Commerce Act (Electricity Distribution Thresholds) Notice 2004

Threshold Compliance Statement

Section 2 - Quality Threshold

19 May 2008

Quality threshold assessment as at 31 March 2008

CONTENTS

EXECUTIVE SUMMARY

Introduction

1 This part of Vector's compliance statement relates to the two criteria of the quality threshold: reliability and consumer engagement.

2 This executive summary is only provided to give a general overview and, therefore, by necessity, does not contain all relevant information related to Vector's performance against the quality threshold. Vector's compliance against the threshold should be assessed on the basis of this complete document, including all supporting information.

Reliability Criterion

3 Lines businesses are required to demonstrate that their system average interruption duration index (SAIDI) and system average interruption frequency index (SAIFI) for the assessment year do not exceed the five year average to 31 March 2003 for those respective reliability measures. Due to a number of extreme weather events throughout the assessment year, Vector exceeds both reliability targets, as summarised in the table below.

Notice Requirement	Result for assessment year	Target	Outcome	Target exceeded by	Target exceeded by (%)
6(1)(a) - SAIDI	199.4	85.5	Breach	113.9	133%
6(1)(b) - SAIFI	1.492	1.313	Breach	0.179	14%

Exclusion of Extreme Events

4 The Commission has made it clear that, post any breaches of the reliability criterion, it will consider the exclusion of extreme events, such as storms. The Commission confirmed the '2.5 Beta Method' of extreme event assessment in the supplementary guidelines issued on 2 November 2007. Prior to this release, Vector was compelled to formulate its own extreme event method (referred to as 'Vector method' from this point onwards). Vector continues to believe that its method provides a more appropriate means of normalising for extreme weather events, because it replaces the storm impact with SAIDI and SAIFI for an "average day", whereas the Beta Method replaces the impact of the storm event with SAIDI and SAIFI on a "not-quite-storm-day". Accordingly, Vector has presented results using both the 2.5 Beta Method and Vector Method.

5 The results (shown below) demonstrate that Vector, with the impact of the extreme weather events removed, complies with the SAIDI target using both assessment techniques.

Extreme Event assessment method	Normalised SAIDI result for assessment year	Target	Outcome	Discrepancy from target	Discrepancy as percentage of target
2.5 Beta Method1[1]	84.7	85.5	Complied	0.8	-1%
Vector's proposed storm method[2]	73.8	85.5	Complied	11.7	-14%

6 Vector also complies with the SAIFI target when extreme events are assessed using Vector's proposed storm method. However, Vector does not comply when the Beta method is applied.

Extreme Event assessment method	Normalised SAIFI result for assessment year	Target	Outcome	Discrepancy from target	Discrepancy as percentage of target
2.5 Beta Method	1.353	1.313	Breach	0.040	3%
Vector's proposed storm method	1.169	1.313	Complied	0.144	-11%

Consumer Engagement Criterion

7 Vector is required by the customer communication threshold to report on its engagement with customers and how this impacts on operational and long term asset management planning decisions and price-quality trade-offs available to customers.

8 Vector engages with its customers through a number of channels including its:

- Customer surveys;
- Call centre;
- Operations team;
- Customer services team;
- Overhead improvement team;
- Cable location service;
- Customer service monitors;
- External publication; and
- Websites.

9 Through these channels, Vector has established in the two years to 31 March 2008 that its customers continue to consider that the overall price-quality relationship is appropriate: in general, customers would not prefer to pay more for higher levels of quality, nor would they like to pay less and receive lower quality. Accordingly, given these customer preferences validate the intent of the quality thresholds to maintain quality levels, Vector focuses its operational and asset management practices on meeting the quality threshold targets (adjusted for extreme weather events).

10 Vector seeks to obtain this performance by use of such approaches as:

[1] Detailed information is available in section *Extreme Event Identification using the 2.5 Beta Methodology*.
[2] Detailed information is available in section *Extreme Event Identification Vector's proposed Storm Method*.

- Incentive schemes ensuring a company wide focus on quality by linking staff and contractor financial rewards to quality and safety performance;

- Using advanced network modelling in order to simulate the workings of Vector's network in entirety, starting from Transpower Grid Exit Points (GXPs) down to distribution transformers; and using the model to perform scenario analysis for changes in quality. The outputs of such analysis are used as an input into asset management planning decisions, as well as to present price-quality trade-off options to large customers; and

- Implementing systems that effectively report and manage the impact of power quality on Vector's customers; an ongoing programme to install power quality measuring equipment; an electronic mail system that automatically sends large customers a power quality report in real time; and a web based reporting system that makes both real time and historical power quality information available to customers.

11 Vector complies with the requirements of the customer communication criterion by:

- Engaging with its customers using a number of communication channels;

- Making customers aware of the price-quality tradeoffs available to them; and

- Taking account of consumer preferences in operating, maintaining and investing in Vector's electricity networks.

12 A summary of the methods used with respect to different customer groups and regions is provided below as a quick reference guide.

SUMMARY OF CUSTOMER ENGAGEMENT METHODS			
Customer Type	***Customer Location***	***Direct Methods of Engagement***	***Indirect Methods of Engagement***
Large	Auckland Area	Retailer and Customer Relationships team, external publications, call centre, websites	Retailers, AECT, Local Body Authorities, MEUG
	Wellington and Northern Areas	Retailer and Customer Relationships team, external publications, websites. For Contact and Mercury customers direct relationship with the call centre, for other customers of other retailers jobs referred via the retailer to our call centre	Retailers, Local Body Authorities, MEUG
Residential and Small Commercial	Auckland Area	Customer Services Team, Overhead Improvement Team, surveys, external publications, call centre, websites	Retailers, AECT, Customer Services Team, Local Body Authorities, Customer Representative Groups
	Wellington and Northern Areas	Customer Services Team, surveys, external publications, websites, For Contact and Mercury customers direct relationship with the call centre, for other customers of other retailers jobs referred via the retailer to our call centre	Retailers, Customer Services Team, Local Body Authorities, Customer Representative Groups

RELIABILITY CRITERIA OF THE QUALITY THRESHOLD – CLAUSES 6(1)(A) AND 6(1)(B)

13 The Commission has made it clear that, post any breaches of the reliability criterion, it will consider the exclusion of extreme events, such as storms. The Commission confirmed the '2.5 Beta Method' of extreme event assessment in the supplementary guidelines issued on 2 November 2007. Prior to this release, Vector was compelled to formulate its own extreme event method (referred to as 'Vector method' from this point onwards). Vector continues to believe that its method provides a more appropriate means of normalising for extreme weather events, because it replaces the storm impact with SAIDI and SAIFI for an "average day", whereas the Beta Method replaces the impact of the storm event with SAIDI and SAIFI on a "not-quite-storm-day". Accordingly, Vector has presented results using both the 2.5 Beta Method and Vector Method.

Extreme Event Identification using the 2.5 Beta Method

14 Vector's 2.5 Beta Method calculations were performed in accordance with the steps laid out in 'Appendix 1: Application of the Beta Method' from the Commerce Commission's Supplementary Guidelines document dated 2 November 2007.

15 Vector has comprehensive reliability data available from 1998. This has been used to calculate historical Major Event Day (MED) values and exclude them from the 5 years preceding the 2007/08 regulation year (the period 1/4/2002-31/3/2007). With the exclusion of these historic storms, regulation year T_{MED} values[3] were calculated to be:

	SAIDI[4]	SAIFI[5]
T_{MED}	5.36	0.109

16 One storm during the regulatory year (which occurred over multiple days; 10-16 July 2007) was found to exceed the year's MED value of 5.36 SAIDI minutes. Details of the storm's reliability impact are provided below:

Date Outage Commenced	Auckland Region SAIDI	Northern Region SAIDI	Daily SAIDI	Comments
10/07/2007	14.36	100.11	114.46	Direct storm period
11/07/2007	1.67	2.21	3.88	Direct storm period
12/07/2007	0.0	0.50	0.50	Extension of storm commencing 10/7/07
13/07/2007	0.0	0.43	0.43	Extension of storm commencing 10/7/07
14/07/2007	0.0	0.58	0.58	Extension of storm commencing 10/7/07
15/07/2007	0.0	0.25	0.25	Extension of storm commencing 10/7/07
Total SAIDI			**120.10**	

[3] The 2.5 Beta method works by calculating a SAIDI 'boundary' value (TMED) based on statistical analysis of SAIDI over the 5 previous years. Guidelines for applying the Beta method can be found in the Commerce Commission document 'Supplementary Guidelines for investigating Breaches of the Reliability Criterion of the Quality Threshold' which was released on 2 November 2007.

[4] Refer to the spreadsheet '07_08 SAIDI Tmed Calculation' (provided separately).

[5] Refer to the spreadsheet '07_08 SAIFI Tmed Calculation' (provided separately).

17 The reliability impact of this storm is excluded and replaced by one instance of the boundary value.

	SAIDI	SAIFI
MED 10-16 July	120.10	0.248
Less T_{MED}	5.36	0.109
Net extreme event for exclusion	**114.74**	**0.139**

18 Excluding the extreme events identified by the 2.5 Beta Method shows that had the storm of 10-16 July 2007 not occurred, Vector would have complied with the SAIDI target but not the SAIFI target[6].

Reliability Index	Normalised result for assessment year	Target	Outcome	Discrepancy from target	Discrepancy as percentage of target
SAIDI	84.7	85.5	Complied	0.8	-1%
SAIFI	1.353	1.313	Breach	0.040	3%

Storm Supporting Evidence

19 The storm of July 2007 resulted in severe damage to Vector's Auckland and Northern electricity regions. Wind speed and equipment faults approached, and in some aspects exceeded, damage caused by cyclone Bola of 1988[7]. Winds increased in intensity throughout Tuesday the 10th and reached (or exceeded) gale force between 11am and 7am the next morning. During this period, network faults snowballed reaching a peak of 131 simultaneous HV faults resulting in 76,000 customers without power.

20 Vector's 'Major Incident Team' coordinated the fault response engaging all available fault crews (including flying additional resources in from Wellington). This allowed the majority of customers to be restored within 24 hours. Crews worked extremely hard but some customers were not restored for more than one week due to the severity of damage to the network.

21 During this period, up to 500 field staff worked around the clock to restore power, replacing over 80 power poles, installing over 20km of overhead lines and restringing over 80km of existing lines.

[6] Refer to the spreadsheet '07_08 Beta Calculation' (provided separately).
[7] Refer to Appendix 2-2 for a meteorological report on this storm prepared by NIWA.

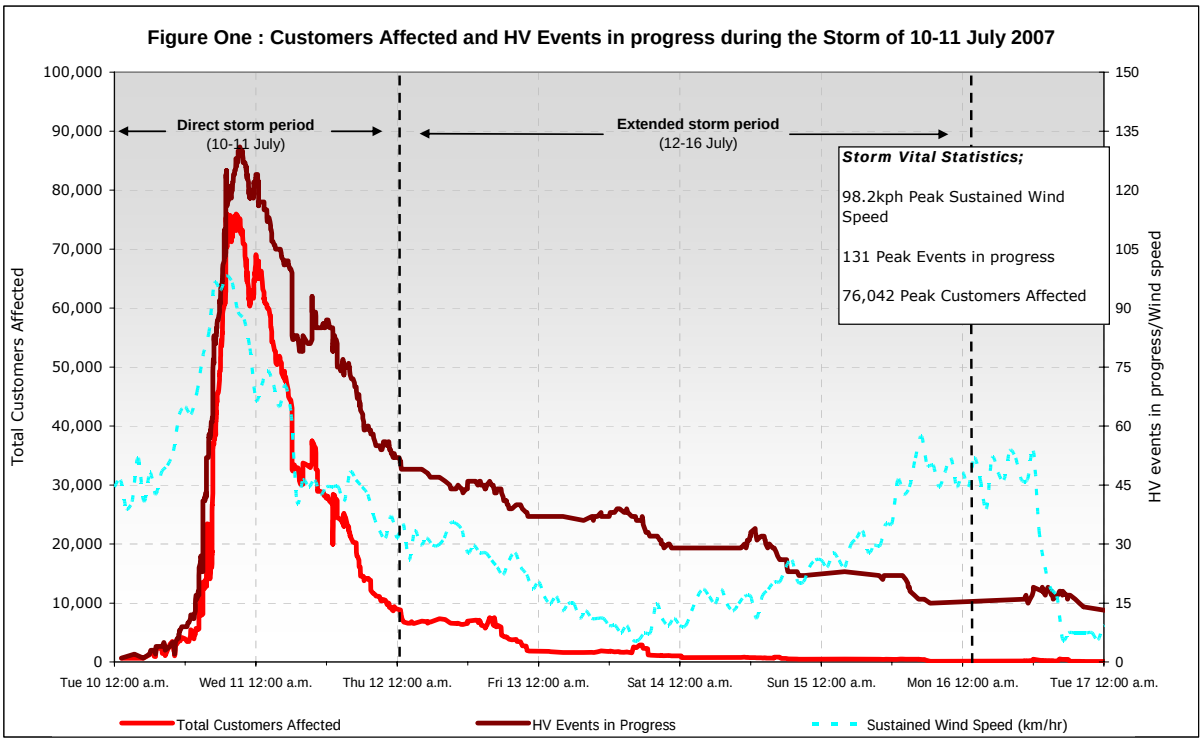
22 Storm damage continued to cause network faults for several days after winds had subsided (loosened branches fell and weakened overhead components failed). Dozens of faults which commenced at the peak of the storm (10-11 July) were still in progress when these new faults occurred. The table below states the number of simultaneous faults still in progress at the beginning of post-storm days:

Date	Simultaneous HV Faults in Progress
12/07/2007	52
13/07/2007	37
14/07/2007	29
15/07/2007	22
16/07/2007	14

23 As resources were already fully committed to restoring earlier faults, minimal reserve was available to mop up these delayed-onset outages. Due to these factors, Vector has categorised the period 12-16 July as the extended storm period and deems the July storm to be a multiple day event spanning 10/7/07 – 16/07/07.

