



# Electric Service Reliability in Pennsylvania

# 2010



# ELECTRIC SERVICE RELIABILITY IN PENNSYLVANIA 2010

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Prepared by Blaine J. Loper  
Bureau of Conservation, Economics and Energy Planning  
Darren Gill, Acting Director

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*Disclaimer: Any comments or conclusions contained in this report do not necessarily reflect the views or opinions of the Commission or individual Commissioners.*



## *Executive Summary*

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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.<sup>1</sup> 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.<sup>2</sup> The Commission also established reliability benchmarks and standards to measure the performance of each electric distribution company (EDC).<sup>3</sup>

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.<sup>4</sup> 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 2010, 10 of the 11 EDCs achieved compliance with the 12-month Customer Average Interruption Duration Index (CAIDI) performance standard for duration of service outages, and six EDCs performed better than the 12-month CAIDI performance benchmark. When measured on a company-wide basis, these six 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.

Ten 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. Eight 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.<sup>5</sup> This year, we have assessed the average reliability performance of EDCs over a three-year period, utilizing data from 2008, 2009 and 2010.

Overall, the three-year average performance has slightly improved. One EDC failed to meet its rolling three-year CAIDI performance standard, and one EDC failed to meet its rolling three-year SAIFI performance standard (as compared to three EDCs in the previous year's comparison. No EDC

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<sup>1</sup> Act of Dec. 3, 1996, P.L. 802, No. 138, 66 Pa.C.S. Sec. 2801 *et. seq.*

<sup>2</sup> Docket No. L-00970120; 52 Pa. Code §§ 57.191-57.197.

<sup>3</sup> Docket No. M-00991220.

<sup>4</sup> Docket No. M-00991220, Page 25.

<sup>5</sup> For an explanation of performance standards, see Section 2, page 4.

exceeded the SAIDI standards and the aggregate SAIDI minutes for 2010 were 67 minutes less than that of 2009.

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.<sup>6</sup> 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 CEEP.

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<sup>6</sup> Docket No. L-00040167.

## ***Table of Contents***

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### ***Section 1 – Introduction***

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<i>Purpose</i> .....	<i>1</i>
<i>Background</i> .....	<i>1</i>

### ***Section 2 – Reliability Performance Measures***

---

<i>Reliability Performance Indices</i> .....	<i>3</i>
<i>Major Events</i> .....	<i>4</i>
<i>Benchmarks and Standards</i> .....	<i>4</i>
<i>Inspection and Maintenance</i> .....	<i>5</i>

### ***Section 3 – Statistical Utility Performance Data***

---

<i>Statewide Summary</i> .....	<i>8</i>
<i>Utility Specific Performance Data</i> .....	<i>10</i>
<i>Citizens’ Electric Company</i> .....	<i>10</i>
<i>Duquesne Light Company</i> .....	<i>14</i>
<i>Metropolitan Edison Company</i> .....	<i>17</i>
<i>PECO Energy Company</i> .....	<i>20</i>
<i>Pennsylvania Electric Company</i> .....	<i>23</i>
<i>Pennsylvania Power Company</i> .....	<i>26</i>
<i>Pike County Light &amp; Power Company</i> .....	<i>29</i>
<i>PPL Electric Utilities Corporation</i> .....	<i>32</i>
<i>UGI Utilities Inc.</i> .....	<i>35</i>
<i>Wellsboro Electric Company</i> .....	<i>38</i>
<i>West Penn Power Company</i> .....	<i>42</i>

### ***Section 4 – Conclusion***

---

*45*

### ***Appendix A – Electric Reliability Indices***

---

*46*

### ***Appendix B – Modifications to Inspection and Maintenance Intervals***

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*48*



## *Section 1 – Introduction*

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### *Purpose*

This report discusses the reliability performance of EDCs operating under the Commission’s jurisdiction within the Commonwealth. Although the reliability of the bulk transmission system<sup>7</sup> is integral to the overall reliability of electric service, this report focuses on the reliability of the electric distribution system.

The data contained in this report was obtained from the quarterly and annual reliability reports submitted by the EDCs pursuant to the Commission’s regulations.<sup>8</sup> These annual reports provide an assessment of electric service reliability for each EDC’s service territory.

### *Background*

The Electricity Generation Customer Choice and Competition Act<sup>9</sup> (Act) amended Title 66 of the Pennsylvania Consolidated Statutes by adding Chapter 28 to establish standards and procedures to create direct access by retail customers to the competitive market for the generation of electricity, while maintaining the safety and reliability of the electric distribution system. Specifically, the Commission was given a legislative mandate to ensure that levels of reliability that existed prior to the restructuring of the electric utility industry would continue in the new competitive markets.<sup>10</sup>

In response to this legislative mandate, the Commission established various reporting requirements designed to ensure the continued safety, adequacy and reliability of the generation, transmission and distribution of electricity in the Commonwealth.<sup>11</sup> On Dec. 16, 1999, the Commission entered a Final Order establishing reliability benchmarks and standards for the EDCs.<sup>12</sup> The purpose of these reliability indices is to measure the performance of EDCs’ transmission and distribution systems in terms of the frequency and duration of unplanned electric service outages to ensure that the levels of reliability existing prior to retail competition do not deteriorate.

On May 7, 2004, the Commission adopted amendments to its existing regulations regarding electric reliability standards, which became effective on Sept. 18, 2004.<sup>13</sup> In conjunction with the adoption of the amended regulations, the Commission adopted an Order amending its benchmarks and standards. Subsequently, the Commission adopted Orders granting adjustments to the benchmarks and standards of five EDCs.

On Jan. 31, 2007, the LB&FC<sup>14</sup> released a performance audit of the Commission. The report observed that the Commission has enhanced the monitoring of electric reliability and generally has the processes

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<sup>7</sup> 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 Pennsylvania Public Utility Commission.

<sup>8</sup> 52 Pa. Code § 57.195.

<sup>9</sup> Dec. 3, P.L. 802, No. 138 § 4.

<sup>10</sup> 66 Pa.C.S. §§ 2802(12), 2804(1) and 2807(d).

<sup>11</sup> Docket No. L-00970120; 52 Pa. Code §§ 57.191-57.197.

<sup>12</sup> Docket No. M-00991220.

<sup>13</sup> Docket No. L-00030161; 34 Pa.B. 5135.

<sup>14</sup> Legislative Budget and Finance Committee.

and procedures in place to adequately monitor electric reliability. The performance audit was directed by House Resolution 695 of 2006 and is available on the LB&FC's website at <http://lbfc.legis.state.pa.us>.

In order to further enhance reliability performance monitoring of the EDCs, the Commission initiated a rulemaking proceeding to determine the type and scope of inspection and maintenance (I&M) standards that would be appropriate for electric transmission and distribution systems.<sup>15</sup> A Final Rulemaking Order was adopted by the Commission on May 22, 2008. The new regulation sets forth inspection and maintenance intervals.<sup>16</sup> 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 Conservation, Economics and Energy Planning (CEEP).

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<sup>15</sup> Docket No. L-00040167.

<sup>16</sup> 52 Pa. Code § 57.198(a) and (n).

## *Section 2 – Reliability Performance Measures*

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### *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<sup>17</sup> 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. It is determined by dividing the sum of all sustained customer interruption durations, in minutes, by the total number of interrupted customers;
- SAIFI measures the average frequency of sustained interruptions per customer occurring during the analysis period. It is calculated by dividing the total number of sustained customer interruptions by the total number of customers served;
- SAIDI is the average duration of sustained customer interruptions per customer occurring during the analysis period. It is the average time customers were without power. It is determined by dividing the sum of all sustained customer interruption durations, in minutes, by the total number of customers served. SAIDI is also the product of CAIDI and SAIFI; and
- MAIFI measures the average frequency of momentary interruptions<sup>18</sup> per customer occurring during the analysis period. It is calculated by dividing the total number of momentary customer interruptions by the total number of customers served.

The actual 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 affect of frequent momentary interruptions on EDCs' customers. Thus, the provision of this data is required, if available.

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

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<sup>17</sup> 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.

<sup>18</sup> The loss of electric service by one or more customers for the period defined as a momentary customer interruption by the IEEE as it may change from time to time – currently less than five minutes. The term does not include “major events” or the authorized termination of service to an individual customer.

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 normal and abnormal periods so that only normal event periods are used for calculating 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.<sup>19</sup> 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 2008, 2009 and 2010 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 electric distribution company'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.<sup>20</sup> In addition, Commission staff may initiate an investigation to determine whether an electric distribution company is providing reliable service.<sup>21</sup>

Benchmarks and standards for EDC reliability performance and average reliability indices for 2010 are listed in Appendix A.

### *Inspection and Maintenance*

The Act also addressed the promulgation of regulations for the establishment of standards for the inspection and maintenance of transmission and distribution systems. Specifically, 66 Pa. C.S. §2802(20) provides:

- (20) Since continuing and ensuring the reliability of electric service depends on adequate generation and on conscientious inspection and maintenance of transmission and distribution systems, the independent system operator or its functional equivalent should set, and the Commission shall set through regulations, inspection, maintenance, repair and replacement standards and enforce those standards.

On May 22, 2008, the Commission entered a Final Rulemaking Order implementing minimum I&M standards for EDCs operating in Pennsylvania. This created a new Section 57.198 in Title 52 of the

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<sup>19</sup> 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.

<sup>20</sup> 52 Pa. Code § 57.195(g).

<sup>21</sup> 52 Pa. Code § 57.197(a).

Pennsylvania Code, effective Sep. 27, 2008.<sup>22</sup> Section 57.198(a) states that initial I&M plans are due by Oct. 1, 2009, for Compliance Group 1 and Oct. 1, 2010, for Compliance Group 2, as determined by the Commission.<sup>23</sup> The plans cover the two calendar years beginning 15 months following the Oct. 1 filing, and must be filed biennially.

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 Section 57.198(n) and include a justification for the time frames selected. The plans are subject to acceptance or rejection by the Commission or the Director of the Bureau of CEEP if they are found to be deficient. See Table 1.

*Table 1 Inspection and maintenance intervals*

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

Each EDC has filed its Biennial Inspection, Maintenance, Repair and Replacement Plan, pursuant to 52 Pa. Code § 57.198(a). Most 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.

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).

<sup>22</sup> Docket No. L-00040167, 38 Pa.B. 5273; Docket No. M-2009-2094773.

<sup>23</sup> 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 Bureau of CEEP has now accepted all I&M plans. These approvals 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 – Statistical Utility Performance Data

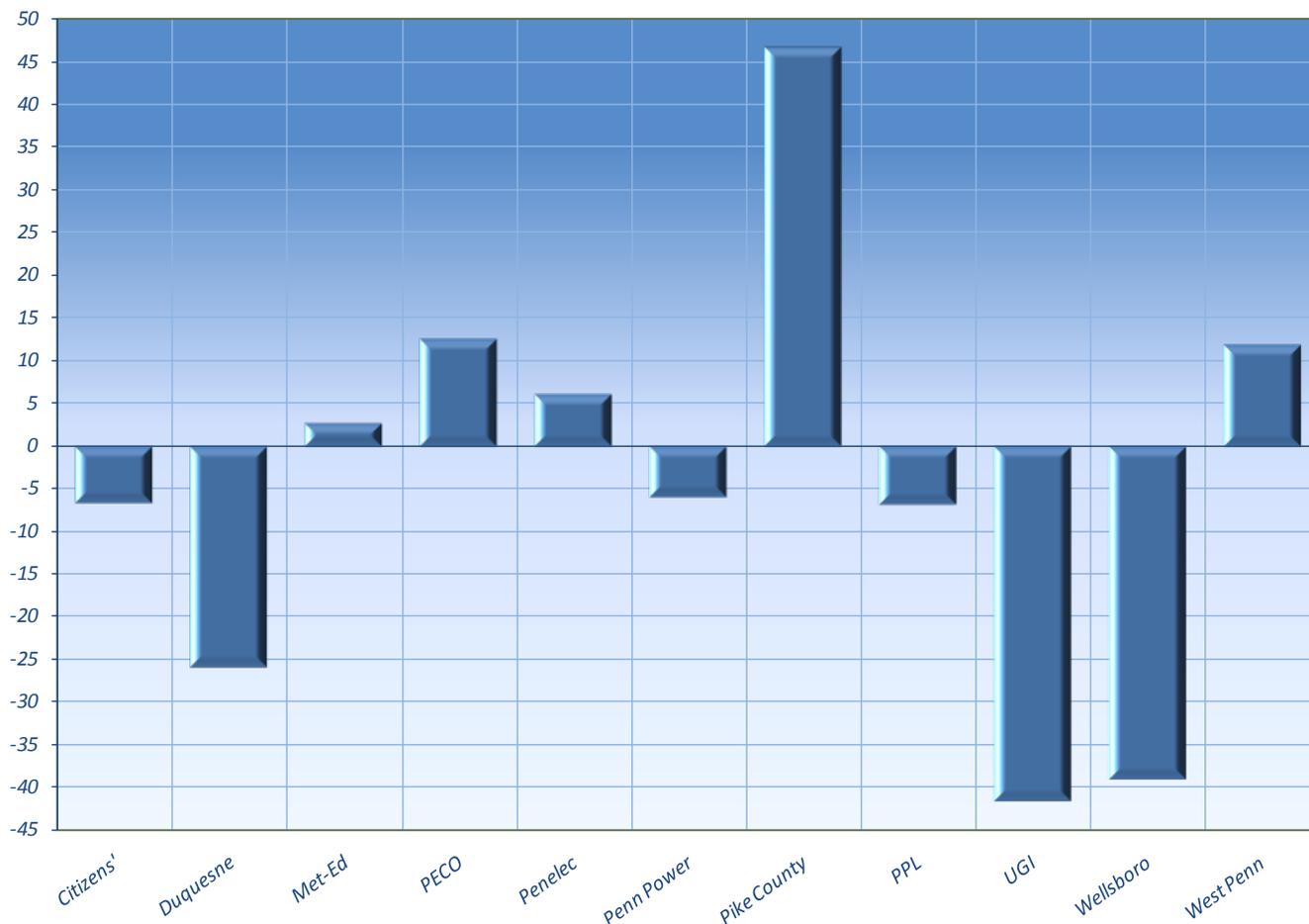
### Statewide Summary

The 2010 reliability data submitted by the EDCs indicates that 10 of the 11 EDCs achieved compliance with the 12-month CAIDI performance standards for duration of service outages. Also, six of the EDCs performed better than their CAIDI benchmarks, at an average reduction in outage duration of 21.0 percent or 28 minutes. Six of the 11 EDCs had SAIDIs better than the benchmark.

Ten of the EDCs met their rolling 12-month SAIFI performance standard for the average frequency of service outages per customer. Eight EDCs performed better than their 12-month SAIFI performance benchmarks, at an average reduction in outage frequency of 12.7 percent or 0.12.

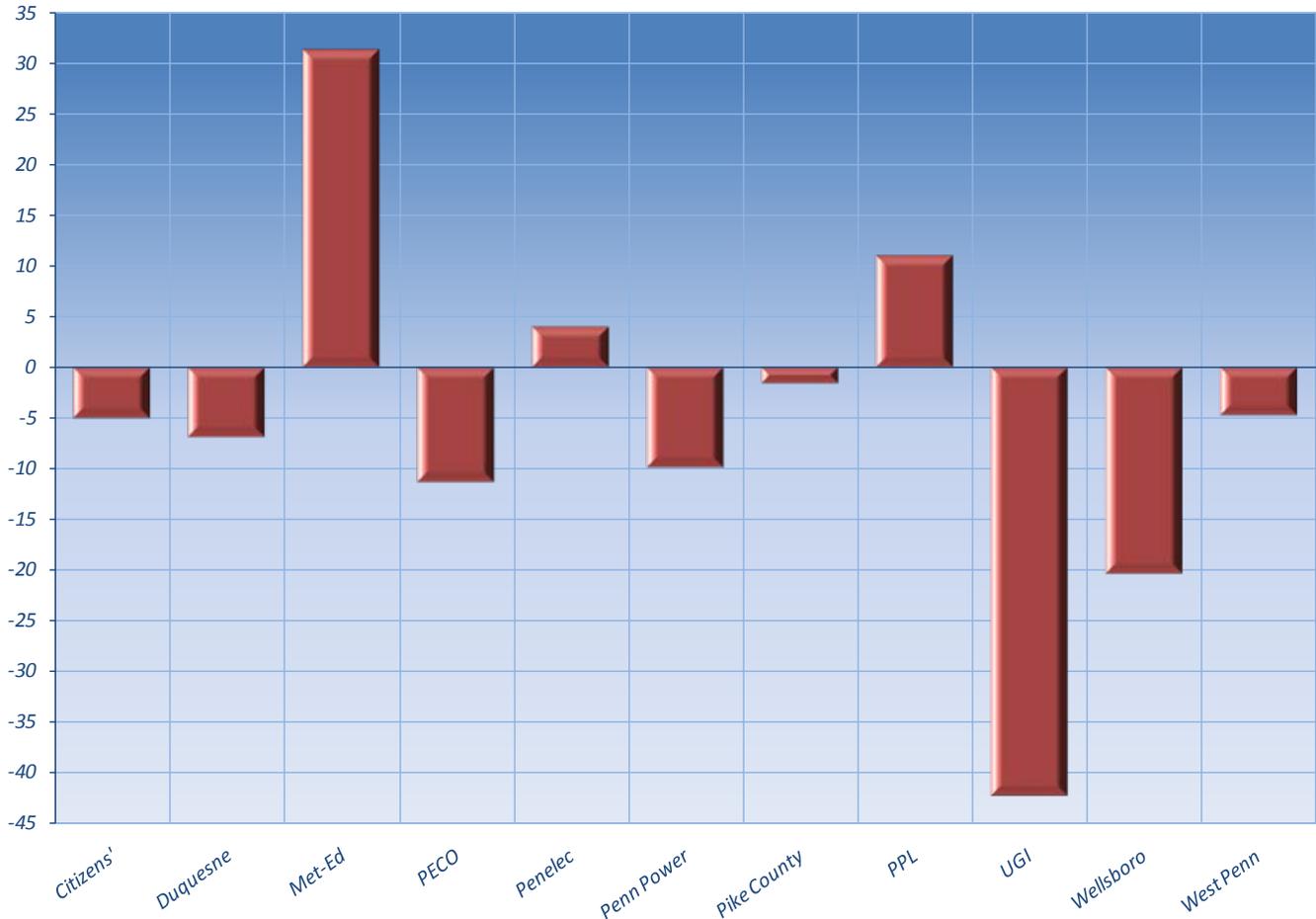
Figures 1 and 2 compare the 2010 CAIDI and SAIFI performance against benchmarks for all EDCs.

Figure 1 CAIDI 2010 comparison (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 2010 comparison (percent above or below benchmark)



Appendix A provides the actual 2010 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 2008, 2009 and 2010. Overall, the three-year average performance has improved. One EDC (Pike County) failed to meet its rolling three-year CAIDI performance standard by 31 minutes. One EDC (Met-Ed) failed to meet its rolling three-year SAIFI performance standard by 0.09, as compared to three EDCs in the previous year's comparison. No EDC exceeded the SAIDI standards, and all EDCs have shown an improvement in their three-year SAIDI averages.

The actual 2008, 2009 and 2010 performance for each EDC and the results of the three-year performance analysis also are displayed in Appendix A.

During 2010, 23 requests for exclusion of major events were filed by the EDCs. All of these requests were approved, with the exception of one partial approval. 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 area with an electric system consisting of one distribution substation and nine distribution feeder lines.

In 2010, Citizens' experienced a total of 1,262 customer interruptions, with a total duration of 124,028 minutes, excluding major events, which was 21.3 percent higher than that which was reported last year. The calculation of the 2010 reliability indices excludes outage data relating to two major events, which were approved by the Commission.<sup>24</sup>

- March 6, 2010 – A squirrel contact caused a single substation circuit to lock out; 1,111 customers were affected (16.3 percent).
- July 9-10, 2010 – A suspension insulator failed during a heavy rain; 1,056 customers were affected (15.5 percent).

Citizens' CAIDI increased from 75 minutes in 2009 to 98 minutes in 2010, which was a 30.7 percent increase in CAIDI minutes but still 6.7 percent better than the benchmark of 105 minutes. Citizens' quarterly CAIDI has been below the benchmark since 2004, except for the last quarter of 2005. The CAIDI three-year average was 36 minutes or 31.3 percent below the standard of 115 minutes. For the 12-month average ending March 31, 2011, CAIDI was 77 minutes, or 26.7 percent below the benchmark. SAIDI dropped from 15 to 11 minutes. Figure 3 depicts the trend in the duration of customer interruptions for the Citizens' system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

Citizens' SAIFI decreased from 0.20 in 2009 to 0.19 in 2010, which was a 4.5 percent improvement in outage frequency and 5.0 percent better than the benchmark of 0.20. Except for the years 2003 and 2004, SAIFI has been better than the standard of 0.27 since 2000 and below the benchmark for seven years. The SAIFI three-year average was 1.5 percent below the standard of 0.22. For the 12-month average ending March 31, 2011, SAIFI was 0.14, or 30.0 percent below the benchmark. Figure 4 depicts the trend in the frequency of service interruptions for the Citizens' system from March 2004 through March 2011, compared to the established benchmark and standards for SAIFI.

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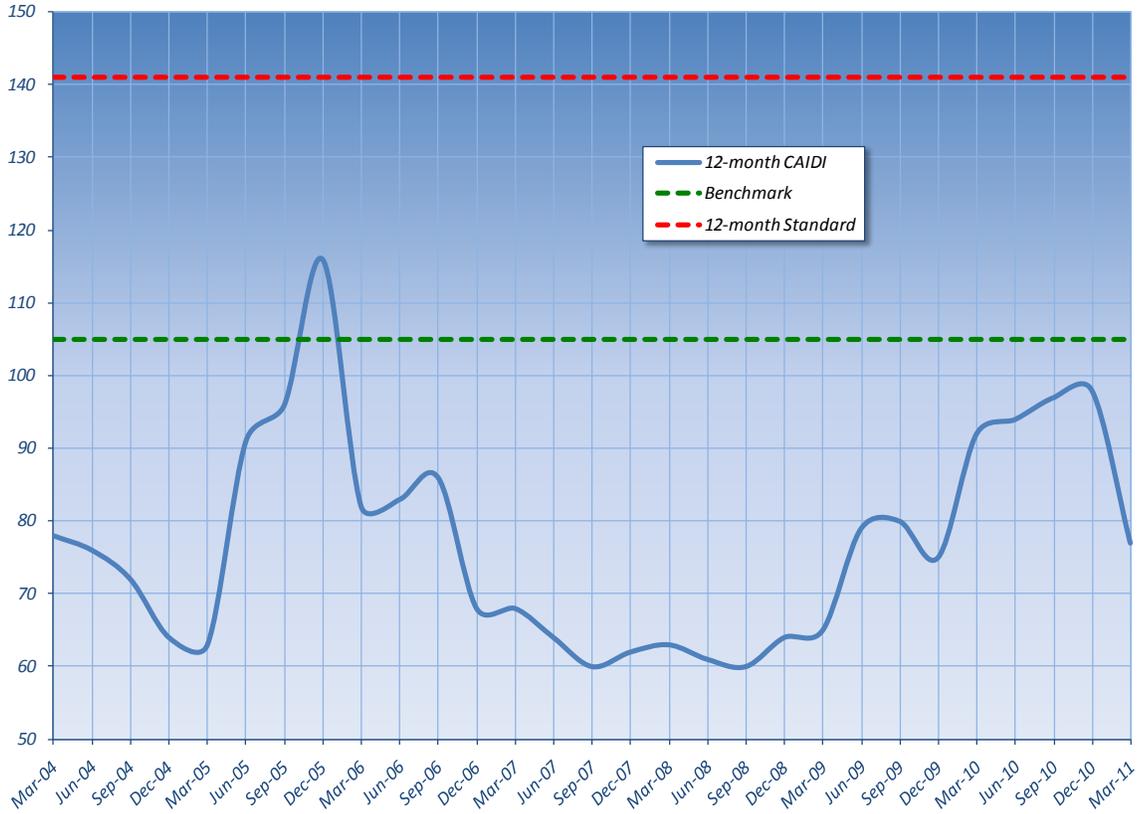
<sup>24</sup> Docket Nos. M-2010-2170867; M-2010-2187965.

