Network Quality and Reliability of Supply

Performance Report

2009/10

Prepared by: Operations – Asset Strategy & Capability
Audited by: Qualeng

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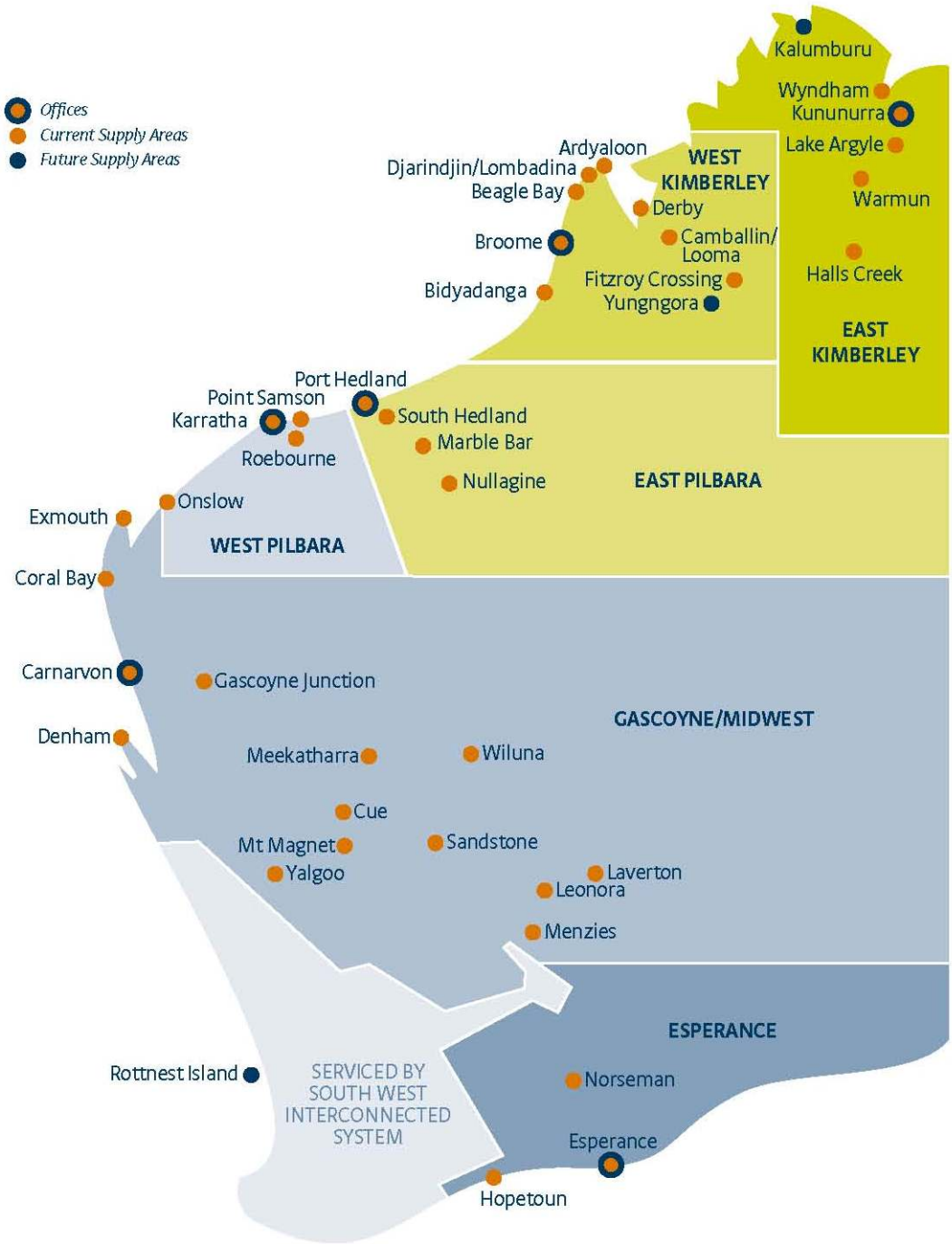
CONTENTS

HORIZON POWER SERVICE AREA MAP

Horizon Power is the Network Operator for thirty four discrete areas including the North West Interconnected System.



