



Transmission & Distribution System Electrical Reliability Annual Report 2009



Created by PSCC

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Section-1
Executive Summary

KEYS Mission Statement

*Provide exceptional customer service while
supplying safe, reliable electric and utility services
at the best value.*

KEYS Utility Board and Staff are committed to maintaining and improving the reliability of our electrical network. One of the tools that we use to aid in the process is the tracking of outages in order to perform statistical comparison of "Past Performance" to other utilities

Example of "What We Track"

- Number of Customer Minutes Interrupted
- Total Number of Customers Served
- Total Number of Customer Interruptions
- Sum of All Customer Momentary Events
- Minutes of Interruption
- Total Number of Outages
- Cause of Outages
- Type of Outage - Overhead, Underground, Both Overhead & Underground

Typical reasons "Why We Track"

- Identify and Target Problem Areas/Zones
- Identify Faulty Construction Material and Trends
- Assist on Vegetation Management (TreeTrimming)
- Capital Improvement Planning
- Identify Areas More Susceptible to Weather
- Compare KEYS to Other Utilities

Some of the basic definitions that KEYS uses for its Distribution Reliability Measurement program include:

- **Service Interruption** (or outage) - The complete loss of voltage for at least one minute to a customer.
- **Service Interruption Duration** - The time interval, in minutes, between the time KEYS first becomes aware of a Service Interruption and the time of restoration of service to that retail customer.
- **Planned Service interruption** – A service interruption initiated by the utility to perform necessary scheduled activities, such as maintenance, infrastructure improvements, new construction due to customer growth. Customers are typically notified in advance of these events.
- **Momentary Interruption** – The complete loss of voltage for less than one minute. This does not include short duration phenomena causing waveform distortion.

There are several indices used in the electric utility industry to track and monitor distribution reliability. The KEYS Distribution Reliability program uses the **SAIDI, CAIDI, SAIFI, MAIFIE, and L-Bar**. An overview of each of these indices is presented below:

SAIDI stands for **System Average Interruption Duration Index**.

SAIDI is calculated by taking the sum of all customer interruption durations (in minutes) and dividing it by the total number of customers served.

SAIDI measures the average **duration** of interruptions for the average customer.

CAIDI stands for **Customer Average Interruption Duration Index**.

CAIDI is the average time required to restore service to the average customer per sustained interruption.

CAIDI measures the average **repair time** experienced by the average customer who experiences an interruption.

SAIFI stands for **System Average Interruption Frequency Index**.

SAIFI is calculated by taking the total number of customer interruptions and dividing it by the total number of customers served.

SAIFI measures the average **frequency** of interruptions for the average customer.

MAIFle stands for **Momentary Average Interruption Event Frequency Index**.

MAIFle is calculated by taking the total number of customer momentary interruption events and dividing it by the number of customers served.

A momentary event, for FMPA participants, is defined as an interruption that lasts less than one minute. All momentary interruptions associated with the same event are considered to be ONE momentary interruption event.

MAIFle measures the average *momentary interruption events* per average customer.

STATISTICAL COMPARISON

| STATISTICAL COMPARISON | | | | | | | |
|-------------------------------|------------------|-------|-------|-----------------|----------------------------|-------------|-----------|
| TRANSMISSION AND DISTRIBUTION | Statistical data | | | Percent Changes | Other Utilities Comparison | | |
| | 2007 | 2008 | 2009 | 2008 To 2009 | FMPA-2008 | FL IOU-2008 | APPA-2003 |
| | | | | | | | |
| TRANSMISSION | | | | | | | |
| -QUANTITY | 16 | 16 | 8 | -50% | Not Applicable | | |
| -SAIDI (minutes) | 108.1 | 318.1 | 160.2 | -50% | | | |
| DISTRIBUTION | | | | | | | |
| -QUANTITY | 35 | 23 | 70 | 204% | | | |
| -SAIDI (minutes) | 49 | 56.2 | 68.4 | 22% | 105.4 | 99.8 | 65 |
| -MAIFI | 5.5 | 3.5 | 5.1 | 46% | 5.3 | 11.2 | 9 |

Reasons for Past Five Year Reliability Improvements:

➔ *Transmission System*

- 4 to 5 years

- Replaced 69kv dead-end bells with polymer insulators
- Utilized Synchronous Condenser for system stability
- New parallel 138kV Line 9 (Big Coppitt - Stock Island)
- Replaced old relays on T-line at US1, Big Pine, and Big Coppitt
- Repaired 35 pole Foundation problems in FKEC
- Additional 10MVAR capacitor bank at Big Coppitt Sub.
- Replace 138kV Gang Switch at Big Pine Sub & Big Coppitt Sub
- Replaced 30 yr old 69 kV oil breakers
- Replace aging shield wire FKEC
- Replace arrestors at Tavernier Sub
- Replace insulators north of Tavernier
- Replace aging 138kV potential transformer

- *Recently Completed*

- Replace 69kV gang switches
- Replace down guy insulator rods
- Replace corroded static brackets and wire
- Repair spalling at pole tops
- Replace 138kV breakers
- Fiber inter-connection
- 69kV Relay upgrade at Kennedy Dr Sub & S.I Plant
- Replace Lightning Arresters
- Replace four 69kv breakers at Stock Island Plant

➔ *Distribution System*

- 4 to 5 years

- Added second transformer at KWD Substation
- Distribution protective relays (replaced with new Microprocessor type)
- Added new Cudjoe Key Substation
- Added additional feeder at Big Coppitt Substation
- Tree Trimming Program
- Lightning Arrestor's Program
- Infrared survey of lines and field correcting/fixing
- Installation of 4 field re-closers
- Installed more Capacitor Banks to improve voltage quality
- Open wire/Back Easement Removal Program
- Reduced number of overloaded transformers
- Installed transformer secondary/primary arrestors
- Replacement at Kennedy Drive Sub bus 13.8kV gear
- New 13.8kV substation breaker (replace 30 yrs. old ones)

- *Recently Completed*

- New substation at Stock Island
- Replace old substation feeder cables
 - OMS (Outage Management System)

Reliability Goals/Plans for year 2008 - 2011

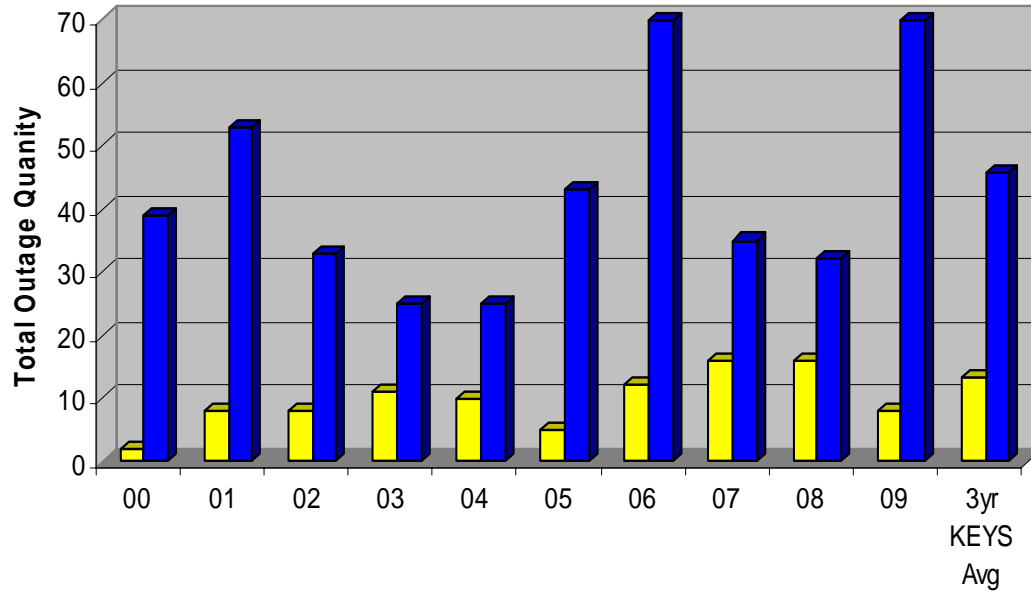
➔ Transmission System

- Foundation repairs to over water poles
- Investigate Transmission Auto Reclosing
- Continue 69kv dead-end insulator replacement

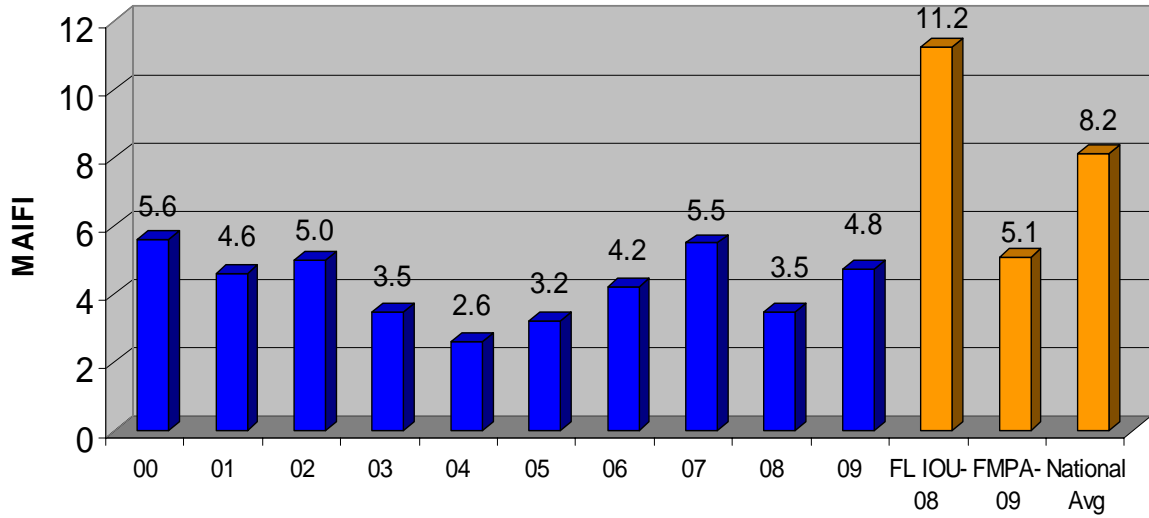
➔ Distribution System

- Pole Replacement Program (Storm Harding Program)
- Replace transformers at Kennedy Drive Sub & US1 Sub
- Additional feeders

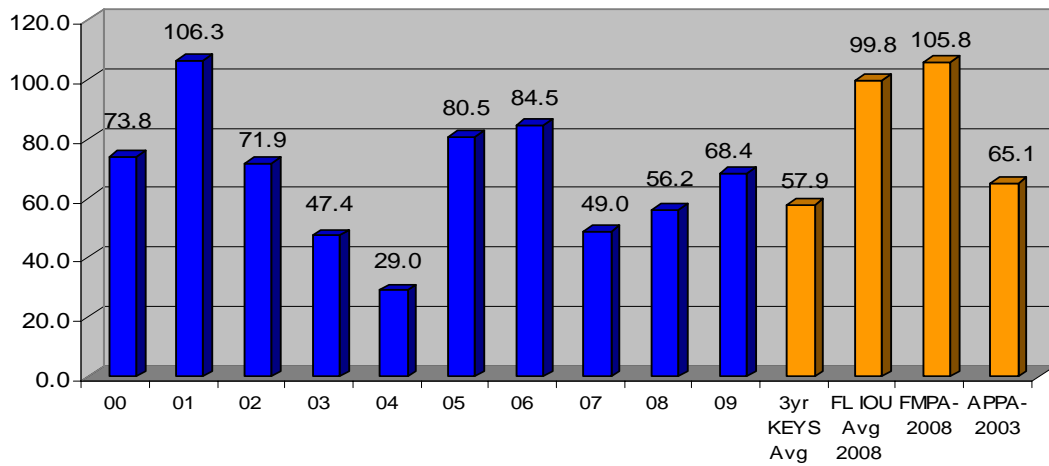
Transmission and Distribution Outages



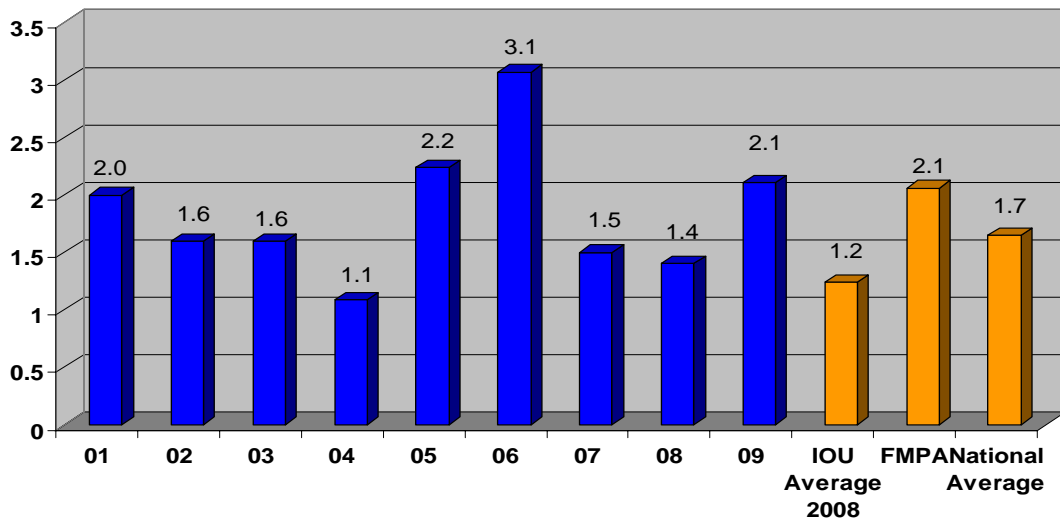
MAIFI - Average Reclosure Quantity Per Customer



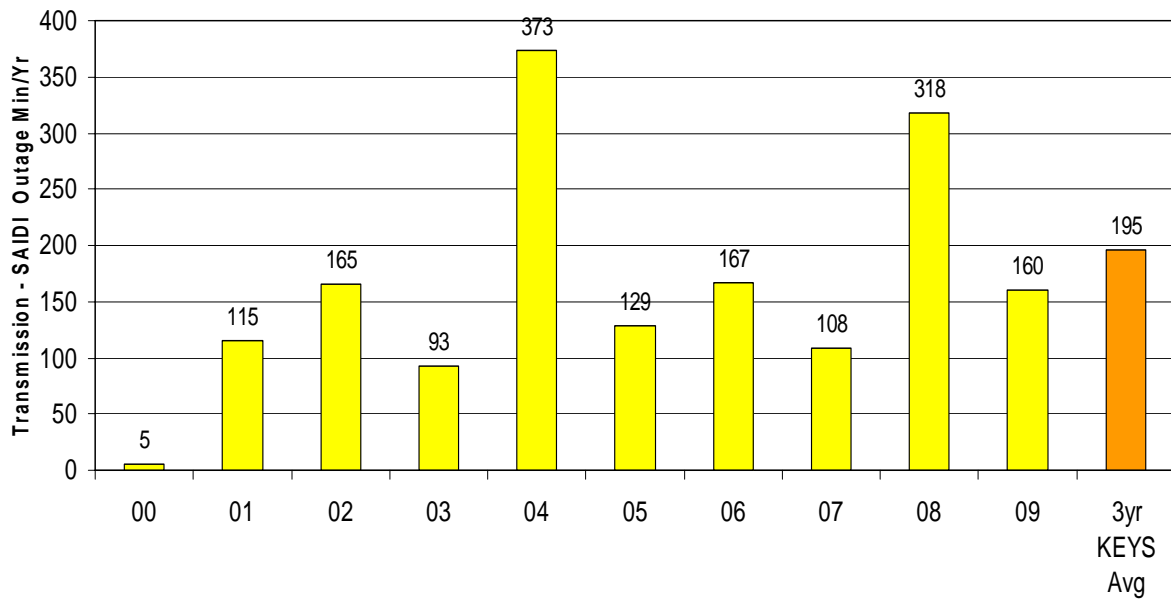
SAIDI - Distribution Average outage Min/Customer



SAIFI - Average Number Of Sustained Distribution Outages

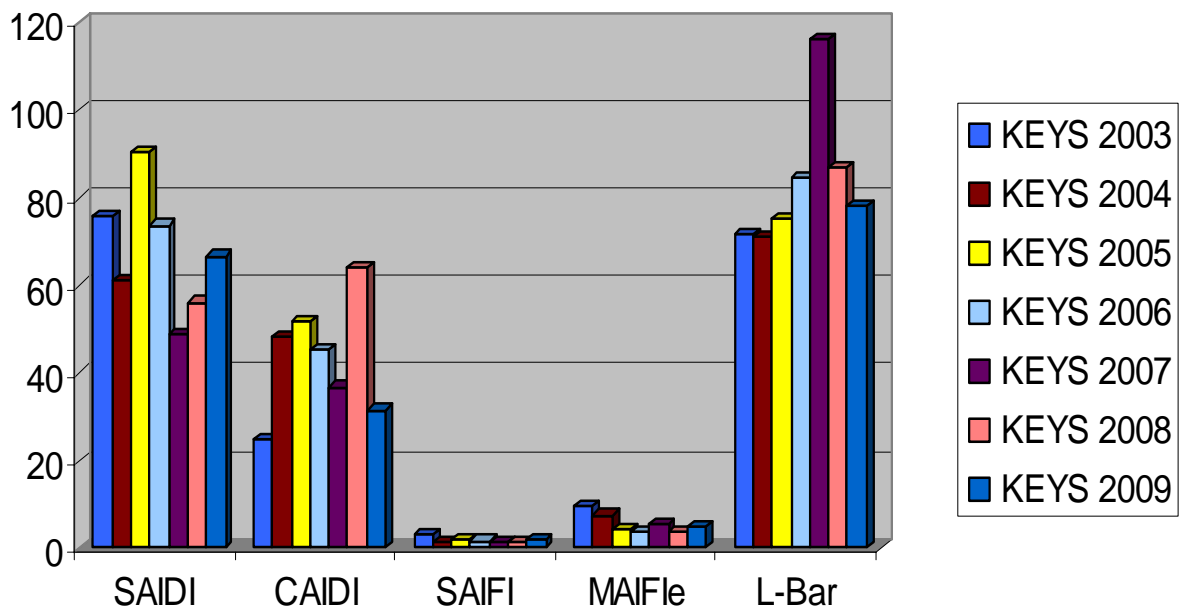


SAIDI - Transmission Average Outage Min/Customer



SAIDI Transmission Minutes - 69kv or 138kv outages that affected KEYS customers

KEYS Indices 2003-2009



Section-2 Reliability Overview of Program and Indices

Tracking and measuring the reliability of KEYS' Transmission & Distribution electric system is an important means for KEYS to gauge its performance, evaluate procedures, and ensure a high level of service to our customers. KEYS' monitors reliability by, tracking the number of power outages, cause of the outages, location of the outage, number of customers impacted and the length of the outages.

KEYS uses the data to identify potential areas for improvement, such as enhanced tree trimming and vegetation management call out procedures for line crews responding to outages, and possible changes to equipment/material. The data is also very useful for KEYS to determine 1) where funds should be spent and 2) when funds are needed to improve reliability, depending on the type of outages experienced.

