

## An Expectation of Reliable Service – Lighting, Snow, Ice and Wind

Summertime in Southside Virginia, what a great place to be - Dixie Youth Baseball in full swing, watching the cows meander their way down to the pond to cool off while the dog makes a lazy day of it in the shade, the taste and refreshment of a tall glass of sweet tea and the smell of freshly cut hay in the evening. All of these are great summertime traditions we get to enjoy as residents of Southside Virginia. Another summertime event we are all familiar with is watching that dark gray thundercloud come rolling in late in the afternoon. Just like hot, hazy afternoons, thunderstorms are part of the summertime experience in Southside Virginia.

On average Southside Virginia will experience a thunderstorm fifty days per year (figure 1). Nearly all of this thunderstorm activity occurs within four months of the year, so during the summer we can expect a thunderstorm every two to three days. The frequency and intensity of the thunderstorms we experience create system design and operational challenges for Southside Electric. The effects of wind and lightning on Southside Electric Cooperative’s distribution system are evident in our reliability indices (figure 2).

To improve system reliability, SEC developed a “Circuit Reconditioning” project to focus on areas of our system where lightning damage has been severe. A total of ten circuits were “reconditioned” in 2010 and 2011 at a total cost of approximately \$4.3 million. This investment included the installation of an estimated six thousand new Cooper Evolution Lightning Arrestors. These lightning arrestors are considered to be some of the best distribution line grade arrestors on the market today. Where these arrestors were deployed, system grounding was tested and improved as needed. We are looking forward to summer 2012 when can evaluate how the areas of our system with the new arrestors and improved grounding perform.



Figure 1: Isokeraunic map showing thunderstorm days as reported by the U.S. Weather Bureau.

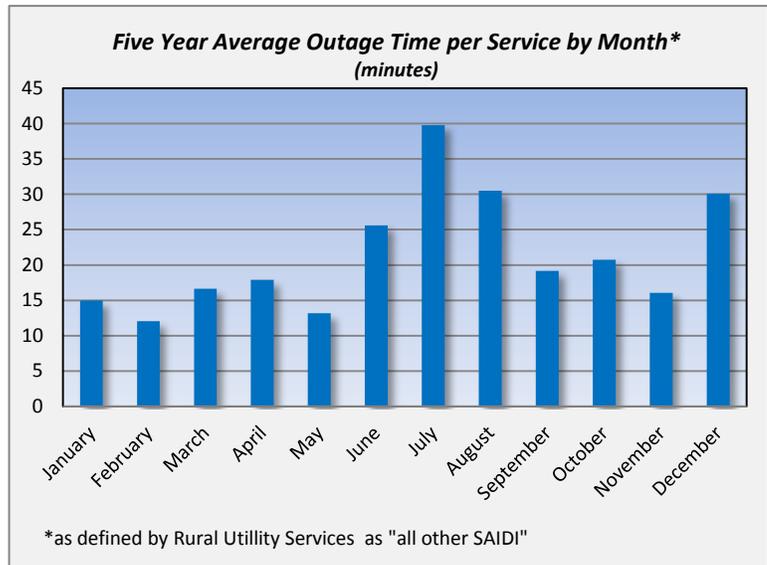


Figure 2: RUS “all other SAIDI” reliability index

As we all know, summertime is not the only time the lights go out. Thunderstorms and winter storms create 50% of SEC's outage time. Snow and ice events are much more difficult to recover from when compared to thunderstorm events because a thunderstorm is here and gone in typically less than an hour, but snow and ice stick around making restoration efforts difficult. The Cooperative's outside personnel deserve to be commended for their dedication and stellar safety record restoring service in the aftermath of winter storms.

SEC's Engineering Staff design the distribution system to withstand the National Electric Safety Code's Heavy Loading District design criteria. Our system rarely suffers a mechanical failure due to wind or frozen precipitation, but the trees found throughout our service territory do not fare as well. Under the weight and pressure of snow, ice and wind, trees break or lean over into our distribution lines and cause outages. We cannot stop all of these tree contacts through vegetation management, but we can design and operate our system in a way to minimize the number of member's affected by any given outage. This can be accomplished by:

1. Creating new sources for the distribution system in the form of new delivery points or substations. This will reduce feeder lengths, and in-turn reduce the number of services affected by an outage. Our Briery Substation (completed in late 2011) is an example of implementing this concept (figure 3).
2. Upgrading system capacity so that loads can be transferred from one source to another. Damaged line sections can be isolated while repairs are made.
3. Deploying Distribution "SCADA" so that loads can be transferred (switches opened and closed) remotely by System Operators in our Operations Center.

4. Deploying Distribution Automation or the "self-healing" grid. With this technology SEC's distribution system will automatically isolate faults and restore service from alternate feeds to as many Members as possible. This is a "smart grid" concept that will be deployed at the Cooperative in the coming years.



**Figure 3: Briery Substation** This new substation serves portions of Madisonville Ckt4, Moran Ckt4, Drakes Branch Ckt1 and Nutbush Ckt3. Briery substation will greatly improve service reliability for our membership in this area.

Thunderstorms, snow, ice and wind are a fact of life in Southside Virginia. Through sound engineering practices and planning, we will improve our system's ability to keep your lights on through the storm.