Illinois Commerce Commission

Assessment of Commonwealth Edison Company

Reliability Report and Reliability Performance

for Calendar Year 2013

Pursuant to 83 Ill. Adm. Code 411.140

May 7, 2015

1. Executive Summary

Commonwealth Edison Company ("ComEd") prepared and filed its "2013 Electric Power Delivery Reliability Report" ("Reliability Report") by Friday, June 1, 2014, in compliance with Section 16-125 of the Public Utilities Act ("Act") and the Illinois Commerce Commission's ("Commission's") electric reliability rules as found in 83 Illinois Administrative Code, Part 411.

The Staff Assessment Report ("Report") includes five significant areas: Historical Performance Relative to Targets, Analysis of ComEd's Year 2013 Reliability Performance, Trends in ComEd's Reliability Performance, ComEd's Plan to Maintain or Improve Reliability, and Potential Reliability Problems and Risks. These are sections 5 through 9 of the Report.

The number of customers who exceeded Service Reliability Targets three years consecutively decreased 76% from 18,379 in 2012 to 4,269 in 2013 (see Section 5).

ComEd reported a 17% decrease in animal-related interruptions, 27% decreases in weather-related interruptions and a 18% decrease in tree-related interruptions in 2013 (see Section 6).

The 2013 four-year rolling average for ComEd system SAIFI continues its downward trend since 2008 while ComEd system CAIDI rolling average continues its upward trend since 2005 (see Sections 7 and 9 as well as Figures 22 and 15).

Substation Corrective Maintenance Backlogs illustrated in Figure 42 continues to decline from 2010 (Section 9).

Undoubtedly, intense storm activity will stress the electric distribution infrastructure and expose any weaknesses or shortfalls in material conditions, maintenance, and the quality of vegetation management (see Section 9). In the field, Staff observed vegetation making contact with and/or threatening ComEd's overhead electric distribution lines and equipment (see Pictures 1 through 4 as well as the Appendix). This is not consistent with Illinois Administrative Code 305.20:

> Trees that may interfere with ungrounded supply conductors should be trimmed or removed. *NOTE:* Normal tree growth, the combined movement of trees and conductors under adverse weather conditions, voltage, and sagging of conductors at elevated temperatures are among the factors to be considered in determining the extent of trimming required.

Trees should never interfere, i.e., touch, nor threaten circuit primaries during normal or adverse weather conditions during any part of the 4-year trim cycle.

Additionally, Staff observed in the field where trees formed an overhead canopy above ComEd's overhead electric distribution lines and equipment. In many cases, though the overhead canopy was trimmed well away from the primaries, overhead canopies still present a significant reliability concern during adverse weather conditions (such as high winds, early wet snows, and heavy ice storms). Studies have shown that by removing overhead canopies above primaries, restoration times can be cut nearly in half[1] after an adverse weather event.

[1] S. Guggenmoos, "Increased Risk of Electric Service Interruption Associated with Tree Branches Overhanging Conductors. UAA Quarterly, 15(4), Fall 2007, S. Guggenmoos, "Storm Hardening the Electric System Against Tree-caused Service Interruptions. T&D World, Vol. 1, No. 12, Nov 18, 2010.

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2. Introduction

Beginning with the year 1999, and at least every three years thereafter, Section 16-125(d) of the Act and 83 Ill. Adm. Code 411.140 ("Part 411.140") require the Commission to assess the annual reliability report of each jurisdictional entity ("utility") and evaluate its reliability performance. Part 411.140 requires the Commission to:

A) Assess the reliability report of each utility.

B) Assess the utility's historical performance relative to established reliability targets.

C) Identify trends in the utility's reliability performance.

D) Evaluate the utility's plan to maintain or improve reliability.

E) Include specific identification, assessment, and recommendations pertaining to any potential reliability problems and risks that the Commission has identified because of its evaluation.

F) Include a review of the utility's implementation of its plan for the previous reporting period.

This document assesses ComEd's "2013 Electric Power Delivery Reliability Report" ("Reliability Report"), filed by June 1, 2014, and evaluates ComEd's reliability performance.

In producing this document, Staff relies on everything that may come to light during the review period up to the date of this document, in addition to the Reliability Report itself.

3. ComEd's 2013 Customer Base and Service Territory

ComEd provides electric service to roughly 3.9 million customers. ComEd's service territory encompasses over 400 municipalities in northern Illinois, including the City of Chicago.

4. ComEd's Electric Distribution System

Part 411.120(b)(3)(G) states that the utility is to report on the age, current condition, reliability and performance of its existing distribution and transmission system. To comply with the requirement that a utility report on the age of its existing distribution and transmission systems, ComEd provided age data on various types of equipment. The age data reported for the equipment included information on the median age, age distribution, and quantity by age. Table 1 lists the median age of some of the equipment that ComEd reported in its last five reports (2009 through 2013).

Table 1 Median Age (in years) of Typical Equipment

	2009	2010	2011	2012	2013
Lightning arresters					
Distribution	16	17	17	18	19
Transmission	7	8	9	*10*	*11*
Substation	10	10	11	*Note 1*	*10*
Underground cables	18	19	19	20	20
Direct Buried	16	16	17	17	18
Cables in Conduit	22	22	23	24	24
Conductors					
Distribution Copper & Other	57	58	59	60	61
Distribution Aluminum	35	36	37	38	38
Transmission	39	40	41	42	43
Poles & Towers *Note 2*					
Distribution (mostly wood)	41	42	43	44	44
Transmission Steel poles	29	30	31	32	33
Transmission Wood poles	42	43	44	45	46
Transmission Towers	43	44	45	46	47
Distribution crossarms	34	34	34	35	35
Meters	11	12	12	13	13
Distribution transformers	16	17	17	17	17
Substation Transformers	32	33	33	35	36

Note 1: ComEd calculated the median age of Transmission and Substation Lightning Arrestors in Combination

Note 2: ComEd reported in 2013 that approximately 1.4 million Poles & Towers are used for distribution. The transmission system has a total of approximately 28 thousand poles & towers.

In Staff's opinion, the increasing median age of the existing equipment in service does not itself provide an indication of possible reduction in distribution or transmission system reliability performance. Some equipment, such as wooden distribution and transmission poles, deteriorate with age and require more intensive (i.e. more expensive) maintenance with each passing year to maintain original design capabilities while other older equipment (such as transformers) can continue to be robust if well maintained. A better determinant of future reliability performance is how regularly and consistently equipment is maintained. An increase in the number of interruptions due to equipment failures or malfunctions provides a stronger basis than age alone to determine if equipment is deteriorating and reducing the reliability of the electric system.

5. ComEd's Historical Performance Relative to Established Reliability Targets

83 Ill. Adm. Code 411.140(b)(4)(A-C) establishes electric service reliability targets that a utility must strive to meet. These targets specify limitations on customer interruptions as well as hours of interruption that a utility must strive

not to exceed on a per customer basis. 83 Ill. Adm. Code 411.120(b)(3)(L) requires each utility to provide a list of every customer, identified by a unique number, who experienced controllable interruptions in excess of the service reliability targets, the number of interruptions and interruption duration experienced in each of the three preceding years, and the number of consecutive years in which the customer has experienced interruptions in excess of the service reliability targets.

In April 2004, ComEd, along with all other regulated Illinois electric utilities, agreed to report on all interruptions (controllable and uncontrollable) in relation to the service reliability targets for the reporting periods of 2003 through 2007, and to include the specific actions, if any, that the utility took or planned to take to address the customer reliability concerns. In January 2008 and again in December 2012 ComEd and the other utilities agreed to extend the agreement through the 2012 and 2017 reporting periods, respectively. Figure 1 illustrates the total number of customers exceeding the reliability targets in 3 or more consecutive years since 2003 and shows a substantial drop in 2013 from 2012.

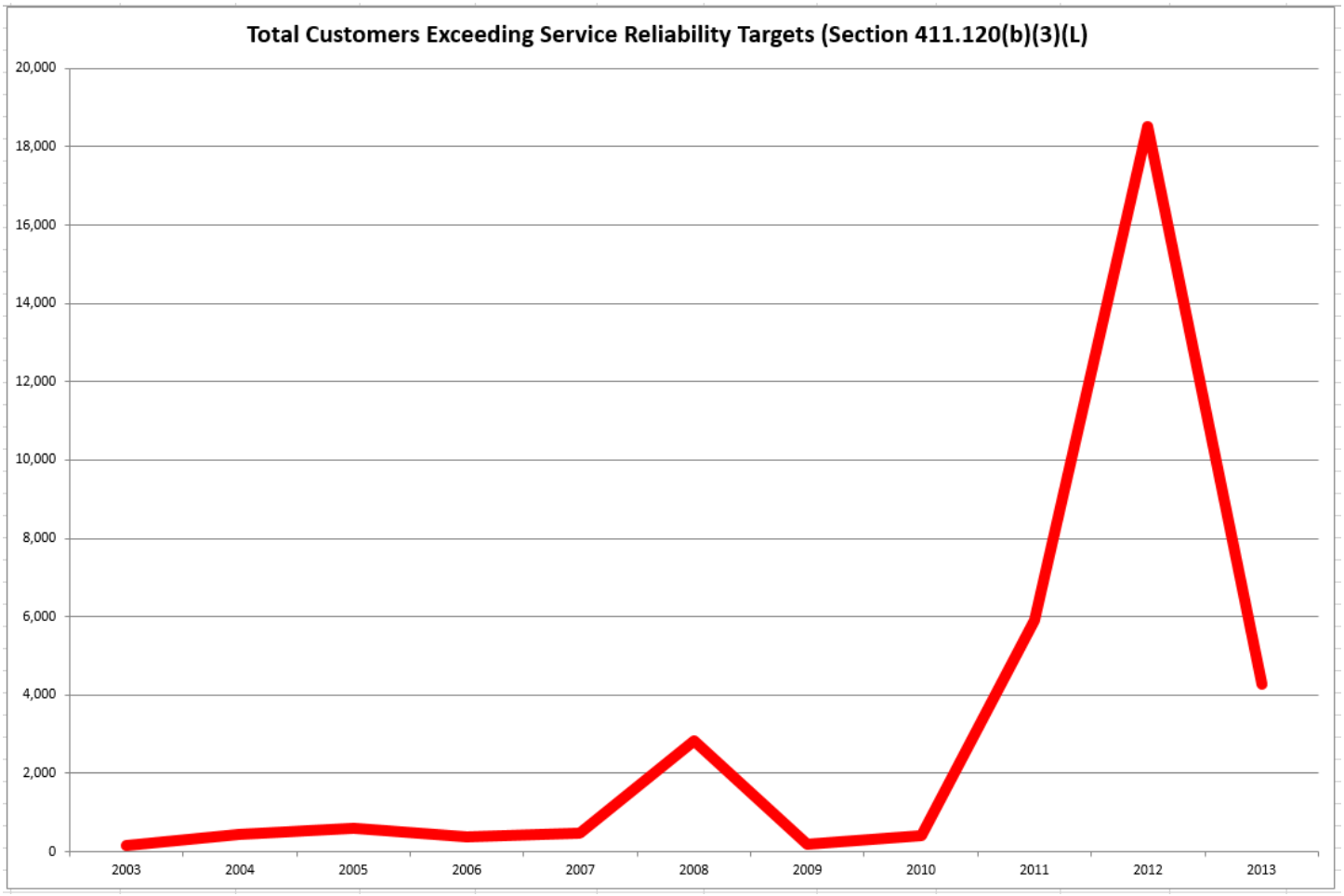


Figure 1 Total Customers Exceeding Service Reliability Targets (Section 411.120(b)(3)(L)

Table 2 summarizes the reliability targets defined in 83 Ill. Adm. Code 411.140(b)(4)(A-C) and the number of ComEd customers exceeding Service Reliability Targets in 2009 through 2013 per 83 Ill. Adm. Code 411.120(b)(3)(L) and the April 2004, January 2008, & December 2012 agreements[2].

[2] 2013 Reliability Report, Supplemental Report, Customers Experiencing Interruptions (controllable and uncontrollable).

Table 2 Distribution of Customers Exceeding Service Reliability Targets

Immediate primary source of service operation level	i. Maximum number of interruptions in each of the last three consecutive years	ii. Maximum hours of total interruption duration in each of the last three years	Customers exceeding Service Reliability Targets (i. &/or ii.) in **2009**	Customers exceeding Service Reliability Targets (i. &/or ii.) in **2010**	Customers exceeding Service Reliability Targets (i. &/or ii.) in **2011**	Customers exceeding Service Reliability Targets (i. &/or ii.) in **2012**	Customers exceeding Service Reliability Targets (i. &/or ii.) in **2013***
69kV or above	3	9	0/0	0/0	0/0	0/0	0/0
Between 15kV & 69kV	4	12	0/0	0/0	0/0	0/0	0/0
15kV or below	6	18	67/115	140/267	207/5,711	223/18,286	108/4,172
Total			182	407	5,918	18,379	4,269

Note: * In 2013 there were 11 customers that met the criteria for both frequency and duration thus there were 4,269 distinct customers that exceeded the service reliability targets (See: Supplemental Report Page 2)

83 Ill. Adm. Code 411.140(b)(4)(D) states that "Exceeding the service reliability targets is not, in and of itself, an indication of unreliable service, nor does it constitute a violation of the Act or any Commission order, rule, direction, or requirement." ComEd appears to have a process in place[3] to identify, analyze, and correct service reliability for customers experiencing a number or duration of interruptions exceeding the targets in 83 Ill. Adm. Code 411.140(b)(4)(A-C). Nonetheless, ComEd should seek out any maintenance or design issues that contribute to customers exceeding the 3-year service reliability targets.

The annual number and causes of interruptions for 83 Ill. Adm. Code 411.120(b)(3)(D) are shown for the ComEd system in Table 3. Interruptions in Table 3 were as defined in 83 Ill. Adm. Code 411.20[4]. In order for a customer to exceed a Service Reliability Target in Figure 1 or Table 2, that customer must exceed the maximum number of interruptions or the maximum hours of total interruption duration in each of the last three consecutive years.

Table 3 Interruptions (Supplemental Report Section 411.120(b)(3)(D))

Interruption Cause Category	**2009**	**2010**	**2011**	**2012**	**2013**
Animal Related	2,990	2,854	2,724	3,749	3,095
Customer	-	-	-	-	-
Intentional	2,247	2,921	3,166	2,975	3,155
Other	497	549	1,032	932	410
Overhead Equipment Related	5,794	6,435	6,342	5,902	5,973
Public	1,566	1,577	1,551	1,587	1,539
Tree Related	5,096	7,879	11,414	7,495	6,169
Transmission & Substation Equip	78	78	64	48	42
Weather Related	3,395	7,172	9,214	6,036	4,403
Underground Equipment Related	7,264	8,379	8,268	8,281	7,974
Unknown	1,050	1,269	1,531	1,737	1,605
ComEd/Contractor Errors	260	290	318	273	234
Total	**30,237**	**39,403**	**45,624**	**39,015**	**34,599**

[3] Beginning on page 97 of the 2013 Reliability Report Supplemental Report any specific actions are listed that ComEd has or will take to address customer reliability concerns.

[4] The difference between the total of interruptions in Table 3 versus other parts of the Report can be traced to the differences in the definition of "Interruption" in Part 411.20 for scheduled interruptions initiated by a utility for purposes of the targets set forth in 83 Ill. Adm. Code 411.140(b)(4) and calculating reliability indices and scheduled interruptions that are reportable under 83 Ill. Adm. Code 411.120(b)(3)(C).

6. Analysis of ComEd's Year 2013 Reliability Performance

In Section C, Tables 5-9 (pages C-3 through C-12) of ComEd's 2013 Reliability Report, ComEd broke out the 2013 planned and unplanned interruptions into 61 separate cause categories in detail for the system as a whole and also for each of ComEd's four operating regions. Table 4 below compares, for the last four years, aggregations under leading cause categories that together represented roughly three-quarters of total annual interruptions.

Table 4 Leading Causes of Unplanned Interruptions (Table 5, ComEd 2013 Report)

	% Improvement from 2009 to 2010	2010 Interruptions	% Improvement from 2010 to 2011	2011 Interruptions	% Improvement from 2011 to 2012	2012 Interruptions	% Improvement from 2012 to 2013	2013 Interruptions
Weather Related	-111%	7,172	-28%	9,214	34%	6,036	27%	4,411
Animal Related	5%	2,854	5%	2,724	-38%	3,749	17%	3,094
Tree Related	-55%	7,879	-45%	11,414	34%	7,495	18%	6,166
Overhead Equipment Related	-11%	6,435	1%	6,342	7%	5,902	-1%	5,977
Underground Equipment Related	-15%	8,379	1%	8,268	0%	8,281	4%	7,977

Figure 2, below, illustrates the trend since 1998 for leading causes of unplanned interruptions. Over the last four years, only the "Over-Head Equipment" unplanned interruptions have been trending down.

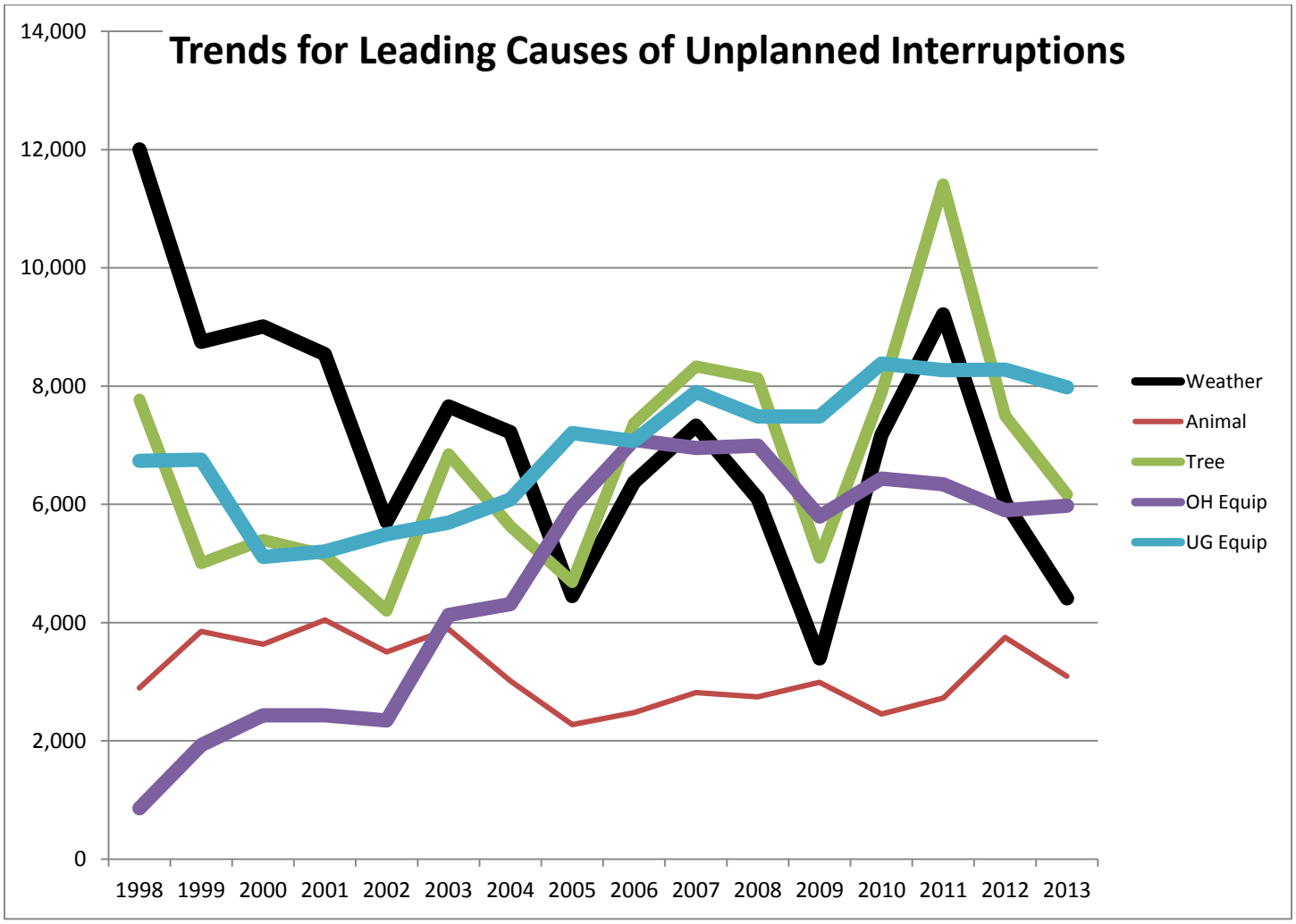


Figure 2 Trends for Leading Causes of UnPlanned Interruptions

83 Ill. Adm. Code 411.120(b)(3)(G)(v) states that the utility is to perform a satisfaction survey covering reliability, customer service and customer understanding of the utility's services and prices. Through a rulemaking (Docket No. 98-0878), the Commission designed and approved a single customer survey applicable to each Illinois utility on a yearly basis starting in 2000. The utilities joined forces and, through a competitive bidding process, selected Opinion Dynamics Corporation ("ODC") to implement the study. ODC asked customers to rate ComEd's performance on a scale of zero to ten where zero means the utility is doing a poor job and ten means the utility is doing an excellent job. The mean (or average) rating from the responses to each question is presented on pages G-10 through G-13 of ComEd's 2013 Reliability Report. A summary of some ratings is shown in Table 5 for 2009 through 2013.

Table 5 -- Summary of Customer Survey Responses (average rating on zero-to-ten scale)

Customer Class		2009	2010	2011	2012	2013
Residential	Providing electric service overall	8.51	8.39	8.11	8.41	8.48
	Providing reliable electric service	8.49	8.37	8.03	8.43	8.47
Non-Residential	Providing electric service overall	8.67	8.31	7.99	8.44	8.55
	Providing reliable electric service	8.58	8.36	8.05	8.51	8.61

Figure 3 illustrates the trend of the survey responses in Table 5 from 2000 through 2013.

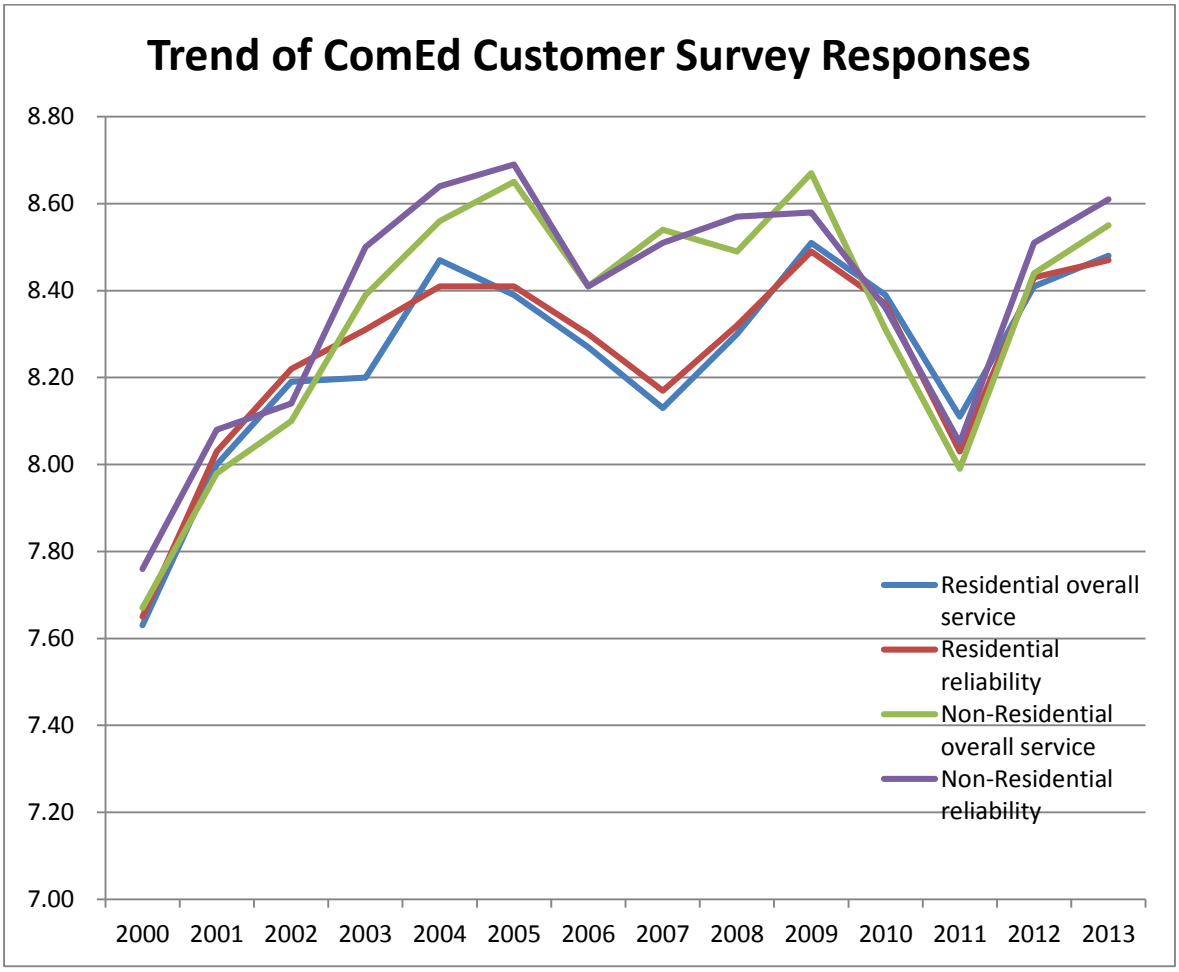


Figure 3 -- Long-Term Trend of ComEd Customer Survey Responses

Table 6 provides another perspective on customer satisfaction from the viewpoint of customer reliability complaints[5] when values from this year's Reliability Report are compared to previous years. The bottom line of the table shows the calculated number of complaints per 1,000 customers and provides a relative measure of complaints from the years 2009 through 2013 for the system.