This information can also be used to calculate several reliability indices used in the electric industry to evaluate reliability performance. These indices help to standardize the data and allow KEYS utility to compare its reliability performance to other utilities.

In Florida, Investor Owned Utilities (IOUs) are required to submit an annual Distribution Service Reliability Report to the Florida Public Service Commission (PSC) as required under Rule 25-6.0455. (A copy of Rule 25-6.0455 FAC is included in Appendix A.) The PSC uses this information to track service levels and identify any trends or areas in need of attention.

In 2007, the PSC issued a data request to the municipal utilities in the state to submit similar data for the first time. KEYS were able to compile data of such request, as we have had an extensive well documented tracking mechanism for years.

In addition, FMPA has been collecting and compiling distribution reliability measurement data from participating municipal electric utilities since 2003. KEYS along with other participating utilities submit distribution reliability data and receive a group report each month. Participants are able to compare their utility's performance each month with other participating municipal utilities. The FMPA data enables KEYS to compare and benchmark to the other Florida utilities.

KEYS collect outage data using our own outage tracking and management systems. The data is comprised on the following.

- ❖ Number of Customer Minutes Interrupted
- ❖ Total Number of Customers Served
- ❖ Total Number of Customer Interruptions
- ❖ Sum of All Customer Momentary Events
- ❖ Minutes of Interruption
- ❖ Total Number of Outages
- ❖ Cause of Outages
- ❖ Type of Outage - Overhead, Underground, Both Overhead & Underground

From this data, the following reliability indices are calculated – SAIDI, CAIDI, SAIFI, MAIFI, L-Bar.



In an effort to mirror the data from the Florida Investor Owned (IOUs) as closely as possible, the participating KEYS and the other municipal utilities report their data using the same definitions and guidelines required by the Public Service Commission. Appendix A provides a copy of Chapter 25-6.0455 FAC, which includes the definitions used by the IOUs for the collection and submittal of the distribution reliability data.

Service Interruption (or outage) - The complete loss of voltage for at least one minute to a retail customer.

Service Interruption Duration - The time interval, in minutes, between the time a utility first becomes aware of a Service Interruption and the time of restoration of service to that retail customer.

Planned Service Interruption – A service interruption initiated by the utility to perform necessary scheduled activities, such as maintenance, infrastructure improvements, new construction due to customer growth. Customers are typically notified in advance of these events.

Momentary Interruption – Complete loss of voltage for less than one minute. This does not include short duration phenomena causing waveform distortion.

In addition to the definitions, the participating KEYS along with the Florida Municipal Utilities have also adopted the exclusions provided in Chapter 25-6.0455 FAC. As provided in this section, IOUs may exclude from their Annual Distribution Service Reliability Report outage events directly caused by one or more of the following:

- ❖ Planned interruptions
- ❖ A storm named by the National Hurricane Center
- ❖ A tornado recorded by the National Weather Service
- ❖ A planned load management event
- ❖ An electric generation or transmission event
- ❖ An extreme weather or fire event causing activation of the county Emergency Operation Center

In 2006, the PSC revised the rules to require IOUs to submit both an “actual” Annual Distribution Service Reliability Report which lists all outages experienced by the utility as well as an “adjusted” report, which excludes outages from those events noted above.

For 2009, there were not any named storms by the National Hurricane Center that could have resulted in excluded distribution reliability data.

There are several indices used in the electric utility industry to track and monitor distribution reliability. The KEYS Distribution Reliability program uses the **SAIDI**, **CAIDI**, **SAIFI**, **MAIFI**, and **L-Bar**. An overview of each of these indices is presented below:



SAIDI stands for **S**ystem **A**verage **I**nterruption **D**uration **I**ndex.

SAIDI is calculated by taking the sum of all customer interruption durations (in minutes) and dividing it by the total number of customers served.

$$\text{SAIDI} = \frac{\text{Sum of all Customer Minutes Interrupted (CMI)}}{\text{Total number of Customers Served (C)}}$$

The unit of SAIDI is time (minutes). SAIDI can be stated: “On average, customers on the distribution system were out of service for _____ minutes.” For example, if Utility X has 10,000 CMI annually, and 1,000 customers then the SAIDI for that utility is 10 minutes per year (for the average customer).

SAIDI measures the average *duration* of interruptions for the average customer

CAIDI stands for **C**ustomer **A**verage **I**nterruption **D**uration **I**ndex.

CAIDI is the average time required to restore service to the average customer per sustained interruption. It is calculated by dividing the sum of all customer minutes interrupted by the total number of customer interruptions.

$$\text{CAIDI} = \frac{\text{Sum of all Customer Minutes Interrupted (CMI)}}{\text{Total number of customer interruptions (CI)}}$$

The unit of CAIDI is time (minutes). CAIDI can be stated as: "The average customer that experiences an outage on the distribution system is out for _____ minutes." For example, if Utility X has a CMI of 10 minutes and a CI of 2, then the CAIDI is 5 minutes.

CAIDI measures the average *repair time* experienced by the average customer who experiences an interruption.

SAIFI stands for **S**ystem **A**verage **I**nterruption **F**requency **I**ndex.

SAIFI is calculated by taking the total number of customer interruptions and dividing it by the total number of customers served.

$$\text{SAIFI} = \frac{\text{Total number of Customer Interruptions (CI)}}{\text{Total number of customers served (C)}}$$

The unit of SAIFI is interruptions. SAIFI can be stated: "On the average, customers on the distribution system experienced _____ service interruptions." For example, if Utility X has 2,000 CI annually, and 1,000 customers, then the SAIFI for that utility is 2 interruptions per year (for the average customer). SAIFI measures the average *frequency* of interruptions for the average customer.

MAIFI stands for **M**omentary **A**verage **I**nterruption **e**vent **F**requency **I**ndex.

MAIFI is calculated by taking the total number of customer momentary interruption events and dividing it by the number of customers served.

$$\text{MAIFI} = \frac{\text{Total Number of Customer Momentary Interruption Events (CME)}}{\text{Total Number of Customers Served (C)}}$$

The unit of MAIFI is "momentary interruptions." MAIFI can be stated as "On the average, customers on the distribution system experienced _____ *momentary* interruptions." For example, if Utility X has 5 CME and 1,000 customers, then the MAIFI is .005.

A momentary event, for FMPA participants, is defined as an interruption that lasts less than one minute. All momentary interruptions associated with the same event are considered to be ONE momentary interruption event. For example, events that result in multiple operations of a re-closer (thus resulting in multiple momentary events) are considered one momentary event. This is true even if the total time for all these momentary events to occur is greater than one minute. MAIFI is similar to SAIFI, where SAIFI tracks the frequency of sustained interruptions, and MAIFI tracks the frequency of momentary interruptions. MAIFI measures the average momentary interruption events per average customer.

L-BAR is the Average length of a service interruption.

L-Bar is calculated by taking the sum of the lengths of each service interruption and dividing by the number of sustained interruptions. Momentary interruptions are not included in the L-Bar calculation.

Minutes of Interruption

L-Bar = Total number Interruptions greater than one minute in length

The unit of L-Bar is time (minutes). L-Bar can be stated as: "On average, sustained interruptions on the system have duration of ____ minutes." For example, if Utility X has 1440 minutes of service interruption and 100 interruptions, then their L-Bar is 14.4 minutes.

L-Bar measures the average *length of a single outage*.

Section-3

KEYS 2009 Distribution Reliability Data, Statistics and Tables



This section provides data collected for the 2009 calendar year and includes comparisons between the Florida Municipal Utilities (2009) and the IOUs (2008) respectfully.

In order to make a valid comparison, the data from the Florida Municipal was calculated as if all the participants were a part of one utility. For example, the data for number of customers, customer minutes interrupted, total outages, etc. and the indices calculated from this data, are based on the sum of all the participating Florida Municipal (versus averaging). This allows for a more appropriate comparison to the IOU data.

Where possible, we have tried to make valid comparisons and identify possible conclusions for the results. However, due to the nature of some of this data, there are many instances where no definite conclusion can be drawn from the data.

The data has been divided into the following groups:

KEYS 2009 Distribution Reliability Indices

- ❖ Comparison of the Florida Municipals to the Investor Owned Utilities
- ❖ Minimum and Maximum data points for each index for the Florida Municipals

Comparison of Historical Data (KEYS 2009) Reliability Indices

- ❖ Four year comparison of Florida Municipals and Investor Owned Utilities
- ❖ Four year comparison of Florida Municipals by Utility Size

Cause of Outages

- ❖ Comparison of the Florida Municipals to the Investor Owned Utilities by total number of outages and by percentage
- ❖ Florida Municipals cause of outages by month
- ❖ Comparison of Florida Municipals (KEYS 2009) cause of outages by percentage
- ❖ Florida Municipals – cause of outages – overhead vs underground

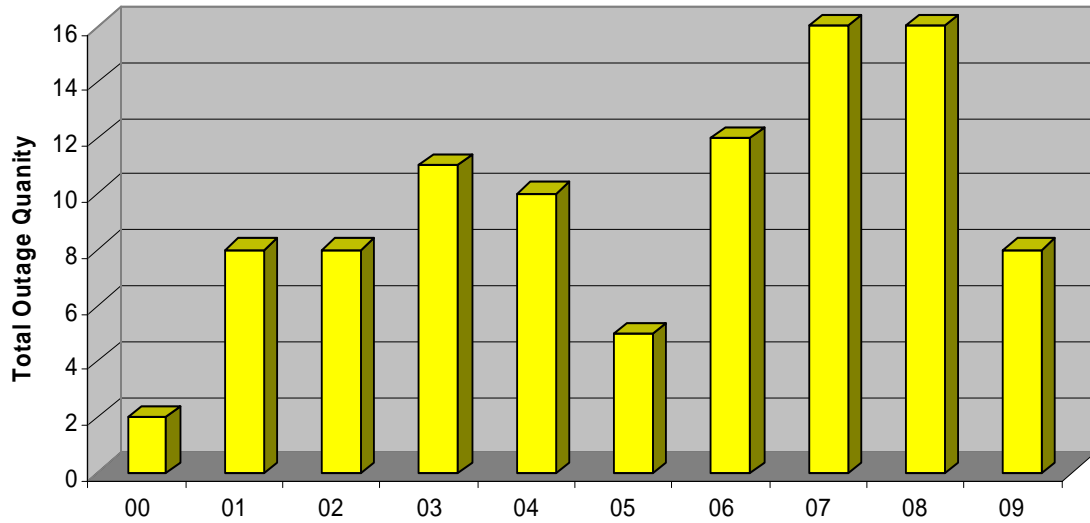
TRANSMISSION & DISTRIBUTION

Charts & Graphs

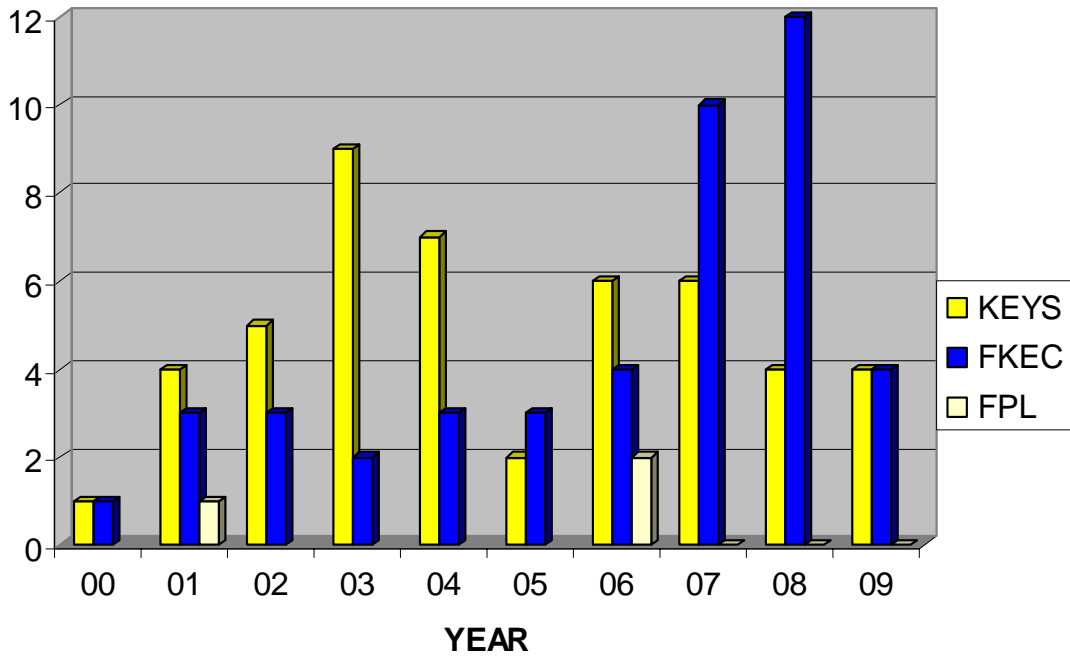
- **Transmission** Outages vs Year
- **Transmission** Outages vs Territory
- **Transmission** Outages vs Holidays
- **Transmission** Outages vs Month 2009
- **Transmission** SAIDI -Avg Outage Min/Cust
- **Transmission** Outages vs Day of the Week
- **Distribution** Outages vs Year with 3yr Average
- Re-closure Quality per Year
- **Transmission** Outages vs Hour of the Day
- **Transmission** Total Outages vs Cause
- **Transmission** Outages vs Human Error (KEYS/Contractor)
- **Transmission** Outages vs System Load
- **Distribution** Outages vs Year
- **Distribution** Outages vs Month
- **Distribution** Outages vs Day of the Week
- **Distribution** Outages vs Hour of the Day
- **Distribution** Total Outages vs Cause
- **Distribution** Outages vs Tree by Month
- **Distribution** Outages vs Tree by Year
- **Distribution** Outages vs Equipment Failure by Month
- **Distribution** Outages vs Equipment Failure by Year
- Total System Outages vs Day of the Week
- Total System Outages vs Weekends
- Total System Outages vs Cause
- Total System Outages vs Minutes
- **Transmission** and **Distribution** Outages qty vs Min
- **Distribution** Transformer & Lateral Outages vs Year
- Key West Diesel Substation Feeder Outage History
- Kennedy Dr Substation Feeder Outage History
- US1 Substation Feeder Outage History
- Big Coppitt Substation Feeder Outage History
- Big Pine Substation Feeder Outage History
- Thompson St Substation Feeder Outage History
- Cudjoe Key Substation feeder Outage History
- White St Substation Feeder Outage History

KEYS Energy 2009 Reliability Data, Statistics, and Tables

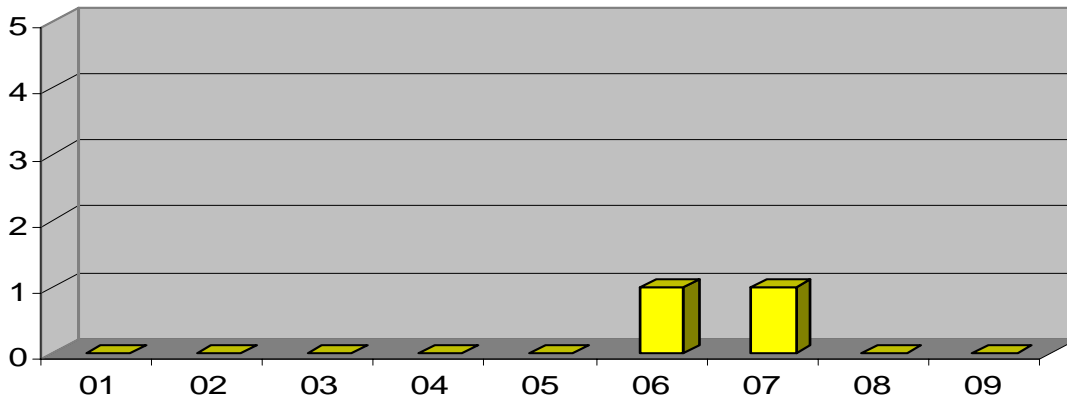
Transmission Outages Per Year



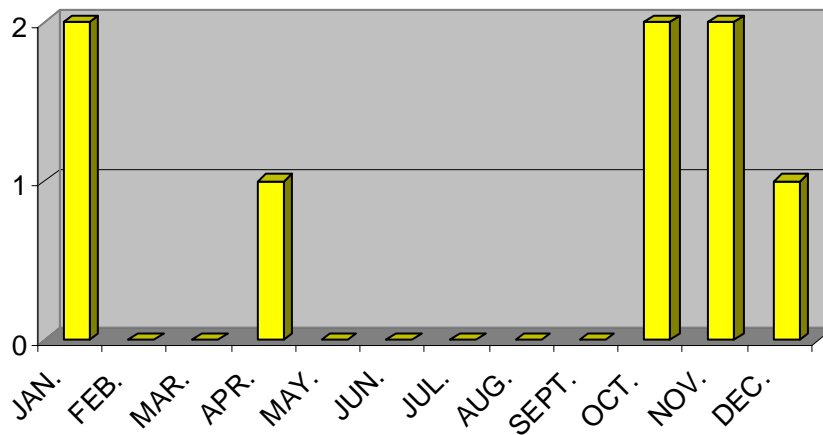
TRANSMISSION OUTAGES BY TERRITORY



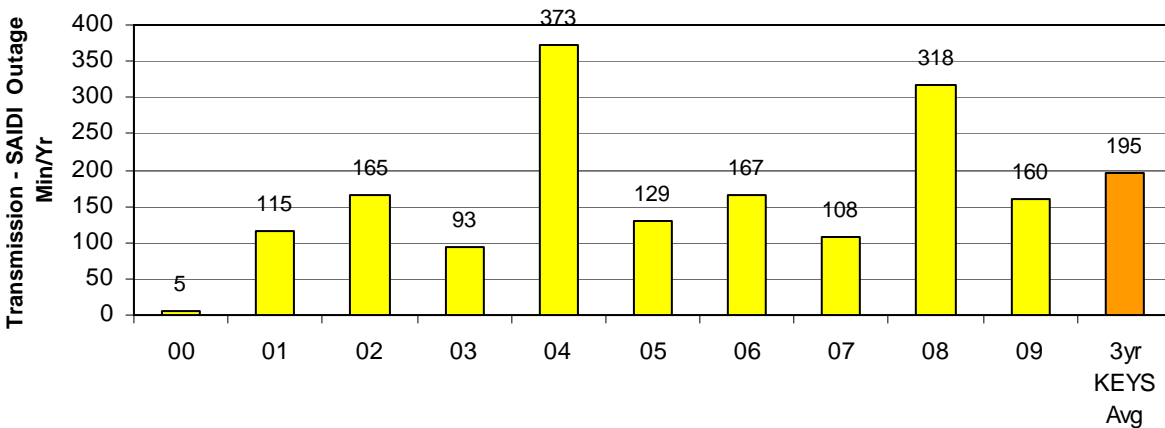
Total Transmission Outages On Holidays vs. Year



