We Energies
231 W. Michigan Street
Milwaukee, WI 53203

www.we-energies.com

29

March 17, 2016

Michigan Public Service Commission
Attn: Executive Secretary
P. O. Box 30221
Lansing, MI 48909

Dear Executive Secretary:

RE: U-10000 ANNUAL INTERRUPTION SUMMARY

Enclosed are three copies of Wisconsin Electric Power Company d/b/a We Energies' 2015 Annual Interruption Summary pursuant to the Commission's Order Approving Settlement Agreement in MPSC Case No. U-10000 dated January 17, 1992.

Sincerely,

James A. Schubilske
Vice President
State Regulatory Affairs

Enclosures

cc: Don Mazuchowski (MPSC) (w/encl.)
Val Werner (w/o encl.)
Jay Nelson (w/o encl.)
D. Tschudy (w/o encl.)
Rates File (w/encl.)

Additional (2) copies given to Donald (Don) Mazuchowski, OWMD on 3/21/16 of Booklets!

2015

Electric Distribution System Reliability Report

For the Michigan Public Service Commission
RELEASED: MARCH 2016

Prepared By:
Distribution Reliability Group,
Electric Distribution Planning, Protection and Reliability
Customer Operations

We Energies

2015 Electric Distribution System Reliability Report (EDSRR)

For the Michigan Public Service Commission

Please Note

This document reports only on the We Energies electric distribution system consisting of voltage levels of 34.5 kV or below. It does not report on any part of the We Energies gas distribution system.

Interpretation of reliability data is complex. If you have any questions regarding the content of this report, or if you require additional information or a more in depth explanation of any of the material presented, please contact a member of the Distribution Reliability Group listed below.

Jennifer Rothwell
Supervising Engineer

Val Werner
Principal Electrical Engineer

Andy Lemminger
Senior Engineer

THE 2015 ELECTRIC DISTRIBUTION SYSTEM RELIABILITY REPORT WAS PRODUCED BY:

Val Werner

ADDITIONAL CONTRIBUTIONS BY:

Jennifer Rothwell

TABLE OF CONTENTS

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CONGRATULATIONS!

Eleven Out of the Last Fourteen Years We Energies' Electric Reliability Judged Best in the Midwest!

For the fifth year in a row, We Energies has received the ReliabilityOne™ Award in the Midwest for the superior reliability of its electric system. The award, which is based on the company's performance for the year 2014, is given annually by PA Consulting Group to utilities that have excelled in delivering the most reliable electric service to their customers. The award was accepted by Kevin Fletcher, Senior Vice President – Customer Operations at an awards ceremony on October 22, 2015.

"Receiving the ReliabilityOne™ award is a testament to the skill and dedication of our employees, and to the focused investment we've made in modern, efficient infrastructure," said Gale Klappa, Chairman, President and Chief Executive of We Energies.

All utilities operating electric delivery networks in North America are eligible for the ReliabilityOne Award. There are a total of six regional awards including Northeast, Mid-Atlantic, Midwest, Plains, West and Southeast. The selection is based primarily on system reliability statistics that measure the frequency and duration of customer outages. After provisional recipients are selected, each company undergoes an extensive on-site certification – an independent review of the processes and systems used to collect, analyze and report a company's reliability results.

We Energies representatives at the ceremony included Dave Megna, Kevin Fletcher, Jennifer Rothwell, Sue Clausing, Paul Gogan, Vern Peterson, and Jim Prothero

Jim Prothero Recognized for Personal Achievement

Jim Prothero was awarded the 2015 Outstanding Personal Achievement Award from PA Consulting. He accepted the award October 22, 2015 at the PA Consulting ReliabilityOne™ ceremony in Miami. In the late '90s, reliability became an issue following a blackout in nearby Chicago. Jim formed a reliability work group at We Energies to measure, analyze, report and develop programs to improve reliability. He also implemented pro-active planning measures for public events at major venues such as Miller Park, State Fair and Summerfest. He initiated the same pro-active planning to ensure reliability at critical facilities such as hospitals. He's also quick to give credit to his colleagues. "The reality is: it takes a team to make everything work, and I have the most dedicated and hard-working team at We Energies."

Note: See Appendix for PA Consulting ReliabilityOne™ award history.

EXECUTIVE SUMMARY

This report presents and evaluates the 2015 reliability performance of the We Energies electric distribution system and its effects on customers. This report is intended to provide information on the 2015 system performance as well as background information concerning distribution system reliability. The information in sections I and II use Michigan customers only in accordance with MPUC Order U-16065. The rest of the report is based on the entire We Energies service territory. The following items summarize the contents of the report:

For Michigan Customers only

- Including all unplanned and sustained outage events:
  - SAIFI of 0.92 is the lowest in the last five years.
  - SAIDI of 158 is the lowest since 2012.
  - CAIDI of 172 is the second highest in the last five years.
  - SAIFI, SAIDI, and ASAI performed better than the five year average; CAIDI did not.

- Same as above but excluding IEEE Major Event Days:
  - SAIFI of 0.74 is the second lowest in the past five years.
  - SAIDI of 115 is the second highest in the past five years.
  - CAIDI of 156 is the highest in the past five years.
  - SAIFI performed better than the five year average; SAIDI, CAIDI and ASAI did not.

- Two Major Event Days occurred in 2015 compared to four in 2014. The Major Event Days average is four per year over the last five years.

- The major outage causes in 2015 include: Equipment Failure/Deterioration 31%, Vegetation 35%, Weather 10%, and Wildlife 10%.

- The 10,464 outage events in 2015 is the highest number of outage events since 2011.
  - The number of Equipment and Weather caused outage events in each category was the lowest in the past five years.
  - Cutout, Cable, and Connector (including insulinks) failures were the leading causes of Equipment caused outage events and were responsible for 21% of all outage events.
  - The number of Other related outage events is the second lowest in the past five years.

- Vegetation outage events were responsible for 45% of the Customer Minutes of Interruption in 2015.

DEFINITIONS

Customer: For reliability reporting purposes, a customer is defined as a separate electrical service point. Customers may be residential, commercial, industrial, or municipal. If a customer has more than one service point assigned to an account, the account is considered a "customer" for reliability reporting purposes.

Outage: An outage is a failure of the power supply system to serve customers causing an interruption to one or more customers. For example, a service drop failure, a fuse operation affecting a portion of a feeder, and a substation breaker trip affecting an entire feeder are each counted as single outages. The loss of a one leg of a single phase service is considered an outage; this is often called partial power. The loss of one or two phases of a three phase service is also considered an outage.

Unplanned Outage: An unplanned outage is one that cannot be avoided or deferred.

Planned Outage: A planned outage is one that can be avoided or deferred, and any customer that is to be interrupted is notified in advance in accordance with Public Service Commission and internal company guidelines.

Momentary Outage: A momentary outage is an unplanned outage lasting five minutes or less, resulting in a loss of power to a customer or group of customers.

Sustained Outage: A sustained outage is an unplanned outage lasting more than five minutes, resulting in a loss of power to a customer or group of customers.

Customer Interruption: The loss of service (power) due to an outage for one or more customers. For example, a service drop failure results in one customer interruption, while failure of a transformer serving four customers results in four customer interruptions.

Customer Minutes of Interruption: The number of minutes of outage duration multiplied by the number of customers affected. For instance a 90 minute outage on a circuit serving 100 customers would result in a total of 9,000 Customer Minutes of Interruption.

Number of Customers Served: The sum of the number of customers served by the distribution system over a defined area. Examples include single circuits, geographic areas, or the total system.

Outage Duration (Minutes): Duration is measured in minutes from the time of the outage until a restoration is made. A restoration can be anything from one customer put back in service or a whole feeder put back in service or any partial restoration in between. The number of customers does not enter into the outage duration.

SAIFI or System Average Interruption Frequency Index: SAIFI is an industry standard reliability measurement index that is designed to give information about the average frequency of sustained interruptions per customer over a defined area during a year. In words it is defined as:

$$\text{SAIFI} = \frac{\text{Total Number of Customer Interruptions}}{\text{Total Number of Customers Served}}$$

As an example, a system SAIFI of 1.0 means that on average, a customer on the distribution system would experience one interruption in a year, while a SAIFI of 0.5 would equate to one interruption every two years.

SAIDI or System Average Interruption Duration Index: SAIDI is an industry standard reliability measurement index that is designed to give information about the average time that customers are interrupted over a defined area during a year. In words it is defined as:

$$\text{SAIDI} = \frac{\text{Total Number of Customer Minutes of Interruption}}{\text{Total Number of Customers Served}}$$

As an example, a system SAIDI of 50 minutes means that on average a customer on the distribution system would experience 50 minutes of interruption in a year.

CAIDI or Customer Average Interruption Duration Index: CAIDI is an industry standard reliability measurement index that is designed to approximate the average length of time required to complete service restoration following a sustained interruption over a defined area. In words it is defined as:

$$\text{CAIDI} = \frac{\text{Total Number of Customer Minutes of Interruption}}{\text{Total Number of Customer Interruptions}}$$

As an example, a system CAIDI of 100 minutes means that if a customer experiences an interruption, the average duration of the interruption would be 100 minutes.

ASAI or Average Service Availability Index: ASAI is an industry standard reliability measurement index that is designed to represent the fraction of time, often in percentage, that a customer has power provided during a defined time period. In words the definition is:

$$\text{ASAI} = \frac{\text{Customer Hours of Available Service}}{\text{Customer Hours of Demand}}$$

As an example: a system ASAI of 0.99975 means that the electric service to a customer was available 99.975% of the time.

CEMI_n or Customers Experiencing Multiple Interruptions: CEMI is an industry standard that indicates for the number of customers experiencing n or more number of interruptions divided by the number of customers on the system. We Energies uses n=5 to find "pockets" of customers on our system that may need addition work done on their isolated portion of the electric system.

Blue Sky: This refers to all times that do not include one of the following: Major Storm, Extraordinary Event (Storm). A Blue Sky day may contain storm activity (Minor Storm) that did not meet the criteria that defines a Major Storm. When Blue Sky is used in describing a year's worth of data, as in the EDSRR, Blue Sky data will contain some storm activity that did not meet the criteria that defines a Major Storm.

Minor Storm: A Minor Storm is not large enough to meet the criteria for a Major Storm. The impact to performance from a Minor Storm is included in the Blue Sky data. Minor Storms are defined so as to better explain the fluctuation in Blue Sky performance. A Minor Storm is defined by a string of hours where there are several outages per hour with weather conditions that were reported as something other than calm.

Major Storm: To be classified as a Major Storm, there must be 10,000 sustained customer interruptions over a widespread geographical area. It begins in the hour when several, weather related sustained outages occur and continues through the last hour that has several, weather related sustained outages. Often this may not occur within a 24 hour period. A new Major Storm can only begin if one to two hours pass since the end of the previous Major Storm.

Extraordinary Storm or Event: An Extraordinary Storm or Event is a significant event that occurs and is declared when one of the following conditions are met: severe weather conditions that result in 100,000 or more unplanned and sustained customer interruptions within a single day, or events of sufficient intensity to give rise to a state of emergency declaration by the local, state, or federal government.

MED: Major Event Day as described in IEEE Std. 1366™-2012.

INTRODUCTION

This report summarizes the 2015 reliability performance of the We Energies electric distribution system and its effects on customers. It is intended to provide information on the 2015 system performance as well as background information concerning distribution system reliability. The report will continue to evolve to meet the current and future needs of its readers.

The tool used to aggregate electric distribution outage information is called the CADOPS* Outage Reporting System (CORS). Outage information is both manually and automatically entered in CORS through CADOPS and the CORS Outage Detail Form. Mobile Data (CAD) was implemented for Troubleshooters in Southeastern Wisconsin in 2004, Fox Valley in 2007, and Iron Range in 2008. The Troubleshooters enter some or all of the outage information directly into CORS using Mobile Data. In 2009, most crews were trained in Mobile Data (CAD) to enter customer restoration data during storms and/or to complete a multi-step customer restoration outage event. Communication between EMS and CADOPS to automatically transfer device status was rolled out to the entire service territory in 2013. In addition, code was added to auto-populate some of the outage data including customers based on the interrupting device, tag number, and phase as reported in Mobile CAD.

The use of CADOPS has increased the accuracy of outage reporting. In eleven of the past 14 years, including 2015, PA Consulting Group certified We Energies' process for collecting, analyzing, verifying and reporting reliability for its accuracy and completeness. As was done in past years, the customer count at the circuit level was reviewed and updated. These updated customer numbers were used in reporting of 2015 reliability performance. For 2014, a customer count of 28,641 We Energies Michigan electric customer accounts was used to compute reliability indices.

A review of the information contained in this report indicates that the performance of the majority of the distribution system remained relatively the same when compared to years prior to 2015. This report graphically presents various causes of the outages affecting the distribution system and includes monthly trends. It is reported using unplanned and sustained outage data that includes all outage causes except where noted. It examines outage duration, response time, and momentary interruption issues based on recloser and circuit breaker operations counts. This report contains information on the progress of various reliability-related programs designed to identify portions of the system where improvement is most needed, and then to take corrective action, as required, to improve the system. The ultimate goal is providing acceptable service to We Energies customers.

*Computer Aided Distribution OPeration System

I. Transmission Events

Below is a listing of transmission events by month. Months with no activity are not shown.

May

There was one Transmission related outage.

A transmission related outage occurred in the Iron Range Area that began at 7:09 PM on May 3, 2015. This affected 1,534 customers originating from the Greenstone Substation with outage durations greater than five minutes, for a total of 96,642 customer minutes of interruption and a CAIDI of 63 minutes.

June

There were two Transmission related outages.

A transmission related outage occurred in the Iron Range Area that began at 14:51 PM on June 4, 2015. This affected 1,588 customers originating from the Greenstone Substation with outage durations greater than five minutes, for a total of 9,528 customer minutes of interruption and a CAIDI of 6 minutes.

A transmission related outage occurred in the Iron Range Area that began at 17:19 PM on June 4, 2015. This affected 1,588 customers originating from the Greenstone Substation with outage durations greater than five minutes, for a total of 682,840 customer minutes of interruption and a CAIDI of 430 minutes.

September

There was one Transmission related outage.

A transmission related outage occurred in the Iron Range Area that began at 6:38 PM on September 6, 2015. This affected 1,582 customers originating from the Greenstone Substation with outage durations greater than five minutes, for a total of 382,844 customer minutes of interruption and a CAIDI of 242 minutes.

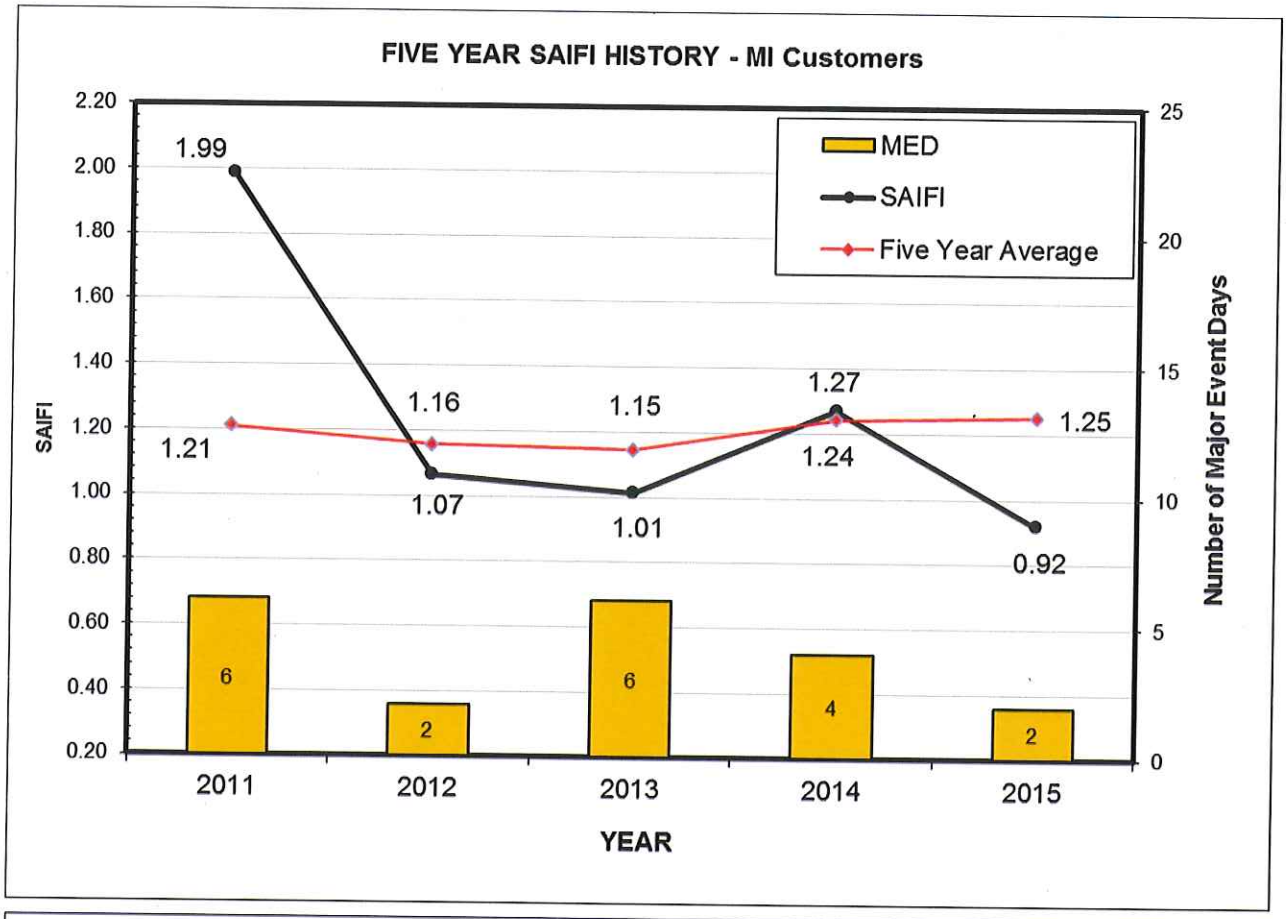
II. RELIABILITY INDICES

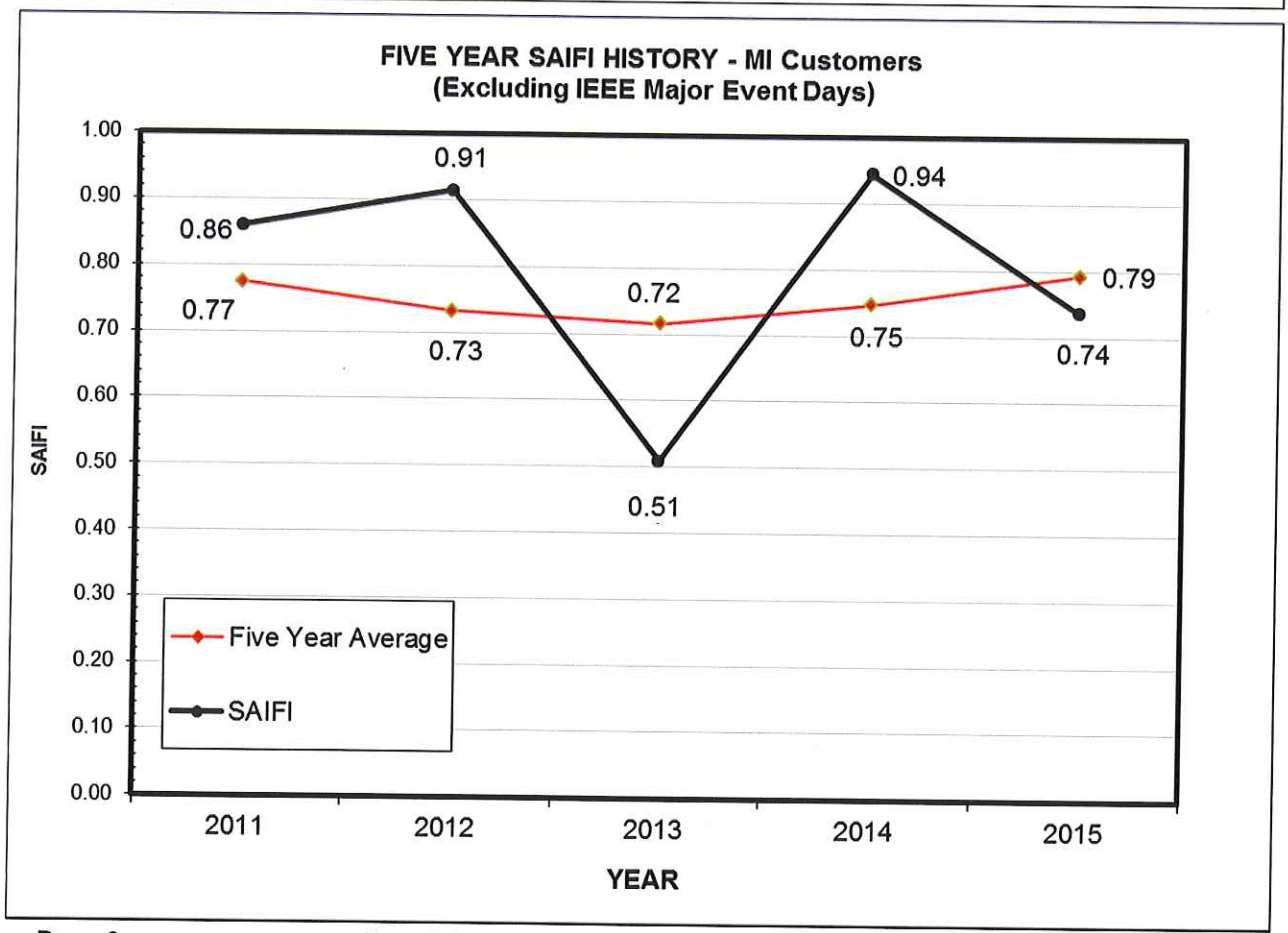
Indices Explanation

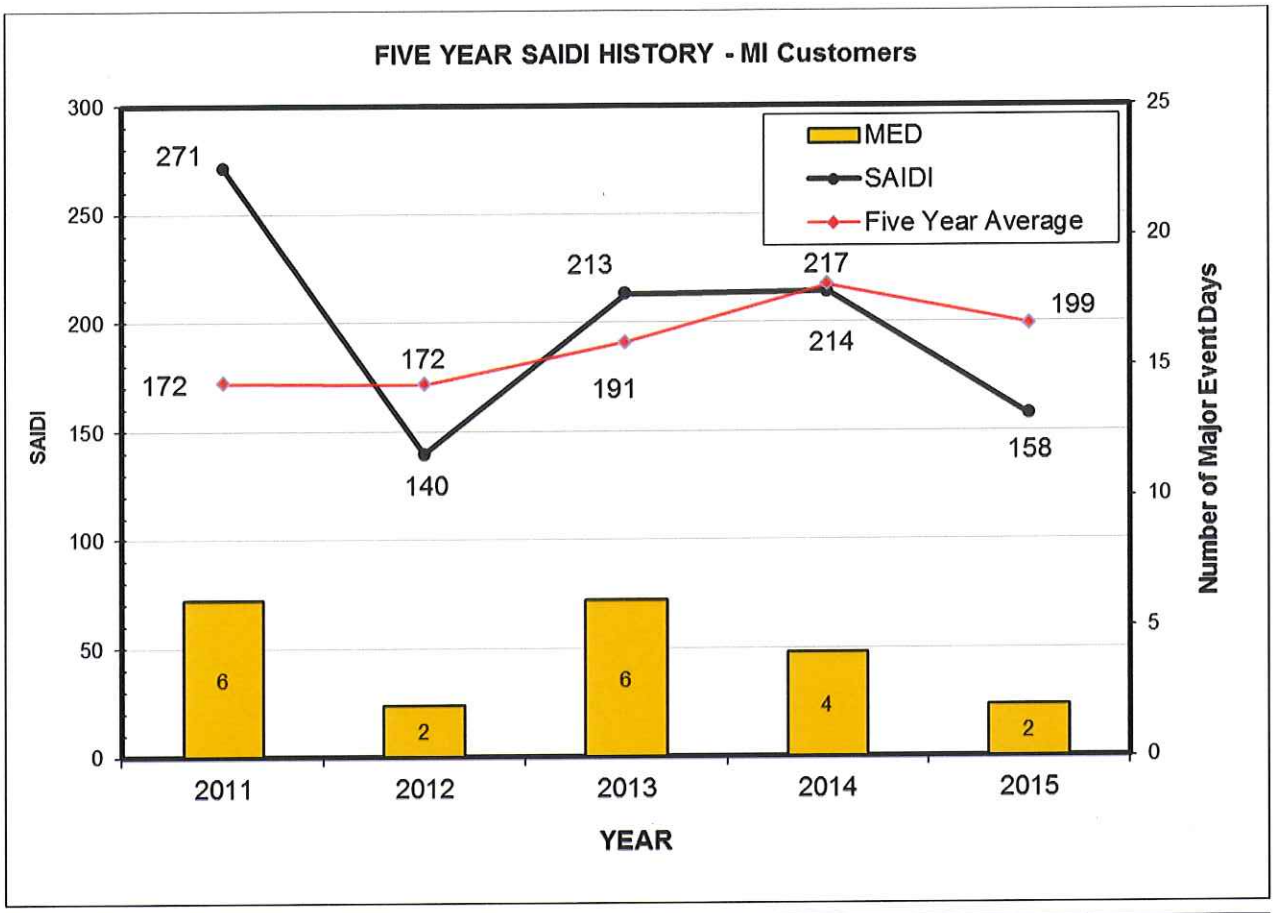
We Energies uses the industry standard distribution system reliability indices SAIFI, SAIDI, CAIDI, and ASAI to measure and track performance. The charts on the following pages display the five-year historical performance of the distribution system for these indices. Each chart shows the yearly reliability index values as well as the rolling five-year average. The top chart on each page shows the indices with all unplanned and sustained outages included. The bottom chart shows the indices with all unplanned and sustained outages but excluding Major Event Days. The 2015 indices in this report are based on a count of **28,641** Michigan customers of We Energies.

