Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

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Dean K. Matsuura
Manager
Regulatory Affairs

May 20, 2013

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2013 MAY 20 P 3:47
PUBLIC UTILITIES COMMISSION

The Honorable Chair 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 2012

Hawaiian Electric Company, Inc. respectfully submits a copy of its Annual Service Reliability Report for the year 2012.

Sincerely,

Dean K Matsuura

Attachment

c: Division of Consumer Advocacy (with Attachment)

HAWAIIAN ELECTRIC COMPANY, INC.

ANNUAL SERVICE RELIABILITY REPORT

2012

Prepared by

System Operation Department

March 25, 2013

INTRODUCTION

This is the 2012 annual service reliability report of the Hawaiian Electric Company, Inc. (HECO). The year-end average number of electric customers increased from 296,679 in 2011 to 297,598 in 2012 (a 0.31% increase). The 2012 peak demand for the system was 1,169 MW (evening peak), 8 MW lower than the peak demand in 2011; the highest system peak demand remains at 1,327 MW set on the evening of October 12, 2004.

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

Attachment-B, contains the definition of terms and the reliability indices explanations and equations.

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 297,598 customers).

ANALYSIS

This analysis of the annual system reliability for HECO is for the year 2012. To determine the relative level of reliability, the statistics for five prior years, 2007 through 2011, are used for comparison.

The reliability indices are calculated using the data from all sustained[1] 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. The guidelines indicate that normalization is allowed for "abnormal" situations such as hurricanes, tsunamis, earthquakes, floods, catastrophic equipment failures, and single outages that cascade into a loss of load greater than 10% of the system peak load. 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.

[1]An electrical service interruption of more than one minute. (The majority of peer companies in the Edison Electric Institute association use a threshold of five minutes to identify sustained interruptions.)

2012 RESULTS

Annual Service Reliability Indices

The annual service reliability for 2012 was ranked second for the best SAIDI & CAIDI in the past 6 years in terms of the indices for all events. The reliability results for 2012 and five prior years are shown below in Table 1: Annual Service Reliability Indices – All Events and Table 2: Annual Service Reliability Indices – with Normalizations. No outage events were normalized in 2012. All subsequent comparisons and discussion are based on the normalized data.

Table 1: Annual Service Reliability Indices - All Events

	2007	2008	2009	2010	2011	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	639,886	729,784	333,908	361,334	502,252	407,197
Customer-Hours Interrupted	1,970,925	3,985,756	442,546	564,424	1,257,338	563,807
SAIDI (Minutes)	402.38	812.39	90.08	114.55	254.59	113.67
CAIDI (Minutes)	184.81	327.69	79.52	93.72	150.20	83.08
SAIFI (Occurrences)	2.177	2.479	1.133	1.222	1.693	1.368
ASAI (Percent)	99.923	99.846	99.983	99.978	99.952	99.978

Table 2: Annual Service Reliability Indices - with Normalization

	2007*	2008*	2009	2010	2011**	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	367,837	382,124	333,908	361,334	408,326	407,197
Customer-Hours Interrupted	488,144	490,842	442,546	564,424	1,044,904	563,807
SAIDI (Minutes)	99.66	100.05	90.08	114.55	211.32	113.67
CAIDI (Minutes)	79.62	77.07	79.52	93.72	153.54	83.08
SAIFI (Occurrences)	1.252	1.298	1.133	1.222	1.376	1.368
ASAI (Percent)	99.981	99.981	99.983	99.978	99.960	99.978

NOTE:

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
2011**	Data normalized to exclude the 03/04/11 Labor Work Stoppage
	Data normalized to exclude the 05/02/11 – 05/03/11 Lightning Storm

T&D vs. Generation – All Events

Table 3: Annual Service Reliability Indices – T&D

	2007	2008	2009	2010	2011	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	639,886	729,784	333,908	361,334	477,797	341,298
Customer-Hours Interrupted	1,970,925	3,985,756	442,546	564,424	1,238,604	524,788
SAIDI (Minutes)	402.38	812.39	90.07	114.55	250.49	105.80
CAIDI (Minutes)	184.81	327.69	79.52	93.72	155.54	92.26
SAIFI (Occurrences)	2.177	2.479	1.133	1.222	1.610	1.147