Total Transmission Outages 2009 vs. Month

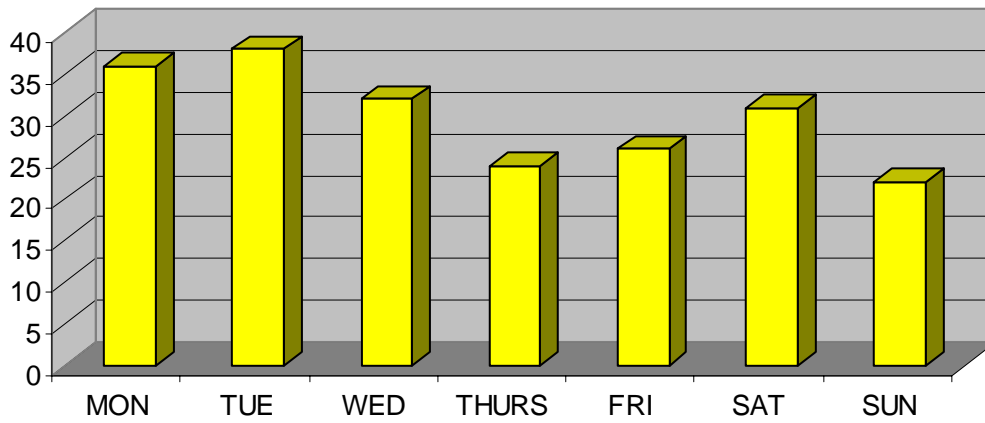


SAIDI - Transmission Average Outage Min/Customer

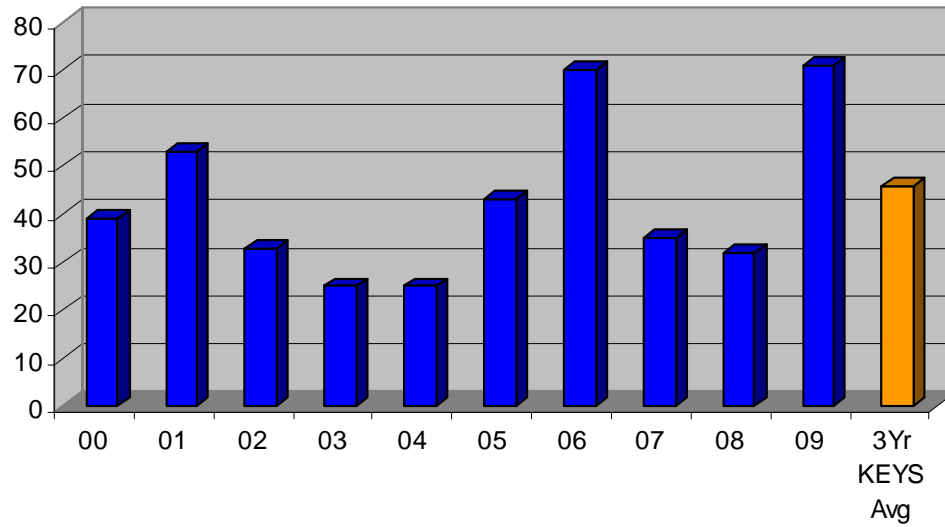


SAIDI Transmission Minutes - 69kv or 138kv outages that affected KEYS customers

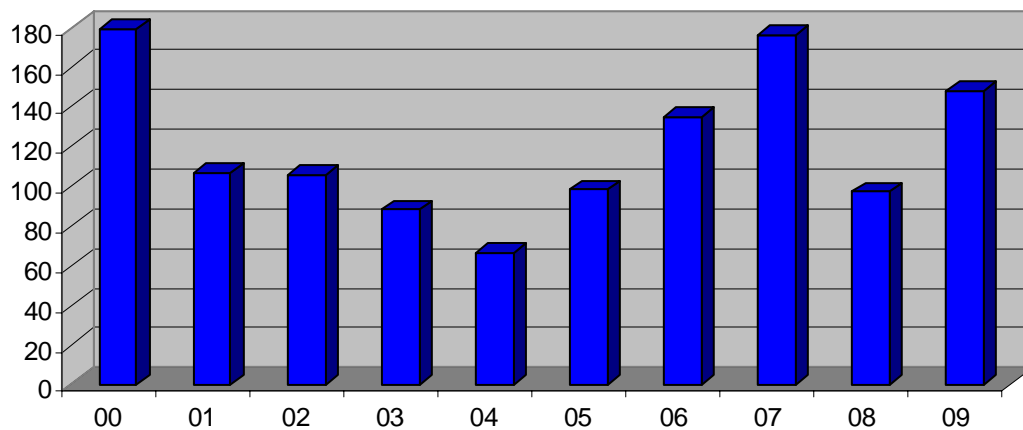
Transmission Outages vs. Day Of The Week (1991-2009)



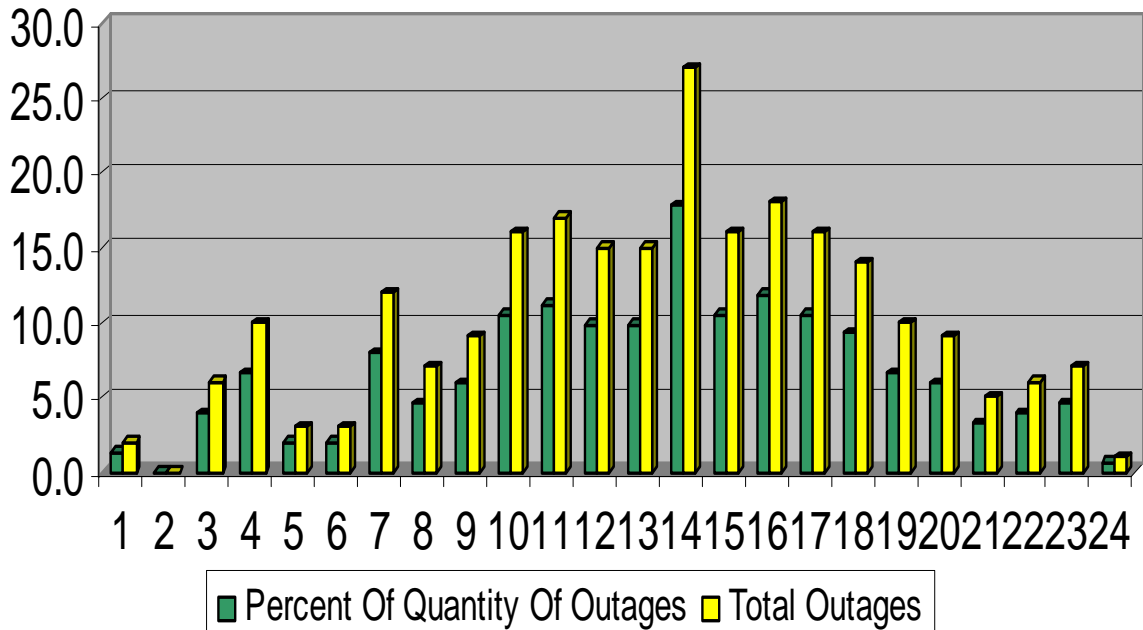
Distribution Feeder Outages



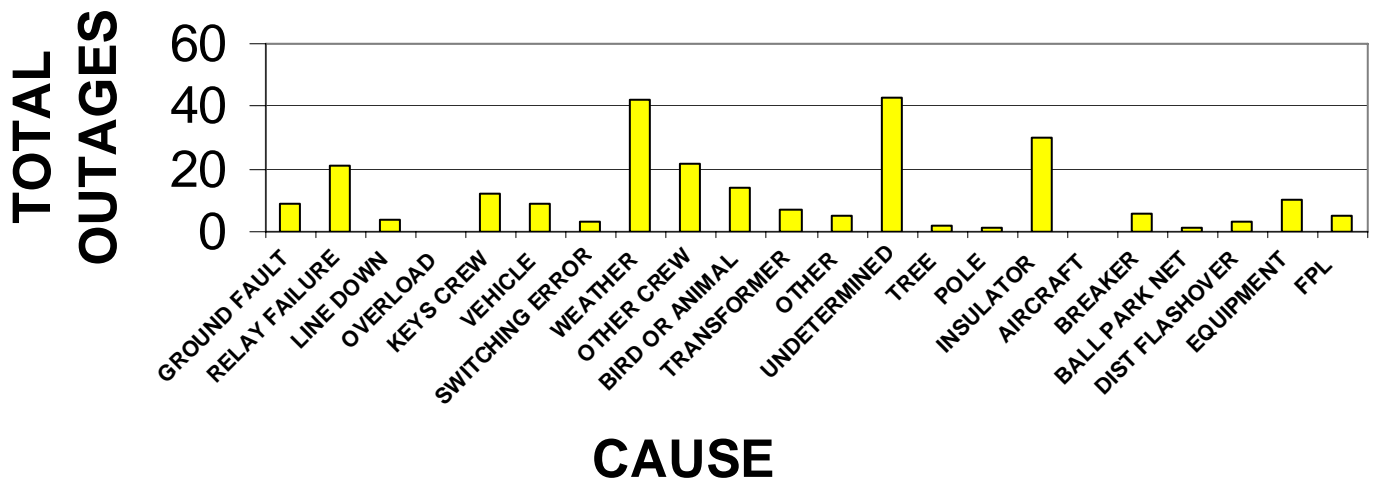
Reclosure Quantity vs. Year



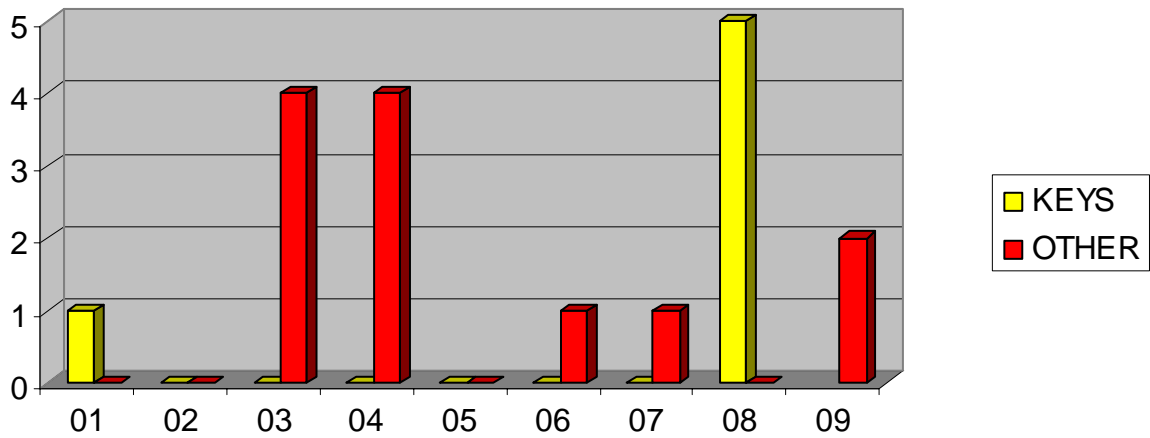
Transmission vs. Hour (1991-2009)



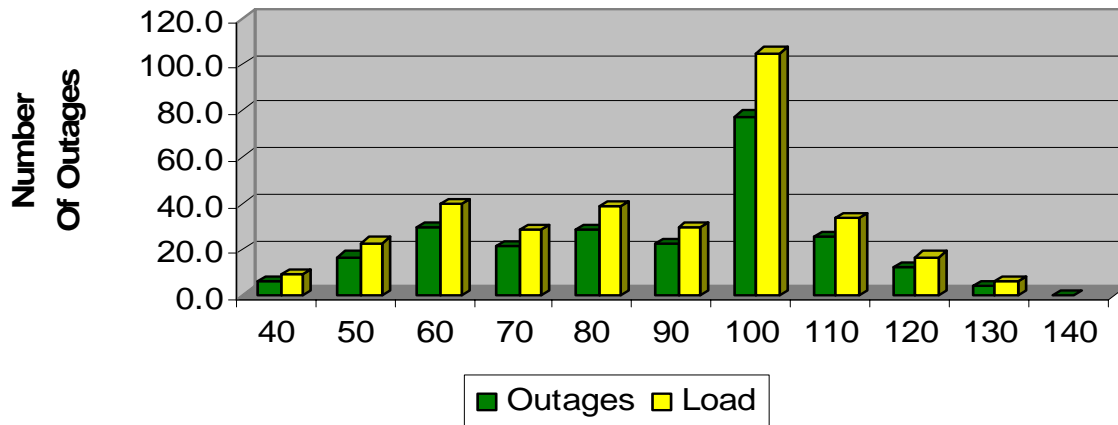
TOTAL TRANSMISSION OUTAGES VS. CAUSE (1991 THRU 2009)



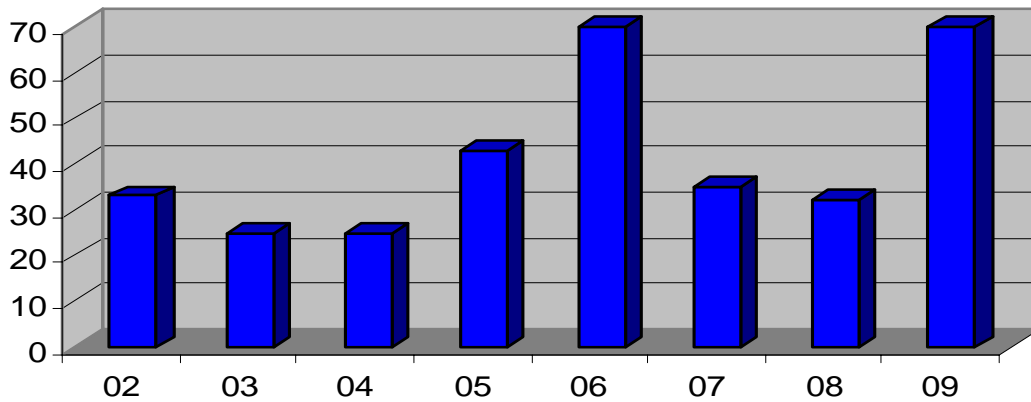
Transmission Outages vs. Human Error(Employee/Contractor)



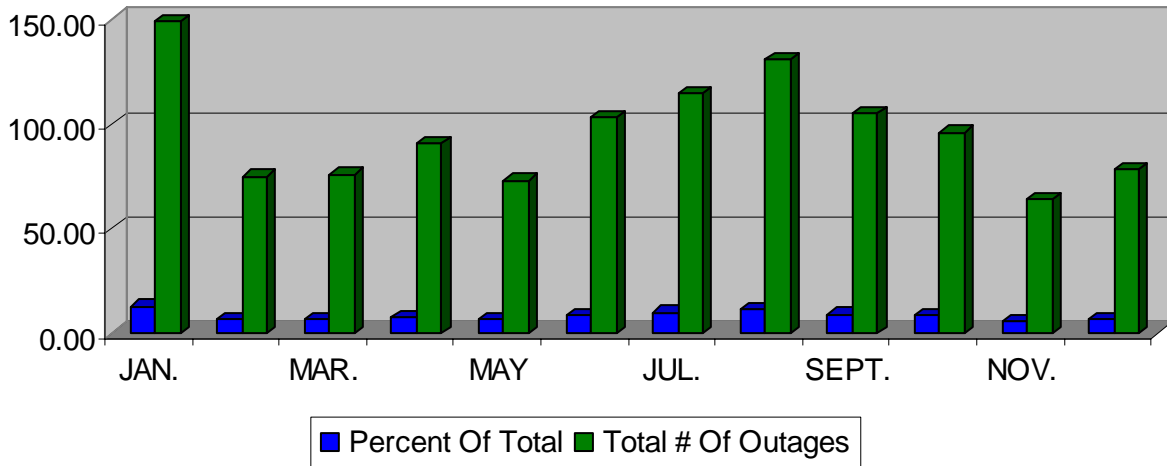
Transmission Outages vs. System Load (1991-2009)



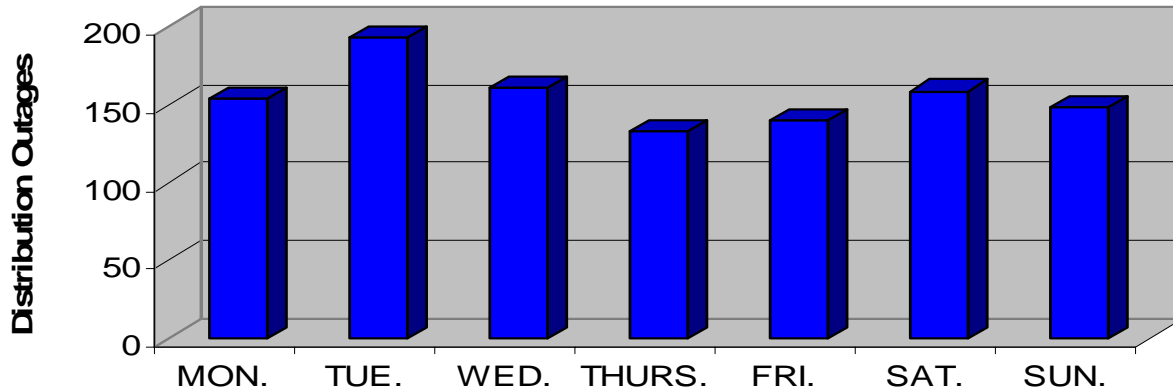
Distribution Outages vs. Year



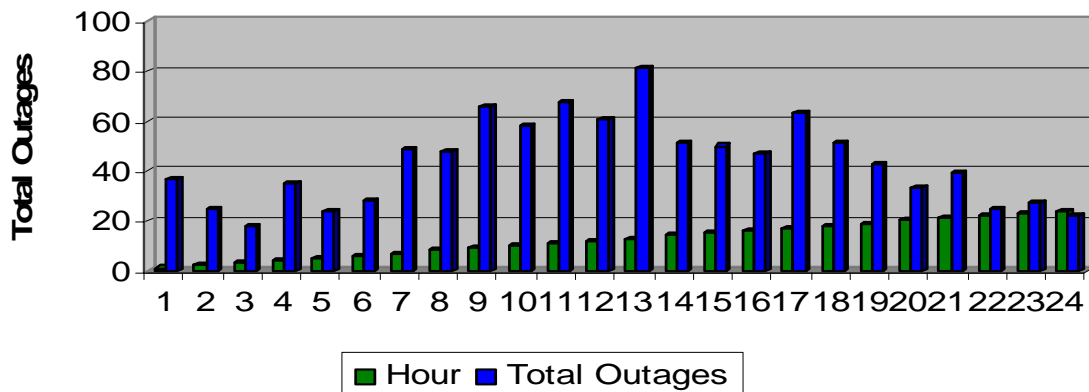
Total Distribution Feeder Outages vs. Month (1991-2009)



