Electricity Distribution Services Default Price-Quality Path Determination 2015

Annual Compliance Statement

20 May 2016

Assessment as at 31 March 2016

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INTRODUCTION

1.1. Background

1.1.1 This Annual Compliance Statement ("the Statement") is submitted by Vector Limited ("Vector") pursuant to clause 11 of the Electricity Distribution Services Default Price-Quality Path Determination 2015 ("the Determination").

1.1.2 The Determination is issued pursuant to Part 4 of the Commerce Act 1986 and requires a non-exempt supplier of lines services ("EDB") to provide information to the Commerce Commission ("the Commission") relevant to the assessment of their performance against the price path and quality standards.

1.1.3 Under clause 8 of the Determination an EDB's notional revenue must not exceed the allowable notional revenue during the current Assessment Period.

1.1.4 Under clause 9 of the Determination an EDB's assessed reliability values either must not exceed the reliability limits for the current Assessment Period or must not have exceeded the reliability limit for either of the two immediately preceding Assessment Periods.

1.1.5 The Statement has been approved for issue on 20 May 2016. In the Statement, references to Vector relate only to Vector's electricity distribution business.

1.2. Statement of compliance

1.2.1 As required by clause 11.2(a) of the Determination, this Statement confirms Vector's compliance with the price path in clause 8 and sets out Vector's non-compliance with the quality standards in clause 9 in respect of the Assessment Period ending on 31 March 2016.

1.2.2 As required by clause 11.2(d)(i) of the Determination, this statement confirms that Vector has undertaken a Restructure of Prices during the Assessment Period (detail provided in Section 2.4).

1.2.3 As required by clause 11.2(d)(ii) of the Determination, this statement confirms that Vector has received a transfer of transmission assets from Transpower that become System Fixed Assets. This took the form of a purchase of a cable trough constructed by Transpower at their Penrose GXP. By its static nature, a trough is

not a network operative element and does not have any direct impact on SAIDI and SAIFI, so there is no impact on any re-calculation of quality measures under 11.5(d).

1.2.4 As required by clause 11.2(d)(iii) – (iv) of the Determination, this statement confirms that no Amalgamation or Merger has occurred in the Assessment Period and no Major Transaction has occurred in the Assessment Period.

1.3. Disclaimer

1.3.1 The information contained in this Statement has been prepared for the express purpose of complying with the requirements of clause 11 of the Determination. This statement has not been prepared for any other purpose. Vector expressly disclaims any liability to any other party who may rely on this statement for any other purpose.

1.3.2 For presentation purposes some numbers in this document have been rounded. In most cases calculations are based on more detailed numbers. This may cause small discrepancies or rounding inconsistencies when aggregating some of the information presented in this document. These discrepancies do not affect the overall compliance calculations which are based on the more detailed information.

PRICE PATH

2.1 Introduction

2.1.1 In this section Vector demonstrates that it has complied with the price path requirements (clause 8) of the Determination.

2.2 Price path (clause 8 of the Determination)

2.2.1 As required by clause 8 of the Determination, in order to demonstrate compliance with the price path, an EDB must demonstrate that their notional revenue during the Assessment Period has not exceeded the allowable notional revenue for the Assessment Period. The current Assessment Period is the first Assessment Period of the Determination and covers the 12 months to 31 March 2016.

2.2.2 As outlined in the calculation below, Vector complies with the price path:

$$NR_{2016} \leq ANR_{2016}$$

$$\$387,159,023 \leq \$387,229,352$$

2.2.3 Notional revenue for the 2016 Assessment Period:

$$NR_{2016} = \sum DP_{i,2016} Q_{i,2014}$$

$$NR_{2016} = \$387,159,023$$

Details of $\sum DP_{i,2016} Q_{i,2014}$ are included in Appendix 2.

2.2.4 The calculation of allowable notional revenue for the 2016 Assessment Period is set out in Schedule 3A of the Determination:

$$ANR_{2016} = MAR_{2016} / \Delta D$$

$$ANR_{2016} = \$395,245,000 / 1.0207$$

$$ANR_{2016} = \$387,229,352$$

MAR_{2016} and ΔD are set out in Schedule 1 of the Determination.

2.2.5 The Pass-through Balance for the 2016 Assessment Period is:

$$PTB_{2016} = \sum PTP_{i,2016} Q_{i,2016} - K_{2016} - V_{2016} + PTB_{2015}\,(1 + r)$$

$$PTB_{2016} = \$225,113,446 - \$11,453,239 - \$208,981,548 + 0$$

$$PTB_{2016} = \$4,678,659$$

Details of $\sum PTP_{i,2016} Q_{i,2016}$ are included in Appendix 3.
Details of K_{2016} and V_{2016} are included in Section 2.5.
PTB_{2015} is nil as per clause 8.6(a) of the Determination.

2.3 Distribution and Pass-through Prices

2.3.1 Interested parties may refer to Vector's *Pricing Methodology*[1] where we have set out in detail our methodology used to calculate Distribution Prices and Pass-through Prices.

2.3.2 The Distribution Prices and Pass-through Prices published in the *Pricing Methodology* contained an arithmetic error that if applied would mean Pass-through prices would recover approximately $1 million more than the Pass-through and Recoverable costs forecast for this Assessment Period. The error had no impact on total prices and only impacted how total prices were split between the Distribution and Pass-through components. Vector has used the correct Distribution Price and Pass-through Price splits for this Compliance Statement.

2.3.3 For each Pass-through Price, all of the price is attributable to Pass-through Costs and Recoverable Costs for the 2016 Assessment Period. No portion is attributable to under- or over-recovery from a prior Assessment Period.

2.3.4 Distribution Prices and Pass-through Prices are set out in Appendix 1.

2.4 Restructure of Prices

2.4.1 Vector undertook three Restructures of Prices during the 2016 Assessment Period:

- For the AHVN and WHVN price categories, Vector introduced an additional eligibility criterion limiting these categories to connections with installed capacity less than or equal to 345 kVA.

[1] See http://vector.co.nz/documents/101943/102886/2015+Electricity+Pricing+Methodology.pdf, section 11.

- For the ALVT, ATXT and AHVT[2] price categories, Vector combined the four seasonal volume prices (SMDY, SMNT, WNDY, WNNT) into a single volume price (24UC).
- For the ARHL, ARHS, WRHL and WRHS price categories, Vector moved from a peak—shoulder—off-peak structure to a peak—off-peak structure by removing the SHLD volume price and adjusting the time periods during which the PEAK and OFPK volume prices applied.

2.4.2 Vector did not derive Quantities under clause 8.10 for any of these Restructures:

- No connections were impacted by the Restructure of the AHVN and WHVN price categories.
- For the ALVT, ATXT and AHVT price categories, Vector allocated all Quantities from the four seasonal volume prices (SMDY, SMNT, WNDY, WNNT) to the new volume price (24UC).
- There were no connections on the ARHL, ARHS, WRHL or WRHS price categories at the time of the Restructure and therefore no Quantities to allocate.

2.5 Pass-through and recoverable costs

2.5.1 Table 2 below sets out the forecast pass-through and recoverable costs used to set prices ($K_{2016,forecast}$ and $V_{2016,forecast}$) and actual pass-through and recoverable costs (K_{2016} and V_{2016}) used in the calculation of the Pass-through Balance for the 2016 Assessment Period.

Table 2: Summary of $K_{2016,forecast}$, K_{2016}, $V_{2016,forecast}$ and V_{2016} for the 2016 Assessment Period

		$K_{2016,forecast}$		K_{2016}
Pass-through costs	**$**	**12,294,619**	**$**	**11,453,239**
Rates	$	9,035,009	$	8,838,007
Electricity Authority levies	$	2,049,033	$	1,497,960
Commerce Act levies	$	969,404	$	852,178
EGCC levies	$	241,174	$	265,095

		$V_{2016,forecast}$		V_{2016}
Recoverable costs	**$**	**209,077,426**	**$**	**208,981,548**
Transmission charges	$	209,077,426	$	208,981,548

2.5.2 Variances between pass-through and recoverable costs used to set prices and the same costs measured at the end of the Assessment Period arise due

[2] These price categories were previously known as ALVH, ATXH and AHVH respectively.

to the need to forecast these costs ex-ante, with the actual costs being determined ex-post. None of the costs are fully fixed and variances will naturally occur. We set out the main reasons for these variances in the table below.

Cost	Key reason(s) for variance
Rates	• Forecast based on council-generated estimates provided prior to finalisation of council 10 year plan
Electricity Authority levies	• Significant decrease in the levy rate for the category 'Registry and Consumer' • Additional 2015 levies not carried over to 2016 as assumed at time of setting prices
Commerce Act levies	• Updated RAB values used to calculate levies • Lower than forecast reduction in electricity industry levy
EGCC levies	• Per ICP levy rate higher than forecast
Transmission charges	• Later than expected commissioning of Pakuranga additional 33kV feeders • Lower than forecast new investment charge for Hobson Street GXP

QUALITY STANDARDS

3.1 Introduction

3.1.1 In this section Vector demonstrates that it has not complied with the quality standards detailed in clause 9 of the Determination. Vector has provided information to illustrate the statement of non-compliance including: SAIDI and SAIFI Assessed Values, Limits, Unplanned Boundary Values, Caps, Collars, Targets for the Assessment Period, supporting calculations and the annual reliability assessments for the five previous Assessment Periods. Furthermore, Vector has included reasons for not complying with the annual reliability assessment and documented actions taken to mitigate and prevent non-compliance in future Assessment Periods. Finally, Vector has provided a description of the policies and procedures for recording SAIDI and SAIFI statistics and documented the cause of each Major Event Day within the Assessment Period.

