Control Number: 32182

Item Number: 15

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CenterPoint Energy

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PUBLIC UTILITY COMMISSION
FILING CLERK

January 19, 2006

David Featherston
Director, Infrastructure Reliability Division
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, Texas 78701

RE: Project No. 32182 – *PUC Investigation of Methods to Improve Electric and Telecom Infrastructure that will Minimize Long Term Outages and Restoration Costs Associated with Gulf Coast Hurricanes*

Presentation for Workshop No. 1

Dear Mr. Featherston:

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy) made the attached presentation at Workshop No. 1 held on January 17, 2006.

Thank you for your attention to this matter.

Yours truly,

DeAnn T. Walker

DeAnn T. Walker
Senior Counsel

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CenterPoint Energy

Project 32182 Workshop

Planned Improvements to Existing Infrastructure
&
Potential Infrastructure Enhancements
That Will Harden the System Against Future
Storm Damage

January 18, 2006

Overview

CenterPoint Energy

I. Hurricane Rita Experience

II. Considerations For Hardening an Electrical System

III. Current Practices to Limit Storm Damage

IV. What Could We Do as an Industry?

Hurricane Rita Experience

CenterPoint Energy

- Glancin g Blow
  - –Sustaine d tropical storm winds
  - –Some hurric ane-force winds
- S ystem Impacts
  - –T ransmission
    - 2 cases of transmission line trouble
    - No weaknesses in transmission infrastructure exposed
  - –Distributi on
    - 719,000 customers without power (6:00am Saturday, 9/24/05)
    - Trees & debris on lines
    - Restoration achieved in 5 days
- Concl usion
  - –No s ystem improvements planned at this time
  - –Possibl e changes to our Emergency Operating Plan being considered

Considerations For Hardening an Electrical System

CenterPoint Energy

- The Big Question: Is it reasonable to expect that an electric utility can endure a direct hit by a Category 4 hurricane with 131 to 155 mph winds and sustain only minor damage?
- Ominous Design Challenges
  - Tidal surge (e.g. devastation, salt-water damage to pad-mount equipment)
  - Flood currents (floating debris impacting structures)
  - Weakened soils from excessive rain (e.g. leaning poles, falling trees)
  - Tornados
  - Flying debris
  - Falling trees from high winds (e.g. 80' pine trees falling into rights-of-way)
- One Size Does Not Fit All: Why are there differences?
- Service Territory Differences
  - Geography (terrain, weather, soils, vegetation)
  - Population Density
  - Enhancements should be specific to the service area
    - Focused approach for cost effectiveness
    - Follows regional model adopted by the NESC

Considerations For Hardening an Electrical System

CenterPoint Energy

- The Design Question: Which transmission structure type is the best to withstand a hurricane? Monopoles? Towers? H-frames?
- The Better Question: What is the common link to all transmission structure designs?
  - The answer is "design criteria."
  - The design criteria (e.g. wind speed) determines the strength of the structure under storm conditions, not the structure type.

Considerations For Hardening an Electrical System

CenterPoint Energy

- T ypical advantages and disadvantages of different designs
  - Monop oles: low to very high relative cost, small footprint, less right-of-way, multiple materials available (e.g. wood, concrete, steel), self supporting or guyed, short to long spans, one or multi-circuit, limitations on maximum height, low to very high cost foundations, very low to moderate erection cost.
  - T owers: moderate to high cost, self supporting or guyed, short to long spans, one or multi-circuit, excellent for tall channel crossings, moderate cost materials, moderate to high cost foundations, moderate to high erection cost.
  - H-frames: lo w to moderate relative cost, semi-compact, relatively short, multiple materials available (e.g. wood, concrete, steel) self supporting or guyed, long spans, one or multi-circuit, limitations on maximum height, low to moderate cost materials, low cost foundations, low erection cost.

