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Electric Service Reliability in Pennsylvania

2015

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PENNSYLVANIA ELECTRIC RELIABILITY REPORT 2015

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Table of Contents

Executive Summary

The Electricity Generation Customer Choice and Competition Act mandated the Pennsylvania Public Utility Commission (PUC or Commission) to ensure levels of reliability that existed prior to the restructuring of the electric utility industry continue in the new competitive markets.[1] In response to this mandate, the Commission adopted reporting requirements designed to ensure the continued safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth.[2] The PUC also established reliability benchmarks and standards to measure the performance of each electric distribution company (EDC).[3]

The benchmarks and standards established by the Commission are based on four reliability performance metrics adopted by the Institute of Electrical and Electronic Engineers Inc. (IEEE). Those metrics are:

- SAIFI: System average interruption frequency index or frequency of outages.
- CAIDI: Customer average interruption duration index or duration of outages.
- SAIDI: System average interruption duration index or frequency of sustained outages.
- MAIFI: Momentary average interruption frequency index or occurrences of momentary customer interruptions.

Given the uncertainty of weather and other events that affect reliability performance, the Commission has stated EDCs shall set goals to achieve benchmark performance in order to prepare for times when unforeseen circumstances push the metrics above the benchmark.[4] In recognition of these unforeseen circumstances, the PUC set the performance standard as the minimum level of EDC reliability performance. Reliability performance standards not in compliance may require an EDC to undergo additional scrutiny and may include a Corrective Action Plan or a credible analysis that would justify no corrective action was needed.

As mandated, EDCs report metrics[5] using both a rolling 12-month average and a rolling three-year average. Table 1, below, provides a brief summary of the EDCs' performance for the rolling 12-month period ending Dec. 31, 2015. More detailed analysis can be found in Section 4, *Statistical Utility Performance Data*.

In addition to monitoring EDCs' reliability performance, the Commission established inspection and maintenance standards for electric transmission and distribution systems.[6] Biennial plans for the periodic inspection, maintenance, repair and replacement of facilities, designed to meet performance benchmarks and standards, were approved by the PUC's Bureau of Technical Utility Services (TUS).

[1] Act of Dec. 3, 1996, P.L. 802, No. 138, 66 Pa.C.S. §§ 2801 et.seq.
[2] Docket No. L-00970120; 52 Pa. Code §§ 57.191-57.197.
[3] Docket No. M-00991220.
[4] Id. at 25.
[5] For an explanation of performance standards, see Section 2, page 3.
[6] Docket No. L-00040167.

Table 1

2015 EDC Performance Scorecard

Metrics achieved **GREEN** Benchmark Metrics not achieved **YELLOW** Standard Metrics not achieved **RED**

		Rolling 12-Month									
		Benchmark Score					Standard Score				
EDCs	[1]Metrics	[2]BM	Q1	Q2	Q3	Q4	[3]STD	Q1	Q2	Q3	Q4
Large EDCs											
Duquesne Light	CAIDI	108	103	105	107	95	130	103	105	107	95
	SAIDI	126	60	69	78	71	182	60	69	78	71
	SAIFI	1.17	0.58	0.66	0.73	0.75	1.40	0.58	0.66	0.73	0.75
PECO	CAIDI	112	92	90	86	84	134	92	90	86	84
	SAIDI	138	73	69	63	61	198	73	69	63	61
	SAIFI	1.23	0.80	0.76	0.73	0.72	1.48	0.80	0.76	0.73	0.72
PPL	CAIDI	145	142	**155**	124	118	174	142	155	124	118
	SAIDI	142	114	122	86	84	205	114	122	86	84
	SAIFI	0.98	0.80	0.79	0.69	0.72	1.18	0.80	0.79	0.69	0.72
Met-Ed (FirstEnergy)	CAIDI	117	**122**	**126**	**128**	113	140	122	126	128	113
	SAIDI	135	133	**158**	**158**	**136**	194	133	158	158	136
	SAIFI	1.15	1.09	**1.25**	**1.23**	**1.19**	1.38	1.09	1.25	1.23	1.19
Penelec (FirstEnergy)	CAIDI	117	**123**	**131**	**123**	**140**	141	123	131	123	140
	SAIDI	148	**185**	**190**	**168**	**191**	213	185	190	168	191
	SAIFI	1.26	**1.50**	**1.45**	**1.37**	**1.36**	1.52	1.50	1.45	1.37	1.36
Penn Power (FirstEnergy)	CAIDI	101	**104**	**109**	95	100	121	104	109	95	100
	SAIDI	113	103	**114**	112	**114**	162	103	114	112	114
	SAIFI	1.12	0.99	1.05	**1.18**	**1.14**	1.34	0.99	1.05	1.18	1.14
West Penn (FirstEnergy)	CAIDI	170	135	148	149	154	204	135	148	149	154
	SAIDI	179	138	168	175	179	257	138	168	175	179
	SAIFI	1.05	1.02	**1.13**	**1.17**	**1.17**	1.26	1.02	1.13	1.17	1.17
Small EDCs											
Citizens'	CAIDI	105	87	73	78	91	141	87	73	78	91
	SAIDI	21	17	17	20	18	38	17	17	20	18
	SAIFI	0.20	0.20	**0.23**	**0.25**	0.19	0.27	0.20	0.23	0.25	0.19
Pike County	CAIDI	174	104	**199**	**197**	**205**	235	104	199	197	205
	SAIDI	106	**119**	93	77	78	194	119	93	77	78
	SAIFI	0.61	**1.15**	0.47	0.39	0.38	0.82	**1.15**	0.47	0.39	0.38
UGI	CAIDI	169	153	122	113	103	228	153	122	113	103
	SAIDI	140	59	52	47	41	256	59	52	47	41
	SAIFI	0.83	0.38	0.43	0.41	0.40	1.12	0.38	0.43	0.41	0.40
Wellsboro	CAIDI	124	75	82	72	76	167	75	82	72	76
	SAIDI	153	54	80	82	81	278	54	80	82	81
	SAIFI	1.23	0.72	0.97	1.14	1.06	1.66	0.72	0.97	1.14	1.06

[1]CAIDI	(Customer Average Interruption Duration Index) - Measures average power restoration time (minutes) for every customer who lost power during this year.
SAIDI	(System Average Interruption Duration Index) - Measures average outage duration time (minutes) for every customer served during this year.
SAIFI	(System Average Interruption Frequency Index) - Measures average frequency of power interruptions for every customer served during this year.
[2]BM	(Benchmark) - EDC's attained performance baseline score prior to electric restructuring. Calculated by averaging historical performance metrics over the five-year period directly prior to electric restructuring (1994 to 1998).
[3]STD	(Standard) - EDC's upper limit performance value. CAIDI STD & SAIFI STD is calculated by multipling BM by 120% for large EDCs and 135% for small EDCs. SAIDI STD is calculated by multiplying CAIDI STD x SAIFI STD.

Section 1 – Introduction

Purpose

The report discusses the reliability performance of EDCs operating under the Commission's jurisdiction, specifically focusing on the reliability of the electric distribution system.[7]

The data presented in this report comes from the quarterly and annual reliability reports submitted by EDCs pursuant to the Commission's regulations. This data focuses on customer power restoration duration (CAIDI), average customer outage duration (SAIDI), and frequency of outages (SAIFI).[8] From these measures, this report provides an overview of the Commonwealth's electric distribution reliability as well as individual analyses of the EDCs operating within Pennsylvania.

Background

The Electricity Generation Customer Choice and Competition Act mandates the Commission ensure the level of reliability that existed prior to the restructuring of the electric utility industry is maintained in the newly restructured markets. In response to this mandate, the Commission adopted reporting requirements designed to monitor continuing safety, adequacy, and reliability of generation, transmission, and distribution of electricity in the Commonwealth.

The Commission also established reliability benchmarks and standards to measure the performance of each EDC. Given the uncertainty of weather and other events that can affect reliability performance, the Commission has stated that EDCs should set goals to achieve benchmark performance in order to prepare for times when unforeseen circumstances push the metrics above the benchmark. As mandated, enforcement of the three-year rolling average standard began with the utilities' filing of their 2006 annual reports. The three-year performance standard only allows a deviation of 10 percent from the reliability index benchmark, as compared with the 20 percent or 35 percent deviations allowed by the 12-month performance standard.

The Commission set the performance standard as the minimum level of EDC reliability performance. Reliability Performance Standards that are not in compliance require EDCs to provide an evaluation to the Commission that includes a Corrective Action Plan or a credible basis that would justify no corrective action is required. Performance Standards that are not achieved during an assessment period will be followed up by the Commission to ensure there is not a systemic breakdown.

[7] The high-voltage transmission system, nominally > 100 kV, is regulated by the Federal Energy Regulatory Commission (FERC). The electric distribution system is under the purview of the PUC.

[8] For more information on CAIDI and SAIFI, see Section 2.

Section 2 –Reliability Performance Measures

Reliability Performance Metrics

The Commission's benchmarks and standards are based on four reliability performance metrics that have been adopted by the IEEE. The EDCs report metrics on a system-wide basis, rather than on a regional operating area basis. EDCs report the four reliability metrics on both a rolling 12-month average and a three-year calendar year average:

1. **CAIDI** (Customer Average Interruption Duration Index): Measures average power restoration time (by minutes) for every customer who lost power during reporting period.
2. **SAIDI** (System Average Interruption Duration Index): Measures average outage duration time (by minutes) for every customer served during reporting period.
3. **SAIFI** (System Average Interruption Frequency Index): Measures average frequency of power interruptions for every customer served during reporting period.
4. **MAIFI** (Momentary Average Interruption Frequency Index): Measures average frequency of momentary (less than 5 minutes) interruptions for every customer served during reporting period.

*Note: EDCs are required to report **MAIFI** data provided the equipment capability is available to obtain relevant data.*

Additional information and data EDCs report:

- Average number of customers served.
- Number of sustained customer interruption minutes.
- Number of customers affected by service interruptions.
- Breakdown and analysis of outage causes such as equipment failure, animal contact and contact with trees.[9]
- Reliability performance on a 5 percent of worst performing circuits and a corrective action plan to increase the reliability of these circuits.

Major Events

In order to analyze and set measurable goals for electric service reliability performance, outage data is separated into either normal or abnormal periods. Only outages during normal event periods are used in calculating the reliability metrics. The term "major event" is used to identify an abnormal event, such as a major storm, and is defined as either of the following:[10]

- An interruption of electric service resulting from conditions beyond the control of the EDC which affects at least 10 percent of the customers in the EDC's service territory during the course of the event for a duration of five minutes or greater; or

[9] This information is collected and trended by EDCs to reduce customer outages and improve system reliability.
[10] *See* 52 Pa. Code § 57.192

- An unscheduled interruption of electric service resulting from an action taken by an EDC to maintain the adequacy and security of the electrical system.

Outage data relating to major events are to be excluded from the calculation of reliability metrics. Prior to excluding major event outage data, an EDC is required to formally request to exclude those service interruptions for reporting purposes. The request must be accompanied by data that demonstrates why the service interruption qualifies as a major event exclusion.

Definitions: benchmark, standard, 12-month average, & 3-year average

The performance **benchmark** represents the statistical average of the EDC's annual, system-wide, reliability performance index values for the five years from 1994-98. The benchmark serves as a reference point limit to ensure an EDC's reliability performance is considered acceptable. As noted in Section 1, above, the EDCs' reliability metrics should be at or below benchmark scores, absent other uncontrollable factors such as worse-than-expected weather.

The performance **standard** is a numerical value representing an EDC's performance upper control limit established for each reliability index. Both long-term (rolling three-year) and short-term (rolling 12-month) performance standards have been established for each EDC based on individual EDC historical performance benchmarks. The performance standard limit allows an EDC to occasionally exceed a benchmark limit. However, exceeding the standard limit may be an indication of reliability issues and will require further scrutiny by Commission staff.

The performance rolling **12-month average** is 120 percent of the benchmark for the large EDCs and 135 percent for the small EDCs.[11] A greater degree of short-term latitude recognizes that small EDCs have fewer customers and fewer circuits than large EDCs, potentially allowing a single event to have a more significant impact on the reliability performance of the small EDCs' distribution systems.

The performance rolling **3-year average** is 110 percent of the benchmark for all EDCs. This performance standard was set at 10 percent above the historical benchmark to ensure that the standard is no higher than the worst annual performance experienced during the years prior to the restructuring of the electric industry. The three-year average performance is measured against the standard at the end of each calendar year. The rolling three-year standard analysis contained in this report uses 2013, 2014 and 2015 calendar year data.

It is noted that a lower number for any index indicates better reliability performance; i.e., a lower frequency of outages or shorter outage duration. A higher number indicates worse performance.

Example: A large EDC's CAIDI benchmark performance was determined to be 100 minutes and its rolling 12-month CAIDI standard is 120, which is 120 percent of benchmark. Evaluate an EDC's quarterly CAIDI score of 110, 90, and 140:

CAIDI of 110 evaluation: Performance is above benchmark, but below standard, and may require additional review and action if the EDC is chronically above benchmark score and trending toward exceeding standard. Upon Commission

[11] Large EDCs currently include: Duquesne Light, Met-Ed, Penelec, Penn Power, PECO, PPL and West Penn. Small EDCs include: UGI, Citizens', Pike County and Wellsboro.

review, the EDC may be required to develop a Corrective Action Plan (CAP) and additional PUC oversight will be taken to monitor effectiveness until performance is below benchmark. In addition, may result in a referral to Investigation & Enforcement Bureau for further action.

CAIDI of 90 evaluation: Performance is considered excellent since CAIDI is below both benchmark and standard.

CAIDI of 140 evaluation: Performance is considered unacceptable since CAIDI is greater than both benchmark and standard. The EDC will be required to develop a Corrective Action Plan (CAP) and additional PUC oversight will be taken to monitor effectiveness until benchmark performance is achieved. In addition, may result in a referral to Investigation & Enforcement Bureau for further action.

If any EDC's reliability performance does not meet Commission standards, the Commission may require a report discussing the reasons for not meeting the standard and the corrective measures the company is taking to improve performance.[12] In addition, Commission staff may initiate an investigation to determine whether an EDC is providing reliable service.[13]

Benchmarks and standards for EDC reliability performance and average reliability Metrics for 2015 are listed in Appendix A.

Inspection and Maintenance

EDCs are required to have a plan for periodic inspection and maintenance of poles, overhead conductors and cables, wires, transformers, switching devices, protective devices, regulators, capacitors, substations, and other facilities critical to maintaining an acceptable level of reliability.[14] The time intervals for such inspections are detailed in Table 2, below. The regulation also sets forth minimum inspection and maintenance intervals for vegetation management, poles, overhead lines and substations.

Listed below are the most recently filed biennial inspection and maintenance (I&M) plans for the periodic inspection, maintenance, repair and replacement of facilities:

- Filed in October 2015 (effective January 2017 through December 2018) for FirstEnergy (Met-Ed, Penelec, Penn Power and West Penn Power) and UGI.

- Filed in October 2014 (effective January 2016 through December 2017) for Duquesne Light, PECO, PPL, Citizens', Pike County and Wellsboro.

The plans are subject to acceptance or rejection by the Commission. Most EDCs proposed modifications to the standards for some programs or parts of programs. Appendix B describes

[12] *See* 52 Pa. Code § 57.195(g).
[13] *See* 52 Pa. Code § 57.197(a).
[14] *See* 52 Pa. Code § 57.198.

the exemptions that were requested by the EDCs and provides a summary of the explained justification for said exemptions.[15]

Table 2 - Inspection and Maintenance Intervals

Program	Interval
Vegetation Management	4-6 years
Pole Inspections	10-12 years
Overhead Distribution Line Inspections	1-2 years
Overhead Transformer Inspections	1-2 years
Above-Ground Pad-Mounted Transformer Inspections	5 years
Below-Ground Transformer Inspections	8 years
Recloser Inspections	8 years
Substation Inspections	5 weeks

Section 3 – 2015 Outage Response Review

Overview

With the exception of Citizens', UGI, and Penn Power; all Pennsylvania EDCs had at least one PUC reportable outage event in 2015.[16] In 2015, a total of approximately 619,500 customers were affected by weather-related reportable outages. Table 3, below, shows a breakdown of PUC reportable outage events in 2015:

[15] *See* 52 Pa. Code § 57.198(c).

[16] Service outages reports are required under 52 Pa. Code § 67.1. The reporting requirements are an initial phone call to the Commission when it is believed the threshold will be reached, followed by a written report 10 days after the last customer is restored. The reporting threshold is service outages to 5 percent of total customers or 2,500 customers, whichever is less, for six or more consecutive hours.

Table 3 - Reportable Outage Events

EDC	Date	Customers Affected	Cause
Penelec	1/8/2015	6,487	Primary span connector failure
Penelec	2/16/2015	10,843	Primary span connector failure
West Penn	4/4/2015	3,554	Primary insulator on a 46 kV line failed
West Penn	4/9/2015	29,011	Thunderstorm, high winds, hail
Penelec	5/11/2015	16,985	Thunderstorm and wind
West Penn	6/12/2015	31,513	Rain and wind
Penelec	6/12/2015	13,983	Thunder Storm and wind
West Penn	6/14/2015	15,606	Thunder Storm and wind
PPL	6/27/2015	19,677	Thunder Storm and wind
Pennelec	6/23/2015	25,130	Thunder Storm and wind
PECO	6/23/2015	352,763	Thunder Storm and wind
Duquesne	7/23/2015	17,400	Thunder Storm and wind
Pennelec	10/28/2015	27,333	Hurricane Patricia
Pennelec	12/29/2015	28,416	Rain and wind
West Penn	12/29/2015	16,273	Rain and wind
Pike	12/5/2015	4,500	Broken strain Bus in 69 kV Shoemaker Station

In general, most of the reportable outages were resolved in about 1 day. Most outage events occurred in June, and were caused by thunderstorms and high winds. PECO experienced the largest storm event in June.

Review of Long-Duration Outage Event(s)

PECO experienced the most severe storm-related outage in Pennsylvania. On June 23, 2015, PECO experienced an extreme summer time thunderstorm with 70 mph wind gusts that caused 352,763 customer service interruptions. The storm caused widespread damage across PECO's service territory during a 24 hour period. PECO restored about 60 percent of all customers in less than 18 hours; about 95 percent of customers were restored within three days; and all customers were restored within six days. PECO received assistance from supplemental resources such as local contractors, PECO's sister utilities (BGE and ComEd), crews from two Mutual Assistance Groups (Southeastern Electric Exchange and North Atlantic Mutual Assistance), and crews from New England and several Midwest states.

Lessons Learned

PECO utilized several initiatives that they had already implemented based on previous lessons learned evaluations, including:

- Utilizing multiple staging areas to efficiently receive and dispatch supplemental resources.
- Enhanced processes to address road closures and communications with county Emergency Operations Centers.
- Construction of auxiliary crew dispatch facilities.
- Creation of a system to send work packages to crews electronically via email.
- Development of group email boxes to improve internal communications during storms.

- Continuing improvements to storm ETR development and communications, including an upgrade of our website's Outage Map tool.
- Development of a "base camp" strategy to address the risk of hotel availability constraints.

Table 4, below, provides a ranking of the top PECO Storm Outage Events, including the June 2016 event.

Table 4 – Top PECO Outage Events

Storm Event Name	Ranking	Date	Number of Customers out-of-service	Total days till last customer restored
Hurricane Sandy	1	October 2012	850,000	9 days
Ice Storm Nika	2	February 2014	715,000	7 days
Ice Breaker (PECO name)	3	January 1994	550,000	5 days
Hurricane Isabel	4	September 2003	545,000	9 days
Hurricane Irene	5	August 2011	508,000	7 days
Hurricane Hazel	9	October 15, 1954	369,511	-
Thunderstorm 70 mph wind gusts	**10**	**June 23, 2015**	**352,836**	**6 days**
Tornado alley	11	May 31, 1998	334,987	-

Section 4 –Statistical Utility Performance Data

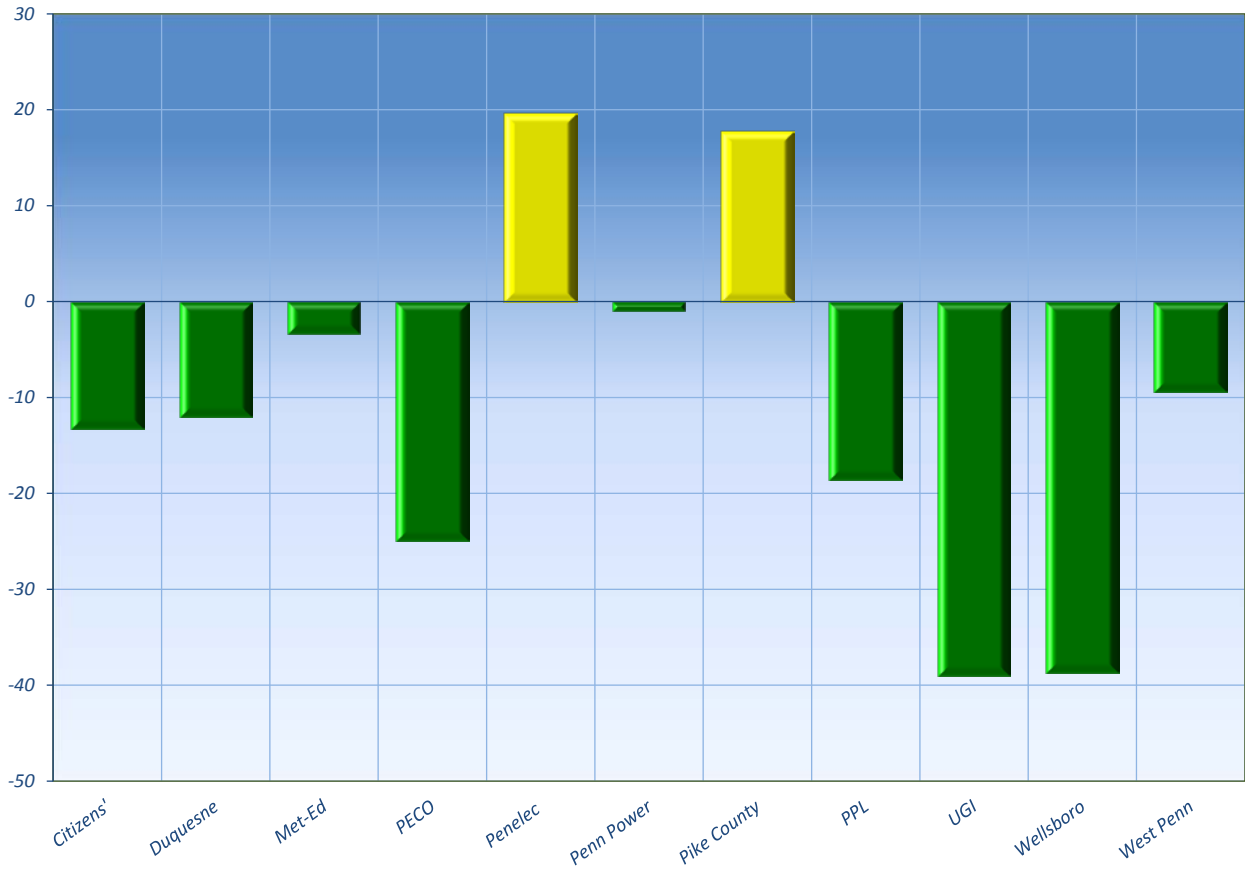
Statewide Summary

Rolling 12-month Benchmark Performance Compliance

The 2015 reliability data for 12-month performance compliance submitted by the 11 EDCs indicates:

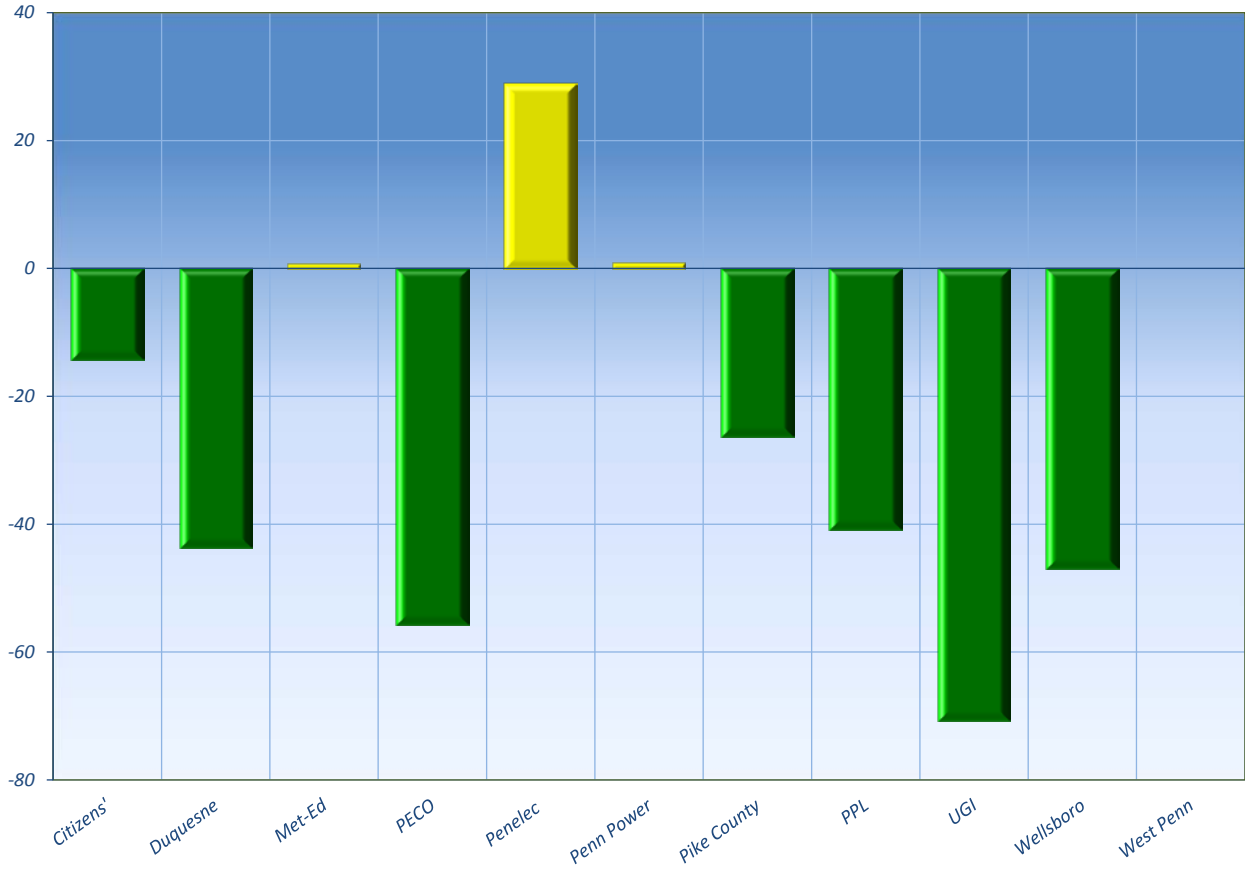
- Nine EDCs achieved the CAIDI benchmark, while two EDCs failed to achieve the CAIDI benchmark (Figure 1).
- Eight EDCs achieved the SAIDI benchmark, while three EDCs failed to achieve the SAIDI benchmark (Figure 2).
- Seven EDCs achieved the SAIFI benchmark, while four EDCs failed to achieve the SAIFI benchmark (Figure 3).

