Electricity Distribution Network Pricing Methodology Disclosure

For the year beginning 1 April 2011

Pursuant to:
Electricity Distribution (Information Disclosure) Requirements 2008,
Distribution Pricing Principles and Information Disclosure Guidelines.

PRICING METHODOLOGY DISCLOSURES

The information in this document is not intended by Vector Limited (Vector) to constitute an offer of services to the public.

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In this document, words and expressions have the meaning given to them in the Electricity Distribution (Information Disclosure) Requirements 2008 (the Disclosure Requirements) or the Commerce Act 1986, unless otherwise specified.

Executive Summary

Vector is required by the Disclosure Requirements to disclose aspects of its pricing methodology under Part 4 of the Transitional Provisions. The information in this document addresses those requirements.

The Distribution Pricing Principles and Information Disclosure Guidelines (the Disclosure Guidelines) published by the Electricity Commission in February 2010 set out further pricing methodology disclosure requirements. At this stage compliance with the requirements of the Disclosure Guidelines is on a voluntary basis however Vector has included information to demonstrate compliance with the Disclosure Guidelines or where Vector is not able to do so, to include a transitional plan to comply with the requirements of the Disclosure Guidelines.

In setting prices for the pricing year beginning on 1 April 2011 Vector has taken a cost causality approach to cost allocation and end consumer segmentation; meaning costs are allocated to end consumer segments (connection types) according to the nature of the network or asset type that the end consumer is connected to. There are a myriad of factors that contribute to the overall level of network costs, this limits the extent to which Vector can accurately attribute costs and therefore cost allocation requires a high level of aggregation.

Vector is subject to a Default Price Path pursuant to section 52P of the Commerce Act which effectively determines revenue Vector can generate from electricity distribution. The Cost of Service Model used by Vector identifies the revenues that would be necessary from each connection type based on an allocation of costs within the constraint of the Default Price Path. Vector uses the relative returns for each connection type to indicate directional price changes required to align actual revenues forecast for each connection type with the Cost of Service Model required revenue for each connection type.

Vector is acutely aware that in the present economic climate it may be difficult for end consumers to cope with substantial changes to prices. Accordingly, in setting prices to take effect from 1 April 2011 Vector has adopted a policy of generally restricting price changes for end consumers to a maximum of 10% at the distribution level. This has led Vector to adopt a transitional period to ensure that the impact on end consumers of price reform is managed over time.

Section 1: Overview

This pricing methodology disclosure describes the pricing methodology that Vector has adopted to calculate prices on its electricity distribution networks for the pricing year beginning 1 April 2011.

Vector's development and use of pricing methodologies needs to be considered in light of the developing regulatory environment that Vector operates in and the historical development of prices and price structures.

This section outlines the significant regulatory requirements affecting pricing methodologies and summarises the more recent events that have influenced Vector's pricing methodology development.

1.1. Description of regulatory requirements

Electricity distribution networks in New Zealand provide an essential service to end consumers. This market is characterised by natural monopolies operating in discrete geographic areas. Consistent with the market arrangements, there are a number of regulatory requirements that govern the provision of distribution services. This section describes the major regulatory requirements affecting pricing methodologies.

1.1.1. Information Disclosure Requirements (pricing methodologies)

Vector is required by the Disclosure Requirements to disclose aspects of its pricing methodology at the start of each pricing year beginning on 1 April. Each pricing methodology disclosure must:

1. Describe the methodology used to calculate prices; and
2. Include the key components of the revenue required to cover costs and profits of Vector's line business activities, including the cost of capital and transmission charges; and
3. State the consumer groups used to calculate prices, including -
    a. The rationale for the consumer grouping; and
    b. The method by which Vector determines which group consumers are in; and
    c. For each consumer group, the statistics relating to that group which were used in the methodology; and
4. Describe the method by which Vector allocated the components of revenue required to cover costs of its line business activities amongst consumer groups including –
    a. The numerical values of the different components allocated to each consumer group; and
    b. The rationale for allocating it in this manner; and

5. Describe the method by which Vector determined the proportion of its charges which are fixed and the proportion which are variable, including the rationale for determining the proportions in this manner.

A copy of the full Disclosure Requirements can be found at:

http://www.comcom.govt.nz/electricity-information-disclosure-requirements/

1.1.2. Electricity Authority pricing methodology guidelines:

In February 2010 the Electricity Commission (now the Electricity Authority) published a set of guidelines to assist distributors in the disclosure of information on their distribution pricing methodologies. The Disclosure Guidelines adopted a principles based approach whereby a number of pricing principles were published for distributors to demonstrate compliance with.

At this stage compliance with the Disclosure Guidelines is on a voluntary basis, however the Electricity Authority (the Authority) has indicated their expectation that distributors will be required to disclose under both the Disclosure Guidelines and the Commerce Commission's (the Commission) Disclosure Requirements. The principles adopted by the Authority include:

1. Prices are to signal the economic costs of service provision, by:
    a. being subsidy free (equal to or greater than incremental costs, and less than or equal to standalone costs), except where subsidies arise from compliance with legislation and/or other regulation;
    b. having regard, to the extent practicable, to the level of available service capacity; and
    c. signalling, to the extent practicable, the impact of additional usage on future investment costs.
2. Where prices based on 'efficient' incremental costs would under-recover allowed revenues, the shortfall should be made up by setting prices in a manner that has regard to consumers' demand responsiveness, to the extent practicable.
3. Prices should be responsive to the requirements and circumstances of stakeholders in order to:
    a. discourage uneconomic bypass;
    b. allow negotiation to better reflect the economic value of services and enable stakeholders to make price/quality trade-offs or non-standard arrangements for services; and
    c. where network economics warrant, and to the extent practicable, encourage investment in transmission and distribution alternatives (e.g. distributed generation and demand response) and technology innovation.
4. Development of prices should be transparent, promote price stability and certainty for stakeholders, and changes to prices should have regard to the impact on stakeholders.

5. Development of prices should have regard to the impact of transaction costs on retailers, consumers and other stakeholders and should be economically equivalent across retailers.

In addition to the pricing principles, the Disclosure Guidelines contain guidelines for the disclosure of pricing methodologies. These are similar to the Disclosure Requirements with the addition of the following guidelines:

1. Prices should be based on a well-defined, clearly explained and published methodology;
2. Any revisions to the pricing methodology should be notified and clearly marked;
3. The pricing methodology should demonstrate how the methodology links to the pricing principles;
4. An explanation of the derivation of tariffs charged to each consumer group and the rationale for the tariff design;
5. The pricing methodology should demonstrate pricing arrangements that will be used to share the value of any deferral of investment in distribution and transmission assets, with the investors in alternatives such as distributed generation or load management, where alternatives are predictable and where network economics warrant;
6. The pricing methodology should employ industry standard terminology, where possible;
7. Where a change to the previous pricing methodology is implemented, describe the impact on the consumer groups and the transition arrangements implemented to introduce the new methodology.

A copy of the full Disclosure Guidelines can be found at:

http://www.ea.govt.nz/our-work/programmes/transmission-work/principles-or-model-approaches-to-distribution-pricing/

1.1.3. Default price-quality path regulation

Vector is subject to a Default Price Path pursuant to section 52P of the Commerce Act. The Commerce Act (Electricity Distribution Default Price-Quality Path) Determination 2010 (the Default Price Path) describes the mechanisms by which Vector may adjust prices each year. The requirements of the Default Price Path are such that Vector can only increase prices each year by the Consumer Price Index (CPI) less an X factor, and to allow for changes in:

1. The transmission and new investment charges from Transpower for the national grid,
2. Avoided transmission charges from embedded generators;
3. The charges from the system operator for the control, dispatch and security functions necessary to operate the transmission system;
4. Territorial local authority (city and regional councils) rates on distribution assets;

5. Electricity Authority levies for the regulation and operation of the electricity industry and markets; and
6. Commerce Commission levies for the costs of the Commerce Commission in performing its functions, powers and duties under Part 4 of the Commerce Act 1986.

A copy of the Default Price Path regulations can be found at:

http://www.comcom.govt.nz/2010-2015-default-price-quality-path/

1.1.4. Low fixed charge regulations

In 2004 the government enacted the Electricity (Low Fixed Charge Tariff option for Domestic Consumers) Regulations 2004 (the Low Fixed Charge Regulations).

These Low Fixed Charge Regulations require distributors to offer domestic consumers low fixed charge tariff options of no more than 15 cents per day (excluding GST but after any prompt payment discount is subtracted) so that an average end consumer would pay no more in total per year on the low fixed plan than they would on a standard plan. The low fixed charge tariff options should incorporate the following design features:

1. Domestic consumers consuming less than 8,000kWh, per year must pay less on a low fixed charge tariff option than on any corresponding tariff option (9,000kWh per year for consumers in the lower South Island);
2. The low fixed charge tariff options are to be advertised in the same manner as existing tariffs;
3. The low fixed charge tariff options need only be available for homes where consumers usually reside;
4. Tariffs with tiers below 8,000kWh per year (for example, high c/kWh for the first 2,000kWh per annum) are proscribed.

