



## **Use-of-System Pricing Methodology**

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1 April 2005

## 1 INTRODUCTION

This document explains the methodology that has been developed by Westpower to charge for its electricity delivery services. Included is all of the information required by Requirement 23 of the Electricity Information Disclosure Requirements 2004. Comments and suggestions for improvement are welcome at any time. The transmission charges to recover Transpower's connection costs are identified separately in the price structure.

The tariff is based upon charges applied at each Installation Control Point (ICP) as measured by the electricity meters installed there.

For small and medium sized customers, transmission charges are bundled with the distribution charges and included in the appropriate tariff component. On the other hand, it has been possible to pass transmission charges through to Bulk and Large Bulk customers in a direct and transparent fashion, which provides an economically efficient pricing signal that these customers can choose to respond to.

## 2 PRICING OBJECTIVES

### 2.1 Revenue

Westpower must obtain sufficient revenue to:

- (a) meet its contractual obligations for connection to the Transpower grid.
- (b) meet its contractual obligations for the delivery of energy over the distribution network to the installations of retailers' customers.
- (c) comply with statutory requirements on public safety, regulatory disclosure, environmental protection and quality of supply.
- (d) provide a commercially appropriate return on funds.

Westpower Limited is purely an asset-owning company and has contracted the management and maintenance of its network assets to ElectroNet Services Limited.

### 2.2 Efficiency

Improvements in the efficiency of electricity delivery will be achieved by promoting efficient investment in and operation of the network by clearly signalling the fixed and variable costs of delivery.

Westpower's costs are based directly on the peak demand capacity built into the network, and while it could be argued that these costs are basically sunk, and hence have a fixed nature, such an historical costing approach does not lead to dynamic efficiency, a key outcome for Westpower. Ideally, an economic, or forward-looking, tariff based on the marginal cost of new investment would be adopted to clearly signal the costs of building additional capacity into the network.

Furthermore, where measurable, the tariff is based directly on the peak demand placed on the network by each consumer. Unfortunately this requires expensive Time of Use metering to be installed and is not commonly applied to small and medium

sized consumers. For this reason, the use of kWh, or energy consumption, which is directly measurable from these customer's existing meters is used as a proxy for the kW demand.

Also included in the tariff is the provision of a strong economic signal to encourage commercial and industrial consumers to improve their power factor, whereby the apparent power supplied and hence losses are significantly reduced, while providing the same level of real power.

### **2.3 Fairness**

As a supplier of essential services, Westpower intends to set fair and reasonable prices. Delivery charges as a whole are cost-based and the recovery of those costs will be spread fairly over users of the network. The application of fairness to delivery pricing is one of the most difficult objectives to achieve as users will have varying views on what is fair, based to a large extent on how the pricing policies impact on their individual delivery prices.

Consumers are placed in load capacity groups; each group's charges vary according to their respective use of different types of assets.

Where new investment is required, those users who obtain the benefit should be required to contribute towards the cost. Notwithstanding this general policy, where a sufficiently large proportion of Westpower's consumers across diverse load groups receive a benefit from a new investment, these costs may be recovered across the whole consumer base.

### **2.4 Simplicity**

Westpower wishes to use the minimum number of tariffs necessary to provide effective signals to its consumers so that it can reduce the cost and complexity of its billing system.

A countervailing driver in considering this goal is the need to sufficiently differentiate the impact on peak demand capacity by various load groups that demonstrate significantly different load profiles. This is implemented through determining overall load factors for different usage patterns such as water heating, night rate, 24 hour supply etc as each usage pattern makes a different overall contribution to peak demand on the system. These load factors are then applied to each group as a means of deriving the cost per kWh to be used in the tariff. (As noted in 2.2 above, this is necessary when kWh is used as a proxy for kW demand)

### **2.5 Transparency**

It is desirable that any signals incorporated in the tariff are passed through to the electricity consumers in a form that will allow them to respond positively. This is particularly the case for bulk customers able to switch large blocks of load at short notice; these customers should see a direct benefit from any avoided transmission costs they are able to create through the operation of their load.

## 2.6 Legislative Compliance

The Commerce Act (Electricity Distribution Thresholds) Notice 2004 pursuant to Part 4A of the Commerce Act 1986 has been developed by the Commerce Commission to provide a targeted control regime for lines businesses as these are deemed to constitute a natural monopoly. A key part of this regime is a price control mechanism based on CPI-X (Consumer Price Index minus a factor X to be determined by the Commission from time to time, where the current value of X for Westpower is 1%).