Figure 1 – 2015 CAIDI Comparison (percent above or below benchmark)



Note: The green bar shows the percentage successfully achieved below CAIDI benchmark performance metric. The yellow bar shows the percentage above the CAIDI benchmark that was not achieved. Actual data is shown in Appendix A.

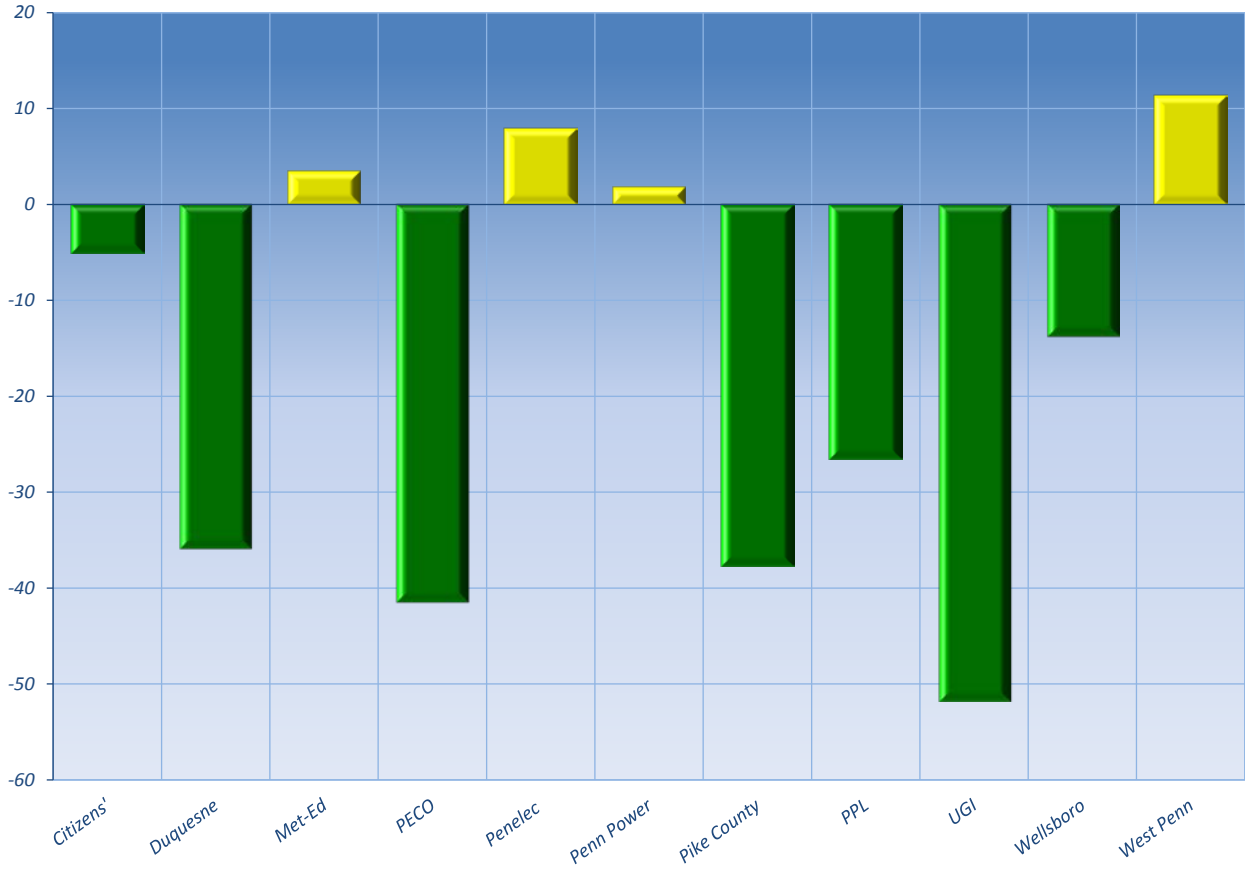
FIGURE 2 – 2015 SAIDI Comparison (percent above or below benchmark)



Note 1: The green bar shows the percentage successfully achieved below SAIDI benchmark performance metric. The yellow bar shows the percentage above the SAIFI benchmark that was not achieved. Actual data is shown in Appendix A.

Note2: West Penn is exactly at benchmark.

FIGURE 3 – 2015 SAIFI Comparison (percent above or below benchmark)



Note: The green bar shows the percentage successfully achieved below SAIFI benchmark performance metric. The yellow bar shows the percentage above the SAIFI benchmark that was not achieved. Actual data is shown in Appendix A.

Rolling 3-year Average Performance Compliance

Appendix A provides the actual 2015 12- month average and three-year average reliability performance metrics for individual EDCs.

One EDC (Penn Power) failed to meet the rolling three-year CAIDI performance standard by 4 minutes, compared to one EDC (Penn Power) by nine minutes in 2014.

Three EDCs (Citizens, Penelec, and Pike County) failed to meet the rolling three-year SAIFI performance standard by 0.70 outages, compared to Four EDCs (Citizens', Penelec, Pike County and West Penn) by 0.49 outages total in 2014.

Three EDCs (Penelec, Penn Power, and Pike) failed to meet the rolling three-year SAIDI performance standard by 64 minutes, compared to three EDCs (Penelec, Penn Power, Pike County) by 80 minutes total in 2014.

Major Exclusion Request

In 2015, EDCs filed 12 requests for exclusion of major events and all 12 requests were approved. A major event exclusion request may be denied for a variety of reasons such as the event not meeting the 10 percent threshold of customers interrupted or the failure of equipment without supporting maintenance records. A brief description of each major event is provided in the individual EDC sections.

Utility-Specific Performance Data

The Commission compares reliability metrics on a quarterly basis, using data obtained for the preceding 12 months. This periodic assessment determines the current status of electric service reliability on an ongoing basis and is instrumental in identifying negative trends. The three-year average performance is measured at the end of each calendar year, using the average of the past three end-year metrics, as indicated in Appendix A. The following sections provide a detailed description of the 11 EDCs' individual reliability performance on a rolling 12-month and three-year average basis.

Citizens' Electric Company

Citizens' has an operating service area of about 41 square miles with about 6,892 customers. The electric system consists of one distribution substation and nine distribution feeder lines. In 2015, Citizens' experienced 1,333 customer interruptions and 121,876 minutes of interruption, compared to 2014 when customers experienced 1,306 interruptions and 115,083 minutes of interruption.

The 2015 reliability metrics exclude the following outage data related to three major events, which were approved by the Commission:

- May 12, 2015 – Porcelain cutout failed during a rain storm, affecting 6,892 customers.
- April 20, 2015 – PPL transformer insulator failed on a 138 kV feeder line to the Citizens' distribution substation, affecting 6,892 customers.
- Sept. 17, 2015 – A farmer's harvesting equipment hooked onto a communication cable and sprung electric pole. This caused the conductor support brackets to fail, affecting 1,387 customers.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Increased from 88 minutes in 2014 to 91 minutes in 2015; achieved benchmark by 13 percent.

Three-year average: Decreased from 99 minutes in 2014 to 87 minutes in 2015; achieved standard by 25 percent.

SAIDI

Rolling 12-month: Increased from 17 minutes in 2014 to 18 minutes in 2015; achieved benchmark by 14 percent.

Three-year average: Increased from 22 minutes in 2014 to 24 minutes in 2015; achieved standard by 4 percent.

SAIFI

Rolling 12-month: Remained the same from 0.19 outages in 2014 to 0.19 outages in 2015; achieved benchmark by 5 percent.

Three-year average: Increased from 0.25 outages in 2014 to 0.28 outages in 2015; failed to achieve standard by 27 percent.

Note: Smaller SAIFI values are typical for companies with fewer customers. Smaller systems tend to experience more variability in service outage data, which is captured in the development of historical. This data can only be used with the historical performance of Citizens' to access reliability performance and actual values are not valid for comparisons among other EDCs.

Historical 12-month CAIDI and SAIFI trends are shown in Figure 4 and Figure 5. As displayed, Citizens' CAIDI and SAIFI were below or close to benchmark during 2015.

Figure 6 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 7 shows the historical trend of the top three main outage causes. The most frequent outage causes were equipment, animals, and off right-of-way trees.

Since 2012, Citizens' has increased its vegetation management budget by 63 percent and experienced a significant reduction of tree related outages. The Emerald Ash Borer beetle has damaged Ash trees and Citizens' will identify, prioritize, and remove significant threats in 2016.

Citizens' Storm hardening initiatives include: continuing its program whereby off right-of-way danger trees are identified; eliminating and identifying and replacing failure-prone equipment such as vintage arrestors and porcelain cutouts; improving the accuracy of Smart Grid outage locations aided by the 100 percent smart meter installation; and continuing line crew usage of mobile wireless tablet based work system deployed in 2015.

Citizens' is currently proactively planning to gradually increase staffing and train operations staff starting in 2016 due to the expectation that over 80 percent of their employees are eligible to retire in the next 10 years.

In the last year, Citizens' achieved benchmark performance in every category and this positive performance trend is expected to continue in 2016.

Figure 4 Citizens' CAIDI (minutes)

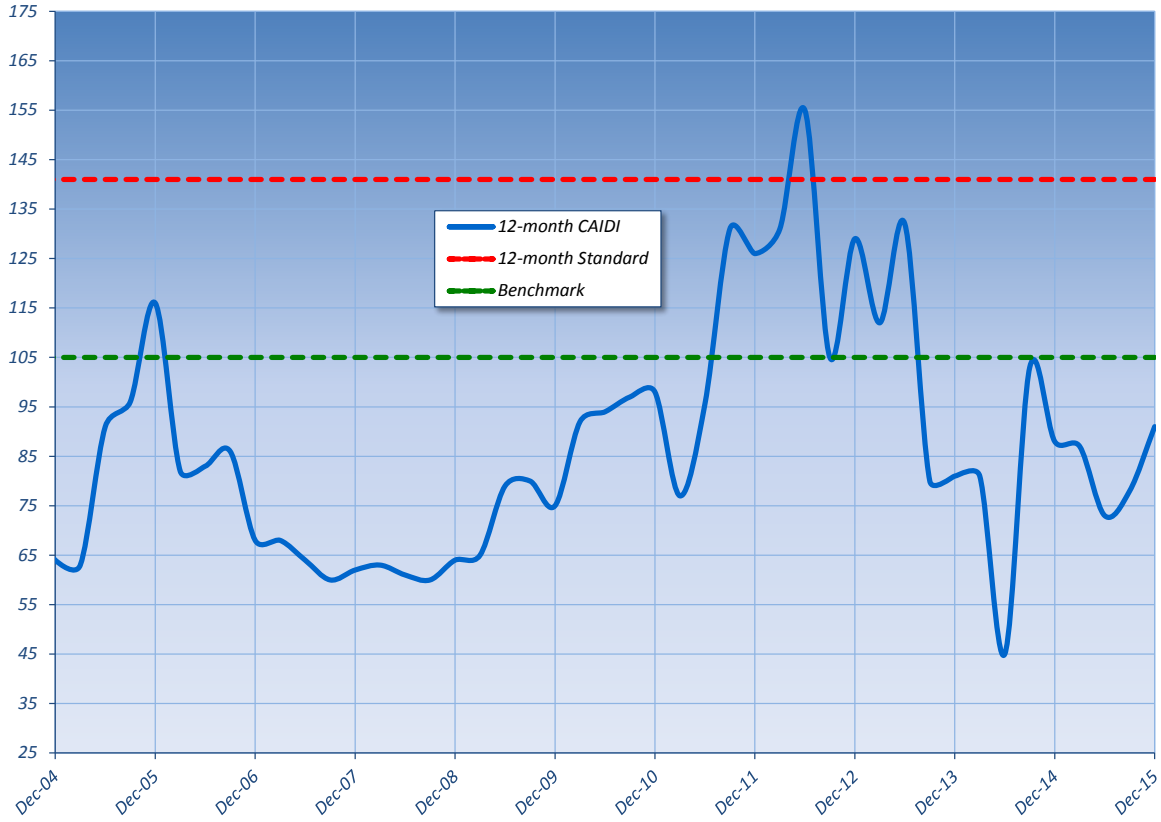


Figure 5 Citizens' SAIFI (interruptions per customer)

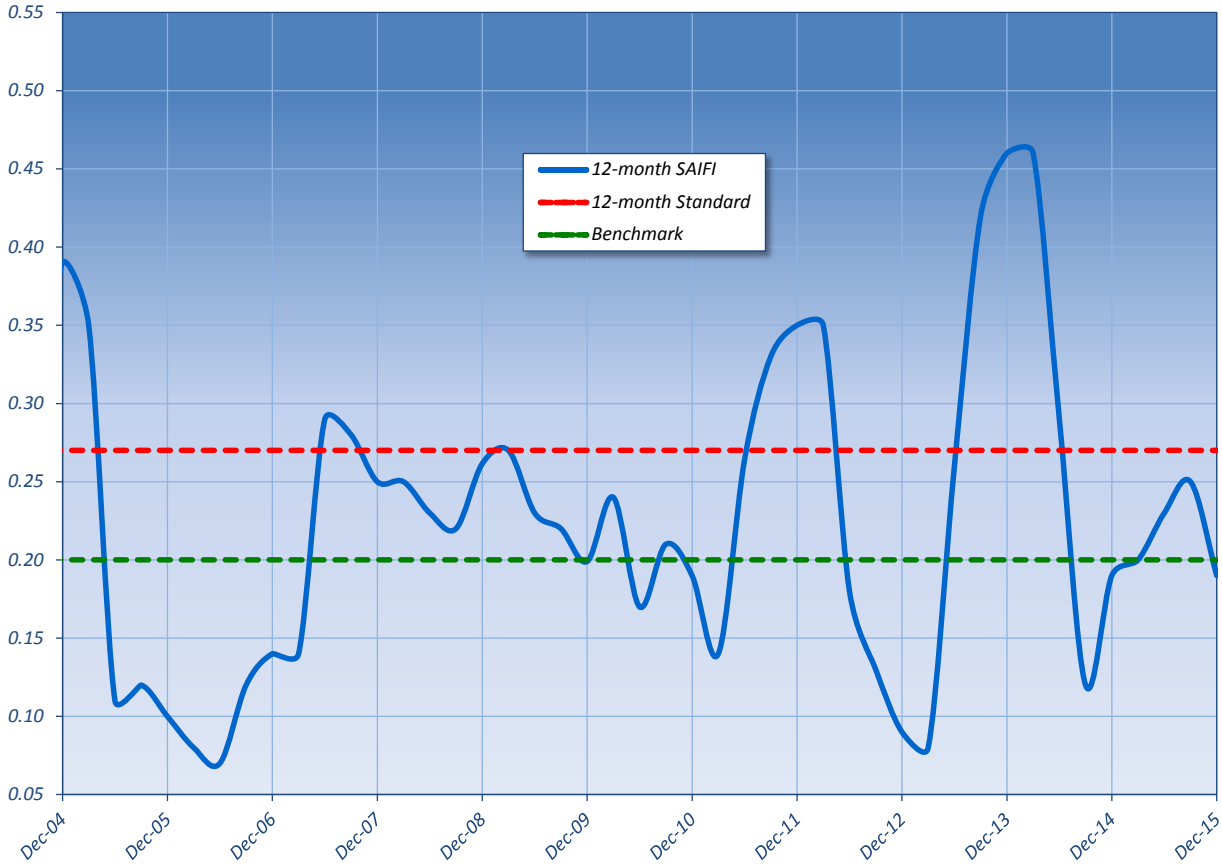


Figure 6 Citizens' Outage Causes (percent of total outages)

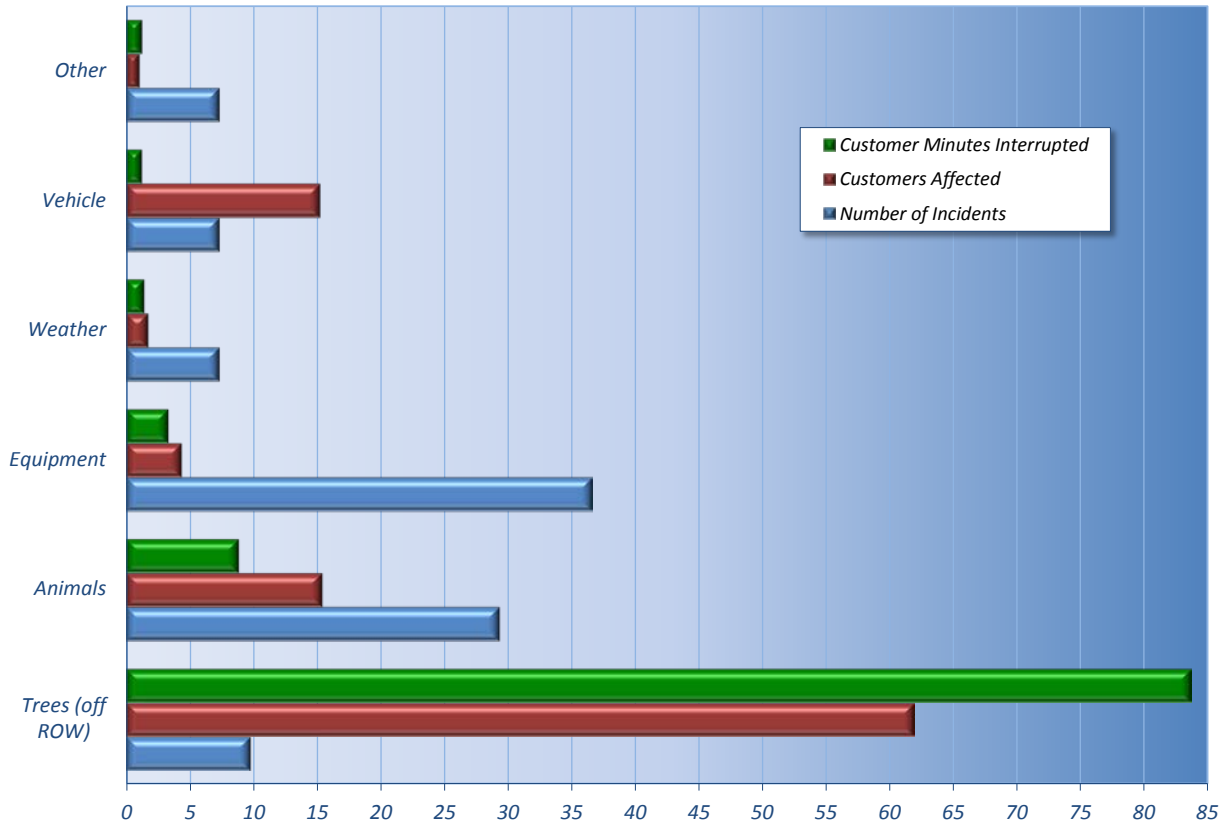
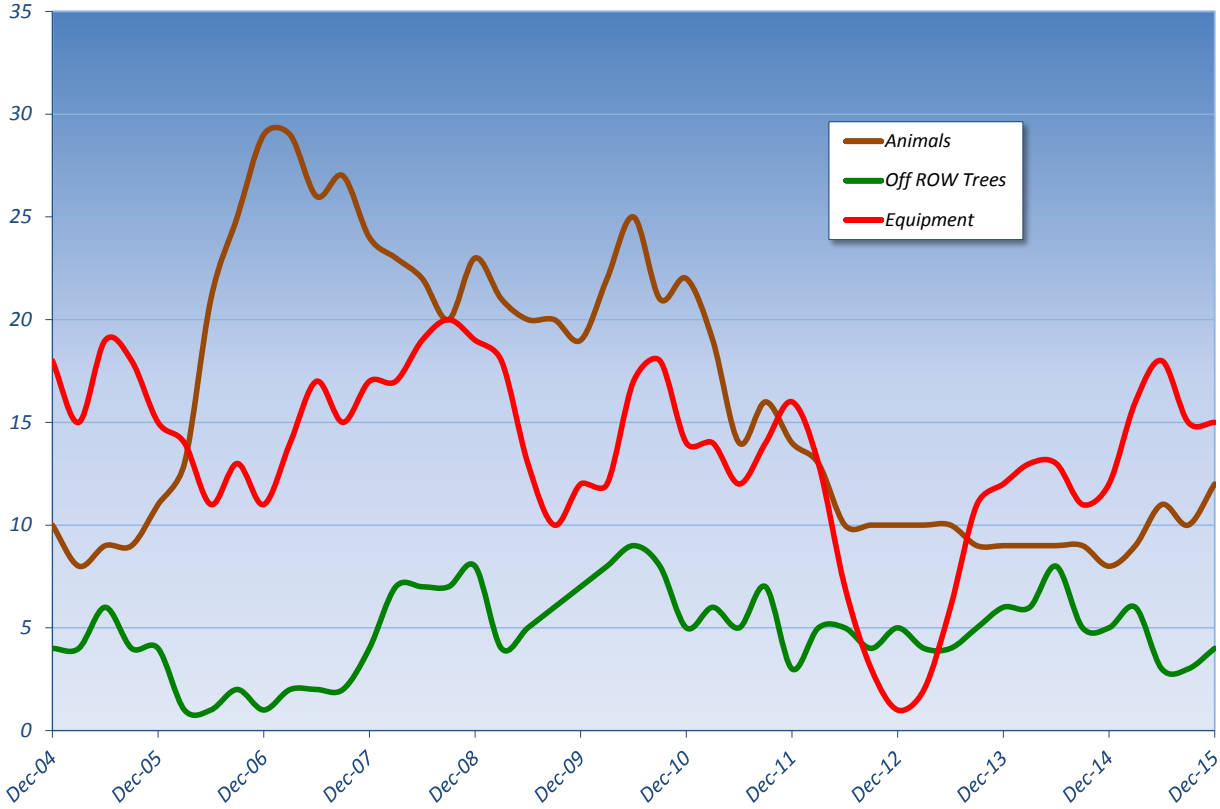


Figure 7 Citizens' Outage Tracking (number of incidents)



Duquesne Light Company

Duquesne has a service territory of about 817 square miles with a well-developed distribution system serving about 588,000 customers. In 2015, Duquesne experienced 5.4 million kilovolt-amps (kVA) interruptions and 514 million kVA-minutes of interruption, compared to 2014, when customers experienced 4.4 million kilovolt-amps (kVA) interruptions and 451 million kVA-minutes of interruption.

Duquesne had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 102 minutes in 2014 to 95 minutes in 2015; achieved benchmark by 12 percent.

Three-year average: Decreased from 113 minutes in 2014 to 106 minutes in 2015; achieved standard by 11 percent.

SAIDI

Rolling 12-month: Increased from 63 minutes in 2014 to 71 minutes in 2015; achieved benchmark by 44 percent.

Three-year average: Decreased from 72 minutes in 2014 to 70 minutes in 2015; achieved standard by 55 percent.

SAIFI

Rolling 12-month: Increased from 0.62 outages in 2014 to 0.75 outages in 2015; achieved benchmark by 36 percent.

Three-year average: Decreased from 0.67 outages in 2014 to 0.66 outages in 2015; achieved standard by 49 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 8 and Figure 9. Duquesne has sustained below benchmark performance during the entire year of 2015 for all benchmark performance categories.

Figure 10 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 11 shows historical trend of the top three main outage causes. The most frequent outage causes were equipment failure, trees, and storms.

Duquesne continues to improve its reliability management work programs and storm hardening activities. Duquesne rolled out an enhanced rights-of-way vegetation management maintenance program which is designed to reduce outages. As of May 2016, Duquesne has 89 circuits that utilize pulse-recloser fault protection and sectionalizing. This type of recloser reduces the stress on the circuit components during a fault event, thereby reducing component damage and outage restoration times. Duquesne continues to evaluate installed Fault Current Indicators (FCI) on sections of underground line to help identify fault locations more quickly thereby reduce outage

restoration times. Duquesne also became a participant in the Spare Transformer Equipment program managed by Edison Electric Institute.

In the last 4-1/2 years, Duquesne achieved benchmark performance in every category. Benchmark performance scores are expected to continue in 2016.