Compliance with the Low Fixed Charge Regulations is measured both before and after any rebates or discounts. Any rebates or discounts must apply consistently to consumers regardless of whether they are on a low fixed charge option or standard tariff option. A copy of the full the Low Fixed Charge Regulations can be found at:

http://www.legislation.govt.nz/regulation/public/2004/0272/latest/096be8ed803afbba.pdf

1.1.5. Distributed generation regulations

The Electricity Industry Participation Code 2010, Part 6 Connection of distributed generation (the DG Regulations) prescribes the pricing principles that influence Vector's ability to recover costs from distributed generation. The distributed generation pricing principles set out that prices for distributed generators should be based on the incremental costs of connection for each embedded generator.

A copy of the full the DG Regulations can be found at:

http://www.ea.govt.nz/act-code-regs/code-regs/the-code/

1.2. Historical development of prices

Vector recognises the potential impacts of price changes on end consumers. Adverse customer outcomes are generated when there are significant changes to prices, price structures or pricing methodologies. When setting prices each year, Vector measures any new or changed price, price structure or pricing methodologies against the existing approach to understand, and where possible, mitigate the impact on end consumers. This section sets out the significant historical events that have affected Vector's prices in recent years.

1.2.1. Acquisition of UnitedNetworks and revenue rebalancing

In 2002 Vector acquired the Northern and Wellington electricity distribution networks from UnitedNetworks Limited. This purchase included the inheritance of pricing approaches and models for the acquired electricity networks that were substantially different to the methodologies that existed on Vector's Auckland network prior to acquisition.

Following the acquisition, Vector reviewed the pricing methodologies across all regions with a view to consolidating these into a more unified approach based on the cost of service analysis undertaken at that time. At a very early stage in the review process it became apparent that misalignment between the relative cost allocations between regions and segments of end consumers was inherent in the existing price structures.

To resolve the price differentials identified by Vector, a voluntary four year rebalance program commenced in 2005. The rebalance program was designed to align cost allocations, including the allocation of return on capital, between regions and consumer groups whilst reflecting the ongoing refinement of end consumer segmentation approaches and overall cost of service models. A four year period was chosen to avoid creating undue end consumer hardship by implementing a single price change to rebalance revenues.

In May 2008 Vector agreed a more formal process for rebalances with the Commerce Commission (the Commission) to be completed by 31 March 2009 under an administrative settlement. This settlement required Vector to apply a cost of service model in a relatively mechanical fashion, the results of which were used to determine tariffs. The tariff change on 1 April 2008 represented the last step of the rebalancing program under the administrative settlement.

1.2.2. Sale of Wellington and regulated pricing methodologies

Following the completion of revenue rebalancing on 1 April 2008, two significant events have occurred.

1. On 24 July 2008 Vector concluded the sale of the electricity network in the Wellington region to Wellington Electricity Distribution Network Limited, an entity jointly owned by Cheung Kong Infrastructure Holdings Limited and Hong Kong Electric Holdings Limited; and
2. Vector developed new cost allocation and end consumer segmentation models for Vector's Auckland gas distribution business to comply with pricing principles and methodological requirements set out in the

Commerce Act (Vector Natural Gas Services) Authorisation 2008. Subsequently, the Commerce Commission endorsed these same principles in the Input Methodologies for gas pipeline businesses that the Commission determined on 22 December 2010.

When comparing the concepts of the gas pricing methodology developed under the Commission's guidelines with the existing electricity methodology it was apparent that the gas model presented a number of significant and material improvements. In particular the way end consumers were segmented in the gas model enabled a significant portion of costs to be directly attributed rather than allocated. This in turn provides for a more stable set of cost allocations and resultant prices.

1.2.3. Recent developments

On 1 April 2009 Vector implemented a uniform change to electricity tariffs to reflect pass through cost changes and an inflation adjustment as allowed for by electricity price regulation. More extensive changes at this time were not sought to limit the impact of price changes on end-consumers during the economic recession.

In February 2010 the Electricity Commission published the Disclosure Guidelines. The Disclosure Guidelines were produced after consultation with the industry and finalised a principles-based approach to distribution pricing methodologies.

On 1 April 2010, Vector introduced refined cost of service models applying the findings from the electricity rebalance program and the revised gas pricing methodology. The pricing principles under the Disclosure Guidelines further influenced this work for the price change on 1 April 2011. This is discussed more in the following sections of this document.

Section 2: Price setting policy considerations

2.1. Economic, commercial and practical drivers

This section highlights some of the key factors that have influenced the design of Vector's pricing approach. The proposed prices are based on an application of economic pricing principles, given practical, physical and commercial constraints. It is useful to have an understanding of these factors, as it assists in understanding various decisions Vector has reached in establishing its pricing methodology.

2.1.1. Cost recovery and end consumer geography segmentation

There is a substantial core network cost to be recovered. Due to the interconnected nature of the electricity distribution network and the interdependence of the services provided by that network the majority of shared costs and cannot be specifically attributed to particular service classes except at high levels of aggregation.

A key feature of Vector's electricity distribution network is that end consumers from several consumer classes utilise many of the same assets. End consumers are not generally geographically segmented in their use of different network assets. For example, there are in general no purely "industrial zones" or "residential zones". A residential end consumer consuming only 8,000kWh of electricity per year is therefore likely to be using the same network assets as a commercial end consumer consuming 800,000kWh. The GIS-generated diagram of a cross-section representative of both the Auckland and Northern networks included as appendix 1 illustrates this point.

The intermingling of end consumers has significant implications for the development of network prices. It means that there are substantial common costs, so a substantial proportion of the prices paid by end consumers relate to allocated shared costs rather than being directly attributable costs for the provision of a specific service to that end consumer.

2.1.2. The nature of service classes

Another factor that has impacted on the development of the cost allocation approach is the small size of service classes. Of the total end consumer base of approximately 527,000, the majority of end consumers (526,000) fall within a single service class with the remaining 1000 end consumers split across the remaining two service classes. Despite the small numbers of end consumers in some service classes, due to the large size of these end consumers, they represent a significant portion of overall network usage.

The small size of service classes and the inability to completely separate out different assets as being used solely by different end consumers has meant the development of a highly granular cost of service model that directly calculates prices or required revenues for each service class has been impractical. This has been a factor which governs the level of granularity Vector has adopted in its cost of service model.

Vector investigated a number of allocation models that would directly calculate the required prices/revenues for each class. However, the final choice of allocation model has been constrained by the desire to avoid creating inefficient incentives, such as strong artificial signals for end consumers to switch classes to obtain a cheaper price (only for this to be reversed in the following year when the cost of service model would reallocate costs to follow the switched end consumers so they are ultimately no better off). This has informed Vector on the development of service classes and cost of service models to ensure robust approaches are implemented that are not subject to end consumer arbitrage.

2.1.3. Technical limitations on pricing

The majority of end consumers' meters are currently simple and record end consumers' total use over monthly or two-monthly meter-reading cycles. Meters that record time of use or maximum demand readings are used by only a small proportion of end consumers. Vector has to work with the metering technology available to measure end consumers' use. Having end consumer consumption information limited to monthly intervals limits Vector's pricing structures to simple fixed and variable components for the majority of end consumers.

2.1.4. Development of prices requires a level of averaging

There are a myriad of factors that contribute to the overall level of network costs including but not limited to distance, end consumer density, end consumer demand profiles, traffic management conditions, age of the network, and incidence of other utilities in the road (which can cause additional costs of relocating assets). It is not practical to take all of these different cost drivers into account in designing network prices, and, therefore, there is necessarily a degree of averaging in developing prices to recover the overall costs. Reflecting "cost causality" in prices is achieved only to the level considered practical and price design is necessarily limited to reflecting the key cost concepts to manage the overall complexity of prices.

The development of Vector's price structure has accordingly focussed on:

1. Cost reflectivity in the design of service classes;
2. A price structure that creates incentives for retaining and attracting end consumers, including appropriate fixed/variable splits;
3. A design that once implemented will be stable over time.

2.2. Outcomes sought from Vector's pricing policy

Vector's prices are reviewed for their overall consistency with the principles in the Disclosure Guidelines. Considering the economic, commercial and practical constraints in the application of the pricing principles, the pricing outcomes sought from Vector's pricing policies include:

1. Recovery of the revenues Vector is allowed under the Default Price Path;
2. A clear and simple price structure that enhances dynamically efficient use of the existing sunk network by making it attractive to maintain connections and for new end consumers to connect;

3. To ensure that the overall price structure is coherent, so that end consumers are not artificially incentivised to switch service classes to take advantage of anomalies in the pricing structure;
4. To ensure that all end consumers face prices that are cost-reflective and charges to recover the cost of the shared network reflect end consumers' propensity to pay; and
5. To provide pricing stability to end consumers and manage rate shock effectively in the transition to the new price structures.

