PB ASSOCIATES

QUEENSLAND ELECTRICITY DISTRIBUTORS

CAPITAL EXPENDITURE STUDY

ENERGEX Limited

CONFIDENTIAL

Prepared for

QUEENSLAND COMPETITION AUTHORITY

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1 EXECUTIVE SUMMARY

In accordance with its responsibilities under the National Electricity Code (the Code); in particular Chapter 6 Parts D and E of the Code which outline the objectives, principles and processes in relation to distribution service pricing, the Queensland Competition Authority (QCA) engaged PB Associates to undertake a consultancy to assess the reasonableness of the Queensland electricity distributors capital expenditure forecasts.

This report provides the findings of the consultancy work with respect to ENERGEX Limited.

The main findings of the review are summarised below:

1.1 NON-DEMAND RELATED CAPITAL EXPENDITURE

Based on the modelling carried out by PB Associates and the discussion provided in the body of this report, we consider the ENERGEX age related replacement capital forecast for the period 2001/02 to 2004/05, as submitted to QCA to be reasonable.

Using the PB Associates model of the required replacement capital expenditure, which PB Associates believe reasonably models the actual requirements of ENERGEX , the ENERGEX submission is approximately half of the value forecast by the model. There are a number of explanations for this difference, including:

- Difficulty in allocation between age replacement and other augmentation. The replacement of an asset or assets is usually undertaken for a number of reasons, whether they be technical, cost and safety reasons or a combination of all these. For this reason it is often difficult to identify one sole factor for the replacement. Under such circumstances, it is reasonable for the distribution business to nominate a primary reason for the replacement and capture the replacement costs under this category. It is PB Associates opinion that a significant proportion of Non Load Related Capital Expenditure costs are captured in other areas of the ENERGEX budget.

- The replacement of aged assets is often captured in augmentation and other budgets. Network augmentation often requires the replacement and upgrading of existing network assets. The assets that are replaced in an augmentation budget contribute to an improved asset base, but are often not captured in the replacement capital expenditure budgets.

One of the most significant outcomes of this review is that due to the installation profiles of the network assets ENERGEX is only beginning to reach the point when significant numbers of network assets will require replacement. This is illustrated by the sharp increase in capex forecast over the next 20 years.

PB Associates consider that the current levels of replacement capital expenditure are not sustainable for future review periods and would expect a significant increase in age related replacement expenditure in future submissions.

PB Associates also notes that the unit costs identified in this report and the GHD valuations are both long-run costs. This means that the costs represent the replacement costs based on a large volume of replacements and not individual or one-off replacements.

1.2 DEMAND RELATED CAPITAL EXPENDITURE

For the demand related capital expenditure two approaches were used to examine the capital expenditure forecasts: -

- **Detailed review of planning processes and specific projects.** The planning processes, methodology and several key projects were examined in detail. Approximately $37 million of expenditure on major projects was examined in detail out of approximately $192 million of demand related expenditure.

- **Comparison with other Utilities in Australia.** Various key parameters and measures of levels of overall expenditure were tabulated to enable a comparison with other distributors.

Detailed review of planning processes and specific projects:

Based upon the review of the documents and data supplied relating to five projects selected by PB Associates for detailed review, we make the following comments:

- ENERGEX has the required processes in place to perform proper Reliability Assessment Planning (RAP) to achieve optimum network performance and CAPEX

- We would consider that a reasonable process is being followed to study the constraints on the ENERGEX network, and these constraints appear to be in line with the planning criteria defined in the relevant documents.

- Based upon the load growth assumptions and information supplied during this review, we would consider that a reasonable process has been followed to define the preferred options and timing of projects.

- ENERGEX has considered a range of options for removal of network constraints. They have analysed these options quite prudently to optimise the performance and capital expenditure

- The economic analysis and business case proposals do appear reasonable in their justification for the preferred project. The processes are in place which will stand in a competitive economic environment

- Generally the reports we reviewed are of high quality in terms of technical and economic evaluations

Comparison with other Utilities in Australia:

Section	Comparison under taken	Comments
1	Customer Driven per New Customer	Low
2	Total Demand / New Customer	Average
3	Total Demand / KVA Load Growth	Slightly lower than typical Rural DB

Table 1-1 Summary of Comparisons

Although detailed historical expenditure levels were not made available for this review, in the categories reviewed we understand that the levels of expenditure over the last few years were significantly below the forecast levels. The trend in expenditure shown is in fact consistent with expenditure levels of other distribution companies with little evidence of “carry over” investment from the previous years.

The major difference between Queensland and the Southern States is the level of load growth, which is typically 2-4% p.a. where 4.2% is forecast for the ENERGEX area. It is likely that the relatively high level of augmentation has resulted in a number of efficiencies leading to ultimately lower costs on a per customer basis compared to the Southern States. However, from previous work undertaken in Australia, we have found that the Customer Driven Capex is generally independent of the type of network and it appears that the low customer capex per customer is due to classification issues rather than low costs. It is difficult without a detailed network comparison to identify the specific areas of cost differences to the level of growth in the network.

PB Associates have not carried out a detailed network comparison between ENERGEX and other DB's however we understand that ENERGEX is predominantly urban/rural with a small CBD area. The expenditure levels are consistent with this type of distribution company from our comparison.

Given the reported low levels of expenditure in the proceeding years and high load growth, our conclusion is that the ENERGEX demand related expenditure is reasonable.

2 INTRODUCTION

2.1 BACKGROUND

In accordance with its responsibilities under the National Electricity Code (the Code); in particular Chapter 6 Parts D and E of the Code which outline the objectives, principles and processes in relation to distribution service pricing, the Queensland Competition Authority (QCA) engaged PB Associates to undertake a consultancy to assess the reasonableness of the Queensland electricity distributors capital expenditure forecasts.

The scope of the consultancy was to undertake a review to analyse and comment on the reasonableness of the capital expenditure (capex) contained in the Distributor's submissions with respect to the following:

- Forecasts of demand growth as provided by the Authority's recent Demand Forecast consultancy together with additional information provided by the Distributors;
- The age distribution of existing assets and associated asset replacement programs;
- Current and projected levels of efficient operating expenditure and any trade off between operating and capital expenditure;
- Current and projected levels of service quality; and
- The impact of differences in operating environment faced by the individual Distributors.

The deliverable from the consultancy is a final report that audits the Distributor's forecasts of capital expenditure for the four-year period 2001/2002 to 2004/2005. One of the aims of the study was to identify whether the Distributor's forecasts were reasonable and represent an efficient level of capital expenditure given factors outlined above. Where the study identified that the Distributor's proposed level of capital expenditure was not reasonable the consultancy was required to identify the appropriate level of expenditure and provide an explanation of the major differences between the Distributor's proposed capital expenditure and the level deemed appropriate by the PB Associates.

This draft report provides the findings of the consultancy work with respect to ENERGEX Limited (ENERGEX).

2.2 METHODOLOGY

2.2.1 Non-demand Related Capex

ENERGEX's proposals for non-demand related capital expenditure have been examined and compared with the PB Associates estimates. The PB Associates estimates are obtained from a replacement-forecast model developed by PB Associates.

The basis for the model's asset replacement capability is that all assets have a finite engineering life and that, if network reliability is to be assured, provision must be made to replace all assets before the end of their engineering life. However asset replacement should not be on the basis of age alone for the following reasons: -

- The condition of individual assets will vary. Some assets will require replacement before the end of their forecast engineering lives while others can be left in service longer than their nominal engineering life would indicate. It is usually the case that the majority of assets are replaced beyond their nominal engineering lives rather than before.

- Replacement due to age alone may well place unacceptable financial commitments on the company over a short time window.

- An asset replacement strategy based on age alone may allow the average age of the network assets to deteriorate to the extent that overall network reliability is put at risk.

Recognising this, the model allows the user to choose between three alternative age replacement strategies.