3.2 Quality standards (clause 9 of the Determination)

3.2.1 As required by clause 9 of the Determination, in order to demonstrate compliance with the quality standards (per clause 9.1) in respect of each Assessment Period, EDB's must either:

a) Comply with the annual reliability assessment specified in clause *9.2* for that Assessment Period; or

b) Have complied with those annual reliability assessments for the two immediately preceding Assessment Periods.

3.2.2 Vector does not comply with either of the quality standards in clause 9.1. As outlined in the calculations below, Vector has exceeded the annual reliability assessment requirement for SAIDI specified in clause 9.2(a) of the Determination for the 2016 Assessment Period. Vector also exceeded the annual reliability assessment requirement for SAIDI for the two previous Assessment Periods.

3.3 Assessed Values

3.3.1 SAIDI and SAIFI values were calculated for the 2016 Assessment Period, incorporating Class B and Class C interruption types (planned interruptions and unplanned interruptions originating within the system fixed assets) per connection point served during the period. Average connection point numbers for the year were used in the calculation.

3.3.2 Results of this Assessment Period and previous Assessment Periods (normalised) are summarised below. An explanation of the reasons for exceeding the SAIDI Limit for the 2016 Assessment Period is provided in Appendix 5.

Period	$SAIDI_{assess}$	$SAIDI_{limit}$	SAIDI Outcome	$SAIFI_{assess}$	$SAIFI_{limit}$	SAIFI Outcome
2011	114	127	Not Exceeded	1.24	1.86	Not Exceeded
2012	95.7	127	Not Exceeded	1.12	1.86	Not Exceeded
2013	95.8	127	Not Exceeded	1.01	1.86	Not Exceeded
2014	141	127	Exceeded	1.45	1.86	Not Exceeded
2015	155	127	Exceeded	1.84	1.86	Not Exceeded
2016	117	104	Exceeded	1.11	1.40	Not Exceeded

3.3.4 Calculation of the SAIDI and SAIFI Assessed Values is as per that described in Schedule 4A of the Determination.

3.3.5 The SAIDI Assessed Value ($SAIDI_{assess}$) for the Assessment Period is calculated in accordance with the formula –

$$SAIDI_{assess} = (0.5 \times SAIDI_B) + SAIDI_C$$

Where –

$SAIDI_B$ is the sum of the daily SAIDI Values for Class B Interruptions commencing within the Assessment Period; and

$SAIDI_C$ is the sum of the daily SAIDI Values for Class C Interruptions commencing within the Assessment Period, where any daily SAIDI Value for Class C Interruptions greater than the SAIDI Unplanned Boundary Value equals the SAIDI Unplanned Boundary Value.

Quality Metric	Formula	RY2016 Total
Planned SAIDI	$(0.5 \times SAIDI_B)$	10
Unplanned SAIDI	$SAIDI_C$	107
SAIDI Assessed Value	$SAIDI_{assess} = (0.5 \times SAIDI_B) + SAIDI_C$	117

3.3.6 The SAIFI Assessed Value ($SAIFI_{assess}$) for the Assessment Period is calculated in accordance with the formula –

$$SAIFI_{assess} = (0.5 \times SAIFI_B) + SAIFI_C$$

Where –

$SAIFI_B$ is the sum of the daily SAIFI Values for Class B Interruptions commencing within the Assessment Period; and

$SAIFI_C$ is the sum of the daily SAIFI Values for Class C Interruptions commencing within the Assessment Period, where any daily SAIFI Value for Class C Interruptions greater than the SAIFI Unplanned Boundary Value equals the SAIFI Unplanned Boundary Value.

Quality Metric	Formula	RY2016 Total
Planned SAIFI	$(0.5 \times SAIFI_B)$	0.05
Unplanned SAIFI	$SAIFI_C$	1.06
SAIFI Assessed Value	$SAIFI_{assess} = (0.5 \times SAIFI_B) + SAIFI_C$	1.11

3.3.7 The SAIDI Limits, SAIFI Limits, SAIDI Unplanned Boundary Values and SAIFI Unplanned Boundary Values, for Vector for the Regulatory Period 1 April 2015 to 31 March 2020, as set out in Table 4A.1 in the Determination, are as follows:

Non-exempt EDB	SAIDI Limit	SAIDI Unplanned Boundary Value	SAIFI Limit	SAIFI Unplanned Boundary Value
Vector	104.173	3.374	1.395	0.039

3.3.8 The SAIDI Target, SAIDI Collar, and SAIDI Cap for Vector during the Regulatory Period 1 April 2015 to 31 March 2020, as set out in Table 5B.1 in the Determination, are as follows:

Non-exempt EDB	SAIDI Target	SAIDI Collar	SAIDI Cap
Vector	96.0364	87.8999	104.1728

3.3.9 The SAIFI Target, SAIFI Collar, and SAIFI Cap for Vector during the Regulatory Period 1 April 2015 to 31 March 2020, as set out in Table 5B.1 in the Determination, are as follows:

Non-exempt EDB	SAIFI Target	SAIFI Collar	SAIFI Cap
Vector	1.2914	1.1874	1.3954

3.4 Major Event Days within the Assessment Period

3.4.1 Within the 2016 Assessment Period Vector experienced three Major Event Days. The results of these days are summarised below with the $SAIDI_C$ and $SAIFI_C$ values highlighted where the SAIDI / SAIFI Unplanned Boundary Value is used in the SAIDI / SAIFI Assessed Values calculation. The cause of each Major Event Day is provided in Appendix 4.

Major Event Days Contributing to the SAIDI / SAIFI Assessed Values				
Date	$SAIDI_C$	SAIDI Unplanned Boundary Value	$SAIFI_C$	SAIFI Unplanned Boundary Value
1 January 2016	3.705	3.374	0.024	0.039
23 March 2016	3.266	3.374	0.043	0.039
24 March 2016	10.84	3.374	0.055	0.039

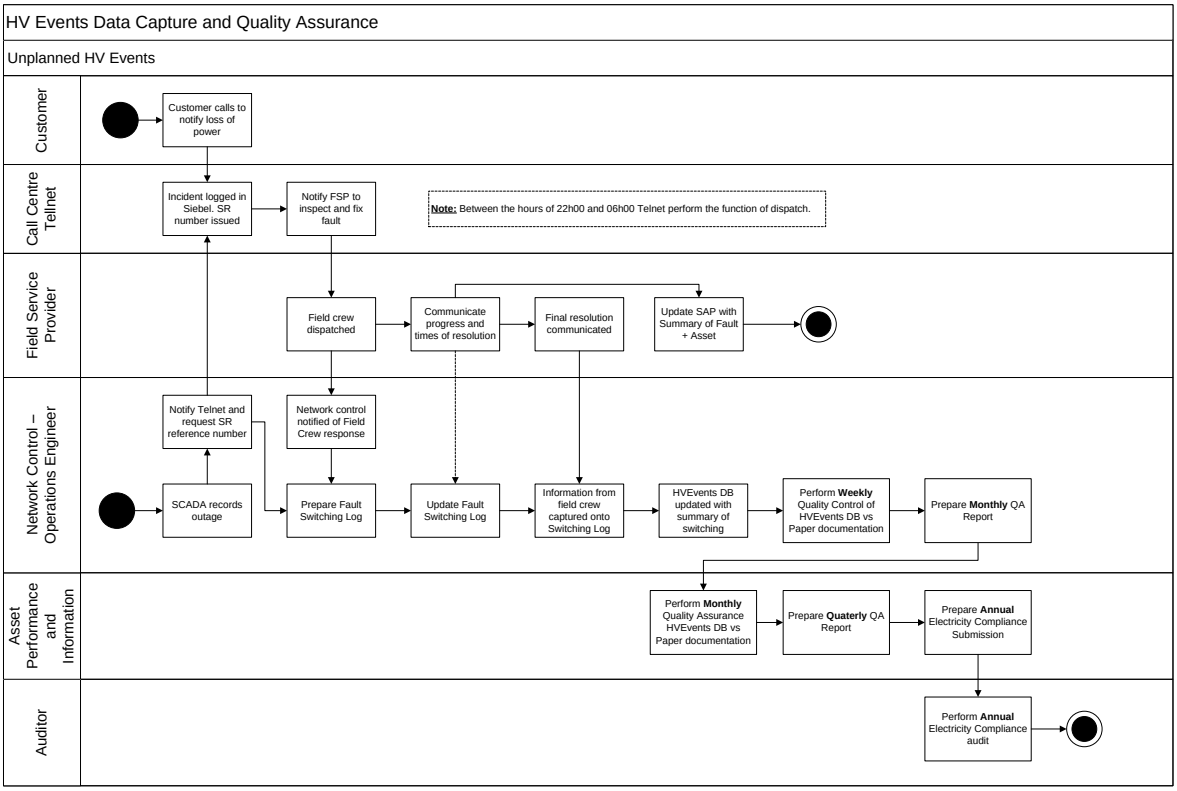
3.5 Policies and procedures for recording SAIDI and SAIFI

3.5.1 Vector's Electricity Operations Centre (EOC) is responsible for managing the electricity network. Resolution of planned and unplanned events is under direction of the duty control room engineer. The EOC also manages the network in accordance with Vector's standard ENG-0051 'Electricity network guidelines: HV Events data capture and quality assurance'. This standard defines the end-to-end process for capturing and reporting reliability performance data.

3.5.2 The majority of medium voltage and high voltage interruptions are monitored and controlled in real-time by the EOC through Vector's SCADA system. Where equipment is involved that is not SCADA enabled, it is

operated by Vector's service providers, with communication to the EOC by radio. All planned and unplanned records are captured by the network control engineer both in hard copy (electricity fault switching log) and electronically (the HVEvents database described below). All interruptions are also logged and tracked separately in Vector's Customer Management System by Vector's customer services team.