The Default Price Path is intended to promote improvements in efficiency over time. Vector considers that this applies equally to the development of pricing methodologies. The reality for Vector is that information on end consumer response to prices is highly imperfect. Vector intends to review end consumers' responses to prices, price structures and pricing methodologies and will continue to enhance price design over time.

2.3. Key characteristics of the pricing approach

The price structure implemented on 1 April 2011 commences a transition path to an approach that:

1. Is based on the principles of cost causality. Service classes are defined according to the nature of the network or asset type that the end consumer is connected to. This is based on different costs being incurred for these different types of connection. Within these service classes are a number of price groups based on the capacity of the end consumer's connection and the metering type used by the end consumer.
2. Retains the existing capacity segmentation, e.g. greater than or less than 69kVA, as these provide a mechanism for signalling the economies of scale that are derived and passed on to end consumers as capacity increases. In addition the capacity groups are familiar and well understood by end consumers.
3. Has not departed materially from the existing balance of fixed and variable charges across capacity groups. Vector has retained the high weighting towards variable charges to comply with the Low Fixed Charge Regulations and promote dynamic efficiency in the use of the existing network, although this may be reviewed in subsequent pricing development.

Vector considers that this approach, given the commercial context of the distribution network, results in a set of prices that are clear, simple, meet the pricing principles in a practical manner, meet end consumer expectations, and following the transition period, will be stable over time.

2.3.1. Managing rate shock

Vector is acutely aware that in the present economic climate it may be difficult for end consumers to cope with substantial changes to prices. Accordingly, in setting prices to take effect on 1 April 2011 Vector has adopted a policy of generally restricting price changes for end consumers to a maximum of 10% at the distribution level. While this may seem high, the impact on delivered prices is

considerably smaller (less than 4% in a high proportion of cases), as the distribution component of the end consumer's bill is typically within the range of approximately 40%[1].

As a consequence of this approach, to achieve the desired end-goal for prices while minimising rate shock to end consumers, Vector has had to develop a transitional arrangement to progress prices and service classes towards the preferred model approach.

2.3.2. Treatment of non-standard arrangements

Under certain circumstances Vector's standard distribution charges may not adequately reflect the actual costs of supplying an end consumer or address the commercial risks associated with investing in new assets to supply that end consumer.

In these circumstances Vector uses a non-standard Network Connection and Services Agreement (NCSA). The NCSA allows for tailored pricing and commercial arrangements to be established between Vector and end consumers. This ensures that customised or unusual circumstances are addressed only for those end consumers that they affect.

Vector has developed broad criteria to determine when non-standard criteria may apply including:

1. Non-standard connection agreements are generally only applied to large end consumers.
2. The capacity of the end consumer's point of connection must be greater than or equal to 1MVA.
3. Vector incurs capital expenditure greater than $50,000 establishing or augmenting its network in order to provide network services to the end consumer.

Customers where Vector has alternative contracting arrangements including but not limited to: sub-division construction agreements and existing non-standard arrangements are excluded from the above criteria.

[1] As calculated using data obtained from the Ministry of Economic Development's Quarterly Survey of Domestic Electricity Prices – 15 November 2010

Section 3: Pricing Methodology

This section provides a high level description of the pricing methodology. Further detail is provided in section 4.2, which describes the development of the cost of service model.

3.1. Methodology used to calculate the prices charged

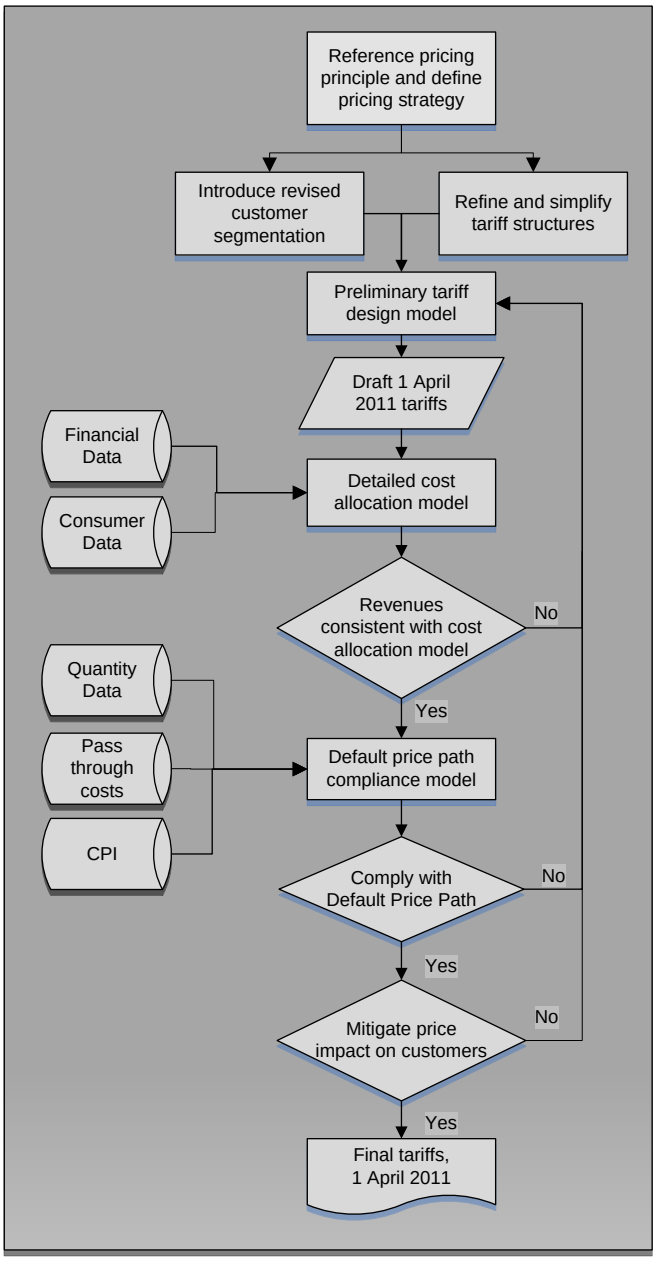
Vector's pricing methodology is based on defined service classes linked to the assets used by each service class (which are the primary source of costs to be recovered). A cost of service model was used to establish the costs directly attributed and allocated to each service class. Having developed this desired end-point for Vector's price structure, Vector then compared the resultant revenues apportioned under the cost of service model with existing revenues and developed a transitional structure and rebalances to ensure that the impact of price reform on end consumers is managed over time.

3.1.1. Process for developing prices

The process for developing prices has been as follows:

1. Reference pricing principles and define pricing strategy in order to comply with these principles;
2. Identify end consumer segmentation approaches that are consistent with the pricing principles and pricing strategy;
3. Incorporate pricing principles, pricing strategy and consumer segmentation approaches into tariff structures. Identify detailed tariff structure initiatives and develop these into draft tariffs. Ensure compliance with other regulatory constraints such as the low fixed charge regulations;
4. Develop cost of service models to incorporate pricing principles and consumer segmentation approaches. Determine the direction and magnitude of relative price changes between each end consumer segment. Ensure tariffs transition in the direction indicated by the cost of service model;
5. Establish quantities and CPI as required under the Default Price Path. Forecast pass through costs including territorial local authority rates, Electricity Authority levies, Commerce Commission levies and transmission costs for the forthcoming year. Ensure tariffs comply with the forecast allowable notional revenue under the Default Price Path; and
6. Ensure overall tariff changes provide for reasonable end consumer outcomes (e.g. mitigating rate shocks where indicated by the cost of service model).

Figure 1: Process used to set prices on 1 April 2011



3.2. Customer segmentation: Rationale, methodology and statistics

Customer segmentation is fundamental to the approach taken by Vector to the allocation of costs and revenues and therefore underpins much of the resulting pricing structure. This section sets out Vector's approach to customer segmentation including the rationale, methodology and statistics relating to each customer segment.

3.2.1. Service class segmentation for cost allocation

As a general proposition, from a "beneficiary pays" perspective, the starting point for determining prices is to directly attribute costs to end consumers/service-

classes as far as practicable. Once this direct attribution has been performed, given the shared nature of the majority of network assets, it then becomes necessary to allocate the remaining common costs or develop some alternative cost-reflective approach to developing prices such that the total costs of the network (directly attributable and shared) can be recovered.

In terms of direct attribution of costs, Vector has identified three service classes of end consumers based on the nature of their connection to the electricity network. The service classes are defined corresponding to the following three different connection-types:

1. **Primary (P) connection type** is where the end consumer is supplied directly from Vector's high voltage or sub-transmission (6.6kV or higher) network (i.e. from A Type assets).
2. **Secondary (S) connection type** is where the end consumer is supplied from a transformer(s) owned by Vector and which supplies the customer's low voltage (400V three phase or 230V single and two phase) network.
3. **Tertiary (T) connection type** is where the end consumer is supplied from Vector's low voltage (400V three phase or 230V single and two phase) network.