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.

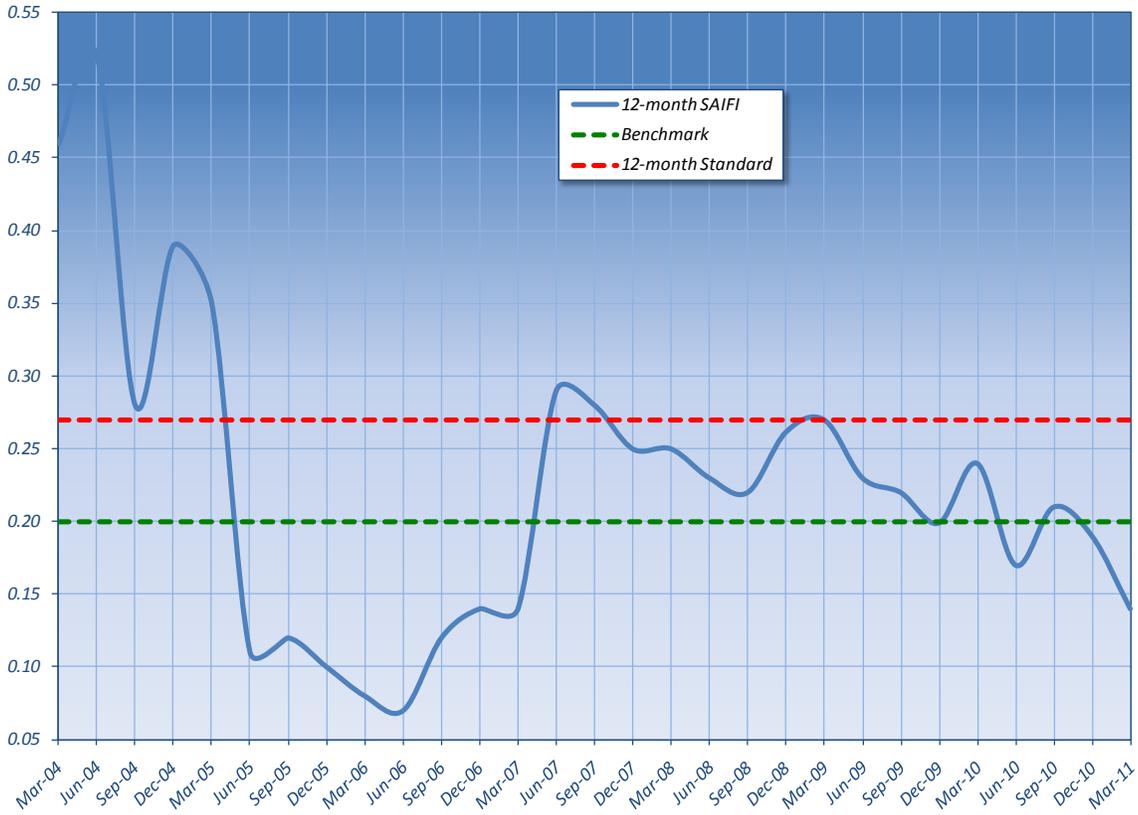
In 2010, the most frequent outage cause was animal related, representing 40.7 percent of the outages, 38.4 percent of customers affected and 17.0 percent of customer minutes interrupted. Equipment failure caused 25.9 percent of the service interruptions, 4.3 percent of customers affected and 3.9 percent of interruption minutes. Trees off the right-of-way represented 9.3 percent of outages, 25.5 percent customers affected and 45.1 percent of interruption minutes. 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. Figure 5 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 three major causes is shown in Figure 6.

During 2010, Citizens' implemented new capabilities for its Outage Management System (OMS). This included the addition of outage graphics software which provides dispatchers with real-time geographic depiction of outages affecting its distribution system. Combined with the AMI-based outage verification software deployed in 2009, this information helps dispatchers assess outages quickly and assists in the efficient deployment of crews. Citizens' also continued efforts to make information available to its customers via online sources. Outage information, including the number of affected customers by geographic area, and a graphical representation of outage quantities, is now available to all stakeholders via its website. The site also provides a tool for Citizens' to communicate other information such as projected storm restoration times.

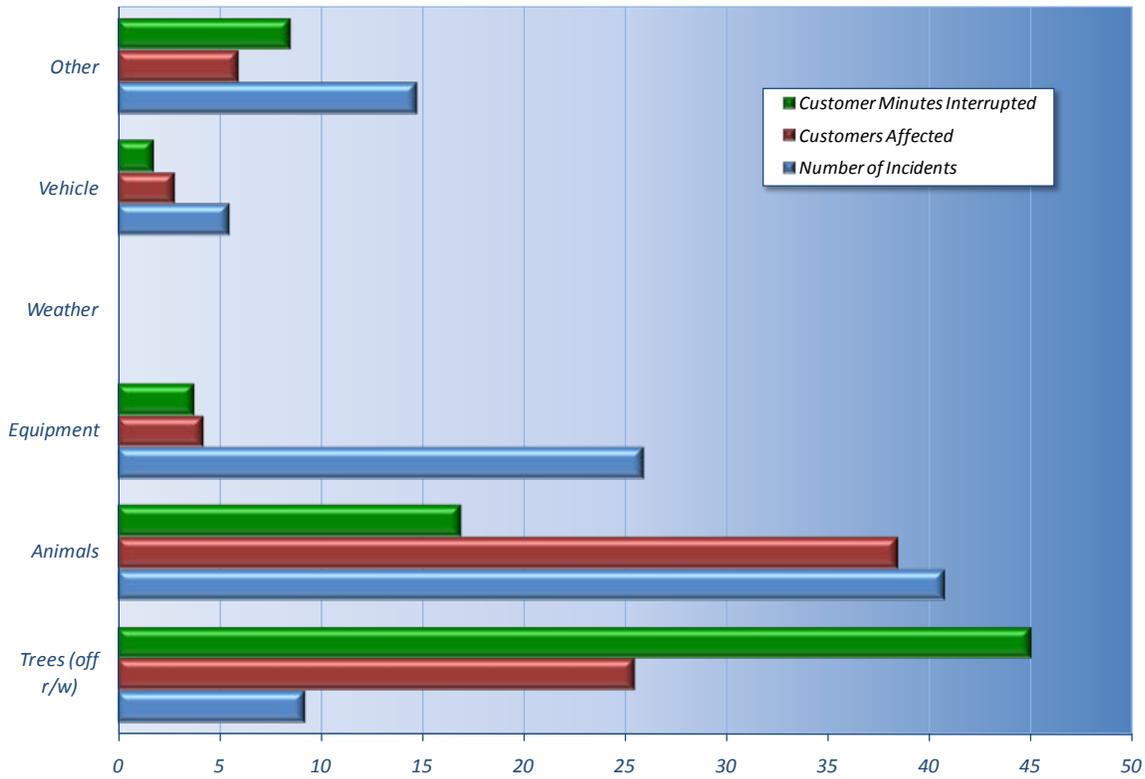
**Figure 3 Citizens' Customer Average Interruption Duration Index (minutes)**



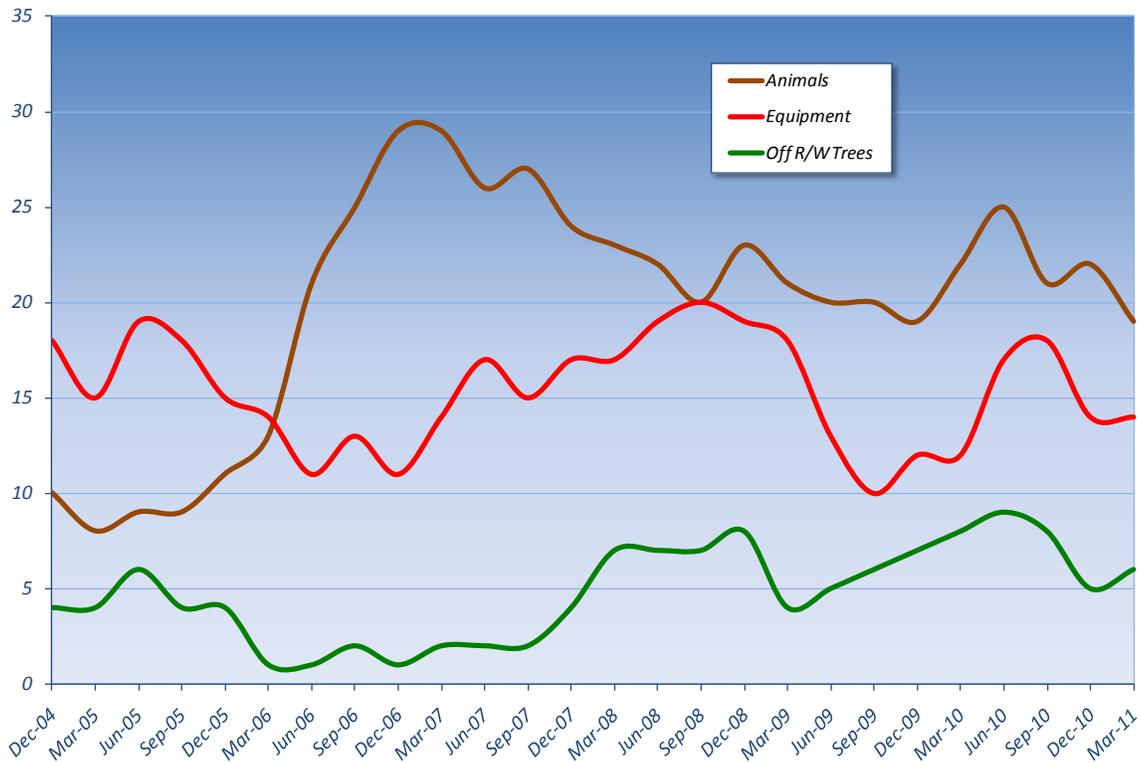
**Figure 4 Citizens' System Average Interruption Frequency Index (interruptions per customer)**



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



**Figure 6 Citizens' outage tracking (number of incidents)**



## *Duquesne Light Company*

In 2010, Duquesne experienced a total of 7.6 million kVA interrupted with a total duration of 611.4 million kVA-minutes, which was 5.6 percent higher than that which was reported last year. Three major events occurred in Duquesne's service territory during 2010. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.<sup>25</sup>

- Feb. 5-12, 2010 – Over 20 inches of heavy, wet snow caused significant damage to distribution facilities and numerous service outages; 1,562,210 kVA were affected (22 percent).
- April 16-19, 2010 – A severe thunderstorm system brought damaging lightning, high winds and heavy rains; 837,830 kVA were affected (12 percent).
- Sept. 22-26, 2010 – A severe thunderstorm system brought damaging lightning, high winds and heavy rains; 985,497 kVA were affected (14 percent).

Duquesne's 2010 CAIDI of 80 minutes was five minutes better than last year, a 5.9 percent decrease in CAIDI minutes and 28 minutes lower than the benchmark of 108 minutes. CAIDI has remained below the benchmark since September 2008 and was the lowest at 78 minutes for the 12 months ending September 2009, according to Commission records. December 2010 is the second lowest. The CAIDI three-year average was 31 minutes below the standard of 119 minutes, or nine minutes better than last year's average performance. For the 12-month average ending March 31, 2011, CAIDI was 82 minutes, or 24.1 percent below the benchmark. SAIDI increased from 82 minutes in 2009 to 87 minutes in 2010, or a 6.1 percent increase. Figure 7 depicts the trend in the duration of customer interruptions for the Duquesne system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

Duquesne's SAIFI reliability performance continues to fall well within the parameters of acceptability. The 2010 SAIFI was an average of 1.09 outages per customer, compared to last year's 0.97 and a benchmark of 1.17 outages.<sup>26</sup> Interruption frequency has remained well below the benchmark since 2004. Since its low of 0.77 in September 2006, SAIFI has risen to just over 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, 2011, SAIFI was 1.10 or 6.0 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 2011, compared to the established benchmark and standard for SAIFI.

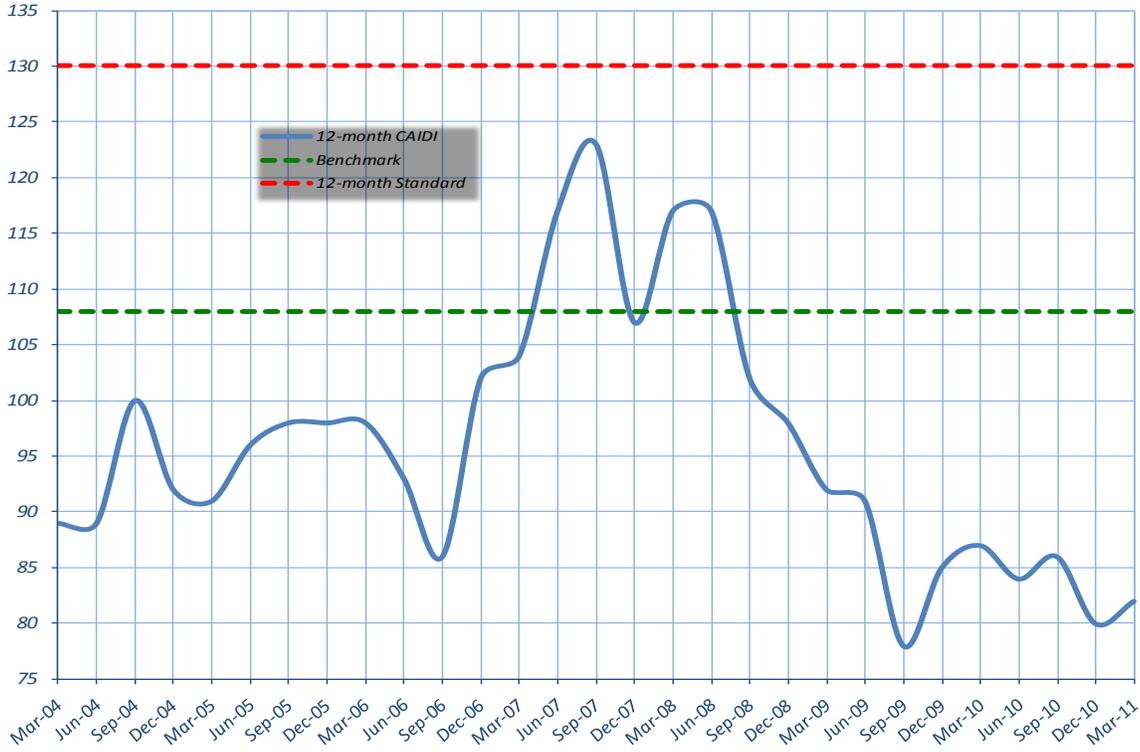
In 2010, equipment failure was responsible for 29.3 percent of the outages, 34.3 percent of interrupted load and 32.9 percent of interruption minutes, down from 35.1 percent in 2009. Fallen trees accounted for 18.1 percent of outages, 20.0 percent of interrupted load and 24.2 percent of interruption minutes. Storms were identified as causing 12.4 percent of the outages, 13.8 percent of interrupted load and 18.6 percent of interruption minutes. Figure 9 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 three major causes is shown in Figure 10.

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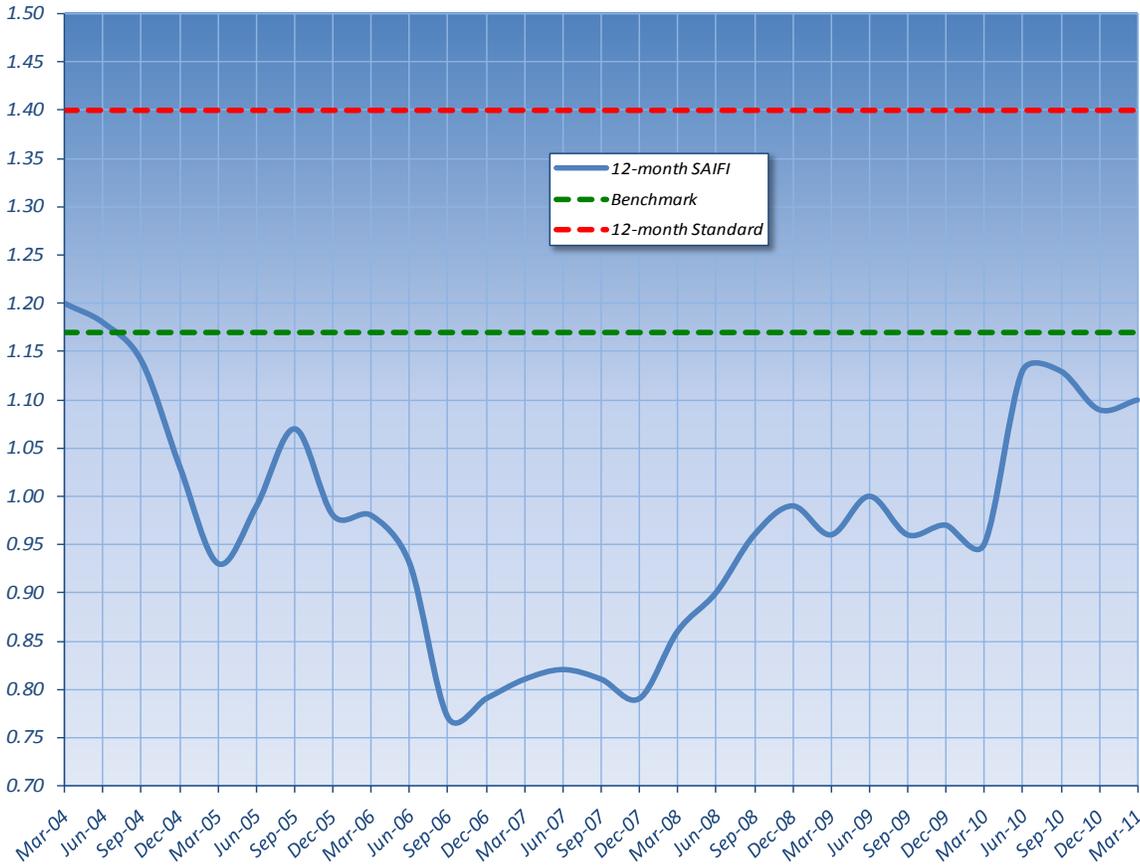
<sup>25</sup> Docket Nos. M-2010-2171057, M-2010-2180966 and M-2010-2205350.

<sup>26</sup> Duquesne's system does not provide an actual count of customers interrupted. The data available is in regard to interrupted load. The unit used is kVA, or kilovoltampere, which is the basic unit of apparent power.

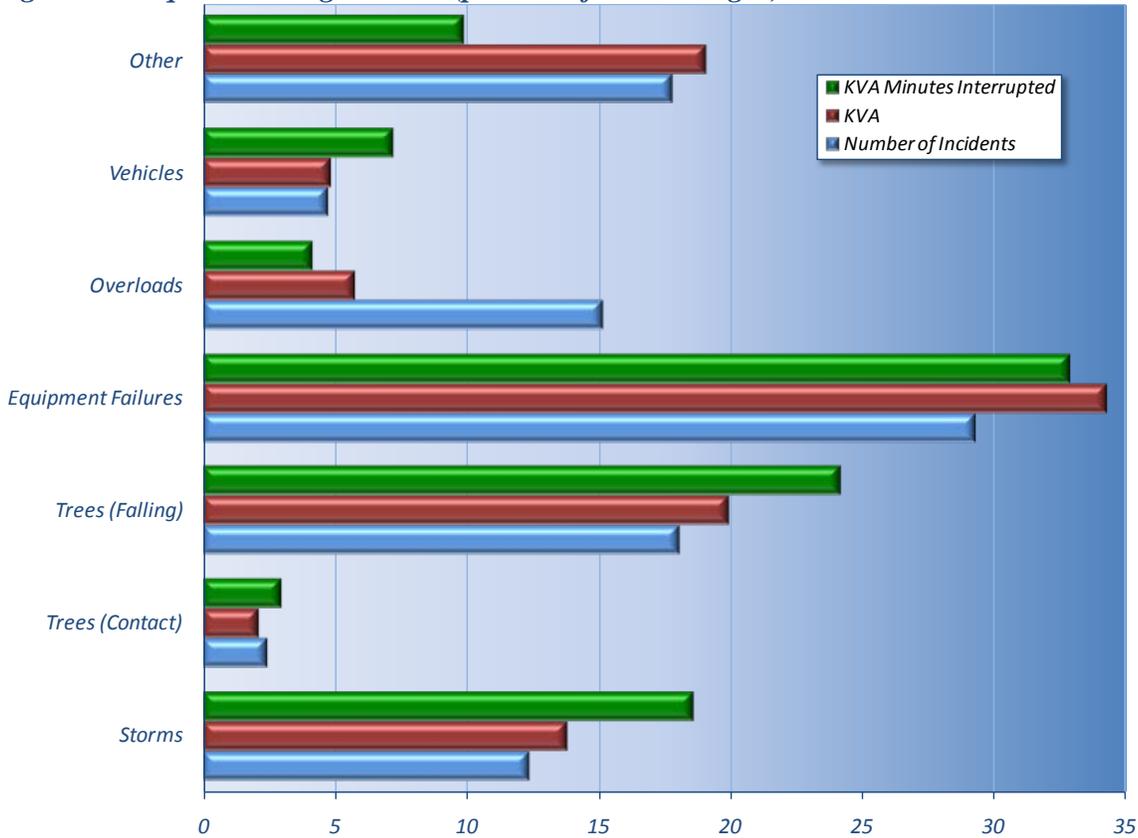
**Figure 7 Duquesne Customer Average Interruption Duration Index (minutes)**



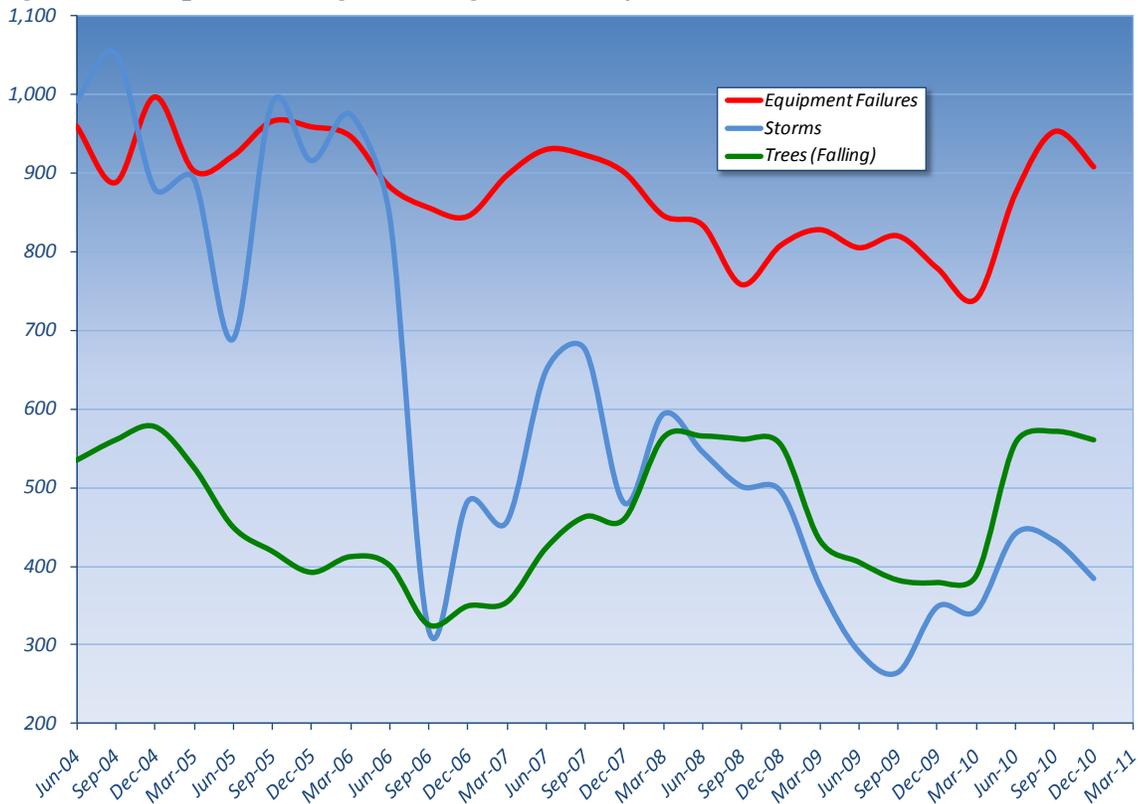
**Figure 8 Duquesne System Average Interruption Frequency Index (interruptions per customer)**



**Figure 9 Duquesne outage causes (percent of total outages)**



**Figure 10 Duquesne outage tracking (number of incidents)**



## *Metropolitan Edison Company*

In 2010, Met-Ed experienced 823,797 customer interruptions with a total duration of 98.7 million customer minutes, or 35.2 percent higher than 2009. One major event occurred in Met-Ed's service territory during 2010. The calculation of the reliability indices excludes outage data relating to this event, which was approved by the Commission.<sup>27</sup>

- July 7, 2010 – A broken crossarm on a 115-kV transmission line caused a fault, eventually leading to rotating outages as a result of a 225-MW load interruption and line constraints; 81,253 customers were affected (15 percent).