3.5.2 Vector maintains a bespoke system for recording interruptions, HVEvents. HVEvents holds a replica of Vector's high voltage and medium voltage network structure, including customer numbers. The EOC engineers record details of all network interruptions, in accordance with the standard ENG-0051. For each interruption, the event type, location, duration and number of customers affected is identified. HVEvents is also used to prioritise network reconfiguration and restoration after an event. The figure below illustrates the HVEvents data capture process and the quality assurance carried out on outage information.



3.5.3 SAIDI and SAIFI are calculated in HVEvents for each interruption, and the data retained in a database for reporting and analysis.

3.5.4 Network performance and quality assurance is provided through ongoing review of all the data captured in HVEvents by the network performance

team, comprising representatives from Asset Resilience, Customer Services and Network Operations. Significant equipment-related incidents are cross-checked with the relevant asset engineer in order to identify root causes of incidents, and to put in place corrective actions as appropriate.

3.5.4 At the end of each year the period's average network customer base is calculated using the Gentrack billing and revenue system (averaging customers at the start and end of the year). The following reliability metrics are extracted from the HVEvents database for disclosure reporting:

- Interruption frequency and duration by class;
- Interruption frequency and duration by cause;
- Interruption frequency and duration by main equipment involved; and
- SAIDI/SAIFI/CAIDI (calculated using average customer count).

APPENDICES

Appendix 1: Details of $DP_{i,2016}$ and $PTP_{i,2016}$

Northern published prices

Residential

Price category	Code	Description	Units	$DPi,2016$	$PTPi,2016$	Price
WRCL	WRCL-FIXD	Fixed	$/day	0.1500	-	0.1500
WRCL	WRCL-AICO	Variable, controlled	$/kWh	0.0630	0.0300	0.0930
WRUL	WRUL-FIXD	Fixed	$/day	0.1500	-	0.1500
WRUL	WRUL-24UC	Variable, uncontrolled	$/kWh	0.0630	0.0380	0.1010
WRCS	WRCS-FIXD	Fixed	$/day	0.9800	-	0.9800
WRCS	WRCS-AICO	Variable, controlled	$/kWh	0.0252	0.0300	0.0552
WRUS	WRUS-FIXD	Fixed	$/day	0.9800	-	0.9800
WRUS	WRUS-24UC	Variable, uncontrolled	$/kWh	0.0252	0.0380	0.0632
WRHL	WRHL-FIXD	Fixed	$/day	0.1500	-	0.1500
WRHL	WRHL-OFPK	Variable, off peak	$/kWh	0.0630	-	0.0630
WRHL	WRHL-PEAK	Variable, peak	$/kWh	0.0630	0.1253	0.1883
WRHS	WRHS-FIXD	Fixed	$/day	0.9800	-	0.9800
WRHS	WRHS-OFPK	Variable, off peak	$/kWh	0.0252	-	0.0252
WRHS	WRHS-PEAK	Variable, peak	$/kWh	0.0252	0.1253	0.1505

Business

Price category	Code	Description	Units	$DPi,2016$	$PTPi,2016$	Price
WBSU	WBSU-FIXD	Fixed	$/day/fitting	0.1400	-	0.1400
WBSU	WBSU-24UC	Variable	$/kWh	0.0372	0.0380	0.0752
WBSN	WBSN-FIXD	Fixed	$/day	0.9800	-	0.9800
WBSN	WBSN-24UC	Variable	$/kWh	0.0252	0.0380	0.0632
WBSH	WBSH-FIXD	Fixed	$/day	0.9800	-	0.9800
WBSH	WBSH-OFPK	Variable, off peak	$/kWh	0.0252	-	0.0252
WBSH	WBSH-PEAK	Variable, peak	$/kWh	0.0252	0.1253	0.1505

Low voltage

Price category	Code	Description	Units	$DPi,2016$	$PTPi,2016$	Price
WLVN	WLVN-FIXD	Fixed	$/day	5.5000	-	5.5000
WLVN	WLVN-24UC	Variable	$/kWh	0.0242	0.0199	0.0441
WLVN	WLVN-CAPY	Capacity	$/kVA/day	0.0266	-	0.0266
WLVN	WLVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
WLVH	WLVH-FIXD	Fixed	$/day	10.3800	-	10.3800
WLVH	WLVH-24UC	Variable	$/kWh	0.0057	-	0.0057
WLVH	WLVH-CAPY	Capacity	$/kVA/day	0.0266	-	0.0266
WLVH	WLVH-DAMD	Demand	$/kVA/day	0.0389	0.2430	0.2819
WLVH	WLVH-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

Transformer

Price category	Code	Description	Units	$DPi,2016$	$PTPi,2016$	Price
WTXN	WTXN-FIXD	Fixed	$/day	4.9500	-	4.9500
WTXN	WTXN-24UC	Variable	$/kWh	0.0198	0.0199	0.0397
WTXN	WTXN-CAPY	Capacity	$/kVA/day	0.0261	-	0.0261
WTXN	WTXN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
WTXH	WTXH-FIXD	Fixed	$/day	9.3400	-	9.3400
WTXH	WTXH-24UC	Variable	$/kWh	0.0056	-	0.0056
WTXH	WTXH-CAPY	Capacity	$/kVA/day	0.0261	-	0.0261
WTXH	WTXH-DAMD	Demand	$/kVA/day	0.0333	0.2430	0.2763
WTXH	WTXH-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

High voltage

Price category	Code	Description	Units	$DPi,2016$	$PTPi,2016$	Price
WHVN	WHVN-FIXD	Fixed	$/day	4.8000	-	4.8000
WHVN	WHVN-24UC	Variable	$/kWh	0.0186	0.0199	0.0385
WHVN	WHVN-CAPY	Capacity	$/kVA/day	0.0253	-	0.0253
WHVN	WHVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
WHVH	WHVH-FIXD	Fixed	$/day	9.0600	-	9.0600
WHVH	WHVH-24UC	Variable	$/kWh	0.0054	-	0.0054
WHVH	WHVH-CAPY	Capacity	$/kVA/day	0.0253	-	0.0253
WHVH	WHVH-DAMD	Demand	$/kVA/day	0.0250	0.2430	0.2680
WHVH	WHVH-DEXA	Excess demand	$/kVA/day	0.6700	-	0.6700
WHVH	WHVH-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

Auckland published prices

Residential

Price category	Code	Description	Units	*DPi,2016*	*PTPi,2016*	*Price*
ARCL	ARCL-FIXD	Fixed	$/day	0.1500	-	0.1500
ARCL	ARCL-AICO	Variable, controlled	$/kWh	0.0630	0.0300	0.0930
ARUL	ARUL-FIXD	Fixed	$/day	0.1500	-	0.1500
ARUL	ARUL-24UC	Variable, uncontrolled	$/kWh	0.0630	0.0380	0.1010
ARCS	ARCS-FIXD	Fixed	$/day	0.9800	-	0.9800
ARCS	ARCS-AICO	Variable, controlled	$/kWh	0.0252	0.0300	0.0552
ARUS	ARUS-FIXD	Fixed	$/day	0.9800	-	0.9800
ARUS	ARUS-24UC	Variable, uncontrolled	$/kWh	0.0252	0.0380	0.0632
ARHL	ARHL-FIXD	Fixed	$/day	0.1500	-	0.1500
ARHL	ARHL-OFPK	Variable, off peak	$/kWh	0.0630	-	0.0630
ARHL	ARHL-PEAK	Variable, peak	$/kWh	0.0630	0.1253	0.1883
ARHS	ARHS-FIXD	Fixed	$/day	0.9800	-	0.9800
ARHS	ARHS-OFPK	Variable, off peak	$/kWh	0.0252	-	0.0252
ARHS	ARHS-PEAK	Variable, peak	$/kWh	0.0252	0.1253	0.1505

Business

Price category	Code	Description	Units	*DPi,2016*	*PTPi,2016*	*Price*
ABSU	ABSU-FIXD	Fixed	$/day/fitting	0.1400	-	0.1400
ABSU	ABSU-24UC	Variable	$/kWh	0.0372	0.0380	0.0752
ABSN	ABSN-FIXD	Fixed	$/day	0.9800	-	0.9800
ABSN	ABSN-24UC	Variable	$/kWh	0.0252	0.0380	0.0632
ABSH	ABSH-FIXD	Fixed	$/day	0.9800	-	0.9800
ABSH	ABSH-OFPK	Variable, off peak	$/kWh	0.0252	-	0.0252
ABSH	ABSH-PEAK	Variable, peak	$/kWh	0.0252	0.1253	0.1505

Low voltage

Price category	Code	Description	Units	*DPi,2016*	*PTPi,2016*	*Price*
ALVN	ALVN-FIXD	Fixed	$/day	1.5600	-	1.5600
ALVN	ALVN-24UC	Variable	$/kWh	0.0429	0.0199	0.0628
ALVN	ALVN-CAPY	Capacity	$/kVA/day	0.0365	-	0.0365
ALVN	ALVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
ALVT	ALVT-24UC	Variable	$/kWh	0.0164	-	0.0164
ALVT	ALVT-CAPY	Capacity	$/kVA/day	0.0365	-	0.0365
ALVT	ALVT-DAMD	Demand	$/kVA/day	0.0633	0.2430	0.3063
ALVT	ALVT-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

Transformer

Price category	Code	Description	Units	*DPi,2016*	*PTPi,2016*	*Price*
ATXN	ATXN-FIXD	Fixed	$/day	1.5100	-	1.5100
ATXN	ATXN-24UC	Variable	$/kWh	0.0416	0.0199	0.0615
ATXN	ATXN-CAPY	Capacity	$/kVA/day	0.0358	-	0.0358
ATXN	ATXN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
ATXT	ATXT-24UC	Variable	$/kWh	0.0161	-	0.0161
ATXT	ATXT-CAPY	Capacity	$/kVA/day	0.0358	-	0.0358
ATXT	ATXT-DAMD	Demand	$/kVA/day	0.0572	0.2430	0.3002
ATXT	ATXT-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