Figure 8 Duquesne CAIDI (minutes)

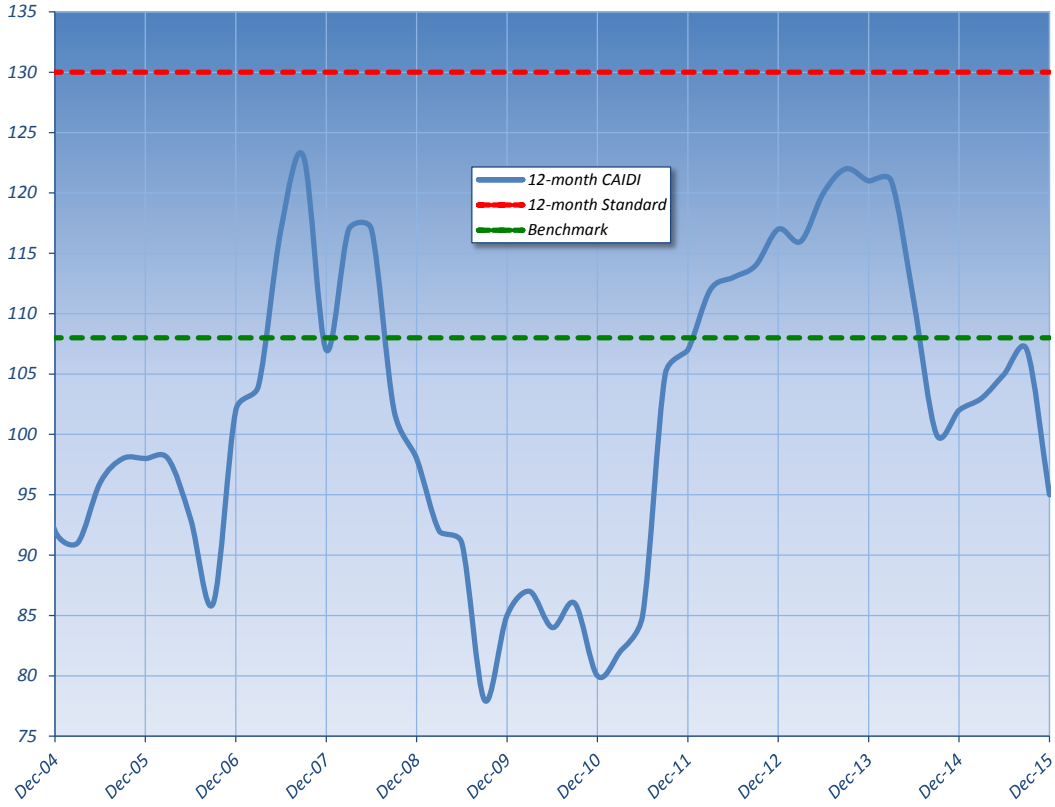


Figure 9 Duquesne SAIFI (interruptions per customer)

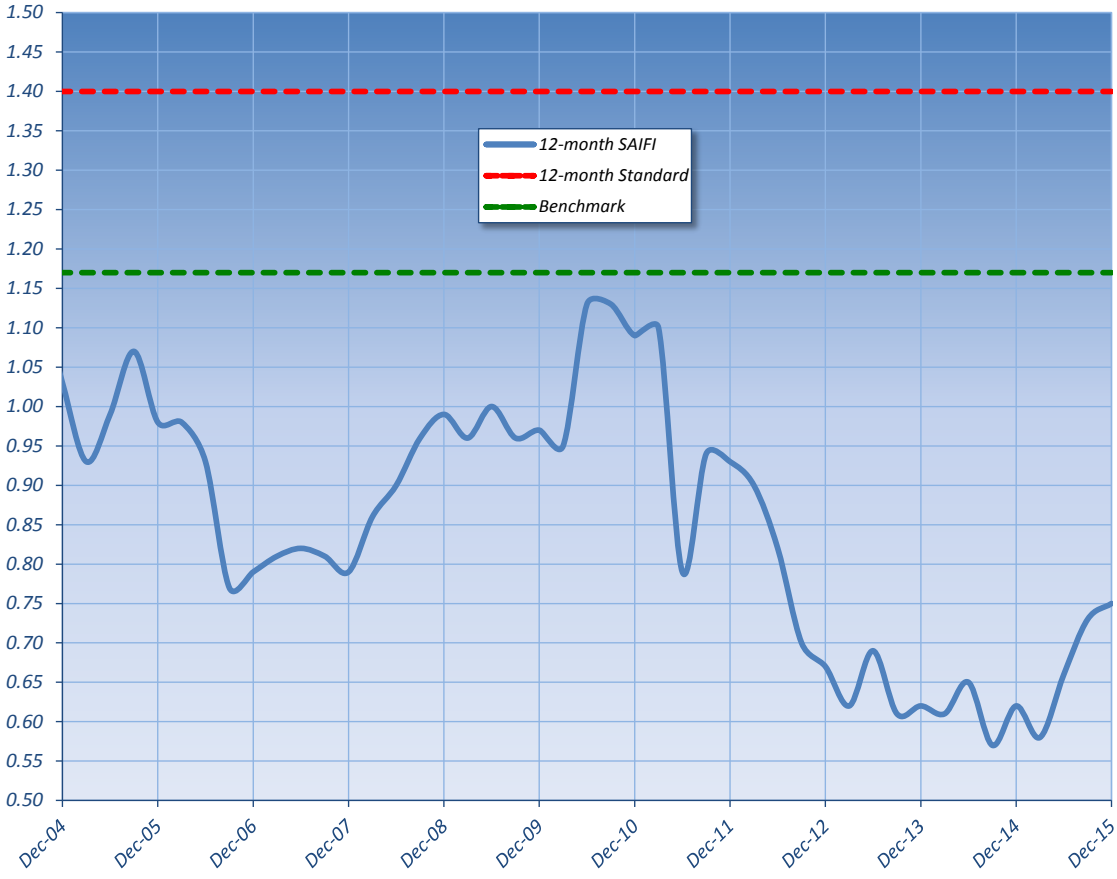


Figure 10 Duquesne Outage Causes (percent of total outages)

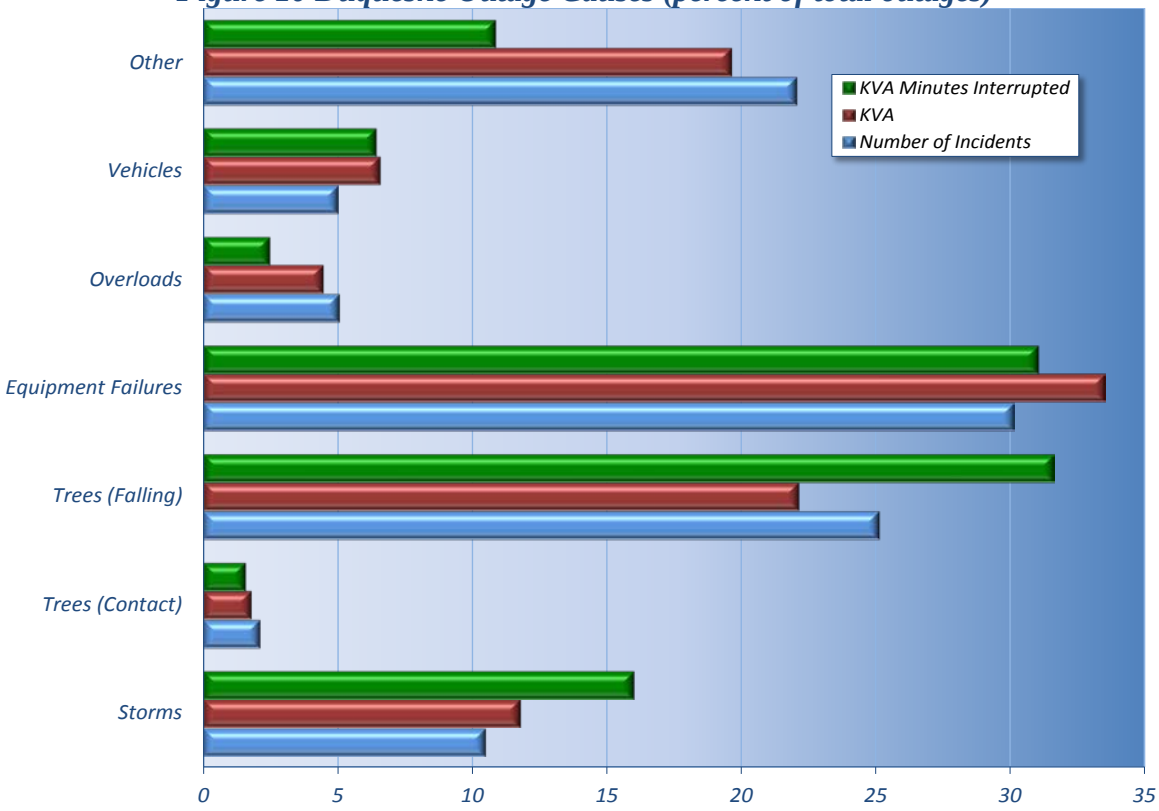
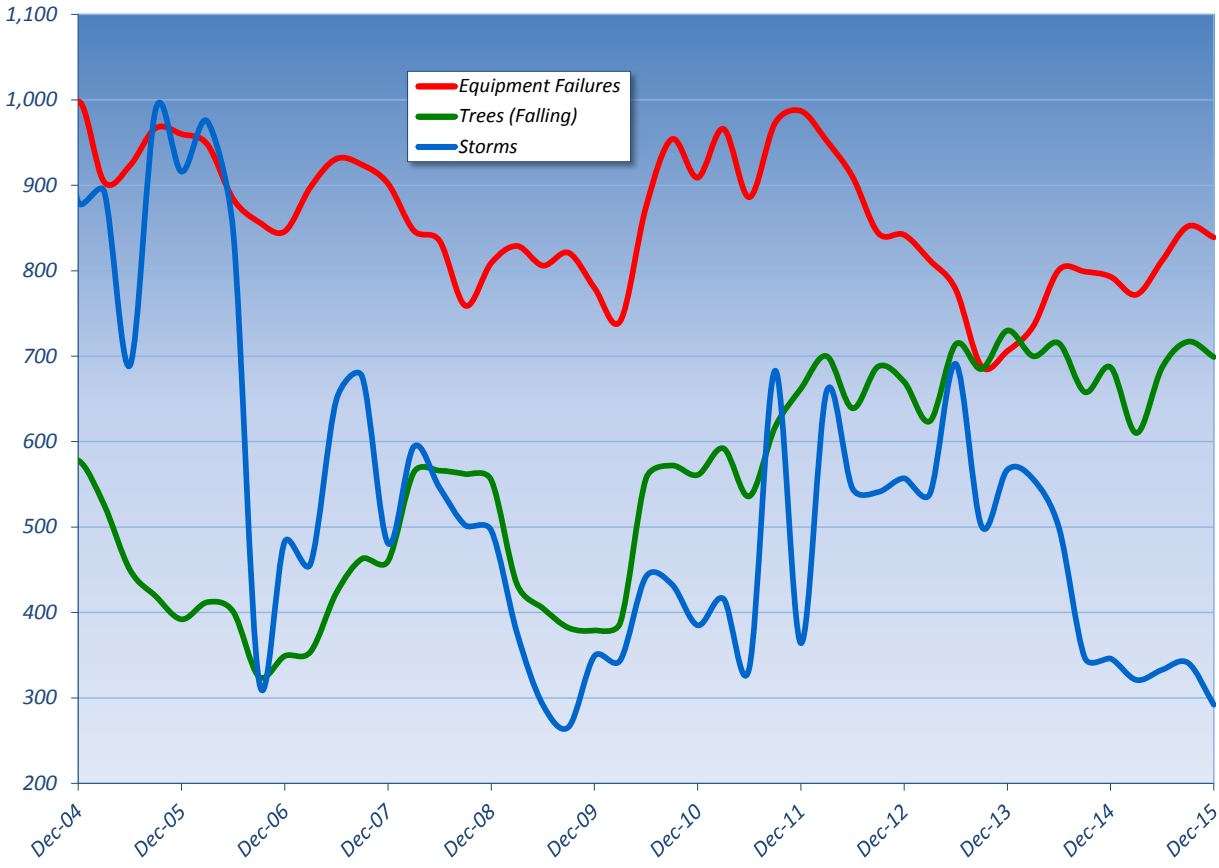


Figure 11 Duquesne Outage Tracking (number of incidents)



Metropolitan Edison Company

Met-Ed has a service territory of about 3,300 square miles that serves about 554,500 customers. In 2015, Met-Ed experienced 662,492 customer interruptions and 2.1 million minutes of interruption, compared to 2014, when customers experienced 610,606 customer interruptions and 2.5 million minutes of interruption.

Met-Ed had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 128 minutes in 2014 to 113 minutes in 2015; failed to achieve benchmark by 3 percent.

Three-year average: Decreased slightly from 118 minutes in 2014 to 115 minutes in 2015; achieved standard by 11 percent.

SAIDI

Rolling 12-month: Decreased from 141 minutes in 2014 to 136 minutes in 2015; failed to achieve benchmark by 0.7 percent.

Three-year average: Decreased from 137 minutes in 2014 to 131 minutes in 2015; achieved standard by 20 percent.

SAIFI

Rolling 12-month: Increased from 1.11 outages in 2014 to 1.19 outages in 2015; failed to achieve benchmark by 3 percent.

Three-year average: Decreased from 1.16 outages in 2014 to 1.13 outages in 2015; achieve standard by 11 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 12 and Figure 13. The past year trend shows a decrease in restoration times and outages frequency. In 2015, Met-Ed trended near and below benchmark during the year.

Figure 14 shows the distribution of causes of service outages that occurred during 2015 as a percentage of total outages. Figure 14 shows the top main outage causes, which shows equipment failure and trees as the most frequent cause of power outages and customer minutes interrupted.

Figure 15 shows a trend of outages causes; and equipment failure has been the most frequent cause of outages and the recent trend has been increasing.

Met-Ed's Long Term Infrastructure Improvement Plan (LTIIP) was approved on Feb 11, 2016.[17] Met-Ed's LTIIP was designed to help improve storm hardening, system resiliency, and reliability. In 2015, Met-Ed continued aggressive storm hardening activities by trimming over 156,000 trees and removing over 3,100 off right-of-way danger trees. In 2015, Met-Ed added sixty-five fuses and twelve reclosers to the system and ten SCADA devices were installed with

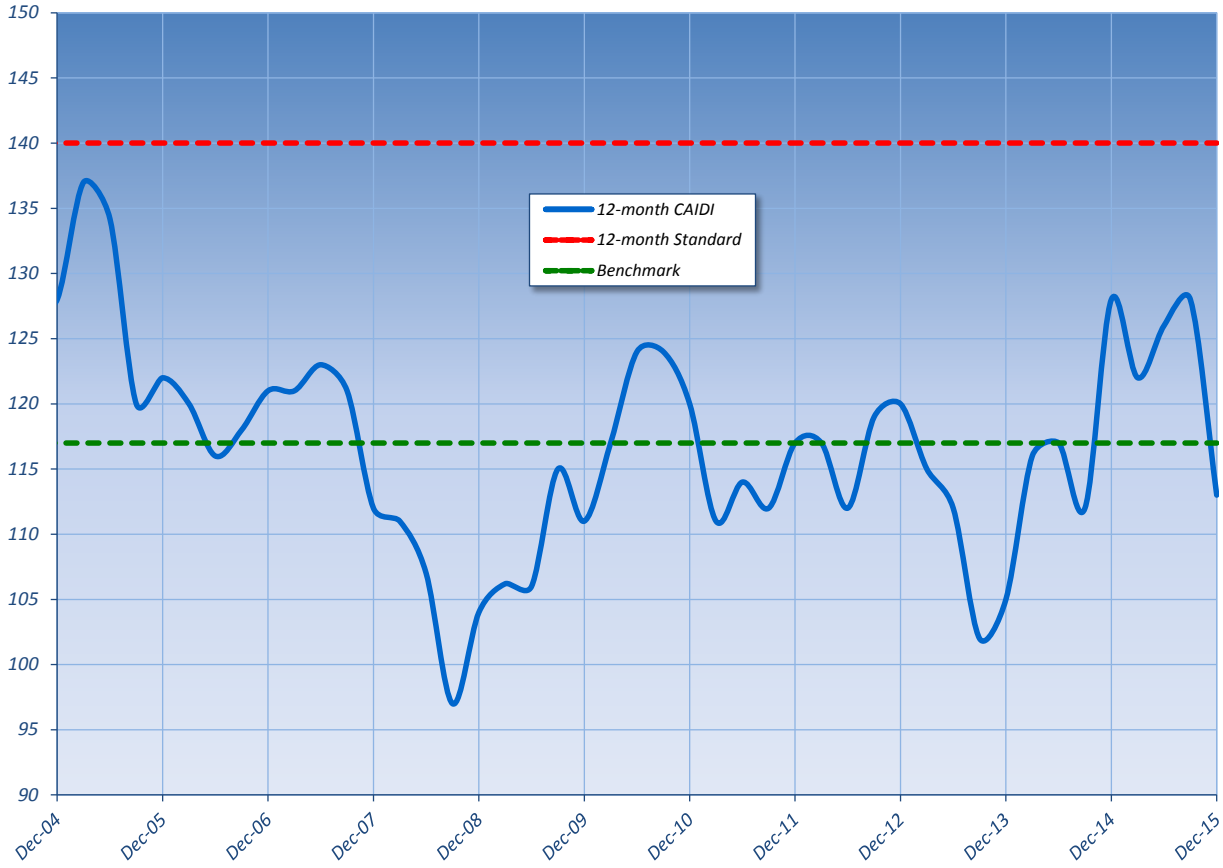
[17] Order entered Feb 11, 2016 at Docket No. P-2015-2508942.

plans to install an additional seventy SCADA devices in 2016 on eleven worst performing circuits. These devices reduce the time it takes to restore customers during an outage. Met-Ed also installed 544 fault indicators in 2015 that are designed to help linemen quickly locate the source of an outage. Met-Ed has also been proactively replacing porcelain cutouts with polymer cutouts. As of June 1, 2016 Met-Ed will have inspected all substation capacitor banks and completed necessary repairs or replacements to ensure minimum 98% available reactive support. In 2015, Met-Ed replaced 533 porcelain cutouts on ten circuits and will target an additional six circuits in 2016.

The PUC has also been performing extra monitoring of Met-Ed's work management system and Reliability Improvement Plan (RIP) as a result of a Commission Motion regarding FirstEnergy's Implementation Plan to the findings of the Commission's Focused Management and Operations Audit.[18]

Even though Met-Ed reliability performance failed to consistently sustain and achieve benchmark performance in 2015, Met-Ed LTIIP and RIP activities should begin to sustain benchmark performance in 2016.

Figure 12 Met-Ed CAIDI (minutes)



[18] Final Order entered Nov 5, 2015 at Docket Nos. D-2013-2365991, D-2013-2365992, D-2013-2365993, and D-2013-2365994.

Figure 13 Met-Ed SAIFI (interruptions per customer)

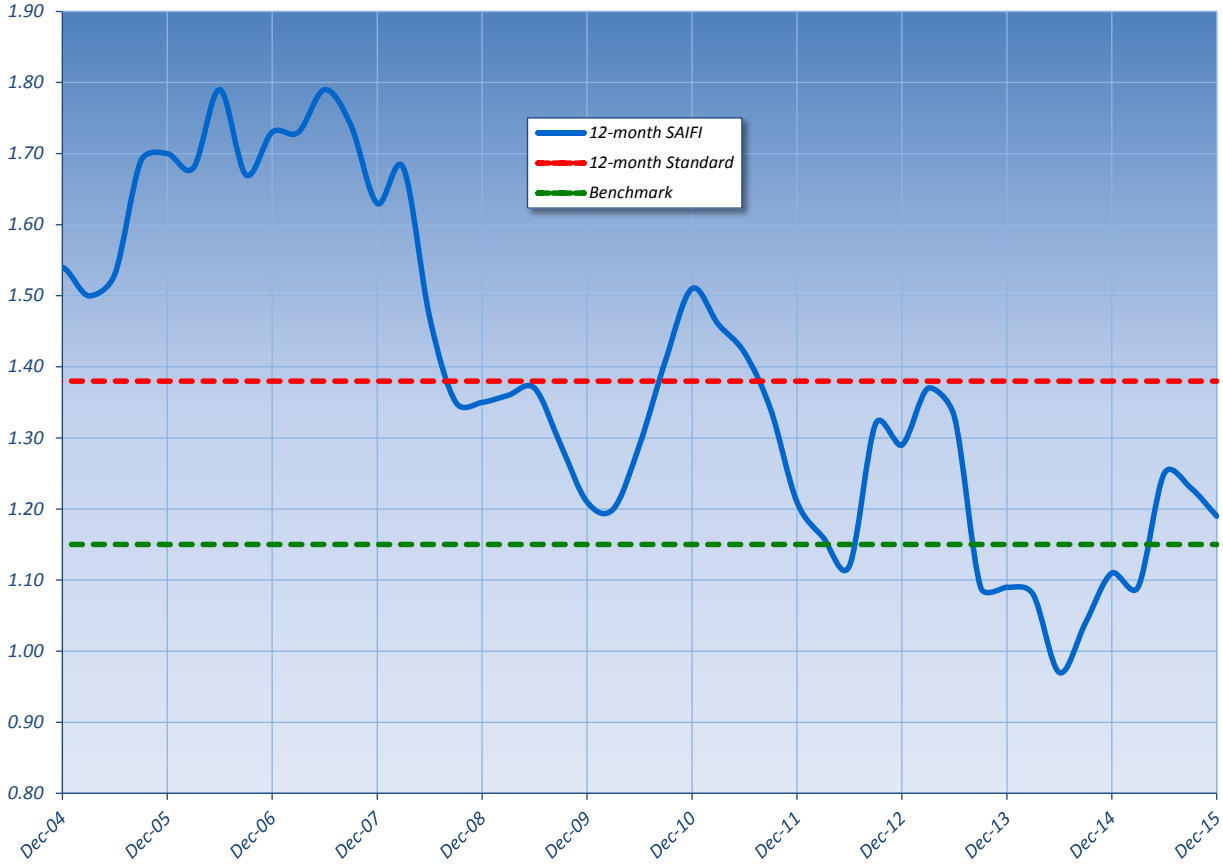


Figure 14 Met-Ed Outage Causes (percent of total outages)

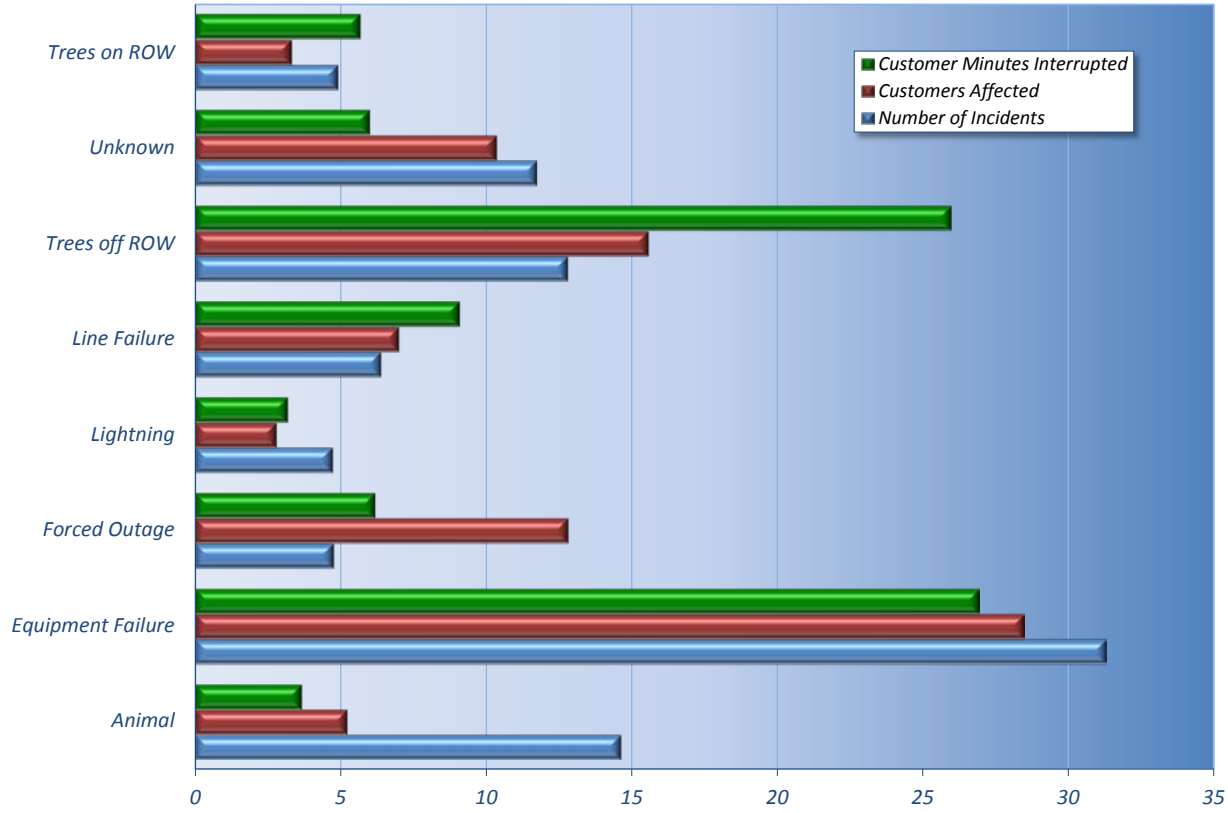
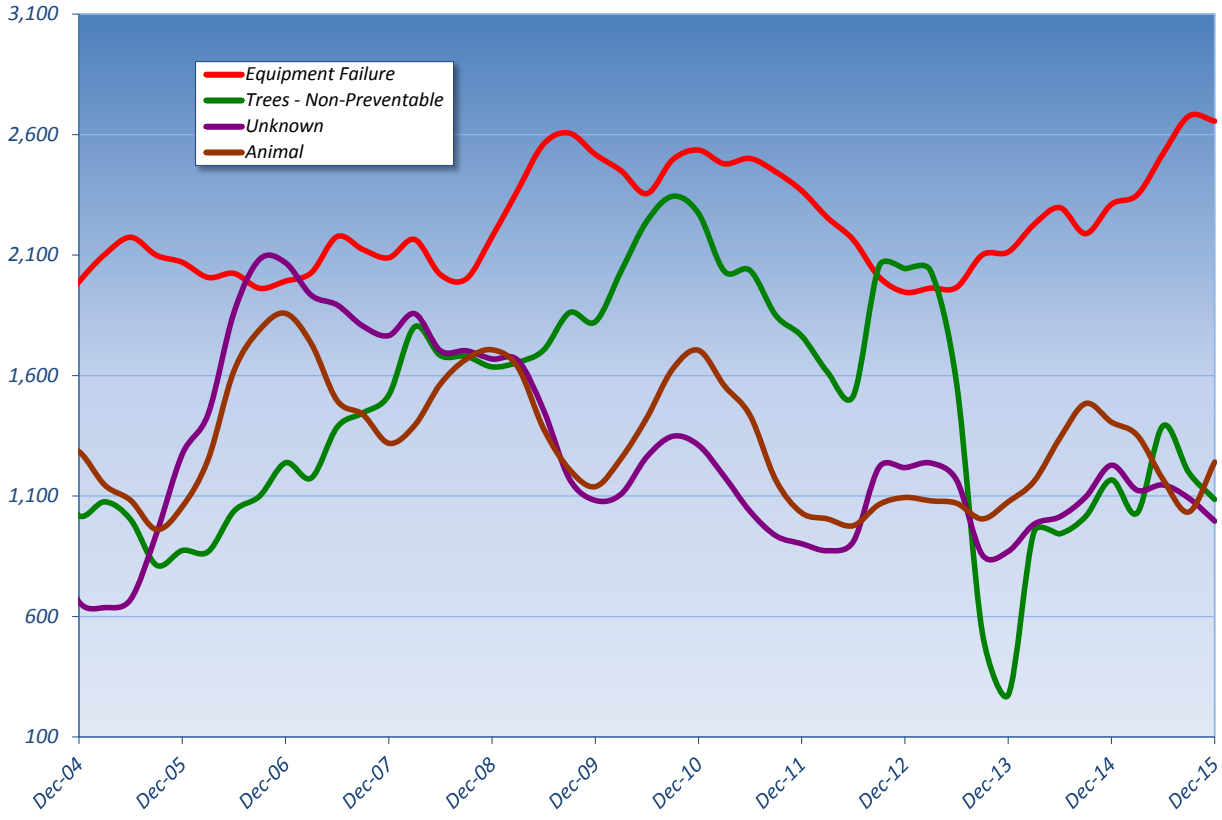


Figure 15 Met-Ed Outage Tracking (number of incidents)



PECO Energy Company

PECO has a service territory of about 2,100 square miles that serves a well-developed distribution system serving about 1.7 million customers. In 2015, PECO experienced 1.23 million customer interruptions and 103.3 million minutes of interruption, compared to 2014, when customers experienced 1.48 million customer interruptions and 141.6 million minutes of interruption.

The 2015 reliability metrics exclude the following outage data related to one Commission approved major event:

- June 23, 2015 – Thunderstorm & high winds, affecting 352,763 customers.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 96 minutes in 2014 to 84 minutes in 2015; achieved benchmark by 25 percent.

Three-year average: Decreased from 95 minutes in 2014 to 90 minutes in 2015; achieved standard by 27 percent.

SAIDI

Rolling 12-month: Decreased from 82 minutes in 2014 to 61 minutes in 2015; achieved benchmark by 56 percent.

Three-year average: Decreased from 73 minutes in 2014 to 69 minutes in 2015; achieved standard by 59 percent.

SAIFI

Rolling 12-month: Decreased from 0.86 outages in 2014 to 0.72 outages in 2015; achieved benchmark by 42 percent.

Three-year average: Decreased from 0.77 outages in 2014 to 0.76 outages in 2015; achieved standard by 44 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 16 and Figure 17. The past year trend shows performance trending below benchmark reliability. PECO has consistently sustained benchmark performance in every reliability category for the past three years.

