Electric Service Reliability in Pennsylvania

2011

Pennsylvania Public Utility Commission

ELECTRIC SERVICE RELIABILITY IN PENNSYLVANIA 2011

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Executive Summary

The Electricity Generation Customer Choice and Competition Act mandates that the Pennsylvania Public Utility Commission (Commission) ensure that 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 continuing safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth.[2] The Commission also established reliability benchmarks and standards to measure the performance of each electric distribution company (EDC).[3]

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 those times when unforeseen circumstances push the indices above the benchmark.[4] In recognition of these unforeseen circumstances, the Commission set the performance standard as the minimum level of EDC reliability performance. The standard is the level of performance beyond which the company must either justify its poor performance or provide information on the corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure may be the threshold for triggering additional scrutiny and potential compliance enforcement actions.

In 2011, eight of the 11 EDCs achieved compliance with the 12-month Customer Average Interruption Duration Index (CAIDI) performance standard for duration of service outages, and five EDCs performed better than the 12-month CAIDI performance benchmark. When measured on a company-wide basis, these five EDCs provided restoration of service in a manner that was statistically timelier than was experienced over the five years prior to the restructuring of the electric utility industry.

Nine of the 11 EDCs achieved compliance with the 12-month System Average Interruption Frequency Index (SAIFI) performance standards for the average frequency of service outages per customer, and have maintained the number of customer outages at a statistically acceptable level. Three EDCs performed better than the 12-month SAIFI performance benchmark, thereby reducing average customer outage levels below those experienced over the five years prior to the restructuring of the electric utility industry.

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.[5]This year, we have assessed the average reliability performance of EDCs over a three-year period, utilizing data from 2009, 2010 and 2011.

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

Overall, the three-year average performance for the EDCs has slightly decreased. Three EDCs failed to meet the rolling three-year CAIDI performance standard, and two EDCs failed to meet the rolling three-year SAIFI performance standard (as compared to the EDCs in the previous year). Three EDCs did not meet the SAIDI standards. The aggregate SAIDI minutes (total of the previous three year averages) for 2011 were 58 minutes more than that of 2010.

In addition to monitoring the reliability performance of the EDCs, the Commission established inspection and maintenance standards that are appropriate 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 filed with the Commission and subsequently approved by the Bureau of Technical Utility Services (TUS).

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[6] Docket No. L-00040167.

Section 1 – Introduction

Purpose

This report discusses the reliability performance of Electric Distribution Companies (EDCs) operating under the Pennsylvania Public Utilities Commission's jurisdiction within the Commonwealth. This report specifically focuses on the reliability of the electric distribution system.[7]

The data presented in this report was obtained from the quarterly and annual reliability reports submitted by the EDCs pursuant to the Commission's regulations. This data focuses on the frequency of outages (the SAIFI) and the duration of outages (the CAIDI).[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

In 2011, severe October snowstorms caused damage to distribution systems in 50,000 locations in the Northeast.[9] FERC and NERC estimate that 95 percent of customer outages were caused by damage to distribution infrastructure. The high-voltage transmission system (under the purview of FERC) was only accountable for 5 percent of customer outages during the storm. The consistent and thorough review of distribution infrastructure reliability is imperative to the safe and reliable operation of the distribution system.

The Electricity Generation Customer Choice and Competition Act mandates that the Commission ensure that 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 the 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 those times when unforeseen circumstances push the indices 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. The standard is the level of performance beyond which the company must either justify its poor performance or provide information on the corrective measures it will take to improve performance.

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[7] The high-voltage transmission system, nominally > 100 kV, is regulated by the Federal Energy Regulatory Commission. The electric distribution system is under the purview of the PA Public Utility Commission.
[8] For more information on CAIDI and SAIFI, see Section 2.
[9] FERC and NERC Joint Report - Transmission Facility Outages During the Northeast Snowstorm of October 29-30, 2011, pg. 17.

Performance that does not meet the standard for any reliability measure may be the threshold for triggering additional scrutiny and potential compliance enforcement actions.

Section 2 –Reliability Performance Measures

Reliability Performance Indices

The benchmarks and standards established by the Commission are based on four reliability performance indices which have been adopted by the Institute of Electrical and Electronic Engineers Inc. (IEEE). These indices include: (1) Customer Average Interruption Duration Index (CAIDI); (2) System Average Interruption Frequency Index (SAIFI); (3) System Average Interruption Duration Index (SAIDI); and (4) Momentary Average Interruption Frequency Index (MAIFI).

- **CAIDI** is the average duration of sustained interruptions[10] for those customers who experience interruptions during the analysis period. CAIDI represents the average time required to restore service to the average customer per sustained interruption. CAIDI will be referred to as the duration of outages for the purpose of this report.

  CAIDI = Number of customer minutes interrupted/number of customer interruptions;

- **SAIFI** measures the average frequency of sustained interruptions per customer occurring during the analysis period. SAIFI will be referred to as the frequency of outages for the purpose of this report.

  SAIFI = Number of customer interruptions/number of customers served

- **SAIDI** is the average duration of sustained customer interruptions per customer occurring during the analysis period. SAIDI measures how much time, on average, a customer may not have service in a given year. SAIDI is the product of CAIDI and SAIFI.

  SAIDI = Number of customer minutes interrupted/Number of customers served

- **MAIFI** measures the average frequency of momentary interruptions per customer occurring during the analysis period.

  MAIFI = Total number of momentary customer interruptions/Total number of customers served.

The values of these four reliability indices are submitted by the EDCs on both a quarterly (rolling 12-month average) and annual basis. Also included is the data used in calculating the indices, namely the average number of customers served, the number of sustained customer interruption minutes, and the number of customers affected by service interruptions.

It is noted that some EDCs do not currently have the necessary equipment to collect meaningful data relating to momentary service interruptions (MAIFI). However, the Commission desires to assess, where possible, the effect of frequent momentary interruptions on EDCs' customers. Thus, the provision of this data is required, if available.

[10] The loss of electric service by one or more customers for the period defined as a sustained customer interruption by the IEEE as it may change from time to time – currently five minutes or greater. The term does not include "major events" or the authorized termination of service to an individual customer.

In addition to the outage data mentioned above, the Commission's regulations require EDCs to report a breakdown and analysis of outage causes, such as equipment failure, animal contact and contact with trees. This analysis is helpful in identifying the primary causes of service interruptions and determining which causes, if any, can be prevented in the future through proposed solutions.

The regulations require EDCs to report reliability performance on a system-wide basis, rather than on an operating area basis, and provide an analysis of the worst performing five percent of circuits and major remedial efforts to improve those 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 indices. The term "major event" is used to identify an abnormal event, such as a major storm, and is defined as either of the following:

- 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

- 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 indices. In order to avoid the inappropriate exclusion of outage data, the Commission has implemented a process whereby an EDC must submit a formal request for exclusion of service interruptions for reporting purposes, accompanied by data which demonstrates that a service interruption qualifies as a major event.

Benchmarks and Standards

The performance **benchmark** represents the statistical average of the EDC's annual, system-wide, reliability performance index values for the five-year time period from 1994-98. The benchmark serves as an objective level of performance that each EDC should strive to achieve and maintain and is a reference point for comparison of future reliability performance.

The 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 each EDC's historical performance benchmarks. Both long-term (rolling three-year) and short-term (rolling 12-month) performance standards have been established for each EDC. The performance standard is the minimum level of EDC reliability performance permitted by the Commission and is a level of performance beyond which the company must either justify its poor performance or provide information on corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure is the threshold for triggering additional scrutiny and potential compliance enforcement actions.

The rolling **12-month standard** 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 rolling **three-year standard** 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 restructuring. 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, utilizes 2009, 2010 and 2011 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. For example, if an EDC has a CAIDI benchmark of 130 minutes, a rolling 12-month CAIDI standard of 156 minutes and an actual CAIDI for a particular year of 143 minutes, its performance is considered to be adequate. If CAIDI is 120 minutes, the performance is better than the historical average performance. A CAIDI of 180 minutes, on the other hand, indicates a failure to meet the reliability performance standard.

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 electric distribution company is providing reliable service.[13]

Benchmarks and standards for EDC reliability performance and average reliability indices for 2011 are listed in Appendix A.

Inspection and Maintenance

On May 22, 2008, the Commission entered a Final Rulemaking Order implementing minimum inspection and maintenance (I&M) standards for EDCs operating in Pennsylvania. This created a new Section 57.198 in Title 52 of the Pennsylvania Code. Initial I&M plans were due by Oct. 1, 2009, for Compliance Group 1 and Oct. 1, 2010, for Compliance Group 2. Under the regulation, Compliance Group 1 includes Met-Ed, Penelec, Penn Power, West Penn and UGI. Compliance Group 2 consists of Duquesne Light, PECO, PPL, Citizens', Pike County and Wellsboro. The plans cover the two calendar years beginning 15 months following the Oct. 1 filing, and must be filed biennially. The second required submittal for Group 1 was due on Oct. 1, 2011.

The I&M plans must detail a program for the inspection and maintenance of electric distribution facilities including: poles, conductors, transformers, switching devices, protective devices, regulators, capacitors and substations, necessary for the distribution of electric current, and owned, operated, managed or controlled by the company and for vegetation management. The plans must comply with the minimum inspection and maintenance intervals set forth in 52 Pa. Code 57.198(n) and include a

[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.
[12] 52 Pa. Code § 57.195(g).
[13] 52 Pa. Code § 57.197(a).

justification for the time frames selected. The plans are subject to acceptance or rejection by the Commission.

Table 1 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*

Each EDC has filed its first submittal of the Biennial Inspection, Maintenance, Repair and Replacement Plan, pursuant to 52 Pa. Code § 57.198(a). And Group 1 has submitted their second round of I&M plans in 2011. Most EDCs proposed modifications to the standards for some programs or parts of programs.

The 52. Pa. Code 57.198(c) provides the following relating to inspection and maintenance time frames:

> (c) *Time frames.* The plan must comply with the inspection and maintenance standards in subsection (n). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (n). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will still support the level of reliability required by law.

52. Pa. Code § 57.198(c).

Approvals of I&M plans are contingent upon the possibility that subsequent audits, reviews and inquiries, in any Commission proceeding, may be conducted pursuant to 52 Pa. Code § 57.197(a). Plan revisions must be submitted as an addendum to the EDC's quarterly reliability report.

Appendix B describes the exemptions which were requested by the EDCs and provides a summary of the justification for said exemptions.

Section 3 – 2011 Outage Response Review

Overview

Extreme weather events in 2011 caused more than 3.8 million electric outages in Pennsylvania, representing the highest number of customer electric outages in the past nine years. Many of these customers experienced outages greater than 72 hours.

Pennsylvania's electric distribution companies (EDCs) were affected by several strong storm systems of varying meteorological circumstances in 2011. All jurisdictional EDCs[14] except Citizen's Electric had at least one Public Utility Commission (PUC) reportable outage event in 2011.[15] The significant events included: heavy snow and some ice in February; strong thunderstorms in late May; a direct impact by Hurricane Irene in late August; flooding rains from the remnants of Tropical Storm Lee in early September; and an early-season heavy, wet snow in late October.

Review of Multiple Long-Duration Outage Events

Although the Commission reviews the performance of EDCs following every major storm event, the multiple, long-duration events presented an opportunity for additional review, especially due to the significant number of affected customers and some patterns that emerged during the utilities' responses to the various storms. In particular, the Commission received numerous complaints about the inability of customers to contact the EDC to report outages; a lack of specific restoration information; or in some cases, inconsistent information about restoration.

To address these concerns, the Commission's Bureau of Technical Utility Services (TUS) was tasked with preparing the following three reports[16]:

(1) ***Hurricane Irene Report*** – Focuses on the EDCs' preparation for and response to Hurricane Irene. After reviewing and analyzing reports submitted by EDCs and comments provided at the Commission's Oct. 12, 2011, Special Reliability Forum, staff offers several recommendations concerning the handling by EDCs of high-volume call periods; relationships between EDCs and local and county emergency management and elected officials; a study of extreme/severe weather patterns; and the need for infrastructure enhancements.

(2) ***Summary Report of EDCs' Handling of High-Call Volumes and Analysis of Storm and Severe Weather Data*** – Summarizes EDC information relating to handling of high-call volumes during major storms and corrective actions that are currently underway or completed. The chief finding from the Hurricane Irene report determined that communications problems exacerbated customer

[14] The PUC jurisdictional EDCs are: Citizen's Power Co.; Duquesne Light Co.; Metroplitan Edison Co.; PECO Energy Co.; Pennsylvania Electric Co.; Pennsylvania Power Co.; Pike County Light & Power Co.; PPL Electric Utilities Inc.; UGI Utilities Inc. – Electric Division; Wellsboro Electric Co.; and West Penn Power Co.

[15] 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 6 or more consecutive hours.

[16] The reports are available on the Commission website at: http://www.puc.state.pa.us/electric/electric_index.aspx.

frustrations. The report also addresses the need to focus on the increase in severe weather events and whether infrastructure improvements are necessary.

(3) ***Summary Report of Outage Information Required by Nov. 11, 2011 Order at Docket No. I-2011-2271989*** – *S*ummarizes outage information submitted by the EDCs for the period from May through November 2011 on full or partial circuit outages greater than 24 hours; between 24 and 48 hours; greater than 48 hours to 72 hours; and greater than 72 hours. It also considered circuits that were among the worst performing 5 percent of circuits identified in the PUC-filed Quarterly Reliability Reports for the first three quarters of 2011. In this report, staff in TUS recommended various studies and corrective actions by EDCs related to vegetation management trimming cycles and other potential outage mitigation measures such as strategic installation of automatic distribution circuit reclosers and sectionalizers.

PUC Action Items

The PUC understands the concerns of residents who were without power for many days, especially as they tried – with little or no success – to get information from their electric utility. The PUC takes each storm incident seriously and makes changes to our regulations and procedures to minimize future storm impacts. The PUC met with all affected utilities individually and during the Oct. 12, 2011, Special Reliability Forum to discuss what worked, what didn't and next steps. The PUC continues to evaluate the data that is being provided from the EDCs and the following is a summary of the PUC's actions to date related to long-term outages:

- *Promulgated additional regulations designed to improve utility responses to outages;*
- *Finalized a policy statement on best practices that electric utilities should utilize to ensure effective communication during service outages, including the use of social media and new technology to keep customers informed;*
- *Incorporated sections into the annual PUC Electric Reliability Report that discuss EDC major event response and our evaluation of such;*
- *Changed the format of the PUC's annual Summer Reliability Meeting to include EDC information on preparations for the summer storm season as well as required all EDCs to submit summary of storm preparations and notable reliability projects; and*
- *Participated in EDC emergency planning drills and tabletop exercises.*

Best practices have been identified through meetings between TUS and EDCs, including:

- *Offering trained EDC liaisons to county 9-1-1 or emergency management centers;*
- *Utilizing county emergency management communications platforms and social media for outage and restoration messaging;*
- *Inviting local emergency responders and county emergency management to EDC drills and tabletop exercises;*

- *Reaching out and providing liaisons to counties during storms; and*
- *Partnering with the University of Florida, who has offered to share best practices from an infrastructure study in response to hurricanes in 2004 and 2005.*

The PUC is committed to ongoing action items in order to effective monitor EDC response to long-term outages such as:

- *Monitoring of the performance of EDCs' call centers during storm events;*
- *Conducting further reviews of staffing during storm events;*
- *Working with EDCs to determine feasibility of compiling data on the costs of storm damages to assess whether an average increase year-after-year has occurred.*
- *Ensuring implementation of the corrective actions outlined by EDCs for their worst performing circuits and evaluating that the actions are having a positive effect; and*
- *Referring EDCs who experience continual problems with adequately handling high-call volumes or issue inconsistent and inadequate restoration messages during PUC reportable storms to the PUC's Bureau of Investigation and Enforcement.*

The PUC also will be undertaking the following actions:

- *Forming a working group with stakeholders to discuss options for addressing any increase in severe weather events;*
- *Partnering with EDCs to study whether Pennsylvania is experiencing increased extreme/severe weather events and determine if recent long-term outages caused by the damage of the severe storms are limited to more remote and hard-to-reach locations of circuits and are these the same troublesome circuits that have experienced multiple long-term outages; and*
- *Studying the condition of EDC infrastructure and can it adequately hold up against increasingly stormy weather and if there is a need for storm-hardening of certain electrical infrastructure.*

Summary of Recommended EDC Action Items

Throughout this evaluation process, Commission staff notes that the response by EDC linemen and workers was extraordinary under hazardous weather conditions and long hours. Despite their best efforts, the significant number of affected customers and the length of the outages led to the development of many recommendations. As described in the three reports in more detail, Commission Staff has developed recommendations in the following areas:

(1) Handling of High-Volume Call Periods

- EDCs need to improve their ability to handle high-volume call periods during major outage events and implement a procedure to prevent inaccurate or misleading messages about restoration during expected long-term outage events.

- EDCs will be required to report progress on their corrective action plans as part of their quarterly reliability reports.

- EDCs that experience problems adequately handling high-volume call periods or provide inconsistent or inadequate restoration messages during their next PUC reportable storm should be referred to the PUC's Bureau of Investigation and Enforcement for further action as deemed appropriate.

(2) Relationships with Local and County Emergency Management and Elected Officials

- EDCs need to strengthen relationships with local and county emergency management and elected officials.

(3) Extreme/Severe Weather Study and Need for Infrastructure Improvements

- EDCs should consider the needs and vulnerabilities identified by the working group noted above when developing their Long-Term Infrastructure Improvement Plans under Act 11 of 2012.

(4) Circuit Study and Vegetation Management Trimming Cycles

EDCs should:

- Examine the service regions and circuits that experienced significant amounts of long-duration outages to determine if vegetation-management trimming cycles should be expedited;

- Review other potential outage mitigation actions such as strategic installation of automatic distribution circuit reclosers and sectionalizers;

- Develop best practices and effective approaches to vegetation management and other outage mitigation methods;

- Work with local and county officials to help mitigate resistance to tree trimming; and

- Continue to implement corrective actions for the worst performing circuits and strive to complete corrective actions for worst performing circuits by the close the calendar-year quarter in which they were identified.

Section 4 –Statistical Utility Performance Data

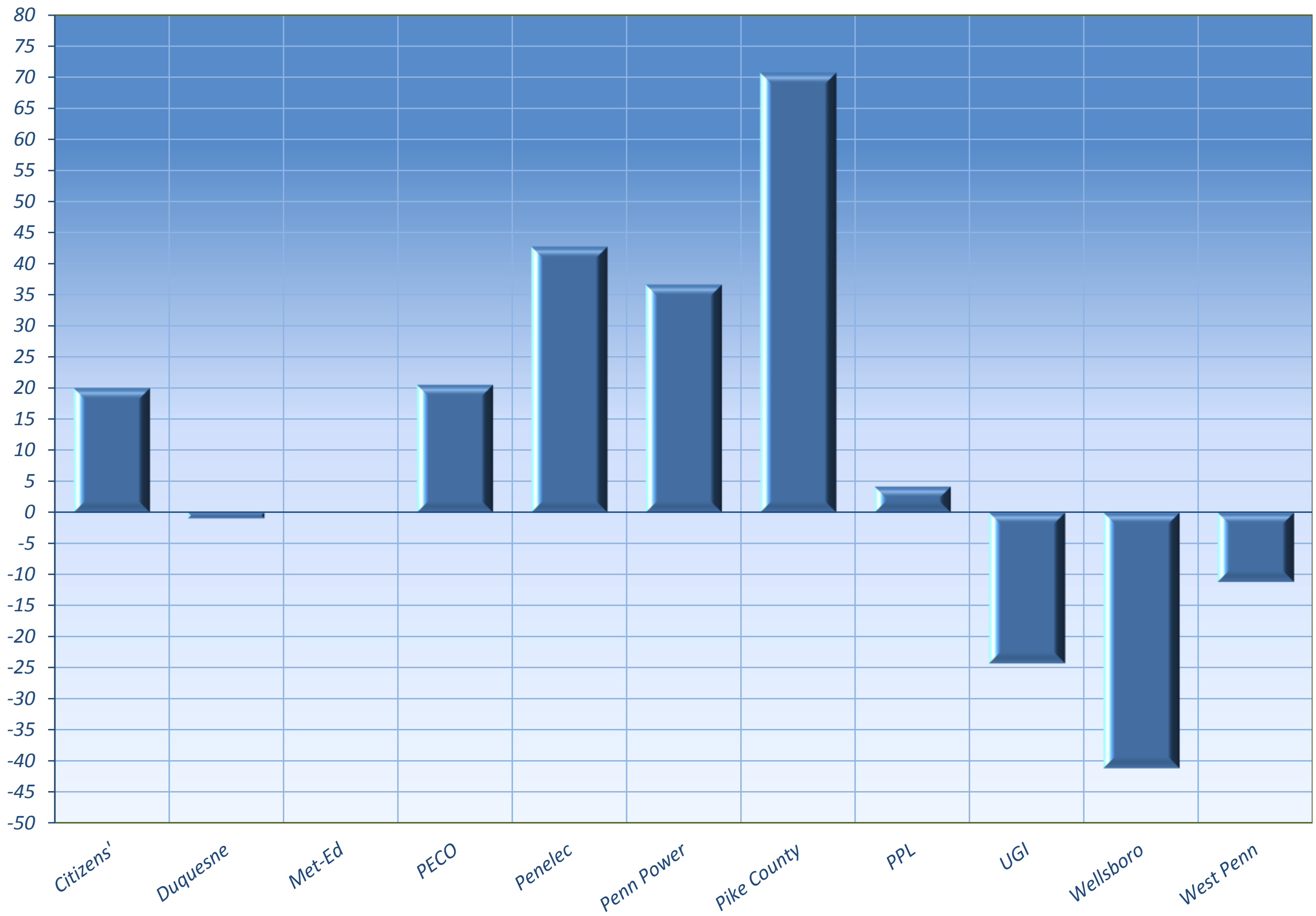
Statewide Summary

The 2011 reliability data submitted by the EDCs indicates that eight of the 11 EDCs achieved compliance within the 12-month CAIDI performance standards for duration of service outages. Also, four of the EDCs performed better than their CAIDI benchmarks, at an average reduction in outage duration of 15.5 percent or 22.4 minutes. Three of the 11 EDCs had SAIDIs better than the benchmark.

Nine of the EDCs met their rolling 12-month SAIFI performance standard for the average frequency of service outages per customer. Three EDCs performed better than their 12-month SAIFI performance benchmarks, at an average reduction in outage frequency of 11.9 percent or 0.14.

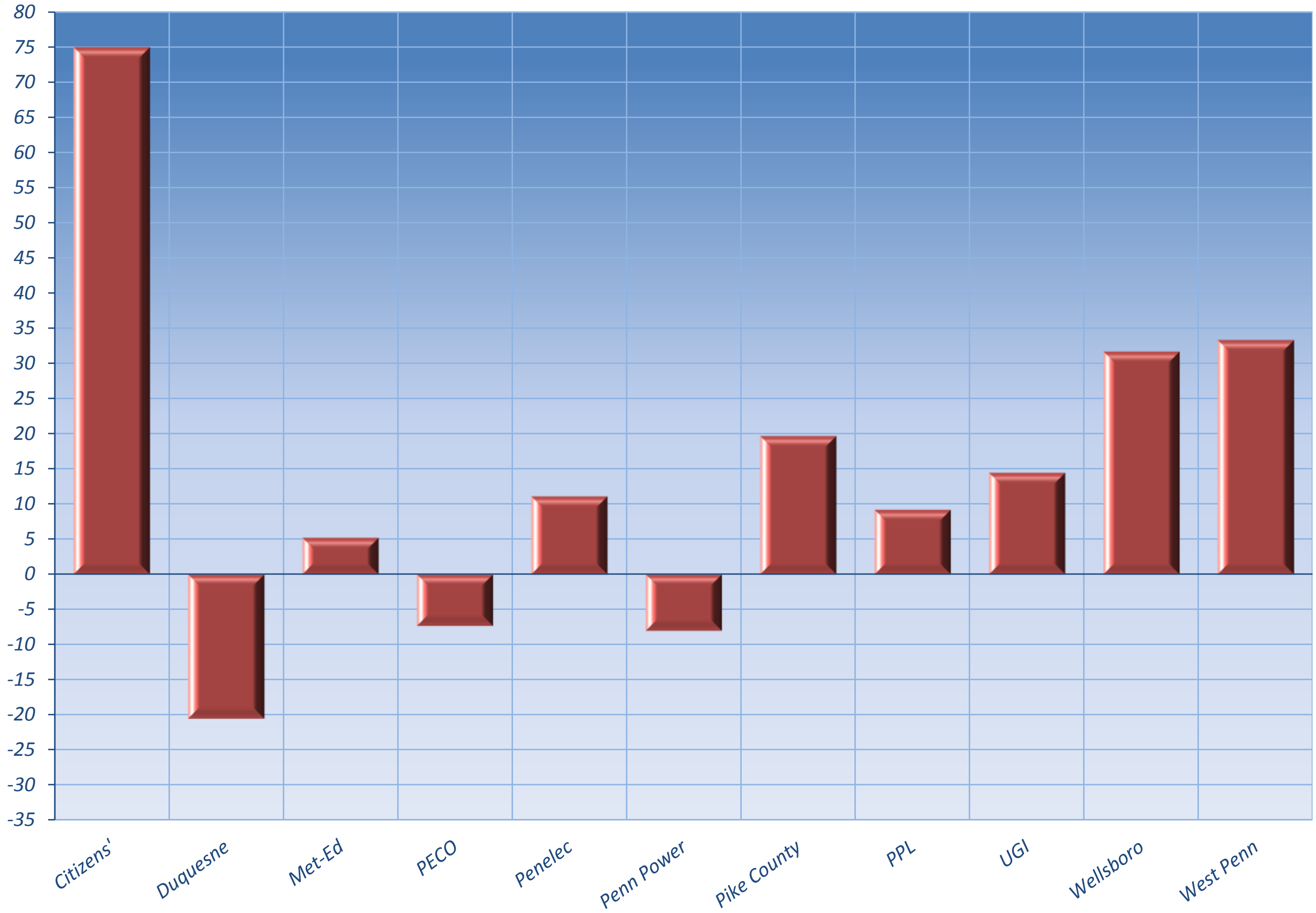
Figures 1 and 2 compare the 2011 CAIDI and SAIFI performance against benchmarks for all EDCs.

Figure 1 CAIDI 2011comparison (percent above or below benchmark)



Note: In Figures 1 and 2, the bars below the zero line indicate performance better than the benchmarks.

Figure 2 SAIFI 2011 comparison (percent above or below benchmark)



Appendix A provides the actual 2011 reliability performance for each EDC and the benchmarks and standards for each reliability index.

We also have assessed the average reliability performance of EDCs for a three-year period, utilizing data from 2009, 2010 and 2011. Overall, the three-year average performance has gone down. Three EDCs (Penelec, Penn Power, and Pike County) failed to meet their rolling three-year CAIDI performance standard by 45 minutes. Two EDCs (Met-Ed and Citizens') failed to meet their rolling three-year SAIFI performance standard by 0.07, as compared to one EDC in the previous year's comparison. Three EDCs (Citizens', Penelec, and Pike County) exceeded their SAIDI standards, as compared to no EDC in the previous year.