Met-Ed's CAIDI for 2010 was 120 minutes, an increase from 111 minutes in 2009, and three minutes above the benchmark, and better than the standard by 14.3 percent. CAIDI had been below the benchmark for every quarter from December 2007 to March 2010. The CAIDI three-year average was 17 minutes below the standard of 129 minutes. For the 12-month average ending March 31, 2011, CAIDI was 111 minutes, or 5.1 percent below the benchmark. SAIDI increased from 134 minutes in 2009 to 181 minutes in 2010, which is 6.7 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 2010, compared to the established benchmark and standard for CAIDI.

Met-Ed's SAIFI increased from 1.21 in 2009 interruptions per customer to 1.51 in 2010, a 24.8 percent decline and 9.4 percent above the standard. SAIFI had been trending downward until the quarter ending September 2010. Met-Ed attributes this to several non-excludable storm events. For the three-year average SAIFI performance, Met-Ed was above the SAIFI three-year standard by 6.8 percent. For the 12-month average ending March 31, 2011, SAIFI was 1.46, or 5.8 percent above the standard. Figure 12 shows the trend in the frequency of customer interruptions for the Met-Ed system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

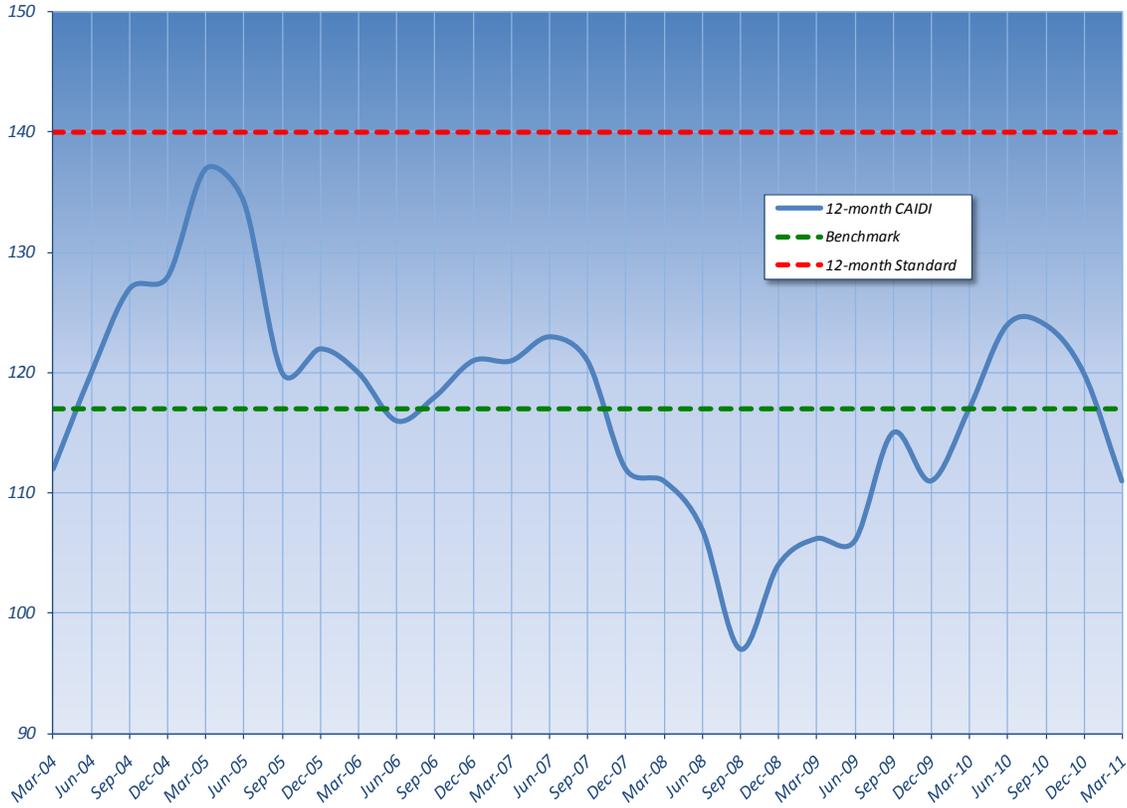
In 2010, equipment failure was responsible for 24.1 percent of incidents, 28.3 percent of customers affected and 19.7 percent of interruption minutes. Non-preventable tree-related incidents caused 21.6 percent of the incidents, 26.1 percent of customers affected and 41.8 percent of interruption minutes. Animals caused 4.0 percent of the outages, 4.0 percent of customers affected and 3.0 percent of interruption minutes. Of the total number of incidents, 12.5 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 2010 as a percentage of total outages. The trend in the number of outages by the top four major causes is shown in Figure 14.

In 2010, Met-Ed implemented 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.

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<sup>27</sup> Docket No. M-2010-2200103.

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



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

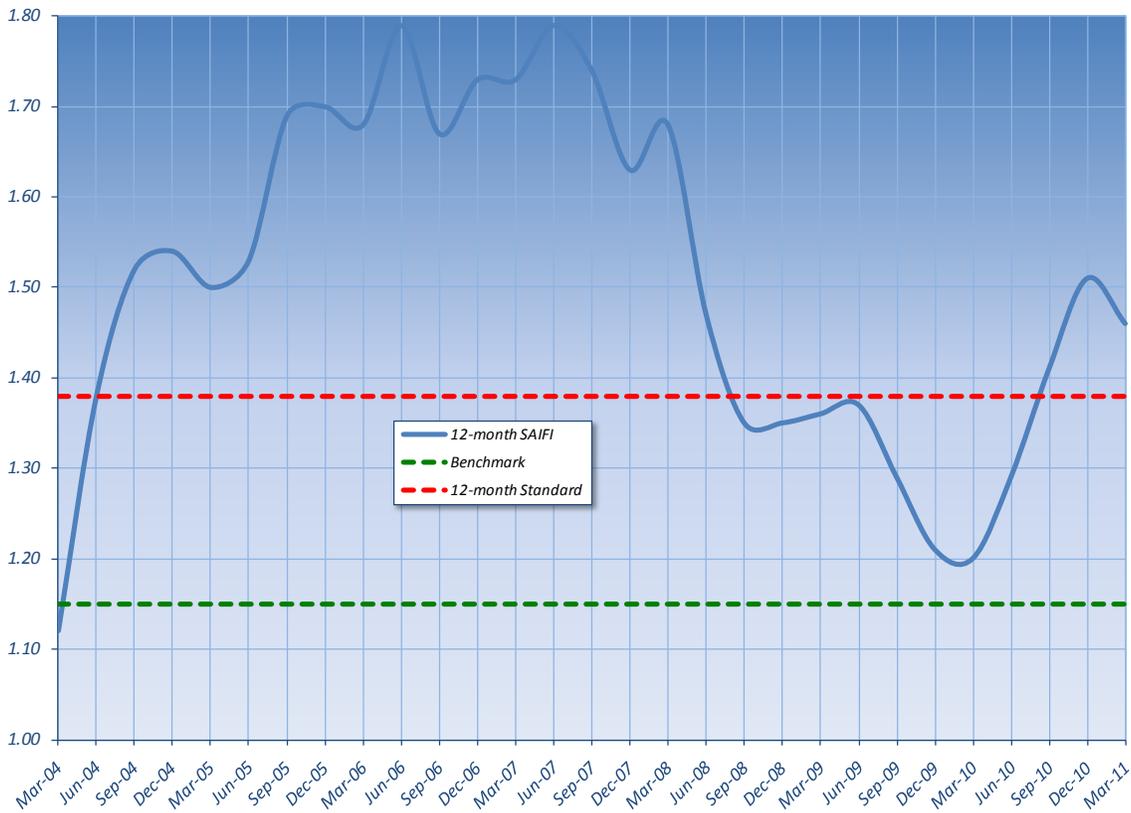


Figure 13 Met-Ed outage causes (percent of total outages)

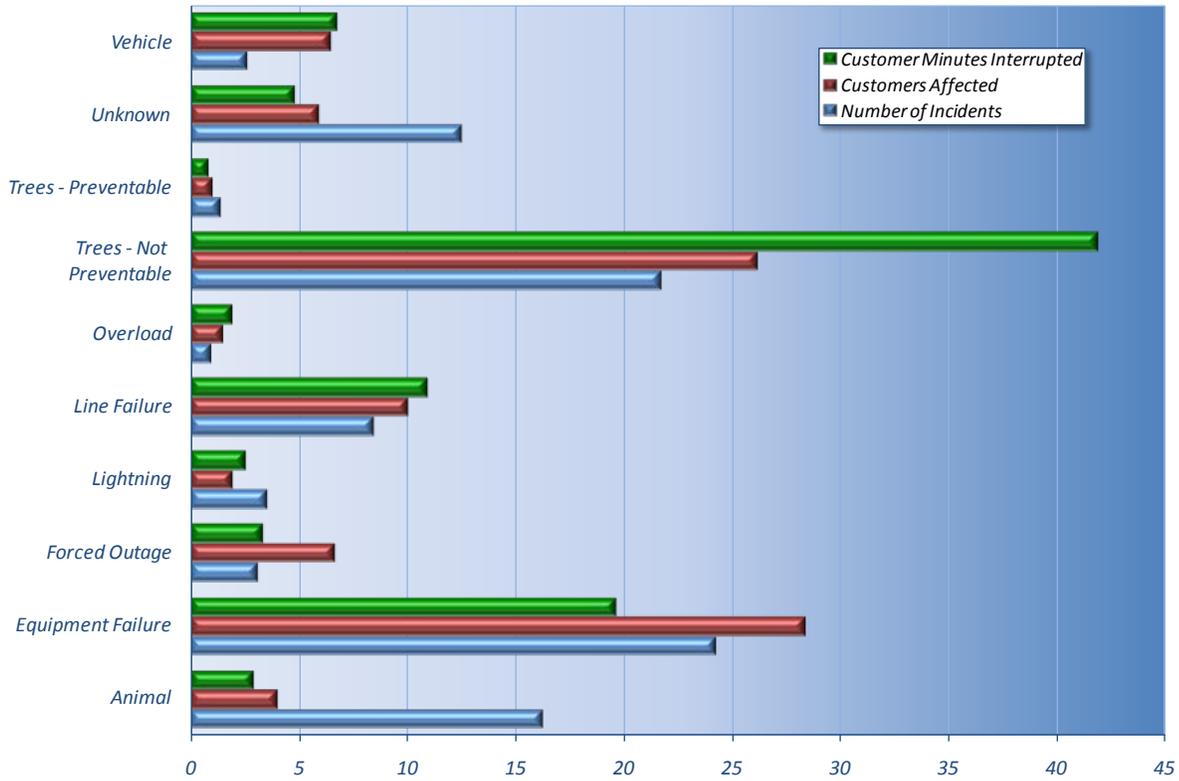
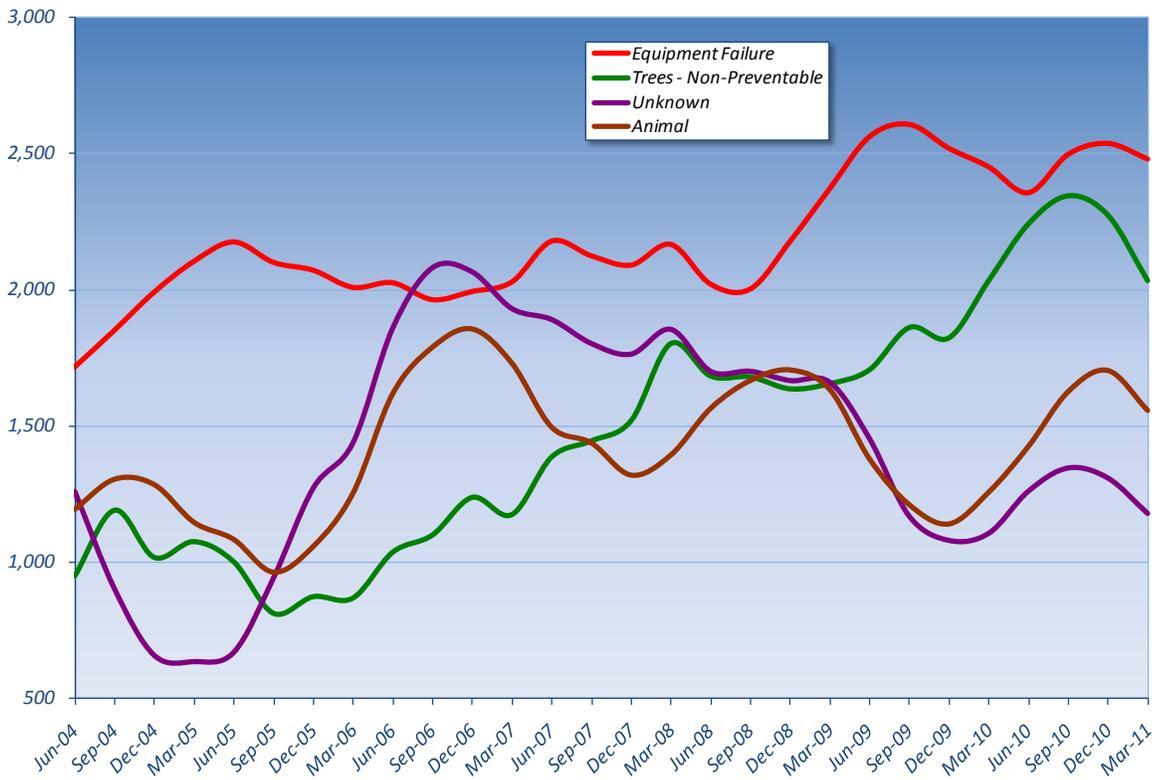


Figure 14 Met-Ed outage tracking (number of incidents)



## *PECO Energy Company*

In 2010, PECO's customers experienced 1,823,663 service interruptions with a total duration of 230.2 million minutes, which was 7.1 percent higher than the 2009 outage minutes. Two major events occurred in PECO's service territory during 2010. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.<sup>28</sup>

- Feb. 9-15, 2010 – Heavy snow, ice and high winds caused trees and tree limbs to fall across electric distribution equipment; 186,720 customers were affected (11.1 percent).
- June 24-30, 2010 – Lightning, rain and high winds caused trees and tree limbs to fall across electric distribution equipment; 337,351 customers were affected (20.1 percent).

PECO's CAIDI increased from 106 minutes in 2009 to 126 minutes in 2010, which was 18.9 percent higher than the previous year and 6.0 percent below the standard of 134 minutes. CAIDI has been near the standard since December 2009. The CAIDI three-year average was 3.5 percent below the standard of 123 minutes. For the 12-month average ending March 31, 2011, CAIDI was 127 minutes, or 5.2 percent below the standard. SAIDI increased from 103 minutes in 2009 to 137 minutes in 2010, or 0.7 percent below the benchmark. Figure 15 depicts the trend in the duration of customer interruptions for the PECO system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

PECO's SAIFI increased from 0.98 interruptions in 2009 to 1.09 in 2010, which was an 11.2 percent increase in outage frequency and 11.4 percent better than the benchmark of 1.23. SAIFI has remained below the benchmark for most of the past 10 years. The SAIFI three-year average was 23.2 percent below the standard of 1.35. For the 12-month average ending March 31, 2011, SAIFI was 1.18, or 4.1 percent below the benchmark. Figure 16 depicts the trend in the frequency of service interruptions for the PECO system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

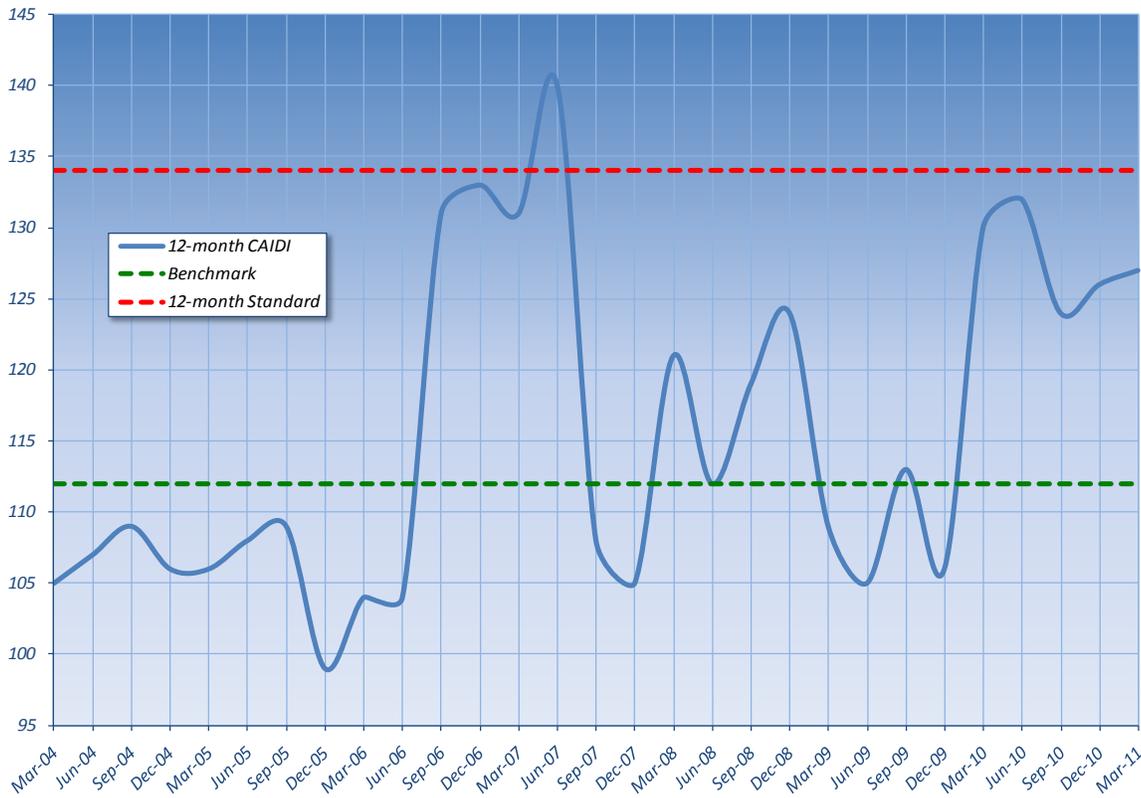
In 2010, equipment failure was responsible for 36.5 percent of the incidents, 39.7 percent of customers affected and 33.1 percent of interruption minutes. Tree-related outages involving broken branches and tree trunks or uprooted trees caused 15.6 percent of the incidents, 21.6 percent of customers affected and 31.2 percent of interruption minutes. Vegetation in-growth caused 10.2 percent of outages, 7.5 percent of customers affected and 13.4 percent of interruption minutes. Of the total number of incidents, 17.7 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 completed installation of a new mobile dispatch system in 2009. This new technology provides the capability to transfer outage information directly from centrally located computers to computers in the vehicles of workers in the field for more efficient operations in outage restoration.

