ELECTRICITY NETWORK
2004 ODV REPORT

Valuation as at 31 March 2004

23 December 2004

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Report Published on 24 December 2004

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1 Executive Summary

The Electricity Information Disclosure Requirements 2004 came into force on 8 May 2004 pursuant to Section 57T of the Commerce Act 1986. These Requirements specify the need for Electricity Lines Businesses to disclose a Valuation Report, prepared using the ODV method as set out in the Commerce Commission's ODV Handbook of 30 August 2004.

This report concerns the ODV valuation of Powerco Limited's (Powerco's) electricity network system fixed assets as at 31 March 2004, as required by the above Information Disclosure Requirements.

The valuation of electricity network assets under the Handbook's ODV methodology has involved the following steps:

a) Preparation of a valuation asset register (section 3 of this report);

b) Determination of the modern equivalent asset replacement cost (RC) (section 3 of this report);

c) Optimisation of the existing valuation asset base to determine the optimised replacement cost (ORC) (section 4 of this report);

d) Depreciation of the RC on the basis of the remaining lives of the existing assets to determine the depreciated replacement cost (DRC) (section 5 of this report);

e) Depreciation of the ORC to determine the optimised depreciated replacement cost (ODRC) (section 5.5 of this report);

f) Application of the Economic Value (EV) test, to the extent it is required (section 6 of this report);

g) Determination of the overall ODV, being the aggregation over all assets the lower of ODRC and EV for each asset (section 6 of this report); and

h) Preparation of an asset valuation (ODV) report (summarised in Appendix 1).

The following table summarises the valuation of Powerco's electricity network assets:

Region	RC	ORC	DRC	ODRC	ODV
Eastern	$702,578,741	$699,030,531	$394,293,822	$393,038,953	$393,038,953
Western	$959,587,965	$949,557,793	$507,865,376	$504,600,134	$504,600,134
Common Assets	$10,708,937	$10,708,937	$7,898,524	$7,898,524	$7,898,524
Total	$1,672,875,644	$1,659,297,261	$910,057,722	$905,537,611	$905,537,611

2 Key Definitions

Consumer	An entity that receives electricity supply through a connection to Powerco's network, but is charged for the connection by an electricity retailer.
DRC	Depreciated Replacement Cost, according to clause 2.48 of the Handbook, asset replacement costs shall be depreciated when the existing asset's remaining life is less than the total life that would normally be expected from a new asset. The depreciation recognises the consumption of an asset's service potential over its total life.
Eastern Region	The part of Powerco's network supplying Tauranga, Western Bay of Plenty, Coromandel Peninsula, Hauraki Piako plains area and the south Waikato as far south as Kinleith. It is geographically distinct from, and non contiguous with, the Western Region.
ELB	Electricity Lines Business
EV	Economic Value, which is defined by clause 1.5 of the Handbook as the net present value of the minimum charges that a consumer would pay for an equivalent service using the least cost practical solution.
GXP	Transmission grid exit point from which Powerco takes supply.
Handbook	Handbook for Optimised Deprival Valuation of System Fixed Assets of Electricity Lines Businesses; 30 August 2004; Commerce Commission
ICP	Installation Control Point, which is the point of connection of a consumer to the Powerco network.
MEA	Modern Equivalent Asset; which is defined by clause 2.11 of the Handbook as the assets that would be installed today to provide the same service potential as the existing assets.
ODRC	Optimised Depreciated Replacement Cost; as per clauses 2.57 and 2.58 of the Handbook, the optimised replacement costs of the assets are to be depreciated. The depreciation recognises the use of optimised assets' service potential over their total life.
ODV	Optimised Deprival Valuation; is defined by clause 1.2 of the Handbook as the methodology that measures the economic value of system fixed assets to an ELB on the basis that the ELB operates in an efficient manner that is sustainable over time and is not able to extract monopoly rents. It is the lesser of the ODRC value and the EV value.
ORC	Optimised Replacement Cost; is defined in clause 2.18 of the Handbook. Under the deprival approach to asset valuation, an optimised network would use the most cost efficient design that would provide the required service potential.
RC	Replacement Cost; is defined in clause 2.11 of the Handbook as the value of the modern equivalent system fixed assets that would be installed today to provide the same service potential as the existing assets.
RL	Remaining Life is the time remaining before the service potential of an asset is fully consumed.
Service Performance	The level of electricity supply service delivered in terms of quality, capacity and reliability.
Service Potential	The total expected future service performance of an asset. It is normally determined by reference to the service performance and economic life of similar assets.
TL	Total Life or Standard Life; this is the length of time over which an asset is expected to provide its economic service before its service potential is fully

	consumed, under normal service conditions and given a satisfactory maintenance regime.
Western Region	The part of Powerco's network supplying the Taranaki, Wanganui, Manawatu and Wairarapa areas. It is geographically distinct from, and non contiguous with, the Eastern Region.

3 Introduction

3.1 Introduction

The Electricity Information Disclosure Requirements 2004 came into force on 8 May 2004 pursuant to Section 57T of the Commerce Act 1986. These Requirements specify the need for Electricity Lines Businesses to disclose a Valuation Report, prepared using the ODV method as set out in the Commerce Commission's ODV Handbook of 30 August 2004.

This report concerns the ODV valuation of Powerco Limited's (Powerco's) electricity network system fixed assets as at 31 March 2004, as required by the above Information Disclosure Requirements.

3.2 Network Overview

Powerco's electricity network has extensive urban and rural networks serving Coromandel, Manawatu, Rangitikei, Taranaki, Tararua, Tauranga, Wanganui, east and south Waikato to Kinleith, Western Bay of Plenty, and Wairarapa. Powerco now supplies approximately 300,000 consumers through more than 26,000 km of lines over an area of 39,000 sq. km.

The network comprises a subtransmission network, mostly at 33kV but with some 66kV, that supplies 101 substations and 3 switching stations. Most zone substations are 33/11kV, but a few are 33/6.6kV or 66/11kV. Some supply 22kV from 11/22kV transformers. A radial feeder network runs from the zone substations throughout the service area. Zone substation transformer capacities range from 1.25 MVA to 24 MVA.

Powerco's network connects to Transpower's grid at 66kV, 33kV and 11kV via 25 Transpower grid exit points (GXPs). It also connects to several of Trustpower's hydro power stations and one wind farm, to two of New Zealand Energy's hydro power stations, and to Genesis Energy's Haunui wind farm.

The 11kV network in the Tauranga, Mt Maunganui, New Plymouth, Wanganui, Palmerston North, Masterton and Tokoroa Central Business Districts consist of highly interconnected radial feeders and the 400V system consists of radial circuits with a high degree of interconnection.

Both high voltage and 400V urban distribution networks are interconnected radial systems. The level of interconnection is moderate, commensurate with reliability requirements. The network configuration for large industrial consumers is commensurate with the nature of the consumers' operation and capacity demand.

The rural networks consist mainly of distribution voltage networks with isolators installed every few kilometres. Some interconnection between feeders is present to allow backfeeding in maintenance and fault situations. Typically, around 70-80% of the feeder load can be supplied by backfeeding from adjacent feeders. The remote rural feeders are radial with limited interconnection between adjacent feeders.

There is a significant highly connected distribution network owned and operated by Powerco supplying CHH's mill at Kinleith.

3.3 The ODV Methodology

The valuation methodology follows that outlined in the Commerce Commission's ODV Handbook of 30 August 2004.

The ODV method assumes a hypothetical operating environment where the relevant market is competitive (contestable with no barriers to entry). Where conventional system fixed assets are economic, an efficient new entrant's revenue would be determined by the efficient cost of capital required to fund the installation of replacement modern equivalent assets. Where conventional system

fixed assets are not economic, an efficient entrant's revenue is determined by the minimum cost of providing an equivalent service using an alternative source of energy, not using system fixed assets.

The ODV method measures the economic value of system fixed assets on the following basis:

- The lines business operates in an efficient manner
- The lines business is sustainable over time
- Monopoly rents are unable to be extracted

The valuation of Powerco's assets under the Handbook's ODV methodology has involved the following steps (as detailed in 1.7 of the Handbook):

a) Preparation of a valuation asset register (section 3 of this report);

b) Determination of the modern equivalent asset replacement cost (RC) (section 3 of this report);

c) Optimisation of the existing valuation asset base to determine the optimised replacement cost (ORC) (section 4 of this report);

d) Depreciation of the RC on the basis of the remaining lives of the existing assets to determine the depreciated replacement cost (DRC) (section 5 of this report);

e) Depreciation of the ORC to determine the optimised depreciated replacement cost (ODRC) (section 5.5 of this report);

f) Application of the Economic Value (EV) test, to the extent it is required (section 6 of this report);

g) Determination of the overall ODV, being the aggregation over all assets the lower of ODRC and EV for each asset (section 6 of this report); and

h) Preparation of an asset valuation (ODV) report (summarised in Appendix 1).

3.4 Handbook Reporting Requirements

Handbook clause 2.65 summarises the requirements that valuation reports must include. The following index allows the reader to reference the section of this report dealing with each requirement.

HB Ref	Report Section	HB Ref	Report Section	HB Ref	Report Section
2.65 a)	7.2, Appendix 1	2.65 h)	6.2	2.65 o)	5.4, Appendix 3
2.65 b)	7.2, Appendix 1	2.65 i)	6.3	2.65 p)	5.3
2.65 c)	4.3	2.65 j)	5.2, 5.3	2.65 q)	5.3
2.65 d)	6.2	2.65 k)	5.5	2.65 r)	7.1
2.65 e)	4.4, Appendix 1	2.65 l)	5.6, Appendix 4	2.65 s)	7.1
2.65 f)	4.3, Appendix 2	2.65 m)	5.6		
2.65 g)	6.3, Appendix 6	2.65 n)	5.7, Appendix 5		

4 Asset Register and Replacement Costs

4.1 Preparation of Valuation Asset Register

Assets included in the ODV valuation include all system fixed assets owned by Powerco or subject to a finance lease. The ODV handbook defines system fixed assets (2.6 of the Handbook) as follows:

System fixed assets are assets that are tangible in nature, have relatively long useful lives, and are used, or intended to be used, for the conveyance or supply of electricity.

Easements may be included as part of the ODV valuation in situations where the easement forms an integral part of a network asset[1].

Stores and spares held in stock may be included in the ODV valuation providing the quantities held are appropriate (based on historical reliability of the equipment and the number of items installed on the network).

The Handbook specifically excludes the following assets:

- Office buildings, except where required for the real time operation and control of the distribution or transmission network.
- Depots and workshops.
- Office furniture and equipment.
- Motor vehicles
- Tools, plant and machinery.
- Works that are under construction.
- Consumer-based meters and load control relays (except transmission revenue meters).
- Non-network related land.
- Non-network related stores and spares.
- Computer systems, except computer systems that are used for real time network operation and control.
- Asset management systems, including geographic information systems, except where such systems are used for real time network operation and control.
- Street lights and poles or other structures used exclusively for the support of streetlights.
- Street light control relays and circuits or other equipment used exclusively for the control of street lights, and
- Assets where the ownership is disputed or unclear.

These assets have not been included in Powerco's electricity network ODV assets

Powerco operates a Geographical Information System (Geonet GIS) for the management of spatial asset information. The GIS contains spatial and attribute information on the following assets and types:

- Overhead lines (66, 33, 22, 11, 6.6kV and 400V);
- Underground cables (66, 33, 22, 11, 6.6kV and 400V);
- Distribution transformers and substations;

[1] As outlined later in the report, no easements have been included in the valuation.

- Distribution switchgear and fuses (66, 33, 22, 11, 6.6kV)
- Associated distribution equipment such as pillar boxes and stay wires.
- Zone substation equipment
- SCADA communications and protection pilot cables

Non-spatial information relating to zone substation assets is also contained in Geonet. Other databases have been used to check the accuracy of the zone substation information contained in Geonet. Certain zone substation information is not contained in Geonet such as protection and SCADA equipment, and in these cases other ancillary databases have been used.

The GIS represents the best source of information on most of Powerco's network assets. Some data and connectivity enhancement projects are still in progress, but Powerco uses the GIS extensively for its own operations and processes. The GIS allows accurate determination of line lengths and asset quantities for determining the network optimised depreciated replacement cost (ODRC). The asset spatial information is also a key input into maintenance scheduling and cable locating. Asset additions and deletions are "as built" as part of the network construction process.

The way in which the original data was captured does have an influence on the valuation. Powerco's network includes several previous line company entities that had different information systems. In some cases, where attribute data, such as conductor size or insulation material, was not known, these have been marked as such in the information system. In other cases, default data has been applied in the information system, for example, the smallest size cable conductor or XLPE insulation could have been ascribed where the size or insulation material was unknown. Unless better information is known, the data in the information system has not been adjusted to compensate for the assumptions made during the data capture.

Powerco operates an ancillary electronic database (Gentrack) for control and issuing of installation connection point (ICP) information to retailers. This database has been used to determine quantities of consumer connections. The database is maintained up to date through Powerco's Customer Initiated Works process.

Powerco's land tenure database has been used to identify Powerco owned network associated land. Easement values have not been included in this valuation.

Quantities of stores and spares have derived from the stores holding inventories, consistent with the Commerce Commission's Explanatory Notes of 22 October 2004.

A summary of the system fixed asset database is included in Appendix 1.

4.2 Determination of RC

Individual system fixed assets (including stores and spares) have been valued using the RC of modern equivalent assets that would be installed today to provide the same service potential.

The valuation has used the standard replacement costs outlined in Appendix A of the Handbook for commonly used system assets. In the case of shared trench cables or multi circuit lines, the primary circuit has been valued at its single circuit equivalent and the secondary circuit has been valued at its equivalent marginal cost.

4.3 Non Standard Replacement Costs

Replacement costs for non-standard assets have been determined on the basis that construction occurs around all existing infrastructure and development, commensurate with a significant scale of construction in accordance with the Handbook. Replacement costs for these assets are listed in Appendix 2 of this report.

Non-standard replacement costs:

- Include the costs associated with installation, testing, commissioning, project management and construction supervision, design and overhead allocation for own construction. They exclude land use consents and any allied legal expenses. GST is excluded.

- Have been based on actual competitive tenders where possible and reflect a significant scale of construction as set out in the Handbook. In some cases it has been necessary to use designer's estimates. Material prices have been based on bulk purchasing from a competitive source – with adjustment to recognise currency exchange rates as appropriate.

- Are based on present day costs to replace assets with those of equivalent service potential and lowest lifetime cost. A broad representative sampling of recent known projects has been collated where possible. In a small number of cases, where tender prices are more than two years old, an adjustment, based on price indices produced by Statistics New Zealand, has been made.

4.4 Multipliers

Adjustments to standard replacement costs are allowed by the Handbook to cater for the construction of network assets in adverse or urban situations.

Standard overhead subtransmission and distribution line replacement costs are based on three phase construction and rural environment with 70 – 80 metre spans. The following multipliers are applicable:

- For lines in urban environments, a replacement cost multiplier of between 1.5 and 1.8 times the standard cost can be applied.

- For lines and other asset types in remote areas situated more than 75km from the ELB or contractor's nearest works depot, a replacement cost multiplier of between 1.0 and 1.25 times the standard cost can be applied.

- For lines and other asset types in rugged terrain areas where normal line construction vehicles and plant cannot be used and where it is necessary to use helicopters, tracked vehicles, boats or other specialised plant, a replacement cost multiplier of between 1.2 and 1.3 times the standard cost can be applied.