Table 6 – Customer Complaints for the Entire System decline significantly in the last two years

	2009	2010	2011	2012	2013
Nature of Complaints	System Total	System Total	System Total	System Total	System Total
Sustained Interruptions	1,598	1,938	2,150	1,213	911
Momentary Interruptions	201	110	130	89	63
Total Low/High Voltage	370	195	139	114	63
Totals	2,169	2,243	2,419	1,416	1,037
Customers Served	**3,769,233**	**3,785,054**	**3,796,214**	**3,803,907**	**3,831,214**
No Customers per Complaint	1,738	1,687	1,569	2,686	3,695
Complaints per 1000 Customers	**0.58**	**0.59**	**0.64**	**0.37**	**0.27**
% change in Complaints per 1000 Customers [negative is good]	**-20%**	**3%**	**8%**	**-42%**	**-27%**

All ComEd Regions experienced a drop in the number of complaints per 1,000 customers except for the Southern Region's 5% increase in complaints per 1,000 customers. System wide ComEd experienced a 27% decrease in complaints per 1,000 customers.

Table 7 – ComEd's Southern Region experienced a 5% increase in Customer Complaints

	2009	2010	2011	2012	2013
Nature of Complaints	Southern Region	Southern Region	Southern Region	Southern Region	Southern Region
Sustained Interruptions	445	487	468	298	330
Momentary Interruptions	56	27	20	23	14
Total Low/High Voltage	111	45	33	20	16
Totals	612	559	521	341	360
Customers Served	**824,142**	**826,519**	**825,881**	**826,169**	**830,293**
No Customers per Complaint	1,347	1,479	1,585	2,423	2,306
Complaints per 1000 Customers	**0.74**	**0.68**	**0.63**	**0.41**	**0.43**
% change in Complaints per 1000 Customers [negative is good]	**3%**	**-9%**	**-7%**	**-35%**	**5%**

[5] Tables on Pages G-14 & 16, ComEd's 2013 Reliability Report

Figure 4 compares ComEd's 2013 customer satisfaction ratings to those of the other reporting Illinois utilities.

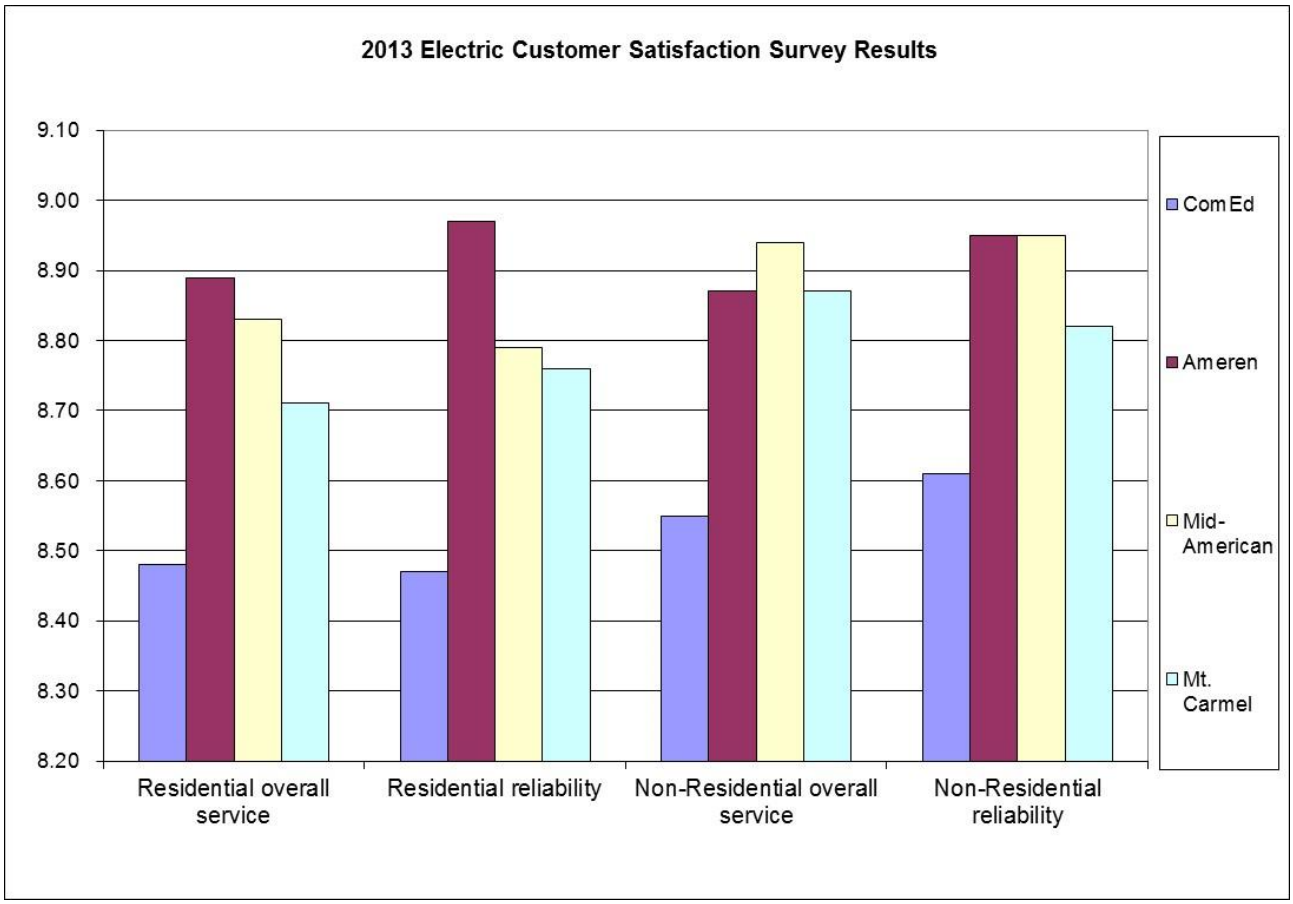


Figure 4 -- Comparison of Four Jurisdictional Utility's Customer Satisfaction Ratings for 2013

83 Ill. Adm. Code 411.120(b)(3)(K) requires the utility to report the total number of customers that experienced a set number of interruptions during 2013. Figure 5 shows the ComEd customer interruption experience for the last five years, 2009 through 2013. In Figure 5, the height of the bars indicate the number of customers who experienced a given number of interruptions during the year.

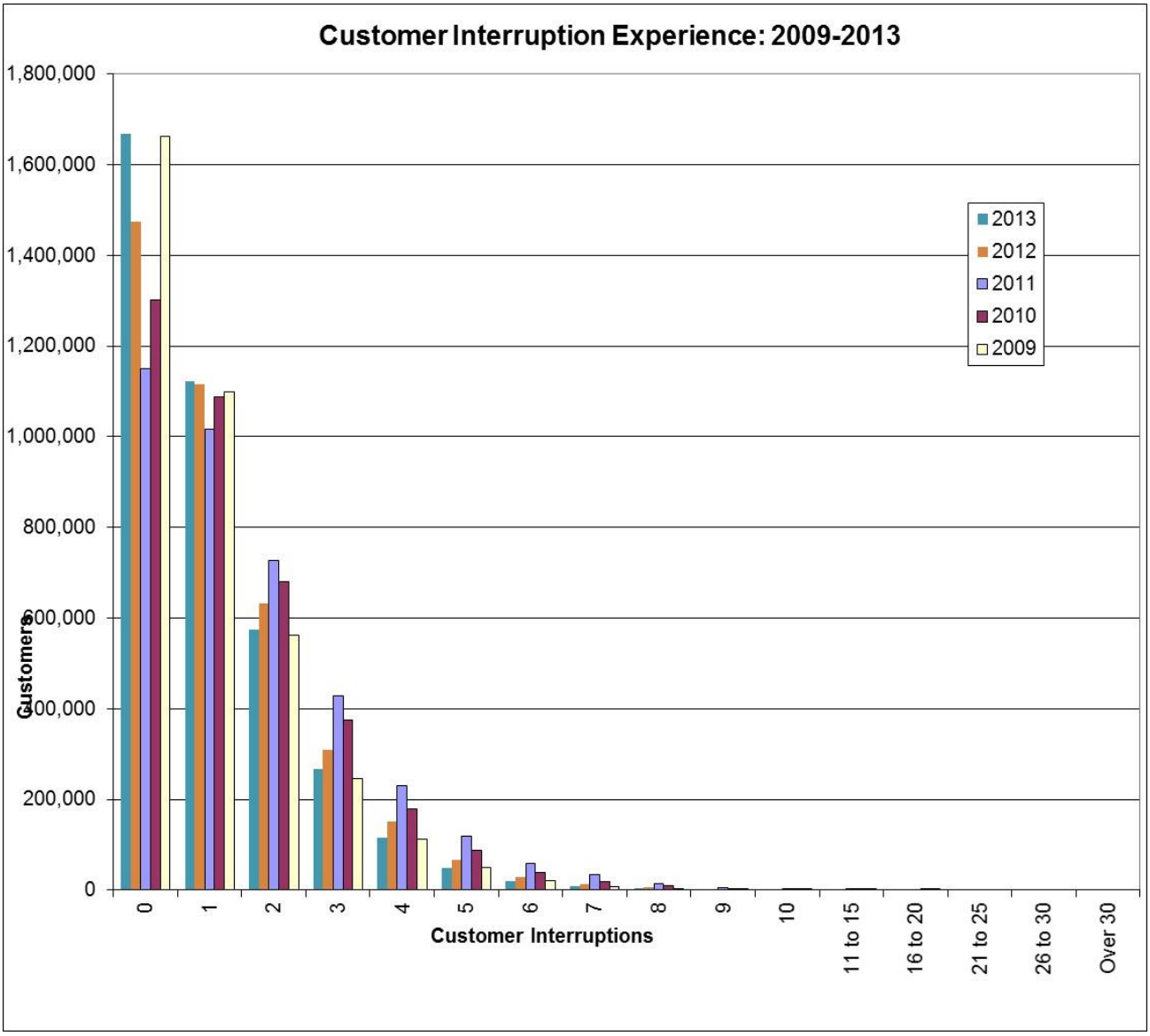


Figure 5 -- Customers Interruption Experience

Figure 6 shows the trend for the number of customers experiencing 5, 6, 7 or more interruptions for each of the last five years, 2009 through 2013.

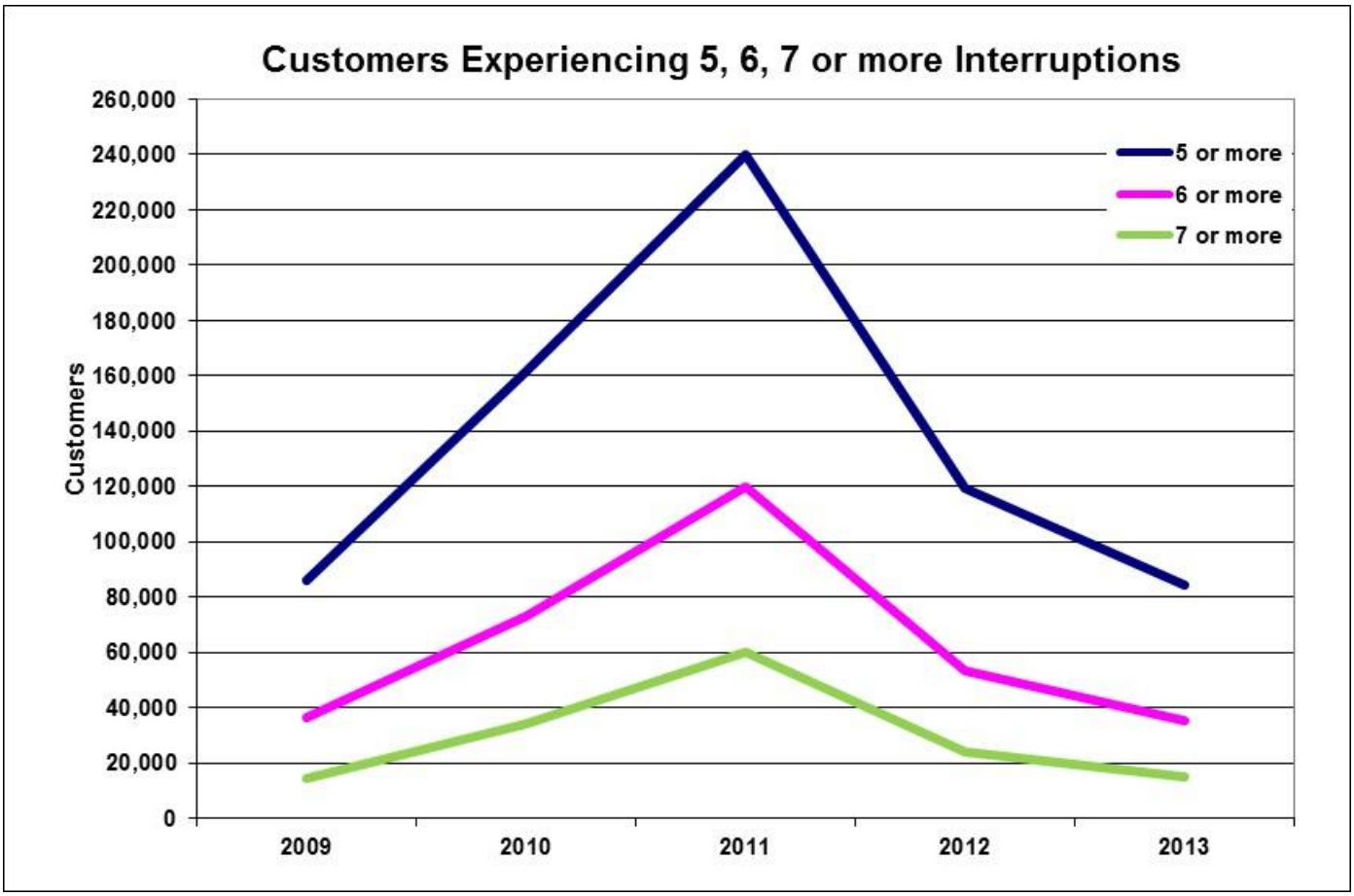


Figure 6 -- Customers Experiencing 5, 6, 7 or more Interruptions

83 Ill. Adm. Code 411.120(b)(3)(I)&(J) requires the reporting utility to list its worst performing circuits ("WPC") (subsection I) and state (subsection J) what corrective actions are planned to improve those circuits' performance. ComEd selected its WPCs from those distribution circuits with the worst performance (highest reliability index scores) from each of its four operating areas and for each of the three reliability indices. This list totaled 116 circuits, and ComEd classified them as its worst 1% performers. Per subsection J, ComEd listed the date, number of customers affected, length of time, and cause of each interruption for each of these 116 circuits.

Worst Performing Circuit[6] Repeats from Previous Reports

Of the 116[7] WPCs in ComEd's 2013 Reliability Report, 19[8] (Table 7) represented repeats from one or more of the years 2008 through 2012.

Table 8 -- 2013 Worst Performing Circuit Repeats (within last 5 years)

	Circuit	Customers Served by Circuit as of the End of the Reporting Period	Voltage	Region	Communities Served	Repeat WPC	Predominantly Urban / Rural	Predominantly Underground (UG) or Predominantly Overhead (OH)	Total Length of Circuit in Miles	DA Installed	Last General Circuit Inspection (Month & Year)	Last Circuit-Wide Tree Trim (Month & Year)
1	WILD041	404	4kV	CHICAGO	CHICAGO	CAIDI-2010	URBAN	OH	3.0	No	May 2012	Mar 2013
2	WSTN145	101	4kV	CHICAGO	CHICAGO	CAIDI-2011	URBAN	UG	5.9	No	Jan 2011	Jan 2014
3	X8440	1,837	12kV	CHICAGO	CHICAGO	CAIDI-2012	URBAN	UG	4.5	No	Jan 2014	Jan 2012
4	Z10438	980	12kV	CHICAGO	CHICAGO	SAIFI/CAIFI-2008	URBAN	OH	5.7	No	Jan 2012	Aug 2011
5	Z1410	1,895	12kV	CHICAGO	CHICAGO	SAIFI/CAIFI-2011	URBAN	OH	7.9	Yes	Oct 2013	Oct 2011
6	Z15077	564	12kV	CHICAGO	CHICAGO	SAIFI/CAIFI-2009	URBAN	OH	9.5	No	Jan 2010	Jul 2013
7	D0502	2,111	12kV	NORTHEAST	OAK PARK	SAIFI/CAIFI-2010	URBAN	OH	8.8	Yes	May 2012	Jan 2011
8	E5211	881	12kV	NORTHEAST	ARLINGTON HEIGHTS	SAIFI/CAIFI-2008	URBAN	OH	13.2	Yes	Sep 2012	Mar 2013
9	W313	442	4kV	NORTHEAST	WHEATON	CAIDI-2008	URBAN	OH	4.5	No	Mar 2013	Dec 2012
10	W6610X	383	12kV	NORTHEAST	HINSDALE, OAKBROOK	SAIFI/CAIFI-2009	URBAN	UG	17.3	Yes	May 2013	Apr 2011
11	W668X	1,409	12kV	NORTHEAST	YORK TWP, OAKBROOK, ELMHURST	CAIDI-2009	URBAN	OH	14.5	Yes	Jul 2013	Mar 2011
12	X7153	1,140	12kV	NORTHEAST	PARK RIDGE, CHICAGO	SAIFI/CAIFI-2009	URBAN	OH	10.7	Yes	Nov 2011	Jan 2014
13	E5114	719	12kV	NORTHWEST	DORR TWP, BULL VALLEY, WOODSTOCK	SAIFI/CAIFI-2008, SAIFI/CAIFI-2011	URBAN	UG	44.4	No	Jan 2012	May 2012
14	E7517	380	12kV	NORTHWEST	CRYSTAL LAKE	CAIDI-2011	URBAN	UG	10.5	No	Aug 2011	Mar 2010
15	R6503	267	12kV	NORTHWEST	ROCKFORD	SAIFI/CAIFI-2012	URBAN	OH	4.3	No	Jan 2013	Jun 2011
16	R6507	1,125	12kV	NORTHWEST	ROCKFORD	CAIDI-2010	URBAN	OH	7.5	Yes	Sep 2012	Jan 2011
17	G284	882	12kV	SOUTHERN	HAZELCREST, MARKHAM	SAIFI/CAIFI-2012	URBAN	OH	10.6	No	Jan 2013	Nov 2011
18	G4374	213	12kV	SOUTHERN	THORNTON, SOUTH HOLLAND, HARVEY	CAIDI-2012	URBAN	OH	7.8	No	Mar 2012	Nov 2011
19	G651	1,469	12kV	SOUTHERN	CHICAGO, DOLTON, RIVERDALE	SAIFI/CAIFI-2008	URBAN	OH	14.5	Yes	Oct 2012	Aug 2012

[6] 83 Ill. Adm. Code 411.20 defines "Worst-performing circuits" are those distribution circuits that, for each reliability index, are among the one percent of all circuits in an operating area (or at least one circuit for each reliability index) with the highest achieved values (lowest performance levels) for the reliability index. For the purpose of identifying worst-performing circuits, only distribution circuit interruptions and customers affected by such interruptions shall be considered in calculating the reliability indices.

[7] 116 represents approximately 2% of all ComEd distribution circuits.

[8] Staff considers a circuit to be a WPC Repeat if it had previously been a WPC for any reason. ComEd considers a Circuit to be a WPC Repeat if it had previously been a WPC in the Same Category list, i.e. a WPC frequency to WPC frequency or WPC duration to WPC duration.

Figure 7 illustrates the distribution of these WPC repeats in ComEd's regions.

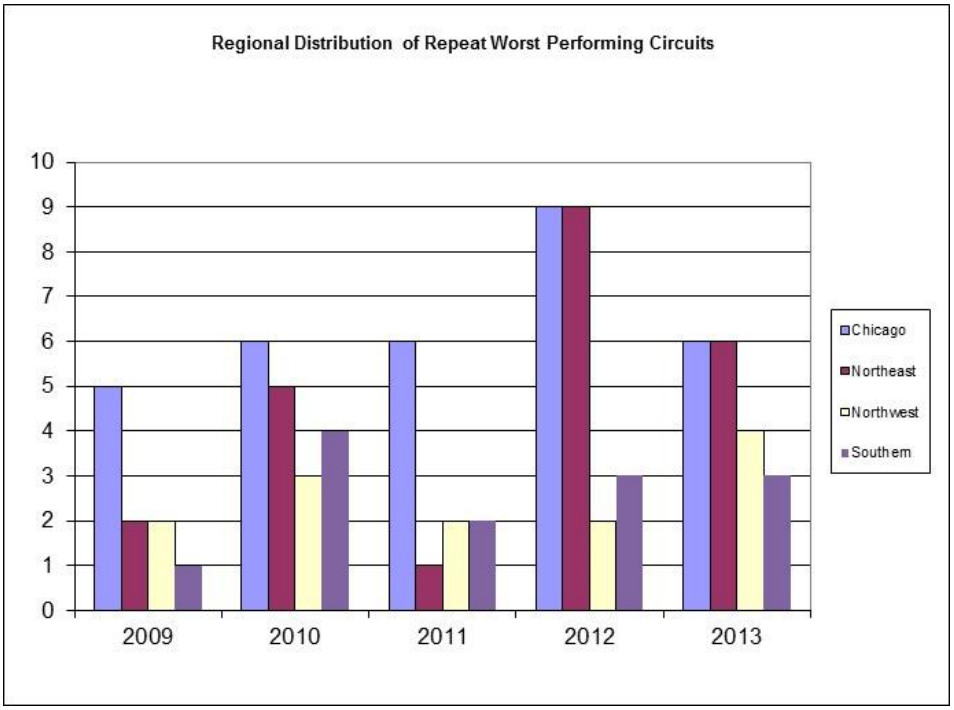


Figure 7 -- WPC Repeat Regional Distribution 2009-2013

ComEd has a finite number of distribution circuits in its system and, with the selection of the worst performing circuits each year out of that finite pool, Staff expects, due to random fluctuations alone, that in each assessment year there would be a small number of repeat circuits from the previous four years. Staff reviews the trending of these repeat circuits because there is a concern that the number of repeats from previous years may be indicative of (1) inadequacies in inspections and/or (2) non-completion of needed corrective actions and/or (3) non-completion of subsequent regular preventive maintenance for worst performing circuits from 2008 through 2012. On page J-1 of ComEd's Reliability Report, ComEd stated that it "*proactively identifies and reviews circuits that have repeated on the one percent list in the previous five years*." Further, on page J-1, ComEd goes on to describe the causes of those repeats and actions taken by ComEd to proactively prevent future repeats on those circuits.

Figure 8 illustrates the distribution of the Worst Performing Circuits in 2013 between those that are predominantly overhead and those that are predominantly underground.

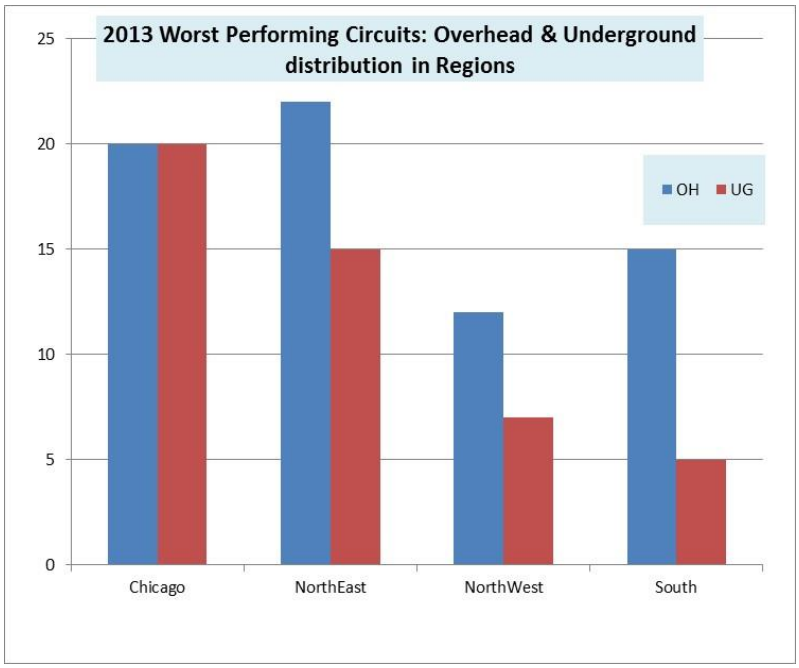


Figure 8 -- 2013 WPC Overhead & Underground distribution by Region

Figure 9 shows that predominantly underground circuits make up a large portion (41% in 2013) of worst performing circuits over the last five years.

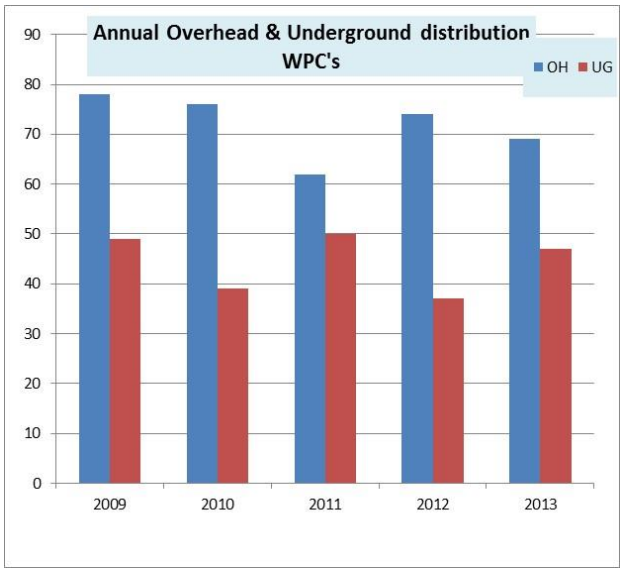


Figure 9 -- Annual WPC distribution OH & UG

Figures 10 and 11 show that a majority of the worst performing circuits do not have automatic line recloser(s)[9] installed.