- Replacement based on age alone.

- Replacement based on condition and age. This approach allows the user to modify the age profiles of each asset category to take account of asset condition.

- Replacement based on risk, condition and age. The incorporation of asset risk requires an asset replacement strategy that ensures that the average remaining life of any particular asset category does fall below a predetermined minimum. This reduces the risk that reliability will be compromised by an excessive number of age related failures.

The model has been used to generate a non-demand related asset replacement expenditure forecast for ENERGEX that minimises required expenditure while at the same time ensures that the required maximum risk is not exceeded.

The model has been populated with data provided by ENERGEX in order to produce the annual forecast capital expenditure requirements by asset class for ENERGEX. The resulting capital expenditure forecasts produced by the model using the asset lives, asset age profiles and replacement unit costs provided by ENERGEX and by PB Associates are discussed in later sections of this report.

Other non-demand related expenditure such as expenditure relating to safety, operating and environmental issues will not be forecast by the model. Anticipated future expenditure levels for these classes of expenditure have been obtained from ENERGEX and these are also discussed in later sections of this report.

2.2.2 Demand related Capex

The demand related capital expenditure investment required to connect new customers to the network and to augment the existing network to meet the forecast demand growth on the ENERGEX network has been reviewed..

Drivers for demand related capital expenditure include the rate of demand growth on the network and the location of that growth. The level and timing of the expenditure is very much influenced by security and reliability considerations, and the costs associated with demand side participation. Security requirements impact on the quality of the installation and the level of redundancy built into the system.

Two approaches were used to examine the capital expenditure forecasts: -

- Detailed review of planning processes and specific projects. The planning processes, methodology and several key projects were examined in detail.

- Comparison with other Utilities in Australia. Various key parameters and measures of levels of overall expenditure were tabulated to enable a comparison with other distributors.

3 ENERGEX CAPITAL FORECAST SUBMISSION

$'000	2001/02	2002/03	2003/04	2004/05	Total
Non Load Related	24,725	33,251	31,192	28,421	117,589
Demand Related	106,425	99,463	101,310	107,407	414,605
Customer Driven	71,901	73,531	82,015	85,825	313,272
Land & ROW	2,896	3,020	3,022	3,091	12,030
System Capital	**205,947**	**209,266**	**217,539**	**224,744**	**857,496**
Non System Capital	**54,442**	**53,351**	**38,913**	**35,503**	**182,209**
Grand Total	**260,388**	**262,617**	**256,452**	**260,247**	**1,039,704**

Table 3-1 ENERGEX Capital Expenditure Forecasts[1]

For the purposes of our analysis the System Capital Expenditure has been broadly defined into four main areas: -

1. Non – Demand Related. Capex required to maintain adequate service quality and quantity obligations of the distributor. It does not make provision for growth.

2. Demand Related. Capex required to enhance service or capability of the Network to meet future growth in response to Customer demand.

3. Customer Driven. Expenditure associated with new customer connections to the Network.

4. Land and right of way (ROW). This is listed separately in line with the previous QCA analysis purposes, however is assumed to be related demand related expenditure.

It should be noted that many projects have multiple drivers. For example age replacement could be a secondary driver for many of the demand related projects.

ENERGEX have provided a detailed project-by-project expenditure forecast for the demand related and non-demand related components except for the “LV Spurs” component, a sub component of the demand related component. In the ENERGEX break down each project is assigned a “category” and “program” which were have been assigned to the above four main areas as shown listed above.

ENERGEX provided a separate item for Engineering and administration. PB Associates distributed pro rata over the demand and non-demand expenditure in order to be consistent with other data.

[1] Data based on spread sheet supplied by ENERGEX, “ENERGEX – Limited – Electricity Network Regulated Revenue, Capital Expenditure – Five Year Program”, email, March 2001. Subsequent data also based on this source.

4 NON-DEMAND RELATED CAPITAL EXPENDITURE ESTIMATES

4.1 ENERGEX ESTIMATES

Table 4-1 below is an extract from Table 3-1 showing capital expenditure requirements as submitted to the QCA by ENERGEX. Table 4-1 shows the items that PB Associates have classified as "non-demand related", and this expenditure is discussed in detail in this section of the report.

$'000	2001/02	2002/03	2003/04	2004/05	Total
"Total Age related"	11,743	13,200	11,991	6,703	43,636
Reliability	6,773	8,425	2,524	228	17,952
Control Centres	2,219	2,941	2,268	2,263	9,692
Other	3,990	8,685	14,409	19,226	46,309
Non Load Related Total	**24,725**	**33,251**	**31,192**	**28,421**	**117,589**

Table 4-1 Non-demand Related Capital Expenditure

As the "Age related" expenditure makes up a considerable portion of the total non-demand related expenditure the main focus of the review has been on this portion of the forecast. The age related expenditure is further expanded in table Table 4-2.

$'000	2001/02	2002/03	2003/04	2004/05	Total
CABLES	*277*	*3,769*	*2,902*	*2,131*	*9,079*
TRANSFORMERS	*832*	*3,185*	*3,846*	*2,028*	*9,892*
SWITCHGEAR	*10,245*	*5,661*	*5,243*	*2,543*	*23,693*
SWITCHGEAR (Distribution)	*388*	*584*	-	-	*973*
Total Age related	**11,743**	**13,200**	**11,991**	**6,703**	**43,636**

Table 4-2 Age related Expenditure

4.2 AGE RELATED EXPENDITURE

"Age related" expenditure, as listed in Table 4-2 is defined by ENERGEX as being "for capital projects initiated for specific replacement or refurbishment of network assets (i.e. end of life, or frequently failing in service, or significantly deteriorated to unsafe or risky condition). Sometimes called capitalised refurbishment maintenance".

In order to review the level of forecast expenditure, PB Associates has created a model of the network assets, based on the quantity, age, replacement cost, and asset lives of the network assets. The results of the replacement capital expenditure model have then been compared with the level of capex forecast by ENERGEX.

The following sections of this report discuss the comparison of these figures and comment on the reasonableness of the capital requirements submission by ENERGEX.

4.2.1 Base Data - Assumptions

The base data for the model is a list of asset types, age profiles, replacement costs and asset lives for each asset type in the network. This data was provided by ENERGEX in spreadsheet form and we were informed that this is the same data that had been used for the asset valuation exercise recently completed by Arthur Andersen and GHD[2] with the exceptions noted in this section and section 4.2.3.

4.2.1.1 Age Profiles and Asset Quantity

PB Associates have not carried out verification of the data provided, however the quantities of a sample of assets were compared with the quantities listed in the valuation and a good correlation was found.

PB Associates are not aware of assumptions that may have been made by ENERGEX in order to create age profiles where records were incomplete or not available. We have however reviewed the overall profiles for consistency and found that there appear to be good consistency across the age profiles.

Where PB Associates was required to make age profile assumptions these assumptions were agreed with ENERGEX as well as being correlated against the GHD average age data. Refer to section 4.2.2 for further details on age profile assumptions and proxies.

4.2.1.2 Replacement Costs

ENERGEX replacement cost data was sourced from the Asset Valuation. The replacement costs from the Asset Valuation did not include GST as the date of the valuation was 31 December 1999. ENERGEX has confirmed with PB Associates that the current budgets and forecasts do not include GST. For this reason, the Asset Valuation costs have not been inflated to include GST and therefore the forecasts produced by the model are also exclusive of GST.

Annual inflation has been considered as part of the PB Associates review. The GHD Valuation replacement costs reflected in this report have not been adjusted for inflation in the current review period.

4.2.1.3 Asset Condition

PB Associates have not been provided with data on the condition of assets.