The actual 2009, 2010, and 2011 performance for each EDC and the results of the three-year performance analysis also are displayed in Appendix A.

During 2011, 29 requests for exclusion of major events were filed by the EDCs. All of these requests were approved. A major event exclusion request may be denied for a variety of reasons, including such things 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 reliability performance data provided herein for each of the indices represent, for the most part, rolling 12-month averages. Benchmarks are based on the averages of index values computed for the 12-month periods ending December 1994 through December 1998. Some benchmarks have been adjusted in subsequent proceedings. The 12-month standard is 120 percent of the benchmark for large EDCs and 135 percent for small EDCs. The three-year standard is 110 percent of the benchmark for all EDCs.

The Commission compares reliability indices 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 indices, as indicated in Appendix A.

Citizens' Electric Company

Citizens' has a relatively small operating service area with an electric system consisting of one distribution substation and nine distribution feeder lines.

In 2011, Citizens' experienced a total of 2,390 customer interruptions, with a total duration of 300,660 minutes, excluding major events, which was 142.4 percent higher than total duration reported last year. The calculation of the 2011 reliability indices excludes outage data relating to six major events, which were approved by the Commission.[1]

- Jan. 13, 2011 – A fault in a transmission line leading to Citizens' substation caused an outage to all 6,817 Citizens customers (100 percent).
- Jan. 25, 2011 – Interruption was caused by an accident when an industrial customer's equipment damaged a fiberglass bracket; 825 customers were affected (12.1 percent).
- March 6, 2011—A storm that dropped 1.5 inches of rain and 12 inches of snow caused outages of 1,306 customers (19.2 percent).
- Aug. 29, 2011—A 100 foot tree fell onto Citizens feeder lines during Hurricane Irene; 887 customers were affected (13 percent).
- Sept. 27, 2011—A fiberglass insulator bracket failed during heavy rain; 887 customers affected (13 percent).
- Nov. 1, 2011—A snow-laden tree branch came into contact with a conductor, affecting 1,199 customers (17.6 percent).

Citizens' CAIDI increased from 98 minutes in 2010 to 126 minutes in 2011, which was a 22.2 percent increase in CAIDI minutes and is 20 percent over the benchmark of 105 minutes. Citizens' quarterly CAIDI has been below the benchmark since 2004, except for the last quarter of 2005 and the last two quarters of 2011. The CAIDI three-year average was 15 minutes or 13.3 percent below the standard of 115 minutes. For the 12-month average ending March 31, 2012, CAIDI was 131 minutes, or 24.7 percent above the benchmark. SAIDI increased from 11minutes to 46 minutes. Figure 3 depicts the

[1] Docket Nos. M-2011-2221027; M-2011-2221202; M-2011-2222501; M-2011-2230586; M-2011-2260207; M-2011-2265884 and M2011-2271270.

trend in the duration of customer interruptions for the Citizens' system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Citizens' SAIFI increased from 0.19 in 2010 to 0.35 in 2011, which was an 84 percent increase in outage frequency and above the benchmark of 0.20. The SAIFI three-year average was 13.6 percent above the standard of 0.22. For the 12-month average ending March 31, 2012, SAIFI was 0.35, or 60 percent above the benchmark. Figure 4 depicts the trend in the frequency of service interruptions for the Citizens' system from March 2004 through March 2012, compared to the established benchmark and standards for SAIFI.

Although the outage frequency values shown on these graphs are much smaller than the SAIFI values of larger companies, valid comparisons are not made with other companies' reliability performance, but with the historical performance of Citizens'. Smaller systems tend to experience more variability in service outage data, which is captured in the development of historical benchmarks.

In 2011, the most frequent outage cause was equipment related failures, representing 28.6 percent of the outages, 3.4 percent of customers affected and 2.5 percent of customer minutes interrupted. Animals caused 25 percent of the service interruptions, 20.5 percent of customers affected and 8.8 percent of interruption minutes. Trees off the right-of-way represented 10.7 percent of outages, 35.4 percent customers affected and 49.3 percent of interruption minutes.

Figure 5 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 6.

Citizens' has exceeded the 12 month average standard for CAIDI and SAIDI. Citizens' has also exceeded the three year average standard for SAIFI and SAIDI. Citizens' described the status of their reliability and their efforts to improve in their 2011 Annual Reliability Report. That information is also presented here. Off right-of-way trees contributed the most interruption minutes for 2011. Citizens' has continued its focus on identifying high risk trees outside the right-of-way and working with property owners to obtain permission for removals where prudent. Outages caused by weather increased significantly for Citizens'. In 2010, there were no outage minutes attributable to weather. In 2011, there were 110,112 minutes of outage caused by weather including lightening, rain, wind and snow. Citizens' will continue assessing its lightening protection equipment and any possible measures to reduce weather-related outages.[17]

During 2011, Citizens' continued its ongoing underground cable replacement program with the replacement of 1970s-vintage cable in a residential subdivision. Citizens' implemented new capabilities for its Interactive Voice Response (IVR) telephone system. The new system is integrated with the company's Outage Management System (OMS) to provide customized information based on whether the caller is part of a known outage or is reporting a new outage. Customers are informed of their estimated restoration time when they call as part of a known outage. In addition, the system can be used to make selective outbound calls, providing proactive outage updates or other information as appropriate.

Citizens' launched a new Facebook page and created a Twitter presence. These tools will be used to help communicate with customers during significant outage events, but can also be used as education

[17] Citizens' Electric Company, 2011 Annual Electric Service Reliability Report.

and information tools during non-emergencies. The Company also continued its outreach to collect email addresses from its customers during 2011 to provide outage status updates directly to affected customers who choose to receive them.[18]

[18] Citizens' Electric Company, Summer Reliability Forum Summary Report, May 31, 2012.

Figure 3 Citizens' Customer Average Interruption Duration Index (minutes)

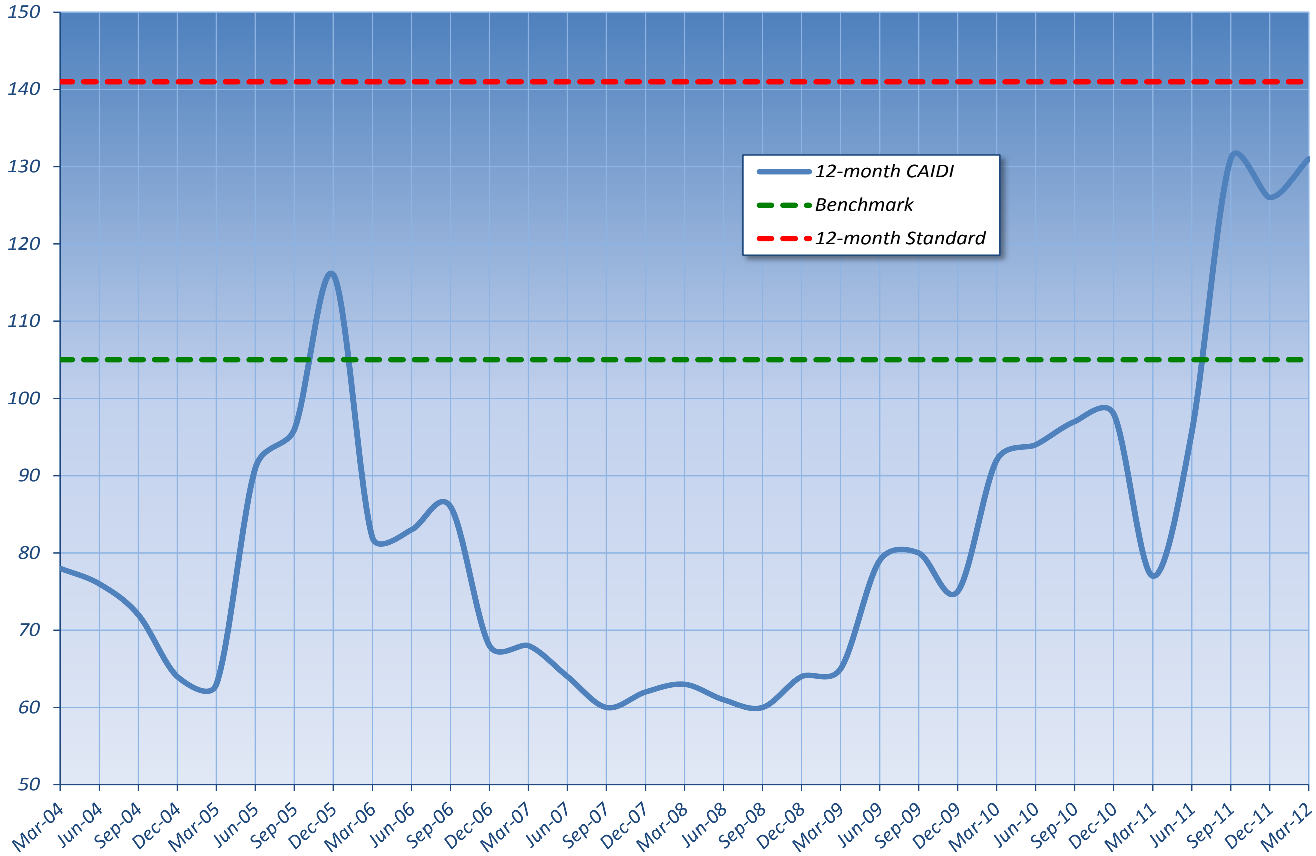


Figure 4 Citizens' System Average Interruption Frequency Index (interruptions per customer)

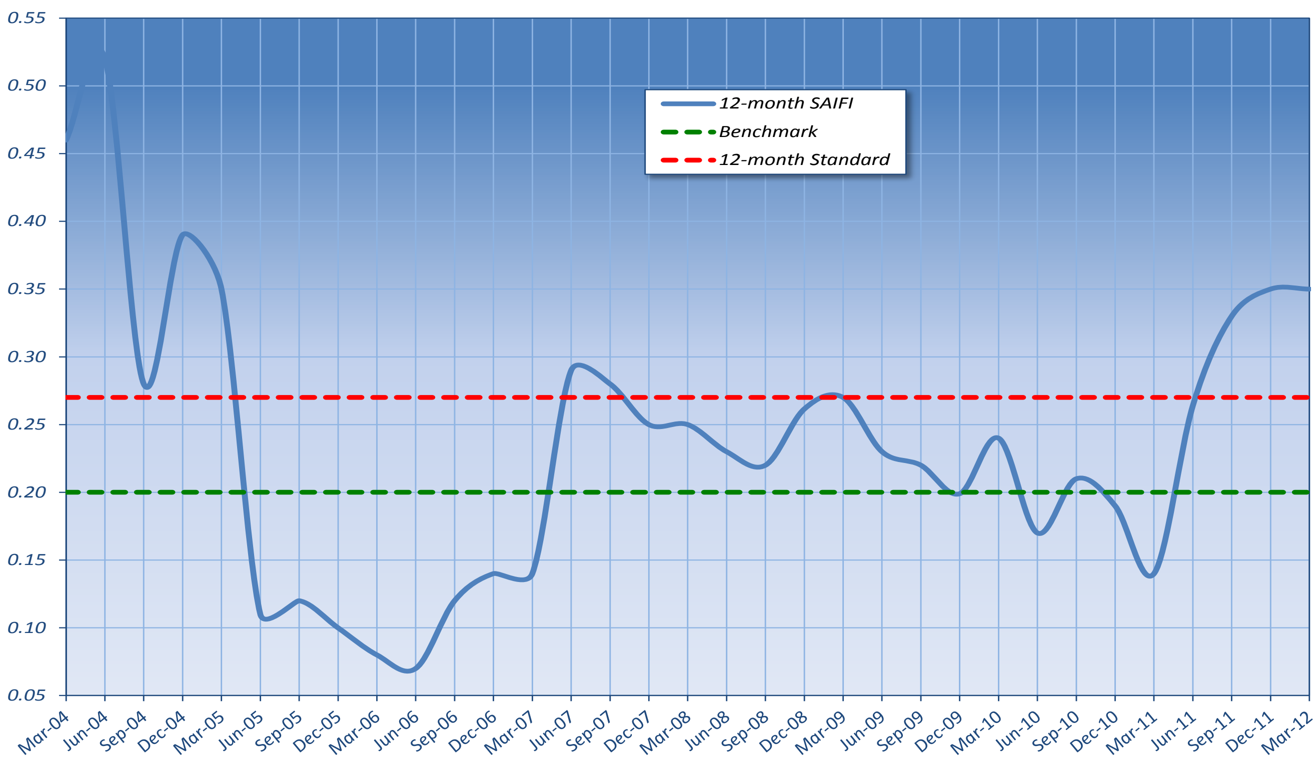


Figure 5 Citizens' outage causes (percent of total outages)

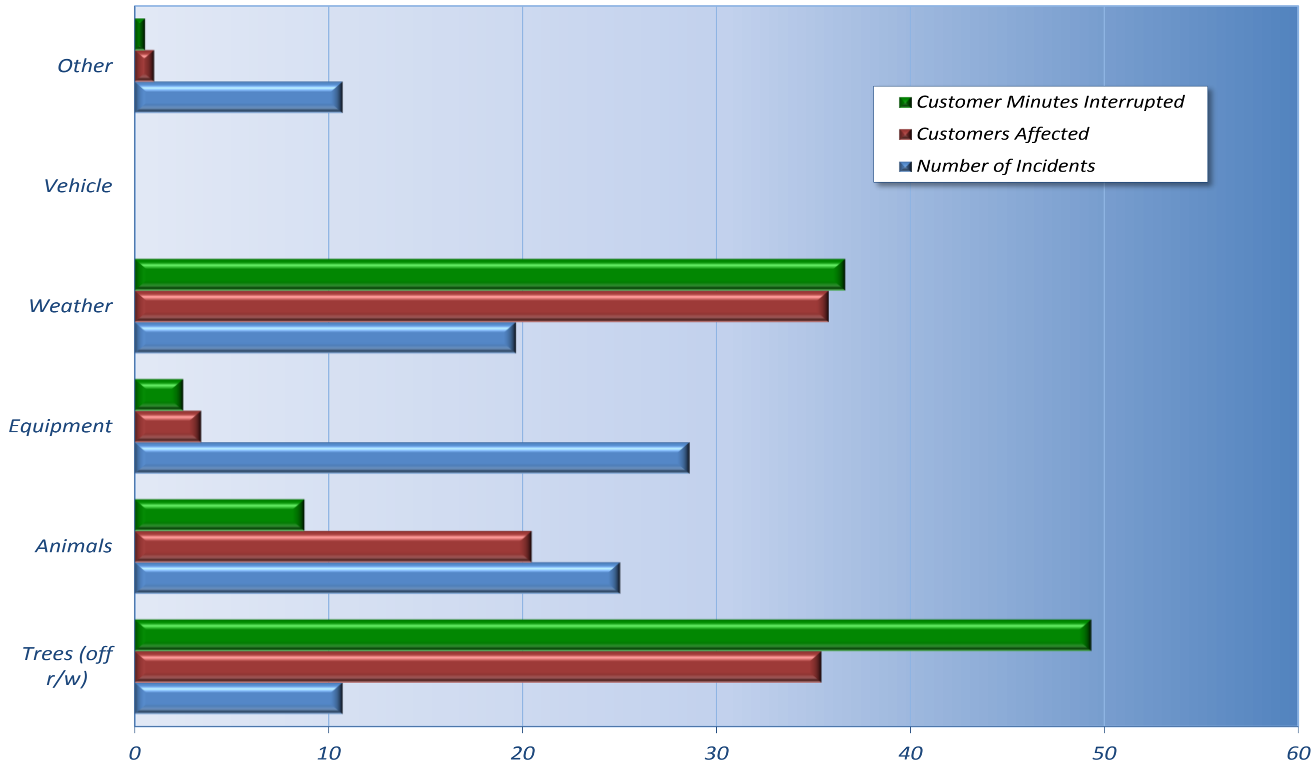
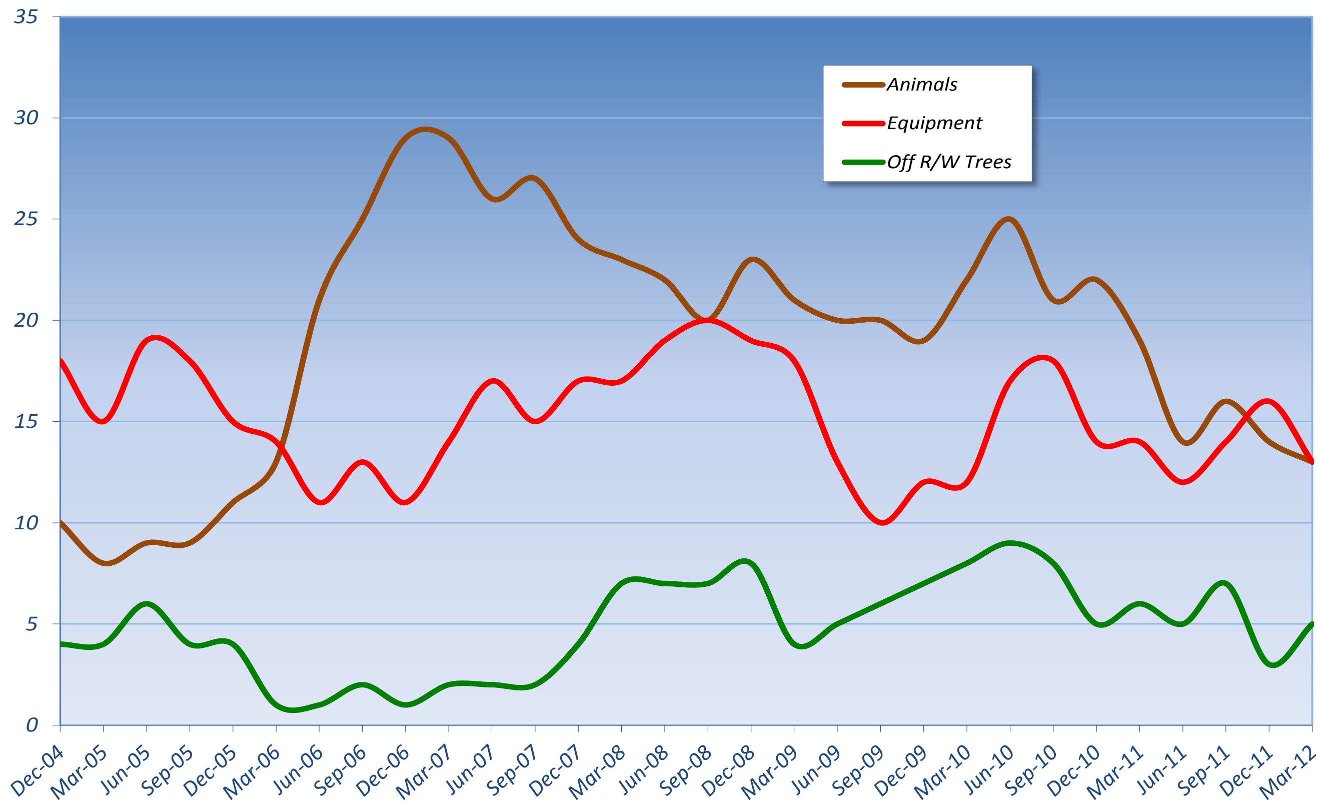


Figure 6 Citizens' outage tracking (number of incidents)



Duquesne Light Company

In 2011, Duquesne experienced a total of 6.6 million kVA interrupted with a total duration of 700.3 million kVA-minutes. The number of kVA interrupted decreased by 13 percent from 2010. Duquesne Light did not report any major events in their service territory during 2011.

Duquesne's 2011 CAIDI of 107 minutes was 27 minutes more than last year, a 33.8 percent increase in CAIDI minutes. Even with the increase, CAIDI is one minute lower than the benchmark of 108 minutes. The CAIDI three-year average was 28 minutes below the standard of 119 minutes. For the 12-month average ending March 31, 2012, CAIDI was 112 minutes, or 3.7 percent above the benchmark. SAIDI increased from 87 minutes in 2010 to 99 minutes in 2011, or a 12.1 percent increase. Figure 7 depicts the trend in the duration of customer interruptions for the Duquesne system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Duquesne's SAIFI reliability performance continues to fall well within the parameters of acceptability. The 2011 SAIFI was an average of 0.93 outages per customer, compared to last year's 1.09 and a benchmark of 1.17 outages.[19] Interruption frequency has remained well below the benchmark since 2004. Since its low of 0.77 in September 2006, SAIFI has risen to just below one outage, still 6.8 percent better than the historical benchmark. The three-year SAIFI average continues to be well below the standard. For the 12-month average ending March 31, 2012, SAIFI was .90 or 23.1 percent below the benchmark. Figure 8 shows the trend in the frequency of service interruptions for the Duquesne service territory from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure was responsible for 29.3 percent of the outages, 37.8 percent of interrupted load and 27.9 percent of interruption minutes, down from 32.9 percent in 2010. Fallen trees accounted for 19.7 percent of outages, 17.8 percent of interrupted load and 23.4 percent of interruption minutes. Storms were identified as causing 19.2 percent of the outages, 18.9 percent of interrupted load and 27.9 percent of interruption minutes. Figure 9 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 10.

Duquesne is meeting all of the benchmarks and standards for CAIDI, SAIFI and SAIDI. Duquesne's Asset Management Group performs ongoing analysis of reliability indices, root cause analysis of outages, and tracking and monitoring of other reliability performance measures. Duquesne has an Emergent Work Process to identify problems, set priorities, and resolve issues. Duquesne also utilizes preventative and predictive maintenance activities to reduce potential for future service interruptions.[20]

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[19] Duquesne's system does not provide an actual count of customers interrupted. The data available is in regard to interrupted <u>load</u>. The unit used is kVA, or kilovoltampere, which is the basic unit of apparent power.
[20] Duquesne Light Company, 2011 Annual Electric Reliability Report.

Figure 7 Duquesne Customer Average Interruption Duration Index (minutes)

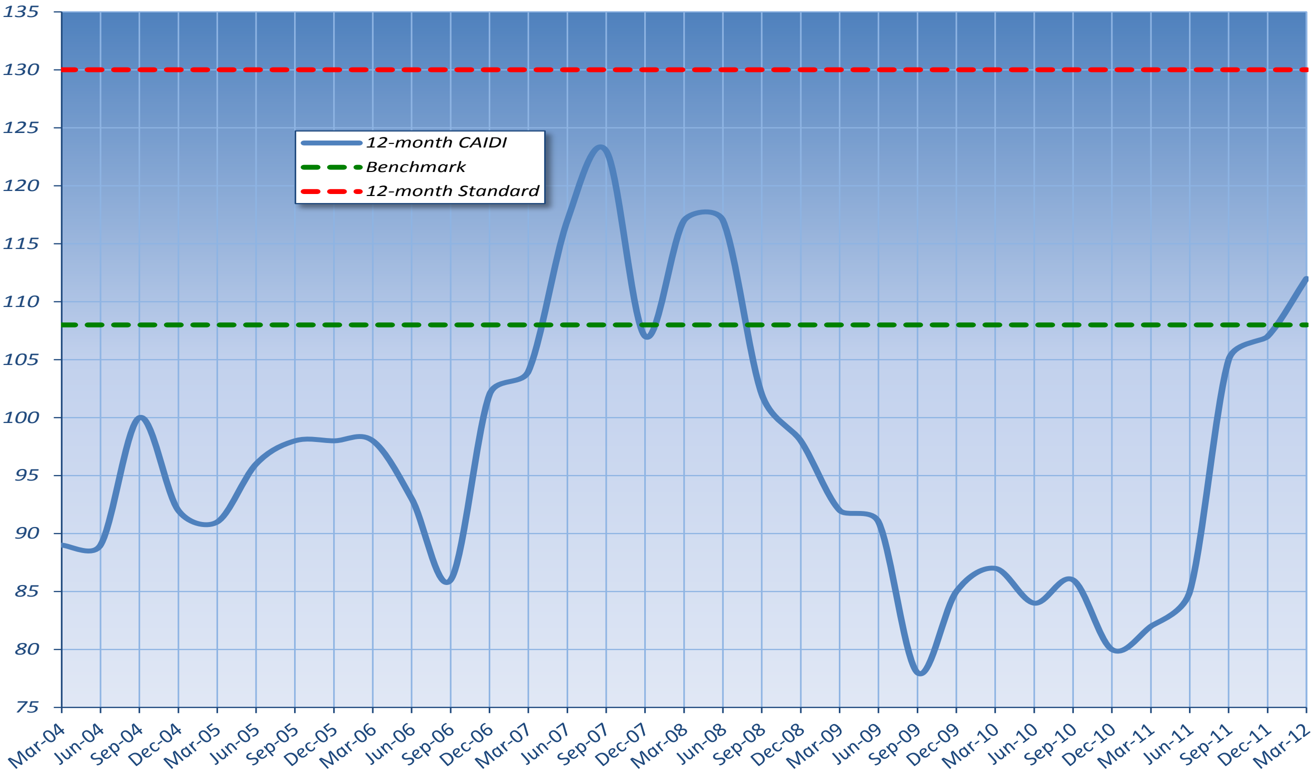


Figure 8 Duquesne System Average Interruption Frequency Index (interruptions per customer)