Table 4: Annual Service Reliability Indices - Generation

	2007	2008	2009	2010	2011	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	0	0	0	0	24,455	65,899
Customer-Hours Interrupted	0	0	0	0	18,734	39,019
SAIDI (Minutes)	0.00	0.00	0.00	0.00	3.79	7.87
CAIDI (Minutes)	0.00	0.00	0.00	0.00	45.96	35.53
SAIFI (Occurrences)	0.000	0.000	0.000	0.000	0.082	0.221

T&D vs. Generation – With Normalization

Table 5: Normalized Annual Service Reliability Indices – T&D

	2007*	2008*	2009	2010	2011**	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	367,837	382,124	333,908	361,334	383,871	341,298
Customer-Hours Interrupted	488,144	490,842	442,546	564,424	1,026,170	524,788
SAIDI (Minutes)	99.66	100.05	90.07	114.55	207.53	105.80
CAIDI (Minutes)	79.62	77.07	79.52	93.72	160.39	92.26
SAIFI (Occurrences)	1.252	1.298	1.133	1.222	1.294	1.147

Table 6: Normalized Annual Service Reliability Indices - Generation

	2007*	2008*	2009	2010	2011**	2012
Number of Customers	293,893	294,371	294,802	295,637	296,679	297,598
Customer Interruptions	0	0	0	0	24,455	65,899
Customer-Hours Interrupted	0	0	0	0	18,734	39,019
SAIDI (Minutes)	0.00	0.00	0.00	0.00	3.79	7.87
CAIDI (Minutes)	0.00	0.00	0.00	0.00	45.96	35.53
SAIFI (Occurrences)	0.000	0.000	0.000	0.000	0.082	0.221

Figure 1: System Average Interruption Duration Index (SAIDI)

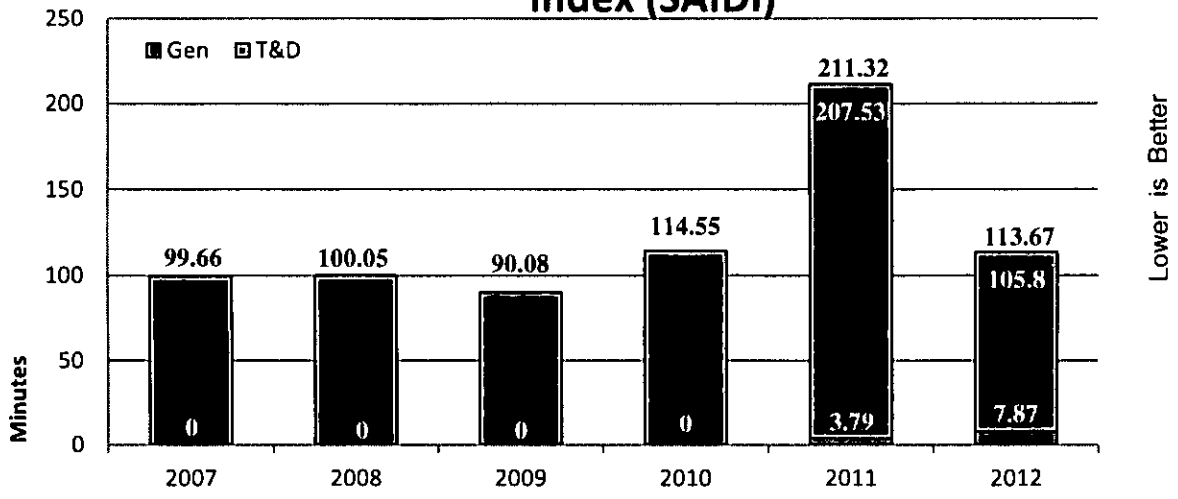


Figure 1 shows the System Average Interruption Duration Indices (SAIDI) for the past six years. It shows that the 2012 SAIDI is 113.67 minutes, a 46% decrease compared to the 2011 SAIDI result of 211.32 minutes. This decrease is a return to a typical SAIDI after the storm of March 4, 2011. The 2012 SAIDI is an improvement over the two earlier years. The SAIDI is the composite of both the SAIFI and CAIDI indices and produces a broader benchmark of system reliability by combining both the duration and the number of customer interruptions during a given period of time.