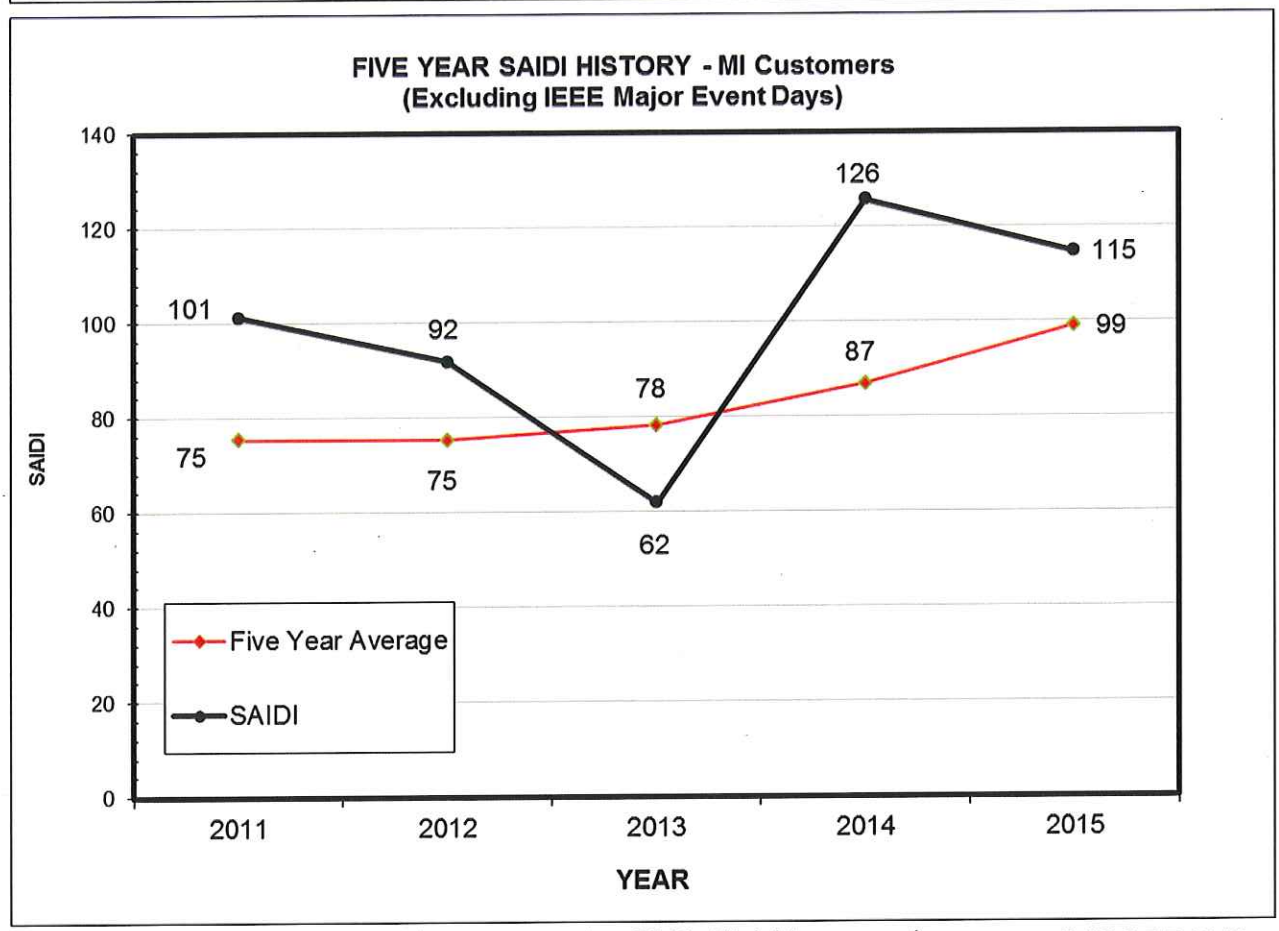
As described in the Definitions section of this report, SAIFI is a measure that is designed to give an indication of the frequency of outages that affect customers. SAIDI, CAIDI, and ASAI are measures that are designed to give indications of the duration of outages that affect customers.

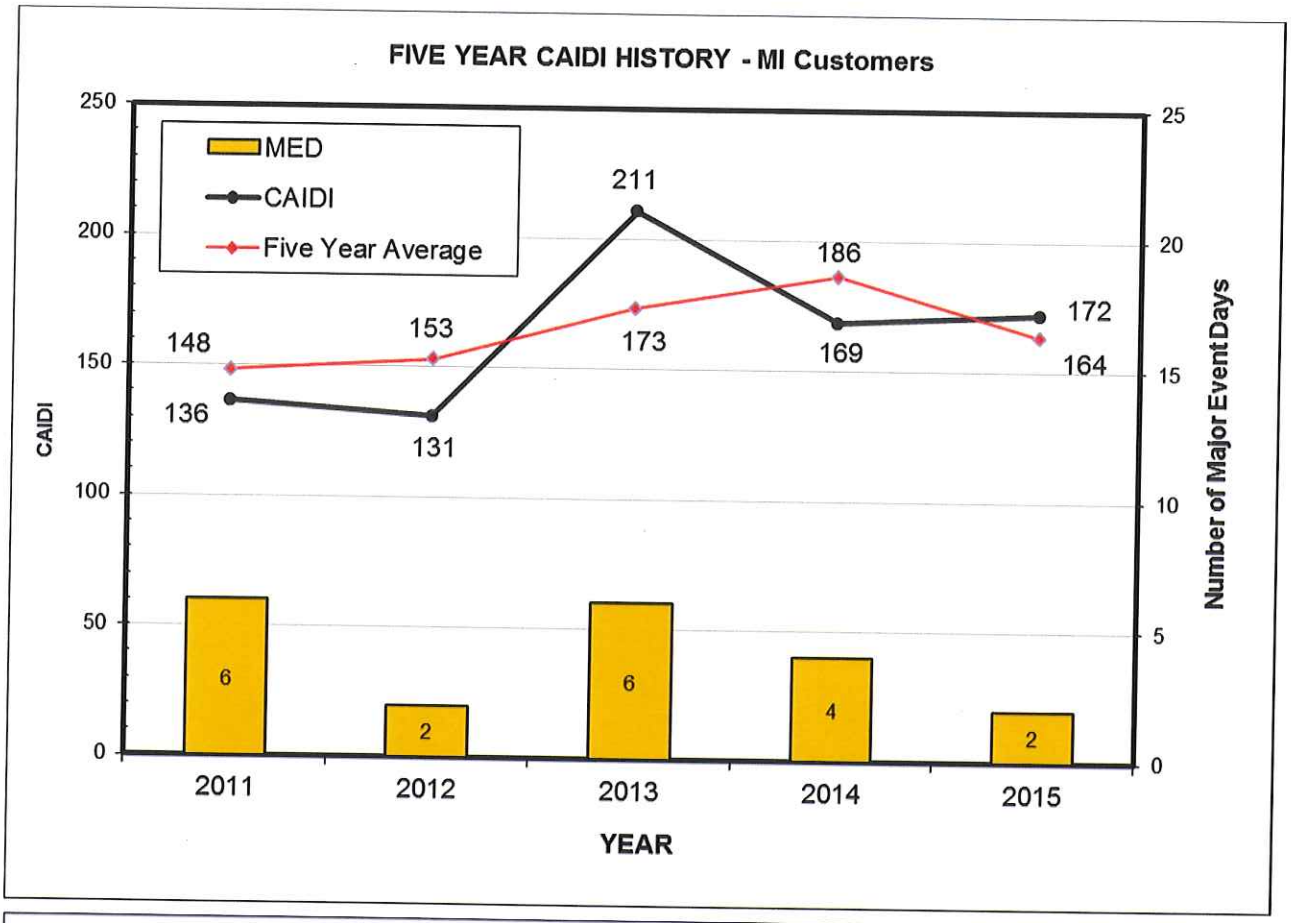
We Energies participates in various reliability benchmarking studies. We Energies is typically a top quartile performer for SAIFI, a second/third quartile performer for SAIDI, and a second/third quartile performer for CAIDI. This is according to surveys based on electrical system performance *prior* to 2015. It is expected that We Energies' SAIFI index will remain in the top quartile, and make strides to improve SAIDI, CAIDI, and ASAI in future benchmarking studies.