24 Figure One below follows the storm's progression plotting wind speed, customers affected and simultaneous HV faults in progress.

Figure One : Customers Affected and HV Events in progress during the Storm of 10-11 July 2007



Extreme Event Identification using Vector's Proposed Storm Method

25 Prior to introduction of the 2.5 Beta Method, Vector formulated its own technique to assess extreme events. In this section (paragraph 25 to 34), Vector provides analysis to demonstrate that the targets set by the reliability criterion were

exceeded due to uncontrollable circumstances (extreme weather events). The events and the degree to which these events affected the Vector network areas are set out in the following tables:

Northern Network Area					
Start Date/Time	End Date/Time	Hours	Faults	SAIDI	SAIFI
9/07/2007 15:00	12/07/2007 04:00	61	131	102.32	0.158
16/08/2007 00:00	17/08/2007 12:00	36	16	0.68	0.009
01/10/2007 06:00	03/10/2007 17:00	59	46	3.55	0.045
21/02/2008 20:00	24/02/2008 04:00	56	35	3.48	0.054
			Total Impact	110.03	0.266

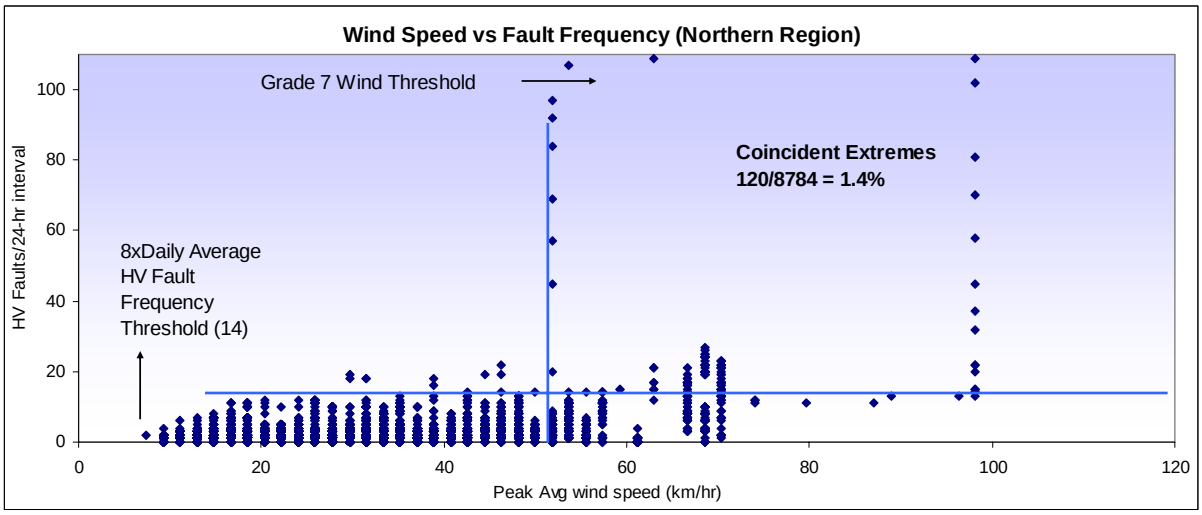
Auckland Network Area					
Start Date/Time	End Date/Time	Hours	Faults	SAIDI	SAIFI
12/04/2007 22:00	14/04/2007 07:00	35	9	0.28	0.005
10/07/2007 06:00	12/07/2007 05:00	47	39	16.03	0.062
			Total Impact	16.31	0.067

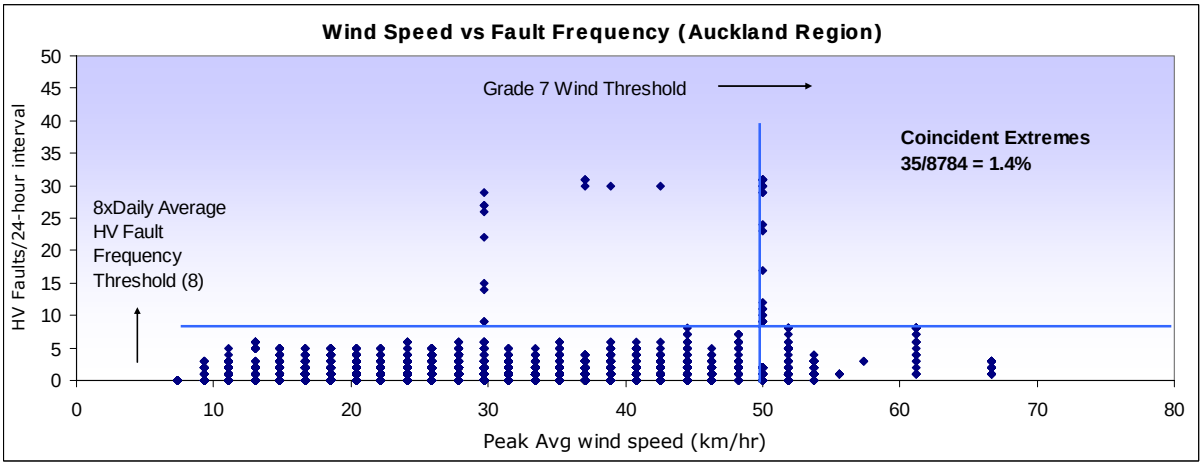
Wellington Network Area					
Start Time	End Time	Hours	Fault Count	SAIDI	SAIFI
03/10/2007 23:00	05/10/2007 12:00	37	5	0.14	0.002
06/10/2007 20:00	08/10/2007 07:00	35	5	0.17	0.004
16/10/2007 02:00	17/10/2007 17:00	39	7	0.15	0.005
13/11/2007 14:00	15/11/2007 10:00	44	8	0.22	0.003
			Total Impact	0.68	0.014

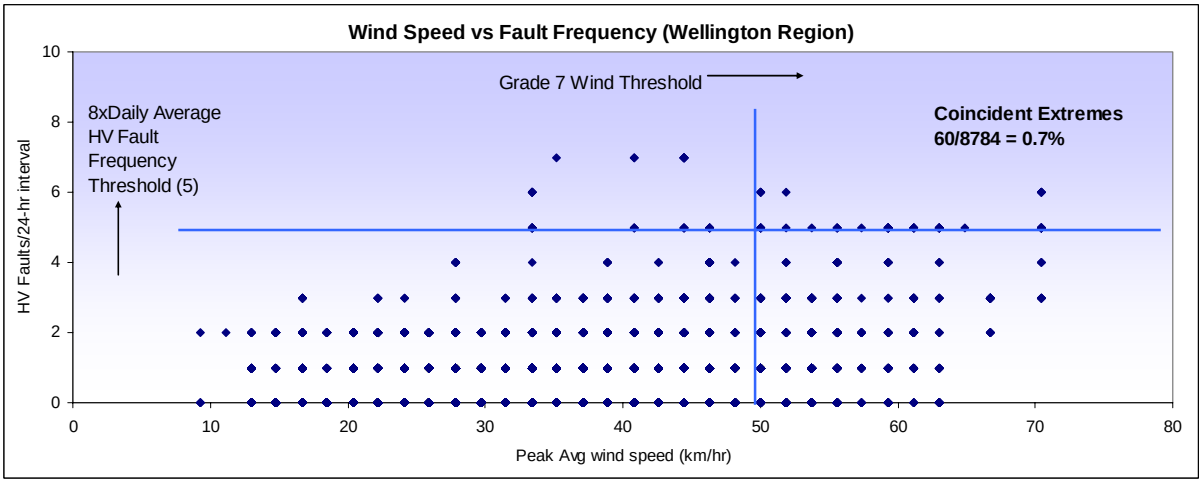
26 Vector has provided its own analysis to demonstrate that the weather conditions during the periods and in the areas listed above constitute extreme events. Analysis shows (summarised below) that, had these extreme weather events not occurred, Vector would not have exceeded the SAIDI and SAIFI targets set by the reliability criterion.

27 The analysis carried out by Vector identifies specific intervals on which Vector's network areas were badly affected by extreme weather conditions.

28 This was achieved by analysing every rolling 24-hour period in the assessment year to identify coincident extremes with respect to an unusually high number of faults occurring and an unusually high peak average wind speed for that interval. The graphics below show the scatter diagrams used to identify such outliers.







29 More specifically, the plots were compiled on the following basis:

- Every rolling 24-hour period in the year (staggered at hourly intervals) was plotted on a scatter-gram, by peak sustained wind speed (x-axis) and fault frequency (y-axis) (noting that some data points coincide such that 8,784 data points may not appear);

- The vertical blue line is based on grade 7 (near gale-force) or higher winds (as defined on the Beaufort wind scale to be ≥13.9 metres per second (m/s), which is equivalent to ≥50 km/h) sustained on average over a period of one hour, where individual gusts in that hour could be of a much higher speed. It is important to note that wind speeds of this level not only cause faults but also make repair of the network difficult, given safety concerns from (for example) using ladders.

Land Beaufort Wind Scale			
Beaufort Number	**Description**	**m/s**	**How to recognise**
0	Calm	0 – 0.2	Smoke rises vertically
1	Light Air	0.3 – 1.5	Smoke drifts
2	Light Breeze	1.6 – 3.3	Wind felt on face, leaves rustle
3	Gentle Breeze	3.4 – 5.4	Small twigs in constant motion, flags flap
4	Moderate Breeze	5.5 – 7.9	Raises dust, loose paper, small branches move
5	Fresh Breeze	8.0 – 10.7	Small trees in leaf begin to sway
6	Strong Breeze	10.8 – 13.8	Large branches in motion, umbrellas used with difficulty
7	Near Gale	13.9 – 17.1	Whole trees in motion, inconvenience felt walking against the wind
8	Gale	17.2 - 20.7	Gale, breaks twigs off trees, impedes progress
9	Severe gale	20.8 – 24.4	Slight structural damage occurs
10	Storm	25.5 – 28.4	Trees uprooted, considerable damage occurs
11	Violent Storm	28.5 – 32.6	Violent storm, widespread damage
12	Hurricane Force	32.7+	Hurricane, extreme destruction

- The horizontal blue line is based on High Voltage (HV) fault frequency, with the number of HV faults recorded for all 24-hour periods above the line being eight or more times the daily average number of HV faults for the benchmark five–year period. Initially, this was an informed judgement by Vector's reliability experts, as to whether the number of interruptions is outside the ordinary or is extreme. However, Vector has since become aware that this approach is consistent with the approach adopted by the UK regulator Ofgem in defining extreme events[8].

30 From prior discussions with NIWA (National Institute of Water & Atmospheric Research) and the MetService, (both of which are expert meteorological bodies) as well as our own research, the Beaufort wind scale is an internationally accepted standard used by the World Meteorological Organisation (WMO). The above table was sourced from NIWA.