Standard underground cable replacement costs are based on laying in suburban areas with developed infrastructure. The following multipliers are applicable:

- For cables laid in central business districts or main arterial roads with restricted access times, special reticulation requirements and areas requiring substantial reinstatement or special backfilling, a replacement cost multiplier of between 1.15 and 2.0 can be applied.

- For cables in rocky ground a replacement cost multiplier of 1.5 to 2.0 can be applied.

Traffic management allowances for lines and cables constructed nearby roads with Level 1 and Level 2 temporary traffic management requirements as defined in the Transit Code of Practice for Temporary Traffic Management in New Zealand. The allowance can only be applied to the primary asset.

The multipliers and allowances applied in Powerco's ODV are detailed further in Appendix 1.

5 Optimisation

5.1 Introduction

Optimisation answers the question:

"What is the most cost effective design of network assets that would provide the required service potential?"

Electricity networks with their long asset lives tend to have been built up over several years and the factors that prompted an expansion or modification to the network in the past are not necessarily relevant to the valuation of the current network. Given present and forecast demand profiles, some parts of the network could have more capacity than they need, other parts may be redundant, and other parts could have a less cost efficient design than present design standards allow. A notional redesign (optimisation) of the network should allow for the provision of the current and forecast levels of services over the planning periods.

The Handbook allows the existing network to be used as the starting point of the valuation. This avoids situations where the existing asset base is completely redesigned and configured which is likely to be costly to prepare and subjective.

The Handbook (2.22) outlines optimisation as consisting of five stages:

a) Exclude stranded assets;

b) Optimise the configuration of the network;

c) Optimise the capacity of elements in the network;

d) Optimise network engineering; and

e) Optimise stores and spares.

The handbook also accepts the following constraints on the optimisation process:

a) The potential level of service of the optimised network shall not exceed that of the existing network, and the performance of any part of the optimised network shall not exceed the ELB's disclosed quality of supply criteria, unless non-standard contracts with customers exist that require the ELB to provide an enhanced quality of supply;

b) The location of network interconnections with other networks should be assumed to be fixed. However, where a point of connection can be bypassed and replaced with a more cost-efficient network arrangement, then that point of connection shall be deleted for valuation purposes;

c) The location and number of connection points to consumers should be assumed fixed;

d) The optimised network should only use the voltage levels used on the existing network; and

e) The existing geographic boundaries of the ELB's supply area should be assumed to be fixed.

In this valuation, optimisation of the system fixed assets was carried out in accordance with the Handbook.

5.2 Network Configuration

The following section describes the optimisation of network configuration performed as part for the valuation.

Point of supply

All Grid Exit Points (GXP) were evaluated to see if they were required given Powerco's disclosed quality of supply criteria. No optimisation was considered necessary.

Subtransmission Circuits

Each subtransmission circuit was evaluated to see whether it was needed at its current voltage in order to meet the disclosed quality of supply criteria given future load growth.

All but two lines were required to meet the required security of supply levels. A dual circuit line was optimised to single circuit.

Six subtransmission lines in the Powerco network operating at 66kV were considered for optimisation to 33kV but the notional cost of establishing this part of the network at 33kV was considerably greater than the notional saving from optimising the substations at these locations.

Three sections of 33kV capacity line in Taranaki operating at 11kV, supplying areas experiencing less growth than had once been expected, have been valued as if they were 11kV lines.

Zone Substations

Each zone substation was evaluated to confirm whether it was required and whether the voltage exceeds that required to meet Powerco's security criteria for the forecast future load.

It was found that one of the existing switching structures in the Manawatu area and its associated circuit breaker could be optimised out with the network still achieving its disclosed quality of supply throughout the planning period.

Several load control injection plants have been optimised out and other plants were notionally installed at Grid Exit Points.

High Voltage Distribution Network

Case studies of distribution lines of three phase construction feeding only single phase loads were assessed to consider variations in design standards between different parts of the network. The interpretation was taken that consumers supplied with three phase supply should continue to receive three phase supply. Studies showed that if three phase consumers agreed to take single phase supply, optimising feeder trunks of three wire line to two wire would leave them prone to overloading or low voltage. No short lengths of three phase line supplying single phase consumers were found, leading us to believe that the optimisable sections of line would be of small incidence and not material to the valuation.

SWER line has been valued as two wire line and SWER isolating transformers have not been included in the valuation as stated by the Handbook.

5.3 Network Capacity and Network Engineering

The optimisation of network capacity and network engineering was performed using the following methodology:

Subtransmission Lines and Cables

The size of line and cable conductor supplying each substation was assessed against the size required to meet the required security of supply over the future growth period provided for and allowed in terms of the Handbook.

As a result various lines in Powerco's network could be optimised down from heavy to light, and in the case of cables, from extra heavy to heavy.

Zone Substations

Each zone substation was examined for equipment, buildings or land that may be under utilised or of an engineering standard that was in excess of that required to meet quality of supply within the planning period.

A small number of substations were found to have surplus structures, switches, bus sections or transformers of a capacity beyond that required. Such equipment was either optimised out, optimised to a smaller capacity or not valued if it did not form part of the MEA definition. Buildings or switch-rooms found to be larger than required to house Modern Equivalent Assets have been optimised to a smaller size.

Assessing details of land titles against the area of land required to accommodate modern equipment identified land in excess of requirements at a number of locations. Land in excess of that required within the horizon period has been optimised out at DVR values pro rated by area.

High Voltage Distribution

Each high voltage line was assessed, using life cycle cost methodologies, to ascertain whether an adequate standard of service to consumers could be maintained more cost-efficiently through use of a smaller size conductor or cable. The methodology adopted involved:

- Identifying size of conductor required to meet maximum demand and voltage quality, under normal and contingent operation, and fault rating, and
- Confirming whether the conductors were appropriately sized to meet the levels of demand forecast to occur during the planning period.

As a result, one length of distribution line in the Eastern Region and eighteen pieces of distribution feeder in the Western Region required optimisation to a smaller size.

Voltage Control Devices

All voltage control devices were examined to see whether they are still needed in the light of current and forecast loads and quality of supply requirements. As a result, five voltage regulators located at zone substations in the Western Region could be replaced with on load tap changers in a modern optimally designed network. These were optimised accordingly.

Distribution Transformers

An assessment of distribution transformer utilisation was undertaken in accordance with the Handbook. The transformers had an average utilisation factor of 31% with a power factor of 0.95. No optimisation was necessary.

Powerco has not separated out any segments of the network where peak loads are not coincident with the network peak.

Low Voltage Distribution

The cost-effectiveness of the Low Voltage designs was assessed from case studies of different parts of the network. These case studies included various situations faced in Powerco's electricity network, including reticulation in rural areas, semi rural life style block areas, suburban overhead and underground networks, central business districts, new subdivisions, and suburban areas with significant infill development.

These case studies demonstrated that no optimisation was necessary because

- The size of lines was appropriate for the loads anticipated during the 5 year planning period allowed;

- The network designs and selection of conductor are still near optimal, even though they were designed and constructed many years ago; and

- There was no stranding of LV assets noted.

System Control

Examination of the SCADA system currently in place confirmed that it was at a nominally appropriate level of sophistication given information requirements for identification of faults, containing outages and managing the load control system. The age and level of sophistication of Powerco's current SCADA system varies considerably between the six sub-regions. None of the existing components are considered superfluous. An optimal configuration would utilise one centralised and fully integrated system with improved data handling capability. The replacement cost for this improved facility warranted was found to be higher than that which exists at present.

Whether Underground Cables are Justified

The requirements of all District Plans pertinent to Powerco's network area were reviewed to consider whether local authorities would allow underground cables to be replaced with overhead lines. It is now common practice, as determined by development companies and thus the consumers they represent, to require new residential subdivisions to be supplied through underground circuits. As well as being more aesthetically acceptable, underground circuits can improve the reliability of the supply and improve road safety. In almost all cases the District Plans either clearly encourage high amenity and landscape values or state that reticulated networks must be underground where possible. In other cases it was considered that replacing underground reticulation with overhead, would not be environmentally acceptable to communities. No optimisation was considered appropriate.

Underground Cable Trenching

All cables, including those used for subtransmission, high voltage distribution and low voltage distribution were assessed so that those running within 3 metres of each other, as identified in Poweroc's GIS system, were optimised down to a single trench. The primary (largest) cable was valued at the standard cost whilst additional cables were valued at marginal installed cost.

5.4 Summary of Optimisation

A schedule of all network optimisations and details of the valuation impact of each optimisation can be seen in Appendix 3.

System fixed assets not required to supply line services to existing consumers that could therefore be disconnected, have been identified and excluded from the optimised network. These are also shown in Appendix 3.

5.5 Life Cycle Costing

The most cost efficient design is the one that optimises the present value of the total costs of the system fixed assets and their use over their standard lives[2].

Life cycle costing has been used to determine the optimal conductor sizes for both high voltage and low voltage distribution lines as part of the optimisation process. The analysis undertaken involved;

- The initial capital cost of installing a conductor of a given size (including the costs of materials, labour and use of equipment) was determined from Appendix A in the Handbook.

- The magnitude of electricity losses (in kWh per km) was calculated based on the % loss to be expected from a normalised load curve.

[2] Consideration of the Equivalent Uniform Annual Worth was not necessary because the total assets lives are similar in all cases.

- The present value of losses was calculated at the date of installation.
- The net present value for conductor was calculated given the present value of the losses, the initial installation cost, operational expenditures and an appropriate discount rate.

The assumptions used in the analysis were:

- The average age of the conductor was 22 years and its lifetime 45 years.
- Load growth over the 5 year planning period provided for was as in Appendix 4.
- Distribution lines were designed in accord with the “two thirds” principle and thus rated for a maximum load of 1/3 more than the normal load.
- Electricity losses were valued at $0.08 /kWh.
- Maintenance and operational costs were 2% of the initial capital cost.
- The discount rate was 8.85%

The maximum capacity of the optimised network is determined by the allowed future load growth. This is defined as the maximum forecast load on the relevant part of the network under contingency operating conditions over the allowed planning period.

5.6 Growth Forecasts

Appendix 4 shows the expected load growth forecasts and existing load growths that have been assumed as part of the optimisation.

The forecasted loads take into account the potential to reduce peak demand through the application of cost effective demand-side management practices where appropriate.

Powerco does not have any separately identifiable new load or load increments exceeding either 5% of its existing demand or 10MW included in the load forecast.

5.7 Quality of Supply Criteria

The optimised network has been designed to supply the existing load, and any future load growth with a quality of supply that matches the level that currently exists for each part of the network except where this is greater than the disclosed quality of supply criteria.

The quality of supply criteria that Powerco currently uses as a basis for its network design is set out in Appendix 5.

6 Depreciation

6.1 Introduction

Having established the value of the system at the optimised replacement cost, the next step is to consider the impact of depreciation.

A system asset is to be depreciated when the remaining service life of the asset is less than the total life of the new asset. Depreciation recognises the reduction in service potential given its (shorter) remaining life.

The Handbook (Paragraph 2.49) dictates that straight line depreciation is to be used so that the DRC is determined as follows:

DRC = RC x RL/TL

Where: RC = Undepreciated replacement cost;

RL = Remaining life; and

TL = Total life

The Handbook dictates the standard total lives of the asset classes to be used. A full list of the total lives of the assets is detailed in Appendix A of the Handbook. Total lives used for non standard assets are given in Appendix 2.

6.2 Determining Asset Age

The life of a system asset commences when the asset is first commissioned. If this date was unknown, then the date of installation was taken to be the same as that used in the previous ODV valuation.

In some cases, estimates of age have had to be carried out and these are outlined as follows:

- For transformer assets whose standard lives have been extended, the date of purchase has been used as the date of commissioning rather than the date of installation.
- There are some instances where the insulation of cables was not known. In these cases, the respective proportions of XLPE and PILC cable have been estimated by extrapolating the proportions of cable with known insulation type by voltage and by year that the cable was installed.
- Where distribution transformers had unknown age, the ages for these were estimated by studying the age profile of similar transformers by the same manufacturer.
- The ages of consumer connections and related equipment were estimated to be the same as the ages of their associated distribution substation.

6.3 Asset Life Extensions

Under certain circumstances as dictated by the Handbook, asset lives may be extended or reduced.

Life extensions are applicable to certain types of switchgear, zone substation transformers and distribution transformers if certain conditions are met. In some situations, it is necessary to reduce the lives of assets. These situations include

- Assets in coastal environments;

- Assets exposed to high use or high fault levels or showing systemic premature failure; and
- Assets that have been poorly maintained.

Appendix 6 shows the assets whose standard lives have been extended in accordance with clauses A32 to A44 of the Handbook. No reduction in standard lives was considered necessary.

6.4 Refurbishment

Refurbishment is classed as work done on the asset (or set of assets) that results in a material extension of its service life beyond its normal TL. This is distinct from maintenance work, which is performed to ensure that an asset is able to perform its designated function for its normal TL.

No asset refurbishment has been captured in this valuation.

6.5 Determining the DRC

The DRC of the system assets of the electricity lines company is the aggregate of the individual system assets replacement cost less depreciation.

6.6 Determining the ODRC

Optimisation can have two impacts in determining the appropriate ODRC. These are:

a) An existing system fixed asset being notionally replaced. In this situation the Handbook requires the asset to be depreciated in the same proportion of the MEA total life to existing life as the asset it replaces.

b) An existing group of assets is optimised or reconfigured. In this situation the replacement assets shall be depreciated as a group to reflect the remaining life of the existing group as a proportion of that group's total life. The calculation should be made on a weighted average cost basis, with the weighting factor being replacement cost.

7 Determining the ODV

7.1 Application of the Economic Value (EV) Test

All areas that were previously tested for Economic Value (EV) in 2001 have been reassessed in accordance with section 2.59 of the Handbook (new Handbook methodology). Subsequent additions to the network have also been reviewed. Based on the results of the assessment, Powerco is satisfied that an economic valuation of these assets would not result in a material reduction to the ODV of the system fixed assets. The materiality threshold for EV Testing in the Handbook is defined as 1% of the ODRC of all system fixed assets.

7.2 Determination of the ODV

The ODV of the system assets is the lower of the ODRC and the EV. In situations where an EV test has not been deemed warranted the ODV value of the asset is to be the ODRC.

Full details of the asset quantities, RC, ORC, DRC, ODRC and ODV for each class of asset are shown in Appendix 1.

8 Certification and Audit Report

KPMG

AUDITOR'S OPINION ON THE VALUATION REPORT OF

POWERCO LIMITED

We have examined the valuation report of Powerco Limited and dated 23 December 2004, which report contains valuations of system fixed assets as at 31 March 2004.

In our opinion, having made all reasonable enquiry, and to the best of our knowledge, the valuations contained in the report, including the total valuation of system fixed assets of $905,537,611 have been made in accordance with the ODV Handbook (as defined in the Commerce Commission's Electricity Information Disclosure Requirements 2004).

KPMG

KPMG
Christchurch
23 December 2004

Powerco Limited

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www.powerco.co.nz

KPMG
P O Box 274
CHRISTCHURCH

20 December 2004

POWERCO

Dear Partners

At the request of Bruce Loader, we write in connection with your audit of the Optimised Deprival Valuation ("ODV") of the value of the lines business assets for the year ended 31 March 2004. The purpose of this letter is to confirm the representations that we and our staff have made to your firm during the course of the audit to enable you to express an audit opinion on our ODV valuation in accordance with the Commerce Commission's Handbook.