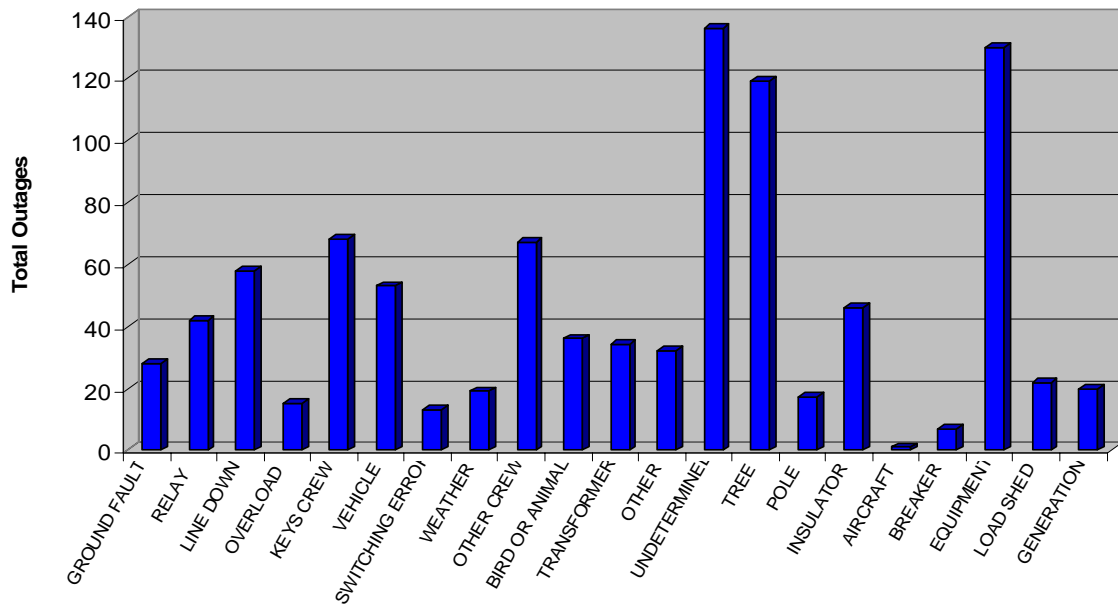
Distribution Feeder Outages vs. Day Of The Week (1991-2009)



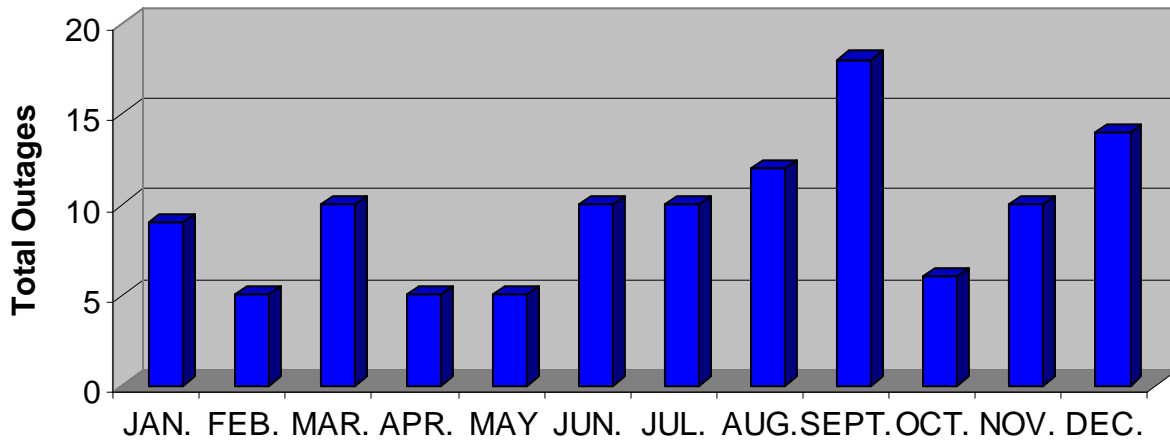
Distribution Feeder vs. Hour (1991-2009)



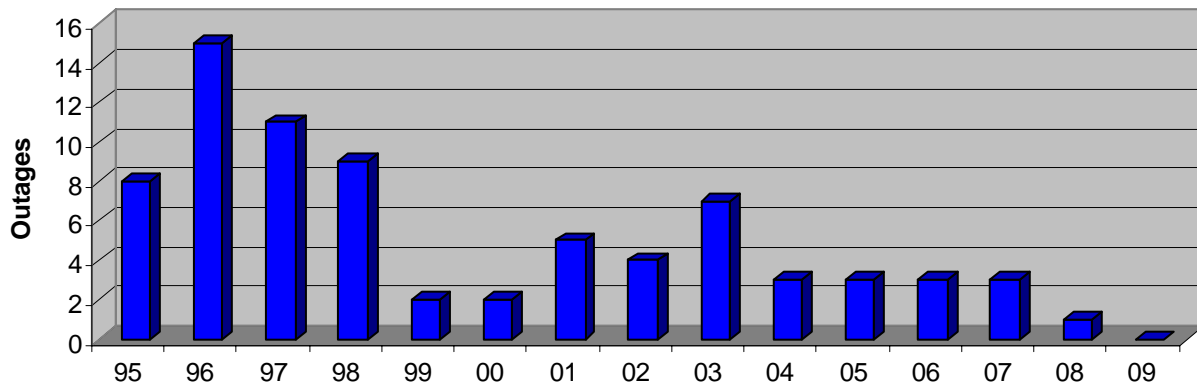
Distribution Outages vs. Cause(1991-2009)



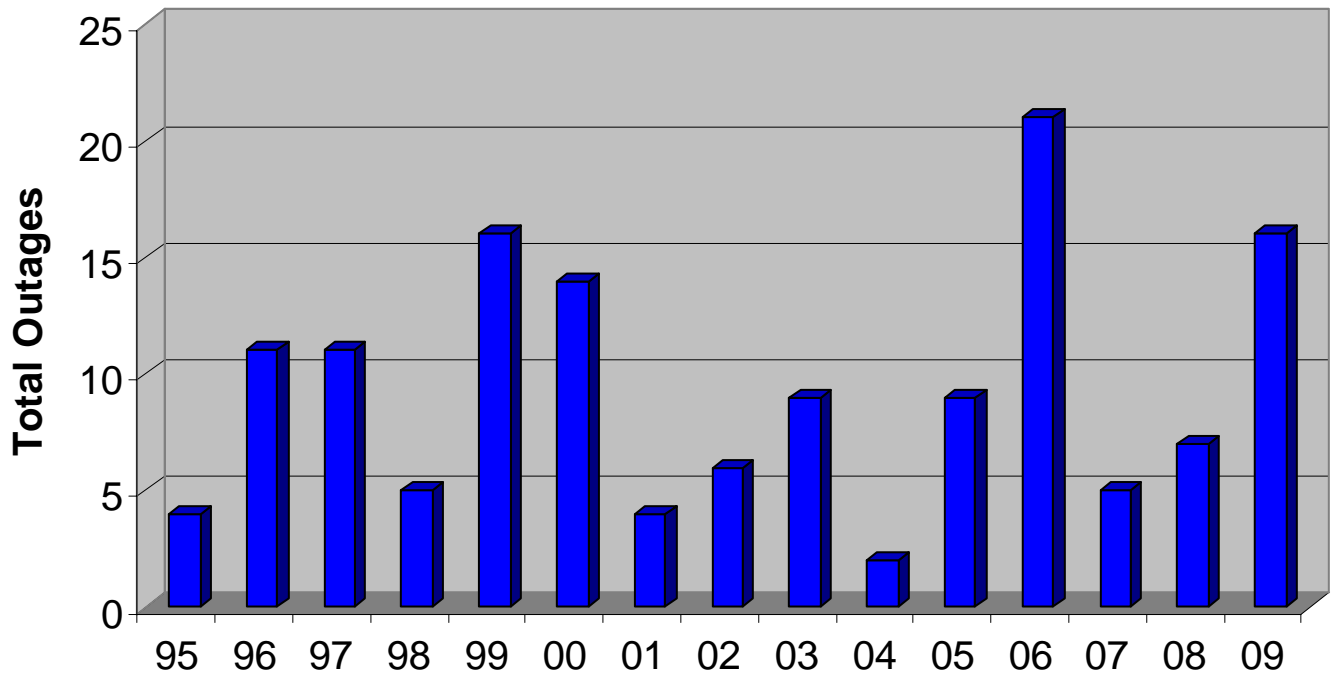
Distribution Outages From Trees vs. Month (1991-2009)



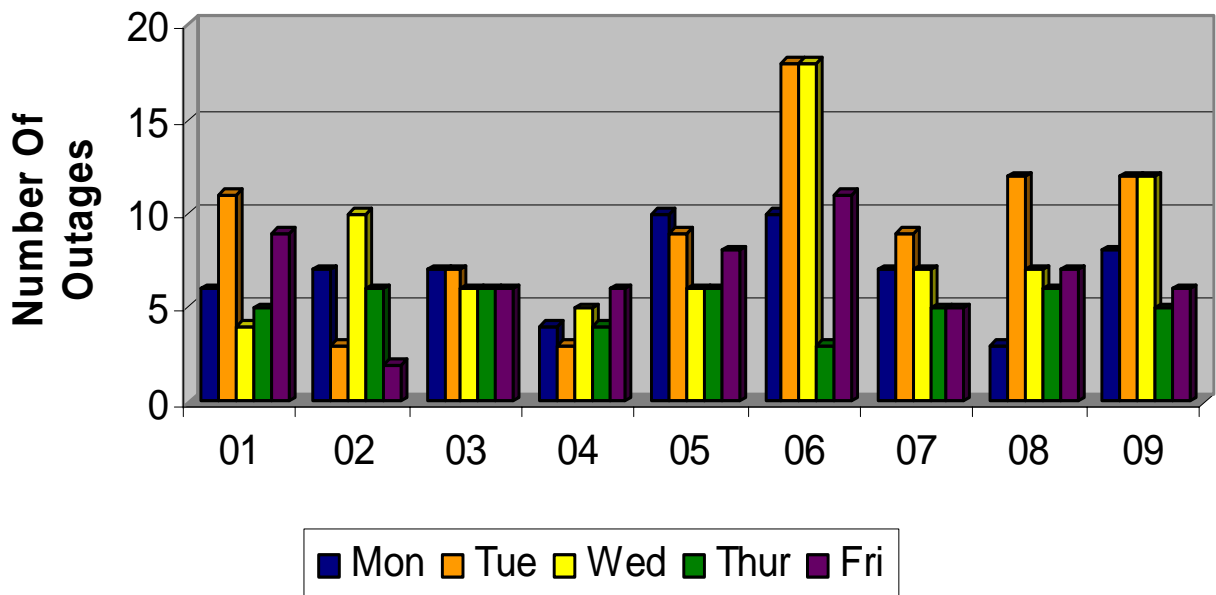
Distribution Outages Caused By Trees vs. Year (1995-2009)



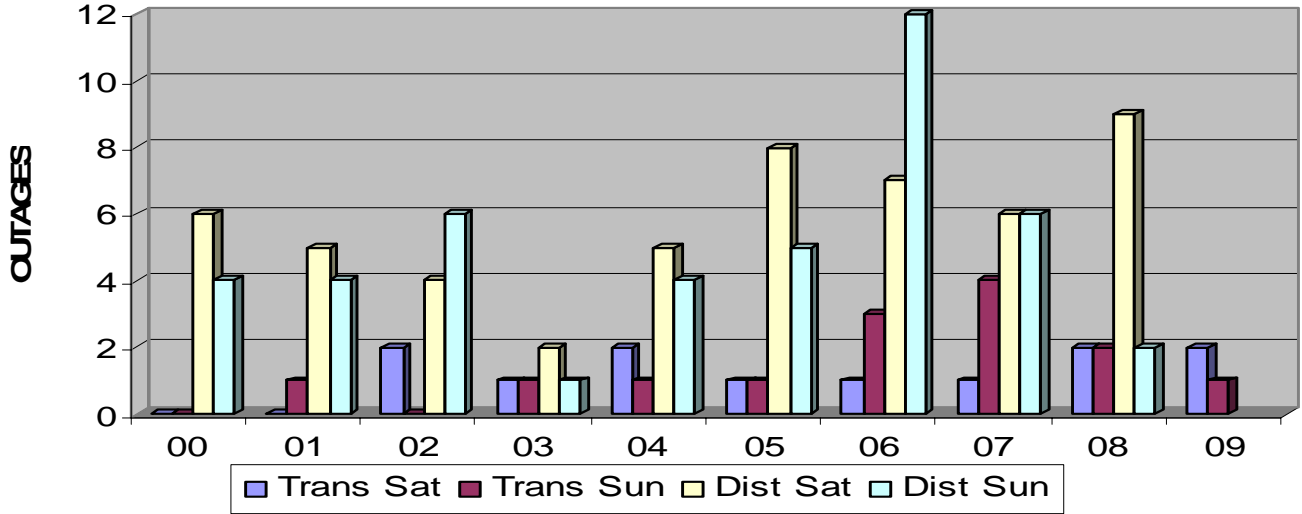
Distribution Outages From Equipment Failure vs. Year



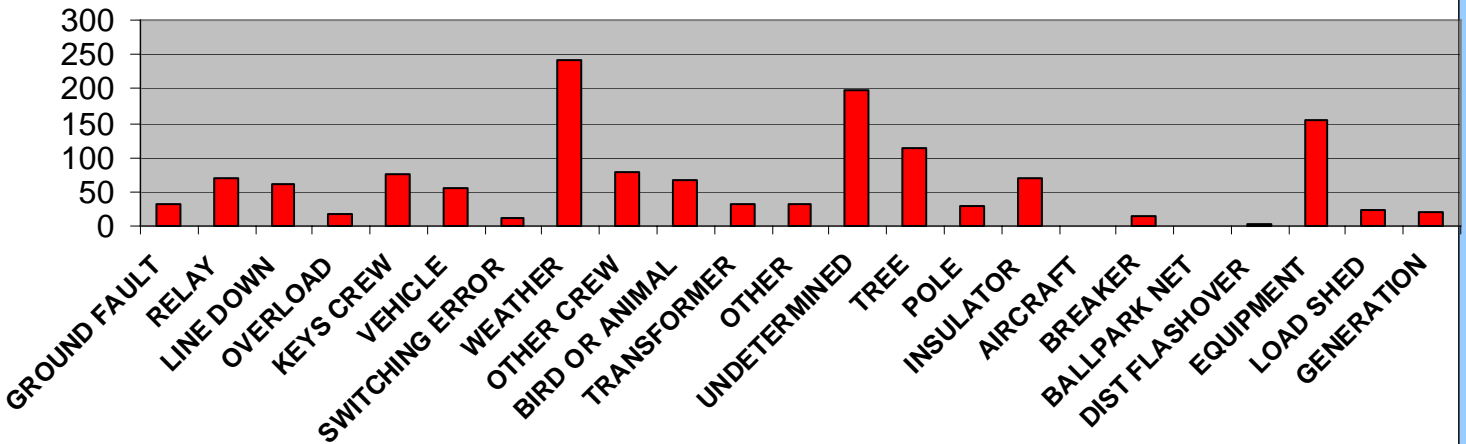
Total System Outages vs. Day Of Week Transmission And Distribution



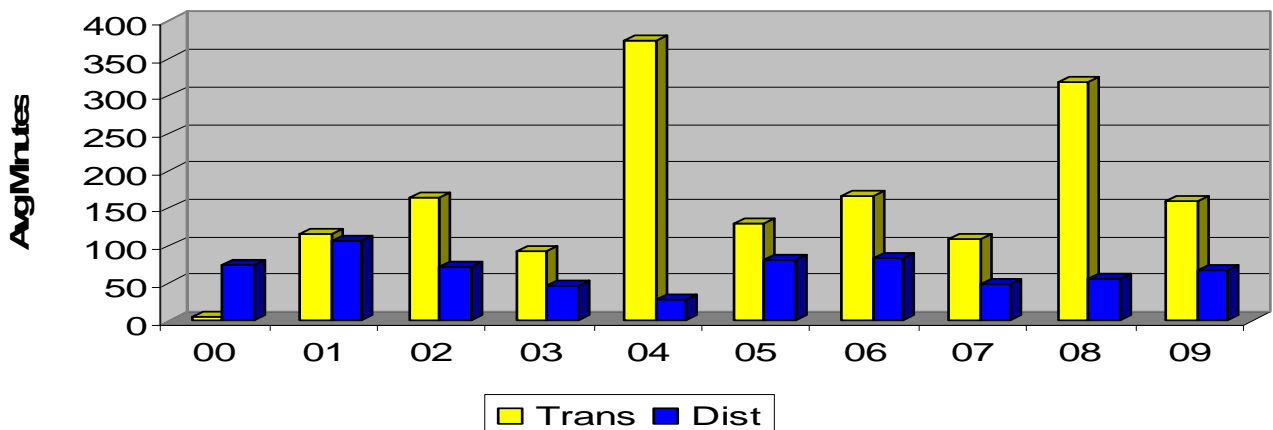
TOTAL SYSTEM OUTAGES VS. WEEKEND



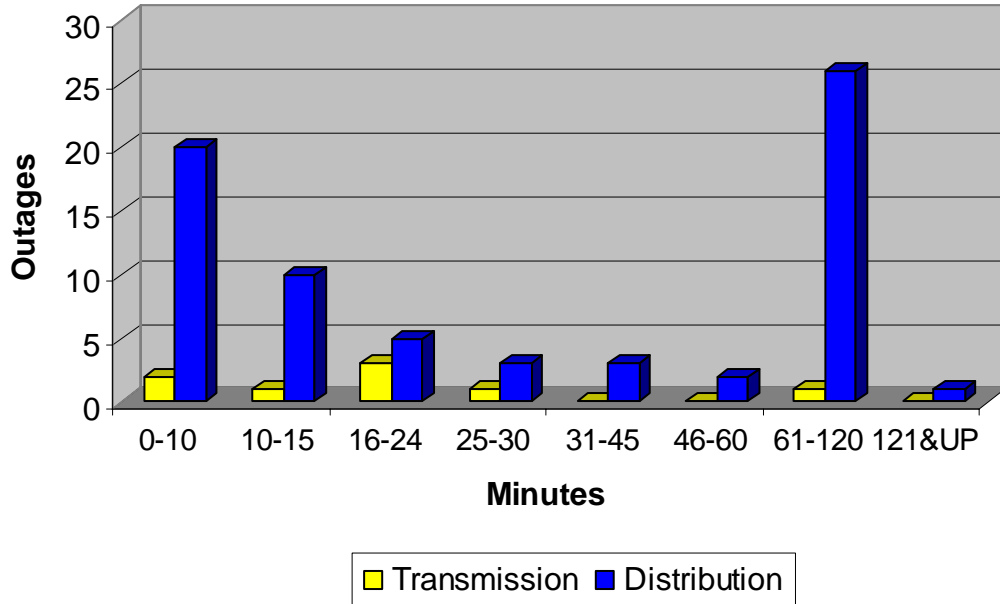
Total System Outages vs. Cause (1991-2009)