INTRODUCTION

This report has been produced to meet the requirements of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005.

AUDIT BY INDEPENDENT EXPERT

Division 3 of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 requires that Horizon Power arrange for an independent expert to audit, and report on the operation of the systems that Horizon Power has in place for monitoring its compliance with the code.

Horizon Power has appointed Qualeng to perform the audit of its systems for compliance with the code. Qualeng is a locally based engineering consulting group with over 15 years engineering, regulatory and quality assurance expertise throughout various industries. Qualeng has a long and successful trading history and comprises a team of highly experienced consultants with recent, relevant and international expertise in the energy sector.

Schedule 1 - Information to be published:

Clause 4 and 10

Clause 4(a) Number of breaches of each provision of the Code:

Quality of Supply	2008/09	2009/10
Voltage fluctuations	0	0
Harmonics	0	0

Clause 4(b) Remedial action taken for each provision:

Voltage Fluctuations

Location	Action Taken
	N/A

Harmonics

Location	Action Taken
	N/A

N/A = Not Applicable.

Continuous monitoring of voltage and harmonic distortion is done at the substation busbar. Temporary power quality monitoring equipment is installed on the network for specific problem monitoring in response to a customer power quality complaint.

Clause 5 - Significant interruptions to small use customers.

	Clause Description	Total
DB 1	Clause 5(a) Number of premises that experienced interruptions greater than 12 hours continuous.	**333**
DB 2	Clause 5(b) Number of premises that experienced more than 16 interruptions.	**2,535**

Detailed analysis of interruptions where duration is greater than 12 hours.

Substation	Date	Duration minutes	Number of Premises.	Cause Description	Damage Description
Kununurra	16/07/2009	1,063	2	Equipment Failure	Pole Top Switch/ Other
Esperance	25/07/2009	766	45	Vegetation	Recloser / Other
Esperance	25/07/2009	743	71	Equipment Failure	Transformer Distribution/ Blown
Esperance	18/09/2009	1,016	25	Equipment Failure	Pole/Broken
Laverton	6/11/2009	769	5	Planned Outage	HV Tap/Clamp/Loose
Esperance	11/11/2009	1,224	12	Lightning	Transformer Distribution / Damaged/Hit
Esperance	14/11/2009	884	15	Lightning	HV Conductor Overhead/ Damaged/ Hit
Esperance	16/11/2009	1,082	15	Equipment Failure	Drop Out Fuse/ Blown
Esperance	23/11/2009	1,046	1	Equipment Failure	No Power
Esperance	9/02/2010	838	1	Lightning	No Power
Esperance	16/02/2010	749	6	Lightning	Sectionaliser Trip
Esperance	16/02/2010	1,012	1	Lightning	No Power
Esperance	16/02/2010	1,430	1	Lightning	No Power
Esperance	22/02/2010	732	20	Lightning	Recloser Trip
Esperance	19/03/2010	942	18	Equipment Failure	Recloser Trip
Esperance	20/03/2010	803	18	Equipment Failure	Recloser Trip
Esperance	3/04/2010	2,215	15	Lightning	Drop Out Fuse Trip
Esperance	3/04/2010	771	18	Lightning	Recloser Trip
Esperance	4/04/2010	866	1	Lightning	Transformer On Pole Damaged
Esperance	23/05/2010	969	1	Lightning	No Power
W. Pilbara	17/06/2010	781	42	Equipment Failure	LV Fuse Trip
			333		

Clause 6 and 10 - Total number of complaints received

	2008/09	2009/10
DC 8	**79**	**54**

Clause 7 and 10 - Number of customer complaints in each discrete area:

Discrete Area	2008/09	2009/10
NWIS	18	11
Ardyaloon		
Beagle Bay		
Bidyadanga		
Broome	14	5
Carnarvon	3	2
Coral Bay		
Cue		
Denham		
Derby	6	7
Djarindjin		
Esperance	24	17
Exmouth	2	1
Fitzroy Crossing		
Gascoyne Junction		
Halls Creek	2	2
Hopetoun	3	2
Kununurra		5
Lake Argyle		
Laverton	2	
Leonora	1	
Looma		
Marble Bar		
Meekatharra		
Menzies		
Mount Magnet		
Norseman	1	
Nullagine		
Onslow	2	2
Sandstone		
Warmun		
Wiluna		
Wyndham	1	
Yalgoo		
Horizon Power	**79**	**54**

Clause 8 and 10 - Total amount spent addressing complaints.