[8] Guaranteed Standards: Ofgem Guidance and Proposals on Best Practice – Electricity Distribution, 28 April 2006, Appendix 1; Electricity (Standards of Performance) Regulations 2005, Part II, clauses 4(a)-(c), http://www.opsi.gov.uk/si/si2005/20051019.htm.

31 Based on the approach described above (8-multiple of average daily HV faults and 50 km/h and above winds) the graphs then identify, in the top right quadrant, a number of candidate data points that may be normalised on the basis that the high SAIDI and SAIFI on those periods are the result of extreme weather events. In other words, near gale force winds and high interruptions are necessary, but not sufficient conditions for a 24-hour period to be normalised. Data points were only normalised after examining Vector's register of HV faults and verifying that 50%[9] or more of the interruptions were the result of weather-related uncontrollable events, such as tree contact, branches on lines, lines clashing, broken cross-arms, poles, binders, insulators and jumpers, and lines on the ground, as recorded in Vector's fault classification; 50% of faults for which the cause is unknown[10] were also assumed to be the result of uncontrollable events.

32 It is important to note that, although some of the faults occurring on such periods are not directly caused by the extreme event, Vector's ability to repair faults is severely affected by extreme weather (for example, due to safety concerns when using ladders during high winds). Thus, the SAIDI and SAIFI impact of faults on extreme event days the causes of which could not be directly linked to extreme weather, is far higher than it would have been had they occurred on a normal day.

33 In order to normalise Vector's performance over the assessment year, the SAIDI and SAIFI figures for outlier periods were replaced with the average SAIDI and SAIFI figures for non-outlier days in the assessment year.

34 Repeating the reliability calculations but using the normalised SAIDI and SAIFI figures (using Vector's proposed storm method) shows that Vector would have complied with both reliability criteria, had the extreme weather events not occurred[11].

Reliability Index	Normalised result for assessment year	Target	Outcome	Discrepancy from target	Discrepancy as percentage of target
SAIDI	73.8	85.5	Complied	11.7	14%
SAIFI	1.169	1.313	Complied	0.144	11%

[9] As is demonstrated in the detailed analysis, for most data points this percentage was much higher.
[10] In Vector's view it is a reasonable and conservative assumption to make that there is a 50% chance of an "unknown" fault to have been, in the presence of a storm, caused by weather related events, such as, lines clash which was not observed or the fault cause (branches, bark, etc) being blown clear of the site before the repair crew arrives. Vector believes that this chance is, in reality, much higher, but has adopted a conservative approach for the purpose of this analysis.
[11] For detailed calculations, refer to the spreadsheet '07_08 Vector's Proposed Storm Method' (provided separately).

CONSUMER ENGAGEMENT (CUSTOMER COMMUNICATION) CRITERION OF THE QUALITY THRESHOLD – CLAUSES 6(1)(C)

Introduction

35 In Vector's 2006 threshold compliance statement, Vector provided extensive information on how it engages with consumers and consumer representatives and the systems and processes Vector uses to take account of customer feedback in operational decisions. Those engagement practices are unchanged since the 2006 report.

36 In this compliance statement, Vector sets out the results of its formal engagement with consumers and how this has affected Vector's operations and decisions during the two years to 31 March 2008.

37 The reality for network owners is that it is often difficult to differentiate service quality levels between customers, except where the size of the customer justifies making available specific assets to accommodate price-quality preferences. That said, there are opportunities to differentiate service levels for smaller customers, including through controlled and non-controlled load options, customer-funded underground programmes for those willing to pay (by way of capital contribution) for the visual amenity benefits of underground cables and differentiation of standard service level guarantees between rural and urban customers. Engagement with customers has identified these opportunities to differentiate services and these are opportunities are drawn to customer's attention through a variety of channels.

38 In future, Vector expects to be able to provide further differentiation of service quality levels through the advent of smart meters. Vector has formed a joint venture with Siemens to provide advanced meters in the New Zealand market. These smart meters will enable consumers to better control their loads and enable "smarter" tariff options which will reward consumers for responding to price signals. The richer information set available from smart meters will also enable improved network management and understanding, which over time will lead to improved capital investment decisions and therefore consumer outcomes. Vector is pleased to be at the forefront of such market developments, and sees this market development as part of a longer term enabler of customer choice, including in substitutes and complements to electricity delivered via distribution networks.

Structure of this Statement

39 Vector's demonstration of its compliance with the consumer engagement criterion is set out as follows:

- we set out the Commission's requirements and expectations;
- we describe the contractual relationships Vector has with the consumers on its networks;
- we then set out the various channels Vector uses to engage with customers on price, quality and quality-related issues;
- we then describe the engagement with customers of various types
- we describe the underpinnings of Vector's approach to quality and service level differentiation;
- we describe the outcomes of the consumer engagement Vector has undertaken in the past two years;
- we describe specific actions taken by Vector in response to consumer's views.

Consumer Engagement Criterion - Requirements

40 The Consumer Engagement Criterion seeks to ensure that lines businesses are meaningfully engaging with their consumers. Section 6(1)(c) of the Notice sets out the Consumer Engagement Criterion, which places a number of requirements on lines businesses, viz:

> "(c) *customer communication:* at least once during the period of 2 years ending 31 March 2006 and at least once during the period of 2 years ending 31 March 2008, a distribution business is to—
>
> > (i) properly advise (or ensure that another person properly advises on its behalf) its customers (or another person that accurately reflects the interests of those customers) about the price-quality trade offs available to them in relation to the goods and services provided by the distribution business; and
> >
> > (ii) consult (or ensure that another person consults on its behalf) with its customers (or another person that accurately reflects the interests of those customers) about the quality of goods and services that they require, with reference to the prices of those goods and services; and
> >
> > (iii) properly consider the views expressed by customers during and after that consultation; and
> >
> > (iv) adequately take these views into account when making its asset management decisions."

41 In the decision paper, published simultaneously with the Notice, the Commission clarified:

> "The Commission therefore considers lines businesses should be able to demonstrate:
>
> - how they engage with consumers, directly or indirectly, to explain the trade-offs between quality and price, and to assess consumers' willingness to pay for different quality levels;
> - what service offers or commitments they make to consumers, directly or indirectly, in response to information obtained during these engagements;
> - how they make decisions about target quality levels;
> - what types of contractual or other arrangements, if any, they enter into in relation to quality; and
> - how they plan to deliver the target quality in terms of medium-term service delivery.

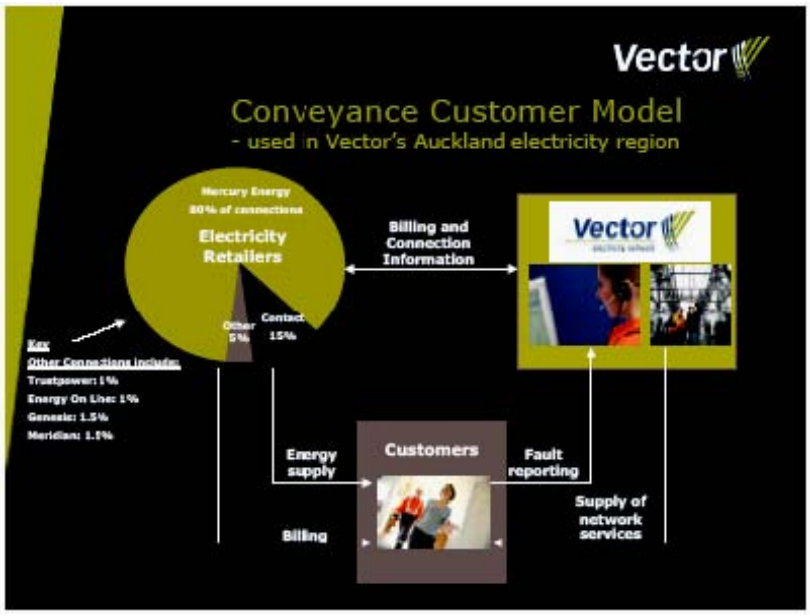
42 Vector has listed in past submissions that we consider the four main aspects of the quality of distribution goods and services to be safety, customer satisfaction, reliability and power quality. Understanding how our customers consider we are performing in these areas is the cornerstone of our customer engagement.

Vector's Relationships with its Customers

43 Due to Vector's ownership structure and the different business models employed in different network areas, the way Vector engages with residential and small commercial customers differs somewhat across the three geographic areas of Vector's network (Wellington, Auckland and Northern). Information gathered from customers through the various methods of engagement is recorded and used as an input into the development of Vector's Standard Service Levels and Asset Management Plan.

Auckland

44 Vector has a direct relationship with all end customers in the Auckland area through direct contracts with all customers under the conveyance business model (visually represented below).

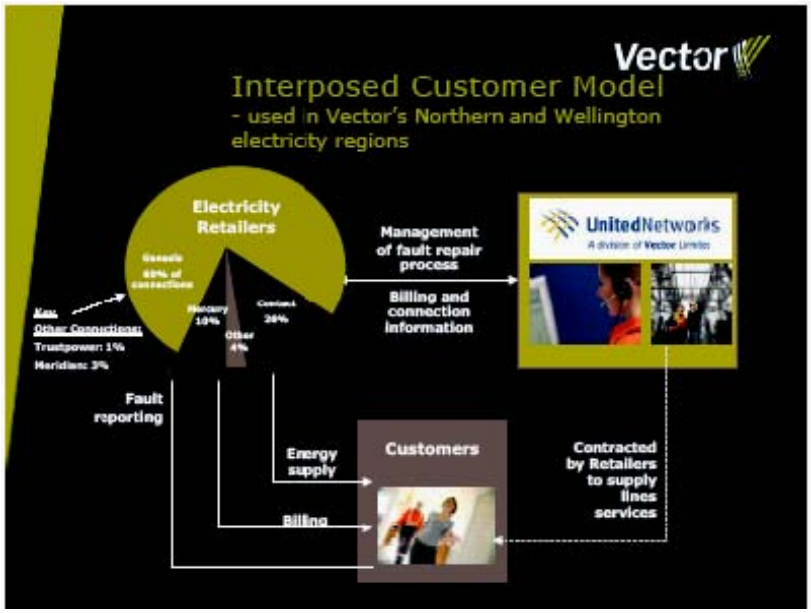


45 Under this model, retailers bill Vector's charges for distribution services on Vector's behalf. This means that all enquiries and/or complaints regarding the distribution goods and services provided by Vector (including the quality of these goods and services) are handled directly by Vector, as opposed to being relayed through a retailer (as is the case in the alternative interposed business model environment). These enquiries and/or complaints are handled by a dedicated Customer Services Team and the call centre (discussed further below) and relate to faults, connections, cable locations, customer service and any other matters raised by customers.

46 Auckland customers are well represented by the Auckland Energy Consumer Trust (elected by consumers every three years), which has a 75.1% shareholding in Vector (Vector's relationship with the Trust is discussed in more detail below). The Trust's role is to appoint Directors (to the extent its shareholding allows it to do so) and distribute dividends paid by Vector. The Trust and Vector have entered into a Deed Recording Essential Operating Requirements, which deals with issues related to pricing and quality of service.

Northern and Wellington Networks

47 In the case of the Northern and Wellington areas the contractual relationship with customers is mostly indirect through the interposed business model (visually represented below).



48 Vector (operating under the UnitedNetworks brand) charges the relevant retailer for lines services to residential and small commercial customers, and the retailer, treating this as one cost input to deliver energy, then sets out the pricing options for end-customers. Consequently, Vector's engagement with customers in these areas tends to be more indirect, for the most part taking place through retailers, Local Body Authorities and Customer Representative Groups (such engagements are discussed in more detail below).

General Methods of Customer Engagement

49 This section discusses in detail the different ways Vector engages with its customers in the following areas:

- Call centre;
- Customer services team;
- Overhead improvement team;
- Cable location Service;
- Customer service monitors.

Call Centre

50 To ensure proper handling of customer enquiries, service requests and/or complaints, Vector employs Telnet Ltd as an outsourced call centre for the network in the Auckland area.

51 In the last 3 years Vector has also worked with two of the main retailers on the Northern and Wellington networks to establish contracts with these parties to provide third party call centre services in fault situations for these retailers. Mercury Energy and Contact Energy customers on the Northern and Wellington networks,

representing 39% of our interposed customers, now talk directly to Vector's call centre in fault situations. This has removed the extra link in the communication chain between the customer and field workers and ensures better information from the field back to the customer as all interactions are held in Vector's own Customer Management system. Mercury and Contact have direct access to view fault information affecting their respective customers.