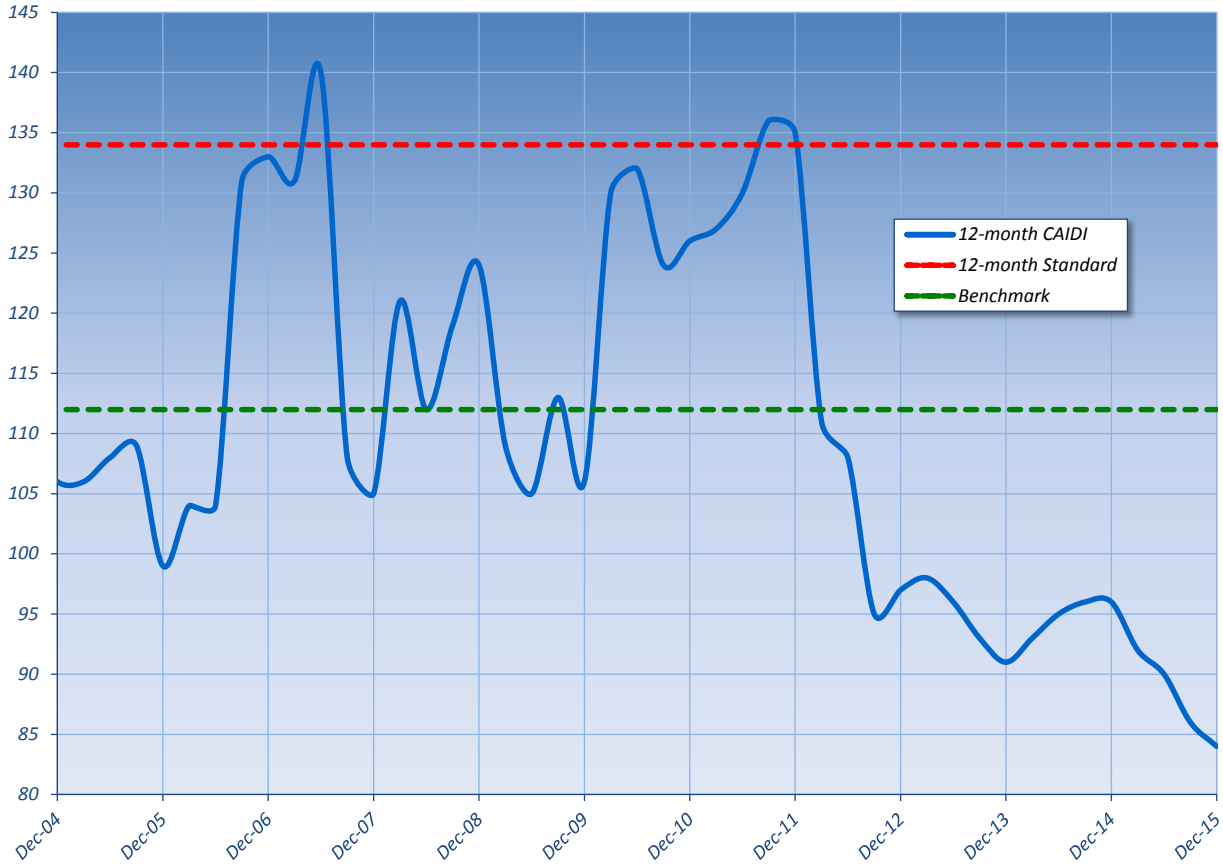
Figure 18 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 19 shows the historical trend of the top three main outage causes. The most frequent outage cause is equipment failure. PECO's LTIIP was approved in 2015 to spend additional money to replace aging infrastructure which will reduce equipment failures. Over the past five years, PECO's service territory has experienced several severe weather events that caused large-scale power outages lasting several days (see Table 4 in Section 3, above). As a result, PECO continues storm hardening activities through infrastructure improvements and enhanced vegetation management. PECO has installed more than 20 miles of tree-resistant wire

in areas impacted by high incidences of vegetation-related outages and removed more than 140 hazardous trees in 2015 to enhance system performance and reduce service interruptions.

PECO's LTIIP, or "System 2020" plan, was approved by the Commission on Oct 22, 2015.[19] With the System 2020 Plan, PECO will spend an additional $274 million through 2020 on system resiliency and storm hardening system improvements. These investments are in three key areas: storm hardening and resiliency measures; accelerated cable replacements; and the acceleration of a plan to retire building substations and to upgrade the distribution facilities supplied by those substations. Accelerated spending in the replacement of aging infrastructure should reduce the number of outages caused by equipment failure which has been trending higher during the past three years. The Commission shall perform extra monitoring of equipment failures in 2016.

In 2015, PECO achieved benchmark performance in every performance category.

Figure 16 PECO CAIDI (minutes)



[19] Order entered on Oct 22, 2015 at Docket No. P-2015-2471423.

Figure 17 PECO SAIFI (interruptions per customer)

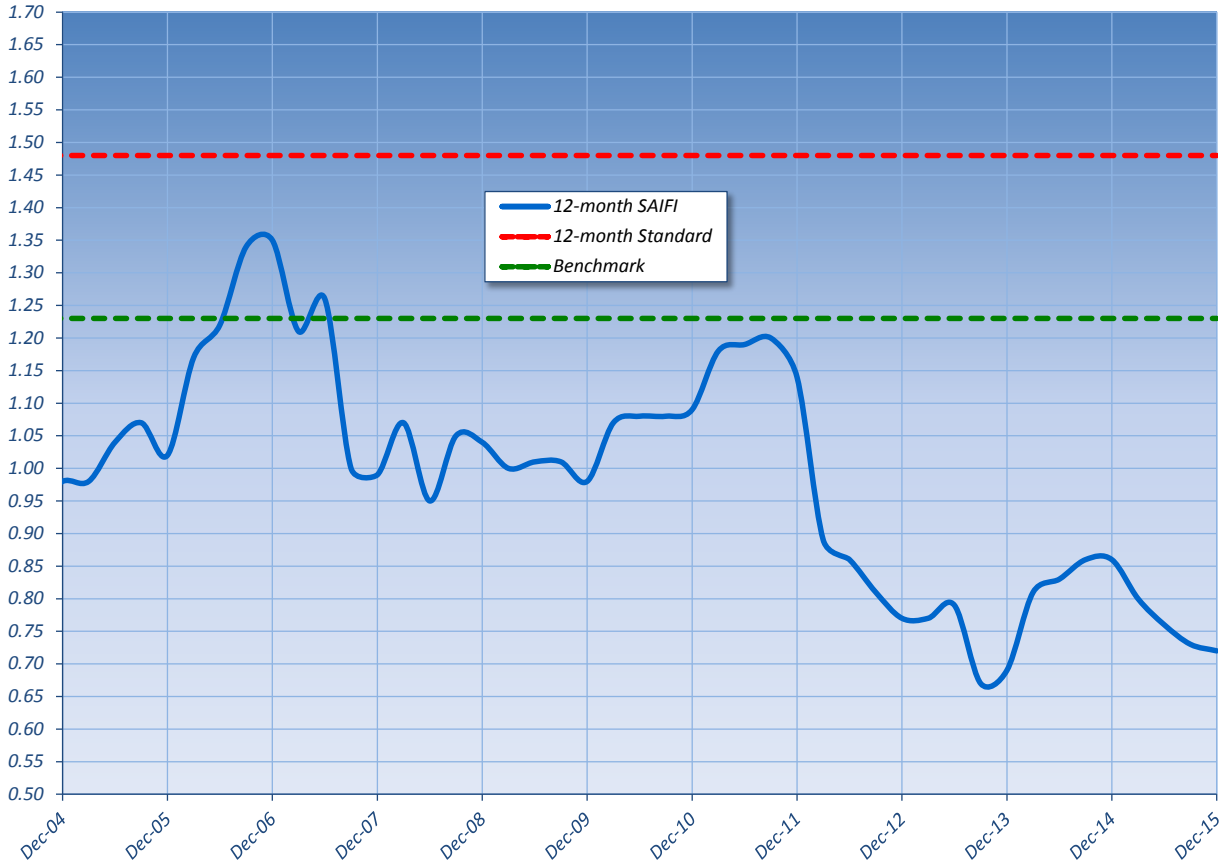


Figure 18 PECO Outage Causes (percent of total outages)

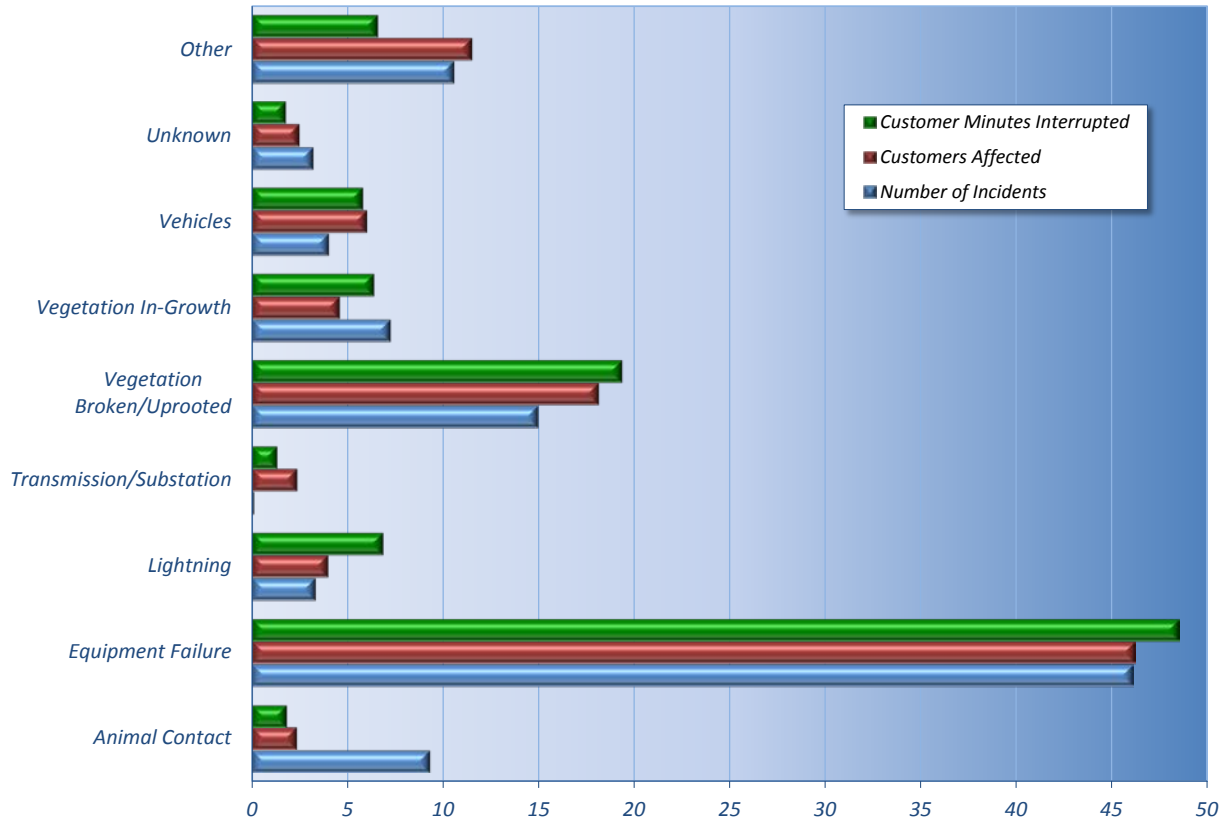
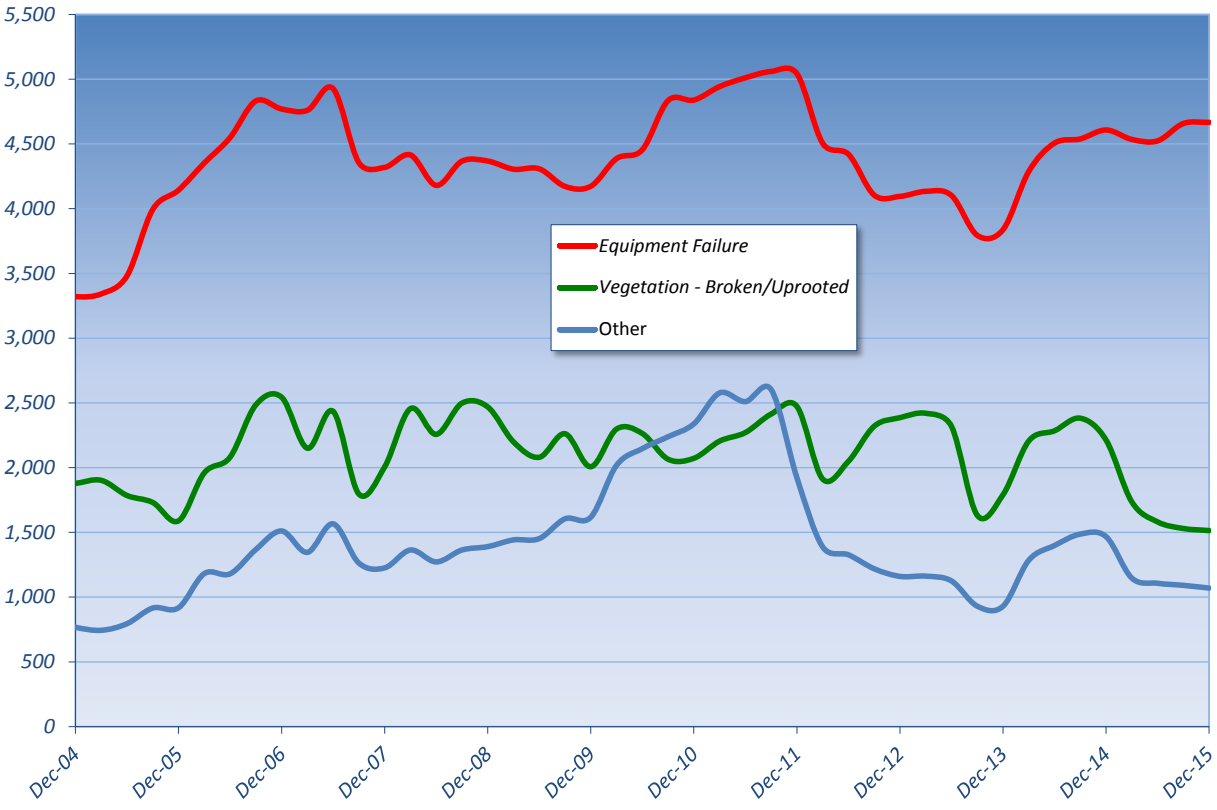


Figure 19 PECO Outage Tracking (number of incidents)



Pennsylvania Electric Company

Penelec has a service territory of about 17,600 square miles serving 582,000 customers. In 2015, Penelec experienced 792,673 customer interruptions and 3.0 million minutes of interruption, compared to 2014, when customers experienced 903,429 customer interruptions and 2.68 million minutes of interruption.

Penelec had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Increased from 118 minutes in 2014 to 140 minutes in 2015; and failed to achieve benchmark by 20 percent.

Three-year average: Increased from 124 minutes in 2014 to 125 minutes in 2015; achieved standard by 3 percent.

SAIDI

Rolling 12-month: Increased from 183 minutes in 2014 to 191 minutes in 2015; failed to achieve benchmark by 29 percent

Three-year average: Decreased from 184 minutes in 2014 to 183 minutes in 2015; failed to achieve standard by 2 percent.

SAIFI

Rolling 12-month: Decreased from 1.55 outages in 2014 to 1.36 outages in 2015; failed to achieve benchmark by 8 percent.

Three-year average: Decreased from 1.48 outages in 2014 to 1.46 outages in 2015; failed to achieve standard by 5 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 20 and Figure 21. The CAIDI trend is increasing away from benchmark and the SAIFI trend is approaching toward benchmark. Figure 22 shows trees and equipment failures are both significant causes of outages and customer interruption minutes. Figure 23 shows a historical trend of the top main outage causes.

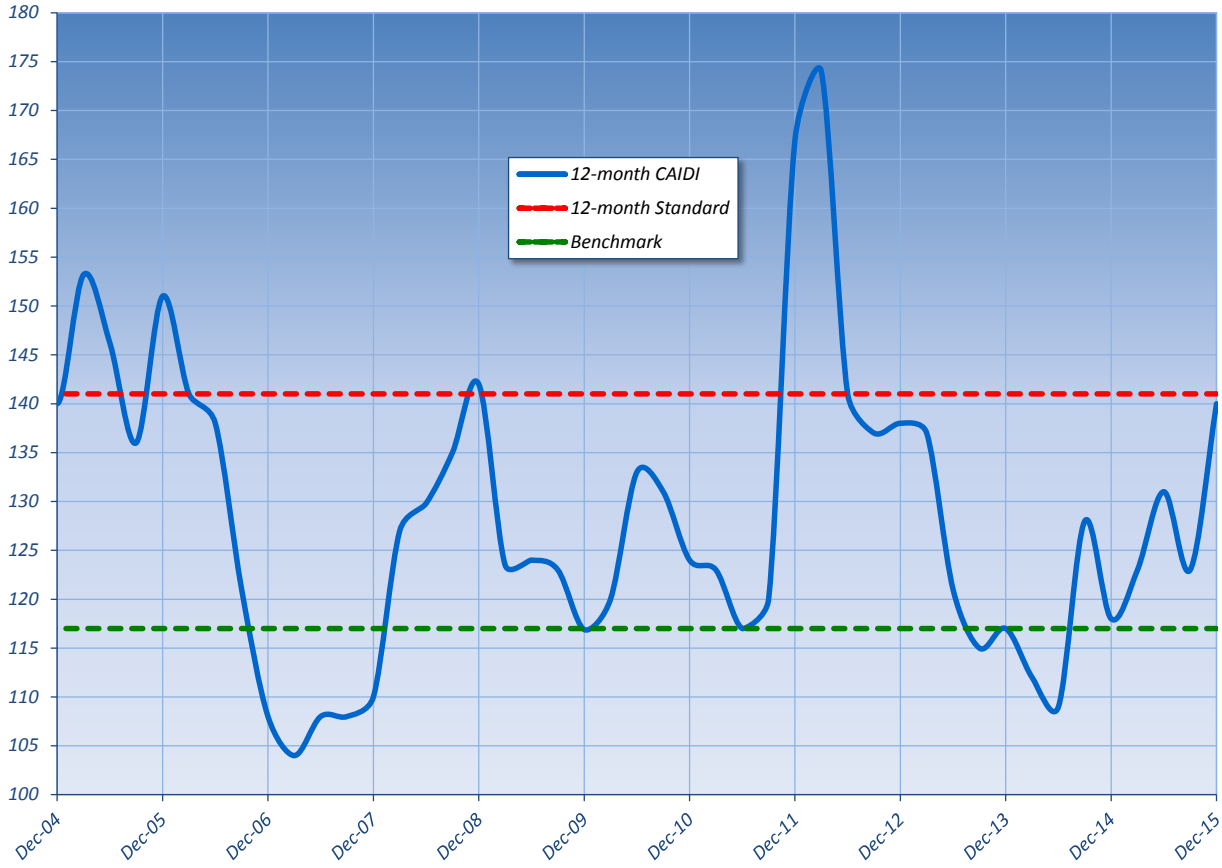
In 2014, and continuing into 2015, the Commission's Reliability and Emergency Preparedness Section of the Bureau of Technical Utility Services (TUS) began increased monitoring and assessment of Penelec's reliability performance due to Penelec's poor reliability performance. TUS required Penelec to initiate a Corrective Action Plan (CAP), or reliability improvement plan (RIP). A 3 year plan was developed and is currently being executed by Penelec to attain benchmark performance by 2018. In 2015, the Commission also required extra monitoring of Penelec's reliability quality system and RIP as a result of a Commission Motion regarding FirstEnergy's Implementation Plan to the findings of the Commission's Focused Management and Operations Audit.[20]

[20] Final Order entered Nov 5, 2015 at Docket Nos. D-2013-2365991, D-2013-2365992, D-2013-2365993, and D 2013-2365994.

Penelec's Long Term Infrastructure Improvement Plan ("LTIIP") was approved on Feb 11, 2016.[21] The LTIIP was designed to help improve storm hardening, system resiliency, and reliability. As part of this program, in 2015, Penelec continued installing new cutouts to enhance the reliability of the 34.5kV system and reduce the number of equipment failures. Penelec also continues to replace porcelain cutouts on their 34.5kV system and in 2015 sixty-seven circuits had porcelain cutouts replaced. Penelec will complete an additional sixty-eight circuits by the end of 2016. In 2015, Penelec accelerated their danger tree removal of trees outside of the right-of-way on over 1,100 circuit miles and plans to accelerate the process on approximately 400 miles in 2016. Fourteen SCADA controlled switches were installed in 2015, and the Company plans to install an additional thirteen in 2016.

Penelec has failed to achieve benchmark performance in every reliability performance category in the last six rolling 12-month quarters. A significant effort is underway by Penelec management to achieve benchmark performance by 2018. Penelec's LTIIP and RIP activities should begin to show positive reliability trend improvements in 2016. The PUC will continue extra monitoring of Penelec's performance.

Figure 20 Penelec CAIDI (minutes)



[21] Order entered Feb 11, 2016 at Docket No. P-2015-2508936.

Figure 21 Penelec SAIFI (interruptions per customer)

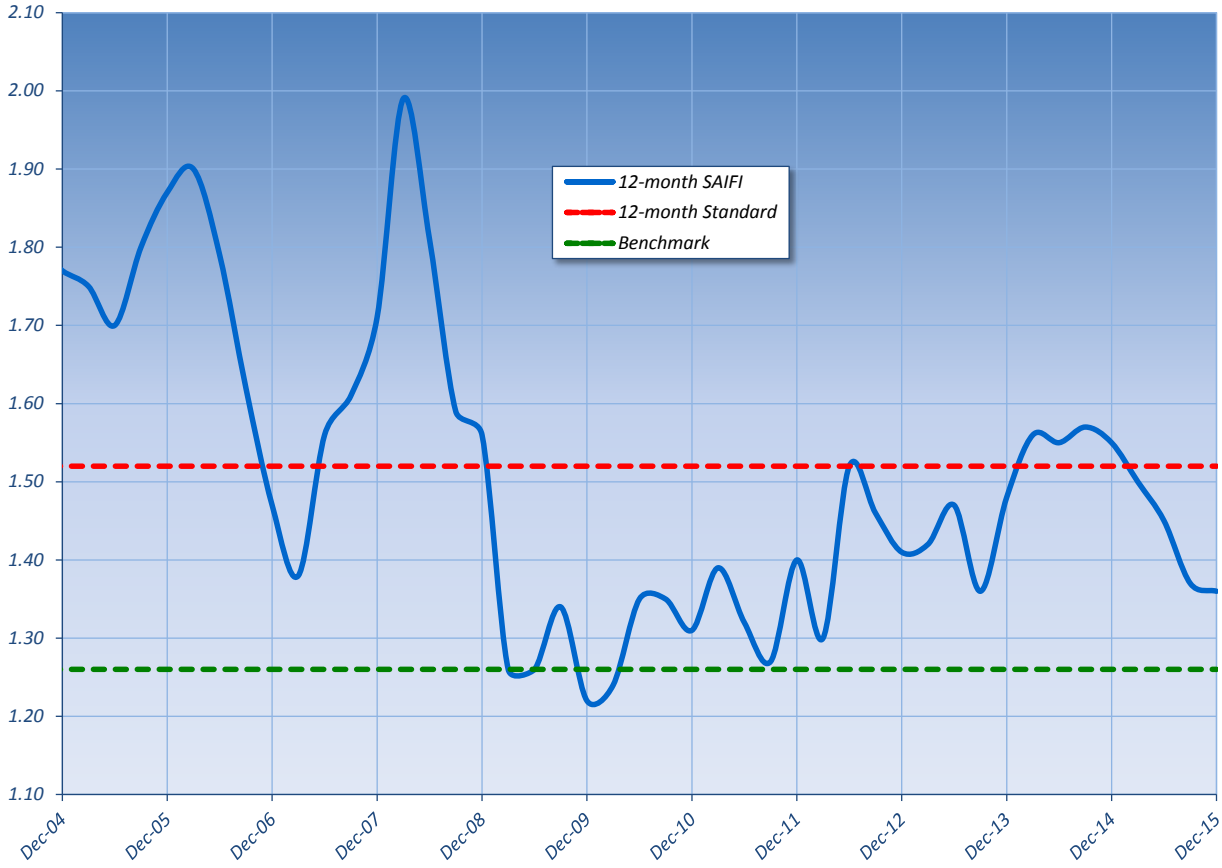


Figure 22 Penelec Outage Causes (percent of total outages)

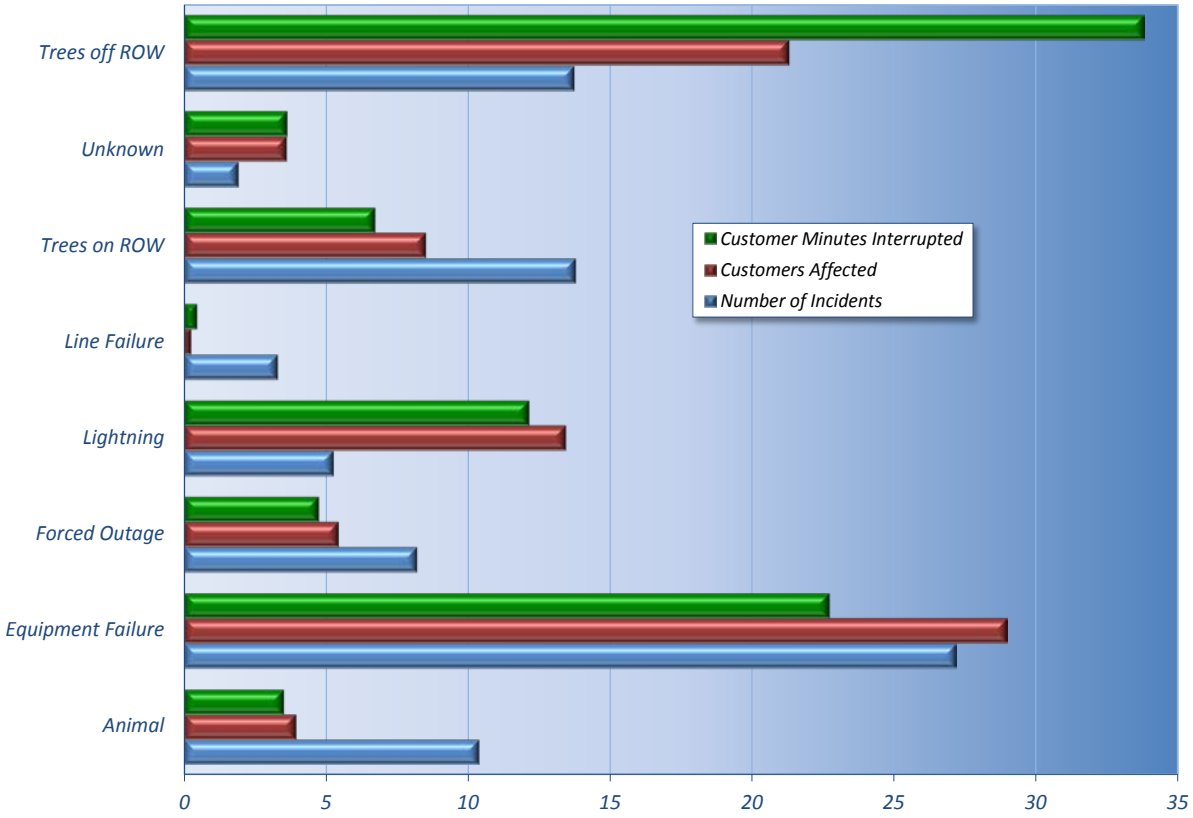
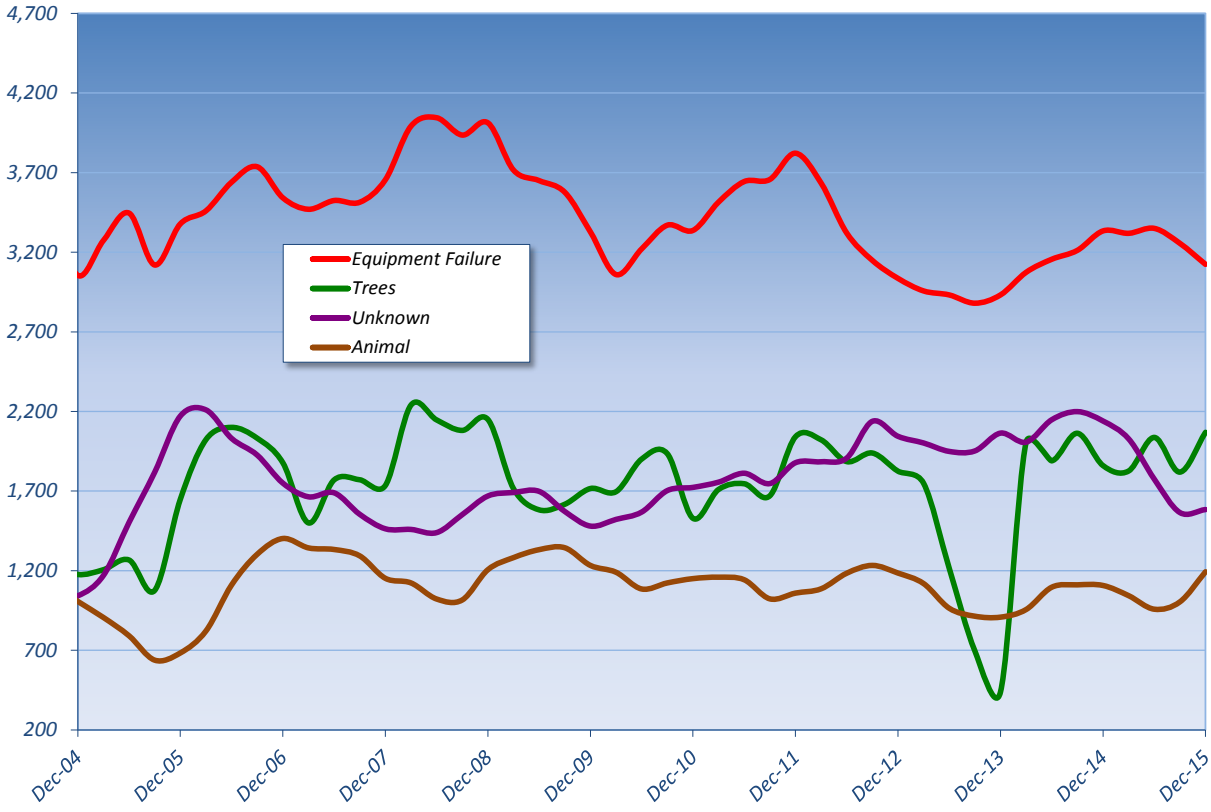


Figure 23 Penelec Outage Tracking (number of incidents)



Pennsylvania Power Company

Penn Power has a service territory of about 1,100 square miles that serves primarily 159,500 customers. In 2015, Penn Power experienced 181,479 customer interruptions and 666,315 minutes of interruption, compared to 2014, when customers experienced 175,271 customer interruptions and 721,189 million minutes of interruption.