In general, any pricing that is developed based on a revenue requirement must then be modified to ensure that it complies with the price path threshold. An exception to this may eventuate, however, if Westpower could demonstrate that it needed to recover a significant, uncontrollable marginal cost such as increased transmission charges from Transpower.

## 3 DISTRIBUTION COST STRUCTURE

### Prices have been derived from:

Forecast revenue requirements to provide agreed returns and to meet the Company's objective to, where possible, fund capital expenditure from current earnings.

A determination to maintain prices at the current levels making this proposed tariff revenue neutral for the company

Company annual revenue requirements for 2005 are determined as:

Transmission	\$2,292,000
Maintenance, Depreciation and Overheads	\$6,819,000
Cost of Capital	\$3,380,000
<b>Total Expenditure</b>	<b>\$12,491,000</b>

## 4 REVENUE FACTORS

### 4.1 Asset Valuation

Book values of the assets are based directly on the ODV valuation.

### 4.2 Maintenance of Existing Assets

The maintenance program is driven by safety requirements, the need to provide consumers with acceptable levels of reliability and repairs to equipment following faults. The safety and reliability requirements set the planned programme for maintenance and are based upon experience in equipment operation and on industry standards.

The amounts budgeted for maintenance are determined according to the 10-year Asset Management Plan and include the following activities

- Inspection, Service and Testing
- Faults
- Repairs

These costs are further subdivided into the following asset categories

- Subtransmission (33 kV and 66 kV)
- Distribution (11 kV)
- Reticulation (400 V)
- Services
- Zone Substations
- MV Switchgear
- SCADA, Communications and Protection
- Distribution Transformers
- Ripple Control

Use of the assets by each load groups is one means used in determining the relativities between load groups in terms of cost recovery. For instance 11 kV bulk consumers should not be required to fund the costs involved in maintaining 400V reticulation.

## 5 PRICING STRUCTURE

Westpower has an economically efficient delivery pricing structure with three components:

- Fixed
- Variable
- Peak

Economically efficient means a pricing basis that signals network costs.

To minimise the costs of charging, Westpower applies the prices to quantities that are readily available and meaningful. For the mass of general connections prices are applied to kWh quantities metered at each ICP, as recorded or reconciled per retailer. For the relatively small number of major customer connections, Westpower's prices are applied to Time of Use quantities, also measured at the individual connections.

### 5.1 Distribution Charge Components

#### 5.1.1 Consumer Groupings

Historical consumer groupings have been retained to provide customers with a degree of stability. Consumers are allocated to groups on the basis of their expected load pattern.

Category 1 Consumers with load less than 15 kVA

Category 2 Greater than 15 kVA capacity and not Industrial, tariff based on demand on network.

Category 2 TOU Greater than 100 kVA and less than 200 kVA

Streetlighting	Public utility lighting
Bulk	Greater than 200 kVA capacity, (On a daily basis) tariff based on demand on network and coincident demand at the source Grid Exit Point
Large Bulk	Greater than 2500 kVA capacity, tariff based on demand on network and coincident demand at the source Grid Exit Point
Tranzrail Otira	As Otira constitutes of an isolated GXP that is not interconnected with the rest of Westpower's network, and is dedicated almost solely to the supply of Toll Rail infrastructure, this area has been ring-fenced in terms of costs (both fixed and variable) that can rightly be attributed to the major consumer. The small number of domestic customers in this area have been included in the normal Category 1 group in the interests of equity.

Statistics for these customer groups are shown in Schedule 3 attached.

The total distribution revenue required from each group is generally based on their pro rata contribution toward the overall net system demand, but with discount factors applied to customers other than Category 1 in recognition of reduced equipment costs related to supplying these customers because of factors such as economies of scale, load factor and energy density.

The apparent distribution discount factors that are applied to each group are contained within the table, but it is of little benefit to try and derive a direct empirical relationship between the drivers discussed above and the numerical value of the discount as Westpower has maintained the same tariff structure for several years and made adjustments by across the board percentage changes to all categories. Usage patterns have changed in the intervening period, but the tariff structure has remained constant in the interests of price stability.

### 5.1.2 Fixed charge

This charge partially recovers costs that are incurred on a connection basis. Full recovery is not possible as fixed charges would exceed customers' and the Government's expectations. In particular the tariff has been set to ensure that the distribution component of the fixed charge for domestic customers does not exceed 15 c per day in accordance with the guidelines provided by the Minister of Energy.

Westpower has chosen to apply this low fixed charge to all Category 1 Domestic consumers for the sake of simplicity as well as to ensure risk and revenue neutrality across the whole customer group. Low-use customers would otherwise constitute a somewhat indeterminate and constantly varying proportion of the overall Category 1 customer group leading to revenue variability.