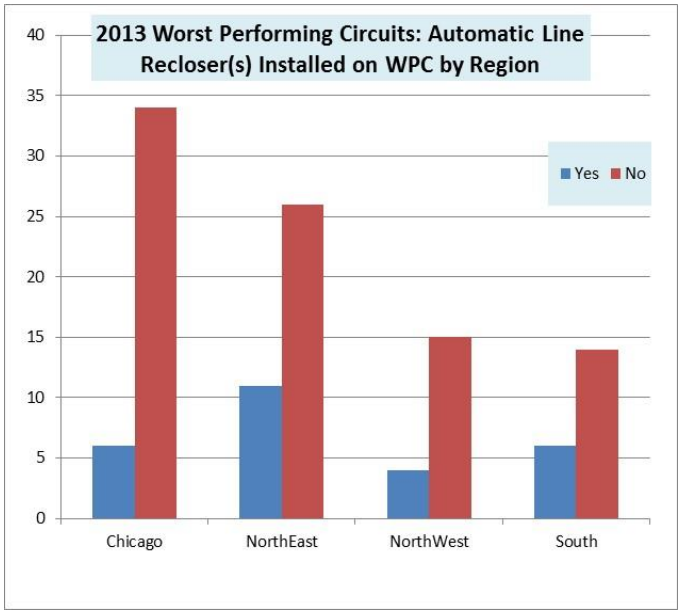


Figure 10 -- Distribution of Automatic Line Recloser(s) on WPC's by Region

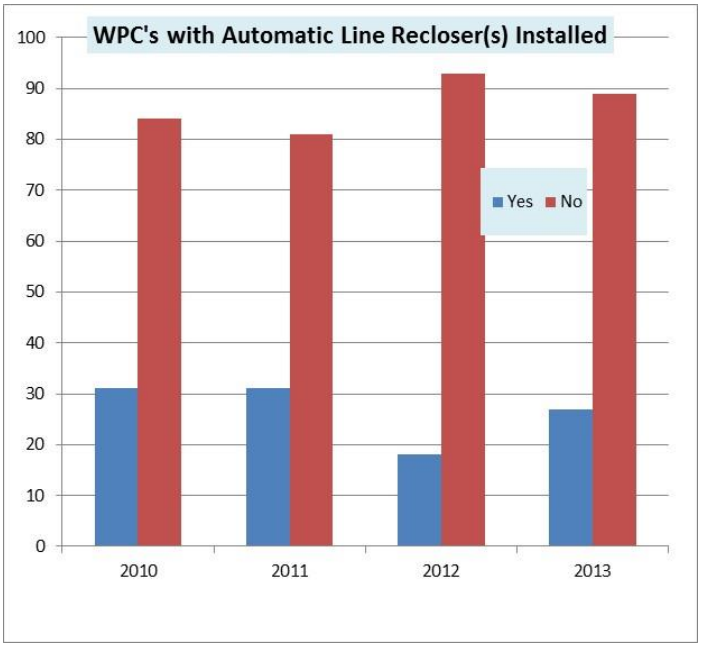


Figure 11 -- Annual Trend of WPC's with Automatic Line Recloser(s) Installed

[9] In response to data request ENG_1.2(f)(xii) the company was asked to indicate (yes or no) whether automatic line recloser(s) are installed on the WPC (not including recloser(s) being utilized as a circuit breaker within a substation). Recloser(s) are used on overhead distributions systems to detect and interrupt momentary faults. Since many short-circuits on overhead lines clear themselves, a recloser improves service continuity by automatically restoring power to the line after a momentary fault. With multiple reclosers on an overhead circuit and with proper coordination those reclosers could be used to isolate the faulted portion of a circuit and restore power to other portions of the overhead circuit.

Field Inspections

To evaluate the overall trend of conditions in ComEd's service territory, Commission Staff conducted six field inspections in 2014, Table 9, eight fence line (from outside the substation fence) substation inspections, Table 10, and one in station substation inspection. The purpose of the inspections was for Staff to see if there were any obviously visible reasons for poor reliability performance. Staff looked for problems on circuits, such as poor tree trimming practices, broken or damaged equipment, rotten poles, and overly slack spans (low sagging lines). At substations, Staff looked for problems such as low or leaking oil in equipment, load tap changers regularly operated at extreme positions, and poor maintenance practices.

Table 9 -- Field Inspections in 2014

Circuit	Region	Communities Served	Date Inspected in 2014
F5283	Southern	Homewood	June 24
G102	Southern	Calumet City	July 17
H321	Northwest	Albany Twp, Albany-Cordova Twp, Fulton Twp, Garden Plain, Garden Plain Twp, Newton Twp	August 12
B2301	Northwest	Riley Twp, Genoa Twp, Marengo, Marengo Twp, Coral Twp	September 23
Random	Southern	Homewood and Homewood Area	June 24
Random	Northwest	Freeport, Pecatonica, Pearl City, Winnebago, Stillman Valley, Oregon Areas	July 1
Random	Southern	Lansing, Lynwood, Sauk Village Beecher, Pestone Areas	July 17
Random	Northwest	Garden Plain, Sterling Areas	August 12
Random	Northeast	Elk Grove Village Area	September 16
Random	Northwest	Riley Twp, Genoa Twp, Marengo, Marengo Twp, Coral Twp	September 23

Table 10 -- Substation Inspections in 2014

Substation Inspections	Date Inspected in 2014
Glenwood (Fence Line Inspection)	June 24
Eleroy (Fence Line Inspection)	July 1
Stillman Valley (Fence Line Inspection)	July 1
Oregon (Fence Line Inspection)	July 1
Calumet City (Fence Line Inspection)	July 17
Garden Plain (Fence Line Inspection)	August 12
Sterling (Fence Line Inspection)	August 12
Tonne	September 16
Marengo (Fence Line Inspection)	September 23

A log of Staff's field observations is contained in Appendix A. Appendix A contains only a few of the many pictures taken by Staff. Additional pictures can be found later in Section 9 – Potential Reliability Problems and Risk.

7. Trends in ComEd's Reliability Performance

Listed in Table 11 are ComEd's reliability indices as reported in the 2013 Reliability Report (for all interruptions) for ComEd's overall system, as well as each region, in comparison to the system values reported by the other utilities for 2013. Table 12 lists the reliability indices for the worst system circuit in each jurisdictional utility.

Table 11 -- Comparison of 2013 Reliability Indices

	CAIDI (minutes)	CAIFI (interruptions)	SAIFI (interruptions)
ComEd System Total	143	1.80	0.99
ComEd Chicago Region	111	1.70	0.79
ComEd Northeast Region	133	1.68	0.95
ComEd Southern Region	195	2.03	1.32
ComEd Northwest Region	118	1.75	0.98
Ameren System	199	2.13	1.44
MidAmerican System	211.39	2.8835	2.2428
Mt. Carmel System	104.54	4.12	4.01

Table 12 -- 2013 Reliability Indices for THE Worst System Circuit

name	CAIDI (minutes)	CAIFI (interruptions)	SAIFI (interruptions)	
Ameren	2625	7.0	7.0	CAIDI: Ckt 305132 Sub: Hartford SAIFI & CAIFI: Ckt: R93701 Sub: Wanda
ComEd	3086	9.9	9.9	CAIDI: **Ckt D44** Sub: DCD172 Twns: La Grange SAIFI & CAIFI: **Ckt: G284** Sub: DCG128 Twns: Hazelcrest, Markham
MidAmerican	1162	7.5301	7.5	CAIDI: Ckt 13-36-3 (454652-554219) SAIFI & CAIFI: Ckt: 13-111-2 (466076-502622
Mt. Carmel	302	4.27	3.95	CAIDI, SAIFI & CAIFI: Ckt: 22000 (Allendale Feeder)

CAIDI: Customer Average Interruption Duration Report (cay' dee). This represents, for the group of customers that actually had one or more interruptions, how long, on average, the interruptions lasted.

CAIFI: Customer Average Interruption Frequency Index (cay' fee). This represents the interruption frequency for the group of customers that had interruptions. **A CAIFI index much higher than SAIFI suggests that subsets of customers experienced significantly more frequent interruptions than the overall system average.**

SAIFI: System Average Interruption Frequency Index (say' fee). This represents the number of customer interruptions divided by total system customers.

The reliability indices required by the Commission rules and provided by ComEd[10] include storm related interruptions. Staff expects that the better designed and maintained an electric system is, the smaller the number (CAIFI & SAIFI indices) or magnitude of storm related problems and the quicker the restoration of the electric system would be, also resulting in a lower system average customer interruption time (CAIDI index).

[10] Page H-2, Table 18a: Reliability Indices for 2013, ComEd 2013 Reliability Report.

In Tables 18b, 18c, 18d, and 18e of ComEd's 2013 Reliability Report, ComEd listed reliability indices that vary from the indices as defined in 83 Ill. Adm. Code 411.20. Staff commends the use by ComEd's engineers and planners of all available tools for their own analyses and reliability improvement purposes. While Staff does look at storms and company-generated statistics that exclude purported storms to help explain year-to-year variations in reliability indices, Staff believes the long term trends of indices with all available data included are the least potentially problematic performance indicators. In Docket Nos. 07-0066, 07-0067, and 07-0068, Staff demonstrated how reliability indices that attempt to exclude storm periods could be misleading[11] and unsuitable[12] for Commission use. Staff used the reliability indices as required by the Commission rules.

Figure 12 illustrates ComEd's CAIDI indices over the last five years in each region. Note that **lower** bar sizes in Figure 12 represent **better** performance.

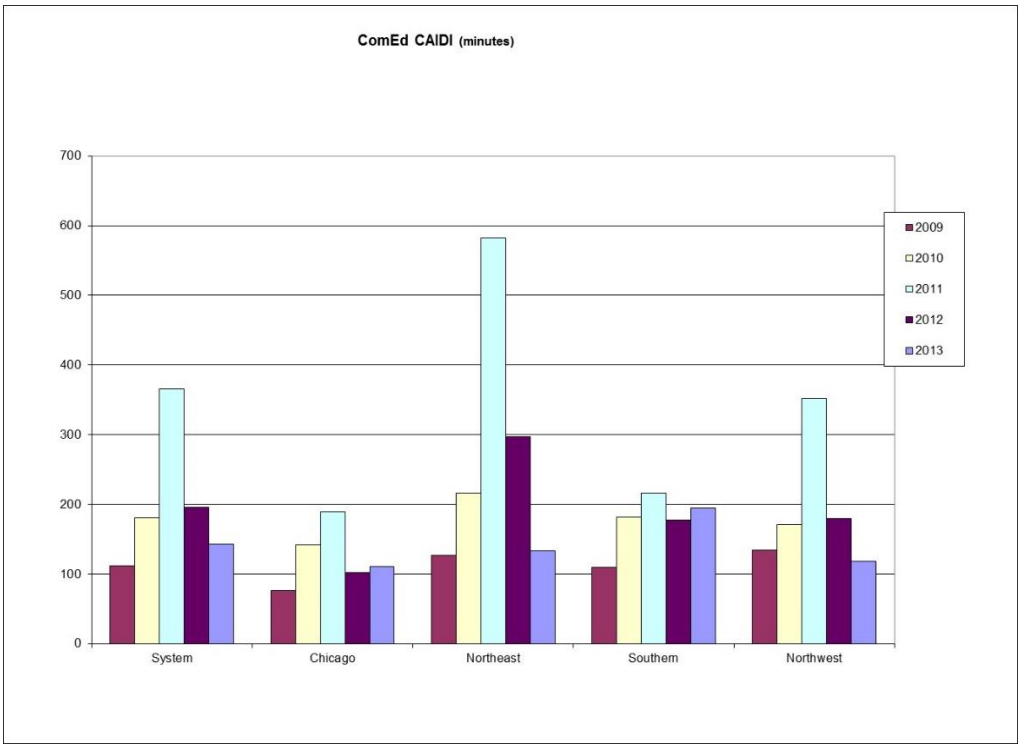


Figure 12 -- ComEd CAIDI 2009-2013

[11] "… Utilities that choose to adequately maintain their electric delivery facilities and workforces might significantly reduce the number and duration of electric service interruptions that their customers experience during storms. The reductions could cause Standard 1366 to identify fewer Major Event Days. Conversely, utilities that fail to adequately maintain their electric delivery systems and workforces might increase the number and duration of electric service interruptions that their customers experience during storms and cause Standard 1366 to identify more Major Event Days. With a larger number of Major Event Days, the utility with the inferior maintenance programs or too-small workforce might appear in the resulting reliability statistics to be performing better than the utility with the superior maintenance program and bigger workforce. …" Docket No. 07-0066 Attachment Q to Order dated January 24, 2007; Docket No. 07-0067 Attachment B to Attachment to Order dated January 24, 2007, Docket No. 07-0068 Attachment Q to Attachment to Order dated January 24, 2007.

[12] "…If Ameren utilities could classify a significant number of the electric service interruptions their customers experience as caused by the weather and use a method … to make many of those weather interruptions disappear from their statistics, then they could report reliability to the Commission that their customers could only wish for, but had never actually seen. … The disturbing possibility that Standard 1366 could alter reliability statistics to favor utilities with poor maintenance programs and inadequate workforces seems to Staff to make Standard 1366 unsuitable for Commission use. …" Docket No. 07-0066 Attachment Q to Order dated January 24, 2007; Docket No. 07-0067 Attachment B to Attachment to Order dated January 24, 2007, Docket No. 07-0068 Attachment Q to Attachment to Order dated January 24, 2007.

Figure 13 shows a comparison of CAIDI values reported for the years 2009 through 2013 by the utilities.

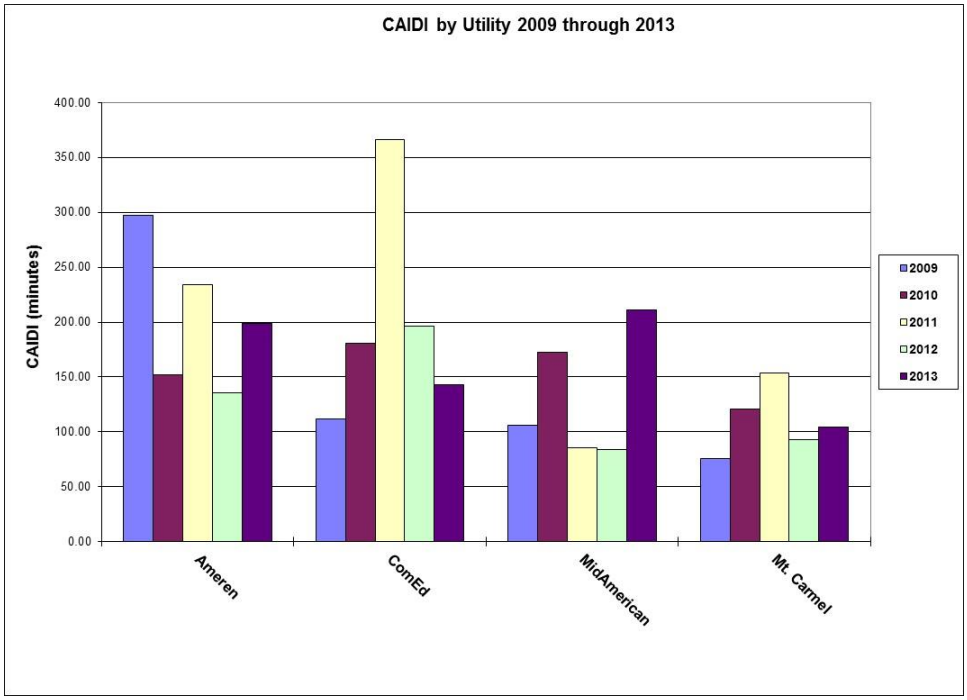


Figure 13 -- CAIDI by Utility 2009-2013

Figure 14 shows a comparison of CAIDI values for the worst circuit for each of the utilities from 2009 through 2013.

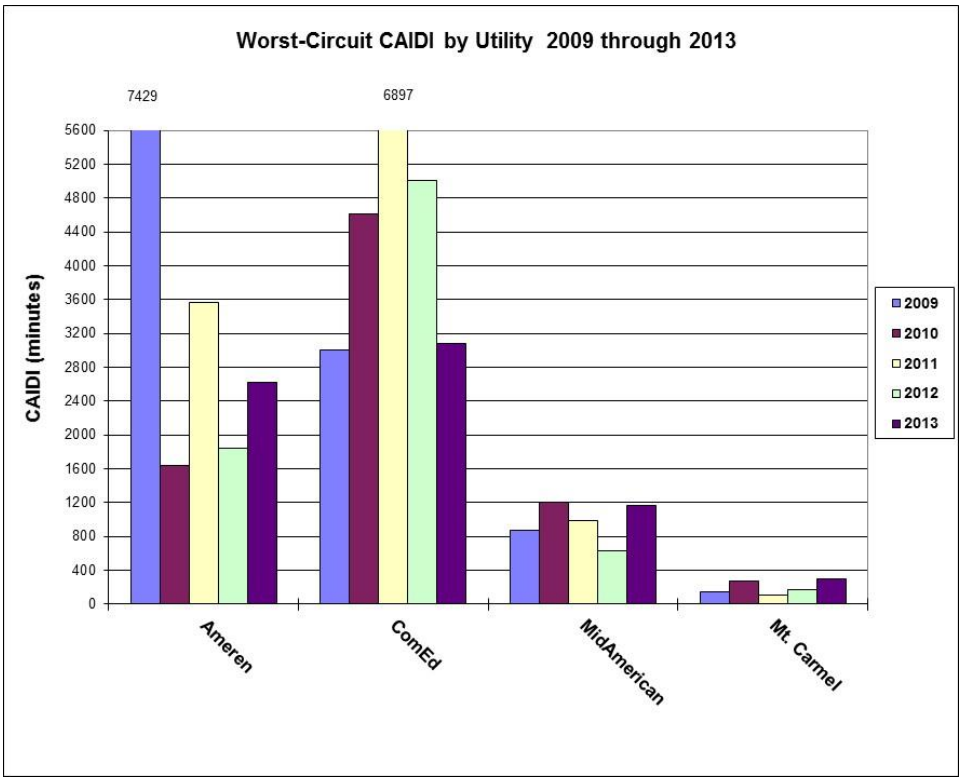


Figure 14 -- Worst Circuit CAIDI by Utility 2009-2013

Figure 15 illustrates ComEd's annual System CAIDI since 1998 and it's trend based on a 4 year rolling average – since 2005 ComEd's 4 year rolling average has been increasing.

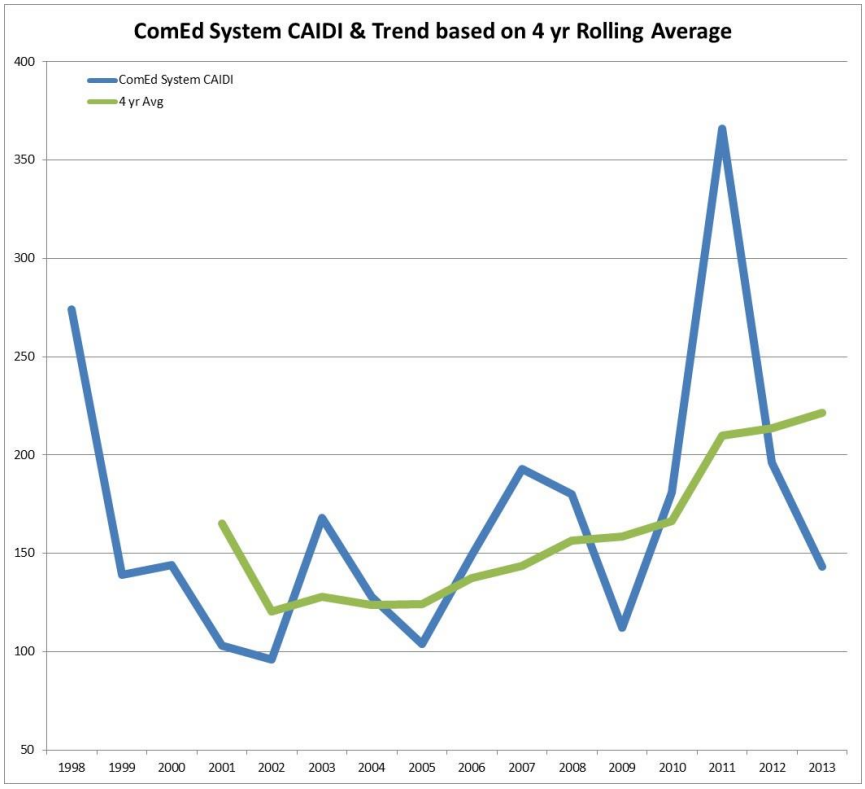


Figure 15 -- ComEd System Annual CAIDI and 4 year Rolling Average Trend

Figure 16 shows ComEd's CAIFI performance over the last 5 years for all ComEd Regions. Note that **lower** bar sizes in Figure 16 represent **better** performance.

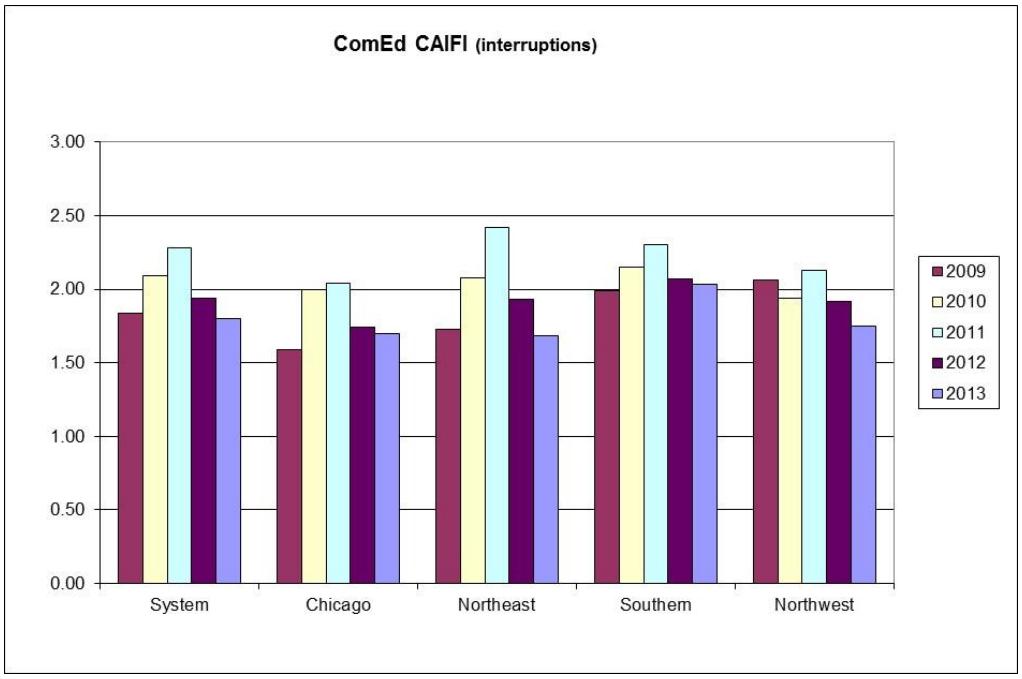


Figure 16 -- ComEd CAIFI 2009-2013

Figure 17 shows a comparison of CAIFI values reported for the years 2009 through 2013 by the utilities.

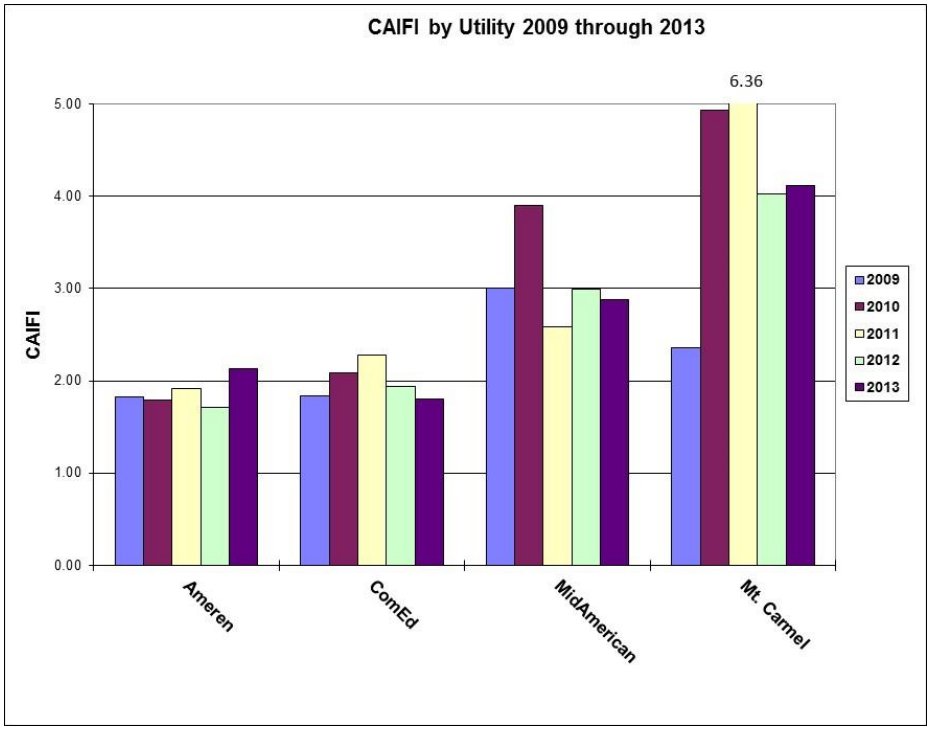


Figure 17 -- CAIFI by Utility 2009-2013

Figure 18 shows a comparison of CAIFI values for the worst-circuit for each of the utilities in 2009 through 2013.