3.2.2. Price structure segmentation

Although Vector has identified three connection type segments defined by the way end consumers connect to and utilise Vectors distribution assets for the purposes of cost allocation, Vector's price structure uses five 'pricing type' segments. Using pricing type segments allows Vector to set average prices for each segment rather than a unique price for every end consumer. This provides simpler tariff structures that are easier to understand and reduces the administrative cost of tariff complexity whilst also allowing the tailoring of tariffs to comply with end consumer needs and regulatory requirements, for example the Low Fixed Charge Regulations apply to residential end consumers only. The Pricing type segments include:

1. **Residential (Res) pricing type** is where the end consumer's connection is for a private dwelling, not normally used for any business activity.
2. **Business (Bus) pricing type** is where the end consumer is not a residential end consumer and has a capacity less than or equal to 69kVA. Business end consumers include unmetered connections.
3. **Low voltage (LV) pricing type** is where the end consumer is not a residential end consumer, has a capacity greater than 69kVA and is connected to Vector's low voltage network.
4. **Transformer (TX) pricing type** is where the end consumer is not a residential end consumer, has a capacity greater than 69kVA and receives a supply from transformers owned by Vector dedicated to supplying the end consumers low voltage network.
5. **High voltage (HV) pricing type** is where the end consumer is not a residential end consumer, has a capacity greater than 69kVA and receives a supply from Vector's high voltage network.

Generally each pricing type segment is mutually exclusive, i.e. an end consumer can logically only fit within one segment. Vector determines which of the five pricing type segments an individual consumer is in based on the physical point of connection to the network. The point of connection has been used to determine the segmentation approach because this has a strong correlation to the distribution assets employed to service each end consumer segment. For example high voltage end consumers do not use any of the low voltage networks.

3.2.3. Relationship between connection type and pricing type

There is a high level of alignment between the pricing type segmentation used to establish pricing options and the connection type segmentation used in the cost allocation process. This ensures that cost allocations and outcomes from the allocation process can be translated into specific pricing outcomes. Table 1 below shows the mapping between pricing type and connection type.

Table 1: Relationship between connection type and pricing type segments

Size	**Large (>69kVA)**			**Medium (<=69kVA)**	**Small (Residential)**
Pricing type	HV	TX	LV	Business	Residential
Connection type	P	S	T		

Instances where the mapping described in *Table 1* does not describe the actual relationship between pricing type and connection type are extremely small and generally represent anomalous connections. For example it is possible (although unlikely) for a large residential customer to have an HV connection to Vector's network.

Table 2: Statistics for end consumers, 1 January 2011

Connection Type	**Pricing Type**	**End consumers (#)**	**End consumers (%)**	**Consumption (MWh)**	**Consumption (%)**
Primary	HV	130	0.02%	734,615	8.8%
Secondary	TX	1,230	0.23%	1,560,894	18.8%
Tertiary	LV	3,690	0.70%	1,084,949	13.1%
	Business	57,000	10.76%	1,320,974	15.9%
	Residential	465,000	88.28%	3,609,491	43.4%

3.3. Tariff design

The overall revenue produced by each segment of end consumers within the constraint of the Default Price Path is determined by the cost allocation process. The detailed pricing design that sits beneath each segment of end consumers requires a trade-off between multiple and often competing criteria such as; historical context, commercial and end consumer outcomes, legislative requirements, economic efficiency criteria, stakeholder needs and other practical

implementation issues. The following section describes the detailed tariff changes from 1 April 2011.

3.3.1. 1 April 2011 tariff initiatives

Based on the key pricing outcomes highlighted above and given the nature of revenue rebalances required following the cost allocation process (outlined in Section 4: and Section 5:), for 1 April 2011, Vector focused tariff development on implementing revised customer segmentation and cost allocation approaches and the revenue rebalances that arose as a consequence. In some cases the nature of the revenue rebalances meant there was further scope for other initiatives which have been outlined below.

During 2009, the Electricity Commission commenced work on 'Model Approaches to Distribution Pricing'. During the Electricity Commission's consultation process, retailers expressed a strong preference for distribution tariff structures to be simpler and more consistent across distribution businesses. Accordingly, subject to a need to establish an efficient tariff structure, Vector consulted with stakeholders on initiatives to rationalise its tariff structures. This received positive feedback and Vector adopted the rationalisation initiatives into final tariff structures from 1 April 2011.

3.3.2. Limit on price increases

To limit the impact of price increase on consumers the annual price increase was generally limited to the greater of 10% of the distribution component of tariffs or $50 per year. In some limited instances, particularly where few end consumers are affected, increases may exceed these amounts, for example where closed or grandfathered price options are being moved towards standard price options.

3.3.3. Residential time-of-use (TOU)

The advanced meters currently being installed by some retailers on Vector's networks provide Vector with the ability to send time based price signals to some residential end consumers in times of high and low network congestion. With this in mind Vector introduced residential price plans effective from 1 April 2011 that have differing prices at pre-determined time periods throughout the day. The implementation of residential time based prices signals to consumers the impact of additional usage on future investment costs, and allows end consumers to make informed decisions on when and how they use energy and invest in their own energy efficiency alternatives.

The price structure contains two new time based price plans including a controlled (ARCH and WRCH) and uncontrolled (ARUH and WRUH) option. This ensures the benefits of load control continue to be signalled. The time based price options have three time periods each. The three time periods are:

1. Peak – To apply to consumption measured between 7:30am to 9:30am, and 5:30pm to 7:30pm
2. Shoulder – To apply to consumption measured between 6:00am to 7:30am, 9:30am to 5:30pm, and 7:30pm to 10:00pm

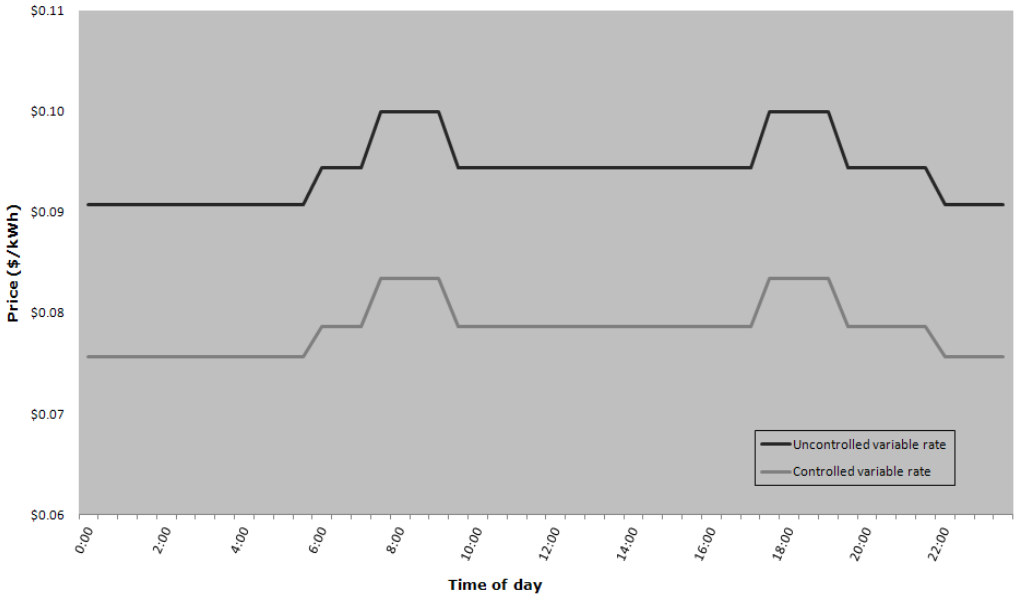
3. Off peak – To apply to consumption measured between 10:00pm and 6:00am.

The peak charges apply only during weekdays where traditionally network loads are higher. At this stage the price differentials between each of the time periods are relatively small reflecting the uncertainty on end consumer uptake of this price option, their responsiveness to the price signal and Vector's ability to only respond to these customer outcomes once every year.

It is intended that the features of the time of use plans such as the tariff differentials will be reviewed in future years as information on end consumer behaviour under the time of use tariffs becomes available and the effects of the price signals are observed.

In order to provide genuine end consumer choice, the new residential TOU price plans are opt in, i.e. end consumers will automatically remain on their existing price option unless their retailer requests to move them to one of the new time based tariff options. Only end consumers with an advanced meter capable of measuring half hourly data are eligible for the new time based tariff option.

Figure 2: Auckland Residential Weekday TOU Variable Prices



3.3.4. Other residential price changes

Vector has closed the existing residential night rate option to new end consumers. The existing night rate option only applies to load permanently wired to a separate night timer controlled meter. This historical option is currently used by a small number of end consumers with night storage heaters. The extremely low uptake, the revised time based variable tariffs and the advent of highly efficient heating alternatives such as heat pumps mitigates the effect of this price change on end consumers. Over time the closed night rate will be transitioned to the appropriate standard variable rate.

