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May 18, 2010

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PUBLIC UTILITIES
COMMISSION

The Honorable Chairman and Members of the
Hawaii Public Utilities Commission
Kekuanaoa Building
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Commissioners:

Subject: Hawaiian Electric Annual Service Reliability Report for 2009

Hawaiian Electric Company, Inc. respectfully submits a copy of its Annual Service Reliability Report for the year 2009.

Sincerely,

Attachment

c: Division of Consumer Advocacy (with Attachment)

HAWAIIAN ELECTRIC COMPANY, INC.
ANNUAL SERVICE RELIABILITY REPORT
2009

Prepared by
System Operation Department

February 22, 2010

INTRODUCTION

This is the 2009 annual service reliability report of the Hawaiian Electric Company (HECO). The average number of electric customers increased from 294,371 in 2008 to 294,802 in 2009 (a 0.15% increase). The peak 2009 demand for the system was 1,260 MW (evening peak); however, the highest system peak demand remains at 1,327 MW set on the evening of October 12, 2004.

The system interruption summary (Attachments A and B) for the past year and the system reliability indices for the four prior years are presented to depict the quality of service provided to the electrical energy consumer.

The definition of terms, the explanation and equations for the reliability indices are contained in Attachment C. In our analyses there are four reliability indices that are examined; 1) Average Service Availability Index (ASAI); 2) System Average Interruption Frequency Index (SAIFI); 3) Customer Average Interruption Duration Index (CAIDI) and 4) System Average Interruption Duration Index (SAIDI).

These indices measure reliability in terms of the overall availability of electrical service (ASAI), the frequency or number of times HECO's customers experience an outage during the year (SAIFI), the average length of time an interrupted customer is out of power (CAIDI), and the average length of time HECO's customers are out of power during the year (SAIDI). SAIDI is an indication of overall system reliability because it is the product of SAIFI and CAIDI and incorporates the impact of frequency and duration of outages on HECO's total customer base (in this case 294,802 customers).

ANALYSIS

This analysis of the annual system reliability for HECO is for the year 2009. To determine the relative level of reliability, the statistics for four prior years, 2005 through 2008, are used for comparison.

The reliability indices are calculated using the data from all sustained¹ system outages except customer maintenance outages. If data normalization is required, it is done using the guidelines specified in the report on reliability that was prepared for the Public Utilities Commission, titled "Methodology for Determining Reliability Indices for HECO Utilities," dated December 1990. That report indicates that normalization is allowed for "abnormal" situations such as hurricanes, tsunamis, earthquakes, floods, catastrophic equipment failures, and single outage events that cascade into a loss of load greater than 10% of the system peak load.

¹ A sustained outage is defined as an interruption of electrical service lasting one minute or longer.

These normalizations are made in calculating the reliability indices because good engineering design takes into account safety, reliability, utility industry standards, and economics, and cannot always plan for catastrophic events.

2009 RESULTS

Annual Service Reliability Indices

The annual service reliability for 2009 was the best in the past five years for SAIFI and SAIDI. The reliability results for 2009 and four prior years are shown below in Table 1: Annual Service Reliability Indices – All Events, and Table 2: Annual Service Reliability Indices – with Normalizations. There were no outage events that were normalized in 2009. All subsequent comparisons and discussion are based on the normalized data.

Table 1: Annual Service Reliability Indices - All Events

	2005	2006	2007	2008	2009
Number of Customers	289,972	292,554	293,893	294,371	294,802
Customer Interruptions	383,410	724,280	639,886	729,784	333,908
Customer-Hours Interrupted	532,156	4,260,045	1,970,925	3,985,756	442,546
ASA (Percent)	99.979	99.834	99.923	99.846	99.983
SAIFI (Occurrences)	1.322	2.476	2.177	2.479	1.133
CAIDI (Minutes)	83.28	352.91	184.81	327.69	79.52
SAIDI (Minutes)	110.11	873.69	402.38	812.39	90.08

Table 2: Annual Service Reliability Indices - with Normalization

	2005	2006*	2007**	2008***	2009
Number of Customers	289,972	292,554	293,893	294,371	294,802
Customer Interruptions	383,410	420,749	367,837	382,124	333,908
Customer-Hours Interrupted	532,156	666,188	488,144	490,842	442,546
ASA (Percent)	99.979	99.974	99.981	99.981	99.983
SAIFI (Occurrences)	1.322	1.438	1.252	1.298	1.133
CAIDI (Minutes)	83.28	95.00	79.62	77.07	79.52
SAIDI (Minutes)	110.11	136.63	99.66	100.05	90.08