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1. Representations in connection with your audit

In connection with your examination we confirm, to the best of our knowledge and belief, the following representations made to you during your audit.

- We do not believe that there are any significant stranded assets as defined by the Handbook
- Where assets are of unknown purchase date and an unknown quantity have been included within the system fixed assets valuation we have used our best estimate to estimate the incomplete data.
- We are not aware of any significant value of system assets owned by the business that have been excluded from the system asset valuation report.
- There will be no material impact on load growth arising from the risk of national electricity supply shortfalls.
- All distribution assets, unless otherwise stated are required for the ongoing operation of the business.
- We do not believe that any system fixed assets have become uneconomic since the 2001 ODV report was issued.
- We are not aware of any significant instances where the optimisation of the system fixed assets is not in accordance with the Handbook or where at optimisation should have been performed in accordance with the Handbook but has not been so.
- There are no customer owned assets that are included within the valuation.
- There have not been any significant line terminations between 31 March 2004 and the date of this letter, not appropriately accounted for.

- There are no material abnormal cash payments likely to be made in the future that will significantly adversely affect the future cash flows of the lines business activity of the company.
- All relevant costs incurred are determined on an arms length basis.

Yours faithfully

For and on behalf of Powerco Limited

Director

Chief Executive Officer

Powerco Limited

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Certification of Valuation Report of Disclosing Entities

POWERCO

We, Barry Upson, Director, and Steven Boulton, Principal, of Powerco Limited certify that, having made all reasonable enquiry, to the best of our knowledge –

a The attached valuation report of Powerco Limited, prepared for the purposes of requirement 19 of the Commerce Commission's Electricity Information Disclosure Requirements 2004 complies with those Requirements; and

b The replacement cost of the line business system fixed assets of Powerco Limited is $1,672,875,644; and

c The depreciated replacement cost of the lines business system fixed assets of Powerco Limited is $910,057,722; and

d The optimised depreciated replacement cost of the lines business system fixed assets of Powerco Limited is $905,537,611; and

e The optimised deprival valuation of the lines business system fixed assets ofPowerco Limited is $905,537,611; and

f The valves in paragraphs (b) through to (e) have been prepared in accordance with the ODV Handbook (as defined in the Electricity Information Disclosure Requirements 2004). These valuations are as at 31 March 2004.

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Director
22 December 2004

Chief Executive Officer
22 December 2004

Appendix 1 – Asset Summary by Category

Eastern Region ODV Summary

Eastern Region ODV Summary

As at 31 March 2004

Description	Quantity	Unit	Ave Std Life (yr)	Ave Age (yr)	RC ($)	ORC ($)	% Opt	DRC ($)	% Dep	ODRC ($)	ODV ($)
Land	5	Pcl	0	0	$214,000	$169,604	20.7%	$214,000	0%	$169,604	$169,604
Total Distribution Substations	**11,411**	**No.**			**$23,319,000**	**$23,274,604**	**0.2%**	**$14,908,221**	**36%**	**$14,863,825**	**$14,863,825**
LV Lines											
Overhead Heavy	28,059	m	57	30	$848,842	$848,842	0.0%	$440,878	48%	$440,878	$440,878
Overhead Medium	1,288,030	m	59	31	$29,522,788	$29,522,788	0.0%	$15,150,001	49%	$15,150,001	$15,150,001
Overhead Light	836,254	m	57	26	$20,874,224	$20,874,224	0.0%	$9,477,421	55%	$9,477,421	$9,477,421
Total LV Lines	**2,152,343**	**m**			**$51,245,854**	**$51,245,854**	**0.0%**	**$25,068,300**	**51%**	**$25,068,300**	**$25,068,300**
LV Cables											
Underground Heavy	4,028	m	46	36	$257,355	$257,355	0.0%	$193,432	25%	$193,432	$193,432
Underground Medium	1,106,772	m	51	31	$62,284,771	$62,284,771	0.0%	$38,427,720	38%	$38,427,720	$38,427,720
Underground Street Light Circuit	947,037	m	52	30	$24,519,551	$24,519,551	0.0%	$14,470,466	41%	$14,470,466	$14,470,466
Link Pillar	14,025	No.	45	12	$7,632,000	$7,632,000	0.0%	$2,434,952	68%	$2,434,952	$2,434,952
LV Cable Pole Termination	4,370	No.	45	24	$1,485,800	$1,485,800	0.0%	$791,670	47%	$791,670	$791,670
Total LV Cables	**2,057,837**	**m**			**$96,179,476**	**$96,179,476**	**0.0%**	**$56,318,240**	**41%**	**$56,318,240**	**$56,318,240**
Customer Service Connection											
LV overhead - 1/2 ph	36,967	No.	45	27	$2,587,690	$2,587,690	0.0%	$1,544,237	40%	$1,544,237	$1,544,237
LV overhead - 3 ph	4,089	No.	45	28	$736,020	$736,020	0.0%	$451,413	39%	$451,413	$451,413
LV underground - 1/2 ph	91,193	No.	45	28	$22,798,250	$22,798,250	0.0%	$13,980,207	39%	$13,980,207	$13,980,207
LV underground - 3 ph	3,653	No.	45	28	$1,461,200	$1,461,200	0.0%	$903,661	38%	$903,661	$903,661
Total Customer Service Connections	**135,902**	**No.**			**$27,583,160**	**$27,583,160**	**0.0%**	**$16,879,518**	**39%**	**$16,879,518**	**$16,879,518**
Traffic Management											
Overhead Level 1	909,176	m	59	31	$727,341	$727,341	0.0%	$381,241	48%	$381,241	$381,241
Overhead Level 2	88,420	m	58	31	$132,629	$132,629	0.0%	$71,996	46%	$71,996	$71,996
Underground Level 1	255,319	m	47	28	$1,531,915	$1,531,915	0.0%	$904,219	41%	$904,219	$904,219
Underground Level 2	83,857	m	47	27	$1,257,861	$1,257,861	0.0%	$716,401	43%	$716,401	$716,401
Total Traffic Management	**1,336,773**	**m**			**$3,649,746**	**$3,649,746**	**0.0%**	**$2,073,857**	**43%**	**$2,073,857**	**$2,073,857**
Other System Fixed Assets											
Stores and Spares	4	Lot			$879,230	$879,230	0.0%	$879,230	0%	$879,230	$879,230
Total Other System Fixed Assets					**$879,230**	**$879,230**	**0.0%**	**$879,230**	**0%**	**$879,230**	**$879,230**
Total Eastern Region					**$702,578,741**	**$699,030,531**	**0.5%**	**$394,293,822**	**44%**	**$393,038,953**	**$393,038,953**

Western Region ODV Summary

Western Region ODV Summary

As at 31 March 2004

Description	Quantity	Unit	Ave Std Life (yr)	Ave Age (yr)	RC ($)	ORC ($)	% Opt	DRC ($)	% Dep	ODRC ($)	ODV ($)
Subtransmission											
33kV Overhead Lines	930,731	m	57	32	$56,414,406	$51,660,061	8.4%	$31,462,112	44%	$29,625,786	$29,625,786
33kV Cables	39,485	m	52	33	$7,515,728	$7,384,350	1.7%	$5,008,775	33%	$4,884,004	$4,884,004
33kV Cable Pole Termination	91	No.	45	28	$221,039	$221,039	0.0%	$139,933	37%	$139,933	$139,933
Pilot/Communications Cable	93,448	m	45	22	$635,444	$635,444	0.0%	$304,821	52%	$304,821	$304,821
Pilot/Communications Line	37,395	m	45	18	$710,510	$710,510	0.0%	$286,902	60%	$286,902	$286,902
33kV ABS	360	No.	35	11	$3,268,800	$3,268,800	0.0%	$1,003,217	69%	$1,003,217	$1,003,217
Total Subtransmission	970,217	m			$68,765,926	$63,880,203	7.1%	$38,205,760	44%	$36,244,662	$36,244,662
Zone Substations											
Land	65	Pcl	0	0	$1,651,748	$1,616,300	2.1%	$1,651,748	0%	$1,616,300	$1,616,300
Site Development and Buildings		No.			$15,270,500	$15,270,500	0.0%	$6,756,387	56%	$6,756,387	$6,756,387
Transformers	99	No.	60	30	$28,888,919	$28,811,919	0.3%	$15,008,861	48%	$14,979,191	$14,979,191
Indoor Circuit Breakers	481	No.	55	22	$15,070,000	$14,710,000	2.4%	$7,458,296	51%	$7,307,463	$7,307,463
Outdoor Switchgear	885	No.	40	17	$13,429,500	$13,339,500	0.7%	$5,695,196	58%	$5,662,946	$5,662,946
Protection and Control	1,726	No.	40	14	$19,280,500	$19,280,500	0.0%	$6,822,415	65%	$6,822,415	$6,822,415
Outdoor Structures	188	No.	60	37	$2,518,900	$2,484,900	1.3%	$1,464,903	42%	$1,445,447	$1,445,447
SCADA and Communications		No.			$4,491,000	$4,491,000	0.0%	$2,274,333	49%	$2,274,333	$2,274,333
Ripple Injection Plant		No.			$10,340,000	$6,600,000	36.2%	$2,827,000	73%	$2,266,000	$2,266,000
DC Supplies		No.			$1,008,500	$1,008,500	0.0%	$591,803	41%	$591,803	$591,803
Other Items	25	No.	40	18	$2,586,400	$2,586,400	0.0%	$1,033,926	60%	$1,033,926	$1,033,926
Total Zone Substations					$114,535,967	$110,199,519	3.8%	$51,584,868	55%	$50,756,211	$50,756,211
Distribution Lines											
11kV Overhead Line - Heavy	531,333	m	59	31	$18,167,623	$18,016,017	0.8%	$9,377,248	48%	$9,300,832	$9,300,832
11kV Overhead Line - Medium	2,394,627	m	58	35	$70,632,419	$70,536,524	0.1%	$42,254,077	40%	$42,200,657	$42,200,657
11kV Overhead Line - Light	6,588,013	m	55	30	$180,064,098	$180,064,098	0.0%	$97,231,159	46%	$97,231,159	$97,231,159
11kV Overhead Line - Single Phase	7,552	m	48	27	$171,071	$171,071	0.0%	$91,402	47%	$91,402	$91,402
22kV Overhead Line - Medium	37,682	m	58	33	$1,043,988	$1,043,988	0.0%	$571,831	45%	$571,831	$571,831
22kV Overhead Line - Light	82,130	m	55	31	$2,236,515	$2,236,515	0.0%	$1,245,615	44%	$1,245,615	$1,245,615
22kV Overhead Line - Single Phase	775	m	45	37	$18,592	$18,592	0.0%	$15,183	18%	$15,183	$15,183
Total Distribution Lines	9,642,112	m			$272,334,306	$272,086,805	0.1%	$150,786,515	45%	$150,656,679	$150,656,679
Distribution Cables											
11kV Cable - Heavy	16,246	m	54	34	$2,091,918	$2,091,918	0.0%	$1,302,495	38%	$1,302,495	$1,302,495
11kV Cable - Medium	352,510	m	54	32	$35,281,833	$34,854,359	1.2%	$20,958,849	41%	$20,706,452	$20,706,452
11kV Cable - Light	168,386	m	51	30	$13,218,854	$13,218,854	0.0%	$7,854,747	41%	$7,854,747	$7,854,747
22kV Cable - Medium	128	m	45	28	$14,676	$14,676	0.0%	$9,097	38%	$9,097	$9,097
22kV Cable - Light	217	m	54	39	$18,798	$18,798	0.0%	$14,347	24%	$14,347	$14,347
11/22kV Cable Pole Termination	2,237	No.	45	25	$2,751,510	$2,751,510	0.0%	$1,546,989	44%	$1,546,989	$1,546,989
Total Distribution Cables	523,479	m			$53,377,588	$52,950,115	0.8%	$31,686,525	41%	$31,434,128	$31,434,128
Distribution Switchgear											
22/11 kV Disconnector (excl pole)	2,728	No.	35	10	$9,706,050	$9,706,050	0.0%	$2,846,396	71%	$2,846,396	$2,846,396
22/11 kV Load Break Switch (excl pole)	295	No.	35	10	$1,917,500	$1,917,500	0.0%	$531,344	72%	$531,344	$531,344
22/11 kV Dropout Fuse (excl pole)	18,175	No.	35	10	$46,504,750	$46,504,750	0.0%	$13,295,719	71%	$13,295,719	$13,295,719
22/11 kV Sectionaliser (excl pole)	44	No.	40	24	$830,700	$830,700	0.0%	$495,131	40%	$495,131	$495,131
22/11 kV Recloser (excl pole)	100	No.	40	27	$2,786,400	$2,786,400	0.0%	$1,861,875	33%	$1,861,875	$1,861,875
Voltage Regulator	44	No.	55	43	$1,685,850	$1,615,850	4.2%	$1,096,390	35%	$1,066,163	$1,066,163
Oil Switches	1,833	No.	40	19	$10,998,000	$10,998,000	0.0%	$5,143,125	53%	$5,143,125	$5,143,125
Fuse Switches	431	No.	40	21	$3,448,000	$3,448,000	0.0%	$1,793,083	48%	$1,793,083	$1,793,083
Remote Switch Control Unit	29	No.	38	34	$116,000	$116,000	0.0%	$103,546	11%	$103,546	$103,546
Pole Top RTU		No.			$550,110	$550,110	0.0%	$251,619	54%	$251,619	$251,619
22/11 kV Circuit Breaker	143	No.	40	23	$3,888,000	$3,888,000	0.0%	$2,241,686	42%	$2,241,686	$2,241,686
Total Distribution Switchgear					$82,431,360	$82,361,360	0.1%	$29,659,916	64%	$29,629,689	$29,629,689
Distribution Transformers											
11kV/400V Pole 1/2 Ph (50kVA or less)	2,962	No.	55	28	$8,474,700	$8,474,700	0.0%	$4,281,664	49%	$4,281,664	$4,281,664
11kV/400V Pole 1/2 Ph (more than 50kVA)	1	No.	55	23	$6,000	$6,000	0.0%	$2,491	58%	$2,491	$2,491
22kV/400V Pole 1/2 Ph	2	No.	55	47	$5,200	$5,200	0.0%	$4,436	15%	$4,436	$4,436
11kV/400V Pole (30kVA)	9,780	No.	55	29	$49,845,250	$49,845,250	0.0%	$26,512,832	47%	$26,512,832	$26,512,832
11kV/400V Pole (50kVA)	1,451	No.	55	36	$10,243,800	$10,243,800	0.0%	$6,743,095	34%	$6,743,095	$6,743,095
11kV/400V Pole (100kVA)	443	No.	55	33	$4,012,650	$4,012,650	0.0%	$2,426,804	40%	$2,426,804	$2,426,804
11kV/400V Pole (200kVA)	478	No.	55	23	$6,221,800	$6,221,800	0.0%	$2,563,257	59%	$2,563,257	$2,563,257
11kV/400V Pole (300kVA)	114	No.	55	23	$1,828,800	$1,828,800	0.0%	$753,324	59%	$753,324	$753,324
11kV/400V Pole (500kVA)	4	No.	55	22	$80,000	$80,000	0.0%	$32,455	59%	$32,455	$32,455
22kV/400V Pole (30kVA)	142	No.	55	21	$852,000	$852,000	0.0%	$331,818	61%	$331,818	$331,818
22kV/400V Pole (50kVA)	17	No.	55	28	$136,000	$136,000	0.0%	$69,794	49%	$69,794	$69,794
22kV/400V Pole (100kVA)	3	No.	55	27	$30,000	$30,000	0.0%	$14,455	52%	$14,455	$14,455
22kV/400V Pole (200kVA)	1	No.	55	37	$15,000	$15,000	0.0%	$10,045	33%	$10,045	$10,045
22kV/400V Pole (300kVA)	1	No.	55	37	$18,000	$18,000	0.0%	$12,055	33%	$12,055	$12,055
11kV/400V Pad 1/2 Ph	20	No.	55	36	$140,000	$140,000	0.0%	$91,467	35%	$91,467	$91,467
11kV/400V Pad (100kVA)	721	No.	55	32	$6,489,000	$6,489,000	0.0%	$3,823,282	41%	$3,823,282	$3,823,282
11kV/400V Pad (200kVA)	419	No.	55	34	$5,866,000	$5,866,000	0.0%	$3,650,861	38%	$3,650,861	$3,650,861
11kV/400V Pad (300kVA)	802	No.	55	33	$12,832,000	$12,832,000	0.0%	$7,730,230	40%	$7,730,230	$7,730,230
11kV/400V Pad (500kVA)	243	No.	55	32	$5,346,000	$5,346,000	0.0%	$3,149,267	41%	$3,149,267	$3,149,267