	2008/09	2009/10
DC 9	**$458,454**	**$410,959**

Clause 9 and 10 - Payments to customers for failure to meet certain standards

The number and total payments made to customers for failure to give required notice of planned interruption.

	2008/09		2009/10	
	Number	Cost	Number	Cost
DD 2	**2**	**$40**	**1**	**$150**

The number and total payments made to customers for supply interruptions exceeding 12 hours.

	2008/09		2009/10	
	Number	Cost	Number	Cost
DD 3	**31**	**$2,480**	**71**	**$5,680**

Clause 11, 12 and 13(a) - Average Length of Interruption of Supply to Customer Premises in Minutes (CAIDI)

Discrete Area	2006/07	2007/08	2008/09	2009/10	Average
NWIS	402.49	76.6	59.88	49.50	147.12
Ardyaloon	0	0	77.27	0.00	19.32
Beagle Bay	N/A	0	749.34	0.00	249.78
Bidyadanga	0	31.93	0	0.00	7.98
Broome	52.12	42.17	46.53	55.36	49.04
Carnarvon	29.44	38.97	35.17	80.61	46.05
Coral Bay	N/A	7.6	4.17	0.00	3.92
Cue	52.74	0	127	145.05	81.20
Denham	190.6	63.88	80.17	0.00	83.66
Derby	91.9	34.79	40.96	42.68	52.58
Djarindjin	N/A	0	8.02	0.00	2.67
Esperance	123.12	56.18	141.85	121.28	110.61
Exmouth	55.25	31.99	76.89	41.50	51.41
Fitzroy Crossing	15.61	129.5	233.13	59.68	109.48
Gascoyne Junction	0	0	152.24	0.00	38.06
Halls Creek	43.92	33.02	52.99	114.37	61.07
Hopetoun	142.7	103.06	125.61	80.14	112.88
Kununurra	37.09	30.97	36.87	42.07	36.75
Lake Argyle	222.14	46.72	39.69	22.21	82.69
Laverton	54.48	34.29	71.58	59.80	55.04
Leonora	47.68	35.9	65.76	26.20	43.89
Looma	38.04	184.98	459.96	225.00	227.00
Marble Bar	9.78	8.36	11.85	10.03	10.00
Meekatharra	36.99	81.16	125.7	0.00	60.96
Menzies	85.44	35.31	0	0.00	30.19
Mount Magnet	24.48	28.97	103.61	28.32	46.34
Norseman	44.49	52.16	51.63	81.65	57.48
Nullagine	78.95	14.9	6.17	249.19	87.30
Onslow	48.48	16.54	14.2	67.38	36.65
Sandstone	11.22	44.2	12.75	0.00	17.04
Warmun	3.54	0	20.4	0.00	5.99
Wiluna	168.19	26.27	343.57	0.00	134.51
Wyndham	44.69	39.79	34.85	41.93	40.31
Yalgoo	32.76	0	8.88	0.00	10.41
Horizon Power	**126.70**	**47.65**	**68.19**	**73.43**	**78.99**

Clause 11, 12 and 13(b) - Average Number of Interruptions of Supply to Customer Premises (SAIFI)