Figure 2: Customer Average Interruption Duration Index (CAIDI)

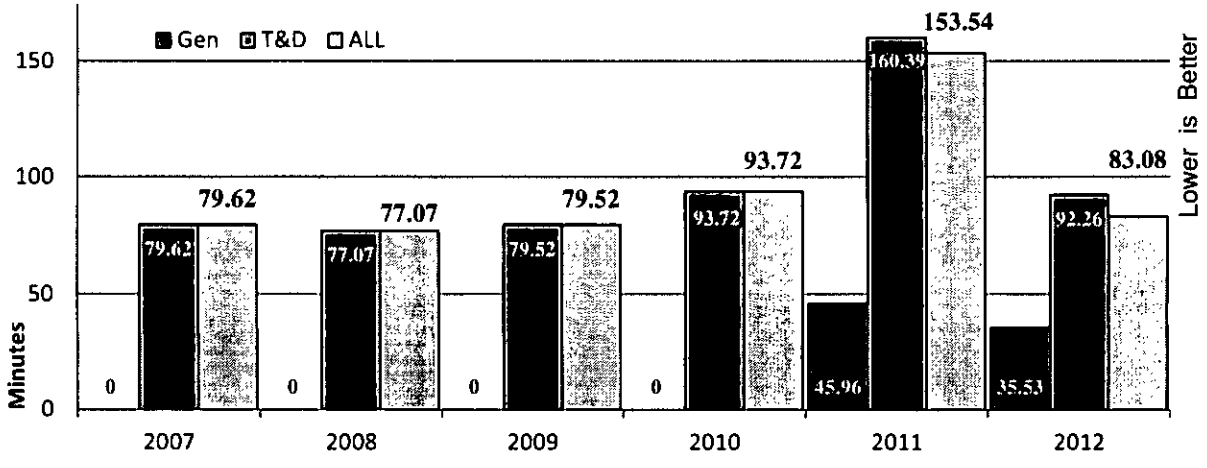


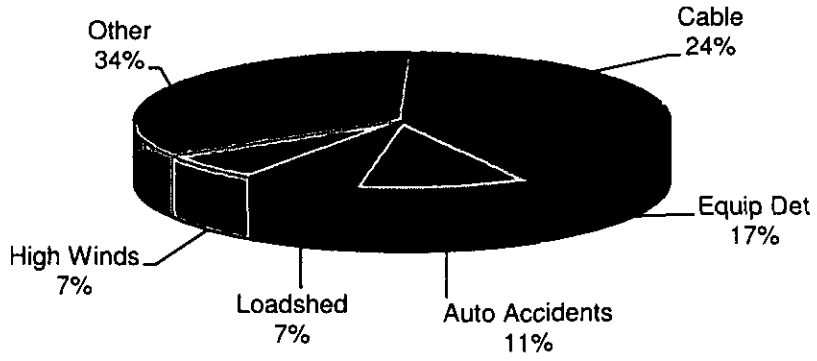
Figure 2 shows the Customer Average Interruption Duration Indices (CAIDI) for the past six years. It shows that the average duration of a customer's outage (CAIDI) for 2012 is 83.08 minutes, a 46% decrease compared to the 2011 CAIDI result of 153.54 minutes. This decrease is a return to typical CAIDI after the March 4, 2011 storm. The 2012 CAIDI is an improvement over the past two years and trending toward the levels obtained in 2008 and 2009.

The three major events affecting the 2012 CAIDI results were:

1. February 20, 2012 – An automobile accident on University Avenue caused outages to 1,310 customers affecting some of them[2] from 40 minutes to 12 hours and 9 minutes.
2. March 11, 2012 – High winds in the areas from Kalihi to Kahala caused outages affecting 2,972 customers from 1 hour and 7 minutes to 7 hours and 34 minutes.
3. September 28, 2012– A cable fault in Mililani affected about 1,820 customers from 44 minutes to 8 hours and 15 minutes[3].