The 2015 reliability metrics exclude the following outage data related to one Commission approved major event:

- May 11, 2015 – Thunderstorm & high winds, affecting 15,838 customers.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 106 minutes in 2014 to 100 minutes in 2015; and achieved benchmark by 1 percent.

Three-year average: Decreased from 120 minutes in 2014 to 115 minutes in 2015; and failed to achieve standard by 4 percent.

SAIDI

Rolling 12-month: Decreased from 118 minutes in 2014 to 114 minutes in 2015; and failed to achieve benchmark by 1 percent.

Three-year average: Decreased from 146 minutes in 2014 to 140 minutes in 2015; and failed to achieve standard by 3 percent.

SAIFI

Rolling 12-month: Increased from 1.11 outages in 2014 to 1.14 outages in 2015; and failed to achieve benchmark by 2 percent.

Three-year average: Decreased from 1.21 outages in 2014 to 1.20 outages in 2015; and achieved standard by 2 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 24 and Figure 25. Figure 26 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Tree-related incidents are the most significant cause of customer minutes interrupted and number of customers affected by an outage in 2015.

Figure 27 shows the historical trend of the top three main outage causes. The most frequent outage cause was trees.

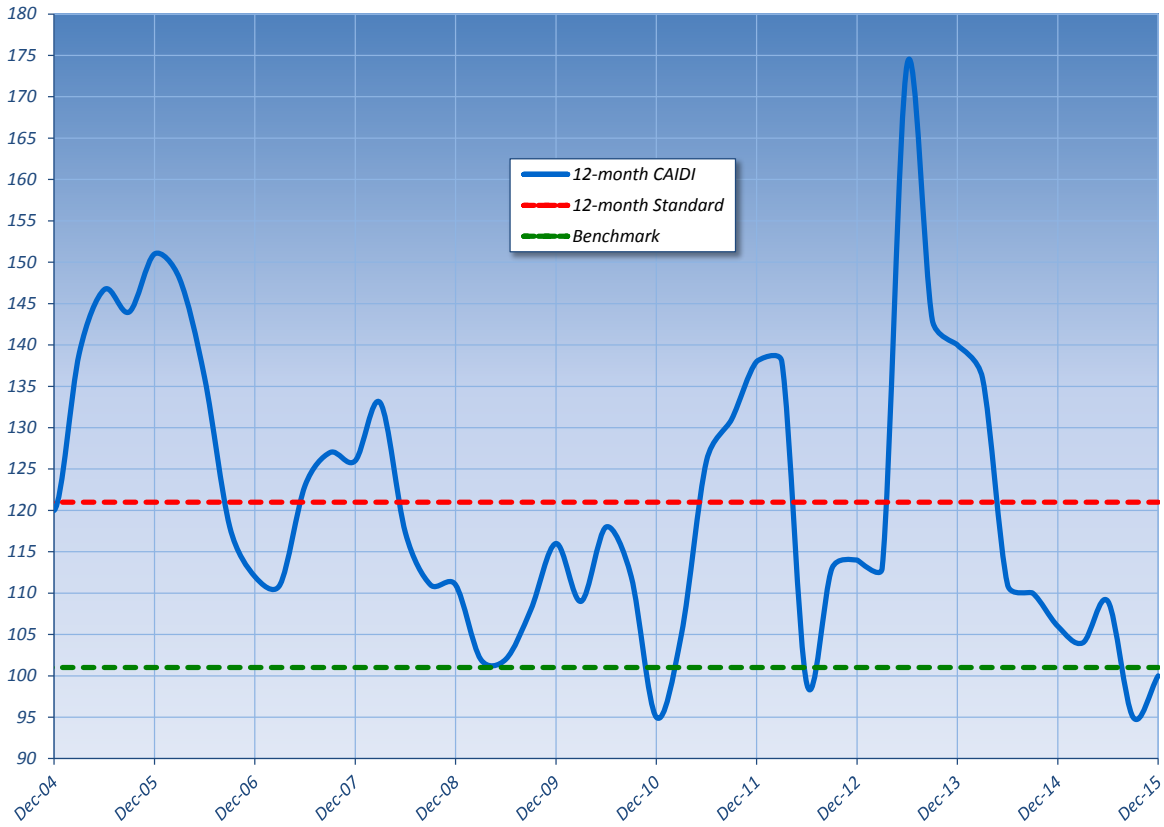
In early 2014, the Commission's Reliability and Emergency Preparedness Section of the Bureau of Technical Utility Services (TUS) began increased monitoring and assessment of Penn Power's reliability due to poor reliability performance. TUS required Penn Power to initiate a Corrective Action Plan (CAP).

Penn Power's CAP, or Reliability Improvement Plan (RIP), incorporates projects and programs to enhance overall reliability. The plan is structured into six main components, which include: targeted removal of off corridor trees; installation of supervisory control and data acquisition (SCADA) and adaptive relaying; deployment of procedural enhancements to speed up restoration; installation of circuit ties, loops or sources; rehabilitation of distribution and transmission lines; and installation of SCADA motor operated air break (MOAB) line switches. Additionally, Penelec's Long Term Infrastructure Improvement Plan ("LTIIP") was approved on Feb 11, 2016.[22] The LTIIP was designed to help improve storm hardening, system resiliency, and reliability.

Beginning in 2015, the Commission also required extra monitoring of Penn Power's reliability quality system and RIP as a result of a Commission Motion regarding FirstEnergy's Implementation Plan to the findings of the Commission's Focused Management and Operations Audit.[23]

Penn Power has made improvements in SAIFI and SAIDI metrics during 2015 and TUS expects Penn Power to become a benchmark performer in all three reliability metric categories in 2016. Continual execution of Penn Power's LTIIP and RIP activities in 2016 should help achieve benchmark performance in all reliability categories.

Figure 24 Penn Power CAIDI (minutes)



[22] Order entered on Feb 11, 2016 at Docket No. P-2015-2508931.
[23] Final Order entered Nov 5, 2015 at Docket Nos. D-2013-2365991, D-2013-2365992, D-2013-2365993, and D 2013-2365994.

Figure 25 Penn Power SAIFI (interruptions per customer)

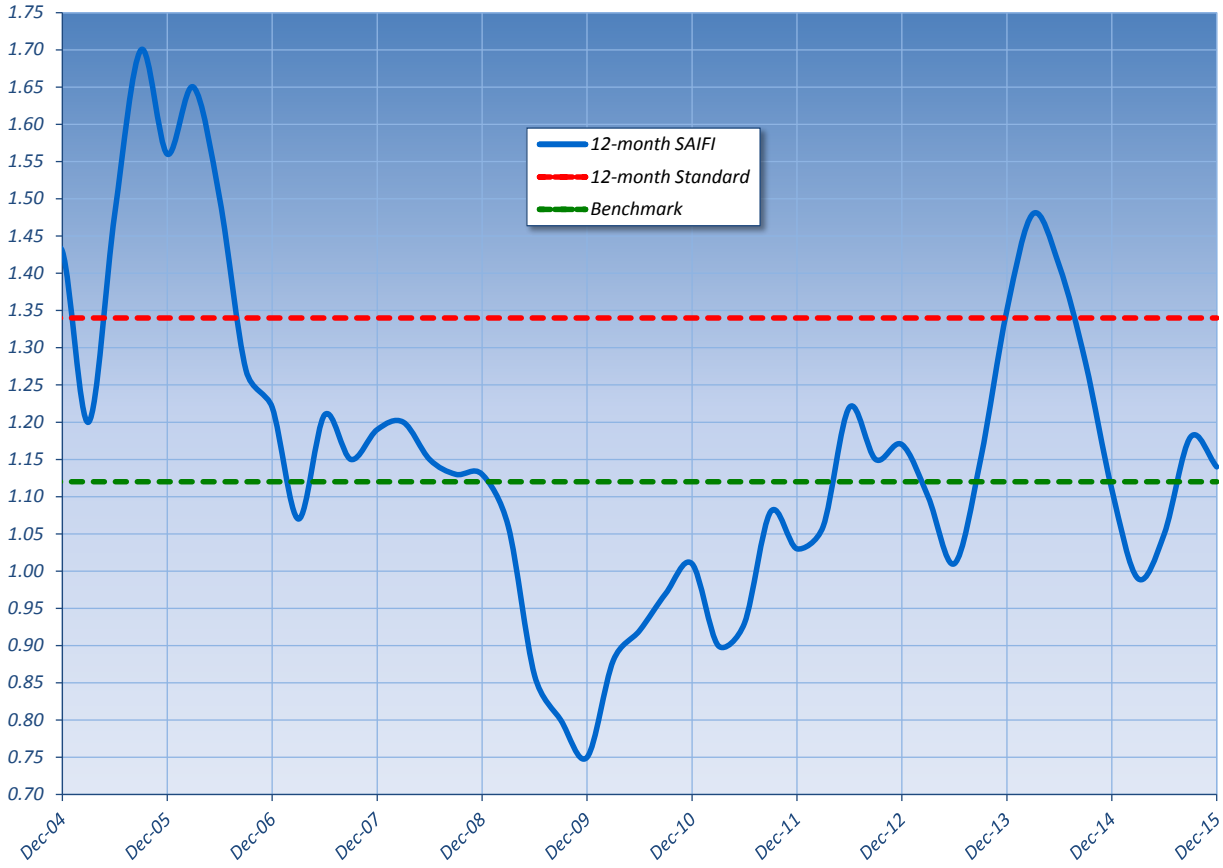


Figure 26 Penn Power Outage Causes (percent of total outages)

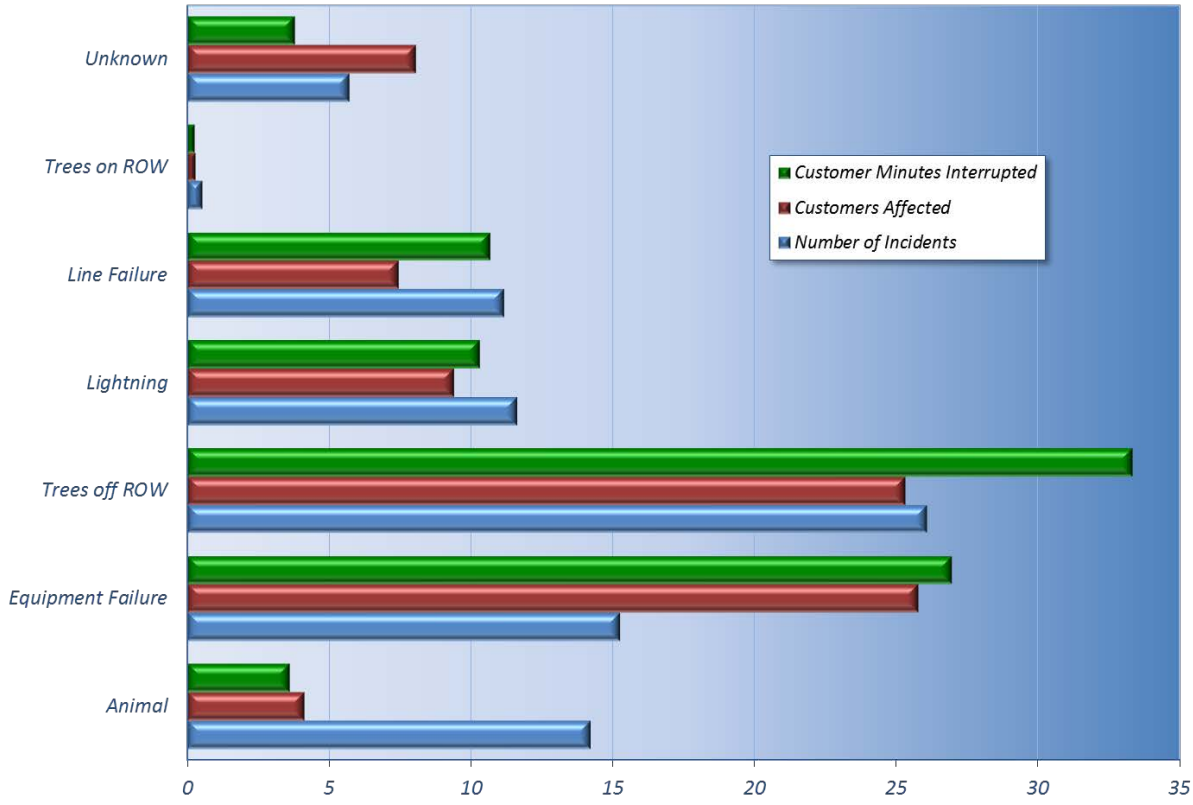
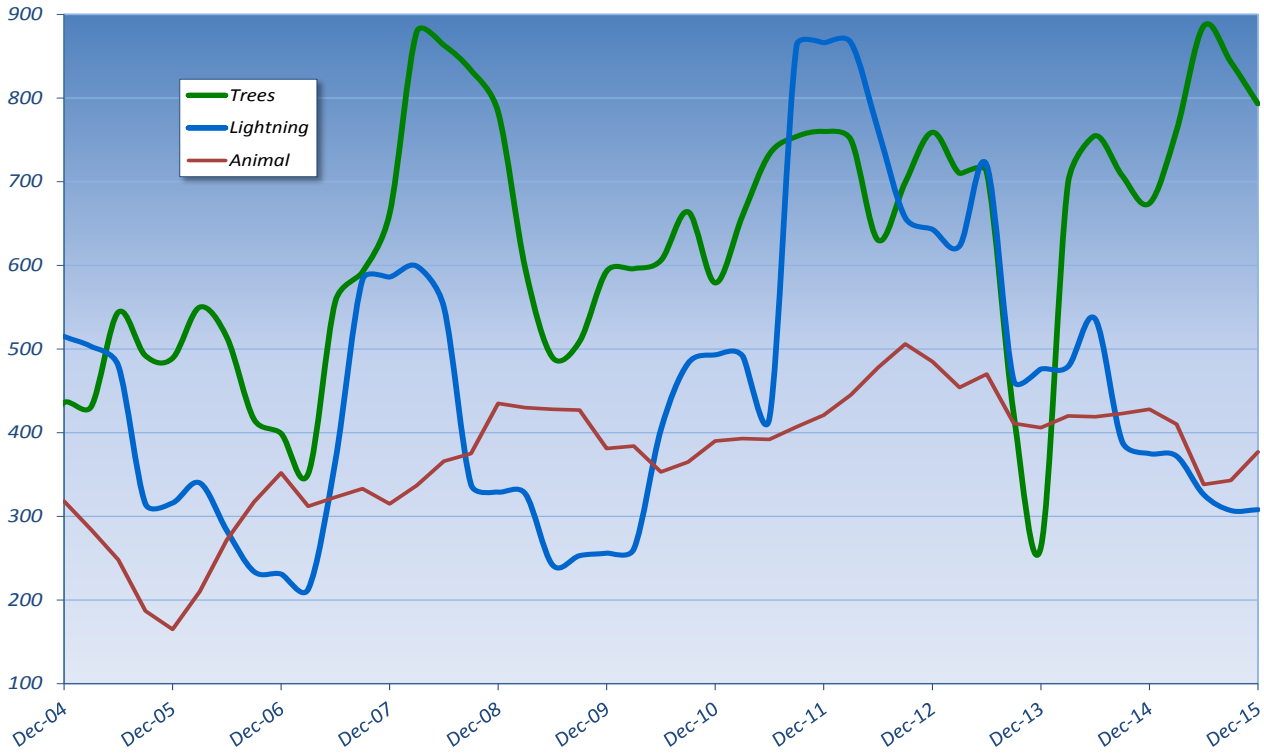


Figure 27 Penn Power Outage Tracking (number of incidents)



Pike County Light & Power Company

Pike has a relatively small operating service area with about 4,429 customers in 44 square miles. Pike County is primarily fed from two 34.5-kilovolt (kV) feeders supplied from New York substations and the eastern portion of Pike County service territory is fed by two 13.2 kV feeders from Matamoras Substation.

In 2015, Pike experienced 1,821 customer interruptions and 367,000 minutes of interruption, as compared to 2014 when customers experienced 9,542 interruptions and 1 million minutes of interruption.

The 2015 reliability metrics exclude the following outage data related to five Commission-approved major events:

- Jan.3, 2015 – Rain & Wind Storm, affecting 1,249 customers.
- Jan. 24, 2015– Tree contact, affecting 2,535 customers.
- April 24, 2015– Non-Company Accident, affecting 2,295 customers.
- Dec. 5, 2015– Equipment failure, affecting 4,540 customers.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Increased from 106 minutes in 2014 to 205 minutes in 2015; and failed to achieve benchmark by 18 percent.

Three-year average: Increased from 166 minutes in 2014 to 173 minutes in 2015; and achieved standard by 10 percent.

SAIDI

Rolling 12-month: Decreased from 224 minutes in 2014 to 78 minutes in 2015; achieved benchmark by 26 percent.

Three-year average: Decreased from 194 minutes in 2014 to 185 minutes in 2015; failed to achieve standard by 43 percent.

SAIFI

Rolling 12-month: Decreased from 2.12 outages in 2014 to 0.38 outages in 2015; achieved benchmark by 38 percent.

Three-year average: Decreased from 1.3 outages in 2014 to 1.24 outages in 2015; failed to achieve standard by 85 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 28 and Figure 29. Pike's CAIDI score is above benchmark. However, Pike's SAIDI and SAIFI scores are below benchmark. Figure 30 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 31 shows the historical trend of the top two main outage causes. The most frequent outage causes were trees and equipment failure.

In early 2014, the PUC began increased monitoring and assessment of Pike's reliability due to poor SAIFI and SAIDI performance. The PUC required Pike to initiate a Corrective Action Plan (CAP).

The five-year CAP includes a provision for a one half mile section of conductor behind the Matamoras substation to be upgraded and re-routed, which will improve backup for the head end portion of radial Line 7 and reduce the exposure of the line by 1.5 miles. In 2013, Pike commenced a mainline parallel path to Line 7 along Old Milford Road from Roberts Lane to approximately Pocono Drive, in order to improve reliability. In 2015, this mainline was continued along Old Milford Road to Whetfield Drive. In 2017, the line will be routed to Route 6 (US 209). From 2018 to 2020, an underground line along US Route 209 will connect the right-of-way (ROW) behind the Matamoras Station to the Old Milford Road mainline, and provide a backup for the radial Line 7 to Milford. The parallel path will provide switchable backup for an area of this circuit where the majority of the interruptions have historically occurred, and the upgraded conductor will improve future capacity and reliability.

In 2015, Pike continued implementing the Reliability Action Plan it initiated in 2014. The Company expanded the use of smart fault indicators ("SFI"). These devices allow for automatic and remote notification of any power disturbances in coverage zones, such as transient and permanent faults. SFIs significantly reduce outage response time by directly identifying faulted zones, thereby directly reducing circuit patrol times and customer outage durations. Pike also completed the second phase of a reliability improvement project by installing an additional mainline circuit feed on Old Milford Road. In 2015, Pike coordinated the removal of many danger trees previously identified along Route 209, an area that has historically been a problem due to tree contact related outages.

Pike's SAIFI and SAIDI performance has improved this past year, as Pike has achieved benchmark performance for both SAIDI and SAIFI. However, Pike's CAIDI performance

regressed in 2015 and it will be a challenge for Pike to substantially lower CAIDI until the CAP is completed along with aggressive and effective tree management.

Figure 28 Pike County CAIDI (minutes)

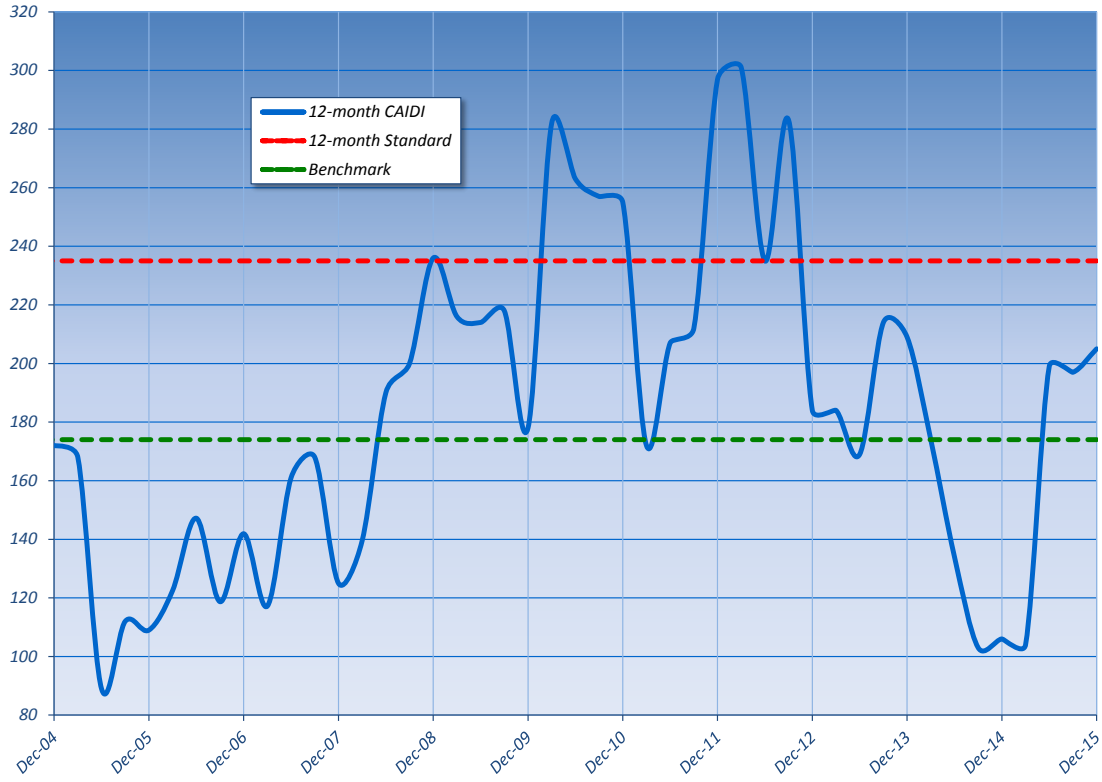


Figure 29 Pike County SAIFI (interruptions per customer)