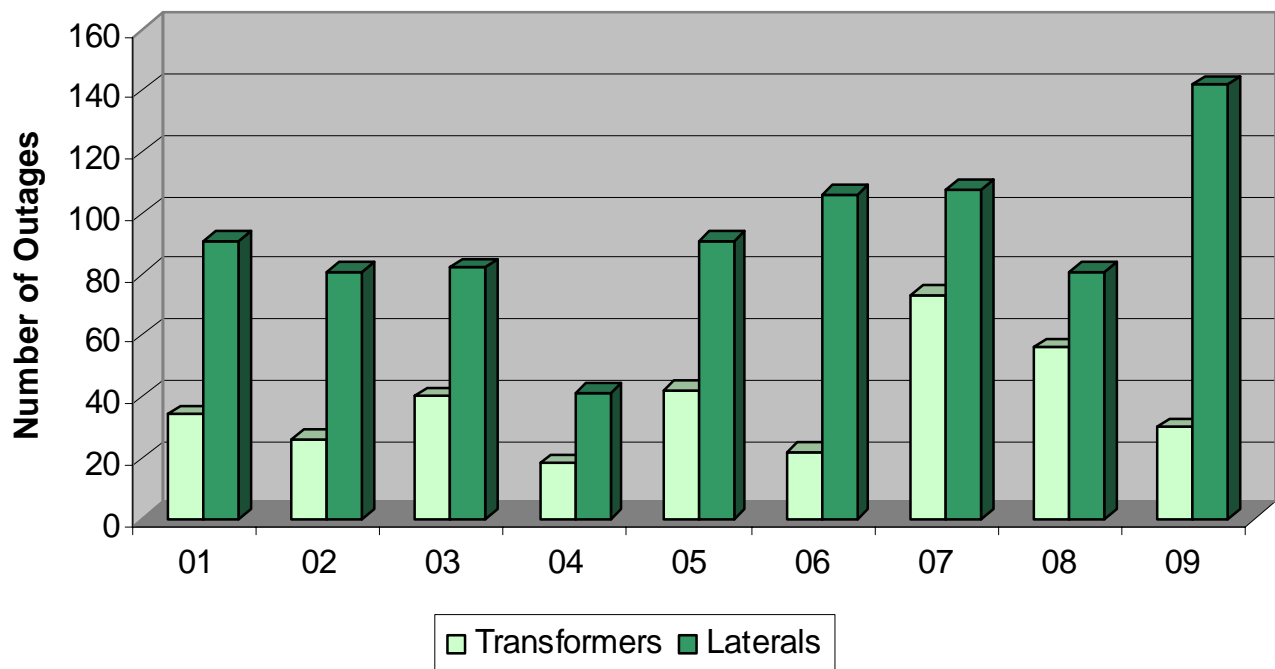
Avg Transmission and Distribution Outage Minutes Per Customer (SAIDI)



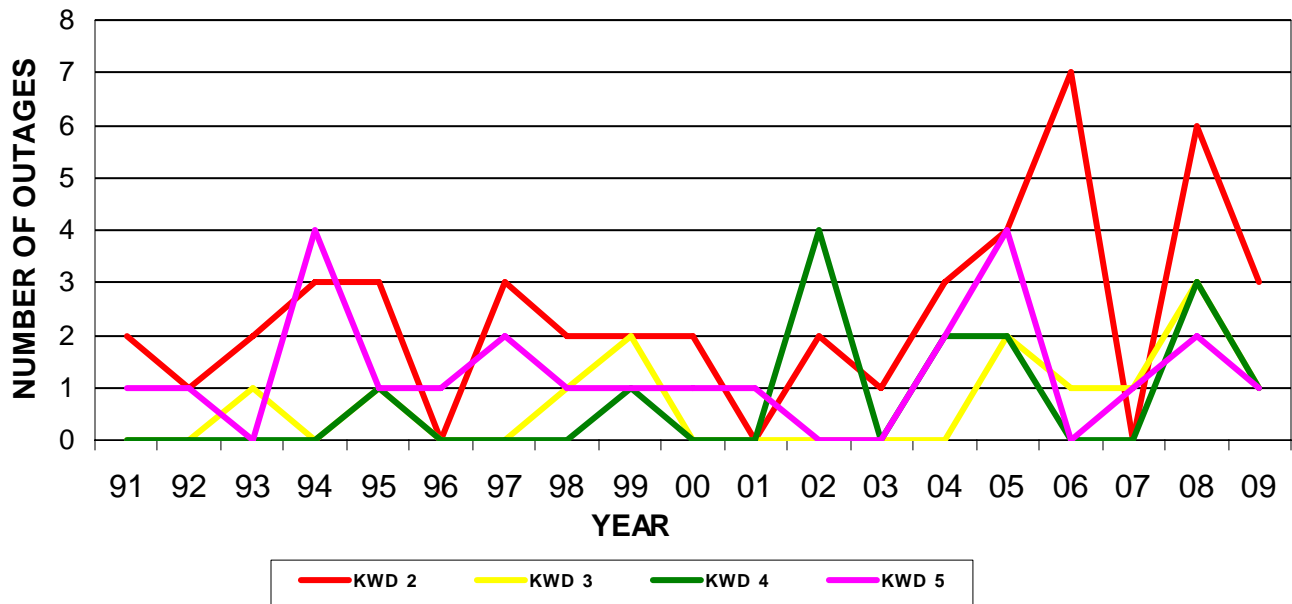
Transmission and Distribution Outages Quantity vs. Group Minutes (2009)



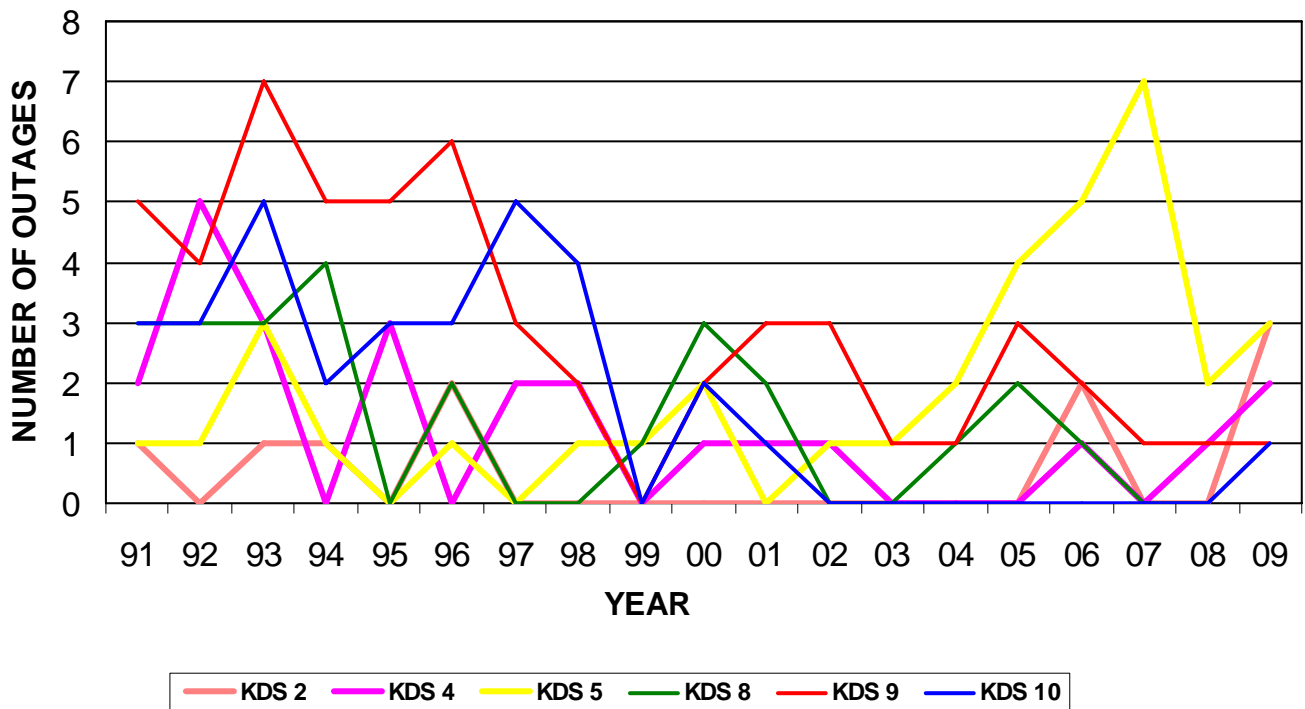
Transformer and Lateral Outages vs. Year (2001-2009)



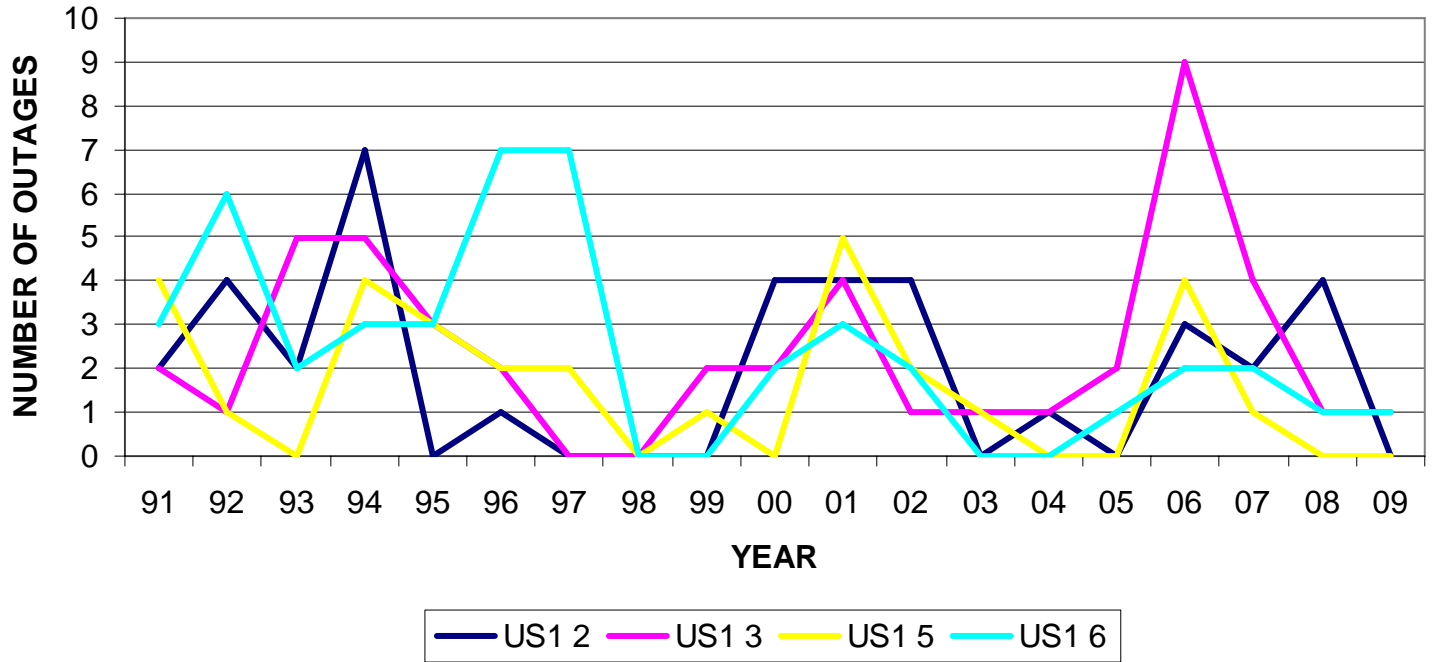
KEY WEST DIESEL SUBSTATION FEEDER OUTAGE HISTORY VS. YEAR (1991 THRU 2009)



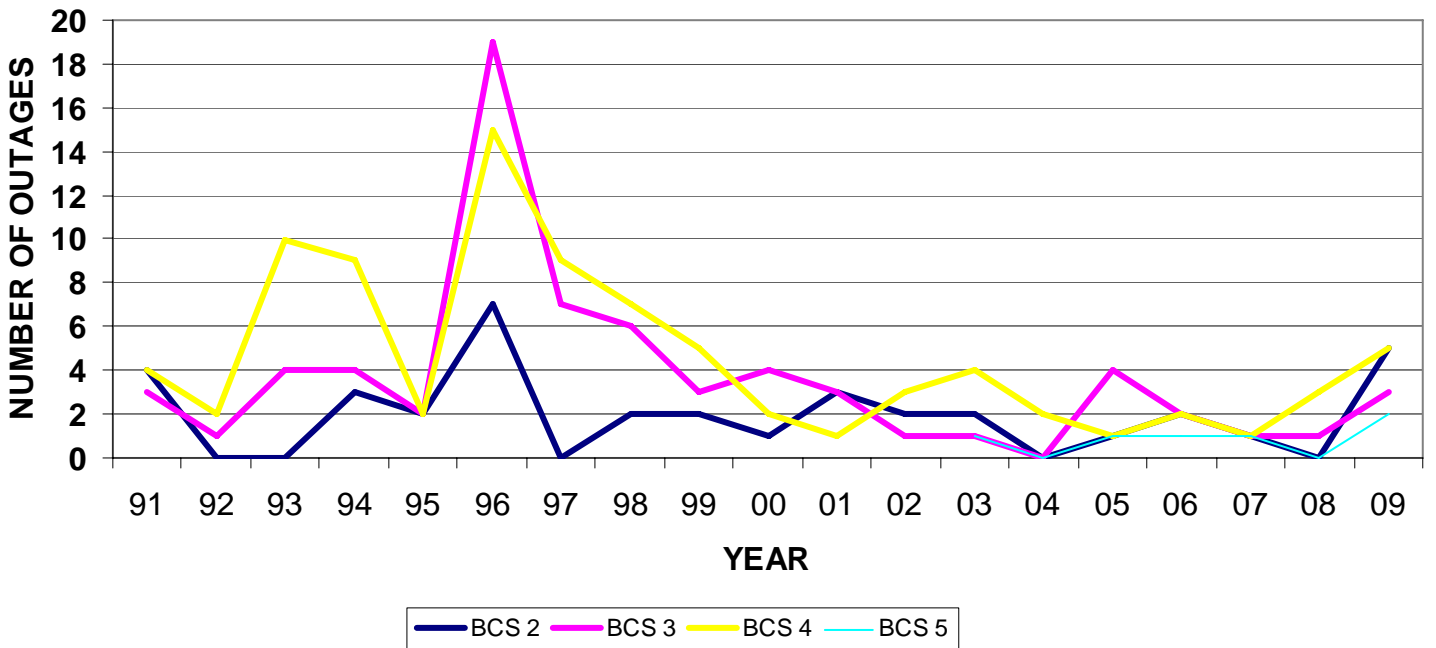
KENNEDY DRIVE SUBSTATION OUTAGE HISTORY VS. YEAR (1991 THRU 2009)



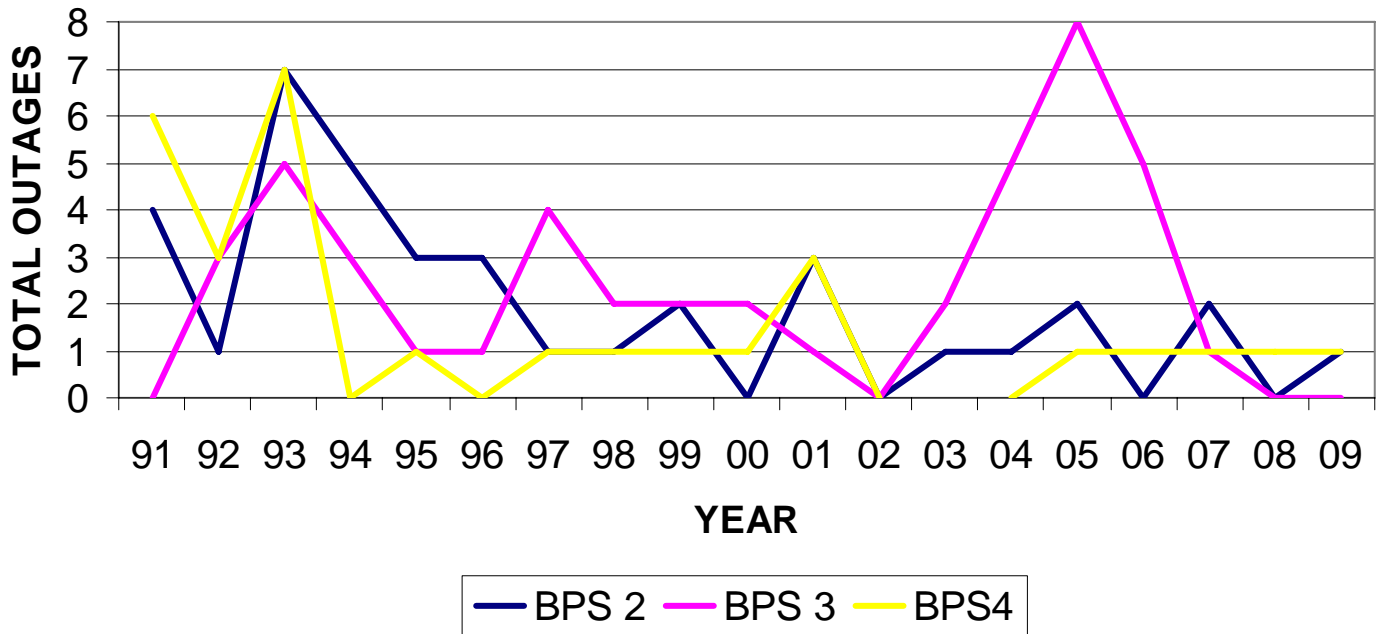
US 1 SUBSTATION FEEDER OUTAGES VS. YEAR (1991 THRU 2009)



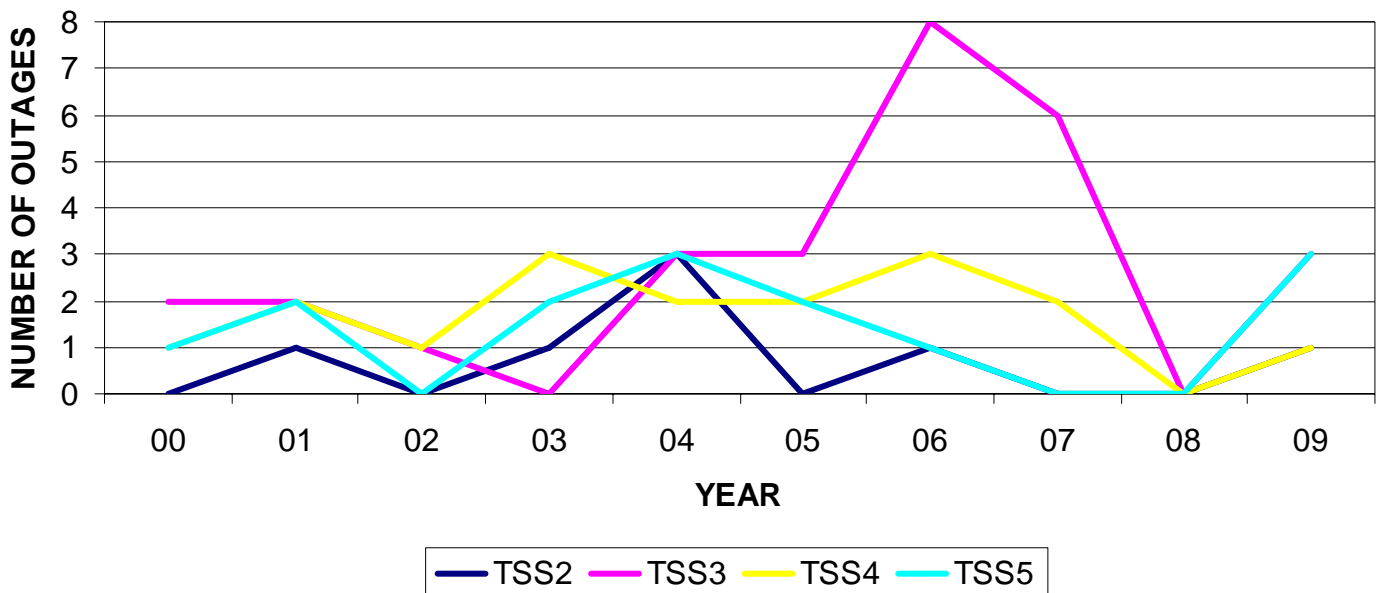
BIG COPPITT SUBSTATION FEEDER OUTAGE HISTORY VS. YEAR (1991 THRU 2009)