Discrete Area	2006/07	2007/08	2008/09	2009/10	Average
NWIS	2.53	1.45	1.89	2.31	2.05
Ardyaloon	0.00	0.00	2.88	0.00	0.72
Beagle Bay	N/A	0.00	0.50	0.00	0.17
Bidyadanga	0.00	0.29	0.00	0.00	0.07
Broome	3.30	10.08	8.62	1.09	5.77
Carnarvon	7.40	4.34	5.89	3.11	5.18
Coral Bay	N/A	2.55	2.29	0.00	1.61
Cue	5.33	0.00	0.26	1.19	1.70
Denham	0.25	2.86	1.06	0.00	1.04
Derby	4.10	11.01	7.90	2.20	6.30
Djarindjin	N/A	0.00	1.99	0.00	0.66
Esperance	11.26	11.62	5.51	5.04	8.36
Exmouth	10.79	9.00	4.43	1.14	6.34
Fitzroy Crossing	4.73	0.46	0.84	1.28	1.83
Gascoyne Junction	0.00	0.00	0.49	0.00	0.12
Halls Creek	11.55	9.23	6.28	0.28	6.84
Hopetoun	14.93	8.17	2.72	2.60	7.11
Kununurra	12.20	14.68	10.08	6.32	10.82
Lake Argyle	5.95	7.10	8.19	1.73	5.74
Laverton	3.70	5.05	7.27	1.71	4.43
Leonora	7.99	1.26	0.46	1.48	2.80
Looma	3.68	2.00	1.40	0.12	1.80
Marble Bar	0.59	11.41	2.59	3.77	4.59
Meekatharra	2.14	1.28	1.38	0.00	1.20
Menzies	4.21	0.96	0.00	0.00	1.29
Mount Magnet	5.49	2.27	6.44	3.53	4.43
Norseman	10.29	1.16	7.43	4.00	5.72
Nullagine	5.46	4.00	1.02	0.44	2.73
Onslow	3.60	9.74	9.06	3.22	6.41
Sandstone	0.96	0.05	0.95	0.00	0.49
Warmun	2.07	0.00	1.91	0.00	1.00
Wiluna	3.07	2.05	0.51	0.00	1.41
Wyndham	15.44	29.95	21.88	7.79	18.77
Yalgoo	1.64	0.00	1.01	0.00	0.66
Horizon Power	**6.11**	**6.67**	**4.92**	**2.78**	**5.12**

Clause 11, 12 and 13(c) - Average Percentage Of Time That Electricity Has Been Supplied To Customer Premises.

Discrete Area %	2006/07	2007/08	2008/09	2009/10	Average
NWIS	99.806	99.979	99.979	99.991	99.939
Ardyaloon	100.000	100.000	99.958	100.000	99.990
Beagle Bay	N/A	100.000	99.929	100.000	99.976
Bidyadanga	100.000	99.998	100.000	100.000	100.000
Broome	99.967	99.919	99.924	99.989	99.950
Carnarvon	99.959	99.968	99.961	99.985	99.968
Coral Bay	N/A	100.000	99.998	100.000	99.999
Cue	99.947	100.000	99.994	99.972	99.978
Denham	99.991	99.965	99.984	100.000	99.985
Derby	99.928	99.927	99.939	99.992	99.946
Djarindjin	N/A	100.000	99.997	100.000	99.999
Esperance	99.736	99.876	99.852	99.977	99.860
Exmouth	99.887	99.945	99.935	99.992	99.940
Fitzroy Crossing	99.986	99.989	99.963	99.989	99.982
Gascoyne Junction	100.000	100.000	99.986	100.000	99.997
Halls Creek	99.903	99.942	99.937	99.978	99.940
Hopetoun	99.595	99.840	99.935	99.985	99.839
Kununurra	99.914	99.914	99.929	99.992	99.937
Lake Argyle	99.749	99.937	99.938	99.996	99.905
Laverton	99.962	99.967	99.901	99.989	99.955
Leonora	99.928	99.991	99.994	99.995	99.977
Looma	99.973	99.930	99.878	99.957	99.935
Marble Bar	99.999	99.982	99.994	99.998	99.993
Meekatharra	99.985	99.980	99.967	100.000	99.983
Menzies	99.932	99.994	100.000	100.000	99.982
Mount Magnet	99.974	99.988	99.873	99.995	99.957
Norseman	99.913	99.989	99.927	99.984	99.953
Nullagine	99.918	99.989	99.999	99.953	99.965
Onslow	99.967	99.969	99.976	99.987	99.975
Sandstone	99.998	100.000	99.998	100.000	99.999
Warmun	99.999	100.000	99.993	100.000	99.998
Wiluna	99.902	99.990	99.967	100.000	99.965
Wyndham	99.869	99.774	99.855	99.992	99.873
Yalgoo	99.990	100.000	99.998	100.000	99.997
Horizon Power	**99.853**	**99.940**	**99.936**	**99.986**	**99.929**