High voltage

Price category	Code	Description	Units	*DPi,2016*	*PTPi,2016*	*Price*
AHVN	AHVN-FIXD	Fixed	$/day	1.4600	-	1.4600
AHVN	AHVN-24UC	Variable	$/kWh	0.0398	0.0199	0.0597
AHVN	AHVN-CAPY	Capacity	$/kVA/day	0.0347	-	0.0347
AHVN	AHVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917
AHVT	AHVT-24UC	Variable	$/kWh	0.0156	-	0.0156
AHVT	AHVT-CAPY	Capacity	$/kVA/day	0.0347	-	0.0347
AHVT	AHVT-DAMD	Demand	$/kVA/day	0.0482	0.2430	0.2912
AHVT	AHVT-DEXA	Excess demand	$/kVA/day	0.7280	-	0.7280
AHVT	AHVT-PWRF	Power Factor	$/kVAr/day	0.2917	-	0.2917

Non-standard prices

Code	Description	Units	$DP_{i,2016}$	$PTP_{i,2016}$
WN01		$/year	$ 203,482	$ 179,716
WN02		$/year	$ 56,463	$ -
WN03		$/year	$ 61,838	$ 5,839
WN04		$/year	$ 240,590	$ 260,952
WN05		$/year	$ -	$ -
WN06		$/year	$ -	$ -
WN07		$/year	$ 27,095	$ 1,831
WN08		$/year	$ 8,596	$ 1,562
WN09		$/year	$ 425,833	$ 200,595
WPR1		$/year	-$ 96,510	$ -
AN01		$/year	$ 274,449	$ -
AN02		$/year	$ -	$ -
AN03		$/year	$ 473,690	$ 66,392
AN04		$/year	$ 25,645	$ -
AN05		$/year	$ 579,014	$ 383,014
AN06		$/year	$ 1,108,064	$ 1,635,623
AN07		$/year	$ -	$ -
AN08		$/year	$ 85,155	$ 55,981
AN09		$/year	$ 67,259	$ -
AN10		$/year	$ 380,985	$ 88,528
AN11		$/year	$ 599,838	$ 164,736
AN12		$/year	$ 259,203	$ -
AN13		$/year	$ 124,482	$ 41,816
AN14		$/year	$ 668,338	$ 333,038
AN15		$/year	$ -	$ -
AN16		$/year	$ -	$ -
AN17		$/year	$ -	$ -
AN18		$/year	$ -	$ -
AN19		$/year	$ 44,439	$ 764
AN20		$/year	$ 234,856	$ 339,935
AN21		$/year	$ 192,158	$ 493,080
AN22		$/year	$ 161,192	$ 109,013
AN23		$/year	$ 1,210,383	$ 445,929
AN24		$/year	$ -	$ 307,896
AN25		$/year	$ 851,614	$ -
AN26		$/year	$ -	$ -
AN27		$/year	$ 167,147	$ 37,689
AN28		$/year	$ 421,434	$ 248,779
AN29		$/year	$ 392,540	$ 995,948
AN30		$/year	$ 39,412	$ -
AN31		$/year	$ 743,686	$ 3,609,162
AN32		$/year	$ 65,453	$ -
AN33		$/year	$ 475,027	$ 233,549
AN34		$/year	$ 189,349	$ 17,596
AN35		$/year	$ 106,387	$ -
AN36		$/year	$ 88,645	$ -
AN37		$/year	$ 462,333	$ 371,611
AN38		$/year	$ 289,423	$ -
AN39		$/year	$ 179,512	$ -
AN40		$/year	$ 287,978	$ 82,049
AN41		$/year	$ 78,552	$ -
AN42		$/year	$ -	$ -
AN43		$/year	$ 537,800	$ 606,214
AN44		$/year	$ 689,888	$ 109,451
AN45		$/year	$ 16,798	$ -
AN46		$/year	$ 36,546	$ 18,925
AN47		$/year	$ 46,734	$ 112,345
AN48		$/year	$ -	$ 191,271
AN49		$/year	$ -	$ 9,876
APR1		$/year	-$ 187,860	$ -

Appendix 2: Details of $DP_{i,2016}Q_{i,2014}$

Northern published charges between 1 April 2015 to 31 March 2016

	$DPi_{,2016}Qi_{,2014}$
Sum	**$ 130,467,926**

Residential

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016}Qi_{,2014}$
WRCL	WRCL-FIXD	Fixed	$/day	0.1500	26,461,327	$ 3,969,199
WRCL	WRCL-AICO	Variable, controlled	$/kWh	0.0630	377,183,236	$ 23,762,544
WRUL	WRUL-FIXD	Fixed	$/day	0.1500	4,042,009	$ 606,301
WRUL	WRUL-24UC	Variable, uncontrolled	$/kWh	0.0630	54,204,033	$ 3,414,854
WRCS	WRCS-FIXD	Fixed	$/day	0.9800	33,652,190	$ 32,979,146
WRCS	WRCS-AICO	Variable, controlled	$/kWh	0.0252	826,793,881	$ 20,835,206
WRUS	WRUS-FIXD	Fixed	$/day	0.9800	5,280,847	$ 5,175,230
WRUS	WRUS-24UC	Variable, uncontrolled	$/kWh	0.0252	119,683,488	$ 3,016,024
WRHL	WRHL-FIXD	Fixed	$/day	0.1500	-	$ -
WRHL	WRHL-OFPK	Variable, off peak	$/kWh	0.0630	-	$ -
WRHL	WRHL-PEAK	Variable, peak	$/kWh	0.0630	-	$ -
WRHS	WRHS-FIXD	Fixed	$/day	0.9800	-	$ -
WRHS	WRHS-OFPK	Variable, off peak	$/kWh	0.0252	-	$ -
WRHS	WRHS-PEAK	Variable, peak	$/kWh	0.0252	-	$ -

Business

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016}Qi_{,2014}$
WBSU	WBSU-FIXD	Fixed	$/day/fitting	0.1400	12,681,238	$ 1,775,373
WBSU	WBSU-24UC	Variable	$/kWh	0.0372	18,829,828	$ 700,470
WBSN	WBSN-FIXD	Fixed	$/day	0.9800	7,834,909	$ 7,678,211
WBSN	WBSN-24UC	Variable	$/kWh	0.0252	390,553,535	$ 9,841,949
WBSH	WBSH-FIXD	Fixed	$/day	0.9800	-	$ -
WBSH	WBSH-OFPK	Variable, off peak	$/kWh	0.0252	-	$ -
WBSH	WBSH-PEAK	Variable, peak	$/kWh	0.0252	-	$ -

Low voltage

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016}Qi_{,2014}$
WLVN	WLVN-FIXD	Fixed	$/day	5.5000	293,314	$ 1,613,227
WLVN	WLVN-24UC	Variable	$/kWh	0.0242	143,901,286	$ 3,482,411
WLVN	WLVN-CAPY	Capacity	$/kVA/day	0.0266	42,155,939	$ 1,121,348
WLVN	WLVN-PWRF	Power Factor	$/kVAr/day	0.2917	656,458	$ 191,489
WLVH	WLVH-FIXD	Fixed	$/day	10.3800	50,250	$ 521,595
WLVH	WLVH-24UC	Variable	$/kWh	0.0057	83,025,950	$ 473,248
WLVH	WLVH-CAPY	Capacity	$/kVA/day	0.0266	13,702,466	$ 364,486
WLVH	WLVH-DAMD	Demand	$/kVA/day	0.0389	6,204,666	$ 241,362
WLVH	WLVH-PWRF	Power Factor	$/kVAr/day	0.2917	607,389	$ 177,175

Transformer

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016}Qi_{,2014}$
WTXN	WTXN-FIXD	Fixed	$/day	4.9500	59,600	$ 295,020
WTXN	WTXN-24UC	Variable	$/kWh	0.0198	56,418,105	$ 1,117,078
WTXN	WTXN-CAPY	Capacity	$/kVA/day	0.0261	15,943,880	$ 416,135
WTXN	WTXN-PWRF	Power Factor	$/kVAr/day	0.2917	569,727	$ 166,189
WTXH	WTXH-FIXD	Fixed	$/day	9.3400	74,686	$ 697,567
WTXH	WTXH-24UC	Variable	$/kWh	0.0056	329,590,661	$ 1,845,708
WTXH	WTXH-CAPY	Capacity	$/kVA/day	0.0261	61,633,452	$ 1,608,633
WTXH	WTXH-DAMD	Demand	$/kVA/day	0.0333	26,354,121	$ 877,592
WTXH	WTXH-PWRF	Power Factor	$/kVAr/day	0.2917	1,602,334	$ 467,401

High voltage

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016}Qi_{,2014}$
WHVN	WHVN-FIXD	Fixed	$/day	4.8000	130	$ 624
WHVN	WHVN-24UC	Variable	$/kWh	0.0186	54	$ 1
WHVN	WHVN-CAPY	Capacity	$/kVA/day	0.0253	-	$ -
WHVN	WHVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	$ -
WHVH	WHVH-FIXD	Fixed	$/day	9.0600	5,475	$ 49,604
WHVH	WHVH-24UC	Variable	$/kWh	0.0054	88,795,380	$ 479,495
WHVH	WHVH-CAPY	Capacity	$/kVA/day	0.0253	11,041,250	$ 279,344
WHVH	WHVH-DAMD	Demand	$/kVA/day	0.0250	6,141,987	$ 153,550
WHVH	WHVH-DEXA	Excess demand	$/kVA/day	0.6700	829	$ 556
WHVH	WHVH-PWRF	Power Factor	$/kVAr/day	0.2917	248,823	$ 72,582

