



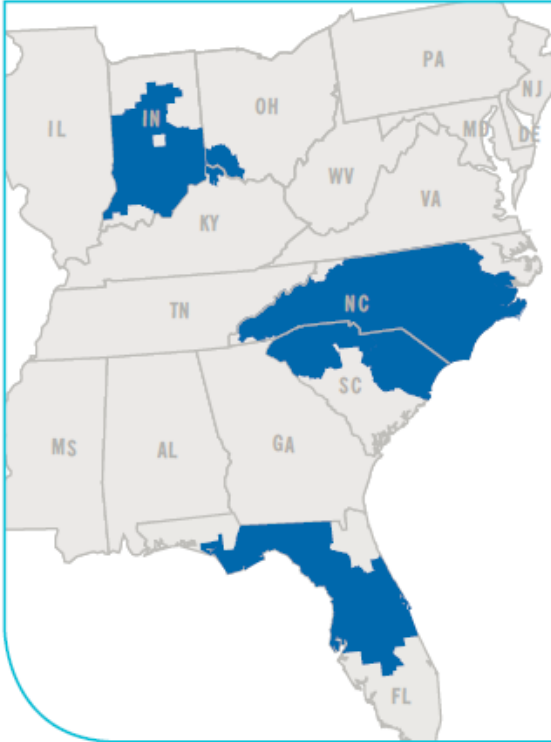
Joint Emergency Operations Management Committee Grid Protection and Resilience - April 10, 2014