NOTE:

- 2006*** Data normalized to exclude the 6/01/06 Load Shedding Outage
Data normalized to exclude the 10/15/06 Earthquake Outage
- 2007**** Data normalized to exclude the 1/29/07 and 02/02/07 High Wind Outages
Data normalized to exclude the 11/04/07 - 11/05/07 and 12/04/07 - 12/06/07 Storms
- 2008***** Data normalized to exclude the 12/10/08 - 12/14/08 High Wind Outages
Data normalized to exclude the 12/26/08 Island Wide Blackout

Figure 1: Average Service Availability Index (ASAI)

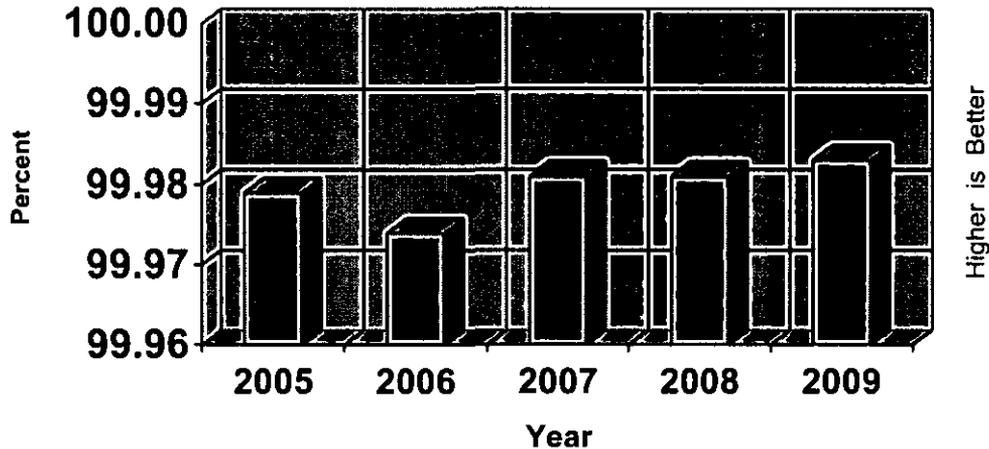


Figure 1 shows that the 2009 ASAI increased compared to the 2008 results after a period of decline from 2005 to 2006. Approximately 48,216 less customers experienced sustained service interruptions during 2009 compared to the previous year, a decrease of 12.6%. Also, the total 2009 Customer-Hours Interrupted as shown in the above Annual Service Reliability Indices decreased by 9.8% compared to 2008.

Figure 2: System Average Interruption Frequency Index (SAIFI)

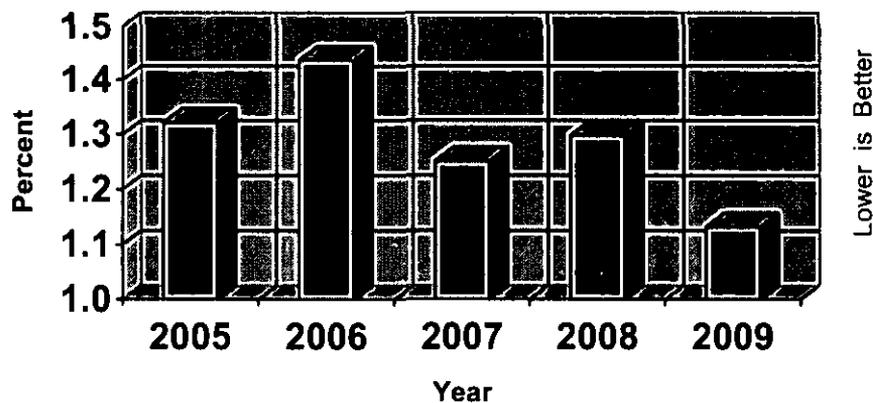
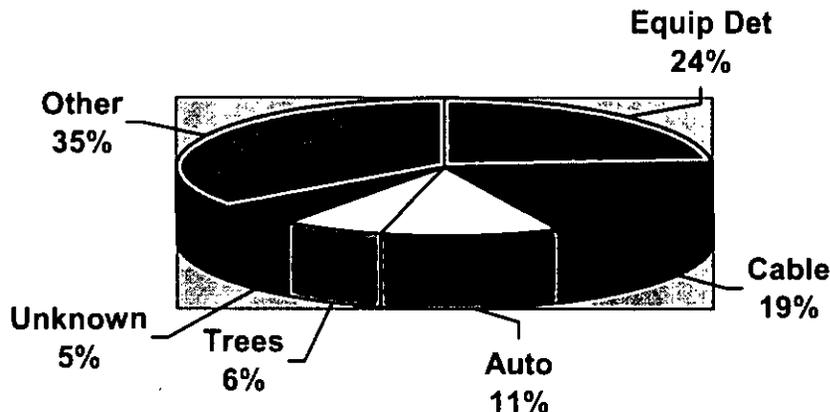