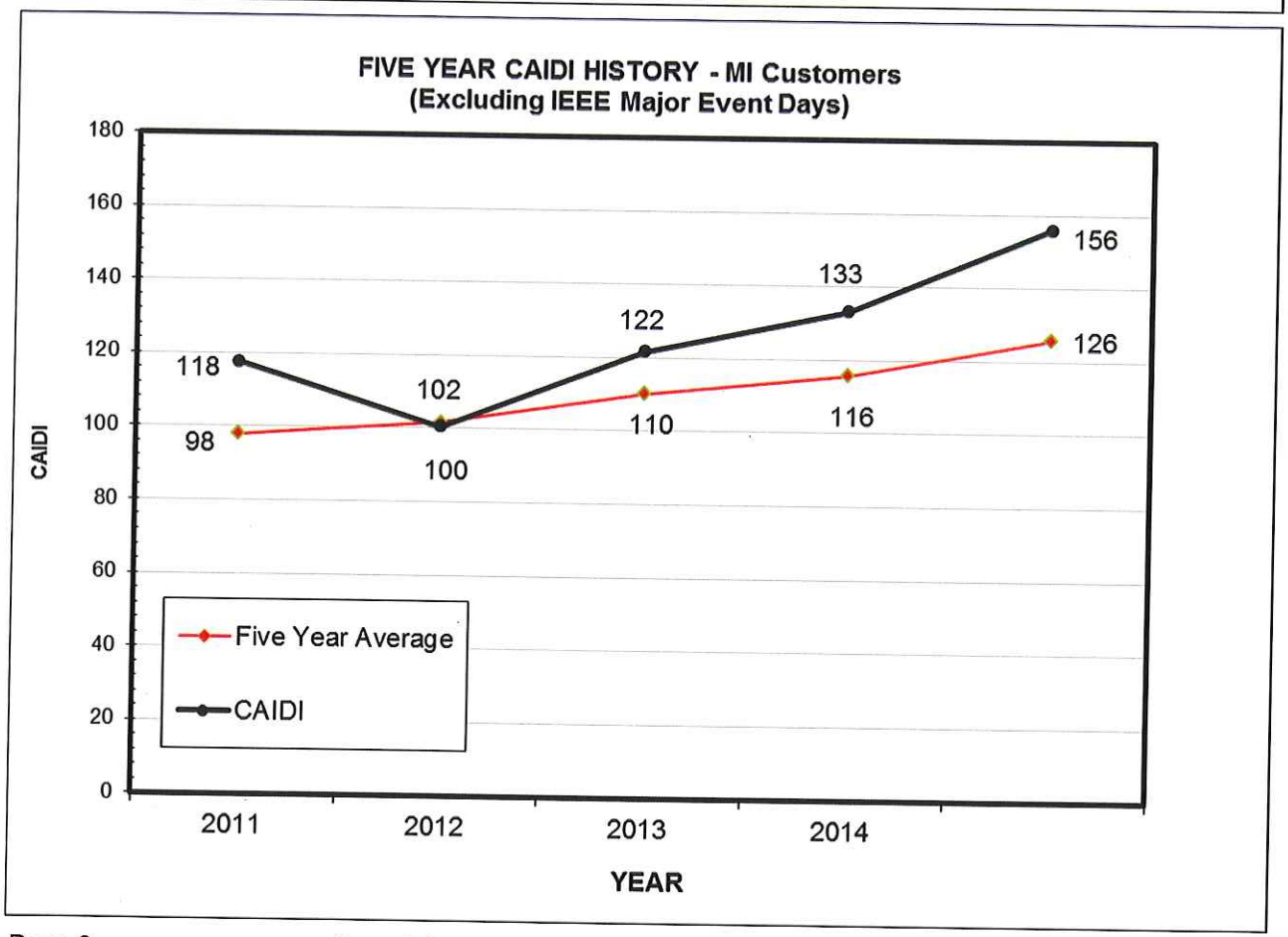


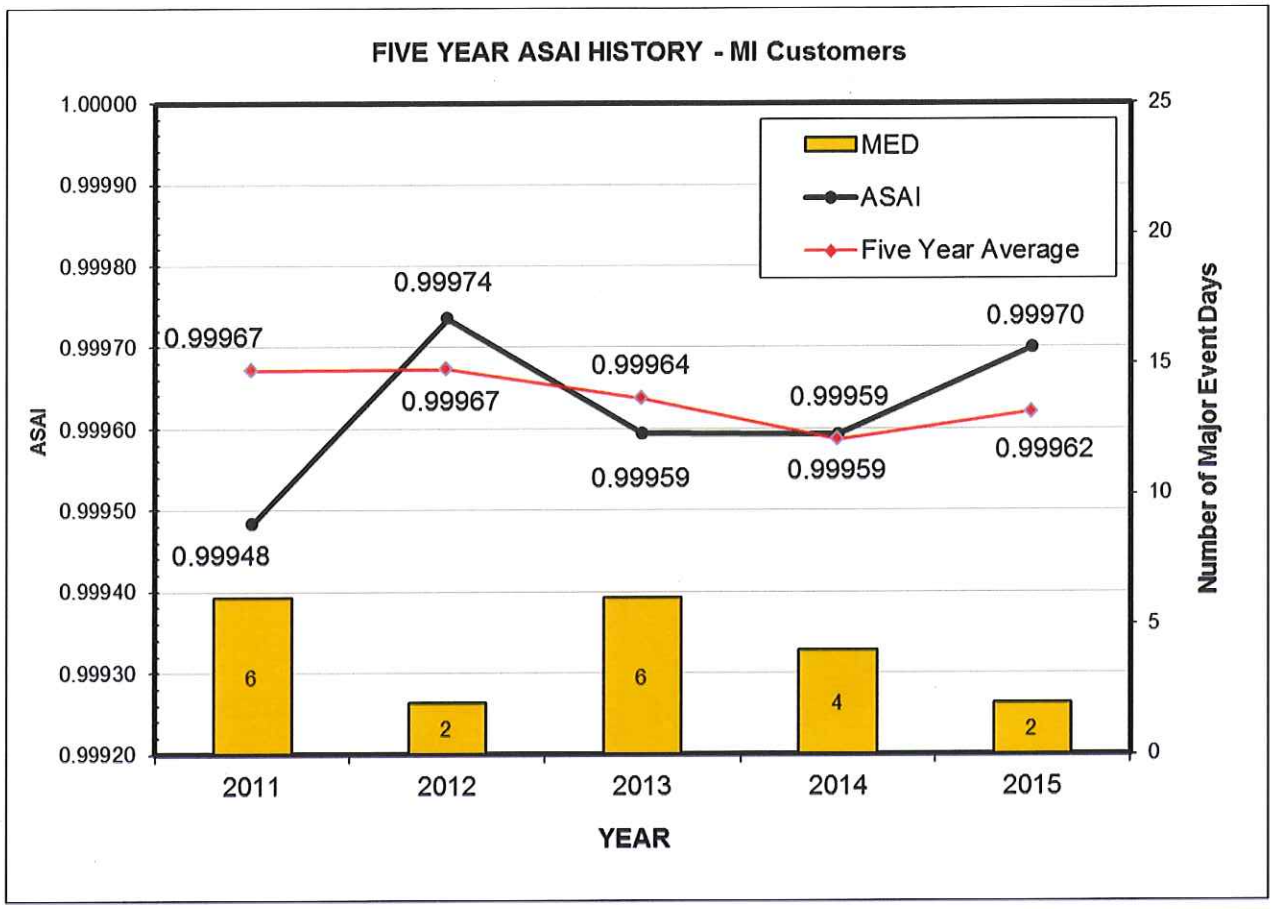


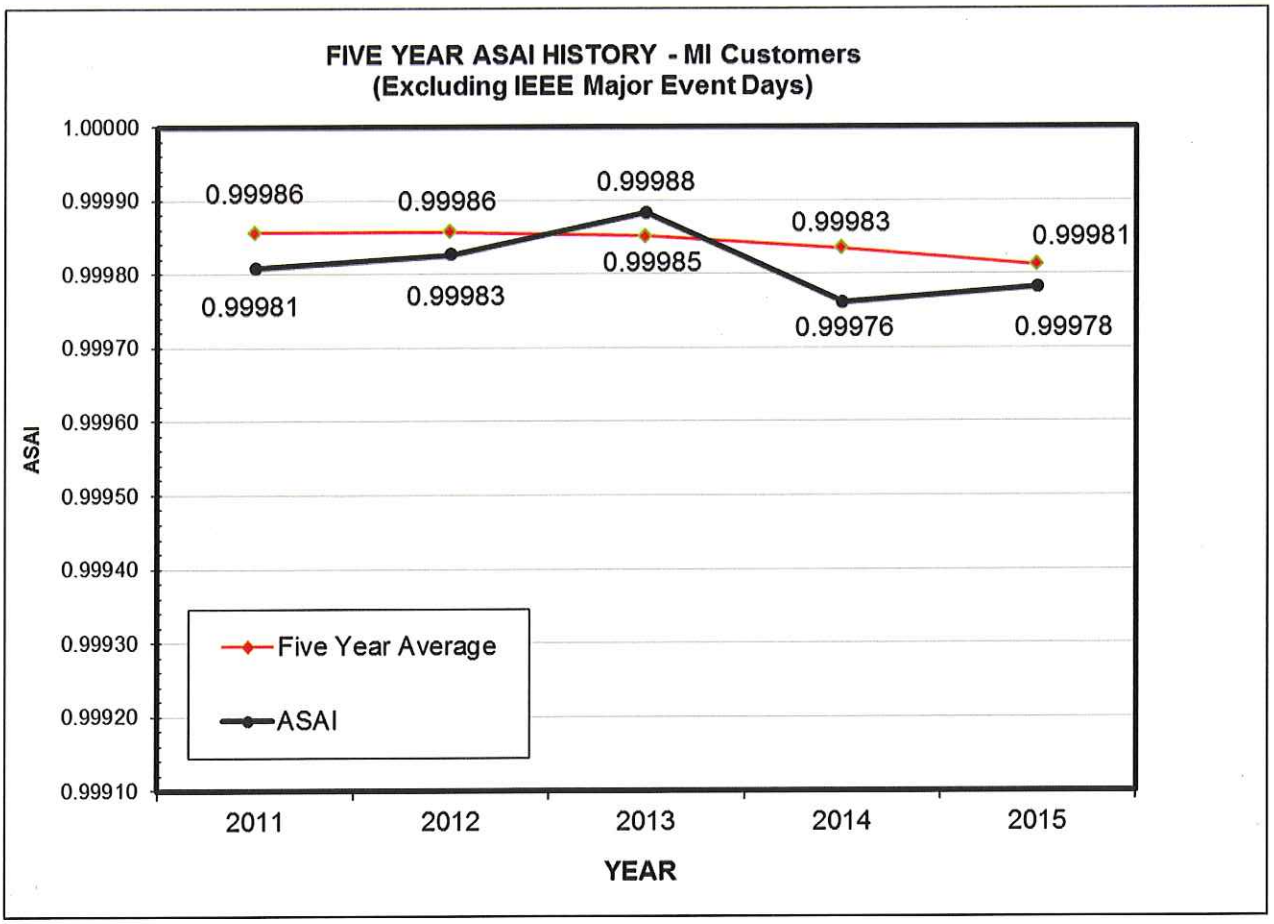




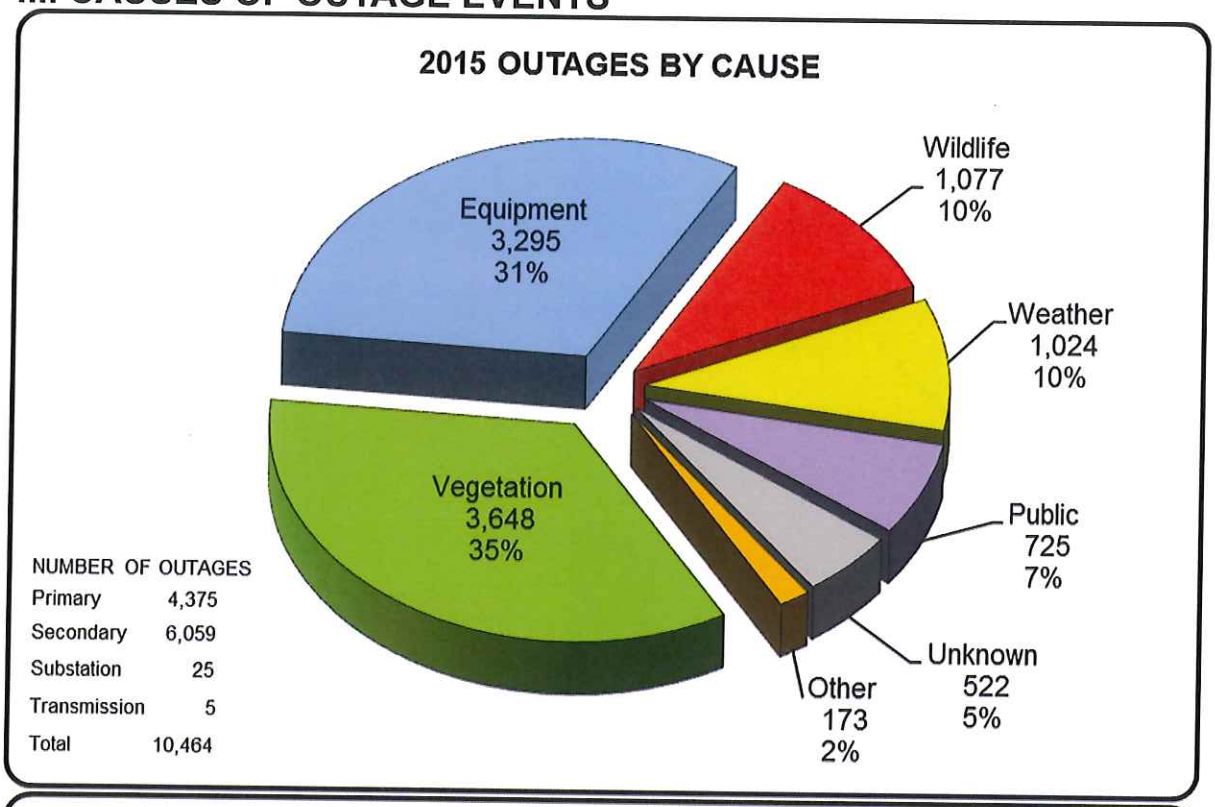


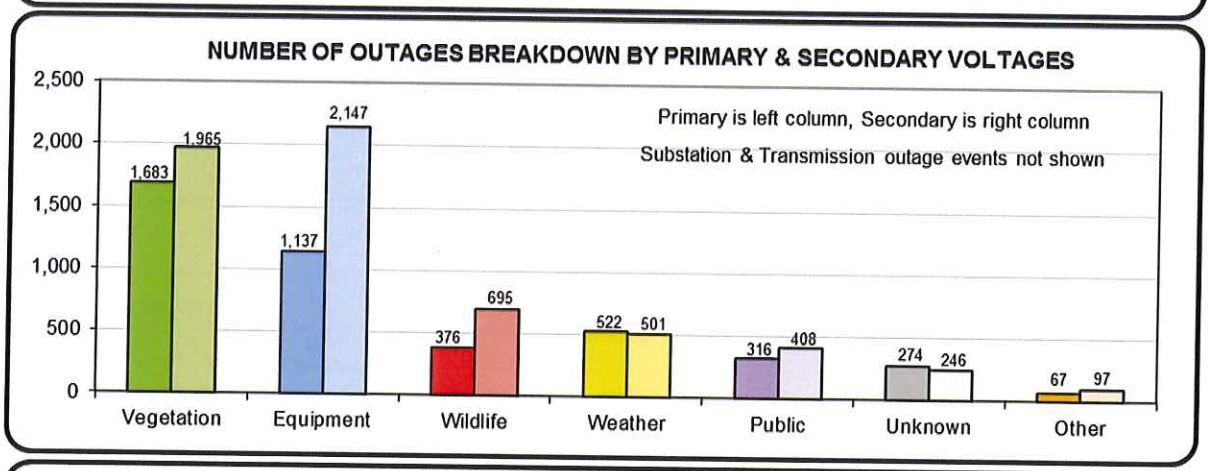


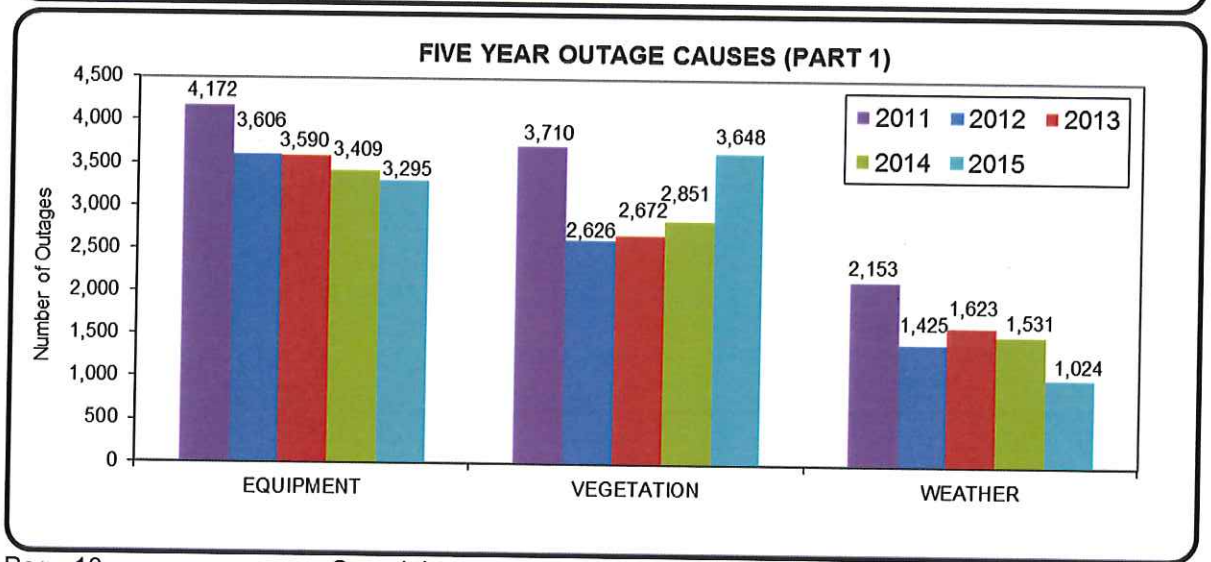




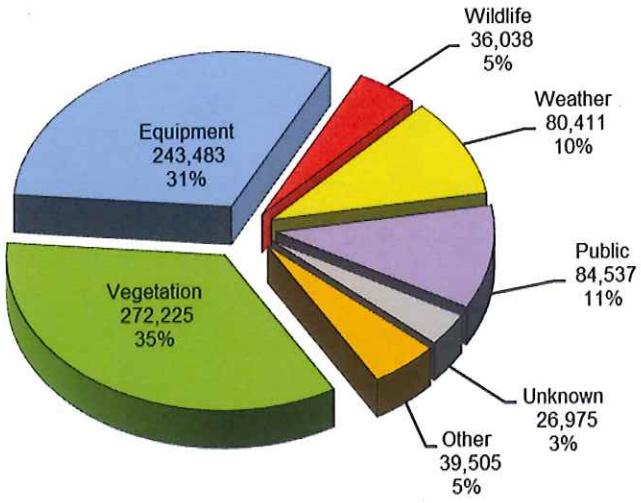
III. CAUSES OF OUTAGE EVENTS





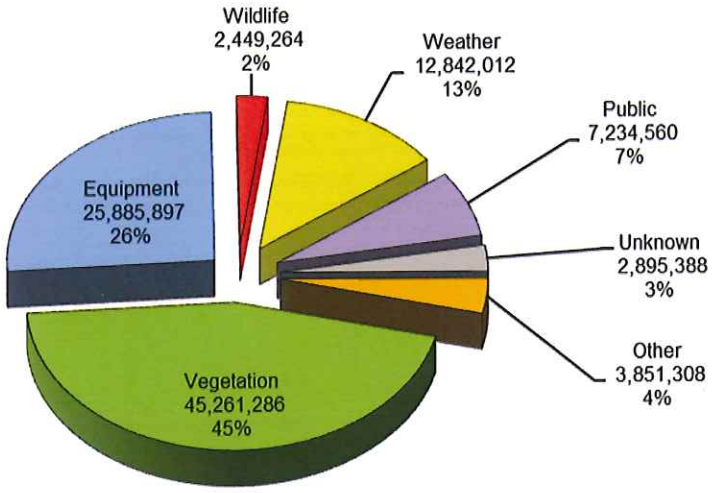


2015 CI BY CAUSE



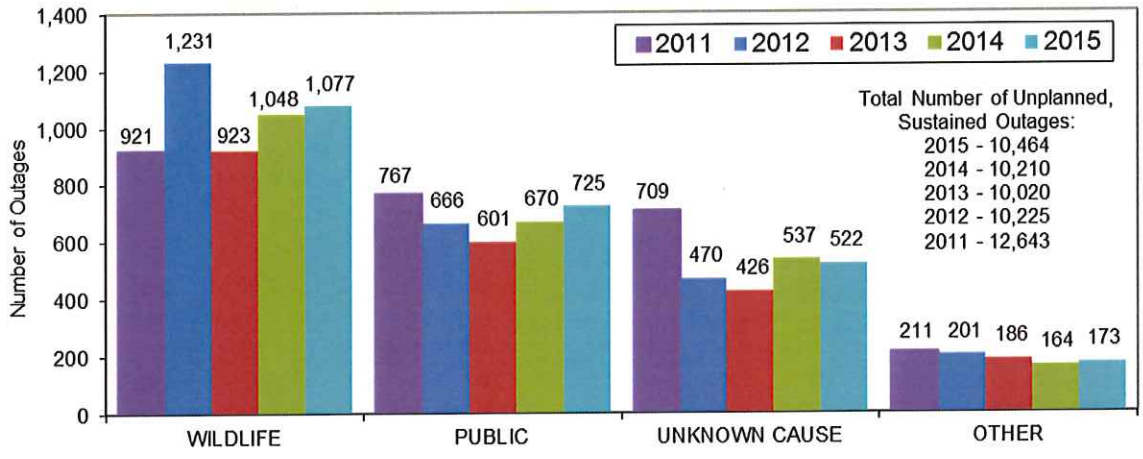
NUMBER OF CI's	
Primary	716,141
Secondary	24,852
Substation	35,888
Transmission	6,293
Total	783,174

2015 CMI BY CAUSE

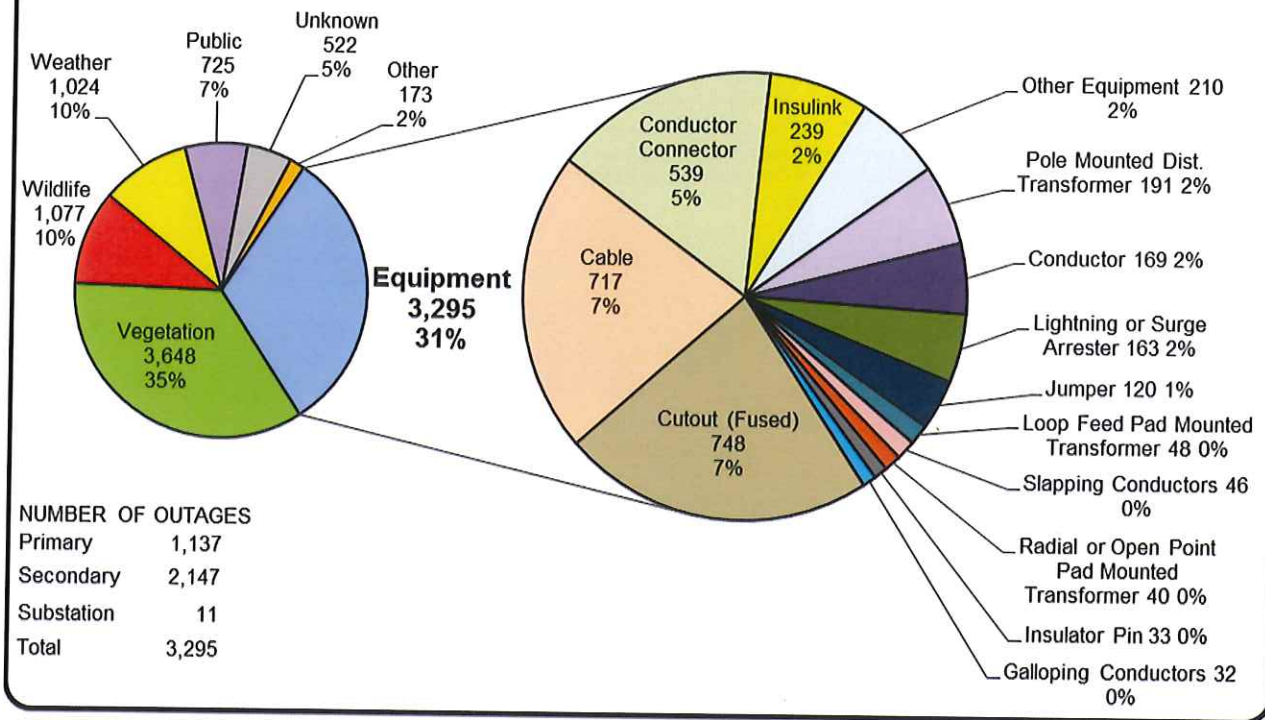


NUMBER OF CMI's	
Primary	92,439,058
Secondary	4,172,058
Substation	2,636,713
Transmission	1,171,886
Total	100,419,715

FIVE YEAR OUTAGE CAUSES (PART 2)



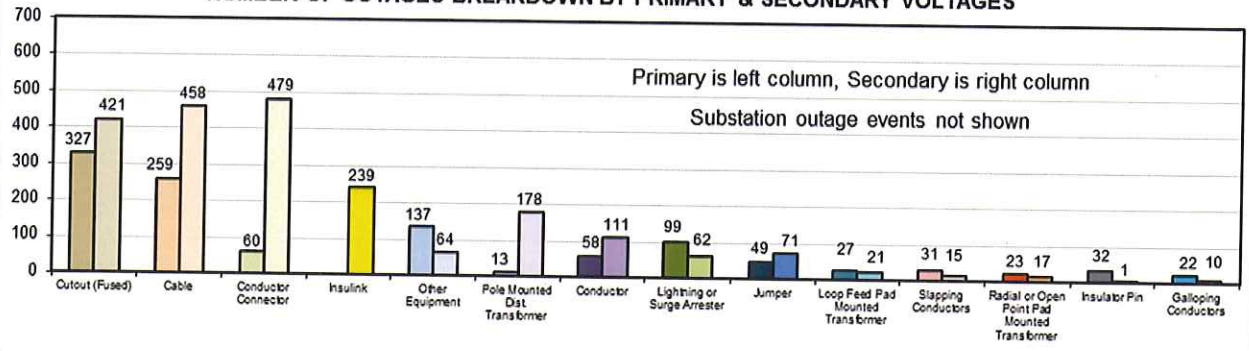
2015 OUTAGE CAUSES- EQUIPMENT FAILURE / DETERIORATION



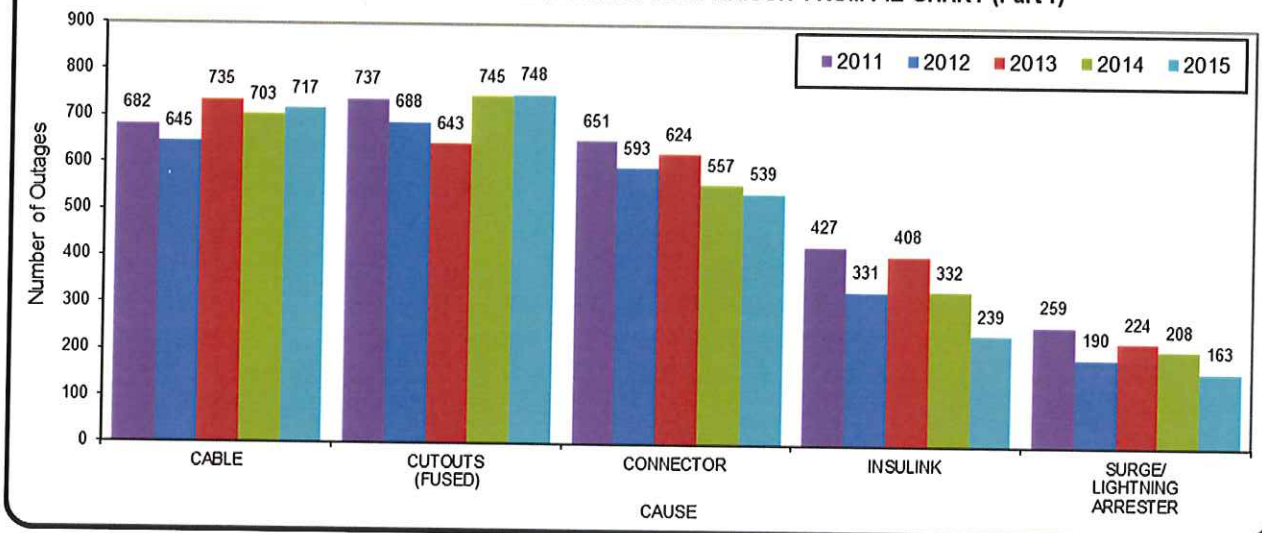
NUMBER OF OUTAGES

Primary	1,137
Secondary	2,147
Substation	11
Total	3,295

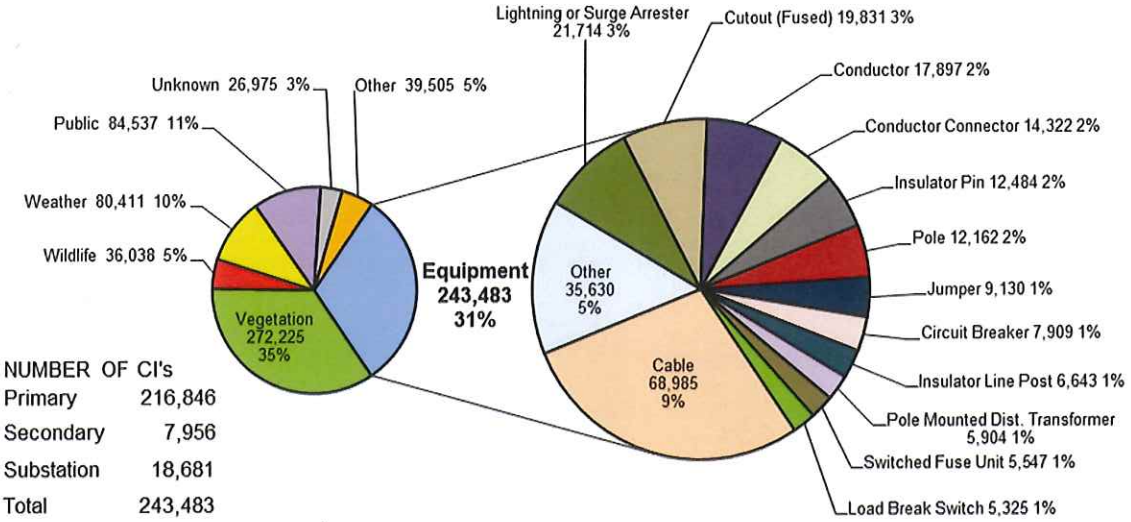
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES



FIVE YEAR OUTAGE CAUSES - FAILED EQUIPMENT COMPARISON FROM PIE CHART (Part 1)

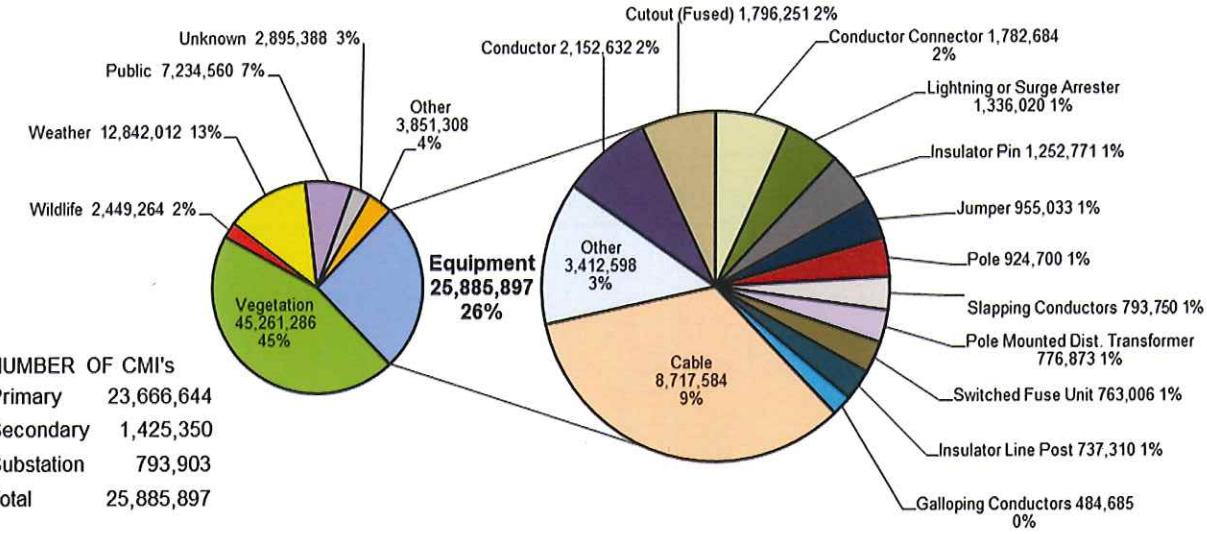


2015 OUTAGE CAUSES- EQUIPMENT FAILURE / DETERIORATION - CI



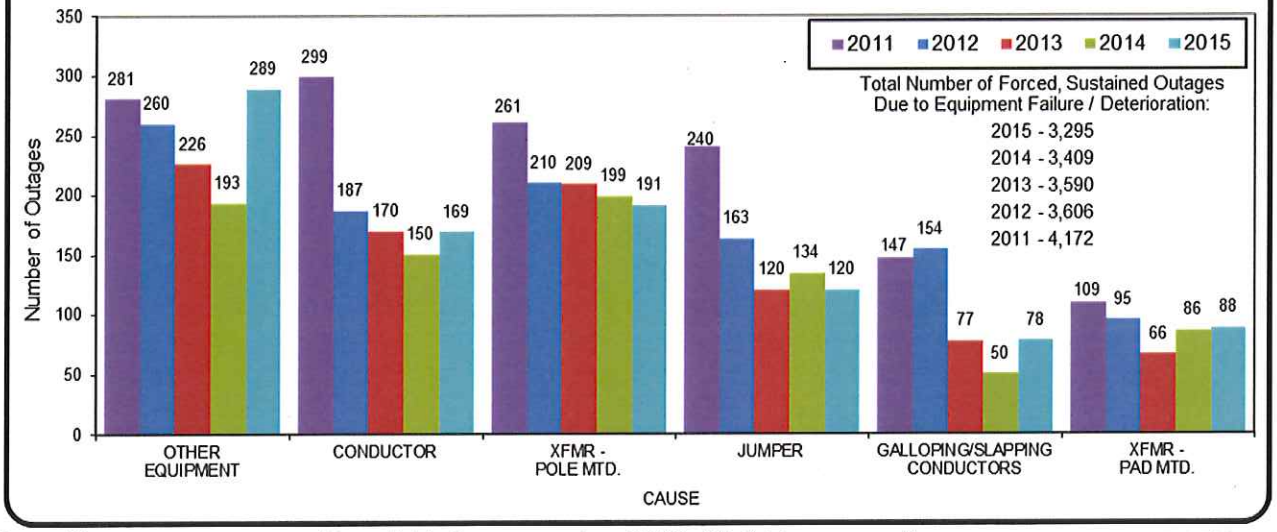
NUMBER OF CI's	
Primary	216,846
Secondary	7,956
Substation	18,681
Total	243,483