As condition assessment data is one of the inputs for the modelling exercise we have used an estimate for condition of assets of 15% in Good Condition, 70% in Average Condition and 15% in Poor Condition. For a well-maintained network these estimates are likely to be conservative in that the quantity of assets in good condition could well be higher than the estimate and the quantity of assets in the poor condition correspondingly lower. During discussion with ENERGEX staff it was agreed that in the absence of better data these condition ratings were reasonable.

4.2.2 Assumptions

ENERGEX data relating to non-demand related capital expenditure has principally been in the form of age profiles for asset types. Where asset age profiles have not been available, a proxy for the age distribution has been used.

An example of an age proxy; the age distribution for 110/132kV outdoor feeder circuit breakers was unavailable. Therefore the age profile for this asset was correlated to the age distribution to that of 110/132kV outdoor transformers circuit breakers.

[2] "Queensland Electricity Distribution Corporations ODRC Valuation of Electricity Supply Assets – Report on ENERGEX Assets", GHD, September 2000.

ENERGEX replacement cost data was primarily sourced from the GHD Asset Valuation[2] with some additional replacement costs being provided directly from ENERGEX. The replacement costs from the GHD Asset Valuation did not include GST as the date of data collection for the valuation was 31 December 1999. ENERGEX has confirmed with PB Associates that the current budgets and forecasts do not include GST. For this reason, the GHD Asset Valuation costs have not been inflated to include GST.

Annual inflation has been considered as part of the PB Associates review. The GHD Valuation replacement costs reflected in this report have not been inflated for the year 2000.

4.2.3 Analysis

A number of checks have been applied to each data source;

- To ensure the appropriateness of the age proxy assumptions, the average age of each asset has been confirmed against the average age listed in the GHD Valuation. All average age variations in excess of 5% have been reviewed against and confirmed with ENERGEX.

- The age profile data supplied by ENERGEX has also provided total asset numbers or quantities. The asset numbers provided by ENERGEX were from a period 12-18 months later than the original GHD Valuation figures. In line with this, the ENERGEX data provided was most often variant from the asset quantities provided in the GHD Valuation. In general, these variations were consistent with the growth of the ENERGEX network and the removal/replacement of aging assets.

- The replacement cost figures utilised in this report are, for the most part, taken directly from the 2000 GHD Valuation. The exception to this has been a number of items (e.g. street lights) where the ENERGEX data groups that were provided did not directly match the GHD Valuation group definitions. In these cases PB Associates has utilised the information provided by ENERGEX and/or a weighted average of the GHD Valuation replacement costs. The final replacement cost figures have also been validated against similar costs from Australian Distribution businesses.

4.2.4 GHD Valuation

The data that is primarily sourced from the GHD valuation report[2] is the replacement cost. As stated above, this cost has not been inflated or altered to account for GST.

The exception to the data sourcing is where ENERGEX has provided supplementary replacement costs that more accurately reflect the asset groupings utilised in this report.

The GHD Valuation data relating to average asset ages and asset numbers have not been utilised directly. Instead they have been utilised as supporting data in validating the information provided by ENERGEX.

4.3 PB ASSOCIATES ESTIMATES

4.3.1 Assumptions

The PB Non-demand related models require three basic items of data about each asset type. These are (a) number of units or quantity of the asset, (b) the replacement cost of the asset and (c) the age profile or distribution of the asset.

Replacement costs have in most part been drawn from the Queensland Electricity Distribution Corporations ODRC Valuation of Electricity Supply Assets – Report on

ENERGEX assets, September 2000. The basic assumptions surrounding the use of this data are described in section 4.6 of this document.

The basic building blocks of standard replacement costs are;

- Unit costs – comprising standardised groups and subgroups of distribution network assets,
- The cost basis – determining whether the valuation approach is based on a "greenfields" or "brownfields" basis. The "brownfields" approach was adopted for the 2000 GHD valuation, and
- Indirect costs – comprising direct costs such as taxes, and indirect costs such as engineering, transport and interest.

4.3.2 Modelling

The ENERGEX network assets have been broken into 11 broad asset based categories. These categories are as follows;

Category 1 - Poles, Structures and Conductor

Category 2 - Distribution Transformers

Category 3 - Power Transformers

Category 3 - Cables

Category 5 - Switches, Reclosers & Sectionalisers

Category 6 - 11kV Zone Substation Switchgear

Category 7 - 11kV C&I Switchgear

Category 8 - 33kV Zone Substation Switchgear

Category 9 - Capacitor Banks & AFLC

Category 10 - StreetLight Summary

Category 11 - Miscellaneous Equipment

The sub-groups of each of the asset categories have been correlated against the GHD valuation to ensure that all assets have been captured.

The category listings are designed to capture homogenous groupings of assets, with the obvious exception of the Miscellaneous Equipment group. The miscellaneous category captures low voltage services, metering and one-off items like the control centre and communications.

4.3.3 Scenario 1 - Using Valuation Data

A model was created using the data provided by ENERGEX including age profile, asset lives, and costs used for the valuation exercise. Based on these inputs the capital expenditure forecast for replacement of assets for the review period 2001/02 to 2004/05 is $398.2 million. The forecast over the next 20 years is as shown in Figure 4-1 below.

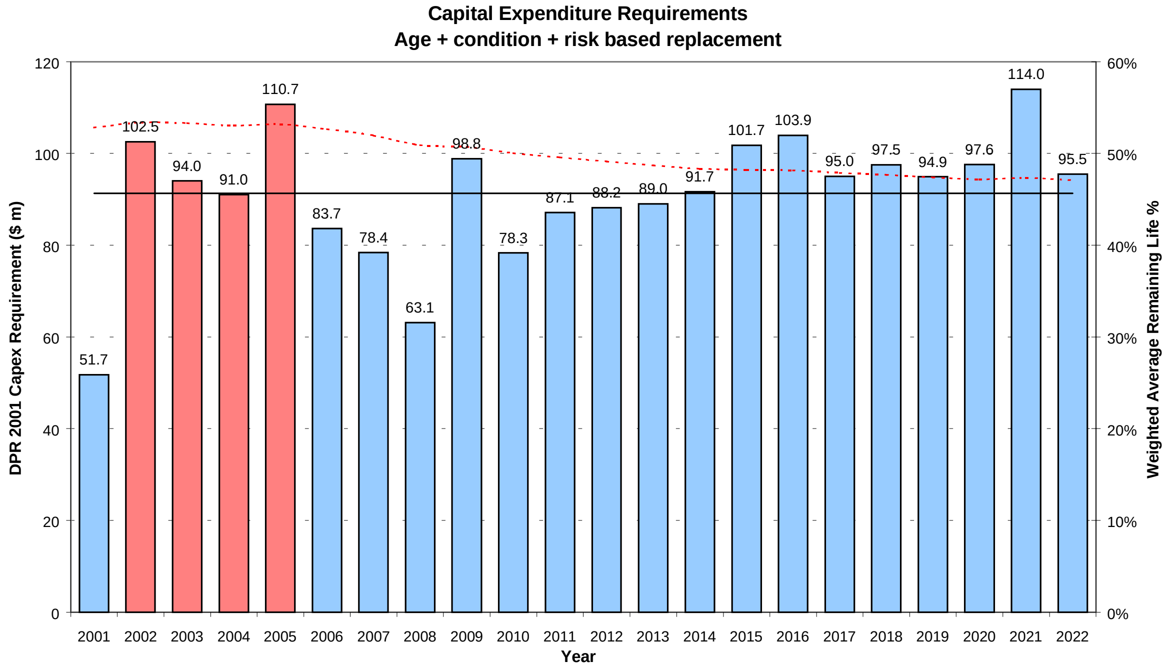

Figure 4-1 Replacement Capital Forecast - Scenario 1

Clearly the forecasts shown above, with an average of **$99 million** per year over the four-year review period, are far in excess of the ENERGEX submission for "non-demand" capital expenditure of between **$15.7 and $26.4 million** per year[3] over the next 4 years, allowing for the expenditure on reliability and control centres which would not be predicted by the model. There are a number of explanations for this mismatch in replacement forecasts as follows:

- Based on the asset lives in the GHD valuation there are a large number of assets that are older than the assigned asset life, these are termed "deferred assets". The Scenario 1 forecast includes replacement expenditure for deferred assets over the review period, whereas ENERGEX do not have significant replacement projects for deferred assets included in their project listing and forecast.