Figure 2 shows the System Average Interruption Frequency Index (SAIFI) for the past five years. It shows that the 2009 SAIFI of 1.132 was the lowest in the past five years. Looking further back, the 2009 SAIFI was the lowest in the past 30 years.

Figure 3: Outage Causes



The Top 5 Outage Causes, as illustrated in Figure 3, equal about 65% of the total Customer Interruptions in 2009; these causes are “Equipment Deterioration”, “Cable Faults”, “Auto Accidents”, “Trees/Branches in Lines”, and “Unknown”. All of these were also major cause factors in 2008 with the exception of “Auto Accidents” which replaced “Equipment Overload” as a top contributor.

The number of Customer Interruptions due to “Equipment Deterioration” decreased, from 82,422 in 2008 to 79,629 in 2009, an improvement of 3%. The number of Customer Interruptions due to “Auto Accidents” increased from 16,493 in 2008 to 35,194 in 2009, an increase of 113%. The number of Customer Interruptions due to “Trees and Branches in Lines” decreased from 38,047 in 2008 to 21,152 in 2009, an improvement of 44%. The number of Customer Interruptions due to “Cable Faults” increased from 62,591 in 2008 to 63,868 in 2009, an increase of 2%. Although the Customer Interruptions due to “Cable Faults” increased slightly from 2008 to 2009, the ongoing cable maintenance programs and the relatively dry weather throughout the year continued to help maintain these Customer Interruptions well below the 2006 figure of 106,653.

There were no sustained interruptions affecting 10,000 or more customers during 2009 as compared to six events in 2008.

Figure 4: Customer Average Interruption Duration Index (CAIDI)

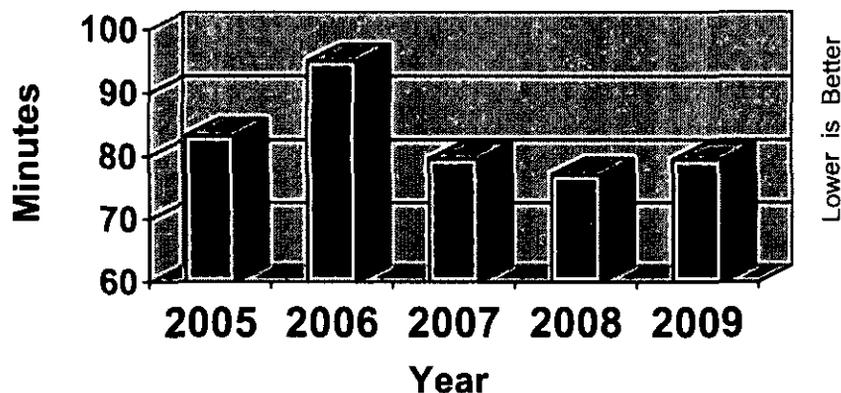


Figure 4 shows that the average duration of a customer's outage (CAIDI) for 2009 was the second lowest in the past 5 years. This shows that a good effort was made in minimizing the time a customer was out of service. The average electrical outage duration (CAIDI) for 2009 was 79.52 minutes, a 3.2% increase from the 77.07 minutes for the 2008 results. Improvements in outage durations were noticeable for "Unknown" and "Auto Accidents", over these same areas from 2008 to 2009.

Two significant events affected the CAIDI results in 2009:

1. January 16, 2009 – Trees in the lines alongside Kalaheo Avenue caused outages in the Kailua area affecting about 6,800 customers for 2 hours and 51 minutes.
2. January 30, 2009 – An automobile accident at 46-205 Lilipuna Rd caused outages in the Kaneohe area affecting about 1,500 customers from 51 minutes to 16 hours and 31 minutes.

