



*Entergy*

# Electrical Grid Security

Severe Storms

Vandals

# Components of Electrical Grid

- Generating Units
- Transmission Lines
  - Substations
- Distribution Lines

# Severe Storms

- EF4 Tornado on April 27 began near Ferndale and traveled 41 miles to near El Paso
- Major damage occurred in the Mayflower – Vilonia Areas
- On the distribution grid Entergy replaced 500 broken poles and re-strung 650 spans of electrical wire
- A force of 1,000 workers repaired most of this damage in a few days

# Severe Storms

- Distribution Line Repairs



# Severe Storms

- The tornado also destroyed 7 transmission line segments and the Mayflower substation

# Transmission Tower Damage





# Transmission Tower Damage



# Mayflower Substation Damage





# Mayflower Substation Damage



# Transmission & Substation Repair

- A team of 100 Entergy employees and 400 contractors worked 7 days a week to rebuild the transmission lines and to erect a temporary substation.
- The damage severely limited the amount of electricity that could be delivered to the central Arkansas area from the west and north
- Arkansas Nuclear One (1800 MW) and the Independence Plant (1600 MW) were effectively cut-off
- The repairs were completed and the lines re-energized on June 11
- Had there been unusually hot weather in early June, there could have been afternoon brown-outs

# Substation Repair Work





# Substation Repair Work





# Vandals

- On August 21<sup>st</sup>, 2013 we had a power outage in Cabot. Tracking down the cause, we found a partially collapsed 500,000 volt transmission tower with the line on the Union Pacific tracks.



# Vandals

- One hundred of the 125 bolts securing the tower to the foundation had been removed.
- A cable had been strung from the tower across to a tree on the other side of the tracks. It was snapped by the first passing train and the tower did not fall.
- In the early morning dark of August 21, someone climbed the tower 100 feet up in the air and with hacksaw sawed away the connectors, dropping a live line onto the tracks.
- A Union Pacific train struck the downed line and burst through it, causing immediate outages and \$100,000 in damage.
- The FBI took over the investigation as a possible terrorist attack.

# Vandals

- On September 29 someone entered a 500,000 volt substation near Scott by cutting the fence with bolt cutters.
- Locks on the electronic control room at the substation were also cut. The interior of the control room was splashed with gasoline and the room set on fire.
- The control room was consumed by fire and the damage exceeded \$2,000,000.
- A message left on a metal panel sent the FBI and Homeland Security into full terrorist response mode.

# Vandals





# Vandals

- The suspected terrorist struck again a week later. Two power poles belonging to First Electric Cooperative were the target. One was cut through with a chain saw and the other an axe.
- The suspects then hot-wired a Kershaw SkyTrim tractor and used it to finish the job, causing an outage for 10,000 First Electric Customers.



# Vandals

- On October 11, the FBI and law enforcement surrounded the Jacksonville home of Jason Woodring and arrested him for the three attacks on the electric grid.
- Woodring claimed he committed the acts alone and the motivation was his anger with the direction of the country and a belief his actions would garner attention and get people talking.
- He was charged with domestic terrorism and faces life in prison.
- It was covered by all the national television networks and national newspapers.

# Conclusion

- Entergy Arkansas has over 37,737 miles of power lines
- Entergy Arkansas has 322 substations
- The Entergy Arkansas service territory covers 40,880 square miles
- Each year we experience damage to power line insulators and transformers in wooded areas from hunters using them for target practice during deer season
- The sheer size of the system makes it impractical to protect it from vandals or lone wolf terrorists