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Clause 11, 12 and 13(d) - Average Total Length of All Interruptions of Supply to Customer Premises in Minutes (SAIDI)

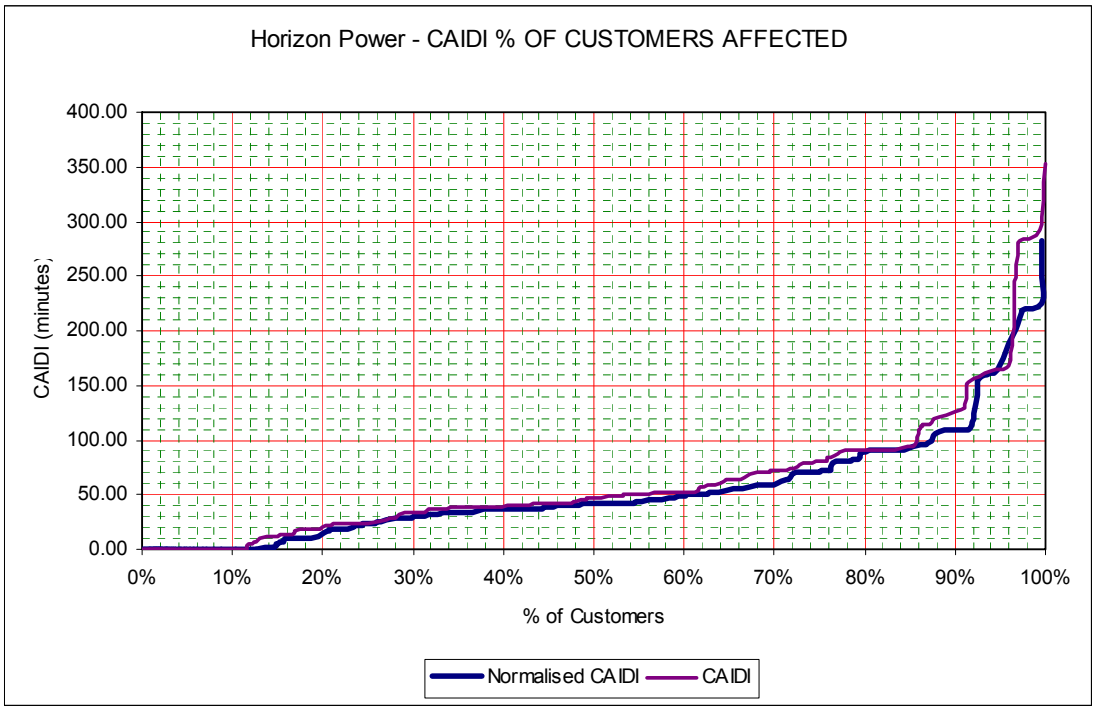
DISCRETE AREA	2006/07	2007/08	2008/09	2009/10	AVERAGE
NWIS	1,018	111	113	114	339
Ardyaloon	0	0	223	0	56
Beagle Bay	N/A	0	375	0	125
Bidyadanga	0	9	0	0	2
Broome	172	425	401	61	265
Carnarvon	218	169	207	250	211
Coral Bay	N/A	19	10	0	10
Cue	281	0	33	173	122
Denham	48	183	85	0	79
Derby	377	383	324	94	294
Djarindjin	N/A	0	16	0	5
Esperance	1,386	653	782	611	858
Exmouth	596	288	341	47	318
Fitzroy Crossing	74	60	196	76	102
Gascoyne Junction	0	0	75	0	19
Halls Creek	507	305	333	32	294
Hopetoun	2,130	842	342	209	881
Kununurra	452	455	372	266	386
Lake Argyle	1,322	332	325	38	504
Laverton	202	173	520	103	249
Leonora	381	45	30	39	124
Looma	140	370	644	27	295
Marble Bar	6	95	31	38	42
Meekatharra	79	104	173	0	89
Menzies	360	34	0	0	99
Mount Magnet	134	66	667	100	242
Norseman	458	61	384	326	307
Nullagine	431	60	6	110	152
Onslow	175	161	129	217	171
Sandstone	11	2	12	0	6
Warmun	7	0	39	0	12
Wiluna	516	54	175	0	186
Wyndham	690	1,192	762	327	743
Yalgoo	54	0	9	0	16
Horizon Power	**774**	**318**	**336**	**204**	**408**

For the period 01/07/2009 to 30/06/2010 SAIDI using the normalised data sets was **162** minutes.