52 The call centre also provides an indirect service in the Wellington and Northern areas through an Outage Manager, who manages and co-ordinates requests for service from retailers (with customers on the Northern and Wellington networks) and allocates the requests to Vector's service providers.

53 An important advantage of the outsourcing arrangement is that although there is a pool of allocated Telnet agents answering calls to Vector's numbers at any one time, outsourcing allows Vector to have extra capacity (through Telnet temporarily allocating additional agents) in fault situations to handle short high volume periods, such as when faults affecting a large number of customers occur.

54 Vector's contract with Telnet is a performance based one, which includes Key Performance Indicators (KPI's) related to service and customer satisfaction as the contract's main driving force. Each month, Telnet's invoice is scaled according to how well they perform, thereby ensuring a strong focus on quality of service. Our agreement with Telnet makes it clear that Vector expects the service level to be maintained even in extreme event situations when major outages are likely (e.g.: 80% of calls to be answered within 20 seconds). Indeed, this is the time when many customers expect a high level of service.

55 All jobs are logged into Vector's Customer Management System (CMS), which allows the Customer Service Representatives at Telnet (or anyone else at Vector) to have visibility as to the progress of a fault job and/or any history on a job, should a customer phone for further information.

56 The CMS is then used by Vector's maintenance contractors to manage the jobs, record customer interactions and to bill Vector for the work completed. Thus, the CMS provides for a full history of any job and ensures efficient information flow of the relevant details relating to customer queries. With the help of this system, Vector is able to provide customers with extensive information, such as, for example, estimated arrival times, cause of fault, details of work completed and details of further work to be carried out. Importantly, the service is seamless from the customer's point of view, no matter who they're in contact with at any given point in time (service provider, call centre, retailer).

57 Aside from providing an important interface with respect to faults, the call centre also deals with customer enquiries and complaints, in many cases referring customers to a relevant Vector staff member, which in some cases results in other forms of direct engagement through the Customer Services Team (discussed below).

Customer Services Team

58 Where customer feedback is received, Vector often engages with customers directly through its dedicated Customer Services Team to discuss quality and price-quality trade-offs. Members of the team from time to time attend community meetings, as well as meeting with individual customers or their representatives (often outside normal working hours) to present and discuss issues related to quality and price-

quality trade-offs. Issues under discussion usually include quality of service history in the area, current quality levels and what Vector is doing to improve them, and/or why Vector does or does not believe certain investments in quality improvement are warranted.

59 Recent examples of such engagements include presentations given to customers in Omaha. In these presentations, Vector provided information to customers regarding quality issues in their area and what Vector is doing to address these issues (including the price-quality trade offs being targeted).

60 At times the team also fields calls from customers directly in the Northern and Wellington areas where the interpose contract operates. Under this contract the traditional method of engagement in complaint situations is via the retailer but Vector has recognised that in some situations of extended or unusual outages that managing the direct relationship with customers is beneficial to all parties. An example of this include post the 10 and 11 July 2007 storm which affected over 150,000 customers on our Auckland and Northern networks.

61 The team members also write articles for community papers and respond in writing to individual queries from customers regarding quality. These articles and letters explain quality levels relevant to the customers concerned and the reasons behind them, including future investment planned by Vector for improving and/or maintaining quality of service. Feedback from such interactions is taken into consideration during the asset management planning process.

62 The Customer Services Team also engages and works with customers to identify potential privately-funded undergrounding projects, where customers and/or customer groups are willing to pay, in order to receive the improved reliability and view that result from undergrounding (further discussed below).

63 Vector has systems in place to ensure that every opportunity is given for customers to communicate any dissatisfaction with the level of quality or the price-quality trade-offs being selected. Processes are in place to ensure that communications received are duly noted and relayed to the relevant people within Vector.

Overhead Improvement Team

64 As noted above, in addition to the overhead improvement projects carried out by Vector as part of its commitment to the AECT's focus on undergrounding, Vector also works with groups of customers in situations where property owners on the same street are willing to financially support the undergrounding of electricity (and possibly other network) reticulation along their street. Following initial discussions with the Customer Services Team, Vector's Overhead Improvement Team communicates directly with such customers in order to explain the scope and costs of the project, to ensure that property owners can make an informed choice, as to whether the costs (to the customers) of the project are worth the quality and amenity improvements that would eventuate.

65 If a very high percentage of property owners are willing to support the project, Vector then signs individual agreements with all property owners involved (usually there are between 20 and 50 parties involved). Following the successful completion of that stage, Vector carries out the undergrounding work.

66 Vector has completed undergrounding projects where customers helped to fund works in two Auckland suburbs (Herne Bay and Parnell) in the period since March

2006. Two projects have also started in another Auckland suburb (Remuera), but works will not be finished until the end of May 2008.

Cable Location Service

67 Vector provides a telephone number for Cable Locations (0508 B4U WORK). This operates from 7am to 6pm Monday to Friday and allows customers to request Vector to locate their cables before the customer undertakes digging activities. This service helps ensure the safety of our customers and is provided as a free service because the benefits from the avoided costs of outages would exceed the costs of providing the service, and charging for the service would be a barrier to use. We have now linked this number to the Australian service provider Before U Dig which has entered the New Zealand market to provide a one stop shop for customers seeking plans from all utilities. Vector was the inaugural member of this service for New Zealand.

Customer Service Monitors

68 Vector regularly surveys its customers in all three network areas to obtain feedback on what is important to customers and how Vector's service can be further improved. The surveys, also known as the Customer Service Monitors (CSM), are carried out monthly in the three network areas to ensure that Vector understands what customers expect and what is important to them. The CSM asks a sample of customers (some of which have had recent contact with Vector, and some that have not) for their views and comments on the company, covering their perception of Vector and their interface with Vector via the phone and/or with servicemen in the field. Vector uses the results of these surveys to seek continual improvement in its customer service.

69 Since the introduction of the Electricity Regulations (Hazards from Trees) 2004 Vector has introduced regular surveys in regard to the current processes for administering the tree trimming requirements under the regulations.

70 The results of the surveys are an important input into Vector's business plans, asset management planning process and service provisions, thereby ensuring a central focus on customer needs.

Customer Engagements Across Customer Types

Engagement with Large Commercial and Industrial Customers

71 The quality needs of large customers are very different in many cases from those of residential and small commercial customers. For the most part, Vector's engagement with large customers is through direct contact although some of the customer feedback channels apply across the full range of Vector's customer base.

72 Large customers are engaged directly through Vector's external publications, the call centre (Auckland area customers only) and Vector's websites, as well as indirectly through Vector's engagement with the Auckland Energy Consumer Trust (Auckland area customers only), retailers, Territorial Local Authorities and customer representatives (e.g. Major Electricity Users' Group - MEUG).

73 Large customers have a direct ongoing relationship with Vector, which is managed by dedicated Account Managers. Vector's Account Managers discuss needs with customers, including quality of supply, and co-ordinate activities to ensure that

advice is provided, options are developed and presented, agreements are recorded through tailored line service contracts, including pricing, and network upgrades are implemented to meet the agreed levels of service. This ongoing process takes place through both formal (e.g. exchange of letters, contracts) and informal (phone calls, meetings, e-mails, etc.) interactions. Throughout this process, the price-quality trade-offs available to the customer, as well as the customer's preferred quality levels are explicitly discussed directly with the customer.

74 Retailers also have dedicated Key Account Managers who work with large commercial customers. In the Northern and Wellington networks, which operate on an interpose model, they liaise with a wider number of these types of customers than those managed by Vector's Account Managers but often members of the Customer Services team visit customers with the retailer Account Managers to provide technical support and feedback from these customers.

75 An example is Owens Illinois (formerly ACI glass), a large glass packaging producer in Auckland. Interactions with this customer have discussed quality of supply issues, including load capacity, reliability and power quality. As a result of these discussions, a long term agreement (10 years) was signed between Vector and the customer. Under this agreement, both Vector and the customer have made changes to the way their respective networks operate. Both Vector and the customer have invested funds for increasing line capacity and improving power quality, to better meet the customer's quality requirements. The pricing and quality of service requirements set out in the agreement reflected the price-quality trade off made by the customer.

76 Many similar interactions are initiated by customers and relate to new connections or improvements in quality. Large customers, in most cases, are much more sophisticated in their quality requirements than residential and small commercial customers. For example, power quality (the provision of supply within acceptable parameters such as voltage, frequency and waveform distortion) is, in many cases, as critical as the frequency and duration of outages. In such cases, customers have a good understanding of their preferred level of quality, and also what price/quality trade-offs are available. Commonly, customers will engage their own independent technical advisors (power systems engineering consultants) and Vector works with both parties to determine needs and reach agreement on solutions.

77 Commercially, investment by Vector in user-specific assets is approached through a transparent analysis of costs arising from both the user-specific assets themselves and an appropriate allocation of shared costs from the parts of the non-dedicated distribution network that the customer benefits from. Vector is generally flexible in the commercial aspects of the contract, for example the term of the contract, so long as the specific risks are clearly identified and allocated to the party best placed to manage them.

78 A dedicated Business Development team has been established to provide assistance for customers working in large developments. By working alongside the developers at an early stage of such projects we are able to facilitate the best outcomes for all involved. Recent examples include the Albany, Sylvia Park, Mt Wellington Quarry and Highbrook developments.

79 As noted above, in addition to direct contact through Vector's Account Managers, engagement with large customers also takes place through many of the processes described in the General Methods of Customer Engagement section above. Collectively, these processes ensure that large customers are advised of the price-

quality trade-offs available and are consulted with respect to which of these trade-offs they prefer. Ultimately, all information gathered through such interactions is also taken into account as an input into Vector's Asset Management Planning process, the main output of which is Vector's Asset Management Plan.

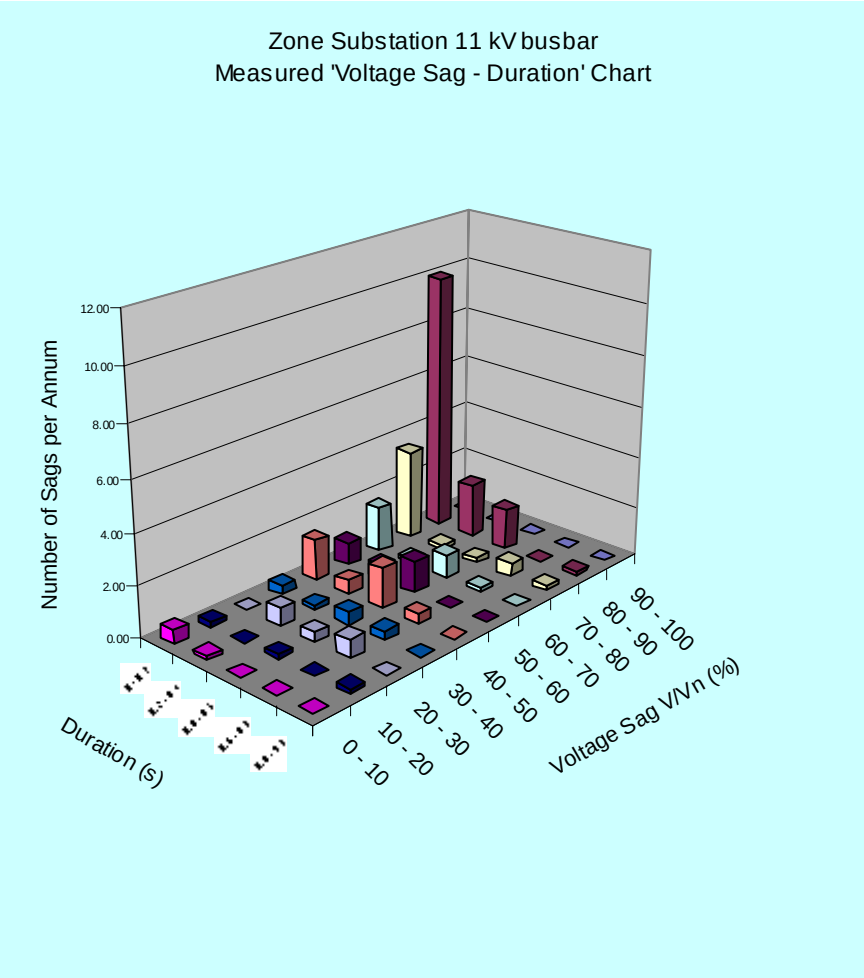
80 Vector recognises the importance of power quality[12], particularly to our larger customers. Accordingly, Vector ensures that its network is designed to a quality level that most modern equipment can effectively operate with. However, as technology advances, new electronic equipment is becoming increasingly sensitive to power disturbances. Also, some specific businesses, especially those involved in manufacturing and service industries, have a higher reliance on disturbance-free power.