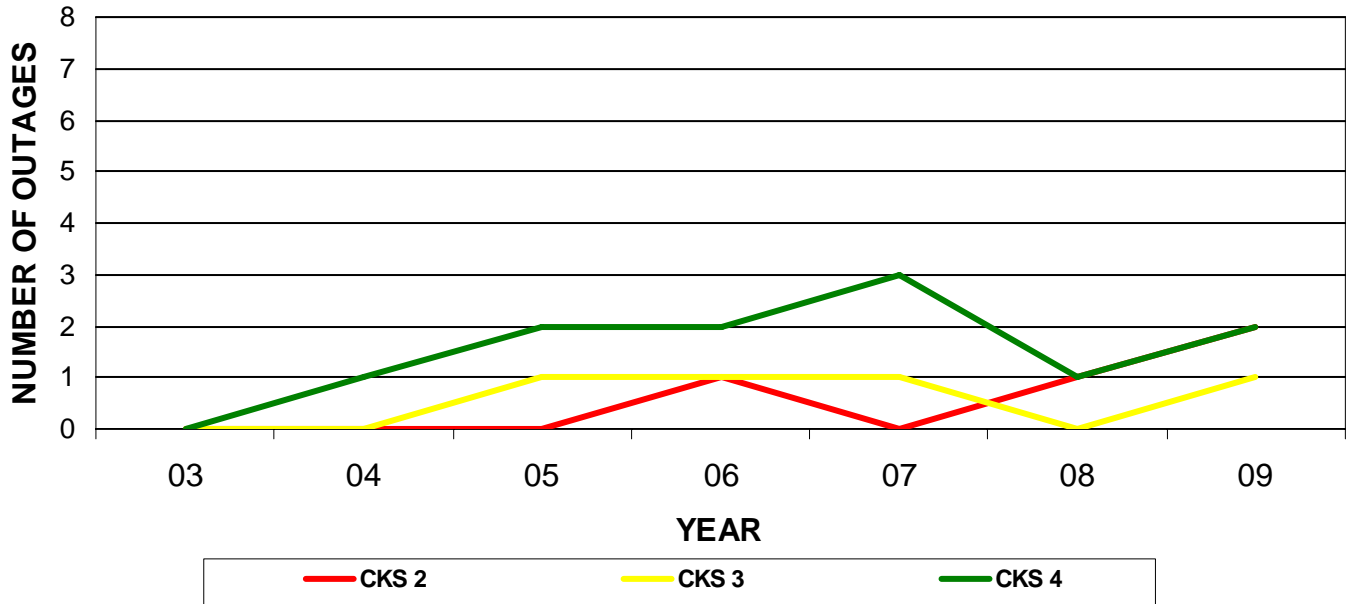
BIG PINE SUBSTATION FEEDER OUTAGE HISTORY VS YEAR (1991 THRU 2009)



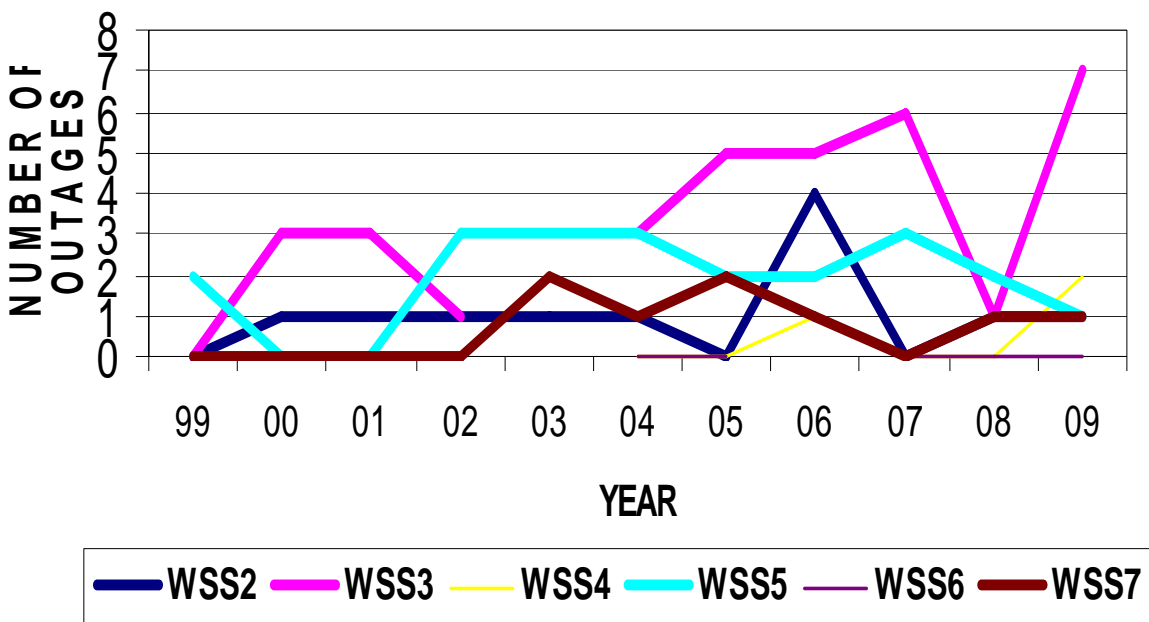
THOMPSON ST. SUBSTATION FEEDER OUTAGE HISTORY VS. YEAR(1999 THRU 2009)



**CUDJOE KEY SUBSTATION FEEDER OUTAGE HISTORY VS. YEAR
(2003 THRU 2009)**



WHITE ST. SUBSTATION FEEDER OUTAGE HISTORY VS. YEAR (1999 THRU 2009)



Section-4 Comparison of KEYS Statistics to Other Utilities

Comparison of the Florida Municipals to the Investor Owned Utilities

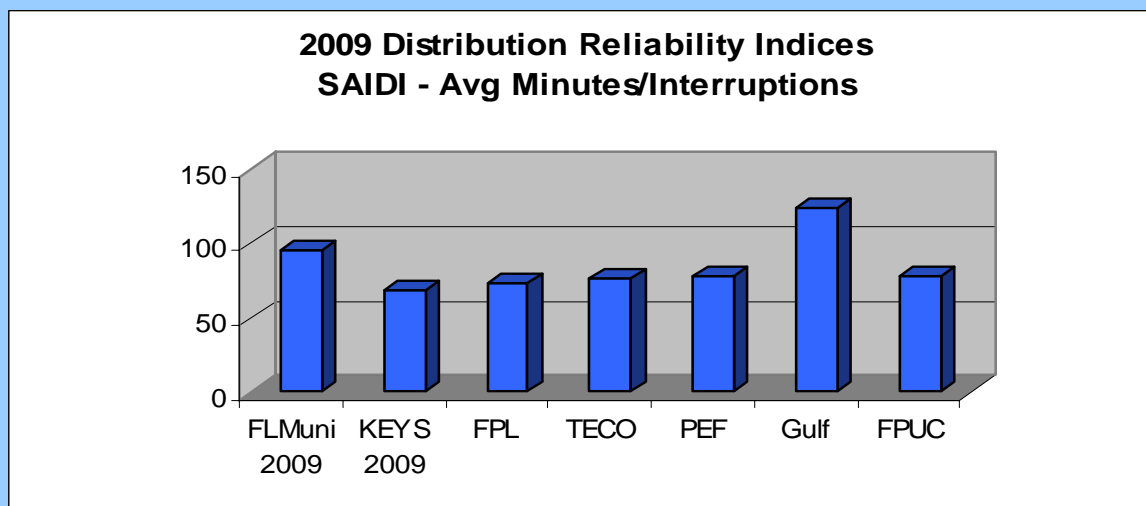
As noted previously, the IOUs are required by the PSC to submit their reliability data by March 1st of each year. The data collected from these annual report submittals is presented below. In comparison, the combined data from the participating FI Municipal is also included. (2009 data for IOU's was not available).

| 2009 Distribution Reliability Indices/2008 IOU's | | | | | | | | |
|--|-------------------------|----------------------|-------|-------|-------|-------|-------|-------------------------|
| | FL Muni ²⁰⁰⁹ | KEYS ²⁰⁰⁹ | FPL | TECO | PEF | Gulf | FPUC | IOU 2008 ^{AVG} |
| SAIDI | 106.1 | 68.4 | 67.2 | 66.0 | 76.0 | 132.5 | 158.1 | 99.8 |
| CAIDI | 45.7 | .81 | 62.9 | 73.0 | 72.3 | 102.9 | 82.5 | 78.6 |
| SAIFI | 2.3 | 2.4 | 1.1 | .89 | 1.1 | 1.3 | 1.9 | 1.2 |
| MAIFle | 5.4 | 5.1 | 10.5 | 14.0 | 11.1 | 9.4 | N/A | 11.24 |
| L-Bar | 129.7 | 81.2 | 199.0 | 144.0 | 120.0 | 137.0 | 98.1 | 139.6 |

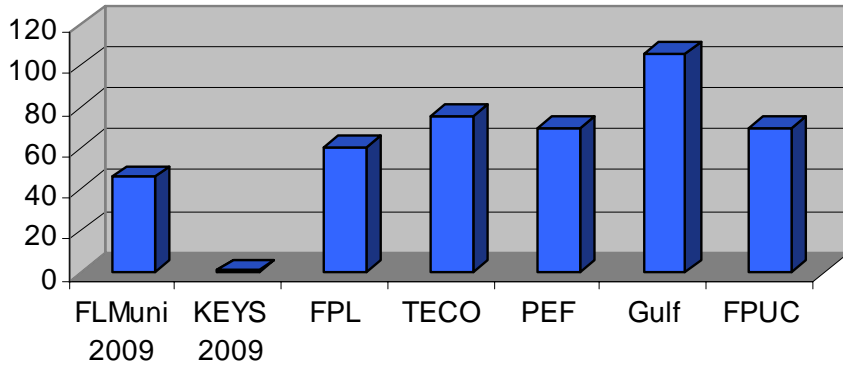
IOU - 2008 Data
FL Muni - 2009 Data
KEYS - 2009 Data

Similar to previous years, this data indicates that the FL Municipal had a higher frequency of outages (SAIFI) than the other utilities in the state. However, the duration of those outages for customers who experienced an outage (CAIDI) was shorter than the other utilities. Again, similar to previous years, the Florida Muni group reported a lower frequency of momentary outage events (MAIFI) than the IOUs. However, some of the participating Florida Municipal utilities do not track momentary outages, so the MAIFI number is artificially low.

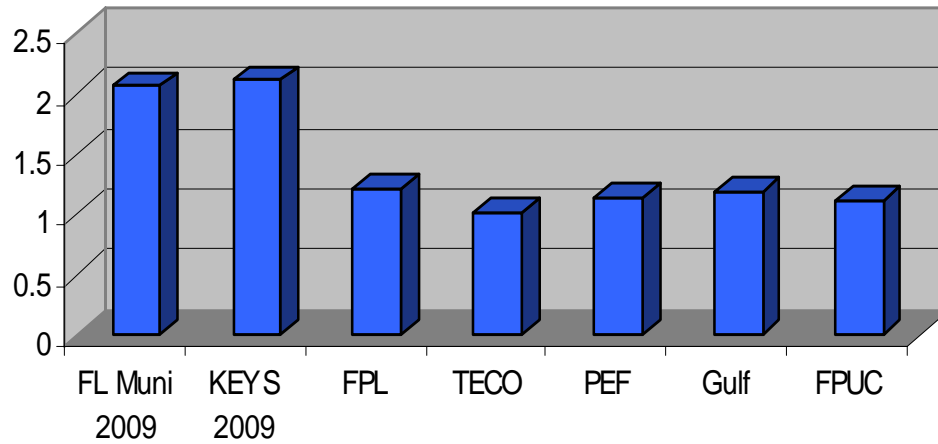
The following presents this data in graph form:



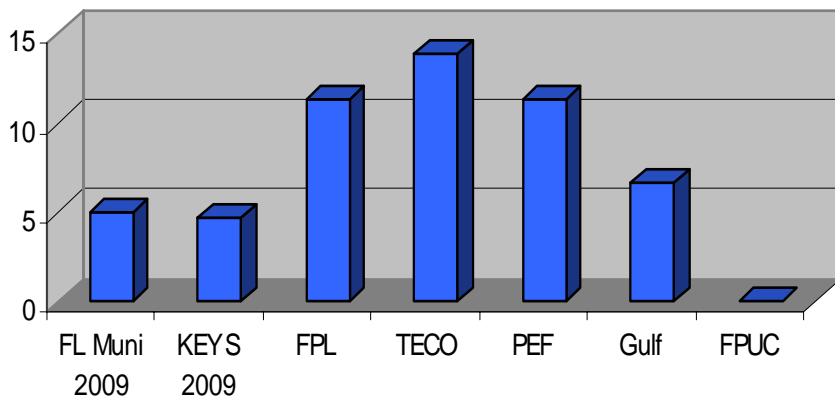
**2009 Distribution Reliability Indices
CAIDI - Avg Repair Time/Outage**



**2009 Distribution Reliability Indices
SAIFI - Avg Frequency of Interruptions**

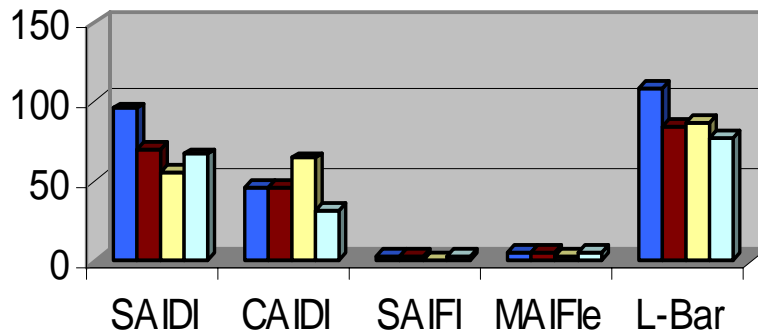


**2009 Distribution Reliability Indices
MAIFle - Avg Momentary Events/Customer**



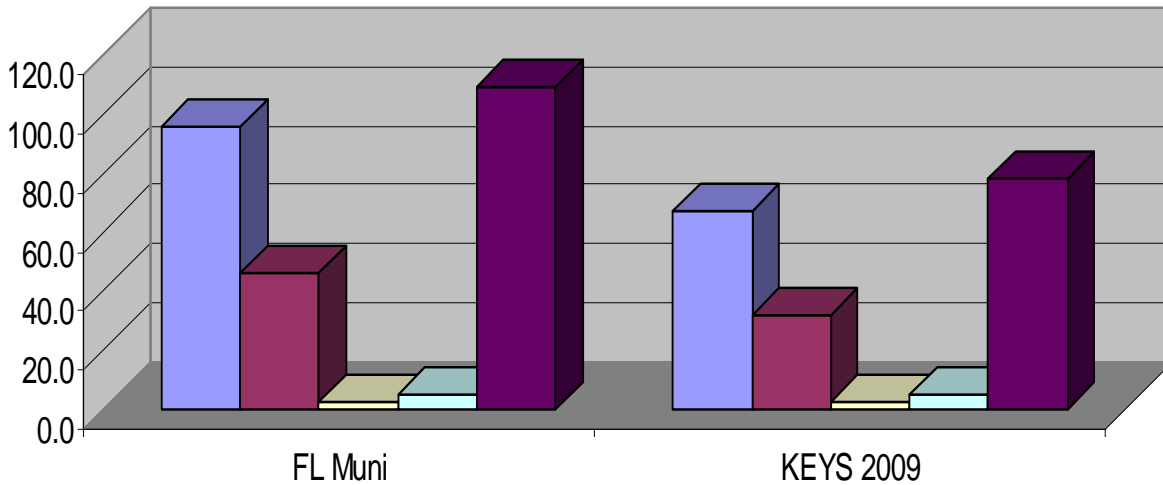
This section presents a comparison of the distribution reliability data collected for calendar years 2003-2005, 2007, 2008 and 2009. The data presented includes the Florida Municipal and the IOUs. The KEYS Distribution Reliability Measurement program has grown over the years. It should be noted that the 2003 data represents 8 utilities; the 2004 data represents 9 utilities; the 2005 data represents 15 utilities; and the 2006 data represents 19 utilities.