- The asset lives used do not reflect actual practice in replacing network assets. This may be due to effective maintenance practices prolonging the asset lives, or underestimation of the service life of assets due to changes in materials and manufacture of assets, or operating conditions. The asset lives listed in the GHD Asset Valuation are considerably shorter than those that are typically found in the Australian industry. In many cases the current asset ages of the ENERGEX network are significantly older than the Asset Valuation lives. The high quantity of assets in the deferred category would tend to confirm that the actual replacement asset lives are much longer than the asset lives assumed for the valuation.

- Capital projects are often carried out for a number of reasons, for example a project to increase capacity of the network may also replace ageing assets and improve reliability. Generally such a project would be classified as augmentation or reliability,

[3] Non-demand capital expenditure figures represent the total of non-demand related expenditure less the reliability and control centre expenditures. This figure is used for comparison against the model expenditure forecasts since, due to overlap between expenditure categories, it is seen to be a more inclusive estimate of ENERGEX's age related capital expenditure.

thus reducing the value of capital expenditure forecast for replacement. It is difficult to determine the value of the overlap without further investigation of the capital projects planned.

- Some works forecast by the model may be classified differently by the distribution business. For example miscellaneous replacements of assets by maintenance crew may be included in operating expenditure budgets thus reducing the forecast for capital expenditure even though these replacements are being carried out.

Although the above points are all probably contributing to the mismatch in forecasts, due to the magnitude of the mismatch PB Associates consider that the appropriateness of asset lives used in the model should be examined more closely. A second scenario has been created for discussion and to assist review of these forecasts as detailed below.

4.3.4 Scenario 2 – Using Modified Asset Lives

It is the opinion of PB Associates that the asset lives assumed in the GHD valuation are short when utilised for capital expenditure modelling. PB Associates experience in Australia, and in the rest of the world[4], is that longer asset lives are to be expected (in general) than those found in the GHD valuation.

The asset lives used in the GHD valuation were examined and compared with asset lives used in capital forecasting models in other States of Australia, mainly Victoria as well as with recommendations made by SKM[5] in their review of the GHD Ergon and ENERGEX Valuations. In general the asset lives used for similar models in Victoria were 5 to 10 years longer than those listed in the GHD valuation of ENERGEX.

Whilst we are not suggesting that operating conditions and therefore asset lives in Queensland are identical to other Australian states, these are useful for comparison.

The actual asset lives used in Scenario 2 model are shown in Appendix A and comparison with the GHD valuation asset lives is given (where these asset lives were not changed they are not listed in the Appendix).

The expenditure forecast from the Scenario 2 model, is approximately twice the value of the ENERGEX submission to QCA.

PB Associates consider Scenario 2 to be a more realistic view of present and future replacement capital expenditure requirements for ENERGEX. The difference between ENERGEX's submission and the model can be explained in part by overlap between augmentation and other projects (as confirmed by ENERGEX), and possibly replacement expenditure being classified as operating expenditure.

Historical age related spend has been low due to the installation profile for the network, and the fact that the majority of assets have not yet, or are just, reaching the end of their productive lives. This situation is expected to change significantly in the next 20 years as the periods of intense installation activity of the 1960's and 1970's will possibly need to be repeated for replacement of these aged assets. Figure 4-2 below illustrates this with a rapidly increasing replacement requirement during the next 20 years.

[4] CIGRE Working Group 37-27 Report, Ageing of the System Impact on Planning

[5] "Asset Valuation Review", SKM, QM85701, 9 November 2000

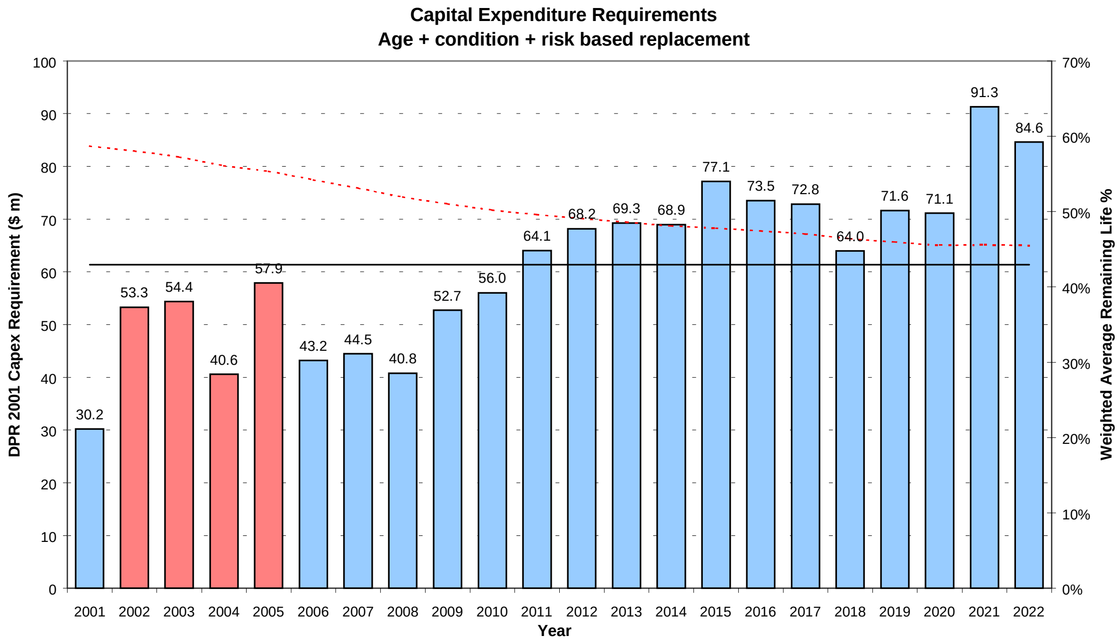

Figure 4-2 Replacement Capital Forecast - Scenario 2

The data in this scenario utilises asset lives that PB has gathered from Australian utilities. We have not used average Australian asset lives. Instead we have reviewed the minimum, maximum and average asset lives and, in most cases, applied the minimum asset lives. This still leaves a capital expenditure estimate that is considerably less than the Scenario 1 model.

We also note that the SKM review[6] provides for sub-transmission wood poles and power transformer life extensions beyond those provided in the GHD Valuation.

4.3.5 PB Associates Valuation

The PB Associates valuation provides a net value of $2,270 million. This compares with an ODRC value of $2,335 million from the GHD Valuation – a variation of 2.8%. This is an acceptable variation given the three variables between the two reports;

- New assets have been added and others replaced over the 12 months between data snapshots,
- some replacement costs have altered, and
- asset ages have increased over the 12 months between asset snapshots.

These values both represent only the system asset. Non-system assets are not included as part of the scope of this assessment.

[6] "Asset Valuation Review", SKM, QM85701, 9 November 2000

SOURCE	Depreciated Valuation $'000s
GHD Valuation (excl generation assets)	$2,335
PB Model – Scenario 1	$2,270
PB Model – Scenario 2	$2,441

Table 4-3 Asset Valuation - Network Assets

Table 4-3 shows that there is not a significant variance in the net valuation of the assets using the 3 methods and data sets described in this report. PB Associates are therefore of the opinion that, although the capital expenditure requirements have been calculated using the revised asset lives, this does not effect the ODRC valuation of the ENERGEX assets provided in the GHD report.