Fixed charges for other customer groups are based on maintaining linkages with historical fixed vs variable ratios to avoid unnecessary price volatility between customers within a group.

### 5.1.3 Variable Charge

Ideally, the variable component signals the incremental cost to provide capacity when the distribution network is operating at peak loading. The rationale for this component is that the investment in networks is primarily determined by the maximum loading on the network. This is generally applicable to both distribution and transmission networks.

As the fixed charge for domestic customers is basically driven by Government policy, it follows that their variable charge must then be set to recover the remaining revenue requirement from the domestic consumer group, resulting in a significantly higher variable charge than would otherwise be expected from the application of normal economic marginal pricing principles.

For general connections in Categories 1 and 2 the variable price is applied to each retailer's monthly kWh consumption. For Bulk and Large Bulk consumers the variable charge is based on peak demand metered quantities at the installation.

### 5.1.4 Fixed Annual Capacity Charge (Category 2 consumers only)

This charge partially recovers costs for Category 2 customers that are incurred on a connection basis, including costs for distribution substations and low voltage reticulation. As the cost is determined to a large extent by the capacity of equipment required to supply the consumer, this charge is based on the assessed capacity required for the coming year and remains fixed throughout the year.

## 5.2 Transmission Charge Components

Westpower has connections to the Transpower network at the following Grid Exit Points:

- ✓ Dobson
- ✓ Greymouth
- ✓ Kumara
- ✓ Hokitika
- ✓ Otira

The following methodology is used as the basis for recovery of Transpower's transmission charges. It is allocated equitably across all customer groups, except that the cost of supply to Toll Rail at Otira substation has been ring-fenced as they are the only significant customer at this Grid Exit Point. The tariff clearly reflects the transmission cost drivers that Transpower has developed through its pricing structure.

In accordance with the objective of providing a transparent tariff, Westpower has attempted to pass through transmission charges without markup. Where possible, because of the availability of TOU metering in the customer's installation, the transmission component of the tariff is charged on the same basis as that used by Transpower, with fixed charges converted to a demand basis for allocation.

For Category 1 and 2 customers, the transmission component of the tariff has been converted to a kWh rate as this is the only metering quantity available.

### *5.2.1 Fixed charge or Fixed Annual Capacity Charge*

This charge recovers all transmission and avoided transmission costs (including System Operator Charges) with the exception of Transpower's Interconnection Charge. The Transpower charges are passed through without markup and are allocated based on demand data.

Likely avoided cost of transmission charges payable to embedded generators are calculated at the beginning of each year and allocated amongst customer groups in a similar manner to the Transpower charges. As any change in avoided transmission cost by generators is directly offset by a corresponding and opposite change in transmission costs payable to Transpower, the overall economic effect of say a dry year is revenue neutral.

### *5.2.2 Variable Charge*

For Category 1 and Category 2 consumers, Transpower's Interconnection Charge is recovered directly in the variable charge. For the purposes of charging, this is converted to a kWh charge and bundled with the Westpower Variable Distribution component to give the Total Variable Line Charge. The charge is allocated across customer groups based on an assessment of their impact on Transpower's peak demand.

### *5.2.3 Coincident Peak Charge*

For Bulk and Large Bulk customer groups, the TransPower Interconnection Charge is recovered in a Coincident Peak Charge. Because these customers all have half-hour Time of Use (TOU) metering, it is possible to calculate the exact contribution to the Transpower Charge each customer makes. That is, the coincident peak kW demand for each customer at the time of the twelve highest GXP demands over the last twelve months is known and the contribution towards Westpower's Interconnection Charge charged at cost.

By providing appropriate signals to bulk customers when peak demand periods are approaching, they are in a position to avoid contributing to the peak through demand side management. As the tariff is effectively a pass-through of the Transpower Interconnection Charges incurred, the customer can receive the benefit of any load control through a reduced Coincident Peak Charge.

## **5.3 Allocation Method**

As discussed in 5.1 and 5.2 above, the allocation of the distribution charge amongst customer groups is based generally on the net demand of that group as modified by a discount factor. These discount factors are historical, based on the prevailing load patterns and collective experience at that time, and have not been empirically derived.

For the purposes of clarity, however, apparent distribution discount factors have been calculated based on the proportion of revenue actually received from each customer group. This discount factor is therefore a reflection of what has taken place, rather than being a driver for future changes in allocation.

Discount factors as such have not been applied to the Transmission Charges, with the intent being to pass these charges directly through to customers on an equitable and transparent basis, depending on the contribution of groups to the overall GXP demands. For the reasons discussed above, however, changing usage patterns over time mean that some distortion has necessarily occurred, but this is not sufficient to



warrant a rebalancing exercise in view of the price shocks that would result to certain groups.