Current Practices to Limit Storm Damage

CenterPoint Energy

- •T ransmission System Network Design
  - Very few single-tap or radial services
  - Majority of substations have at least two lines serving them
- •T ransmission Line Design
  - –Follo w NESC (ANSI C2-2002)
    - Combined Ice and Wind Loading (Rule 250B)
      - "Light" loading…59.3 mph (9 lb/ft^2) wind, no ice
      - "Medium" loading…39.5 mph (4 lb/ft^2) wind, ¼" radial ice
      - "Heavy" loading…39.5 mph (4 lb/ft^2) wind, ½" radial ice
    - Extreme Wind Loading (Rule 250C)
      - Rule added in 1977 edition of NESC
      - Applies to structures 60' or taller above ground or water
      - Basic wind speeds of 90 to 140 mph with added gust response factors, increasing wind as structure height increases

Current Practices to Limit Storm Damage

CenterPoint Energy

- T ransmission Line Design (cont'd)
  - The condition with the greatest effect determines the design.
  - "Medium" or "Heavy" loading is applied by CNP in areas which have experienced icing conditions.
  - In additio n, CNP incorporates anti-cascade design conditions
    - Line post insulators with fail-safe bases or load limiters
    - Storm guys or deadends in H-frame lines
    - Arms of steel structures designed to fail before structure fails
  - Utilize PLS- CADD transmission line design software