**Figure 5: System Average
Interruption Duration Index (SAIDI)**

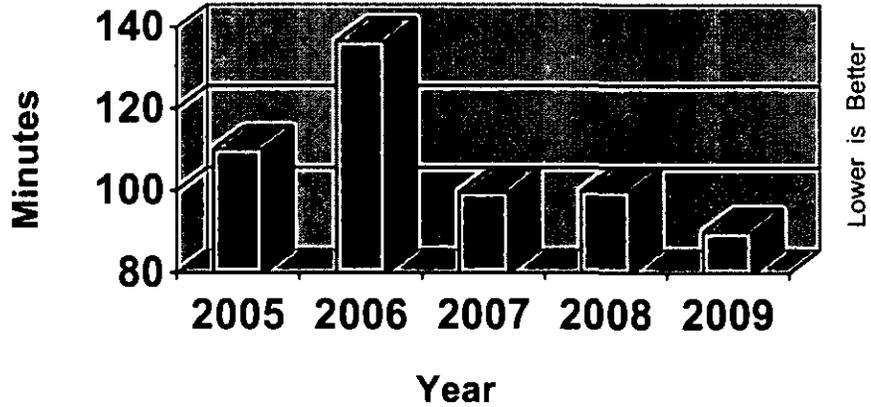


Figure 5 shows the System Average Interruption Duration Index (SAIDI) for the past five years. It shows that the 2009 SAIDI of 90.07 minutes, which was a 10% decrease from the 2008 SAIDI results, was the lowest during the last five years. SAIDI is the composite of both the SAIFI and CAIDI indices and produces a broader system wide benchmark of system reliability by combining both the duration and the number of customer interruptions during a given period of time. The decrease in the 2009 SAIDI result from 2008 was strongly affected by the decrease in the SAIFI statistics.

Hawaiian Electric Company Normalized Sustained Interruption Summary

From: January 1, 2009

To: December 31, 2009

Outage Cause	Customer Hours	Customer Interruptions	SAIFI	SAIDI	CAIDI
EQUIP DETERIORATION	120,146.17	79,629	0.270	24.45	90.53
CABLE FAULT	87,126.52	63,868	0.217	17.73	81.85
AUTO ACCIDENT	52,144.85	35,194	0.119	10.61	88.90
TREES/BRANCHES IN LINES	42,503.92	21,152	0.072	8.65	120.57
UNKNOWN	18,693.78	17,387	0.059	3.80	64.51
MYLAR BALLOON	6,117.95	13,156	0.045	1.25	27.90
FORCED MAINTENANCE	7,122.88	11,574	0.039	1.45	36.93
COMPANY SWITCHING ERROR	3,342.03	10,254	0.035	0.68	19.56
FOREIGN OBJECT IN LINES	8,965.38	9,642	0.033	1.82	55.79
FAULTY EQUIP OPERATION	6,716.90	8,946	0.030	1.37	45.05
COMPANY PERSONNEL ERROR	4,943.22	8,495	0.029	1.01	34.91
HIGH WINDS	9,863.50	7,433	0.025	2.01	79.62
FLASHOVER	4,619.83	6,910	0.023	0.94	40.11
CONTAMINATION FLASHOVER	8,459.02	6,660	0.023	1.72	76.21
SCHEDULED MAINTENANCE	16,493.60	5,841	0.020	3.36	169.43
ANIMAL IN LINES	3,344.28	4,564	0.015	0.68	43.97
EQUIP ROT OR TERMITES	6,019.27	4,144	0.014	1.23	87.15
CONSTRUCTION ACCIDENT	4,082.90	3,203	0.011	0.83	76.48
VANDALISM	6,297.52	2,939	0.010	1.28	128.56
TRANSFORMER FAILURE	10,121.45	2,899	0.010	2.06	209.48
CUSTOMER EQUIP	5,382.42	2,844	0.010	1.10	113.55
OTHER	2,825.80	2,333	0.008	0.58	72.67
OVERGROWN VEGETATION	3,302.90	1,864	0.006	0.67	106.32
LIGHTNING	2,018.62	1,119	0.004	0.41	108.24
EQUIP OVERLOAD	519.62	770	0.003	0.11	40.49
MAN IN LINES	270.83	625	0.002	0.06	26.00
MOVING EQUIP ACCIDENT	623.22	262	0.001	0.13	142.72
TRANSFORM OVERLOAD	403.23	173	0.001	0.08	139.85
MANUFACTURER EQUIP DEFECT	40.53	16	0.000	0.01	152.00
FIRE	34.00	12	0.000	0.01	170.00
IPP EQUIP FAILURE	0.00	0	0.000	0.00	0.00
NATURAL DISASTER	0.00	0	0.000	0.00	0.00
CUSTOMER MAINTENANCE	0.00	0	0.000	0.00	0.00
SWITCH LOAD MAINTENANCE	0.00	0	0.000	0.00	0.00
SYSTEM LOAD MAINTENANCE	0.00	0	0.000	0.00	0.00
TRANSFER LOAD MAINTENANCE	0.00	0	0.000	0.00	0.00
LANDSLIDE/FLOODING	0.00	0	0.000	0.00	0.00
Total	442,546.13	333,908	1.133	90.07	79.52