81 Vector continually strives to reduce power disturbances that affect our customers. However, all electricity networks, as a matter of engineering and physics, are subject to unplanned disturbances. It is, therefore, impossible to guarantee a perfect power supply free of voltage sags, surges or harmonic distortions. These are often the result of faults or incidents occurring elsewhere, including disturbances originating from neighbouring commercial premises or even the customer's own equipment, the effect of which ripples through other parts of Vector's network.

82 A range of strategies have been implemented to effectively report and manage the impact of power quality on Vector's customers, including:

- An ongoing programme to install power quality measuring equipment at Transpower's grid exit points, zone substations and customer sites;
- An electronic mail system that automatically sends a power quality report (by e-mail) in real time to customers informing them that their plant could have experienced a power quality disturbance;
- A web based reporting system that makes both real time and historical power quality information available to customers. The graphic below illustrates a typical report that is available on the Vector intranet (or sent to a customer direct);

[12] Power quality relates to the consistency of voltage and current delivered by the network. Sudden sags or spikes in voltage (with corresponding changes in current) can damage equipment.



- Application of modelling software and tools to predict the impact of power quality disturbances on customers; and

- Application of mobile power quality instruments to investigate power quality related complaints.

Engagement with Residential and Small Commercial Customers

83 Vector understands that different customers have different needs and, therefore, where possible, Vector provides individual residential and small commercial customers with a price-quality trade-off they can make themselves at any point in time.

84 Vector offers such customers a choice of an interruptible or non-interruptible supply. By choosing interruptible supply, customers are able to save between 14.4% and 23.1% (depending on which network region the customer is located in) off their variable lines charge in exchange for allowing Vector to interrupt their supply in order to shed load. This enables Vector to manage abnormal conditions more effectively without the need to disconnect large groups of customers to protect the system, as well as to better manage peaks on Transpower Grid Exit Points, thereby reducing transmission costs. This trade-off allows those customers that are willing to accept a slightly lower level of reliability to receive a price reduction.

85 The availability of this option is drawn to consumer's attention through annual print advertising of Vector's charges and through the retailer channel.

Engagement in the Auckland Region

86 Residential and small commercial customers in Auckland are also engaged using a number of other methods (discussed above). Specifically, such customers are directly engaged through, external publications, surveys, Vector's website and interactions with the Customer Services and Overhead Improvement Teams, as well as indirectly through Vector's engagement with Local Body Authorities, retailers and customer groups.

87 Together, these processes help ensure that residential and small commercial customers and/or their representatives in the Auckland area are advised of the price-quality trade-offs available and are given the opportunity for consultation on these trade-offs should they wish to do so. Ultimately, information gathered through such interactions is duly considered and taken into account as an input into Vector's Asset Management Planning process.

Engagement in the Northern and Wellington Regions

88 Vector considers that retailers accurately reflect the quality requirements (especially in relation to reliability) of small and residential customers. Retailers engage with customers through administering customer surveys to better understand customers' needs and preferences, including with regard to the quality of distribution goods and services they require and pricing. Engagement also takes the form of customer complaints and queries, as well as direct meetings with large customers.

89 Such engagement takes place on a regular basis and ensures that retailers are aware of customer preferences and requirements. Retail companies also have a much better and much more detailed understanding (than the average domestic or small commercial customer) of the electricity industry as a whole and the relevant issues (including those related to network engineering, reliability and quality of service, and regulation). Retailers, therefore, are in a position to reflect the views of customers and relay them to lines businesses by combining their understanding of customers' needs with their knowledge of important technical and operational matters within the electricity industry, including the interface between its different components (generation, transmission, distribution and retail). Whilst retailers have a good understanding of customer needs, they agree that it is difficult to ascertain customer preferences and willingness to pay for different price-quality trade-offs.

90 Vector interacts with retailers through its day-to-day business activities, spanning a number of inter-business process areas (requests for customer service in respect of faults or new connections, billing, etc.). The relationship with retailers is coordinated by a dedicated Retailer Relationship Manager, who maintains and updates the Retailer Partner Plan. The plan discusses issues and activities relevant to specific retailers. The Plan involves:

- Consultation with retailers over Vector's plans for development of its pricing methodology. The input from retailers, over a number of years, has significantly influenced choices that Vector has made in streamlining pricing methodologies across its various network areas;

- Routinely sharing Vector's annual Asset Management Plan with retailers and encouraging feedback on the content of that plan. Vector highlights projects of significance and, where performance issues have arisen, works in co-ordination with retailers to ensure effective communication of remedial plans across affected communities;

- Annually surveying retailers on a range of relevant service related areas, including pricing and operations;

- Regular meetings to discuss a range of issues, including quality of service and reliability raised by the retailers themselves, or raised by them on behalf of customers; and

- Regular interaction through the Retailer Relationship Manager.

91 Since extending its coverage to the Northern and Wellington areas, Vector has taken a more direct approach to customer engagement and has rolled out the customer surveys (previously administered in the Auckland area only) in the Northern and Wellington regions, under the UnitedNetworks brand name (the surveys are further discussed below).

92 As mentioned previously Vector has worked with two of the main retailers on the Northern and Wellington networks to establish contracts with these parties to provide third party call centre services in fault situations for these retailers. Mercury Energy and Contact Energy customers on the Northern and Wellington networks, representing 39% of our interposed customers, now talk directly to Vector's call centre in fault situations. Vector continues to work with the remaining retailers on our Northern and Wellington networks to align our call centres (to ensure that retailer Customer Service Representatives are aware of all the information required by Vector, Vector's escalation processes and contingency plans, etc.). This is done through regular meetings and good relationships being formed between the respective Customer Services teams.

93 Residential and small commercial customers in the Northern and Wellington areas are also engaged using a number of other methods (discussed below). Specifically, such customers are engaged directly through external publications, surveys, Vector's website (under the UnitedNetworks brand) and direct contact with customers or their representatives through the Customer Services Team.

94 Together, these processes help ensure that residential and small commercial customers and/or their representatives in the Northern and Wellington areas are advised of the price-quality trade-offs available and are given the opportunity for consultation on these trade-offs should they wish to do so. Ultimately, information gathered through such interactions is duly considered and taken into account as an input into Vector's Asset Management Planning process.

Engagement with Territorial Local Authorities

95 Vector has a close relationship with Territorial Local Authorities in the areas where it operates its network. Such authorities are elected by customers and, in Vector's view, it is reasonable to assume that their views and preferences, with regard to service quality, are closely aligned to those of customers. Given the strong interests Local Body Authorities have in infrastructure, Vector engages with them on a

regular basis. Direct engagement takes place through designated individuals in the business on a regular basis, as well as through partnering work groups and workshops aimed at improving cooperation with Territorial Local Authorities. These authorities also have access to and are encouraged to comment on Vector's Asset Management Plan.

96 Vector's CEO meets with the CEOs of the Territorial Local Authorities in the areas where Vector operates its network. At these meetings a range of issues are discussed, including pricing, reliability and power quality.

Engagement with Customers with Installed Distributed Generation

97 Vector facilitates the connection of customer installed distributed generation. Information is provided via published brochures and guideline information on our website. We have a simple one-step notification process for connection of residential generation (<10kW) and a step-by-step application and review process for connection of commercial generation (typically approx 1MW). Processes are monitored to ensure we adhere to response times to customers and we use the default contractual terms and conditions under the MED 2007 Distributed Generation Regulations.

Vector's Approach to Establishing Quality Standards and Price-Quality Preferences

98 Whilst all engagement is analysed and outcomes are considered when establishing our Asset Management Plan the key sources of information regarding price quality trade off expectations of customers have been three key customer surveys (in 1998, 2006 and 2008).

Levels of Service and Quality

99 Vector's current Standard Service Levels (SSLs) can be tracked back to a customer survey in 1998, which established that customers varied in their quality requirements and expectations. To differentiate these expectations, Vector implemented a means of banding customers into categories, whereby customers would be compensated for failures to provide service at appropriate levels. The survey generally established that customers were satisfied with the level of quality they were receiving and did not want to pay more for higher quality of service.

100 Following the acquisition of UnitedNetworks, Vector undertook a review of SSLs in Auckland and in the acquired networks and rationalised some of the zoning and customer group designations to ensure consistency in approach across networks.

101 The SSLs are set out in the following table:

VECTOR STANDARD SERVICE LEVELS						
Network Location	**Customer type**	**Service Area**	**Maximum restoration time per outage (hours)**	**Potential number of outages per year**	**Potential number of voltage sags below 80% of nominal value per year**	**Payment entitled to if SSLs breached (dollars)**
Auckland	Commercial/Industrial	CBD	0-2	0-3	0-20	-
		Industrial	0-2	0-4	0-20	-
		Urban	0-2.5	0-4	0-30	-
		Rural	0-3	0-14	0-40	-
	Business	Rural	0-3	0-14	0-40	$200
		Urban	0-2.5	0-4	0-30	$200
	Residential	Rural	0-3	0-14		$50
		Urban	0-2.5	0-4		$50
Wellington and Northern	Commercial/Industrial	CBD/ Industrial	0-3			-
		Rural	0-6			-
		Urban	0-3			-
	Business	Rural	0-6			$100
		Urban	0-3			$100
	Residential	Rural	0-6			$40
		Urban	0-3			$40

102 To ensure reliability targets are in line with our customers' requirements and expectations (which vary across the network), Vector moved away from a universal standard of service (one-size-fits-all approach), to specific outcome targets for different zone levels (rural, urban, CBD, industrial, etc). Consequently, Vector's philosophy requires a reliability-based assessment of the need for expenditure in the network, before an investment is made.

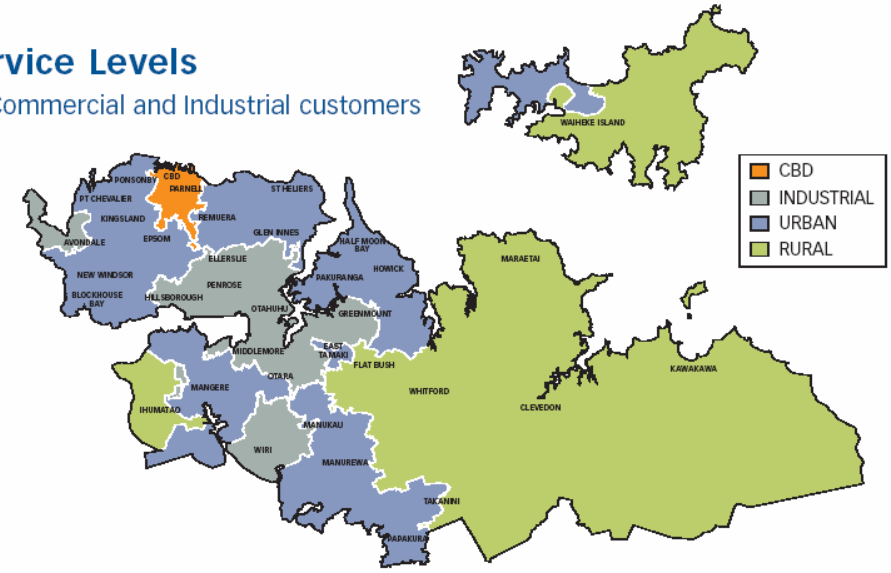
103 The risk of an outage occurring for customers in a given area is calculated and assessed against the baseline level of service for that customer type (calculated by assessing past reliability performance of the network with respect to the relevant customer type). This 'probabilistic assessment' ensures that effort is directed to proactively highlight areas where specific corrective actions are required to enhance reliability in those areas. Where, and if, required, some customers (usually large

commercial and industrial customers) are also able to contract for higher levels of quality.

104 The standard service level targets for our customers, as shown above, have been derived from such a performance analysis. For network management purposes, Vector has translated the standard service levels into individual ZAIFI and CAIDI targets for the field service providers (maintenance contractors), based on the mix of customer types in their area (as shown below). Currently these are at zonal level and reflect the predominant customer type within the zone. Maps of SSL zones in the Auckland, Northern and Wellington network regions are provided below.