3.3.5. Merger of business price plans

From 1 April 2010 Vector offers two price plans for business end consumers in each network. The first price plan is for business end consumers with a capacity less than or equal to 15kVA whilst the second is applicable to business end consumers with a capacity greater than 15kVA and less than or equal to 69kVA.

Under the price structure from 1 April 2011, the two business price options on each network have been amalgamated into a single price option for capacities less than or equal to 69kVA. The general effect will be for small increases or decreases depending on which price option the end consumer is on in order to amalgamate the options. As a result of the merger of the price plans no business end consumers will experience increases greater than 10%, unless the annual effect of the increases is less than $50.

3.3.6. Unmetered price structures

From 1 April 2010 Vector applies two different pricing approaches to unmetered supplies across the Auckland and Northern networks. Auckland end consumers are charged on a $/day/fitting basis and Northern end consumers are charged on a $/kWh basis.

With the six local councils covered by Vector's networks amalgamating into the new Auckland Council, the Auckland Council will be the largest customer for unmetered services across both networks. With this in mind Vector believes a consistent pricing approach across network geographies would create greater transparency in this segment.

From 1 April 2011, new unmetered price plans (ABSU and WBSU) have been proposed with both fixed and variable charges. Prices continue to differ across the networks reflecting the different cost of service in each network; however the pricing methodology is aligned.

3.3.7. Closed >69kVA pricing plans

Vector's 2010 price structure has three pricing plans across both networks that are closed to new end consumers. These groups (ALVC, WLVC, & WTXC pricing plans) were effective from 1 April 2010 to address customer rate shock concerns with the merging of non half-hourly pricing plans.

The longer term strategy for the closed price plans is to transition these towards alternative standard published tariffs. At this stage Vector does not believe it can transfer end consumers on these closed groups to the applicable standard pricing plan without significant impacts on end consumers. As a consequence these pricing plans continue to apply for the 2011/12 pricing year however have been adjusted consistent with the limits on price changes described above.

3.4. Method and rationale for fixed and variable rates

There are many factors which determine the proportion of fixed and variable charges within each connection type segment. These usually differ between segments as relevant factors such as consumer preferences, quantities, asset deployment, historical pricing, regulatory requirements and service levels differ

for each segment. This section sets out the rationale and statistics Vector has adopted for determining the proportion of charges which are fixed or variable.

3.4.1. Residential

The fixed charge for this pricing type segment has been constrained by regulation in that the Low Fixed Charge Regulations require that electricity distributors provide a residential tariff option that contains a fixed charge of no more than 15cents/day and a variable charge that is cheaper than any alternative options up to 8000kWh (on Vector's networks). For administrative simplicity Vector has only implemented residential tariffs that have a standard fixed charge of less than or equal to 15cents/day. The Low Fixed Charge Regulations have therefore determined the proportion of the fixed and variable charges for this pricing type segment.

3.4.2. All other price categories

Generally as the connection size of the end consumer increases the fixed component of revenue also increases. This reflects the risk-investment relationship required for larger and more costly assets. For example, Vector is required to invest more to serve a larger end consumer compared with a smaller end consumer. Greater fixed portion of charges with increasing end consumer size tends to meet end consumer requirements where larger end consumers wish to fix their operating costs whereas smaller end consumers generally desire costs that reflect usage. Despite this, the existing fixed/variable proportions are largely determined by historical pricing methodologies and vary by region.

3.4.3. Statistics for each pricing type

Table 3 shows the forecast proportion of fixed and variable revenue for each pricing type segment and region based on 1 April 2011 prices.

Table 3: Fixed/variable proportions (forecast for the pricing year)

	Auckland		Northern	
Pricing Type	**Fixed (%)**	**Variable (%)**	**Fixed (%)**	**Variable (%)**
Residential	9%	91%	7%	93%
Business	11%	89%	21%	79%
Low voltage	16%	84%	21%	79%
Transformer	12%	88%	21%	79%
High voltage	8%	92%	11%	89%
Non-standard	100%	0%	100%	0%

Section 4: Cost Allocation

Whilst prices are set within the constraints of the Default Price Path, Vector uses a cost of service model to determine the prices charged to each segment of end consumers each year. The cost of service model allocates costs shared by many end consumers to each connection type based on logical rules and processes.

Whilst Vector has used and applied cost of service models to set prices in the past, the sale of the Wellington network, the establishment of cost of service models and principles in Vector's gas distribution business, the experience gained through Vector's rebalance process on the electricity distribution networks and the publication of pricing principle guidelines by the Electricity Authority has led Vector to refine the cost allocation approaches used in its electricity distribution business. The new approaches are described in the following section.

4.1. Network cost structures

Where end consumers share assets it is not practical to establish a direct relationship between each end consumer's use of those shared assets and the costs of the asset. Accordingly, costs must be allocated to end consumers rather than directly attributed.

As described in section 3.2.1 Vector uses a segmentation approach to establish groups of end consumers with similar attributes and use of assets for the purposes of cost allocation. In order to identify assets to be allocated to each connection type Vector reviewed its network assets in an attempt to classify them into logical segments aligned to the connection type segmentation approach. This process identified three distinct classes of assets that are used to different extents by end consumers in each connection type. The asset types are defined corresponding to the following three different ownership apportionments:

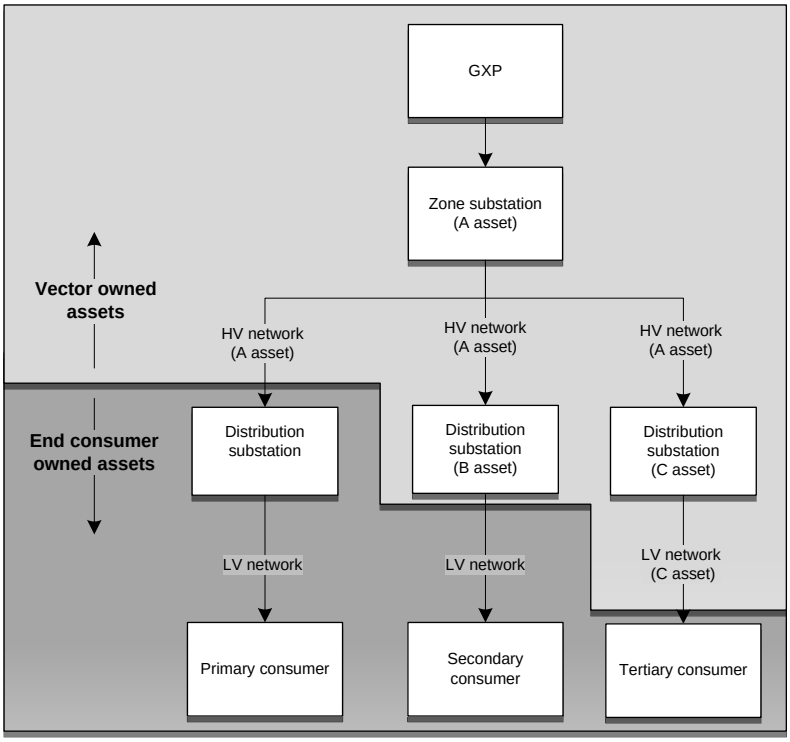
1. **A asset types** are all high voltage lines and cables, zone substation and sub-transmission assets.
2. **B asset types** are platforms (distribution substations) that have no Vector owned low voltage lines or cables leaving, excluding platforms that supply only Tertiary end consumers.
3. **C asset types** are all low voltage assets. Platforms (distribution substations) that have Vector owned low voltage lines or Vector platforms that supply multiple end consumers connected at low voltage.

Vector selected these asset types to reflect the actual costs of connecting customers to various points on the distribution network. The use of voltage to segment assets reflects that there are different costs associated with supplying differing network configurations, particularly at differing voltages. This asset type classification provides end consumers real choice when determining whether to invest in the assets required to supply electricity to them, for example the ownership of their dedicated distribution transformer.

The segmentation approach creates a high level of alignment between Vectors' customer segmentation approach and asset segmentation approach. The way in

which both assets and customers have been segmented allows for a high incidence of cost attribution. This means under Vector's cost of service model used for the cost allocation process, low voltage assets are not allocated to high voltage end consumers. This is illustrated diagrammatically in Figure 3 below.

Figure 3: Electricity network diagram



4.2. Description of the cost of service model

Vector's experience in aligning prices with those indicated by a cost of service model (COSM) has provided the basis for the development of the electricity cost of service and segmentation approaches. Two of the key drivers that have resulted from this process are:

1. Wherever possible ensuring a strong relationship between cost causality and the establishment of service classes so that costs can be directly attributed rather than allocated; and
2. The need to develop a coherent and linear structure of prices.

In this section Vector describes in detail how the COSM operates.