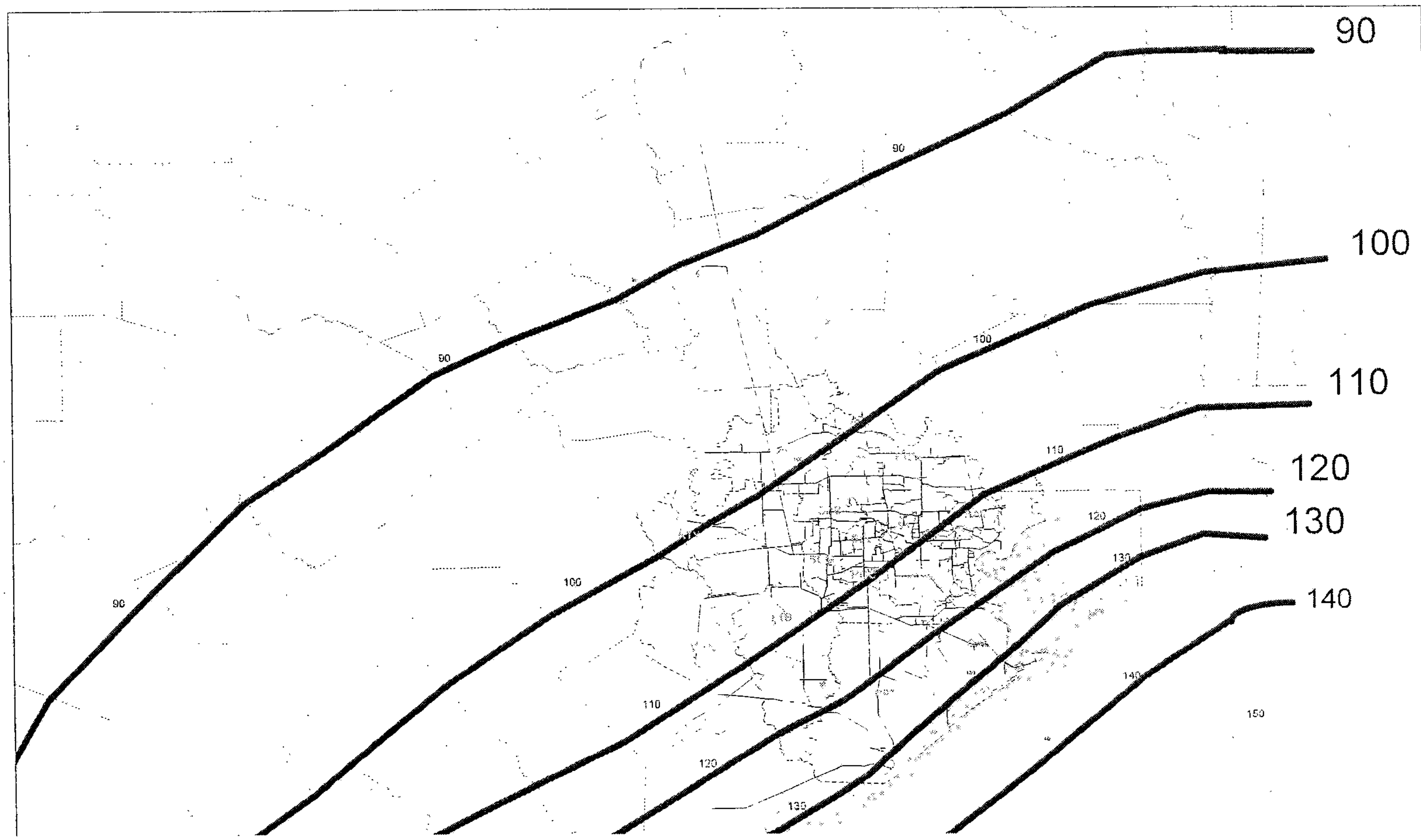
Current Practices to Limit Storm Damage

CenterPoint Energy

NESC Loading Districts

Current Practices to Limit Storm Damage

CenterPoint Energy



NESC Basic Wind Speed

January 18, 2006

Current Practices to Limit Storm Damage

CenterPoint Energy

- Distributi on Line Design
  - Follo w NESC (ANSI C2-2002)
    - Combined Ice and Wind Loading (Rule 250B)
      - "Light" loading…59.3 mph (9 lb/ft^2) wind, no ice (CNP Territory)
    - Extreme Wind Loading (Rule 250C)
      - Applies to structures 60' or taller above ground or water
  - T he vast majority of distribution structures are shorter than 60' and are designed for NESC "Light" loading.
  - Utilize L D-Pro distribution line design software

Current Practices to Limit Storm Damage

CenterPoint Energy

- T ransmission Line Maintenance Program
  - –Proactive 5- year inspection and maintenance cycle for all transmission circuits (345kV, 138kV, and 69kV)
    - All components inspected and maintained or replaced based on condition (grounding, structures, conductors, insulators, etc.)
    - Rights-of-way inspected for encroachments
  - –Groundl ine treatment of wood poles on a 10-year cycle to retard rot
  - –T argeted painting program for galvanized structures in highly corrosive areas to avoid loss of steel
  - –Coord inated circuit maintenance
    - Vegetation management completed first
    - Line inspection follows 3 months later
    - Line maintenance follows 3 to 6 months later
      - Dependent on outage availability & materials lead time
  - –Circuit outa ges monitored for maintenance performance issues
    - All outages investigated for root cause and potential mitigation

Current Practices to Limit Storm Damage

CenterPoint Energy

- Distributi on Line Maintenance
  - C ycle-based maintenance
    - Rotten pole replacements
    - Groundline treatment
    - Automated equipment servicing/testing (e.g. reclosers, regulators)
  - Performance-based maintenance
    - Line inspection of 10% worst circuits
      - Maintenance or replacement of deteriorated components
      - Reliability analysis and improvements implemented
    - Infrared inspections of devices (e.g. terminals, cap banks, switches)
    - Line and Transformer fuses
      - Pro-active monitoring of fuse incidents
      - Root cause analysis and mitigation

Current Practices to Limit Storm Damage

CenterPoint Energy

- T ransmission Vegetation Management Program
  - –Proactive 5- year maintenance cycle for all transmission circuits (345kV, 138kV, and 69kV)
    - Coordinated with transmission line maintenance cycle
    - Our objective is to produce a low-growing predictable environment within our transmission line corridors
    - Tree removal is the primary method of control within rights-of-way
  - –Annua l aerial inspection of system to identify danger trees for removal
  - –Annua l self-certification of program is submitted to ERCOT
  - –Vegetatio n related outages of 345kV are reported monthly to ERCOT
    - No outages to report as yet

Current Practices to Limit Storm Damage

CenterPoint Energy

- Distributi on Vegetation Management
  - Proactive Strateg y: Tree trimming efforts focused on circuits in a manner that maximizes the benefits toward achieving system SAIDI targets
  - All circuits are ranked based on customer-minutes of outage due to vegetation and wind, as well as years since circuit was last trimmed.
    - For 35kV, 3 years since last trim or more
    - For 12kV, 4 years since last trim or more
  - Focus is put on the worst circuits
  - Provide se parate budgets for 12KV and 35KV circuits
  - T rim all laterals, along with feeder-main, on a given circuit
  - T ree trimming dollars are also provided to Service Centers to handle spot tree trimming problems on a reactive basis

What Could We Do As an Industry?

CenterPoint Energy

- Construct mor e lines underground
  - Ex tremely high cost vs. overhead construction
    - Overhead 138kV ~$350K - $700K per mile
    - Underground 138kV ~$6.5MM - $10MM per mile
  - Desig n limitations on technology for long distances
  - Floodi ng concerns
- Adopt a more r obust design criteria for higher winds
  - Ex tremely high cost to rebuild existing infrastructure
  - Does not ad dress storm surge or tornados
- W iden rights-of-way to remove more trees
  - Customer ob jections, aesthetic impacts
  - Cond emnation for additional rights a likely challenge