4.4 CONCLUSIONS

Based on the modelling carried out by PB Associates and the discussion above, we consider the ENERGEX age related replacement capital forecast for the period 2001/02 to 2004/05, as submitted to QCA to be reasonable and within the expected bounds for a similar asset base.

With consideration of the Scenario 2 model, which we believe more closely models the actual requirements of ENERGEX, it appears that the ENERGEX submission is approximately half of the value forecast by the model. As discussed there are a number of explanations for this difference, including;

- Difficulty in allocation between age replacement and other augmentation. The replacement of an asset or assets is usually undertaken for a number of reasons, whether they be technical, cost and safety reasons or a combination of all these. For this reason it is often difficult to identify one sole factor for the replacement. Under such circumstances, it is reasonable for the distribution business to nominate a primary reason for the replacement and capture the replacement costs under this category. It is PB Associates opinion that a significant proportion of Non Load Related Capital Expenditure costs are captured in other areas of the ENERGEX budget.

- The replacement of aged assets is often captured in augmentation and other budgets. Network augmentation often requires the replacement and upgrading of existing network assets. The assets that are replaced in an augmentation budget contribute to an improved asset base, but are often not captured in the replacement capital expenditure budgets.

Probably the most significant outcome of this review is that due to the installation profiles of the network assets ENERGEX is only beginning to reach the point when significant numbers of network assets will require replacement. This is illustrated by the sharp increase in capex forecast over the next 20 years, as shown in Scenario 2.

PB Associates consider that the current levels of replacement capital expenditure are not sustainable for future review periods and would expect a significant increase in age related replacement expenditure in future submissions.

PB Associates also wishes to note that the unit costs identified in this report and the GHD valuations are both long-run costs. This means that the costs represent the replacement costs based on a large volume of replacements and not individual or one-off replacements.

4.5 RELIABILITY

The total capex submitted by ENERGEX for Reliability Improvement projects is $17.952 million, of which $13.798 million is for transmission and $4.154 million is for distribution.

ENERGEX have provided data in support of their proposed capital expenditure in the form of individual reliability improvement projects and the information included in the ENERGEX response to the QCA draft determination.[7] The project information provides a view of the capital expenditure and the type of work but does not give any indication of the reliability improvement that is expected as a result of the expenditure.

In their response the QCA Draft Determination ENERGEX state *"ENERGEX customers, Government stakeholders and presumably the QCA all believe that ENERGEX's reliability and other service levels should improve. However there is insufficient experience in Queensland to write a regulatory contract explicitly linking expenditure and reliability for this regulatory period. Instead ENERGEX proposes an arrangement in which ENERGEX targets defined service standards provided that the QCA allows sufficient operating and capital expenditure initiatives to facilitate achievement of these targets. ENERGEX is prepared to target the standards in Figure 1, using the network category definitions proposed by the Victorian Office of the regulator general."* The target figures proposed by ENERGEX are shown in Table 4-4 below. Without equivalent figures to these showing the current and/or historical position it is not possible to estimate, or to comment on, the levels of capital expenditure that may be required to achieve the target figures.

Network category	SAIDI (min/year)	SAIFI (number)	CAIDI (minutes)
CBD	6	0.1	60
Urban	180	1.5	120
Short rural	600	4.0	150
Long rural/remote	1200	6.7	180

Table 4-4 ENERGEX target reliability standards

The ENERGEX urban CAIDI figures are 120 minutes compared to around 60 minutes in Victoria. The high CAIDI figures for ENERGEX are probably due to conditions specific to Queensland such as cyclonic storm fronts creating damage affecting a high number of feeders at the same time coupled with much greater of access difficulty compared to Victoria. It is therefore not unreasonable to expect that ENERGEX will have CAIDI figures that are significantly higher than Victoria. Similar comments may be made for the short and long rural network categories.

[7] Submission to the Queensland Competition Authority (QCA), Response to Draft Determination Regulation of Electricity Distribution - Submission by ENERGEX Limited 19 February 2001 (page 4, section 2.4 Service quality).

The SKM reliability report for Ergon Energy[8] recommended that capital expenditure be targeted at SAIFI improvements and, from the limited data we have been provided, we would concur with that finding and would also extend the finding to ENERGEX.

Without further data on the present level of performance of the ENERGEX network, or the improvements expected from the capital expenditure figures proposed by ENERGEX, PB Associates are not able to comment on the reasonableness of the ENERGEX proposed capital expenditure on reliability improvement other than to say that the levels proposed for reliability improvements on the distribution network look very low. The forecast capital expenditure on the distribution network is around $1 million per year, which for a network the size of ENERGEX, will achieve only very small improvements in reliability when targeted at SAIFI improvements.

4.6 OTHER

The total capex submitted by ENERGEX for "Other" projects is $46.3 million. While PB Associates has not reviewed any specific "other" project in detail, we are satisfied with the general classification and inclusion of items in this category.

Samples of project types included in this category;

- Substation fencing
- Fire protection
- Feeder Rating Assessment
- Oil containment
- Noise abatement
- Alarm systems
- RTU replacement
- Capacitor banks
- Reactive compensation

PB Associates notes that the inclusion of Feeder Rating Assessments as part of a capital expenditure plan is not common, however, the value of this item is not overly significant.

[8] SKM Report entitled Reliability and Quality Improvement capex Plan (see QCA website)

5 DEMAND RELATED CAPITAL EXPENDITURE ESTIMATES

5.1 ENERGEX ESTIMATES

Table 5-1 below is an extract from Table 3-1 showing capital expenditure requirements as submitted to the QCA by ENERGEX. Table 5-1 shows the items that PB Associates have classified as "Demand related", and this expenditure is discussed in detail in this section of the report.

$'000	2001/02	2002/03	2003/04	2004/05	Total
Security	25,765	38,744	64,696	61,603	190,808
Distribution	18,863	19,517	21,020	24,746	84,145
Sub Transmission	61,798	41,203	15,594	21,058	139,652
Demand Related Subtotal	**106,425**	**99,463**	**101,310**	**107,407**	**414,605**
Customer Driven Sub total	**71,901**	**73,531**	**82,015**	**85,825**	**313,272**
Land & ROW	**2,896**	**3,020**	**3,022**	**3,091**	**12,030**
Grand Total Demand Related	**181,222**	**176,015**	**186,347**	**196,323**	**739,907**

Table 5-1 Demand Related Capital Expenditure Forecasts[9]

In order to provide a consistent comparison with other power authorities definitions and categories were chosen to align generally with the Victorian 20001 price review. Two classifications were used:

- **Demand related expenditure** is related to additions to the capacity of the network incurred due to increase of demand not attributable to one individual customer. The additional load generally causes existing assets to operate at a higher utilisation (which may need reinforcement). Demand related expenditure included land, normal cyclic limitation and single contingency. Reliability projects identified by ENERGEX have been allocated to non-demand related expenditure. In addition it is noted that a number of customer requested specific projects might be included in the demand component due to the budgeting process.

- **Customer Driven expenditure** includes all expenditure associated with new customer connecting to the network. In this case additional load generally requires new network to be constructed to connect the new customers.

Land listed separately in the above table was included in the Demand related expenditure.

5.2 REVIEW METHODOLOGY

Two approaches were used to examine the capital expenditure forecasts: -

- Detailed review of planning processes and specific projects. The planning processes, methodology and several key projects were examined in detail. Approximately $85M of expenditure on major projects was examined on a high level basis and a further $25M was examined in detail. These figures relate to a total of approximately $223M of demand related expenditure.

[9] Customer Driven Expenditure includes street lighting in Table 5-1, however this has been removed in subsequent analysis in order to be consistent with other data.

- Comparison with other utilities in Australia. Various key parameters and measures of levels of overall expenditure were tabulated to enable a comparison with other distributors.

5.3 REVIEW OF PLANNING PROCESSES

5.3.1 Introduction

The main drivers of demand related capital expenditure include the following:

- the rate of load growth and customer growth on the network, and the location of the growth;
- the utilisation of the existing assets; and
- the planning criteria that define level of security, reliability and quality of supply.