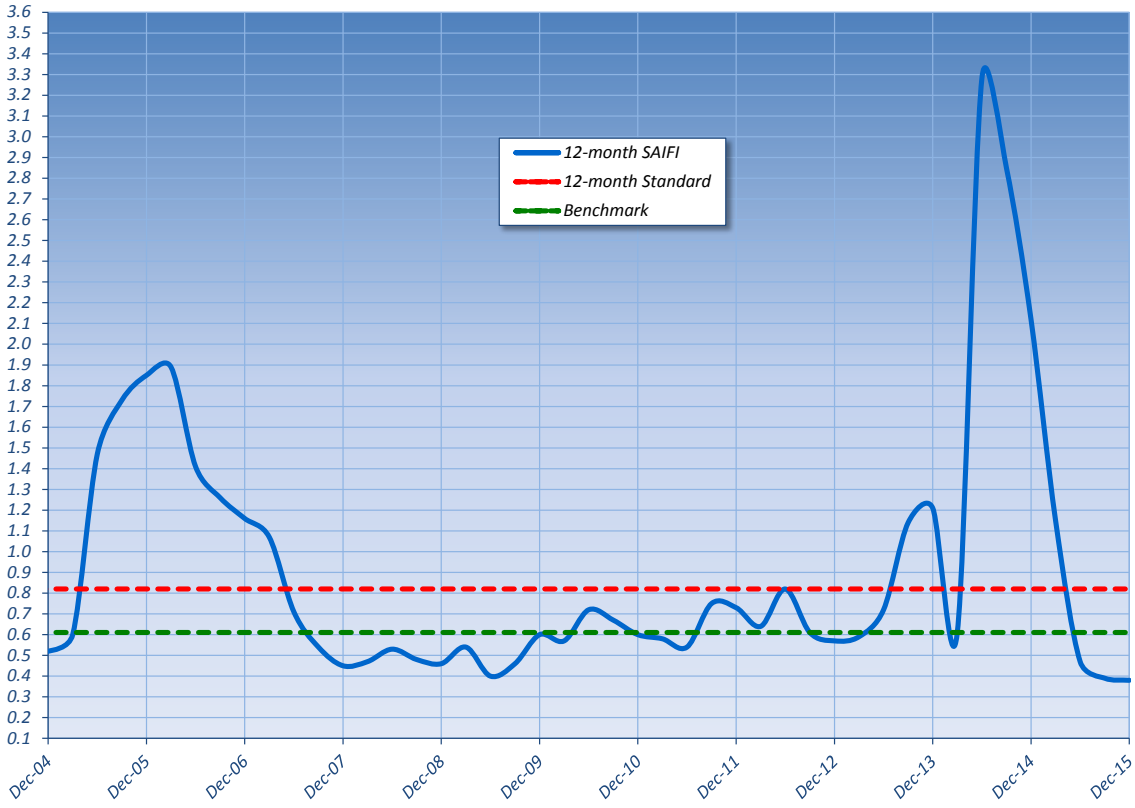


Figure 30 Pike County Outage Causes (percent of total outages)

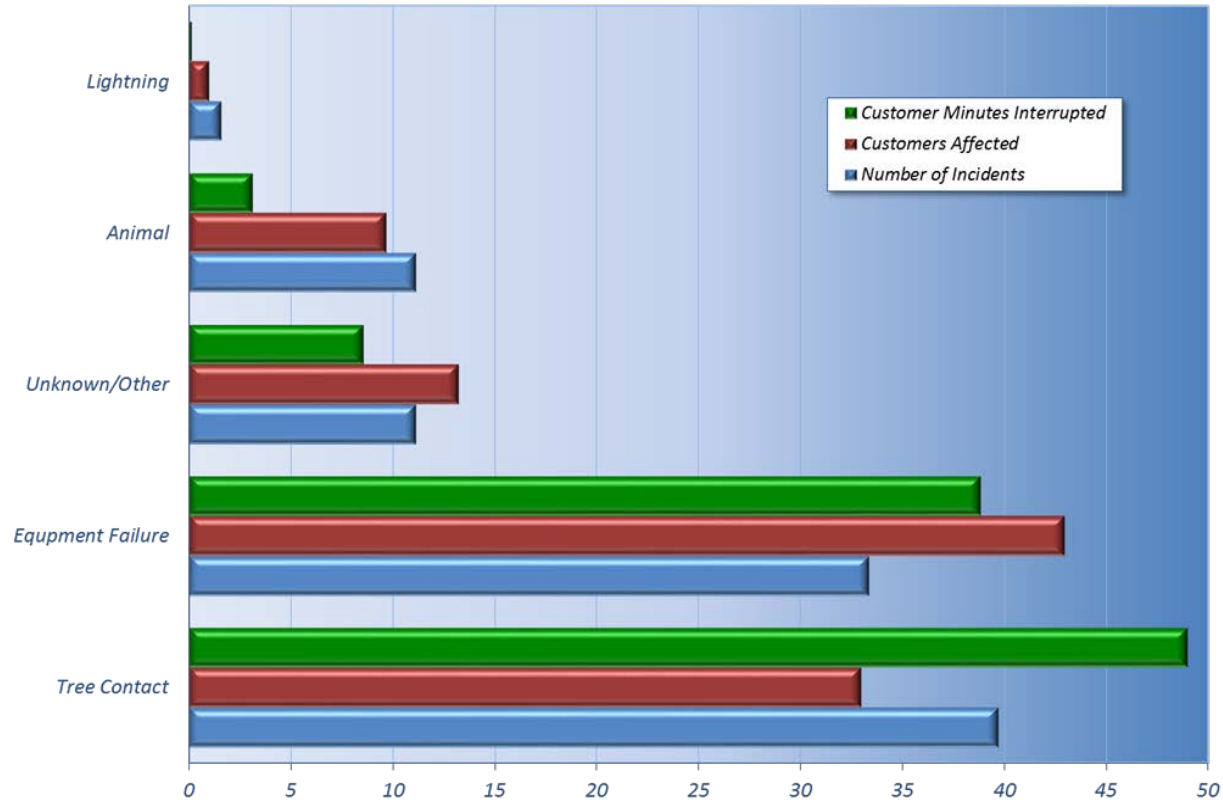
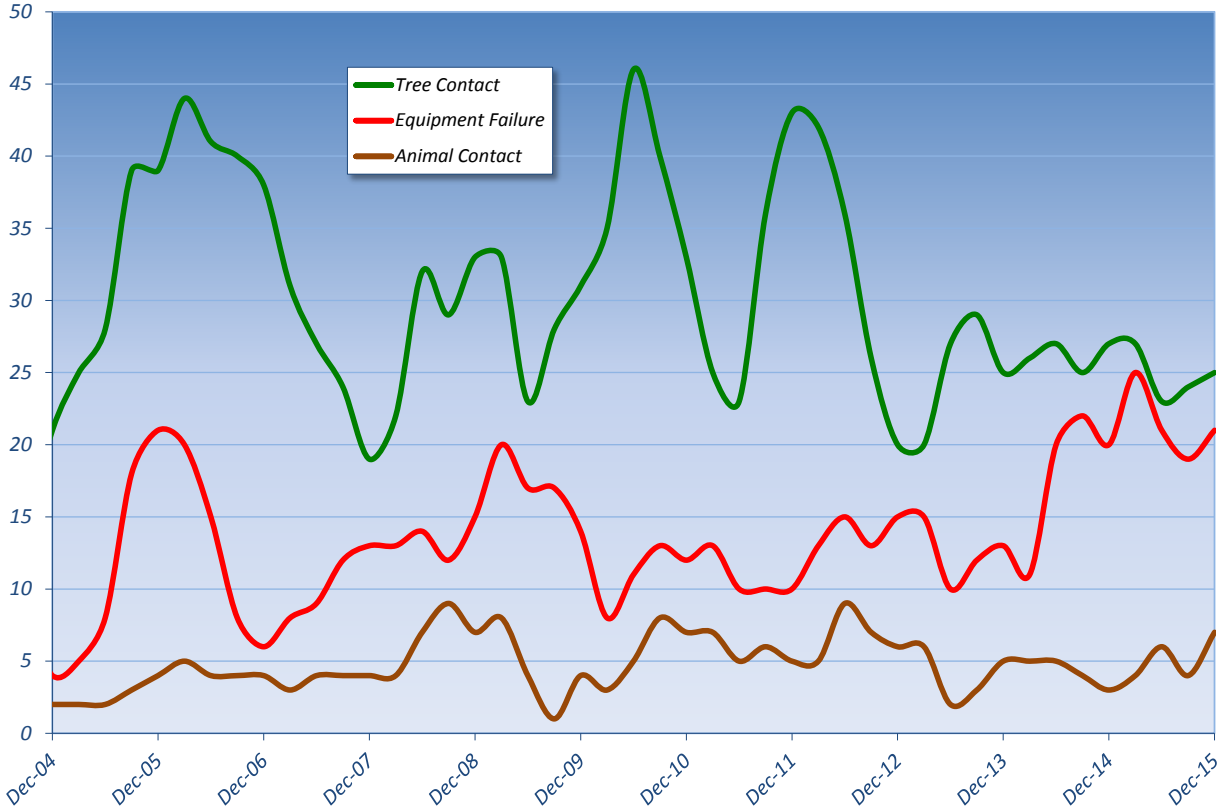


Figure 31 Pike County Outage Tracking (number of incidents)



PPL Electric Utilities Corporation

PPL has a service territory of about 10,000 square miles and serves 1.4 million customers. In 2015, PPL experienced 1 million customer interruptions and 118.5 million minutes of interruption, compared to 2014, when customers experienced 1.28 million customer interruptions and 232.2 million minutes of interruption.

PPL had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 180 minutes in 2014 to 118 minutes in 2015; and achieved benchmark by 19 percent.

Three-year average: Decreased from 147 minutes in 2014 to 135 minutes in 2015; achieved standard by 15 percent.

SAIDI

Rolling 12-month: Decreased from 165 minutes in 2014 to 84 minutes in 2015; and achieved benchmark by 41 percent.

Three-year average: Decreased from 139 minutes in 2014 to 113 minutes in 2015; achieved standard by 35 percent.

SAIFI

Rolling 12-month: Decreased from 0.92 outages in 2014 to 0.82 outages in 2015; achieved benchmark by 24 percent.

Three-year average: Decreased from 0.94 outages in 2014 to 0.82 outages in 2015; achieved benchmark by 24 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 32 and Figure 33. The recent trend is that outages are less frequent and the duration is decreasing. Figure 34 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 35 shows a historical trend of the top three main outage causes. The most frequent outage causes were trees and equipment failure.

Since trees are generally the most common cause of power outages, PPL's vegetation management program utilizes industry best practices and seeks to improve the reliability of the electric transmission and distribution systems by preventing outages from vegetation located on easements and rights-of-way (ROW), and minimizing outages from vegetation located adjacent to ROW. Trees are generally the most common cause of storm-related power outages, so vegetation management is critical to keeping the system reliable.

In 2013, PPL launched ground to sky trimming on multi-phase circuits, and accelerated its efforts to identify and remove trees outside of the ROW that have the potential to cause outages. These efforts, combined with several years of more comprehensive tree trimming on higher voltage lines, have resulted in a 25 percent reduction in the number of tree-related outages in 2015, compared to the average of the previous 10 years. In 2016, these initiatives continue with the expectation of further reductions in vegetation-related service interruptions

In 2015, PPL began full implementation of a 10- year plan to replace existing three-phase hydraulic reclosers with communication-enabled vacuum circuit reclosers. This allows for remote operation of these devices, in addition to remote monitoring to facilitate the move toward condition based maintenance. These devices play a crucial role in reducing the number of customers interrupted by an outage and allow a majority of customers to be back in service before permanent repairs can be made.

In 2016, PPL Electric is implementing three-phase fusing and a pilot of single-phase tripping on three-phase lines. Currently, when a three-phase Smart Grid device trips, or goes out of service due to a fault, all three phases trip. This technology will allow a single-phase fault to only impact customers on that phase, which reduces permanent and momentary outages for the other two-thirds of the customers on that line.

PPL Electric recently completed a system wide rollout of FISR (Fault Isolation and Service Restoration) technology. FISR identifies faulted sections and quickly develops an optimized restoration plan, then automatically executes that plan. Customers typically can be restored within five minutes from the start of the outage. This milestone is an industry first and looks to significantly reduce overall outage durations. In addition, further improvements have been made in the technology that analyzes the severity and location of a fault, enabling field forces to more rapidly respond to the trouble location.

In 2015 PPL was considered a benchmark performer in all quarters except for second quarter CAIDI reliability performance. PPL continues to proactively improve grid resiliency, reliability, sustainability, and storm hardening.

Figure 32 PPL CAIDI (minutes)

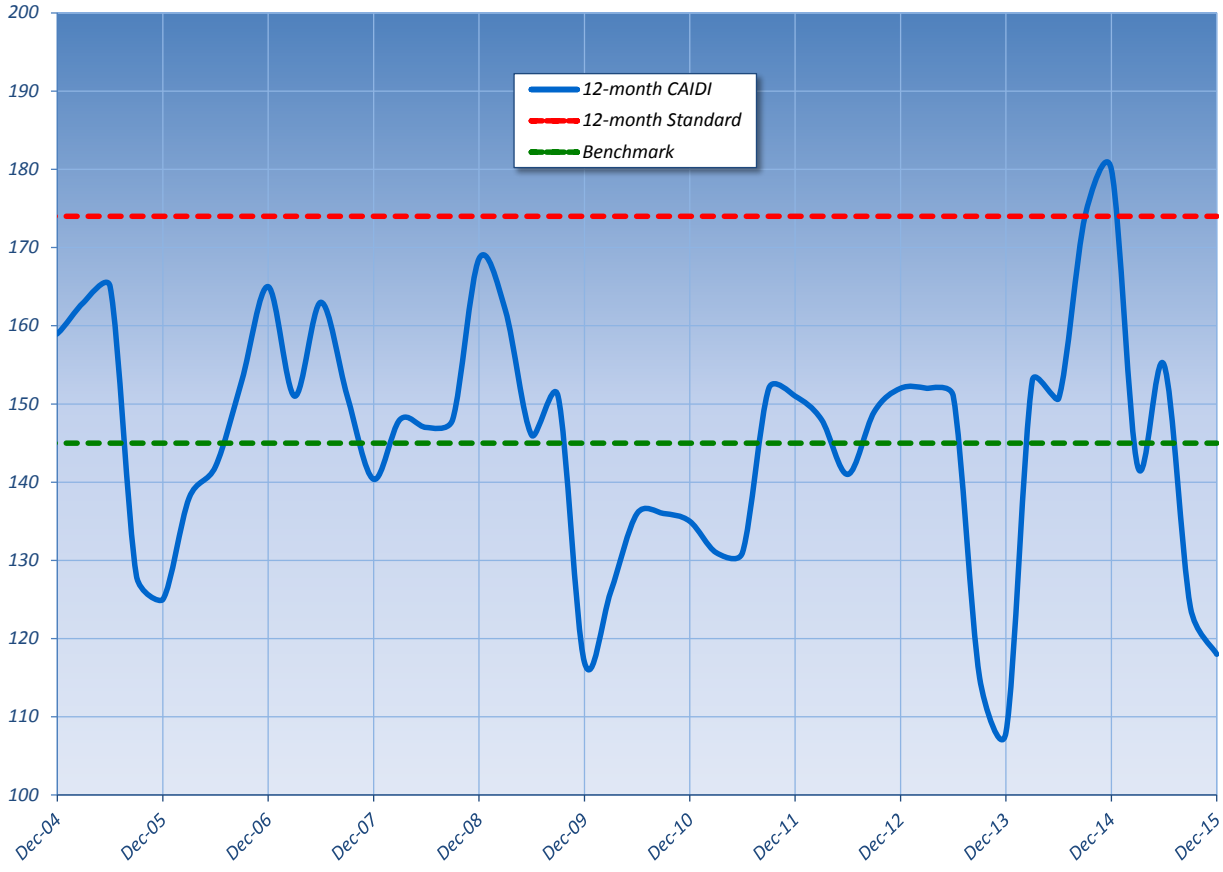


Figure 33 PPL SAIFI (interruptions per customer)

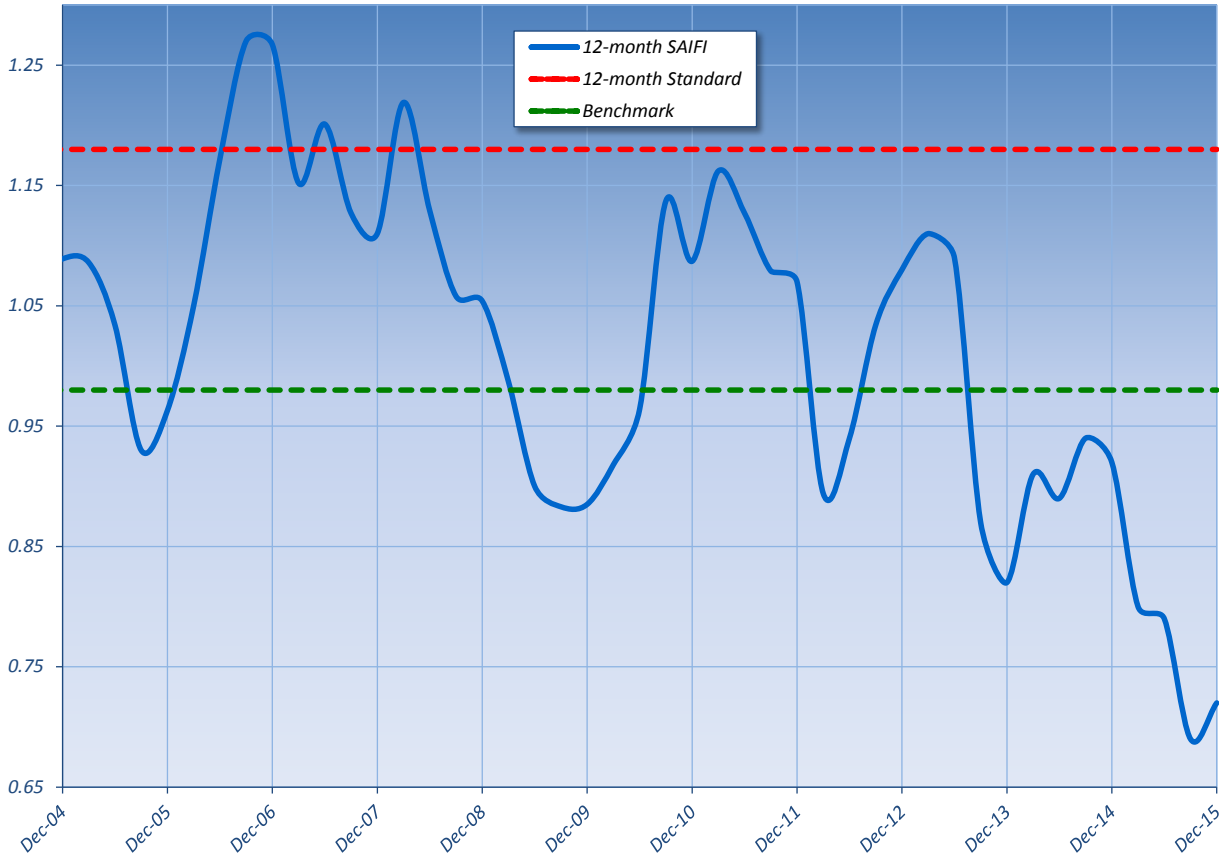


Figure 34 PPL Outage Causes (percent of total outages)

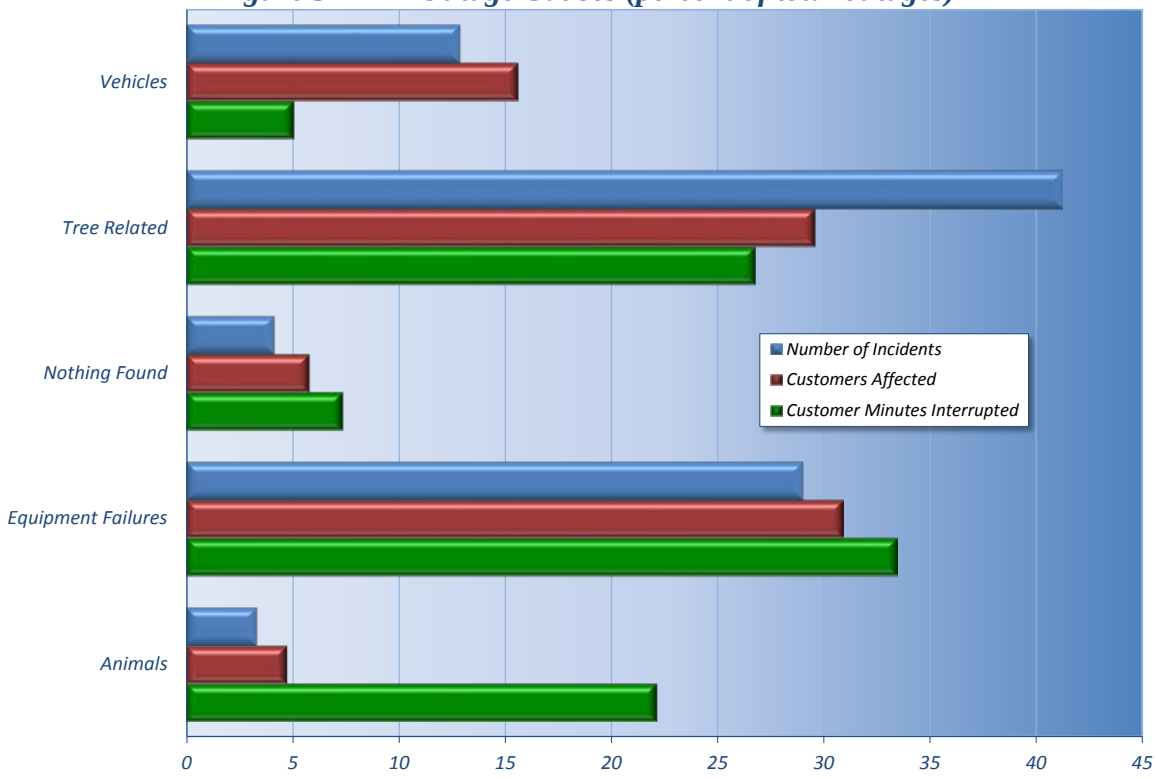
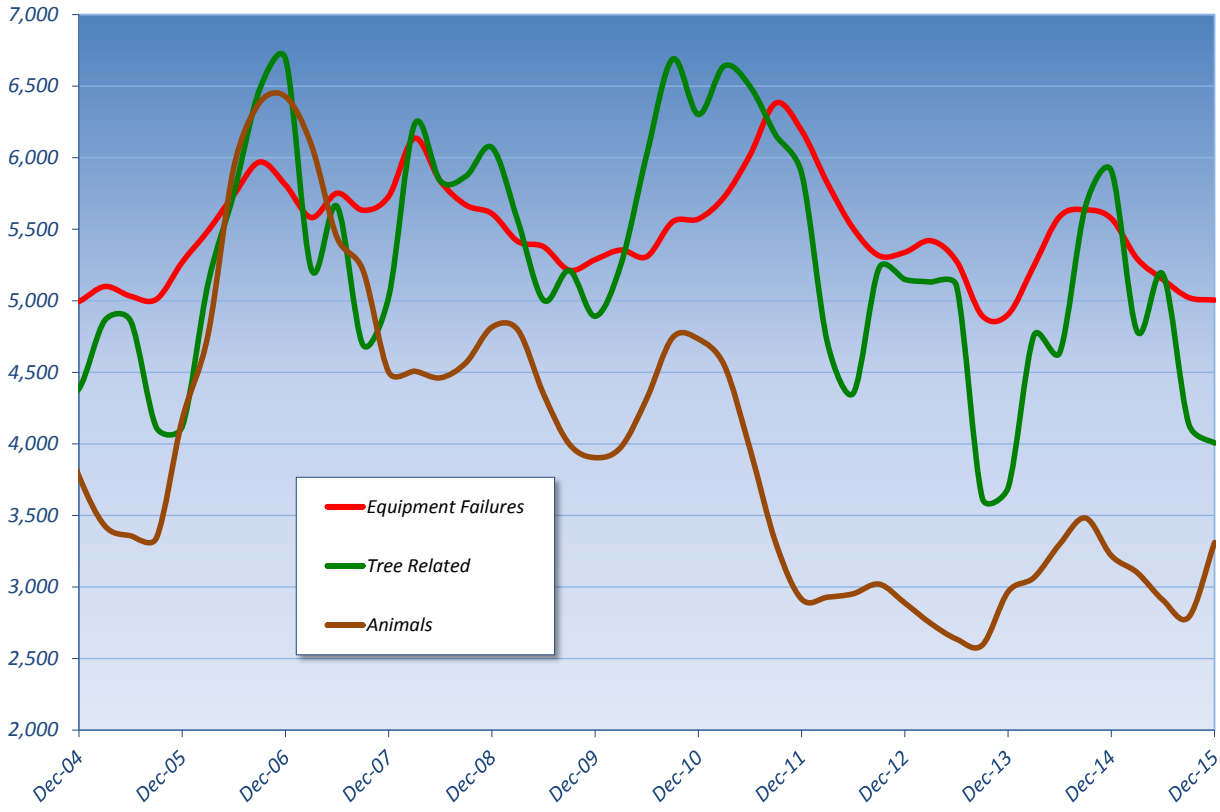


Figure 35 PPL Outage Tracking (number of incidents)



UGI Utilities Inc.

UGI has a service territory of about 410 square miles and serves about 61,200 customers. In 2015, UGI experienced 24,122 customer interruptions and 2.48 million minutes of interruption, compared to 2014, when customers experienced 26,885 customer interruptions and 3.86 million minutes of interruption.

UGI had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Decreased from 144 minutes in 2014 to 103 minutes in 2015; achieved benchmark by 39 percent.

Three-year average: Decreased from 125 minutes in 2014 to 119 minutes in 2015; achieved standard by 36 percent.

SAIDI

Rolling 12-month: Decreased from 63 minutes in 2014 to 41 minutes in 2015; achieved benchmark by 71 percent.

Three-year average: Decreased from 67 minutes in 2014 to 63 minutes in 2015; achieved standard by 63 percent.

SAIFI

Rolling 12-month: Decreased from 0.44 outages in 2014 to 0.40 outages in 2015; achieved benchmark by 52 percent.

Three-year average: Decreased from 0.55 outages in 2014 to 0.54 outages in 2015; achieved standard by 41 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 36 and Figure 37. Figure 38 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 39 shows the historical trend of main outage causes. The most frequent outage causes were animals and equipment failure, which are trending lower.

UGI initiated a Distribution Automation Pilot Project in 2015 and continues to work toward implementation in 2016. The goal is to extend remote monitoring and control capability via wireless communication links to field devices such as 3-phase reclosers and sectionalizers. Remote management of these devices, by UGI System Operators, is expected to significantly reduce switching times to sectionalize and/or restore customers impacted by outages. The initial phase of the project will focus on three OCR's spread throughout the service territory. Plans for 2017 include adding communication functionality to all 3-phase devices on a selected substation.

UGI initiated a Danger Tree Mitigation Program to identify and address off right of way trees that pose a threat to its transmission and distribution lines. This program involves line clearance crews identifying and addressing such trees. In addition UGI continues the practice of "ground to sky" trimming on multi-phase circuits and on single phase lines where appropriate.

UGI also initiated a Line Segmentation Program that focuses on identifying locations to install fuses, disconnects, and other devices to limit the number customers affected when line damage occurs. UGI notes this will also enable field personnel to restore service to customers on unaffected line segments through switching before repairs are made.
UGI's Line Relocations Program is designed to move distribution lines from troublesome off road locations to road side rights of way. UGI expects that relocating the lines to the road side will enable quicker patrolling as well as making repairs quicker and safer because mechanized aerial equipment can be used as opposed to climbing the poles to do repair work.

In the last 3-3/4 years, UGI achieved benchmark performance in every category and this positive performance is expected to continue in 2016.

