Network Quality and Reliability of Supply

Annual Report

2007/08

Prepared by: Network Customer Services Division
Audited by: Logica

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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 Logica. to perform the audit of its systems for compliance with the code. Logica is an international company that provides management and IT consultancy, systems integration and outsourcing services to clients across diverse markets including telecoms, financial services, energy and utilities, industry, distribution and transport and the public sector. Among its core global competencies Logica lists knowledge management and regulatory reporting.

HORIZON POWER

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

REPORTS - Code 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	2006/07	2007/08
Voltage fluctuations	UD	0
Harmonics	UD	0

UD = Under development. Although there is a process in place to investigate and correct voltage and harmonics complaints, it did not include the recording of out of limits events.

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: **115**.

Clause 5(b) Number of premises that experienced more than 16 interruptions: **2,979**

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

SUBSTATION	DATE	DURATION [MINS]	CUSTOMERS AFFECTED	CAUSE
ESPERANCE	08-Sep-07	814	11	Lightning storm
ESPERANCE	13-Sep-07	765	11	Lightning storm
HOPETOUN	16-Dec-07	939	14	Equipment failure
ESPERANCE	08-Jan-08	979	2	Lightning storm
ESPERANCE	08-Jan-08	1,020	9	Lightning storm
EXMOUTH	19-Feb-08	917	39	Strong Winds
MURDOCK DRIVE	28-Mar-08	1,354	18	Equipment failure
HOPETOUN	31-Mar-08	810	5	Equipment failure
DERBY	02-Apr-08	793	2	Animals / Bats
FITZROY CROSSING	07-Jun-08	910	4	Animals / Bats

Clause 6 and 10- Total number of complaints received

2006/07	2007/08
185	140

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

DISCRETE AREA	2006/07	2007/08
NWIS	32	21
Ardyaloon	0	0
Beagle Bay	N/A	0
Bidyadanga	0	0
Broome	12	20
Carnarvon	3	3
Coral Bay	N/A	0
Cue	1	0
Denham	0	1
Derby	8	17
Djarindjin	N/A	0
Esperance	93	51
Exmouth	14	5
Fitzroy Crossing	1	2
Gascoyne Junction	0	1
Halls Creek	2	2
Hopetoun	12	2
Kununurra	3	9
Lake Argyle	0	1
Laverton	0	1
Leonora	1	1
Looma	0	0
Marble Bar	0	0
Meekatharra	2	1
Menzies	0	0
Mount Magnet	0	0
Norseman	1	1
Nullagine	0	0
Onslow	1	0
Sandstone	0	0
Warmun	0	0
Wiluna	0	0
Wyndham	0	1
Yalgoo	0	0
Horizon Power	**185**	**140**

Clause 8 and 10- Total amount spent addressing complaints.

2006/07	2007/08
$261,292	**$730,890**

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.

2006/07		2007/08	
Number	Cost	Number	Cost
0	$0	0	$0

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

2006/07		2007/08	
Number	Cost	Number	Cost
323	$25,840	27	$2160

(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	2004/05	2005/06	2006/07	2007/08	AVERAGE
NWIS	82.61	163.26	402.49	76.60	181.24
Ardyaloon	N/A	N/A	0	0	0
Beagle Bay	N/A	N/A	N/A	0	0
Bidyadanga	N/A	N/A	0	31.93	15.97
Broome	39.33	48.04	52.12	42.17	45.41
Carnarvon	36.59	36.28	29.44	38.97	35.32
Coral Bay	N/A	N/A	N/A	7.60	7.6
Cue	256.92	178.67	52.74	0	122.08
Denham	114.00	20.29	190.60	63.88	97.19
Derby	75.00	41.08	91.90	34.79	60.69
Djarindjin	N/A	N/A	N/A	0	0
Esperance	26.00	32.24	123.12	56.18	59.38
Exmouth	31.79	47.41	55.25	31.99	41.61
Fitzroy Crossing	32.00	44.36	15.61	129.50	55.37
Gascoyne Junction	40.00	10.81	0	0	12.70
Halls Creek	59.38	52.17	43.92	33.02	47.12
Hopetoun	67.10	95.69	142.70	103.06	102.14
Kununurra	37.73	38.15	37.09	30.97	35.99
Lake Argyle	38.50	16.35	222.14	46.72	80.93
Laverton	68.52	31.53	54.48	34.29	47.20
Leonora	33.21	51.67	47.68	35.90	42.12
Looma	61.54	211.43	38.04	184.98	124.00
Marble Bar	0	0	9.78	8.36	4.53
Meekatharra	26.90	41.99	36.99	81.16	46.76
Menzies	76.67	26.37	85.44	35.31	55.95
Mount Magnet	39.29	40.36	24.48	28.97	33.27
Norseman	0	48.44	44.49	52.16	36.27
Nullagine	15.56	48.65	78.95	14.90	39.51
Onslow	33.68	213.13	48.48	16.54	77.96
Sandstone	27.00	0	11.22	44.20	20.60
Warmun	N/A	N/A	3.54	0	1.77
Wiluna	84.62	23.85	168.19	26.27	75.73
Wyndham	32.54	42.29	44.69	39.79	39.83
Yalgoo	30.00	42.72	32.76	0	26.37
Horizon Power	**36.27**	**71.91**	**126.70**	**47.65**	**70.63**