4.2.1. Operation

The structure and treatments within Vector's electricity network COSM are largely based on the COSM developed for use in the Auckland gas network. This link between COSMs ensures the cost allocation principles and treatments already established with the Commission have been reinforced across Vectors distribution businesses.

A key output of the COSM is the price relativities between service classes i.e.; the percentage of revenues required from each class. These relativities inform the direction and extent to which actual revenues per customer category need to move. Vector has adopted this approach because Vector's total revenue is stipulated at the aggregate level by the Default Price Path. The best way to accommodate this within a cost of service framework is to determine the relative proportions of the revenue requirement to be recovered from end consumers. Effectively this approach scales the cost allocations from the COSM to the weighted average price cap allowable revenues.

The COSM apportions existing costs into Primary, Secondary and Tertiary service classes using specified allocators. This in turn determines the revenue percentage for each class. Vector has designed its COSM to provide for a high degree of pricing stability for end consumers over time. In particular, although the model includes forward-looking input information this will not be updated annually. To do so would lead to unnecessary pricing volatility as year on year variations in inputs (e.g. changing volume due to weather variations) result in similar variations in output prices. Vector intends to review the best approach to updating the COSM in the future to ensure annual updating of inputs doesn't induce significant model-induced volatility in prices.

4.2.2. Data sources

The COSM uses data from a number of sources. In general the data set used within the COSM is sourced from Vector's disclosure statements under the Electricity Distribution (Information Disclosure Requirements) 2008. However the information required by the COSM is often required at a more disaggregated level. In these cases Vector reports information from its corporate systems to disaggregate the information disclosure information.

4.2.3. Allocators

The process of allocating shared or common costs to customer segments requires the adoption of suitable allocators. The complex nature of electricity distribution networks, data limitations and the broad nature of customer behaviours mean that it is not always possible to select allocators that perfectly reflect cost incidence. In most cases some form of judgement is required to trade-off the outcomes produced by the various allocators available. The descriptions below reflect the allocators Vector has adopted in its cost of service model to set tariffs from 1 April 2011. As appropriate, Vector may review allocators in future to ensure the cost allocation process delivers rational outcomes that meet the pricing principles.

With a view to adopting a cost allocation approach that reflects cost drivers, Vector has identified the most significant driver of network costs as end consumer peak demand. This is explained more fully in Vector's asset management plan.

In order to measure end consumer peak demand TOU metering is required. At this time only a small portion of end consumers have this type of metering, or where they do Vector is not provided with meaningful end consumer TOU demand information. It is possible to infer demand for each connection type based on a number of assumptions, however in practice Vector has found this process is

highly volatile and the results are unreliable. As a consequence usable demand information for end consumers on the electricity network are limited such that Vector cannot allocate costs based on demand, and has had to develop alternative methods to allocate group information to service classes.

Vector has identified eight further potential allocators to be applied to the COSM cost categories. These allocators were identified based on the presence of meaningful and or reliable allocation information. Table 4 shows the allocators available for the COSM, a description of each allocator and how the connection type percentage for each allocator is derived.

Table 4: Description of allocators used in COSM

Allocator	Description	Formula
ICP	Percentage of the number of end consumers within each connection type.	$ICP_{CT}\% = ICP_{CT}/ICP_{Total}$
kWh	Percentage of the volume of electricity consumed by end consumers within each connection type.	$kWh_{CT}\% = kWh_{CT}/kWh_{Total}$
kW	Ratio of the total electricity demand of end consumers within each connection type at the time of system peaks.	$kW_{CT}\% = kW_{CT}/kW_{Total}$
Revenue	Ratio of the line charge revenue received from end consumers within each connection type.	$\$_{CT}\% = \$_{CT}/\$_{Total}$
kWh & ICP	Weighted average of ICP and kWh allocators. A weighting of 50% for ICP and 50% kWh has been adopted to provide a uniform weighting to each of the inputs.	$kWhICP_{CT}\% = ICP_{CT}\% * W + kWh_{CT} * (1 - W)$ where $W = Weighting\ Factor$
kW * DIST	Ratio of the electricity demand multiplied by the average network length used by end consumers within each connection type.	$kWDist_{CT}\% = \frac{kW_{CT} * KM_{CT}}{kW_P * KM_P + kW_T * KM_T + kW_S * KM_S}$

Assets	Ratio of the value of network assets used by end consumers within each connection type. Three asset types are defined in the Vector regulatory valuation i.e. A, B and C types. A type assets are shared by all three connection types and are allocated by means of the "kW*DIST" allocator to each connection type. B type assets are solely used by the "secondary" connection type and C type assets are solely used by the "tertiary" connection type.	$Assets_P = kWDist_P\% * AssetValue_A$ $Assets_S = kWDist_S\% * AssetValue_A + AssetValue_B$ $Assets_T = kWDist_T\% * AssetValue_A + AssetValue_C$
EBIT	Ratio of the total EBIT value of end consumers within each connection type.	$EBIT_{CT} = \frac{EBIT_{CT}}{EBIT_{Total}}$
Subscript: CT = Connection type, P = Primary, S = Secondary, T = Tertiary, A = A asset types, B = B asset types, C = C asset types		

The allocator most appropriate to each cost category has been selected; for example with the strongest relationship to cost causation. Of the eight potential allocators identified by Vector, only five have been used in the actual allocation process (kW, kWh & ICP, kW * Dist, Assets and EBIT). The six allocation methods are shown in a percentage format in Table 5 and Table 6 below. These percentages can be applied to the group total to obtain the connection type values for each cost category.

Table 5: Auckland allocation methods and weightings by connection-type

Allocator	Primary	Secondary	Tertiary
kW	16%	16%	68%
kWh & ICP	9%	9%	82%
kW * DIST	15%	15%	70%
Assets	10%	13%	78%
EBIT	5%	10%	85%

Table 6: Northern allocation methods and weightings by connection-type

Allocator	Primary	Secondary	Tertiary
kW	3%	10%	87%
kWh & ICP	3%	8%	89%
kW * DIST	3%	8%	89%
Assets	2%	6%	92%
EBIT	1%	3%	96%

Table 7 outlines each COSM cost category and the allocator Vector has used to allocate that cost into each connection type, and the rationale for choosing that allocator. Only the material costs have been shown in this table.

Table 7: Method of cost allocation

COSM Cost Category	Allocator Used in COSM	Rationale
A assets	kW * DIST	A assets have been apportioned based on end consumer demand and distance. These inputs have been used as they determine the size and length of distribution cable or line to install and hence determine the overall cost.
Return on investment (cost of capital)	Assets	The return on investment has been apportioned relative the denominator (assets) in order to produce an uniform return outcome.
Depreciation – System Fixed Assets	Assets	The depreciation of system fixed assets will be approximately in proportion to the asset value for each connection type.
Non system fixed asset cost and depreciation on non system fixed assets.	kWh and ICP	Non system fixed assets are those assets employed to assist staff to perform their jobs, and are very difficult to be attributed to any particular connection type. Common examples of non system fixed assets are vehicles and office furniture. A kWh and ICP matrix was chosen to not unfairly allocate these costs to any one connection type over another.
Maintenance and system management and operations	Assets	The predominant costs here relates to asset maintenance. There is a strong relationship between maintenance costs and the value of network assets. To reflect this relationship Vector has adopted asset value to allocate these costs.
Indirect & Other Costs	kWh and ICP	Indirect costs tend to be items such as personnel costs, professional expenses, computer, administrative and property expenses. Similar to non system fixed assets these costs are difficult to attribute to individual or groups of end consumers. A kWh and ICP matrix was chosen to not unfairly allocate these costs to any one connection type over another.
Pass-through Costs	kW	Pass through costs are predominantly transmission costs (levied by Transpower), and governmental

		and regulatory levies. As transmission costs are predominantly levied based on Vector's network peaks, network peak demand was used as an allocator.
Revaluations	Assets	Revaluations arise directly from the indexation of system-fixed assets. Asset value has been used to apportion this cost due to the direct relationship with the cost causality and the allocator.
Capital Expenditure	Assets	Capital expenditure is most commonly associated with the extension or replacement of network assets. Extensions of the network are most likely to occur in line with the current proportions of ODV.
Revaluation and working capital	Assets	These costs either relate directly to the value of assets or are proportional to new assets deployed.
Regulatory Tax	EBIT	Tax is directly related to profit. Vector has allocated regulatory tax on the basis of EBIT.
Customer Contribution	Assets	Vector receives capital contributions from end consumers to meet the costs of connection in circumstances where costs are atypically large (e.g. lengthy distance from the mains or through volcanic rock). As end consumer contributions are payments for extending the network, which increases the system fixed asset pool, Asset value has been adopted as the allocator of these costs.

Section 5: Revenue rebalancing

5.1.1. Determining existing return by connection type

Under the Default Price Path Regulations, the COSM uses actual line revenues as determined under the price path, less allocated costs, to determine what the consequential return is, both in aggregate, at a regional level and for each connection type.