2015 OUTAGE CAUSES- EQUIPMENT FAILURE / DETERIORATION - CMI

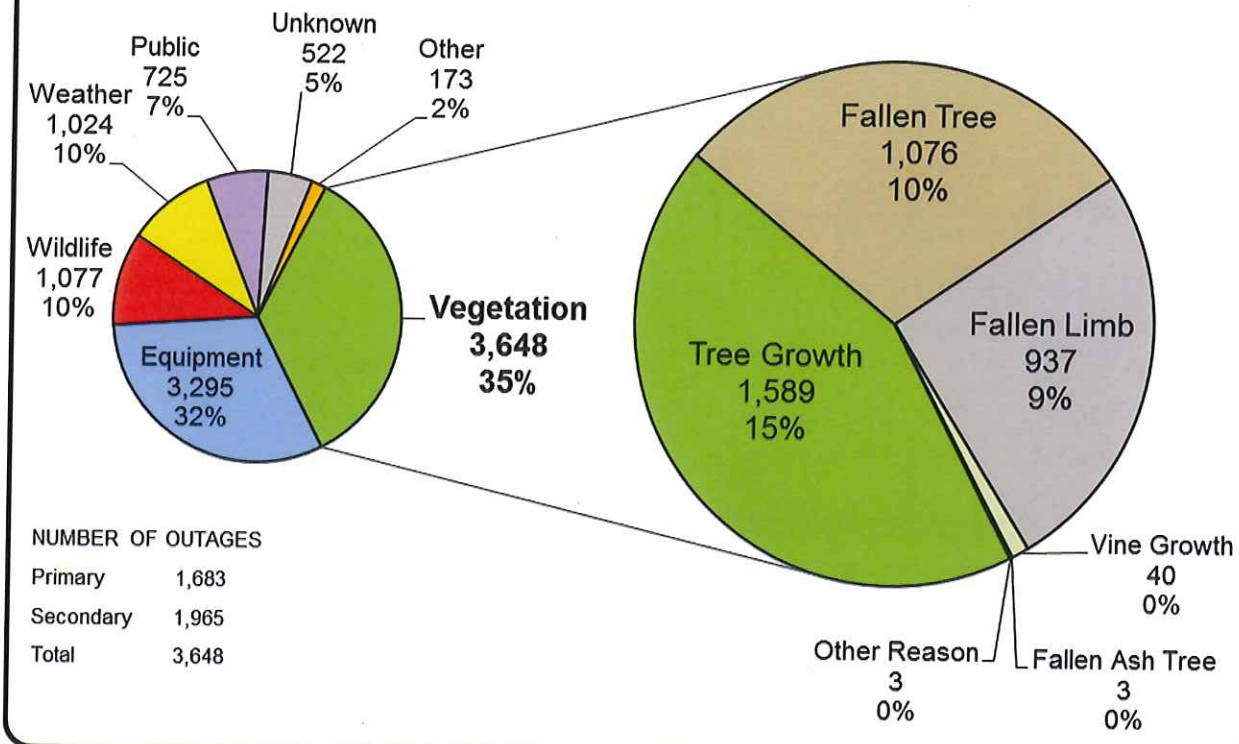


NUMBER OF CMI's	
Primary	23,666,644
Secondary	1,425,350
Substation	793,903
Total	25,885,897

FIVE YEAR OUTAGE CAUSES - FAILED EQUIPMENT COMPARISON FROM PIE CHART (Part 2)



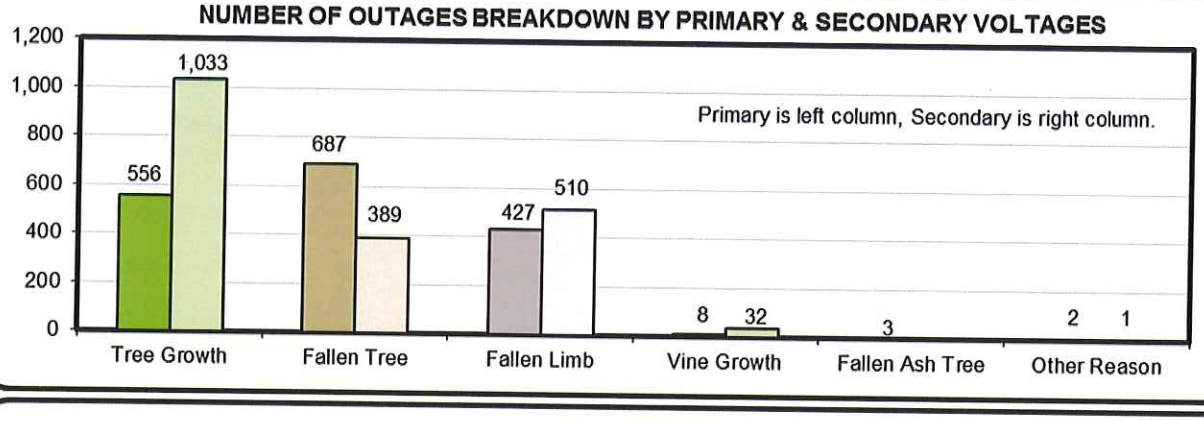
2015 OUTAGE CAUSES - VEGETATION



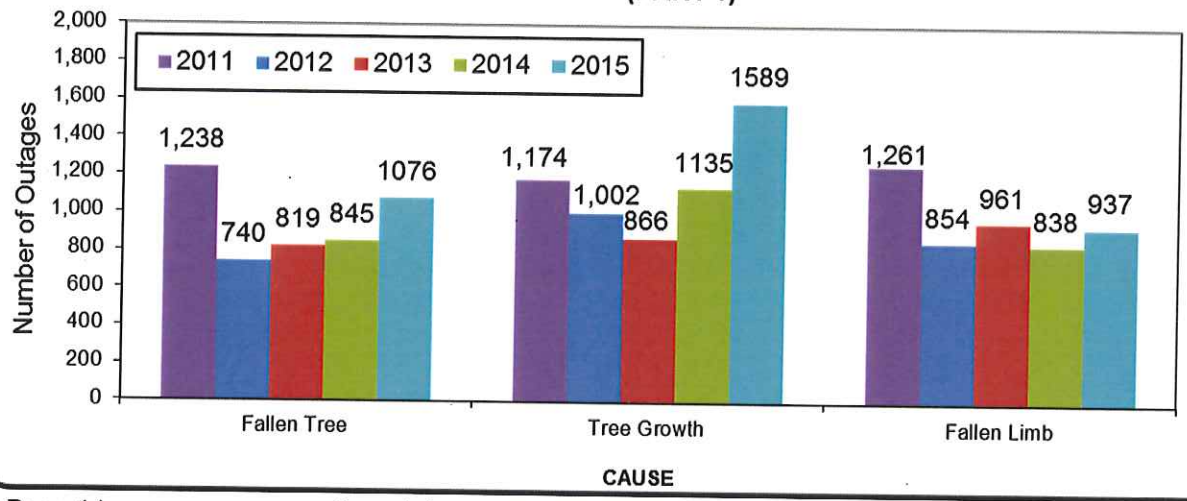
NUMBER OF OUTAGES

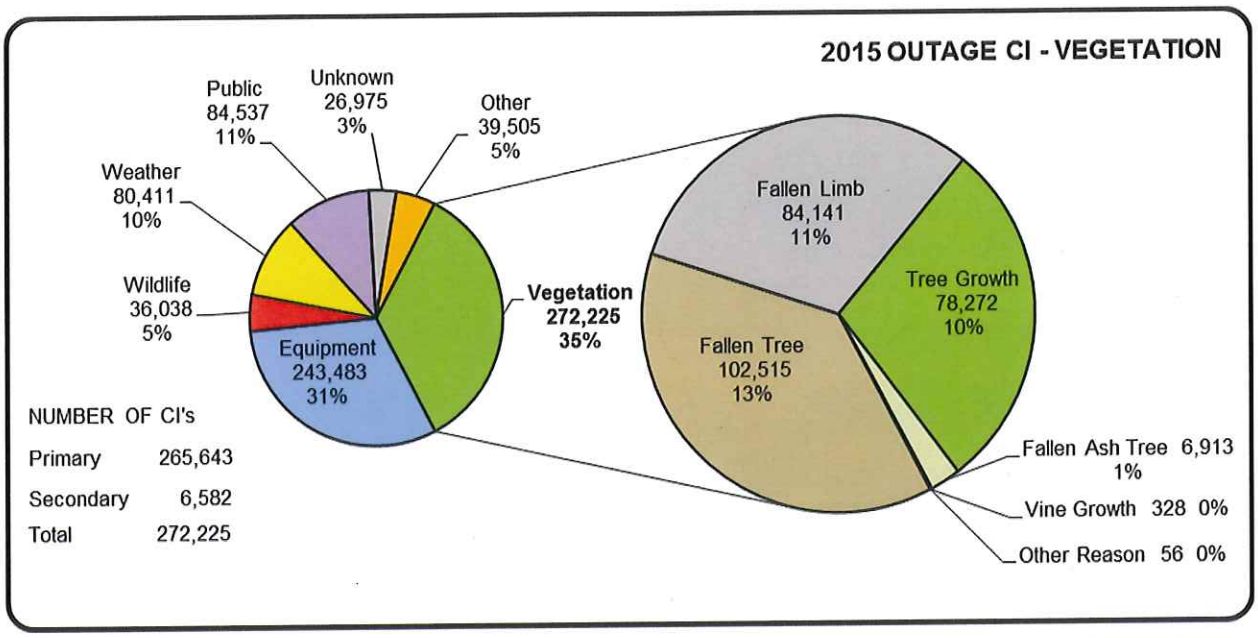
Primary	1,683
Secondary	1,965
Total	3,648

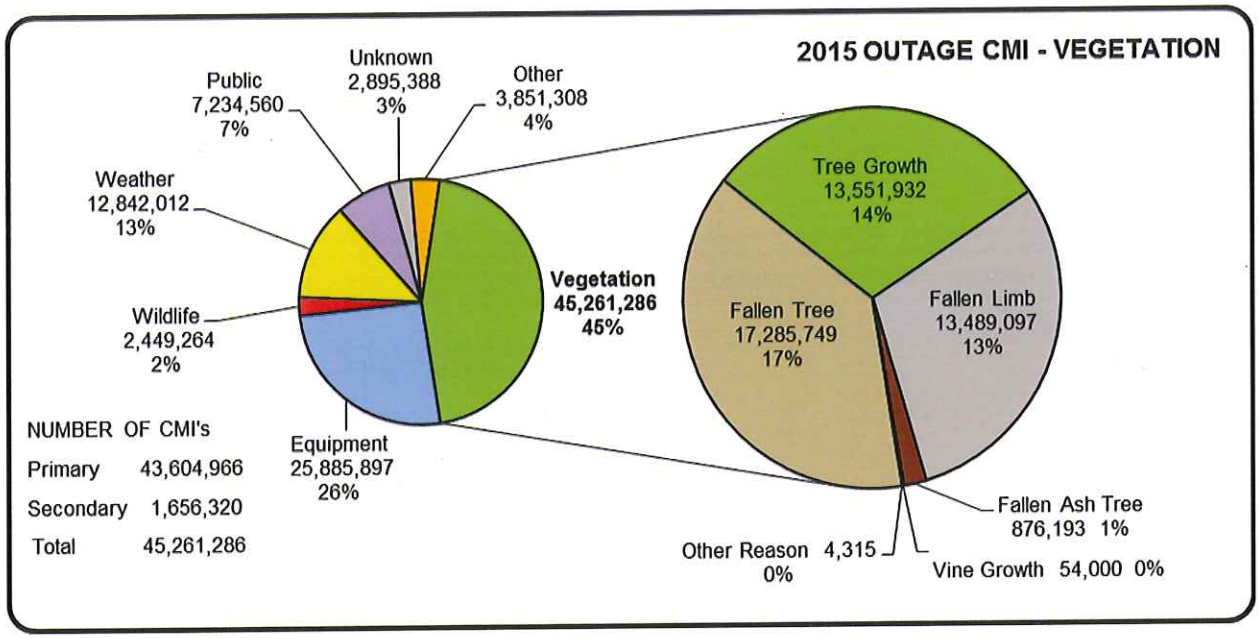
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES

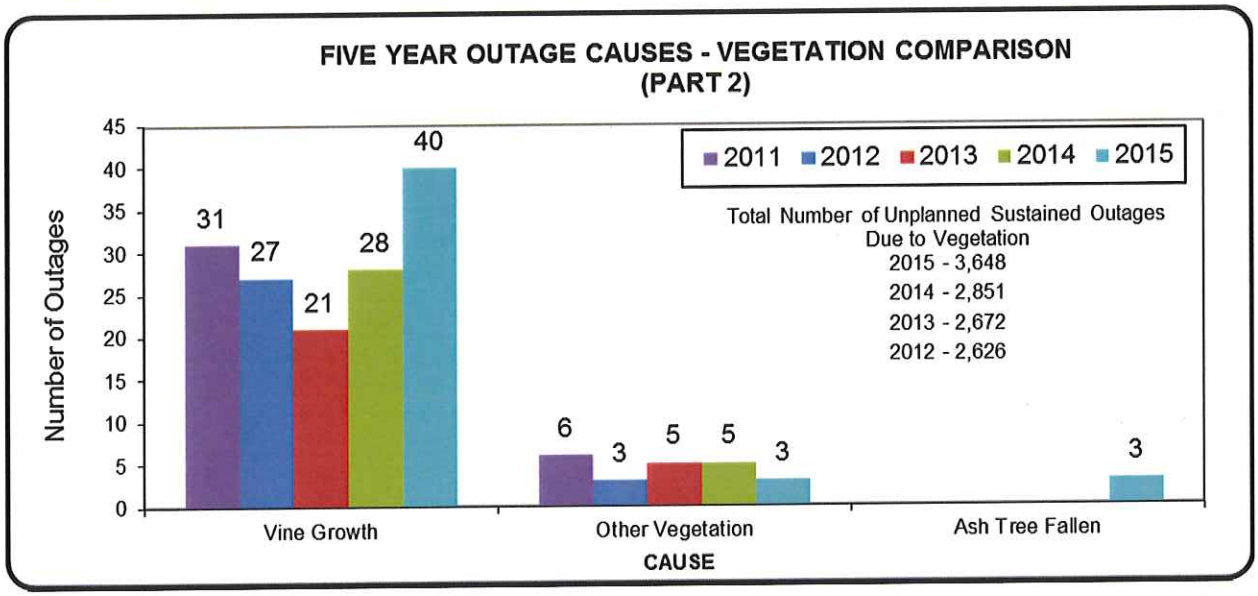


FIVE YEAR OUTAGE CAUSES - VEGETATION COMPARISON (PART 1)

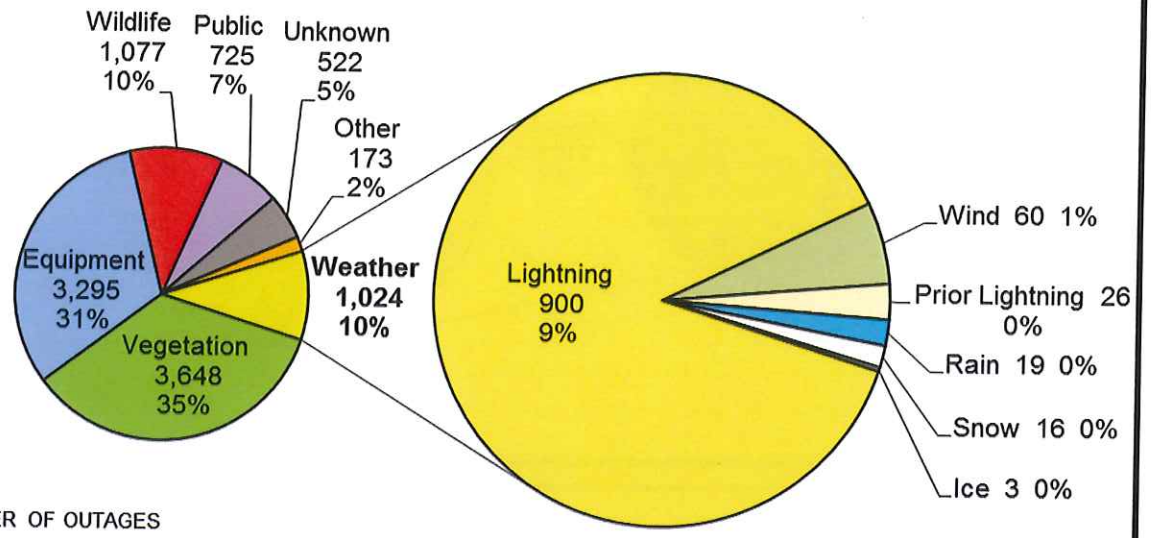






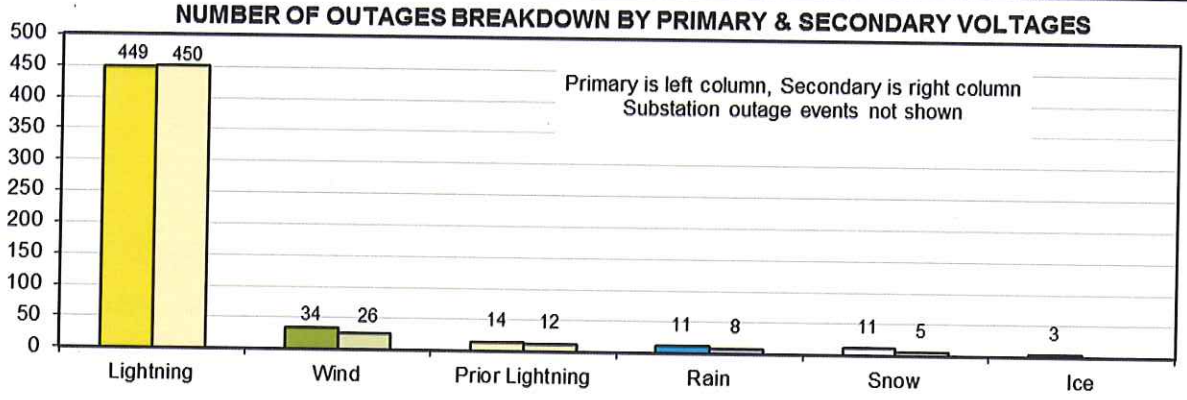


2015 OUTAGE CAUSES - WEATHER

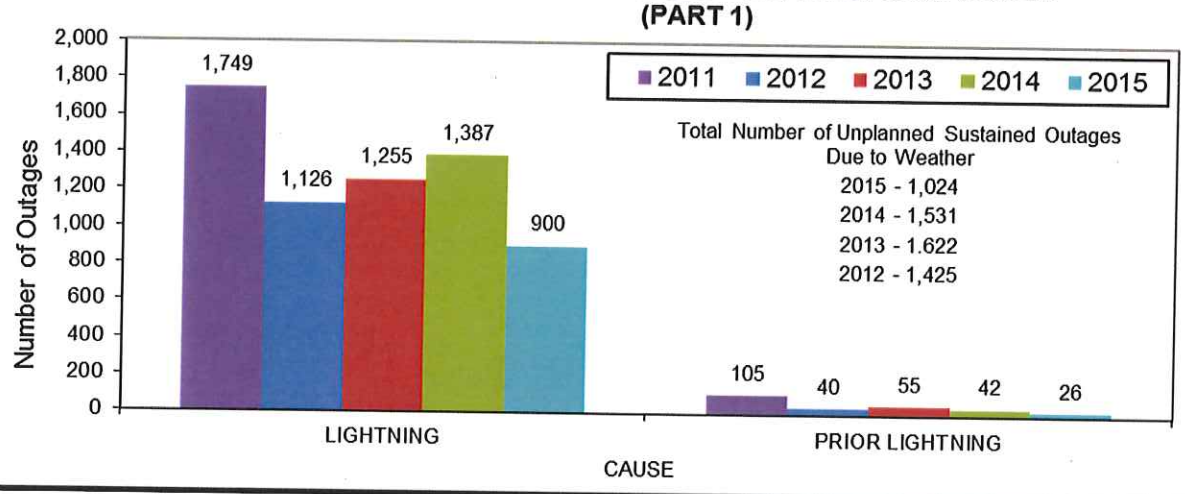


NUMBER OF OUTAGES	
Primary	522
Secondary	501
Substation	1
Total	1,024

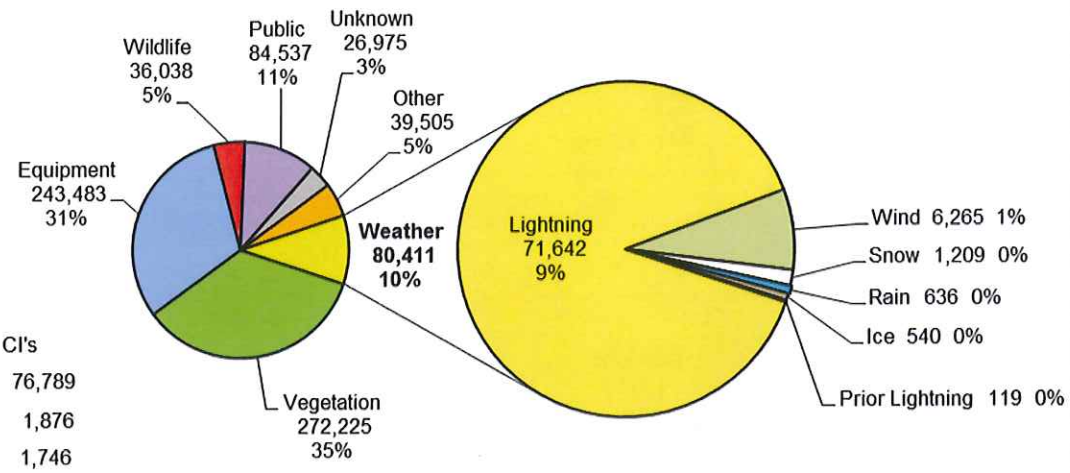
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES



FIVE YEAR OUTAGE CAUSES - WEATHER COMPARISON (PART 1)