Florida Muni Indices 2009/KEYS 2009



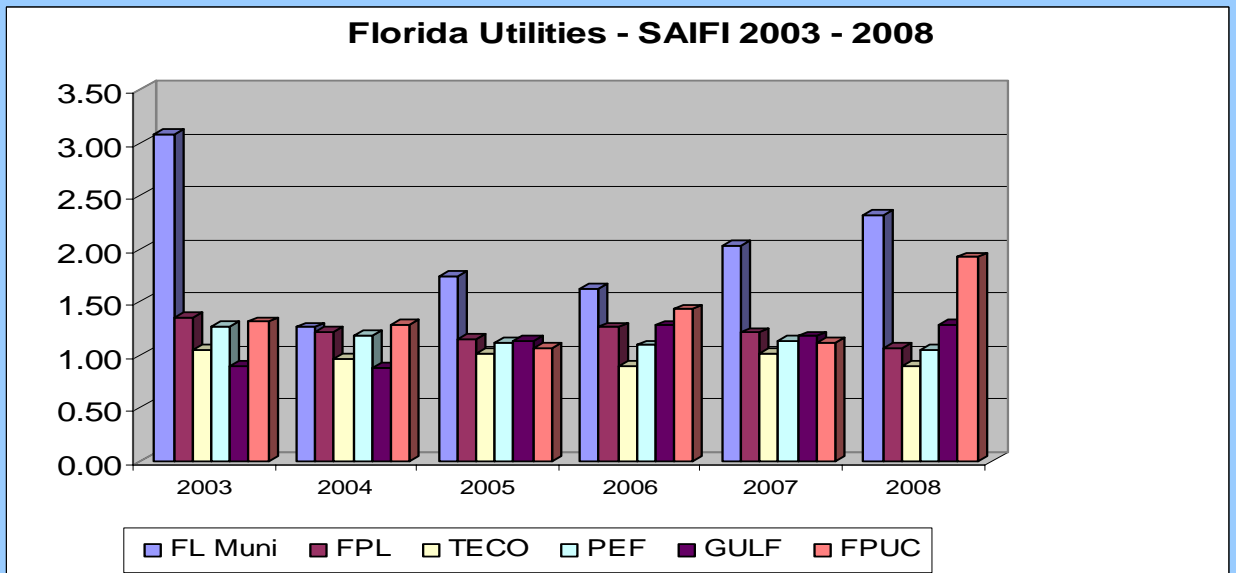
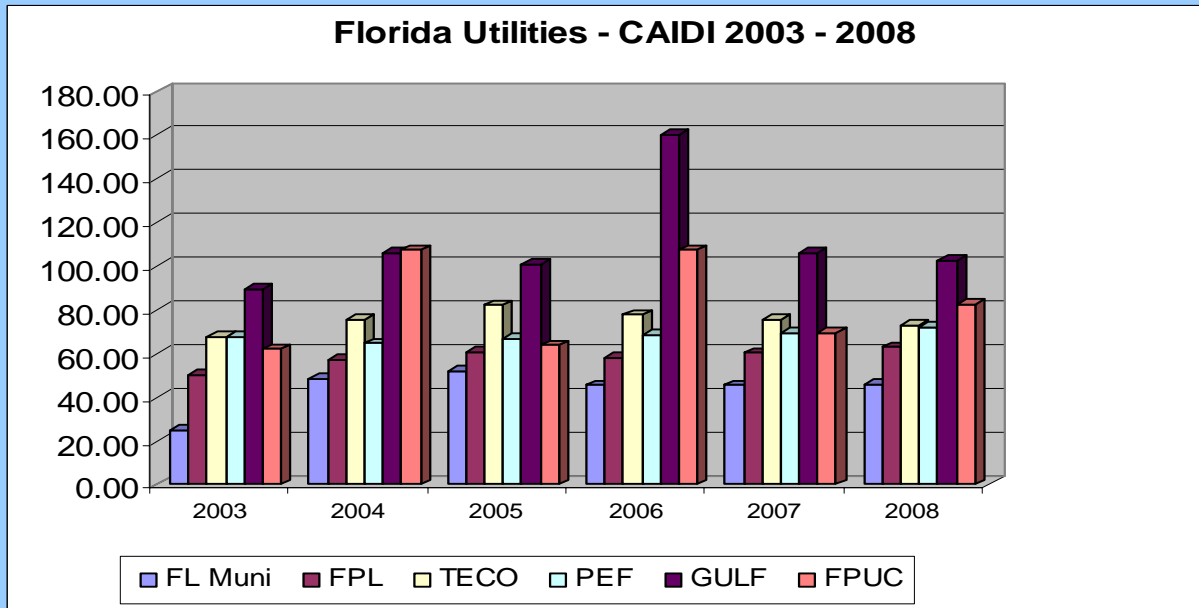
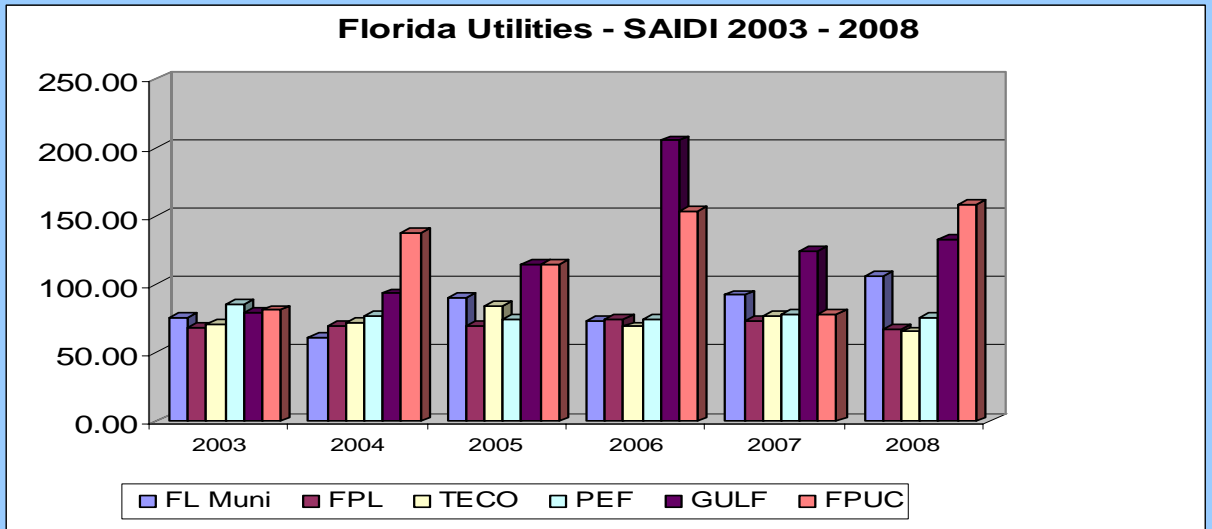
■ FLA MUNI 2009 ■ KEYS 2007 ■ KEYS 2008 ■ KEYS 2009

Florida Muni(2009) & Keys(2009) Indices

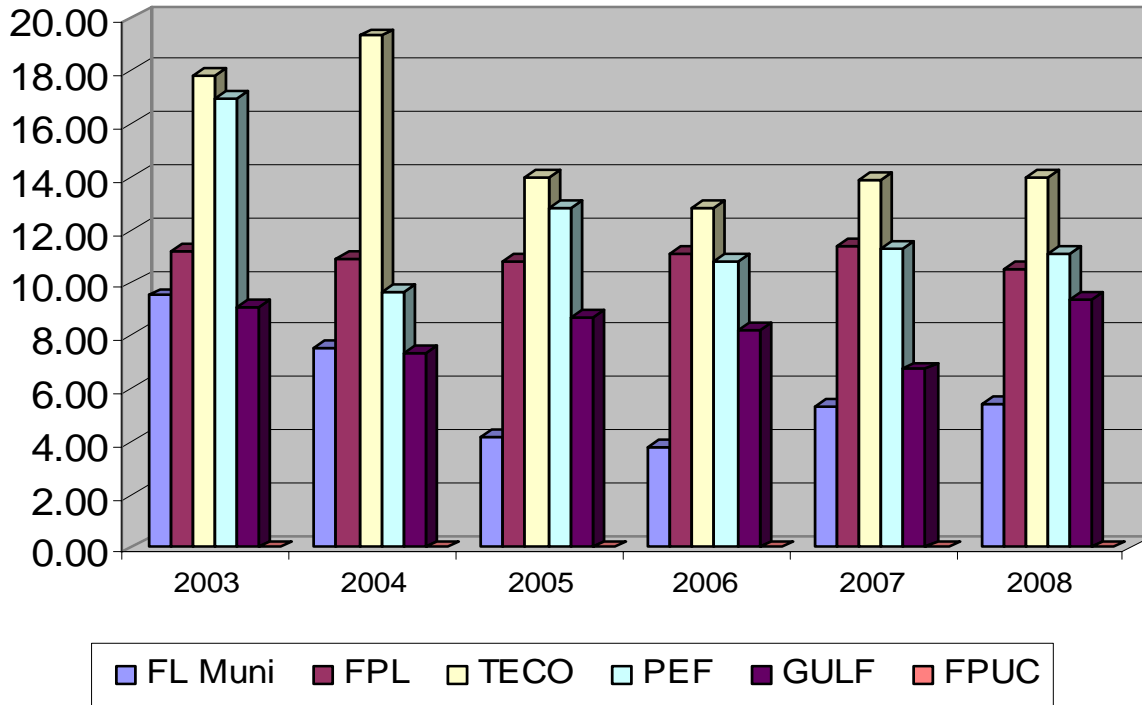


■ SAIDI ■ CAIDI ■ SAIFI ■ MAIFle ■ L-Bar

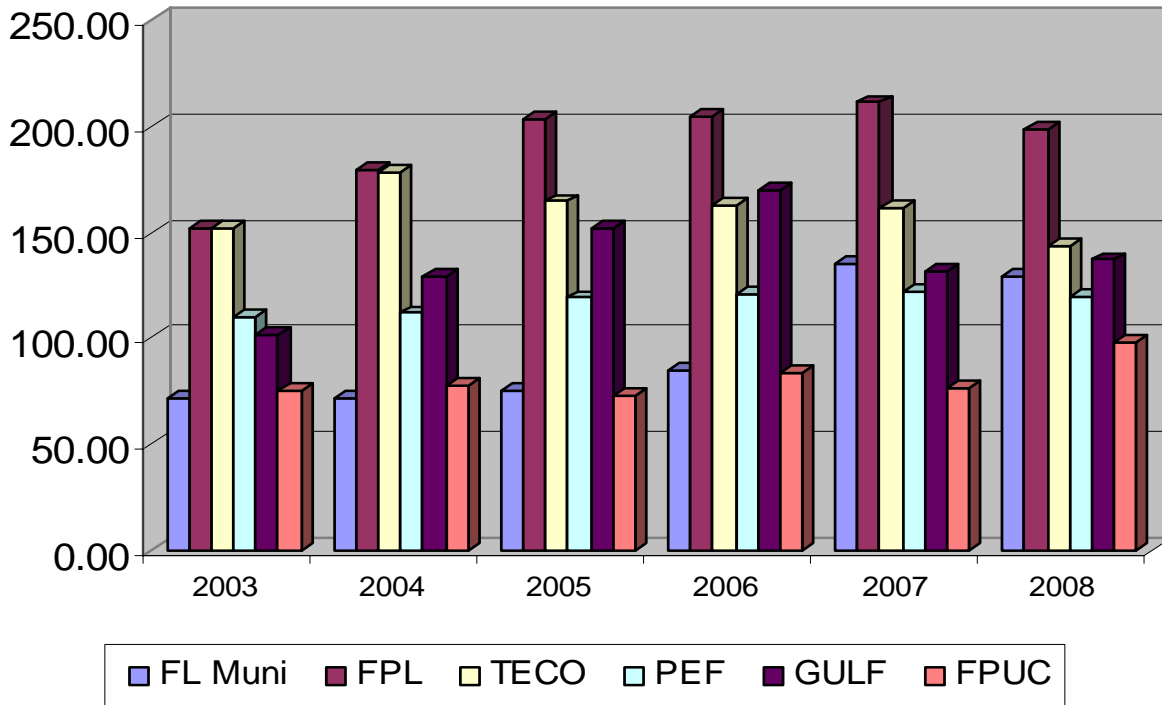
Comparison of Historical Data for Florida Municipals & Investor Owned Utilities



Florida Utilities - MAIFle 2003 - 2008

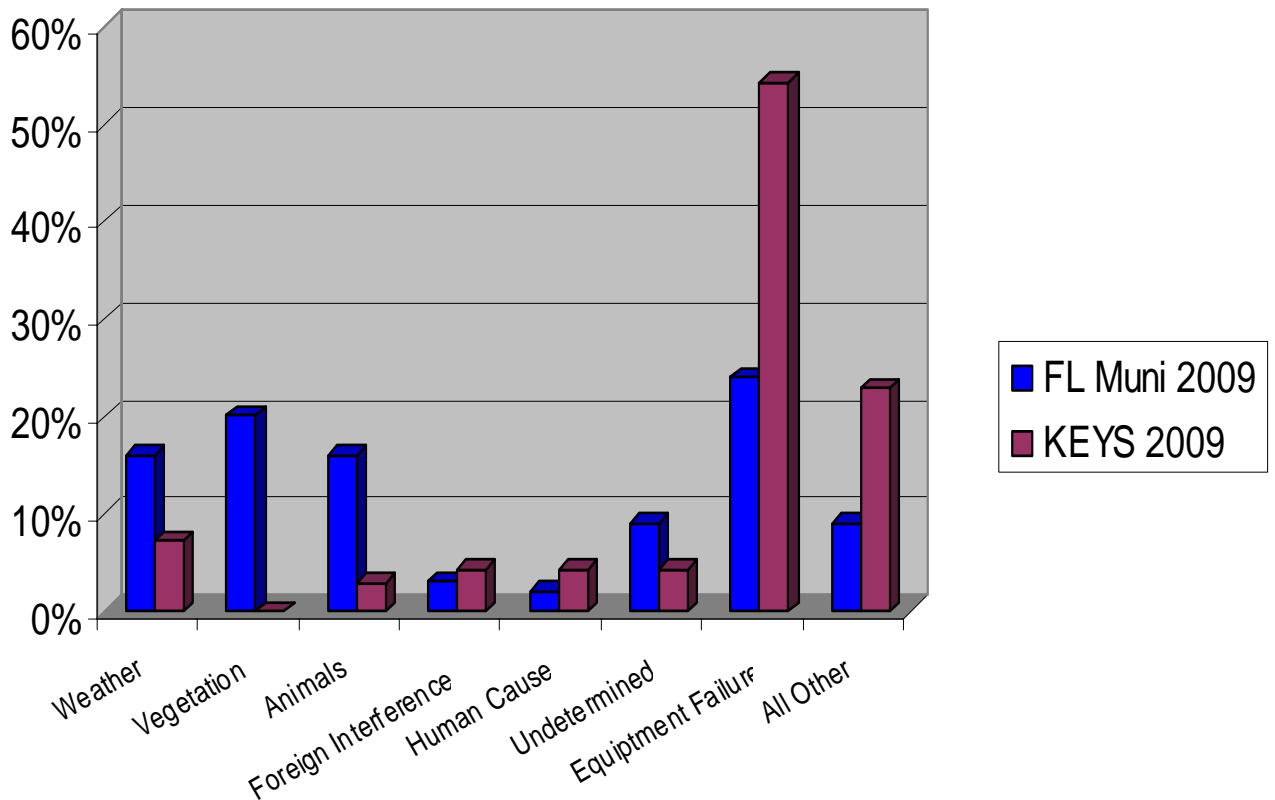


Florida Utilities - L-Bar 2003 - 2008



The table and chart below present the cause of outages by percentage

| Total Number of Outages by Percentage of Florida Utilities | | | | | | | |
|--|-----------------|-------------|--------------|-------------|--------------|--------------|--------------|
| CAUSE OF OUTAGE | FL MUNI 2009 | FPL 2008 | TECO 2008 | PEF 2008 | GULF 2008 | FPUC 2008 | KEYS 2009 |
| Weather | 3.7% | 13.0% | 25.0% | 16.0% | 23.0% | 17.0% | 7.0% |
| Vegetation | 21.0% | 13.0% | 18.0% | 17.0% | 11.0% | 28.0% | 0.0% |
| Animals | 24.9% | 10.0% | 18.0% | 13.0% | 21.0% | 22.0% | 3.0% |
| Foreign Interference | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 3.0% | 4.0% |
| Human Cause | 2.8% | 0.0% | 2.0% | 0.0% | 0.0% | 0.0% | 4.0% |
| Undetermined | 10.3% | 15.0% | 10.0% | 11.0% | 10.0% | 12.0% | 4.0% |
| Equipment Failure | 30.4% | 29.0% | 20.0% | 16.0% | 26.0% | 6.0% | 54.0% |
| All Other | 6.0% | 19.0% | 7.0% | 27.0% | 34.0% | 12.0% | 24.0% |



Section -5 System Improvement Reliability Plans

▣ Reasons for Past Five Year Reliability Improvements:

→ *Transmission System*

- Replace 69kv dead-end bell's with polymer insulators
- Utilized Synchronous Condenser for system stability
- New parallel 138kV Line 9 (Big Coppitt - Stock Island)
- Replaced old relays on T-line at US1, Big Pine, and Big Coppitt
- Repaired 35 pole Foundation problems in FKEC
- Additional 10MVAR capacitor bank at Big Coppitt Sub.
- Replace 138kV Gang Switch at Big Pine Sub & Big Coppitt Sub
- Replaced 30 yr old 69 kV oil breakers
- Replace aging shield wire FKEC
- Replace arrestors at Tavernier Sub
- Replace insulators north of Tavernier
- Replace aging 138kV potential transformer

→ *Distribution System*

- Added second transformer at KWD Substation
- Distribution protective relays (replaced with new Microprocessor)
- Added new Cudjoe Key Substation
- Added additional feeder at Big Coppitt Substation
- Tree Trimming program
- Lightning arrestor's program
- Infrared survey of lines and field correcting/fixing
- Installation of 4 field re-closers
- Installed more Capacitor Banks to improve voltage quality
- Open wire/back easement removal program
- Reduced number of overloaded transformers
- Installed transformer secondary/primary arrestors
- Replacement at Kennedy Drive Sub bus 13.8kV gear
- New 13.8kV substation breaker (replace 30 yrs. old ones)

▪ Reliability Goals/Plans for year 2008 - 2011

➔ *Transmission System*

- Foundation repairs to over water poles
- Replace 69kV gang switches
- Replace down guy insulator rods
- Replace corroded static brackets and wire
- Repair spalling at pole tops
- Replace 138kV breakers
- Fiber inter-connection
- 69kV Relay upgrade at KDS and SIP
- Replace Lightning Arresters
- Auto Re-close On Transmission Lines
- Replace four 69kv breakers at Stock island Plant

➔ *Distribution System*

- Pole replacement program (Storm Harding Program)
- New substation at Stock Island
- Replace old substation feeder cables
- Replace transformers at KDS & US1
- Additional feeders
- Use Of New OMS (Outage Management System)