Auckland published charges between 1 April 2015 to 31 March 2016

	$DPi_{,2016} Qi_{,2014}$
Sum	**$ 243,296,160**

Residential

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
ARCL	ARCL-FIXD	Fixed	$/day	0.1500	37,637,424	$ 5,645,614
ARCL	ARCL-AICO	Variable, controlled	$/kWh	0.0630	525,070,553	$ 33,079,445
ARUL	ARUL-FIXD	Fixed	$/day	0.1500	11,655,097	$ 1,748,265
ARUL	ARUL-24UC	Variable, uncontrolled	$/kWh	0.0630	129,533,043	$ 8,160,582
ARCS	ARCS-FIXD	Fixed	$/day	0.9800	43,245,437	$ 42,380,528
ARCS	ARCS-AICO	Variable, controlled	$/kWh	0.0252	1,047,706,946	$ 26,402,215
ARUS	ARUS-FIXD	Fixed	$/day	0.9800	9,386,474	$ 9,198,745
ARUS	ARUS-24UC	Variable, uncontrolled	$/kWh	0.0252	204,955,267	$ 5,164,873
ARHL	ARHL-FIXD	Fixed	$/day	0.1500	-	$ -
ARHL	ARHL-OFPK	Variable, off peak	$/kWh	0.0630	-	$ -
ARHL	ARHL-PEAK	Variable, peak	$/kWh	0.0630	-	$ -
ARHS	ARHS-FIXD	Fixed	$/day	0.9800	-	$ -
ARHS	ARHS-OFPK	Variable, off peak	$/kWh	0.0252	-	$ -
ARHS	ARHS-PEAK	Variable, peak	$/kWh	0.0252	-	$ -

Business

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
ABSU	ABSU-FIXD	Fixed	$/day/fitting	0.1400	22,622,925	$ 3,167,210
ABSU	ABSU-24UC	Variable	$/kWh	0.0372	37,174,334	$ 1,382,885
ABSN	ABSN-FIXD	Fixed	$/day	0.9800	12,437,184	$ 12,188,440
ABSN	ABSN-24UC	Variable	$/kWh	0.0252	771,148,806	$ 19,432,950
ABSH	ABSH-FIXD	Fixed	$/day	0.9800	-	$ -
ABSH	ABSH-OFPK	Variable, off peak	$/kWh	0.0252	-	$ -
ABSH	ABSH-PEAK	Variable, peak	$/kWh	0.0252	-	$ -

Low voltage

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
ALVN	ALVN-FIXD	Fixed	$/day	1.5600	664,123	$ 1,036,032
ALVN	ALVN-24UC	Variable	$/kWh	0.0429	206,803,755	$ 8,871,881
ALVN	ALVN-CAPY	Capacity	$/kVA/day	0.0365	94,625,995	$ 3,453,849
ALVN	ALVN-PWRF	Power Factor	$/kVAr/day	0.2917	306,589	$ 89,432
ALVT	ALVT-24UC	Variable	$/kWh	0.0164	575,960,714	$ 9,445,756
ALVT	ALVT-CAPY	Capacity	$/kVA/day	0.0365	128,281,278	$ 4,682,267
ALVT	ALVT-DAMD	Demand	$/kVA/day	0.0633	52,482,360	$ 3,322,133
ALVT	ALVT-PWRF	Power Factor	$/kVAr/day	0.2917	7,770,776	$ 2,266,735

Transformer

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
ATXN	ATXN-FIXD	Fixed	$/day	1.5100	50,593	$ 76,395
ATXN	ATXN-24UC	Variable	$/kWh	0.0416	18,973,206	$ 789,285
ATXN	ATXN-CAPY	Capacity	$/kVA/day	0.0358	11,639,628	$ 416,699
ATXN	ATXN-PWRF	Power Factor	$/kVAr/day	0.2917	35,588	$ 10,381
ATXT	ATXT-24UC	Variable	$/kWh	0.0161	1,034,703,543	$ 16,658,727
ATXT	ATXT-CAPY	Capacity	$/kVA/day	0.0358	189,061,422	$ 6,768,399
ATXT	ATXT-DAMD	Demand	$/kVA/day	0.0572	83,956,484	$ 4,802,311
ATXT	ATXT-PWRF	Power Factor	$/kVAr/day	0.2917	7,472,398	$ 2,179,698

High voltage

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
AHVN	AHVN-FIXD	Fixed	$/day	1.4600	1,984	$ 2,897
AHVN	AHVN-24UC	Variable	$/kWh	0.0398	677,977	$ 26,984
AHVN	AHVN-CAPY	Capacity	$/kVA/day	0.0347	525,639	$ 18,240
AHVN	AHVN-PWRF	Power Factor	$/kVAr/day	0.2917	-	-
AHVT	AHVT-24UC	Variable	$/kWh	0.0156	411,539,028	$ 6,420,009
AHVT	AHVT-CAPY	Capacity	$/kVA/day	0.0347	50,160,100	$ 1,740,555
AHVT	AHVT-DAMD	Demand	$/kVA/day	0.0482	32,140,007	$ 1,549,148
AHVT	AHVT-DEXA	Excess demand	$/kVA/day	0.7280	148,905	$ 108,403
AHVT	AHVT-PWRF	Power Factor	$/kVAr/day	0.2917	2,084,999	$ 608,194

Northern non-standard charges between 1 April 2015 to 31 March 2016

	$DPi_{,2016} Qi_{,2014}$
Sum	**$ 927,386**

Non-standard

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
WN01			$/year	$ 203,482	1	$ 203,482
WN02			$/year	$ 56,463	1	$ 56,463
WN03			$/year	$ 61,838	1	$ 61,838
WN04			$/year	$ 240,590	1	$ 240,590
WN05			$/year	$ -	1	$ -
WN06			$/year	$ -	1	$ -
WN07			$/year	$ 27,095	1	$ 27,095
WN08			$/year	$ 8,596	1	$ 8,596
WN09			$/year	$ 425,833	1	$ 425,833
WPR1			$/year	-$ 96,510	1	-$ 96,510

Auckland non-standard charges between 1 April 2015 to 31 March 2016

	$DPi_{,2016} Qi_{,2014}$
Sum	**$ 12,467,550**

Non-standard

Price category	Code	Description	Units	$DPi_{,2016}$	$Q_{i,2014}$	$DPi_{,2016} Qi_{,2014}$
AN01			$/year	$ 274,449	1	$ 274,449
AN02			$/year	$ -	1	$ -
AN03			$/year	$ 473,690	1	$ 473,690
AN04			$/year	$ 25,645	1	$ 25,645
AN05			$/year	$ 579,014	1	$ 579,014
AN06			$/year	$ 1,108,064	1	$ 1,108,064
AN07			$/year	$ -	1	$ -
AN08			$/year	$ 85,155	1	$ 85,155
AN09			$/year	$ 67,259	1	$ 67,259
AN10			$/year	$ 380,985	1	$ 380,985
AN11			$/year	$ 599,838	1	$ 599,838
AN12			$/year	$ 259,203	1	$ 259,203
AN13			$/year	$ 124,482	1	$ 124,482
AN14			$/year	$ 668,338	1	$ 668,338
AN15			$/year	$ -	1	$ -
AN16			$/year	$ -	1	$ -
AN17			$/year	$ -	1	$ -
AN18			$/year	$ -	1	$ -
AN19			$/year	$ 44,439	1	$ 44,439
AN20			$/year	$ 234,856	1	$ 234,856
AN21			$/year	$ 192,158	1	$ 192,158
AN22			$/year	$ 161,192	1	$ 161,192
AN23			$/year	$ 1,210,383	1	$ 1,210,383
AN24			$/year	$ -	1	$ -
AN25			$/year	$ 851,614	1	$ 851,614
AN26			$/year	$ -	1	$ -
AN27			$/year	$ 167,147	1	$ 167,147
AN28			$/year	$ 421,434	1	$ 421,434
AN29			$/year	$ 392,540	1	$ 392,540
AN30			$/year	$ 39,412	1	$ 39,412
AN31			$/year	$ 743,686	1	$ 743,686
AN32			$/year	$ 65,453	1	$ 65,453
AN33			$/year	$ 475,027	1	$ 475,027
AN34			$/year	$ 189,349	1	$ 189,349
AN35			$/year	$ 106,387	1	$ 106,387
AN36			$/year	$ 88,645	1	$ 88,645
AN37			$/year	$ 462,333	1	$ 462,333
AN38			$/year	$ 289,423	1	$ 289,423
AN39			$/year	$ 179,512	1	$ 179,512
AN40			$/year	$ 287,978	1	$ 287,978
AN41			$/year	$ 78,552	1	$ 78,552
AN42			$/year	$ -	1	$ -
AN43			$/year	$ 537,800	1	$ 537,800
AN44			$/year	$ 689,888	1	$ 689,888
AN45			$/year	$ 16,798	1	$ 16,798
AN46			$/year	$ 36,546	1	$ 36,546
AN47			$/year	$ 46,734	1	$ 46,734
AN48			$/year	$ -	1	$ -
AN49			$/year	$ -	1	$ -
APR1			$/year	-$ 187,860	1	-$ 187,860