The results of the allocation of key cost components within the COSM such as; depreciation, operations and maintenance, administration, transmission charges allocated to a regional level based on the allocators described in 4.2.3 and the consequential return on investment are set out in Table 8 below.

Table 8: Cost components used in Vector's cost of service model

Component	Units	Auckland	Northern
Transmission charges	$000	95,934	48,787
Maintenance and operations	$000	23,423	19,512
Administration	$000	29,971	17,409
Depreciation	$000	53,541	32,616
Tax	$000	45,545	21,624
Return on investment	$000	118,250	63,206
Asset value	$000	1,423,149	765,526

The regional aggregate level cost information from Table 8 has been further disaggregated into connection type information for each region in Table 9 and Table 10 below.

Table 9: Cost allocation relating to Auckland connection types (for prices from 1 April 2011)

Component	Units	Primary	Secondary	Tertiary
Transmission charges	$000	15,741	15,108	65,085
Maintenance & operations	$000	2,292	2,938	18,193
Administration	$000	2,578	2,807	24,586
Depreciation	$000	5,192	6,607	41,622
Tax	$000	2,236	4,385	38,924
Return on investment	$000	5,805	11,386	101,059
Asset value	$000	139,118	178,166	1,105,865

Table 10: Cost allocation relating to Northern connection types (for prices from 1 April 2011)

Component	Units	Primary	Secondary	Tertiary
Transmission charges	$000	1,546	4,757	42,484
Maintenance & operations	$000	346	1,217	17,948
Administration	$000	515	1,353	15,540
Depreciation	$000	632	2,104	29,880
Tax	$000	278	577	20,770
Return on investment	$000	812	1,686	60,708
Asset value	$000	13,765	47,995	703,766

5.1.2. Determining target returns by connection type

In addition to calculating the actual return by connection type, the COSM also calculates the target returns by connection type. These target returns are determined by allocating the aggregate consequential return (as determined under 5.1.1) to each connection type in a uniform fashion. In this manner the revenues from each connection type required to deliver uniform returns can be determined.

In practice the only difference between the 'actual return' COSM described in 5.1.1 and the 'target return' COSM described above are the revenues by connection type. On this basis it is simpler to consider the different return outcomes generated by the different COSMs in terms of revenue relativities.

Vector uses the differences (if any) in the revenue relativities to inform directional price changes. This ensures that connection type relativities are aligned over time within the bounds of an acceptable range and within the constraints of the Default Price Path.

In addition to the allocated financial information presented in the previous section, Vector has expressed actual, forecast and COSM revenues by connection type as a percentage of total revenue. The use of percentages allows direct comparison of revenue relativities irrespective of the total revenue which changes year-on-year as allowed for under the Default Price Path.

This information provides meaningful context on the way in which the COSM has been applied to determine prices. These relativities are shown in Table 11 and Table 12 below.

Table 11: Auckland revenue weighting by connection type

Connection Type	Pricing Year (ending)		COSM
	2011 actual	2012 forecast	
Primary	9.2%	9.4%	10.9%
Secondary	11.8%	12.2%	12.8%
Tertiary	79.0%	78.4%	76.3%
Total	100.0%	100.0%	100.0%

Table 12: Northern revenue weighting by connection type

Connection Type	Pricing Year (ending)		COSM
	2011 actual	2012 forecast	
Primary	2.0%	2.2%	2.2%
Secondary	5.7%	6.2%	6.9%
Tertiary	92.2%	91.7%	90.9%
Total	100.0%	100.0%	100.0%

The introduction of new cost allocation processes and end consumer segmentation approaches means the relativities between consumer groups fall outside the outcomes indicated from the COSM. This is because of the limitations placed on annual price changes in order to avoid undue end consumer hardship through significant price changes and to meet the price principle requirement to have regard to end consumer impacts.

It is Vector's current expectation that revenue relativities will materially comply with the COSM allocation following the 1 April 2012 price change. As end consumer responses to price changes are not well-understood this phased approach will allow Vector to monitor the impact of changes over time, and for retailers and end consumers to provide their input for future price changes.

Section 6: Compliance with pricing principles

This section demonstrates how Vector has shown regard for and consistency with the Electricity Authority Pricing Principles in developing its pricing methodology.

6.1.1. Subsidy free range

Pricing Principle (a) i in the Electricity Authority guidelines states that:

> "Prices are to signal the economic costs of service provision, by being subsidy free (equal to or greater than incremental costs, and less than or equal to standalone costs), except where subsidies arise from compliance with legislation and/or other regulation;"

That is, a certain price for a service will be subsidy free if it falls within the following range:

Incremental Cost ("IC") ≤ Price ≥ Stand Alone Cost ("SAC")

Vector agrees that it is economically and commercially desirable for charges to be subsidy-free. If prices are above the stand alone cost then the customer would be better off providing the service themselves and if prices are below the incremental cost of providing the service then Vector would either make a loss on each new end consumer taking that service or other end consumers will, by definition, be paying more than would otherwise be necessary.

Vector has found that developing quantitative estimates of the subsidy-free range is extremely difficult, particularly for estimating stand-alone costs. To accurately estimate standalone costs it would be necessary to develop a separate ODV for each service class, which is an extensive undertaking. The reality of being under the constraint of a weighted average price cap, the substantial nature of the shared network that must be recovered, and the small size of incremental costs of connecting end consumers into the network, means that it would be an extremely perverse price structure for prices to fall outside of the subsidy-free range.

As an alternative to developing detailed models describing both the stand alone and incremental costs for each service class, at a principled level Vector believes it is possible to qualitatively demonstrate compliance with the subsidy free range through the nature of the cost allocation approach that Vector has adopted.

Vector's cost allocation approach allocates the *actual* costs of supplying network distribution services. Actual costs reflect the economies of scale that exists in the deployment of large scale network infrastructure assets, have had assets optimised under the ODV valuation approach to mimic the efficient deployment of assets and allow for sharing of network assets and indirect costs amongst multiple users. The use of complete actual costs at the aggregated level to

determine prices means that prices must be greater than the incremental cost which only considers the cost of the next incremental unit. Similarly at the aggregate level the use of actual costs that include significant sharing of network assets, diversity of customer demand, and economies of scale (that do not exist under the stand alone approach) must be less than the stand alone approach. At the aggregate level costs will inherently fall within the incremental – stand alone cost band.

The segmentation approach that Vector has employed means that connection types are not allocated assets they do not use, i.e. the Primary connection type is not allocated any of the C Asset type (low voltage) assets. As a consequence each connection type is only allocated a proportional share of assets used to supply them electricity. This allocation continues to reflect the significant sharing of network assets, diversity of customer demand, and economies of scale inherent at the aggregate level and includes a more fulsome consideration of costs compared with the incremental approach. The allocation approach means that prices for each connection type reflect the actual costs (including both allocated and directly attributed) of supplying network distribution services and inherently fall within the subsidy free band.

In future Vector intends on developing more detailed estimates of the stand alone and incremental cost bands for each connection type so as to be able to quantitatively demonstrate compliance with the subsidy free range. However in the interim, through its cost allocation approach, Vector is confident that prices will reflect the actual costs of providing distribution services governed by the Commission's input methodology process and hence inherently will fall somewhere within the subsidy free range.

6.1.2. Level of available service capacity

Pricing Principle (a) ii in the Electricity Authority guidelines states that:

> "Prices are to signal the economic costs of service provision, by having regard, to the extent practicable, to the level of available service capacity;"

Vector generally contracts with end consumers on its distribution Networks indirectly through electricity retailers. This gives retailers the potential to repackage Vector's prices as they see fit, meaning it is not necessarily the case that price signals inherent in Vector's prices make their way through to end consumers.

In any event, electricity distribution prices excluding transmission costs make up approximately 30% of the average end consumer's bill[2], so any price signal at the distribution level will tend to be overwhelmed by retailer energy charges.

Notwithstanding the signalling issues that exist within the supply chain arrangements, Vector has met this requirement by segmenting end consumers into pricing types within the Primary, Secondary, and Tertiary service classes. Prices in each group are determined in accordance with the principle that, as capacity requirements increase, end consumers should pay higher charges, but

[2] As calculated using data obtained from the Ministry of Economic Development's Quarterly Survey of Domestic Electricity Prices – 15 November 2010

the rate of increases in charges should be declining, reflecting that there are economies of scale in the provision of additional network capacity.

Vector offers controlled load prices to residential end consumers for the ability to remotely switch off the electricity supply of end consumers' hot water cylinders. To depress the effects of system peaks, Vector will turn off the hot water supply for those end consumers that choose to have a controlled supply. To compensate end consumers with controlled supplies, Vector charges a lower variable price to controlled end consumers than end consumers without any controlled load.

Vector also offers time of use (TOU) pricing for residential end consumers that applies higher prices at times of typical peak network demand. This provides incentives to end consumers to shift demand away from these peak periods.