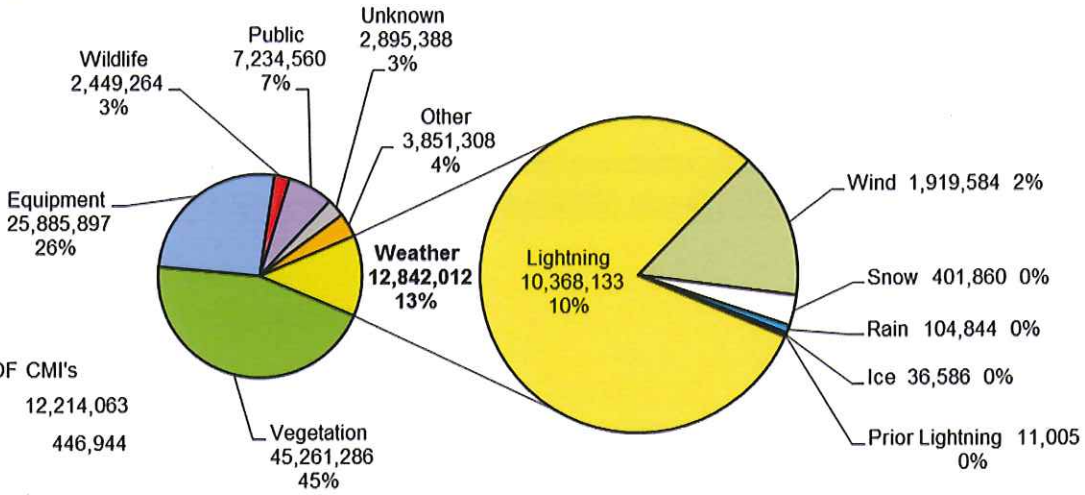


2015 OUTAGE CI - WEATHER



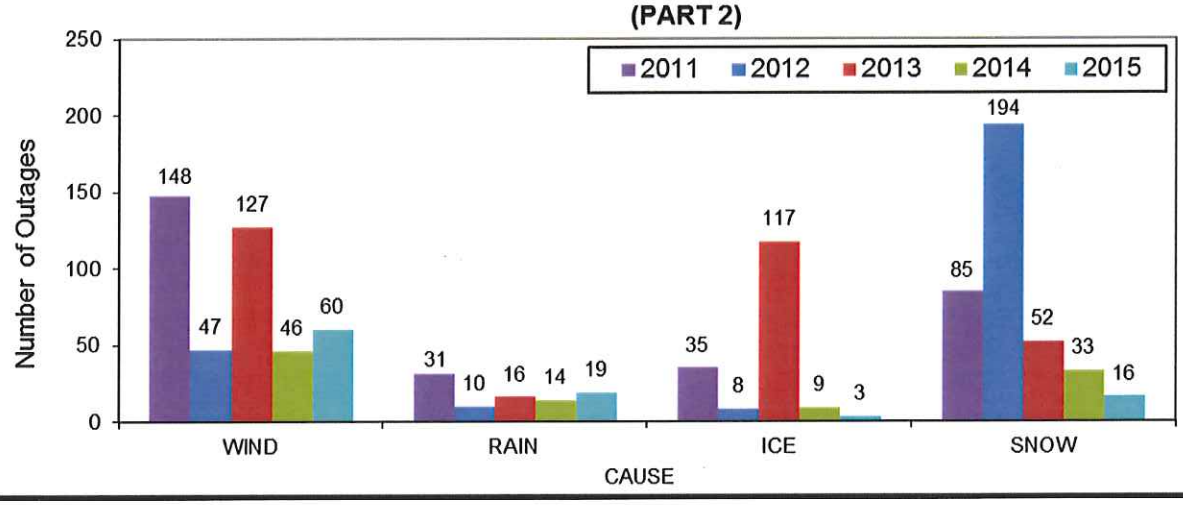
NUMBER OF CI's	
Primary	76,789
Secondary	1,876
Substation	1,746
Total	80,411

2015 OUTAGE CMI - WEATHER

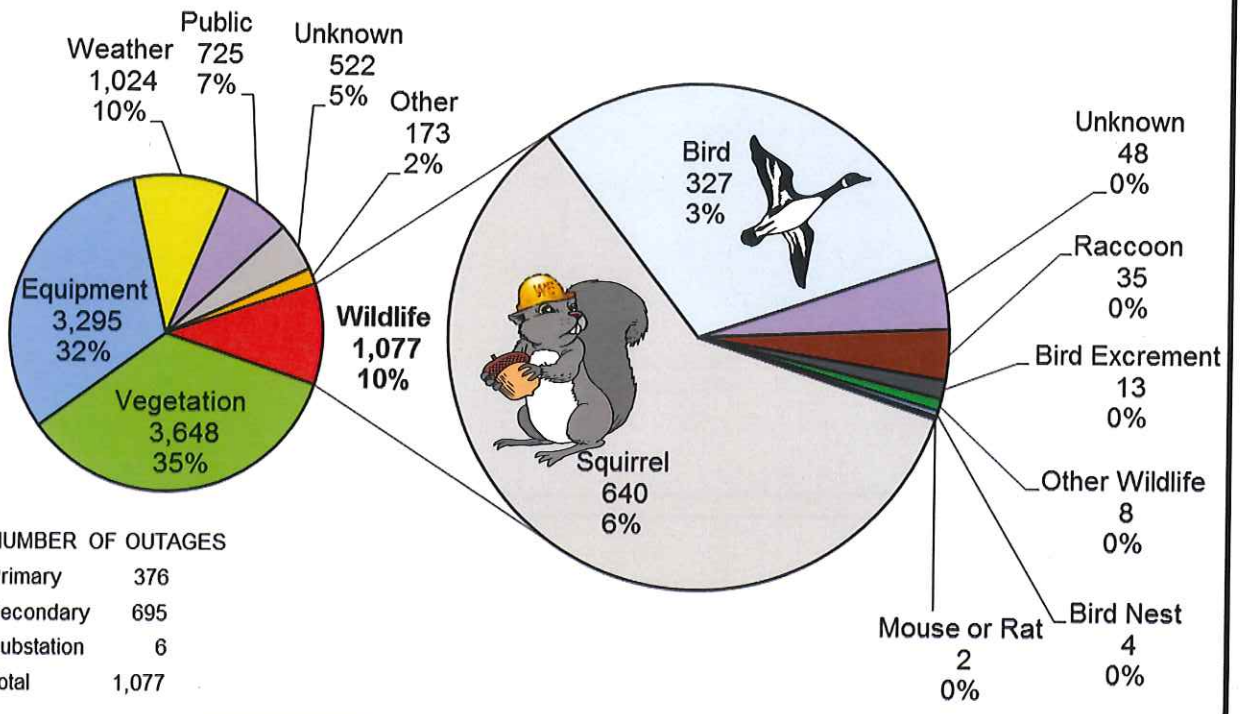


NUMBER OF CMI's	
Primary	12,214,063
Secondary	446,944
Total	12,842,012

FIVE YEAR OUTAGE CAUSES - WEATHER COMPARISON (PART 2)



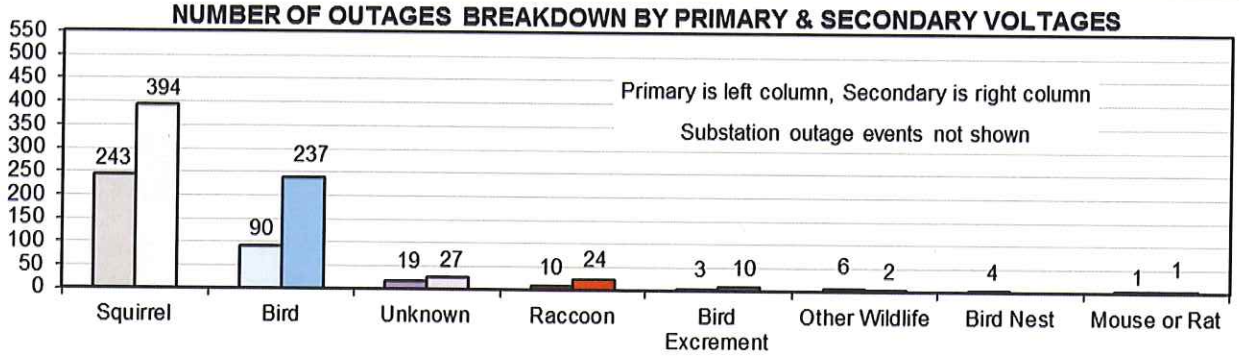
2015 OUTAGE CAUSES - WILDLIFE



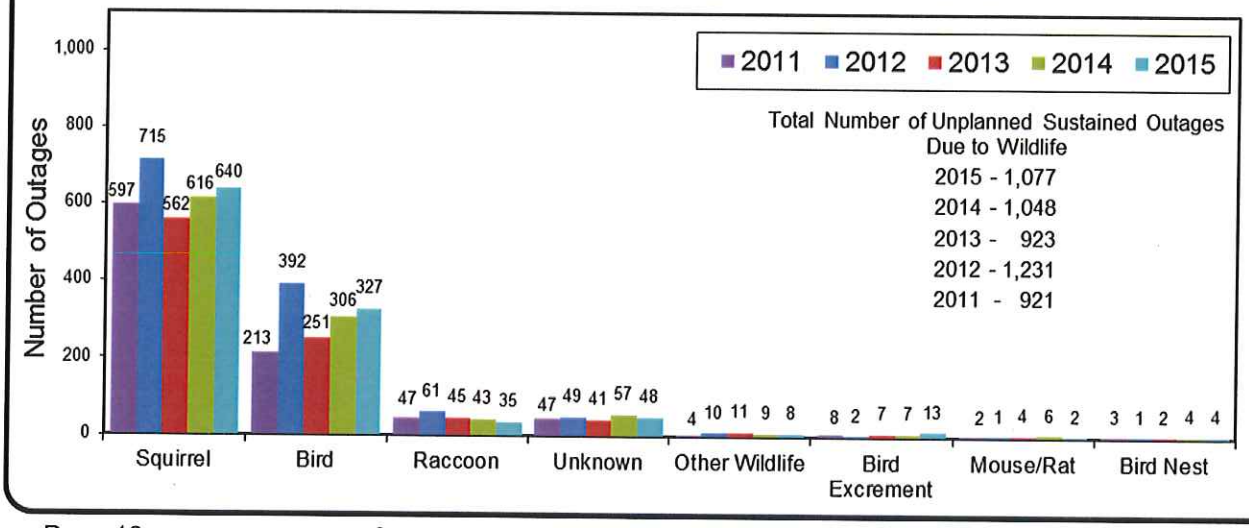
NUMBER OF OUTAGES

Primary	376
Secondary	695
Substation	6
Total	1,077

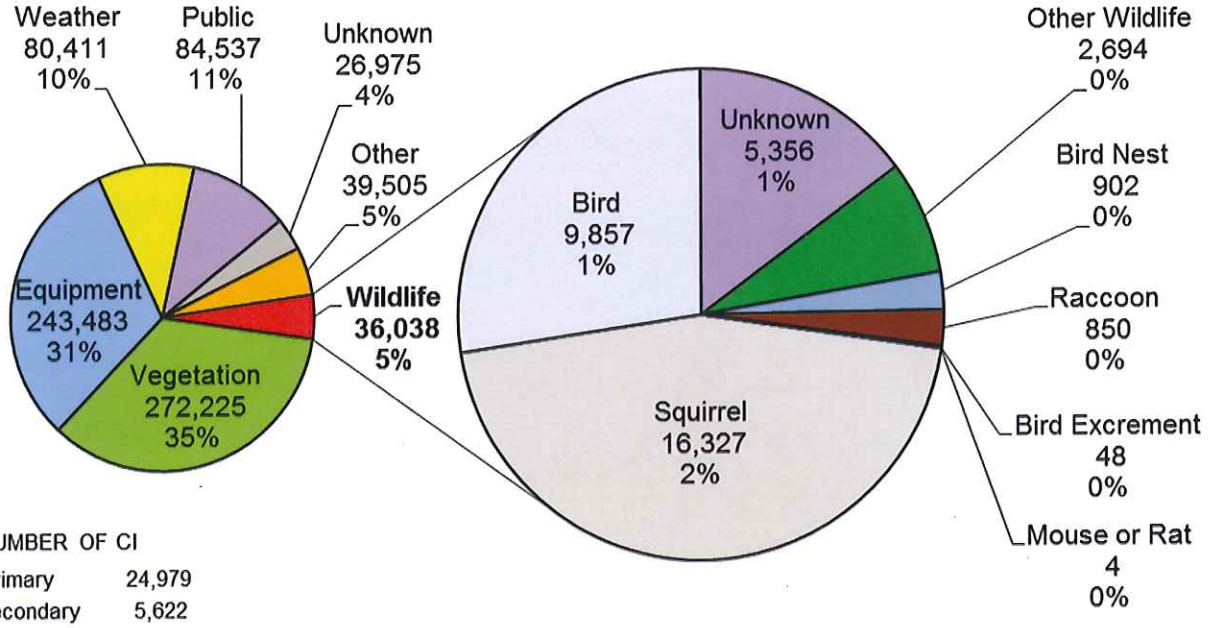
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES



FIVE YEAR OUTAGE CAUSES - WILDLIFE



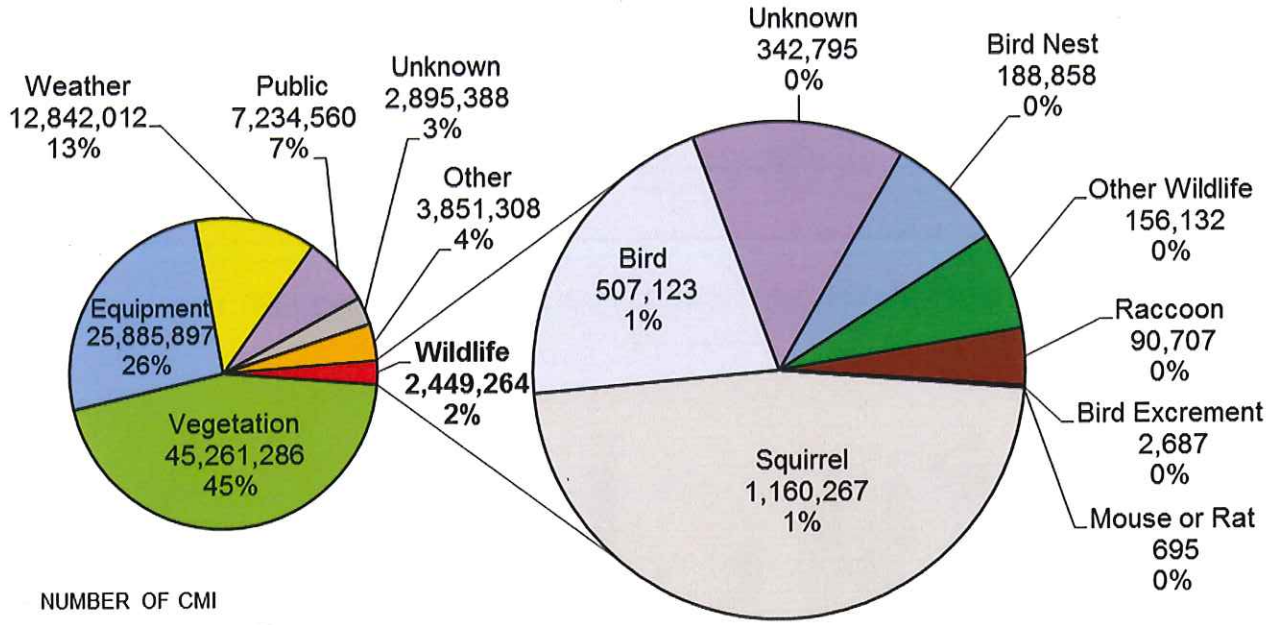
2015 OUTAGE CAUSES - WILDLIFE - CI



NUMBER OF CI

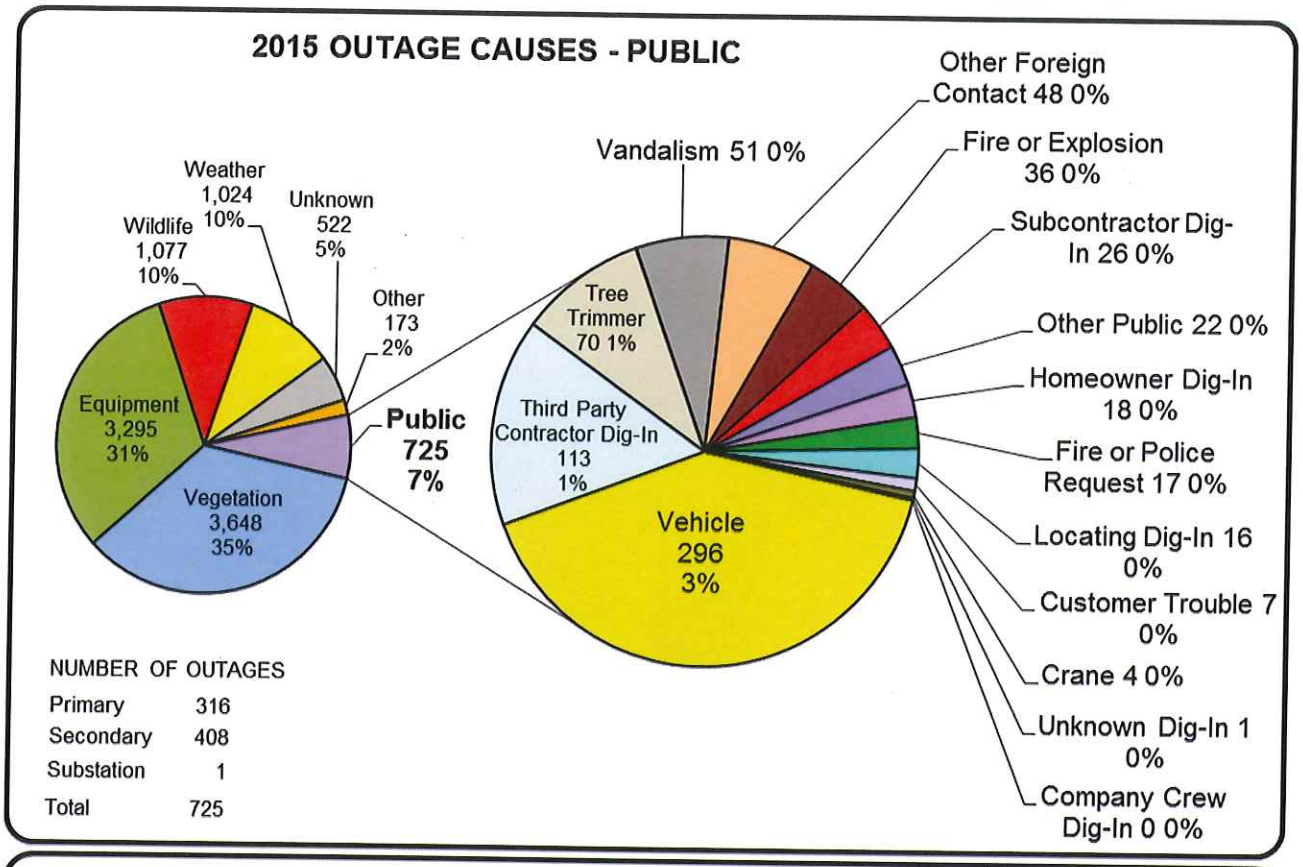
Primary	24,979
Secondary	5,622
Substation	5,437
Total	36,038