Clause 14(a) - Horizon Power - Average Length of Interruption - Frequency Distribution

Percentile	Minutes
25th	24.71
50th	47.81
75th	79.54
90th	125.84
95th	166.06
98th	285.78
100th	353.50

Clause 15(a) - CAIDI Frequency Graph.

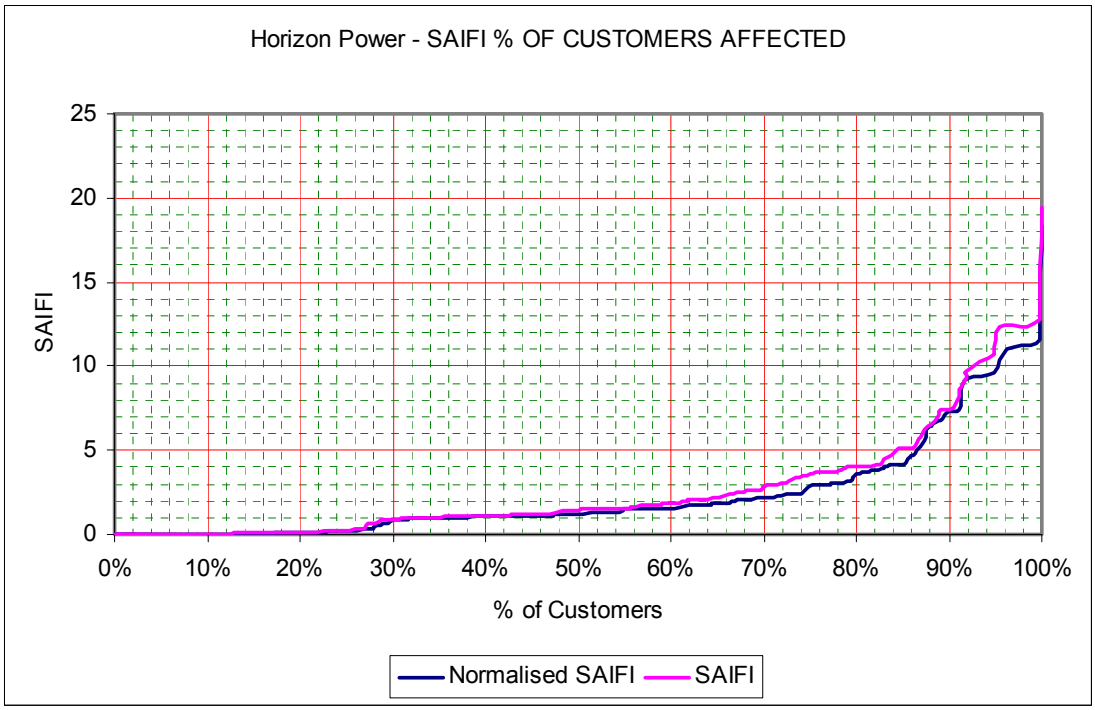


During the period 01/07/2009 to 30/06/2010 of those customers who experienced an interruption, approximately 65% had an interruption of less than 60 minutes.

Clause 14(b) - Horizon Power - Number of Interruptions - Frequency Distribution

Percentile	Interruptions
25th	0.24
50th	1.41
75th	3.56
90th	7.52
95th	11.14
98th	12.37
100th	19.42

Clause 15(b) - SAIFI Frequency Graph.