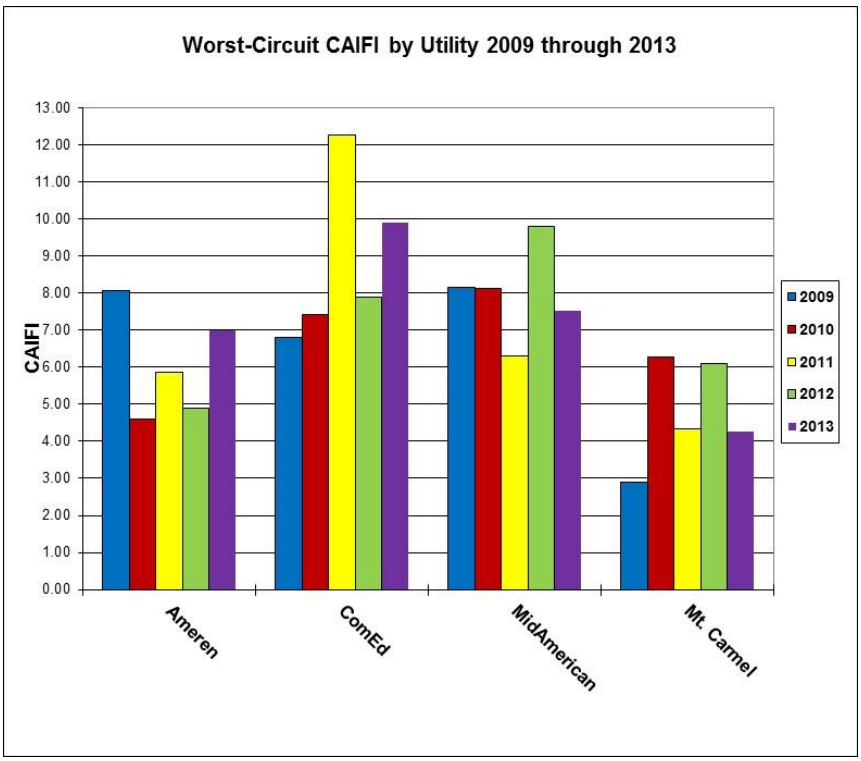


Figure 18 -- Worst Circuit CAIFI by Utility 2009-2013

Figure 19 shows ComEd's SAIFI performance over the last 5 years for all ComEd Regions. Note that **lower** bar sizes in Figure 19 represent **better** performance.

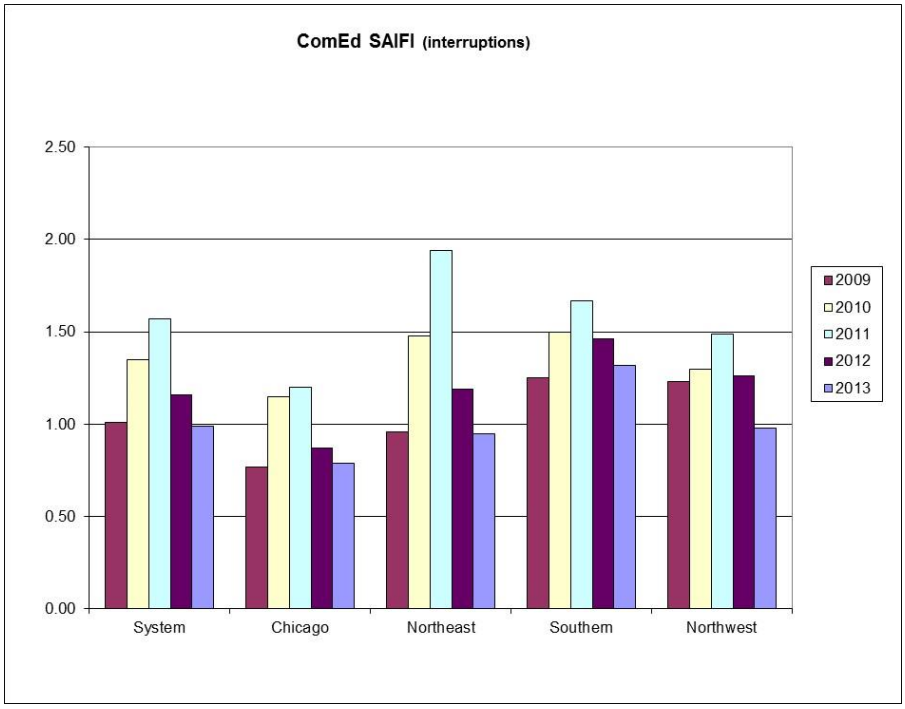


Figure 19 -- ComEd SAIFI 2009-2013

Figure 20 below shows a comparison of SAIFI values reported for the years 2009 through 2013 by the four utilities.

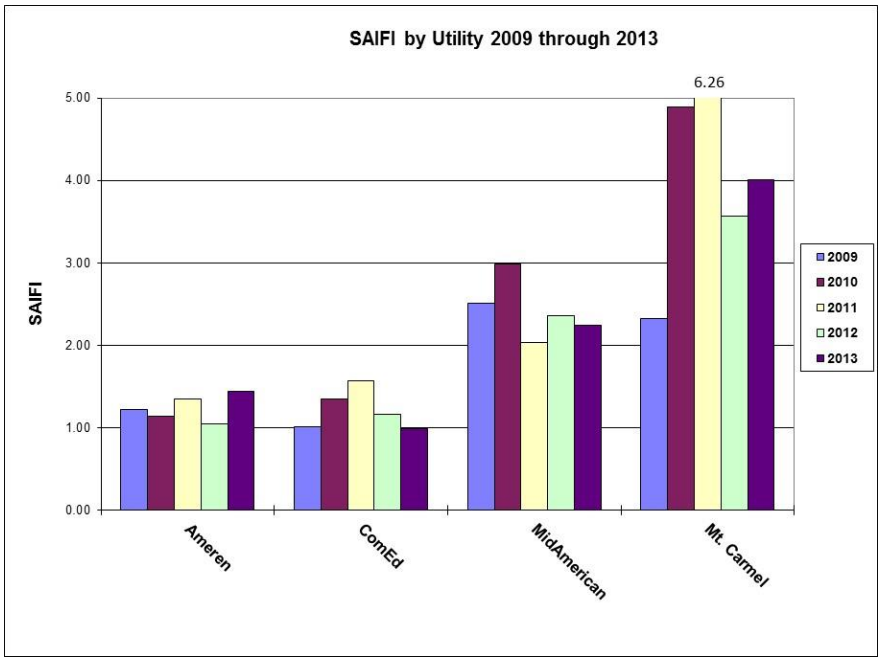


Figure 20 -- SAIFI by Utility 2009-2013

Figure 21 shows a comparison of SAIFI values for the worst performing circuit for each of the six utilities for 2009 through 2013.

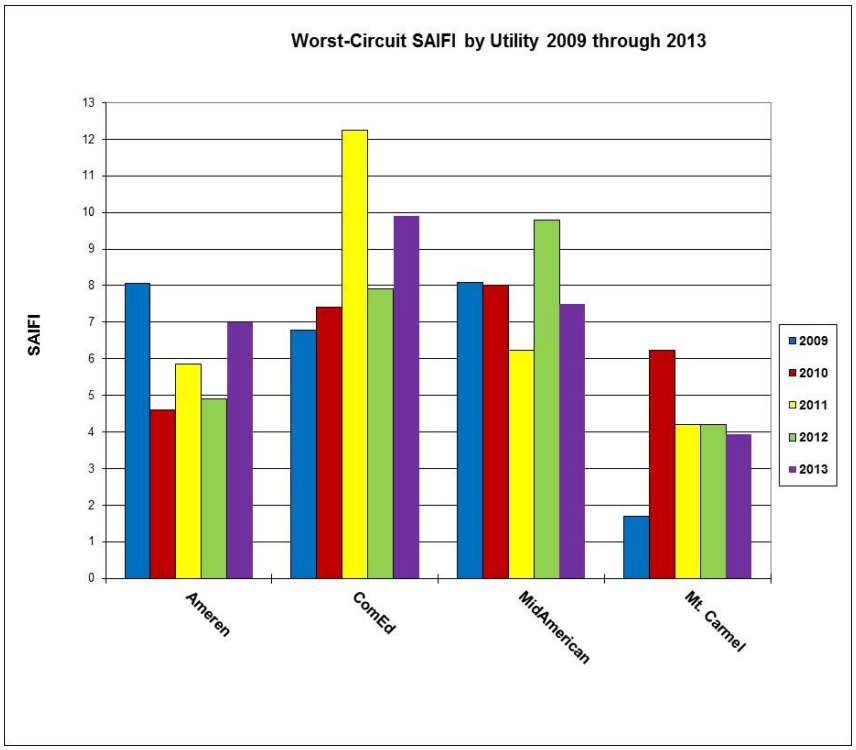


Figure 21 -- Worst-Circuit SAIFI by Utility 2009-2013

Figure 22 illustrates ComEd's annual System SAIFI since 1998 and it's trend based on a 4 year rolling average – ComEd's 4 year rolling average SAIFI has been trending down (i.e. improving) since 2008.

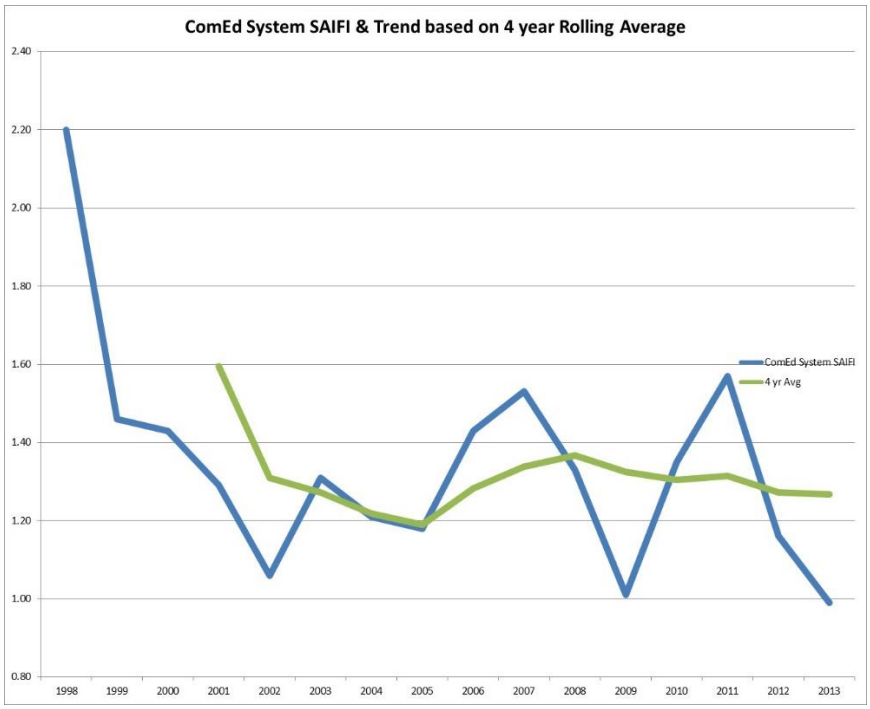


Figure 22 -- ComEd System SAIFI & 4 year Rolling Average Trend

83 Ill. Adm. Code 411.210(b)(3) states that each utility having 1,000,000 or more customers is to provide a list of substation transformers that had a peak loading that equaled or exceeded 90% of their rated normal capacity. Figure 23 shows the historical distribution, by region, of substation transformers with a peak loading at or above 90% in the last 5 years, 2009-2013.

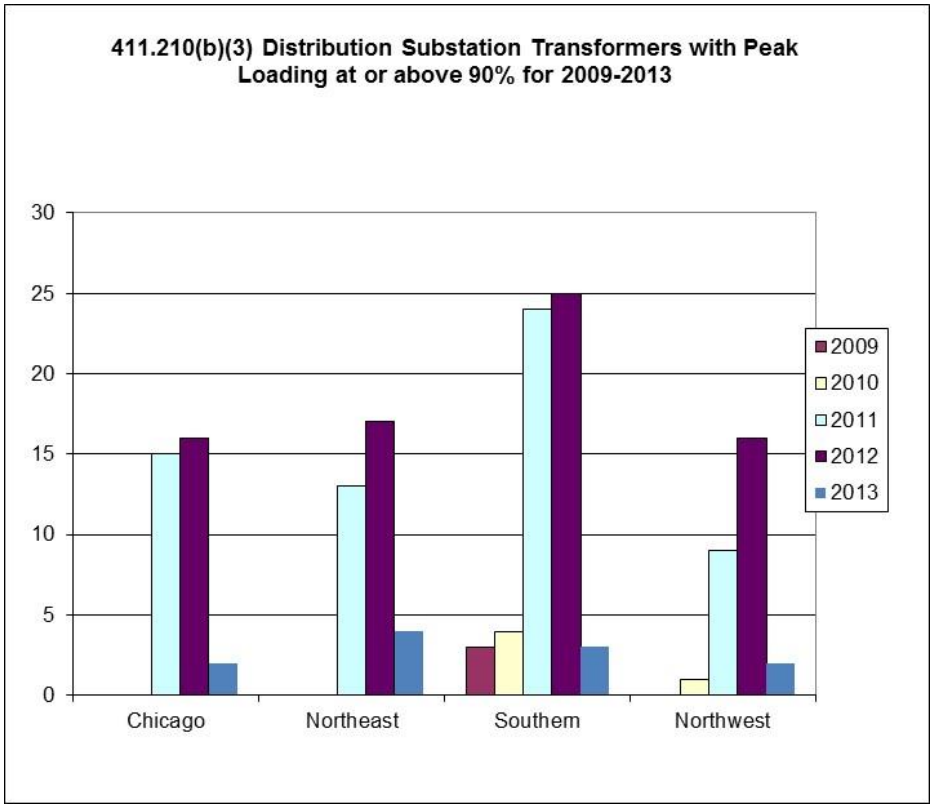


Figure 23 Distribution Substation Transformer with Peak Loading at or above 90%

When actual system peak loads approach the extreme hot weather load projections used for capacity expansion planning (see Figure 25), the trend in the number of transformers that exceed the criterion in 83 Ill. Adm. Code 411.210(b)(3) could signify reliability risks in the future. High transformer loadings can impact reliability in three ways: (1) when a substation transformer is loaded over its normal capacity rating for a length of time, the likelihood increases that the transformer may fail[13] due to cumulative thermal deterioration from overloading; (2) when a transformer is highly loaded, system reconfiguration flexibility is reduced if other failures occur in the system or if greater-than-expected load growth occurs; and (3) a trend toward a higher number of transformers exceeding the criterion in 83 Ill. Adm. Code 411.210(b)(3) at or below planning criterion load levels may signify inadequate substation capacity expansion planning.

In Figure 24, the solid red line represents actual annual peak demand while the lighter dashed or dotted lines represent the projected average weather load forecast. The average weather load forecast is not used to plan capacity expansions in the system.

[13] Higher operating temperatures, dependent in part on loading, shorten transformer life.

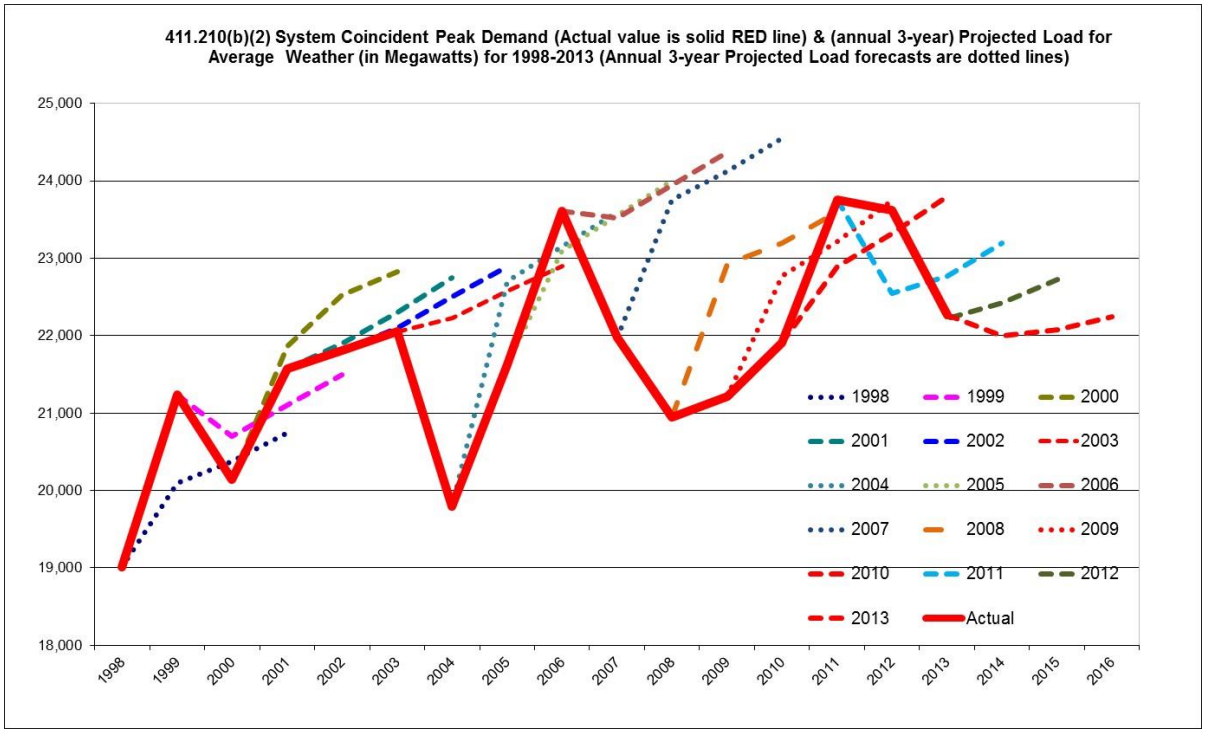


Figure 24 Actual Peak Demand and Projected Load for Average Weather

In Figure 25, the solid red line represents actual annual peak demand while the lighter dashed or dotted lines represent the projected extreme hot (90/10) weather load forecast used to plan capacity expansions in the system. Using the 90/10 load forecast for system capacity expansion planning was implemented as a result of the 1999 summer failures.

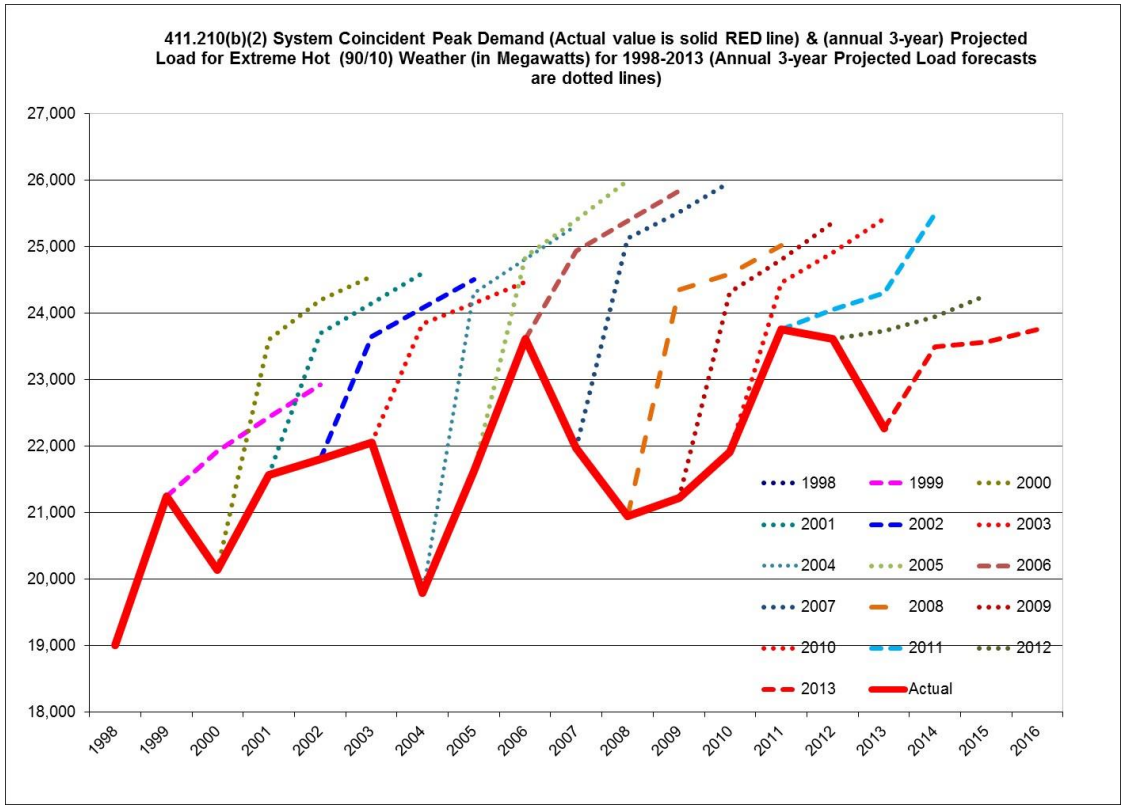


Figure 25 Actual Peak Demand and Projected Load for Extreme Hot Weather (90/10 Planning Criterion)

8. ComEd's Plan to Maintain or Improve Reliability

With information from 83 Ill. Adm. Code 411.120(b)(3)(G)(iii & iv), Figures 26 and 27 display "Construction and Maintenance Expenditures" in current and constant dollars for Distribution and Transmission, respectively.

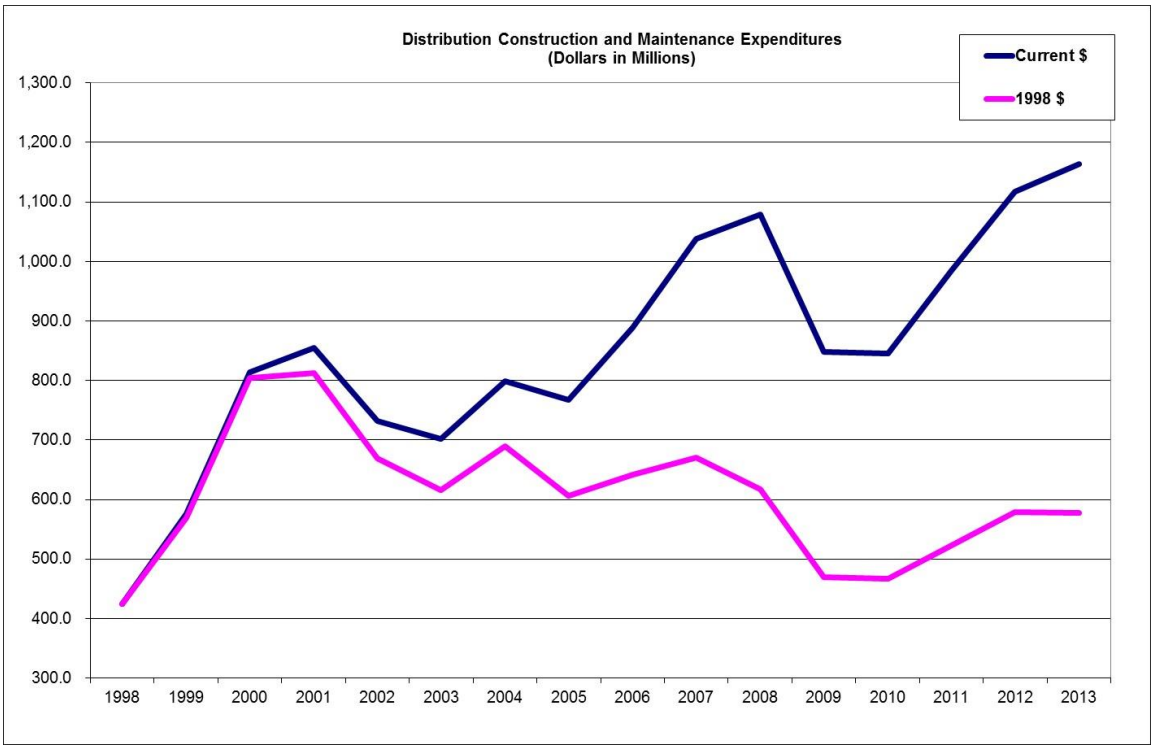


Figure 26 -- Distribution Construction & Maintenance Expenditures 1998-2013

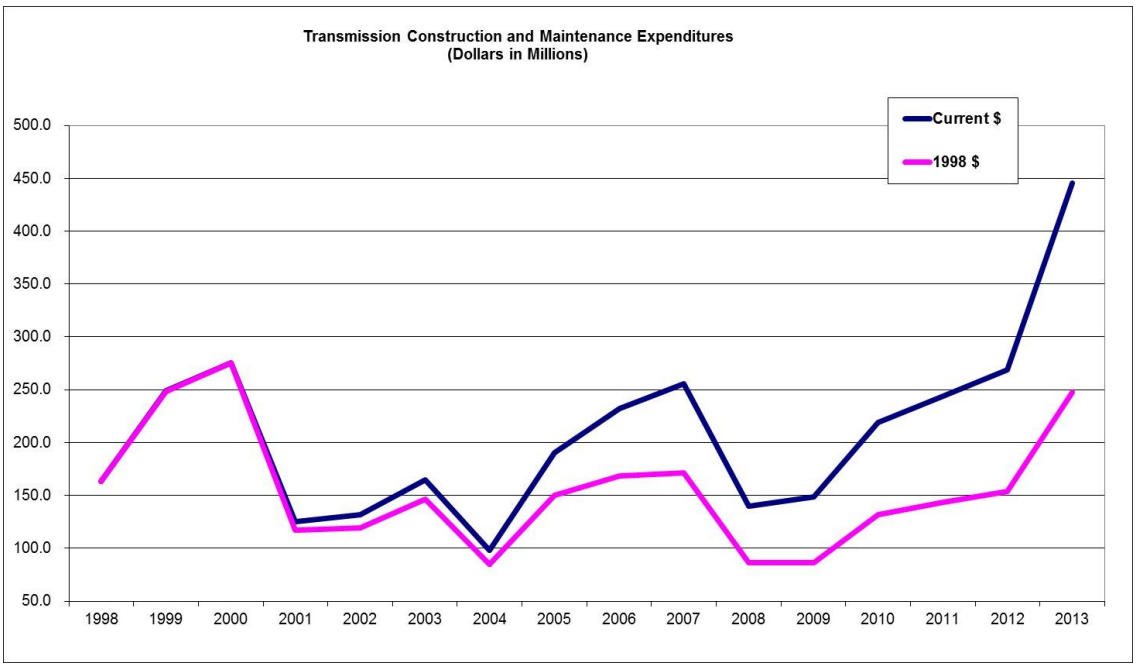


Figure 27 -- Transmission Construction & Maintenance Expenditures 1998-2013

ComEd's plans for future investment, as required by 83 Ill. Adm. Code 411.120(b)(3)(A), are detailed in pages A-1 through A-8, including Table 1 on pages A-5 through A-8, of the 2013 Reliability Report detail. A summary of the current plan is shown in Table 13 along with total variances from previous plan years.

