Network Quality and Reliability of Supply

Performance Report

2008/09

Prepared by : Governance & Compliance Branch
Audited by : Qualeng

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CONTENTS

HORIZON POWER SERVICE AREA MAP

Horizon Power is the Network Operator for the North West Interconnected System and thirty-three isolated systems.

INTRODUCTION

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

It is acknowledged that there is room for improvement in the quality & reliability of supply performance on some power systems. Horizon Power is striving to improve the performance of these systems by implementing targeted asset management plans.

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	2007/08	2008/09
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 5(a) Number of premises that experienced interruptions greater than 12 hours continuous: **354**.

Clause 5(b) Number of premises that experienced more than 16 interruptions: **2,176**

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

Substation	Date	Duration [mins]	Customers affected	Cause
Anderson St.	18/09/2008	859	9	Vehicle/machine/tool
Fitzroy Crossing	16/11/2008	731	12	Animal
Esperance	26/11/2008	1,232	9	Unknown
Esperance	26/11/2008	933	2	Wind (incl debris)
Esperance	3/12/2008	1,241	15	Equip fail (inc ptf)
Esperance	3/12/2008	1,301	13	Equip fail (inc ptf)
Esperance	3/12/2008	1,421	8	Equip fail (inc ptf)
Esperance	3/12/2008	1,571	7	Equip fail (inc ptf)
Esperance	3/12/2008	1,691	2	Equip fail (inc ptf)
Esperance	3/12/2008	1,871	2	Equip fail (inc ptf)
Esperance	3/12/2008	3,041	6	Equip fail (inc ptf)
Fitzroy Crossing	5/12/2008	1,602	2	Unknown
Esperance	19/12/2008	1,367	25	Wind (incl debris)
Beagle bay	22/12/2008	839	26	Cyclone
Esperance	26/01/2009	888	6	Lightning
Hopetoun	15/02/2009	1,500	1	Equip fail (inc ptf)
Esperance	02/03/2009	766	19	Vegetation
Esperance	02/03/2009	826	4	Vegetation
Esperance	02/03/2009	846	15	Vegetation
Esperance	02/03/2009	986	1	Vegetation
Hopetoun	29/03/2009	1,110	14	Lightning
Hopetoun	29/03/2009	730	38	Lightning
Meekatharra	27/04/2009	885	49	Willful damage
Esperance	21/05/2009	1,713	1	Equip fail (inc ptf)
Esperance	19/06/2009	1,200	13	Wind (incl debris)
Esperance	19/06/2009	1,422	8	Wind (incl debris)
Esperance	19/06/2009	1,591	11	Wind (incl debris)
Esperance	19/06/2009	1,650	17	Wind (incl debris)
Esperance	19/06/2009	1,485	9	Wind (incl debris)
Esperance	19/06/2009	1,199	7	Wind (incl debris)
Esperance	23/06/2009	800	3	Equip fail (inc ptf)

Clause 6 and 10 - Total number of complaints received

2007/08	2008/09
140	79

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

Discrete Area	2007/08	2008/09
NWIS	21	18
Ardyaloon		
Beagle Bay		
Bidyadanga		
Broome	20	14
Carnarvon	3	3
Coral Bay		
Cue		
Denham	1	
Derby	17	6
Djarindjin		
Esperance	51	24
Exmouth	5	2
Fitzroy Crossing	2	
Gascoyne Junction	1	
Halls Creek	2	2
Hopetoun	2	3
Kununurra	9	
Lake Argyle	1	
Laverton	1	2
Leonora	1	1
Looma		
Marble Bar		
Meekatharra	1	
Menzies		
Mount Magnet		
Norseman	1	1
Nullagine		
Onslow		2
Sandstone		
Warmun		
Wiluna		
Wyndham	1	1
Yalgoo		
Horizon Power	140	79

Clause 8 and 10 - Total amount spent addressing complaints.

2007/08	2008/09
$730,890	$458,454

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.

