New York State Energy Planning Board

New York State Transmission and Distribution System Reliability Study

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Introduction and Overview
Transmission System Reliability
Distribution Reliability
Investment and Expenditures
Environmental Regulations
T&D Reliability Impacts from Policy
Future T&D Reliability Issues
Key Findings and Recommendations
Overview of The Electric System
Fundamental Reliability Principle

Generation

Transmission & Distribution

Load
New York State Generation

38,902 MW
2012 Summer Capacity

139,965 GWH
2011 Energy

Source: NYISO, 2012
New York State High Voltage Transmission

Source: NYISO, 2012
New York Transmission Owner Service Areas

Legend
- Central Hudson Gas & Electric
- Consolidated Edison
- Long Island Power Authority
- National Grid
- NYS Electric and Gas
- Orange and Rockland Utilities
- Rochester Gas and Electric
- Municipal Utilities

Source: DPS, 2012
Historical Load Growth
By Aggregated Wholesale Energy Load Zone

MWH

Zones A-E
Zones F-I
Zones J-K
Transmission System Reliability
Transmission Reliability Metrics

- Planning Metrics
  - Resource Adequacy
    - Loss of Load Expectation
    - 1 in 10 years
  - System Security Analysis or Operation Reliability
    - N-1; N-1-1

- Operations Metrics
  - Uncontrolled Loss of Load Event
Transmission System Planning

- NYISO
  - Area Transmission Review
  - Comprehensive System Planning Process
    - Local Transmission Planning Process
    - Reliability Needs Assessment
    - Comprehensive Reliability Plan
    - Congestion Assessment and Resource Integration Study

- Regional and Interregional
  - EIPC
  - Northeast Coordinated Plan
  - Eastern Interconnection Assessment Group
  - NPCC Overall Transmission Assessment
  - NERC 2011 Long-Term Reliability Assessment
Transmission System Operations

- Seasonal Operating Studies
  - Assesses transfer limits on key interface
- Day Ahead Operating Plan
  - Security Constrained Unit Commitment
- Real Time Operations
  - Real Time Commitment and Dispatch
- System Operating States
  - Normal
  - Warning
  - Alert
  - Major Emergency
  - Restoration
Reliability Issues Identified in Planning Studies

- NERC
  - 2011 Long-Term Reliability Assessment
  - 2011 Risk Assessment of Reliability Performance Report

- 2010 Comprehensive Reliability Plan
  - No reliability violations identified in base case
  - Risks identified in sensitivities

- State Transmission Assessment and Reliability Study
  - Aging infrastructure
  - Opportunities to increase transfer capacity
Distribution System Reliability
Distribution Reliability

- Annual Reliability Report
- Reliability Improvements
- Power Quality Issues
- Electric Utility Emergency Plans
- Storm Mitigation
Distribution Reliability Metrics

Customer Average Interruption Duration Index (CAIDI)
Number of Customer Hours/ Number of Customers Affected

System Average Interruption Frequency Index (SAIFI)
Number of Customer Affected/Number of Customers Served
Note: 2011 Values are draft, does not include LIPA outage data from Hurricane Irene
Causes of Distribution Interruptions

Radial Interruptions
- Tree: 27%
- Equipment: 40%
- Prearranged: 14%
- Accident: 13%
- Lightning: 5%
- Cust Equip: 1%
- Overload: 3%
- Error: 0%
- Unknown: 8%

Network Interruptions
- Services: 81%
- Equipment: 7%
- Mains: 7%
- Accident: 1%
- Prearranged: 0%
- Cust Equip: 4%
Number of Customer-Hour Interruptions

Note: 2011 Values are draft, does not include LIPA outage data from Hurricane Irene
Investment and Expenditures
Utility Capital Expenditure ($000s)
Electric O&M Expenses ($000s)
Environmental Regulations
Environmental Regulations

- Existing Rules
  - NOx RACT Rule
  - Best Available Retrofit Technology (BART) Rule
  - Utility MACT Rule
  - Best Technology Available (BTA) Policy

- New and Future Rules
  - Cross-State Air Pollution Rule
  - Cooling Water Intake Structures
  - Coal Combustion Residuals
  - CO₂ Emission Allowance
Impacts to Reliability
Reliability Impacts From Policies

- **Load**
  - Energy Efficiency
  - Large Load Growth
  - Other Load Varying Mechanisms

- **Generation**
  - Renewable Portfolio Standard
  - Distributed Generation

- **Transmission & Distribution**
  - Bulk Electric System Definition
  - Performance Rate Making, Multi-Year Rate Agreements, and other Departures from Traditional Regulatory Mechanisms

- **Regulatory**
  - Corporate Reorganization of Electric Utilities
Possible Future Reliability Issues

**Generation**
- **Retirements**
  - Environmental Initiatives
  - Nuclear Relicensing
  - Market Conditions
- **Results**
  - Fuel Mix Issues/Diversity of Supply

**T&D**
- **Aging Infrastructure**
  - 2,300 miles over next 10 yrs nearing design life
  - 1,200 additional miles in next 10-20 years
- **Results**
  - Increases maintenance and downtime
  - Increases risk from unavailability

**Load**
- **Variations**
  - Smart Grid and Emerging Technologies
  - Electric Vehicles
- **Results**
  - Transition for both technology & process poses challenges
  - Implemented correctly could optimize asset utilization & operational efficiency

**External Forces**
- **Sources**
  - Security Threats
  - Geomagnetic Disturbances
  - Aging Workforce
- **Issues**
  - Risks known and estimated
  - Mitigation measures developed
  - Effectiveness unknown
Preliminary Findings and Recommendations

- As assessed using existing metrics, the electric system generally appears to be reliable
- Allow system planners and operators flexibility when developing policies
- Support cost-effective replacement of aging infrastructure
- Support diverse mix of electric generation fuel sources
- Monitor gas/electric interdependence
- Encourage workforce development
- Support distributed generation technologies
- Improve storm mitigation, restoration, and communication
Questions?