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

DISCRETE AREA	2004/05	2005/06	2006/07	2007/08	AVERAGE
NWIS	1.15	3.45	2.53	1.45	2.15
Ardyaloon	N/A	N/A	0	0	0
Beagle Bay	N/A	N/A	N/A	0	0
Bidyadanga	N/A	N/A	0	0.29	0.15
Broome	1.5	2.45	3.30	10.08	4.33
Carnarvon	9.1	3.67	7.40	4.34	6.13
Coral Bay	N/A	N/A	N/A	2.55	2.55
Cue	1.3	0.98	5.33	0	1.90
Denham	0.5	0.99	0.25	2.86	1.15
Derby	1.8	5.02	4.10	11.01	5.48
Djarindjin	N/A	N/A	N/A	0	0
Esperance	15	8.96	11.26	11.62	11.71
Exmouth	2.8	5.18	10.79	9.00	6.94
Fitzroy Crossing	14.5	4.55	4.73	0.46	6.06
Gascoyne Junction	6.3	2.58	0	0	2.22
Halls Creek	9.7	6.92	11.55	9.23	9.35
Hopetoun	14.5	9.38	14.93	8.17	11.75
Kununurra	14.1	8.86	12.20	14.68	12.46
Lake Argyle	8	3.14	5.95	7.10	6.05
Laverton	5.4	1.53	3.70	5.05	3.92
Leonora	5.6	2.25	7.99	1.26	4.28
Looma	2.6	0.42	3.68	2.00	2.18
Marble Bar	0	0	0.59	11.41	3.00
Meekatharra	8.7	0.99	2.14	1.28	3.28
Menzies	4.5	2.58	4.21	0.96	3.06
Mount Magnet	7	4.45	5.49	2.27	4.80
Norseman	0	13.33	10.29	1.16	6.20
Nullagine	9.9	4.76	5.46	4.00	6.03
Onslow	3.8	9.70	3.60	9.74	6.71
Sandstone	1	0	0.96	0.05	0.50
Warmun	N/A	N/A	2.07	0	1.03
Wiluna	3.9	3.43	3.07	2.05	3.11
Wyndham	13.8	9.37	15.44	29.95	17.14
Yalgoo	0.4	1.97	1.64	0	1.00
Horizon Power	**6.12**	**5.09**	**6.11**	**6.67**	**6.00**

Clause 11, 12 and 13(c) 0 Average Percentage Of Time That Electricity Has Been Supplied To Customer Premises.