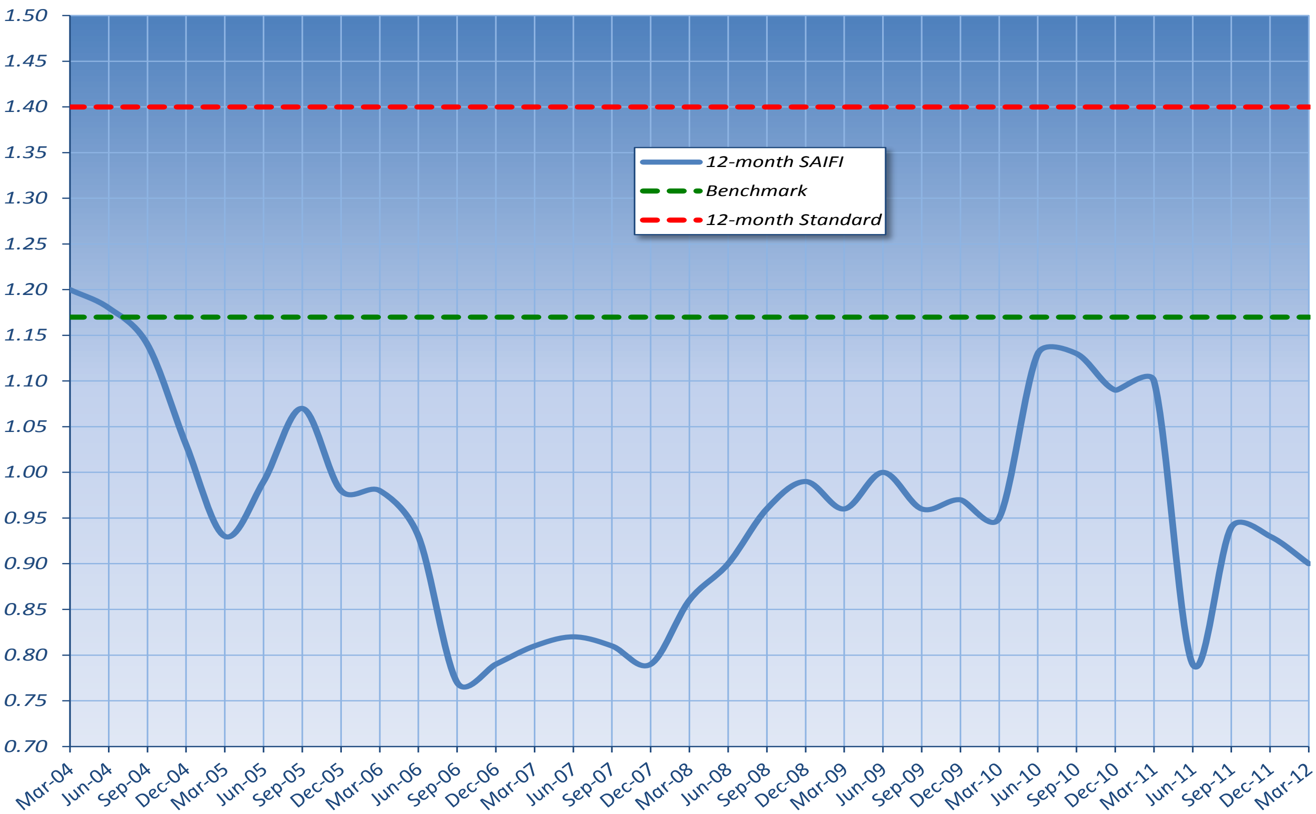


Figure 9 Duquesne outage causes (percent of total outages)

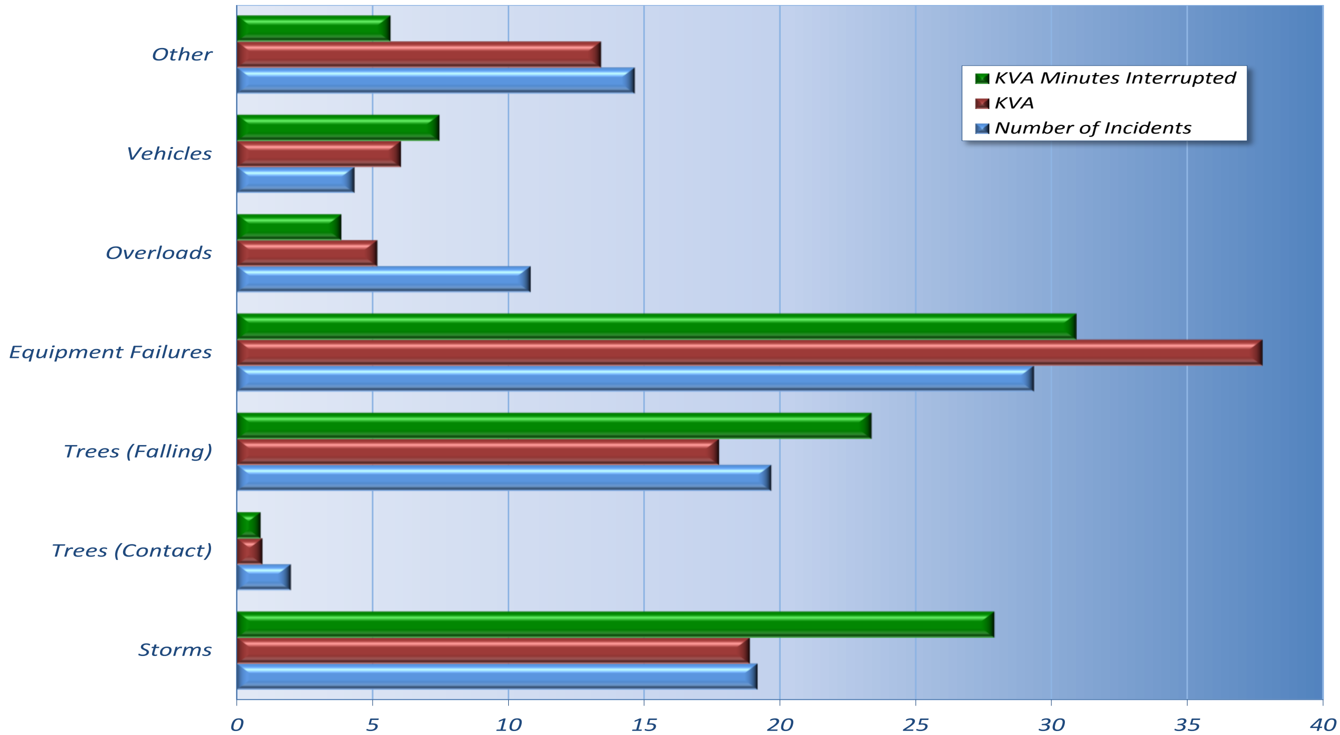
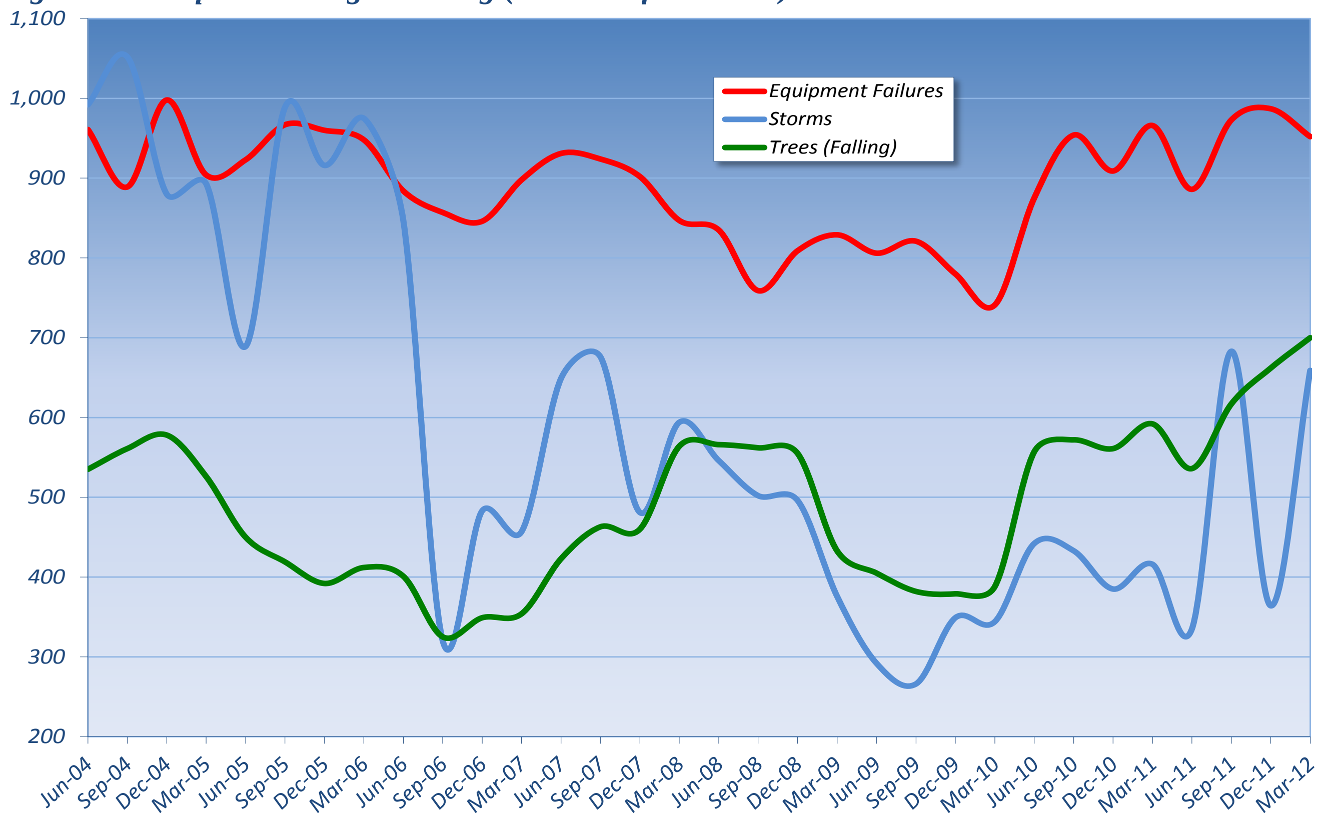


Figure 10 Duquesne outage tracking (number of incidents)



Metropolitan Edison Company

In 2011, Met-Ed experienced 633,044 customer interruptions with a total duration of 77.3 million customer minutes, or 21.6 percent lower than 2010. Three major events occurred in Met-Ed's service territory during 2011. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.[1]

- Feb. 2, 2011- Snow and freezing rain caused ice accumulations of 0.25 inches to 0.5 inches, as well as heavy winds; 56,679 customers affected (10 percent).
- Aug. 27, 2011 – Hurricane Irene caused outages resulting from the storm's heavy wind and rain; 224,735 customers were affected (41 percent).
- Sept. 5 to 9, 2011 – The remnants of Tropical Storm Lee caused widespread flooding, which necessitated that some lines be de-energized, and also contributed to accessibility issues, slowing response times; 56,278 customers were affected (10 percent).

Met-Ed's CAIDI for 2011 was 117 minutes, a decrease from 120 minutes in 2010, and right on the benchmark, and better than the standard by 16.4 percent. The CAIDI three-year average was 13 minutes below the standard of 129 minutes. For the 12-month average ending March 31, 2012, CAIDI was 140 minutes, or 19.7 percent above the benchmark. SAIDI decreased from 181 minutes in 2010 to 142 minutes in 2011, which is 5.2 percent better than the standard. Figure 11 shows the trend in the duration of customer interruptions for the Met-Ed system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Met-Ed's SAIFI decreased from 1.51 in 2010 interruptions per customer to 1.21 in 2011, a 19.8 percent decrease and 4.9 percent above the standard. For the three-year average SAIFI performance, Met-Ed was above the SAIFI three-year standard by 3.1percent. For the 12-month average ending March 31, 2012, SAIFI was 1.38, which is right on the 1.38 standard. Figure 12 shows the trend in the frequency of customer interruptions for the Met-Ed system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure was responsible for 26.9 percent of incidents, 22.4 percent of customers affected and 19.7 percent of interruption minutes. Non-preventable tree-related incidents caused 20.0 percent of the incidents, 24.1 percent of customers affected and 34.7 percent of interruption minutes. Animals caused 11.7 percent of the outages, 5.1 percent of customers affected and 3.8 percent of interruption minutes. Of the total number of incidents, 10.2 percent were assigned to Met-Ed's "unknown" category. This category ranked as the No. 4 cause for outages. Figure 13 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 14.

Met-Ed exceeded only the three year SAIFI standard. All other measures were below the standard. Met-Ed continues to implement a series of reliability improvement initiatives to "storm proof" or "harden" the three-phase distribution backbone, including aggressive tree-trimming and detailed circuit-condition assessments. To limit the scope of an outage, additional protective equipment, such as fuses, reclosers and remote-controlled switches were systematically added. Additional planned reliability

[1] Docket No. M-2011-2234902, M-2011-2266736 and M-2011-2267704.

improvements include the application of distribution automation to operate the system and additional protective equipment such as fuses and reclosers.[21]

[21] First Energy, Joint 2011 Annual Reliability Report – Pennsylvania Power Company, Pennsylvania Electric Company and Metropolitan Edison Company.

Figure 11 Met-Ed Customer Average Interruption Duration Index (minutes)

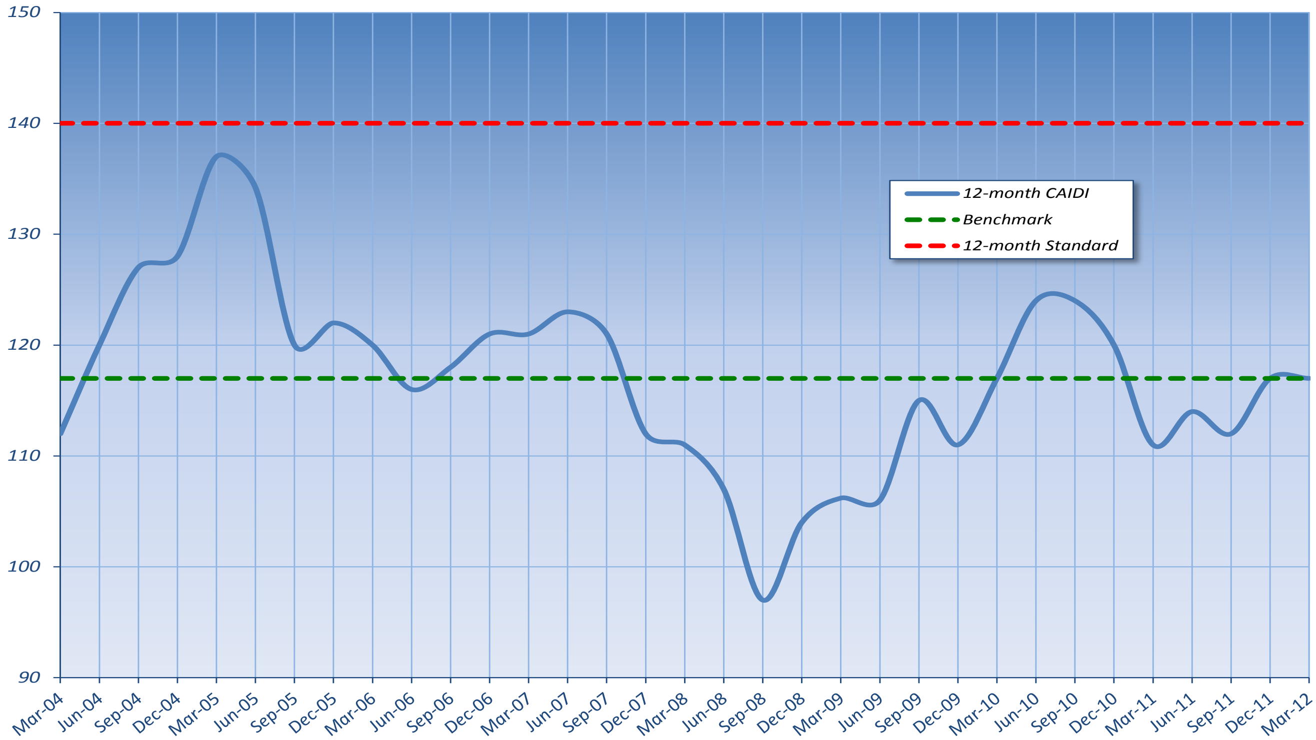


Figure 12 Met-Ed System Average Interruption Frequency Index (interruptions per customer)

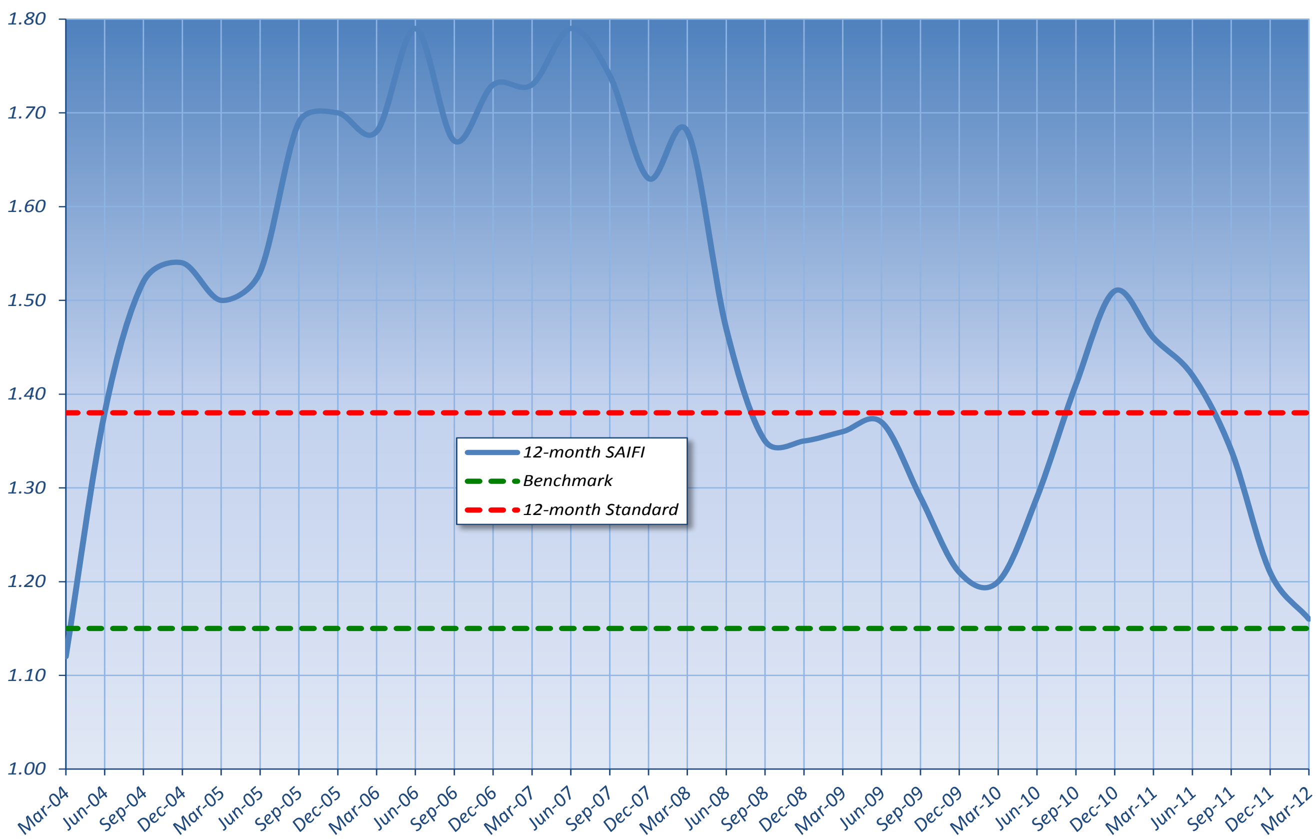


Figure 13 Met-Ed outage causes (percent of total outages)

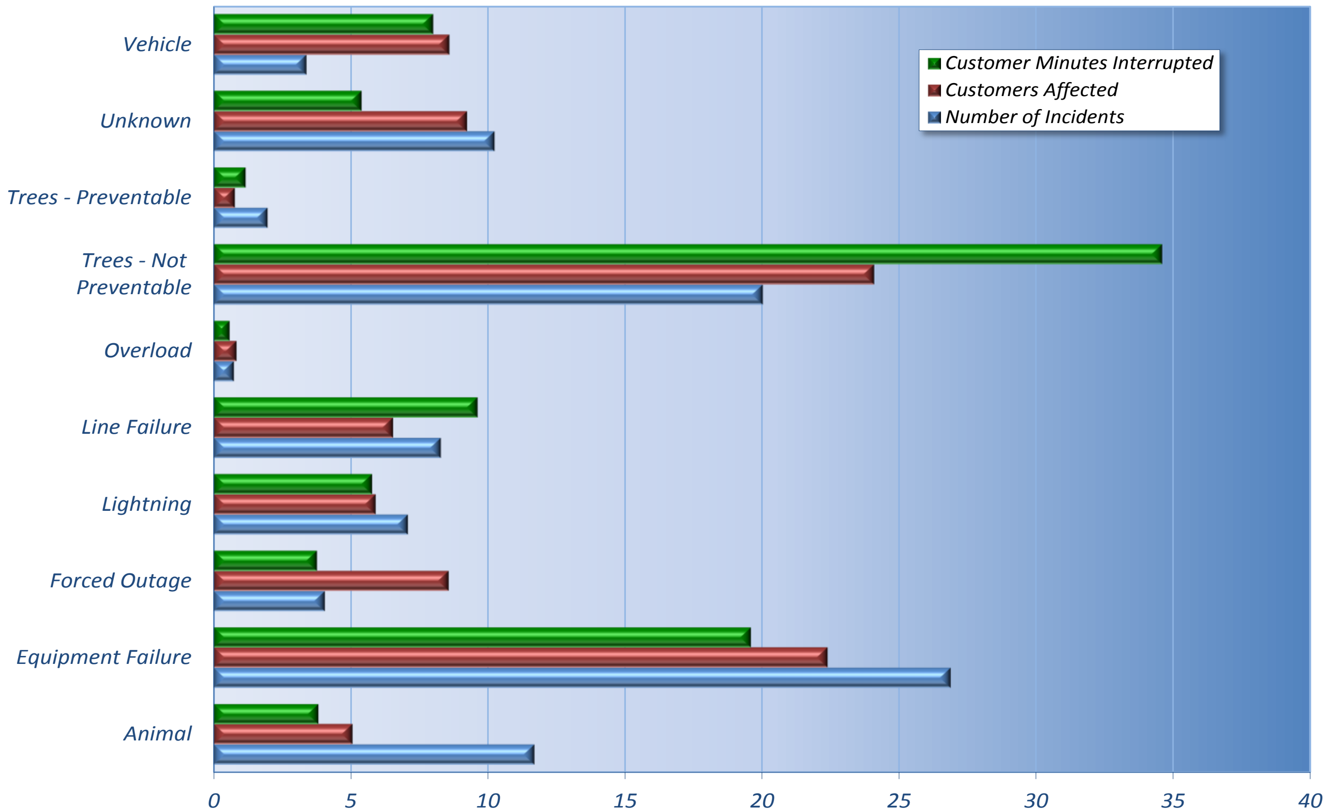
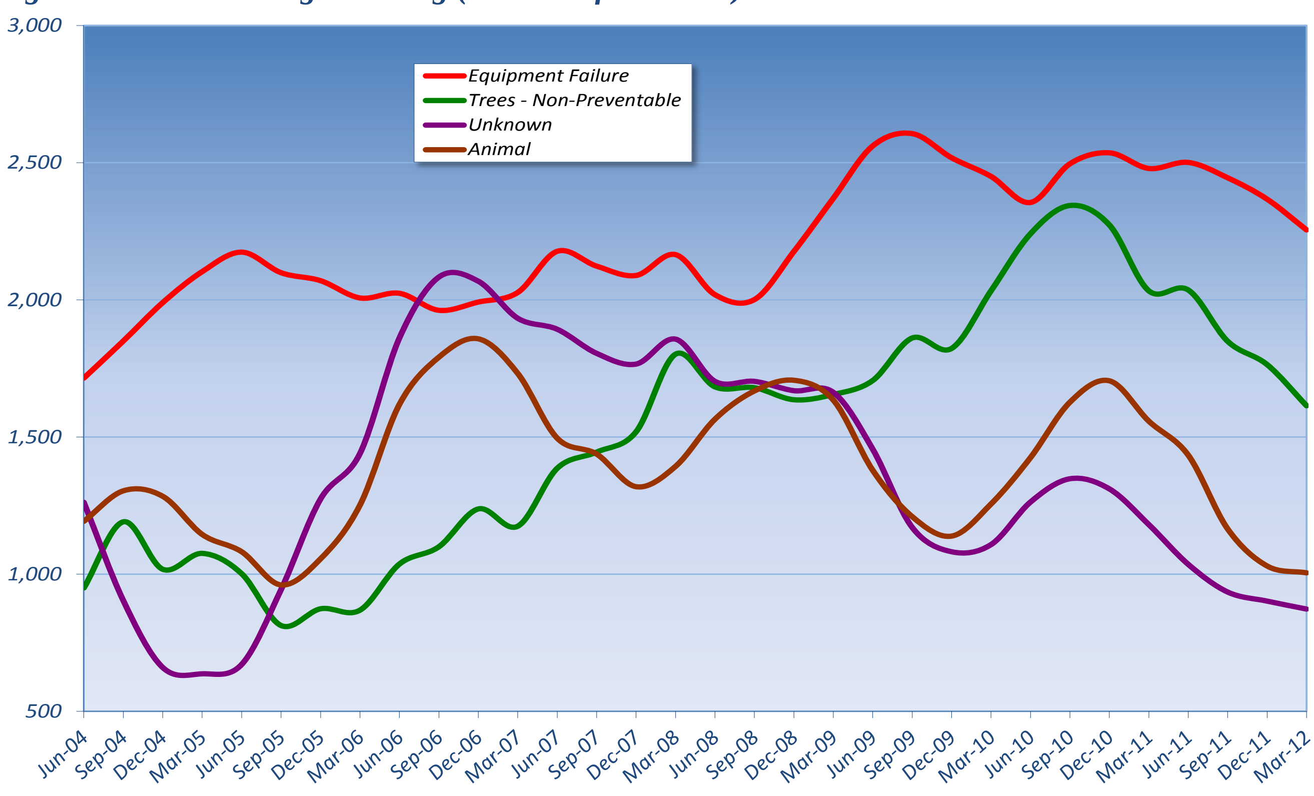


Figure 14 Met-Ed outage tracking (number of incidents)



PECO Energy Company

In 2011, PECO experienced 1,924,325 customer interruptions with a total duration of 260.2 million minutes, which was 11.6 percent higher than the 2010 outage minutes. Two major events occurred in PECO's service territory during 2011. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.[1]

- Aug. 27 to Sep. 3, 2011 – heavy rain and winds from Hurricane Irene impacted PECO territory, causing trees and tree limbs to fall on or damage distribution equipment and aerial facilities; 551,102 customers were affected (32.7 percent).
- Oct. 29 to Nov.2, 2011 – Heavy snow and rain caused damage to vegetation in PECO territory, downing aerial electric facilities; 275,710 customers were affected (16.4 percent).

PECO's CAIDI increased from 126 minutes in 2010 to 135 minutes in 2011, which was 7.1 percent higher than the previous year and 0.7 percent above the standard of 134 minutes. CAIDI has been near the standard since December 2009. The CAIDI three-year average was 0.8 percent below the standard of 123 minutes. For the 12-month average ending March 31, 2012, CAIDI was 134 minutes, which is right on the standard. SAIDI increased from 137 minutes in 2010 to 154 minutes in 2011, or 12.4 percent increase above the benchmark of 138. Figure 15 depicts the trend in the duration of customer interruptions for the PECO system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

PECO's SAIFI increased from 1.09 interruptions in 2010 to 1.14 in 2011, which was a 4.6 percent increase in outage frequency and 8.9 percent better than the benchmark of 1.23. SAIFI has remained below the benchmark for over 10 years. The SAIFI three-year average was 20.7 percent below the standard of 1.35. For the 12-month average ending March 31, 2012, SAIFI was 0.89, or 40 percent below the benchmark. Figure 16 depicts the trend in the frequency of service interruptions for the PECO system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure was responsible for 36.6 percent of the incidents, 33.0 percent of customers affected and 29.5 percent of interruption minutes. Tree-related outages involving broken branches and tree trunks or uprooted trees caused 17.9 percent of the incidents, 23.6 percent of customers affected and 29.9 percent of interruption minutes. Vegetation in-growth caused 9.9 percent of outages, 8.0 percent of customers affected and 29.9 percent of interruption minutes. Of the total number of incidents, 13.9 percent were categorized as "other." Figure 17 shows the distribution of causes of service outages occurring during 2010 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 18.