2007/08		2008/09	
Number	Cost	Number	Cost
0	$0	2	$40

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

2007/08		2008/09	
Number	Cost	Number	Cost
27	$2160	31	$2,480

(06/07 affected by a high incidence of cyclones)

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

DISCRETE AREA	2005/06	2006/07	2007/08	2008/09	AVERAGE
NWIS	163.26	402.49	76.60	59.88	175.56
Ardyaloon	N/A	0	0	77.27	25.76
Beagle Bay	N/A	N/A	0	749.34	374.67
Bidyadanga	N/A	0	31.93	0	10.64
Broome	48.04	52.12	42.17	46.53	47.21
Carnarvon	36.28	29.44	38.97	35.17	34.97
Coral Bay	N/A	N/A	7.60	4.17	5.88
Cue	178.67	52.74	0	127.00	89.60
Denham	20.29	190.60	63.88	80.17	88.74
Derby	41.08	91.90	34.79	40.96	52.18
Djarindjin	N/A	N/A	0	8.02	4.01
Esperance	32.24	123.12	56.18	141.85	88.35
Exmouth	47.41	55.25	31.99	76.89	52.89
Fitzroy Crossing	44.36	15.61	129.50	233.13	105.65
Gascoyne Junction	10.81	0	0	152.24	40.76
Halls Creek	52.17	43.92	33.02	52.99	45.52
Hopetoun	95.69	142.70	103.06	125.61	116.77
Kununurra	38.15	37.09	30.97	36.87	35.77
Lake Argyle	16.35	222.14	46.72	39.69	81.23
Laverton	31.53	54.48	34.29	71.58	47.97
Leonora	51.67	47.68	35.90	65.76	50.25
Looma	211.43	38.04	184.98	459.96	223.60
Marble Bar	0	9.78	8.36	11.85	7.50
Meekatharra	41.99	36.99	81.16	125.70	71.46
Menzies	26.37	85.44	35.31	0	36.78
Mount Magnet	40.36	24.48	28.97	103.61	49.35
Norseman	48.44	44.49	52.16	51.63	49.18
Nullagine	48.65	78.95	14.90	6.17	37.16
Onslow	213.13	48.48	16.54	14.20	73.08
Sandstone	0	11.22	44.20	12.75	17.04
Warmun	N/A	3.54	0	20.40	7.98
Wiluna	23.85	168.19	26.27	343.57	140.47
Wyndham	42.29	44.69	39.79	34.85	40.40
Yalgoo	42.72	32.76	0	8.88	21.09
Horizon Power	**71.91**	**126.70**	**47.65**	**68.19**	**78.61**

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

DISCRETE AREA	2005/06	2006/07	2007/08	2008/09	AVERAGE
NWIS	3.45	2.53	1.45	1.89	2.33
Ardyaloon	N/A	0	0	2.88	0.96
Beagle Bay	N/A	N/A	0	0.50	0.25
Bidyadanga	N/A	0	0.29	0	0.10
Broome	2.45	3.30	10.08	8.62	6.11
Carnarvon	3.67	7.40	4.34	5.89	5.33
Coral Bay	N/A	N/A	2.55	2.29	2.42
Cue	0.98	5.33	0	0.26	1.64
Denham	0.99	0.25	2.86	1.06	1.29
Derby	5.02	4.10	11.01	7.90	7.01
Djarindjin	N/A	N/A	0	1.99	1.00
Esperance	8.96	11.26	11.62	5.51	9.34
Exmouth	5.18	10.79	9.00	4.43	7.35
Fitzroy Crossing	4.55	4.73	0.46	0.84	2.65
Gascoyne Junction	2.58	0	0	0.49	0.77
Halls Creek	6.92	11.55	9.23	6.28	8.50
Hopetoun	9.38	14.93	8.17	2.72	8.80
Kununurra	8.86	12.20	14.68	10.08	11.46
Lake Argyle	3.14	5.95	7.10	8.19	6.10
Laverton	1.53	3.70	5.05	7.27	4.39
Leonora	2.25	7.99	1.26	0.46	2.99
Looma	0.42	3.68	2.00	1.40	1.88
Marble Bar	0	0.59	11.41	2.59	3.65
Meekatharra	0.99	2.14	1.28	1.38	1.45
Menzies	2.58	4.21	0.96	0	1.94
Mount Magnet	4.45	5.49	2.27	6.44	4.66
Norseman	13.33	10.29	1.16	7.43	8.05
Nullagine	4.76	5.46	4.00	1.02	3.81
Onslow	9.70	3.60	9.74	9.06	8.03
Sandstone	0	0.96	0.05	0.95	0.49
Warmun	N/A	2.07	0	1.91	1.33
Wiluna	3.43	3.07	2.05	0.51	2.27
Wyndham	9.37	15.44	29.95	21.88	19.19
Yalgoo	1.97	1.64	0	1.01	1.16
Horizon Power	**5.09**	**6.11**	**6.67**	**4.92**	**5.70**