DISCRETE AREA	2004/05	2005/06	2006/07	2007/08	AVERAGE
NWIS	99.982%	99.893%	99.806%	99.979%	99.915%
Ardyaloon	N/A	N/A	100.000%	100.000%	100.000%
Beagle Bay	N/A	N/A	N/A	100.000%	100.000%
Bidyadanga	N/A	N/A	100.000%	99.998%	99.998%
Broome	99.989%	99.978%	99.967%	99.919%	99.963%
Carnarvon	99.937%	99.975%	99.959%	99.968%	99.959%
Coral Bay	N/A	N/A	N/A	100.000%	100.000%
Cue	99.936%	99.967%	99.947%	100.000%	99.962%
Denham	99.989%	99.996%	99.991%	99.965%	99.985%
Derby	99.974%	99.961%	99.928%	99.927%	99.948%
Djarindjin	N/A	N/A	N/A	100.000%	100.000%
Esperance	99.926%	99.945%	99.736%	99.876%	99.871%
Exmouth	99.983%	99.953%	99.887%	99.945%	99.942%
Fitzroy Crossing	99.912%	99.962%	99.986%	99.989%	99.962%
Gascoyne Junction	99.952%	99.995%	100.000%	100.000%	99.987%
Halls Creek	99.890%	99.931%	99.903%	99.942%	99.917%
Hopetoun	99.815%	99.829%	99.595%	99.840%	99.770%
Kununurra	99.899%	99.936%	99.914%	99.914%	99.916%
Lake Argyle	99.941%	99.990%	99.749%	99.937%	99.904%
Laverton	99.930%	99.991%	99.962%	99.967%	99.962%
Leonora	99.965%	99.978%	99.928%	99.991%	99.965%
Looma	99.970%	99.983%	99.973%	99.930%	99.964%
Marble Bar	100.000%	100.000%	99.999%	99.982%	99.995%
Meekatharra	99.955%	99.992%	99.985%	99.980%	99.978%
Menzies	99.934%	99.987%	99.932%	99.994%	99.962%
Mount Magnet	99.948%	99.966%	99.974%	99.988%	99.969%
Norseman	100.000%	99.877%	99.913%	99.989%	99.945%
Nullagine	99.971%	99.956%	99.918%	99.989%	99.958%
Onslow	99.976%	99.607%	99.967%	99.969%	99.880%
Sandstone	99.995%	100.000%	99.998%	100.000%	99.998%
Warmun	N/A	N/A	99.999%	100.000%	99.999%
Wiluna	99.937%	99.984%	99.902%	99.990%	99.953%
Wyndham	99.915%	99.925%	99.869%	99.774%	99.870%
Yalgoo	99.998%	99.984%	99.990%	100.000%	99.993%
Horizon Power	99.958%	99.930%	99.853%	99.940%	99.920%

Clause 11, 12 and 13(d) 0 Average Total Length of All Interruptions of Supply to Customer Premises in Minutes (SAIDI)

DISCRETE AREA	2004/05	2005/06	2006/07	2007/08	AVERAGE
NWIS	95	563	1,018	111	**447**
Ardyaloon	N/A	N/A	0	0	0
Beagle Bay	N/A	N/A	N/A	0	0
Bidyadanga	N/A	N/A	0	9	5
Broome	59	118	172	425	193
Carnarvon	333	133	218	169	213
Coral Bay	N/A	N/A	N/A	19	19
Cue	334	175	281	0	198
Denham	57	20	48	183	77
Derby	135	206	377	383	275
Djarindjin	N/A	N/A	N/A	0	0
Esperance	390	289	1,386	653	**679**
Exmouth	89	246	596	288	**305**
Fitzroy Crossing	464	202	74	60	200
Gascoyne Junction	252	28	0	0	70
Halls Creek	576	361	507	305	**437**
Hopetoun	973	898	2,130	842	**1,211**
Kununurra	532	338	452	455	**444**
Lake Argyle	308	51	1,322	332	**503**
Laverton	370	48	202	173	198
Leonora	186	116	381	45	182
Looma	160	89	140	370	190
Marble Bar	0	0	6	95	25
Meekatharra	234	42	79	104	115
Menzies	345	68	360	34	202
Mount Magnet	275	180	134	66	164
Norseman	0	646	458	61	**291**
Nullagine	154	232	431	60	219
Onslow	128	2,067	175	161	**633**
Sandstone	27	0	11	2	10
Warmun	0	0	7	0	4
Wiluna	330	82	516	54	246
Wyndham	449	396	690	1,192	**682**
Yalgoo	12	84	54	0	37
Horizon Power	**222**	**366**	**774**	**318**	**420**