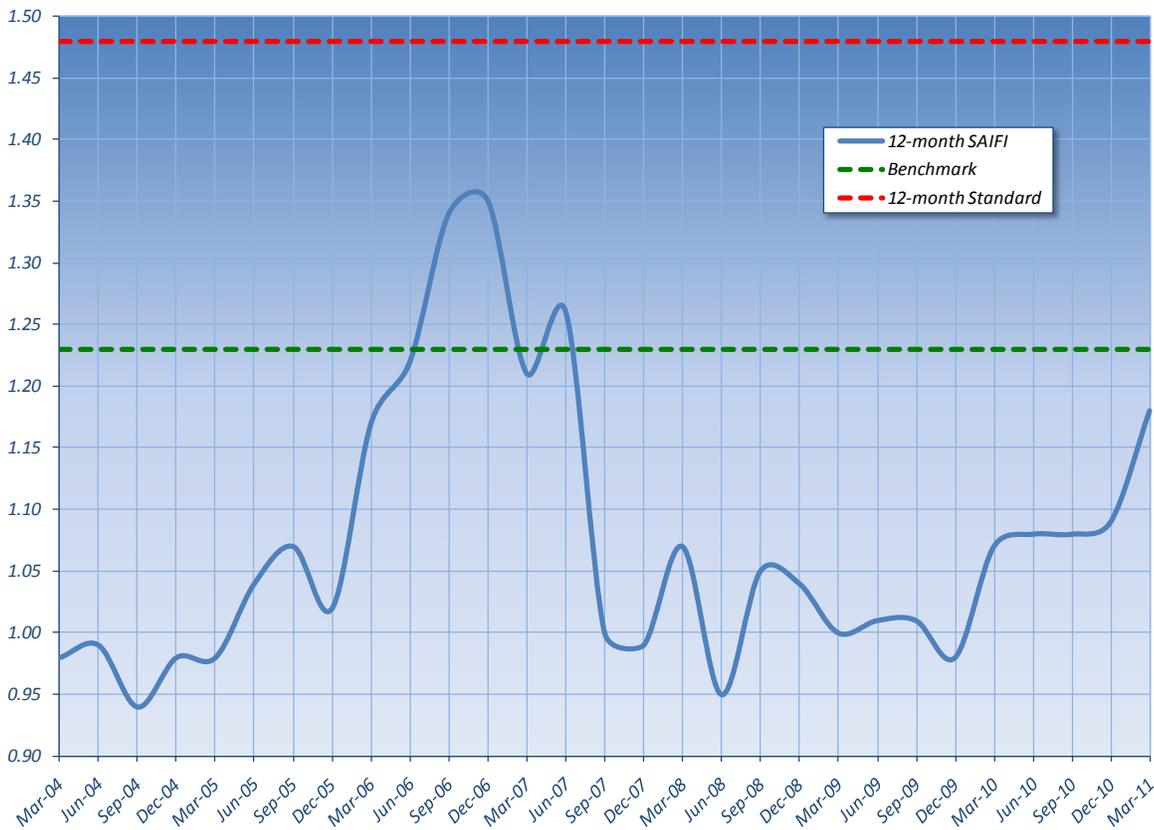
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<sup>28</sup> Docket Nos. M-2010-2166572 and M-2010-2187142.

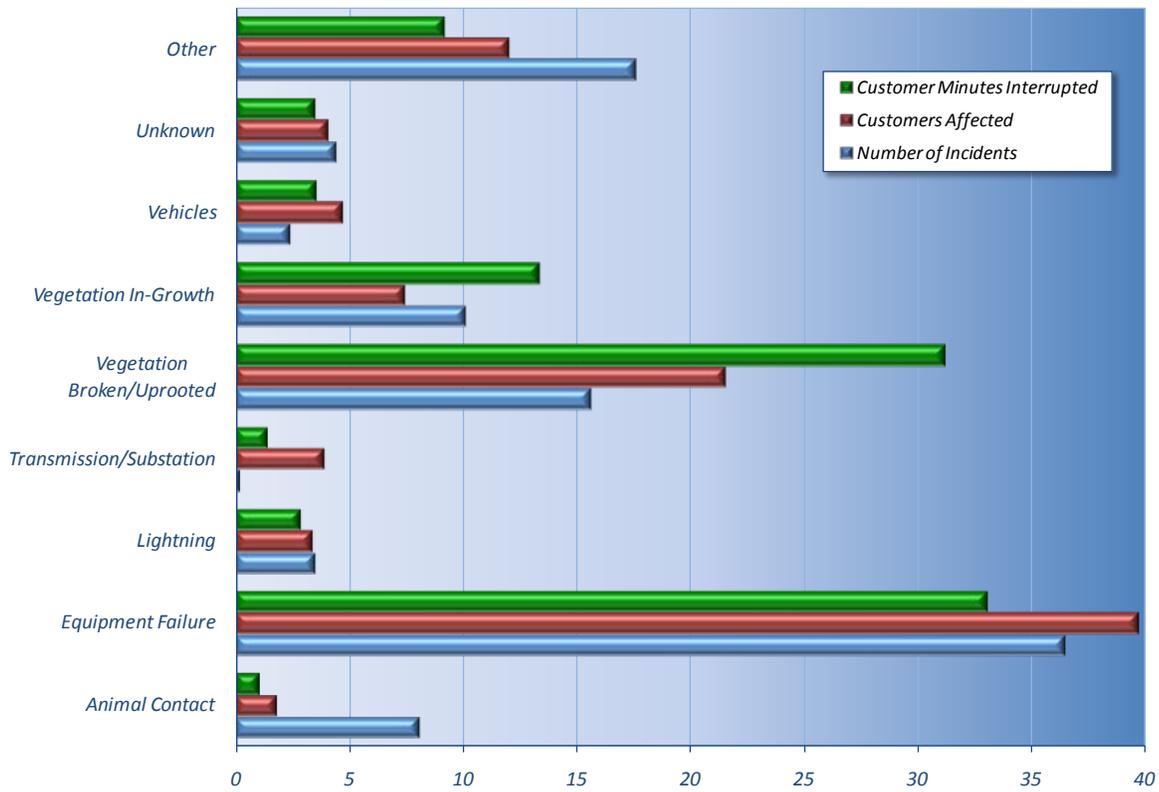
**Figure 15 PECO Customer Average Interruption Duration Index (minutes)**



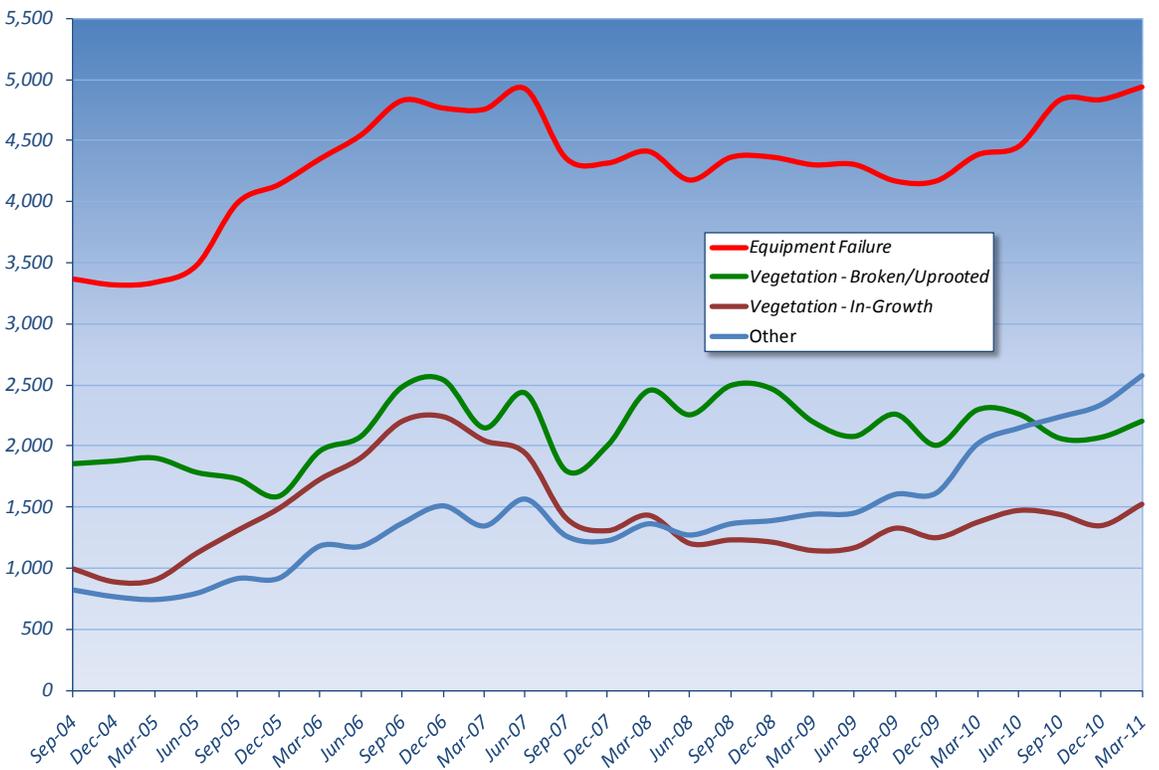
**Figure 16 PECO System Average Interruption Frequency Index (interruptions per customer)**



**Figure 17 PECO outage causes (percent of total outages)**



**Figure 18 PECO outage tracking (number of incidents)**



## *Pennsylvania Electric Company*

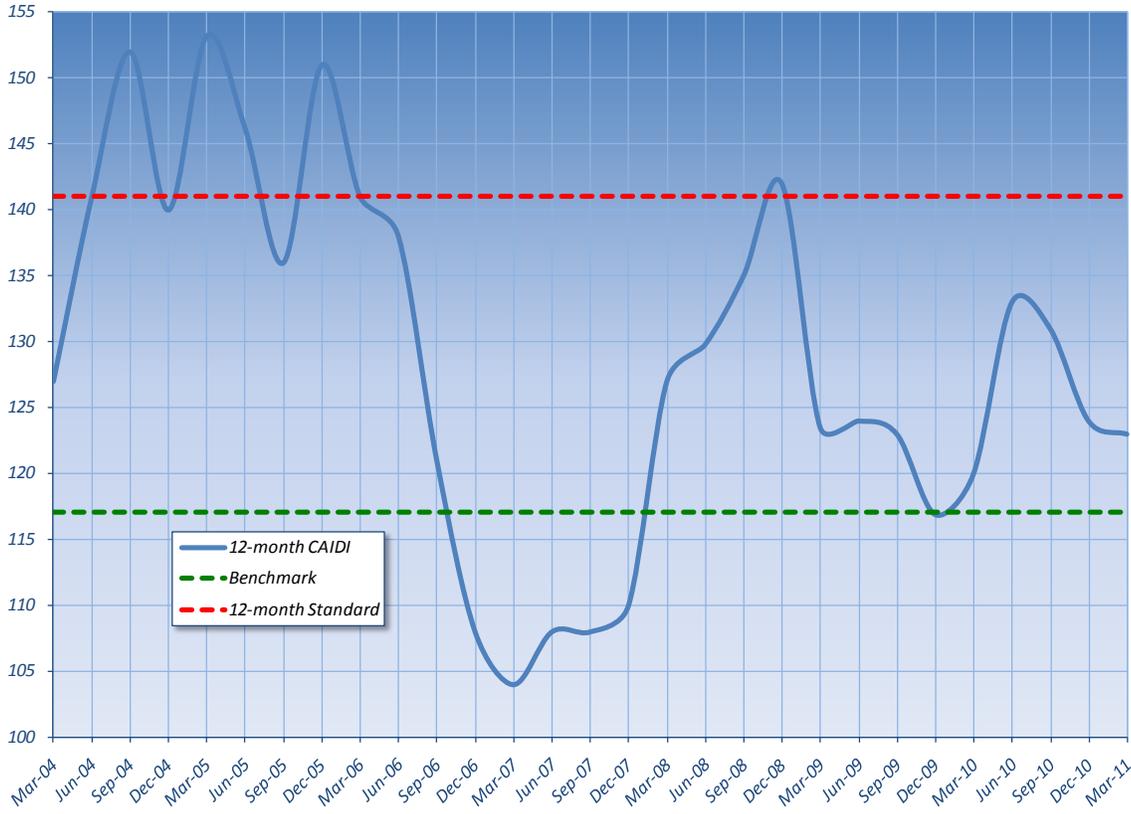
In 2010, Penelec experienced 763,846 customer interruptions with a total duration of 94.8 million customer minutes, or 13.9 percent higher than last year. No major events occurred in Penelec's service territory during 2010.

Penelec's overall reliability indices in 2010 were higher than last year's. CAIDI increased from 117 minutes in 2009 to 124 minutes in 2010, which was a 6.0 percent increase in CAIDI minutes and 6.0 percent over the benchmark of 117 minutes. CAIDI has been trending downward since the second quarter of 2010. The CAIDI three-year average was one minute below the standard of 129. For the 12-month average ending March 31, 2011, CAIDI was 123 minutes, or 1.5 percent above the benchmark. SAIDI increased from 143 minutes in 2009 to 162 minutes in 2010, or 9.5 percent above the benchmark. Figure 19 depicts the trend in the duration of customer interruptions for the Penelec system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

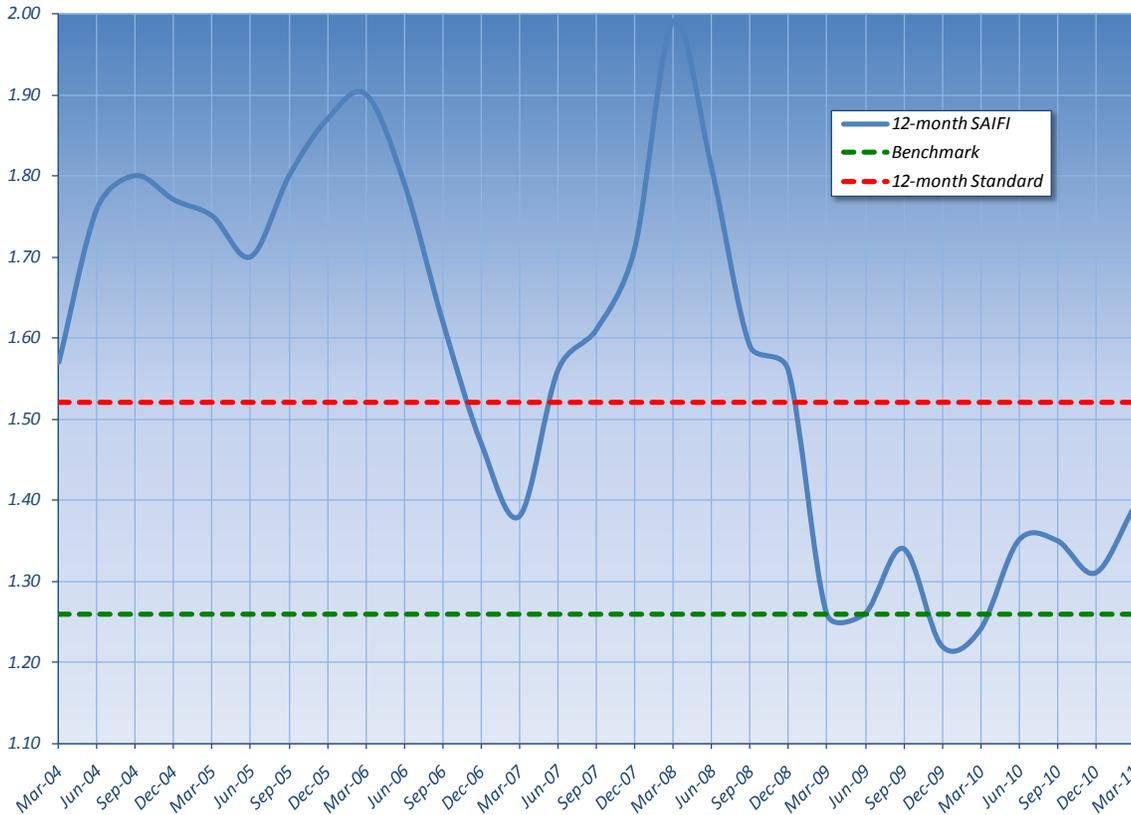
Penelec's SAIFI increased from 1.22 service interruptions per customer in 2009 to 1.31 in 2010, which was a 7.4 percent increase in outage frequency and 4.0 percent above the benchmark of 1.26. The SAIFI three-year average was 1.36 or 1.9 percent better than the standard of 1.39, which shows a positive trend. For the 12-month average ending March 31, 2011, SAIFI was 1.39, or 10.3 percent below the standard. Figure 20 shows the trend in the frequency of service interruptions for the Penelec system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

In 2010, equipment failure was responsible for 29.5 percent of incidents, 27.8 percent of customers affected and 22.9 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 13.5 percent of total incidents, 18.4 percent of customers affected and 28.8 percent of interruption minutes. Animals contributed to 10.2 percent of total incidents, 3.3 percent of customers affected and 3.0 percent of interruption minutes. Outages in the "unknown" category represented 15.2 percent of incidents, 11.9 percent of customers affected and 7.2 percent of interruption minutes. Figure 21 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 22.

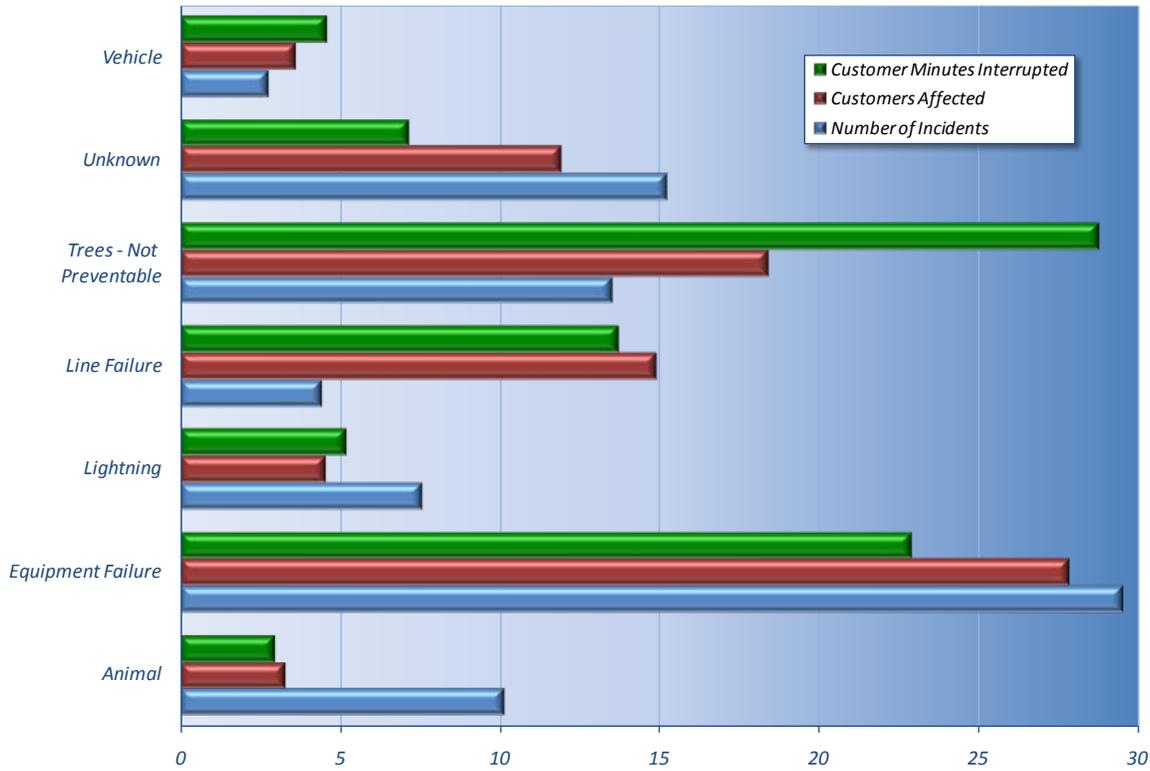
**Figure 19 Penelec Customer Average Interruption Duration Index (minutes)**



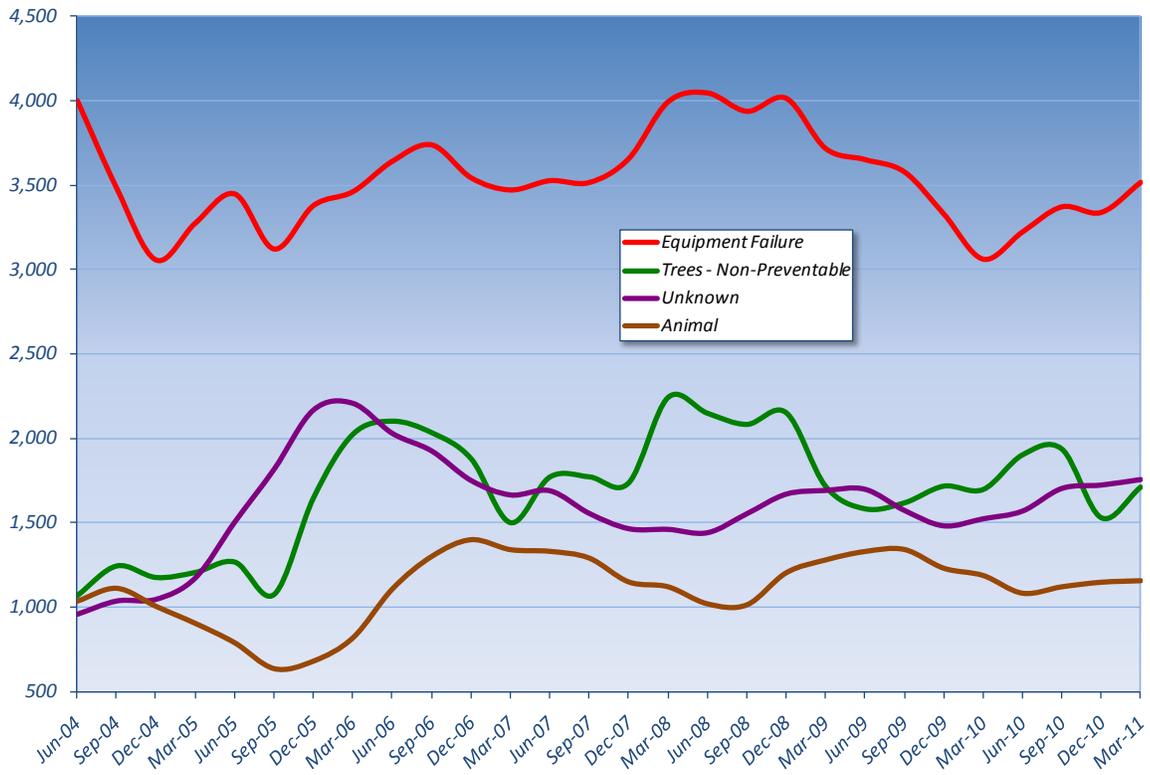
**Figure 20 Penelec System Average Interruption Frequency Index (interruptions per customer)**



**Figure 21 Penelec outage causes (percent of total outages)**



**Figure 22 Penelec outage tracking (number of incidents)**



## *Pennsylvania Power Company*

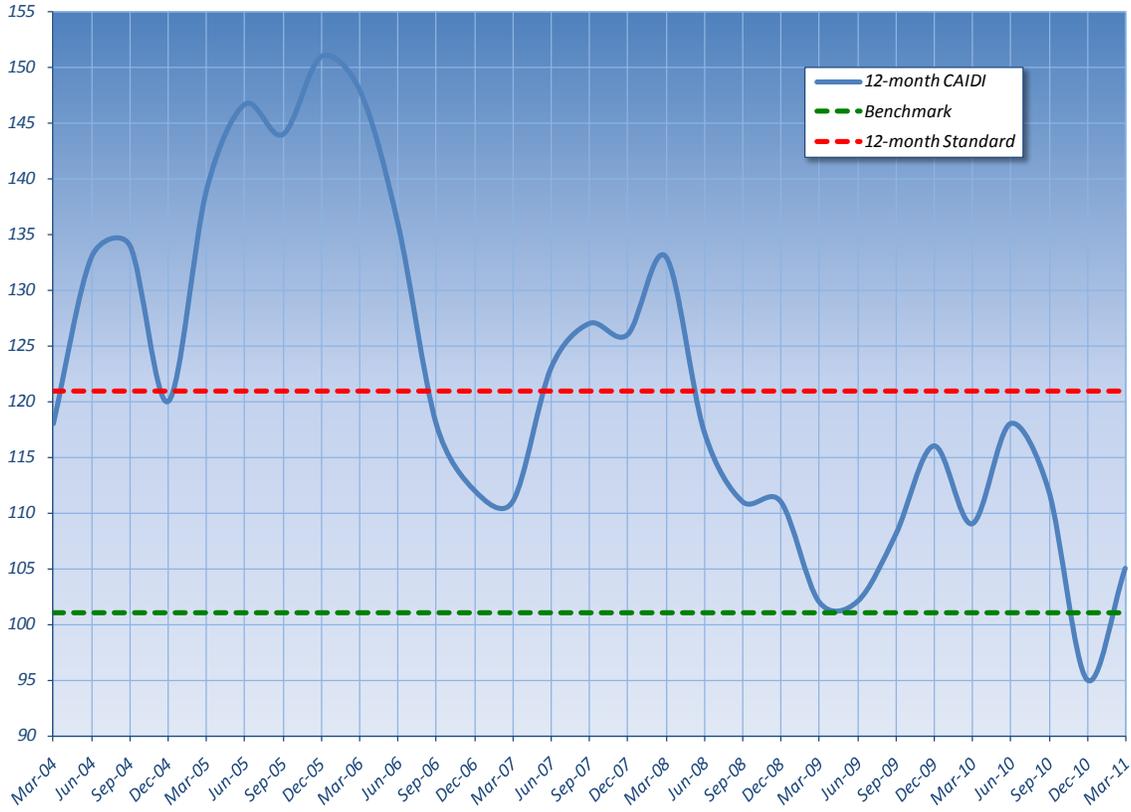
In 2010, Penn Power experienced 159,615 customer interruptions with a total duration of 15.1 million minutes, or 10.2 percent higher than 2009. No major events occurred in Penn Power's service territory during 2010.