Details for Transmission Outages for 2009

| Date | Time | Duration (min) | Location | % Keys Cust | Cause | Explanation |
|------------|-------|----------------|----------|-------------|-----------------|---|
| 1/8/2009 | 23:43 | 30 | FKEC | 100% | Undetermined | All 138kv MAR, TAV, JCS 138kv breakers opened |
| 1/21/2009 | 03:14 | 79 | BCS | 75% | Insulator | Blown 138kv Insulator on line 4 |
| 4/27/2009 | 14:34 | 16 | WSS/FKEC | 100% | Fork Lift/Boat | Forklift lifted a boat into the lines at Steadman's Boat Yard |
| 10/06/2009 | 12:29 | 6 | US1 | 75% | KEYS Contractor | KEYS contractor caused a relay trip on 69kv W5, UV operation |
| 10/24/2009 | 18:32 | 9 | FKEC | 100% | Undetermined | MAR 138kv W7, W8, W9 and W362 breakers opened |
| 11/15/2009 | 22:57 | 16 | FKEC | 100% | Undetermined | 138kv MAR W7, W8, W9 breakers opened |
| 11/21/2009 | 08:03 | 18 | KDS | 50% | Undetermined | Fault on 69kv line 1 caused isolation of 69kv line 1 |
| 12/7/2009 | 06:51 | 11 | FKEC | 100% | Undetermined | MAR W7, W8, W9 and W362 |
| | | | | | | |
| | | | | | | |
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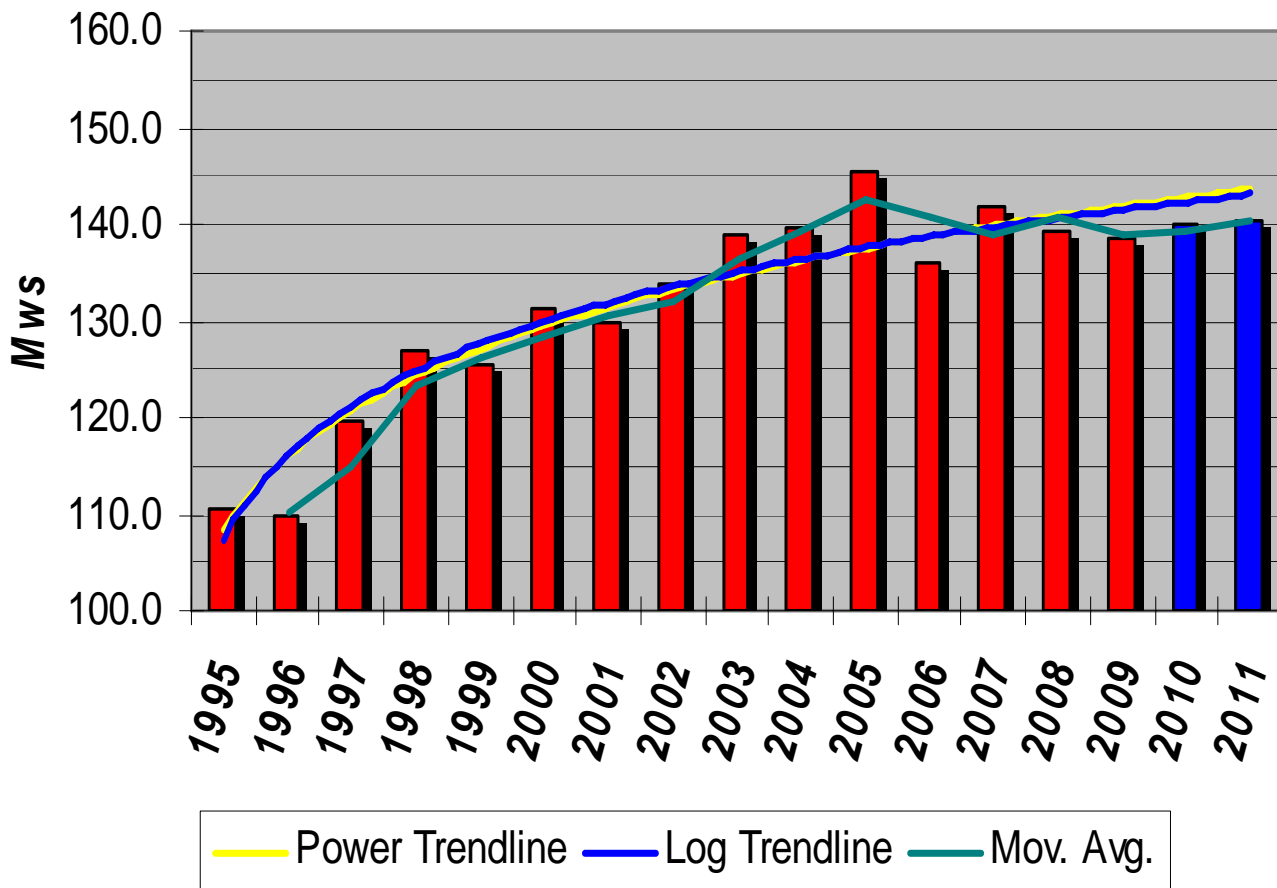
| FKEC Area - initial cause | Location | Cause | Outage minutes | KEYS Customers Affected | FKEC Customers Affected |
|---------------------------|--------------|--------------|----------------|-------------------------|-------------------------|
| 1/8/2009 | 138kv line 3 | Undetermined | 30 | 100% | 100% |
| 10/24/2009 | 138kv line 5 | Undetermined | 9 | 100% | 18% |
| 11/15/2009 | 138kv line 5 | Undetermined | 4 | 100% | 18% |
| 12/7/2009 | 138kv line 5 | Undetermined | 12 | 100% | 18% |
| | | | | | |

| KEYS Area - initial cause | Location | Cause | Outage minutes | KEYS Customers Affected | FKEC Customers Affected |
|---------------------------|--------------|----------------------|----------------|-------------------------|-------------------------|
| 1/21/2009 | 138kv line 4 | Dead end bells BC14 | 84 | 64% | 0 |
| 4/27/2009 | 69kv line 1 | Sailboat, Steadman's | 20 | 100% | 0 |
| 10/6/2009 | US 1 Sub | Contractor Error | 6 | 64% | 0 |
| 11/21/2009 | 69kv line 1 | Undetermined | 15 | 37% | 0 |
| | | | | | |

Section - 6
KEYS Load Forecast
FPCS RULE on Reliability Tracking



**KEYS Energy Yearly 60 Min. Peak
 Load Projections (1995-2011)**



Rule 25-6.044 Florida Administrative Code

25-6.044 Continuity of Service.

25-6.044 Continuity of Service.

(1) Definitions applicable to this part:

(a) "Area of Service." A geographic area where a utility provides retail electric service. An Area of Service can be the entire system, a district, or a subregion of the utility's system in which centralized distribution service functions are carried out.

(b) "Average Duration of Outage Events (L-Bar)." The sum of each Outage Event Duration for all Outage Events occurring during a given time period, divided by the Number of Outage Events over the same time period within a specific Area of Service.

(c) "Customer Average Interruption Duration Index (CAIDI)." The average time to restore service to interrupted retail customers within a specified Area of Service over a given period of time. It is determined by dividing the sum of Customer Minutes of Interruption by the total number of Service Interruptions for the respective Area of Service.

(d) "Customers Experiencing More Than Five Interruptions (CEMI5)." The number of retail customers that sustain more than five Service Interruptions for a specified Area of Service over a given period of time.

(e) "Customer Minutes of Interruption (CMI)." For a given Outage Event, CMI is the sum of each affected retail customer's Service Interruption Duration.

(f) "Momentary Average Interruption Event Frequency Index (MAIFIE)." The average number of Momentary Interruption Events recorded on primary circuits for a specified Area of Service over a given period of time.

(g) "Momentary Interruption." The complete loss of voltage for less than one minute. This does not include short duration phenomena causing waveform distortion.

(h) "Momentary Interruption Event." One or more Momentary Interruptions recorded by the operation of a utility distribution interrupting device within a five minute period. For example, two or three operations of a primary circuit breaker within a five minute period that did not result in a Service Interruption is one Momentary Interruption Event.

(i) "Number of Customers Served (C)." The sum of all retail customers on the last day of a given time period within a specific Area of Service.

(j) "Number of Outage Events (N)." The sum of Outage Events for an Area of Service over a specified period of time.

(k) "Outage Event." An occurrence that results in one or more individual retail customer Service Interruptions.

(l) "Outage Event Duration (L)." The time interval, in minutes, between the time when a utility first becomes aware of an Outage Event and the time of restoration of service to the last retail customer affected by that Outage Event.

(m) "Service Interruption." The complete loss of voltage of at least one minute to a retail customer.

(n) "Service Interruption Duration." The time interval, in minutes, between the time a utility first becomes aware of a Service Interruption and the time of restoration of service to that retail customer.

(o) "System Average Interruption Duration Index (SAIDI)." The average minutes of Service Interruption Duration per retail customer served within a specified Area of Service over a given period of time. It is determined by dividing the total Customer Minutes of Interruption by the total Number of Customers Served for the respective Area of Service.

(p) "System Average Interruption Frequency Index (SAIFI)." The average number of Service Interruptions per retail customer within a specified Area of Service over a given period of time. It is determined by dividing the sum of Service Interruptions by the total Number of Customers Served for the respective Area of Service.

(q) "Planned Service Interruption." A Service Interruption initiated by the utility to perform necessary scheduled activities, such as maintenance, infrastructure improvements, and new construction due to customer growth.

(2) Each utility shall keep a record of its system reliability and continuity of service data, customers' Service Interruption notifications, and other data necessary for the annual reports filed under these rules. These records and data shall be retained for a minimum of ten years from the filing of each annual report. The utility shall record each Outage Event as planned or unplanned and shall identify the point of origination such as generation facility, transmission line, transmission substation equipment, or distribution equipment. The cause of each Outage Event shall be determined and recorded in a standardized manner throughout the utility. The date and time of the Outage Event and the number of Service Interruptions for the Outage Event shall also be recorded.

(3) Each utility shall make all reasonable efforts to prevent interruptions of service and when such interruptions occur shall attempt to restore service within the shortest time practicable consistent with safety.

(4) When the service is necessarily interrupted or curtailed, it shall be done at a time which, when at all practicable, will result in the least inconvenience to customers and all such scheduled interruptions shall be preceded by reasonable notice whenever practicable to affected customers. Each utility shall maintain a current copy of its noticing procedures with the Division of Economic Regulation.

(5) The provisions of this rule shall not apply to a curtailment or an interruption of service to customers receiving service under interruptible rate classifications when the curtailment or interruption of service occurs pursuant to the affected retail customer's service agreement.

Specific Authority 366.05(1) FS. Law Implemented 366.03, 366.04(2)(c), (5), 366.05 FS. History—New 7-29-69, Formerly 25-6.44, Amended 2-25-93, 11-7-02, 8-17-06.

Rule 25-6.0455 Florida Administrative Code

25-6.0455 Annual Distribution Service Reliability Report.

(1) Each utility shall file a Distribution Service Reliability Report with the Director of the Commission's Division of Economic Regulation on or before March 1 of each year, for the preceding calendar year.

(2) The Distribution Service Reliability Report will exclude the impact of all service interruptions associated with generation and transmission disturbances governed by subsections 25-6.018(2) and (3), F.A.C.

(3) The report shall contain the following information on an actual and adjusted basis:

(a) The utility's total number of Outage Events (N), categorized by cause for the highest ten causes of Outage Events, the Average Duration of Outage Events (L-Bar), and Average Service Restoration Time (CAIDI). The utility shall record these data and analyses on Form PSC/ECR 102-1(a) (8/06) and Form PSC/ECR 102-1(b) (8/06), entitled "Causes of Outage Events – Actual" and "Causes of Outage Events – Adjusted", respectively, which may be obtained from the Division of Economic Regulation, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, (850)413-6900, and which are incorporated herein by reference;

(b) Identification of the three percent of the utility's Primary Circuits (feeders) with the highest number of feeder breaker interruptions. For each primary circuit so identified the utility shall report the primary circuit identification number or name, substation origin, general location, number of affected customers by service class served, Number of Outage Events (N), Average Duration of Outage Events (L-Bar), Average Service Restoration Time (CAIDI), whether the same circuit is being reported for the second consecutive year, the number of years the primary circuit was reported on the "Three Percent Feeder List" in the past five years, and the corrective action date of completion. The utility shall record these data and analyses on Form PSC/ECR 102-2(a) (8/06) and Form PSC/ECR 102-2(b) (8/06), entitled "Three Percent Feeder List – Actual" and "Three Percent Feeder List – Adjusted", respectively, which may be obtained from the Division of Economic Regulation, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, (850)413-6900, and which are incorporated herein by reference;

(c) The reliability indices SAIDI, CAIDI, SAIFI, MAIFIE, and CEM15 for its system and for each district or region into which its system may be divided. The utility shall report these data and analyses on Form PSC/ECR 102-3(a) (8/06) and Form PSC/ECR 102-3(b) (8/06), entitled "System Reliability Indices – Annual" and "System Reliability Indices – Adjusted", respectively, which may be obtained from the Division of Economic Regulation, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, (850)413-6900, and which are incorporated herein by reference. Any utility furnishing electric service to fewer than 50,000 retail customers shall not be required to report the reliability indices MAIFIE or CEM15; and

(d) The calculations for each of the required indices and measures of distribution reliability.

(4) Adjusted distribution reliability data may omit Outage Events directly caused by:

- (a) Planned Service Interruptions;
- (b) A storm named by the National Hurricane Center;
- (c) A tornado recorded by the National Weather Service;

- (d) Ice on lines;
- (e) A planned load management event;
- (f) Any electric generation or transmission event not governed by subsections 25-6.018(2) and (3), F.A.C.; or
- (g) An extreme weather or fire event causing activation of the county emergency operation center.

Specific Authority 366.05(1) FS. Law Implemented 366.03, 366.04(2)(c), (f), (5), 366.05, 366.05(7) FS. History—New 2-25-93, Amended 11-7-02, 8-17-06.

OMS -- Outage Classification Codes

| Territory -Initiated | Initial Cause Class | Outage Type | Outage Class | Cause Codes |
|---------------------------|--------------------------|--------------------------|-------------------|-------------------------------------|
| 1- KEYS area | 1- Distribution | 1- Reclosure | 1- Overhead | 1- Undervoltage operation |
| 2- FKEC area | 2- Transmission | 2- Outage - Transmission | 2- Underground | 2- Underfrequency operation |
| 3- FPL area | 3- Generation | 3- Outage - Feeder | 3- Planned outage | 3- Equip Failure- Arrestor(LA) |
| 4- STATE area | 4- Synchr Condenser | 4- Outage - Lateral | | 4- Equip Failure- Wire splice |
| 5- Major Storms/Hurricane | 5- Substation | 5- Outage - Transformer | | 5- Equip Failure- Insulator |
| | 6- Capacitor bank-Trans. | 6- Outage - Service wire | | 6- Equip Failure- Switch |
| | | | | 7- Equip Failure- Breaker |
| | | | | 8- Equip Failure- Capacitor |
| | | | | 9- Equip Failure- Pole |
| | | | | 10- Equip Failure- Xformer |
| | | | | 11- Equip Failure- Relay |
| | | | | 12- Equip Failure- Crossarm |
| | | | | 13- Empl Error- Switching |
| | | | | 14- Emp Error- Linework(KEYS) |
| | | | | 15- Emp Error- Linework(contr) |
| | | | | 16- Emp Error- Substation |
| | | | | 17- Weather- Lightning |
| | | | | 18- Weather- Trees Blown into |
| | | | | 19- Weather- Xarm/pole Fire |
| | | | | 20- Weather- Other |
| | | | | 21- Animal-Bird |
| | | | | 22- Animal-Iguana |
| | | | | 23- Animal-Snake |
| | | | | 24- Animal-Debris from animal |
| | | | | 25- Overload-Transformer |
| | | | | 26- Overload-Conductor |
| | | | | 27- Overload-Fuse |
| | | | | 28- Vehicle |
| | | | | 29- Boat |
| | | | | 30- Airplane/ParaSailor |
| | | | | 31- Vegatation (not weather) |
| | | | | 32- Fire- (ie. house, trees) |
| | | | | 33- Customer caused |
| | | | | 34- Outside Contractor-not KEYS |
| | | | | 35- UG cable "Dig in" |
| | | | | 36- Vandalism |
| | | | | 37- Undetermined-Not confirmed |
| | | | | 38- Undetermined-maybe weather |
| | | | | 39- All other(not identified above) |

Feeder Outage Cause- Totals

Keys Energy Services

Period From 1/1/2009 to 12/31/2009

Selected Categories:

Territory-Initiated: 1-KEYS area

Cause Codes: All Cause Codes

Initial Cause Class: 1-Distribution

Outage Type: 3-Outage - Feeder

Outage Class: 1-Overhead

| Cause Codes | Totals |
|--------------------------------|---------------|
| 01-Undervoltage operation | 15 |
| 04-Equip Failure-Wire splice | 2 |
| 05-Equip Failure-Insulator | 1 |
| 06-Equip Failure-Switch | 2 |
| 07-Equip Failure-Breaker | 3 |
| 08-Equip Failure-Capacitor | 1 |
| 11-Equip Failure - Relay | 5 |
| 12-Equip Failure - Crossarm | 4 |
| 14-Emp Error - Linework(KEYS) | 2 |
| 15-Emp Error - Linework(contr) | 1 |
| 17-Weather - Lightning | 1 |
| 20-Weather - Other | 2 |
| 21-Animal - Bird | 2 |
| 22-Animal - Iguana | 1 |
| 24-Animal - Debris from animal | 1 |
| 28-Vehicle | 2 |
| 37-Undetermined - Unconfirmed | 3 |
| 39-All other (not above) | 1 |
| 40-Fuse/Relay Coord. Issue | 1 |
| 41-Balloon/Kite | 1 |
| 45-Generator Trip | 20 |

Lateral Outage Cause- Totals

Keys Energy Services

Period From 1/1/2009 to 12/31/2009

Selected Categories:

Territory-Initiated: 1-KEYS area

Cause Codes: All Cause Codes

Initial Cause Class: 1-Distribution

Outage Type: 4-Outage - Lateral

Outage Class: 1-Overhead

| Cause Codes | Totals |
|--------------------------------|---------------|
| 03-Equip Failure-Arrestor(LA) | 3 |
| 04-Equip Failure-Wire splice | 5 |
| 06-Equip Failure-Switch | 3 |
| 09-Equip Failure-Pole | 1 |
| 10-Equip Failure - Xformer | 1 |
| 12-Equip Failure - Crossarm | 2 |
| 15-Emp Error - Linework(contr) | 3 |
| 17-Weather - Lightning | 34 |
| 18-Weather - Trees Blown into | 5 |
| 19-Weather - Xarm/pole Fire | 1 |
| 20-Weather - Other | 9 |
| 21-Animal - Bird | 11 |
| 22-Animal - Iguana | 1 |
| 27-Overload - Fuse | 3 |
| 28-Vehicle | 1 |
| 31-Vegatation (not weather) | 3 |
| 37-Undetermined - Unconfirmed | 36 |
| 38-Unsure- Maybe Weather | 18 |
| 39-All other (not above) | 2 |

Reclosure Cause- Totals

Keys Energy Services

Period From 1/1/2009 to 12/31/2009

Selected Categories:

Territory-Initiated: 1-KEYS area

Cause Codes: All Cause Codes

Initial Cause Class: 1-Distribution

Outage Type: 1-Reclosure

Outage Class: 1-Overhead

| Cause Codes | Totals |
|--------------------------------|---------------|
| 01-Undervoltage operation | 1 |
| 03-Equip Failure-Arrestor(LA) | 1 |
| 08-Equip Failure-Capacitor | 3 |
| 10-Equip Failure - Xformer | 3 |
| 12-Equip Failure - Crossarm | 1 |
| 15-Emp Error - Linework(contr) | 2 |
| 17-Weather - Lightning | 36 |
| 18-Weather - Trees Blown into | 2 |
| 20-Weather - Other | 17 |
| 21-Animal - Bird | 7 |
| 22-Animal - Iguana | 1 |
| 27-Overload - Fuse | 2 |
| 28-Vehicle | 2 |
| 31-Vegatation (not weather) | 1 |
| 37-Undetermined - Unconfirmed | 53 |
| 38-Unsure- Maybe Weather | 24 |
| 39-All other (not above) | 3 |
| 41-Balloon/Kite | 1 |