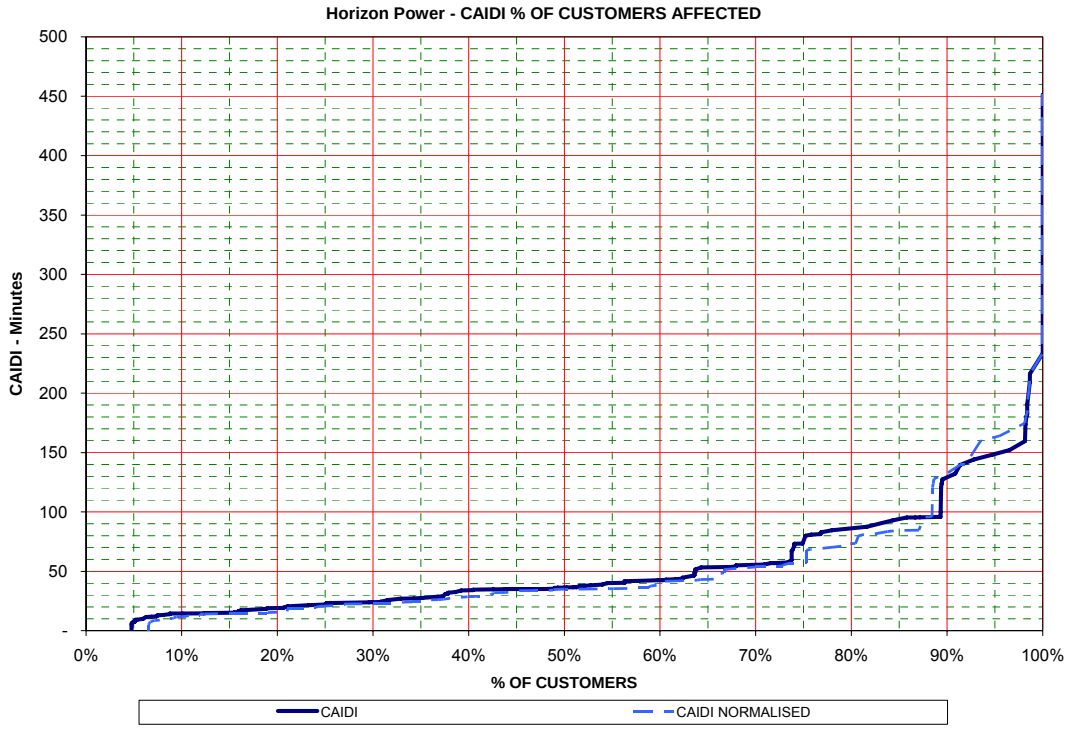
Note: Figures in red indicate where SAIDI is greater than 290 minutes.

For the period 01/07/2007 to 30/06/2008 SAIDI using the normalised data sets was 268 minutes.

Clause 14(a) 0 Horizon Power 0 Average Length of Interruption – Frequency Distribution

Percentile	Minutes
25th	22.08
50th	36.26
75th	75.56
90th	129.14
95th	148.68
98th	158.96
100th	451.41

Clause 15(a) – CAIDI Frequency Graph.