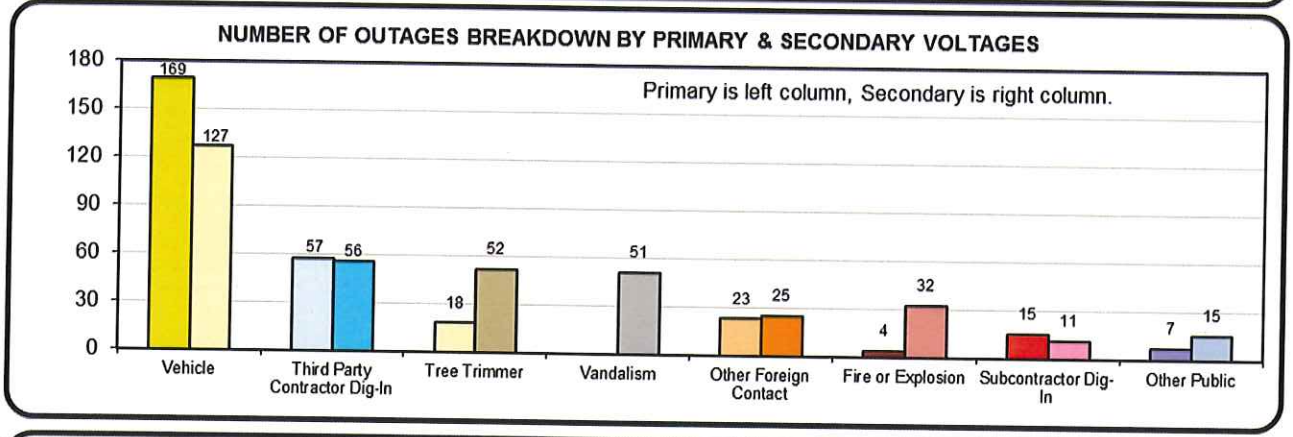
2015 OUTAGE CAUSES - WILDLIFE - CMI

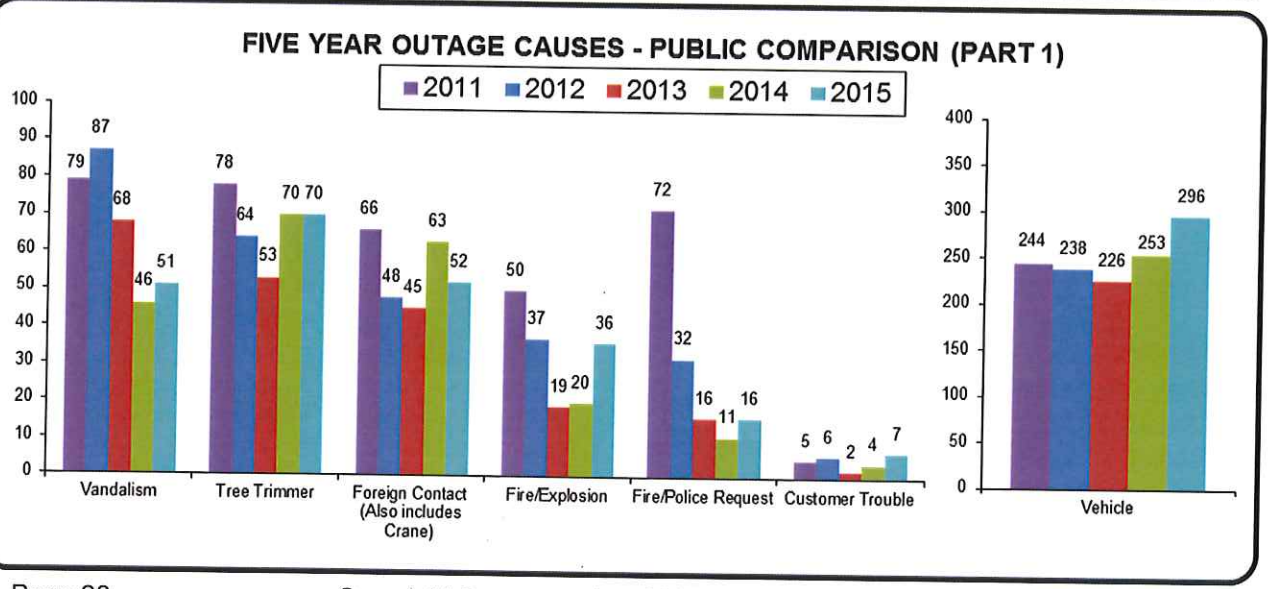


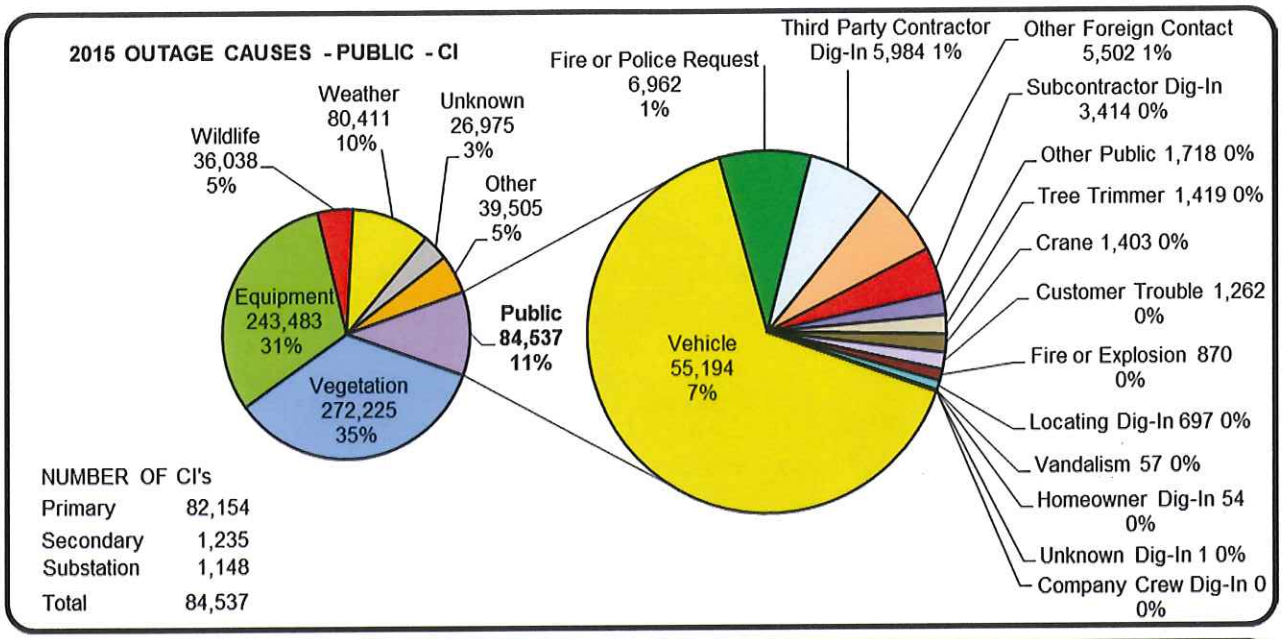
NUMBER OF CMI

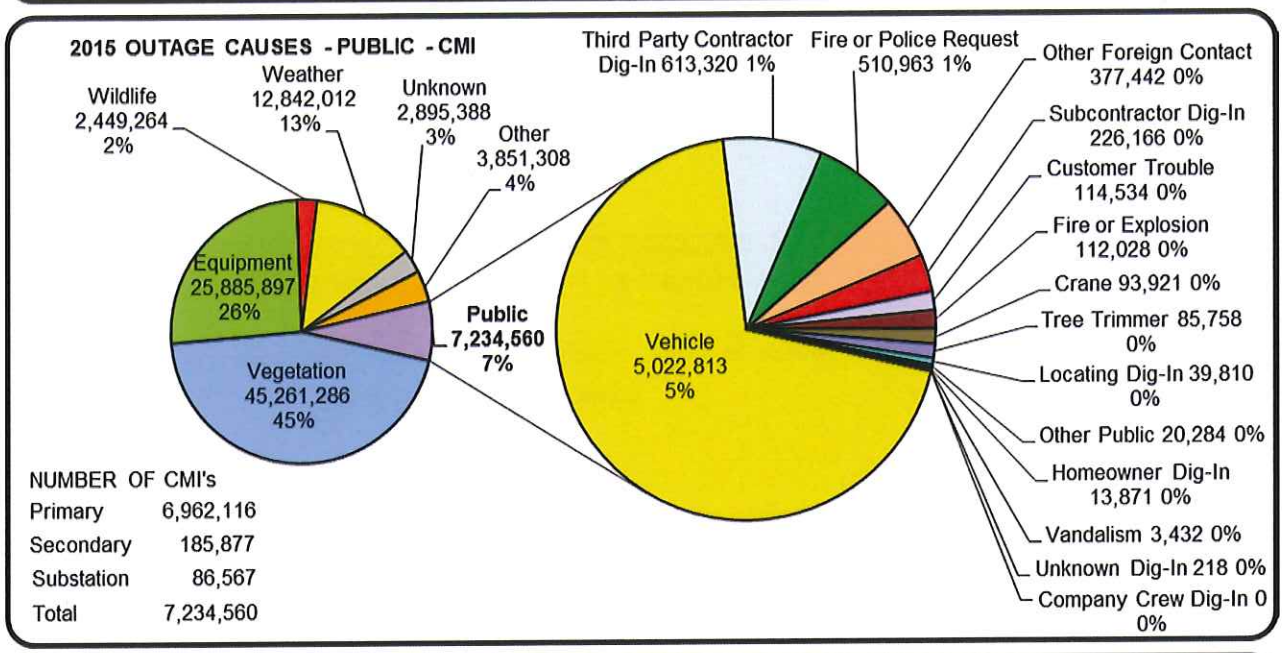
Primary	1,645,627
Secondary	318,008
Substation	485,629
Total	2,449,264

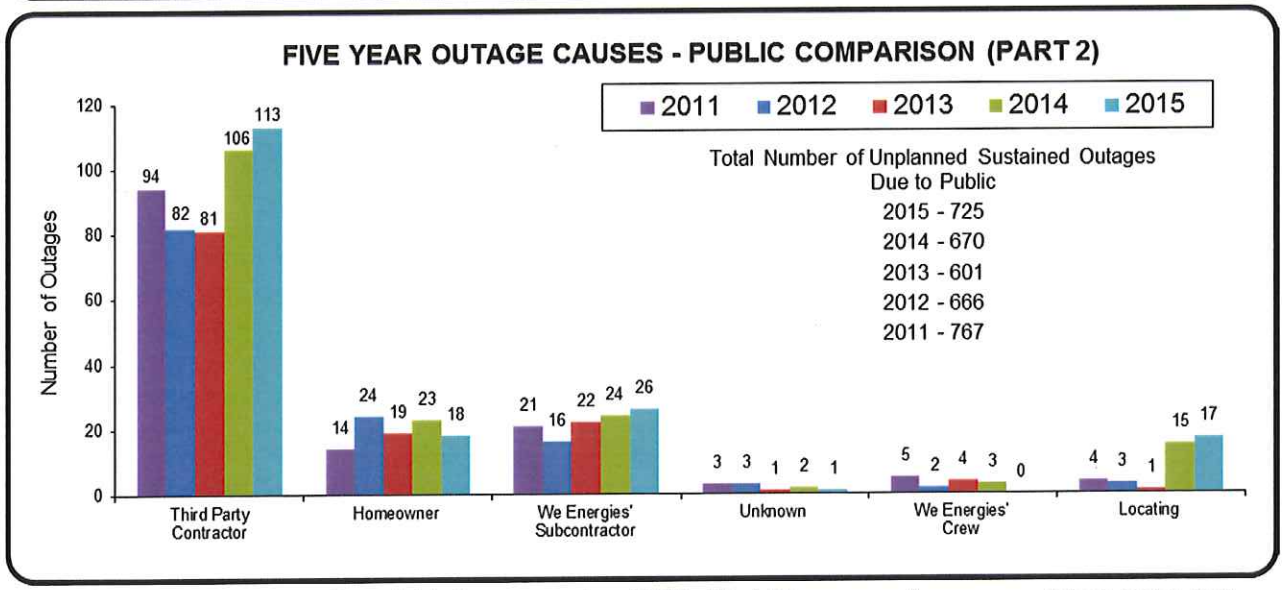




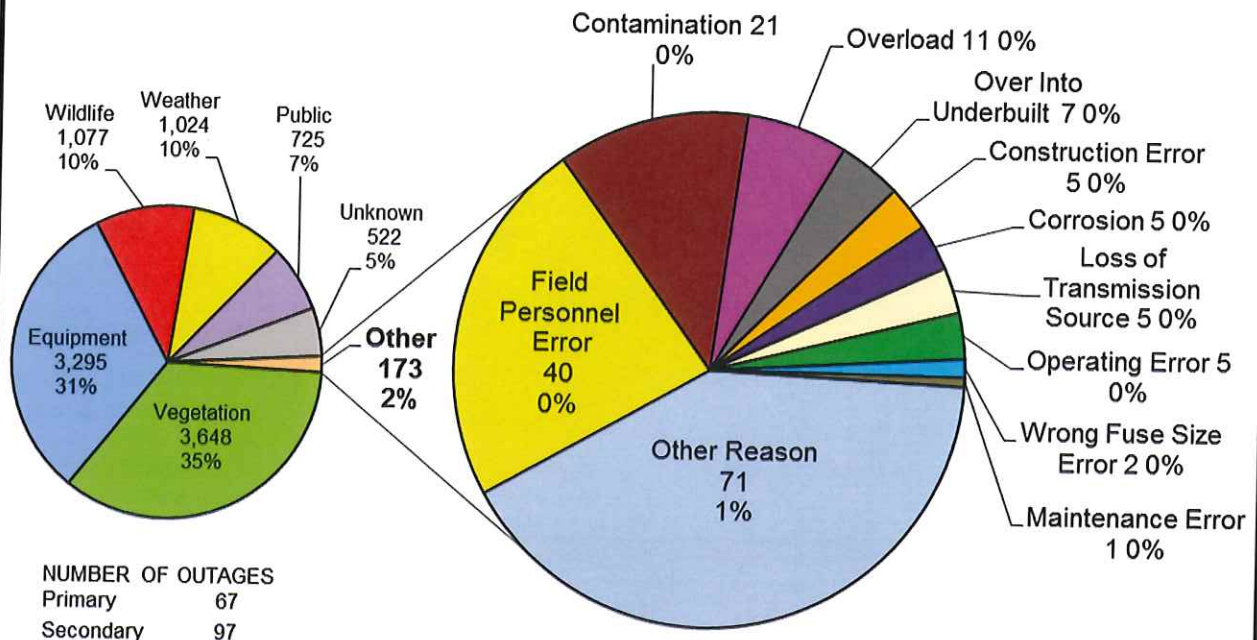








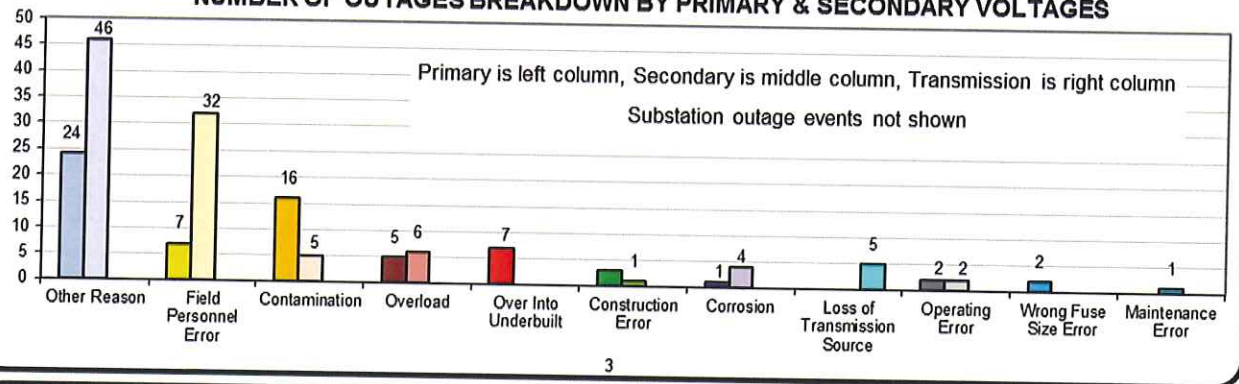
2015 OUTAGE CAUSES - OTHER



NUMBER OF OUTAGES

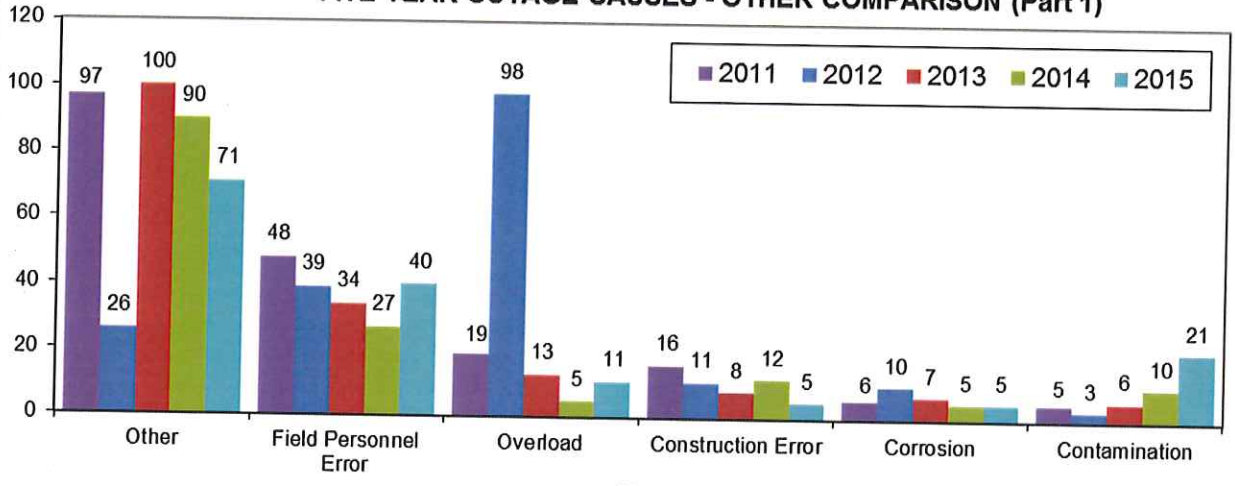
Primary	67
Secondary	97
Substation	4
Transmission	5
Total	173

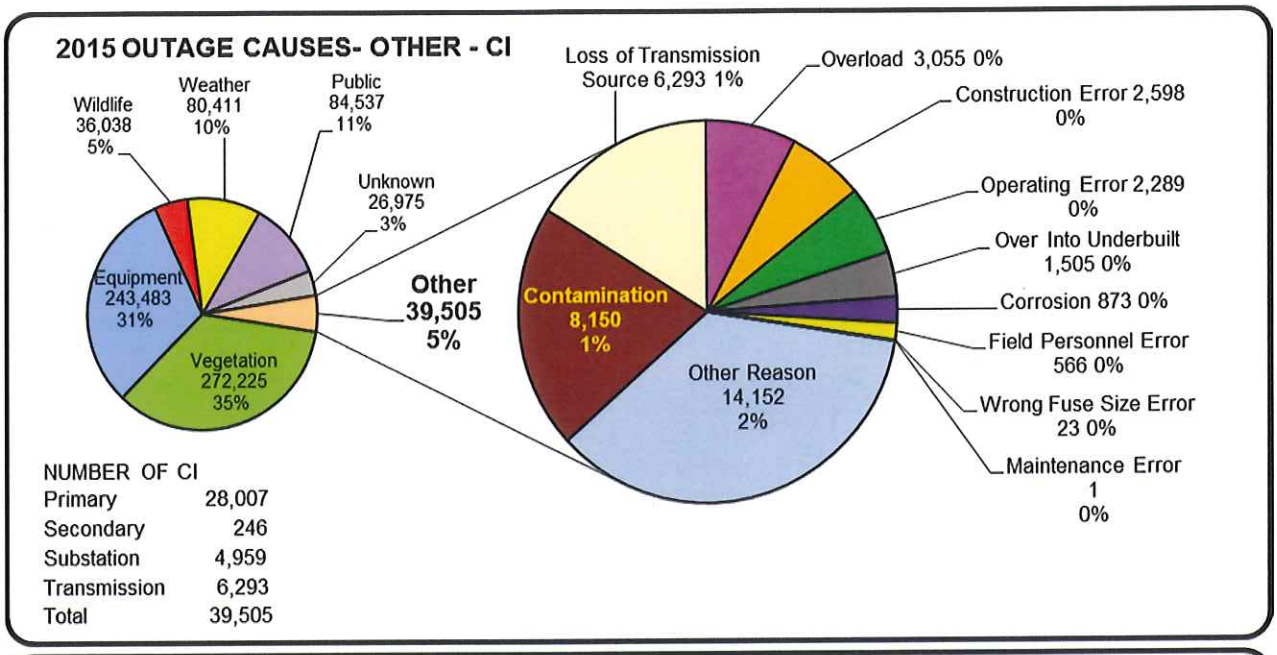
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES

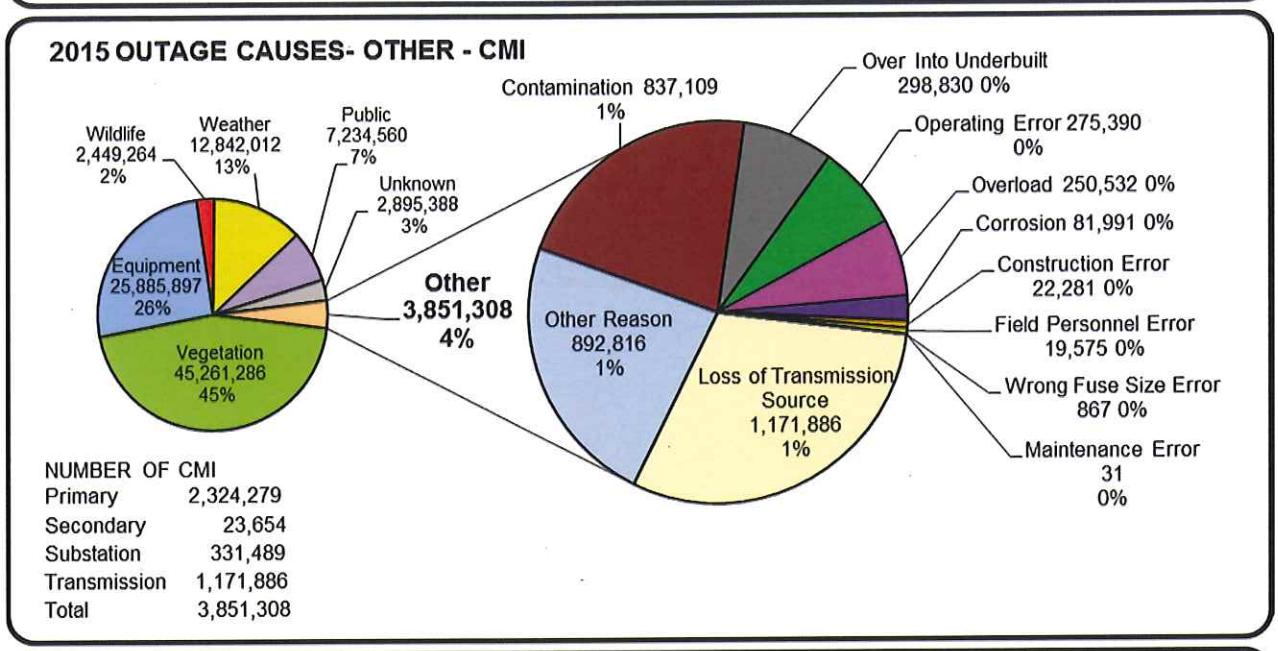


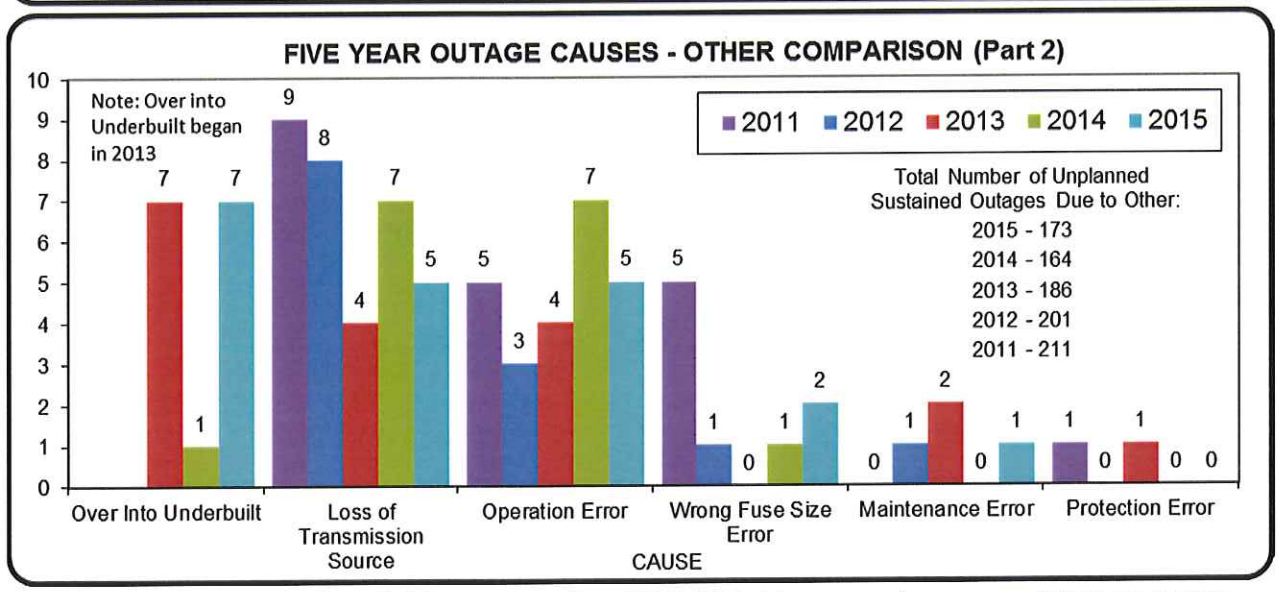
3

FIVE YEAR OUTAGE CAUSES - OTHER COMPARISON (Part 1)