Penn Power's CAIDI decreased from 116 minutes in 2009 to 95 minutes in 2010, which was an 18.1 percent decrease in CAIDI minutes and six minutes better than the benchmark, or 5.9 percent. Penn Power has consistently met the CAIDI standard since June 2008 and this is the first time Penn Power's annual CAIDI has been better than the benchmark of 101 minutes. The CAIDI three-year average was four minutes below the standard of 111 minutes, or 3.3 percent, and has been trending downward. For the 12-month average ending March 31, 2011, CAIDI was 105 minutes, or 4.0 percent above the benchmark. SAIDI increased from 87 minutes in 2009 to 95 minutes in 2010, or 15.9 percent below the benchmark. Figure 23 depicts the trend in the duration of customer interruptions for the Penn Power system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

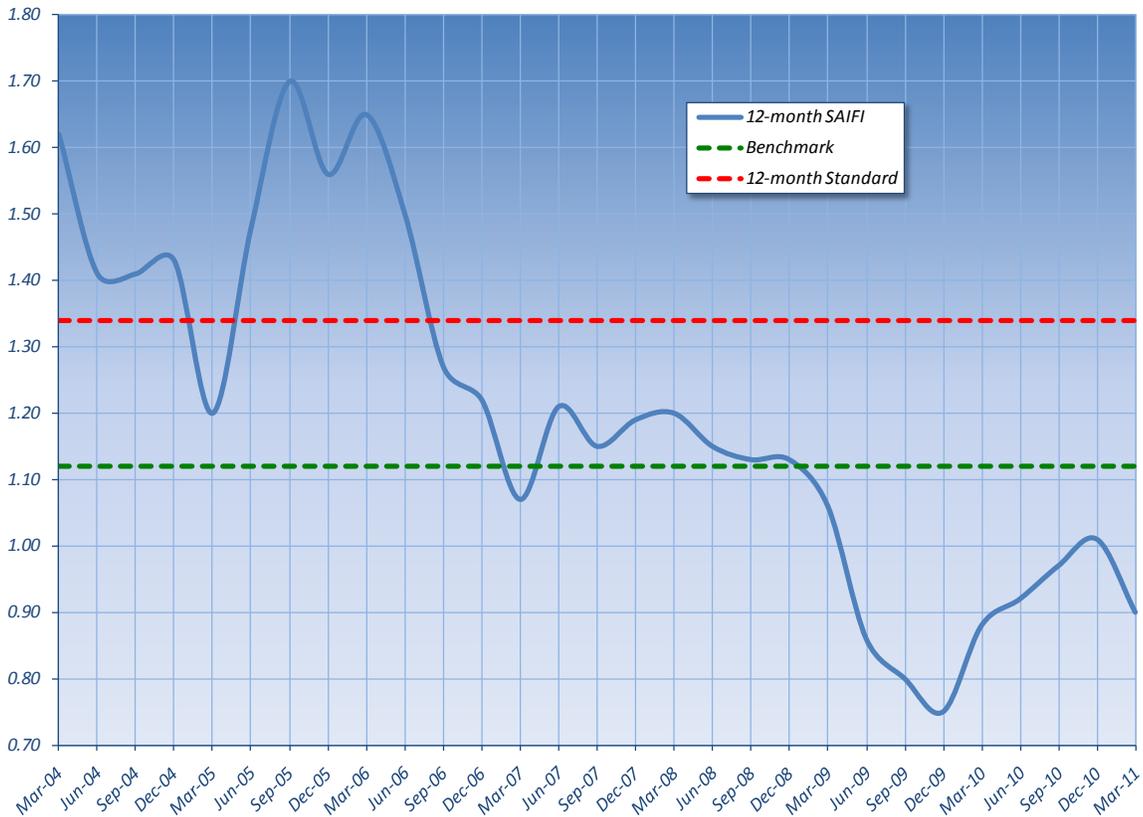
Penn Power's SAIFI was 34.7 percent higher than last year's, increasing from 0.75 service interruptions per customer in 2009 to 1.01 in 2010, which is 9.8 percent better than the benchmark of 1.12. SAIFI has been better than the benchmark for the past two years. The SAIFI three-year average was 0.96, or 21.7 percent below the standard of 1.23, and continues to trend downward. For the 12-month average ending March 31, 2011, SAIFI was 0.90 or 19.6 percent better than the benchmark. Figure 24 shows the trend in the frequency of service interruptions for the Penn Power system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

In 2010, non-preventable tree-related outages represented 19.1 percent of the incidents, 19.0 percent of customers affected and 31.8 percent of interruption minutes. Equipment failure accounted for 13.8 percent of the incidents, 39.2 percent of customers affected and 21.9 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 7.8 percent of incidents, 6.1 percent of customers affected and 9.8 percent of interruption minutes. Lightning caused 16.2 percent of outages, 8.8 percent of customers affected and 11.1 percent of interruption minutes. Figure 25 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 26.

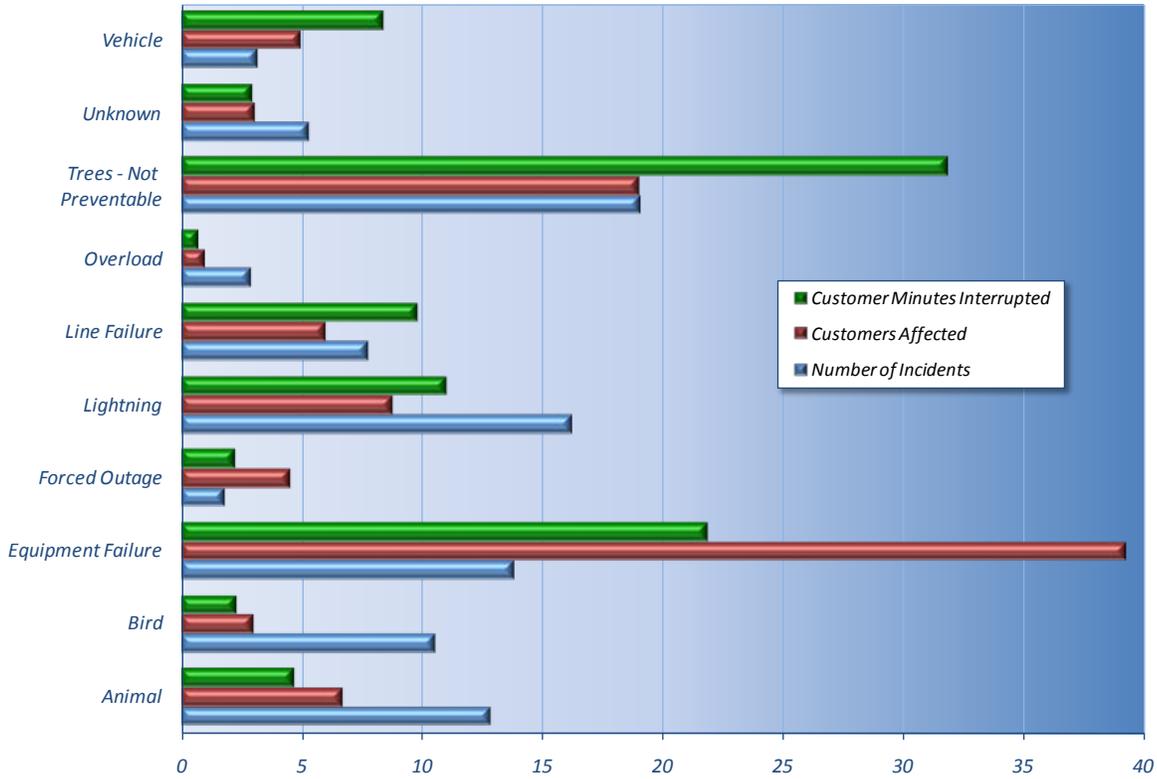
**Figure 23 Penn Power Customer Average Interruption Duration Index (minutes)**



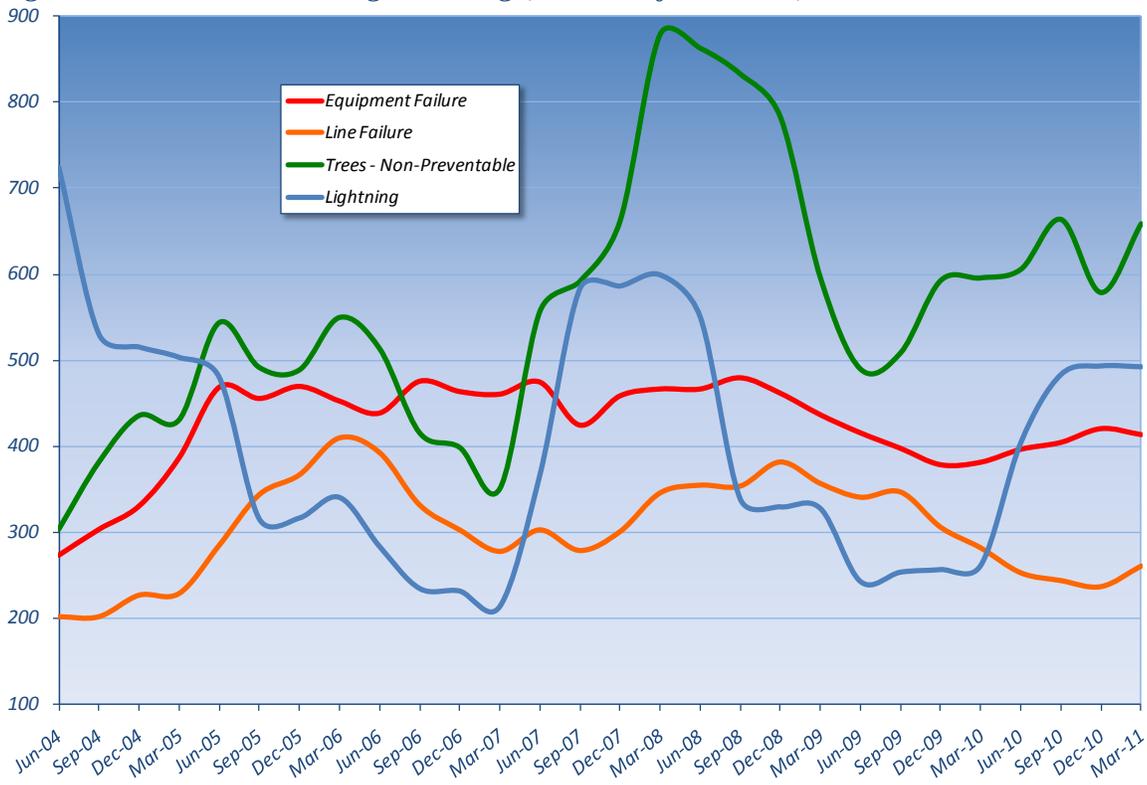
**Figure 24 Penn Power System Average Interruption Frequency Index (interruptions per customer)**



**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 2010, Pike County experienced 2,685 customer interruptions with a total duration of 685,799 minutes, which was 44.2 percent higher than that which was reported last year. The calculation of the 2010 reliability indices excludes outage data relating to seven major events, which were approved by the Commission.<sup>29</sup>

- Jan. 25, 2010 – High winds and rain caused a wire to fall, isolating the line; 1,685 customers were affected (37.5 percent).
- Feb. 28, 2010 – Heavy snowfall caused trees and tree limbs to fall across electric distribution equipment; 588 customers were affected (13.1 percent).
- March 13-14, 2010 – High winds and heavy rain caused trees and tree limbs to fall across electric distribution equipment; 1,758 customers were affected (39.3 percent).
- April 26, 2010 – Arcing on a phase of primary wire led to a fault isolation; 590 customers were affected (13.2 percent).
- May 1, 2010 – Insulator failure; 1,677 customers were affected (37.6 percent).
- July 26, 2010 – Primary wire fell due to apparent previous lightning damage; 1,220 customers were affected (27.3 percent).
- Sept. 30, 2010 – A wind and rain storm caused a tree to fall on primary wires; 2,186 customers were affected (48.9 percent).

Pike County's CAIDI increased from 178 minutes in 2009 to 255 minutes in 2010, which was a 43.3 percent increase in CAIDI minutes and 8.5 percent above the standard of 235 minutes. Pike attributes this increase to the denial of the exclusion of outages occurring in February 2010.<sup>30</sup> The CAIDI three-year average was 31 minutes (16.1 percent) above the standard of 192 minutes. For the 12-month average ending March 31, 2011, CAIDI was 172 minutes, or 1.1 percent better than the benchmark. SAIDI went from 106 minutes in 2009 to 153 minutes in 2010. Figure 27 depicts the trend in the duration of customer interruptions for the Pike County system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

Pike County's SAIFI remained the same as last year at 0.60, which is 1.6 percent better than the benchmark of 0.61. SAIFI has remained below the benchmark for 12 out of the last 14 quarters. The SAIFI three-year average was 17.4 percent below the standard of 0.67. For the 12-month average ending March 31, 2011, SAIFI was 0.58, or 4.9 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 2011, compared to the established benchmark and standard for SAIFI.

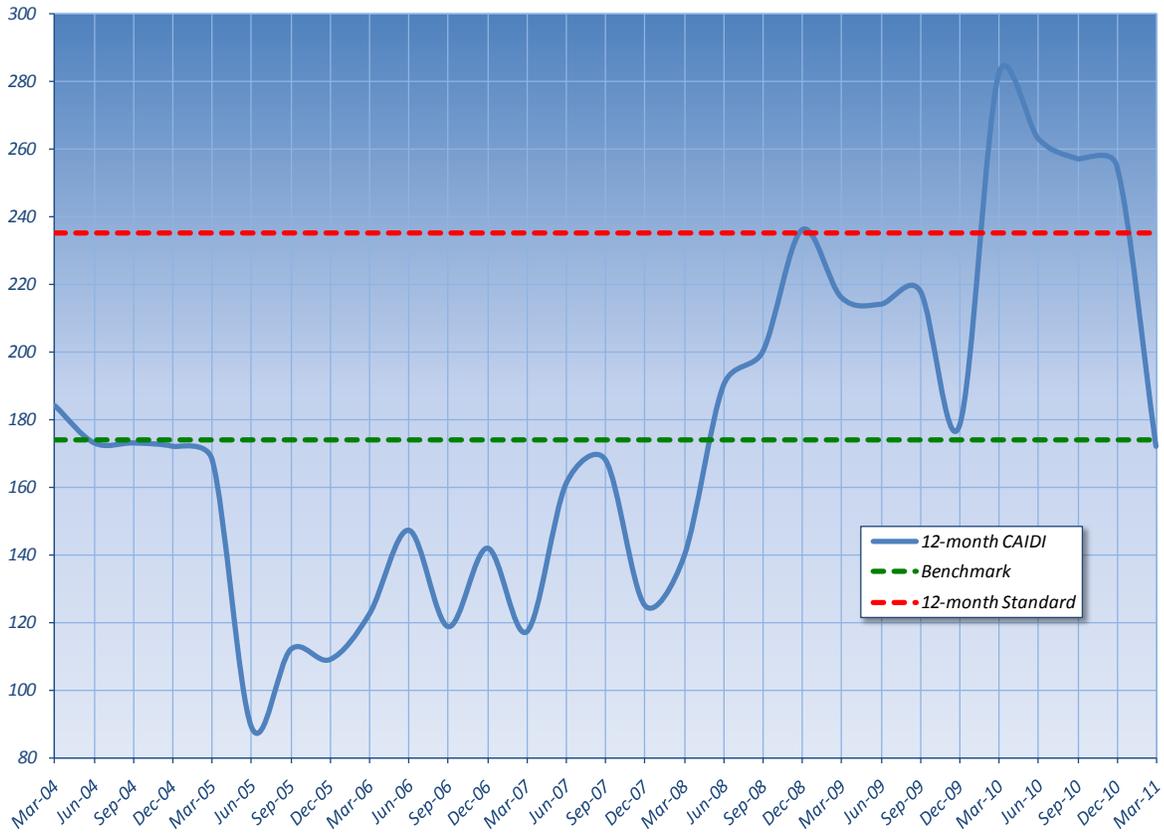
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<sup>29</sup> Docket Nos. M-2009-2162843, M-2010-2165633, M-2010-2165585, M-2010-2198358, M-2010-2198359, M-2010-2207530 and M-2010-2207527.

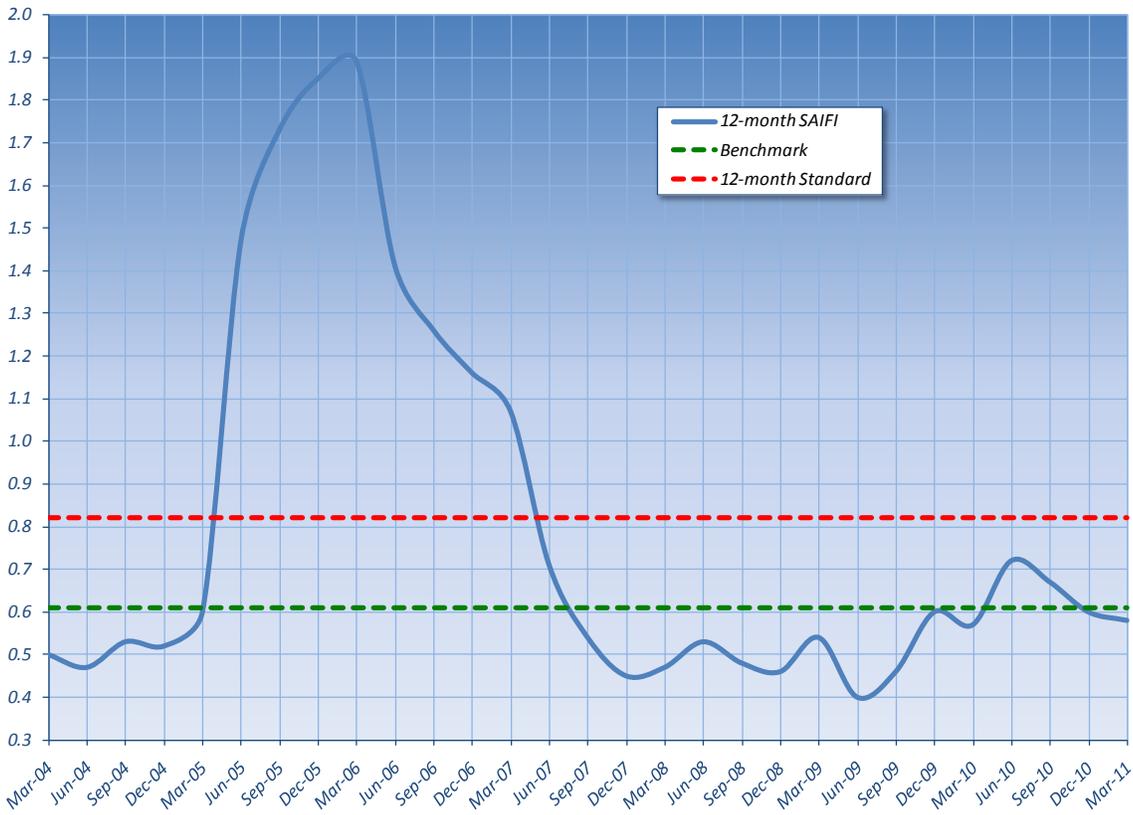
<sup>30</sup> A request for exclusion of service interruptions occurring on Feb. 25-27, 2010, was denied. A Petition for Appeal of Staff Action was also denied.

In 2010, the major cause of service outages was tree contact with 52.4 percent of interruptions affecting 51.4 percent of customers for 78.0 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 19.1 percent of the outages, 21.5 percent of customers affected and 10.6 percent of interruption minutes. Animal contact was responsible for 11.1 percent of total outages, 5.0 percent of customers affected and 1.3 percent of interruption minutes. Figure 29 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 three major causes is shown in Figure 30.

