OKLAHOMA CORPORATION COMMISSION
REGULATED ELECTRIC UTILITIES

2010 RELIABILITY SCORECARD

May 1, 2010
1.0 Introduction
The annual Reliability Scorecard is being presented in accordance with Oklahoma Corporation Commission Rules as described in OAC 165:35-25 Part 3, Reliability of Service and Reliability Program. The reliability of regulated electric utilities cannot be assessed without generally understanding how their dependability is measured. The Oklahoma Corporation Commission (OCC or Commission) primarily relies upon two basic gauges of reliability: System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) to gain insights regarding how well the state’s regulated electric utility systems are consistently providing energy. Since these two metrics will be mentioned throughout the report, it is helpful to explain them for reader clarification. SAIFI measures how often an electrical outage occurs on average; while, SAIDI measures the length of time (longer than one minute) an electrical outage occurs on average. A more specific definition of both terms will appear later.

2.0 Summary
The five electric utilities regulated by this Commission reported reliability information contained in this report. These five utilities are Arkansas Valley Electric Coop., Corp., Canadian Valley Electric Coop., Inc., Empire District Electric Co., Northeast Oklahoma Electric Cooperative, Inc., Oklahoma Gas and Electric Co. and Public Service Company of Oklahoma. The SAIFI measure indicates that an Oklahoma Customer being served by a regulated utility faced approximately 1.19 outages in 2009. The SAIDI measure indicates that an Oklahoma Customer being served by a regulated utility was without power approximately 156 minutes, or 2.6 hours.

3.0 Purpose
The purpose of this scorecard is to present the results of the calculations that measure the reliability of electric utility systems in the State of Oklahoma. These calculations include SAIFI, SAIDI, Momentary Average Interruption Frequency (MAIFI), and Momentary Average Interruption Event Frequency (MAIFI_E) indices. The worst performing circuits were also provided according to the rules. These poor performing circuits will be monitored. This scorecard enables the Commission and others to monitor the performance/improvements of the regulated utilities over a period of time.

The following companies provided data pursuant to those rules.

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>OKLAHOMA CUSTOMERS AT YEAR-END</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
</tr>
<tr>
<td>Arkansas Valley Electric Coop., Corp.</td>
<td>4,299</td>
</tr>
<tr>
<td>Canadian Valley Electric Coop., Inc.</td>
<td>22,208</td>
</tr>
<tr>
<td>Empire District Electric Co.²</td>
<td>5,641</td>
</tr>
<tr>
<td>Northeast Okla. Electric Coop., Inc.</td>
<td>37,260</td>
</tr>
<tr>
<td>Oklahoma Gas and Electric Co.³</td>
<td>682,808</td>
</tr>
<tr>
<td>Public Service Company of Oklahoma</td>
<td>510,325</td>
</tr>
</tbody>
</table>

¹ The indices are further supported by IEEE Standards 1366, Guide for Electric Power Distribution Reliability Indices.
² Empire District used the customer counts shown above in its computations because, while those numbers included customers outside Oklahoma, all customers were served using the same circuits.
4.0 Definitions

Distribution system: That portion of an electric system that delivers electric energy from transformation points on the transmission system to the customer.

Duration interruption: The period (measured in seconds, or minutes, or hours, or days) from the initiation of an interruption to a customer or other facility until service has been restored to that customer or facility. An interruption may require step-restoration tracking to provide reliable index calculation. It may be desirable to record the duration of each interruption.

Major event: A disastrous event that exceeds design limits of the electric power system and is characterized by the following (as defined by the utility):
   a) Extensive damage to the electric power system;
   b) More than a specified percentage of customers simultaneously out of service;
   c) Service restoration times longer than specified.
Some examples are extreme weather, such as a one in five year event, or earthquakes.
5.0 Analysis

5.1 SAIFI Trends and Patterns

The following graph shows the outages for the year 2009 separated by utility and region:

![Chart 1. All Electric Companies - 2009 SAIFI](chart.png)

The chart suggests that Empire District customers were without power, on average 1.43 times per year, while Northeast Oklahoma customers were without power, on average, 0.17 times per year. The customers of OG&E and PSO, the state’s largest electric companies, were without power 1.07 and 1.27 times per year, respectively. In 2009, an Oklahoma customer being served by a regulated utility was without power approximately 1.31 times per year on average.

Historically, customers from Empire District were without power more than any other regulated utility in Oklahoma for the past five years at 2.69 outages per year on average; while, the customers of Northeast Oklahoma Electric were without power the least at 0.16 times over the past five years on average.

On average Oklahoma customers served by a regulated utility experienced 1.31 outages per year.

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6 The SAIFI and SAIDI reliability indices are based on 12 months of system performance data ending December 2009, and exclude “Major Events” as defined by OAC 165:35-25-13. The Oklahoma Average SAIFI and SAIDI were estimated by first computing a weighted average of the combined data for each statistic and then computing a simple (unweighted) average in a similar manner.