AVERAGE SYSTEM AVAILABILITY = 99.983%
NUMBER OF CUSTOMERS FOR THE PERIOD = 294,802
AUTO-TRANSFER MOMENTARY CUSTOMER INTERRUPTIONS FOR THE PERIOD = 152,124
AUTO-TRANSFER MAIF= 0.516

SAIFI = SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX
SAIDI = SYSTEM AVERAGE INTERRUPTION DURATION INDEX (MINUTES)
CAIDI = CUSTOMER AVERAGE INTERRUPTION DURATION INDEX (MINUTES)

NOTES: Outage causes are listed in order of SAIFI.

Outages with zero customer hours or due to customer maintenance are not included in the report.

Hawaiian Electric Company Normalized Sustained Interruption Summary

From: January 1, 2009

To: December 31, 2009

Outage Cause	Interruptions		Customer Hours	
	Number	% of Total	Number	% of Total
<u>ACCIDENT</u>	91	4.61	56,850.97	12.85
CONSTRUCTION ACCIDENT	21	1.06	4,082.90	0.92
MOVING EQUIP ACCIDENT	3	0.15	623.22	0.14
AUTO ACCIDENT	67	3.40	52,144.85	11.78
<u>CABLE FAULT</u>	531	26.93	87,126.52	19.69
CABLE FAULT	531	26.93	87,126.52	19.69
<u>COMPANY ERROR</u>	28	1.42	8,285.25	1.87
COMPANY PERSONNEL ERROR	9	0.46	4,943.22	1.12
COMPANY SWITCHING ERROR	19	0.96	3,342.03	0.76
<u>EQUIPMENT</u>	398	20.18	138,824.90	31.37
IPP EQUIP FAILURE	0	0.00	0.00	0.00
MANUFACTURER EQUIP DEFECT	1	0.05	40.53	0.01
EQUIP OVERLOAD	6	0.30	519.62	0.12
EQUIP DETERIORATION	353	17.90	120,146.17	27.15
CUSTOMER EQUIP	16	0.81	5,382.42	1.22
EQUIP ROT OR TERMITES	3	0.15	6,019.27	1.36
FAULTY EQUIP OPERATION	19	0.96	6,716.90	1.52
<u>FIRE</u>	2	0.10	34.00	0.01
FIRE	2	0.10	34.00	0.01
<u>FLASHOVER</u>	16	0.81	13,078.85	2.96
FLASHOVER	8	0.41	4,619.83	1.04
CONTAMINATION FLASHOVER	8	0.41	8,459.02	1.91
<u>MAINTENANCE</u>	587	29.77	23,616.48	5.34
SCHEDULED MAINTENANCE	470	23.83	16,493.60	3.73
SYSTEM LOAD MAINTENANCE	0	0.00	0.00	0.00
SWITCH LOAD MAINTENANCE	0	0.00	0.00	0.00
CUSTOMER MAINTENANCE	0	0.00	0.00	0.00
FORCED MAINTENANCE	117	5.93	7,122.88	1.61
TRANSFER LOAD MAINTENANCE	0	0.00	0.00	0.00
<u>OBJECT IN LINES OR EQUIP</u>	41	2.08	18,698.45	4.22
ANIMAL IN LINES	15	0.76	3,344.28	0.76
MYLAR BALLOON	11	0.56	6,117.95	1.38
MAN IN LINES	1	0.05	270.83	0.06
FOREIGN OBJECT IN LINES	14	0.71	8,965.38	2.03
<u>OTHER</u>	6	0.30	2,825.80	0.64
OTHER	6	0.30	2,825.80	0.64
<u>TRANSFORMER</u>	91	4.61	10,524.68	2.38
TRANSFORMER FAILURE	76	3.85	10,121.45	2.29
TRANSFORM OVERLOAD	15	0.76	403.23	0.09
<u>UNKNOWN</u>	70	3.55	18,693.78	4.22
UNKNOWN	70	3.55	18,693.78	4.22