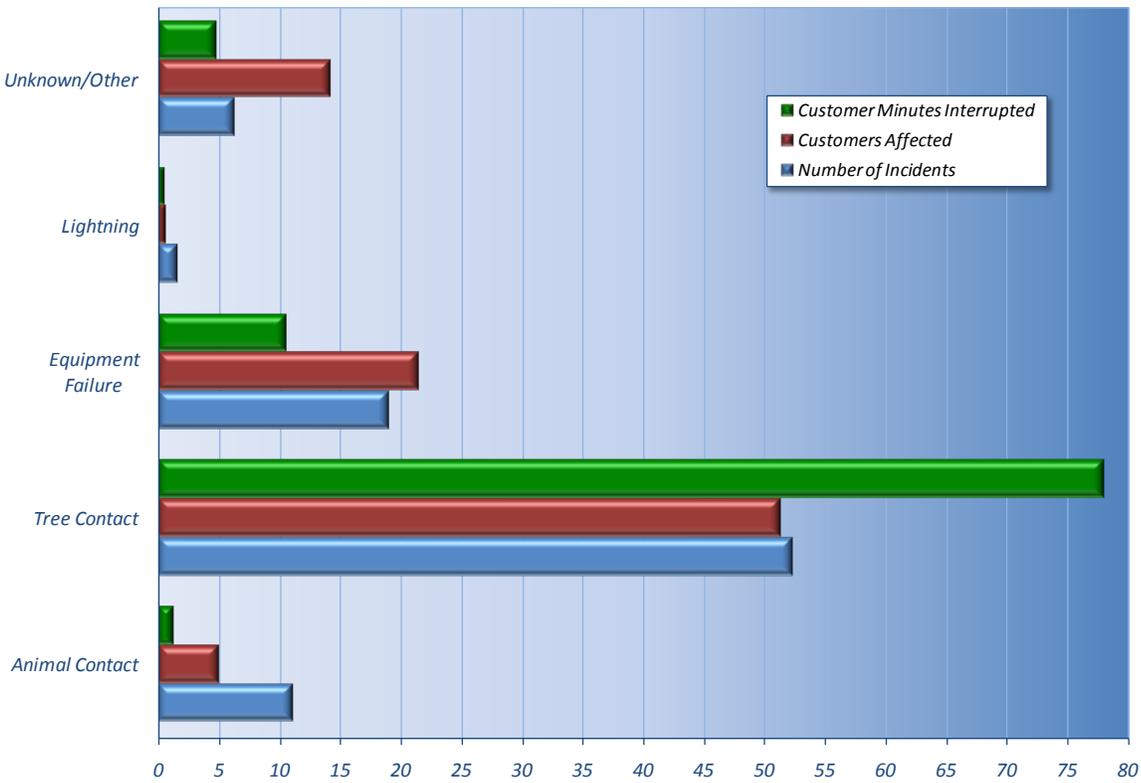
**Figure 27 Pike County Customer Average Interruption Duration Index (minutes)**



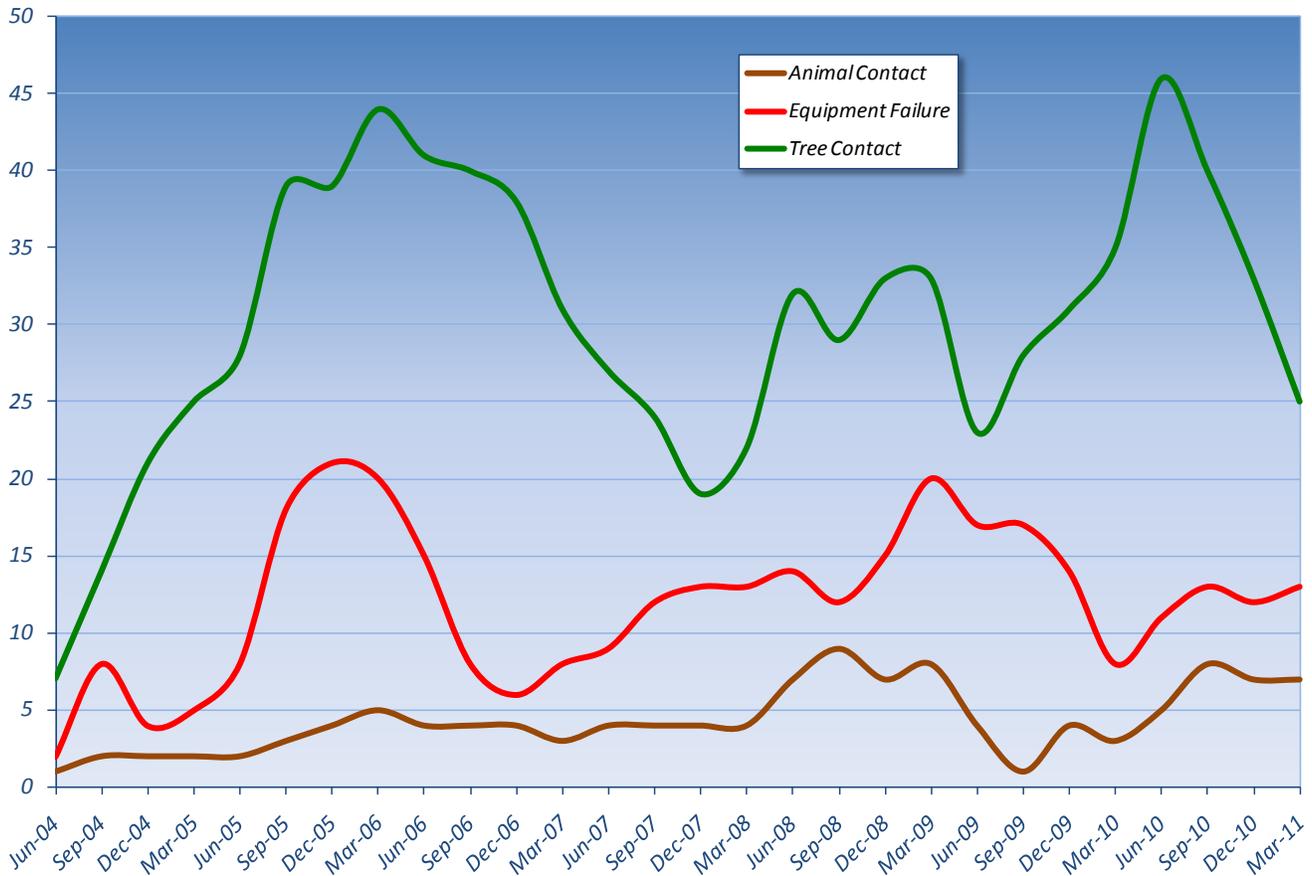
**Figure 28 Pike County System Average Interruption Frequency Index (interruptions per customer)**



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



**Figure 30 Pike County outage tracking (number of incidents)**



**PPL Electric Utilities Corporation**

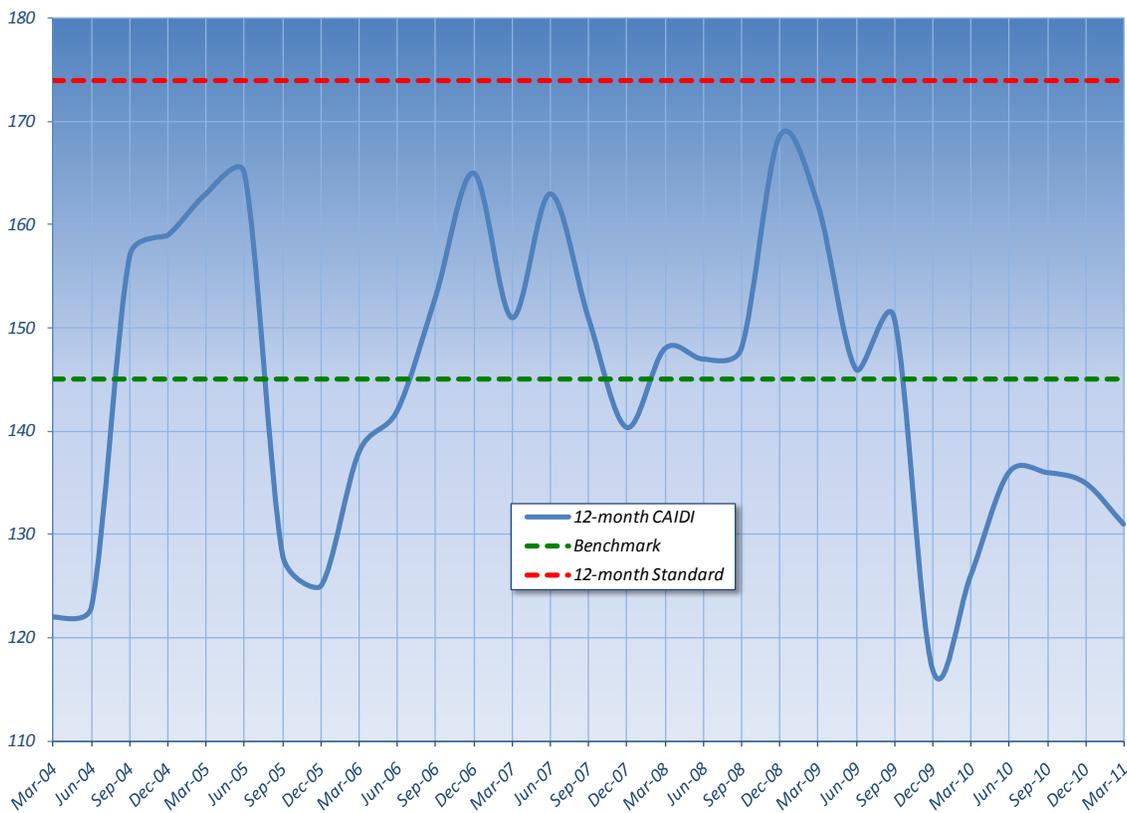
In 2010, PPL’s customers experienced 1,508,318 service interruptions with a total duration of 204 million minutes, or 42.2 percent higher than last year’s figure. No major events occurred in PPL’s service territory during 2010. There were, however, 10 PUC-reportable storms, other than major events, which is comparable to the average of 4.2 storms per year during the benchmark years, 1994-1998. There also were 19 storms that were not reportable, compared to an average of 10.2 storms per year recorded from 2001 through 2005. The company’s overall performance was attributable to these storms, which required opening one or more area emergency centers to manage restoration efforts.

PPL’s CAIDI increased from 117 minutes in 2009 to 135 minutes in 2010, or 15.4, but still remained below the benchmark of 145 minutes. PPL’s CAIDI was better than the benchmark for the last five quarters. The CAIDI three-year average improved slightly, at 12.4 percent below the standard of 160 minutes. For the 12-month average ending March 31, 2011, CAIDI was 131 minutes, or 9.7 percent below the benchmark. CAIDI has been below the benchmark since December 2009. SAIDI increased from 104 minutes in 2009 to 147 minutes in 2010, 3.5 percent above the benchmark. Figure 31 depicts the trend in the duration of customer interruptions for the PPL system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

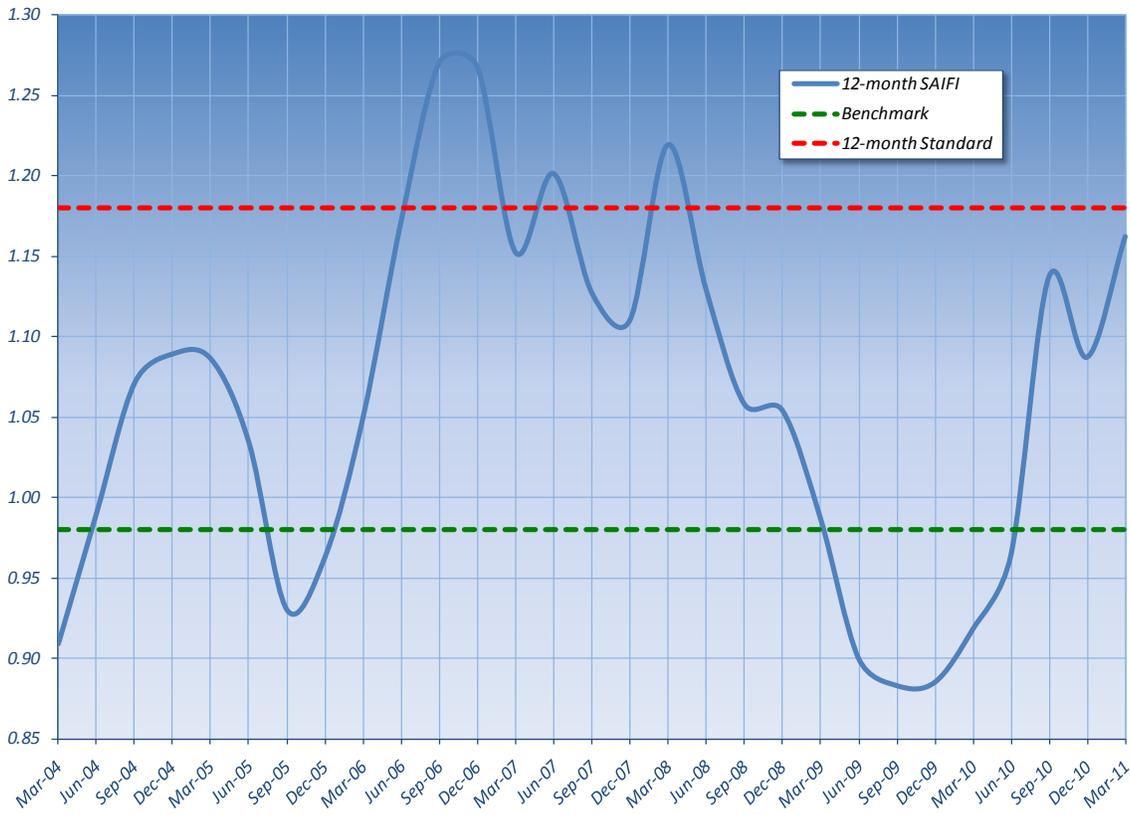
PPL's SAIFI increased from 0.89 in 2009 to 1.09 in 2010, which was a 22.5 percent increase in outage frequency and 7.9 percent better than the standard of 1.18. SAIFI had remained below the benchmark from June 2009 through June 2010, but is trending upward, attributable, in part, to storms that are not excludable. The SAIFI three-year average was 1.01, or 6.6 percent below the standard of 1.08. For the 12-month average ending March 31, 2011, SAIFI was 1.16, or 1.5 percent below the standard. Figure 32 depicts the trend in the frequency of service interruptions for the PPL system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

In 2010, equipment failure represented 27.8 percent of the interruptions, 32.1 percent of customers affected and 27.4 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 27.0 percent of incidents, 33.8 percent of customers affected and 48.4 percent of interruption minutes. Animal-related outages accounted for 23.6 percent of incidents, 5.3 percent of customers affected and 4.6 percent of interruption minutes. Figure 33 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 three major causes is shown in Figure 34.

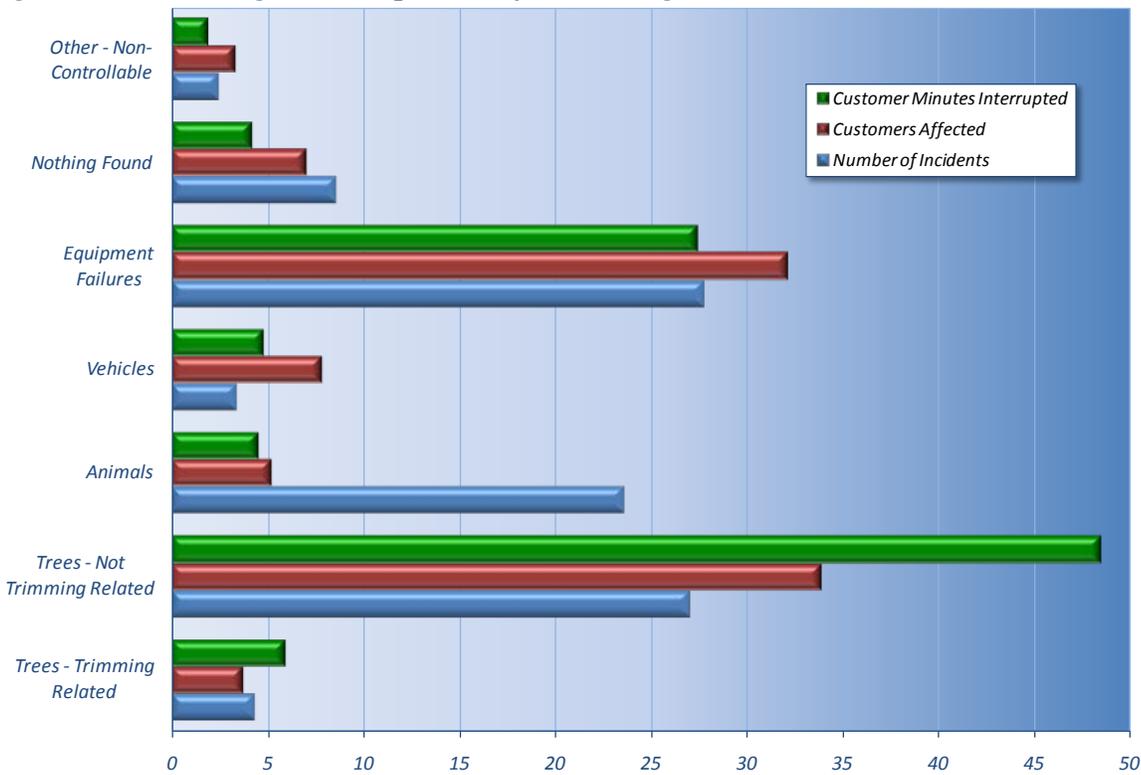
**Figure 31 PPL Customer Average Interruption Duration Index (minutes)**



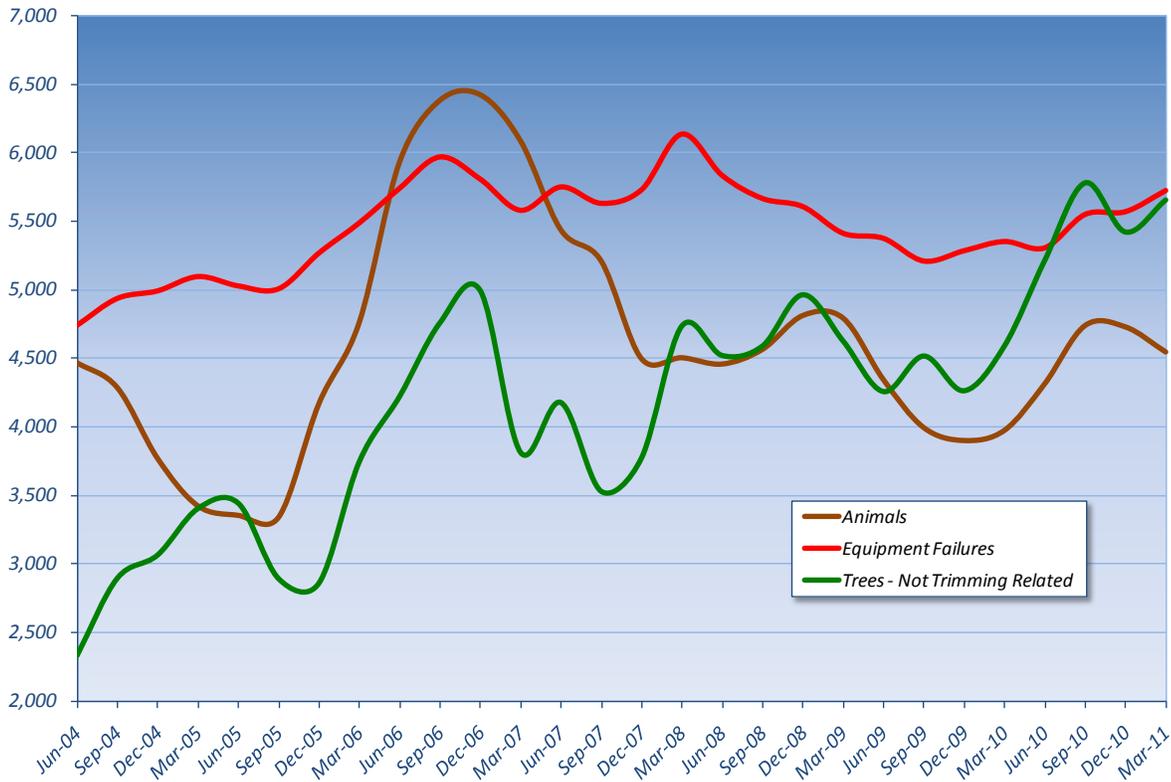
**Figure 32 PPL System Average Interruption Frequency Index (interruptions per customer)**



**Figure 33 PPL outage causes (percent of total outages)**



**Figure 34 PPL outage tracking (number of incidents)**



**UGI Utilities Inc.**

In 2010, UGI’s customers experienced 30,022 service interruptions with a total duration of 2,963,057 minutes, which was 40.5 percent lower than last year. No major events occurred in UGI’s service territory in 2010.

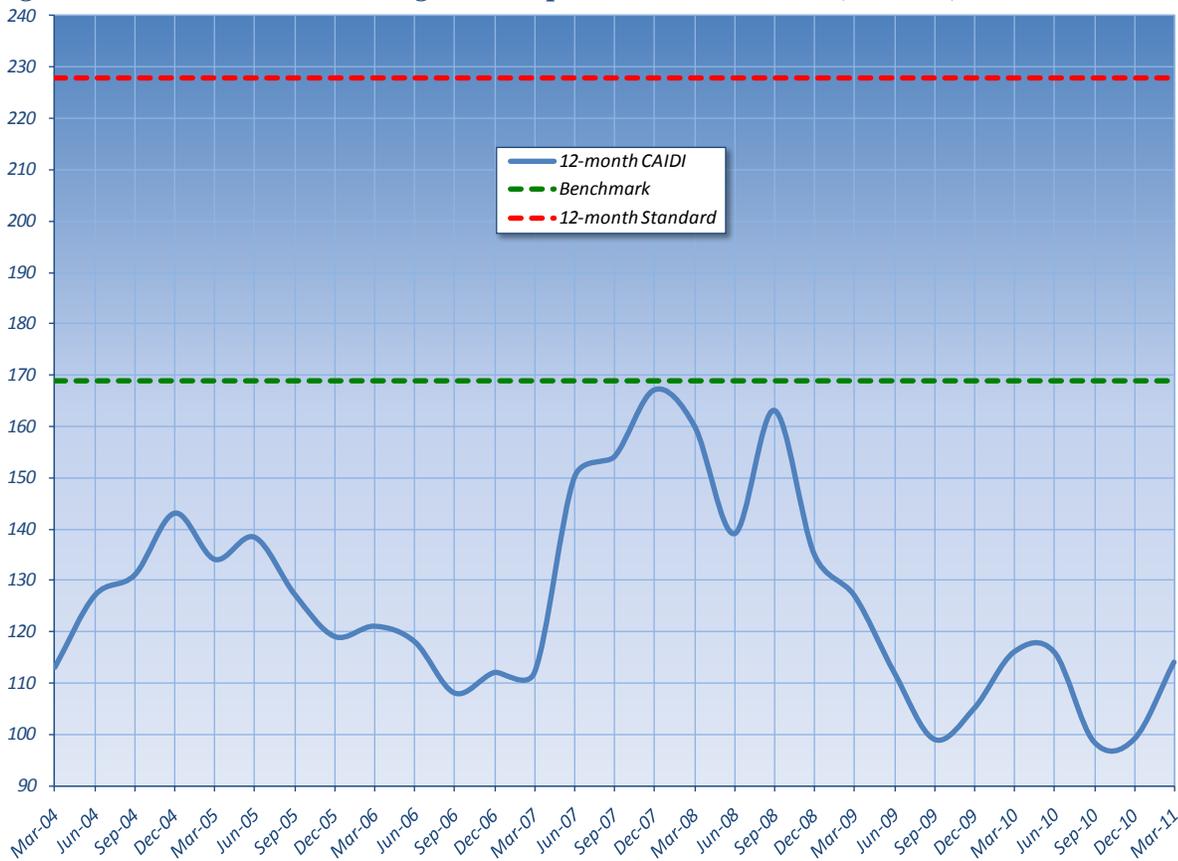
UGI’s CAIDI declined from 105 minutes in 2009 to 99 minutes in 2010, which was a 5.7 percent decrease in CAIDI minutes and 41.4 percent better than the benchmark of 169 minutes. CAIDI has remained below the benchmark ever since the Commission began monitoring reliability performance. A declining CAIDI has been the general trend since December 2008. The CAIDI three-year average of 113 minutes was 39.2 percent better than the standard of 186 minutes. For the 12-month average ending March 31, 2011, CAIDI was 114 minutes, or 32.5 percent below the benchmark. SAIDI dropped from 80 minutes in 2009 to 48 minutes in 2010. Figure 35 depicts the trend in the duration of customer interruptions for the UGI system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