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

DISCRETE AREA %	2005/06	2006/07	2007/08	2008/09	AVERAGE
NWIS	99.893	99.806	99.979	99.979	99.914
Ardyaloon	N/A	100.000	100.000	99.958	99.979
Beagle Bay	N/A	N/A	100.000	99.929	99.964
Bidyadanga	N/A	100.000	99.998	100.000	99.999
Broome	99.978	99.967	99.919	99.924	99.947
Carnarvon	99.975	99.959	99.968	99.961	99.965
Coral Bay	N/A	N/A	100.000	99.998	99.997
Cue	99.967	99.947	100.000	99.994	99.977
Denham	99.996	99.991	99.965	99.984	99.984
Derby	99.961	99.928	99.927	99.939	99.939
Djarindjin	N/A	N/A	100.000	99.997	99.998
Esperance	99.945	99.736	99.876	99.852	99.852
Exmouth	99.953	99.887	99.945	99.935	99.930
Fitzroy Crossing	99.962	99.986	99.989	99.963	99.975
Gascoyne Junction	99.995	100.000	100.000	99.986	99.995
Halls Creek	99.931	99.903	99.942	99.937	99.928
Hopetoun	99.829	99.595	99.840	99.935	99.800
Kununurra	99.936	99.914	99.914	99.929	99.923
Lake Argyle	99.990	99.749	99.937	99.938	99.903
Laverton	99.991	99.962	99.967	99.901	99.955
Leonora	99.978	99.928	99.991	99.994	99.973
Looma	99.983	99.973	99.930	99.878	99.941
Marble Bar	100.000	99.999	99.982	99.994	99.994
Meekatharra	99.992	99.985	99.980	99.967	99.981
Menzies	99.987	99.932	99.994	100.000	99.978
Mount Magnet	99.966	99.974	99.988	99.873	99.950
Norseman	99.877	99.913	99.989	99.927	99.926
Nullagine	99.956	99.918	99.989	99.999	99.965
Onslow	99.607	99.967	99.969	99.976	99.880
Sandstone	100.000	99.998	100.000	99.998	99.999
Warmun	N/A	99.999	100.000	99.993	99.996
Wiluna	99.984	99.902	99.990	99.967	99.961
Wyndham	99.925	99.869	99.774	99.855	99.855
Yalgoo	99.984	99.990	100.000	99.998	99.993
Horizon Power	**99.930**	**99.853**	**99.940**	**99.936**	**99.915**

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

DISCRETE AREA	2005/06	2006/07	2007/08	2008/09	AVERAGE
NWIS	563	1,018	111	113	**451**
Ardyaloon	N/A	0	0	223	74
Beagle Bay	N/A	N/A	0	375	187
Bidyadanga	N/A	0	9	0	3
Broome	118	172	425	401	279
Carnarvon	133	218	169	207	182
Coral Bay	N/A	N/A	19	10	14
Cue	175	281	0	33	122
Denham	20	48	183	85	84
Derby	206	377	383	324	**322**
Djarindjin	N/A	N/A	0	16	8
Esperance	289	1,386	653	782	**777**
Exmouth	246	596	288	341	**368**
Fitzroy Crossing	202	74	60	196	133
Gascoyne Junction	28	0	0	75	26
Halls Creek	361	507	305	333	**376**
Hopetoun	898	2,130	842	342	**1,053**
Kununurra	338	452	455	372	**404**
Lake Argyle	51	1,322	332	325	**507**
Laverton	48	202	173	520	236
Leonora	116	381	45	30	143
Looma	89	140	370	644	**311**
Marble Bar	0	6	95	31	33
Meekatharra	42	79	104	173	100
Menzies	68	360	34	0	115
Mount Magnet	180	134	66	667	262
Norseman	646	458	61	384	**387**
Nullagine	232	431	60	6	182
Onslow	2,067	175	161	129	**633**
Sandstone	0	11	2	12	6
Warmun	0	7	0	39	15
Wiluna	82	516	54	175	207
Wyndham	396	690	1,192	762	**760**
Yalgoo	84	54	0	9	37
Horizon Power	**366**	**774**	**318**	**336**	**448.37**