PECO exceeded the 2011 CAIDI 12-month standard by 1 minute. PECO met all of the other standards. PECO's reliability metrics were impacted by storms. The February 2, 2011 ice storm affected 9.7 percent of customers and was included in the reliability metrics. Without this storm, PECO would have met all of the standards.[22]

[1] Docket Nos. M-2011-2265081 and M-2011-2277242.
[22] PECO, 2011 Electric Distribution Company Annual Reliability Report, Revised August 2012.

Each year, PECO analyzes a minimum of its bottom 5 percent performing circuits and takes actions such as installing reclosers, identifying and repairing problems through inspections, vegetation management, and upgrading fuses.

Additionally, through distribution automation, PECO installed nearly 300 3-phase reclosers in automated loop schemes in the last three years, bringing the total to nearly 1,500 reclosers. These reclosers automatically reduce the numbers of customers affected by outages and restore service to sections of circuits where repairs are not needed. Reclosers were primarily installed in Chester, Delaware, Montgomery and Bucks counties, with selected circuits addressed in Philadelphia and York County.[23]

[23] PECO, 2012 Summer Readiness Overview, June 5, 2012.

Figure 15 PECO Customer Average Interruption Duration Index (minutes)

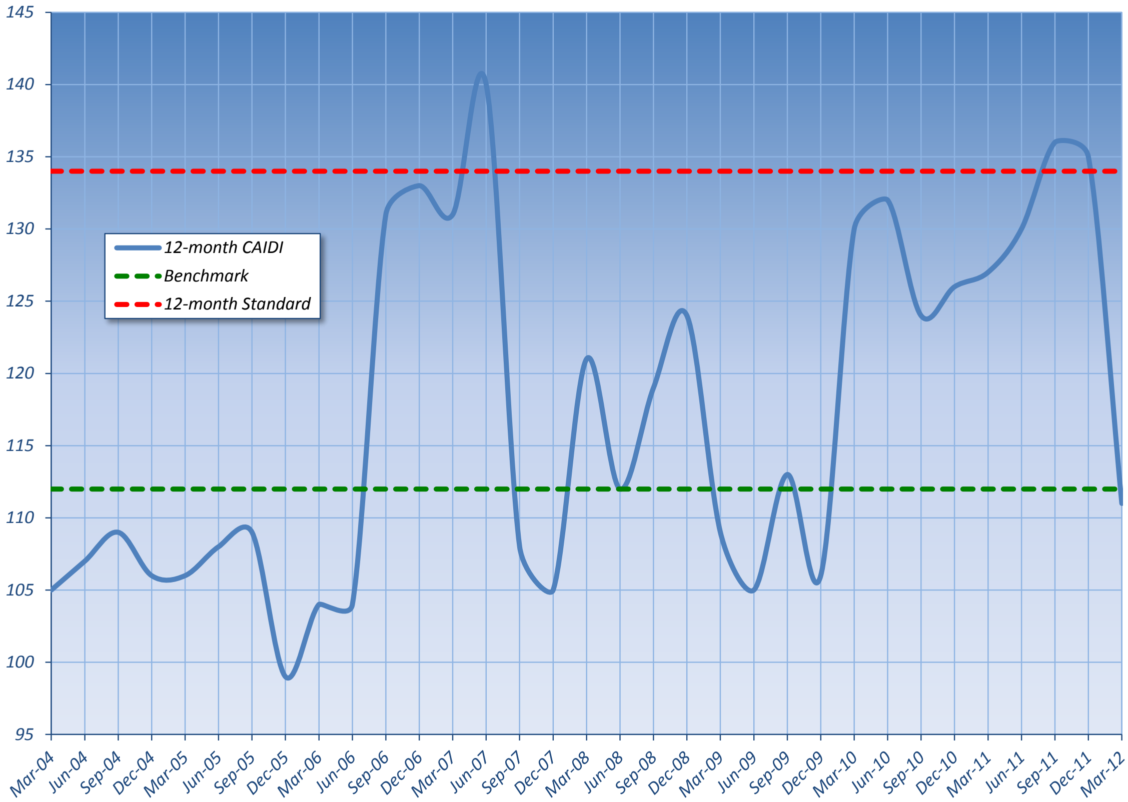


Figure 16 PECO System Average Interruption Frequency Index (interruptions per customer)

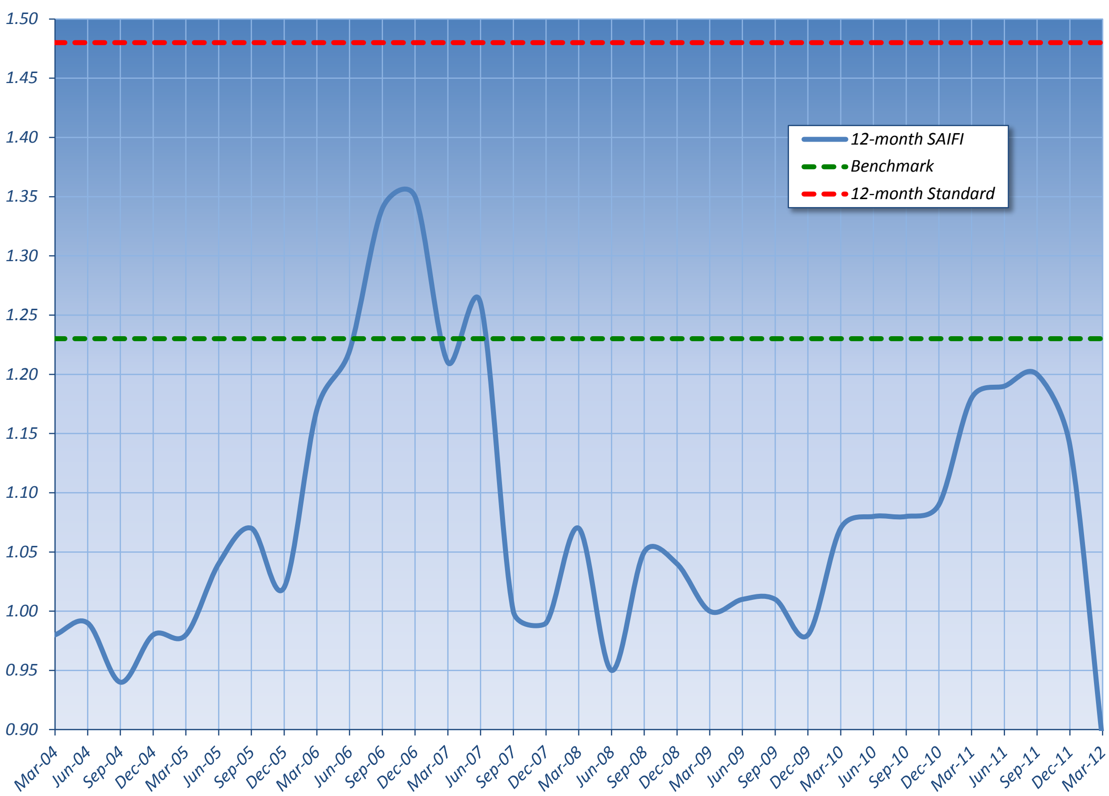


Figure 17 PECO outage causes (percent of total outages)

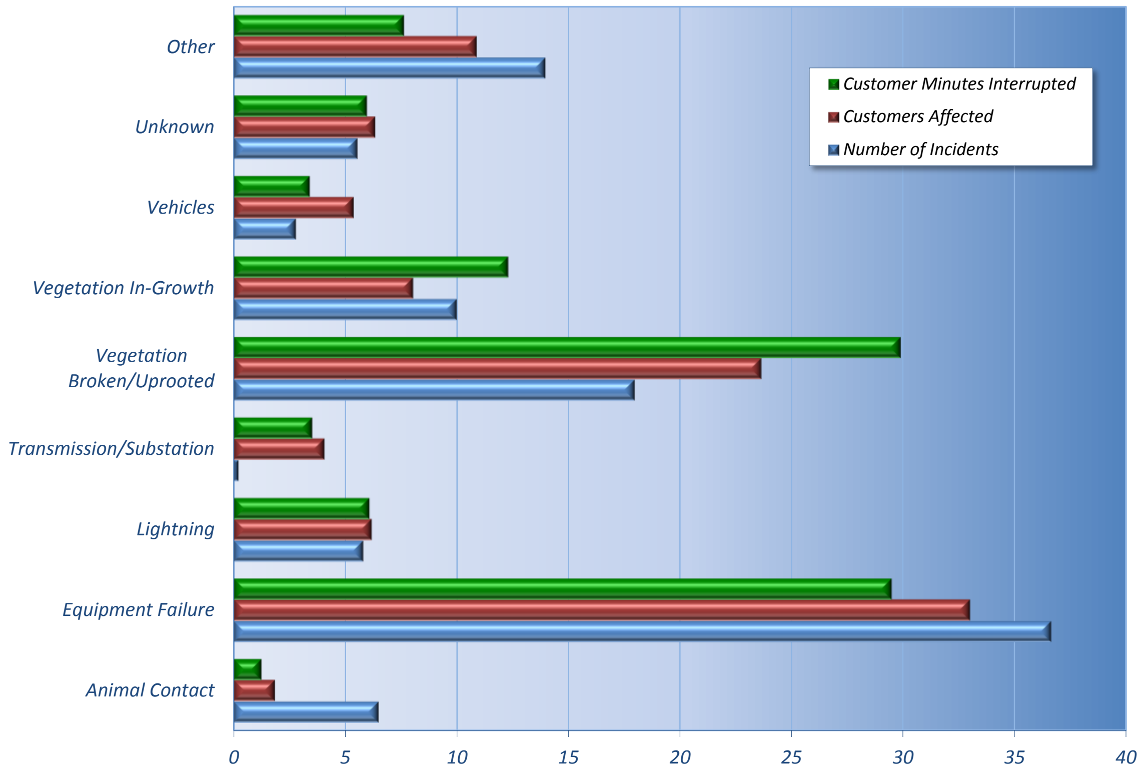
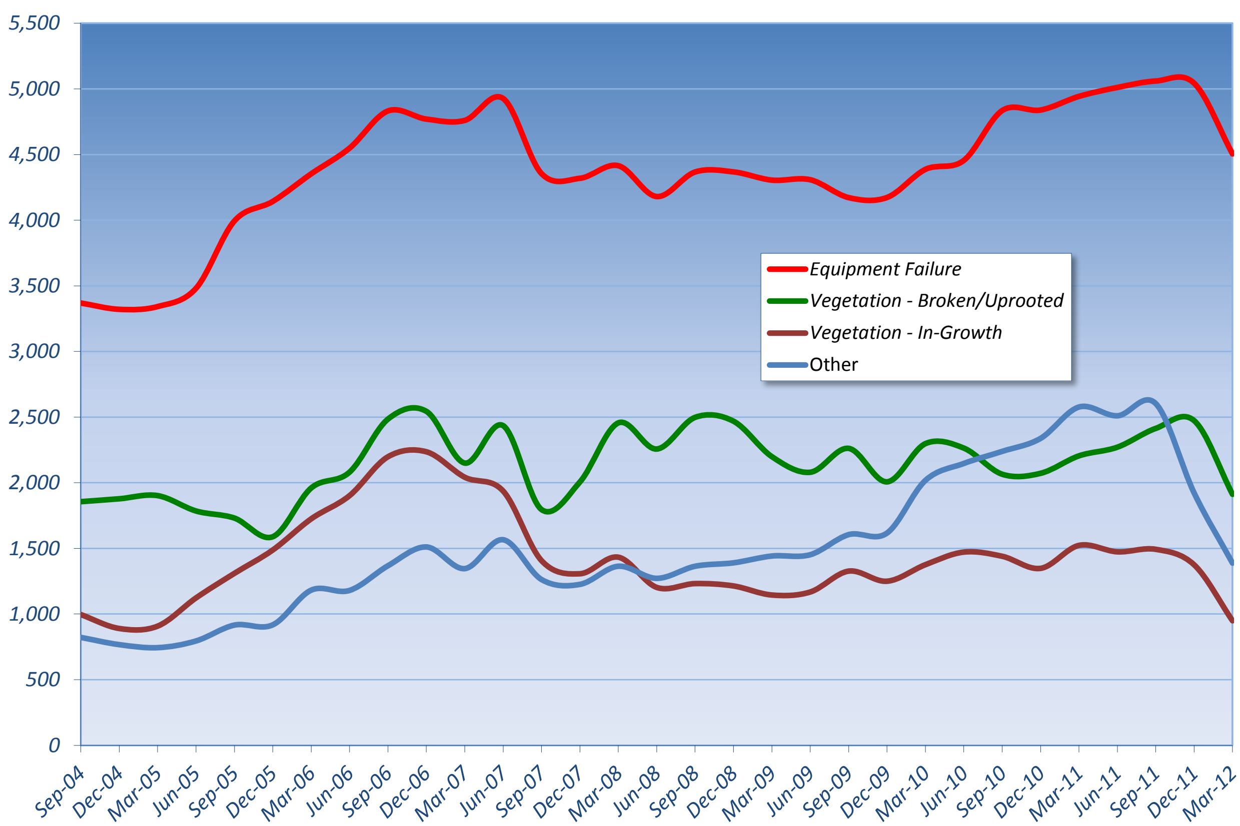


Figure 18 PECO outage tracking (number of incidents)



Pennsylvania Electric Company

In 2011, Penelec experienced 820,085 customer interruptions with a total duration of 136,653,998 million customer minutes, or 44 percent higher in minutes interrupted than 2011. Penelec was approved for three major events in their service area in 2011. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.[24]

- May 2 to June 1, 2011 – A strong thunderstorm produced high winds and rain; 74,725 customers were affected (12.8 percent).
- Aug. 28 to Sept. 5, 2011 – Hurricane Irene caused high winds and heavy rain; 60,737 customers were affected (10.4 percent).
- Sept. 7 to Sept. 9, 2011 – Rain and heavy localized flooding resulting from the remnants of Tropical Storm Lee caused accessibility issues, which delayed restoration efforts and caused some customers to be de-energized for safety reasons; 13,927 customers were affected (2.3 percent).[25]

Penelec's CAIDI increased from 124 minutes in 2010 to 167 minutes in 2011, which was a 6.0 percent increase in CAIDI minutes and 36.8 percent over the benchmark of 117 minutes. CAIDI has been trending downward since the second quarter of 2010 until the last quarter of 2011. The CAIDI three-year average was seven minutes above the standard of 129. For the 12-month average ending March 31, 2012, CAIDI was 141 minutes, or 20.5 percent above the benchmark. SAIDI increased from 162 minutes in 2010 to 233 minutes in 2011, or 65 percent above the benchmark set at 141. Figure 19 depicts the trend in the duration of customer interruptions for the Penelec system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Penelec's SAIFI increased from 1.31 service interruptions per customer in 2010 to 1.40 in 2011, which was a 6.9 percent increase in outage frequency and 11.1 percent above the benchmark of 1.26.The SAIFI three-year average was 1.31 or 5.8 percent better than the standard of 1.39, which shows a positive trend. For the 12-month average ending March 31, 2011, SAIFI was 1.52, or 20.6 percent below the standard. Figure 20 shows the trend in the frequency of service interruptions for the Penelec system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure was responsible for 29.8 percent of incidents, 38.0 percent of customers affected and 27.9 percent of interruption minutes. Penelec has identified porcelain cutout failures to be a large contributor to equipment failure outages and has been replacing them with polymer cutouts as a preventative measure. Non-preventable tree-related incidents accounted for 15.9 percent of total incidents, 17.0 percent of customers affected and 40.8 percent of interruption minutes. Animals contributed to 8.3 percent of total incidents, 1.9 percent of customers affected and 1.0 percent of interruption minutes. Outages in the "unknown" category represented 14.6 percent of incidents, 9.8 percent of customers affected and 7.3 percent of interruption minutes. Figure 21 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 22.

[24] Docket Nos. M-2011-2265890, M-2011-2267655 and M-2011-2252314.

[25] Most major events are filed because the number of customers affected exceeds 10% of total customers; however, 52 Pa. Code 57.192 also defines a major event as "an unscheduled interruption of electric service resulting from an action taken by an EDC to maintain the adequacy and security of the electrical system…, which affects at least one customer." This major event was filed and approved under this section of 52 Pa. Code 57.192.

Penelec exceeded the 12-month CAIDI and SAIDI standards for 2011 and the three year average standards for CAIDI and SAIDI. Penelec completed a main line protection program in 2011 that ensured that circuits carrying more than 300 customers were equipped with a mid-line recloser with coordinating fuse protection in every mainline tap. Full circuit protection coordination reviews that began in 2009 continued in 2011 and 2012. [26]

[26] First Energy, Joint 2011 Annual Reliability Report – Pennsylvania Power Company, Pennsylvania Electric Company and Metropolitan Edison Company.

Figure 19 Penelec Customer Average Interruption Duration Index (minutes)

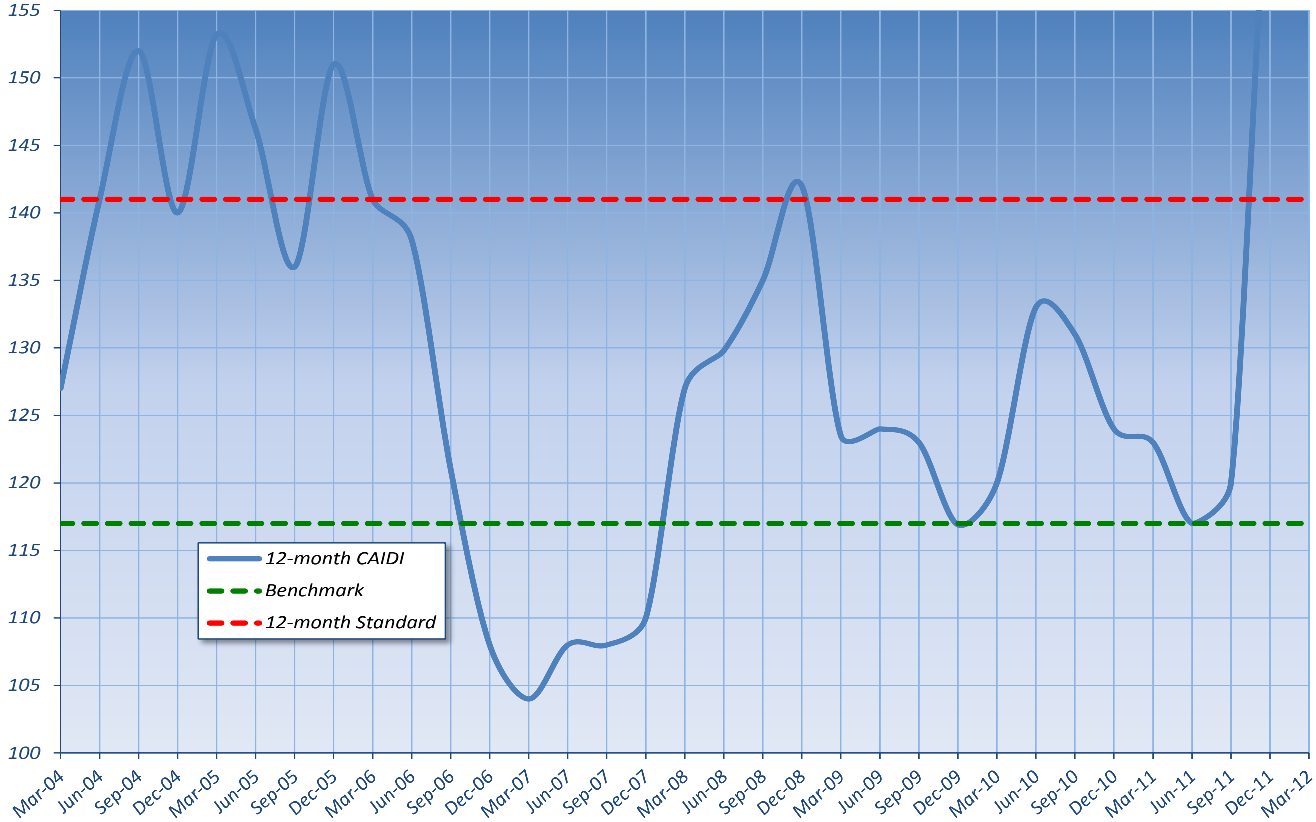


Figure 20 Penelec System Average Interruption Frequency Index (interruptions per customer)

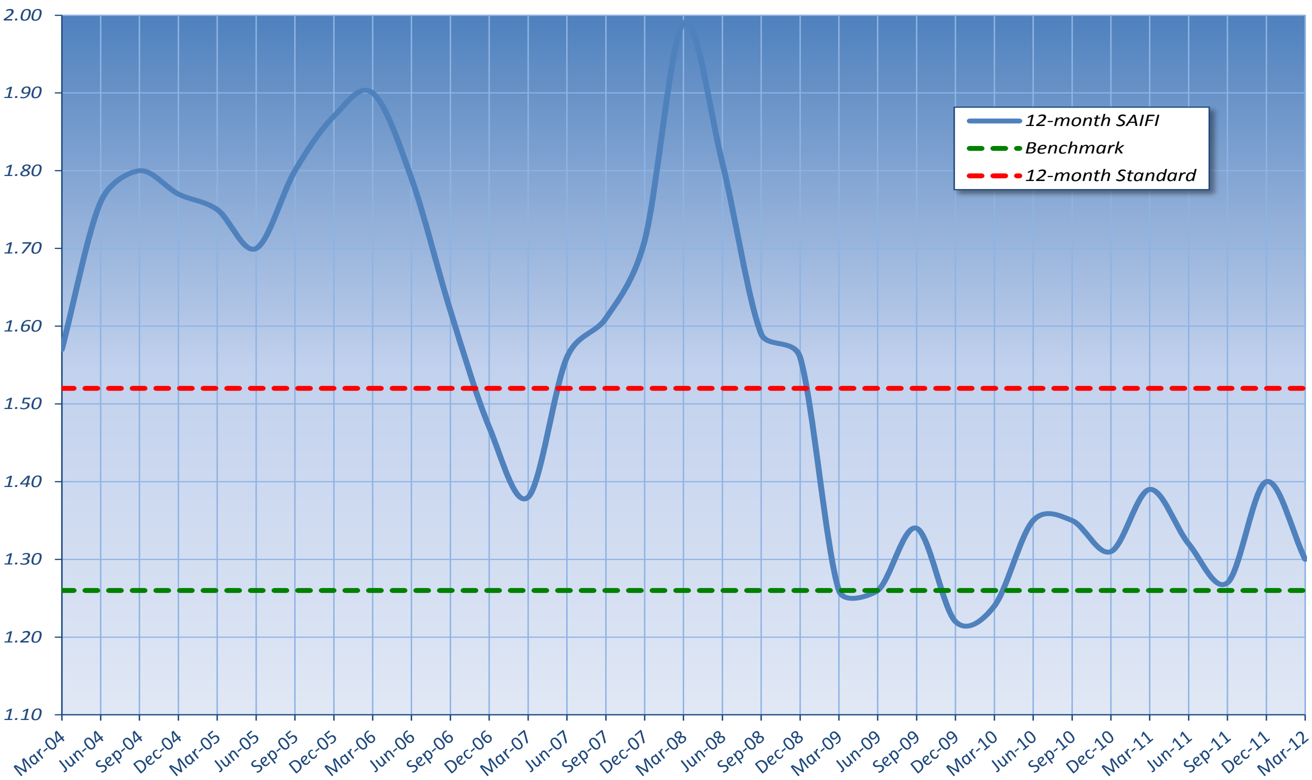


Figure 21 Penelec outage causes (percent of total outages)