The review of the distribution demand related capital expenditure forecasts of ENERGEX has been conducted in four parts that are detailed in the sections below. These parts relate to the load forecasts, planning methodology, the planning criteria, and the capital forecasting process. The aim of this review is to ascertain the procedure and methodology defined by ENERGEX to produce the forecasts, validate that these procedures have been followed, comment on the suitability of such procedures and methodology, and comment on the level of demand related capital expenditure with respect to other benchmarks.

In order to perform this task, the documents listed in Appendix C have been reviewed, meetings have been held with ENERGEX staff, and further question have been put to ENERGEX where queries arose.

5.3.2 Load forecasts

Load forecasting is the starting point in the preparation of demand-related capital expenditure requirements. The forecast defines the need and determines the timing for network augmentation. A significant amount of data and information needs to be recorded for this process to be accomplished.

ENERGEX have all the required information systems in place to provide necessary data to prepare comprehensive load forecasts for different network segments with a reasonable level of accuracy.

ENERGEX prepare a very comprehensive, detailed 10-year load forecasts for their zone substations. They do not prepare a detailed feeder load forecasts as the ENERGEX SCADA system can provide sufficient demand information for short term planning. In addition detailed feeder forecasts are carried out in detailed planning studies

For the connection points to the Powerlink transmission network ENERGEX provide load forecasts for ten years. Powerlink also use an independent authority, National Institute of Economic and Industry Research (NIEIR) to obtain forecasts incorporating economic activity. The ENERGEX forecasts agree well with NIEIR forecasts when normalised.

Generally we find that the load forecasting process followed by ENERGEX is good and will result in a reasonable CAPEX forecast of augmentation requirements. We have reviewed the load forecasting in terms of the major network segments or types.

5.3.3 Planning Criteria

The ENERGEX network covers a geographical area of about 25,000 square kilometers located in the South East corner of Queensland with more than 1 million customers. The

ENERGEX network connects into the Powerlink transmission network at 132kV, 110kV and 33kV. The total maximum demand of the ENERGEX distribution network is around 4500MVA. This is non-diversified total maximum demand at connection assets to the Powerlink. The planning criteria of ENERGEX is contained in the document "Application of Reliability Assessment Planning within ENERGEX" which was published by ENERGEX based on a publication by ESAA. These planning criteria form the basis for the planning of the ENERGEX network.

The document "Reliability Assessment Planning" which is briefly discussed in the section above provides a detailed, planning process that is very appropriate in the present competitive economic environment.

A fundamental requirement in the application of the prescribed planning process with defined planning criteria is a comprehensive and up to date knowledge of the current state and future potential for change of the network. ENERGEX maintain comprehensive databases and this information is used by the planners when undertaking studies. All existing and historical loading of substations including feeders is also available from the SCADA system.

In our comments in the section above we have indicated that the prescribed process is adequate and we can also confirm that the required data and tools are also available to be used by the ENERGEX planners. Again, this would suggest that the capital expenditure forecasts produced for the 4-year period is prepared on a reasonable basis.

The existing planning criteria discussed briefly above are based essentially on probabilistic planning principles. PB Associates believes that these are now widely used in order to optimise network performance and capital expenditure in a competitive environment.

Network planning has traditionally been based on deterministic planning criteria. The basic weakness of this approach is that while it provides 100% backup at all times, it does not take into account the probabilistic nature of system behaviour, customer demands, or component failure. **"Probabilistic planning"** uses probability techniques to recognise the random behaviour of different system states, components and loads. The probabilistic planning approach quantifies the risk of failures and accepts these risks. Contingency plans are prepared to manage these quantified risks. The application of this approach will enable the economic value of reliability improvements to be objectively assessed. Using modelling techniques it is possible to compare the CAPEX outcomes of using the two different approaches and identify the savings that may be realised. A sensitivity analysis would be done to establish a more accurate value for the level of risk. This is considered important as the introduction of the necessary contingency plans that form part and parcel of the probabilistic approach will have a cost element associated with them. Although this process is more applicable at the planning of some subtransmission assets such as zone substations, where proper Markov reliability modelling could be done, it is useful at the HV feeder level as well to optimise the system performance and CAPEX. From the documents we reviewed, we observed that ENERGEX has adequate systems in place to perform proper reliability assessment planning.

5.3.4 Capital forecasting

One of the objectives of this assignment is to review whether the appropriate processes have been followed in preparation of the Demand related CAPEX of the ENERGEX distribution network for the next 4-year regulatory period. As described in the sections above, the Distribution capital forecasts produced by ENERGEX are based on the following items:

- Load forecast

- Planning criteria
- Planning studies
- Historical expenditure
- Current loading levels of the feeders
- Power quality issues

The main components of the Demand related CAPEX are;

- Subtransmission
- HV Feeders
- LV reinforcements

5.4 REVIEW OF PROJECTS PLANNED

5.4.1 Project review methodology

Major subtransmission reinforcement projects can have high (>$10 million) CAPEX requirements compared to distribution projects, which may require procurement of assets over a very short (1 or 2 year) time frame. For this reason, the transmission demand related capital expenditure requirements, from year to year, might be very lumpy. This can make benchmarking transmission demand related capital expenditure over a short time frame unreliable if due consideration of this effect is not taken into account.

ENERGEX have provided a list of the specific projects that have made up the ENERGEX transmission and distribution capital expenditure forecast. In order to assess the reasonableness of the ENERGEX demand related capital expenditure forecast a number of the larger and different types of projects have been selected by PB Associates for more detailed review.

The aim of this review is the following:

1. To assess the reasonableness of the process for examining constraints on the ENERGEX subtransmission network;

2. To confirm that this process and the constraints are in line with the Technical Code and Planning Criteria.

3. To assess the reasonableness of assumption and data sources used in this analysis (e.g. load forecasts, network models, failure rates etc);

4. To assess the reasonableness of options and that a sufficient range of options has been considered;

5. To assess reasonableness of economic analysis performed to justify the preferred option, including: -

   - medium and long term project scope;
   - capital requirements;
   - load growth assumptions;
   - generation developments assumptions;
   - ENERGEX assessment of risk;
   - ENERGEX assessment of customer/business/state benefits.

We do not consider it within the scope of this work or the time constraints on this review to perform a detailed audit of the analysis and studies performed. Where studies and analysis performed have been indicated by ENERGEX we have not attempted to validate that the individual studies have been performed correctly or that the interpretation of the individual studies by ENERGEX staff is correct. Neither have we attempted to put forward other possible augmentation options.

In order to perform this review, ENERGEX initially provided outlines of six projects as requested by PB Associates, so that PB Associates could ascertain a general overview of the projects. Following the initial general overview, more detailed information relating to the actual studies performed, planning reports prepared and business case reports were requested and examined by PB Associates.

5.4.2 General comments on Project Review

Based upon the review of the documents and data supplied relating to the major projects reviewed the following is noted:

1. ENERGEX has the required processes in place to perform proper RAP to achieve optimum network performance and CAPEX

2. We would consider that a reasonable process is being followed to study the constraints on the ENERGEX network, and these constraints appear to be in line with the planning criteria defined in the relevant documents.

3. Based upon the load growth assumptions and information supplied during this review, we would consider that a reasonable process has been followed to define the preferred options and timing of projects.

4. ENERGEX has considered a range of options for removal of network constraints. They have analysed these options quite prudently to optimise the performance and capital expenditure

5. The economic analysis and business case proposals do appear reasonable in their justification for the preferred project. The processes are in place which will stand in a competitive economic environment

6. Generally the reports we reviewed are of high quality in terms of technical and economic evaluations

5.5 COMPARISON OF DEMAND RELATED CAPEX WITH OTHER DISTRIBUTION COMPANIES IN AUSTRALIA

5.5.1 Basis of Data Compared

Various key parameters and measures of levels of expenditure were tabulated to enable comparison with other distributors. Data is available in the public arena for Victoria, submitted as part of the Victorian 2001 price review. Work carried out by PB Associates in South Australia and Western Australia has shown that the Victorian figures are indicative of expenditure levels in these states as well.