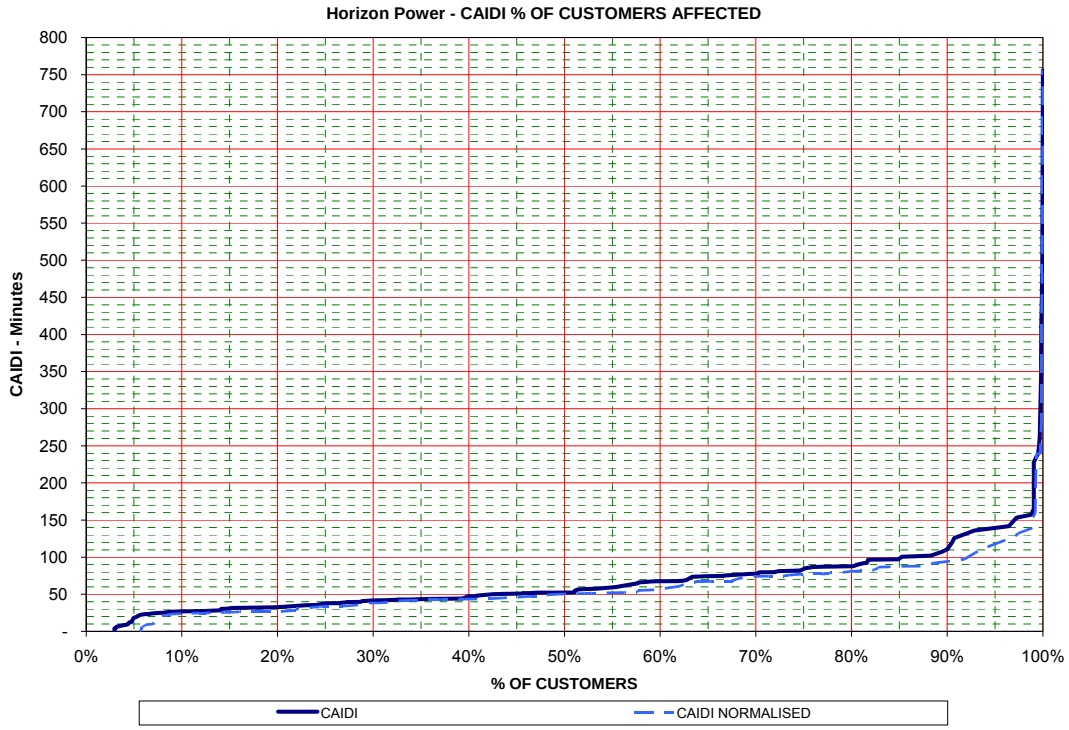
Note: Figures in red indicate where SAIDI is greater than 290 minutes.

For the period 01/07/2008 to 30/06/2009 SAIDI using the normalised data sets was **284** minutes.

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

Percentile	Minutes
25th	37.71
50th	52.45
75th	84.08
90th	110.57
95th	139.39
98th	155.20
100th	755.80

Clause 15(a) - CAIDI Frequency Graph.