Standard Service Levels

Auckland region - Commercial and Industrial customers

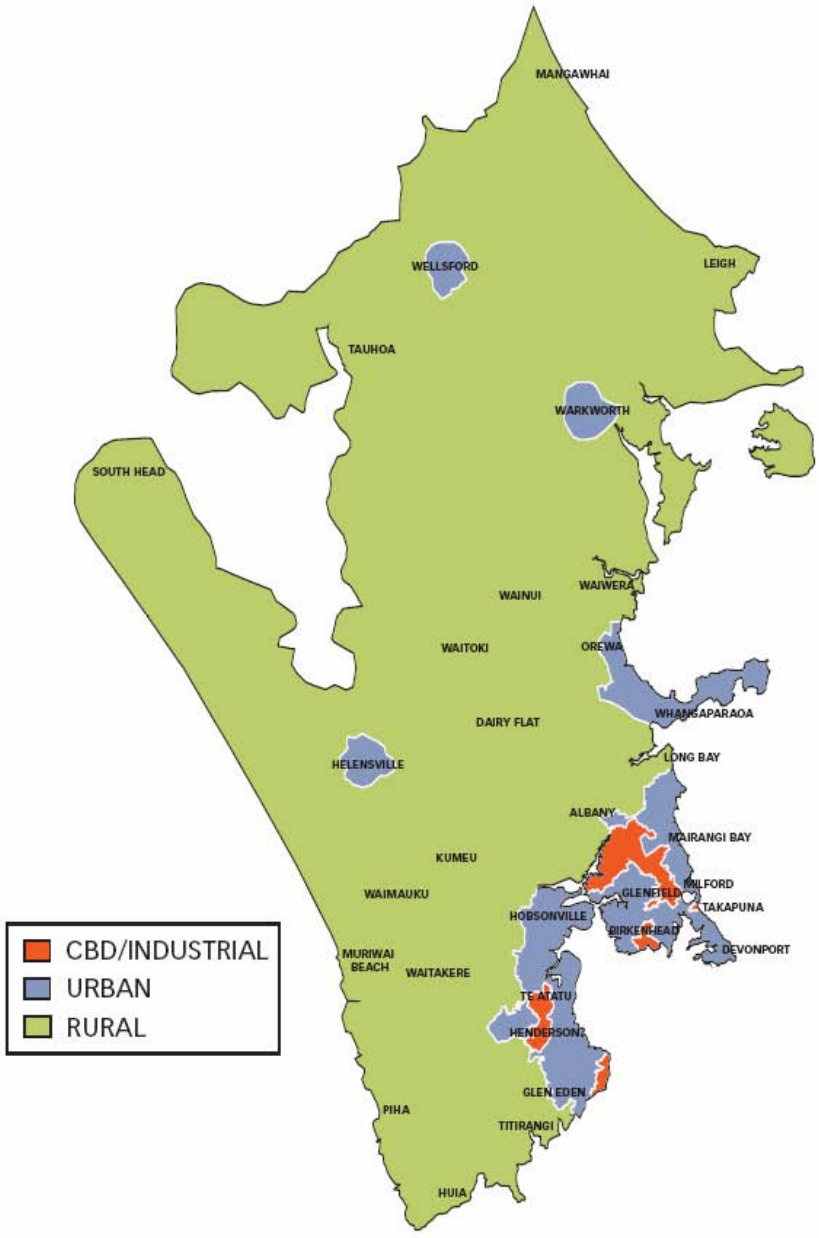


	SERVICE LEVELS			
	CBD	INDUSTRIAL	URBAN	RURAL
Time to restore power	From 0 – 2 hours	From 0 – 2 hours	From 0 – 2.5 hours	From 0 – 3 hours
Number of interruptions	From 0 – 3 per annum	From 0 – 4 per annum	From 0 – 4 per annum	From 0 – 14 per annum
Power quality - sags (to less than 80% of nominal voltage)	From 0 – 20 per annum	From 0 – 20 per annum	From 0 – 30 per annum	From 0 – 40 per annum
Voltage 230 Volts ± 6%	✓	✓	✓	✓
Frequency 50Hz ± 0.75Hz	✓	✓	✓	✓
Free Faults Line 0508 VECTOR (0508 832 867)	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days

Effective: 1 May 2005

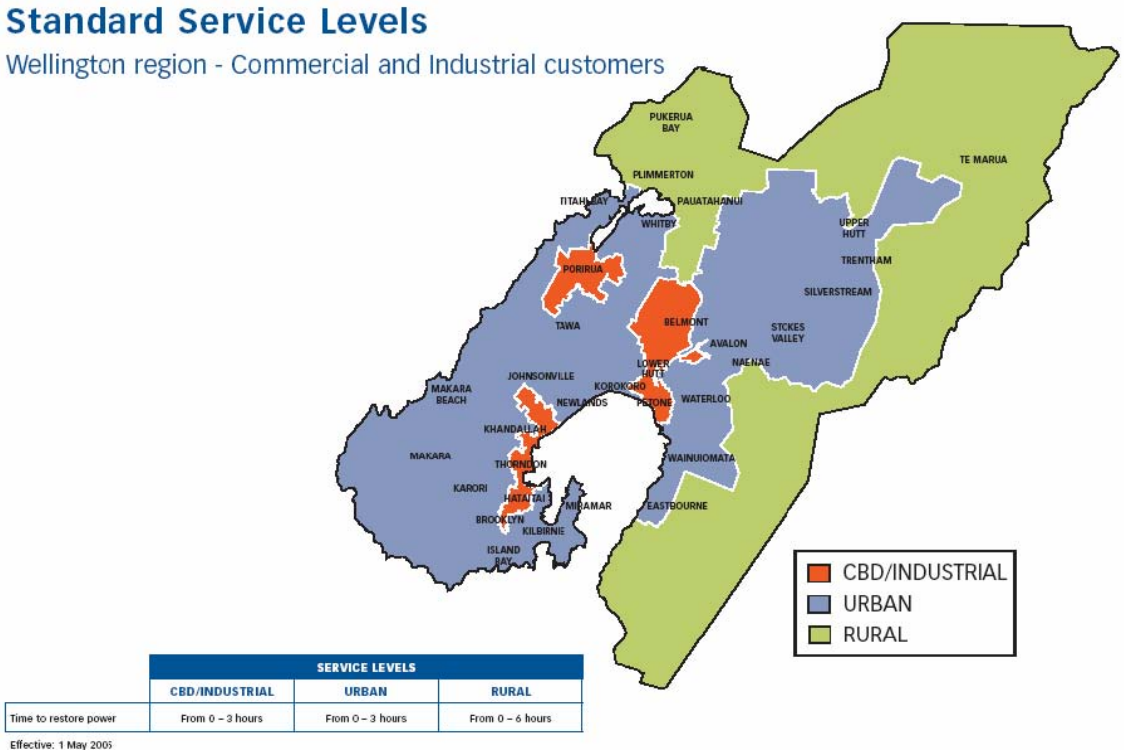
Standard Service Levels

Northern region - Commercial and Industrial customers



	SERVICE LEVELS		
	CBD/INDUSTRIAL	URBAN	RURAL
Time to restore power	From 0 – 3 hours	From 0 – 3 hours	From 0 – 6 hours

Effective: 1 May 2005



Vector Security of Supply Survey 2006 and 2008

105 Vector has performed a further two mass market residential surveys across its electricity networks since the 1998 survey in an effort to understand and identify the level of performance that customers require or are satisfied with in terms of outages and duration of outages, and the amount they would be prepared to pay to alter these parameters. We have conducted an analysis of the results to see if there has been any significant shift in customer's expectations. Relevant quality price research objectives focussed on the following:

- Number and acceptability of outages experienced over the last 12 months;
- Length and acceptability of length of power outages;
- Pricing and discounts expected / acceptable for different numbers of outages and different durations;
- Importance of not having outages at different times.

106 This research was undertaken as a Computer Assisted Telephone Interviewing (CATI) Survey. Participants were all identified as the "person most responsible for making decisions about electricity".

107 The 2006 sample size was n = 2,141 Residential Customers. The standard margin of error at the 95% confidence level on a sample size of n = 2,141 is +/- 2.1%. The rural customer representation was 958 (45%), urban representation was 1,183.

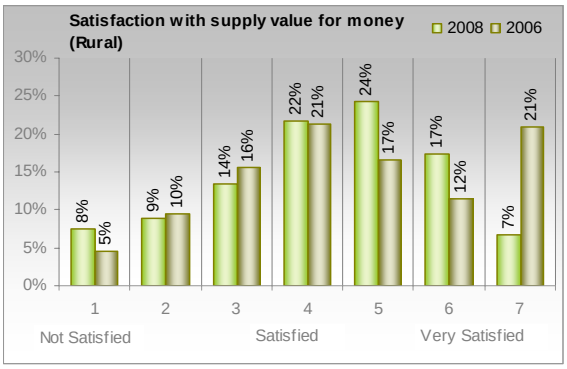
108 The survey undertaken in 2008 largely repeated the questions and topics covered in the previous 2006 survey. The 2008 sample size was n = 1,500 Residential Customers. The standard margin of error at the 95% confidence level on a sample size of n = 1,500 is +/- 2.5%. The rural customer representation was 671 (45%), urban representation was 829.

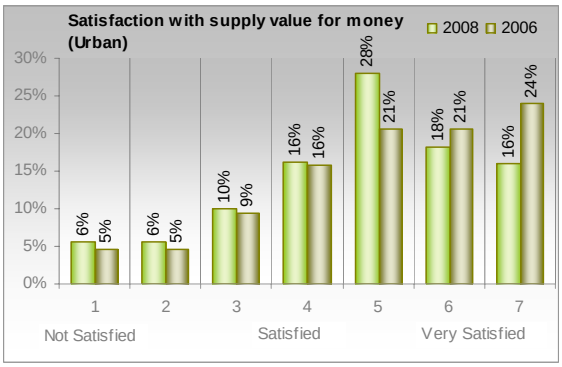
109 The 2008 results were:

Statement	Rural	Urban
Satisfied with the value for money regarding their electricity supply.	70%	79%
Rate the current service provided by Vector as adequate or better.	79%	91%
Believe they have experienced less than 3 outages over 12 months.	32%	74%
Believe they have experienced less than 6 outages over 12 months.	61%	89%
Rate the frequency of outages experienced to be acceptable.	50%	71%
Do not wish to pay an additional amount for fewer outages.	82%	85%
Do not wish to pay an additional amount for NO outages.	85%	84%
Consider a maximum of 3 outages per annum to be acceptable.	72%	81%
Believe the last outage they experienced was less than 3 hours.	48%	58%
Believe the last outage they experienced was more than 3 hours.	33%	23%
Rate the duration of the last outage experienced to be acceptable.	49%	63%
Do not wish to pay an additional amount for shorter duration outages.	89%	90%
Consider a 30 to 60 minute outage to be acceptable.	61%	56%

110 A comparison was done on the results of 2006 to 2008 in an effort to identify any changes in customer's expectations or desire to consider a cost increase for increased reliability.

Satisfaction with value for money from suppliers of electricity



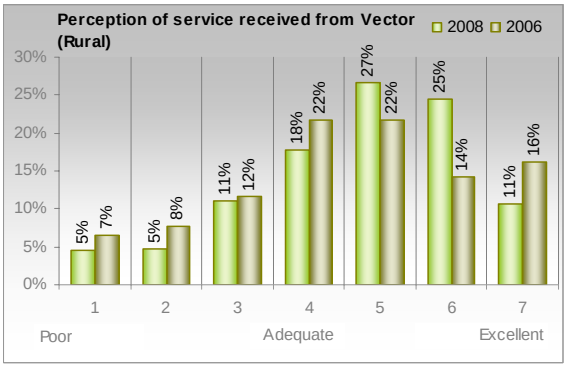


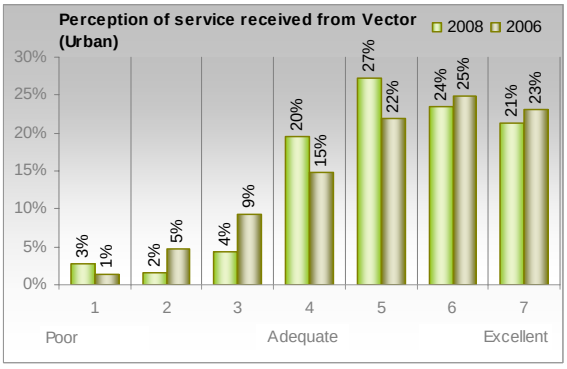
111 Summary:

- Rural - The majority of respondents at 70% remain satisfied or more than satisfied with the value for money from suppliers of electricity. Relative indifference from the 71% 2006 response;

- Urban - The majority of respondents at 78% remain satisfied or more than satisfied with the value for money from suppliers of electricity. Minor reduction from the 82% 2006 response, however inside margin of error.