Western Region ODV Summary

As at 31 March 2004

Description	Quantity	Unit	Ave Std Life (yr)	Ave Age (yr)	RC ($)	ORC ($)	% Opt	DRC ($)	% Dep	ODRC ($)	ODV ($)
11kV/400V Pad (750kVA)	96	No.	55	35	$2,496,000	$2,496,000	0.0%	$1,602,033	36%	$1,602,033	$1,602,033
11kV/400V Pad (1000kVA)	52	No.	55	37	$1,508,000	$1,508,000	0.0%	$1,009,815	33%	$1,009,815	$1,009,815
11kV/400V Pad (1500kVA)	7	No.	55	35	$322,000	$322,000	0.0%	$203,655	37%	$203,655	$203,655
22kV/400V Pad (100kVA)	7		55	39	$70,000	$70,000	0.0%	$49,697	29%	$49,697	$49,697
22kV/400V Pad (200kVA)	2	No.	55	51	$32,000	$32,000	0.0%	$29,915	7%	$29,915	$29,915
22kV/400V Pad (300kVA)	3	No.	55	53	$54,000	$54,000	0.0%	$52,227	3%	$52,227	$52,227
Total Distribution Transformers	17,771	No.			$116,924,200	$116,924,200	0.0%	$65,150,972	44%	$65,150,972	$65,150,972
Distribution Substations											
Pole Mounted (50kVA or less)	14,354	No.	45	28	$14,778,400	$14,778,400	0.0%	$9,121,979	38%	$9,121,979	$9,121,979
Pole Mounted (100kVA or more)	1,045	No.	45	29	$2,097,900	$2,097,900	0.0%	$1,373,154	35%	$1,373,154	$1,373,154
Ground Mounted (Covered)	2,488	No.	45	29	$9,952,000	$9,952,000	0.0%	$6,406,200	36%	$6,406,200	$6,406,200
Kiosk	18	No.	45	30	$198,000	$198,000	0.0%	$132,998	33%	$132,998	$132,998
Land	99	Pcl	0	0	$699,850	$677,706	3.2%	$699,850	0%	$677,706	$677,706
Total Distribution Substations	17,905	No.			$27,726,150	$27,704,006	0.1%	$17,734,182	36%	$17,712,038	$17,712,038
LV Lines											
Overhead Heavy	111,633	m	58	31	$3,217,191	$3,217,191	0.0%	$1,701,241	47%	$1,701,241	$1,701,241
Overhead Medium	2,215,140	m	58	32	$55,008,273	$55,008,273	0.0%	$29,463,727	46%	$29,463,727	$29,463,727
Overhead Light	1,611,317	m	53	25	$39,082,233	$39,082,233	0.0%	$18,105,795	54%	$18,105,795	$18,105,795
Total LV Lines	3,938,089	m			$97,307,697	$97,307,697	0.0%	$49,270,762	49%	$49,270,762	$49,270,762
LV Cables											
Underground Heavy	53,769	m	58	29	$5,060,888	$5,060,888	0.0%	$2,562,081	49%	$2,562,081	$2,562,081
Underground Medium	1,224,357	m	49	28	$70,668,008	$70,668,008	0.0%	$40,450,391	43%	$40,450,391	$40,450,391
Underground Street Light Circuit	186,477	m	49	26	$5,060,228	$5,060,228	0.0%	$2,727,479	46%	$2,727,479	$2,727,479
Link Pillar	2,874	No.	45	24	$5,203,500	$5,203,500	0.0%	$2,750,488	47%	$2,750,488	$2,750,488
LV Cable Pole Termination	6,085	No.	45	26	$2,068,900	$2,068,900	0.0%	$1,201,422	42%	$1,201,422	$1,201,422
Total LV Cables	1,464,603	m			$88,061,524	$88,061,524	0.0%	$49,691,860	44%	$49,691,860	$49,691,860
Customer Service Connection											
LV overhead - 1/2 ph	66,047	No.	45	26	$4,632,705	$4,632,705	0.0%	$2,683,764	42%	$2,683,764	$2,683,764
LV overhead - 3 ph	18,734	No.	45	28	$3,377,205	$3,377,205	0.0%	$2,138,625	37%	$2,138,625	$2,138,625
LV underground - 1/2 ph	72,286	No.	45	27	$18,071,500	$18,071,500	0.0%	$10,736,053	41%	$10,736,053	$10,736,053
LV underground - 3 ph	7,881	No.	45	27	$3,152,400	$3,152,400	0.0%	$1,920,616	39%	$1,920,616	$1,920,616
Total Customer Service Connections	164,948	No.			$29,233,810	$29,233,810	0.0%	$17,479,057	40%	$17,479,057	$17,479,057
Traffic Management											
Overhead Level 1	1,757,360	m	59	30	$1,405,888	$1,405,888	0.0%	$726,271	48%	$726,271	$726,271
Underground Level 1	561,378	m	46	24	$3,368,268	$3,368,268	0.0%	$1,773,408	47%	$1,773,408	$1,773,408
Total Traffic Management	2,318,738	m			$4,774,156	$4,774,156	0.0%	$2,499,679	48%	$2,499,679	$2,499,679
Other System Fixed Assets											
Stores and Spares	1	Lot	0	0	$4,115,281	$4,074,398	1.0%	$4,115,281	0%	$4,074,398	$4,074,398
Total Other System Fixed Assets					$4,115,281	$4,074,398	1.0%	$4,115,281	0%	$4,074,398	$4,074,398
Total Western Regio n					$959,587,965	$949,557,793	1.0%	$507,865,376	47%	$504,600,134	$504,600,134

Common Assets ODV Summary

Common Assets ODV Summary

As at 31 March 2004

System

Description	Quantity	Unit	Ave Std Life (yr)	Ave Age (yr)	RC ($)	ORC ($)	% Opt	DRC ($)	% Dep	ODRC ($)	ODV ($)
Other System Fixed Assets											
Control Centre					$10,708,937	$10,708,937	0.0%	$7,898,524	26%	$7,898,524	$7,898,524
Total Other System Fixed Assets					$10,708,937	$10,708,937	0.0%	$7,898,524	26%	$7,898,524	$7,898,524
Total Operations Centre					$10,708,937	$10,708,937	0.0%	$7,898,524	26%	$7,898,524	$7,898,524

Multipliers

The multipliers shown in Table A1.4 have been applied in the valuation.

Table A1.4: Replacement Cost Multipliers

Situation	Description	Multiplier Applied
Urban Overhead Lines	Applied to built up areas where roads have a speed limitation.	1.50 to 1.64
Remote Lines & Equipment	Applied to the area in south Wairarapa around Cape Palliser, and east Taranaki around Whangamomona.	1.25
Rugged Terrain Lines and Equipment	Applied to the rugged area in east Taranaki, north Wanganui area and north Manawatu area, requiring helicopters and tracked vehicles. Also applied to rocky area in south west Taranaki, parts of Wairarapa and Coromandel peninsula where tracked vehicles and blasting are required to construct lines.	1.15 to 1.3
CBD Cables	Applied to cables in CBD areas with special paving stones or asphalt or concrete footpaths.	1.2 to 1.8
Rocky Ground Cables	Applied to cables in Opunake and Manaia rocky ground exists, and Masterton, Carterton and Martinborough where river stones exist.	1.05 to 1.35

Traffic Management Allowances

Traffic management allowances were applied as in Table A1.5.

Table A1.5: Traffic Management Allowances

Classification	Description	Allowance Applied
Level LV Roads	Roads with traffic volumes less than 500 vehicles per day.	No allowance
Level 1 Roads	Roads with traffic volumes greater than 500 but less than 10,000 per day.	Level 1
Level 1P Roads	Level 1 roads classified as level 2 between certain hours.	Level 1
Level 2 Roads	Roads with traffic volumes greater than 10,000	Level 2
State Highways	Highways administered by Transit NZ	Level as defined above.

Appendix 2 – Non-Standard Asset Replacement Costs and Lives

The main non-standard replacement costs and lives are detailed in Table A2.1 as follows:

Table A2.1: Non Standard Replacement Costs and Lives

Asset	Unit	RC ($000)	SL (years)	Basis of Determination
Subtransmission				
Single circuit 33kV cable greater than 240mm^2			45	Based on increase in cost of (large scale quantity) three single core over three core plus incremental cost of laying in wider or deeper trench with more bedding material.
400 mm^2 Al	km	220		
500 mm^2 Al	km	225		
630 mm^2 Al	km	243		
630 mm^2 Cu	km	361		
Double circuit 33kV cable greater than 240mm^2			45	
400 mm^2 Al	km	371		
500 mm^2 Al	km	381		
630 mm^2 Al	km	416		
630 mm^2 Cu	km	653		
Overhead Pilot / Communications Circuits	km	19	45	MEA is optical fibre. Overhead cost derived from recent contractor supply and installation price. For underground, SWA optical fibre placed in an existing, and open, cable trench; based on 'bottom-up' cost estimates.
Underground Pilot / Communications Circuits	km	6.80	45	
33kV cable terminations up poles	Unit	2.4	45/70	Average based on contract rates.
Transmission Metering	Unit	27	40	Recent quotes and estimate for installation
Zone Substations				
Land		Market value	-	District Valuation Roll values.
Indoor Large Substations				Known costs from past zone substation construction projects, and unit rates for substation buildings.
Site development	Unit	30	50	
Earthing	Unit	30	50	
Civil works	Unit	100	50	
Fencing/gates/security	Unit	20	50	
Buildings	Unit	280	50	
Indoor Medium Substations				
Site establishment	Unit	25	50	
Earthing	Unit	25	50	
Civil works	Unit	90	50	
Fencing/gates/security	Unit	15	50	
Buildings	Unit	219	50	

Asset	Unit	RC ($000)	SL (years)	Basis of Determination
Outdoor Medium Substations				
Site establishment	Unit	25	50	
Earthing	Unit	25	50	
Civil works	Unit	90	50	
Fencing/gates/security	Unit	15	50	
Buildings	Unit	22.5	50	
Outdoor Small Substation				
Site establishment	Unit	15	50	
Earthing	Unit	15	50	
Civil works	Unit	70	50	
Fencing/gates/security	Unit	10	50	
Buildings	Unit	18	50	
Transformers (refer Table A2.2)	Unit		45/60	
Outdoor Structure Bay			45 wood pole	Cost estimates based on recent projects embracing bus work, poles & cable termination stands. Bus-work was based on an MEA of 1.5" aluminium tube. Statistical indices published by Statistics N.Z. were used to derive an adjustment factor that was applied to actual costs and obtain equivalent 2004 RC's.
33kV outdoor bay	Bay	17.5		
11kV outdoor bay	Bay	6	60 conc pole	
Incomer Cables			45	Recent projects and tender prices.
Indoor large	Unit	57.8		
Indoor medium	Unit	49.9		
Outdoor medium	Unit	30.7		
Outdoor small	Unit	7.6		
Protection & Controls	Unit		40	Materials cost includes adjustment for exchange rate. Installation cost, including transport, storage and overheads is based on recent design reports. Actual cost of purchase for protection relays plus $6.3k per for installation and commissioning.
SCADA & Communications Equipment			15	Sampled costs for completed projects and detailed estimates based on component costs.
Large substation	Unit	160		
Medium substation	Unit	94		
Small substation	Unit	72		
Ripple Injection Plant/Load Control Plant	Unit	440	20	Recent quotes for GXP based load control injection plant.
DC Supplies, Batteries & Inverters			20	20 Amp smart switch-mode power supply together with bank of 65 Ah 10 year VRLA batteries, seismic stand and SCADA monitoring plus installation & commissioning
110 volt DC supply	Unit	16.3		
24 volt DC supply	Unit	13		

Asset	Unit	RC ($000)	SL (years)	Basis of Determination
Distribution Lines and Cables				
11/22kV cable terminations up poles	Unit	1.2	45/70	Average based on contract rates.
11kV underground cable shared light	km	111	45/70	Extrapolation from Handbook costs.
Distribution Switchgear				
Voltage Regulators 2.5 MVA	Unit	120	55	Average quoted costs plus estimate for installation.
Distributed Capacitor Banks	Unit	11.7	40	Weighted average cost of past projects.
Pole top SCADA	Unit	4	15	Past projects (includes RTU & Radio)
Distribution Transformers				
2000kVA	Unit	55	45/55	Manufacturers' quotations, installation estimates
4000kVA	Unit	70	45/55	
8000kVA	Unit	100	45/55	
Distribution Substations				
Land	Unit	Market Value		District Valuation Roll values
LV Lines & Cables				
LV cable terminations up poles	Unit	0.34	45/70	Average based on contract rates.
SCADA & Communications				
Control Room Building	Unit	402	50	Based on unit rates for buildings of light commercial construction and size of building.
Control Room SCADA	Unit	10,307	15	Sum of component replacement costs for the existing master stations, software and real time communications system.

Replacement costs for zone substation transformers are detailed below in Table A2.2. These were derived from recent project tenders involving a range of transformer sizes and locations. Replacement costs for transformers of size now rarely installed were interpolated or extrapolated from replacement costs for transformers recently purchased. Where a range of similar sized transformers exists, the same replacement cost is applied to all, this being the lowest replacement cost in the range.