Table 13 -- 2013 Future Investment Plan ($'s in Millions)

Pages A-5 through A-8 of 2013 Reliability Report			
	Plan 2014	Plan 2015	Plan 2016
Transmission System Improvements [see page A-5]	455	560	464
Distribution Capacity [see page A-6]	61	77	73
Substation [see page A-6]	64	74	51
4kv, 12kv, & 34kv Ckt Improvemetns [see page A-7]	273	414	381
Inspection and Maintenance [see page A-8]	157	160	165
	1010	**1285**	**1134**
Variance from plan in 2012 Report	***238***	***371***	
Variance from plan in 2011 Report	***152***		

Greater detail of actual (using information from Part 411.120(b)(3)(B)) and projected investment plans (83 Ill. Adm. Code 411.120(b)(3)(A) information from the 2004 through 2013 Reliability Reports) is illustrated in Figures 28 through 33.

ComEd describes its plan for future investment on pages A-1 through A-8 of the 2013 Reliability Report.

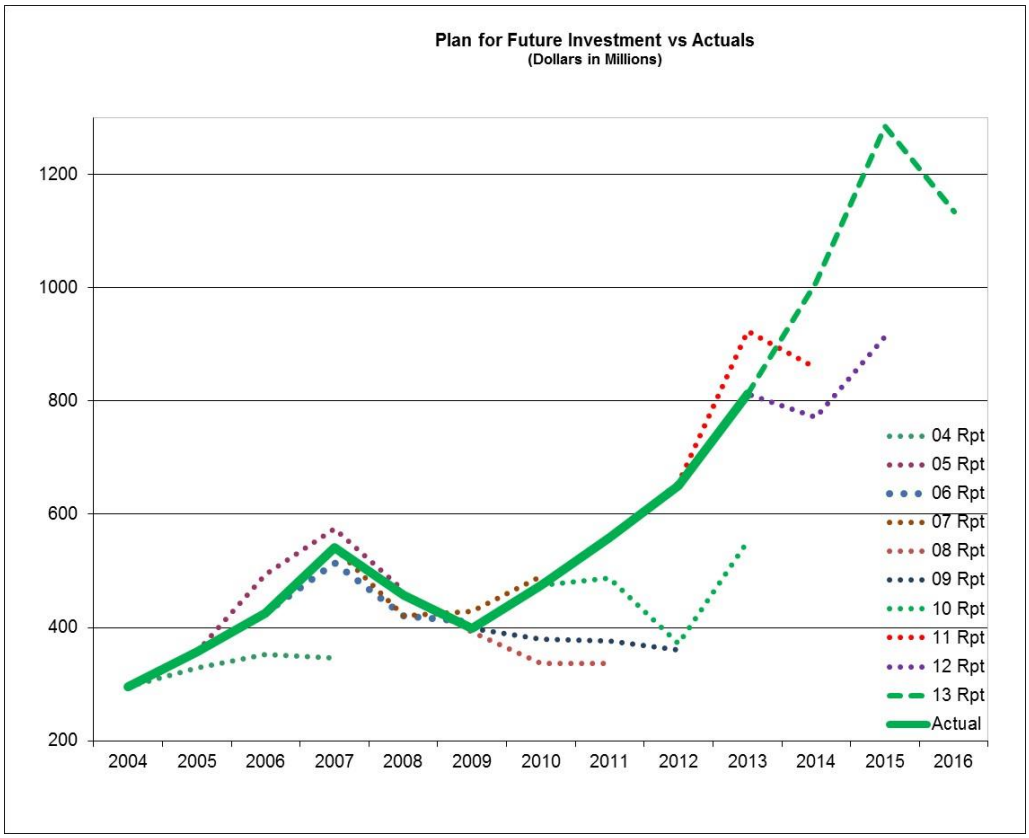


Figure 28 -- Comparison of Actual vs Plan for Future Investment 2004-2016

ComEd describes details of its plan for the Transmission System on page A-5 of the 2013 Reliability Report.

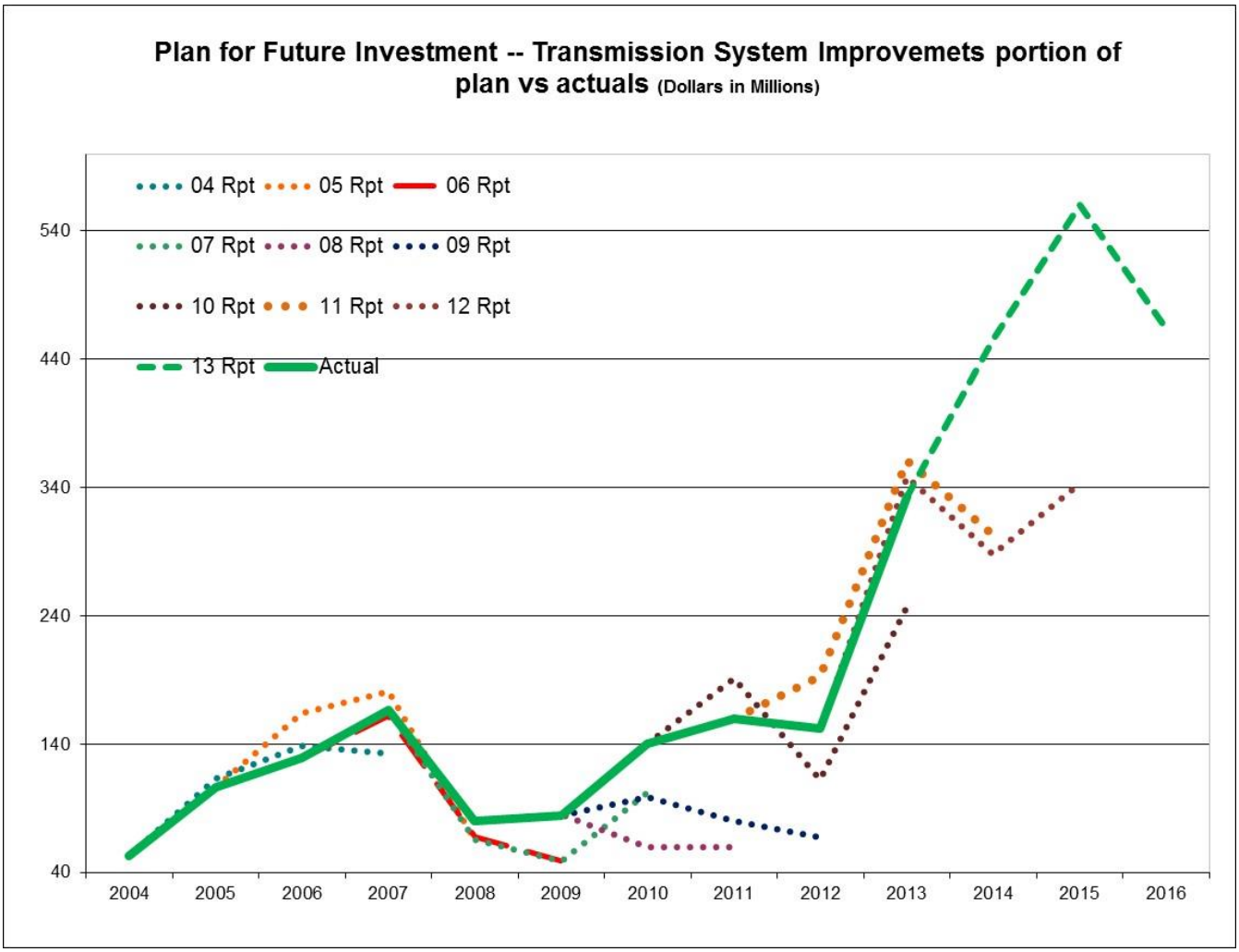


Figure 29 -- Comparison of Actual vs Plan for Future Investment -- Transmission System Improvements 2004-2016

ComEd describes details of its plan for Distribution Capacity on page A-6 of the 2013 Reliability Report.

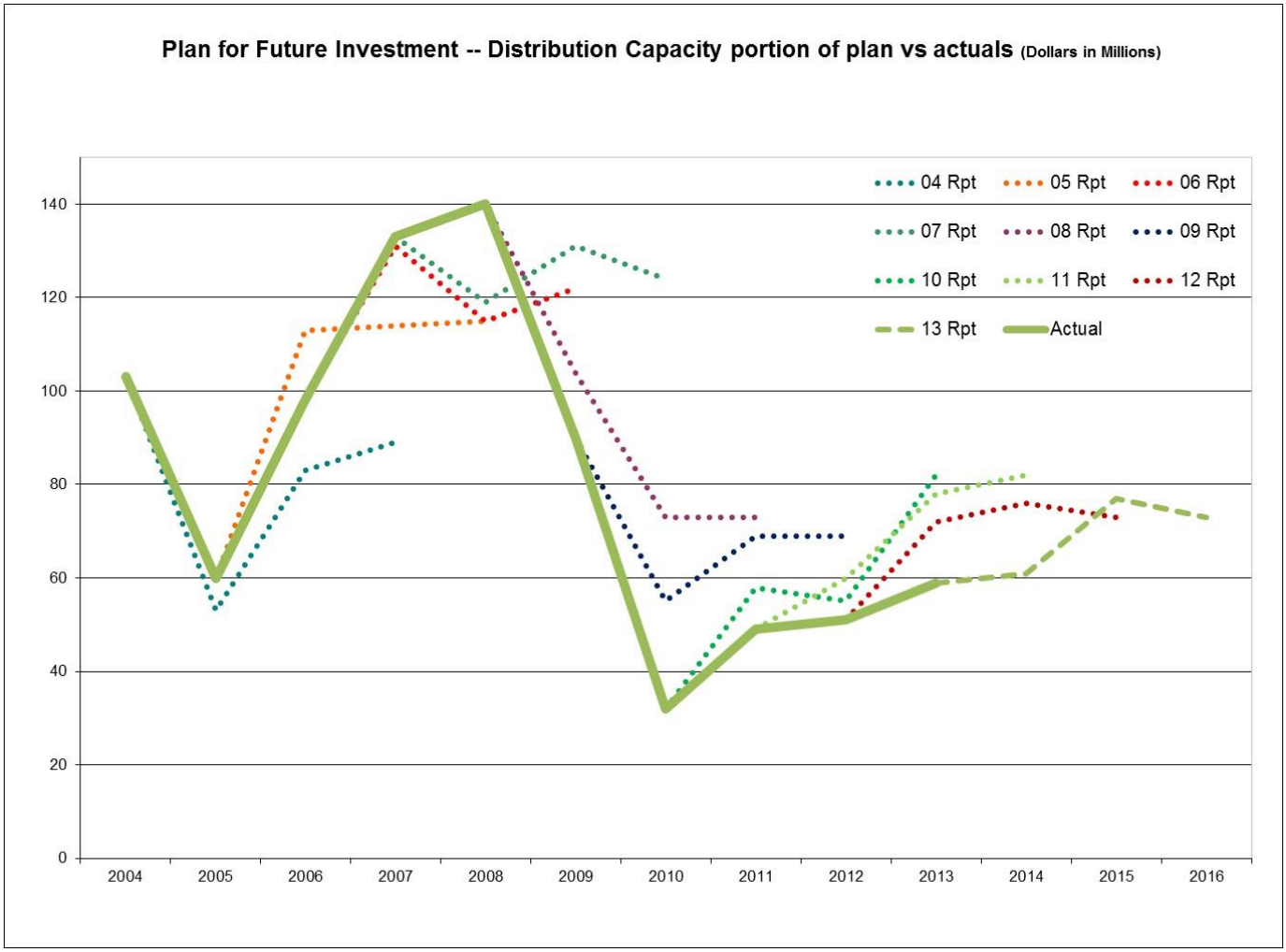


Figure 30 -- Comparison of Actual vs Plan for Future Investment -- Distribution Capacity -- 2004-2016

ComEd describes details of its plan for Substations on page A-6 of the 2013 Reliability Report.

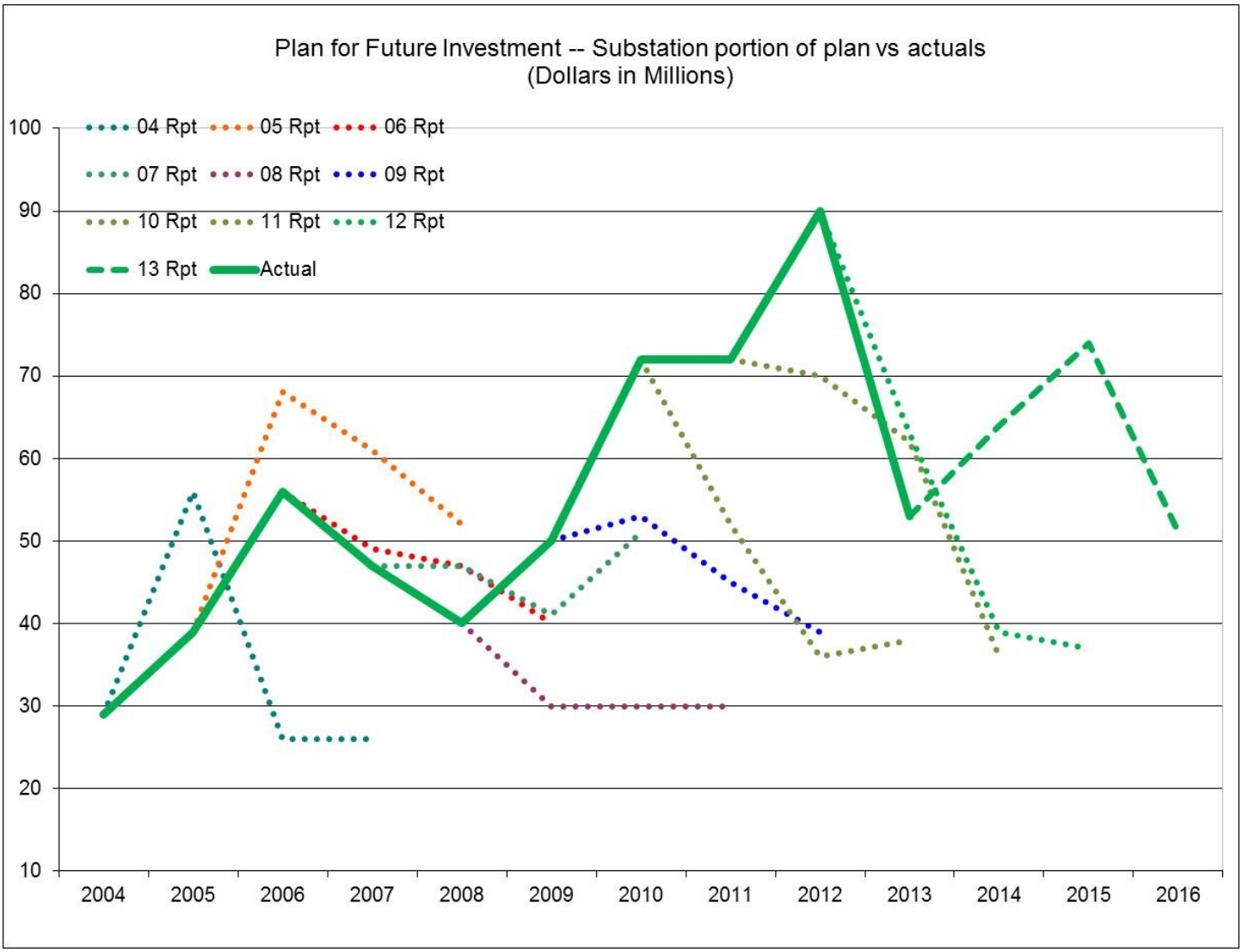


Figure 31 -- Comparison of Actual vs Plan for Future Investment -- Substation -- 2004-2016

ComEd describes details of its plan for 4, 12, and 34kV Circuit improvements on page A-7 of the 2013 Reliability Report.

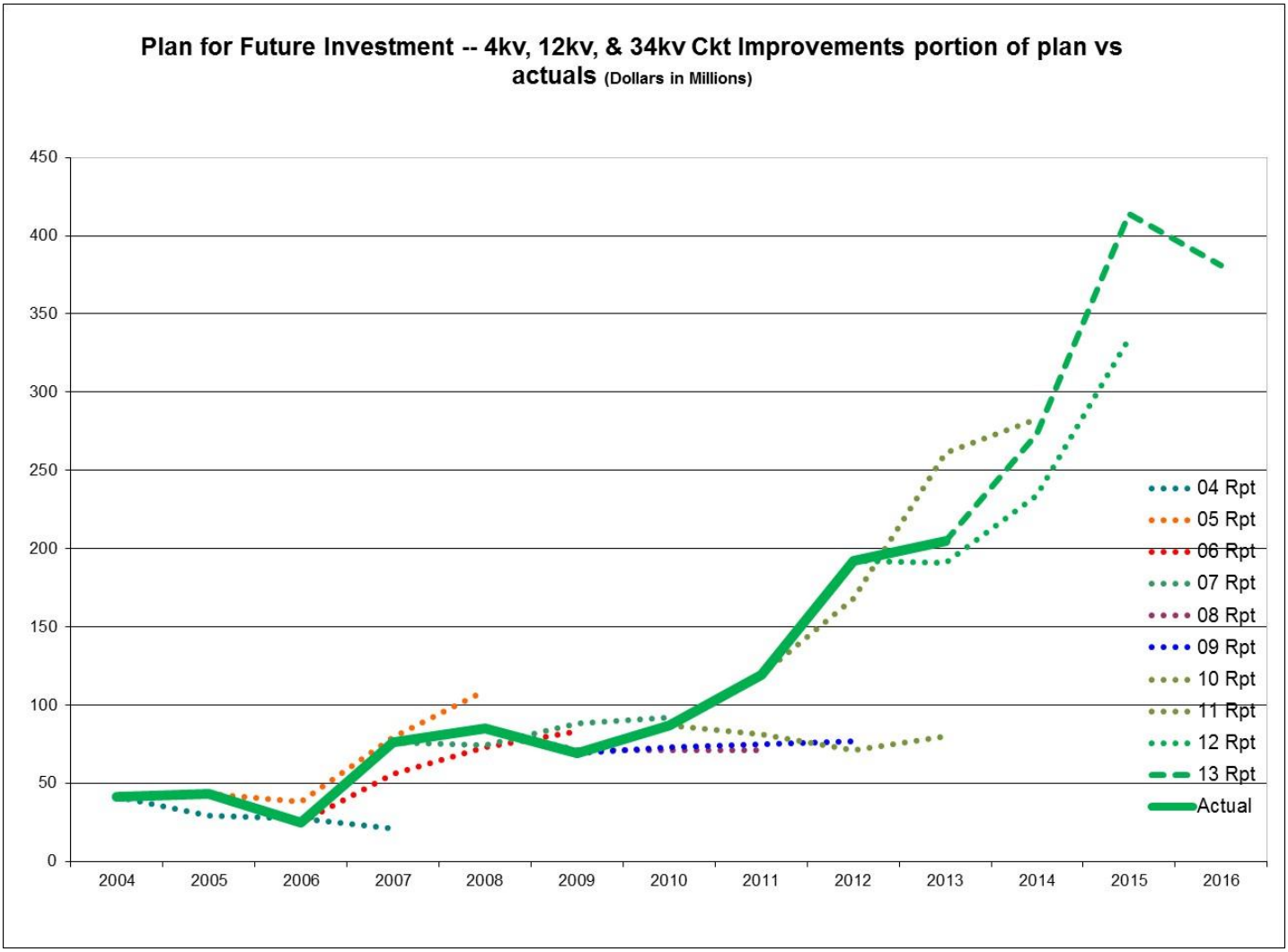


Figure 32 -- Comparison of Actual vs Plan for Future Investment -- 4kV, 12kV, & 34kV Circuit Improvements -- 2004-2016

ComEd describes details of its plan for Inspection and Maintenance on page A-8 of the 2013 Reliability Report.

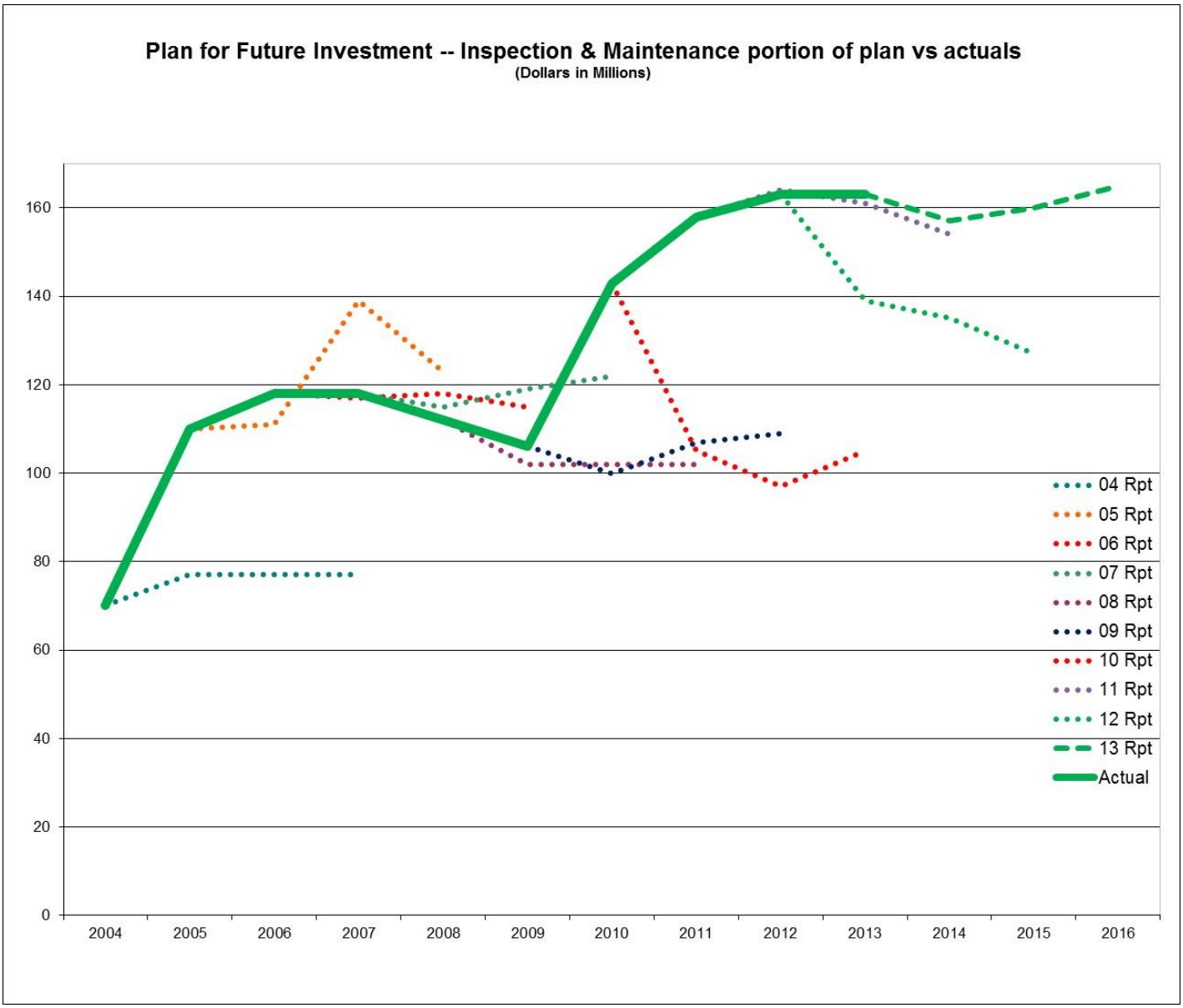


Figure 33 -- Comparison of Actual vs Plan for Future Investment -- Inspection and Maintenance -- 2004-2016

9. Potential Reliability Problems and Risks

Efficiency

Trends in spending levels alone do not explain how well ComEd is addressing reliability issues unless there is some indication of how efficiently that spending is applied. For example, if all else were equal, spending patterns similar to those in the mid 1990's would be a cause for alarm because the spending patterns of the mid-1990's were a precursor to the reliability problems of 1999. However, rarely are all things equal and a good example of

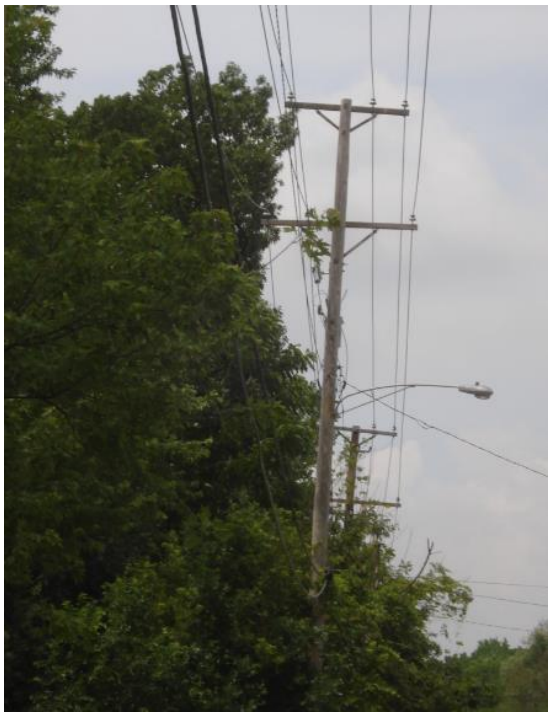
this would be to look at the strides made by the utility industry in capabilities of distribution and substation automation technologies and associated costs over the past 20 years.