UGI’s SAIFI decreased from 0.76 in 2009 to 0.48 in 2010, which was a 36.8 percent decline in outage frequency and 42.2 percent better than the benchmark. Except for two quarters in 2009, SAIFI has remained under the benchmark for several years. The SAIFI three-year average was 30.0 percent below the standard of 0.91. For the 12-month average ending March 31, 2011, SAIFI was 0.49 or 41.0 percent better than the benchmark. Figure 36 depicts the trend in the frequency of service interruptions for the UGI system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

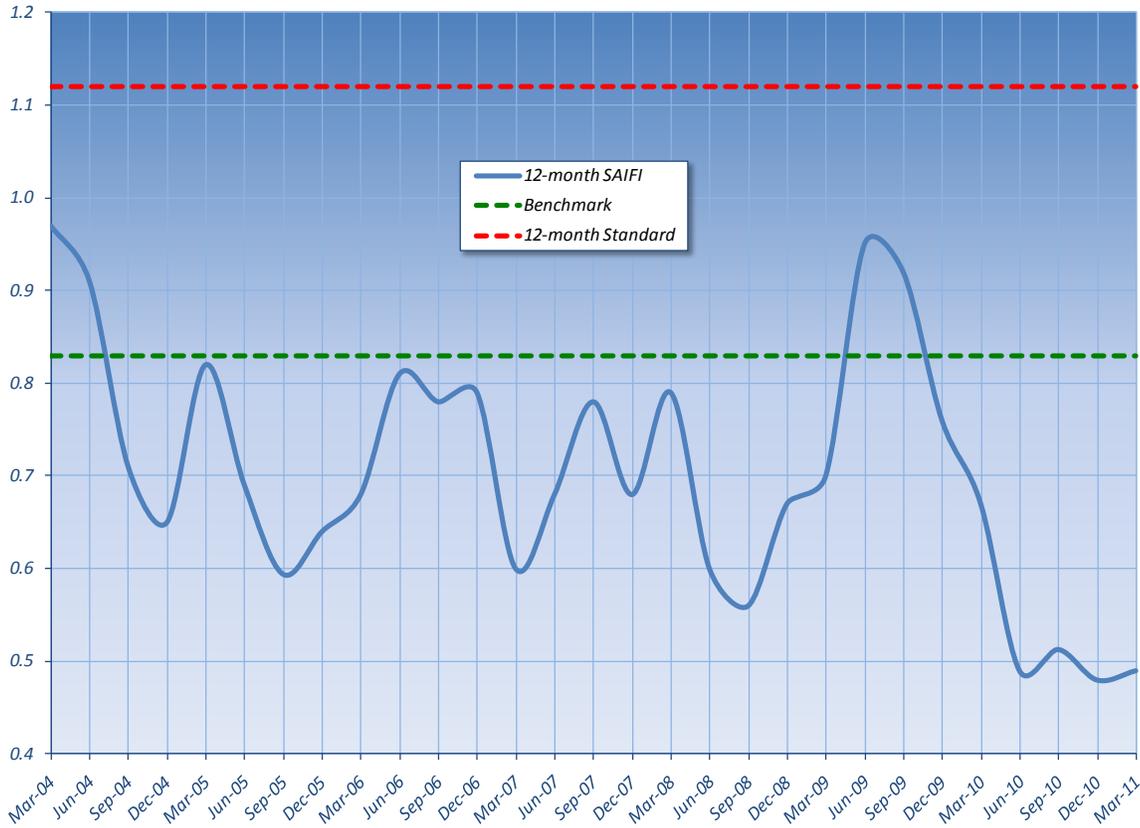
In 2010, equipment failure was attributed to 28.5 percent of the incidents, 29.0 percent of customers affected and 27.9 percent of interruption minutes. Tree-related outages represented 23.9 percent of incidents, 28.0 percent of customers affected and 33.9 percent of interruption minutes. Animals were responsible for 22.5 percent of the outages, 7.9 percent of customers affected and 6.3 percent of interruption minutes. Figure 37 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 three major causes is shown in Figure 38.

A portion of the equipment failures have been attributed to a problem with the A.B. Chance fuse cutouts utilized on the UGI system. UGI has completed its program to replace these defective fuse cutouts, since they have experienced an above-average failure rate and had been the noted source of an increase in outages caused by equipment failure on UGI's system.

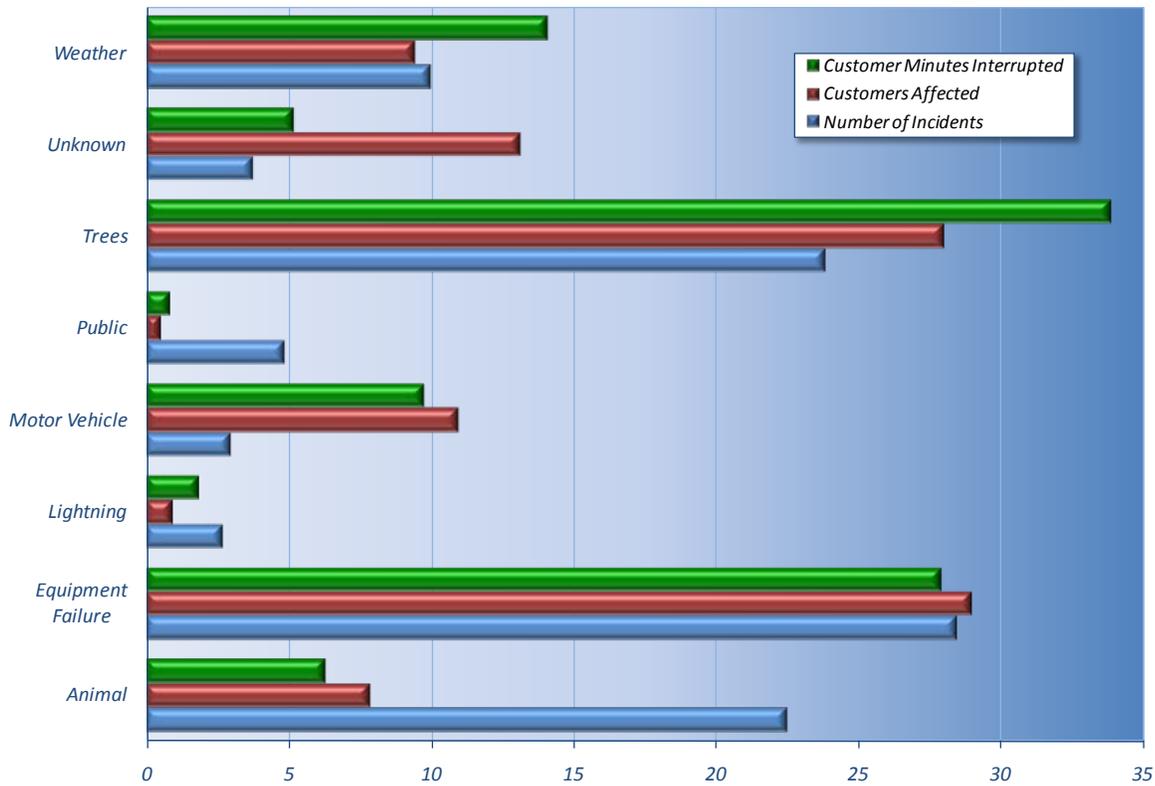
**Figure 35 UGI Customer Average Interruption Duration Index (minutes)**



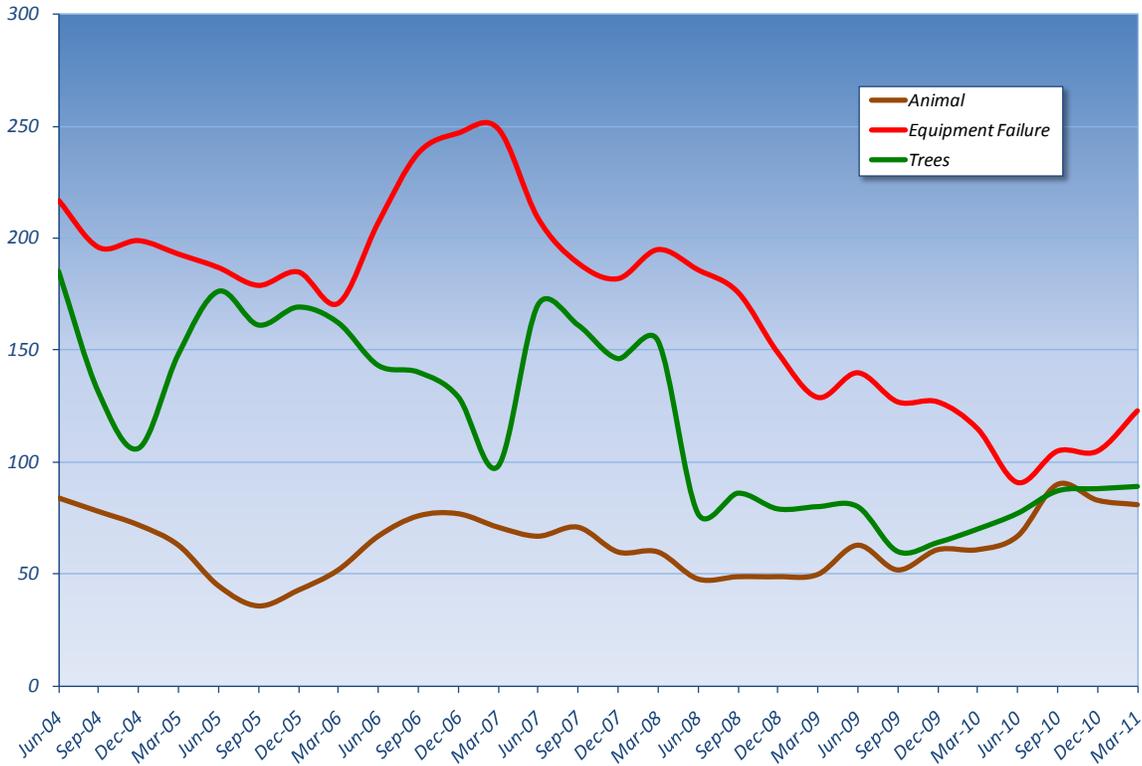
**Figure 36 UGI System Average Interruption Frequency Index (interruptions per customer)**



**Figure 37 UGI outage causes (percent of total outages)**



**Figure 38 UGI outage tracking (number of incidents)**



**Wellsboro Electric Company**

In 2010, Wellsboro experienced 6,378 customer interruptions with a total duration of 482,833 customer minutes, which was 33.4 percent lower than last year. Five major events occurred in Wellsboro’s service territory during 2010. The calculation of the reliability indices excludes outage data related to these events, which were approved by the Commission.<sup>31</sup>

- May 1, 2010 – A vehicle accident resulted in a broken pole; 957 customers were affected (15.7 percent).
- May 8-9, 2010 – High wind; 1,199 customers were affected (19.7 percent).
- Sept. 2-3, 2010 – Substation tripped due to failed recloser; 3,026 customers were affected (49.4 percent).
- Sept. 10, 2010 – Failed relay caused substation outage; 3,026 customers were affected (49.4 percent).
- Oct. 15, 2010 – Dead off-right-of-way tree fell onto three-phase line; 1,420 customers were affected (23.2 percent).

Wellsboro’s CAIDI declined from 96 minutes in 2009 to 76 minutes in 2010, which was a 20.8 percent decrease in CAIDI minutes and 39.0 percent better than the benchmark of 124 minutes. Since June 2004, CAIDI has remained below the benchmark. The CAIDI three-year average was 35.4 percent below the standard of 136 minutes. For the 12-month average ending March 31, 2011, CAIDI was 76

<sup>31</sup> Docket Nos. M-2010-2175256, M-2010-2189079, M-2010-2201406, M-2010-2206195 and M-2010-2205333.

minutes, or 38.7 percent below the benchmark. SAIDI decreased from 117 minutes in 2009 to 74 minutes in 2010, or 51.6 percent below the benchmark. Figure 39 depicts the trend in the duration of customer interruptions for the Wellsboro system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

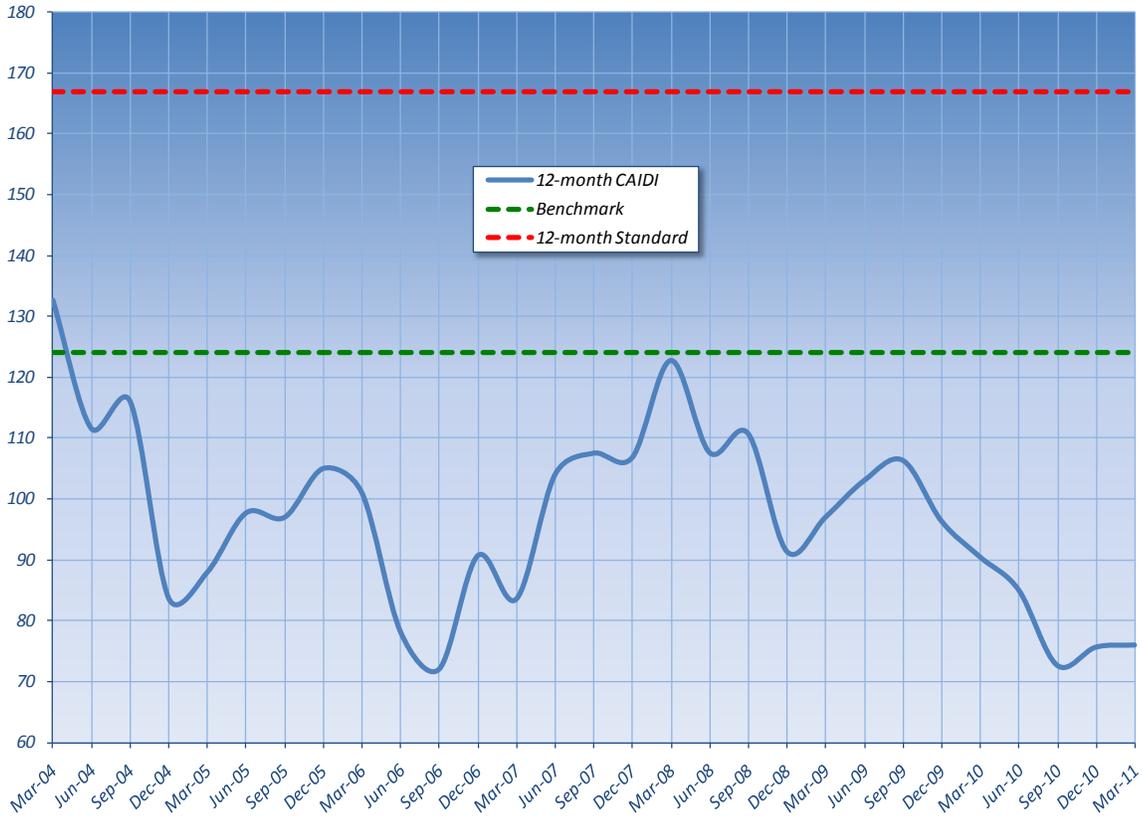
Wellsboro's SAIFI declined from 1.21 in 2009 to 0.98 in 2010, which was a 19.0 percent decrease in outage frequency and 20.3 percent better than the benchmark of 1.23. SAIFI has remained below the benchmark since September 2008. The SAIFI three-year average was 19.5 percent below the standard of 1.35. For the 12-month average ending March 31, 2011, SAIFI was 1.38, or 12.2 percent above the benchmark. Figure 40 depicts the trend in the frequency of service interruptions for the Wellsboro system from March 2004 through March 2011, compared to the established benchmark and standard for SAIFI.

In 2010, tree-related incidents were responsible for 20.3 percent of the outages, 26.6 percent of customers affected and 43.2 percent of interruption minutes. Equipment failure caused 16.4 percent of incidents, 15.4 percent of customers affected and 12.4 percent of interruption minutes. Animals were responsible for 22.6 percent of incidents, 20.7 percent of customers affected and 5.7 percent of interruption minutes. Outages with unknown causes represented 22.6 percent of outage incidents, 8.2 percent of customers affected and 7.1 percent of interruption minutes. Figure 41 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 42.

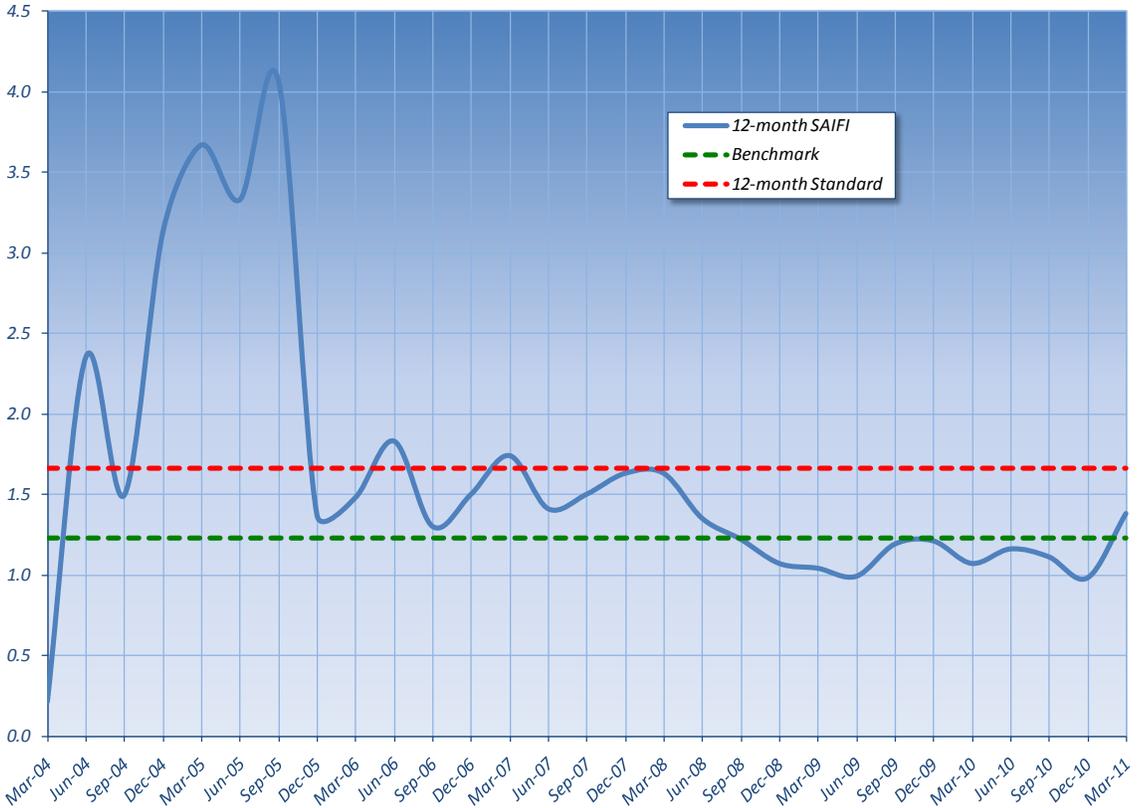
Wellsboro has completed Phase II of a substation project that includes two power transformers that will supply the needs of the entire service territory. Circuit transfer to the new Buena Vista Substation will begin in 2011.

Wellsboro was awarded a DOE grant for the installation of smart metering. Currently, 660 residential meters are online and Wellsboro plans to begin installation of commercial and industrial meters in 2011. The project is expected to be completed at the end of 2012.

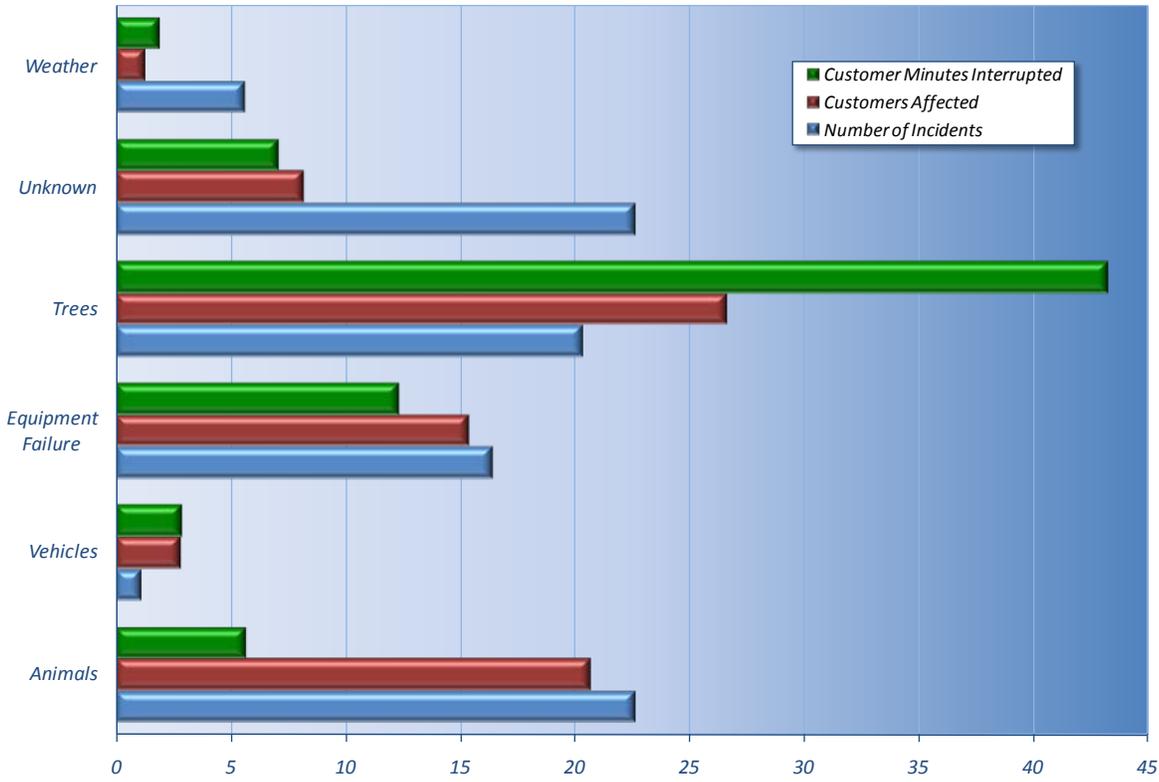
**Figure 39 Wellsboro Customer Average Interruption Duration Index (minutes)**



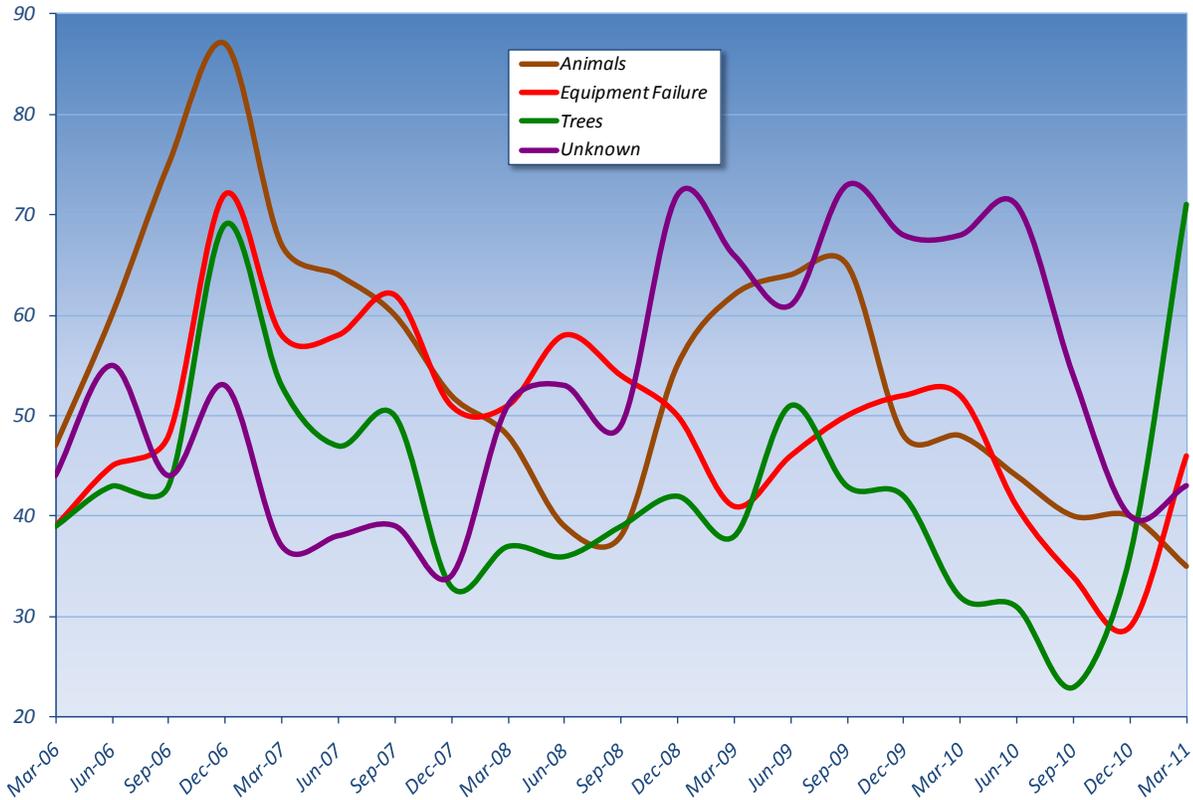
**Figure 40 Wellsboro System Average Interruption Frequency Index (interruptions per customer)**



**Figure 41 Wellsboro outage causes (percent of total outages)**



**Figure 42 Wellsboro outage tracking (number of incidents)**



## *West Penn Power Company*

In 2010, West Penn experienced 715,735 customer interruptions with a total duration of 136.1 million minutes, which was 19.6 percent lower than last year. Three major events occurred in West Penn's service territory during 2010. The calculation of the reliability indices excludes outage data relating to these events, which were approved by the Commission.<sup>32</sup>

- Feb. 5-16, 2010 – The most severe weather event in its history involving heavy, wet snow, sleet and freezing rain; 300,000 customers were affected (42.4 percent).
- April 16-19, 2010 – Strong winds and lightning; 106,000 customers were affected (15.0 percent).
- Sept. 22-25, 2010 – Severe wind and thunderstorm event; 85,584 customers were affected (12.0 percent).