The following measures were examined: -

1. Customer Driven Capex per New Customer

2. Total Demand + Customer Driven Capex per New Customer

3. Total Demand + Customer Driven Capex per kVA Load Growth

The following section details the assumptions made for determining customer numbers and growth forecasts.

5.5.1.1 Customer Projections Expenditure

Customer numbers were extrapolated linearly based on historical figures published by the ESAA. On this basis, overall customer numbers were predicted to increase at 2.8% per annum over the review period in Queensland.

5.5.1.2 Load Growth

The overall load growth figures used in the analysis was based on work previously commissioned by the QCA as follows[10] :-

ENERGEX Annual compound growth 2001 – 2006 - 4.2%

5.5.2 Results of 2001 Price Review Comparisons

5.5.2.1 Customer Driven Capital Expenditure per New Customer

As part of the 2001 Electricity Price Review in Victoria, distribution companies were compared by examining “New Customer Connections capital expenditure per New Customer (NCC)”. This is roughly equivalent to ENERGEX Energy Customer requested per New Customer. It is understood that in both cases the treatment of customer services is similar, however a component of metering is excluded in the Victorian figures, but included in the Queensland data. Due to the categorizations it is difficult to reconcile accurately this, however we believe this only have a minor effect on the absolute quantities, slightly inflating the ENERGEX indices.

In Victoria, the NCC incorporates costs for all types of customers and excludes “100% recoverable works” which are works required that does not realise additional customers for example, deviations for road works.

From examination of the detailed project list we noted that there are a number of items in the demand related expenditure, which would have been classified as customer driven in the Victorian Price review. Therefore we expect the ENERGEX forecast to be slightly lower than the Victorian figures, however this would be balanced in the demand related comparisions.

Figure 5-1 below compares the forecast ENERGEX customer driven expenditure with the maximum, minimum and average equivalent NCC capex forecast by Victorian DBs in the 2001 price review.

[10] QCA, ”Electricity Demand Forecast fro 2001 to 2011”, February 2001

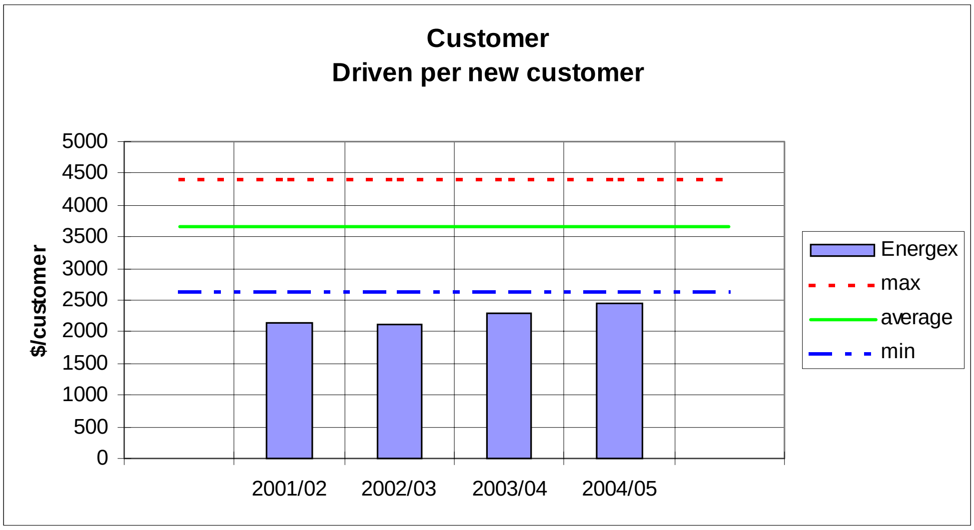

Figure 5-1 Customer Driven Expenditure

As can be seen this expenditure per new customer is relatively constant over the forecast period. The expenditure level is closer to the minimum Victorian levels which could be explained by any of the following: -

- Connection costs are lower and the cost of customer funded works is less in QLD than in Victoria;
- The mix of customers is different;
- A proportion of the customer driven CAPEX is classified in the demand related Capex as specific projects.

5.5.2.2 Total Capex per New Customer

The total demand per new customer measures the total cost of network per new customer. For comparative purposes, it has been assumed that the Customer Driven, Single Contingency and Normal Cyclic Limitation components of the ENERGEX CAPEX are equivalent to the total Demand Related Reinforcement CAPEX (DRR CAPEX) in the Victorian 2001 price review.

The ENERGEX break down of the Capex components is shown in Figure 5-2 below :-

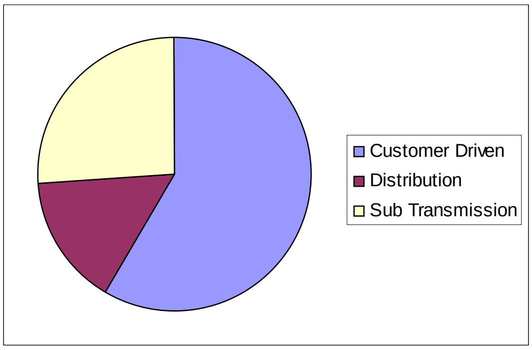

Figure 5-2 Breakdown of Capex

Similarly to the customer driven capex per new customer, these levels are signifcantly less than the average Victorian distribution company, as is shown in Figure 5-3.

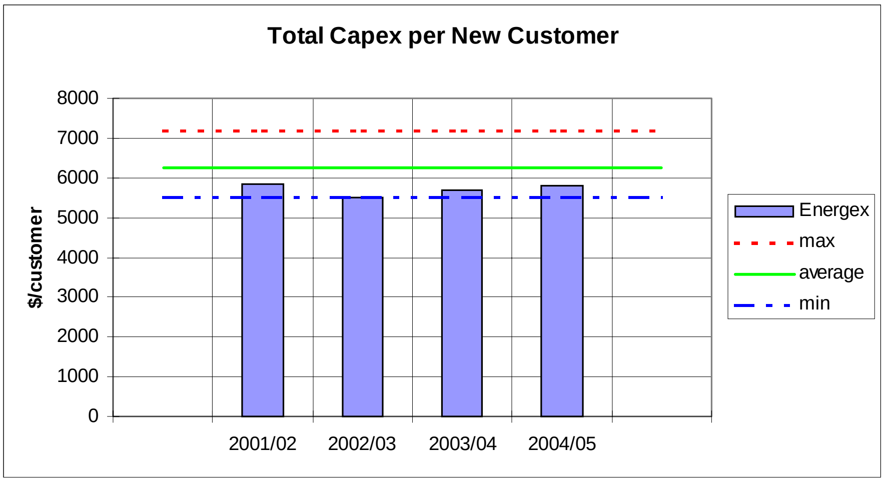

Figure 5-3 ENERGEX Total Capex per New Customer

5.5.2.3 Total Demand Capex per kVA Load Growth

The total demand Capex per kVA load growth is a measure of the ability & cost effectiveness of the network to supply additional load. This measure is significantly affected by the nature of the network. Generally long rural networks will require high levels of expenditure to meet additional demand, while dense urban network are less costly due to the shorter distances involved and increased customer density.

Figure 5-4 and Figure 5-5 below show the total demand related CAPEX for an increase in forecast non-coincident zone substation peak demand compared to Victorian distributors.

Results indicate that forecast expenditure is similar to Victorian levels.