Reviews of spending patterns, spending levels and inspections by Staff of actual conditions in the field with assessment of work that should be done and is actually getting done is the most effective way to determine the status of plans to maintain and improve reliability.

Attachment A is Staff's "Field Inspection Log" of Staff's field inspections listed in Table's 9 and 10, earlier in this report, as well as a sample of many pictures taken in the field by Staff.

Staff observed instances in the field where more careful investment or careful attention to detail would yield greater reliability returns on ComEd's reliability investment. Staff found such examples as illustrated in Pictures 1-5 where ComEd had not ensured that vegetation does not grow back into contact with ComEd's overhead electric distribution lines or grow or deteriorate into a position or a condition that threatens ComEd's overhead electric distribution lines, electric service reliability, employees, or the general public before ComEd returns to trim again.

Picture 1: 660 **Circuit F5283 – Trees into Primaries on two Circuits**



Picture 2: 079 **Circuit B2301 -- Pole buried in Trees**

Picture 3: 706 **Unknown Circuit – Homewood Area -- Two Dead Trees Overhang the Primary – 1 from each side of road**

Picture 4: 754 **Unknown Circuit – Freeport Area – Pole completely covered with vines**

Picture 5: 820 **Calumet City Substation – Trees into and over fence**

Inspection and Maintenance is one activity where cost moderation or even reductions are difficult to achieve without impacting reliability. Illustrative of this are the actual distribution tree trimming (vegetation management) expenditures from 2004 through 2013 as well as the three-year budget/forecasts[14] associated with the current and previous report analyses shown in Figure 34. The quality as well as quantity (illustrated by Pictures 1 through 5 earlier) of vegetation management can significantly impact the number of customer-experienced interruptions during adverse weather conditions as well as more normal conditions. The overall distribution tree trimming spending trend of Figure 34 has been upward with spending peaks in 2007 and 2013.

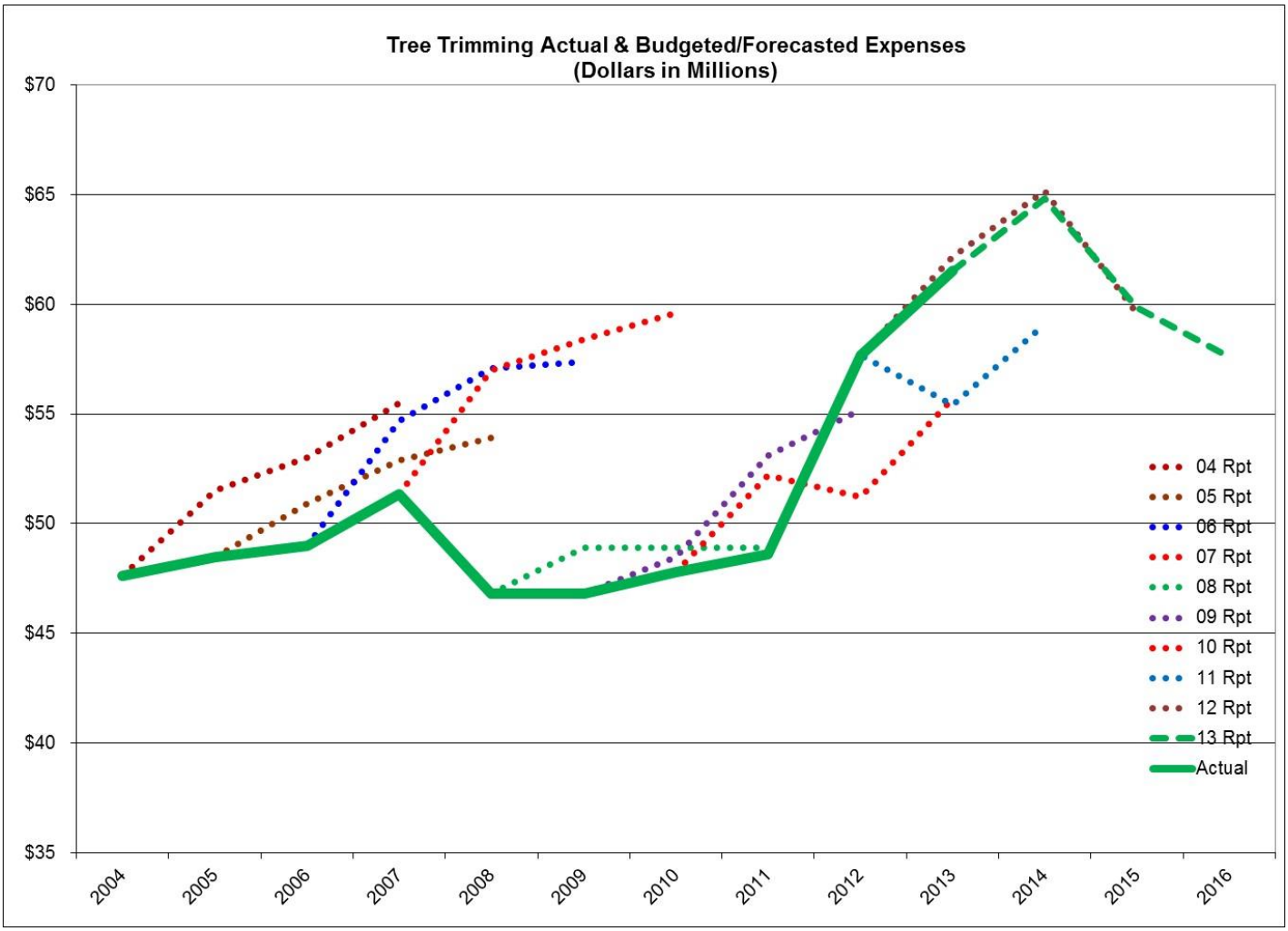


Figure 34 -- Distribution Tree Trimming Actual & Budgeted/Forecasted Expenses -- 2004-2016

[14] The first year in the future is a budget number followed by two forecast numbers.

On January 29, 2002, ComEd reaffirmed its commitment[15] to a four-year tree trimming cycle. Figure 35 indicates, based on most recent four year rolling totals of reported circuits trimmed, that ComEd is on a four-year cycle[16].

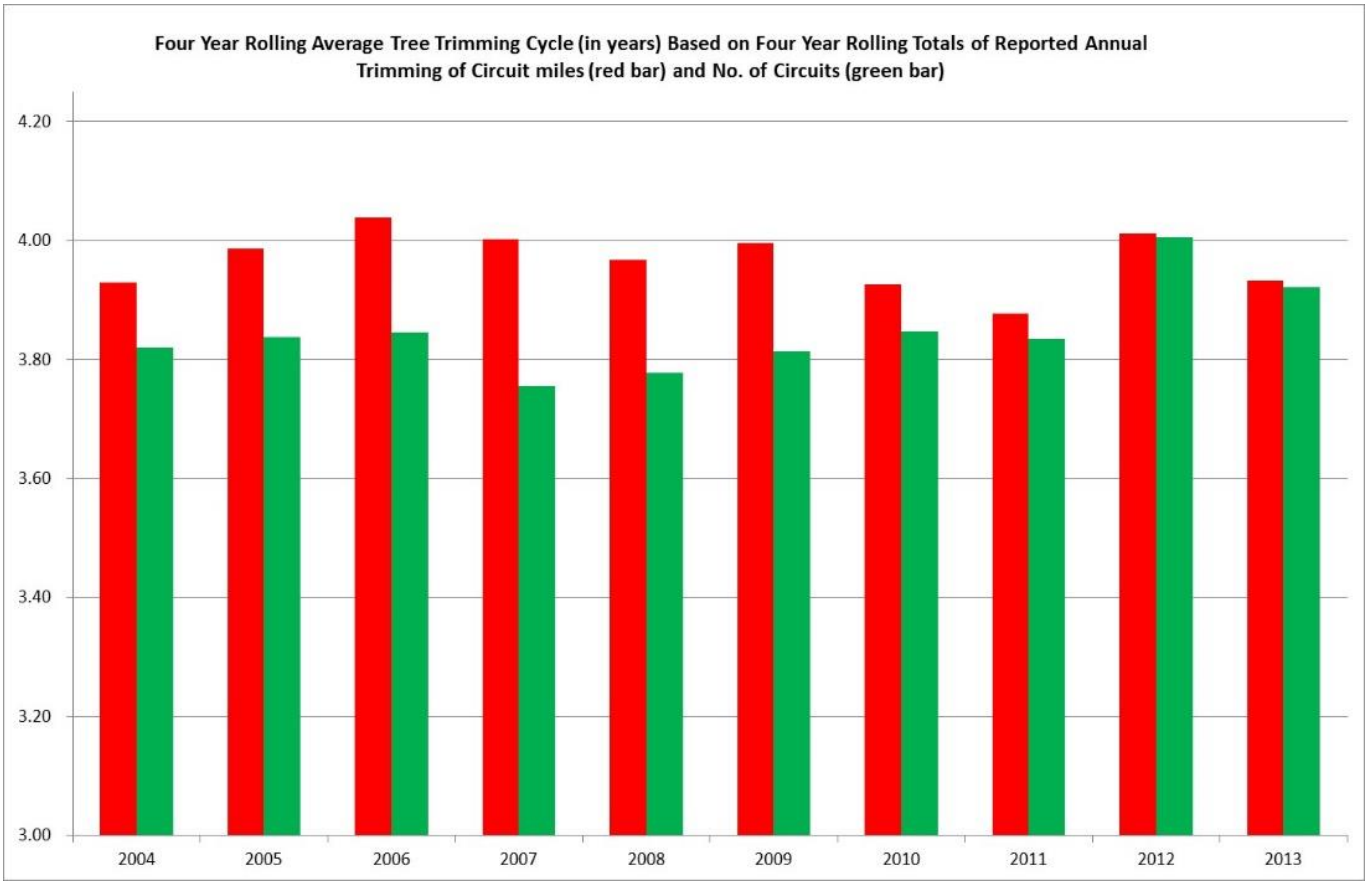


Figure 35 -- Rolling Average Distribution Tree Trimming Cycle Based on Most Recent Four Year Totals -- 2004-2013

[15] January 29, 2002, David Helwig, ComEd, to ICC Staff, "… ComEd will remove vegetation to ensure that vegetation does not grow back into contact with ComEd's overhead electric distribution lines or grow or deteriorate into a position or a condition that threatens ComEd's overhead electric distribution lines, electric service reliability, employees, or the general public before ComEd returns to trim again in a maximum of four years …"; additionally, ComEd has made commitments to address Liberty Recommendations to bring ComEd's performance in line with good utility practices that are summarized in Liberty's "Final Report of the Investigation of Commonwealth Edison's Transmission and Distribution Systems" **http://www.icc.illinois.gov/downloads/public/en/010416ComEdLib4.zip** which is a summary of Liberty's First, Second, and Third reports: **http://www.icc.illinois.gov/downloads/public/nq/Liberty%20Report.zip** **http://www.icc.illinois.gov/downloads/public/en/000717ComEd2.zip** **http://www.icc.illinois.gov/downloads/public/en/001019ComEdLib3.zip**

[16] Since the year 2000.

Tree Conditions

> …[I]t is generally accepted that the single largest cause of electric power outages occurs when trees, or portions of trees, grow or fall into overhead power lines. The odds are that every single electric customer in the US and Canada has, at one time or another, experienced a sustained electric outage as a direct result of a tree and power line conflict.[17]

Tree conditions near ComEd's overhead electric distribution lines are required to meet NESC Rule 218(A)(1) as adopted from the 2002 NESC by the Commission in 83 Ill. Adm. Code 305.20 on June 15, 2003.

NESC Rule 218(A)(1) and its associated note state the following:

> Trees that may interfere with ungrounded supply conductors should be trimmed or removed.
>
> *NOTE:* Normal tree growth, the combined movement of trees and conductors under adverse weather conditions, voltage, and sagging of conductors at elevated temperatures are among the factors to be considered in determining the extent of trimming required.

Staff observed trees making contact with ComEd's overhead electric distribution lines and observed where trees and other vegetation had grown into a position that threatened ComEd's overhead electric distribution lines and equipment as well as substations. See examples in Pictures 1 through 5 as well as Appendix A.

Staff recommends ComEd continue to investigate problem areas and modify programs to advance *and maintain* a four-year (minimum) tree trimming cycle throughout its service territory that is in compliance with NESC Rule 218.

Staff observed many instances in the field where trees formed an overhead canopy above ComEd's overhead electric distribution lines and equipment. While in many cases the overhead canopy has been trimmed well away from the primaries, nevertheless these overhead canopies present a significant reliability concern during adverse weather conditions (such as high winds, early wet snows, and heavy ice storms). Studies have shown that by removing overhead canopies above primaries, restoration times can be cut nearly in half[18] in those areas after an adverse weather event.

Staff continues to recommend that, as ComEd makes additional progress in re-establishing the trim zones and removing dead wood above conductors of its distribution circuits, ComEd investigate additional ways to address danger and hazard trees (defined in ANSI A300 72.5[19] and 72.8[20]). By addressing danger and hazard trees sooner rather than later, ComEd can moderate future costs of vegetation management while improving reliability.

Staff observed many instances in the field where customers and municipalities planted trees and vines near or directly below primaries, which will be sources of future maintenance expenses and reliability issues.

Staff recommends ComEd pursue more opportunities to educate customers about the reliability consequences of planting some types of vegetation beneath or near ComEd's distribution equipment.

---

[17] U.S.-Canada Power System Outage Task Force, Final Report on the August 14th Blackout in the United States and Canada: Causes and Recommendations (April 2004) (Final Blackout Report).

[18] S. Guggenmoos, "Increased Risk of Electric Service Interruption Associated with Tree Branches Overhanging Conductors. UAA Quarterly, 15(4), Fall 2007, S. Guggenmoos, "Storm Hardening the Electric System Against Tree-caused Service Interruptions. T&D World, Vol. 1, No. 12, Nov 18, 2010.

[19] ANSI A300 72.5 **danger tree:** A tree on or off the right-of-way that could contact electric supply lines.

[20] ANSI A300 72.8 **hazard tree:** A structurally unsound tree that could strike a target when it fails. As used in this clause the target of concern is electrical supply lines.

Maintenance

Adequate preventive and corrective maintenance programs, which include a well-planned vegetation management program discussed earlier, are the most important factors that influence long-term customer reliability.

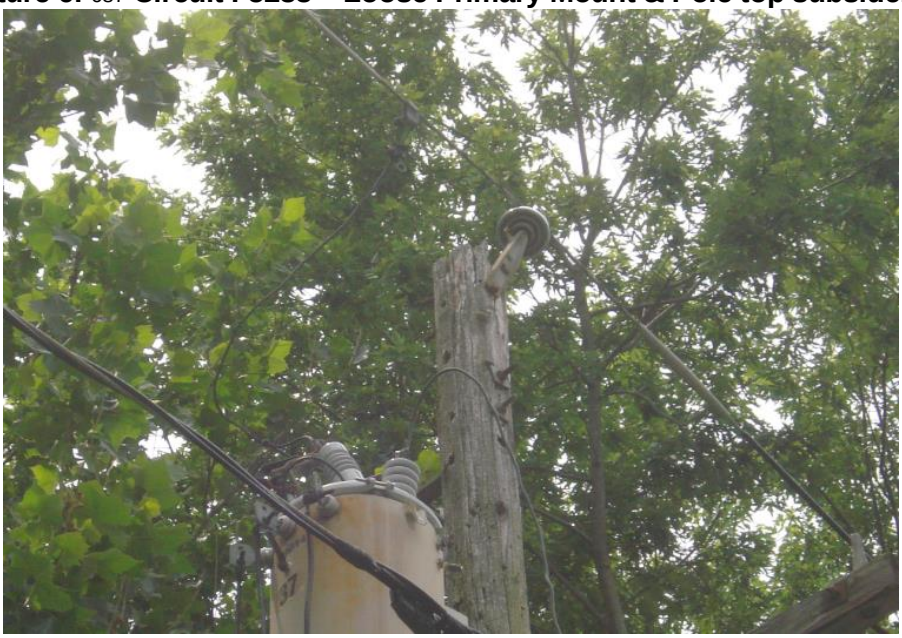
Unfortunately, maintenance programs are one area where a company can cut spending quickly and have an immediate impact on short-term income statement performance with minimal impact on short-term reliability performance[21]. Figure 33[22] illustrates ComEd's projected and actual spending pattern for "Inspection and Maintenance". The projected inspection and maintenance expenditures for 2014-2016 are approximately at or above 2011-2012 spending levels. All things being equal, Staff would expect reliability performance to remain approximately the same. Changes in "efficiency" could have a significant impact on outcomes.

Table 1 of this report shows the median age for distribution poles increasing every year with the median age now at 44 years, meaning that half of ComEd's over 1.3 million wooden distribution poles are over 44 years old. This was graphically illustrated in ComEd's Report Figure 5, Page G-4.

Close examination of the graph (ComEd's Report, Figure 5, Page G-4) shows nearly 200,000 distribution poles that are 61 or more years old. Pictures 2, 6, & 11 illustrate what some of these older poles look like and why they lead to hardware failures and are unlikely to survive many more storm events.

Pictures 6, 8, 11, & 12 show primary mounts that are nearing failure (or have failed) and will need repairs soon in order to function through future storms. Picture 7 illustrates a lightning arrestor that has failed and will need repair to maintain the circuit's resilience in future storms. Picture 9 shows the absence of animal guards on Primaries exiting Garden Plain Substation that lowers the effectiveness of animal protection within the substation. Picture 10 shows heavily rusted poles that have not been maintained for some time.

Picture 6: 687 **Circuit F5283 – Loose Primary Mount & Pole top subsidence**



[21] Staff would expect a delay of up to several years between when maintenance expenditures are cut and when material impacts will be apparent in reliability performance. An analogy would be the depressed spending levels for distribution in 1995-1998 and the service reliability problems of 1998 and 1999.

[22] The data that makes up Figure 33 is collected from Sections A and B of the current and previous ComEd Reliability Reports.

Picture 7: 758 **Unknown Circuit – Highway 20E -- Catastrophic failure of Lightning Arrestor**

Picture 8: 763 **Unknown Circuit – Pecatonica area -- Bolt on Primary Mount Near Failure**

Picture 9: 879 **Garden Plain Substation – No squirrel guards on Circuit H322 Overhead**

Picture 10: 727 **Eleroy Substation – Heavy rust on poles in station**

Picture 11: 930 **Circuit H321 – Damaged Pole Top & Primary J-Mount is lose and near failure**

Picture 12: 860 **Unknown Circuit – Beecher Area – Floating Primary Insulator**

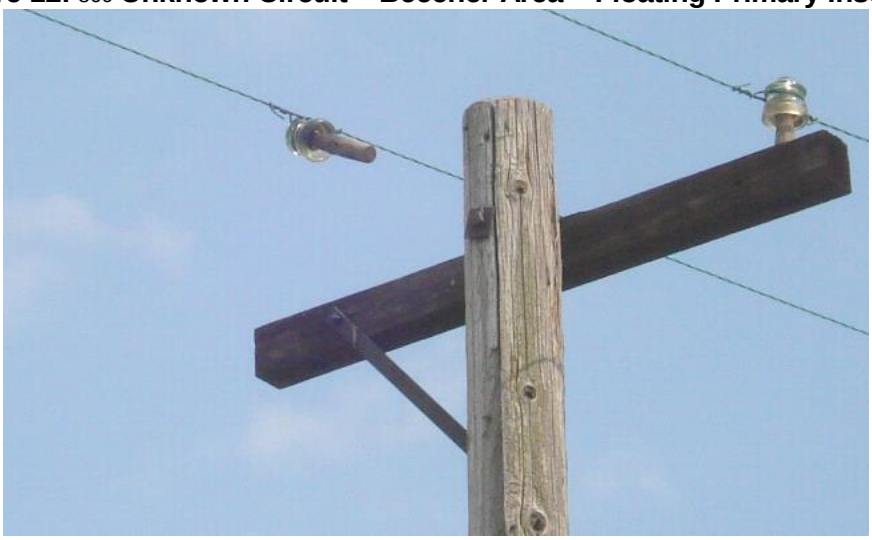


Figure 36 represents the annual total O&M dollars spent per ComEd customer from 2004 through 2013. The trend shows a distinct saddle shape between 2008 and 2011. Over time, Staff would expect the trend to steadily increase.

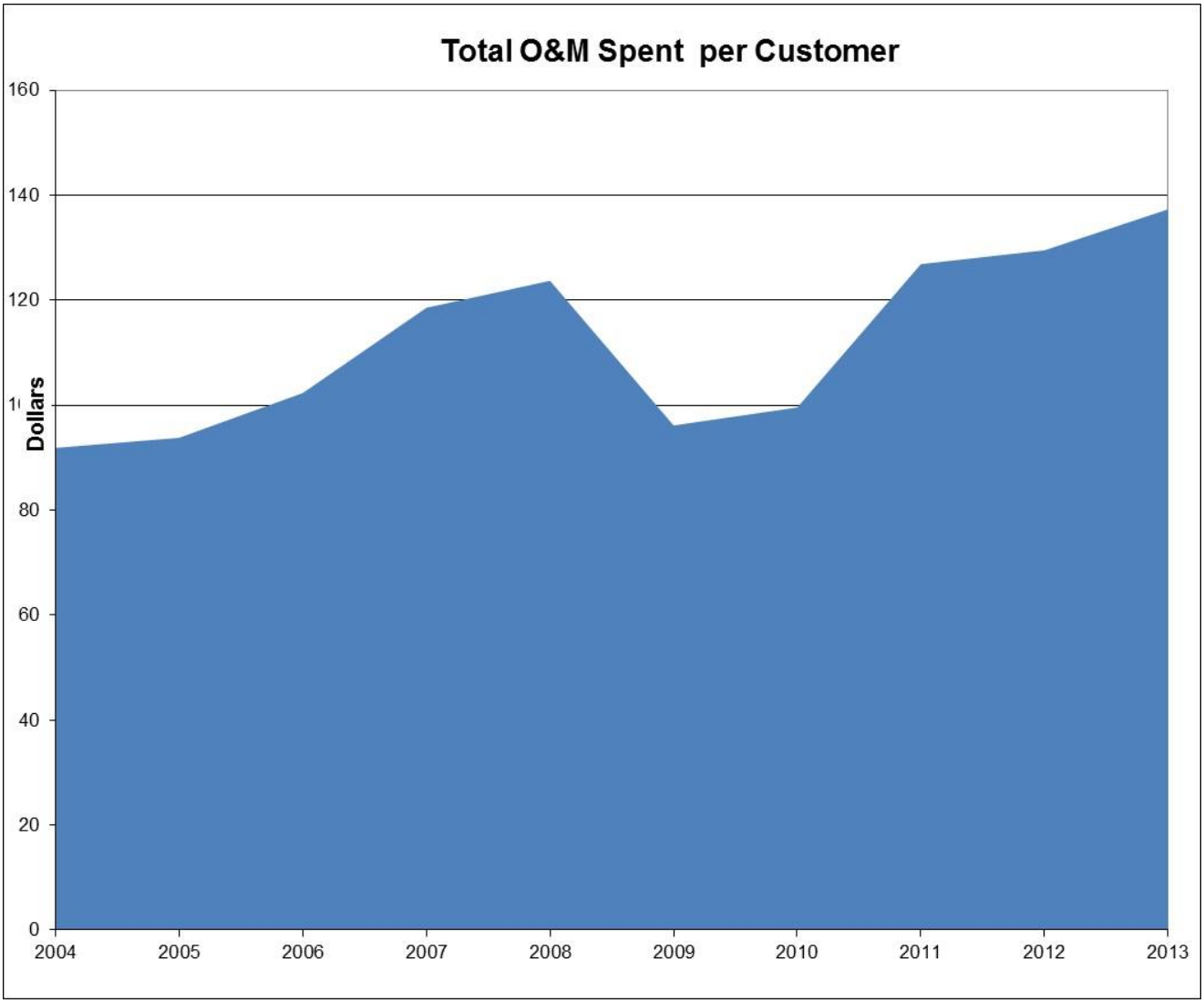


Figure 36 -- Total O&M Spent by ComEd per Customer -- 2004-2013

Figure 37 shows the trend in total annual system interruptions from 1998 through 2013 as identified in ComEd's responses to 83 Ill. Adm. Code 411.120(b)(3)(G)(ii)[23]. Staff would expect that, over time, ComEd's system total interruption levels should be in line with the 2000-2005 time period, though Staff would also expect years when rare severe storm events would push totals above those levels[24]. The four-year-rolling-average, shown in purple on Figure 37, display's the trend for System Total Interruptions as generally rising since 2005. Staff would expect that, over time, this trend would generally level out with some bumps up and down related to weather events (all things being equal).