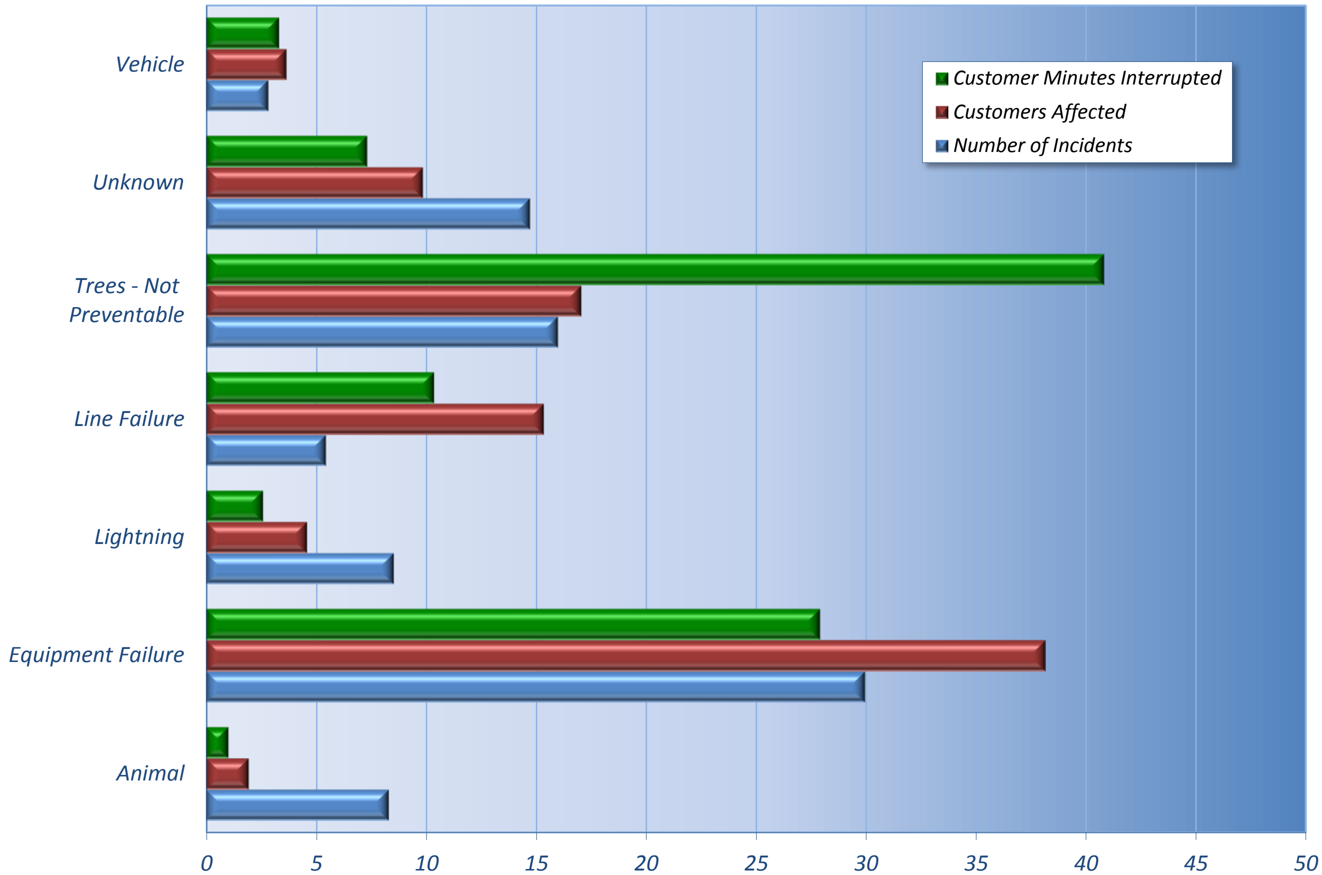
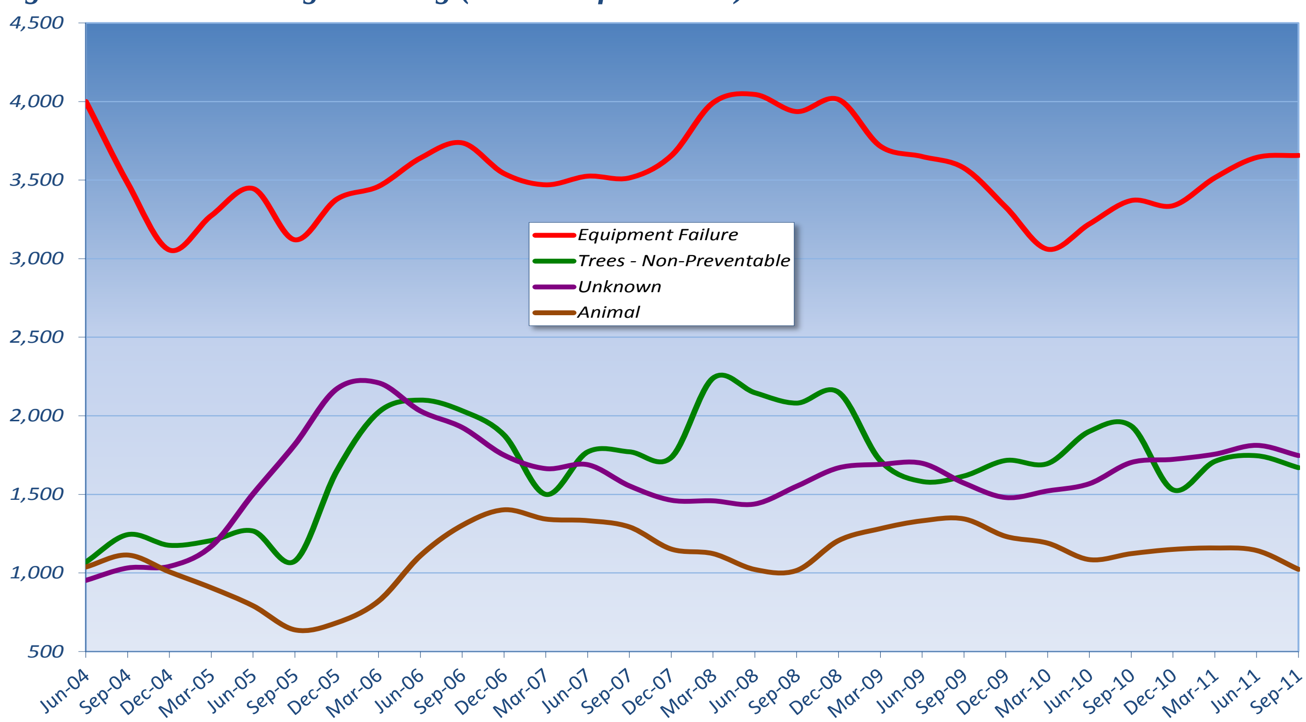


Figure 22 Penelec outage tracking (number of incidents)



Pennsylvania Power Company

In 2011, Penn Power experienced 160,948 customer interruptions with a total duration of 22.7 million minutes, or 50.2 percent higher than 2010. Two major events occurred in Penn Power's service territory during 2011. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.[27]

- April 17, 2011 – A strong low pressure system produced high winds and rain; 22,009 customers were affected (13.9 percent).
- May 24, 2011 – A conductor sleeve failure on a 138 kV transmission line caused adjacent breakers to trip and for the rest of the transmission line to fail, causing damage to 69kV distribution circuits; 42,218 customers were affected (26.7 percent).

Penn Power's CAIDI increased from 95 minutes in 2010 to 138 minutes in 2011, which was a 45.3 percent increase in CAIDI minutes and 37 minutes over the benchmark, or 36.6 percent. Penn Power has consistently met the CAIDI standard since June 2008 and this is only the second time Penn Power's annual CAIDI has exceeded the benchmark of 101 minutes. The CAIDI three-year average was five minutes above the standard of 111 minutes, or 4.5 percent. For the 12-month average ending March 31, 2012, CAIDI was 121 minutes, or 19.8 percent above the benchmark. SAIDI increased from 95 minutes in 2010 to 143 minutes in 2011, or 26.5 percent above the benchmark. Figure 23 depicts the trend in the duration of customer interruptions for the Penn Power system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Penn Power's SAIFI was 2 percent higher than last year's, increasing from 1.01 service interruptions per customer in 2010 to 1.03 in 2011, which is 8 percent better than the benchmark of 1.12. SAIFI has been better than the benchmark for the past three years. The SAIFI three-year average was 0.93, or 24.4 percent below the standard of 1.23, and continues to trend downward. For the 12-month average ending March 31, 2012, SAIFI was 1.34 or 19.6 percent below the benchmark. Figure 24 shows the trend in the frequency of service interruptions for the Penn Power system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, non-preventable tree-related outages represented 12.0 percent of the incidents, 23.8 percent of customers affected and 34.0 percent of interruption minutes. Equipment failure accounted for 5.8 percent of the incidents, 18.6 percent of customers affected and 7.8 percent of interruption minutes. Porcelain cutouts were found to be the major cause for cutout-related outages, resulting in the discontinued use of porcelain cutouts for new installations, and older porcelain cutouts are being replaced with new polymer cutouts when they fail. Line failure resulted in 5.7 percent of incidents, 11.1 percent of customers affected and 13.2 percent of interruption minutes. Lightning caused 13.7 percent of outages, 18.1 percent of customers affected and 17.1 percent of interruption minutes. Figure 25 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 26.

Penn Power exceeded the 12-month CAIDI standard and the three year average CAIDI standard. In 2011, Penn Power maintained its procedure of reviewing outage causes and weather, minimizing the impact and size of outages by installing protective devices, tree trimming, and tweaks to shift coverage

[27] Docket Nos. M-2011-2241256 and M-2011-2251467.

strategy in order to increase reliability and improve response time. Also, 43 circuits were assessed for age and damaged equipment. Infrared inspections were also done on the nine worst performing circuits.[28]

[28] First Energy, Joint 2011 Annual Reliability Report – Pennsylvania Power Company, Pennsylvania Electric Company and Metropolitan Edison Company.

Figure 23 Penn Power Customer Average Interruption Duration Index (minutes)

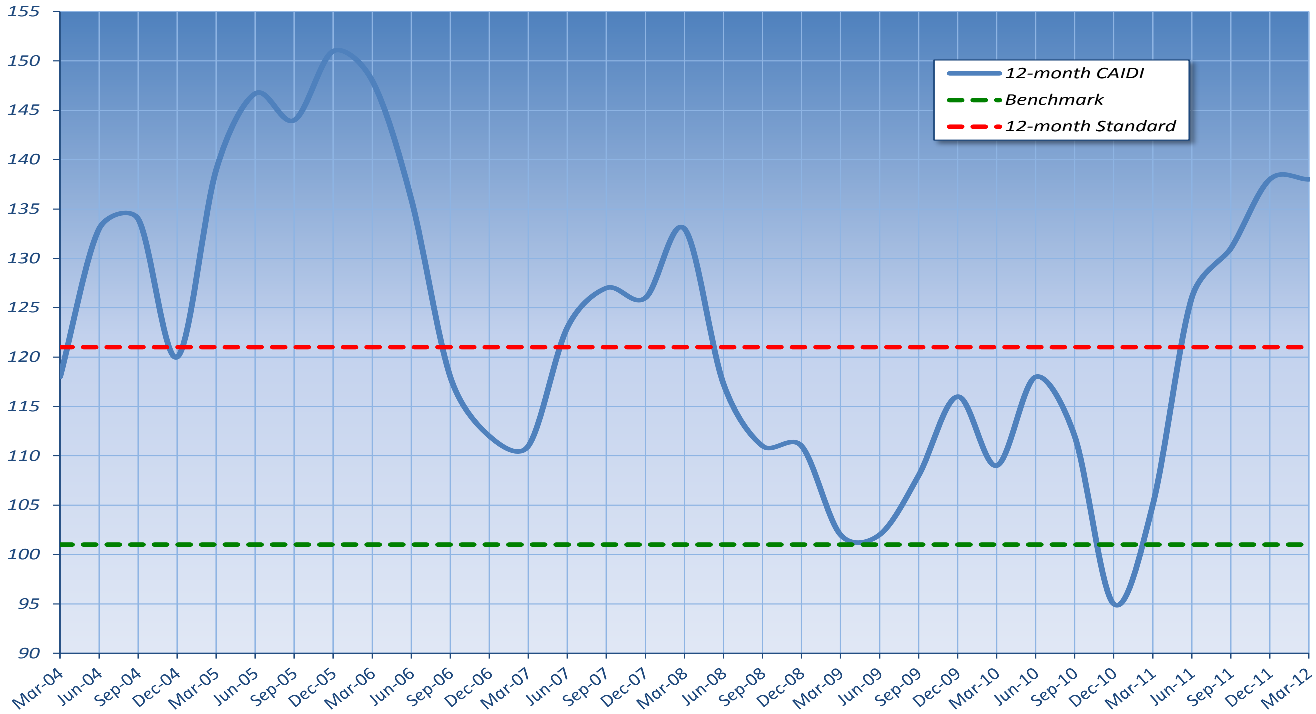


Figure 24 Penn Power System Average Interruption Frequency Index (interruptions per customer)

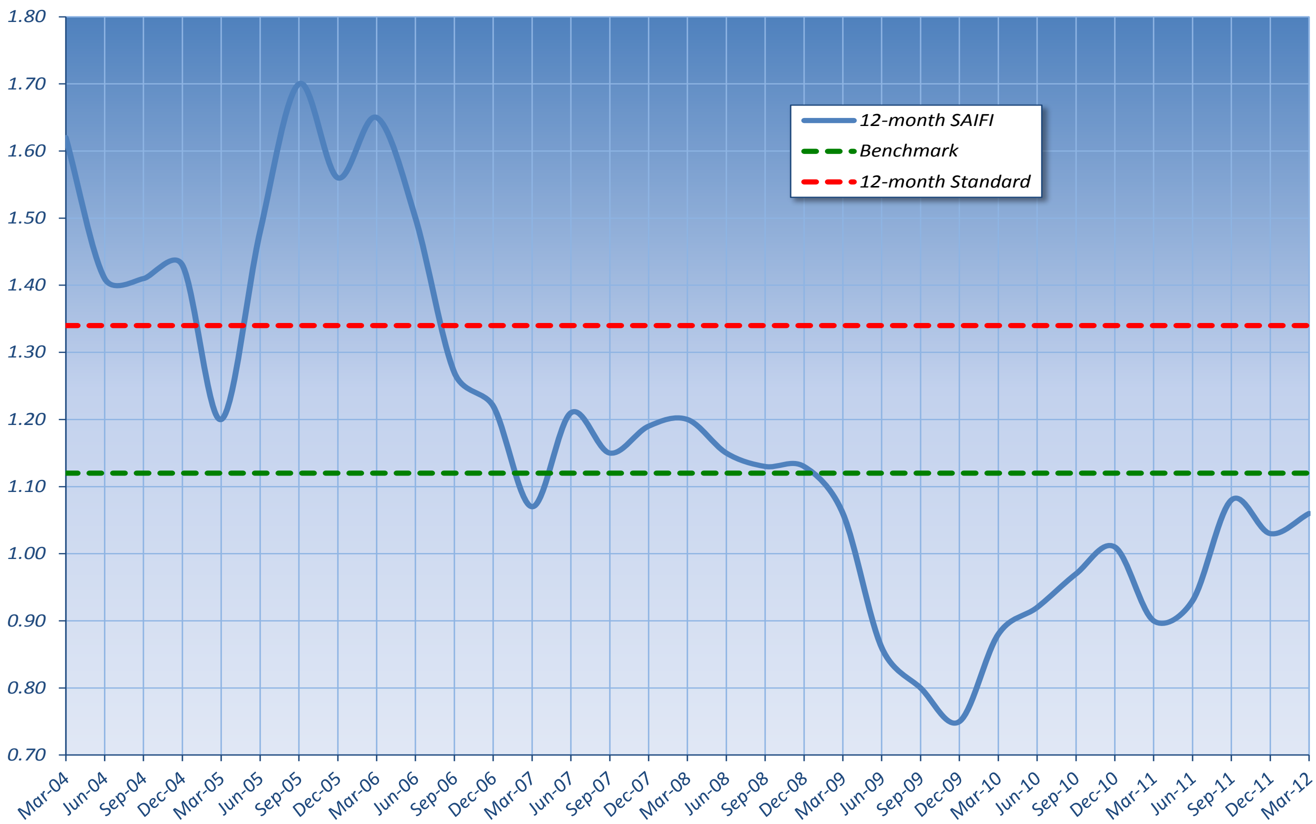


Figure 25 Penn Power outage causes (percent of total outages)

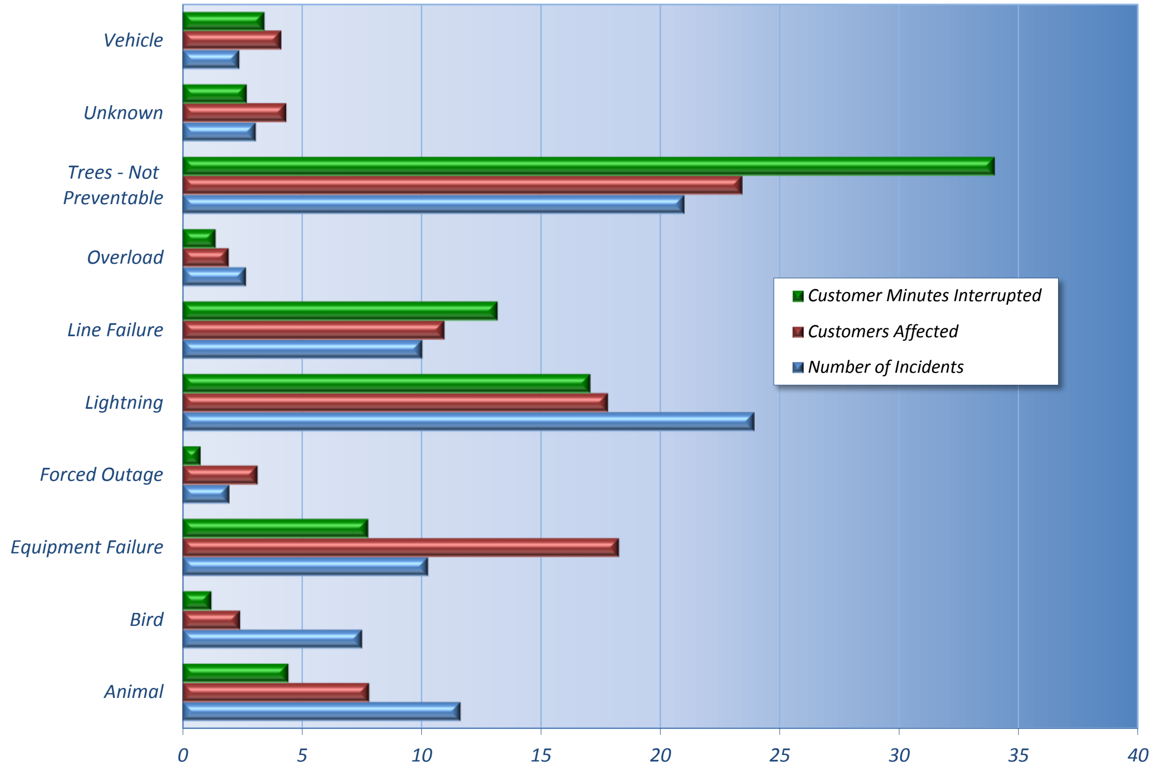
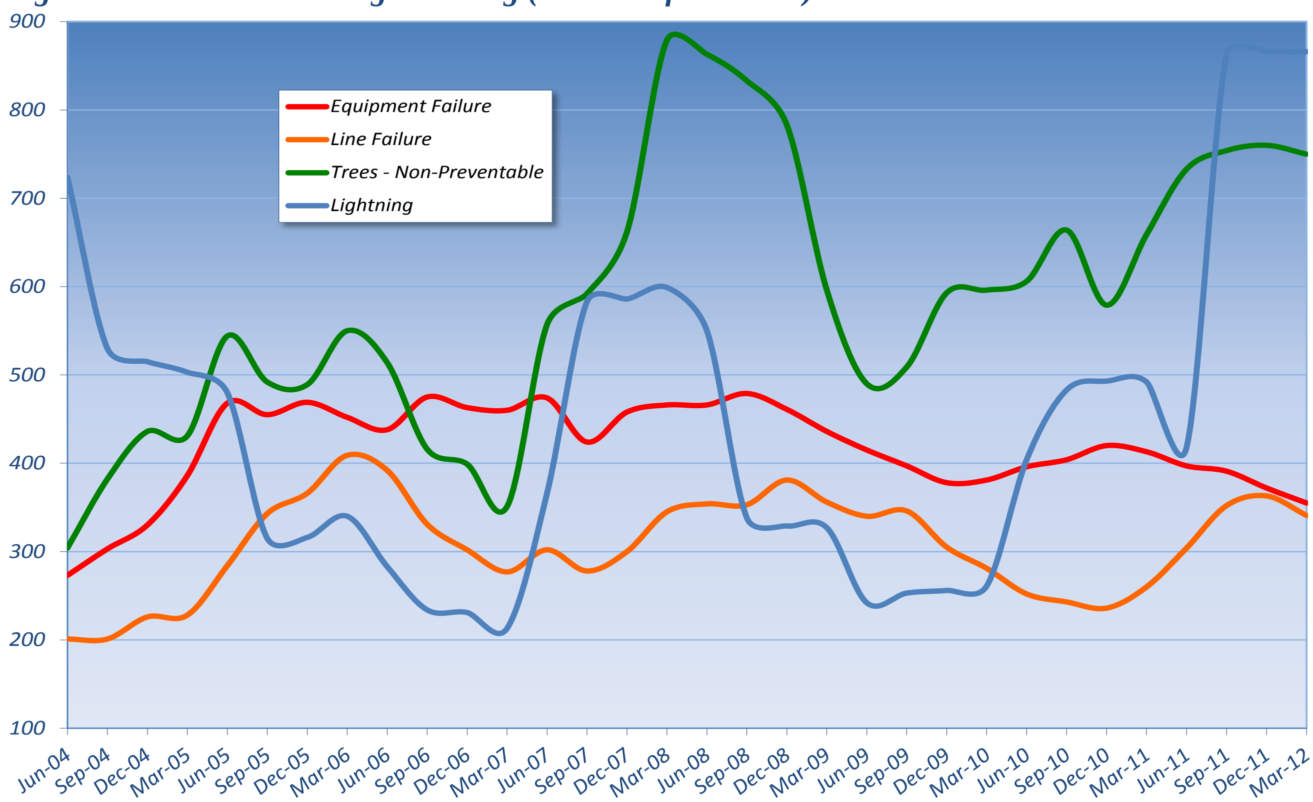


Figure 26 Penn Power outage tracking (number of incidents)



Pike County Light & Power Company

Pike County is the westernmost portion of Orange & Rockland's Northern Operating Division. This area is primarily fed from two 34.5-kV feeders that emanate from New York substations. Thus, sustained interruptions are usually smaller, affecting fewer customers, and will take a longer amount of time per customer to restore service.

In 2011, Pike County experienced 3,218 customer interruptions with a total duration of 969,660 minutes, which was 19.9 percent higher than that which was reported last year. The calculation of the 2011 reliability indices excludes outage data relating to six major events, which were approved by the Commission.[29]

- Feb. 11, 2011 – A primary wire came off of its insulating pin, causing a failure of a main line section of primary cable; 2,512 customers were affected (55.9 percent).
- Feb. 25, 2011 – A rain storm caused a primary conductor to contact the cross arm, causing a mainline sectionalizing device to lock out; 2,278 customers were affected (50.6 percent).
- June 9, 2011 – An out-of-right-of-way tree limb fell during a thunderstorm on to a double-circuit section of lines; 3,675 customers were affected (81.8 percent).
- July 8, 2011 – A damaged insulator allowed one of the lines to make contact with the pole, causing the pole to catch on fire and necessitating the de-energizing of the line to additional customers in order to initiate repairs; 2,505 customers were affected (55.8 percent).
- Aug. 16 to Aug. 17, 2011 – A motor vehicle struck a utility pole, splitting it in half, causing a need to de-energize the circuit; 2,266 customers were affected (50.4 percent).
- July 26, 2011 – High winds and heavy rains caused damage to 45 spans of wire and five transformers; 4,366 customers were affected (97.2 percent).

Pike County's CAIDI increased from 255 minutes in 2010 to 297 minutes in 2011, which was a 16.5 percent increase in CAIDI minutes. The CAIDI three-year average was 51 minutes (26 percent) above the standard of 192 minutes. For the 12-month average ending March 31, 2012, CAIDI was 217 minutes, or 24.7 percent above the benchmark. SAIDI went from 153 minutes in 2010 to 216 minutes in 2011. Figure 27 depicts the trend in the duration of customer interruptions for the Pike County system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Pike County's SAIFI increased from last year at 0.60 to 0.73, which is 20 percent above the benchmark of 0.61. For the 12-month average ending March 31, 2012, SAIFI was 0.55, or 9.8 percent below the benchmark. Figure 28 depicts the trend in the frequency of service interruptions for the Pike County system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, the major cause of service outages was tree contact with 60.6 percent of interruptions affecting 51.3 percent of customers for 76.5 percent of interruption minutes. The change to a more frequent (three-year) tree-trimming cycle is expected to help to contain the number of these types of interruptions. Equipment failure accounted for 14.1 percent of the outages, 13.1 percent of customers affected and 4.8 percent of interruption minutes. Animal contact was responsible for 7.0 percent of total outages, 19.1 percent of customers affected and 5.6 percent of interruption minutes. Figure 29 shows

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[29] Docket Nos. M-2011-2228288, M-2011-2230587, M-2011-2248964, M-2011-2256197, M-2011-2264931 and M-2011-2264928.

the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 30.

Pike exceeded the 12-month CAIDI and SAIDI standards and the three year average CAIDI and SAIDI standards. Pike had two weather events that did not qualify for major event exclusions but negatively impacted Pike's reliability metrics. Pike is scheduled to complete a full cycle tree trimming in 2012. Pike has instituted a Circuit Ownership Program where circuits are patrolled by 'circuit owners' who identify and address circuit issues including tree issues.[30]

[30] Pike County Light & Power Company, Annual Electric Reliability Report 2011 System Performance.