Figure 36 UGI CAIDI (minutes)

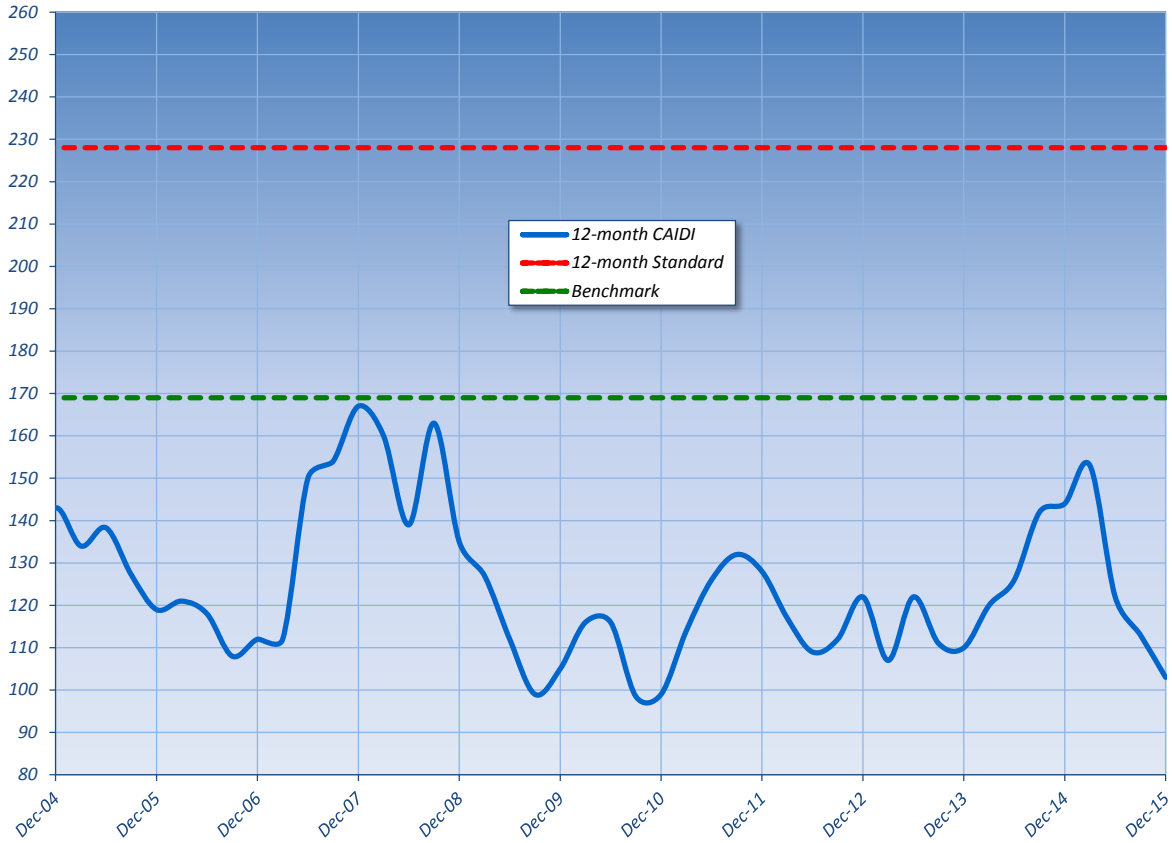


Figure 37 UGI SAIFI (interruptions per customer)

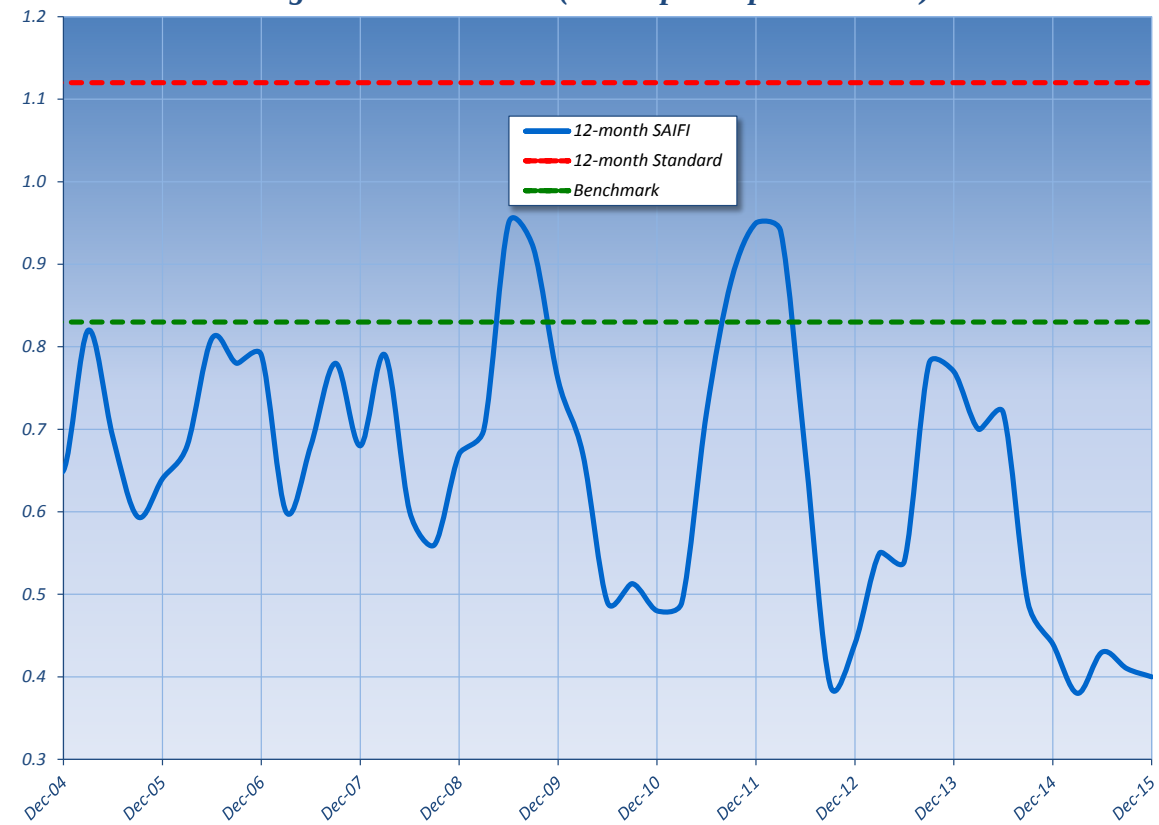


Figure 38 UGI Outage Causes (percent of total outages)

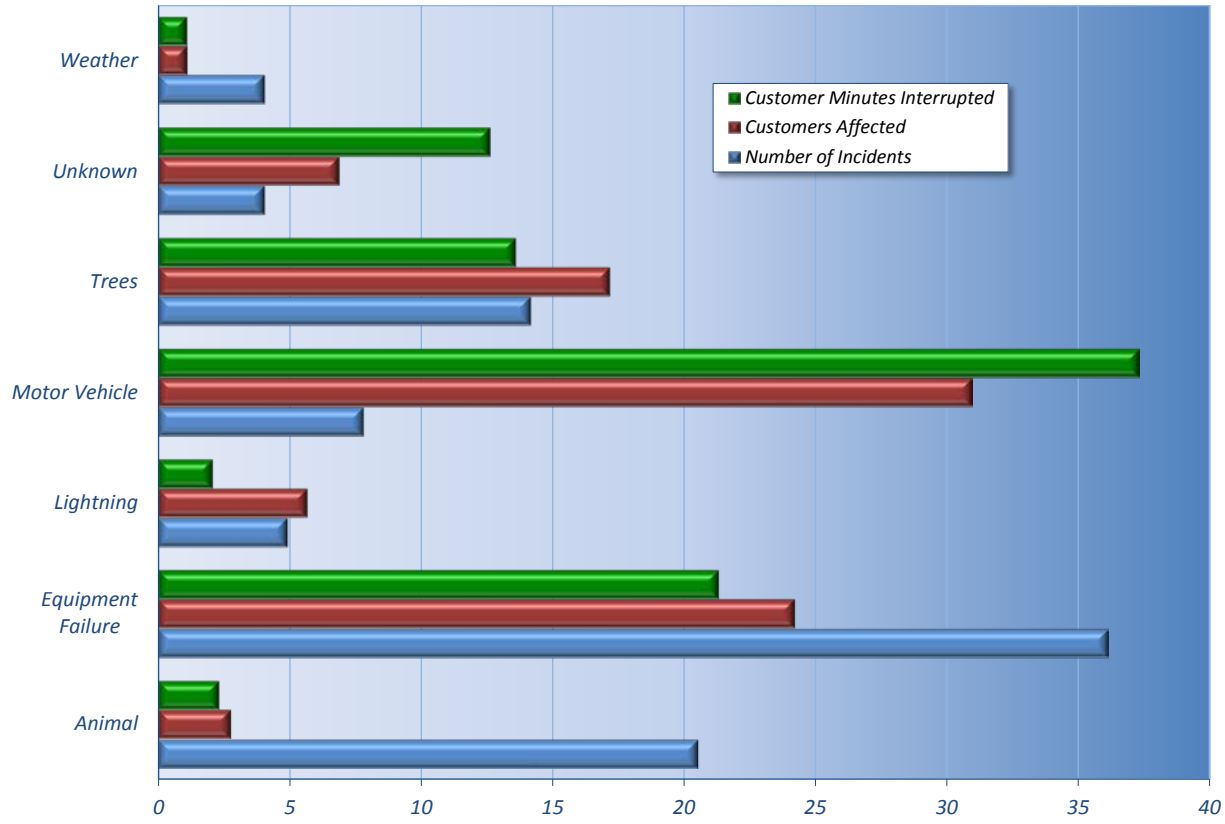
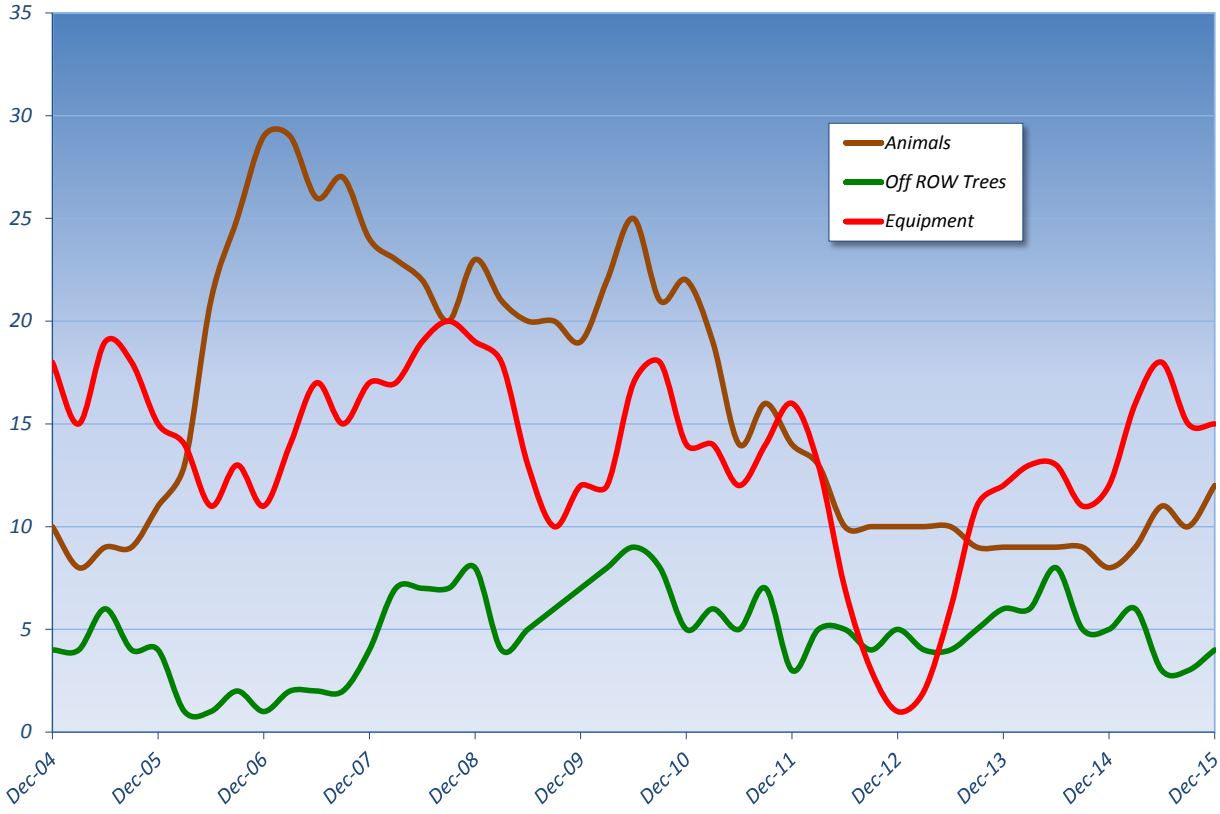


Figure 39 UGI Outage Tracking (number of incidents)



Wellsboro Electric Company

Wellsboro has a service territory of about 178 square miles and serves about 6,272 customers. In 2015, Wellsboro experienced 5,209 customer interruptions and 496,803 minutes of interruption, compared to 2014, when customers experienced 3,828 customer interruptions and 367,505 minutes of interruption.

The 2015 reliability metrics exclude the following outage data related to two Commission approved major events:

- July 27, 2015 – Dump truck caught phone wire, affecting 6,020 customers.
- Sept. 8, 2015 - Loss of FirstEnergy Transmission line, affecting 6,101 customers.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Increased from 75 minutes in 2014 to 76 minutes in 2015; achieved benchmark by 39 percent.

Three-year average: Increased slightly from 70 minutes in 2014 to 74 minutes in 2015 and achieved standard by 46 percent.

SAIDI

Rolling 12-month: Increased from 57 minutes in 2014 to 81 minutes in 2015; achieved benchmark by 47 percent.

Three-year average: Increased from 52 minutes in 2014 to 59 minutes in 2015; achieved standard by 68 percent.

SAIFI

Rolling 12-month: Increased from 0.77 outages in 2014 to 1.06 outages in 2015; achieved benchmark by 14 percent.

Three-year average: Increased from 0.76 outages in 2014 to 0.80 outages in 2015 and achieved standard by 41 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 40 and Figure 41. Figure 42 shows the distribution of outage causes as a percentage of total outages. Figure 43 shows the historical trend of main outage causes. The most frequent outage causes were equipment failure and animals, which are trending higher.

Wellsboro is continuing its programs to maintain electric reliability. Wellsboro continues to install overhead and underground fault indicators on various parts of the system to enable faster fault location. Wellsboro is also continuing installation of AMI advanced meters. Approximately 93% of the installations are completed. Wellsboro has contracted with a tree removal company to perform a complete trimming and removal of danger trees on sixty miles of its distribution system.

In the last three and a half years, Wellsboro achieved benchmark performance in every category and this positive performance is expected to continue in 2016.

Figure 40 Wellsboro CAIDI (minutes)

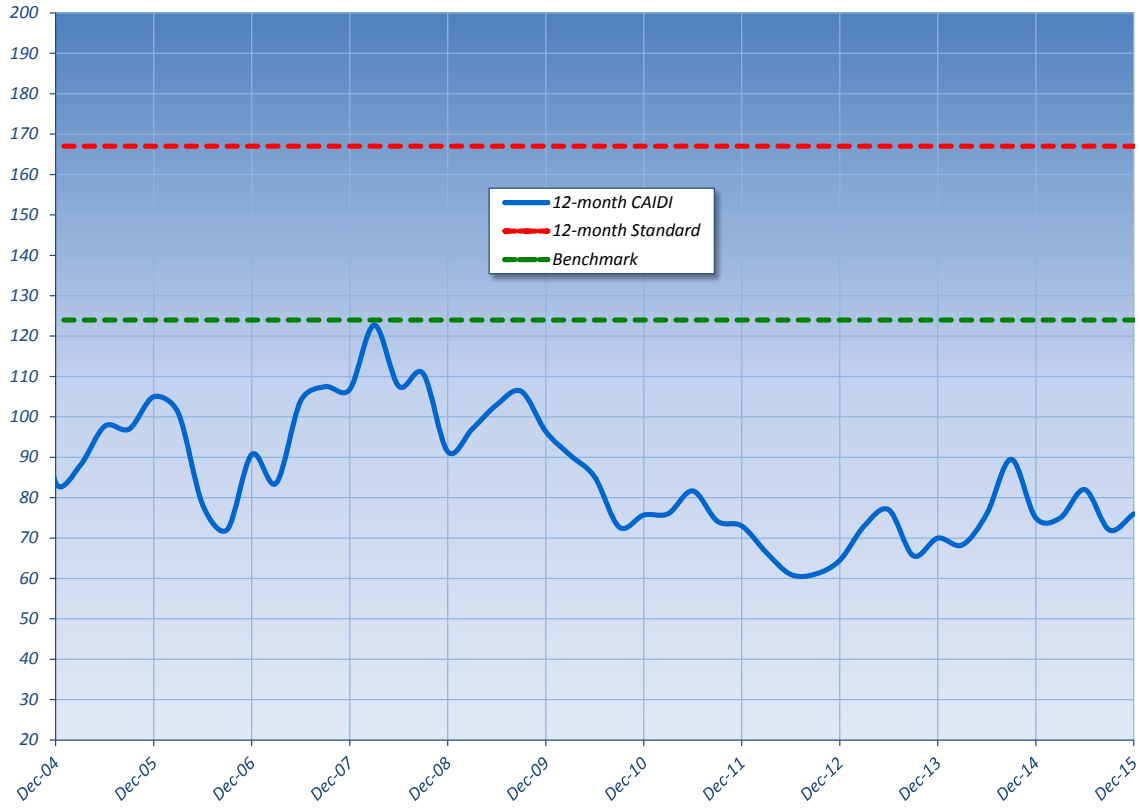


Figure 41 Wellsboro SAIFI (interruptions per customer)

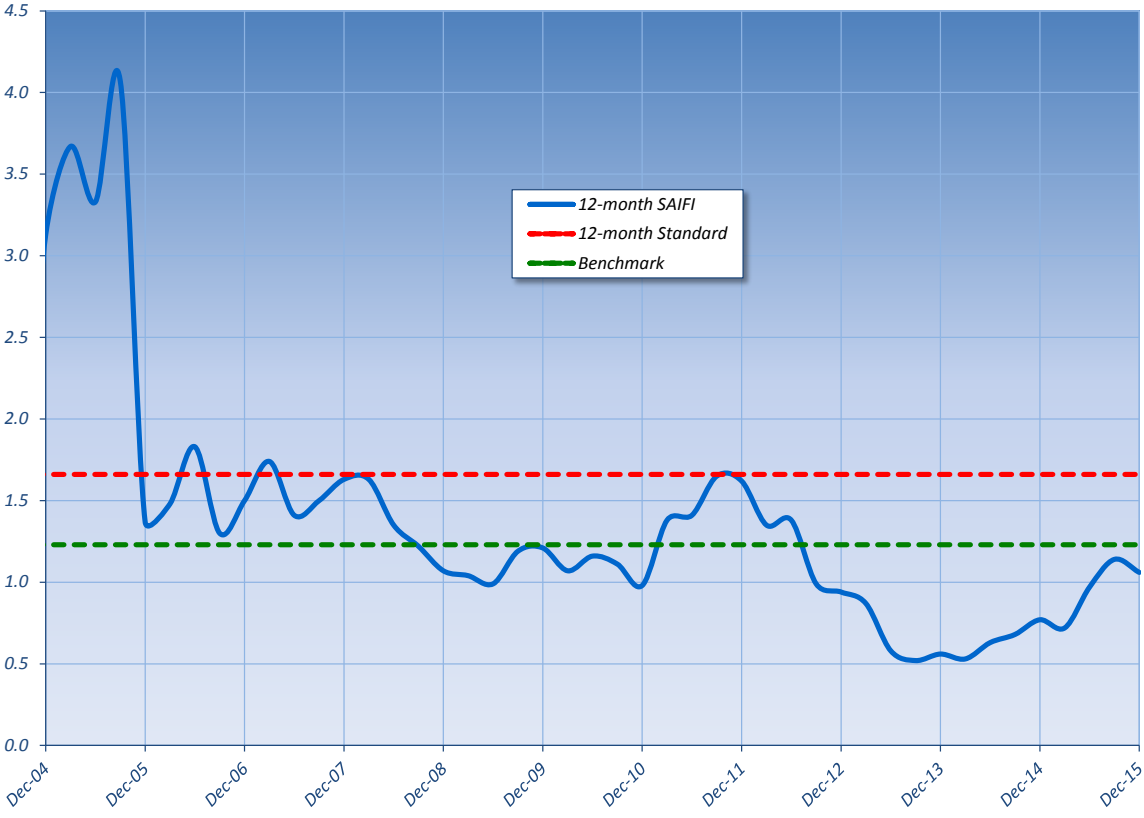


Figure 42 Wellsboro Outage Causes (percent of total outages)

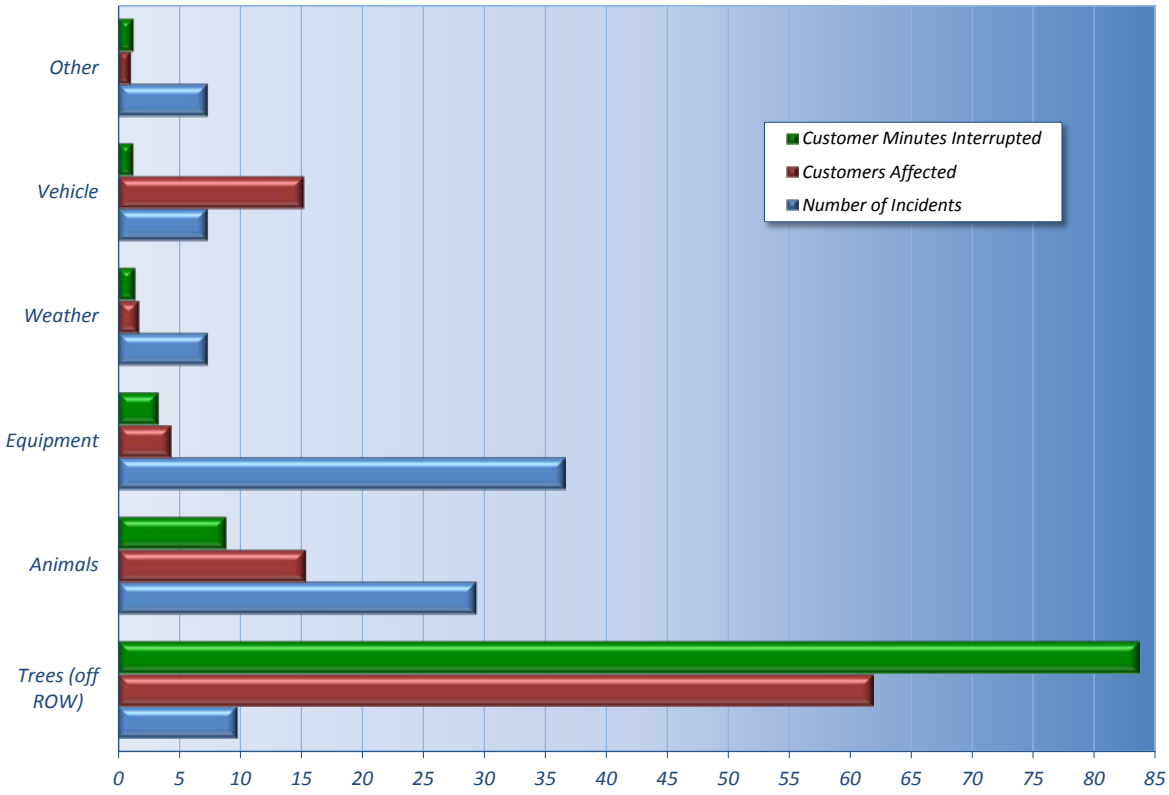
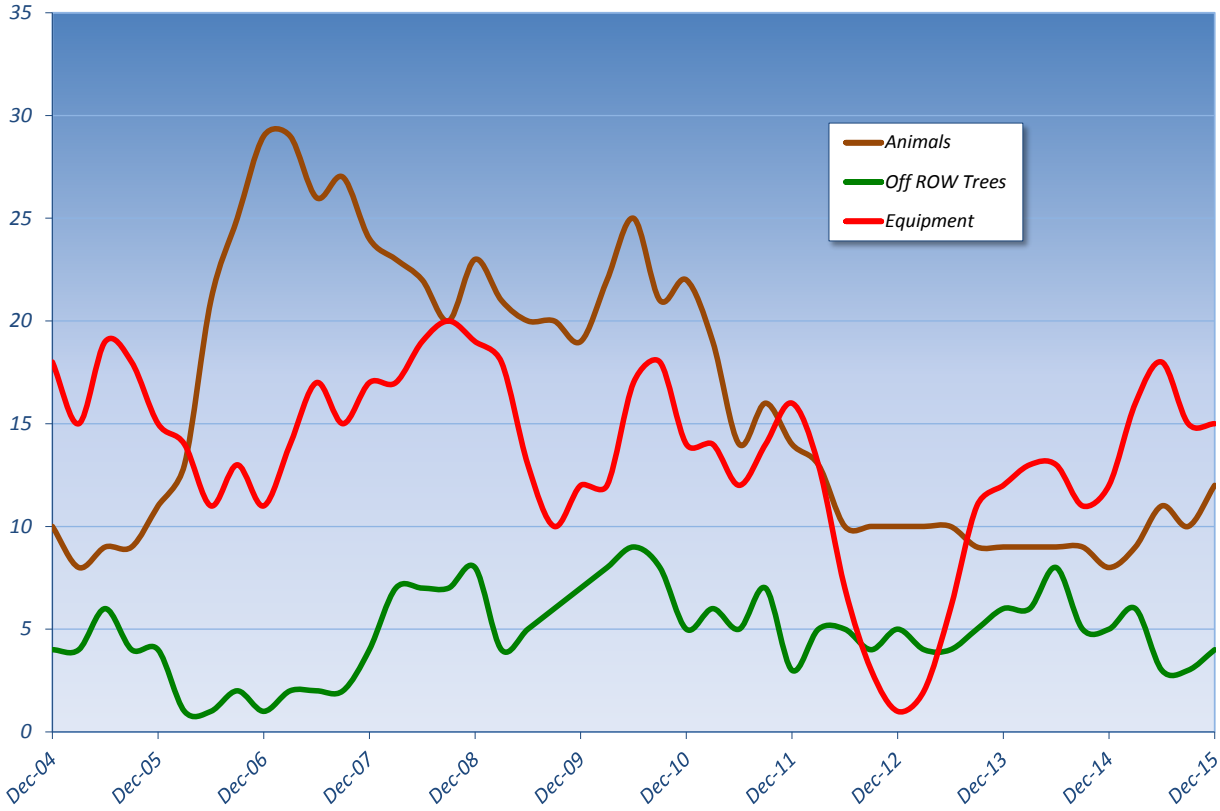


Figure 43 Wellsboro Outage Tracking (number of incidents)



West Penn Power Company

West Penn has a service territory of about 10,400 square miles and serves about 710,000 customers. In 2015, West Penn experienced 827,613 customer interruptions and 3.4 million minutes of interruption, compared to 2014, when customers experienced 722,597 customer interruptions and 2.6 million minutes of interruption.

West Penn had no major events in 2015.

CAIDI/SAIDI/SAIFI Evaluation

CAIDI

Rolling 12-month: Increased from 137 minutes in 2014 to 154 minutes in 2015; and achieved benchmark by 9 percent.

Three-year average: Decreased from 182 minutes in 2014 to 158 minutes in 2015; and achieved standard by 16 percent.