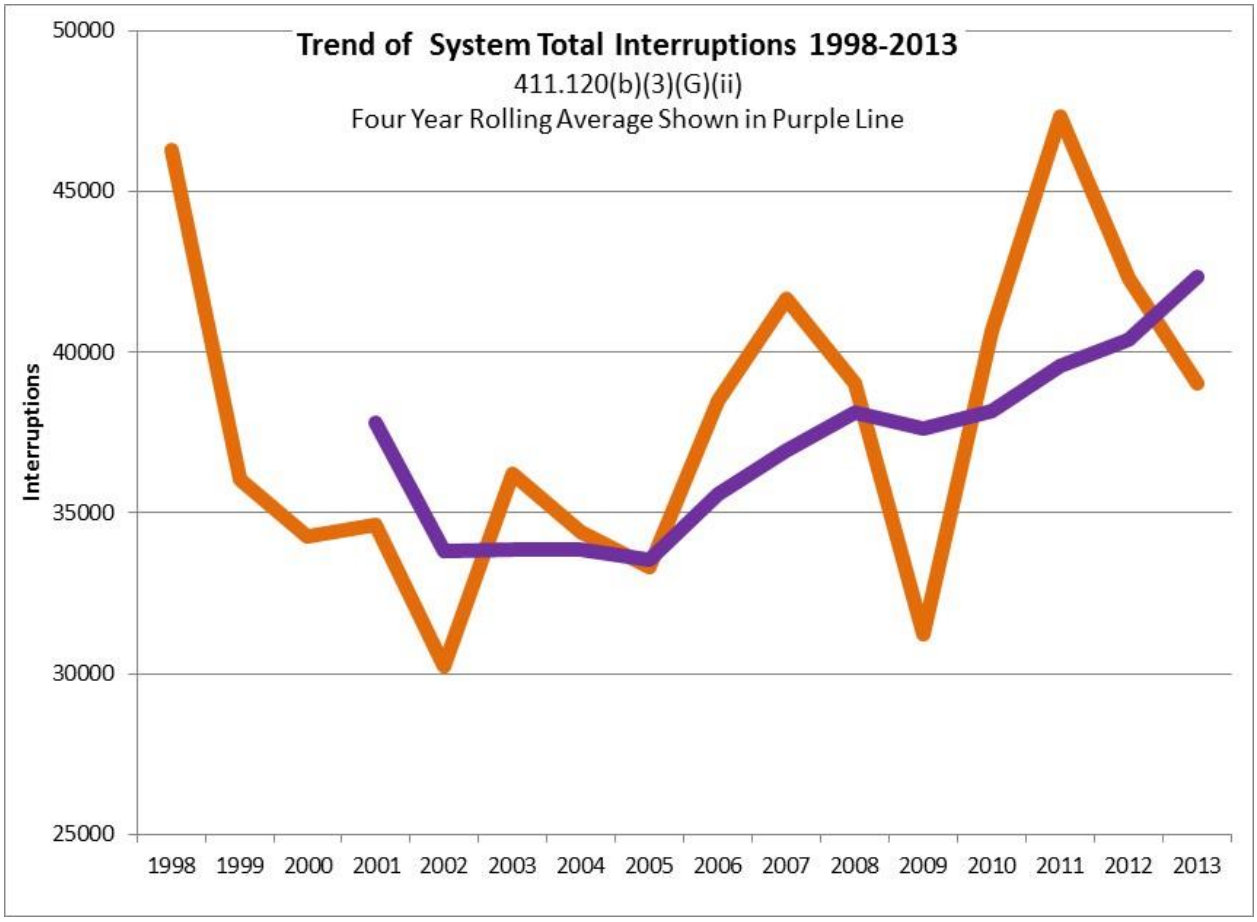


Figure 37 Trend of System Total Interruptions

The Annual ComEd System CAIDI since 1998 and the 4-year rolling average trend since 2001 was illustrated in Figure 15. Since 2005 the CAIDI 4-year average has been trending higher.

The Annual ComEd System SAIFI since 1998 and the 4-year rolling average trend since 2001 were illustrated in Figure 22. While not as low as the 2002-2006 period, the 4-year rolling average trend for System SAIFI has been moderating since 2008 and is trending down.

[23] The 2013 System Total of 39,055 interruptions is from Table 12 on Page G-9 of ComEd's 2013 Report.
[24] With total interruption levels returning to the lower levels in subsequent years.

Figure 38 shows the overall trend of combined company & contract employees at the end of each year.

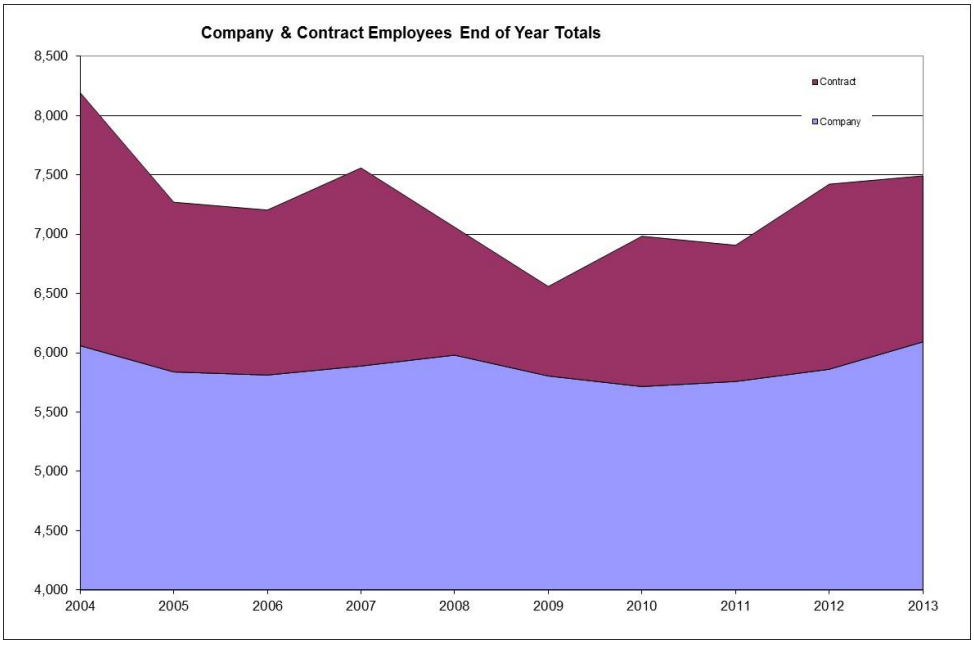


Figure 38 -- Company and Contract Employees -- End of Year Totals -- 2004-2013

With employee counts rising as shown in Figure 38 the amount of O&M dollars spent per person in ComEd's electric operations still continues to rise in Figure 39. Spending more per employee on O&M, all other things being equal, should result in improved equipment reliability and availability.

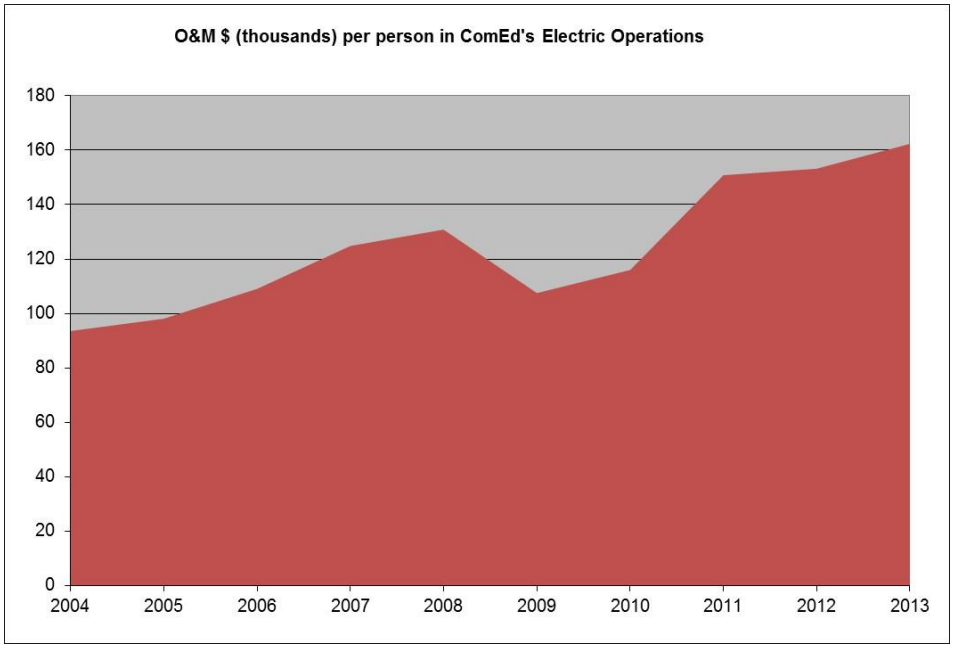


Figure 39 -- O&M $ (thousands) per person in ComEd's Electric Operations -- 2004-2013

In addition to building new substations to meet increased demand and to improve customer reliability, it is important that maintenance be scheduled and completed in substations to insure maximum capability, flexibility and reliability during periods of high demand. Figures 40 and 41 show the trends in spending on substation preventive and corrective maintenance expenditures.

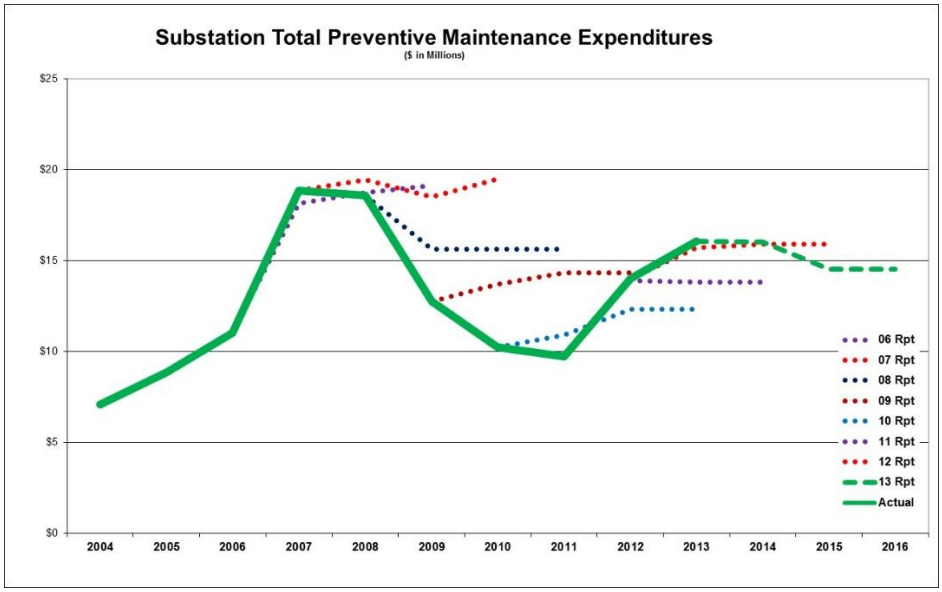


Figure 40 -- Actual vs Planned Substation Preventive Maintenance -- 2004-2016

Spending more on maintenance, all other things being equal, should result in improved equipment reliability and availability.

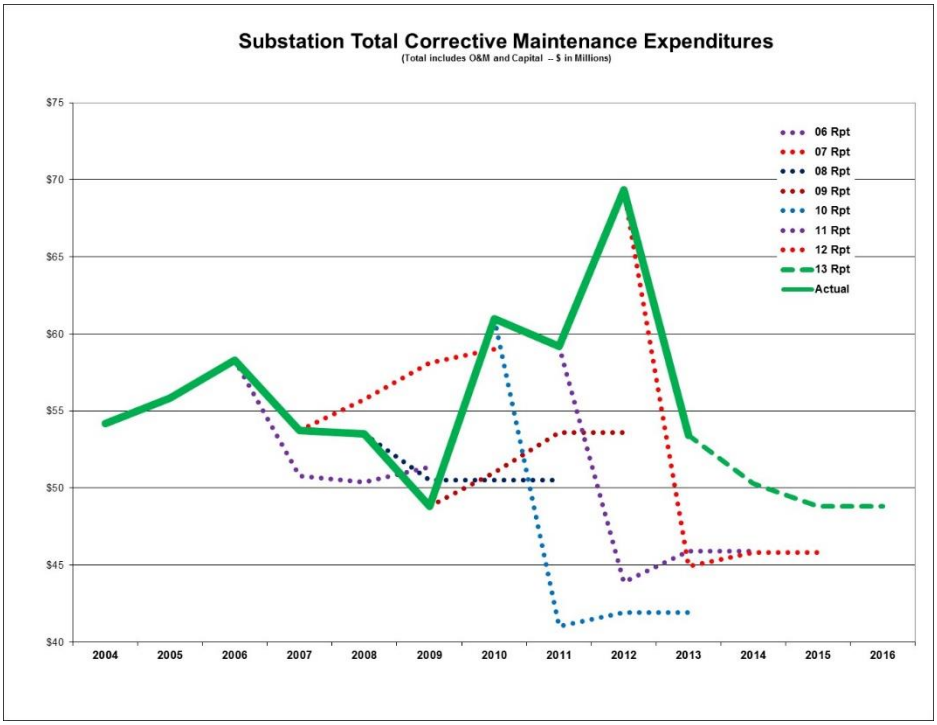


Figure 41 -- Actual vs Planned Substation Corrective Maintenance -- 2004-2016

Spending less in future years on Substation Corrective maintenance could harm equipment reliability and availability if it results in a reversal of the downward trend currently shown in Figure 42 representing Substation Corrective Maintenance backlogs. Staff is encouraged that this downward trend continues for Substation Corrective Maintenance backlogs in 2013.

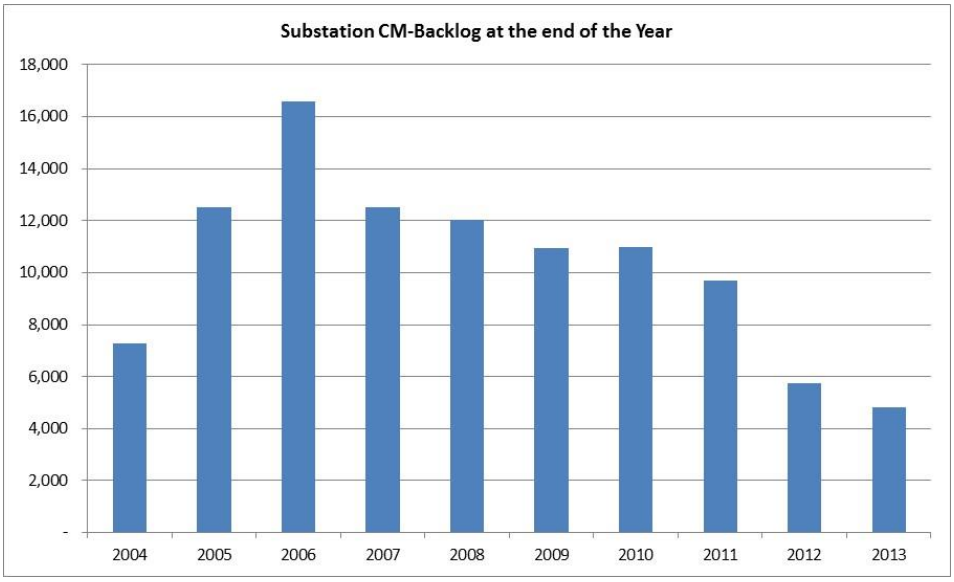


Figure 42 – End of the Year Substation Corrective Maintenance Backlog -- 2004-2013

Staff is encouraged by the decline in Distribution corrective maintenance backlogs for 2013 illustrated in Figure 43.

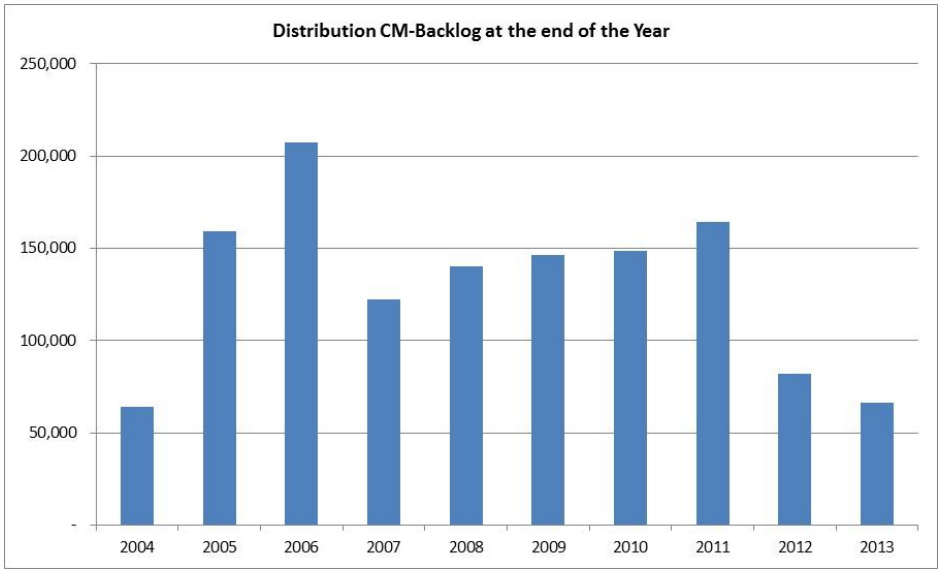


Figure 43 -- End of the Year Distribution Corrective Maintenance Backlog -- 2004-2013

During Staff's field inspections in previous years, Staff found instances of NESC violations, but none were noted this year in Appendix A. Staff is encouraged that ComEd is actively looking for, finding and addressing these NESC violations as part of its regular inspection[25] cycle. Staff was further encouraged to learn that ComEd found and is correcting line clearance issues associated with its transmission system.

[25] "… The thorough inspection of 34kV lines are performed every 2 years and 4kV and 12kV lines are inspected every 4 years. …" ComEd response to Staff DR, ENG 2.09.

10. Review of ComEd's Implementation Plan for the Previous Reporting Period

A report on the significant deviations from ComEd's 2012 plan for 2013 from 2013 actual spending levels was included in ComEd's 2013 reliability report in pages B-1 through B-6. Table 13 summarizes the data from ComEd's plan.

Table 14-- Comparison of 2012 Plan for 2013 to 2013 Actual (in $ Million's)

	2012 Plan for 2013	Actual 2013	Var	% Var
Transmission System Improvements [see page B-3]	348	333	-15	-4.3%
Distribution Capacity [see page B-4]	72	59	-13	-18.1%
Substation [see page B-4]	63	53	-10	-15.9%
4kv, 12kv, & 34kv Ckt Improvemetns [see page B-5]	191	205	14	7.3%
Inspection and Maintenance [see page B-6]	139	163	24	17.3%
	813	813	0	0.0%

While the variances for several areas were substantial, ComEd's explanations[26] for their major variances in response to 411.120(b)(3)(B) appear reasonable.

11. Summary of Recommendations

Staff recommends the following actions:

- Staff recommends ComEd should seek out any maintenance or design issues that are contributing to customers exceeding the 3 year service reliability targets.
- Staff recommends ComEd continue to investigate problem areas and modify programs to advance *and maintain* a four-year (minimum) tree trimming cycle in compliance with NESC Rule 218 throughout its service territory.
- Staff continues to recommend that, as ComEd makes additional progress in re-establishing the trim zones and removing dead wood above conductors of its distribution circuits, ComEd investigate additional ways to address danger and hazard trees (defined in ANSI A300 72.5[27] and 72.8[28]).
- Staff recommends that ComEd pursue more opportunities to educate customers on the reliability consequences of planting some types of vegetation beneath or near ComEd's distribution equipment.

[26] Read Pages B-1 through B-6 of ComEd's 2013 Reliability Report.
[27] ANSI A300 72.5 **danger tree:** A tree on or off the right-of-way that could contact electric supply lines.
[28] ANSI A300 72.8 **hazard tree:** A structurally unsound tree that could strike a target when it fails. As used in this clause the target of concern is electrical supply lines.

Appendix A: Log of Summer Field Observations

The summary[1] for each inspection represents typical observations noted during the field inspections and **does not** represent all of the problems or potential problems that may exist.

To evaluate the overall trend of conditions in ComEd's service territory, Commission Staff conducted a series of field inspections in 2014. The purpose of the inspections was for Staff to see if there were any obviously visible reasons for poor reliability performance. For example, on distribution circuits Staff looked for problems such as poor tree trimming practices, broken or damaged equipment, rotten poles, and overly slack spans (low sagging lines), while at substations Staff looked for problems such as low or leaking oil, load tap changers regularly operated at extreme positions, and poor maintenance practices. It is important to note that it is not the purpose of Staff's field inspections to find problems for ComEd to fix[2] but rather to develop a picture of the overall condition of the power delivery infrastructure in ComEd's service territory.

Field Inspection Log

Utility: ComEd **Investigators: J. Stutsman (Staff)**

Feeder Ckt: F5283 **City: Homewood** **Voltage: 12kV** **Date: Tuesday, June 24, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
613-649		**TDC452 Glenwood Substation**	**Fence line Inspection:** Red Fire Box noted on Fence. Fence Posts at Gate were Grounded but were not bound to Gate. Veg Management Sticker on Gate 5/5/2014 Heavy rust & signs of past oil leaks on transformer 74 Bushing oil levels look good from fence-line Tap changer on Transformer 74 looks good via picture 629 Rust on other equipment/poles/posts in yard Squirrel guards broken/missing on two circuits No direct stroke lightning protection

[1] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[2] Though Staff would expect that those identified problems and the problems inferred would be addressed.

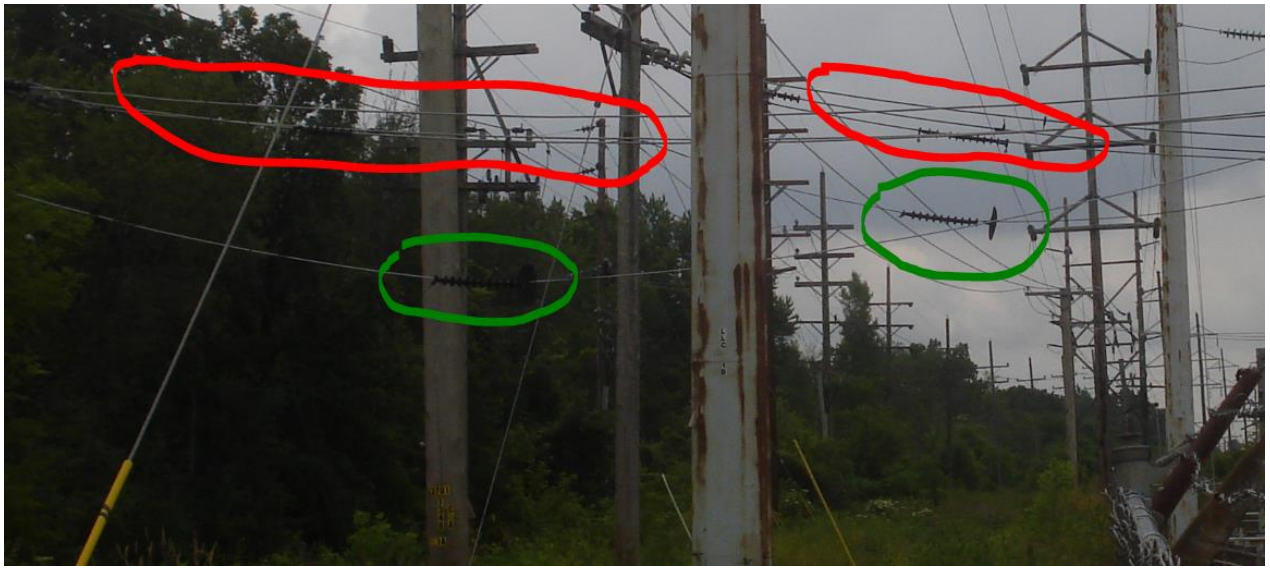
Appendix A: Log of Summer Field Observations

		Feeder Ckt: F5283 City: Homewood **Voltage: 12kV**	
650	1	Corner of Patricia Dr & Holbrook Rd	Lose Ground Cover
654-5	1-2 Break	90 & 86 Holbrook Rd	Trees close to Primary located below Ckt F5283
656-7	1-2 Break	62 & 58 Holbrook Rd	Trees into Primary located below Ckt F5283 as well as into F5283
658-9	1-2 Break	West from 58 Holbrook Rd	More Tree issues for Primary below F5283
660-1	2	214-224 Holbrook Rd	More Tree issues into Primary below F5283 as well as into F5283
662	2	Near Intersection of Holbrook Rd & Serena Dr	Lose Cover on Ground
664-5	2	244 Holbrook Rd	Tree into Primary
667-8	2	234 Holbrook Rd	Tree into Primary
673	2	244 Holbrook Rd	Dead Part of Tree leaning into/towards Primary
674-7	2	535 Hamiltonwood RD	Heavy Overhang creating Tunnel effect in ROW behind house Missing Down Guy Guard
678-80	2	Line East of 400-408-416 etc. Hamiltonwood Rd	Primary buried in Trees/Brush Canopy DO NOT see direct contact on Primary Picture taken of New Pole in front of 400 Hamiltonwood Rd & Canopy above that Pole which was typical
682-7	3	1911 Hanover LN	Pole Top Bad – Mount for Primary is lose/lose bolts Pole Top Subsidence
689-90	3	1934 Hanover LN	Only 1 bolt holding Primary Mount & Primary Mount is twisting
691	3	1933 Hanover LN	Missing Guy Guard
	3	Near 1716 Cambridge Ave	Trees into Primary
692-4	4	187th St	Overhang above Primary
696	5	1854 Heather Rd	Missing Down Guy Guard

Appendix A: Log of Summer Field Observations

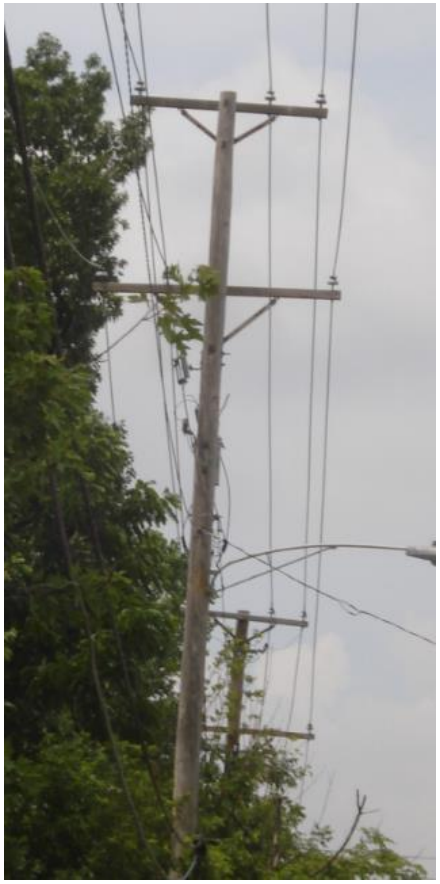
697-9	5	Near Intersection of Klimm Ave & Willow Rd	Badly leaning Pole
		Feeder Ckt: <u>Unknown Circuit(s)</u> City: <u>Homewood and Homewood Area</u> Voltage: <u>12kV</u>	
	NA	Vollmer Road between I-57 and HWY-1	Several locations of Vegetation into Primary and 1 location of broken lightning arrestors
700-4	NA	On Chicago Heights/Glenwood Rd in front of Coales Rd	Vines on Poles & down Guys
709	NA	771 Coales Rd	Service on old Pole and Replacement Pole – Service only partly moved to replacement pole
706-8, 710	NA	779 & 774 Coales Rd	2 dead Trees overhang Primary – 1 from each side of the road

Settings on Transformer 74 LTC
629 Glenwood Substation



Squirrel Guards Broken/Missing
634 Glenwood Substation

Appendix A: Log of Summer Field Observations



Tree in contact with Primaries
660

Bad Pole Top & Lose Mount
684

Leaning Pole
699

Appendix A: Log of Summer Field Observations

708: 2 dead trees overhanging/threating Primary

Appendix A: Log of Summer Field Observations

The summary[3] for each inspection represents typical observations noted during the field inspections and **does not** represent all of the problems or potential problems that may exist.