7 The simple SAIFI average for all of Oklahoma’s regulated utilities is slightly below 1.50 and the metric’s weighted average is somewhat lower than 1.50.
These average historical outages are shown below:

<table>
<thead>
<tr>
<th>Utility</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas Valley Electric Coop., Corp.³</td>
<td>0.99</td>
<td>1.52</td>
<td>0.54</td>
<td>2.53</td>
<td>1.80</td>
<td>1.48</td>
</tr>
<tr>
<td>Canadian Valley Electric Coop., Inc.</td>
<td>1.92</td>
<td>1.71</td>
<td>0.16</td>
<td>0.59</td>
<td>1.42</td>
<td>0.90</td>
</tr>
<tr>
<td>Empire District Electric Company</td>
<td>2.47</td>
<td>2.11</td>
<td>3.21</td>
<td>4.23</td>
<td>1.43</td>
<td>2.69</td>
</tr>
<tr>
<td>Northeast Oklahoma Electric Coop., Inc.</td>
<td>0.13</td>
<td>0.16</td>
<td>0.17</td>
<td>0.19</td>
<td>0.17</td>
<td>0.16</td>
</tr>
<tr>
<td>Oklahoma Gas and Electric Company</td>
<td>1.39</td>
<td>1.12</td>
<td>1.23</td>
<td>1.32</td>
<td>1.07</td>
<td>1.23</td>
</tr>
<tr>
<td>Public Service Company of Oklahoma</td>
<td>1.46</td>
<td>1.52</td>
<td>1.40</td>
<td>1.46</td>
<td>1.27</td>
<td>1.42</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>1.39</td>
<td>1.36</td>
<td>1.12</td>
<td>1.72</td>
<td>1.19</td>
<td><strong>1.31</strong></td>
</tr>
</tbody>
</table>

Electrical outages can be caused by severe and recurring weather, engineering problems, or other company-specific causes. The OCC will continue to monitor customer outage data for all regulated utility systems and investigate any unusual occurrences.

The graph below shows outages for electric companies in the years 2005 through 2009⁸:

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⁵ Arkansas Valley SAIFI data includes information from both Oklahoma and Arkansas circuits.

⁸ Data points for each regulated utility that provided SAIFI indices for year 2009 and the four prior years were plotted. The SAIFI indices were plotted to present a visual comparison among the companies. Since there is not an industry-wide standard by which to measure the companies’ performance, averages for the state for SAIFI were calculated using the data provided by each company.
5.2 SAIDI Trends and Patterns

The following graph shows the length of time an outage occurs for the year 2009 separated by utility and region:

![Chart 2. All Electric Companies - 2009 SAIDI](chart2)

In 2009, out of the Oklahoma’s six regulated electricity providers, on average Arkansas Valley customers were without power the longest, 298.8 minutes, or 4.98 hours. This figure is 1.93 hours longer than Empire District customers who were without power for 182.92 minutes on average. On average customers of regulated electric utilities were without power for 156.15 minutes. Northeast Oklahoma Electric customers were without power for the shortest time period on average at 37.93 minutes. OG&E and PSO customers were without power for 133.73 and 119.70 minutes, respectively.

Over the five-year period, Empire District customers were without power the longest in three of those years; while, on average Canadian Valley customers were without power the longest for the five-year period. Canadian Valley reduced its outage time from 604.20 minutes, or 10.07 hours in the year 2007 to 163.8 minutes, or 2.73 hours in 2009.

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9 The weighted SAIDI mean for 2009 is approximately 140, and its simple average is 196; therefore, a customer consuming power from one of these regulated entities in 2009 was without electricity 2.33 hours to 3.27 hours for the entire year, on average.

Oklahoma Corporation Commission
2010 Annual Electric Utilities Reliability Scorecard - Page 5
The table below shows the average time a customer was without power in the past five years:

<table>
<thead>
<tr>
<th>Utility</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas Valley Electric Coop., Corp.</td>
<td>168.53</td>
<td>92.07</td>
<td>11.54</td>
<td>216.32</td>
<td>298.80</td>
<td>157.45</td>
</tr>
<tr>
<td>Canadian Valley Electric Coop., Inc.</td>
<td>152.40</td>
<td>121.20</td>
<td>604.20</td>
<td>161.40</td>
<td>163.80</td>
<td>240.60</td>
</tr>
<tr>
<td>Empire District Electric Company</td>
<td>360.61</td>
<td>395.10</td>
<td>332.69</td>
<td>472.00</td>
<td>182.92</td>
<td>348.66</td>
</tr>
<tr>
<td>Northeast Oklahoma Electric Coop., Inc.</td>
<td>234.39</td>
<td>224.97</td>
<td>44.18</td>
<td>58.91</td>
<td>37.93</td>
<td>120.08</td>
</tr>
<tr>
<td>Oklahoma Gas and Electric Company</td>
<td>197.20</td>
<td>114.62</td>
<td>139.59</td>
<td>153.08</td>
<td>133.70</td>
<td>147.64</td>
</tr>
<tr>
<td>Public Service Company of Oklahoma</td>
<td>191.10</td>
<td>176.38</td>
<td>135.45</td>
<td>141.20</td>
<td>119.70</td>
<td>152.77</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>217.37</td>
<td>187.39</td>
<td>211.28</td>
<td>200.49</td>
<td>156.15</td>
<td><strong>194.53</strong></td>
</tr>
</tbody>
</table>

On average a customer who was served by a regulated electric utility was without power for 194.53 minutes or 3.24 hours over the five-year period. Customers being served by the state’s largest electric utilities, OG&E and PSO were without power for 147.64 minutes or 2.23 hours and 119.70 minutes or 2 hours on average, respectively over the five-year period. OCC is actively monitoring the electrical outages and inquiring into the causes.