Appendix 3: Details of $PTP_{i,2016}Q_{i,2016}$

Northern published charges between 1 April 2015 to 31 March 2016

	$PTPi_{,2016}Qi_{,2016}$
Sum	**$ 74,250,741**

Residential

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016}Qi_{,2016}$
WRCL	WRCL-FIXD	Fixed	$/day	-	31,736,077	$ -
WRCL	WRCL-AICO	Variable, controlled	$/kWh	0.0300	465,595,384	$ 13,967,862
WRUL	WRUL-FIXD	Fixed	$/day	-	5,829,249	$ -
WRUL	WRUL-24UC	Variable, uncontrolled	$/kWh	0.0380	79,592,219	$ 3,024,504
WRCS	WRCS-FIXD	Fixed	$/day	-	27,888,846	$ -
WRCS	WRCS-AICO	Variable, controlled	$/kWh	0.0300	742,393,603	$ 22,271,808
WRUS	WRUS-FIXD	Fixed	$/day	-	5,845,826	$ -
WRUS	WRUS-24UC	Variable, uncontrolled	$/kWh	0.0380	136,105,721	$ 5,172,017
WRHL	WRHL-FIXD	Fixed	$/day	-	294	$ -
WRHL	WRHL-OFPK	Variable, off peak	$/kWh	-	4,552	$ -
WRHL	WRHL-PEAK	Variable, peak	$/kWh	0.1253	1,203	$ 151
WRHS	WRHS-FIXD	Fixed	$/day	-	658	$ -
WRHS	WRHS-OFPK	Variable, off peak	$/kWh	-	2,052	$ -
WRHS	WRHS-PEAK	Variable, peak	$/kWh	0.1253	8,692	$ 1,089

Business

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016}Qi_{,2016}$
WBSU	WBSU-FIXD	Fixed	$/day/fitting	-	12,736,656	$ -
WBSU	WBSU-24UC	Variable	$/kWh	0.0380	18,867,835	$ 716,978
WBSN	WBSN-FIXD	Fixed	$/day	-	7,970,169	$ -
WBSN	WBSN-24UC	Variable	$/kWh	0.0380	392,403,803	$ 14,911,344
WBSH	WBSH-FIXD	Fixed	$/day	-	4,062	$ -
WBSH	WBSH-OFPK	Variable, off peak	$/kWh	-	1,377,239	$ -
WBSH	WBSH-PEAK	Variable, peak	$/kWh	0.1253	436,351	$ 54,675

Low voltage

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016}Qi_{,2016}$
WLVN	WLVN-FIXD	Fixed	$/day	-	291,556	$ -
WLVN	WLVN-24UC	Variable	$/kWh	0.0199	131,319,309	$ 2,613,254
WLVN	WLVN-CAPY	Capacity	$/kVA/day	-	43,097,020	$ -
WLVN	WLVN-PWRF	Power Factor	$/kVAr/day	-	487,606	$ -
WLVH	WLVH-FIXD	Fixed	$/day	-	73,471	$ -
WLVH	WLVH-24UC	Variable	$/kWh	-	108,738,766	$ -
WLVH	WLVH-CAPY	Capacity	$/kVA/day	-	17,429,667	$ -
WLVH	WLVH-DAMD	Demand	$/kVA/day	0.2430	8,238,713	$ 2,002,007
WLVH	WLVH-PWRF	Power Factor	$/kVAr/day	-	663,875	$ -

Transformer

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016}Qi_{,2016}$
WTXN	WTXN-FIXD	Fixed	$/day	-	53,515	$ -
WTXN	WTXN-24UC	Variable	$/kWh	0.0199	44,707,708	$ 889,683
WTXN	WTXN-CAPY	Capacity	$/kVA/day	-	15,541,192	$ -
WTXN	WTXN-PWRF	Power Factor	$/kVAr/day	-	419,207	$ -
WTXH	WTXH-FIXD	Fixed	$/day	-	88,295	$ -
WTXH	WTXH-24UC	Variable	$/kWh	-	350,823,063	$ -
WTXH	WTXH-CAPY	Capacity	$/kVA/day	-	67,473,806	$ -
WTXH	WTXH-DAMD	Demand	$/kVA/day	0.2430	27,570,351	$ 6,699,595
WTXH	WTXH-PWRF	Power Factor	$/kVAr/day	-	1,299,477	$ -

High voltage

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016}Qi_{,2016}$
WHVN	WHVN-FIXD	Fixed	$/day	-	300	$ -
WHVN	WHVN-24UC	Variable	$/kWh	0.0199	261	$ 5
WHVN	WHVN-CAPY	Capacity	$/kVA/day	-	9,104	$ -
WHVN	WHVN-PWRF	Power Factor	$/kVAr/day	-	-	$ -
WHVH	WHVH-FIXD	Fixed	$/day	-	6,711	$ -
WHVH	WHVH-24UC	Variable	$/kWh	-	114,621,889	$ -
WHVH	WHVH-CAPY	Capacity	$/kVA/day	-	12,682,350	$ -
WHVH	WHVH-DAMD	Demand	$/kVA/day	0.2430	7,924,971	$ 1,925,768
WHVH	WHVH-DEXA	Excess demand	$/kVA/day	-	12,338	$ -
WHVH	WHVH-PWRF	Power Factor	$/kVAr/day	-	193,282	$ -

Auckland published charges between 1 April 2015 to 31 March 2016

	$PTPi_{,2016} Qi_{,2016}$
Sum	**$ 139,101,998**

Residential

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
ARCL	ARCL-FIXD	Fixed	$/day	-	45,193,617	$ -
ARCL	ARCL-AICO	Variable, controlled	$/kWh	0.0300	647,519,325	$ 19,425,580
ARUL	ARUL-FIXD	Fixed	$/day	-	14,547,357	$ -
ARUL	ARUL-24UC	Variable, uncontrolled	$/kWh	0.0380	167,546,628	$ 6,366,772
ARCS	ARCS-FIXD	Fixed	$/day	-	35,675,224	$ -
ARCS	ARCS-AICO	Variable, controlled	$/kWh	0.0300	923,731,753	$ 27,711,953
ARUS	ARUS-FIXD	Fixed	$/day	-	8,790,645	$ -
ARUS	ARUS-24UC	Variable, uncontrolled	$/kWh	0.0380	203,031,969	$ 7,715,215
ARHL	ARHL-FIXD	Fixed	$/day	-	741	$ -
ARHL	ARHL-OFPK	Variable, off peak	$/kWh	-	9,315	$ -
ARHL	ARHL-PEAK	Variable, peak	$/kWh	0.1253	2,108	$ 264
ARHS	ARHS-FIXD	Fixed	$/day	-	238	$ -
ARHS	ARHS-OFPK	Variable, off peak	$/kWh	-	13,920	$ -
ARHS	ARHS-PEAK	Variable, peak	$/kWh	0.1253	3,952	$ 495

Business

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
ABSU	ABSU-FIXD	Fixed	$/day/fitting	-	24,174,846	$ -
ABSU	ABSU-24UC	Variable	$/kWh	0.0380	38,664,927	$ 1,469,267
ABSN	ABSN-FIXD	Fixed	$/day	-	13,228,693	$ -
ABSN	ABSN-24UC	Variable	$/kWh	0.0380	767,966,647	$ 29,182,733
ABSH	ABSH-FIXD	Fixed	$/day	-	11,085	$ -
ABSH	ABSH-OFPK	Variable, off peak	$/kWh	-	4,005,647	$ -
ABSH	ABSH-PEAK	Variable, peak	$/kWh	0.1253	1,255,222	$ 157,279

Low voltage

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
ALVN	ALVN-FIXD	Fixed	$/day	-	755,573	$ -
ALVN	ALVN-24UC	Variable	$/kWh	0.0199	224,402,107	$ 4,465,602
ALVN	ALVN-CAPY	Capacity	$/kVA/day	-	111,765,349	$ -
ALVN	ALVN-PWRF	Power Factor	$/kVAr/day	-	501,854	$ -
ALVT	ALVT-24UC	Variable	$/kWh	-	572,833,656	$ -
ALVT	ALVT-CAPY	Capacity	$/kVA/day	-	130,330,852	$ -
ALVT	ALVT-DAMD	Demand	$/kVA/day	0.2430	50,268,112	$ 12,215,151
ALVT	ALVT-PWRF	Power Factor	$/kVAr/day	-	6,012,441	$ -

Transformer

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
ATXN	ATXN-FIXD	Fixed	$/day	-	62,149	$ -
ATXN	ATXN-24UC	Variable	$/kWh	0.0199	26,962,270	$ 536,549
ATXN	ATXN-CAPY	Capacity	$/kVA/day	-	16,055,582	$ -
ATXN	ATXN-PWRF	Power Factor	$/kVAr/day	-	150,233	$ -
ATXT	ATXT-24UC	Variable	$/kWh	-	1,106,294,451	$ -
ATXT	ATXT-CAPY	Capacity	$/kVA/day	-	214,137,852	$ -
ATXT	ATXT-DAMD	Demand	$/kVA/day	0.2430	88,584,611	$ 21,526,060
ATXT	ATXT-PWRF	Power Factor	$/kVAr/day	-	5,966,574	$ -

High voltage

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
AHVN	AHVN-FIXD	Fixed	$/day	-	3,324	$ -
AHVN	AHVN-24UC	Variable	$/kWh	0.0199	2,316,873	$ 46,106
AHVN	AHVN-CAPY	Capacity	$/kVA/day	-	1,628,400	$ -
AHVN	AHVN-PWRF	Power Factor	$/kVAr/day	-	230,352	$ -
AHVT	AHVT-24UC	Variable	$/kWh	-	439,696,561	$ -
AHVT	AHVT-CAPY	Capacity	$/kVA/day	-	54,464,357	$ -
AHVT	AHVT-DAMD	Demand	$/kVA/day	0.2430	34,086,306	$ 8,282,972
AHVT	AHVT-DEXA	Excess demand	$/kVA/day	-	139,234	$ -
AHVT	AHVT-PWRF	Power Factor	$/kVAr/day	-	1,685,591	$ -

Northern non-standard charges between 1 April 2015 to 31 March 2016

	$PTPi_{,2016} Qi_{,2016}$
Sum	**$ 650,496**

Non-standard

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
WN01			$/year	$ 179,716	1	$ 179,716
WN02			$/year	$ -	1	$ -
WN03			$/year	$ 5,839	1	$ 5,839
WN04			$/year	$ 260,952	1	$ 260,952
WN05			$/year	$ -	1	$ -
WN06			$/year	$ -	1	$ -
WN07			$/year	$ 1,831	1	$ 1,831
WN08			$/year	$ 1,562	1	$ 1,562
WN09			$/year	$ 200,595	1	$ 200,595
WPR1			$/year	$ -	1	$ -