Perceptions of Vector's performance as a lines company



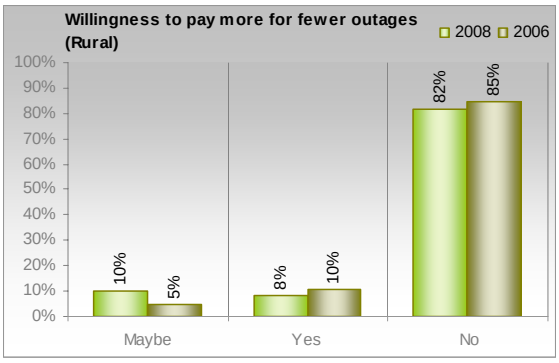


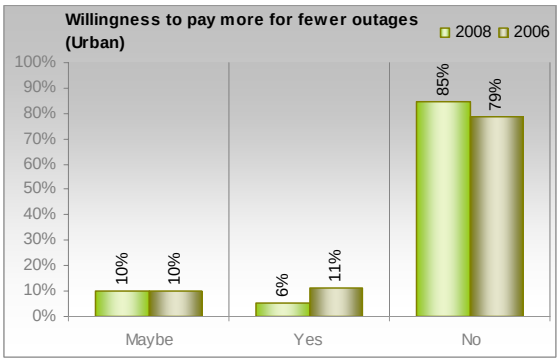
112 Summary:

- Rural - The majority of respondents at 81% continue to rate the service received from Vector as adequate or better. Positive increase from the 74% 2006 response;

- Urban - The vast majority of respondents at 92% continue to rate the service received from Vector as adequate or better. Positive increase from the 85% 2006 response.

Willingness to pay an additional amount for fewer power outages



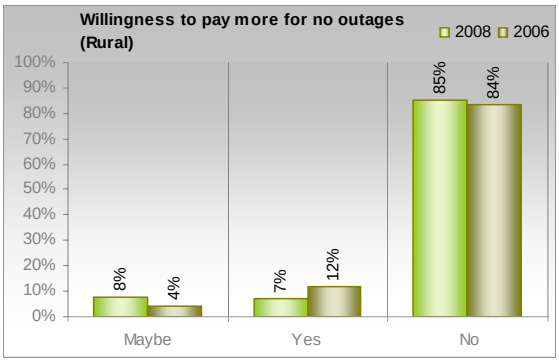


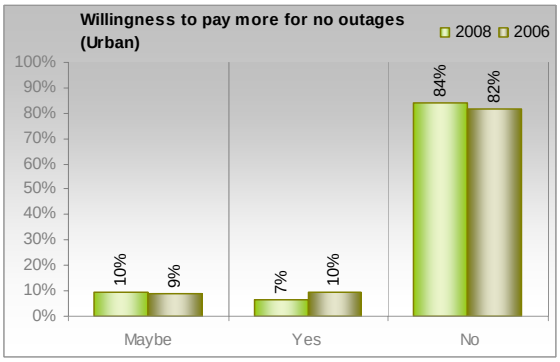
113 Summary:

- Rural - The absolute majority of respondents at 82% are unwilling to pay an additional amount for fewer power outages. Relative indifference from the 85% 2006 response;

- Urban - The absolute majority of respondents at 85% are unwilling to pay an additional amount for fewer power outages. Net margin of error a minor increase from the 79% 2006 response.

Willingness to pay an additional amount for NO power outages





114 Summary:

- Rural - The absolute majority of respondents at 85% are unwilling to pay an additional amount for NO power outages. Relative indifference from the 84% 2006 response;

- Urban - The absolute majority of respondents at 84% are unwilling to pay an additional amount for NO outages. Relative indifference from the 82% 2006 response.

Conclusion

115 There has been no significant change from 2006 in customers' willingness to pay more for a more reliable power supply.

Translating Customer Preferences into Specific Actions

116 Vector actively seeks customer feedback by all the methods of engagement listed above and often as a result of customer engagement process improvements are developed. Many of these process improvements do not have a price quality trade off but are implemented to the benefit of the customer at no further cost.

Standard Service Levels

117 As described above, based on an original survey in 1998, the results of which have been reconfirmed in the 2006 and 2008 surveys, Vector has implemented SSLs across its networks. These SSLs are then used to underpin targeted operational and asset management planning decisions to meet customer SSL expectations. Performance against the SAIFI fault frequency targets (SSL targets) is reviewed across the network to understand if there is a particular asset or group of assets causing high fault frequencies, or a particular fault cause in an area. The results of the analysis are then used to initiate revised preventative maintenance, asset refurbishment or replacement programmes, or other solutions if the fault cause is external (such as car versus pole or directional drilling).

118 The CAIDI fault duration targets (SSL targets) are reviewed to understand what is causing the high duration outages and what the potential solutions could be. The solutions could include restructuring of the fault crew response, automation, or installation of fault passage indicators to assist efficient fault location. Annual maintenance plans are developed as a result of the review and analysis of SAIFI and CAIDI performance, and the optimum management plan to achieve the standard service level for that zone is then established.

119 This sort of analysis is used to ensure that the network will be able to deliver the quality levels expected by customers. It is also one of the main inputs into the development of Vector's Asset Management Plan.

Network Modelling

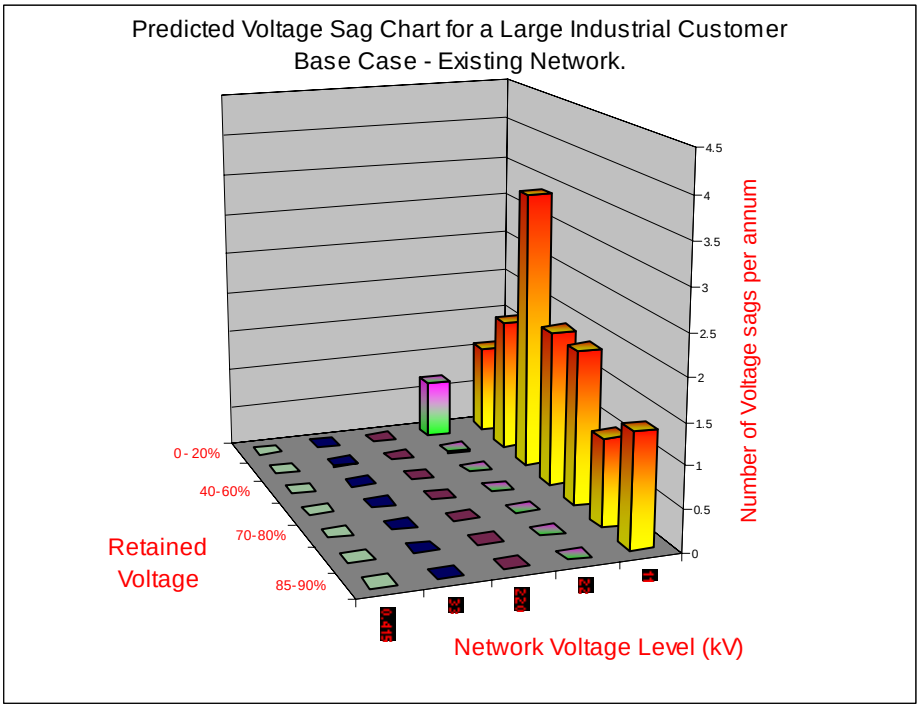
120 A key tool that Vector uses to understand quality performance in each area of its network is a network modelling tool. Vector uses a sophisticated approach to network modelling in order to simulate the workings of its network. Essentially, all our electricity network components (e.g. overhead lines, underground cables, transformers, switchgear) are modelled in entirety, starting from Transpower Grid Exit Points (GXPs) down to distribution transformers[13]. The model can also 'drill down' in order to simulate the workings of a segment of the network down to each distribution transformer. To the best of our knowledge, this model is the most comprehensive and largest of its kind in New Zealand.

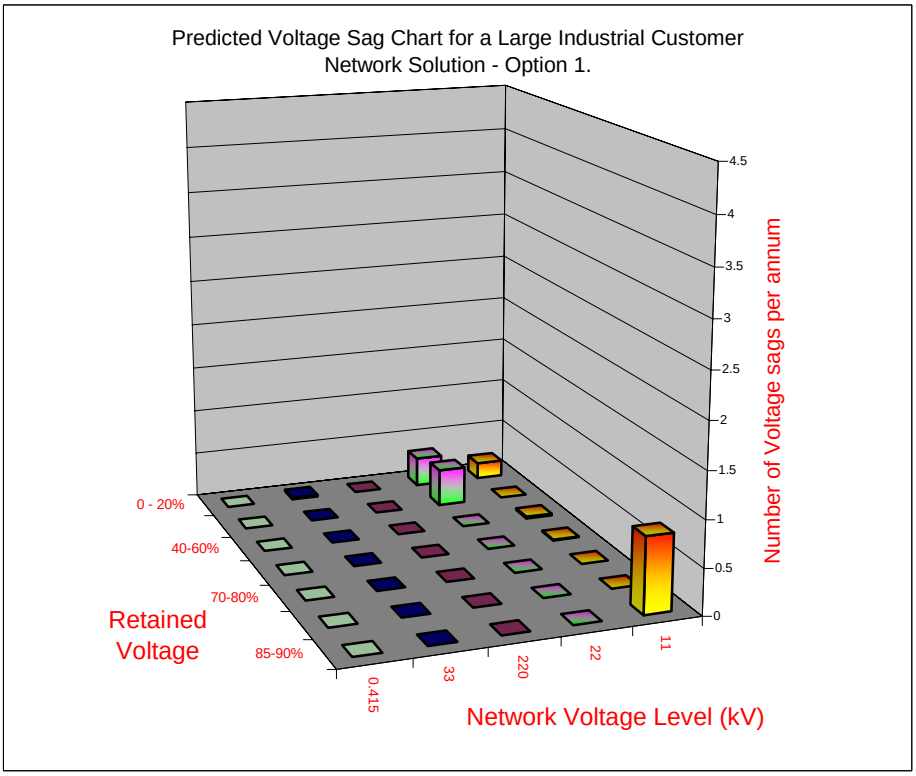
121 The model allows Vector to simulate and analyse the effect that possible changes or events may have on the network. Thus, it can be used to run scenario tests, in order to analyse the impact of equipment failure, storms and other extreme events on reliability, as well as the effect of adding or removing load at different locations around the network. This allows Vector to identify parts of the network that could be improved and, accordingly, to plan efficient maintenance and investment around these weak links to improve reliability.

122 Importantly, the model also allows Vector to provide customers (mostly large

[13] These, on average supply 50-60 residential customers, or one industrial customer.

commercial and industrial) who are considering a new connection or a possible change to the quality of their supply, with detailed information about, and analysis of, different possible scenarios (often involving a price-quality trade-off). This information shows the customer what changes they are likely to see in terms of reliability and power quality, should they go ahead with a particular option.





123 Although this model is rarely used as a tool for direct engagement with residential and small commercial customers, the analysis carried out using the model feeds directly into the Asset Management Planning Process, to select those projects that contribute most to the achievement of the targeted quality of service on the network.

Performance Incentives

124 Maintenance contractors are incentivised under the performance nature of their contracts to manage the operation and maintenance of the network to achieve zone targets. All of Vector's maintenance contractors (Northpower, Energex and Siemens) have zonal SAIFI and CAIDI targets (in addition to other incentive targets related to customer satisfaction and Vector's satisfaction), against which Vector measures their performance. The service providers' performance against these targets directly affects the amounts paid by Vector for the services rendered.