Table A2.2: Zone Substation Transformer Replacement Costs

Transformer Size	Replacement Cost
22/11kV Transformers 2.5 MVA	$101,000
22/11kV Transformers 4 MVA	$120,000
33kV Sub Transformers 1 MVA	$84,882
33kV Sub Transformers 1.25 MVA	$130,088
33kV Sub Transformers 1.5 MVA	$100,131
33kV Sub Transformers 3.0 MVA	$119,600
33kV Sub Transformers 5.0 MVA	$284,000
33kV Sub Transformers 5/6.25 MVA	$284,000
33kV Sub Transformers 6.25 MVA	$284,000
33kV Sub Transformers 7.5MVA	$310,000
33kV Sub Transformers 7.5/9.4 MVA	$335,000
33kV Sub Transformers 10.0 MVA	$335,000
33kV Sub Transformers 7.5/10 MVA	$335,000
33kV Sub Transformers 11.0 MVA	$335,000
33kV Sub Transformers 7.5/11 MVA	$335,000
33kV Sub Transformers 11.5 MVA	$335,000
33kV Sub Transformers 10/12.5 MVA	$335,000
33kV Sub Transformers 12.5 MVA	$335,000
33kV Sub Transformers 12.5/15 MVA	$385,000
33kV Sub Transformers 15.0 MVA	$385,000
33kV Sub Transformers 9/15 MVA	$385,000
33kV Sub Transformers 10/16 MVA	$385,000
33kV Sub Transformers 12.5/16 MVA	$385,000
33kV Sub Transformers 16.0 MVA	$385,000
33kV Sub Transformers 12.5/17MVA	$385,000
33kV Sub Transformers 10/20 MVA	$430,000
33kV Sub Transformers 20 MVA	$430,000
33kV Sub Transformers 20 MVA	$430,000
33kV Sub Transformers 20MVA	$430,000
33kV Sub Transformers 20MVA	$430,000
33kV Sub Transformers 11.5/23 MVA	$430,000
33kV Sub Transformers 12/24 MVA	$430,000
33kV Sub Transformers 24 MVA	$714,484
33kV Sub Transformers 30 MVA	$834,751
66kV Sub Transformers 5.0 MVA	$421,947
66kV Sub Transformers 5/6.25 MVA	$421,947
66kV Sub Transformers 7.5 MVA	$443,049
66kV Sub Transformers 7.5/10 MVA	$443,049

Appendix 3 – Network Optimisation

Subtransmission System Optimisation

Subtransmission optimisation has been implemented as shown in Table A3.1.

Table A3.1: Subtransmission Optimisation

Line	RC ($)	ORC ($)	RC-ORC ($)	DRC ($)	ODRC ($)	DRC-ODRC ($)
Longburn switching structure	Not included in valuation					
Linton – Pascal St circuit	$1,385,500	$1,254,121	$131,379	$1,315,818	$1,191,047	$124,771
Pongaroa – Alfredton line	$1,802,155	$0	$1,802,155	$415,484	$0	$415,484
Inglewood – Motukawa line	$101,687	$75,015	$26,672	$68,238	$50,339	$17,898
Huirangi – Mamaku Rd line	$170,496	$125,775	$44,720	$122,425	$90,314	$32,112
Opunake Pungarehu line	$149,098	$109,991	$39,108	$79,617	$58,734	$20,883
Opunake Ngariki line	$1,449,218	$477,262	$971,956	$759,281	$310,340	$448,941
Opunake Tasman line	$108,622	$80,131	$28,491	$64,647	$47,690	$16,956
Ngariki – Tasman line	$852,637	$628,995	$223,643	$637,249	$470,102	$167,147
Carrington - Oakura circuit	Valued as 11kV line					
Carrington – Mangorei circuit	Valued as 11kV line					
Inglewood – Cutfield St line	Valued as 11kV line					
Waikino – Paeroa line	$636,330	$469,424	$166,906	$323,179	$238,411	$84,768
Waihi T – Waihi Beach line	$944,326	$697,830	$246,496	$520,058	$384,343	$135,714
Waihou – Tahuna line	$1,227,616	$905,705	$321,912	$572,377	$422,281	$150,096
Browne St north	$458,355	$364,014	$94,341	$398,939	$316,827	$82,112
Browne St south	$357,632	$284,416	$73,216	$84,110	$66,890	$17,219
Baird Rd cable	$450,161	$347,134	$103,027	$183,892	$141,886	$42,005
Maraetai Rd cable	$18,549	$12,485	$6,064	$7,042	$4,740	$2,302
Kinleith - Maraetai Rd cable	$188,481	$146,596	$41,885	$71,553	$55,652	$15,901
Kinleith – Midway line	$281,282	$273,302	$7,980	$124,399	$121,370	$3,029
Clareville lines	$944,031	$696,804	$247,226	$269,264	$198,831	$70,433
Greytown Kempton line	$700,818	$517,026	$183,792	$270,142	$199,309	$70,833
Greytown Featherston line	$121,678	$94,442	$27,235	$16,123	$12,551	$3,572
Pahautea – Featherston line	$772,433	$570,026	$202,407	$101,440	$74,846	$26,594
Wanganui - Hatricks line	$294,129	$260,715	$33,414	$180,886	$154,554	$26,332
Blink Bonnie line	$3,283	$2,422	$861	$1,602	$1,182	$420
Bulls line	$431,950	$337,645	$94,305	$284,072	$219,580	$64,492
Taihape dual circuit line	$828,358	$0	$828,358	$454,228	$0	$454,228
Total	14,678,825	8,731,276	5,947,550	7,326,063	4,831,818	2,494,245

Zone Substation Optimisation

Zone substation optimisation has been implemented as shown in Table A3.2.

Table A3.2: Zone Substation Optimisation

Substation[3]	RC ($)	ORC ($)	RC-ORC ($)	DRC ($)	ODRC ($)	DRC-ODRC ($)
Cloton Rd 11 kV bus section	30,000	0	30,000	17,222	0	17,222
Ngariki 33kV structure	17,000	0	17,000	9,303	0	9,303
Ngariki 33kV switchgear	45,000	0	45,000	14,438	0	14,438
Pongaroa 33kV structure	17,000	0	17,000	10,153	0	10,153
Pongaroa 33kV switchgear	45,000	0	45,000	17,813	0	17,813
Arahina CBs	30,000	0	30,000	9,500	0	9,500
Hatricks Wharf CBs	60,000	0	60,000	53,333	0	53,333
Rata transformer	310,000	284,000	26,000	97,306	89,144	8,161
Roberts Ave CBs	60,000	0	60,000	23,778	0	23,778
Taihape CBs	60,000	0	60,000	14,444	0	14,444
Taihape transformer	335,000	310,000	25,000	149,819	138,639	11,181
Taupo Quay CBs	60,000	0	60,000	23,778	0	23,778
Waiouru transformer	310,000	284,000	26,000	123,139	112,811	10,328
Wanganui East CBs	60,000	0	60,000	8,778	0	8,778
Total	1,439,000	878,000	572,802	572,802	340,594	232,208

Zone Substation Land Optimisation

Zone substation land has been optimised as shown in Table A3.3.

Table A3.3: Zone Substation Land Optimisation

Zone Substation Land	RC ($)	ORC ($)	RC-ORC ($)
Aongatete	119,000	25,977	93,023
Arahina	10,000	4,091	5,909
Browne St	52,000	17,432	34,568
Kai Iwi	6,000	969	5,031
Kairanga	42,000	29,731	12,269
Kerepehi	14,000	6,919	7,081
Peat St	20,500	13,697	6,803
Te Puke	104,000	38,348	65,652
Tower Rd	74,000	45,053	28,947
Wanganui East	10,000	4,564	5,436
Total	451,500	186,781	264,719

[3] The MEAs applied to the Douglas, Inglewood, Aongatete, Kerepehi and Tower Rd structures and buildings and Taihape switchrooms mean that no optimisation is necessary.

Distribution System Optimisation

Optimisation of the distribution system has been implemented as shown in Table A3.4.

Table A3.4: Distribution System Optimisation

Feeder	RC ($)	ORC ($)	RC-ORC ($)	DRC ($)	ODRC ($)	DRC-ODRC ($)
Takaro	$174,482	$137,280	$37,202	$92,321	$72,639	$19,683
Duthie Rd	$278,407	$248,953	$29,454	$182,272	$162,963	$19,309
Keith St 14	$323,683	$254,902	$68,781	$187,843	$147,941	$39,902
Keith St 22	$284,430	$224,050	$60,380	$201,249	$158,462	$42,787
Keith St 24	$423,247	$333,225	$90,022	$250,135	$196,931	$53,204
Armstrong St	$213,167	$168,298	$44,869	$130,926	$103,377	$27,548
Malden St	$69,327	$55,043	$14,284	$43,489	$34,527	$8,962
Stoney Creek	$193,780	$166,900	$26,880	$90,491	$77,867	$12,624
Otautu	$43,875	$39,629	$4,246	$16,669	$15,056	$1,613
Patea	$127,075	$113,729	$13,346	$63,765	$57,078	$6,687
Portland Quay	$95,945	$86,660	$9,285	$62,341	$56,308	$6,033
Pascal St 6	$198,248	$156,381	$41,867	$129,724	$102,212	$27,511
Bulls	$217,101	$190,887	$26,214	$119,041	$104,241	$14,800
Rongotea	$989,510	$894,312	$95,199	$462,973	$418,482	$44,491
Oaonui	$250,651	$226,447	$24,203	$123,545	$111,622	$11,922
Guyton	$149,952	$118,873	$31,079	$70,342	$55,740	$14,601
Moturoa 6	$195,191	$176,518	$18,673	$129,080	$116,724	$12,356
Browne St	$182,656	$143,665	$38,991	$85,246	$67,049	$18,198
Thomas Rd	$138,092	$125,375	$12,717	$87,567	$79,511	$8,056
	$4,548,817	$3,861,125	$687,692	$2,529,018	$2,138,729	$390,289

In addition 450 metres of Medium conductor in Wanganui has been optimised out as it is stranded. This has not been included in the valuation.

Stores and Spares

Certain spares considered surplus to requirements have been optimised out. The optimisation of these items has a valuation impact of $40,833.

Distribution Substation Land

Some land associated with distribution substations has been optimised down. The optimisation of land has a valuation impact of $66,540.

Voltage Control Device Optimisation

Voltage control devices at the following sites have been optimised to on load tap changers as shown in Table A3.5.

Table A3.5: Voltage Control Device Optimisation

Voltage Control Device	RC ($)	ORC ($)	RC-ORC ($)	DRC ($)	ODRC ($)	DRC-ODRC ($)
Blink Bonnie	40,000	70,000	-30,000	17,879	31,288	-13,409
Cardiff	20,000	70,000	-50,000	17,030	59,606	-42,576
Gladstone	120,000	70,000	50,000	60,727	35,424	25,303
Tinui regulators 1 and 2	240,000	140,000	100,000	146,182	85,273	60,909
Total	420,000	350,000	70,000	241,818	211,591	30,227

Load Control Devices

The following Load Control devices have been optimised out:

- Aongatate Plessey Motor Generator
- Bell Block Plessey
- Greerton 11kV
- Matapihi No 2 Plessey
- Moturoa 11kV Motor Generator
- New Plymouth City No 1
- Otumoetai OMI
- Pongakawa Plessey
- Tarahua 11kV Motor Generator
- Tauranga City Landis and Gyr
- Te Puke No 2 OMI
- Triton Plessey
- Waihi Rd Landis and Gyr
- Welcome Bay Plessey Motor Generator

The total valuation impact caused by the removal of these plants is $671,000.

In addition the cyclo-control plants at the following sites have been notionally optimised to single GXP based plants at Huirangi and Stratford.

- Cardiff
- Cloton Rd
- Douglas
- Eltham
- Inglewood
- Kaponga
- McKee
- Tarata
- Waitara East
- Waitara West

The total valuation impact associated with the optimisation of these plants is $330,000.

Appendix 4 – Future Load Growth

Forecast Maximum Demand at GXP's (MVA)

The following GXP load forecasts have been derived from historical extrapolation, except in the case of Tauranga, where forecasts have been based on econometric forecasting. They are based on a 1% exceedance level.

Table A4.1: GXP Load Forecasts

Forecast Maximum Demands for Manawatu GXPs			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Bunnythorpe	2.3	73	102
Linton	-1.1	38	32
Mangamaire	-0.6	11	10

Forecast Maximum Demands for Taranaki GXPs			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Carrington 33kV	-1.1	30	25
Carrington 11kV	-2.3	15	11
Hawera	0.3	25	26
Huirangi	-2.4	12	9
Moturoa	-0.2	14	14
Opunake	-0.3	10	10
Stratford	-3.6	21	12

Forecast Maximum Demands for Tauranga GXPs			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Tauranga 33kV	6.0	40	96
Tauranga 11kV	4.0	20	3
Mt Maunganui 33kV	4.1	27	50
Mt Maunganui 11kV	4.1	15	28
Te Matai	3.7	20	34

Forecast Maximum Demand for Valley GXPs			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Hinuera	3.8	31	54
Kinleith	-	70	70[4]
Kopu	2.1	35	48
Waihou	1.3	50	61
Waikino	2.8	28	42

Forecast Maximum Demand for Wairarapa GXPs			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Greytown	1.4	9	11
Masterton	0.0	32	32

[4] The forecast for Kinleith GXP depends upon a major industrial consumer. The present load was assumed to continue.

Forecast Maximum Demand for Wanganui GXP's			
GXP	Growth % p.a.	Peak 2004	Peak 2019
Brunswick	0.0	23	23
Marton	0.0	12	12
Mataroa	-1.8	7	5
Ohakune	-1.8	2	1
Wanganui	-1.2	23	19
Waverley	0.0	3	3

Forecast Maximum Demand at Zone Substations (MVA)

The zone substation maximum demand forecasts are based on historical extrapolation. Loads have been determined with a 0.5% exceedance level.

Table A4.2: Zone Substation Load Forecasts

Forecast Maximum Demands for Manawatu Zone Substations			
Substation	Annual Growth %	2004	2014
Alfredton	1.0	0.6	0.7
Feilding	1.0	18.0	19.9
Kairanga	2.0	13.0	15.8
Keith St	3.0	9.0	12.1
Kelvin Grove	3.0	8.2	11.0
Kimbolton	1.0	2.3	2.5
Main St	2.0	22.7	27.7
Mangamutu	1.0	7.6	8.4
Milson	3.0	11.8	15.9
Parkville	1.0	1.8	2.0
Pascal St	2.0	18.0	21.9
Pongoroa	1.0	0.8	0.9
Sanson	1.0	7.6	8.4
Turitea	4.0	11.0	16.3

Forecast Maximum Demands for Taranaki Zone Substations			
Substation	Annual Growth %	2004	2014
Bell Block	3.0	16.0	21.5
Cambria	2.0	12.0	14.6
Cardiff	1.0	1.5	1.7
City	2.0	15.2	18.5
Cloton Rd	2.0	7.4	9.0
Douglas	1.0	1.6	1.8
Eltham	1.0	7.9	8.7
Inglewood	1.0	4.2	4.6
Kaponga	1.0	2.7	3.0
Kapuni	1.0	6.9	7.6
Livingstone	1.0	2.7	3.0
Manaia	1.0	5.4	6.0
McKee	1.0	1.3	1.4
Motukawa	1.0	2.5	2.8
Ngariki	1.0	2.2	2.4

Forecast Maximum Demands for Taranaki Zone Substations			
Substation	Annual Growth %	2004	2014
Pungarehu	1.0	2.7	3.0
Tasman	1.0	6.9	7.6
Waihapa	0.0	1.3	1.3
Waitara East	1.0	4.5	5.0
Waitara West	1.0	3.5	9.2
Whareroa	1.0	3.7	4.1
Carrington GXP	2.0	17.0	20.7
Moturoa GXP	2.0	16.3	19.9

Forecast Maximum Demands for Tauranga Zone Substations			
Substation	Annual Growth %	2004	2014
Aongatete	2.5	9.5	12.2
Kauri Point	3.0	3.7	5.0
Matua	1.0	7.0	7.7
Omokoroa	4.5	6.4	9.9
Otumoetai	1.5	15.5	18.0
Papamoa	5.5	14.0	23.9
Pongakawa	2.5	5.4	6.9
Tauranga City	4.5	14.8	23.0
Te Puke	3.0	18.2	24.5
Triton	4.5	17.2	26.7
Waihi Rd	3.0	8.5	11.4
Welcome Bay	2.5	16.8	21.5
Tauranga GXP	2.0	20.2	24.6
Mt Maunganui GXP 11 kV	4.5	16.0	24.8