Hawaiian Electric Company Normalized Sustained Interruption Summary

From: January 1, 2009

To: December 31, 2009

Outage Cause	Interruptions		Customer Hours	
	Number	% of Total	Number	% of Total
<u>VANDALISM</u>	5	0.25	6,297.52	1.42
VANDALISM	5	0.25	6,297.52	1.42
<u>VEGETATION</u>	76	3.85	45,806.82	10.35
TREES/BRANCHES IN LINES	72	3.65	42,503.92	9.60
OVERGROWN VEGETATION	4	0.20	3,302.90	0.75
<u>WEATHER</u>	30	1.52	11,882.12	2.68
NATURAL DISASTER	0	0.00	0.00	0.00
HIGH WINDS	21	1.06	9,863.50	2.23
LIGHTNING	9	0.46	2,018.62	0.46
LANDSLIDE/FLOODING	0	0.00	0.00	0.00
Total:	1,972	442,546.13		

NOTES: Outages with zero customer hours or due to customer maintenance are not included in the report.

DEFINITION OF TERMS

OUTAGE

The state of a component when it is not available to perform its intended function due to some event directly associated with that component. An outage may or may not cause an interruption of service to consumers depending on the system configuration.

INTERRUPTION

The loss of service to one or more consumers and is a result of one or more component outages.

INTERRUPTION DURATION

The period from the initiation of an interruption to a consumer until service has been restored to that consumer.

MOMENTARY INTERRUPTION

An interruption that has a duration limited to the period required to restore service by automatic or supervisory-controlled switching operations or by manual switching at locations where an operator is immediately available. Such switching operations must be completed in a specific time not to exceed one minute. Previous issues of this report indicated that a momentary interruption has a duration not to exceed five minutes. A December 1990 report, "Methodology for Determining Reliability Indices for HECO Utilities" indicated that momentary interruptions will have a duration of less than one minute.

SUSTAINED INTERRUPTION

Any interruption not classified as a momentary interruption. Only this type of interruption is included in the reliability indices within this report. In conformance with the guidelines established in the report, "Methodology for Determining Reliability Indices for HECO Utilities," dated December 1990, a sustained interruption has a duration of one minute or longer.

CUSTOMER INTERRUPTION

One interruption of one customer.

NOTE: Interruptions to customers at their request (e.g., customer maintenance) are not considered.

Reliability indices used in this report conform to standards proposed by both the Edison Electric Institute (EEI) and the Institute of Electrical and Electronics Engineers (IEEE) unless otherwise indicated in the above definitions. Four reliability indices that convey a meaningful representation of the level of reliability were selected and are presented in this report. These reliability indices are as follows:

RELIABILITY INDICES

AVERAGE SERVICE AVAILABILITY INDEX (ASA)

Total customer hours actually served as a percentage of total customer hours possible during the year. This indicates the extent to which electrical service was available to all customers. This index has been commonly referred to as the "Index of Reliability." A customer-hour is calculated by multiplying the number of customers by the number of hours in the period being analyzed.

$$ASA = \frac{\sum \text{No. of Customer Hours Actually Served during the year}}{\sum \text{No. of Customer Hours Possible during the year}} \times 100\%$$

SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIFI)

The number of customer interruptions per customer served during the year. This index indicates the average number of sustained interruptions experienced by all customers serviced on the system.

$$SAIFI = \frac{\sum \text{No. of Customer Interruptions Experienced during the year}}{\text{Average No. of Customers served during the year}}$$

CUSTOMER AVERAGE INTERRUPTION DURATION INDEX (CAIDI)

The interruption duration per customer interrupted during the year. This index indicates the average duration of an interruption for those customers affected by a sustained interruption.

$$CAIDI = \frac{\sum \text{Duration of Interruption} \times \text{No. of Customers affected}}{\sum \text{No. of Customer Interruptions Experienced for the year}}$$

SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAIDI)

The interruption duration per customer served during the year. This index indicates the average interruption time experienced by all customers serviced on the system.

$$SAIDI = \frac{\sum \text{Duration of Interruption} \times \text{No. of Customers Affected}}{\text{Average No. of Customers Served during the year}}$$