Auckland non-standard charges between 1 April 2015 to 31 March 2016

	$PTPi_{,2016} Qi_{,2016}$
Sum	**$ 11,110,211**

Non-standard

Price category	Code	Description	Units	$PTPi_{,2016}$	$Q_{i,2016}$	$PTPi_{,2016} Qi_{,2016}$
AN01			$/year	$ -	1	$ -
AN02			$/year	$ -	1	$ -
AN03			$/year	$ 66,392	1	$ 66,392
AN04			$/year	$ -	1	$ -
AN05			$/year	$ 383,014	1	$ 383,014
AN06			$/year	$ 1,635,623	1	$ 1,635,623
AN07			$/year	$ -	1	$ -
AN08			$/year	$ 55,981	1	$ 55,981
AN09			$/year	$ -	1	$ -
AN10			$/year	$ 88,528	1	$ 88,528
AN11			$/year	$ 164,736	1	$ 164,736
AN12			$/year	$ -	1	$ -
AN13			$/year	$ 41,816	1	$ 41,816
AN14			$/year	$ 333,038	1	$ 333,038
AN15			$/year	$ -	1	$ -
AN16			$/year	$ -	1	$ -
AN17			$/year	$ -	1	$ -
AN18			$/year	$ -	1	$ -
AN19			$/year	$ 764	1	$ 764
AN20			$/year	$ 339,935	1	$ 339,935
AN21			$/year	$ 493,080	1	$ 493,080
AN22			$/year	$ 109,013	1	$ 109,013
AN23			$/year	$ 445,929	1	$ 445,929
AN24			$/year	$ 307,896	1	$ 307,896
AN25			$/year	$ -	1	$ -
AN26			$/year	$ -	1	$ -
AN27			$/year	$ 37,689	1	$ 37,689
AN28			$/year	$ 248,779	1	$ 248,779
AN29			$/year	$ 995,948	1	$ 995,948
AN30			$/year	$ -	1	$ -
AN31			$/year	$ 3,609,162	1	$ 3,609,162
AN32			$/year	$ -	1	$ -
AN33			$/year	$ 233,549	1	$ 233,549
AN34			$/year	$ 17,596	1	$ 17,596
AN35			$/year	$ -	1	$ -
AN36			$/year	$ -	1	$ -
AN37			$/year	$ 371,611	1	$ 371,611
AN38			$/year	$ -	1	$ -
AN39			$/year	$ -	1	$ -
AN40			$/year	$ 82,049	1	$ 82,049
AN41			$/year	$ -	1	$ -
AN42			$/year	$ -	1	$ -
AN43			$/year	$ 606,214	1	$ 606,214
AN44			$/year	$ 109,451	1	$ 109,451
AN45			$/year	$ -	1	$ -
AN46			$/year	$ 18,925	1	$ 18,925
AN47			$/year	$ 112,345	1	$ 112,345
AN48			$/year	$ 191,271	1	$ 191,271
AN49			$/year	$ 9,876	1	$ 9,876
APR1			$/year	$ -	1	$ -

Appendix 4: Major Event Day Explanations

In accordance with Commerce Commission definitions, a Major Event Day means any day where the daily SAIDI Value for Class C Interruptions or daily SAIFI Value for Class C Interruptions exceeds the applicable SAIDI Unplanned Boundary Value or SAIFI Unplanned Boundary Value. The following events qualify as Major Event Days.

Event Description – James Street Gas Switch Failure: 01 January 2016

On 1 January 2016, a fault occurred on the 33kV outdoor busbar located at the James Street zone substation. The zone substation outage was caused by two distinctive events:

- An initial fault due to vegetation debris resulted in flashover damage to an Air-break Switch (ABS) and collateral damage to the adjacent SF6 gas switch.
- After isolation of the faulted apparatus an attempt was made to re-liven the substation. At this time there was an explosion on an additional SF6 gas switch.

As can be expected under the circumstances, the initial fault caused damage to both the Air-break switch and the gas switch. The second fault was the result of the explosion of the gas switch.

Post fault, crews worked to reinstate the 33kV busbar the following day. The incident impacted approximately 7,326 customers at its peak, with most customers having been restored supply within 2 hours and 30 minutes.

On 01/01/2016 Vector's SAIDI Value for Class C Interruptions exceeded the SAIDI Unplanned Boundary Value. The incident is presented below were Table 1 details the SAIDI and SAIFI Assessed Values for the day and Table 2 details the non-normalised total impact of the day.

Table 1 SAIDI and SAIFI Assessed Values for 1 January 2016

Major Event Day	SAIDI[3]	SAIFI
01/01/2016	3.374	0.02422

Table 2 Non-normalised SAIDI and SAIFI for 1 January 2016

Major Event Day	SAIDI	SAIFI
01/01/2016	3.705	0.02422

[3] Note: No planned works were completed on the 01 January 2016, therefore the SAIDI Value represents the SAIDI Unplanned Boundary Value.

Contributing Factors

Detailed investigation was completed on the James Street incident to identify the root causes and apply appropriate control mechanisms to reduce the likelihood of any further similar incidences.

The initial fault was caused by vegetation within the outdoor yard of the zone substation interfering with the overhead switches. The removal of the three protected Pohutukawa trees, located at the rear of the James Street zone substation, is currently in progress. The native vegetation is protected by Auckland Council, however, resource consent has been approved for the removal of the vegetation and works will be carried out as per the normal operating procedures.

The cause of the second event, failure of the SF6 gas switch, cannot be categorically confirmed, however it is likely the interrupter either had experienced a loss or absence of SF6 gas or an internal defect was evident (both of which could have been caused by the initial through fault). Upon re-energisation either the lack of SF6 or internal defect (or both) resulted in the explosion.

The gas switch was sent for assessment to the manufacturer, located in USA, and a detailed manufacturer's report on the asset failure is expected shortly. The report will provide a clear analysis and determine whether the cause of the asset failure was external (i.e. vegetation debris), or was an internal asset based failure. The findings will also allow for an informed decision to be made regarding the remaining three gas switches of the same model installed on the network, and the procurement of any further switches of a similar type.

Event Description – Storm Event: 23 - 24 March 2016

On 23 March 2016, a period of strong north-easterly flows and heavy rain began to spread across many areas of New Zealand, resulting in strong winds for the Auckland region. The storm period continued from 23–25 March with wind speeds peaking at 74 kph, resulting in asset failures and a loss of supply to customers.

In figure 1, the impact of the storm is graphically illustrated. The impact of the gale force wind speeds on the network performance is evident.

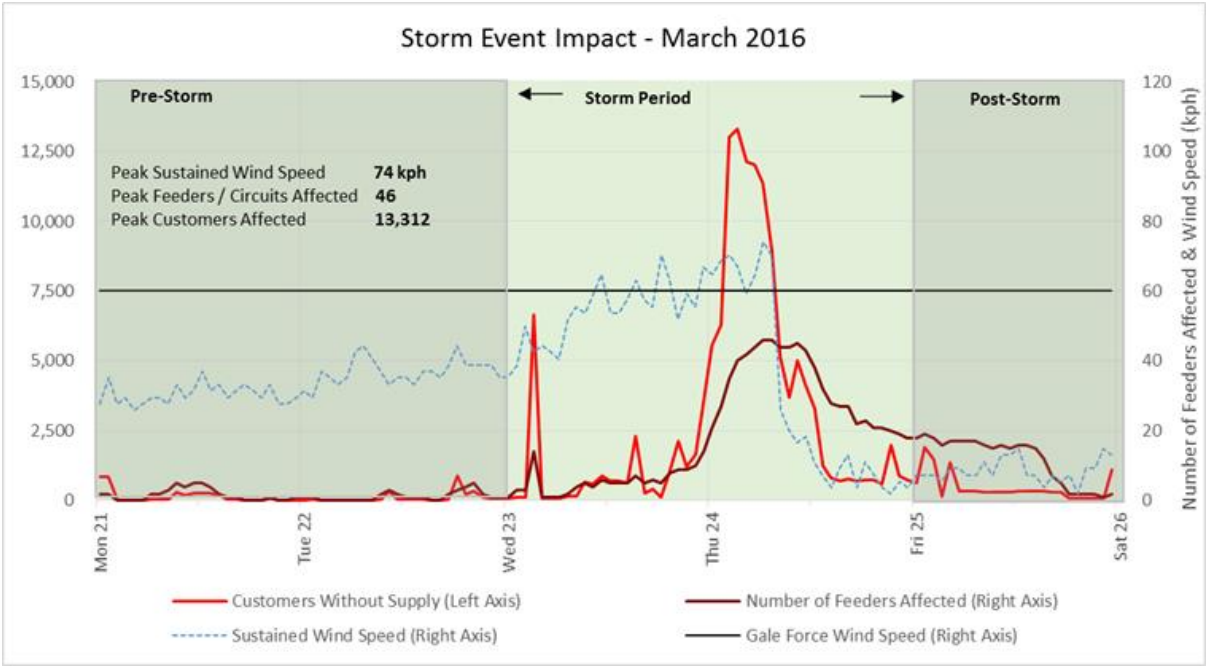


Figure 1 March Storm Event Customer Impact

On 23/03/2016 Vector's SAIFI Value for Class C Interruptions exceeded the SAIFI Unplanned Boundary Value; on 24/03/2016 both Vector's SAIDI and SAIFI Values for Class C Interruptions exceeded the applicable SAIDI and SAIFI Unplanned Boundary Values. The impact of the storm event is presented below. Table 3 details the SAIDI and SAIFI Assessed Values for each day and Table 4 details the non-normalised total impact of each day.