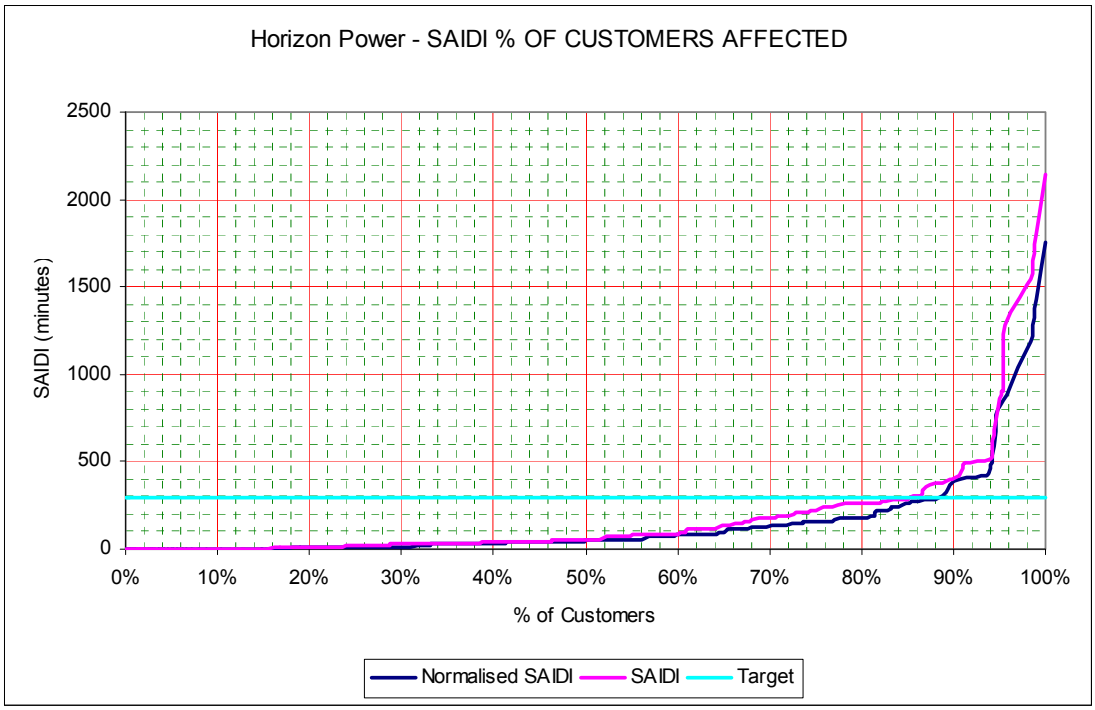


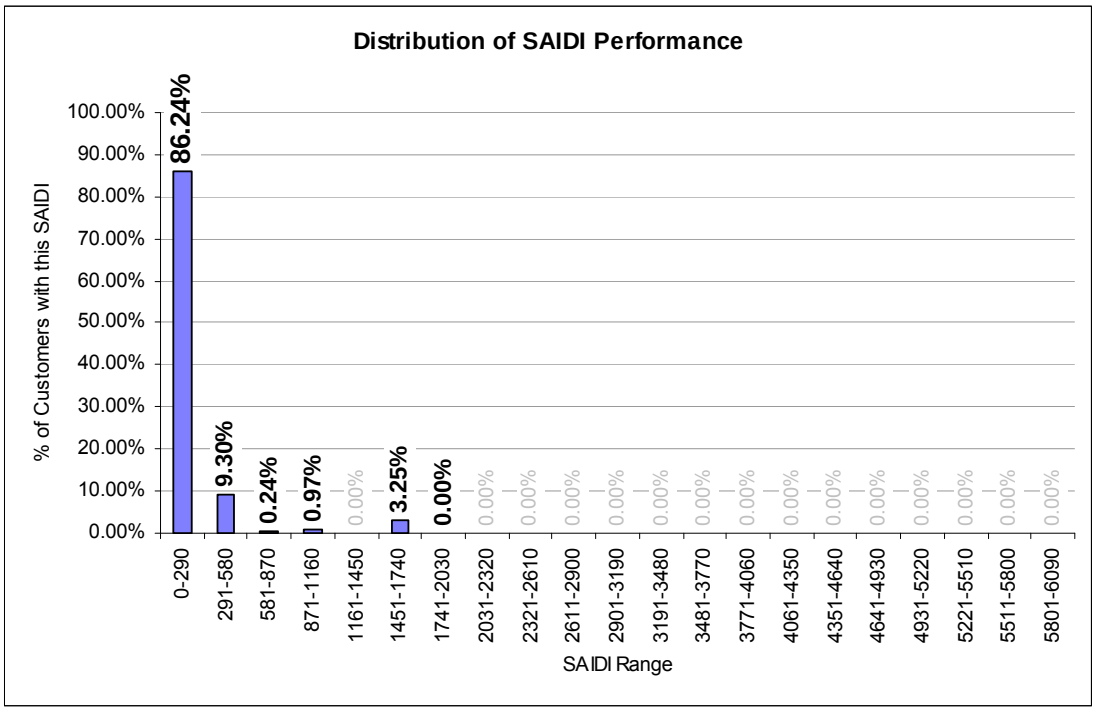
During the period 01/07/2009 to 30/06/2010 approximately 99% of customers experienced an average of less than 16 outages.