Finally, subdivision of the revenue requirement into individual revenue components was not carried out in determining the allocation of charges amongst the various categories. The cost components discussed in 4.2 are only used to determine the overall revenue requirement.

## **6 AVOIDED COST OF TRANSMISSION**

Where an investor provides assets as an alternative to Transpower providing transmission services, such as distributed generation, the benefit of avoided transmission charges will be passed through to the investor on a transparent basis with values calculated in accordance with Transpower's pricing methodology. The connection of generators to the Westpower network, and the charge/rebates applicable are subject to Westpower review on a case-by case basis.

Investment that has the potential to reduce the Peak Demand at a GXP will be recognised via pass-through of any reductions in Transpower's Interconnection Charge. This will be carried out based on actual recorded half-hourly metering data, and allocated in an equitable manner amongst individual investors.

The maximum potential for reduction in Transpower charges is dependent on operating assets in co-ordination with Westpower's load management and any other party's capability as well as ensuring that the assets are available at times of peak system loadings. The level of risk and sharing of benefits between providers will be subject to contracted terms between parties.

It should be noted that the investor can equally be Westpower, any retailer, any generator or independent party and all parties will be treated in the same manner. Where there is a choice of alternative investments, preference will be given to the least cost solution to Westpower Limited on offer at the time of commitment.

Westpower carries the risk of managing transmission cost. This risk is recovered via transmission charges which include an avoided transmission component.

## **7 LOSSES**

### **7.1 General**

Losses represent the percentage of electricity entering the network that is consumed during the delivery to consumers' installations. The quantity of electricity metered at consumer installations is thus after losses and in order to determine each retailer's purchase responsibilities the electricity measured at the consumer's meter has to be multiplied by a "loss factor". There are two main components to the loss:

- (a) Fixed component due to the standing losses of the zone substation and distribution transformers.
- (b) Variable components arising from the heating effects of the resistive losses in the delivery conductors. The resistive losses are proportional to the square of the load current and occur in the 66 kV, 33 kV, 11 kV and LV network conductors, the zone substations and distribution transformers.

## **7.2 HV and LV Metered Installations**

Most consumer installations are metered at LV, however a few consumers' installations are metered at HV and thus these installations should not incur any LV network losses nor the fixed and variable losses in the distribution transformer. Thus two values of loss factors apply.

## **7.3 Methodology**

Westpower has adopted the following methodology in determining the loss factors to be applied by retailers.

The average loss percentage for the distribution network is calculated for Information Disclosure purposes from data supplied by the National Reconciliation Manager. This percentage value is then applied to the total kWh consumed to give the kWh lost for any particular year.

The declared loss factors are listed in Schedule 2.

# WESTPOWER LTD

## SCHEDULE 1

### DISTRIBUTION AND TRANSMISSION CHARGES APPLICABLE 01 AUGUST 2005

ALL CHARGES SHOWN ARE EXCLUSIVE OF GST

#### CATEGORY 1 DOMESTIC

FIXED CHARGES:

DISTRIBUTION CHARGE- per 12 month period

UNIT CHARGES (VARIABLE):

Tariff Name

#### CODES

WP1D \$49.92

Domestic 24hr

Controlled 17hr

Economy, day

Economy, night

Night only

Tariff code	Westpower Distribution (cents per unit)	Trans Power Transmission (cents per unit)
D	7.297	1.331
DC	4.344	0.792
DD	8.514	1.553
DE	0.399	0.000
DN	2.068	0.000

#### CATEGORY 1 NON-DOMESTIC ( For loads less than 15 kVA )

DISTRIBUTION CHARGE - per 12 month period

UNIT CHARGES (VARIABLE):

Tariff Name

WP1N \$191.01

24 HR

Controlled 17hr

Economy, day

Economy, night

Night only

Priority Controlled

Tariff code	Westpower Distribution (cents per unit)	Trans Power Transmission (cents per unit)
N	7.297	1.331
NC	4.344	0.792
ND	8.514	1.553
NE	0.399	0.000
NN	2.068	0.000
PC	4.468	0.815

#### STREET LIGHTING:

FIXED CHARGES:

DISTRIBUTION CHARGE per 12 month period per light

UNIT CHARGES (VARIABLE):

Tariff Name

WPSL \$16.42

Public Lighting

Under Verandah Lighting

Tariff code	Westpower Distribution (cents per unit)	Trans Power Transmission (cents per unit)
	4.164	0.362
	4.164	0.362