These three events alone increased the 2012 CAIDI by over 3 minutes.

Figure 3: Outage Categories



The Top 5 Outage Categories, by number of customers affected, as illustrated in Figure 3, equates to about 64% of the total Customer Interruptions in 2012; these causes are:

	Outage Category	Sample Causes
1.	Cable Faults	underground equipment failures,
2.	Equipment Deterioration	failed, broken, corroded equipment,
3.	Auto Accidents	vehicular contact with poles, vaults, and support structures,
4.	Load Shedding	loss of generation, major disruptions to distribution,
5.	High Wind	objects blown into lines, conductor swing shorts

The major cause factors for 2011 were similar, except "Lightning" which was replaced by "Auto Accidents" in 2012.

[2] Over the duration of the outage groups of customers were restored and the outage was isolated to a small group of customers that remained out of service until the damaged pole could be replaced.

[3] For outages caused by the failure of a cable, customers are restored by switching their electrical service to an alternate source. However the customers in the direct vicinity of the failed cable will need to wait until repairs are made before their service can be restored.

The total number of customer interruptions in 2012 was 407,197 compared with 408,326 interruptions in 2011. In the six year period, 2012 was the second worst performing year for the number of interruptions. The number of customer interruptions due to "Cable Faults" increased from 84,523 in 2011 to 88,965 in 2012, an increase of 5%. The number of customer interruptions due to "Equipment Deterioration" also increased from 55,216 in 2011 to 59,320 in 2012, a 7% increase. However, the outages due to "High Winds" decreased from 57,562 in 2011 to 37,807, a 34% reduction. The reliability improvement in the outage cause category "High Winds" may be attributed primarily to two program areas. The first is the area of vegetation management which focuses on trimming trees and other vegetation away from the lines and the second is the pole replacement and overhead line maintenance programs. In the past, older poles on the system were damaged by the high wind causing outages. The results in 2012 show that there were significantly less outages caused by pole failures and for the ones that did occur they were the result of motor vehicle accidents. Although vegetation related outages would be coded to "Trees and Branches" during high wind conditions some of the outages occur due to intermittent contact or debris from trees flying into the lines. The results indicate that with HECO's focus in this area it is improving reliability because a lower number of outages occurred in 2012 from High Winds.

In 2012, there was one event that resulted in the loss of more than 10,000 customers. On January 5, 2012, the island experienced a load shedding event due to the loss of three generating units. This event caused outages to 57,116 customers or 19% of our customers with outage durations ranging from 14 minutes to 3 hours.

Figure 4: System Average Interruption Frequency Index (SAIFI)