The graph below shows length of an outage for electric companies from 2005 to 2009:

An inspection of the graph reveals that PSO and OG&E have only slight changes in their lengths of outages, which points to their consistent reliability. There is much higher year-on-year reliability change among Canadian Valley, Empire District, and Arkansas Valley. Inconsistencies among the length of outages are principally caused by irregular weather patterns, although company-specific factors, such as the availability of linemen to restore power, are also important.
In closing, some utilities have improved their reliability with outages that did not occur as frequently as they did in the past. Also, when an outage occurred it did not last as long as an outage lasted in the past. Other electric utilities must show continued efforts to minimize the frequency and duration of power outages. In all cases, the OCC is committed to working with each regulated utility in its improvement to provide stable and dependable electricity in a manner that minimizes costs to ratepayers while ensuring a quality product.

6.0 Commission Rules Summary

OAC 165:35-25-14. Reliability program
Each utility shall design and maintain a program to limit the frequency and duration of electric service interruptions. The program should include inspection, maintenance, repair and replacement standards that ensure service restoration as well as preventive and emergency maintenance; and should give special emphasis to the improvement of the worst performing circuits in each region. The program should include at a minimum:

1) The age, distribution and location of equipment on each circuit.
2) The number, density and location of customers on each circuit.
3) The location and density of trees on the system.
4) An annual vegetation management plan.
5) The impacts on distribution system reliability of animals, wind, storms, ice and auto accidents.

OAC 165:35-25-20. Annual reliability report
Each utility shall submit an annual reliability report to the Commission by March 1st of each year, beginning March 1, 2005. The Commission may request additional data; however, the report shall include the following:

1) A description of all vegetation management performed by the utility for the previous calendar year and plans for the current year.
2) SAIDI and SAIFI (and to the maximum extent practicable, MAIFI) values computed for the entire service territory and displayed in tabular form.
3) SAIDI and SAIFI (and to the maximum extent practicable, MAIFI) values computed for each of the utility’s regions and displayed in tabular form.
4) A detailed report for each major event that is not included in the calculation of the reliability indices. The major event report shall include the interruption cause or causes, date, regional location, percentages of customers without service in that region as a result of the event, the time or time frame in which service was lost to 10% or more of that region, the time the last customer’s service was restored in that region, and any other details that the utility or the Commission believes will further justify the exclusion of the event from the calculations.
5) A description of the program the utility has in place for analyzing and improving worst performing circuits and a summary of the results of the program for the reporting year.
6) A description and map identifying the utility’s service regions or operations divisions, documentation and illustration of any changes in region boundaries as defined by the utility, and justification for such changes.
7) For each utility with less than 100,000 customers, the utility must show the data used to calculate as well as the calculation of the rural adjusted minimum performance level.
7.0 System Average Interruption Indices

SAIFI: System Average Interruption Frequency Index (sustained interruptions). This is a way of measuring the average frequency of interruptions to the customer, or, how often, on average, is power lost?

SAIDI: System Average Interruption Duration Index. This is a measure of the average length of interruptions for all the customers served by a company. In other words, when power is lost, what is the average length of time it stays off?

CAIDI: Customer Average Interruption Duration Index. This represents the average time required to restore service. CAIDI is calculated by dividing SAIDI by SAIFI.

8.0 Sample Calculations

\[
SAIFI = \frac{200 + 600 + 25 + 90 + 700 + 1500 + 100}{2000} = 1.6075
\]

\[
SAIDI = \frac{(8.17*200)+(71.3*600)+(30.3*25)+(267.2*90)+(120*700)+(10*1500)+(40*100)}{2000} = 86.11 \text{ min}
\]

\[
CAIDI = \frac{SAIDI}{SAIFI} = \frac{86.110}{1.6075} = 53.567 \text{ min}
\]

The value of these standards in assessing an electric utility’s performance can help point to specific areas where more attention by the utility is necessary to improve reliability. Cause of outages can be identified on a systemic basis and improvement plans can be developed. For example, the extent that a company routinely inspects utility poles to determine those most susceptible to deterioration and collapse, a cause for interruptions, may be established from evaluating reliability indices. A common finding, for example, is that a lack of vegetation management (commonly referred to as “tree trimming”) is responsible for outages along specific circuits. There may be a number of reasons why plant life has grown too close to power lines, but the fix is singular and relatively simple.

Other reasons for interruptions may be more difficult to detect, such as animals on poles or along wires, resulting in shorts and the subsequent interruptions. Whatever the reason for an interruption or series of interruptions, these calculations can assist the utility to determine primary causes of outages and develop a plan to restore reliable flow of electricity to customers.