The method for determining the prices in each service class and the relativities between service classes is discussed in more detail in Section 3.2 and 4.2.3.

6.1.3. The impact of additional usage on future investment costs

Pricing Principle (a) iii in the Electricity Authority guidelines states that:

> "Prices are to signal the economic costs of service provision, by signalling, to the extent practicable, the impact of additional usage on future investment costs."

The extent of capacity usage is measured by the network peak-demand over the capacity for a particular network segment. The best pricing structure to signal capacity usage and potential future investment is through a price related to the end consumer's demand during the peak-demand period on the network (where network demand is the highest). For large end consumers with TOU meters, the majority of end consumers' costs due to Vector's charges are through the demand charge. This signals the benefits of avoiding consumption in peak periods to these end consumers. As mentioned above Vector also controls peak consumption through ripple control of hot water for the vast majority of residential end consumers.

For end consumers without TOU metering, or controlled hot water, Vector is not able to provide signals to reduce peak consumption. Typically these will either be residential end consumers who have gas hot water (eliminating Vector's ability to control load), or business end consumers for whom the cost outlay (for the end consumer) of a TOU meter is not warranted.

Notwithstanding the inconsistencies in Vector's ability to signal the impact of additional usage on future investment costs, the segmentation of end consumers into pricing types and the differences in charges between types provides a signal on the additional cost of utilising network distribution assets. The use of variable prices (for non-TOU end consumers) to the extent that such a signal can be tailored also sends a dynamic pricing signal on the increased costs of increased network usage.

For large end consumers, Vector has established a standardised methodology for determining non-standard charges. This approach signals that for these very large end consumers, additional capacity leads to higher prices for these end consumers.

Vector intends on further development of pricing structures to enhance and align the signalling of increased usage during periods of times of constraint on network costs.

6.1.4. Ramsey pricing

Pricing Principle (b) in the Electricity Authority guidelines states that:

> "Where prices based on 'efficient' incremental costs would under-recover allowed revenues, the shortfall should be made up by setting prices in a manner that has regard to consumers' demand responsiveness, to the extent practicable."

Vector interprets this Pricing Principle as the economic principle of Ramsey pricing. That is, for a natural monopoly, pricing at marginal costs will result in the company making a loss as the marginal costs of sunk distribution network assets is low and insufficient to cover total costs. Ramsey pricing suggests that companies should recover average costs but the additional cost allocation over marginal costs for each service class should be proportionally inverse to the price elasticity of demand for that end consumer. That is, end consumers with lower price-elasticity of demand (a given price increase will result in a relatively small decrease in usage) should have a proportionally higher price additional cost allocation over their marginal costs.

In practice, Ramsey pricing is only ever used to provide guidance in the development of prices and price structures, as price elasticities for different end consumers are generally not observable. Ramsey pricing also requires an ability to segment end consumers by their characteristics. For example, a movie theatre can distinguish children from adults from students from retired people by time of day/week. Prices can be set to reflect differences in willingness to pay between these groups. It is difficult for a network owner (particularly under interposed arrangements with retailers) to carry out such segmentation, except in differentiating major end consumer classes such as "residential" or on a case-by-case basis with large end consumers where the transaction costs of developing non-standard arrangements are small in relation to the value of the network service.

Ramsey pricing principles have also influenced the balance of revenues to be recovered between fixed and variable charges. By weighting charges towards variable charges, particularly for smaller end consumers, this is an effective means of discriminating between differences in end consumers' willingness to pay when it is unknown what elasticity each end consumer-type has.

6.1.5. Discouraging uneconomic bypass

Pricing Principle (c) i in the Electricity Authority guidelines states that:

> "Provided that prices satisfy (a) above, prices should be responsive to the requirements and circumstances of stakeholders in order to discourage uneconomic bypass;"

This principle requires that prices should not be so high for any end consumer that it becomes economic for a competitor to supply that end consumer using an

alternative network supply. This principle is based on the rationale that it is not economically efficient to replicate sunk assets.

Vector seeks to address this principle through two measures: ensuring prices are cost reflective as a result of the cost allocation process so that end consumers at a connection type level are faced with the true economic cost of service provision and by using tailored non-standard pricing for individual end consumers. Vector can use non-standard pricing to provide pricing that reflects the true cost and consequently by-pass risk from an alternative network operator for an individual end consumer. The by-pass risk would typically be high for large end consumers located in close proximity to a Transpower grid exit point (GXP). Non-standard pricing allows Vector to analyse each site on a case-by-case basis where all end consumer specific factors can be taken into account.

6.1.6. Pricing to reflect the value of services

Pricing Principle (c) ii in the Electricity Authority guidelines states that:

> "Provided that prices satisfy (a) above, prices should be responsive to the requirements and circumstances of stakeholders in order to allow negotiation to better reflect the economic value of services and enable stakeholders to make price/quality trade-offs or non-standard arrangements for services;"

Vector considers that the best way to allow end consumers to negotiate differing levels of economic value from a service is through non-standard contracts. Large end consumers are able to negotiate with Vector for different terms and conditions as long as it is commercially viable and possible for Vector to provide the service.

Typical examples of end consumers negotiating to realise economic value of different specific service include reinforcement of the network to allow for greater capacity and the installation and management of specialist equipment and connections. Contracts have been negotiated on non-standard pricing structures to allow end consumers to manage their risk, including adjustment in prices to allow for atypical demand loads (e.g. seasonal use patterns) or a preference for pricing that is largely, if not wholly, fixed.

In addition Vector's standard pricing approach contains differing prices for different points of connection to the network (i.e. for each connection type). This structure allows end consumers to determine the appropriate level of investment and ownership on their part for their connection assets to achieve a given distribution cost outcome.

6.1.7. Transmission and distribution alternatives

Pricing Principle (c) iii in the Electricity Authority guidelines states that:

> "...prices should be responsive to the requirements and circumstances of stakeholders in order to, where network economics warrant, and to the extent practicable, encourage investment in transmission and distribution alternatives (e.g.

> distributed generation and demand response) and technology innovation."

Consistent with the DG Regulations, Vector only charges distributed generators the incremental costs of connecting to Vector's network.

Vector has drafted an Avoided Cost of Transmission (ACOT) policy which outlines the methodology by which end consumers who supply distributed generation services on Vector's networks are provided the benefit of Vector's avoidance of transmission costs. This policy is pending internal approval.

Vector has set its prices, and specifically a high variable to fixed charge apportionment, in a way to provide end consumers an incentive to invest in technology alternatives, for example solar PV panels, with the goal of decreasing their usage and therefore the variable cost component of the consumers' charges.

6.1.8. Regard to the impact on end consumers

Pricing Principle (d) in the Electricity Authority guidelines states that:

> "Development of prices should be transparent, promote price stability and certainty for stakeholders, and changes to prices should have regard to the impact on stakeholders."

Prior to making price changes each year, Vector undertakes consultation with all retailers on its network. This allows for price structures to be independently tested and feedback on proposed changes to be incorporated into pricing design. Following the establishment of prices, Vector engages with key stakeholders such as the Major Electricity Users Group, the Domestic Energy Users Network, Grey Power Federation, and the Employers and Manufacturers Association. This engagement allows for information on prices changes to be disseminated to end consumers.

As mentioned in Section 2.3.1 Vector has implemented a transition plan for end consumers. This transition plan mitigates rate shock to end consumers, which is particularly important in the current economic conditions. The need to manage rate shock has created the need for a transition structure that Vector expects will be completed in the 1 April 2012 price change.

In summary, the development of Vector's prices has been heavily influenced by current economic circumstances and the need to manage end consumers' exposure to rate shock. Vector has promoted price stability and certainty for end consumers in our pricing decision in the following ways:

1. Non-standard contracts are fixed for set terms and price changes are usually based on pre-defined escalators.
2. The approach to developing prices for connection types ensures a degree of pricing stability by moving away from mechanical cost allocation approach subject to significant price volatility particularly for service classes with few end consumers.
3. Simplification of price structures over time.

6.1.9. Regard to transaction costs for stakeholders

Pricing Principle (e) in the Electricity Authority guidelines states that:

> "Development of prices should have regard to the impact of transaction costs on retailers, consumers and other stakeholders and should be economically equivalent across retailers."

In recent years Vector has taken active steps in simplifying its distribution price structure so that the transaction costs on retailers, end consumers, and Vector itself are minimised.

Vector offers retailers the opportunity to comment on its proposed price structures for each pricing year. This provides an opportunity for all retailers to identify any proposals that would increase transaction costs, and provides Vector the opportunity the address any concerns retailers may have.

Vector offers the same network pricing to all end consumers irrespective of which retailer they use i.e. Vector's does not provide any discounts or special terms to end consumers who are supplied by a particular retailer. The non-differentiation of network charges is enshrined in the use of systems agreements that Vector has with retailers operating on Vector's network.

Appendix 1: Overlay of end consumers for a cross section representative of both the Auckland and Northern networks.