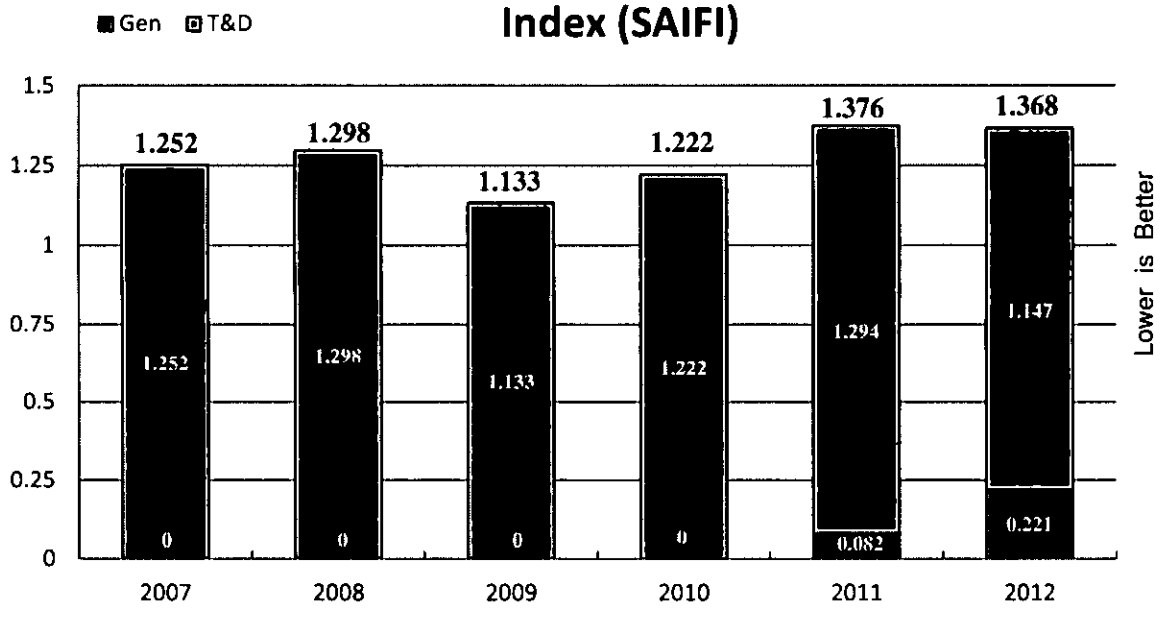


Figure 4 shows the System Average Interruption Frequency Index (SAIFI) for the past six years. It shows that the 2012 SAIFI of 1.368 was the second worst performance in the past six years, decreasing from the six year high of 1.376 in 2011.

Figure 5: Average Service Availability Index (ASAI)

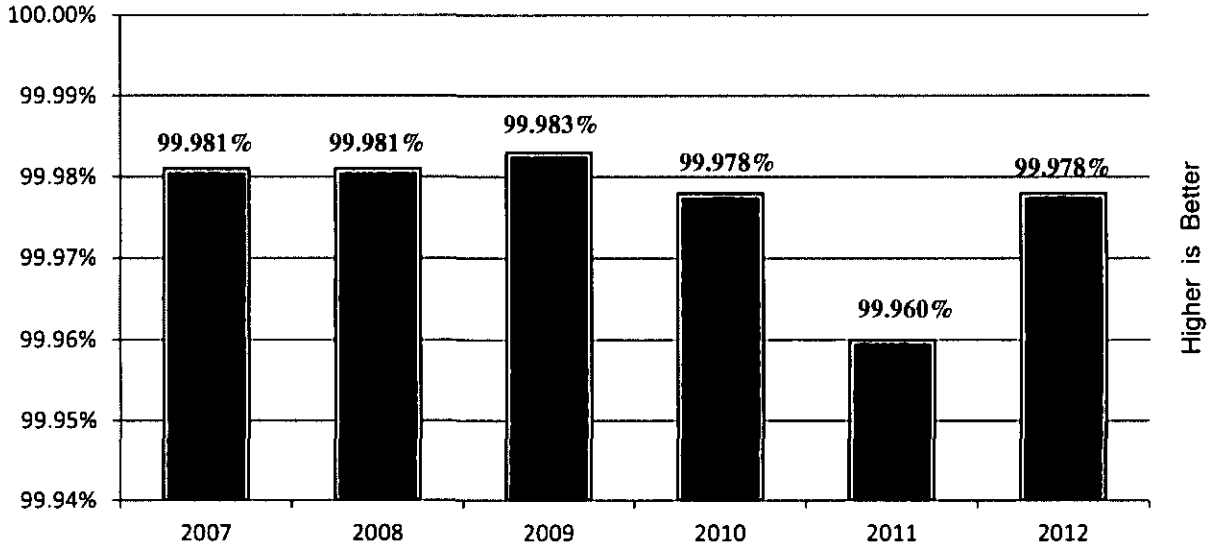


Figure 5 shows that the 2012 Average Service Availability Index increased as compared to the 2011 results after a period of decline (higher is better) from 2009 to 2011. Approximately 46% fewer hours of outage were sustained during 2012 compared to the previous year, thus causing a 1.9% increase to the ASAI, raising this statistic from 99.960% to 99.978%.