Table 3 SAIDI and SAIFI Assessed Values for 23 – 24 March 2016

Major Event Days	SAIDI	SAIFI
23/03/2016	3.368	0.03970
24/03/2016	3.374	0.03900

Table 4 Non-normalised SAIDI and SAIFI for 23 – 24 March 2016

Major Event Days	SAIDI	SAIFI
23/03/2016	3.470	0.04414
24/03/2016	10.844	0.05492

The storm resulted in a significant rise in overhead asset faults, most of which were caused by tree contact and vegetation debris as a result of the extreme wind speeds.

Vector fault crews were operating under storm response mode[4] with extended hours (relating to the HV event) to complete repair and restoration. At its peak, around 46 circuits were affected by the storm, impacting around 13,000 customers. The majority of customers had supply restored by 16:00 on 25 March.

[4] When operating under storm response mode crews are instructed to focus solely on the event at hand and to postpone any planned work or non-critical activities.

Appendix 5: Explanation for Not Complying with Annual Reliability Assessment & Actions to Mitigate Future Non-Compliance

During RY2016, Vector's SAIDI Assessed Value exceeded the SAIDI Limit specified in Schedule 4A of the Determination. This constitutes a breach of clause 9.1 of the Determination.

The overall event circumstances giving rise to the quality standards breach in RY2016 include an increase on the 10 year historical average for overhead asset failures, underground asset failures and vegetation related outages. These are discussed below.

Events Caused by Vegetation

Events caused by vegetation for RY2016 resulted in around 14 SAIDI minutes; this is an increase from RY2015 and above the historical 10 year average. The event rate for vegetation related faults is 171 events, also a slight increase from RY2015 (which incurred 153 events) and higher than the 10 year historic average.

Events caused by air-borne debris have increased in RY2016. This is generally the result of the impact of out-of-zone vegetation. Out-of-zone vegetation is that not in the cut-zone of the overhead assets as defined by the *Electricity (Hazard from Tree) Regulations* 2003 (the Tree Regulations). EBDs have no rights to address vegetation outside of the cut zone defined by the Tree Regulations. The EDB has to negotiate with tree owners (both local councils and private property owners) for trees that pose risks to electricity assets.

Out-of-zone vegetation causes damage to electricity assets during high wind speeds. Figure 1 plots daily SAIDI on the left axis and peak mean wind speeds on the right axis for RY2016.

Figure 1 Daily SAIDI and peak mean wind speed

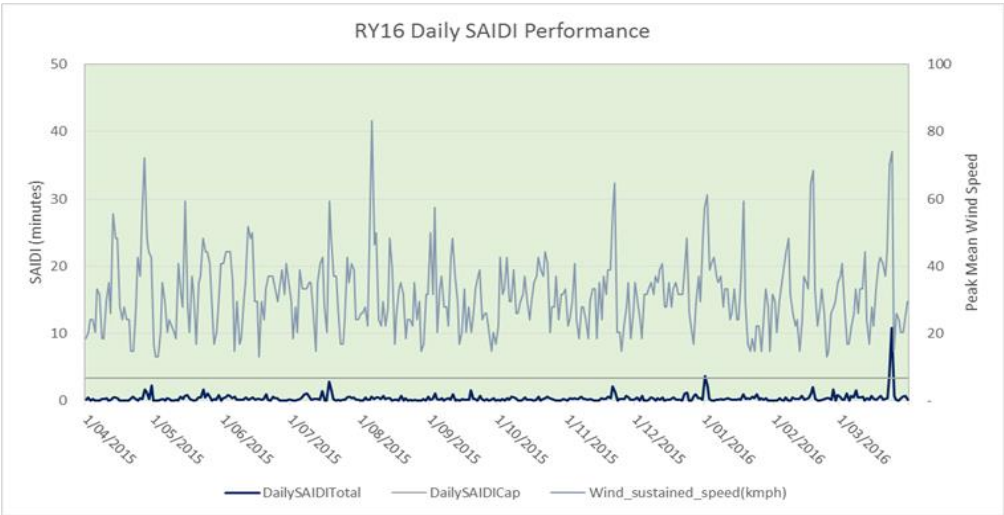


Figure 1 shows the correlation that strong wind days had on SAIDI over the year. There were seven days in RY2016 where the peak mean wind speed exceeded 60 kilometres per hour, excluding the Major Event Days for the year. Accordingly, when peak mean wind speeds exceeded 60 kilometres per hour the risk of out-of-zone vegetation to electricity assets increases significantly. On days when wind speeds exceed 60 kilometres per hour daily SAIDI also generally increases to a multiple of the daily average for the year. The daily SAIDI for these seven days in RY2016 ranged from a multiple of two times the daily average for the year to almost 12 times the daily average SAIDI for the year. Weather events creating strong winds were responsible for significantly increasing vegetation SAIDI given the higher impact "out-of-zone" vegetation connecting with overhead assets that occurred on these days.

Asset Performance

Overhead Asset Failures

The allocation of SAIDI minutes attributable to overhead asset failures for RY2016 was approximately 24 minutes; this is an increase from the 10 year historical average and above that seen in RY2015. The event rate is also above the historical average at 308 events, however reduced from RY2015 where Vector incurred 322 overhead asset events.

Underground Asset Failures

The allocation of SAIDI minutes attributable to underground asset failures for RY2016 was 20 minutes; this is an increase from the 10 year historical average. The event rate is also above the historical average at 222 events.

Although both the overhead and underground assets saw an increase in SAIDI minutes from the 10 year average, Vector does not see this result as indicative of declining asset reliability. This is reflected in Vector's SAIFI performance which has maintained well within acceptable limits. It is noted that longer restoration times are a leading factor in the increase of SAIDI minutes related to asset failures. Longer restoration times were common for both underground and overhead asset faults.

The following are some contributing factors related to the rise in SAIDI minutes and restoration times:

- Health and safety practices both prescribed by industry standards and organisational requirements have increased fault response crew times for restoration. An example of challenges imposed by new health and safety requirements is the change in process resulting from changes to the Safety Manual Electricity Industry (SM-EI) released in July 2015. The new process now requires fault crews to identify and create visible breaks and additional earths at both ends

of an overhead asset fault, prior to the fault repair. Implementing the visible breaks and additional earths process creates additional complexities for repairs contributing to the increase in restoration time and resulting SAIDI minutes. Other significant changes include the introduction of Vector's live-line work policy that significantly restricts the work that can be done on the network in an energised state.

- Traffic congestion in Auckland creates increasing challenges for Vector fault response crews. The increasing level of traffic congestion being experienced in the Auckland region is causing challenges for Vector's fault response crews to reach fault locations in a timely manner during peak traffic periods. An example of the impact that congestion is having on fault crews was evident during a recent weather event on Good Friday 2016. Vehicle traffic occurring at the same time as the network event obstructed Vector's fault crew from travelling from our main depot in Albany to Warkworth to resolve a power outage.
- TomTom traffic data confirms the problem of congestion getting worse. Their analysis shows that evening peak period traffic will increase journey length travel time by up to 80 percent in Auckland while the morning peak can also add up to 70 percent time to travel. TomTom's travel analysis also shows this historical trend is rising with their bespoke congestion index rating rising from 27 percent in 2012 to 33 percent in 2015. For context the rating is the same as New York and rates Auckland as the 40th worst city for congestion out of 174 measured world wide.

Third Party and Animal Related Faults

Within the RY2016 period Vector also experienced an increase in third party and animal related faults contributing to 1.62 and 2.61 minutes above the 10 year historic average respectively. Third party causes also include traffic accidents involving Vector assets. In RY2016 Vector had 135 traffic accidents with assets that contributed to SAIDI minutes for the year. The high number of traffic accidents with Vector assets reflects the growing light passenger fleet in Auckland that has grown by 90,000 vehicles since 2010 according to the Ministry of Transport.[5]

Vector's Actions to Mitigate Non Compliance

Since Vector first exceeded the SAIDI reliability limit in RY2014, we have put significant focus on our vegetation management program. A review of the program in RY2015

[5] Ministry of Transport – Transport fleet volumes at:http://www.transport.govt.nz/ourwork/tmif/transport-volume/tv004/

highlighted that a significant portion of vegetation related SAIDI faults were occurring on particular poor performing feeders. Accordingly, since that time Vector has, to the extent possible, reoriented resources to remove or trim vegetation along these poorer performing feeders. Since the second quarter of RY2014 Vector has been strategic with its vegetation management along these poorer performing feeders and has trimmed or removed 8,315 trees. The cost of taking a more permanent solution such as undergrounding is also not economically practicable given the circuit length involved and number of customers served along such feeders.

Any legal rights Vector has to cut or trim vegetation are governed by the Tree Regulations which specify acceptable perimeters around different types of conductors. Only once vegetation encroaches upon the perimeter can Vector request the property owner to take action against the vegetation either by trimming or removing the tree. Where the tree encroaches upon the perimeter for the first time, then Vector will trim or remove the tree for the customer. Vector's vegetation management program along its poorer performing feeders should start delivering SAIDI benefits once it has been able to clear such feeders from the risks of vegetation debris.

The number of overhead asset incidents that occurred in RY2016 is below that for the previous year however SAIDI resulting from overhead assets has increased from the previous year.

Since 2010 Vector introduced a heightened standard for its overhead structure replacements. This program introduced a heightened standard to condemn poles for replacement. The heightened standard prescribed a five year inspection cycle to cover the entire network and an expedited process for poles that were in urgent need for replacement. This program substantially increased the volume of condemned poles over the five years which was recently completed.

The SAIDI attributable to underground asset incidents was a sudden and significant departure from RY 2015 and the 10 year average. Vector is investigating the root cause for this sudden increase from SAIDI attributable to underground assets. The causes being investigated include whether such faults are arising from unreported dig-in incidents.