Nelson Peeler, VP, Transmission System Operations

Robert Combs, VP, Design Engineering and Construction Planning



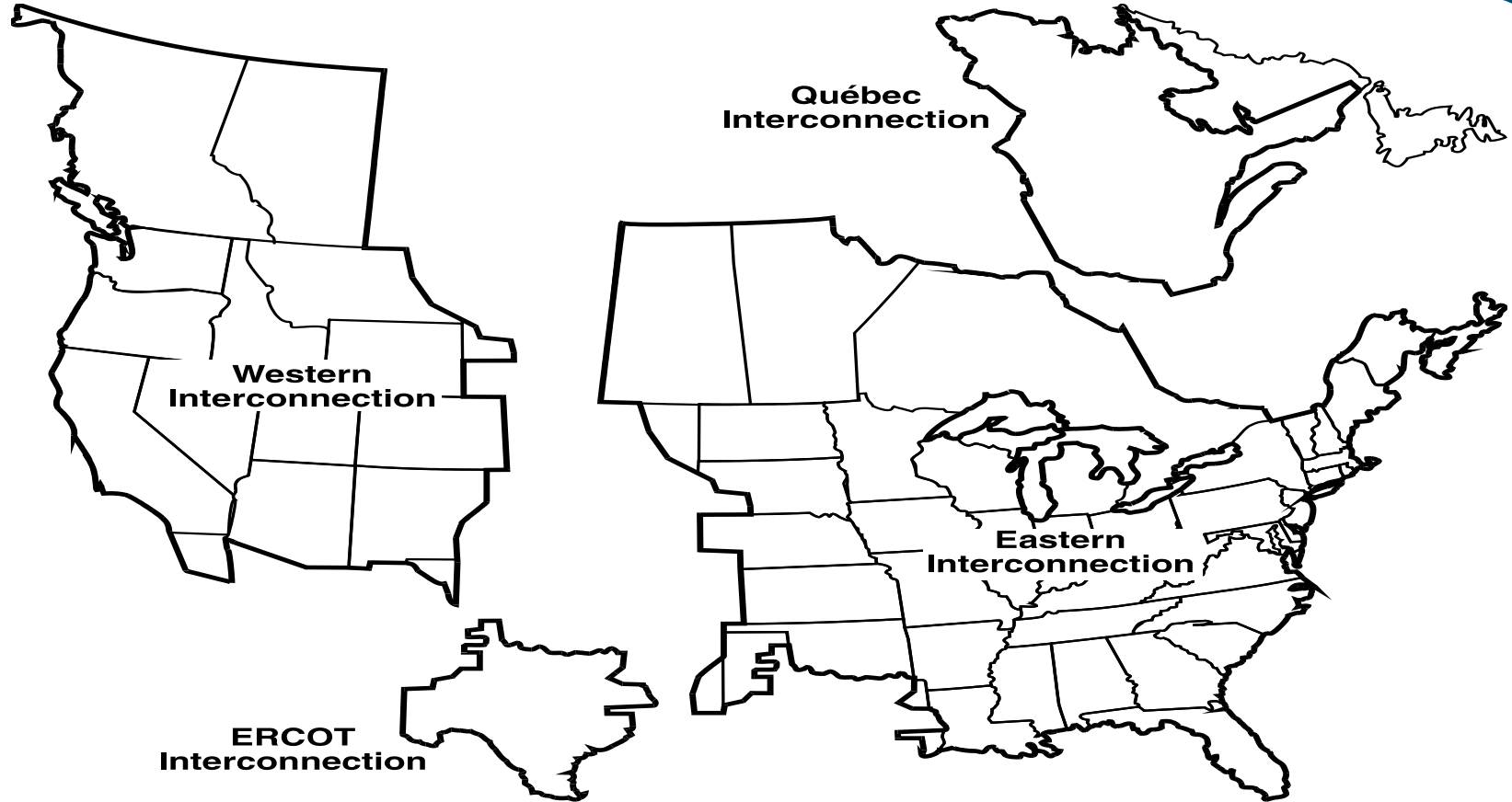
About Duke Energy



Duke Energy Service Territory

- 150+ years of service
- 7.2 million electric customers and 500,000 gas customers
- Fortune 250 company
- \$100+ billion in assets
- 57,700 megawatts of generating capacity from a diverse mix of coal, nuclear, natural gas, oil and renewable resources
- Service area covering approximately 104,000 square miles in the Southeast and Midwest

The North American Electric Grid - Interconnections



Protecting the Electric Grid

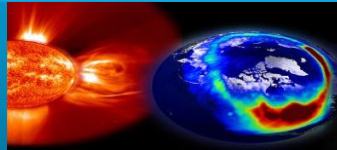
- Protecting the electric grid and maintaining system reliability – **Top Priorities**
- Have made, continue to make, significant investments to protect the grid from disruptions. **An efficient, reliable and safe electric system -- core to all we do.**
- Work with local, regional and national law enforcement and security agencies
- Coordinate with industry peers, research organizations and federal agencies to safeguard these important assets, and to monitor and develop solutions and responses.
- Collaborative relationship-- serves our customers well.
- Ability to share information and review research key to developing effective solutions on a national level across the electric grid.

Grid Resiliency – High Impact Low Frequency (HILF) Events

HILF Events occur infrequently, but can have significant impacts. These types of events require the appropriate balance of detection, prevention and response mitigations.



Physical Security



GMD/ EMP



Hurricane/ Ice Storms



Tornados



Floods



Straight Line Winds



Seismic



Fires

Protecting the Electric Grid

- Duke Energy -- employs a multi-tiered approach to grid security based on resiliency.
 - Includes elements of prevention and response to system threats.
 - Internal working teams specifically focused on geomagnetic disturbance and physical security threats to the grid.
- No single solution can completely eliminate risk—We ensure there are contingencies and redundancies in place.
- Must constantly balance threat mitigation with the cost impact to customers:
 - ***We ensure that every dollar invested is prudent, and addresses all risks, but in a common-sense, priority-based manner.***

Protecting the Grid – Physical Security

- Current Duke Energy Actions:
 - Internal working team comprised of security and operations employees
 - Recent meetings with FERC to discuss threats and mitigating actions
 - Participation in industry groups – North American Transmission Forum, EEI, etc.
 - System studies and site reviews
 - Emergency response plans, blackstart, plans, system operator training
 - Spare equipment plans and programs (EEI STEP)
 - Involvement in development of NERC physical security standard
 - Participation in EPRI research efforts for Transmission Resiliency and Physical Security
 - Coordination and information sharing with local, state and federal agencies
 - NERC standards for Critical Infrastructure Protection (CIP) and Emergency Operations (EOP)

