



Increasing Reliability on Your Poorest Performing Distribution Circuits

November 2, 2022

RISE TO THE CHALLENGE

ISO 9001:2015 Certified | Employee-owned Since 1988



Objectives

- Learn about what SAIDI, SAIFI, and MAIFI measure
- Improve reliability on your poorest performing circuits
- Learn about protective devices to improve reliability
- Engage in a fun and informational dialogue

Introduction



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- Native Floridian
- Tampa Electric
- KCI Technologies



Cairo Vanegas

- 25 years experience
- IOU and munis
- S&C Electric

Reliability Metrics

SAIDI – System Average Interruption Duration Index

$$\text{SAIDI} = \frac{\text{sum of all customer interruption durations}}{\text{total number of customers served}}$$

- Vegetation management
- Lightning arrestor maintenance
- Wildlife mitigation
- Pole inspection
- Circuit patrols
- UG equipment inspections
- Sectionalizing, lateral reclosing (Trip Savers), and fault circuit indicators
- Identifying and addressing worst performing circuits

Reliability Metrics

SAIFI – System Average Interruption Frequency Index

$$\text{SAIFI} = \frac{\text{total number of customer interruptions}}{\text{total number of customers served}}$$

- Vegetation management
- Lightning arrestor maintenance
- Wildlife mitigation
- Pole Inspection
- Circuit patrols
- UG equipment inspections
- Sectionalizing and lateral reclosing (Trip Savers)
- Identifying and addressing worst performing circuits

Reliability Metrics

MAIFI – Momentary Average Interruption Frequency Index

$$\text{MAIFI} = \frac{\text{total number of customer interruptions less than the defined time}}{\text{total number of customers served}}$$

- Vegetation management
- Lightning arrestor placement and maintenance
- Wildlife mitigation
- Pole Inspection
- Circuit patrols
- Sectionalizing and lateral reclosing (Trip Savers)
- Identifying and addressing worst performing circuits

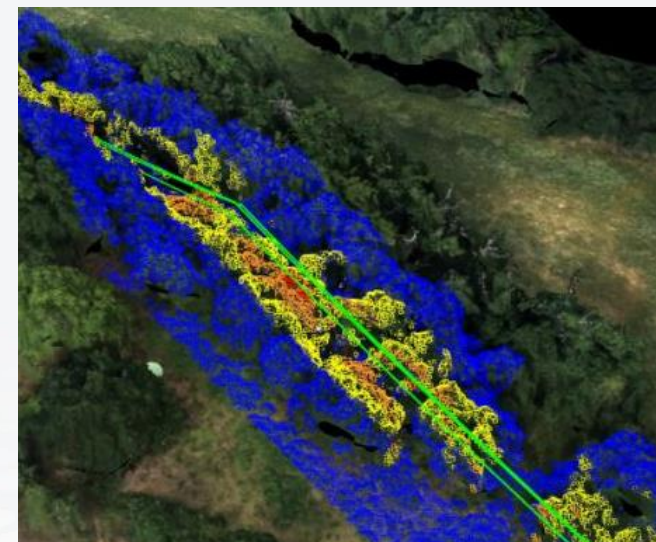
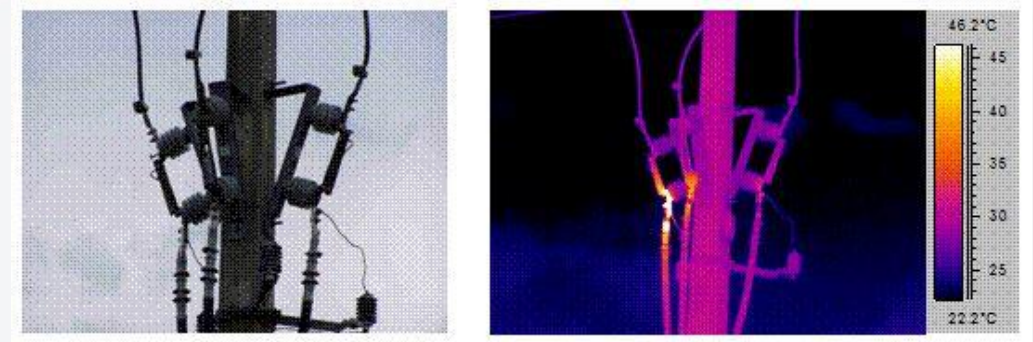
Common Denominators

- **Vegetation**
- **Lightning**
- **Wildlife**

Circuit Patrol



- Infrared inspection
- Vegetation encroachment
- Blown lightning arrestors
- Deteriorated assets
 - ▶ Crossarms
 - ▶ Conductor
 - ▶ Insulators
 - ▶ Braces
- Wildlife protection



Vegetation

- 3-year trim cycle ideal
 - ▶ Many fast-growing species demand more frequent trimming
 - ▶ “Enhanced” trimming (exceeding the ANSI standard for clearance) has proven to be effective for some utilities
- Education campaign to promote proper tree selection/placement
- GIS location of trees in conflict with power lines

Lightning

- Install arrester station every 3 spans and at every normally open point or dead-end
- Replace all legacy porcelain-housed SiC arresters
- Add arresters to lines constructed with a shield wire
- Ensure crews utilize ground resistance tester at all new transformer and arrester installations
- Add arrester stations to GIS to easily assess lightning protection

Wildlife

- Review construction standards and material specifications
- Have line crews install animal guards on every pole they work on
- Target areas with high incidence of animal contact
- Review substations for potential exposure


Protective Device Solutions

- Reclosers – reduce extent of feeder outages; enable auto-restoration schemes
- TripSaver[®] – cost effective way to improve reliability of laterals



Fault Indicators

- Use FCI to segment long feeders into 2-3mi. Segments and at OH-UG transition points
- Install FCIs at quarter points on UG loops; train crews on proper installation
- Provide crews with “portable” FCI units to assist troubleshooting when necessary
- Use wireless communication or utilize SCADA



**What reliability challenges
keep you up at night?**