To evaluate the overall trend of conditions in ComEd's service territory, Commission Staff conducted a series of field inspections in 2014. The purpose of the inspections was for Staff to see if there were any obviously visible reasons for poor reliability performance. For example, on distribution circuits Staff looked for problems such as poor tree trimming practices, broken or damaged equipment, rotten poles, and overly slack spans (low sagging lines), while at substations Staff looked for problems such as low or leaking oil, load tap changers regularly operated at extreme positions, and poor maintenance practices. It is important to note that it is not the purpose of Staff's field inspections to find problems for ComEd to fix[4] but rather to develop a picture of the overall condition of the power delivery infrastructure in ComEd's service territory.

Field Inspection Log

Utility: ComEd **Investigators: J. Stutsman (Staff)**

Feeder Ckt: Random **City: Freeport, Pearl City, Stillman Valley, Oregon Areas** **Voltage: 12kV** **Date: Tuesday, July 1, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
711-739		**TDC370 Eleroy Substation**	**Fence line Inspection:** Red Fire Box noted on Fence. Gate Posts at Gate were Grounded Gates bound to Gate Posts. Veg Management Sticker on Gate 5/3-4/2014 TB Some standing water in substation yard Corner Posts – can see grounded Rust on sides of LV switchgear Rust on Transformer 71 Overall, yard looks good except for standing water Bushing oil levels look OK on both Transformer high sides Direct Stroke Lighting protection visible from Transmission line static wires carried into substation over equipment Heavy rust on some poles in substation

[3] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[4] Though Staff would expect that those identified problems and the problems inferred would be addressed.

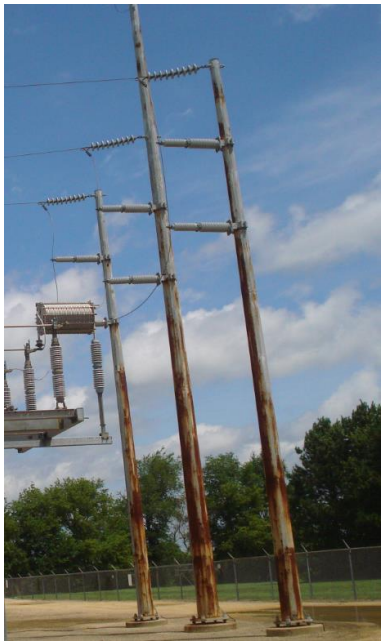
Appendix A: Log of Summer Field Observations

			Rust on Transmission poles immediately outside Substation
		Feeder Ckt: Random City: various locations Voltage: 4-12kV	
741-2	NA	1368 Helter Rd	Missing guard on down guy Evidence of past problems with vines on down guy & pole
744-5	NA	1413 S. Silberman Rd	Bad Pole Top – J mount appears lose (Pole Top Subsidence) Possible bad Pole?
747-8	NA	1818 S. Silberman Rd	Pole Top Subsidence
750	NA	2425 S. Silberman Rd – looking North	Significant Overhang but no Contact
751	NA	2425 S. Silberman Rd – looking South	Re-enforced Pole
753-4	NA	2 poles East of: 2001 Mill Grove Rd	Pole completely covered with Vines
755	NA	2001 Mill Grove Rd – Area	Slack on Down Guy Wire on ~~2 different poles~~ Subsequent field review by ComEd personnel found only 1 pole in the area with Slack Down Guy Wire – the 2nd pole could not be located in the immediate area Heavy leaning Pole with Transformer mounted on Pole
757-9	NA	8178 US Highway 20E	Catastrophic failure of Lightning Arrestor
761-3	NA	16101 W. State Rd, Pecatonica	Near Failure -- Loose bold on Primary insulator Mount Noted 3 more locations East of here with similar issue (between here & Winnebago Rd)
765-6	NA	15788 W. State Rd, Pecatonica	Damaged/Splintered Pole Top
768-71	NA	15682 W. State Rd, Pecatonica	Damaged Pole Top – Large portion of pole missing and exposing bolts holding primary mount
	NA	~1/2-1 mile East of: 15682 W. State Rd, Pecatonica	Very lose down guy covered with vines
773-5	NA	10662 N Kennedy Hill Rd	Damaged Cross Arm Brace

776-797		**DCB 27 Stillman Valley Substation**	**Fence line Inspection:** Gate Posts at Gate were Grounded Gates bound to Posts. Veg Management Sticker on Gate 6/18/2014 Standing water outside of Gate but not in Substation Yard Transformer 51 slight spots of rust Overall, substation yard looks good No squirrel guards on primaries into/out of substation Yard Bushing oil levels look good from fence-line Trees into and Over Fence on Cap-Bank Side of Substation Yard Animal Protection visible on bushings and Insulators in bus-work Transformer 51 Reg looks good No visible direct stroke lightning protection in Substation Yard but Communications tower nearby probably provides significant protection
		Feeder Ckt: Random City: Stillman Area Voltage: 12kV	
	NA	Drive from Winnebago to Stillman Valley	Observed some good Tree Trimming – Observed a few slack down guys and a few emerging vine problems

Appendix A: Log of Summer Field Observations

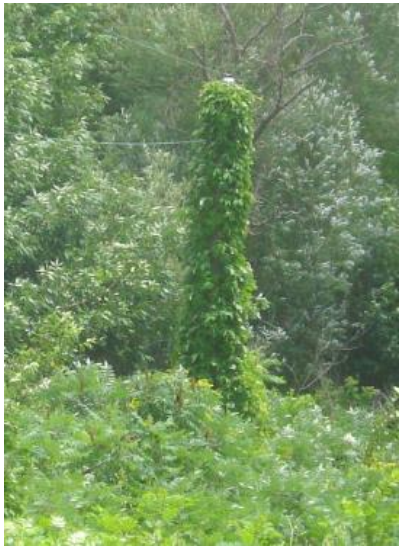
800-812		**DCB 54 Oregon Substation**	**Fence line Inspection:** Fence Posts at Gate were Grounded but were not bound to Gate. Veg Management Sticker on Gate 6/17/2014 No Squirrel guards on primaries into/out of substation yard Animal guards on bushings/insulators in bus-work Animal guards on equipment bushings No animal guards on Transformer secondary bushings Overall, substation yard looks good No visible direct stroke lightning protection



Appendix A: Log of Summer Field Observations

Rust & Pealing Paint
717 Eleroy Substation

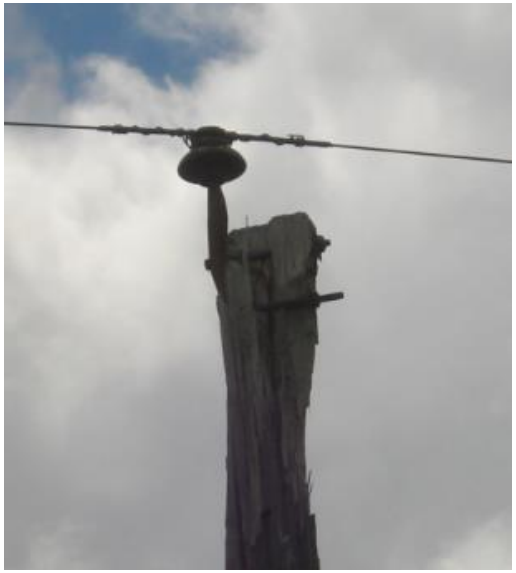
Static Lines protecting Circuits into Sub
721 Eleroy Substation



Heavy Rust on Poles
727 Eleroy Substation

Lose J-Mount/Bad Pole Top
744

Pole Completely Vine covered
753



Catastrophic failure of Lightning Arrestor
758

Appendix A: Log of Summer Field Observations

Near Failure: Bolt on Primary Mount
763

Damaged Pole Top Exposing Mount Bolts
770

Trees into and over Fence
789 Stillman Valley Substation

Animal Guards visible on equipment and bus-work insulators
807 Oregon Substation

Appendix A: Log of Summer Field Observations

The summary[5] for each inspection represents typical observations noted during the field inspections and **does not** represent all of the problems or potential problems that may exist.

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Field Inspection Log

Utility: ComEd **Investigators: J. Stutsman (Staff)**

Feeder Ckt: G102 **City: Calumet City, Lansing, Beecher Areas** **Voltage: 4-12kV** **Date: Thursday, July 17, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
813-836		**DCG100 Calumet City Substation**	**Fence line Inspection:** Gate Posts at Gate were Grounded New Gates. Previous Gates had been bound to Gate Posts – bonding straps are currently hanging. Veg Management Sticker on Gate 5/20/2014 TC Transformer Oil Leak in the past with visible staining at base of Transformer and substation yard – Some appeared wet and may represent an active leak Trees into Fence and over Fence No Animal guard on Primary into Yd No Animal guard on Transformer Transformer needs painting Substation yard – some weeds and trash No direct Stroke lightning protection Ground cover on riser G102712 next to Substation looks new

[5] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[6] Though Staff would expect that those identified problems and the problems inferred would be addressed.

Appendix A: Log of Summer Field Observations

			Some trees/bushes had been cut on the South Side of Substation via visible stumps
		Feeder Ckt: G102 City: Calumet City Voltage: 4kV	
837	1	41.61594 -87.53638 looking East	Trees into Primary
838	1	41.61594 -87.53638 looking West	Trees into Primary
839	1	41.61596 -87.53419	Vines on Down Guy
840	1	41.61597 -87.53197	Tree into Primary
841	1	41.61678 -87.53051	Tree threatening Primary
842	1	41.61880 -87.52930	Trees into Primary
843	1	Looking North from 41.61880 -87.52930	Overhang
-	1	41.62022 -87.52913	Tree into Primary
-	1	41.62077 -87.52932	Leaning & bad pole – noted that it was already marked for removal
844-5	1	41.62255 -87.52917	Temporary wood brace on Pole using Cross-Arms
846	1	Near 41.62255 -87.52917	Tree into Primary
848	1	41.62255 -87.52917 looking West	Line Hose on Primary
849	1	41.62255 -87.52917 looking East	Tree into and overhanging Primary
			General Note G102: Lots of old hardware but none appeared damaged or otherwise not serviceable – 1 pole noted above had been marked for removal

Appendix A: Log of Summer Field Observations

852	Random	41.57025 -87.55929 Street Side	Primary almost (threatening) in Trees
853	Random	Alley behind 41.57025 -87.55929	Primary into Trees
854	Random	2314 179th St, Lansing	Twisted Bad Pole (subsidence)
855	Random	Looking West from 2314 179th St, Lansing	Primary into Tree
-	Random	Alley behind 17934 Hickory St	Primary close to and into trees
-	Random	Torrence Avenue South of Ridge Rd to Glenwood Lansing Rd – i.e. for ~1/2 mile	Numerous Location of Trees close to and into Primary
-	Random	Near 2563 E Joe Orr Rd & Torrence Ave	Tree into Primary
-	Random	On ILL-1 South of Belmont Race Track and North of Beecher	Two Locations where Lightning Arrestors were wired with “curly” leads – the “curly” leads will add high impedance in series with the Lightning Arrestors
-	Random	On ILL-1 just North of Beecher	Broken Cross-arm on East Side of ILL-1
-	Random	Approx. 6 Poles East of 2534 West Indiana Ave, Beecher, IL	Blown Lightning Arrestor
-	Random	Approx. 4 poles East of 30095 South Kedzie Ave, Beecher, IL	Blown Lightning Arrestor
-	Random	29979 S. Kedzie Ave Beecher, IL 41.34469 -87.68909	Badly leaning Pole
858	Random	41.35478 -87.69700	Split Pole
-	Random	41.35470 -87.70429	Primary into Tree
860	Random	41.34357 -87.70837	Primary Insulator Lifted Out Of Cross-Arm Heavy Pole Subsidence

Appendix A: Log of Summer Field Observations

Trees into/over Fence
820 Calumet City Substation

Transformer Oil
823 Calumet City Substation

Gate Ground Bonding Strap not attached
814 Calumet City Substation

No Animal Guards
817 Calumet City Substation

Load Tap Changer Range of Travel
826 Calumet City Substation

Trees Canopy Overhang Primary
843

Appendix A: Log of Summer Field Observations

Tree into Primary
846

Split Pole
858

Hanging Primary Insulator
860

Appendix A: Log of Summer Field Observations

The summary[7] for each inspection represents typical observations noted during the field inspections and **does not** represent all of the problems or potential problems that may exist.

To evaluate the overall trend of conditions in ComEd's service territory, Commission Staff conducted a series of field inspections in 2014. The purpose of the inspections was for Staff to see if there were any obviously visible reasons for poor reliability performance. For example, on distribution circuits Staff looked for problems such as poor tree trimming practices, broken or damaged equipment, rotten poles, and overly slack spans (low sagging lines), while at substations Staff looked for problems such as low or leaking oil, load tap changers regularly operated at extreme positions, and poor maintenance practices. It is important to note that it is not the purpose of Staff's field inspections to find problems for ComEd to fix[8] but rather to develop a picture of the overall condition of the power delivery infrastructure in ComEd's service territory.

Field Inspection Log

Utility: ComEd **Investigators: J. Stutsman (Staff)**

Feeder Ckt: H321 **City: Garden Plain Township** **Voltage: 12kV** **Date: Tuesday, August 12, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
861-902		**TSS132 Garden Plain Substation**	**Fence line Inspection:** No Gnd binding strap from Gate to Gate Posts Veg management tag on gate dated 5-22-14 and checked 7-30-14 Rock surface graded or piled to substation fence bottom to prevent animal intrusion Substation Yard looks good & is largely weed free Bushing oil levels look good on Power Transformers 77 & 78 Bushing oil levels look good in Distribution yard Animal Fence surrounding Sub-Transmission Yard LTC's look OK Pole marked for removal outside yard New Poles & Cross-Arms outside yard Areas

[7] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[8] Though Staff would expect that those identified problems and the problems inferred would be addressed.

			Animal guards on insulators on Distribution Buss-work for H321 & H322 – H322 bkr is badly rusted No squirrels guard on Circuit H322 overhead out of substation – Circuit H321 goes to riser and then underground to riser in front of Substation No direct stroke lighting protection seen in substation yard – 138kV and 34kV lines outside of yard do have static wire over primaries Vine observed growing up guy on pole for H322 outside of substation yard Another Guy seen with Vine growth just outside south side of Substation Signs that Trees/brush had been cut back outside North-East corner of Substation yard (near where Distribution equipment is located)
		Feeder Ckt: H321 City: Fulton **Voltage: 12kV**	
907	1	41.79301 -90.11115	Riser 3S143 outside of Substation from H321 breaker by transformer 51
909-910	1	41.79356 -90.11125 Device #13318277	Lose ground cover on ground to transmission tower static line
912-915	Random	41.86069 -90.14112	Vines on Down Guy Very old pole with substantial subsidence – may have been marked already for replacement Old cross-arm
916-917	1	41.800556 -90.13046	Pole – cross-arm – cutout – all being replaced
918	1	41.79956 -90.13056	Missing down guy guard
920	1	41.79823 -90.13058	Hanging ground cover
921-922	1	41.79410 -90.13053	Center Lightning Arrestor has curly leads (which cause High Impedance)
924	1	41.78973 -90.13049	Field Side Lightning Arrestor is Blown
925	1	41.78696 -90.13052	Line Hose on Field Side Primary
926	1	41.78696 -90.13052	Damaged Pole Top and Damaged Cross-Arm

Appendix A: Log of Summer Field Observations

927-928	2	41.78138 -90.13054	Blown Lightning Arrestor on Field Side
929	2	41.77822 -90.13055	All three Lightning Arrestor have curly lead connections and thus High Impedance
930-931	2	41.77204 -90.12243	Primary J-Mount is lose and near failure Pole Top is Damaged
932-933	2	41.77202 -90.11204	Pole looks bad Pole top bad Primary J-Mount is Lose
935-936	2	41.77208 -90.11990	Split Pole / Damaged Pole
937	2	41.77623 -90.16814	Cross-Arm holding Cut-Outs appears to be in bad shape
--	2	41.75977 -90.15942	Curly Leads (High Impedance) to Field & Road Side Lightning Arrestors
--	2	41.75694 -90.15137	Curly Leads (High Impedance) to Field & Road Side Lightning Arrestors
938	5	41.73690 -90.15194	Curly Leads (High Impedance) to Field & Road Side Lightning Arrestors
--	5	41.73692 -90.1584	Curly Least (High Impedance) to Field & Road Side Lightning Arrestors
--	5	2 Poles East of 41.73692 -90.1584	Very Lose/Hanging Ground Guard
--	5	3 Poles West of 41.73692 -90.1584	Very Lose/Hanging Ground Guard

Appendix A: Log of Summer Field Observations

939-991		**DCH62 Sterling Substation**	**Fence line Inspection:** Ground Bonding Straps from Gates to Gate Posts is Broken Transformer 51 appears older and while it needs painting it is not visibly Rusty Transformer 52 does appear newer than Transformer 51 Rock in Substation yard is up to fence bottom to help prevent animal entry Bushing oil levels on Transformer 52 look OK Overall: Yard Looks Good – Some Old equipment but it appears in Maintained shape No vegetation intrusion into substation yard – obvious had some in the past but it is OK now Signs of trees/bushes being cut back from substation fence line Gate may have been painted Some Rust and/or old paint on equipment in yard but overall looks good from fence line

Rust/Peeling Paint on Circuit H322 Breaker
885 Garden Plain Substation

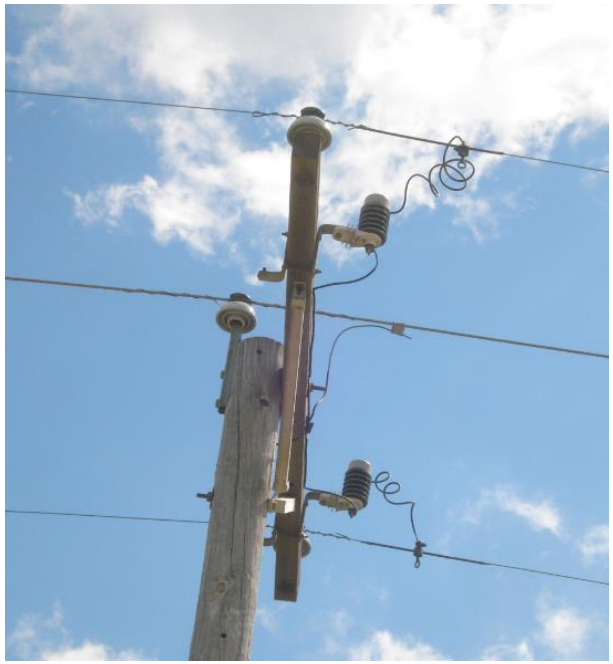
Field Side Lightning Arrestor Blown
924

Damaged Pole & Damaged Cross-Arm
926

Appendix A: Log of Summer Field Observations

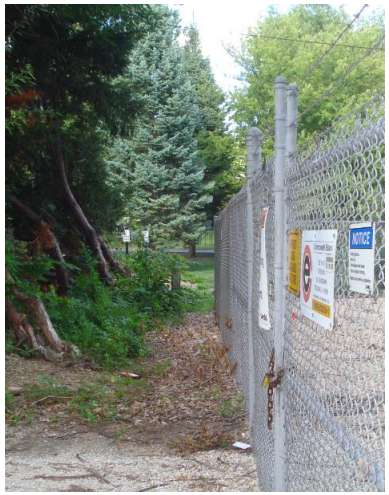
Primary J-Mount is Lose & Pole Damage
930

Split/Damaged Pole
936



Curly Leads (High Impedance) to Lightning Arrestors
938

Broken Ground Bonding Strap
946 Sterling Substation



Trees/Brush cut back from fence line
944 Sterling Substation

Appendix A: Log of Summer Field Observations

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Field Inspection Log

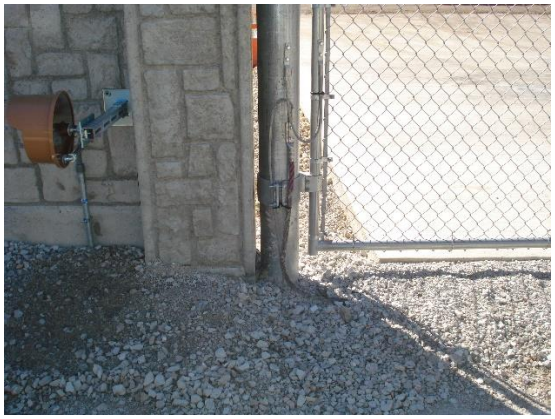
Utility: ComEd **Investigators: J. Stutsman (Staff) & and 12 people from ComEd Regulatory and Technical Staff**

Substation: Tonne TDC207 **City: Elk Grove Village** **Voltage: 138-34-12kV** **Date: Tuesday, September 16, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
992-048		**TDC207 Tonne Substation**	**Yard Inspection:** Construction in the Substation Yard substantially completed since last year New 34KV SwitchGear Bldg Transformer 77 New Fire wall; Oil levels OK; Transformer 78 Oil levels OK; Transformer 79 New Fire wall; Oil levels OK; 138KV Control Building Lots of new equipment and solid state relays 34KV Control Room Condition looked good Security switches on doors and Security camera(s)

[9] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[10] Though Staff would expect that those identified problems and the problems inferred would be addressed.

			12KV Transformers – Transformer 74 Oil levels OK; Transformer 73 Oil levels OK; Transformer 72 Oil levels OK; Transformer 71 Oil levels OK; 12KV Yard The 12KV Yard looking good with some construction remaining to be completed – including the installation of new breakers; 12KV House New equipment & solid state relays Station Yard Yard looks good New poles installed with static wires connecting at top for direct stroke Lightning protection Check last year's field log for information on construction



Gate bonded to grounded Post
Part of perimeter detection system also visible
996

34KV Switchgear building
992

Creative design used to install switches above Breaker
028

Appendix A: Log of Summer Field Observations

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Field Inspection Log

Utility: ComEd **Investigators: J. Stutsman (Staff)**

Feeder Ckt: B2301 **City: Marengo** **Voltage: 12kV** **Date: Tuesday, Sept 23, 2014**

Photo ID	Drawing No.	Location Description	Observations at this Location
049-075		**TSS123 Marengo Substation**	**Fence line Inspection:** Firebox at Gate Gate not bound to grounded gate posts 34kV T-Bus CB rusty L12372 BKR being prep'd for painting No squirrel guards on 12kV lines out of yard Fence line clean Substation yard clean of vegetation/weeds Rust on BKR for Fdr B2301 No apparent Direct Stroke Lightning Protection Oil levels OK on Transformers 51 & 52 Oil levels on Transformer 76 looked low Employees doing work in substation yard

[11] Detail was provided ComEd indicating the location of most deficiencies found on the respective circuits by Staff.
[12] Though Staff would expect that those identified problems and the problems inferred would be addressed.

Appendix A: Log of Summer Field Observations

			Met employee who was leaving substation at the gate when I arrived and identified myself Substation fence looked clean and maintained
		Feeder Ckt: B2301 City: Marengo **Voltage: 12kV**	
-	1	Just North of Chicago and Northwestern RR track crossing	Tree close to or into Primary
-	2	4506 Thorton RD	Missing Down Guy Guard
-	2	4609 Thorton Rd	Missing Down Guy Guard
076	3	5818 Meyer Rd	Loose/hanging Gnd Cover near top of pole
-	3	3 poles North of Above	Loose/hanging Gnd Cover near top of pole
-	4	South of Lakewood Drive on Meyer Rd	Loose/hanging Gnd Cover near top of pole
077-080	10	42.20192 -88.64607	Pole buried in tree/bush
081	10	42.20277 -88.64825	Old pole & J-hook primary mount barely in pole
-	10	Promary running along Blissdale North of Grange Rd	A large number of old poles
082-084	10	42.21169 -88.70924	Pole buried in tree/bush
085-086	Random	42.24434 -88.76117	Bad pole top / bad pole / primary near failure

Appendix A: Log of Summer Field Observations

Rust 34kV Transfer Bus Circuit Breaker
062

Animal guards on 12kV bushings in yard
No squirrel guards on 12kV lines in/out of yard
Fence line clean of vegetation/weeds
067

Pole surrounded by tree/bush
078

Old pole & Primary J-Mount Loose
081

Old & Split/Damaged Pole & Loose Primary J-Mount
085