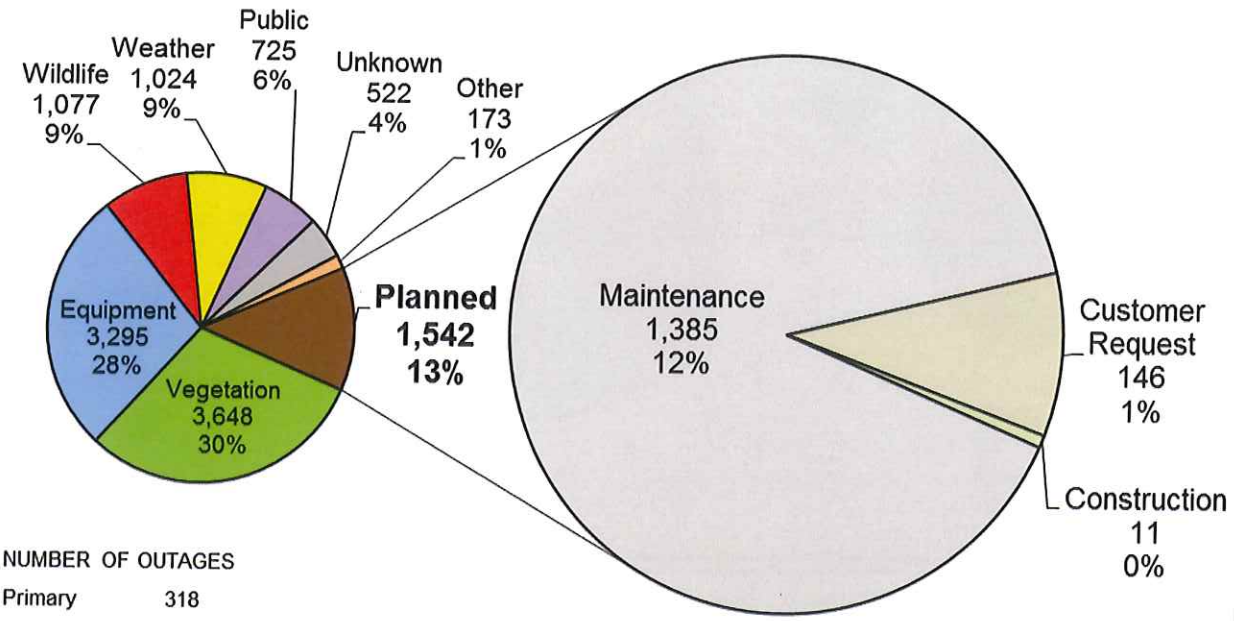






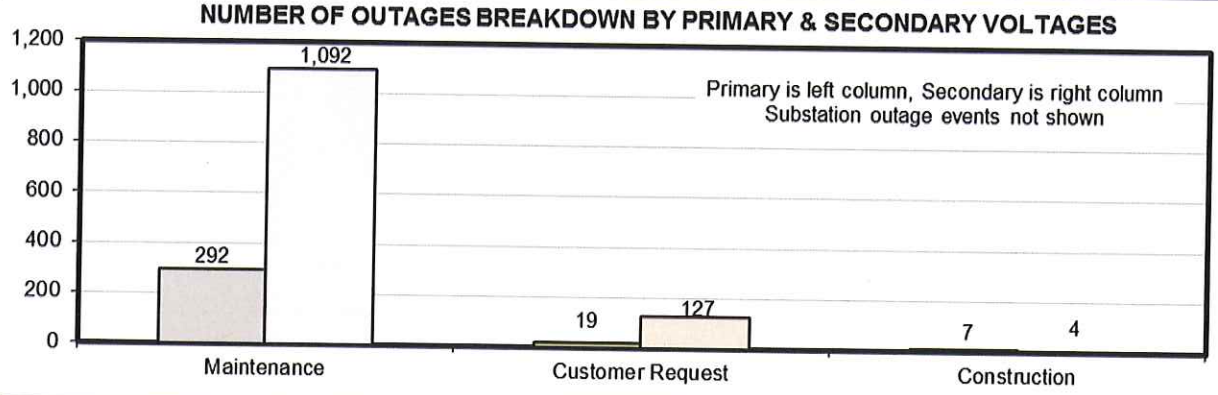


2015 OUTAGE CAUSES - PLANNED

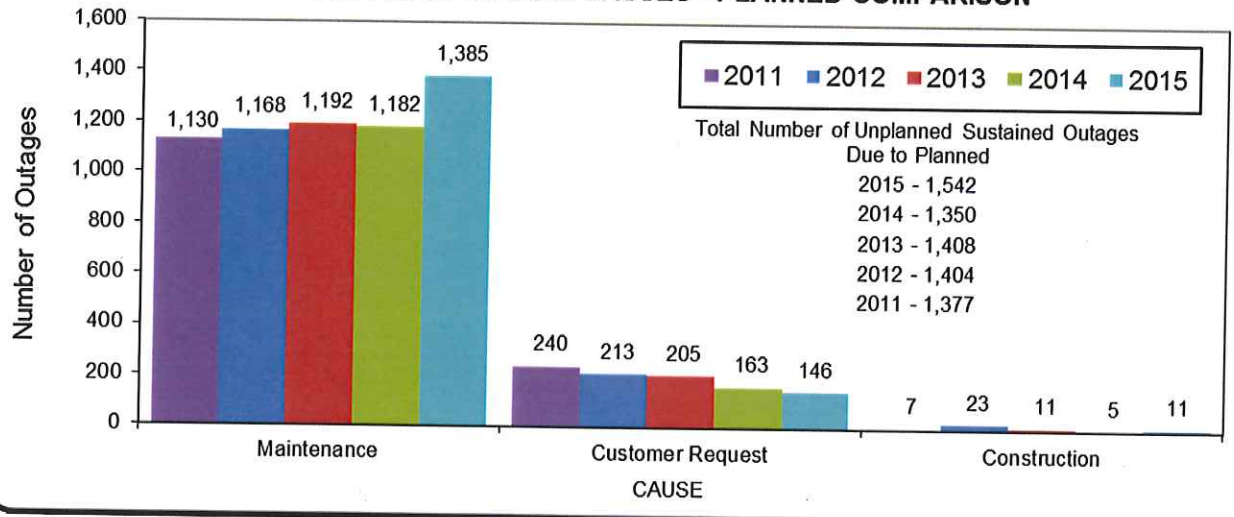


NUMBER OF OUTAGES	
Primary	318
Secondary	1,223
Substation	1
Total	1,542

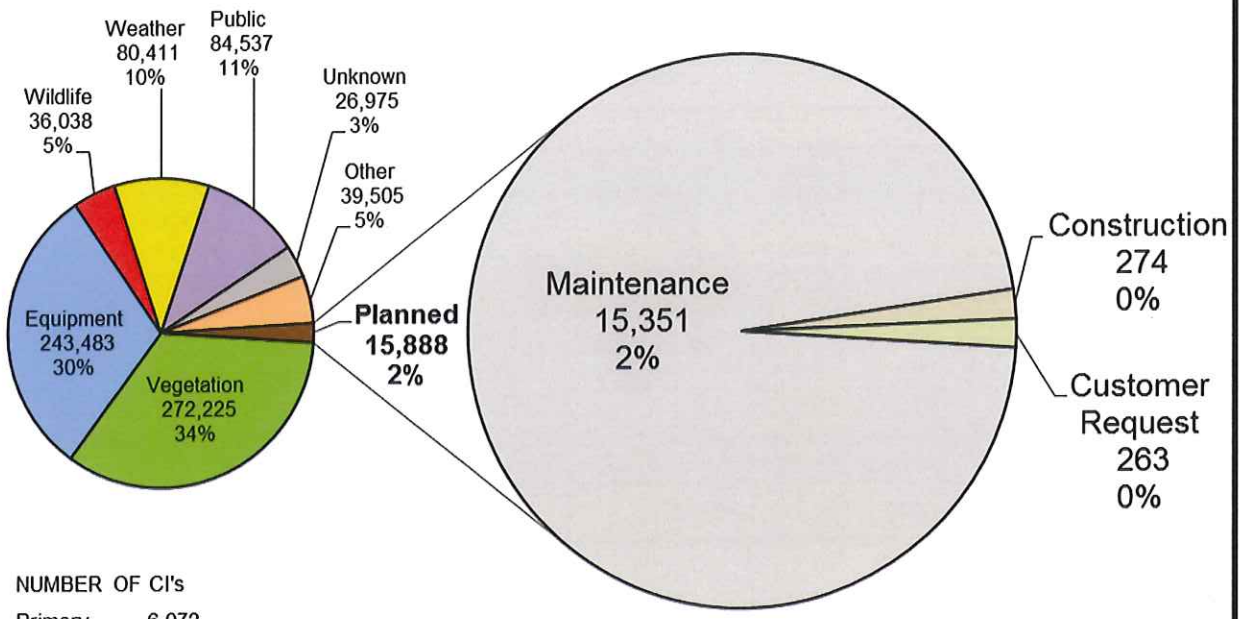
NUMBER OF OUTAGES BREAKDOWN BY PRIMARY & SECONDARY VOLTAGES



FIVE YEAR OUTAGE CAUSES - PLANNED COMPARISON

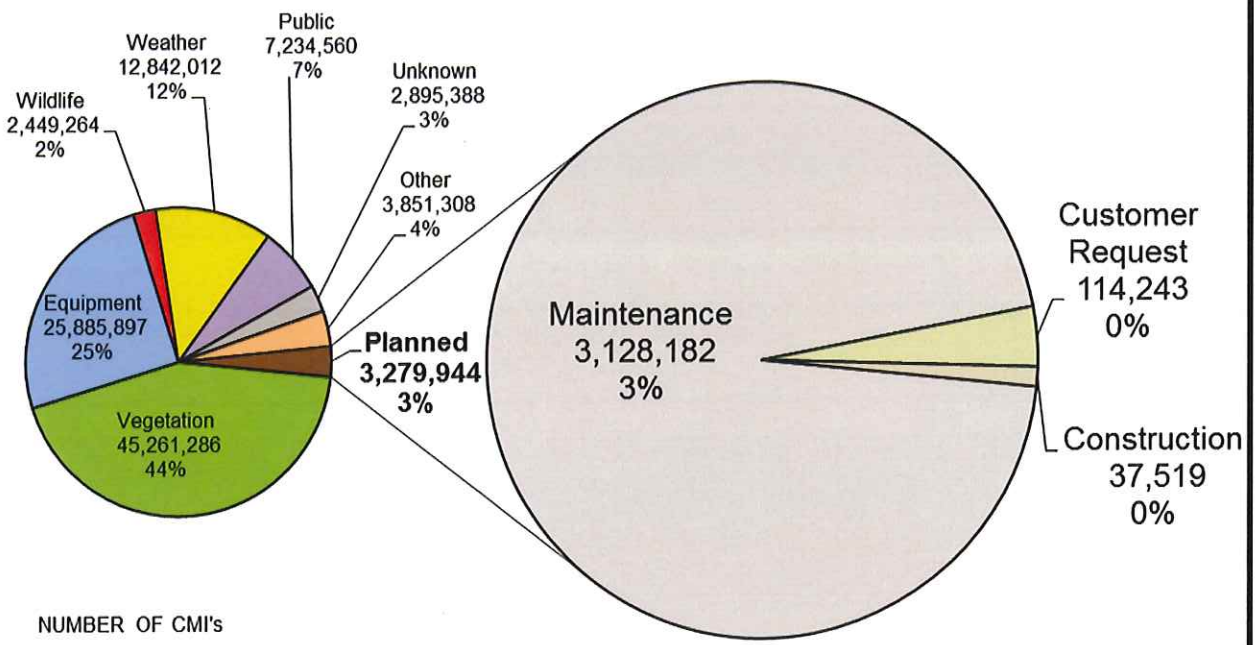


2015 OUTAGE CI - PLANNED



NUMBER OF CI's	
Primary	6,072
Secondary	6,461
Substation	3,355
Total	15,888

2015 OUTAGE CMI - PLANNED



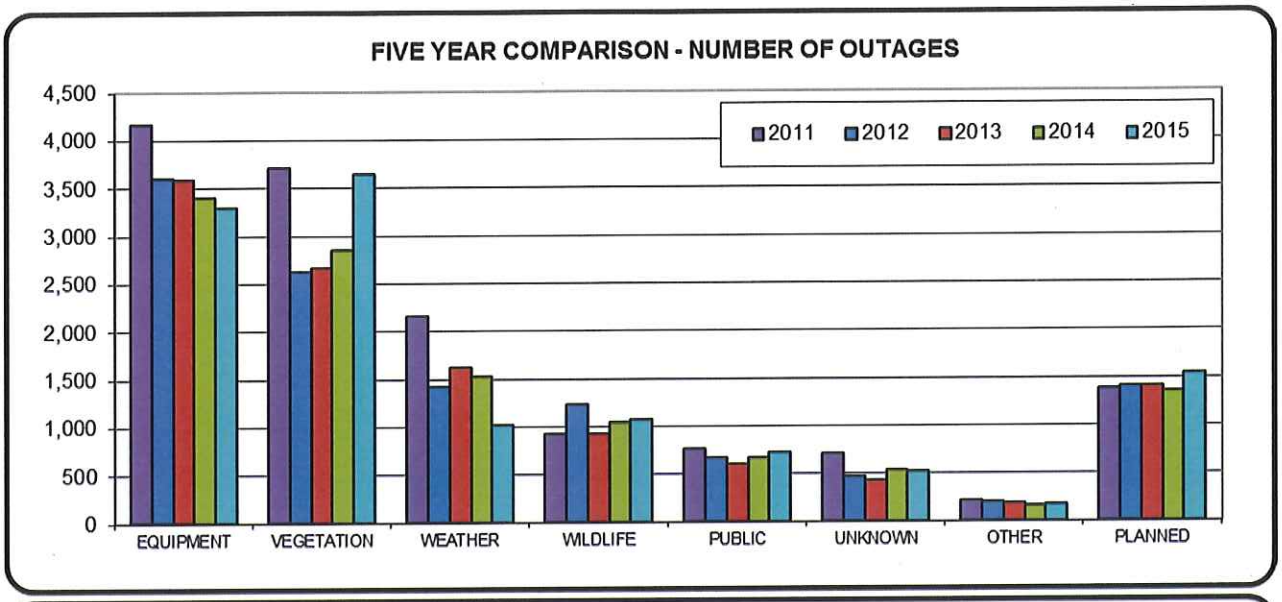
NUMBER OF CMI's	
Primary	1,441,604
Secondary	1,536,390
Substation	301,950
Total	3,279,944

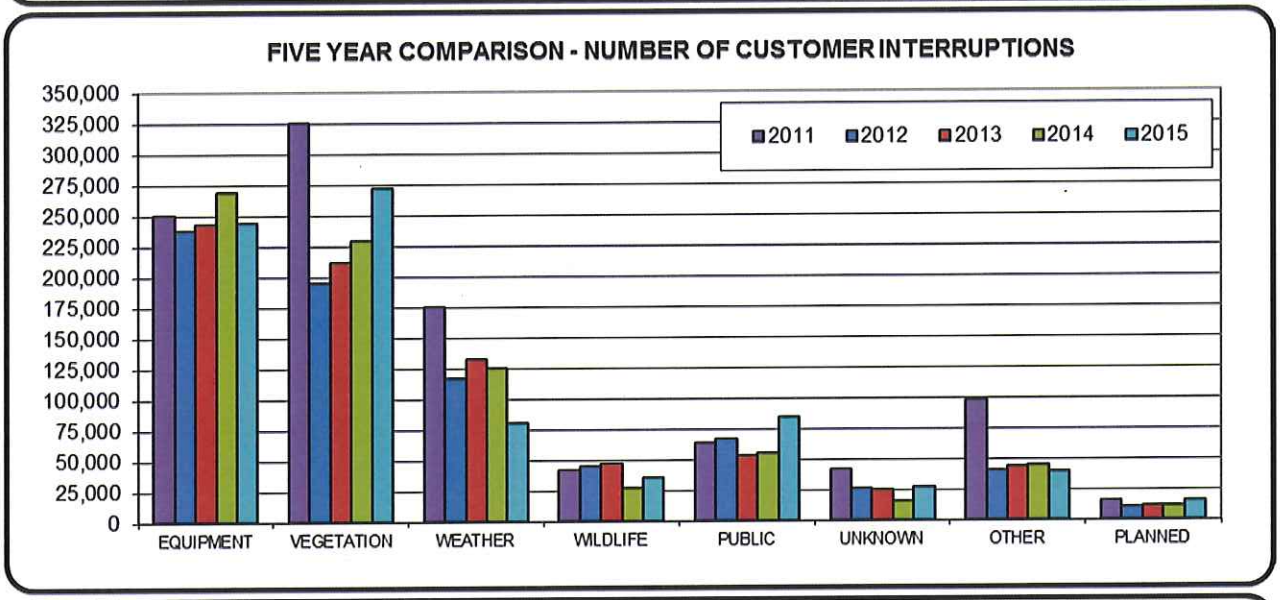
We Energies Five Year Cause Comparison

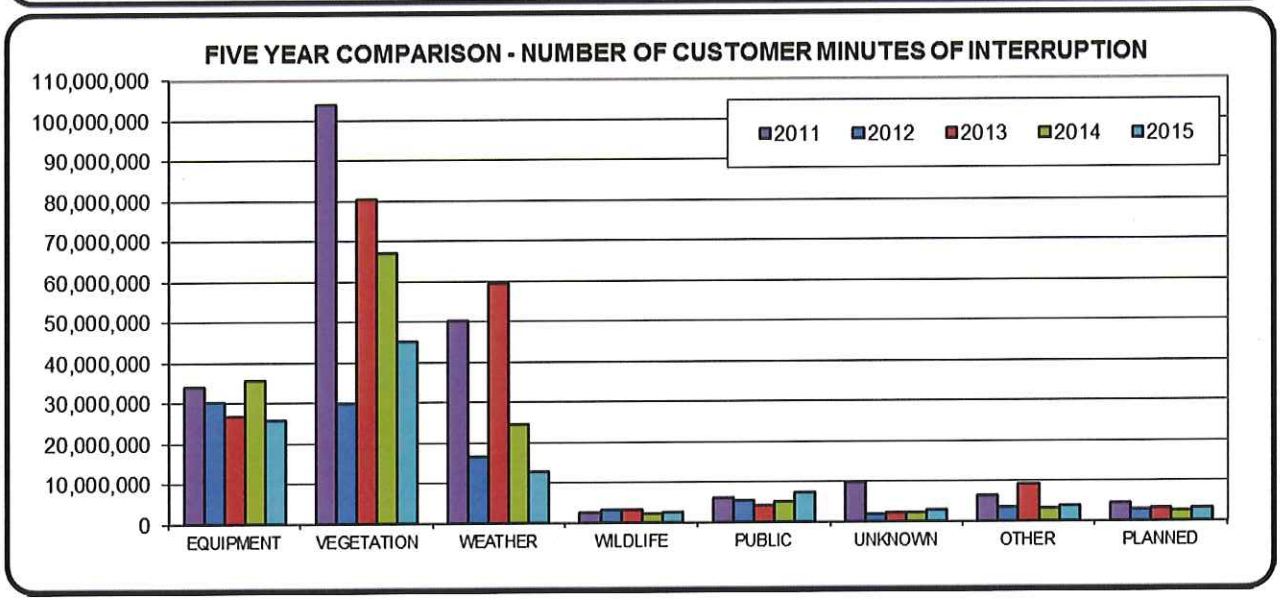
	NUMBER OF OUTAGES (followed by % of Total for each year)									
CAUSE CATEGORY	2011		2012		2013		2014		2015	
EQUIPMENT	4,172	30%	3,606	31%	3,590	31%	3,409	29%	3,295	27%
VEGETATION	3,710	26%	2,626	23%	2,672	23%	2,851	25%	3,648	30%
WEATHER	2,153	15%	1,425	12%	1,623	14%	1,531	13%	1,024	9%
WILDLIFE	921	7%	1,231	11%	923	8%	1,048	9%	1,077	9%
PUBLIC	767	5%	666	6%	601	5%	670	6%	725	6%
UNKNOWN	709	5%	470	4%	426	4%	537	5%	522	4%
OTHER	211	2%	201	2%	186	2%	165	1%	173	1%
PLANNED	1,377	10%	1,407	12%	1,412	12%	1,353	12%	1,542	13%
TOTAL	14,020		11,632		11,433		11,564		12,006	

	NUMBER OF CUSTOMER INTERRUPTIONS (followed by % of Total for each year)									
CAUSE CATEGORY	2011		2012		2013		2014		2015	
EQUIPMENT	250,291	25%	237,544	32%	242,799	32%	268,534	34%	243,483	30%
VEGETATION	325,448	32%	194,662	26%	211,363	27%	229,103	29%	272,225	34%
WEATHER	175,604	17%	117,231	16%	132,827	17%	125,417	16%	80,411	10%
WILDLIFE	42,234	4%	44,556	6%	47,461	6%	27,684	4%	36,038	5%
PUBLIC	64,027	6%	66,974	9%	53,714	7%	55,776	7%	84,537	11%
UNKNOWN	41,800	4%	25,926	4%	25,348	3%	15,835	2%	26,975	3%
OTHER	97,934	10%	41,202	6%	44,163	6%	44,898	6%	39,505	5%
PLANNED	16,184	2%	10,746	1%	11,967	2%	11,383	1%	15,888	2%
TOTAL	1,013,522		738,841		769,642		778,630		799,062	