Figure 27 Pike County Customer Average Interruption Duration Index (minutes)

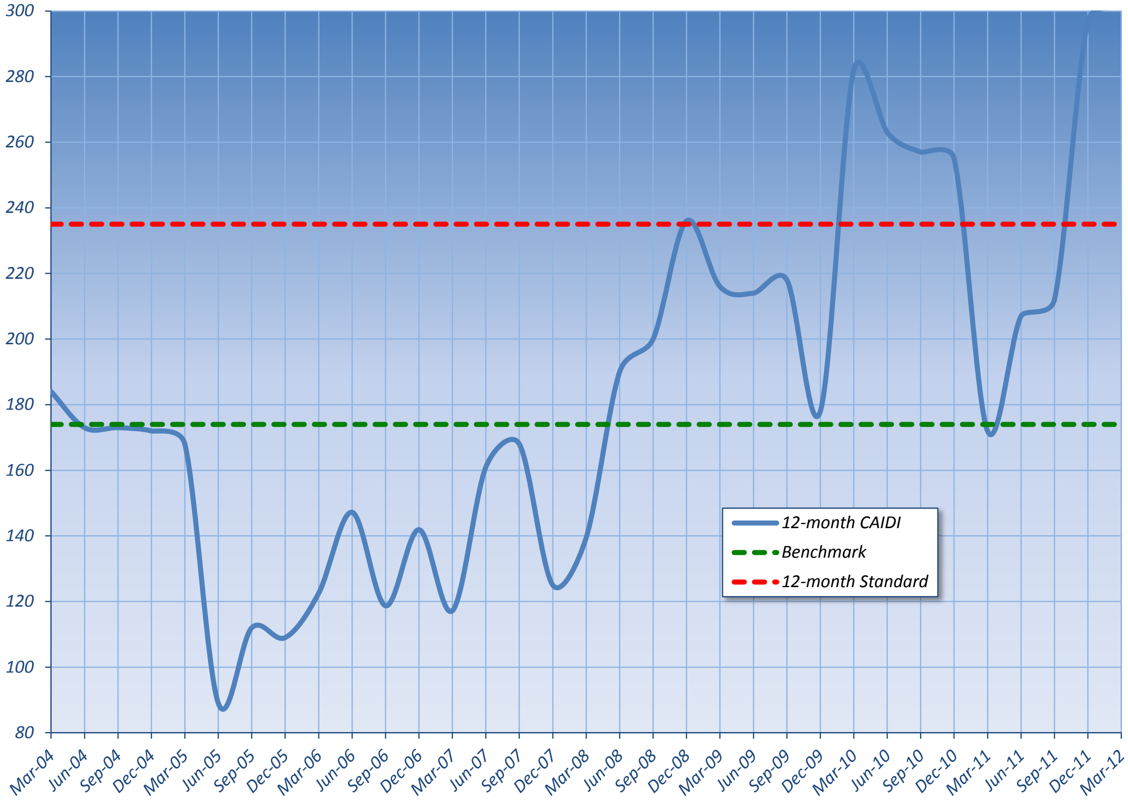


Figure 28 Pike County System Average Interruption Frequency Index (interruptions per customer)

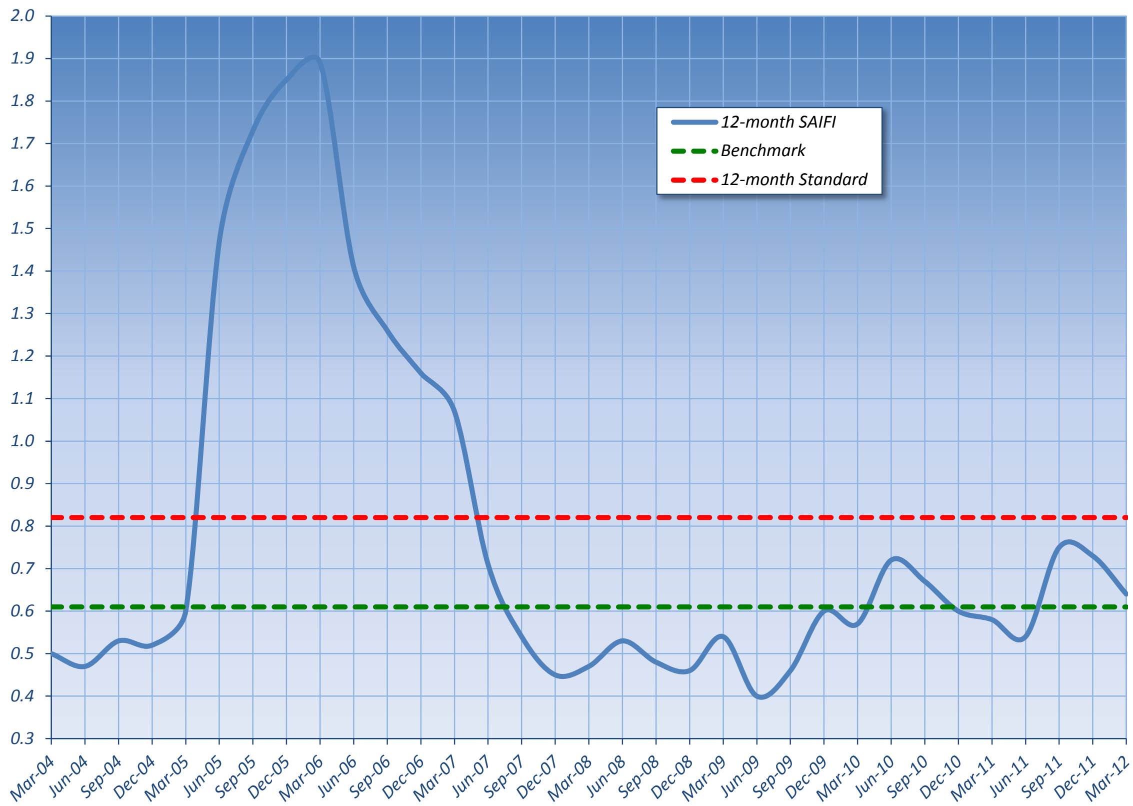


Figure 29 Pike County outage causes (percent of total outages)

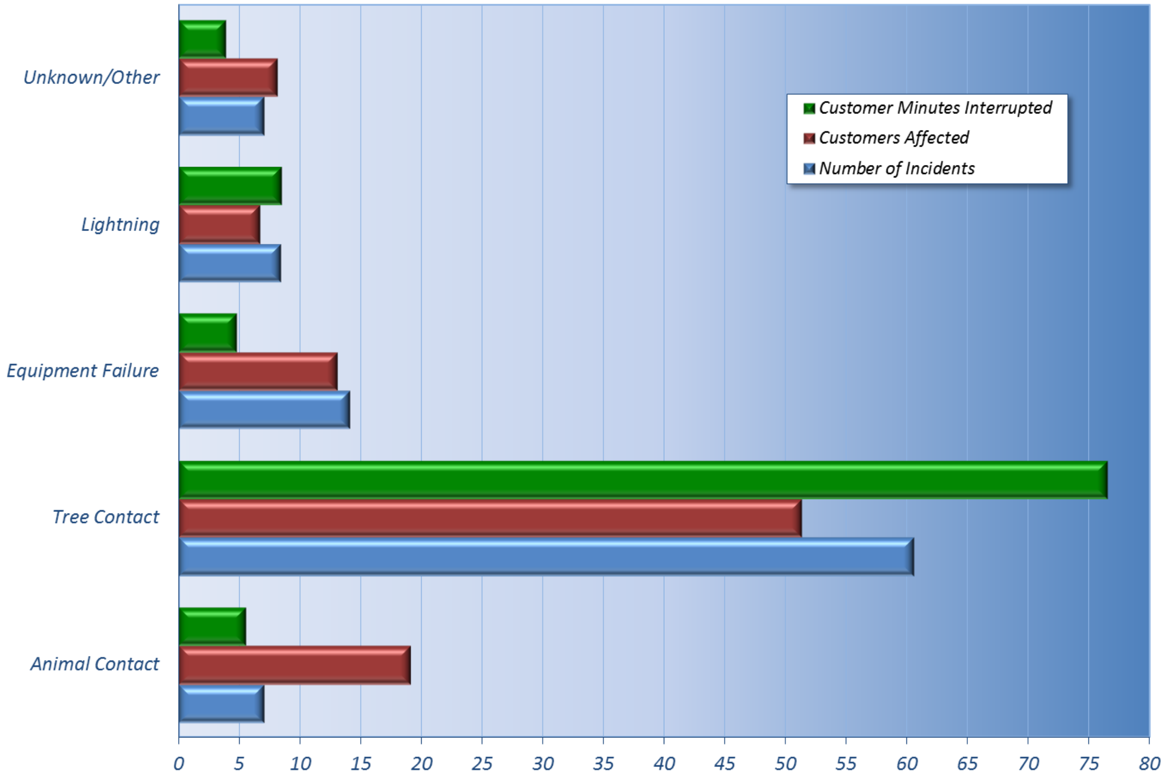
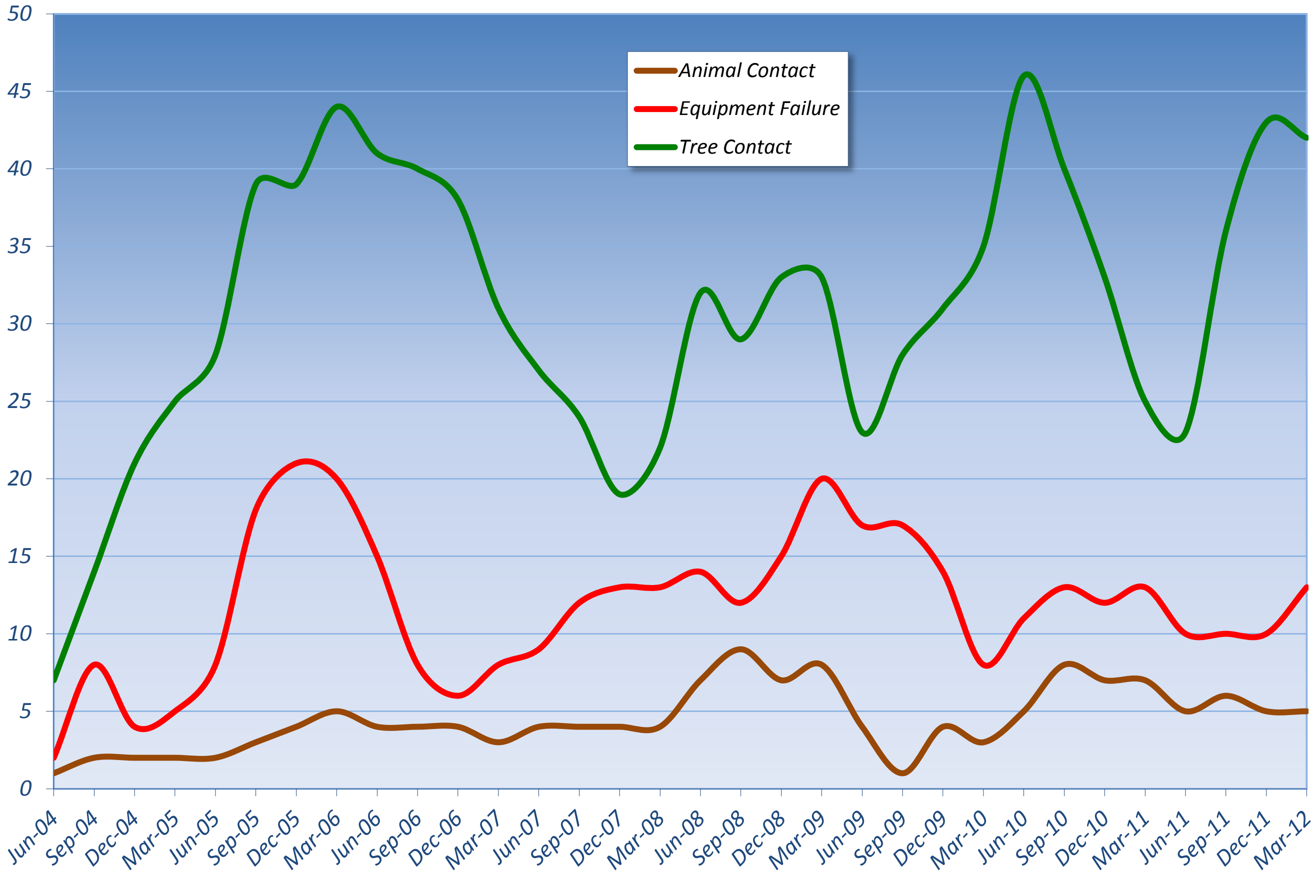


Figure 30 Pike County outage tracking (number of incidents)



PPL Electric Utilities Corporation

In 2011, PPL's customers experienced 1,489,151 service interruptions with a total duration of 225 million minutes, or 10.3 percent higher than last year's figure. There were three major events in PPL territory in 2011. The calculation of the 2011 reliability indices excludes outage data relating to three major events, which were approved by the Commission.[31]

- May 26 to May 31, 2011 – Severe thunderstorms and tornadoes caused service interruptions; 182,478 customers were affected (13.1 percent).
- Aug. 27 to Sept. 3, 2011 – Heavy rain and high winds resulting from Hurricane Irene caused service interruptions; 428,503 customers were affected (30.9 percent).
- Oct. 29 to Nov. 5, 2011 –A heavy, wet snow storm early in the season caused damages in PPL service territory; 388,318 customers were affected (28 percent).

PPL's CAIDI increased from 135 minutes in 2010 to 151 minutes in 2011, for an 11.9 percent increase, and above the benchmark of 145 minutes by six minutes. The CAIDI three-year average improved slightly, at 16.3 percent below the standard of 160 minutes. For the 12-month average ending March 31, 2012, CAIDI was 151 minutes, or 4.3 percent above the benchmark. CAIDI has been below the benchmark since December 2009, until the last quarter of 2011. SAIDI increased from 147 minutes in 2010 to 162 minutes in 2011, 14.1percent above the benchmark. Figure 31 depicts the trend in the duration of customer interruptions for the PPL system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

PPL's SAIFI decreased from 1.09 in 2010 to 1.07 in 2011, which was a 2 percent decrease in outage frequency and 9.2 percent better than the standard of 1.18. The SAIFI three-year average was 1.02, or 5.9 percent below the standard of 1.08. Figure 32 depicts the trend in the frequency of service interruptions for the PPL system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure represented 33.6 percent of the interruptions, 33.5 percent of customers affected and 27.2 percent of interruptions minutes. PPL reported that a large portion of interruptions attributed to equipment failure were weather-related and are not considered to be indicators of equipment condition or performance. Non-trimming tree-related outages, generally caused by trees falling from outside of PPL's rights-of-way, were the second-largest cause of customer outages representing 27.5 percent of incidents, 30.1 percent of customers affected and 41.2 percent of interruption minutes. Animal-related outages accounted for 15.8 percent of incidents, 3.4 percent of customers affected and 2.3 percent of interruption minutes. Figure 33 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 34.

PPL met all of the 12-month and three year average standards. Reliability metrics were negatively impacted due to a substantial increase in total storm activity in 2011. PPL initiated several actions to minimize the impact of future storm events by updating and revising its Emergency Response Plan, enhancing their Outage Management System and improving its communications system.[32]

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[31] Docket Nos. M-2011-2252834, M-2011-2265964, and M-2011-2265964.
[32] PPL Electric Utilities Corporation, 2011 Annual Reliability Report.

Figure 31 PPL Customer Average Interruption Duration Index (minutes)

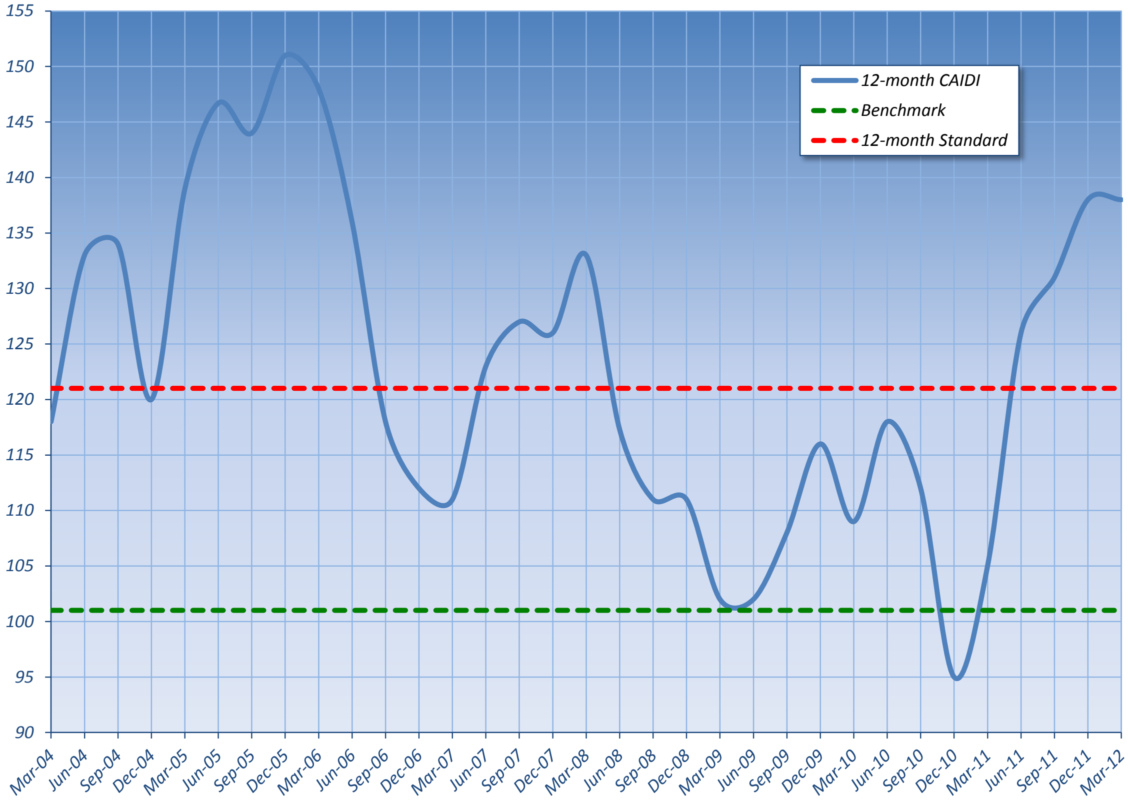


Figure 32 PPL System Average Interruption Frequency Index (interruptions per customer)

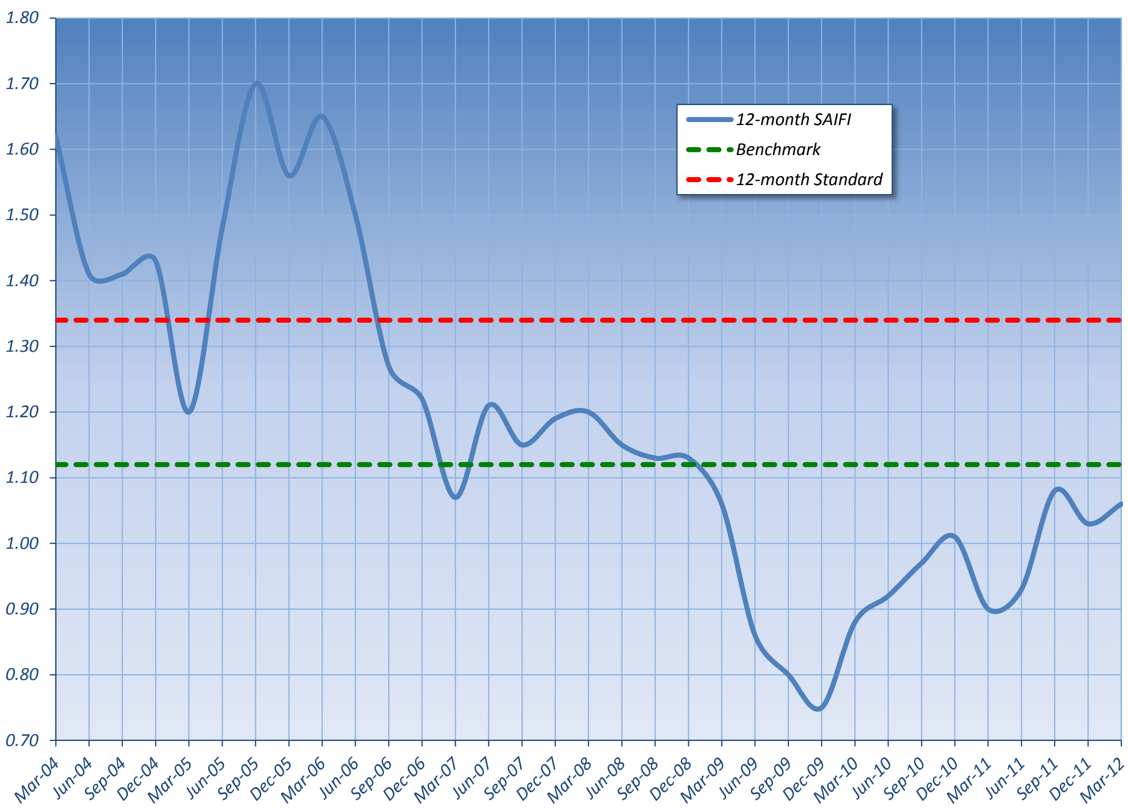


Figure 33 PPL outage causes (percent of total outages)

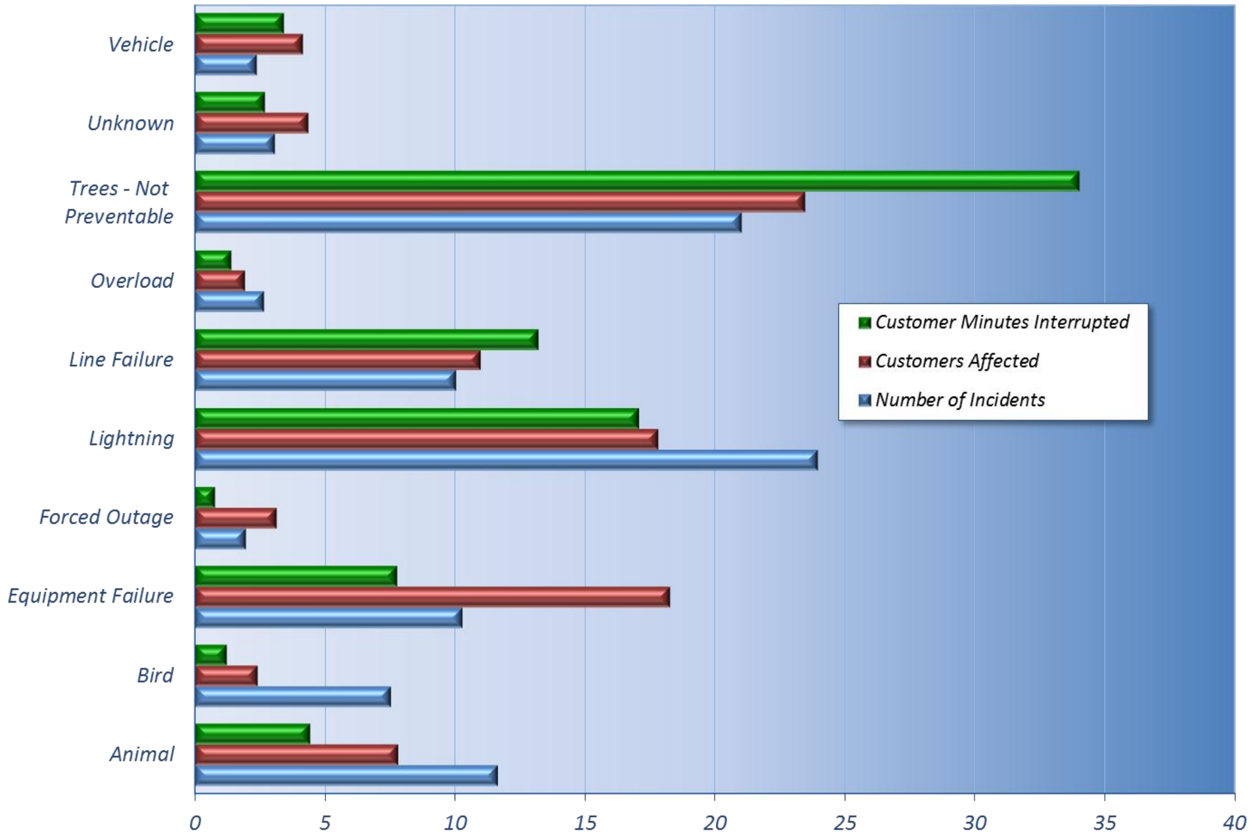
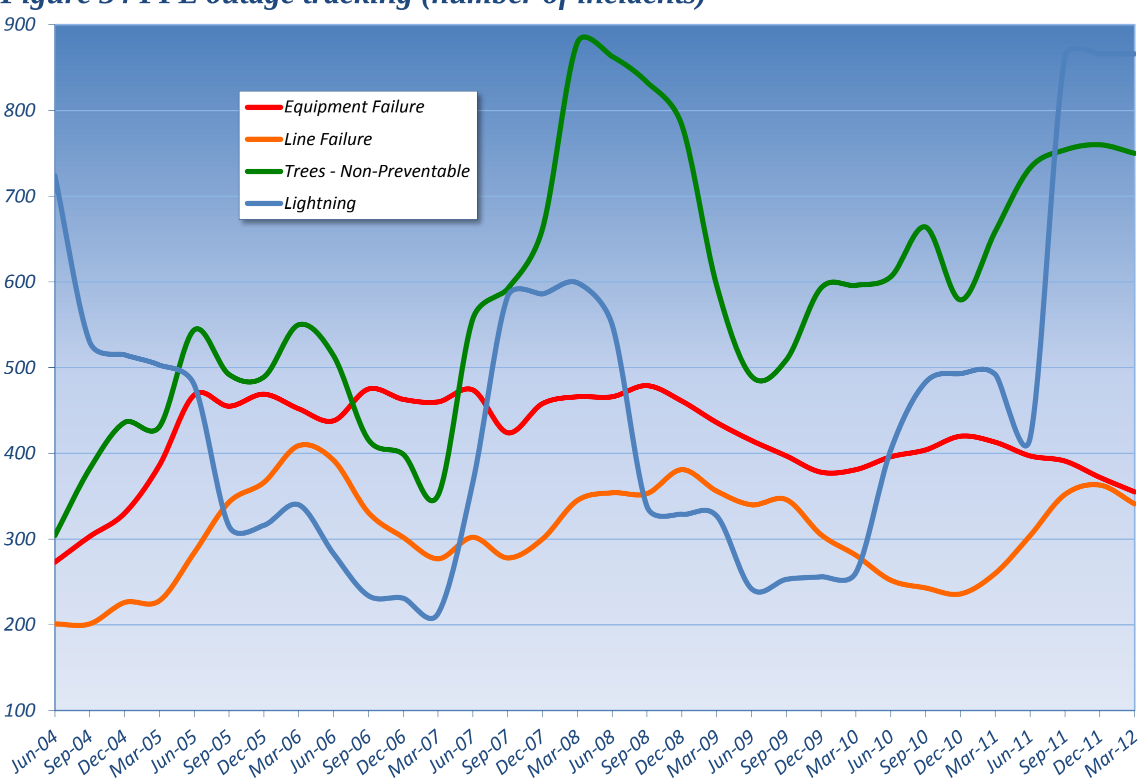


Figure 34 PPL outage tracking (number of incidents)



UGI Utilities Inc.

In 2011, UGI's customers experienced 53,157 service interruptions with a total duration of 6,095,546 minutes, which was105.7 percent higher than last year. UGI reported two major events in 2011. The calculation of the 2011 reliability indices excludes outage data relating to two major events, which were approved by the Commission.[33]

- Aug. 28 to Sept. 7, 2011 – Heavy rains and high winds caused by Hurricane Irene caused service interruptions; 35,975 customers were affected (58 percent).
- Sept. 9, 2011 – Rain and flooding resulting from the remnants of Hurricane Lee caused floodwaters above the 100 year flood level, causing damage to the Hunlock substation and three adjacent distribution substations; 11,940 customers were affected (19.3 percent).

UGI's CAIDI increased from 99 minutes in 2010 to 128 minutes in 2011, which was a 29.3 percent increase in CAIDI minutes and 24.3 percent better than the benchmark of 169 minutes. CAIDI has remained below the benchmark ever since the Commission began monitoring reliability performance. A declining CAIDI has been the general trend since December 2008 outside of the 2011 year. The CAIDI three-year average of 111 minutes was 40.3 percent better than the standard of 186 minutes. For the 12-month average ending March 31, 2012, CAIDI was 117 minutes, or 30.8 percent below the benchmark. SAIDI increased from 48 minutes in 2010 to121 minutes in 2011. Figure 35 depicts the trend in the duration of customer interruptions for the UGI system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

UGI's SAIFI increased from 0.48 in 2010 to 0.95 in 2011, which was a 97.9 percent increase in outage frequency and 14.5 percent over the benchmark set at 0.83. Except for two quarters in 2009 and the last two quarters of 2011, SAIFI has remained under the benchmark for several years. The SAIFI three-year average was 19.8 percent below the standard of 0.91. For the 12-month average ending March 31, 2012, SAIFI was 0.94 or 13.3 percent over the benchmark. Figure 36 depicts the trend in the frequency of service interruptions for the UGI system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure was attributed to 33.7 percent of the incidents, 24.7 percent of customers affected and 16.4 percent of interruption minutes. Tree-related outages represented 21.9 percent of incidents, 31.1 percent of customers affected and 39.1 percent of interruption minutes. Animals were responsible for 13 percent of the outages, 8.2 percent of customers affected and 4.8 percent of interruption minutes. Figure 37 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 38.

UGI met all of the 12-month and three year average standards. UGI initiated a project to purchase and install an advanced Outage Management System (OMS). UGI currently uses a work order system supplemented by an enhanced electronic mapping system and internally developed OMS. UGI has completed the vendor demonstration phase of this project and is currently developing the system specification with full implementation by 2013.[34]

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[33] Docket Nos. M-2011-2265882 and M-2011-2265933.
[34] UGI, 2012 UGI Electric Division Reliability and Storm Preparedness Summary.