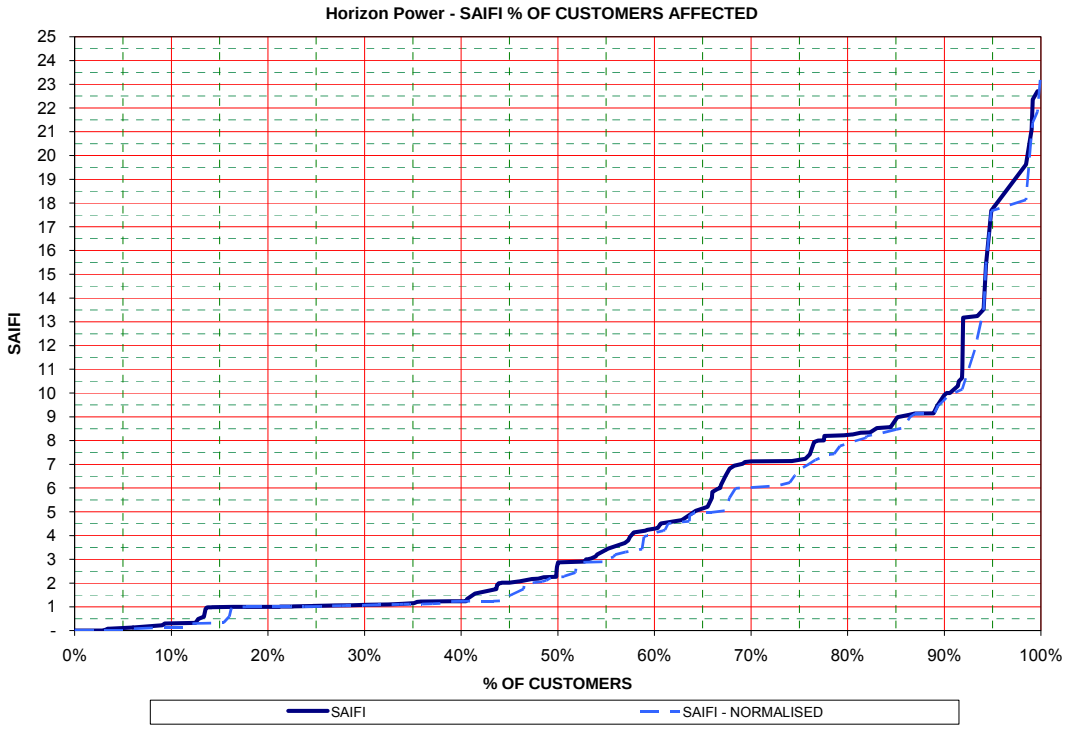


During the period 01/07/2008 to 30/06/2009 of those customers who experienced an interruption, approximately 55% had an interruption of less than 60 minutes.

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

Percentile	Interruptions
25th	1.04
50th	2.83
75th	7.19
90th	9.90
95th	17.75
98th	19.37
100th	23.56

Clause 15(b) - SAIFI Frequency Graph.