West Penn's CAIDI increased from 166 minutes in 2009 to 190 minutes in 2010, which was a 14.5 percent increase in CAIDI minutes and 11.8 percent above the benchmark of 170 minutes. Before a spike in CAIDI in the third quarter (216 minutes), CAIDI had remained below the benchmark since December 2008. CAIDI still remains below the standard of 204 minutes. The CAIDI three-year average was 12 minutes below the standard of 187 minutes. For the 12-month average ending March 31, 2011, CAIDI was 189 minutes, or 7.4 percent below the standard. SAIDI increased from 161 minutes in 2009 to 191 minutes in 2010. Figure 43 depicts the trend in the duration of customer interruptions for the West Penn system from March 2004 through March 2011, compared to the established benchmark and standard for CAIDI.

West Penn's SAIFI increased slightly from 0.97 in 2009 to 1.00 in 2010, which was a 3.1 percent increase in outage frequency but still 4.8 percent better than the benchmark of 1.05. SAIFI has remained below the benchmark seven out of the eight quarters since the first quarter of 2009. The SAIFI three-year average remained at 1.15 or 0.9 percent below the standard of 1.16. For the 12-month average ending March 31, 2011, SAIFI was 1.15, or 8.7 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 2011, compared to the established benchmark and standard for SAIFI.

In 2010, equipment failure was responsible for 31.3 percent of the outages, 33.6 percent of customers affected and 18.7 percent of customer minutes interrupted. Trees off the right-of-way were the second leading cause of service interruptions, with 22.8 percent of the outages, 21.6 percent of customers affected and 37.5 percent of interruption minutes. Weather accounted for 9.6 percent of total outages, 10.2 percent of customers affected and 18.4 percent of interruption minutes. Figure 45 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 three major causes is shown in Figure 46.

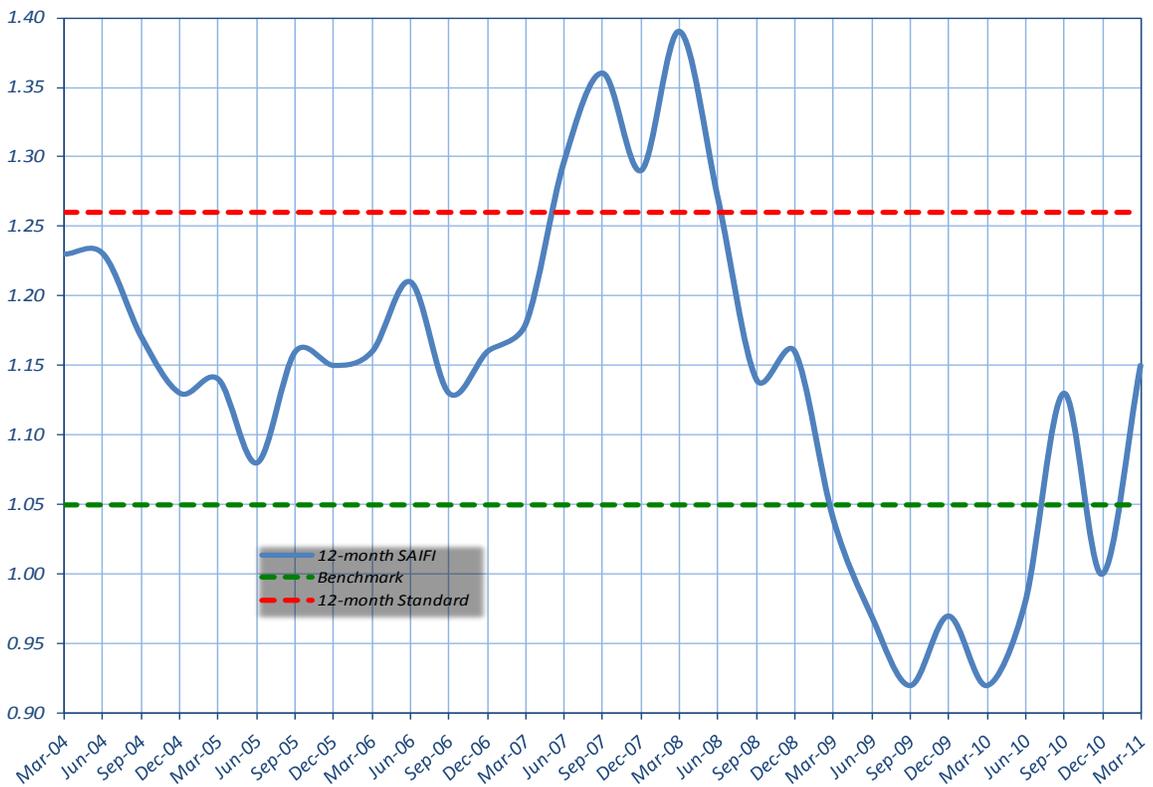
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<sup>32</sup> Docket Nos. M-2010-2162243, M-2010-2172734 and M-2010-2202507.

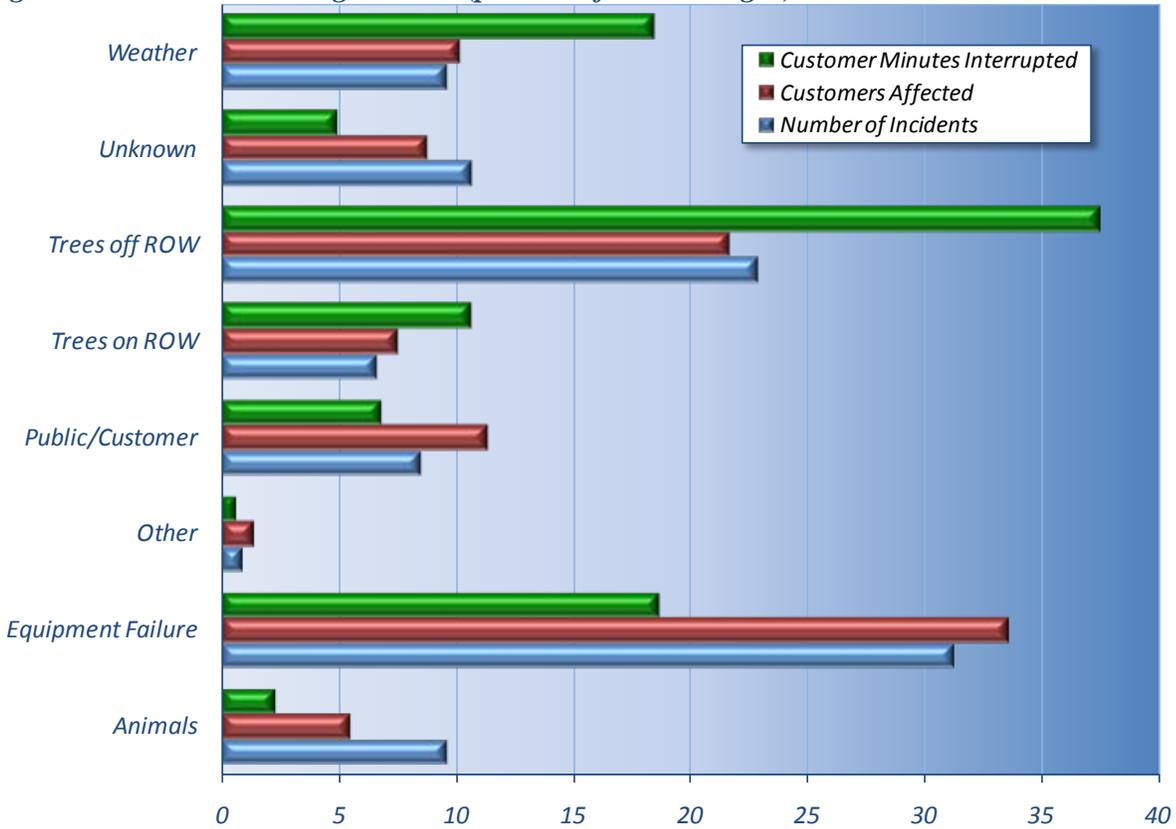
Figure 43 West Penn Customer Average Interruption Duration Index (minutes)



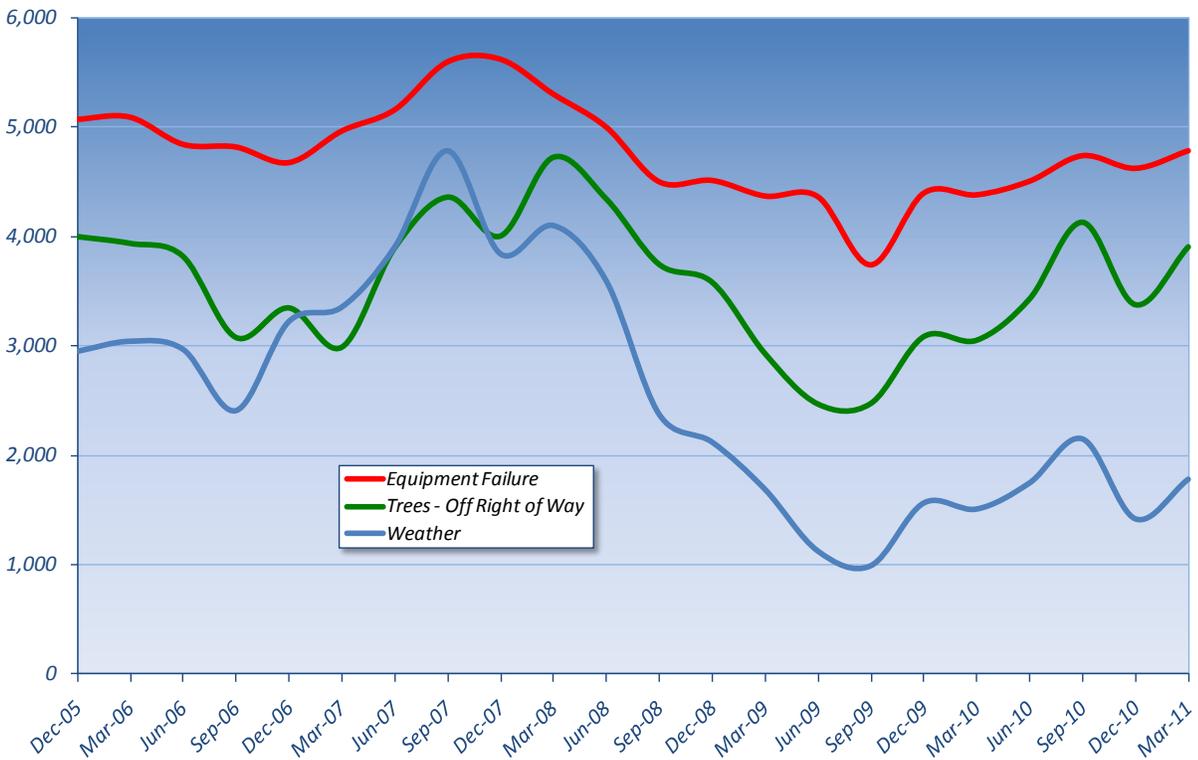
Figure 44 West Penn System Average Interruption Frequency Index (interruptions per customer)



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



**Figure 46 West Penn outage tracking (number of incidents)**



## *Section 4 – Conclusion*

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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 2010, more than half of the EDCs performed better than their benchmarks, which is the Commission's ultimate goal. Although last year's overall performance was not as impressive as that of 2009, only two EDCs exceeded one standard each. Obviously, there are external factors which can affect such performance, like an unusually high number of non-excludable weather events. It is the dedication of utility employees, adequate funding, and proper management practices and planning that must be recognized as the internal deciding factors.

Through ongoing oversight of utility performance and enforcement of newly established inspection and maintenance standards, the Commission will continue to ensure that the reliability of electric service in Pennsylvania is maintained.

## Appendix A – Electric Reliability Indices

### Twelve-month average electric reliability indices for 2010

Customer Average Interruption Duration Index (CAIDI)				% Above (+) or Below (-) Benchmark	% Above (+) or Below (-) Standard
EDC	Dec-10	Benchmark	Standard		
Citizens'	98	105	141	-6.7	-30.5
Duquesne Light	80	108	130	-25.9	-38.5
Met-Ed (FE)	120	117	140	2.6	-14.3
PECO	126	112	134	12.5	-6.0
Penelec (FE)	124	117	141	6.0	-12.1
Penn Power (FE)	95	101	121	-5.9	-21.5
Pike County	255	174	235	46.6	8.5
PPL	135	145	174	-6.9	-22.4
UGI	99	169	228	-41.4	-56.6
Wellsboro	76	124	167	-39.0	-54.7
West Penn (FE)	190	170	204	11.8	-6.9

System Average Interruption Frequency Index (SAIFI)				% Above (+) or Below (-) Benchmark	% Above (+) or Below (-) Standard
EDC	Dec-10	Benchmark	Standard		
Citizens'	0.19	0.20	0.27	-5.0	-29.6
Duquesne Light	1.09	1.17	1.40	-6.8	-22.1
Met-Ed (FE)	1.51	1.15	1.38	31.3	9.4
PECO	1.09	1.23	1.48	-11.4	-26.4
Penelec (FE)	1.31	1.26	1.52	4.0	-13.8
Penn Power (FE)	1.01	1.12	1.34	-9.8	-24.6
Pike County	0.60	0.61	0.82	-1.6	-26.8
PPL	1.09	0.98	1.18	10.9	-7.9
UGI	0.48	0.83	1.12	-42.2	-57.1
Wellsboro	0.98	1.23	1.66	-20.3	-41.0
West Penn (FE)	1.00	1.05	1.26	-4.8	-20.6

System Average Interruption Duration Index (SAIDI)				% Above (+) or Below (-) Benchmark	% Above (+) or Below (-) Standard
EDC	Dec-10	Benchmark	Standard		
Citizens'	18	21	38	-14.3	-52.6
Duquesne Light	87	126	182	-31.0	-52.2
Met-Ed (FE)	181	135	194	34.1	-6.7
PECO	137	138	198	-0.7	-30.8
Penelec (FE)	162	148	213	9.5	-23.9
Penn Power (FE)	95	113	162	-15.9	-41.4
Pike County	153	106	194	44.3	-21.1
PPL	147	142	205	3.5	-28.3
UGI	48	140	256	-65.7	-81.3
Wellsboro	74	153	278	-51.6	-73.4
West Penn (FE)	191	179	257	6.7	-25.7

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 2008-10

Customer Average Interruption Duration Index (CAIDI)				3-Year Average	3-Year Standard	% Above (+) or Below (-) Standard
EDC	2008	2009	2010			
Citizens'	64	75	98	79	115	-31.3
Duquesne Light	98	85	80	88	119	-26.3
Met-Ed (FE)	104	111	120	112	129	-13.4
PECO	124	106	126	119	123	-3.5
Penelec (FE)	142	117	124	128	129	-1.0
Penn Power (FE)	111	116	95	107	111	-3.3
Pike County	236	178	255	223	192	16.1
PPL	169	117	135	140	160	-12.3
UGI	135	105	99	113	186	-39.2
Wellsboro	91	96	76	88	136	-35.6
West Penn (FE)	168	166	190	175	187	-6.6

System Average Interruption Frequency Index (SAIFI)				3-Year Average	3-Year Standard	% Above (+) or Below (-) Standard
EDC	2008	2009	2010			
Citizens'	0.26	0.20	0.19	0.22	0.22	-1.5
Duquesne Light	0.99	0.97	1.09	1.02	1.29	-21.2
Met-Ed (FE)	1.35	1.21	1.51	1.36	1.27	6.8
PECO	1.04	0.98	1.09	1.04	1.35	-23.2
Penelec (FE)	1.56	1.22	1.31	1.36	1.39	-1.9
Penn Power (FE)	1.13	0.75	1.01	0.96	1.23	-21.7
Pike County	0.46	0.60	0.60	0.55	0.67	-17.4
PPL	1.05	0.89	1.09	1.01	1.08	-6.5
UGI	0.67	0.76	0.48	0.64	0.91	-30.0
Wellsboro	1.07	1.21	0.98	1.09	1.35	-19.5
West Penn (FE)	1.16	0.97	1.00	1.04	1.16	-10.1

System Average Interruption Duration Index (SAIDI)				3-Year Average	3-Year Standard	% Above (+) or Below (-) Standard
EDC	2008	2009	2010			
Citizens'	17	15	18	17	25	-33.3
Duquesne Light	97	82	87	89	153	-42.0
Met-Ed (FE)	139	134	181	151	163	-7.2
PECO	129	103	137	123	167	-26.3
Penelec (FE)	220	143	162	175	179	-2.2
Penn Power (FE)	125	87	95	102	136	-24.8
Pike County	109	106	153	123	129	-4.9
PPL	178	104	147	143	172	-16.9
UGI	90	80	48	73	170	-57.3
Wellsboro	98	117	74	96	185	-47.9
West Penn (FE)	195	161	191	182	217	-16.0

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

## *Appendix B – Modifications to Inspection and Maintenance Intervals*

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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. 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)***

<b>Company</b>	<b>Exemption Requested</b>	<b>Justification</b>
<b>FirstEnergy</b>	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 make cost of pole inspections three times higher and do not make economical or technical sense.
<b>FirstEnergy</b>	Distribution overhead line inspections	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.
<b>FirstEnergy</b>	Overhead transformer inspections	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.
<b>West Penn</b>	Pole loading calculations	Pole failure rates are under 50 per year and do not warrant the additional \$1.2 million per year. Also, pole attachment companies are required to perform pole load calculations on all poles prior to attaching their equipment.
<b>West Penn</b>	Distribution overhead line inspections	Inspection intervals less than the current six-year cycle would provide minimal, if any, safety or reliability benefit. Failure rates for various components were less than one percent in 2008. An increase in the frequency of inspections to one to two years would cost an additional \$1 million per year.
<b>West Penn</b>	Overhead transformer inspections	The 2008 failure rate for overhead transformers was 0.337 percent. Additional costs are included in the \$1 million figure, above.
<b>West Penn</b>	Substation inspections	Performing inspections on a cycle less than six months would provide minimal, if any, safety or reliability benefit. The number of customer minutes interrupted as a result of equipment issues in substations averaged 1.96 percent from 2003 to 2008. In 2008, with a six-month inspection period, 75 percent of its substations were visited six or more times. Increasing the frequency to monthly would require 17,000 additional man-hours at a cost of \$0.78 million per year.
<b>UGI</b>	None	n/a

***Modifications to Inspection and Maintenance Intervals (Group 2)***

<b>Company</b>	<b>Exemption Requested</b>	<b>Justification</b>
<b>Citizens'</b>	Pole loading calculations	Line designs are based on NESC Heavy Loading 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.
<b>Duquesne</b>	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.
<b>Duquesne</b>	Overhead line inspections	Infrared technology is more effective on a five-year cycle. Added cost for a one-to-two year cycle is \$2 million. Identified items would contribute only 0.148 SAIFI.
<b>Duquesne</b>	Overhead transformer inspections	Same as line inspections. Added cost of \$2 million. All transformer-related outages contributed 3 percent to SAIFI and SAIDI on average.
<b>Duquesne</b>	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.
<b>PECO</b>	Pole loading calculations	All poles designed based on NESC loading standards. Added cost of 30 percent.
<b>Pike County</b>	Pole loading calculations	Standards utilize load calculations to define classes of poles required. Pole strength assessment performed prior to attaching other than routine equipment.
<b>PPL</b>	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.
<b>PPL</b>	Overhead line inspections	Infrared inspections are combined with condition-based visual inspections to keep costs below \$2 per CMI saved.
<b>PPL</b>	Transformer inspections	Cost to inspect overhead transformers every two years is \$1.3 million or \$65 per CMI avoided. Condition-based approach is cost effective.
<b>Wellsboro</b>	Pole loading calculations	Unnecessary for reasons given by other EDCs.

Pennsylvania Public Utility Commission  
P.O. Box 3265  
Harrisburg, PA 17105-3265  
[www.puc.state.pa.us](http://www.puc.state.pa.us)