Forecast Maximum Demands for Valley Zone Substations			
Substation	Annual Growth %	2004	2014
Baird Rd	1.0	6.9	7.6
Browne St	1.0	5.5	6.1
Coromandel	1.5	3.3	3.8
Farmer Rd	1.0	5.4	6.0
Kerepehi	1.0	7.9	8.7
Lake Rd	1.0	4.7	5.2
Lakeside plus Midway	0.0	4.7	4.7
Maraetai Rd	1.0	9.0	9.9
Matatoki	1.5	6.0	7.0
Mikkelsen Rd	1.0	12.0	13.3
Morrinsville	1.0	7.4	8.2
Paeroa	1.0	7.0	7.7
Piako	1.0	11.4	12.6
Putaruru	1.0	10.8	11.9
Tahuna	1.0	5.1	5.6
Tairua	1.0	6.6	7.7
Thames T2 & T3	1.0	11.2	12.4
Thames T1	1.0	3.5	3.9
Tirau	1.0	7.7	8.5
Tower Rd	1.0	9.2	10.2
Waihi	1.0	14.7	16.2

Forecast Maximum Demands for Valley Zone Substations			
Substation	Annual Growth %	2004	2014
Waihi Beach	1.0	2.4	2.7
Waitoa	0.0	12.8	14.1
Walton	1.0	6.0	6.6
Whangamata	1.5	9.0	9.9
Whitianga	1.5	9.9	11.5

Forecast Maximum Demands for Wairarapa Substations			
Substation	Annual Growth %	2004	2014
Akura	1.0	9.0	11.0
Awatoitoi	1.0	1.2	1.3
Chapel	1.0	12.8	15.6
Clareville	1.0	5.3	6.5
Featherston	1.0	3.5	3.9
Gladstone	1.0	0.7	0.8
Hau Nui	1.0	3.7	4.1
Kempton	1.0	3.2	3.5
Martinborough	1.0	2.4	2.7
Norfolk	1.0	5.6	6.8
Te Ore Ore	1.0	5.0	5.5
Tinui	1.0	0.8	0.9
Tuhitarata	1.0	1.8	2.0

Forecast Maximum Demands for Wanganui Substations			
Substation	Annual Growth %	2004	2014
Arahina	1.0	6.9	7.6
Beach Rd	5.0	5.3	8.6
Blink Bonnie	1.0	2.3	2.5
Bulls	1.0	3.9	4.3
Castlecliff	5.0	8.4	13.7
Hatricks Wharf	1.5	7.9	9.2
Kai Iwi	1.0	2.2	2.4
Peat St	2.0	14.0	17.1
Pukepapa	1.0	2.3	2.5
Rata	1.0	2.6	2.9
Roberts Ave	1.0	3.8	4.2
Taihape	1.0	4.5	5.0
Taupo Quay	1.5	6.3	7.3
Waiouru	1.0	2.0	2.2
Wanganui East	1.5	5.5	6.1
Ohakune GXP	1.0	1.9	2.1
Waverley GXP	1.0	3.5	3.9

Distribution Feeder Maximum Demands

Powerco's distribution feeder maximum demands present and forecast are outlined in the following table. These loads are based on a 2% exceedance level to allow for load transfers.

Table A4.3: Feeder Load Forecasts

Forecast Growth for Manawatu Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Alfredton	Brooklands	1.0%	0.15	0.16
Alfredton	Castlehill	1.0%	0.15	0.16
Alfredton	Ihuraua	1.0%	0.15	0.16
Alfredton	Rongomai	1.0%	0.15	0.16
Feilding	Business	1.0%	1.62	1.70
Feilding	Colyton	1.0%	1.83	1.92
Feilding	Crown	1.0%	3.68	3.86
Feilding	Denbigh	1.0%	2.50	2.62
Feilding	Kawakawa	1.0%	1.33	1.40
Feilding	Makino	1.0%	1.77	1.86
Feilding	Residential	1.0%	1.98	2.08
Feilding	West Town	1.0%	2.84	2.98
Feilding	Works	1.0%	2.67	2.80
Kairanga	Awapuni	2.0%	1.89	2.08
Kairanga	Dairyfact	2.0%	4.44	4.90
Kairanga	Kopane	2.0%	2.55	2.82
Kairanga	Pioneer	2.0%	2.84	3.13
Kairanga	Taikorea	2.0%	1.62	1.79
Kairanga	Takaro	2.0%	1.01	1.11
Kairanga	Tremaine Ave	2.0%	1.92	2.12
Keith St	Keith St 11	3.0%	0.50	0.57
Keith St	Keith St 12	3.0%	1.64	1.90
Keith St	Keith St 13	3.0%	0.27	0.31
Keith St	Keith St 14	3.0%	0.76	0.88
Keith St	Keith St 21	3.0%	1.11	1.28
Keith St	Keith St 22	3.0%	0.86	0.99
Keith St	Keith St 23	3.0%	1.81	2.10
Keith St	Keith St 24	3.0%	0.93	1.08
Kelvin Grove	Armstrong St	3.0%	0.84	0.97
Kelvin Grove	Ashhurst	3.0%	2.19	2.54
Kelvin Grove	Karamea	3.0%	3.20	3.71
Kelvin Grove	Malden St	3.0%	0.30	0.35
Kelvin Grove	Pohangina	3.0%	0.91	1.06
Kelvin Grove	Roberts Line	3.0%	2.57	2.98
Kelvin Grove	Stoney Creek	3.0%	0.50	0.57
Kimbolton	Apiti	1.0%	0.76	0.80
Kimbolton	Rangiwahia	1.0%	0.23	0.24
Kimbolton	Waituna	1.0%	1.20	1.26
Main St	Main St 11	2.0%	1.47	1.62
Main St	Main St 12	2.0%	2.00	2.21
Main St	Main St 13	2.0%	1.09	1.20
Main St	Main St 14	2.0%	3.96	4.38
Main St	Main St 15	2.0%	2.74	3.03

Forecast Growth for Manawatu Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Main St	Main St 21	2.0%	3.32	3.66
Main St	Main St 22	2.0%	1.45	1.60
Main St	Main St 23	2.0%	4.61	5.09
Main St	Main St 24	2.0%	3.20	3.53
Main St	Main St 25	2.0%	0.88	0.97
Mangamutu	Coonoor	1.0%	0.38	0.40
Mangamutu	Konini	1.0%	0.50	0.52
Mangamutu	Mangamaire	1.0%	0.90	0.94
Mangamutu	Mangatainoka	1.0%	0.95	1.00
Mangamutu	Pahiatua	1.0%	2.74	2.88
Mangamutu	Tmp	1.0%	3.37	3.54
Milson	Bunnythorpe	3.0%	0.67	0.77
Milson	Fairs Rd	3.0%	2.67	3.09
Milson	Gemini	3.0%	2.19	2.54
Milson	Milson	3.0%	0.93	1.08
Milson	Rangitikei	3.0%	2.61	3.03
Milson	Ruahine	3.0%	1.96	2.27
Milson	Te Arakura	3.0%	1.20	1.39
Parkville	Eketahuna	1.0%	0.50	0.52
Parkville	Hukanui	1.0%	0.70	0.74
Parkville	Mauriceville	1.0%	0.46	0.48
Parkville	Rongokokako	1.0%	0.27	0.28
Pascal St	Pascal St 11	2.0%	2.50	2.76
Pascal St	Pascal St 12	2.0%	3.70	4.08
Pascal St	Pascal St 4	2.0%	3.60	3.98
Pascal St	Pascal St 5	2.0%	3.41	3.77
Pascal St	Pascal St 6	2.0%	0.80	0.88
Pascal St	Pascal St 7	2.0%	2.15	2.38
Pascal St	Pascal St 8	2.0%	1.05	1.16
Pascal St	Pascal St 9	2.0%	2.99	3.30
Pongaroa	Coast Road	1.0%	0.19	0.20
Pongaroa	Horoeka	1.0%	0.11	0.12
Pongaroa	Tiraumea	1.0%	0.13	0.14
Pongaroa	Waione	1.0%	0.19	0.20
Sanson	Kakariki	1.0%	0.84	0.88
Sanson	Mt Stewart	1.0%	0.95	1.00
Sanson	Ohakea	1.0%	1.87	1.96
Sanson	Oroua Downs	1.0%	2.71	2.84
Sanson	Rongotea	1.0%	1.03	1.08
Turitea	Aokautere	4.0%	1.30	1.58
Turitea	Linton	4.0%	2.69	3.27
Turitea	Massey	4.0%	3.47	4.22
Turitea	Summerhill	4.0%	3.37	4.10

Forecast Growth for Taranaki Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Bell Block	Bell Block 2	3.0%	1.70	1.97
Bell Block	Bell Block 3	3.0%	2.95	3.42

Forecast Growth for Taranaki Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Bell Block	Bell Block 4	3.0%	2.06	2.39
Bell Block	Bell Block 5	3.0%	2.06	2.39
Bell Block	Bell Block 6	3.0%	2.51	2.92
Bell Block	Bell Block 7	3.0%	3.05	3.53
Bell Block	Bell Block 8	3.0%	1.39	1.61
Bell Block	Bell Block 9	3.0%	0.70	0.82
Cambria	Argyle St	2.0%	1.71	1.89
Cambria	Cambria St	2.0%	2.51	2.78
Cambria	Glover Rd East	2.0%	1.47	1.62
Cambria	Glover Rd West	2.0%	2.38	2.63
Cambria	Grey St Depot	2.0%	2[5]	2.21
Cambria	Lowe Walker	2.0%	4.15	4.59
Cambria	Tawhiti Rd	2.0%	1.33	1.47
Cardiff	Cardiff Rd	1.0%	0.13	0.13
Cardiff	Cardiff Rd	1.0%	0.21	0.22
Cardiff	Climie Rd	1.0%	0.42	0.44
Cardiff	Mahoe	1.0%	0.42	0.44
City	City 10	2.0%	1.41	1.56
City	City 11	2.0%	2	2.21
City	City 2	2.0%	2	2.21
City	City 3	2.0%	4.36	4.82
City	City 4	2.0%	3.28	3.62
City	City 5	2.0%	1.60	1.77
City	City 6	2.0%	0.00	0.00
City	City 7	2.0%	1.62	1.79
City	City 8	2.0%	1.87	2.06
City	City 9	2.0%	1.92	2.12
Cloton Rd	Cloton Rd Central	2.0%	0.76	0.84
Cloton Rd	Cloton Rd Industrial	2.0%	1.92	2.12
Cloton Rd	Cloton Rd North	2.0%	0.97	1.07
Cloton Rd	Cloton Rd North	2.0%	1.62	1.79
Cloton Rd	Cloton Rd South	2.0%	1.03	1.14
Cloton Rd	Cloton Rd West	2.0%	1.30	1.43
Douglas	Huiroa	1.0%	0.48	0.50
Douglas	Strathmore	1.0%	0.46	0.48
Douglas	Toko	1.0%	0.46	0.48
Douglas	Toko	1.0%	0.76	0.80
Eltham	Eltham Town North	1.0%	2.67	2.80
Eltham	Eltham Town South	1.0%	2.80	2.94
Eltham	Mangatoki	1.0%	3.14	3.30
Eltham	Ngaere	1.0%	0.88	0.92
Eltham	Rawhitiroa	1.0%	0.41	0.43
Eltham	Rawhitiroa	1.0%	0.69	0.72
Eltham	Te Roti	1.0%	2.76	2.90

[5] Loads on City 2, City 11 and Grey St Depot have been estimated.

Forecast Growth for Taranaki Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Inglewood	Bristol Rd	1.0%	0.42	0.44
Inglewood	Brookes St	1.0%	1.12	1.18
Inglewood	Elliot St	1.0%	0.61	0.64
Inglewood	Kaimata	1.0%	0.63	0.66
Inglewood	Mountain Rd	1.0%	1.05	1.11
Inglewood	Rata St	1.0%	0.73	0.77
Kaponga	Duthie Rd	1.0%	0.67	0.70
Kaponga	Manaia Rd	1.0%	0.70	0.74
Kaponga	Palmer Rd	1.0%	0.42	0.44
Kaponga	Riverlea	1.0%	0.82	0.86
Kapuni	Kapuni	1.0%	0.15	0.16
Kapuni	Matapu	1.0%	2.08	2.18
Kapuni	Petrochem 1	1.0%	2.19	2.30
Kapuni	Petrochem 2	1.0%	2.19	2.30
Livingstone	Kakaramea	1.0%	1.18	1.24
Livingstone	Otautu	1.0%	0.69	0.72
Livingstone	Patea	1.0%	0.48	0.50
Livingstone	Portland Quay	1.0%	0.42	0.44
Manaia	Auroa	1.0%	1.56	1.64
Manaia	Manaia	1.0%	2.17	2.28
Manaia	Okaiawa	1.0%	0.70	0.74
Manaia	Otakeho	1.0%	1.68	1.76
Mckee	Mckee 1	1.0%	0.34	0.36
Mckee	Mckee 2	1.0%	0.34	0.36
Mckee	Otaraoa Rd	1.0%	0.34	0.36
Motukawa	Kohete Rd	1.0%	0.17	0.18
Motukawa	Ratapiko	1.0%	0.39	0.41
Motukawa	Tarata	1.0%	0.96	1.01
Ngariki	Ngariki Rd	1.0%	0.53	0.56
Ngariki	Rahotu	1.0%	0.70	0.74
Ngariki	South Rd Ngariki	1.0%	0.48	0.50
Pungarehu	Parihaka	1.0%	1.37	1.44
Pungarehu	Pungarehu	1.0%	0.59	0.62
Pungarehu	Warea	1.0%	0.97	1.02
Tasman	Ihaia Rd	1.0%	1.07	1.12
Tasman	Oaonui	1.0%	0.90	0.94
Tasman	Opunake	1.0%	1.11	1.16
Tasman	Pihama	1.0%	1.35	1.42
Tasman	S.T.O.S.	1.0%	1.85	1.94
Tasman	Te Kiri	1.0%	1.16	1.22
Waihapa	Petrocorp 1	0.0%	0.59	0.59
Waihapa	Petrocorp 2	0.0%	0.59	0.59
Waitara East	Main Rd Motunui	1.0%	1.49	1.56
Waitara East	Princess St	1.0%	0.95	1.00
Waitara East	Tikorangi	1.0%	0.90	0.94
Waitara East	Waitara East Town	1.0%	0.00	0.00