Figure 35 UGI Customer Average Interruption Duration Index (minutes)

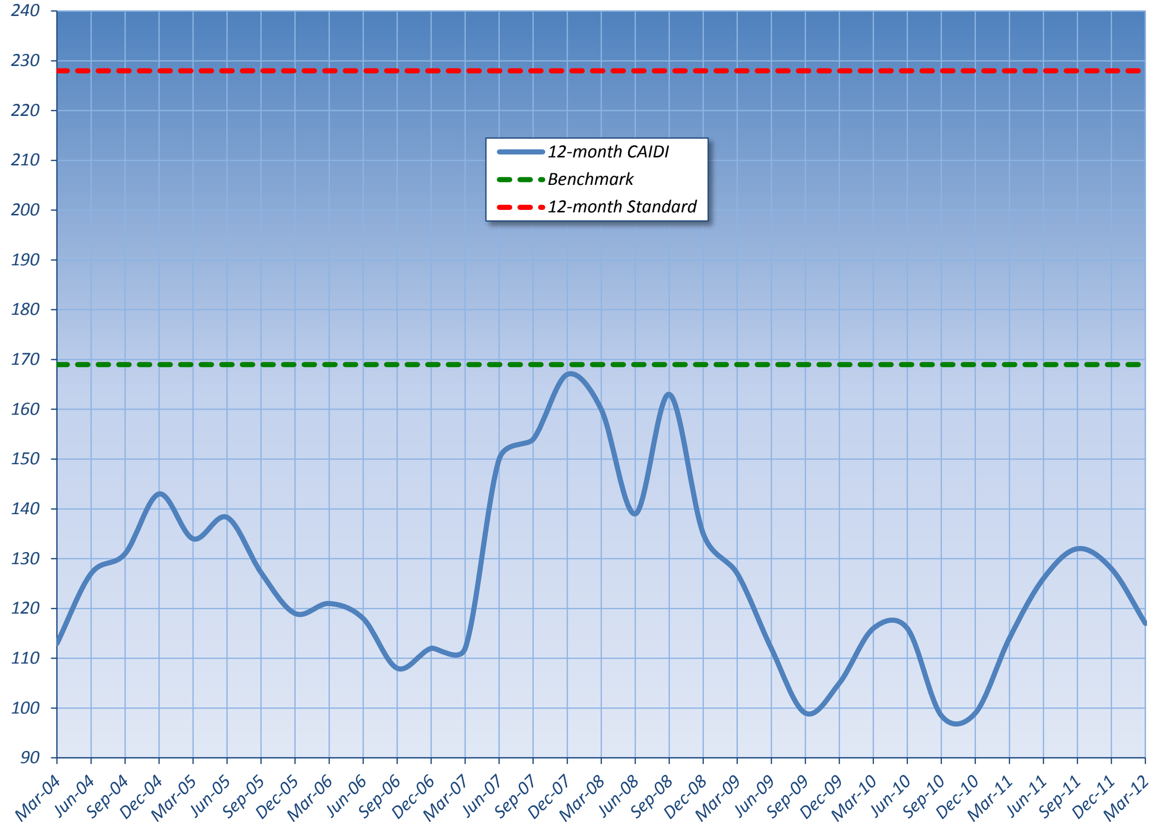


Figure 36 UGI System Average Interruption Frequency Index (interruptions per customer)

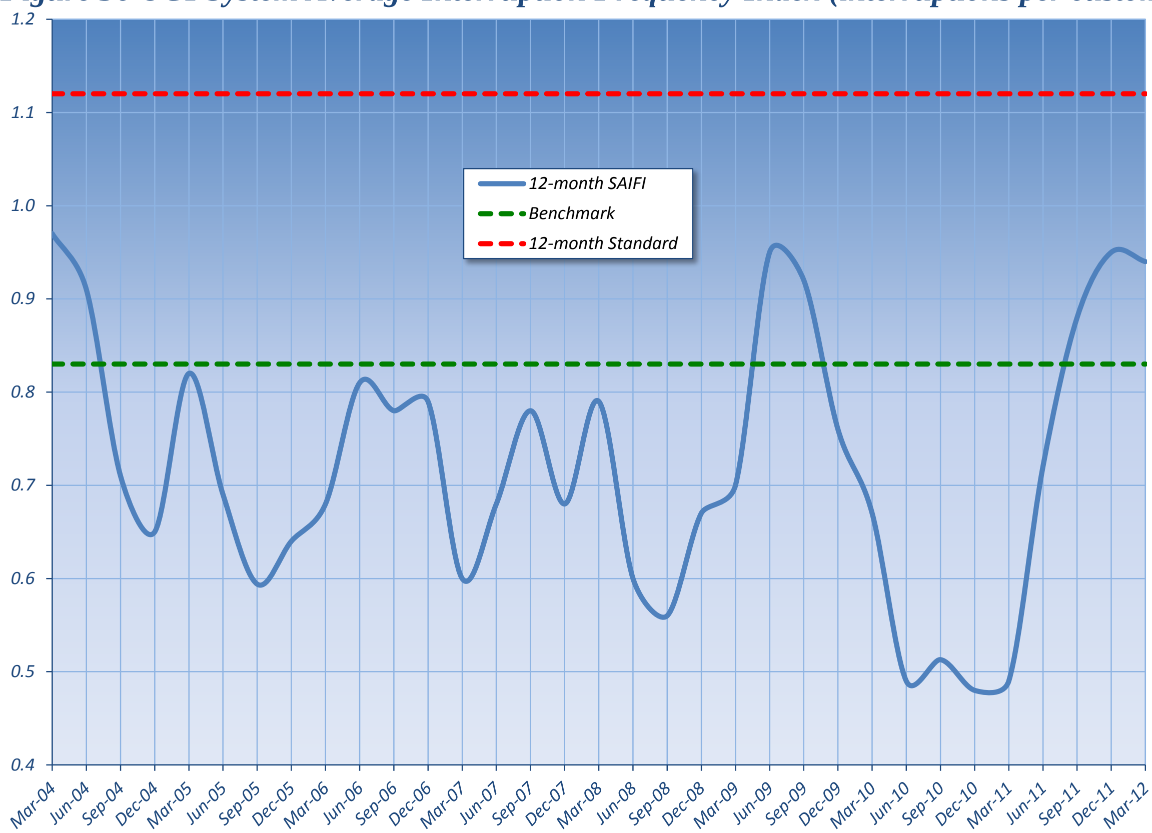


Figure 37 UGI outage causes (percent of total outages)

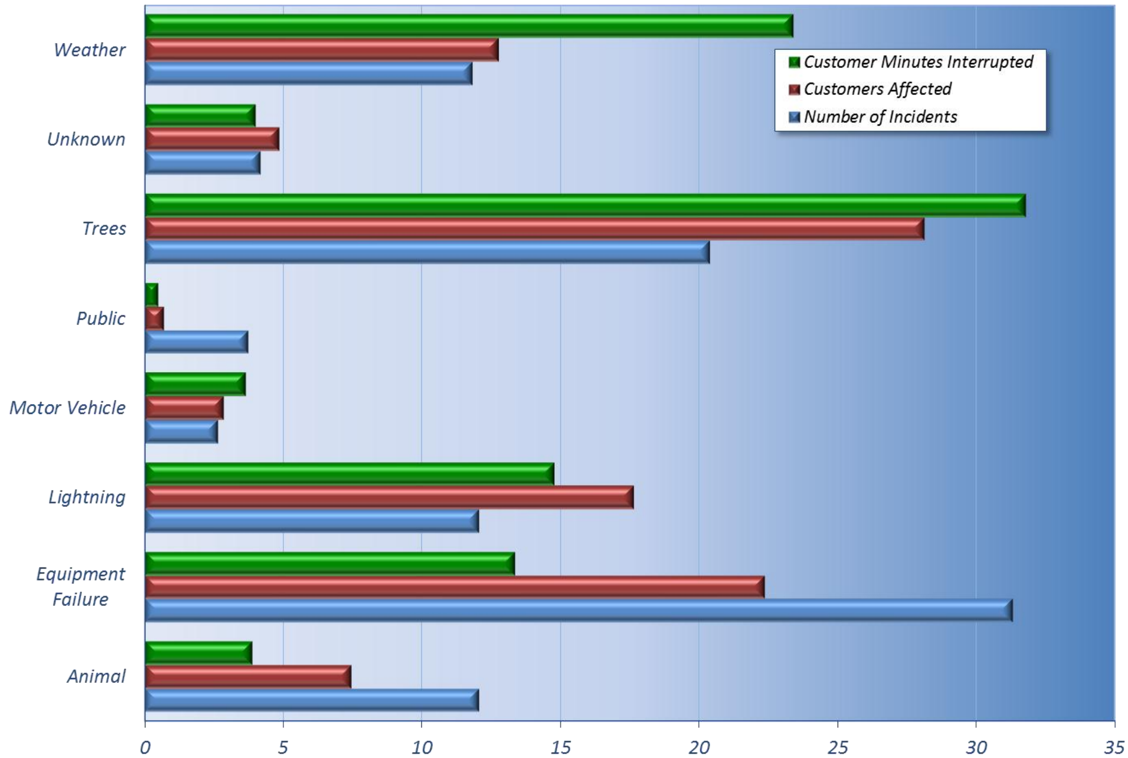
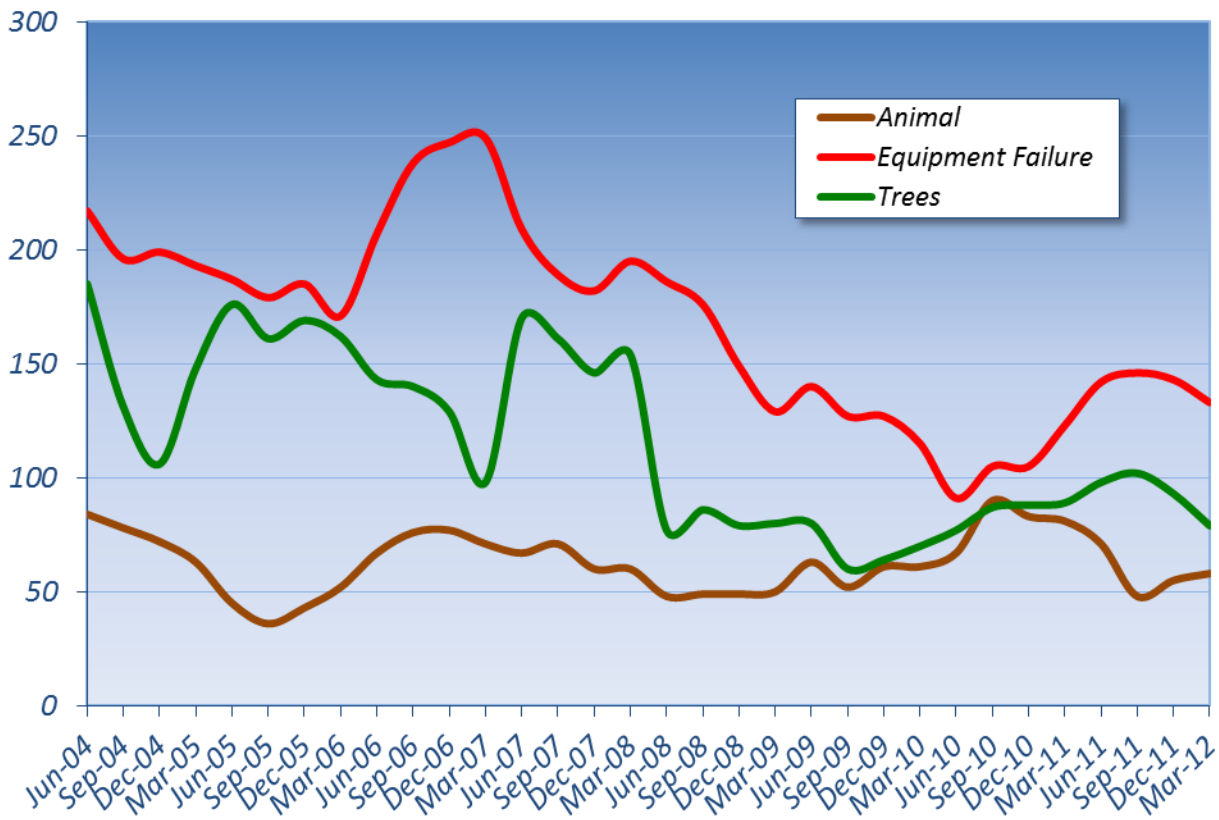


Figure 38 UGI outage tracking (number of incidents)



Wellsboro Electric Company

In 2011, Wellsboro experienced 9,978 customer interruptions with a total duration of 731,645 customer minutes, which was 51.5 percent higher than last year. Five major events occurred in Wellsboro's service territory during 2011. The calculation of the reliability indices excludes outage data related to these events, which were approved by the Commission.[35]

- Jan. 4, 2011 – An off-of-right-away tree limb fell onto Wellsboro facilities and caused an outage at a substation; 1,997 customers were affected (32.5 percent).
- April 16 to 17, 2011 – A high wind and rain event caused outages over two days; 2,109 customers affected (33 percent).
- May 26 to May 29, 2011 – A combination of strong thunderstorms and a loss of the main power feed from First Energy caused numerous interruptions; 7,211 sustained interruptions (100 percent).
- June 21 to June 22, 2011 – A Penelec 34 kV line fell on to a Wellsboro 12 kV distribution line; 1,382 customers were affected (22.6 percent).
- Sept. 29, 2011 - A 100 amp loadbreak cutout fell onto a three-phase circuit during a rainstorm; 867 customers were affected (14 percent).

Wellsboro's CAIDI declined from 76 minutes in 2010 to 73 minutes in 2011, which was a 3.9 percent decrease in CAIDI minutes and 41.1 percent better than the benchmark of 124 minutes. Since June 2004, CAIDI has remained below the benchmark. The CAIDI three-year average was 60.3 percent below the standard of 136 minutes. For the 12-month average ending March 31, 2012, CAIDI was 66 minutes, or 53.2 percent below the benchmark. SAIDI increased from 74 minutes in 2010 to 119 minutes in 2011, still 35.7 percent below the benchmark. Figure 39 depicts the trend in the duration of customer interruptions for the Wellsboro system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

Wellsboro's SAIFI increased from .98 in 2010 to 1.62 in 2011, which was a 65.3 percent increase in outage frequency and 31.7 percent over the benchmark of 1.23. Before 2011, SAIFI has remained below the benchmark since September 2008. The SAIFI three-year average was 5.9 percent below the standard of 1.35. For the 12-month average ending March 31, 2012, SAIFI was 1.35, or 9.8 percent above the benchmark. Figure 40 depicts the trend in the frequency of service interruptions for the Wellsboro system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, equipment failure caused 30.7 percent of incidents, 26.6 percent of customers affected and 30.5 percent of interruption minutes. Tree-related incidents were responsible for 24.5 percent of the outages, 23.9 percent of customers affected and 27.5 percent of interruption minutes. Animals were responsible for 12.7 percent of incidents, 14.2 percent of customers affected and 8.3 percent of interruption minutes. Outages with unknown causes represented 26.6 percent of outage incidents, 26.5 percent of customers affected and 21.4 percent of interruption minutes. Figure 41 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 42.

[35] Docket Nos. M-2011-2223703, M-2011-2245443, M-2011-2249250, M-2011-2249250, and M-2011-2265594.

Wellsboro met all of the 12-month and three year average standards. Wellsboro tracks causes of outages with an Outage Management System. Data is reviewed to determine circuits and installations that are experience multiple outages and corrective action planned. Wellsboro clears or trims 55 miles of circuit at a minimum each year. Wellsboro has an educational program in place with the community to educate customers on the proper location and species of trees suitable for planting near power lines and works with the community to identify and remove hazard trees along the power lines.[36]

[36]Wellsboro Electric Company, Annual Reliability Report for the Year 2011.

Figure 39 Wellsboro Customer Average Interruption Duration Index (minutes)

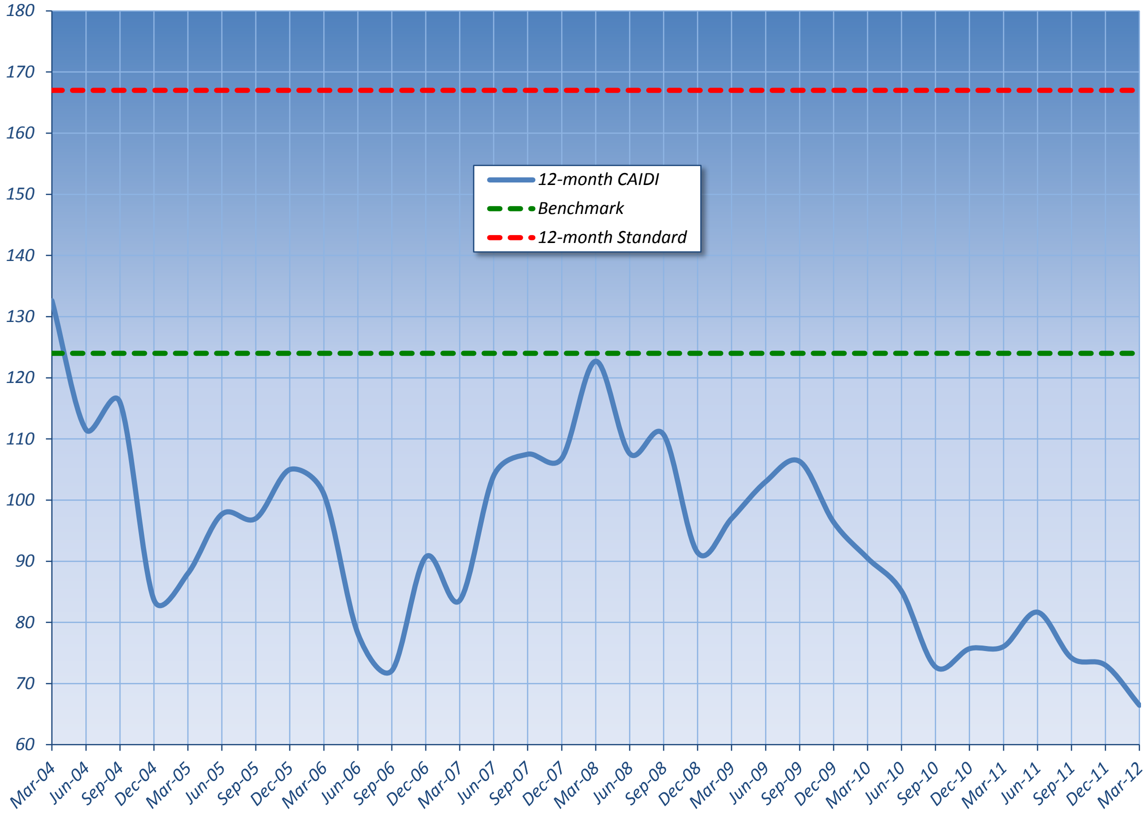


Figure 40 Wellsboro System Average Interruption Frequency Index (interruptions per customer)

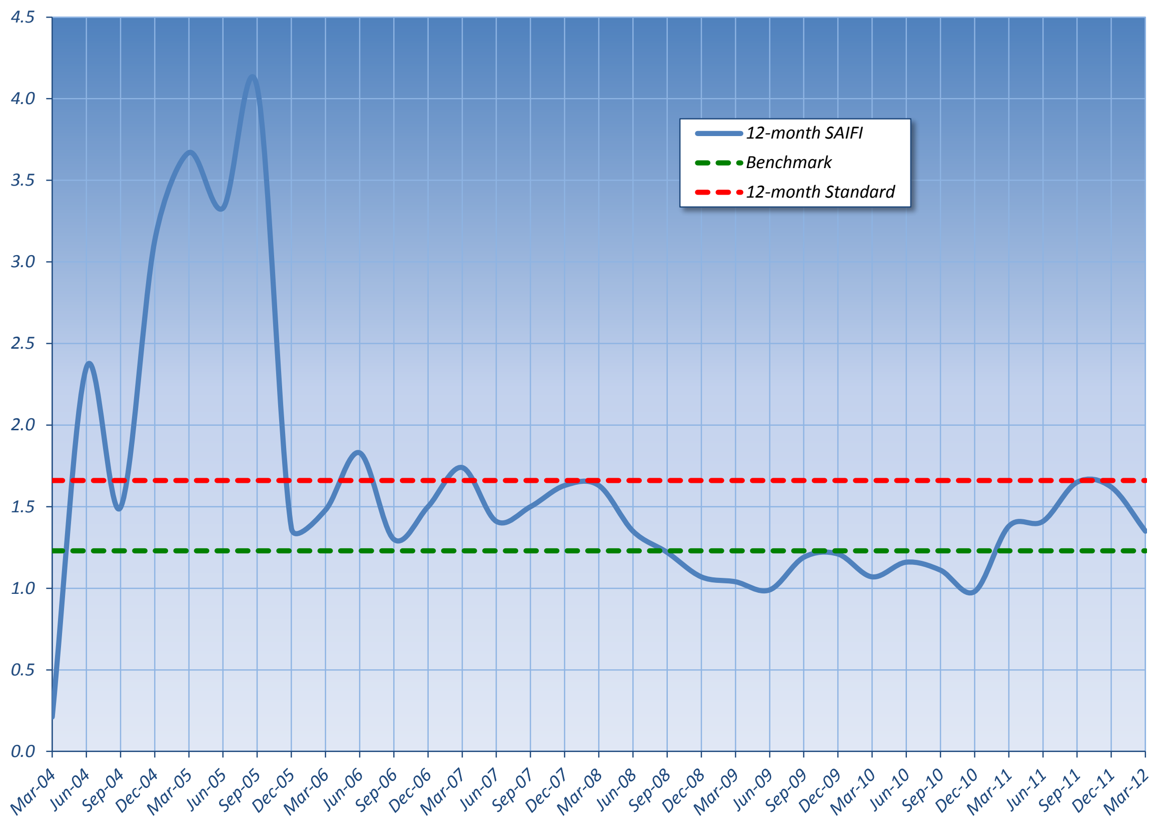


Figure 41 Wellsboro outage causes (percent of total outages)

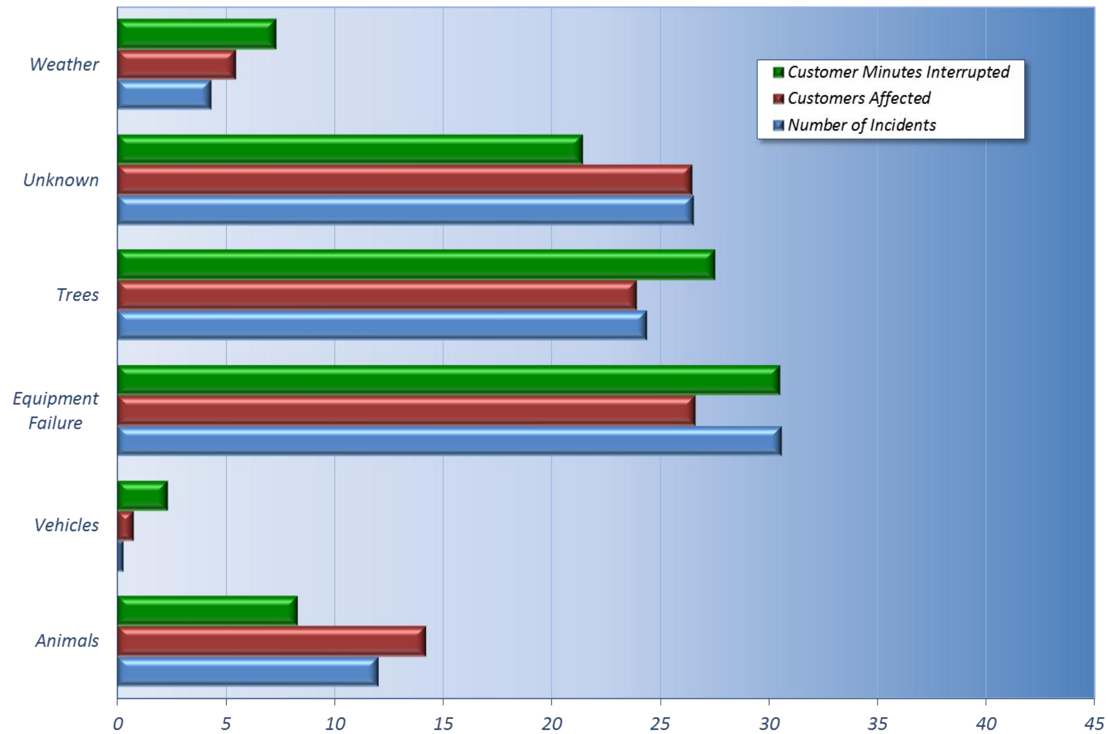
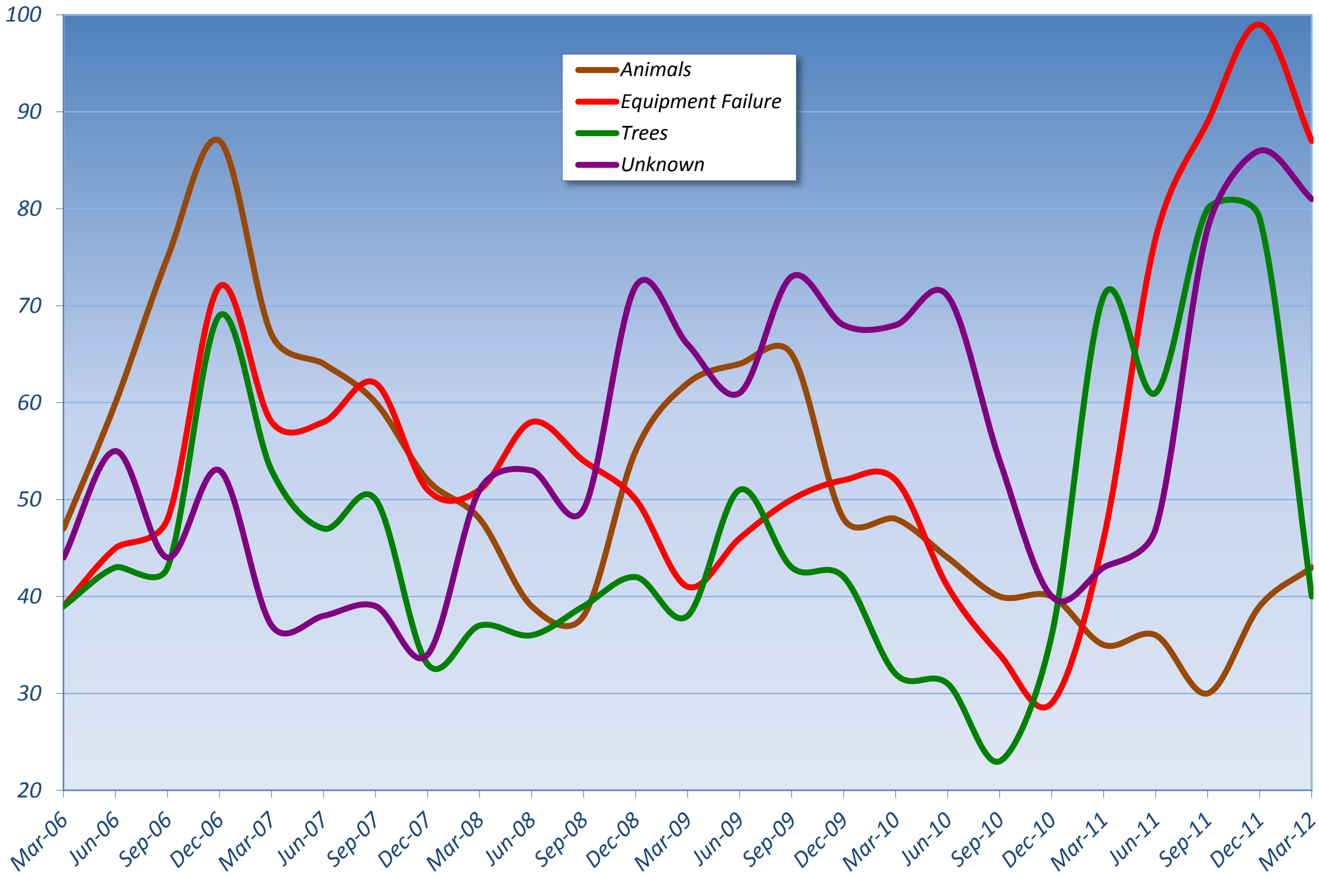


Figure 42 Wellsboro outage tracking (number of incidents)



West Penn Power Company

In 2011, West Penn experienced 993,096 customer interruptions with a total duration of 174.3 million minutes, which was 28 percent higher than last year. No major events occurred in the West Penn territory in 2011.