Protecting the Grid – Geomagnetic Disturbance (GMD)

- Current Duke Energy Actions:
 - Internal working team of technical experts meets monthly
 - Participation in various industry activities – NERC HILF report, GMD Task Force, Spare Equipment Database Task Force, Severe Impact Resilience Task Force
 - Provided significant contribution to the development of Phase I of the NERC GMD standard and currently supporting the development of Phase II
 - Monitoring all G1 and up watches/warnings/alerts issued by the Space Weather Prediction Center
 - Inventoried bulk electric system transformers to collect voltage, configuration, impedance, age, and other parameters to assess vulnerability to ground induced current impacts.
 - Implemented GMD operating procedures and provided training to system operators
 - Completed system studies for potential GMD impacts
 - Installed monitoring equipment (EPRI Sunburst program) on specific transformers

Integrated Approach to GMD mitigation





Storm Prep, Response and Restoration

Robert Combs, VP, Design Engineering and Construction
Planning



Safety Is Built into All Aspects of Our Response

- **Public**

- Educate the public before events
- Public service announcements
- Media messages
- Storm website

- **Personnel**

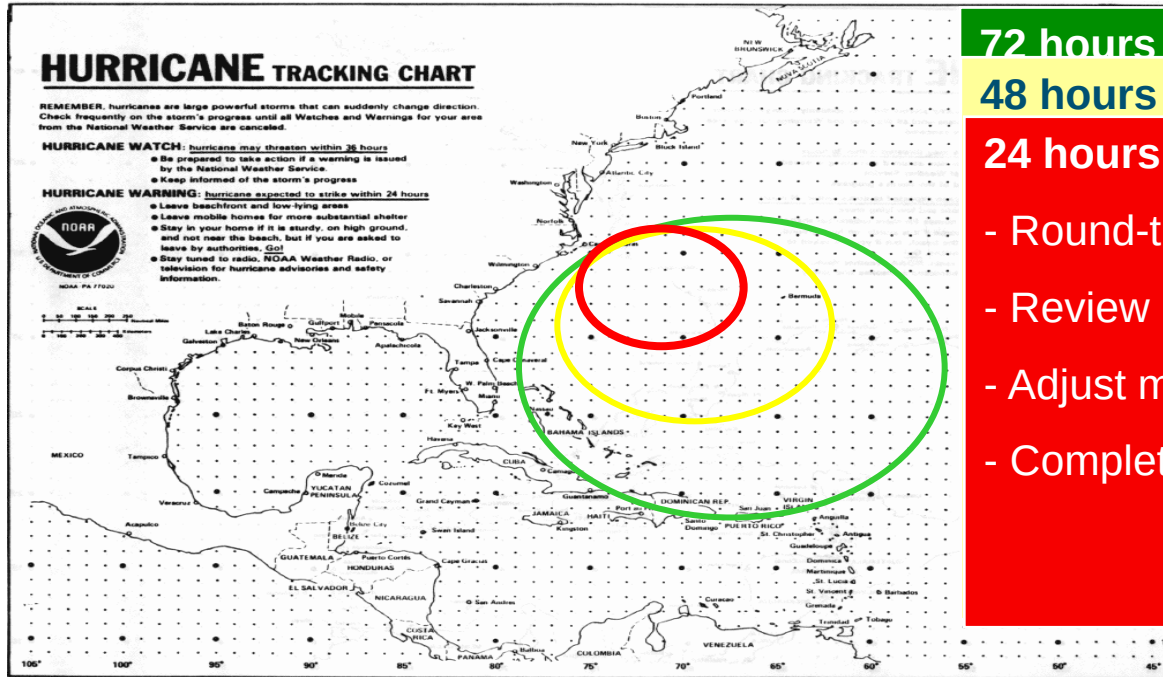
- Training qualifications
- Ongoing skills and system training
- Tailgate sessions
- Safety briefings for non-native crews
- Field oversight of crews