Forecast Growth for Taranaki Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Waitara West	Affco-Queen St	1.0%	-	-
Waitara West	Affco-West Quay	1.0%	0.99	1.04
Waitara West	Blake St	1.0%	1.20	1.26
Waitara West	Browne St	1.0%	0.90	0.94
Waitara West	Domett St	1.0%	-	-
Waitara West	West Quay	1.0%	0.61	0.64
Whareroa	Kiwi 1	1.0%	-	-
Whareroa	Kiwi 2	1.0%	-	-
Whareroa	Manawapou Rd	1.0%	1.66	1.74
Whareroa	Manutahi	1.0%	0.82	0.86
Whareroa	Whakamara	1.0%	1.05	1.10
TP_Carrington 11kV	Carrington 1	2.0%	2.25	2.48
TP_Carrington 11kV	Carrington 10	2.0%	0.36	0.40
TP_Carrington 11kV	Carrington 11	2.0%	4.29	4.73
TP_Carrington 11kV	Carrington 12	2.0%	3.05	3.37
TP_Carrington 11kV	Carrington 13	2.0%	0.30	0.34
TP_Carrington 11kV	Carrington 14	2.0%	0.04	0.04
TP_Carrington 11kV	Carrington 2	2.0%	1.87	2.06
TP_Carrington 11kV	Carrington 3	2.0%	1.51	1.66
TP_Carrington 11kV	Carrington 5	2.0%	3.03	3.34
TP_Carrington 11kV	Carrington 6	2.0%	0.34	0.38
TP_Carrington 11kV	Carrington 7	2.0%	2.27	2.50
TP_Carrington 11kV	Carrington 8	2.0%	0.57	0.63
TP_Carrington 11kV	Carrington 9	2.0%	2.17	2.40
TP_Moturoa	Moturoa 2	2.0%	2.13	2.36
TP_Moturoa	Moturoa 3	2.0%	1.96	2.17
TP_Moturoa	Moturoa 4	2.0%	2.71	2.99
TP_Moturoa	Moturoa 5	2.0%	2.78	3.07
TP_Moturoa	Moturoa 6	2.0%	1.26	1.39
TP_Moturoa	Moturoa 7	2.0%	1.41	1.56
TP_Moturoa	Moturoa 8	2.0%	1.64	1.81
TP_Moturoa	Moturoa 9	2.0%	4.71	5.20

Forecast Growth for Tauranga Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Aongatete	Matakana Rd	2.5%	0.74	0.84
Aongatete	Katikati	2.5%	1.03	1.16
Aongatete	Apata	2.5%	1.83	2.07
Aongatete	Wills Rd	2.5%	1.79	2.03
Aongatete	Mural Town	2.5%	2.97	3.36
Kauri Point	Lindermann Rd	3.0%	0.97	1.13
Kauri Point	Bowentown	3.0%	1.75	2.03
Matua	Matua Point	1.0%	1.91	2.00
Matua	Bellevue Rd	1.0%	1.56	1.64
Matua	Beach Rd	1.0%	1.49	1.56
Matua	Bureta Rd	1.0%	0.80	0.84

Forecast Growth for Tauranga Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Omokoroa	Pahoia	1.5%	1.45	1.56
Omokoroa	Omokoroa Rd	1.5%	2.31	2.48
Omokoroa	Whakamarama	1.5%	0.65	0.70
Omokoroa	Te Puna	1.5%	1.18	1.27
Otumoetai	Central Otumoetai	1.5%	0.50	0.00
Otumoetai	Cherrywood Drive	1.5%	1.62	1.74
Otumoetai	Pillans Point	1.5%	1.87	2.01
Otumoetai	Brookfield Tce	1.5%	2.48	2.67
Otumoetai	Bethlehem Heights	1.5%	3.35	3.61
Otumoetai	Judea Rd	1.5%	2.88	3.10
Otumoetai	Vale St	1.5%	1.77	1.91
Papamoa	Tara Rd	5.5%	2.99	3.91
Papamoa	Domain Rd	5.5%	3.18	4.16
Papamoa	Black Stump	5.5%	1.41	1.84
Papamoa	Kairua Rd	5.5%	0.74	0.97
Papamoa	Papamoa Beach West	5.5%	4.84	6.32
Papamoa	Mangatawa	5.5%	1.16	1.52
Papamoa	Papamoa Junction	5.5%	0.00	0.00
Papamoa	Reid Road	5.5%	0.00	0.00
Pongakawa	Tainui	2.5%	1.41	1.60
Pongakawa	Otamarakau	2.5%	1.71	1.94
Pongakawa	Rotoehu	2.5%	1.26	1.42
Pongakawa	Old Coach Rd	2.5%	0.46	0.52
Tauranga City	Elizabeth St West	4.5%	2.25	2.80
Tauranga City	Cameron Rd Domain	4.5%	1.41	1.76
Tauranga City	Ripple Plant	4.5%	0.00	0.00
Tauranga City	Wharf & Durham St	4.5%	2.25	2.80
Tauranga City	Ripple Plant	4.5%	0.00	0.00
Tauranga City	Hamilton St	4.5%	1.54	1.92
Tauranga City	Selwyn St	4.5%	2.80	3.49
Tauranga City	Courthouse	4.5%	1.35	1.69
Tauranga City	Spring St	4.5%	2.63	3.28
Te Puke	Roads	3.0%	2.02	2.34
Te Puke	Central Rd	3.0%	0.50	0.57
Te Puke	Maketu	3.0%	3.05	3.53
Te Puke	Paengaroa	3.0%	1.68	1.94
Te Puke	Papamoa	3.0%	1.83	2.12
Te Puke	Rangiruru	3.0%	3.32	3.84
Te Puke	Manoeka Rd	3.0%	3.11	3.60
Te Puke	Te Matai Rd	3.0%	1.07	1.24
Triton	Hull Rd	4.5%	3.41	4.25
Triton	Hewletts Rd	4.5%	3.49	4.34
Triton	Central Triton	4.5%	0.50	0.62
Triton	Crane Supply	4.5%	1.68	2.09
Triton	Wharf	4.5%	2.65	3.30
Triton	Fert Works	4.5%	2.71	3.37

Forecast Growth for Tauranga Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Triton	Totara St North	4.5%	2.40	2.99
Triton	South	4.5%	1.52	1.90
Waihi Rd	Ripple Plant	1.0%	0.00	0.00
Waihi Rd	16th Ave	1.0%	1.83	1.92
Waihi Rd	10th Ave	1.0%	1.66	1.74
Waihi Rd	11th Ave	1.0%	1.83	1.92
Waihi Rd	13th Ave	1.0%	2.08	2.18
Welcome Bay	Ohauiti	2.5%	1.24	1.40
Welcome Bay	Maungatapu	2.5%	2.51	2.85
Welcome Bay	Welcome Bay	2.5%	3.32	3.75
Welcome Bay	Kaitemako Rd	2.5%	0.70	0.80
Welcome Bay	Poike	2.5%	3.26	3.69
Tauranga[6]	Ripple Plant	2.0%	0.00	0.00
Tauranga	Oropi Rd	2.0%	3.81	4.19
Tauranga	Gate Pa	2.0%	2.86	3.14
Tauranga	Cameron Rd	2.0%	3.81	4.19
Tauranga	Green Park	2.0%	3.81	4.19
Tauranga	Maleme St	2.0%	4.76	5.24
Tauranga	Kaimai Drive	2.0%	1.91	2.10
Tauranga	Cambridge Rd Tauranga	2.0%	1.91	2.10
Tauranga	Bethlehem	2.0%	2.86	3.14
Mt Maunganui	Te Maunga	4.5%	1.89	2.35
Mt Maunganui	Mount	4.5%	2.92	3.63
Mt Maunganui	Arataki	4.5%	2.50	3.11
Mt Maunganui	Omanu	4.5%	2.15	2.68
Mt Maunganui	Aerodrome	4.5%	3.51	4.37
Mt Maunganui	Mcdonald St	4.5%	3.09	3.85

Forecast Growth for Valley Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Baird Road	Rata St	1.0%	0.32	0.34
Baird Road	Kauri St	1.0%	1.05	1.10
Baird Road	Campbell St	1.0%	2.21	2.32
Baird Road	Harris Block	1.0%	1.12	1.18
Baird Road	Papanui St	1.0%	0.90	0.94
Baird Road	Dalmeny St	1.0%	1.16	1.22
Browne Street	Elizabeth St	1.0%	1.56	1.64
Browne Street	Smith St	1.0%	0.91	0.96
Browne Street	Station Rd	1.0%	0.63	0.66
Browne Street	Tainui St	1.0%	1.71	1.80
Coromandel	Colville	1.5%	1.45	1.56
Coromandel	Wyuna Bay	1.5%	0.93	1.01
Coromandel	Manaia	1.5%	0.67	0.72
Farmer Road	Woods Rd	1.0%	2.86	3.00

[6] Loads for Tauranga 11kV GXP have been estimated

Forecast Growth for Valley Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Farmer Road	Township & LS	1.0%	0.72	0.76
Farmer Road	Tatuanui	1.0%	2.44	2.56
Kerepehi	Kaihere	1.0%	2.93	3.08
Kerepehi	Awaiti	1.0%	1.14	1.20
Kerepehi	Hauraki Rd	1.0%	0.95	1.00
Kerepehi	County Water	1.0%	0.74	0.78
Kerepehi	Mangatarata	1.0%	1.31	1.38
Kerepehi	Ngatea	1.0%	2.23	2.34
Lake Road	Totmans Rd	1.0%	1.22	1.28
Lake Road	Rangitanuku Rd	1.0%	1.41	1.48
Lake Road	Buckland Rd	1.0%	1.73	1.82
Maraetai Road	Balmoral Dr	1.0%	2.27	2.38
Maraetai Road	Lomond Ave	1.0%	2.72	2.86
Maraetai Road	Old Cambridge Rd	1.0%	0.91	0.96
Maraetai Road	Mossops Rd	1.0%	2.27	2.38
Maraetai Road	Thompson Dr	1.0%	0.65	0.68
Maraetai Road	Duke St	1.0%	0.36	0.38
Maraetai Road	Arawa St	1.0%	1.24	1.30
Matatoki	Kopu	1.5%	1.92	2.07
Matatoki	Puriri	1.5%	0.42	0.45
Matatoki	Carter H.H.	1.5%	2.50	2.69
Mikkelsen Road	Springdale	1.0%	1.64	1.72
Mikkelsen Road	Maungakawa Rd	1.0%	2.55	2.68
Mikkelsen Road	McCabe Road	1.0%	2.04	2.14
Mikkelsen Road	Thomas Rd	1.0%	1.01	1.06
Mikkelsen Road	Stanley Ave	1.0%	2.04	2.14
Mikkelsen Road	Ngarua	1.0%	2.04	2.14
Mikkelsen Road	Te Aroha Borough	1.0%	2.02	2.12
Mikkelsen Road	Mountain	1.0%	1.62	1.70
Morrinsville	Lorne St	1.0%	1.94	2.04
Morrinsville	NZDC A	1.0%	3.77	3.96
Morrinsville	Alexandra Ave	1.0%	2.36	2.48
Paeroa	Willoughby St	1.0%	1.22	1.28
Paeroa	Railway St	1.0%	1.52	1.60
Paeroa	Bennett St	1.0%	1.73	1.82
Paeroa	Shaw Ave	1.0%	1.16	1.22
Paeroa	Tirohia-Karangahake	1.0%	1.79	1.88
Piako	Mville North	1.0%	1.31	1.38
Piako	Mville South	1.0%	2.36	2.48
Piako	Horrells Rd	1.0%	1.18	1.24
Piako	Motumaoho	1.0%	1.20	1.26
Piako	Kiwitahi	1.0%	1.05	1.10
Piako	Kereone	1.0%	1.85	1.94
Piako	Du Pont	1.0%	2.08	2.18
Putaruru	Arapuni St	1.0%	2.82	2.96
Putaruru	Bent St	1.0%	1.56	1.64

Forecast Growth for Valley Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Putaruru	Taumangi Rd	1.0%	1.77	1.86
Putaruru	Lichfield	1.0%	1.60	1.68
Putaruru	Waotu	1.0%	1.79	1.88
Putaruru	Local Service		0.00	0.00
Putaruru	Kennedy Drive	1.0%	2.36	2.48
Tahuna	Hoe-Patetonga	1.0%	1.79	1.88
Tahuna	Mangateparu	1.0%	0.97	1.02
Tahuna	Te Puninga	1.0%	1.52	1.60
Tairua	Pepe Rd	1.5%	1.73	1.87
Tairua	Pauanui	1.5%	2.32	2.50
Tairua	Hikuai	1.5%	0.95	1.03
Thames	Rolleston St	1.0%	1.77	1.86
Thames	Totara	1.0%	1.18	1.24
Thames	Queen St	1.0%	3.11	3.26
Thames	Thames Coast	1.0%	2.21	2.32
Thames	A & G Price	1.0%	2.13	2.24
Thames	Pollen St	1.0%	1.98	2.08
Tirau	NZDG Tirau 1	1.0%	2.69	2.82
Tirau	NZDG Tirau 3	1.0%	2.67	2.80
Tirau	Cambridge Rd[7]	1.0%	0.00	0.00
Tirau	Prospect St	1.0%	0.65	0.68
Tirau	Okoroire	1.0%	0.61	0.64
Tower Road	Gordon	1.0%	1.98	2.08
Tower Road	Te Poi	1.0%	1.98	2.08
Tower Road	Banks St	1.0%	1.31	1.38
Tower Road	Burwood Rd	1.0%	1.24	1.30
Tower Road	Rawhiti Ave	1.0%	1.73	1.82
Waihi	Waihi Gold2	1.0%	4.25	4.47
Waihi	Waihi North	1.0%	0.74	0.78
Waihi	Waihi Beach Rd	1.0%	0.91	0.96
Waihi	Gilmour St	1.0%	2.11	2.22
Waihi	Victoria St	1.0%	1.92	2.02
Waihi	Waihi Gold	1.0%	4.21	4.43
Waihi	Waitawheta	1.0%	1.05	1.10
Waihi Beach	Beach Rd	1.0%	1.09	1.14
Waihi Beach	Wilson Rd	1.0%	1.52	1.60
Walton	Wairere Rd	1.0%	1.51	1.58
Walton	Campbell Rd	1.0%	1.16	1.22
Walton	Piakoiti Rd	1.0%	1.26	1.32
Walton	Waharoa	1.0%	1.43	1.50
Whangamata	Achilles Ave	1.5%	2.04	2.20
Whangamata	Whiritoa	1.5%	0.46	0.49
Whangamata	Opoutere	1.5%	1.60	1.72

[7] Load on this feeder is now supplied from Lake Road Substation. When Tirau substation is upgraded, load will be returned to this feeder.