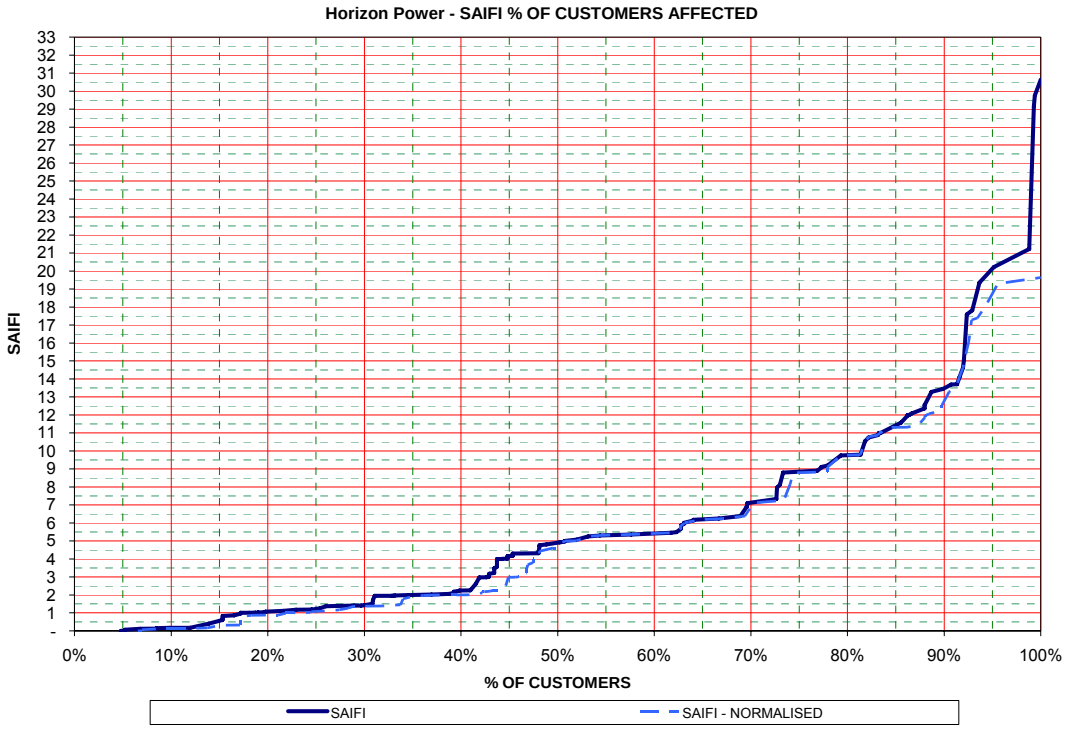


During the period 01/07/2007 to 30/06/2008 of those customers who experienced an interruption, approximately 74% had an interruption of less than 60 minutes.

Clause 14(b) 0 Horizon Power 0 Number of Interruptions – Frequency Distribution

Percentile	Interruptions
25th	1.22
50th	4.90
75th	8.85
90th	13.48
95th	20.14
98th	21.01
100th	30.63

Clause 15(b) – SAIFI Frequency Graph.