#### CATEGORY 2

#### FOR LOAD GREATER THAN 15 KVA and UP TO 200 KVA

FIXED CHARGES:

DISTRIBUTION CHARGE - per 12 month period per Notional Unit

UNIT CHARGES (VARIABLE):

Tariff Name

WP2N \$21.55

Non Domestic 24hr

Non Domestic Controlled

Non Domestic Economy, day

Non Domestic Economy, night

Non Domestic Night

Priority Controlled

Tariff code	Westpower Distribution (cents per unit)	Trans Power Transmission (cents per unit)
U1	6.275	1.178
U2	2.104	0.395
U3N	6.816	1.279
U3L	0.178	0.000
U5	0.791	0.000
U6	4.449	0.835

**CATEGORY 2 (TIME OF USE METERING )  
FOR LOAD GREATER THAN 100 KVA and UP TO 200 KVA**

Fixed Annual Capacity Charge. (per kW per year)	C2F	\$21.55	
Peak charge. (per kW per year)	C2P	\$154.33	\$52.08

**BULK (loads over 200kVA)**

Fixed Annual Capacity Charge. (per kVA per year)	C3F	\$35.61	\$9.37
Peak charge. (per kW per year)	C3P	\$35.61	
Coincident Peak Charge per kW per year	C3CP		\$52.08

**Large Bulk (loads over 2500kVA)**

Fixed Annual Capacity Charge:	C4F	\$26.71	\$9.37
Peak charge. (per kW per year)	C4P	\$26.71	
Transpower Coincident peak demand per kW per year	C4CP		\$52.08

**Tranzrail Otira**

Fixed Annual Capacity Charge:	C5F	\$189.59	\$85.75
Peak charge, per kW per year:	C5P	\$35.61	
Transpower Coincident peak demand per kW per year	C5CP		\$52.08

**Power Factor Charge**

Annual charge per kVAR of assessed correction required to bring PF up to 0.95	C2PF	\$86.19	
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**Transpower Rental Adjustment**

Adjustment based on actual Transpower Losses and Constraints rebates ( Applicable to category 3 , 4 & 5 only)	031		
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**Note:**

All charges are exclusive of GST.  
Capacity Charge is assessed on the basis of the measured demand, mains size, LV fuses or transformer capacity.

An additional \$86.19 per kVAR per annum of equivalent corrective capacitance applies if the installation power factor is required to be improved to 0.95.

**Total Line Charges include the following:**

Distribution Charge  
Distribution Unit Charges (Westpower)  
Transmission Unit Charges (Transpower)

- 1 A unit is a kilowatt hour (kWh).
- 2 All fixed charges are attributable to Westpower only.
- 3 The Notional Unit of Demand (NUD) is an assessment of the system capacity provided for the customer and is based on factors such as measured loads or transformer capacity. In general 1 NUD = 1 kVA.
- 4 The Large Bulk tariff is only available to existing loads as at 1 March 2002.
- 5 Standard Peak charges are charged and reset monthly

## SCHEDULE 2

### LOSS FACTORS

The following loss factors are to be used by Retailers to multiply the kWh recorded on the half-hour meter at each Connected Customer's Installation in order to determine the Electricity Retailer's responsibility for the purchase of kWh within the Distribution Network.

Supply at 11kV (1.05%)	05
Supply at 400V (1.08%)	08

### SCHEDULE 3

#### REVENUE ALLOCATION DISCLOSURE TABLE

Category	1	2	2 TOU	3	4	5	Total
Customers	10985	781	15	18	2	1	11802
Net Demand (kW)	15015	10,547	1657	9,714.87	4,601	484	42019
Consumption (kWh)	78,462,558	47,797,625	9,596,451	27,105,799	32,532,325	1,326,284	196,821,042
Load Factor	0.60	0.52	0.66	0.32	0.81	0.31	0.53
Av Demand per Customer (kW)	1.37	13.50	110.47	539.71	2300.61	484.00	3.56
Revenue - Distribution	\$ 5,618,702	\$ 3,262,864	\$ 307,969	\$ 709,225	\$ 251,954	\$ 121,125	\$ 10,271,840
Revenue - Transmission	\$ 837,481	\$ 471,487	\$ 64,180	\$ 483,138	\$ 293,837	\$ 69,036	\$ 2,219,160
Total revenue	\$ 6,456,182	\$ 3,734,352	\$ 372,150	\$ 1,192,364	\$ 545,791	\$ 190,161	\$ 12,491,000
Distribution Revenue per kW	\$ 374.21	\$ 309.36	\$ 185.86	\$ 73.00	\$ 54.76	\$ 250.26	
Apparent Discount Factor	100%	83%	50%	20%	15%	67%	