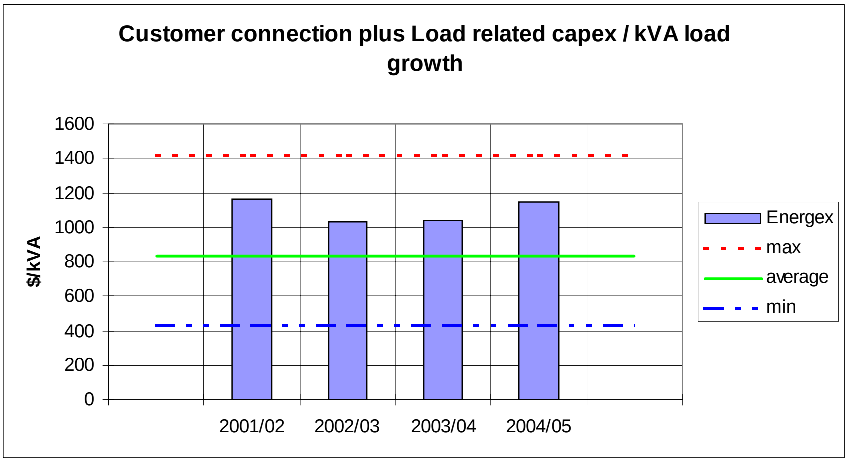

Figure 5-4 Total Demand Capex per kVA Load Growth

Figure 5-5 is a repeat of Figure 5-4 , but comparing ENERGEX to different type of networks. The ENERGEX figures are similar to rural utilities.

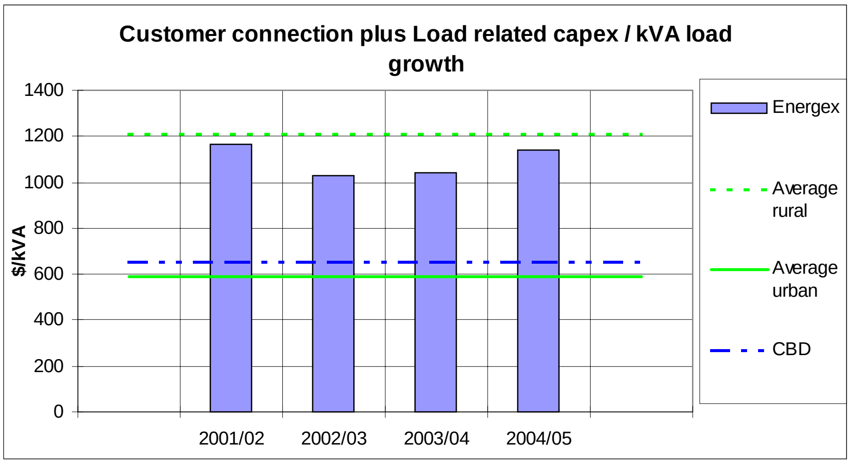

Figure 5-5 Total Demand Capex per kVA Growth (Network Comparison)

5.5.3 Discussion of Demand Related Comparison

A number of factors resulted in extreme differences in the capital expenditure parameters examined above. These are predominately due to: -

- Network density
- Differences in network utilisation levels
- Different planning thresholds
- Specific effects of equipment upgrades eg 6.6kV to 22kV conversions
- Unit costs

In the Victorian 2001 Price Review these were examined using the PB Power model, which accounts for these different operating and planning parameters. In this review the comparison was limited to comparing the output parameters only.

The results are summarised in Table 5-2.

Section	Comparison under taken	Comments
1	Customer Driven per New Customer	Low
2	Total Demand / New Customer	Average
3	Total Demand / KVA Load Growth	Slightly lower than typical Rural DB

Table 5-2 Summary of Comparisons

Although detailed historical expenditure levels were not made available for this review, in the categories reviewed we understand that the levels of expenditure over the last few years were significantly below the forecast levels. The trend in expenditure shown is in fact consistent with expenditure levels of other distribution companies with little evidence of "carry over" investment from the previous years.

The major difference between Queensland and the Southern States is the level of load growth, which is typically 2-4% p.a. where 4.2% is forecast for the ENERGEX area. It is likely that the relatively high level of augmentation has resulted in a number of efficiencies leading to ultimately lower costs on a per customer basis compared to the Southern States. However, from previous work undertaken in Australia, we have found that the Customer Driven Capex is generally independent of the type of network and it appears that the low customer capex per customer is due to classification issues rather than low costs. It is difficult without a detailed network comparison to identify the specific areas of cost differences to the level of growth in the network.

Due to time constraints, we have not carried out a detailed network comparison between ENERGEX and other DB's however we understand that ENERGEX is predominantly urban/rural with a small CBD area. The expenditure levels are consistent with this type of distribution company from our comparison.

Given the reported low levels of expenditure in the proceeding years and high load growth, our conclusion is that the ENERGEX demand related expenditure is reasonable.

APPENDIX A
ASSET LIFE COMPARISON

APPENDIX A Comparison of Asset lives used in Scenario 1 and Scenario 2

	Valuation Asset Lives Scenario 1	Revised Asset Lives Scenario 2	Difference
11 CAP - CUBICLE & POLE TYPE	45	35	**-10**
11 CB INDOOR & OUTDOOR	45	50	**5**
11 FDR - RECLOSER	45	40	**-5**
132 CB OUTDOOR (all types)	45	50	**5**
132/33 or 11kV transformers, All MVA	45	50	**5**
132/66/11 transformers, All MVA (Auto)	45	50	**5**
220 CB OUTDOOR - FDR	45	50	**5**
33 CAP – 10 & 20 MVAR	45	35	**-10**
33 CB INDOOR (all types)	45	50	**5**
33/11kV transformers, All MVA	45	50	**5**
66 CAP	45	35	**-10**
66 CB – (All Types)	45	50	**5**
66/11 transformers, All MVA	45	50	**5**
66/33 transformers, 5/6-25 MVA (Auto)	45	50	**5**
Pilot Wire – (All types)	35	60	**25**
11 kV - Cable box All kVA	35	45	**10**
11 kV - Kiosk and pad mount All Sizes	35	45	**10**
11 kV Ground transformer All kVA	35	45	**10**
12.7 kV SWER pole mount 10/25kVA	35	45	**10**
12.7 kV SWER pole mount isol	35	45	**10**
19.1 kV recloser	35	40	**5**
19.1 kV SWER pole mount All sizes	35	45	**10**
22 kV - Kiosk and pad mount All sizes	35	45	**10**
22/11 kV - Pole mount All sizes	35	45	**10**
33 kV ABS	35	45	**10**
33 kV Ground 1,000 (No RMU)	35	45	**10**
33 kV polemount All sizes	35	45	**10**
33 kV Recloser	35	45	**10**
33 kV Regulator - Rural	35	45	**10**
ABS All voltages	35	45	**10**
Recloser 11/22 kV - 3 ph	35	40	**5**
Regulators pole mount – 2 & 3 ph	35	45	**10**
Sectionalisers -all sizes	35	45	**10**
SWER Reactor	35	45	**10**
Low Voltage Overhead Lines all types	35	45	**10**
Low Voltage Services – all types	35	44	**9**
Low Voltage Underground Cables – all types	60	70	**10**
Metering – all types	25	30	**5**

	Valuation Asset Lives Scenario 1	Revised Asset Lives Scenario 2	Difference
Major metering gear HV	15	30	**15**
11/22 kV Overhead Distribution Lines – all types	35	45	**10**
Overhead Transmission Lines – 132kV all types	50	45	**-5**
33 kV Overhead – wood poles	35	45	**10**
33 kV Overhead – Concrete poles	50	45	**-5**
66 kV Overhead – wood poles	35	45	**10**
66 kV Overhead – concrete poles	50	45	**-5**
Streetlight poles all types	20	40	**20**
SWER Overhead Lines – all types	35	45	**10**
132/110 kV UG (SOLID)	45	60	**15**
66kV terminations	60	50	**-10**