Responding When the Grid Is Damaged

- **Plan, drill the plan, gain feedback/best practices to improve the plan**
 - Duke Energy has a comprehensive response plan for major events impacting the grid
 - Duke drills the plan to ensure understanding and to determine ways to improve our response
 - Duke's participation in industry groups (Edison Electric Institute, Southeastern Electric Exchange, etc.) helps us learn industry best practices related to response plans, technologies and practices
 - Duke Energy leadership role in the National Response Event (NRE) - a coordinated response plan/structure to national events developed after Hurricane Sandy

What We Do to Prepare

We provide for a coordinated and orderly response to storms



72 hours before storm

48 hours before storm

24 hours before storm

- Round-the-clock operations
- Review resource needs
- Adjust mobilization
- Complete staging/logistics

Resourcing the Plan to Restore the Grid to Normal Operations

Duke is a member of three mutual assistance groups:

- Southeastern Electric Exchange
- Great Lakes
- Midwest

We share and receive:

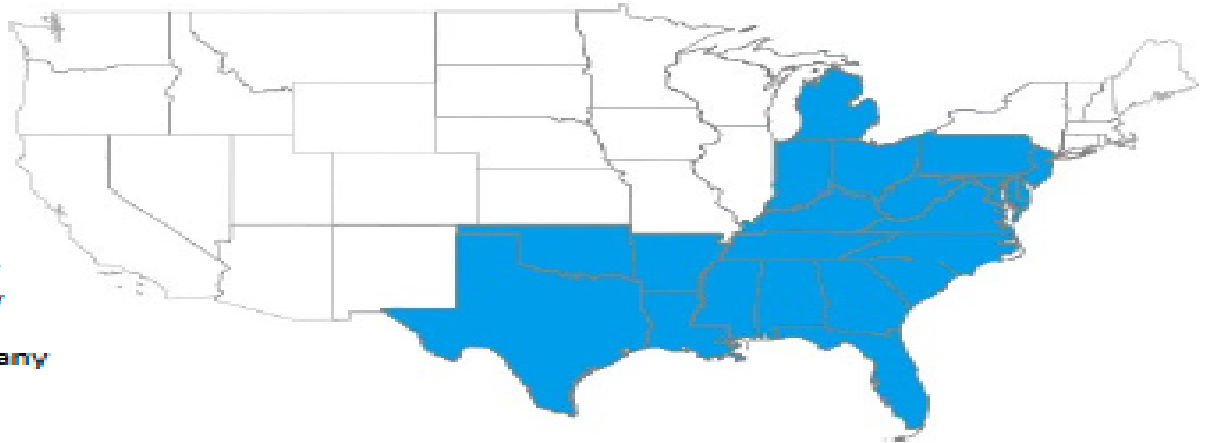
- Resources
- Workers
- Forecasts
- Crucial information



Responding When the Grid Is Damaged

Southeastern Electric Exchange

- American Electric Power
- Baltimore Gas & Electric
- CenterPoint Energy
- Cleco
- Dayton Power & Light
- Dominion
- Duke Energy
- Entergy Corporation
- First Energy
- Florida Power & Light Company
- Florida Public Utilities Company
- LG&E /KU Energy
- Oklahoma Gas & Electric Company
- Oncor
- PECO
- PHI, Inc.
- PPL
- South Carolina Elec. & Gas Co.
- Southern Company
- Tampa Electric Co.
- Texas – New Mexico Power



Storm Communications

During the storm, we do our best to keep everyone informed.

Target audiences

- Governmental
- Regulatory
- Media
- Customers
- Online

Messages

- Magnitude of storm and damage
- Number of outages
- Estimated times of restoration
- Safety before, during and after the storm



Responding When the Grid Is Damaged

- **This year we have already implemented our major storm response plan three times:**
 - January 28, 2014
 - February 11, 2014
 - March 6, 2014
- **We continue to refine our restoration plan by gathering feedback after each event.**

