Designing Overhead Transmission Systems for Grid Resiliency

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CLIENTS WE SERVE
Transmission & Distribution #1
Power #1
Top Program Management Firms #14
Top 500 Design Firms #18

Industry Rankings

Esop Association
Company of the Year 2012

Company Awards #16

Fortune Magazine Best Companies to Work For

PsMJ Premier Award for Client Satisfaction

Engineering News-Record
Designing Overhead Transmission Systems for Grid Resiliency

- Why Resiliency?
- Defining Resiliency
- Regulatory Policy Guidance
- Design Strategies to Consider
- Q&A
Why Resiliency

- Weather Events
  - Hurricanes
  - Fires
  - Floods & Storm Surge
- Operational Events
  - Cascading Faults
  - Redundancy limitations
  - Less Rigorous Design Criteria
- Security Events
  - Physical
  - Cyber
- Economic Stimulus
The Commission places a priority on resilience, and today issued an order initiating a new proceeding (Docket No. AD18-7-000) to holistically examine the resilience of the bulk power system. The Commission recognizes that it must remain vigilant with respect to resilience challenges, because affordable and reliable electricity is vital to the country’s economic and national security.
FERC has proposed that resilience means the “ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.”

Credit: Utility Dive Feb 2, 2018 by Kate Konschnik and Brian Murray

- Recovery
- Prevent Impacts
- Survivability
High Level Resiliency Program Considerations

- **Event Prevention:**
  - Upgrade Design standards
  - Improve Construction guidelines
  - Prioritize & Improve Maintenance routines and Inspection procedures

- **Event Survivability:** - Ability to maintain some basic level of electrical system functionality
  - Identify key system components
    - Communications with Customers / Agencies / IC Team
    - Critical Infrastructures - traffic signals, prisons, hospitals, and cell phones
  - Design to Survive diverse events
    - Distributed Generation considerations – Microgrids
    - Design Rigor
    - Scenario Planning

- **Event Recovery:**
  - Rapid Damage Assessment
  - Prompt crew deployment / Crew & Equipment Staging
  - Material Readiness
  - Crew Routing
  - Mutual Assistance agreements – Incident Command System
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High Level Resiliency Program Considerations

“Prevention”

• Upgrade Design standards
  • Windloading Requirements
    • 165 mph extreme event loading
    • Foundation strategies
  • Materials Upgrades – Concrete vs Wood
  • 100 Year Flood Criteria
    • Elevating equipment
    • Undergrounding
    • Flood monitoring
  • OPGW – dedicated protection & communications
• Data Collection – Sensors
• Automation

• Improve Construction guidelines

• Prioritize & Improve Maintenance routines and Inspection procedures
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High Level Resiliency Program Considerations

“Survivability”

• Ability to maintain some basic level of electrical system functionality
  ► Communications with Customers / Agencies / IC Team
  ► Identification of Critical Community Infrastructure - traffic signals, prisons, hospitals, and cell phones
  ► Identification of Critical Utility Infrastructure - Data & Controls

• Distributed Generation Integration
  ► Renewable Sources
  ► Storage
  ► Traditional Solutions? Back-up Generation – Diesel?
  ► Distribution Grid Modernization
    ► Sectionalizing & Self Healing Automation – FLISR
    ► Smart Inverter Standards – IEEE 1547
    ► Adaptive Relaying

IEEE 1547 and 2030 Standards for Distributed Energy Resources Interconnection and Interoperability with the Electricity Grid

Thomas Basso
National Renewable Energy Laboratory
High Level Resiliency Program Considerations

"Recovery"

- Rapid Damage Assessment
  - Helicopter technology
  - Drone program
  - SCADA & Sensor – Data Analytics

- Prompt crew deployment / Crew & Equipment Staging
  - Standard Work Order preparation
  - ERP Work Order / Material Management processes

- Material Readiness
  - ERP Work Order / Material Management processes
  - Partnerships with Material Vendors

- Crew Routing
  - Mutual Assistance agreements – Incident Command System
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Case Study: FP&L Data Capabilities

Source: Courtesy of Florida Power & Light Company
Thank You