Other

125 In addition to actions designed to meet SAIFI and CAIDI performance targets, some examples of process improvement based on customer engagement in the last 24 months include:

Type of Customer Engagement	Changed Outcome
Customers on the Northern and Wellington networks wishing to speak directly to the Lines company in fault situations.	• Management of all compensation requests directly rather than through the retailer following the July 2007 storm, outages in CBD Wellington December 07and February 08. • Face to face contact with customers in escalated fault situations either by Vector Customer Service staff or Vector's field staff. • Customer Services on call staff 24/7 for escalated customer issues. • Letter drops from Vector to customers in areas affected by multiple faults.
Vector engaged directly with customers on the Auckland network regarding complaints after the significant storm in July 2007.	• Development of standard message templates for the Avalanche messaging service • Development of web site information in storm situations (currently project in progress)

Vector engaged directly with customers on the Northern network regarding complaints after the significant storm in July 2007.	• Development of improved communications to retailer call centres. • Development of standard templates to make updates to retailers more simple and easier to provide back to customers. • Development of standard message templates for the Avalanche messaging service. • Development of web site information in storm situations (currently project in progress).
General feedback from customers in regard to which company should manage faults calls for lines companies.	• Agreement with Mercury Energy and Contact Energy to provide third party call centre services.
Customer meeting with Omaha community.	• Development of a contingency plan to provide alternative supply via generation in extended outage situations.
Comments from customers regarding call centre performance from Customer Satisfaction surveys.	• Focus group sessions with Telnet to improve performance in areas identified as a weakness.
Comments from customers regarding field services performance from Customer Satisfaction surveys.	• Focus group sessions with Faults staff to improve performance in areas identified as a weakness.
Complaint from customer regarding notification process for First Cut and Trim. The incorrect customer was notified via letter drop.	• All First Cut and Trim notifications must now be signed before work is conducted. • Reassessment of all written material supplied to customers relating to the first cut and trim process.

126 As a direct result of the July 2007 storm (refer to Reliability section of this report) Vector has been strengthening our storm response procedures. A team has been put in place to focus on three main areas:

- Predicting possible damage to our network and subsequent customer outage durations by modelling previous storms.
- Providing the ability to change our storm processes and response by applying severity categories to events.
- Developing a suite of standard templates and processes enabling us to communicate quickly to large volumes of customers via media and call centres.

127 Vector continues to engage with customers during outages and where necessary install temporary generation to restore power quicker at no extra cost. Vector has invested heavily into providing generator connection points throughout the networks and has purchased two Mobile Generator Connection Units (MGCUs). The

MGCUs allow us to connect standard 400V generators to our network at 11kV, enabling the generators to supply more customers.

128 Vector participated in a Trans-Tasman benchmarking exercise to explore the ways electricity distribution businesses are shaping their business behaviours and culture to support reliability strategies. Although there were three improvement opportunities identified, the study recommendations did not see these as urgent priorities due to Vector's solid performance in reliability thresholds.

APPENDICES

Appendix 2-1 Calculation of SAIDI and SAIFI figures for the purposes of S6(1)(A) and 6(1)(B)

Event_CauseResponsibility	(All)

Excluding Transpower

SumOfEvent_CustMins.	Region_Name			
DISCLOSURE_YEAR	Auckland	Northern	Wellington	Grand Total
98/99	20,937,255	36,432,001	5,325,964	62,695,220
99/00	14,944,847	19,358,545	4,374,432	38,677,824
00/01	13,070,886	25,576,088	4,315,737	42,962,711
01/02	14,018,590	26,774,194	3,542,016	44,334,800
02/03	20,035,481	41,183,159	4,493,664	65,712,304
03/04	18,067,518	36,529,672	11,769,009	66,366,199
04/05	18,032,508	29,006,503	6,288,957	53,327,968
05/06	26,509,646	45,946,317	4,980,649	77,436,612
06/07	30,555,223	40,852,313	5,583,921	76,991,457
07/08	28,417,145	101,216,412	5,111,293	134,744,850
Grand Total	204,589,099	402,875,204	55,785,642	663,249,945

Event_CauseResponsibility	(All)

Excluding Transpower

SumOfEvent_CustAffec.	Region_Name			
DISCLOSURE_YEAR	Auckland	Northern	Wellington	Grand Total
98/99	309,937	449,658	79,471	839,066
99/00	263,966	357,669	57,094	678,729
00/01	261,162	380,458	59,125	700,745
01/02	217,055	437,458	63,038	717,551
02/03	326,204	582,197	65,195	973,596
03/04	270,208	550,391	99,476	920,075
04/05	247,404	433,458	60,717	741,579
05/06	380,683	533,317	80,085	994,085
06/07	351,821	490,829	103,168	945,818
07/08	299,682	625,592	83,057	1,008,331
Grand Total	2,928,122	4,841,027	750,426	8,519,575

BENCHMARK				
Year	CustMins	CustAffec	SAIDI	SAIFI
98/99	62,695,220	839,066	109.44	1.46
99/00	38,677,824	678,729	66.24	1.16
00/01	42,962,711	700,745	72.54	1.18
01/02	44,334,800	717,551	73.46	1.19
02/03	65,712,304	973,596	105.62	1.56
Average			**85.46**	**1.31**
REGULATED YEARS	CustMins	CustAffec	SAIDI	SAIFI
03/04	66,366,199	920,075	104.38	1.45
04/05	53,327,968	741,579	82.54	1.15
05/06	77,436,612	994,085	118.10	1.52
06/07	76,991,457	945,818	115.60	1.42
07/08	134,744,850	1,008,331	**199.43**	**1.49**

Customer Numbers

YEAR	NORTHERN	WELLINGTON	AUCKLAND	VECTOR	Regulation Year	Regulation Customers[14]
1-Apr-94	157,978	134,830	242,066	534,874		
1-Apr-95	157,978	136,852	243,104	537,934		
1-Apr-96	160,313	138,905	249,622	548,840		
1-Apr-97	164,587	140,989	251,490	557,066		
1-Apr-98	173,802	143,104	252,361	569,267		
1-Apr-99	173,802	145,250	257,478	576,530	98/99	572,898
1-Apr-00	175,285	147,429	268,621	591,335	99/00	583,933
1-Apr-01	181,266	150,493	261,500	593,259	00/01	592,297
1-Apr-02	185,918	152,595	275,329	613,842	01/02	603,551
1-Apr-03	190,074	154,554	285,850	630,478	02/03	622,160
1-Apr-04	192,075	156,357	292,739	641,171	03/04	635,825
1-Apr-05	196,828	158,462	295,763	651,053	04/05	646,112
1-Apr-06	198,309	158,647	303,391	660,347	05/06	655,700
1-Apr-07	201,334	160,602	309,742	671,678	06/07	666,013
1-Apr-08	204,268	162,349	312,996	679,613	07/08	675,646

Note to reliability data tables

129 In relation to the Northern and Wellington networks acquired in October 2002, the historical information has been prepared from records acquired with the business. In some cases these records have been limited and are not consistent with other operational network management systems. We are satisfied that the information available is reliable and has been consistently compiled for the purposes of the preparation of the calculations.

[14] Average of customers at period start and period end.

Appendix 2-2 NIWA Summary of the July 2007 Storm

The following report, prepared by NIWA, overviews the climactic conditions experienced during the storm of 10-11 July 2007:

BRIEF SUMMARY OF THE 9-11 JULY 2007 WEATHER EVENT

- **Severe weather – Northern North Island, 9-11 July**

A state of emergency was declared in the far north of the North Island as gale easterlies and flood-producing rainfall, due to the passage of a deep depression with an intense pressure gradient, tracked across the north of the North Island. The intense flood-producing rainfall did not spread much further south than Whangarei. However, *damaging winds did*, affecting parts of Auckland and the Coromandel.

The *damaging winds* were relevant to Vector's Northern and Auckland regions, resulting in fallen trees, broken power lines, as well as structural damage. In central Auckland, a roof was lifted off an apartment block, and two motorcyclists were blown off their bikes on the Auckland Harbour Bridge. Several large containers were toppled at Auckland's Bledisloe Wharf, and two boats washed ashore at Torpedo Bay in Devonport. Damaged power lines meant that thousands of people were without electricity and many without land-line phone usage. Major power outages occurred in Auckland's East Coast Bays districts, and as far north as Warkworth.

A wind gust as high as 180 km/h was recorded on the offshore island of Tititiri Matangi (just east of Whangaparaoa Peninsula) and 148 km/h at Mokohinau Island, well north of Auckland, during this event. However, these sites are well offshore. At land-based Auckland recording sites, easterly gust speeds of near or above 100 km/h were measured during the evening of 10 July 2007, being most intense in Auckland at about 7 pm.

Rainfall in Warkworth totalled 50 mm for the 24 hours between 9am 10 July and 9am 11 July, and most gauges further south (in Auckland) recorded 20 mm or less over the same period. Warkworth's rainfall was moderate in intensity (1.2 to 5.9 mm per hour) between 4am on the 10 July and 8am on the 11 July. Further south, in Auckland, the duration of rainfall was shorter, and its intensity weaker.

- **Maximum wind gusts**

The table below shows maximum daily wind gusts and the direction they were from for the 10 July 2007 event in the Northern and Auckland regions.

Station name	Warkworth EWS		Whangaparaoa AWS		Auckland Airport	
Date	Direction	Speed (km/h)	Direction	Speed (km/h)	Direction	Speed (km/h)
10-Jul-2007	E	119	E	98*	E	96

** Mean speed (gusts will have been higher)*

The following table shows, for each site, the two most recent dates for which stronger gusts (than those of 10 July 2007) were recorded from the same direction (E) at that site and the strength of that gust. If there was no stronger gust the two next strongest gusts are shown.

Station name	Warkworth EWS		Whangaparaoa AWS		Auckland Airport	
	Date	Speed (km/h)	Date	Speed (km/h)	Date	Speed (km/h)
	16-Jul-2000	83	20-Jun-2002	85*	18-Sep-1985	98
	28-Mar-2003	76	28-Nov-1998	85*	13-Apr-1981	109
Start of record	1-Nov-1999		30-Nov-1986		1-Jul-1971	

** Mean speed (gusts will have been higher)*

ARI estimates (in years) for the storm of 10 July 2007 have been calculated for those stations in Vector's Northern and Auckland regions that have an appropriate length of homogeneous record and are presented below. Warkworth is omitted as it has an insufficient record length to confidently estimate gust return periods. However, the easterly gust speed of 10 July 2007 is much higher than any previously recorded. At Whangaparaoa the peak mean wind speed has been used, as the daily gust speed is not recorded.

Station name	Whangaparaoa			Auckland Airport		
Date	Direction	Speed (km/h)	ARI (years)	Direction	Speed (km/h)	ARI (years)
10-Jul-2007	E	98*	>20	E	96	19

** Peak mean speed used, as daily gust not recorded*

In summary, ARI for the easterly winds of 10 July 2007, recorded at for both Whangaparaoa and Auckland Airport were significant, being close to 20 years. Rainfall was greater in the north, but not particularly high.

Appendix 2-3 Beaufort wind scale (as supplied by NIWA)

The Beaufort scale of wind force

		Mean speed*	Mean speed*	Mean speed*	Approx. Wind Pressure	
Beaufort Number	**Classification**	**km/h**	**knots**	**m/s**	**Pa**	**Description of effects**
0	Calm	<1	<1	0-0.2	0	Smoke rises vertically
1	Light Air	1 – 5	1 – 3	0.3 – 1.5	0.5	Smoke drifts
2	Slight Breeze	6 - 11	4 – 6	1.6 -3.3	5	Wind felt on face, leaves rustle
3	Gentle Breeze	12 - 19	7 - 10	3.4 -5.4	10	Small twigs in constant motion, flags flap
4	Moderate Breeze	20 – 28	11 - 16	5.5 – 7.9	25	Raises dust and loose paper, small branches are moved
5	Fresh Breeze	29- 38	17 - 21	8.0 – 10.7	50	Small trees in leaf begin to sway
6	Strong Breeze	39 – 49	22 - 27	10.8 – 13.8	90	Large branches in motion, some whistling, umbrellas used with difficulty
7	Near Gale	50 – 61	28 - 33	13.9 – 17.1	145	Whole trees in motion, inconvenience when walking against wind
8	Gale	62 – 74	34 - 40	17.2 – 20.7	215	Breaks twigs break off, generally impedes progress
9	Strong gale	75 – 88	41 - 47	20.8 – 24.4	305	Slight structural damage may occur
10	Storm	89 - 102	48 - 55	24.5 – 28.4	420	Trees uprooted, considerable structural damage
11	Violent Storm	103 - 117	56 - 63	28.5 – 32.6	560	Widespread damage
12	Hurricane Force	118+	64+	32.7+	640	Extreme destruction

*Note that gust speeds are higher than the mean speed