West Penn's CAIDI decreased from 190 minutes in 2010 to 151 minutes in 2011, which was a 20.5 percent decrease in CAIDI minutes and 11.2 percent above the benchmark of 170 minutes. Before a spike in CAIDI in the third quarter (216 minutes) of 2010, CAIDI had remained below the benchmark since December 2008. CAIDI still remains below the standard of 204 minutes. The CAIDI three-year average was 29 minutes below the standard of 217 minutes. For the 12-month average ending March 31, 2012, CAIDI was 170 minutes, or 16.7 percent below the standard. SAIDI increased from 191 minutes in 2010 to 211 minutes in 2011. Figure 43 depicts the trend in the duration of customer interruptions for the West Penn system from March 2004 through March 2012, compared to the established benchmark and standard for CAIDI.

West Penn's SAIFI increased from 1.00 in 2010 to 1.40 in 2011, which was a 40 percent increase in outage frequency and 33.3 percent over the benchmark of 1.05. SAIFI has remained below the benchmark seven out of the eight quarters since the first quarter of 2009. However, during the last year SAIFI has been above the benchmark all four quarters of 2011. The SAIFI three-year average remained below the standard at 1.12 or 3.4 percent below the standard of 1.16. For the 12-month average ending March 31, 2012, SAIFI was 1.05, or 16.7 percent below the standard. Figure 44 depicts the trend in the frequency of service interruptions for the West Penn system from March 2004 through March 2012, compared to the established benchmark and standard for SAIFI.

In 2011, trees off the right of way were responsible for 27.9 percent of the outages, 26.2 percent of customers affected and 34.3 percent of customer minutes interrupted. Equipment failure was the second leading cause of service interruptions, with 24.3 percent of the outages, 24.2 percent of customers affected and 14.6 percent of interruption minutes. Weather accounted for 14.1 percent of total outages, 16.3 percent of customers affected and 34.3 percent of interruption minutes. Figure 45 shows the distribution of causes of service outages occurring during 2011 as a percentage of total outages. The trend in the number of outages by the top three major causes is shown in Figure 46.

West Penn Power exceeded the 12 month standard by 11 percent for SAIFI in 2011. In May 2011, West Penn Power implemented a program to address SAIFI on 165 circuits that had the worst 12 month rolling SAIFI. The program reviewed the mainline of the circuits from the substation to the first set of protective devices and corrected any issues found that would potentially y cause a circuit lockout. West Penn Power's SAIFI for the second half of 2011 was 7 percent below target. West Penn Power plans to continue the program with additional circuits.[37]

[37] West Penn Power, Revised 2011 Annual Reliability Report.

Figure 43 West Penn Customer Average Interruption Duration Index (minutes)

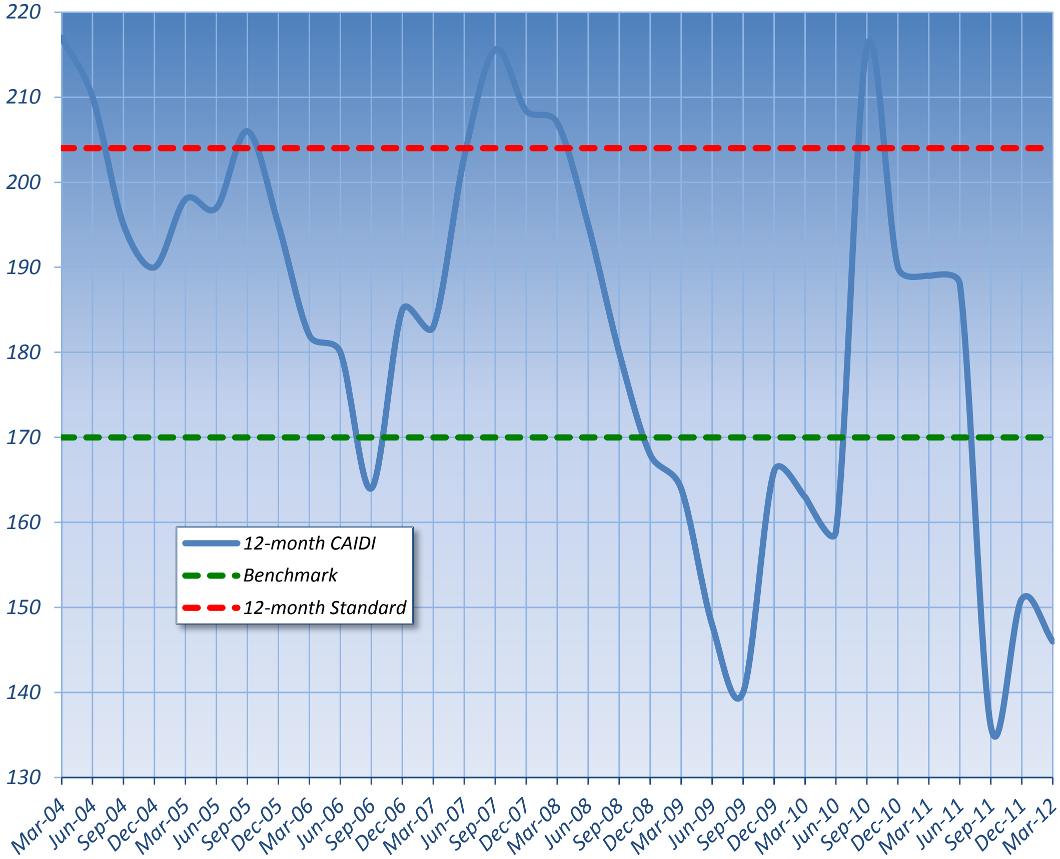


Figure 44 West Penn System Average Interruption Frequency Index (interruptions per customer)

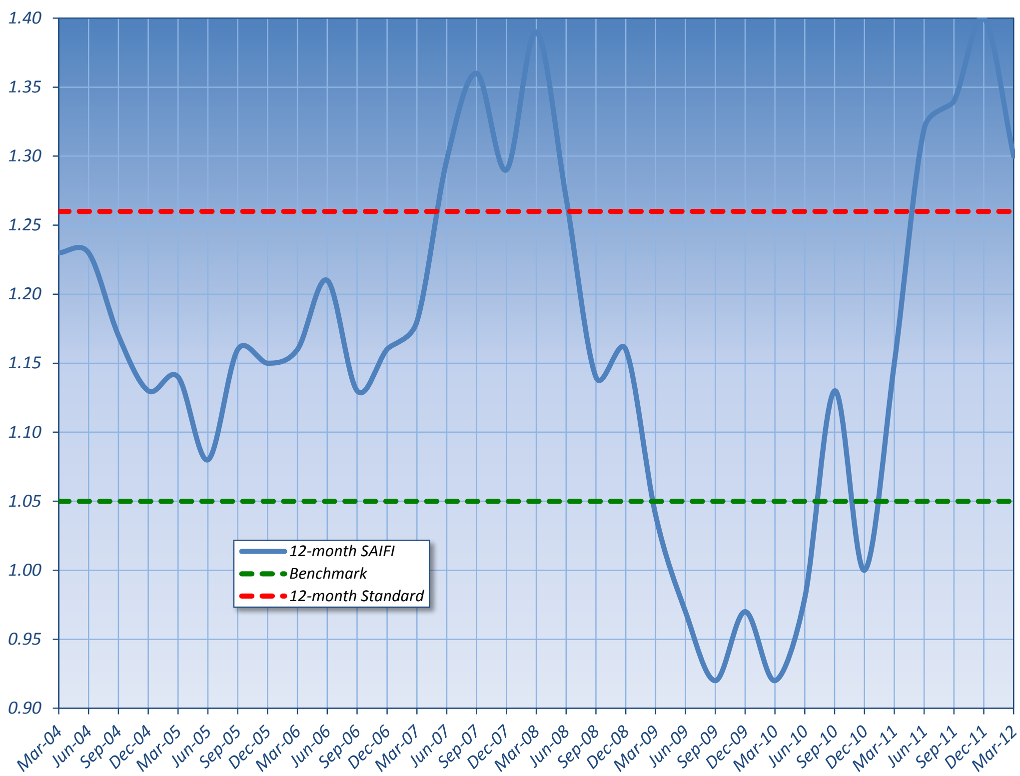


Figure 45 West Penn outage causes (percent of total outages)

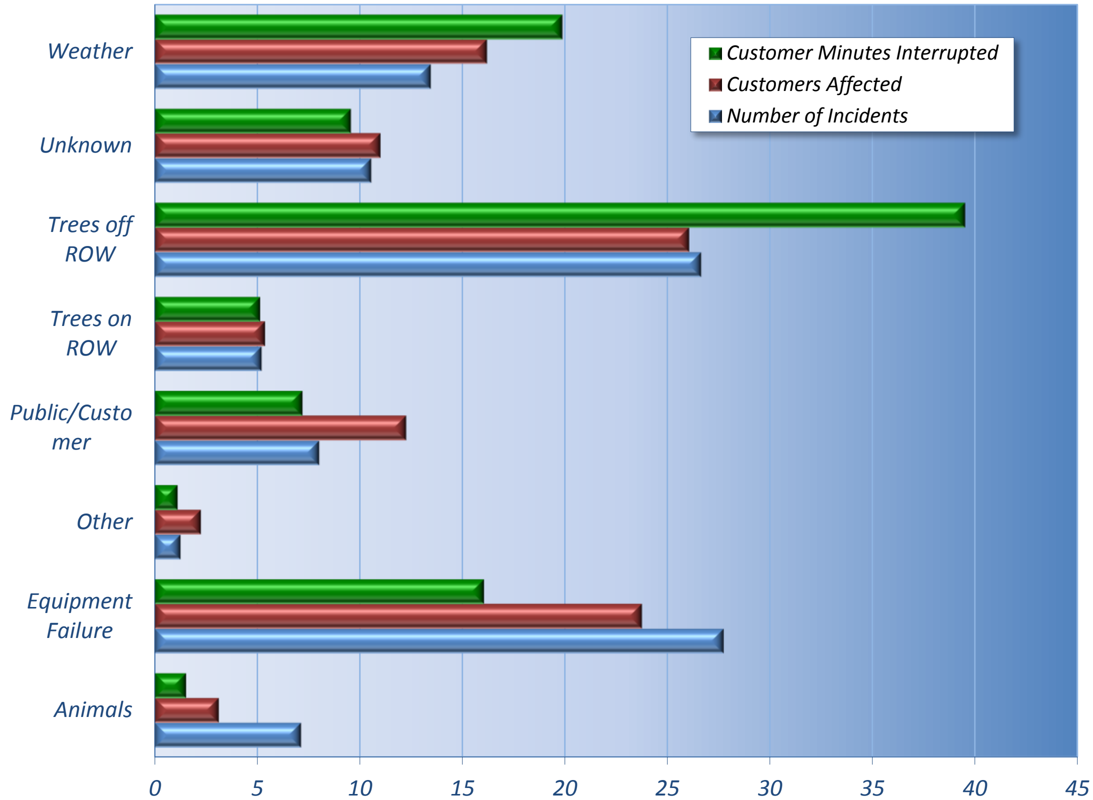
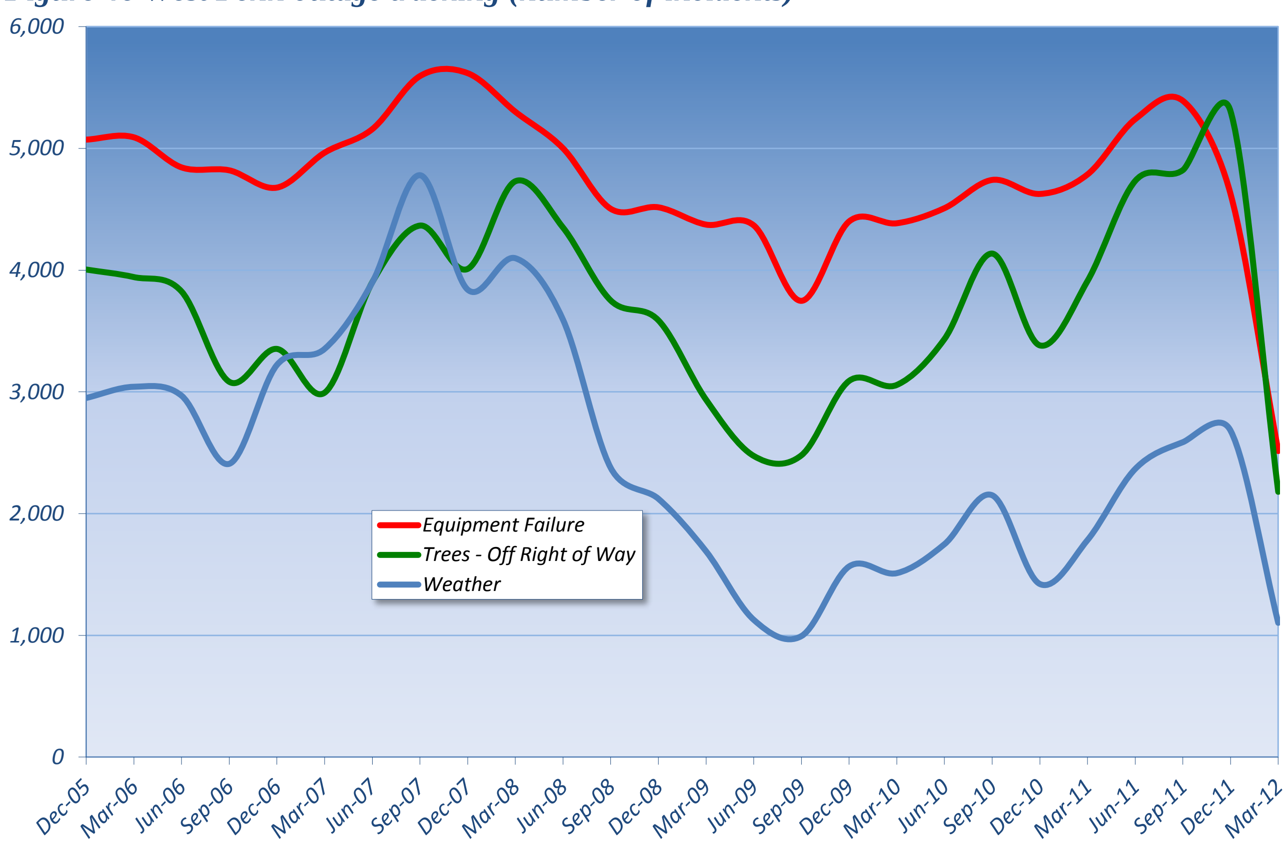


Figure 46 West Penn outage tracking (number of incidents)



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 to this mandate, the Commission 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.

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 or better to allow for those times when unforeseen circumstances push the indices above the benchmark. In recognition of these unforeseen circumstances, the Commission set the performance standard as the minimum level of EDC reliability performance. The standard is the level of performance beyond which the company must either justify its poor performance or provide information on the corrective measures it will take to improve performance. Performance that does not meet the standard for any reliability measure may be the threshold for triggering additional scrutiny and potential compliance enforcement actions.

In 2011, eight of the 11 EDCs achieved compliance with the 12-month Customer Average Interruption Duration Index (CAIDI) performance standard for duration of service outages, and five EDCs performed better than the 12-month CAIDI performance benchmark. When measured on a company-wide basis, these five EDCs provided restoration of service in a manner that was statistically timelier than was experienced over the five years prior to the restructuring of the electric utility industry.

Nine of the 11 EDCs achieved compliance with the 12-month System Average Interruption Frequency Index (SAIFI) performance standards for the average frequency of service outages per customer, and have maintained the number of customer outages at a statistically acceptable level. Three EDCs performed better than the 12-month SAIFI performance benchmark, thereby reducing average customer outage levels below those experienced over the five years prior to the restructuring of the electric utility industry.

Overall, the three-year average performance for the EDCs has slightly decreased. Three EDCs failed to meet the rolling three-year CAIDI performance standard, and two EDCs failed to meet the rolling three-year SAIFI performance standard (as compared to the EDCs in the previous year). Three EDCs did not meet the SAIDI standards. The aggregate SAIDI minutes (total of the previous three year averages) for 2011 were 58 minutes more than that of 2010.

The Commission will continue to monitor the reliability of electric service in Pennsylvania through ongoing oversight of utility performance and enforcement of inspection and maintenance standards. Commission staff is in the process of detailed review of each EDC’s inspection and maintenance plan. Commission staff is also working with the EDCs to facilitate the exchange of best practices. For those EDCs not meeting their standards or their benchmarks, Commission staff will work with the EDC to set goals towards improving the EDC’s performance.

Appendix A – Electric Reliability Indices

Twelve-month average electric reliability indices for 2011

Customer Average Interruption Duration Index (CAIDI)				% Above (+) or	% Above (+) or
EDC	Dec-11	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	126	105	141	20.0	-10.6
Duquesne Light	107	108	130	-0.9	-17.7
Met-Ed (FE)	117	117	140	0.0	-16.4
PECO	135	112	134	20.5	0.7
Penelec (FE)	167	117	141	42.7	18.4
Penn Power (FE)	138	101	121	36.6	14.0
Pike County	297	174	235	70.7	26.4
PPL	151	145	174	4.1	-13.2
UGI	128	169	228	-24.3	-43.9
Wellsboro	73	124	167	-41.1	-56.3
West Penn (FE)	151	170	204	-11.2	-26.0

System Average Interruption Frequency Index (SAIFI)				% Above (+) or	% Above (+) or
EDC	Dec-11	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	0.35	0.20	0.27	75.0	29.6
Duquesne Light	0.93	1.17	1.40	-20.5	-33.6
Met-Ed (FE)	1.21	1.15	1.38	5.2	-12.3
PECO	1.14	1.23	1.48	-7.3	-23.0
Penelec (FE)	1.40	1.26	1.52	11.1	-7.9
Penn Power (FE)	1.03	1.12	1.34	-8.0	-23.1
Pike County	0.73	0.61	0.82	19.7	-11.0
PPL	1.07	0.98	1.18	9.2	-9.3
UGI	0.95	0.83	1.12	14.5	-15.2
Wellsboro	1.62	1.23	1.66	31.7	-2.4
West Penn (FE)	1.40	1.05	1.26	33.3	11.1

System Average Interruption Duration Index (SAIDI)				% Above (+) or	% Above (+) or
EDC	Dec-11	Benchmark	Standard	Below (-) Benchmark	Below (-) Standard
Citizens'	44	21	38	109.5	15.8
Duquesne Light	99	126	182	-21.4	-45.6
Met-Ed (FE)	142	135	194	5.2	-26.8
PECO	154	138	198	11.6	-22.2
Penelec (FE)	233	148	213	57.4	9.4
Penn Power (FE)	143	113	162	26.5	-11.7
Pike County	216	106	194	103.8	11.3
PPL	162	142	205	14.1	-21.0
UGI	121	140	256	-13.6	-52.7
Wellsboro	119	153	278	-22.2	-57.2
West Penn (FE)	211	179	257	17.9	-17.9

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 2009-2011

Customer Average Interruption Duration Index (CAIDI)				3-Year	3-Year	% Above (+) or
EDC	2009	2010	2011	Average	Standard	Below (-) Standard
Citizens'	75	98	126	100	115	-13.3
Duquesne Light	85	80	107	91	119	-23.8
Met-Ed (FE)	111	120	117	116	129	-10.1
PECO	106	126	135	122	123	-0.5
Penelec (FE)	117	124	167	136	129	5.4
Penn Power (FE)	116	95	138	116	111	4.8
Pike County	178	253	297	243	192	26.4
PPL	117	135	151	134	160	-16.0
UGI	105	99	128	111	186	-40.5
Wellsboro	96	76	73	82	136	-40.0
West Penn (FE)	166	190	151	169	187	-9.6

System Average Interruption Frequency Index (SAIFI)				3-Year	3-Year	% Above (+) or
EDC	2009	2010	2011	Average	Standard	Below (-) Standard
Citizens'	0.20	0.19	0.35	0.25	0.22	12.1
Duquesne Light	0.97	1.09	0.93	1.00	1.29	-22.7
Met-Ed (FE)	1.21	1.51	1.21	1.31	1.27	3.1
PECO	0.98	1.09	1.14	1.07	1.35	-20.7
Penelec (FE)	1.22	1.31	1.40	1.31	1.39	-5.8
Penn Power (FE)	0.75	1.01	1.03	0.93	1.23	-24.4
Pike County	0.60	0.60	0.73	0.64	0.67	-4.0
PPL	0.89	1.09	1.07	1.02	1.08	-5.9
UGI	0.76	0.48	0.95	0.73	0.91	-19.8
Wellsboro	1.21	0.98	1.62	1.27	1.35	-5.9
West Penn (FE)	0.97	1.00	1.40	1.12	1.16	-3.2

System Average Interruption Duration Index (SAIDI)				3-Year	3-Year	% Above (+) or
EDC	2009	2010	2011	Average	Standard	Below (-) Standard
Citizens'	15	18	44	26	25	2.7
Duquesne Light	82	87	99	89	153	-41.6
Met-Ed (FE)	134	181	142	152	163	-6.5
PECO	103	137	154	131	167	-21.4
Penelec (FE)	143	162	233	179	179	0.2
Penn Power (FE)	87	95	143	108	136	-20.3
Pike County	106	153	216	158	129	22.7
PPL	104	147	162	138	172	-20.0
UGI	80	48	121	83	170	-51.2
Wellsboro	117	74	119	103	185	-44.1
West Penn (FE)	161	191	211	188	217	-13.5

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

Appendix B – Modifications to Inspection and Maintenance Intervals

The Commission's regulations provide the following relating to inspection and maintenance time frames:

> (c) *Time frames.* The plan must comply with the inspection and maintenance standards in subsection (n). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (n). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will still support the level of reliability required by law.

52. Pa. Code § 57.198(c).

Each EDC has filed its Biennial Inspection, Maintenance, Repair and Replacement Plan, pursuant to 52 Pa. Code § 57.198(a), which are effective for two calendar years. Most of the EDCs proposed modifications to the standards for some programs or parts of programs. The exemptions requested involved pole loading calculations, and the intervals for overhead line and transformer inspections and substations inspections. All plans have now been accepted except West Penn's plan. Compliance Group 1 plans became effective on Jan. 1, 2011. Compliance Group 2 plans will become effective on January 1, 2012.

The following tables describe the exemptions that were requested and provide a summary of the justification for said exemptions.

Modifications to Inspection and Maintenance Intervals (Group 1) Submitted October 2011, effective January 1, 2013- December 31, 2014

Company	Exemption Requested	Justification
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Pole loading calculations	Approved previously in the January 1, 2011-December 31, 2012 I&M Plan.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Distribution overhead line inspections– 5 year rather than 1-2 year cycle	Approved previously in the January 1, 2011-December 31, 2012 I&M Plan.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Overhead transformer inspections– 5 year rather than 1-2 year cycle	Approved previously in the January 1, 2011-December 31, 2012 I&M Plan.
UGI	None	n/a

Modifications to Inspection and Maintenance Intervals (Group 1) Submitted October 2009, effective January 1, 2011- December 31, 2012

Company	Exemption Requested	Justification
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Pole loading calculations	Line designs are based on NESC Heavy Loading guidelines. An assessment of the pole's ability to accommodate new pole attachments is performed at the time a request is made. Additional load calculations are not cost-effective.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Distribution overhead line inspections – 5 year rather than 1-2 year cycle	A periodicity of five years between inspections has been proven to be successful in addressing emergent problems in a timely manner. This experience does not justify the expense of an increased cycle.
FirstEnergy including Penelec, Penn Power, Met-Ed and West Penn Power	Overhead transformer inspections – 5 year rather than 1-2 year cycle	A five-year cycle is based on accepted electric utility practices and company experience and has proven to be successful in addressing emergent problems in a timely manner.
UGI	None	n/a

Modifications to Inspection and Maintenance Intervals (Group 2) Submitted October 2010, effective January 1, 2012- December 31, 2013

Company	Exemption Requested	Justification
Citizens'	Pole loading calculations	Standardized purchase of class 3 poles for typical primary pole sizes. Poles have excess strength than the minimum required by NESC guidelines. Remaining strength is calculated as part of the pole inspection process. The inclusion of pole loading calculations would result in a significant cost increase, with no corresponding improvement in reliability. Citizens' had no pole failures as of October 2010.
Duquesne	Pole loading calculations	Line designs are based on NESC Heavy Loading guidelines. Added cost is $4 million. Pole failures average 11 incidents per year and account for only 0.005 SAIFI.
Duquesne	Overhead line inspections	Infrared technology is more effective on a five-year cycle than an annual visual inspection. Added cost for a one-to-two year cycle is $2 million. Identified items would contribute only 0.148 SAIFI.
Duquesne	Overhead transformer inspections	Same as line inspections. Added cost of $2 million. All transformer-related outages from 2004-2010 contributed approximately 3 percent to SAIFI and SAIDI on average.
Duquesne	Above-ground pad-mounted transformers	More cost effective to combine inspection cycles with below-ground transformers on eight-year cycle. Added cost of $2 million.
PECO	Pole loading calculations	All poles designed based on NESC loading standards. Added cost of 30 percent.
Pike County	Pole loading calculations	Standards utilize load calculations to define classes of poles required. Pole strength assessment performed if a pole appears overloaded or prior to attaching other than routine equipment.
PPL	Pole loading calculations	Line designs are based on NESC Heavy Loading conditions. Entities attaching facilities must perform their own load calculations before making the attachment.
PPL	Overhead line inspections	Infrared inspections are combined with condition-based visual inspections to keep costs below $2 per Customer Minutes Interrupted (CMI) saved.
PPL	Transformer inspections	Cost to inspect overhead transformers every

Company	Exemption Requested	Justification
		two years is $1.3 million or $65 per CMI avoided. Condition-based approach is cost effective.
Wellsboro	Pole loading calculations	Unnecessary for reasons given by other EDCs. Wellsboro is required to conduct subsequent assessments of pole strength prior to attachment of non-company facilities.

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