Clause 14(c) - Horizon Power - Total Length of all Interruptions - Frequency Distribution

Percentile	Minutes
25th	18.76
50th	54.28
75th	225.46
90th	402.27
95th	833.00
98th	766.17
100th	2144.36

Clause 15(c) - SAIDI Frequency Graph





During the period 01/07/2009 to 30/06/2010 just over 86% of customers experienced outages with durations of less than 290 minutes. Using a normalised data set this is increased to just over 88%.

AFFECT OF MAJOR EVENT DAYS

In the period 01/07/2009 to 30/06/2010 there were no Major Event Days recorded.

Appendix

Major Event Days

Major event days are days on which the impact of system faults is statistically greater than normal. These faults are due to unusually severe events that are outside the control of Horizon Power, for example a very severe cyclone or widespread flooding. This report makes reference to the impact of major event days where they have had a significant impact on the statistics.

IEEE 136602003 - Section 4.5 Major Event Day Classification

The following process ("Beta Method") is used to identify MED's. Its purpose is to allow major events to be studied separately from daily operation, and in the process, to better reveal trends in daily operation that would be hidden by the large statistical effect of major events.

A major event day is a day in which the daily system SAIDI exceeds a threshold value $\mathbf{T}_{MED}$. The SAIDI is used as the basis of this definition since it leads to consistent results regardless of utility size and because SAIDI is a good indicator of operational and design stress. Even though SAIDI is used to determine the major event days, all indices should be calculated based on removal of the identified days.

In calculating daily system SAIDI, any interruptions that span multiple days are accrued to the day on which the interruption begins.

The major event day identification threshold value $\mathbf{T}_{MED}$, is calculated at the end of each period (typically one year) for use during the next reporting period as follows:

a) Collect values of daily SAIDI for five sequential years ending on the last day of the last complete reporting period. If fewer than five years of historic data are available, use all available historical data until five years of historical data are available.
b) Only those days that have a SAIDI/Day value will be used to calculate the T_{MED} (do not include days that did not have any interruptions).
c) Take the natural log (ln) of each daily SAIDI value in the data set.
d) Find α (Alpha), the average of the logarithms (also known as the log-average) of the data set.
e) Find β (Beta), the standard deviation of the logarithms (also known as the log-standard deviation) of the data set.
f) Compute the major event day threshold $\mathbf{T}_{MED}$, using equation 25.

$$T_{MED} = e^{(\alpha+2.5\beta)} \qquad (25)$$

g) Any day with daily SAIDI greater than the threshold value T_{MED} that occurs during the subsequent reporting period is classified as a major event day.

Normalised Data Sets - Unplanned

As well as using 'All Faults' data for monitoring system reliability, Horizon Power also uses normalised data sets unplanned to better reflect incidents that are within the business' control.

The SCONRRR(1) definition of normalised data sets – unplanned excludes;

- Planned interruptions;
- Transmission outages;
- Exceeds a threshold SAIDI of 3 minutes;
- Are caused by exceptional nature or third party events;
- Major Event Days;
- The distributor cannot reasonably be expected to mitigate the effect of the event on interruptions by prudent asset management.

Horizon Power is a vertically integrated business and is responsible for generation, transmission and distribution. Therefore the normalised data sets do not exclude generation or transmission outages that are within the control of Horizon Power. Also the threshold SAIDI used by Horizon Power is 1 minute.

(1) Steering Committee on National Regulatory Reporting Requirements (SCONRRR). SCONRRR was established to oversee the development of requirements for reporting by electricity retailers and distributors.