Hawaiian Electric Company
Normalized Sustained Interruption Summary

From: January 1, 2012 **To:** December 31, 2012

Outage Cause	Customer Hours	Customer Interruptions	SAIFI	SAIDI	CAIDI
CABLE FAULT	138,910.20	88,965	0.299	28.01	93.68
EQUIP DETERIORATION	99,154.70	59,320	0.199	19.99	100.29
AUTO UF LOADSHED	27,069.25	53,424	0.180	5.46	30.40
HIGH WINDS	38,535.17	37,807	0.127	7.77	61.16
AUTO ACCIDENT	61,712.60	24,790	0.083	12.44	149.36
TREES/BRANCHES IN LINES	32,006.75	19,216	0.065	6.45	99.94
UNKNOWN	26,344.12	16,568	0.056	5.31	95.40
ANIMAL IN LINES	3,293.22	12,754	0.043	0.66	15.49
MANUAL UF LOADSHED	11,949.27	12,475	0.042	2.41	57.47
COMPANY SWITCHING ERROR	2,665.20	11,561	0.039	0.54	13.83
CONTAMINATION FLASHOVER	20,622.05	11,390	0.038	4.16	108.63
CONSTRUCTION ACCIDENT	17,428.58	10,667	0.036	3.51	98.03
COMPANY PERSONNEL ERROR	4,455.33	9,717	0.033	0.90	27.51
SCHEDULED MAINTENANCE	29,407.78	8,286	0.028	5.93	212.95
MYLAR BALLOON	6,056.75	7,153	0.024	1.22	50.80
LIGHTNING	11,232.97	5,308	0.018	2.26	126.97
FORCED MAINTENANCE	8,031.13	5,208	0.018	1.62	92.52
OVERGROWN VEGETATION	2,756.88	2,648	0.009	0.56	62.47
FLASHOVER	1,401.00	1,801	0.006	0.28	46.67
FOREIGN OBJECT IN LINES	3,506.63	1,622	0.005	0.71	129.72
FAULTY EQUIP OPERATION	733.95	1,395	0.005	0.15	31.57
FIRE	1,358.43	1,158	0.004	0.27	70.39
LANDSLIDE/FLOODING	5,373.83	906	0.003	1.08	355.88
TRANSFORMER FAILURE	5,992.37	894	0.003	1.21	402.17
TRANSFORM OVERLOAD	1,254.82	802	0.003	0.25	93.88
EQUIP OVERLOAD	1,346.55	698	0.002	0.27	115.75
CUSTOMER EQUIP	318.38	263	0.001	0.06	72.63
MOVING EQUIP ACCIDENT	278.13	184	0.001	0.06	90.70
TRANSFER LOAD MAINTENANCE	3.77	113	0.000	0.00	2.00
VANDALISM	111.20	47	0.000	0.02	141.96
OTHER	379.27	35	0.000	0.08	650.17
SYSTEM LOAD MAINTENANCE	116.23	22	0.000	0.02	317.00
MAN IN LINES	0.00	0	0.000	0.00	0.00
NATURAL DISASTER	0.00	0	0.000	0.00	0.00
IPP EQUIP FAILURE	0.00	0	0.000	0.00	0.00
MANUFACTURER EQUIP DEFECT	0.00	0	0.000	0.00	0.00
EQUIP ROT OR TERMITES	0.00	0	0.000	0.00	0.00
CUSTOMER MAINTENANCE	0.00	0	0.000	0.00	0.00
OTHER-GENERATION	0.00	0	0.000	0.00	0.00
SWITCH LOAD MAINTENANCE	0.00	0	0.000	0.00	0.00
Total	563,806.52	407,197	1.368	113.67	83.08

AVERAGE SYSTEM AVAILABILITY =	99.978%
NUMBER OF CUSTOMERS FOR THE PERIOD =	297,598
AUTO-TRANSFER MOMENTARY CUSTOMER INTERRUPTIONS FOR THE PERIOD =	190,064
AUTO-TRANSFER MAIFI =	0.639
24 MONTH ANNUALIZED SAIDI AVERAGE FOR THE PERIOD 1/1/2011 - 12/31/2012 =	162.42
24 MONTH AVAERAGE NUMBER OF CUSTOMERS FOR THE PERIOD 1/1/2011 - 12/31/2012 =	297,139

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, 2012 **To:** December 31, 2012

