are grouped on the basis of skill level, skill specialisation, similarity of skills and scarcity into:

- Planning engineer;
- Asset and operations engineer;
- Project manager;
- Technical officer; and
- Other.

Approximately half the Transend workforce is grouped in the "other" category for workforce planning purposes, reflecting that recruitment of personnel in this category is relatively easier than for the other "technical" categories.

Table 7-2 illustrates the growth in positions over the planning period, by skill categories.

Table 7-2: Annual recruitment by skill category

	Planning engineer	Asset & ops engineer	Project manager	Technical officer	Other	Total
2008-09	7	6	1	8	26	48
2009-10	2	5	5	3	20	35
2010-11	3	2	2	2	17	26
2011-12	1	2	1	0	20	24
2012-13	2	3	3	3	18	29
2013-14	2	2	1	2	15	22
Total	17	20	13	18	116	184
Annual ave	2.8	3.3	2.2	3.0	19.3	30.7

Transend is committed to the development of industry skills and actively supports initiatives such as scholarships, work placements, undergraduate vacation employment, technical and commercial traineeships, and involvement in engineering bodies including Engineers Australia and the Australian Power Institute.

Transend participates in a technical officer development program–TasTech. As well, the development of future industry skills is supported through participation in the Graduate Development program.

Transend contends that it has the ability to recruit the resources required. Annual recruitment over the planning period peaks at 48 in 2008-09, including in-sourcing of five protection and control positions. In 2008-09 there are 22 forecast separations resulting in a net increase of 26 positions over the year. By comparison, 49 employees were recruited in 2007-08, with 24 separations, resulting in a net increase of 25 positions.

Transend has developed a wide range of initiatives to support increasing internal resource capability. These initiatives are detailed in the resourcing plan and focus on the “technical” areas. Although the number of “other” personnel required is far higher than in the “technical” area, Transend is confident it can fill these vacancies through traditional recruitment strategies. WorleyParsons concurs with this.

WorleyParsons has reviewed the proposed initiatives and considers that it is probable that Transend will be able to fill the expected vacancies, albeit with some challenges in the “technical” areas.

7.2.2 External Labour

Transend will continue to complement and supplement internal resources with the appropriate use of external resources. Transend strives to complement the skills of external service providers, contractors and consultants with internal competencies so that responsibility is shared and effective long-term cooperative working relationships are built.

A range of skills are provided under established contractual arrangements, covering nine primary categories of service, including:

- Labour supply (contract provides one or more persons working under instruction from Transend or Transend's representative, such as works inspectors, consultants etc);
- Information technology (IT) services;
- Network development consultancy services (being higher level development work undertaken before the design stage, such as evaluating the requirement for, and possible placement of a new transmission line);
- Design consultancy services (for example, designing a transmission line);
- Project works associated with transmission lines;
- Project works associated with substations;
- Design and construct services;
- Construct services (for example, building a transmission line but not designing it); and
- Equipment supplies.

Transend has recently written to its contractor pool seeking expressions of interest to participate in the new panel contract arrangements. The formal process is due to be completed in the latter part of 2008. In the interim Transend has approached the contractor pool seeking a preliminary indication of:

- Whether contractors in the market are interested in participating in Transend's panel arrangements; and
- Whether interested contractors have the capability and capacity to participate.

Positive responses to these two questions have been received from the contractor pool, indicating that the necessary external resources will be available to deliver the works program. WorleyParsons notes the wide range of contractors that responded positively, supporting the view that the required external resources will be available.

7.3 Conclusions

Transend has appropriately identified its likely resourcing gaps by skill set, taking into account increased workloads, natural attrition and retirements.

Transend has developed initiatives to bridge the resourcing gaps. WorleyParsons has reviewed the proposed initiatives and considers that it is probable that Transend will be able to fill the expected vacancies, albeit with some challenges in the “technical” areas.

Based on responses received from the contractor pool, the indications are that the necessary external resources will be available to deliver the works program.

8. GLOSSARY

ABS	Australian Bureau of Statistics
AC	Alternating current
AER	Australian Energy Regulator
AMIS	Asset Management Information System
ASIO	Australian Security and Intelligence Organisation
AWOTE	Average Weekly Ordinary Time Earnings
BPO	Base Planning Object
BPR	Base Planning Rate
CAM	Cost Accumulation Model
CB	Circuit breaker
CEG	Competition Economists Group
CIGRE	International Council on Large Electrical Systems
CMD	Coincident Maximum Demand
CPA	Combined Planning Authority
CT	Current transformer
CVY	Capacitive voltage transformer
DC	Direct current
DGA	Dissolved Gas Analysis
DSM	Demand Side Management
ERP	Enterprise Resource Planning
ESAA	Electricity Supply Association of Australia
ESI	Electricity Supply Industry
EWG	Electricity Water and Gas
FDC	Finance During Construction
FTE	Full Time Equivalent

GSP	Gross State Product
HASU	Hobart Area Supply Upgrade
LASU	Launceston Area Supply Upgrade
LPI	Labour Price Index
LME	London Metals Exchange
MD	Maximum Demand
MMA	McLennan Magasanik Associates
MNPR	Minimum Network Performance Requirement
MVA	mega volt amps
MW	mega watts
NEMMCO	National Electricity Market Management Company
NEM	National Electricity Market
NER	National Electricity Rules
NIEIR	National Institute of Economic and Industrial Research
NOCS	Network Operations Control System
NPV	Net Present Value
OLTC	On Load Tap Changer
OPGW	Optical Ground Wire
OTI	Oil Temperature Indicator
PBA	PB Associates
POE	Probability of Exceedance
RAB	Regulated Asset Base
RNPP	Reliability and Network Planning Panel
SCADA	Supervisory Control and Data Acquisition
SKM	Sinclair Knight Mertz
TEC	Tasmanian Electricity Code
TSMP	Transmission System Management Plan
VT	Voltage transformer

VoLL	Value of Lost Load
WACC	Weighted Average Cost of Capital
WASP	Works Assets Scheduling and Programming system
WIP	Works in Progress
WTI	Winding Temperature Indicator

9. APPENDICES – SEE VOLUME 2