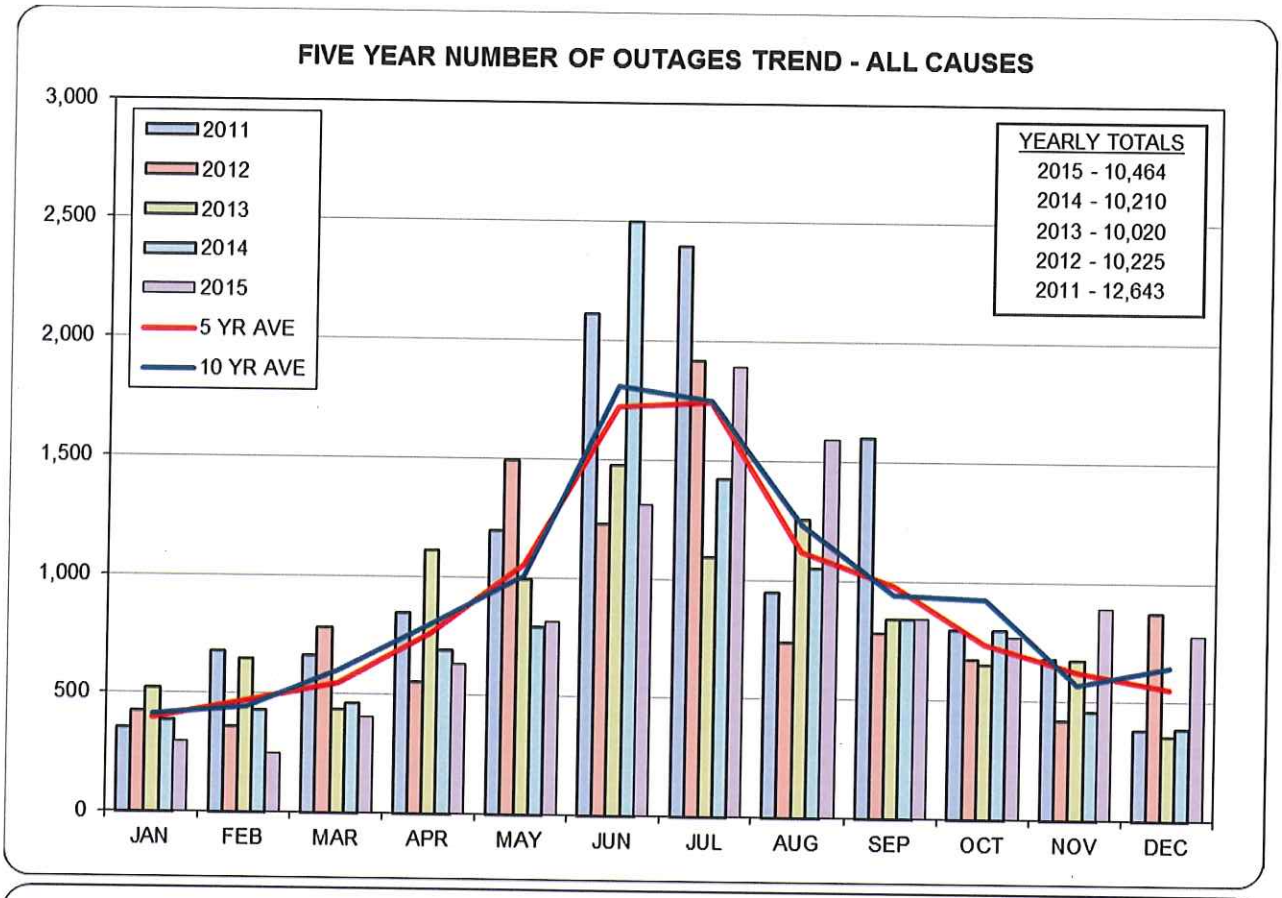
	NUMBER OF CUSTOMER MINUTES OF INTERRUPTION (followed by % of Total for each year)									
CAUSE CATEGORY	2011		2012		2013		2014		2015	
EQUIPMENT	34,177,410	16%	30,255,048	32%	26,769,238	14%	35,639,458	25%	25,885,897	25%
VEGETATION	103,757,103	48%	29,944,944	32%	80,358,995	43%	67,034,915	47%	45,261,286	44%
WEATHER	50,346,441	23%	16,435,039	18%	59,368,992	31%	24,556,365	17%	12,842,012	12%
WILDLIFE	2,727,028	1%	3,121,469	3%	3,110,703	2%	2,357,995	2%	2,449,264	2%
PUBLIC	5,973,798	3%	5,390,619	6%	4,271,295	2%	5,248,665	4%	7,234,560	7%
UNKNOWN	9,912,176	5%	1,879,309	2%	2,390,236	1%	2,131,924	1%	2,895,388	3%
OTHER	6,554,928	3%	3,566,036	4%	9,361,700	5%	3,223,916	2%	3,851,308	4%
PLANNED	4,402,358	2%	2,849,353	3%	3,085,600	2%	2,641,961	2%	3,279,944	3%
TOTAL	217,851,242		93,441,817		188,716,759		142,835,199		103,699,659	

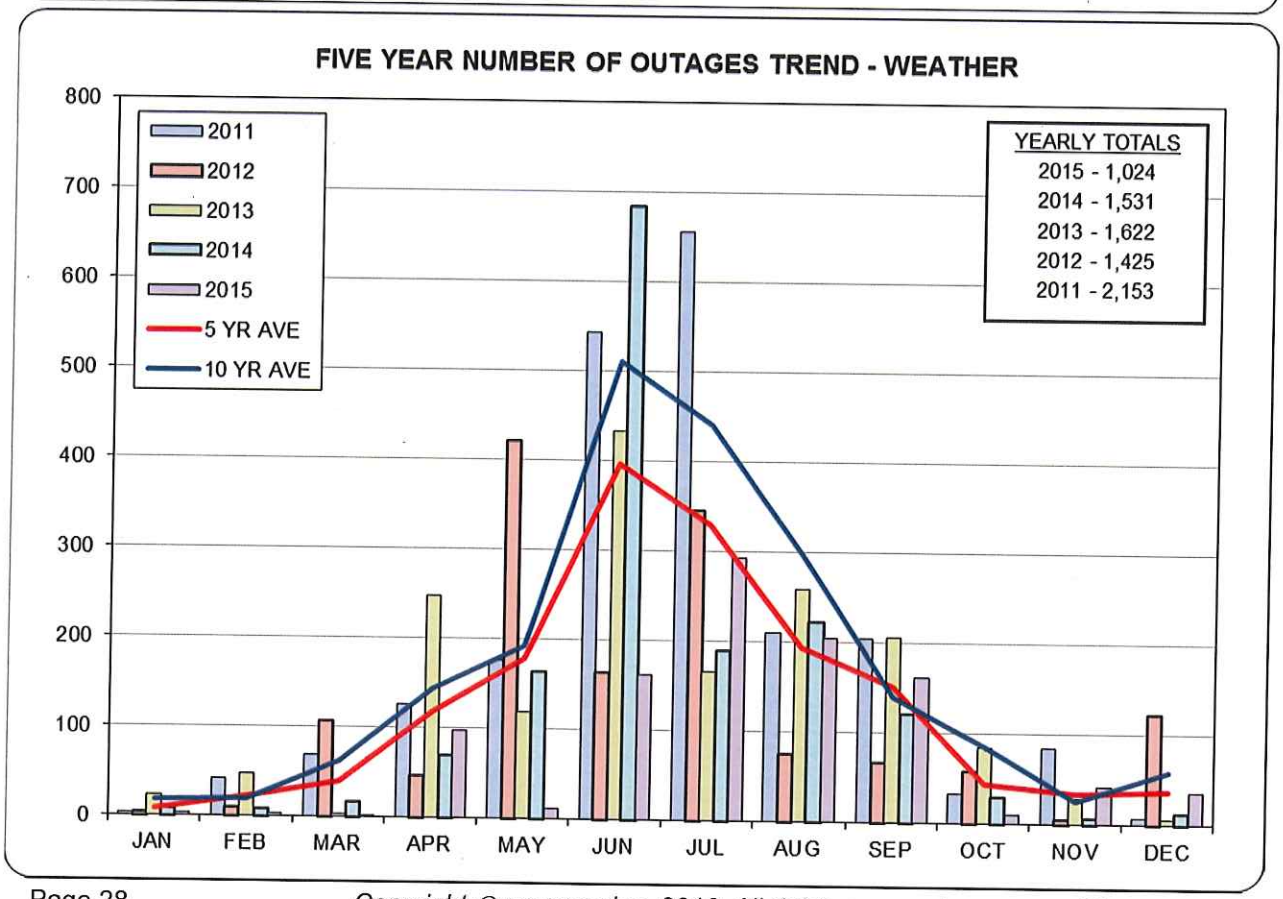




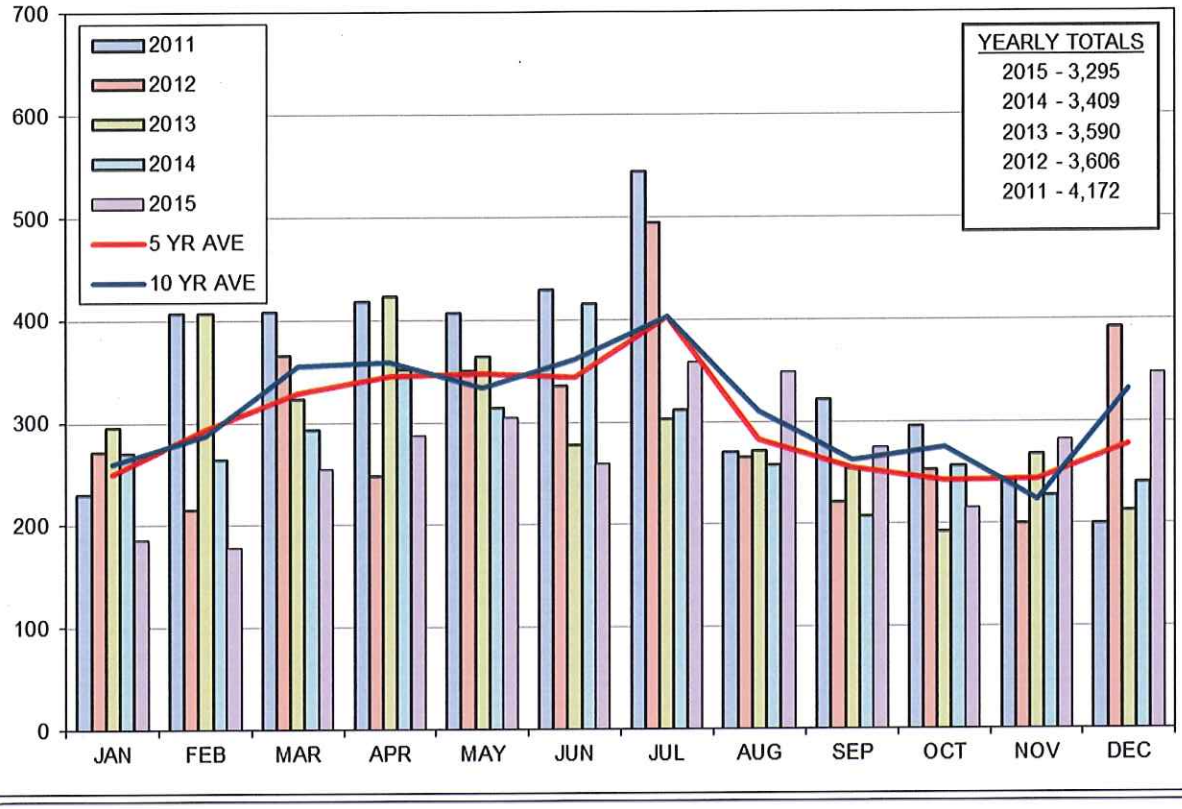


IV. MONTHLY OUTAGE TRENDS

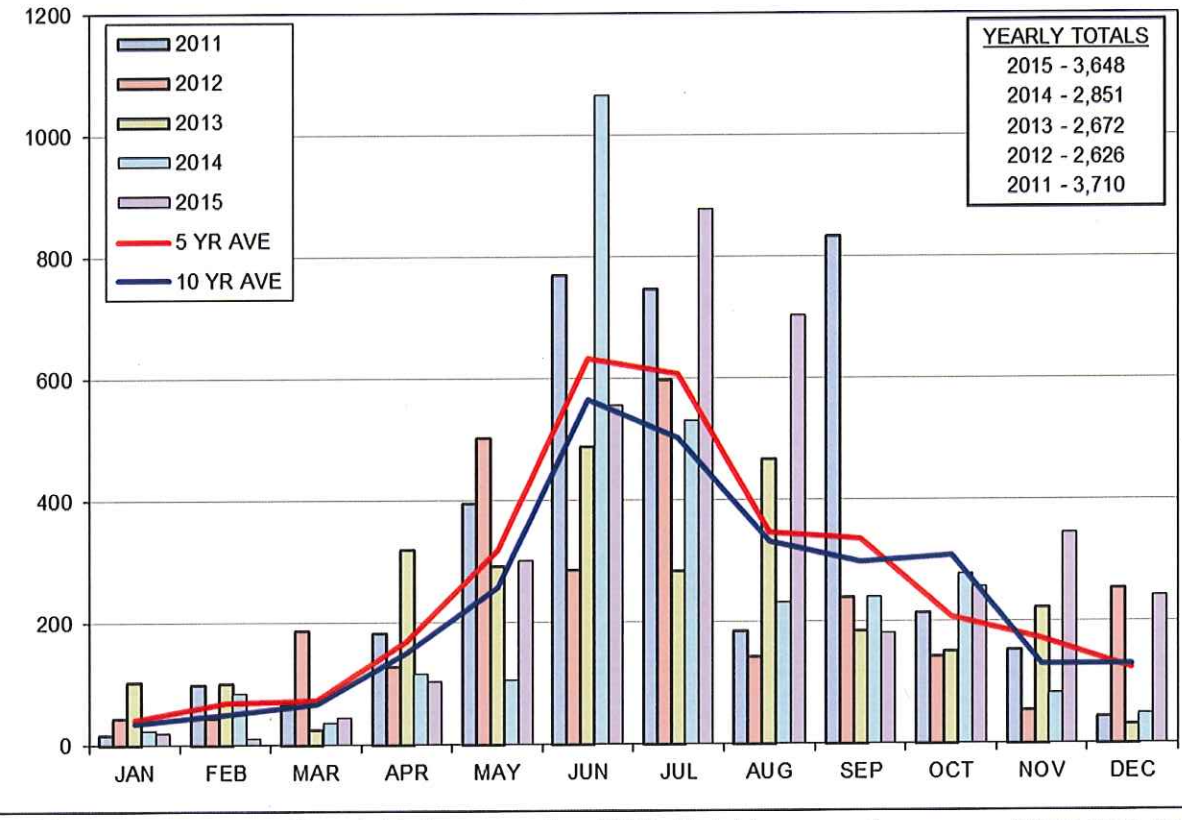


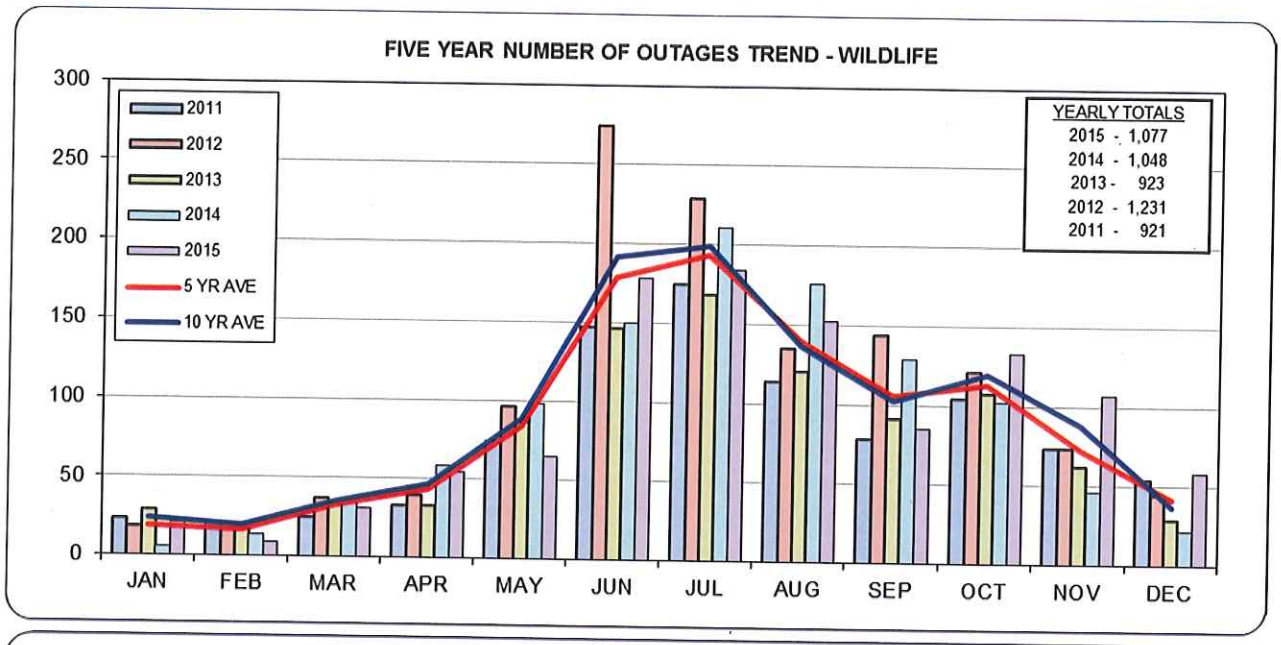


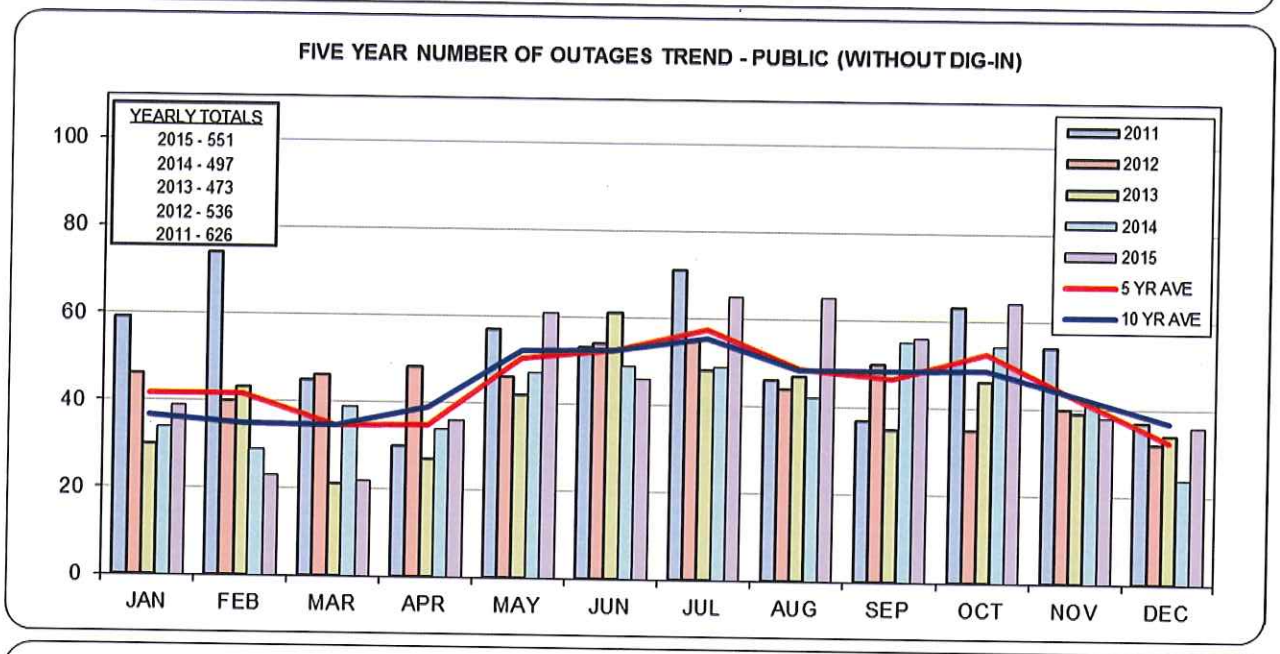
FIVE YEAR NUMBER OF OUTAGES TREND - EQUIPMENT FAILURE / DETERIORATION

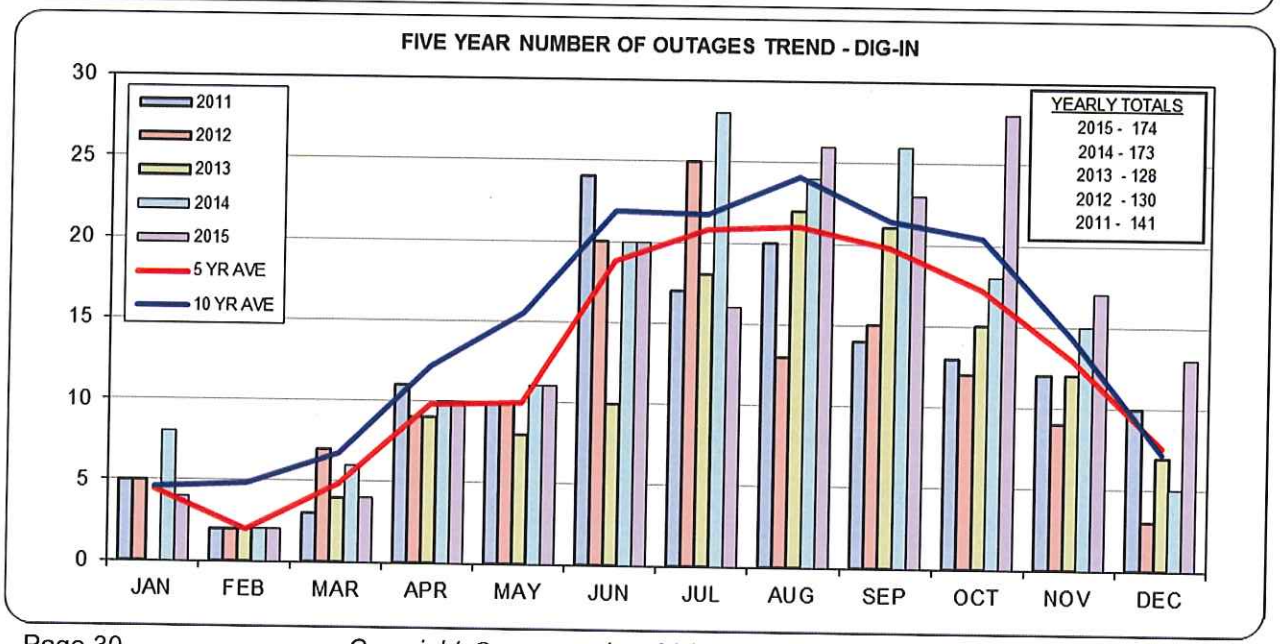


FIVE YEAR NUMBER OF OUTAGES TREND - VEGETATION









V. RELIABILITY IMPROVEMENT

This section summarizes the reliability improvement work completed in 2015, results, and future efforts. Programs to address system reliability issues have been in place since the mid-1990s, and include the Top Feeder Program and various equipment targeted initiatives. Efforts focused on improving customer satisfaction through CAIDI reduction began in 2003.

Top Feeder Program

The Top Feeder Program (TFP) has been a key reliability program since 1998, addressing approximately 100-150 circuits each year. Criteria for selecting TFP circuits have been agreed to with the Wisconsin PSC, and include SAIFI, SAIDI, and Number of Customer Complaints, along with Operating, Customer Service, and Area input. Customer Minutes of Interruption was added as a criterion in 2003 to identify feeders for Faulted Circuit Indicator application. The TFP focuses on analyzing reliability performance and outage causes, conducting field patrols to identify improvements and design issues, and completing most field remediation and forestry prior to storm season.

The 2015 Top Feeder Program included 104 circuits selected based on their fourth quarter 2013 through third quarter 2014 performance. Remediation included forestry work, installation of lightning arresters and faulted circuit indicators, tap fuse additions or cutout replacements, hardware repairs and applications of wildlife protection. All of these items are associated with improving feeder reliability performance. The majority of the remediation work was completed in the field prior to the start of the 2015 storm season.

Other Reliability Efforts

In addition to the TFP program, other efforts undertaken in 2015 to improve system reliability included:

- Completed the Barton 8 kV and Calumet 8kV Targeted Reliability Improvement Project (TRIP), which included seven SCADA line reclosers (SVRs). This project applies new distribution automation guidelines to mature areas of our system. Reliability performance is being tracked to validate expected improvements.
- In 2015, predictive reliability studies were completed for the 13.2 kV system served by Shorewood Substation. Recommendations included additional SVRs and remote communicating FCIs. In 2016 work continues to define the targeted reliability project that will be constructed through 2017.
- Continued annual recloser and breaker operations count program, completing analysis, patrols, and field remediation as appropriate to address momentary outages.
- Piloted the use of S&C Trip Saver II. This drop-out recloser fits in a cutout, and if successful could provide a cost effective option to reduce sustained outages.

Results and Future Efforts

While the 2015 Blue Sky CAIDI of 92 minutes did not meet the goal of ≤85 minutes, there was improvement over previous years. The Major Storm CAIDI performance of 191 minutes met the goal of ≤200 minutes.