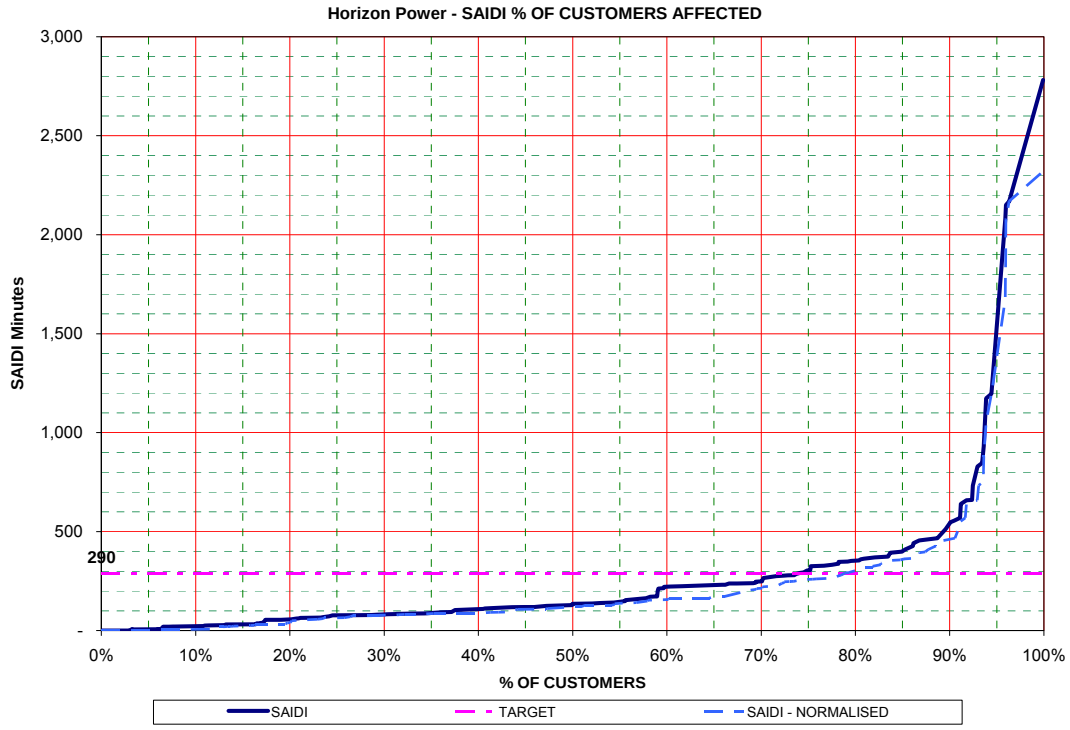


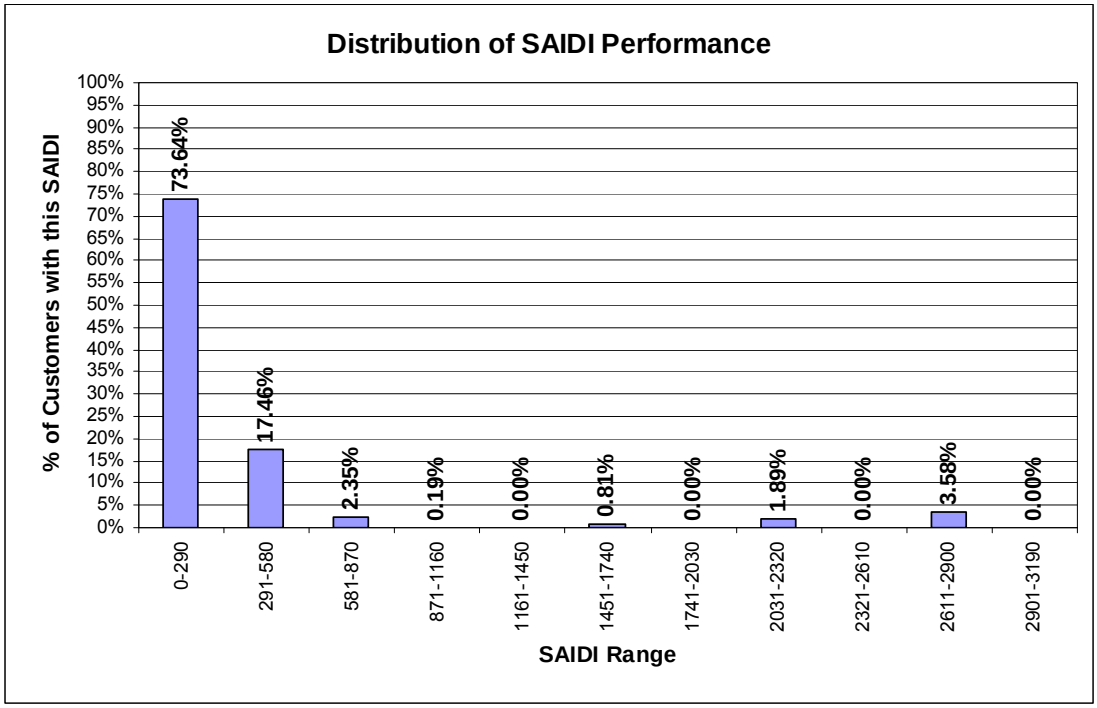
During the period 01/07/2008 to 30/06/2009 approximately 94% of customers experienced less than 16 outages.

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

Percentile	Minutes
25th	77
50th	136
75th	305
90th	541
95th	1,536
98th	2,455
100th	3,269

Clause 15(c) - SAIDI Frequency Graph





During the period 01/07/2008 to 30/06/2009 approximately 74% of customers experienced outages with duration of less than 290 minutes. Using a normalised data set this is increased to approximately 79%.

AFFECT OF MAJOR EVENT DAYS

In the period 01/07/2008 to 30/06/2009 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 MEDs. 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.