SAIDI

Rolling 12-month: Increased from 139 minutes in 2014 to 179 minutes in 2015; and achieved benchmark.

Three-year average: Decreased from 201 minutes in 2014 to 180 minutes in 2015; and achieved standard by 17 percent.

SAIFI

Rolling 12-month: Increased from 1.02 outages in 2014 to 1.17 outages in 2015; and failed to achieve benchmark by 11 percent.

Three-year average: Increased from 1.10 outages in 2014 to 1.13 outages in 2015; and achieved standard by 2 percent.

Historical 12-month CAIDI and SAIFI trends are shown on Figure 44 and Figure 45. Figure 46 shows the distribution of outage causes that occurred during 2015 as a percentage of total outages. Figure 47 shows the historical trend of the main outage causes. The top two known causes were trees and equipment failure.

West Penn's Long Term Infrastructure Improvement Plan (LTIIP) was approved on Feb 11, 2016.[24] West Penn's LTIIP is designed to help improve storm hardening, system resiliency, and reliability. Since implementing its new, more aggressive vegetation management program in 2011, West Penn has experienced positive improvements in overall reliability. In addition to normal on-cycle tree trimming, West Penn has introduced a program to accelerate the mitigation of trees subject to damage by the Emerald Ash Borer from its current five years to a new three-year completion timeline for the sub-transmission system and the zone two (three phase lines after the first safety device downstream of the substation) portion of its distribution system.

[24] Order entered on Feb 11, 2016 at Docket No. P-2015-2508948.

The PUC has also been performing extra monitoring of West Penn's reliability quality system and Reliability Improvement Plan (RIP) as a result of a Commission Motion regarding FirstEnergy's Implementation Plan to the findings of the Commission's Focused Management and Operations Audit[25]

West Penn's RIP includes a sub-transmission modernization and automation program to install upgraded SCADA controlled reclosers, switches, and automatic air switches. This will provide enhanced sectionalizing for larger blocks of customers at the substation source level. The SCADA controlled switches will also allow for remote switching to sectionalize and restore large blocks of customers more quickly, leading to reduced outage durations. In 2016, West Penn will install forty-five SCADA controlled reclosers and switches at its substations.

West Penn also started adding SCADA control to electronic reclosers in select substations with existing SCADA capabilities; this will provide additional monitoring and also allow for remote switching to restore customers at the circuit level more quickly. In 2016, West Penn plans to replace a total of twenty-five breakers with electronic reclosers at five substations.

West Penn will continue the underground getaway replacement program for select underground substation exits. This is the cable that leads out of the substation to the overhead lines. Specifically, this program will target underground getaways that were installed prior to 1988 and are known to be prone to failure. In 2016, West Penn will replace underground getaways at three substations, which will provide positive impact to nine circuits.

In the last one and one-quarter years, West Penn has achieved benchmark CAIDI and SAIDI performance. The Commission expects West Penn to be a benchmark performer in all reliability performance categories in 2016 as they continue to implement their RIP.

[25] Final Order entered Nov 5, 2015 at Docket Nos. D-2013-2365991, D-2013-2365992, D-2013-2365993, and D 2013-2365994.

Figure 44 West Penn CAIDI (minutes)

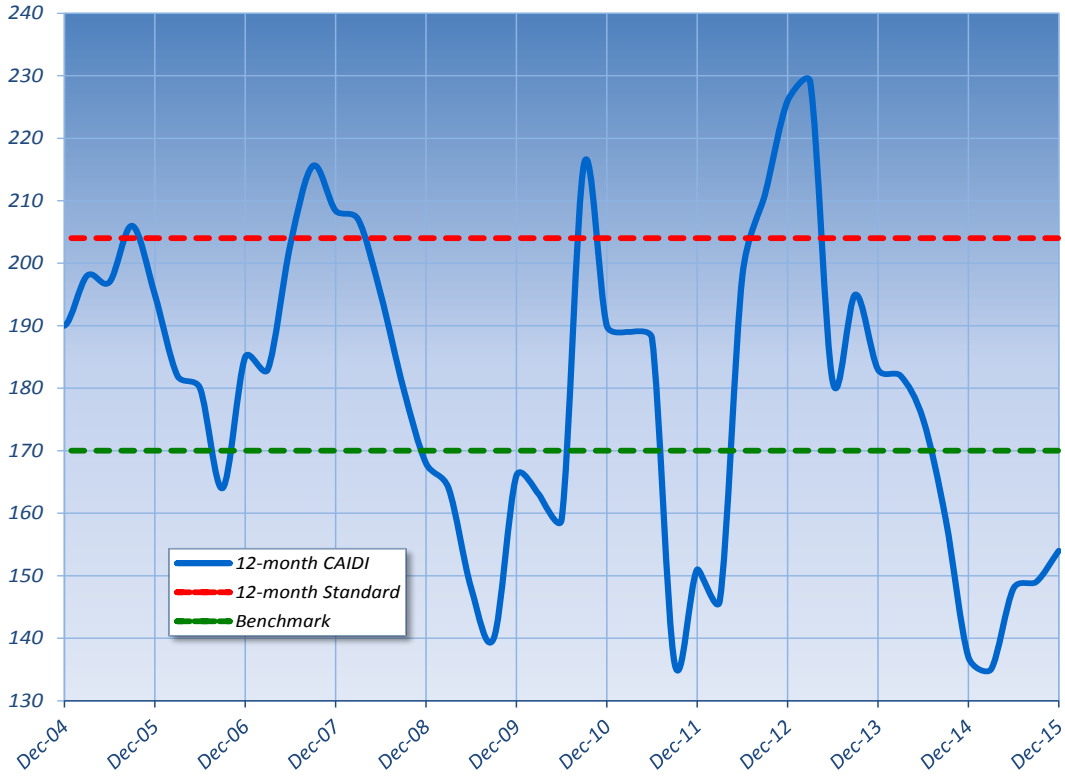


Figure 45 West Penn SAIFI (interruptions per customer)

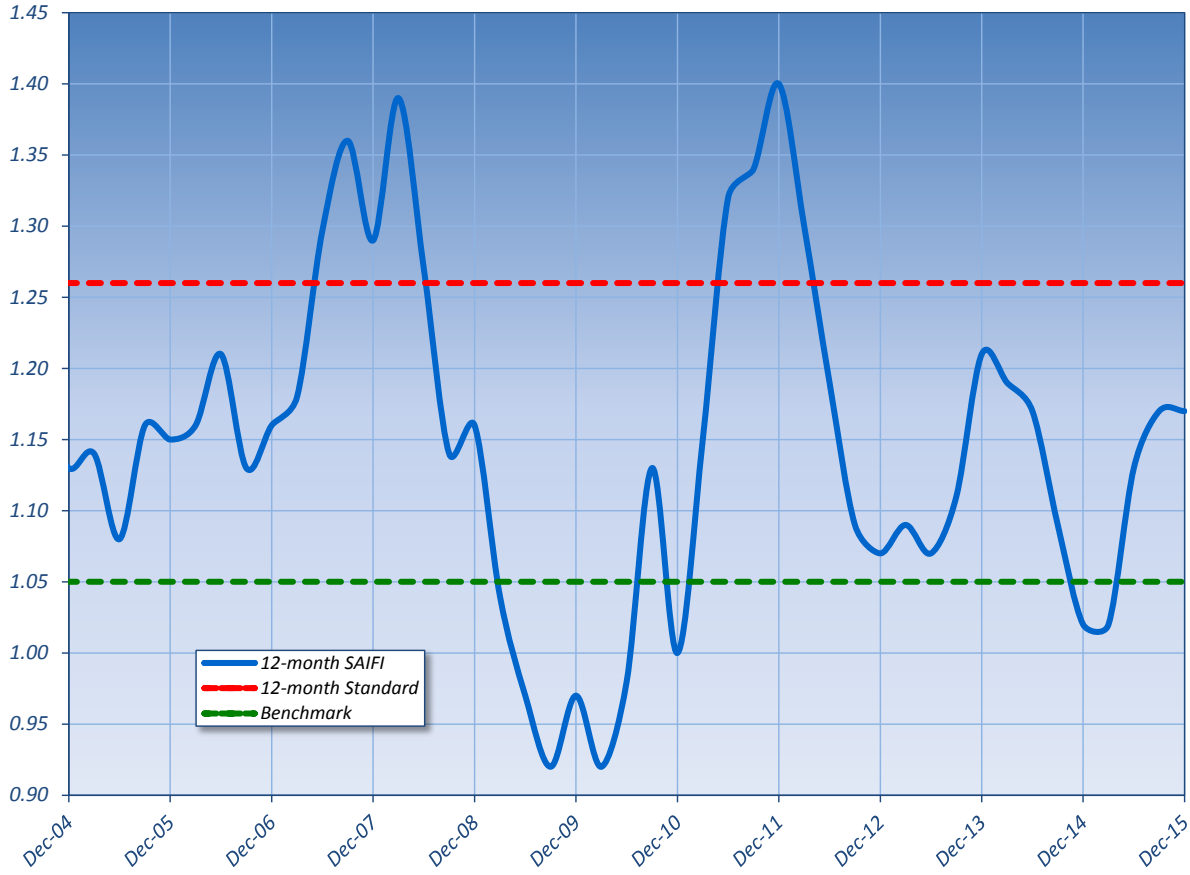


Figure 46 West Penn Outage Causes (percent of total outages)

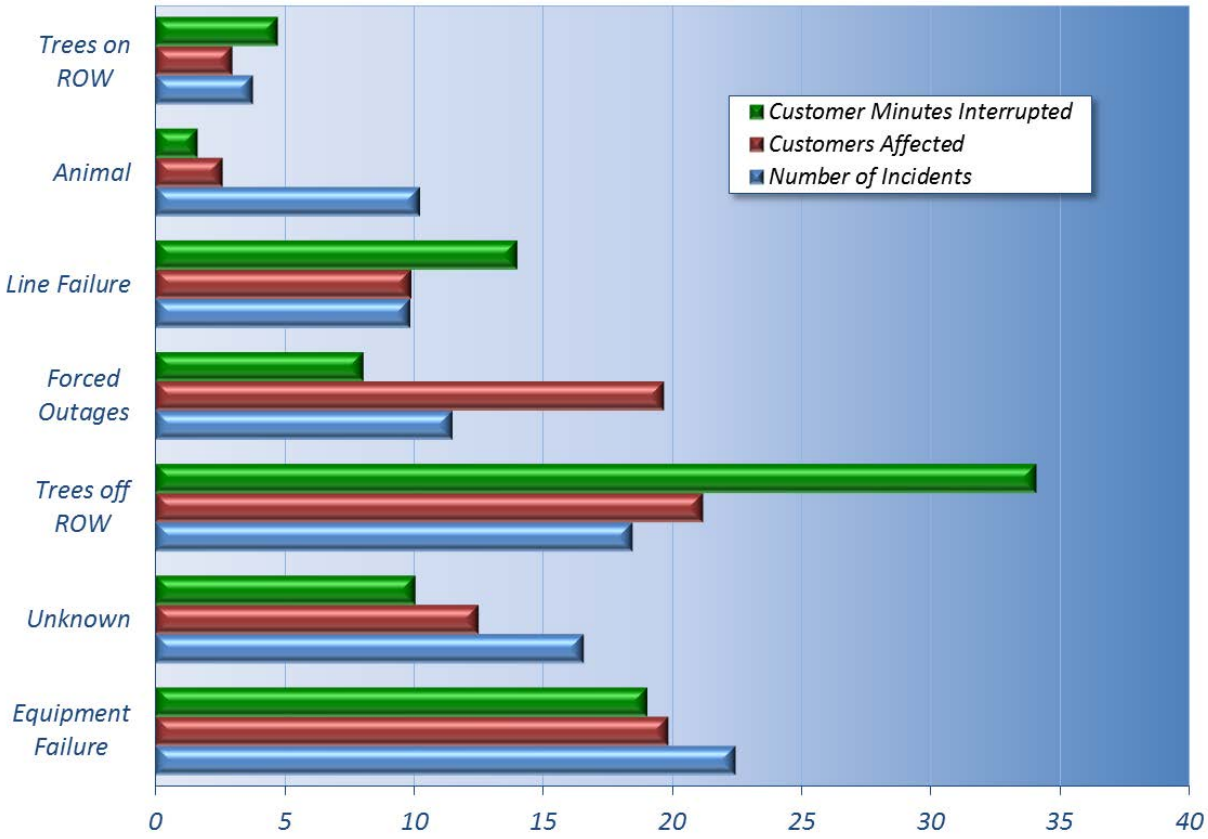
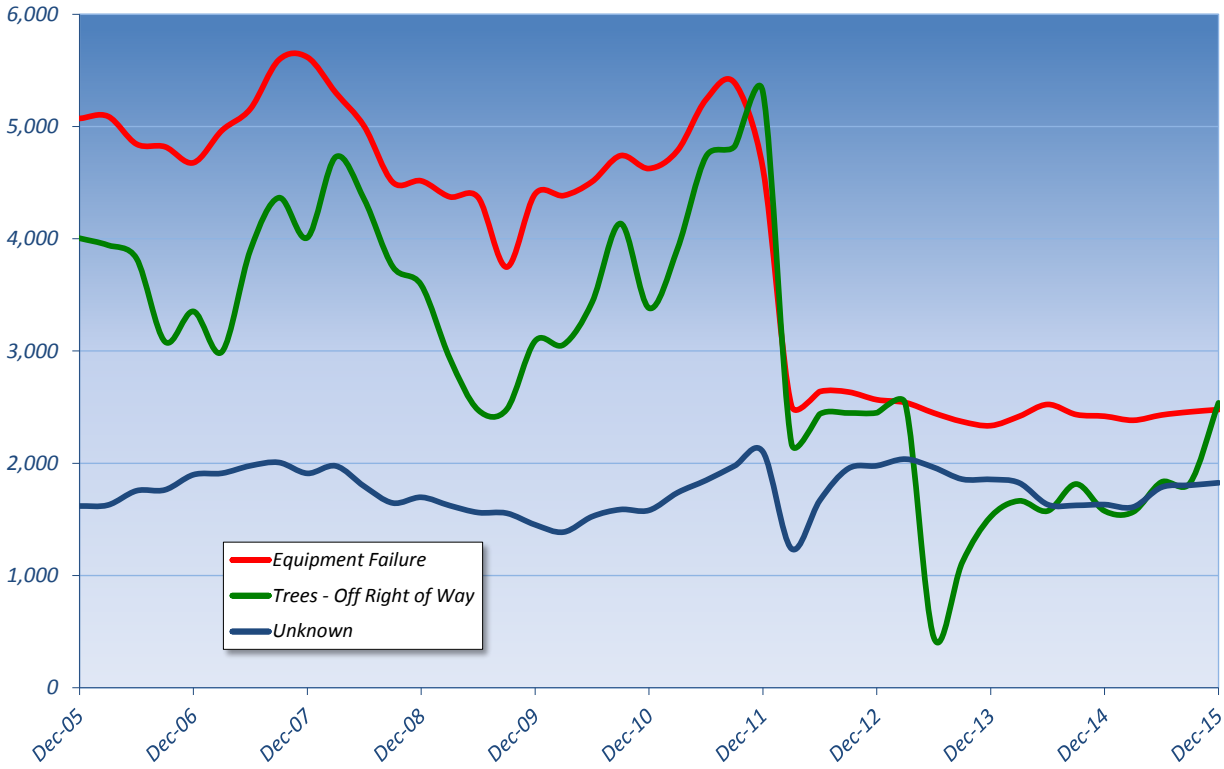


Figure 47 West Penn Outage Tracking (number of incidents)



Section 5– Conclusion

The Electricity Generation Customer Choice and Competition Act of 1996 mandates that the Commission ensure that levels of reliability that existed prior to the restructuring of the electric utility industry continue in the new competitive markets. In response, the PUC adopted reporting requirements designed to ensure the continuing safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth. The Commission also established reliability benchmarks and standards with which to measure the performance of each EDC, and standards for the inspection and maintenance of electric distribution facilities.

As of the date of this report, six EDCs have approved Long Term Infrastructure Improvement Plans (LTIIPs) and one EDC has a LTIIP under review.[26] EDCs are utilizing the LTIIPs to proactively accelerate replacement of degraded distribution system components and improve the resiliency of their distribution systems through storm hardening initiatives. There has also been an increase in tree trimming activity beyond historic levels for many EDCs, in addition to the LTIIP measures. It is expected that this should also reduce damage to the electric system during storms and contribute to a general overall reduction in the amount of outages in Pennsylvania.

In general, as noted in the 2014 PUC reliability report, every utility is challenged with danger trees outside its right-of-way boundaries. These trees are a significant threat to electric reliability and cause significant damage to the distribution system during severe storms. Trees are a direct challenge to the resiliency and storm hardening of the distribution system during major storm events and are the number one cause of catastrophic power loss during storms. Pennsylvania EDCs continue to improve their aggressive vegetation management programs and recognize that removal of off-right-of-way trees are a chronic challenge due to private property rights laws.

The overall performance of the EDCs is trending in a positive direction, and we expect more improvement in 2016. In 2014, the EDCs reported quarterly CAIDI, SAIDI, and SAIFI metrics and failed to achieve benchmark 53 times total for the year; while in 2015 the total failure to achieve benchmark was 38 times total for the year. In 2014, EDCs failed to achieve standard 19 times total in the year; while in 2015 this was reduced to just one instance for the whole year.

The PUC believes that EDCs should set internal goals to consistently achieve reliability performance scores below benchmark for what are called "blue-sky" days.[27] It is suggested that EDCs consider implementing an internal goal of maintaining their reliability metrics about 20 percent below benchmark during "blue sky" days. Such a goal may provide a cushion within the reliability metrics to absorb storms and unforeseen system events and still achieve benchmark performance.

[26] The six EDCs with approved LTIIPs are Met-Ed, PECO, Penelec, Penn Power, PPL and West Penn. Duquesne Light filed a petition for approval of their LTIIP on Apr 15, 2016 at Docket No. P-2016-2540046.

[27] "Blue sky" days are those days where no storm activity or other detrimental weather phenomenon occur (wind, snow, or heavy rain). As part of their benchmark calculations, EDCs factored in "normal" bad weather, which means they have factored a certain number of storm events (storm days) in to their determination of the benchmark metrics based on their actual experience during the benchmark period (1994-1998). This ensures the benchmark metrics reflect the average performance of the EDC during the period. "Blue sky" is a measure of the EDC's performance excluding any storm days, thus it can be assumed that the EDCs' reliability metrics on "blue sky" days should be better than that of average, "normal" days. By measuring performance on "blue sky" days, EDCs may be able to detect reliability issues not related to damage from storms.

The PUC will continually monitor EDC improvement plans and implement corrective action plans when an EDC's reliability performance metrics exceed the standard, or continuously exceed the benchmark.

Appendix A – Electric Reliability Metrics

12-Month Average Electric Reliability Indices for 2015

Customer Average Interruption Duration Index (CAIDI)- min/yr/cust				% Above (+) or	% Above (+) or
EDC	Dec-15	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	91	105	141	-13.3	-35.5
Duquesne Light	95	108	130	-12.0	-26.9
Met-Ed (FE)	113	117	140	-3.4	-19.3
PECO	84	112	134	-25.0	-37.3
Penelec (FE)	140	117	141	19.7	-0.7
Penn Power (FE)	100	101	121	-1.0	-17.4
Pike County	205	174	235	17.8	-12.8
PPL	118	145	174	-18.6	-32.2
UGI	103	169	228	-39.1	-54.8
Wellsboro	76	124	167	-38.7	-54.5
West Penn (FE)	154	170	204	-9.4	-24.5
System Average Interruption Frequency Index (SAIFI)- outages/yr/cust				% Above (+) or	% Above (+) or
EDC	Dec-15	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	0.19	0.20	0.27	-5.0	-29.6
Duquesne Light	0.75	1.17	1.40	-35.9	-46.4
Met-Ed (FE)	1.19	1.15	1.38	3.5	-13.8
PECO	0.72	1.23	1.48	-41.5	-51.4
Penelec (FE)	1.36	1.26	1.52	7.9	-10.5
Penn Power (FE)	1.14	1.12	1.34	1.8	-14.9
Pike County	0.38	0.61	0.82	-37.7	-53.7
PPL	0.72	0.98	1.18	-26.5	-39.0
UGI	0.40	0.83	1.12	-51.8	-64.3
Wellsboro	1.06	1.23	1.66	-13.8	-36.1
West Penn (FE)	1.17	1.05	1.26	11.4	-7.1
System Average Interruption Duration Index (SAIDI)- min/yr/cust				% Above (+) or	% Above (+) or
EDC	Dec-15	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	18	21	38	-14.3	-52.6
Duquesne Light	71	126	182	-43.7	-61.0
Met-Ed (FE)	136	135	194	0.7	-29.9
PECO	61	138	198	-55.8	-69.2
Penelec (FE)	191	148	213	29.1	-10.3
Penn Power (FE)	114	113	162	0.9	-29.6
Pike County	78	106	194	-26.4	-59.8
PPL	84	142	205	-40.8	-59.0
UGI	41	140	256	-70.7	-84.0
Wellsboro	81	153	278	-47.1	-70.9
West Penn (FE)	179	179	257	0.0	-30.4

*Note: **GREEN** = better than benchmark; **RED** = worse than standard; **BLACK** = between benchmark and standard.*

Performance Benchmark. An EDC's performance benchmark is calculated by averaging the EDC's annual, system-wide reliability performance indices over the five-year period directly prior to the implementation of electric restructuring (1994 to 1998). The benchmark is the level of performance that the EDC should strive to achieve and maintain.

Performance Standard. An EDC's performance standard is a numerical value that represents the minimal performance allowed for each reliability index for a given EDC. Performance standards are based on a percentage of each EDC's historical performance benchmarks.

Three-Year Average Electric Reliability Indices for 2013-2015

Customer Average Interruption Duration Index (CAIDI)-min/yr/cust				*3-Year*	*3-Year*	*% Above (+) or*
EDC	*2013*	*2014*	*2015*	*Average*	*Standard*	*Below (-) Standard*
Citizens'	*81*	*88*	*91*	*87*	*115*	*-24.6*
Duquesne Light	*121*	*102*	*95*	*106*	*119*	*-10.9*
Met-Ed (FE)	*105*	*128*	*113*	*115*	*129*	*-10.6*
PECO	*91*	*96*	*84*	*90*	*123*	*-26.6*
Penelec (FE)	*117*	*118*	*140*	*125*	*129*	*-3.1*
Penn Power (FE)	*140*	*106*	*100*	*115*	*111*	*3.9*
Pike County	*209*	*106*	*205*	*173*	*192*	*-9.7*
PPL	*108*	*180*	*118*	*135*	*160*	*-15.4*
UGI	*110*	*144*	*103*	*119*	*186*	*-36.0*
Wellsboro	*70*	*75*	*76*	*74*	*136*	*-45.9*
West Penn (FE)	*183*	*137*	*154*	*158*	*187*	*-15.5*
System Average Interruption Frequency Index (SAIFI)-outages/yr/cust				*3-Year*	*3-Year*	*% Above (+) or*
EDC	*2013*	*2014*	*2015*	*Average*	*Standard*	*Below (-) Standard*
Citizens'	*0.46*	*0.19*	*0.19*	*0.28*	*0.22*	*27.3*
Duquesne Light	*0.62*	*0.62*	*0.75*	*0.66*	*1.29*	*-48.6*
Met-Ed (FE)	*1.09*	*1.11*	*1.19*	*1.13*	*1.27*	*-11.0*
PECO	*0.69*	*0.86*	*0.72*	*0.76*	*1.35*	*-44.0*
Penelec (FE)	*1.48*	*1.55*	*1.36*	*1.46*	*1.39*	*5.3*
Penn Power (FE)	*1.35*	*1.11*	*1.14*	*1.20*	*1.23*	*-2.4*
Pike County	*1.21*	*2.12*	*0.38*	*1.24*	*0.67*	*84.6*
PPL	*0.82*	*0.92*	*0.72*	*0.82*	*1.08*	*-24.1*
UGI	*0.77*	*0.44*	*0.40*	*0.54*	*0.91*	*-41.0*
Wellsboro	*0.56*	*0.77*	*1.06*	*0.80*	*1.35*	*-41.0*
West Penn (FE)	*1.21*	*1.02*	*1.17*	*1.13*	*1.16*	*-2.3*
System Average Interruption Duration Index (SAIDI)-min/yr/cust				*3-Year*	*3-Year*	*% Above (+) or*
EDC	*2013*	*2014*	*2015*	*Average*	*Standard*	*Below (-) Standard*
Citizens'	*37*	*17*	*18*	*24*	*25*	*-4.0*
Duquesne Light	*75*	*63*	*71*	*70*	*153*	*-54.5*
Met-Ed (FE)	*115*	*141*	*136*	*131*	*163*	*-19.8*
PECO	*63*	*82*	*61*	*69*	*167*	*-58.9*
Penelec (FE)	*174*	*183*	*191*	*183*	*179*	*2.0*
Penn Power (FE)	*188*	*118*	*114*	*140*	*136*	*2.9*
Pike County	*253*	*224*	*78*	*185*	*129*	*43.4*
PPL	*89*	*165*	*84*	*113*	*172*	*-34.5*
UGI	*85*	*63*	*41*	*63*	*170*	*-62.9*
Wellsboro	*39*	*57*	*81*	*59*	*185*	*-68.0*
West Penn (FE)	*222*	*139*	*179*	*180*	*217*	*-17.1*

*Note: **GREEN** = better than standard; **RED** = worse than standard.*

Appendix B – Modifications to Inspection and Maintenance Intervals

Modifications to Inspection and Maintenance (I&M) Intervals (Group 1) Submitted October 2015, effective January 1, 2017- December 31, 2018

Company	Exemption Requested	Justification
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Pole loading calculations	Approved previously in the Jan. 1, 2013- Dec. 31, 2014 I&M Plan.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Distribution overhead line inspections – 5 year rather than 1 to 2-year cycle	Approved previously in the Jan. 1, 2013- Dec. 31, 2014 I&M Plan.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Overhead transformer inspections – 5 year rather than 1 to 2-year cycle	Approved previously in the Jan. 1, 2013- Dec. 31, 2014 I&M Plan.
UGI	None	n/a

Modifications to Inspection and Maintenance Intervals (Group 2) Submitted October 2014, effective January 1, 2015- December 31, 2016

Company	Exemption Requested	Justification
Citizens'	Pole loading calculations	Approved previously in the Jan. 1, 2012-Dec.31, 2013 I&M Plan.
Duquesne	Pole loading calculations	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
Duquesne	Overhead line inspections	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
Duquesne	Overhead transformer inspections	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
Duquesne	Above-ground pad-mounted transformers	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
PECO	Pole loading calculations	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
Pike County	Pole loading calculations	Approved previously in the Jan. 1, 2012-Dec.31, 2013 I&M Plan
PPL	Pole loading calculations	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
PPL	Overhead line inspections	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
PPL	Transformer inspections	Approved previously in the Jan. 1, 2012- Dec. 31, 2013 I&M Plan
Wellsboro	Pole loading calculations	Approved previously in the Jan. 1, 2012-Dec.31, 2013 I&M Plan