Forecast Growth for Valley Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Whangamata	Port Rd	1.5%	1.83	1.97
Whangamata	Otahu Rd	1.5%	1.22	1.31
Whitianga	Purangi	1.5%	2.55	2.75
Whitianga	Owera Rd	1.5%	2.48	2.67
Whitianga	Cook Drive	1.5%	2.84	3.06
Whitianga	Kuaotunu	1.5%	2.34	2.52
Whitianga	Coroglen	1.5%	1.26	1.35

Forecast Growth for Wairarapa Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Akura	Coradine St	1.0%	2.32	2.44
Akura	Edith St	1.0%	1.37	1.44
Akura	Hope St	1.0%	1.60	1.68
Akura	Miro St	1.0%	1.75	1.84
Akura	Mount Bruce	1.0%	1.33	1.40
Akura	Ngaumutawa Rd	1.0%	1.64	1.72
Akura	Oxford St	1.0%	1.33	1.40
Akura	Renall St	1.0%	0.84	0.88
Awatoitoi	Blairlogie	1.0%	0.40	0.42
Awatoitoi	Mangapakeha	1.0%	0.40	0.42
Awatoitoi	Rorokoko	1.0%	0.40	0.42
Chapel	Cornwall St	1.0%	1.56	1.64
Chapel	Essex St	1.0%	1.37	1.44
Chapel	Head Office	1.0%	3.43	3.60
Chapel	High St	1.0%	3.12	3.28
Chapel	Masonic	1.0%	1.85	1.94
Chapel	South Rd Chapel	1.0%	2.10	2.20
Chapel	Worksop Rd	1.0%	1.56	1.64
Clareville	Belvedere	1.0%	0.48	0.50
Clareville	Chester Rd	1.0%	0.38	0.40
Clareville	Park Rd	1.0%	1.56	1.64
Clareville	Somerset Rd	1.0%	0.67	0.70
Clareville	Taverner St	1.0%	1.94	2.04
Clareville	Wyndham St	1.0%	2.32	2.44
Featherston	Dairy Factory	1.0%	1.75	1.84
Featherston	Revans St	1.0%	1.56	1.64
Featherston	South Featherston	1.0%	0.57	0.60
Featherston	Waite St	1.0%	0.76	0.80
Gladstone	Gladstone Rd	1.0%	0.15	0.16
Gladstone	Kourarau	1.0%	0.15	0.16
Gladstone	Longbush	1.0%	0.15	0.16
Gladstone	Puketiro	1.0%	0.15	0.16
Gladstone	Westmere Gladstone	1.0%	0.15	0.16
Hau Nui	Tuturumuri	1.0%	0.40	0.42
Hau Nui	Windfarm	1.0%	4.00	4.21
Kempton	East St	1.0%	1.64	1.72

Forecast Growth for Wairarapa Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Kempton	Moroa	1.0%	1.18	1.24
Kempton	Ponatahi	1.0%	1.14	1.20
Kempton	West St	1.0%	1.11	1.16
Martinborough	Cologne St	1.0%	0.78	0.82
Martinborough	Dyerville	1.0%	0.80	0.84
Martinborough	Naples St	1.0%	0.48	0.50
Martinborough	Tawaha	1.0%	0.30	0.32
Norfolk	Holdsworth	1.0%	1.18	1.24
Norfolk	Upper Manaia Rd	1.0%	3.89	4.08
Norfolk	Waingawa Rd	1.0%	1.64	1.72
Te Ore Ore	Bideford	1.0%	0.90	0.94
Te Ore Ore	Church St	1.0%	1.11	1.16
Te Ore Ore	Colombo Rd	1.0%	1.12	1.18
Te Ore Ore	Gordon St	1.0%	0.97	1.02
Te Ore Ore	Tauweru	1.0%	0.40	0.42
Te Ore Ore	Totara St	1.0%	0.40	0.42
Te Ore Ore	Weraiti	1.0%	0.40	0.42
Tinui	Annedale	1.0%	0.27	0.28
Tinui	Castlepoint	1.0%	0.27	0.28
Tinui	Langdale	1.0%	0.27	0.28
Tuhitarata	Burnside	1.0%	0.50	0.52
Tuhitarata	Kumenga	1.0%	0.50	0.52
Tuhitarata	Otaraia	1.0%	0.50	0.52
Tuhitarata	Pirinoa	1.0%	0.50	0.52

Forecast Growth for Wanganui Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Arahina	Broadway	1.0%	0.57	0.60
Arahina	Crofton	1.0%	1.24	1.30
Arahina	Marton	1.0%	2.08	2.18
Arahina	Ngatawa	1.0%	1.52	1.60
Arahina	Tutaenui	1.0%	0.90	0.95
Arahina	Tutaenui	1.0%	1.51	1.58
Beach Rd	Beach Rd	5.0%	1.12	1.43
Beach Rd	Gilberd St	5.0%	1.20	1.53
Beach Rd	Imlay	5.0%	3.28	4.18
Blink Bonnie	Durie Hill	1.0%	0.76	0.80
Blink Bonnie	Fordell	1.0%	0.88	0.92
Blink Bonnie	Union Line	1.0%	0.50	0.52
Bulls	Parewanui	1.0%	1.71	1.80
Bulls	Racecourse	1.0%	0.76	0.80
Bulls	State Highway 3	1.0%	0.08	0.08
Castlecliff	Bryce St	5.0%	1.81	2.31
Castlecliff	Cornfoot St	5.0%	1.12	1.43
Castlecliff	Heads Rd	5.0%	1.96	2.50
Castlecliff	Polson St	5.0%	1.66	2.12

Forecast Growth for Wanganui Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Castlecliff	Puriri St	5.0%	1.68	2.14
Hatricks Wharf	Bell St	1.5%	1.81	1.95
Hatricks Wharf	City Bridge	1.5%	0.04	0.04
Hatricks Wharf	Drews Ave	1.5%	2.08	2.24
Hatricks Wharf	Marangai	1.5%	1.37	1.48
Hatricks Wharf	Opera House	1.5%	1.92	2.07
Hatricks Wharf	Plymouth St	1.5%	0.50	0.53
Kai Iwi	Maxwell	1.0%	0.40	0.42
Kai Iwi	Mission Rd	1.0%	0.59	0.62
Kai Iwi	Waterworks Rd	1.0%	0.63	0.66
Kai Iwi	Waterworks Rd	1.0%	1.05	1.10
Peat St	Aramoho Inland	2.0%	1.60	1.77
Peat St	Aramoho Riverside	2.0%	0.84	0.93
Peat St	College	2.0%	2.04	2.25
Peat St	Pitt St	2.0%	0.69	0.76
Peat St	Springvale	2.0%	2.15	2.38
Peat St	St Johns	2.0%	2.80	3.09
Peat St	Westmere Peat St	2.0%	1.18	1.30
Pukepapa	Bulls	1.0%	0.27	0.28
Pukepapa	Henderson	1.0%	0.21	0.22
Pukepapa	Lake Alice	1.0%	0.26	0.28
Pukepapa	Lake Alice	1.0%	0.44	0.46
Pukepapa	Leedstown 22kv	1.0%	0.91	0.96
Pukepapa	Turakina	1.0%	0.97	1.02
Rata	Factory	1.0%	1.49	1.56
Rata	Hunterville 22kv	1.0%	0.51	0.54
Rata	Hunterville 22kv	1.0%	1.03	1.08
Rata	Putorino	1.0%	0.53	0.56
Rata	Putorino	1.0%	1.07	1.12
Roberts Ave	Brunswick	1.0%	0.59	0.62
Roberts Ave	Brunswick	1.0%	0.99	1.04
Roberts Ave	Cemetery	1.0%	0.99	1.04
Roberts Ave	Makirikiri	1.0%	0.76	0.80
Roberts Ave	Peat St Inland	1.0%	0.99	1.04
Roberts Ave	Peat St Riverside	1.0%	1.09	1.14
Taihape	Goldfinch	1.0%	0.50	0.52
Taihape	Mangaweka	1.0%	1.12	1.18
Taihape	Mangaweka	1.0%	2.25	2.36
Taihape	Mataroa	1.0%	0.65	0.68
Taihape	Moawhango	1.0%	1.12	1.18
Taihape	Papakai	1.0%	0.48	0.50
Taihape	Taihape Town North	1.0%	0.86	0.90
Taihape	Taihape Town South	1.0%	1.18	1.24
Taupo Quay	Carlton	1.5%	1.31	1.42
Taupo Quay	Gonville	1.5%	2.99	3.22
Taupo Quay	Guyton	1.5%	0.42	0.45

Forecast Growth for Wanganui Feeders				
Substation	Feeder	Growth p.a.	Load 2004	Load 2009
Taupo Quay	Ridgway St	1.5%	0.74	0.80
Taupo Quay	Taupo 1	1.5%	0.42	0.45
Taupo Quay	Taupo 2	1.5%	0.53	0.57
Taupo Quay	Taupo Quay Bus Tie	1.5%	1.68	1.81
Waiouru	Camp Rd	1.0%	1.89	1.98
Waiouru	Irirangi	1.0%	0.76	0.80
Waiouru	Ruapehu	1.0%	1.68	1.76
Wanganui East	Eastown Rd	1.5%	1.18	1.27
Wanganui East	Ikitara Rd	1.5%	1.18	1.27
Wanganui East	Kiwi St	1.5%	1.37	1.48
Wanganui East	No 3 Line	1.5%	1.56	1.68
Wanganui East	Wanganui East	1.5%	1.28	1.38
TP_Ohakune	Parapara	1.0%	0.67	0.70
TP_Ohakune	Raetihi	1.0%	0.40	0.42
TP_Ohakune	Raetihi	1.0%	0.67	0.70
TP_Waverley	Rangikura	1.0%	1.16	1.22
TP_Waverley	Waitotara	1.0%	1.16	1.22
TP_Waverley	Waverley	1.0%	1.16	1.22

Appendix 5 – Quality of supply criteria used as a basis for optimisation

A description of the quality of supply criteria that Powerco currently uses as a basis for network design and the optimisation process for the 2004 ODV is given below. The reader is also referred to Powerco's 2005 Asset Management Plan.

Security levels

Powerco's security of supply and target fault restoration times depend on the magnitude of electricity demand and on the types of consumer supplied as detailed below in Table A5.1.

In February 2004, Powerco has carried out a survey to canvas consumers' views on their reliability of supply and their willingness to pay for an improvement to it. The main finding of the survey was that most consumers are satisfied with the present quality of supply.

Powerco tests its security criteria to ensure that they are technically feasible and will result in an economic network configuration. In situations where this test imposes some limitations particular care is taken to ensure that the critical components of the supply system are as reliable as possible.

Table A5.1: Zone Substation Security Classification

Substation Classification	Average Duration for First Interruption	Average Duration for Second Interruption
AAA	None	50% to 100% load, 60 minutes Remainder, repair time
AA+	15 seconds	50% to 100% load, 60 minutes Remainder, repair time
AA	45 minutes	Repair time
A1	Isolation time	Repair time
A2	Repair time	Repair time

Powerco's security of supply criteria require communities of over 40,000 and large CBD's to be supplied, at least partially, from more than one GXP. Security levels for large industrial users are agreed by direct negotiation.

Substations with an AAA or AA rating are allowed to restore supply by automatic switching. If two lines or cables supplying the substation are in sufficient proximity for a single event to cause the failure of both, at least 50% of the load can be supplied from an alternative source. For substations with an AAA rating this can be done without interruption.

Switching can restore supply from substations with an AA, A2 or A1 rating. Group loads with an AA rating this can be done at subtransmission / distribution level. Loads with an A2 rating will be restored after the fault element is repaired or replaced while loads with an A1 rating are restored after the fault element has been isolated.

The classification of the zone substation is determined in accordance with Table A5.2, by the maximum demand encountered and the 'type' of consumer in the areas supplied from it.

Table A5.2: Zone Substation Security Level Selection

Load Type	Zone Substation Maximum Demand			
	< 1MVA	1 – 5MVA	5 – 12MVA	>12MVA
F1 (Large industrial)	AA	AA	AA+	AAA
F2 (Commercial, CBD)	AA	AA	AA+	AAA
F3 (Urban residential)	AA	AA	AA	AA
F4 (Rural)	A1	A1	A1	n/a
F5 (Remote Rural)	A2	A2	n/a	n/a

Reliability Targets

Network reliability is maintained in accordance with accepted industry standards. Powerco sets reliability targets at a network and feeder level.

Each distribution feeder is assigned a feeder class that best encompasses the types of consumers connected to the feeder. Feeder reliability targets are an approximation of individual consumer reliability needs.

Acceptable reliability performance is performance equal to or better than the performance indices stated in Table A5.3 below. This table indicates the average and maximum (worst case) thresholds for feeder class reliability performance.

Table A5.3: Reliability Performance Targets by Feeder (Consumer) Type

Typical Consumer Type	Large Industrial	Commercial	Urban	Rural	Remote Rural	Unit
Powerco Feeder Class	F1	F2	F3	F4	F5	
Average number of consumers on feeder class	5	100	800	500	250	
SAIFI (average for class)	0.33	0.33	0.5	2	3	interruptions per year
CAIDI (average for class)	45	45	45	90	150	minutes per interruption
SAIDI (average for class)	15	15	23	180	450	minutes per consumer per year
Maximum No. of auto-recloses				16	24	reclose shots per year
Maximum No. of Interruptions	0.5	1.0	1.5	4	6	interruptions per year
Maximum average outage duration	60	60	120	150	180	minutes per interruption
Feeder interruption duration index (FIDI)	30	60	180	600	1080	minutes per feeder per year

Note: The reliability performance stated in the table above excludes the performance of the network upstream of the feeder.

Voltage Regulation

Powerco's voltage regulation targets are in line with statutory requirements, which are that the voltage shall be maintained within ±6% at the consumer's point of connection. Performance outside the target

is usually indicated by low voltage complaints from consumers. Corrective action is taken as soon as possible after the performance gap is identified.

Network Losses

Targeted levels of network losses are given in Table A5.4 below. Network losses can be determined by calculating the difference between energy flowing into the network and energy flowing out. This relies on information provided from Retailers

Table A5.4: Loss Ratio Performance Targets

KPI Description	2004	2005	2006
Loss Ratio (%)	6.0	6.0	5.9

Appendix 6 – Assets with extended or reduced service lives

The following assets have been granted extensions to their standard lives:

- The lives of all zone substation transformers have been able to be extended to 60 years from 45 years.
- The lives of all distribution transformers have been able to be extended to 55 years from 45 years.
- The lives of switchgear of modern sealed design shown in Table A6.1 below have been extended to 55 years from 45 years.

Table A6.1: Switchgear of Modern Sealed Design

Location	Type	Make	Status
Feilding	Vacuum	LMVP	2 extension LMVP panels
Kairanga	SF_6	Fluarc	Whole switchboard
Keith St 33 kV	SF_6	Fluarc	Whole switchboard
Keith St	Vacuum	LMVP	Whole switchboard
Kelvin Grove	Vacuum	Toshiba VK	Whole switchboard
Main St	Vacuum	LMVP	Whole switchboard
Pascal St 33 kV	SF_6	Fluarc	Whole switchboard
Cloton Rd	SF_6	Fluarc	Whole switchboard
Douglas	Vacuum	LMVP	Whole switchboard
Eltham	Vacuum	LMVP	Whole switchboard
Moturoa	Vacuum	LMVP	2 extension LMVP panels
Pungarehu 33 kV	Vacuum[8]	Siemens	Whole switchboard
Pungarehu	Vacuum	LMVP	Whole switchboard
Waitara East	SF_6	ABB Safesix	Whole switchboard
Waitara West 33 kV	SF_6	Fluarc	Whole switchboard
Waitara West	SF_6	ABB Safesix	Whole switchboard
Papamoa	Vacuum	LMVP	Whole switchboard
Browne St	Vacuum	LMVP	Whole switchboard
Coromandel	Vacuum	LMVP	Whole switchboard
Farmer Rd	Vacuum	LMVP	Whole switchboard
Morrinsville	Vacuum	LMVP	Whole switchboard
Piako	Vacuum	LMVP	Whole switchboard
Tairua	Vacuum	LMVP	Whole switchboard
Tower Rd	Vacuum	LMVP	Whole switchboard
Thames	SF_6	Yorkshire YSF6	9 panels
Waihi	Vacuum	LMVP	1 extension panel
Whitianga	Vacuum	LMVP	Whole switchboard
Norfolk	Vacuum	LMVP	1 incomer panel extension
Blink Bonnie	Vacuum	LMVP	Whole switchboard
Peat St	SF_6	Fluarc	Whole switchboard
Taupo Quay	Vacuum	LMVP	Whole switchboard

[8] This board could be SF6 but it is definitely of modern sealed design.