Outage Cause	Interruptions Number	Interruptions % of Total	Customer Hours Number	Customer Hours % of Total
ACCIDENT	82	3.87	79,419.32	14.09
MOVING EQUIP ACCIDENT	3	0.14	278.13	0.05
CONSTRUCTION ACCIDENT	26	1.23	17,428.58	3.09
AUTO ACCIDENT	53	2.50	61,712.60	10.95
CABLE FAULT	553	26.11	138,910.20	24.64
CABLE FAULT	553	26.11	138,910.20	24.64
COMPANY ERROR	50	2.36	7,120.53	1.26
COMPANY PERSONNEL ERROR	29	1.37	4,455.33	0.79
COMPANY SWITCHING ERROR	21	0.99	2,665.20	0.47
EQUIPMENT	298	14.07	101,553.58	18.01
EQUIP OVERLOAD	12	0.57	1,346.55	0.24
MANUFACTURER EQUIP DEFECT	0	0.00	0.00	0.00
IPP EQUIP FAILURE	0	0.00	0.00	0.00
FAULTY EQUIP OPERATION	10	0.47	733.95	0.13
EQUIP DETERIORATION	257	12.13	99,154.70	17.59
CUSTOMER EQUIP	19	0.90	318.38	0.06
EQUIP ROT OR TERMITES	0	0.00	0.00	0.00
FIRE	9	0.42	1,358.43	0.24
FIRE	9	0.42	1,358.43	0.24
FLASHOVER	20	0.94	22,023.05	3.91
CONTAMINATION FLASHOVER	9	0.42	20,622.05	3.66
FLASHOVER	11	0.52	1,401.00	0.25
GENERATION	53	2.50	39,018.52	6.92
MANUAL UF LOADSHED	4	0.19	11,949.27	2.12
AUTO UF LOADSHED	49	2.31	27,069.25	4.80
OTHER-GENERATION	0	0.00	0.00	0.00
MAINTENANCE	715	33.76	37,558.92	6.66
SYSTEM LOAD MAINTENANCE	1	0.05	116.23	0.02
TRANSFER LOAD MAINTENANCE	1	0.05	3.77	0.00
SWITCH LOAD MAINTENANCE	0	0.00	0.00	0.00
SCHEDULED MAINTENANCE	617	29.13	29,407.78	5.22
FORCED MAINTENANCE	96	4.53	8,031.13	1.42
CUSTOMER MAINTENANCE	0	0.00	0.00	0.00
OBJECT IN LINES OR EQUIP	40	1.89	12,856.60	2.28
ANIMAL IN LINES	16	0.76	3,293.22	0.58
FOREIGN OBJECT IN LINES	9	0.42	3,506.63	0.62
MYLAR BALLOON	15	0.71	6,056.75	1.07
MAN IN LINES	0	0.00	0.00	0.00
OTHER	4	0.19	379.27	0.07
OTHER	4	0.19	379.27	0.07

Hawaiian Electric Company
Normalized Sustained Interruption Summary

From: January 1, 2012 **To:** December 31, 2012

Outage Cause	Interruptions Number	Interruptions % of Total	Customer Hours Number	Customer Hours % of Total
TRANSFORMER	99	4.67	7,247.18	1.29
TRANSFORMER FAILURE	53	2.50	5,992.37	1.06
TRANSFORM OVERLOAD	46	2.17	1,254.82	0.22
UNKNOWN	49	2.31	26,344.12	4.67
UNKNOWN	49	2.31	26,344.12	4.67
VANDALISM	4	0.19	111.20	0.02
VANDALISM	4	0.19	111.20	0.02
VEGETATION	79	3.73	34,763.63	6.17
TREES/BRANCHES IN LINES	73	3.45	32,006.75	5.68
OVERGROWN VEGETATION	6	0.28	2,756.88	0.49
WEATHER	63	2.97	55,141.97	9.78
HIGH WINDS	40	1.89	38,535.17	6.83
LANDSLIDE/FLOODING	3	0.14	5,373.83	0.95
NATURAL DISASTER	0	0.00	0.00	0.00
LIGHTNING	20	0.94	11,232.97	1.99
Total:	2,118		563,806.52	

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 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 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.

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

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.

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

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.

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

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.

$$SAID = \frac{\sum Duration of\ Interruption\ x\ No.of\ Customers Affected}{Average No.of\ Customers Served during the year}$$