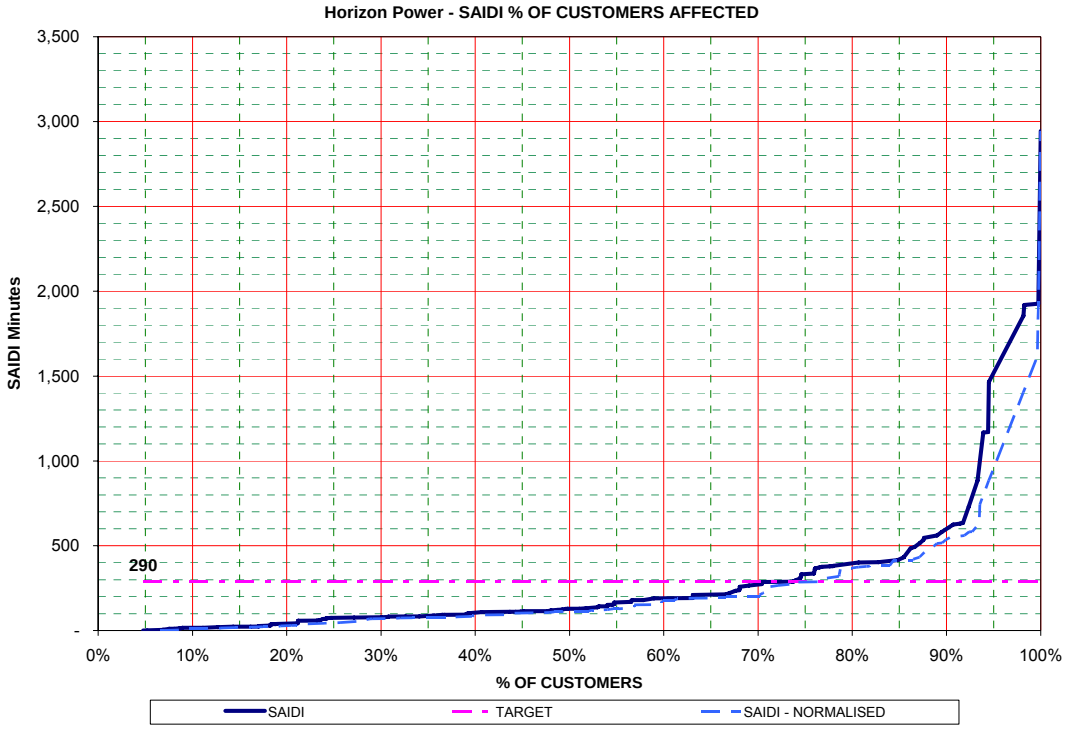


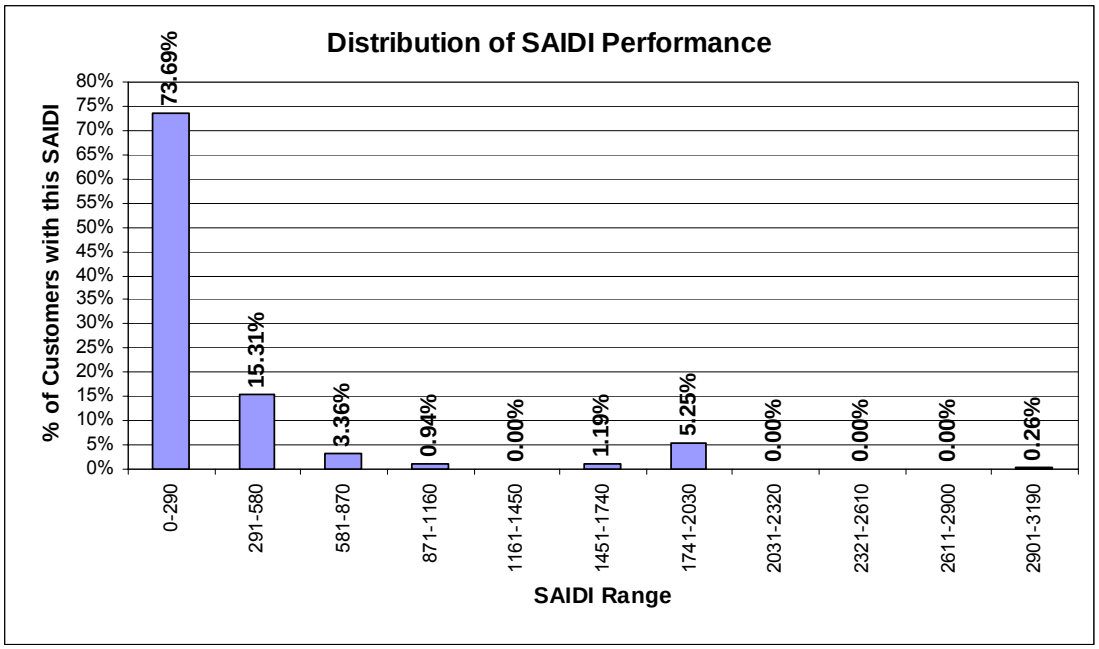
During the period 01/07/2007 to 30/06/2008 approximately 92% of customers experienced less than 16 outages.

Clause 14(c) 0 Horizon Power – Total Length of all Interruptions – Frequency Distribution

Percentile	Minutes
25th	75
50th	128
75th	333
90th	599
95th	1,519
98th	1,839
100th	2,994

Clause15(c) – SAIDI Frequency Graph





During the period 01/07/2007 to 30/06/2008 approximately 74% of customers experienced outages with duration of less than 290 minutes. Using a normalised data set this is increased to approximately 78%.

AFFECT OF MAJOR EVENT DAYS

In the period 01/07/2007 to 30/06/2008 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.

Major Event Days are identified using the IEEE 1366 2.5 Beta Method. Horizon Power has only four years of accurate daily data available. Therefore for this report daily historic data for 2003/04, 2005/06, 2006/07 and 2007/08 was used. The 2008/09 report will use five years data.

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 T_{MED}. The SAIDI index 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 be calculated based on removal of the identified days.

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

The major event day identification threshold value $T_{MED,}$ is calculated at the end of each period (typically one year) for use during the next reporting period s 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 log0average) of the data set.
e) Find β (Beta), the standard deviation of the logarithms (also known as the log0standard deviation) of the data set.
f) Compute the major event day threshold T_{MED}, using equation 25.

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

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

Normalised Data Sets 0 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.