New York State Energy Planning Board

New York State Transmission and Distribution System Reliability Study

Patrick Curran, NYISO

Erin Hogan, NYSERDA

Michael Worden, DPS

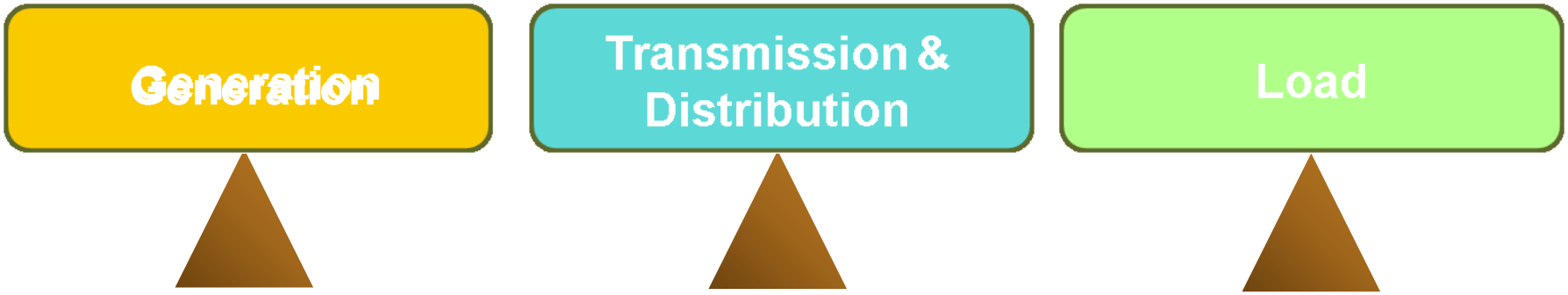
June 4, 2012

T&D Reliability Study Highlights

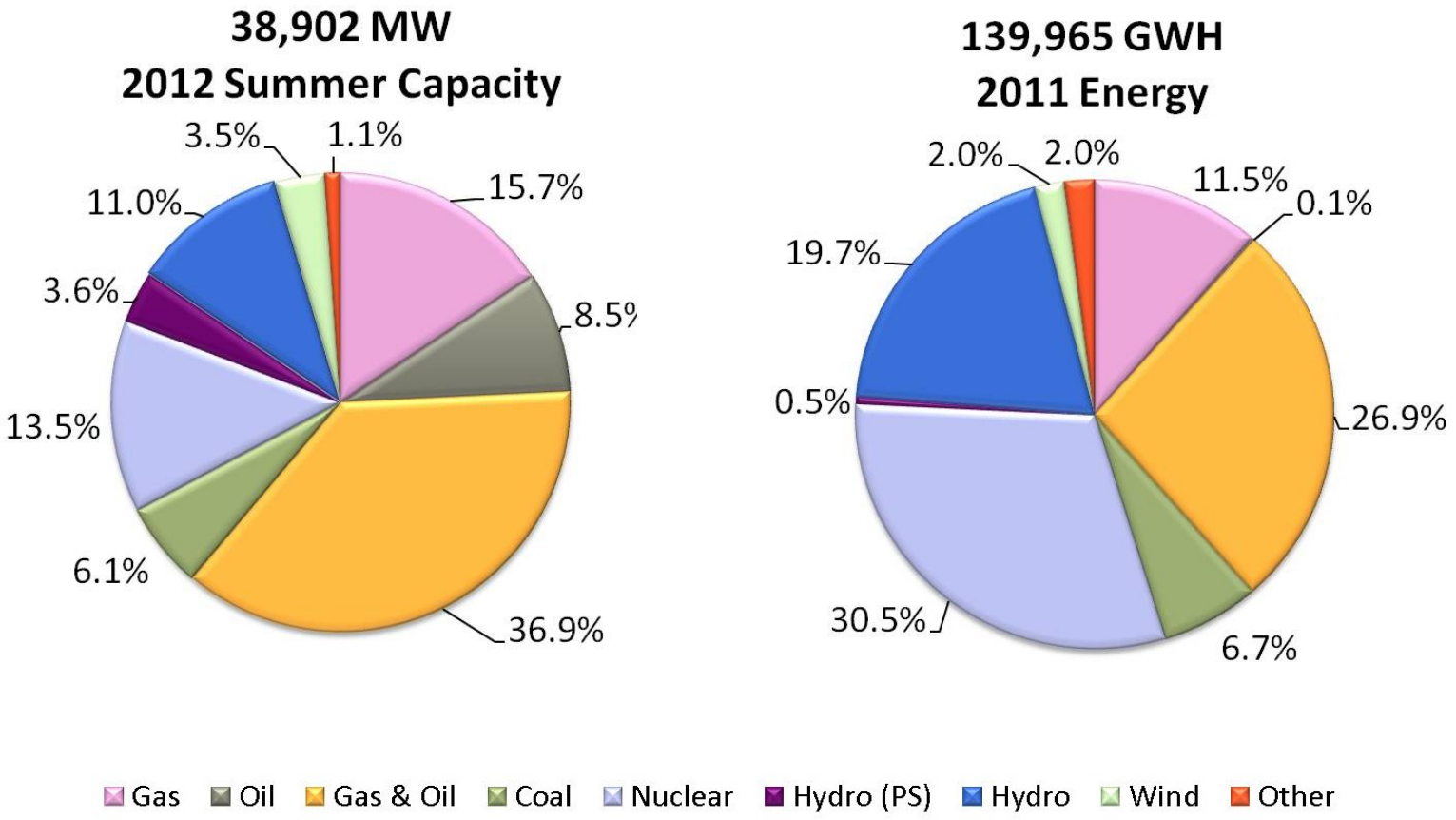
- Introduction and Overview
- Transmission System Reliability
- Distribution Reliability
- Investment and Expenditures
- Environmental Regulations
- T&D Reliability Impacts from Policy
- Future T&D Reliability Issues
- Key Findings and Recommendations

Overview of The Electric System

Fundamental Reliability Principle

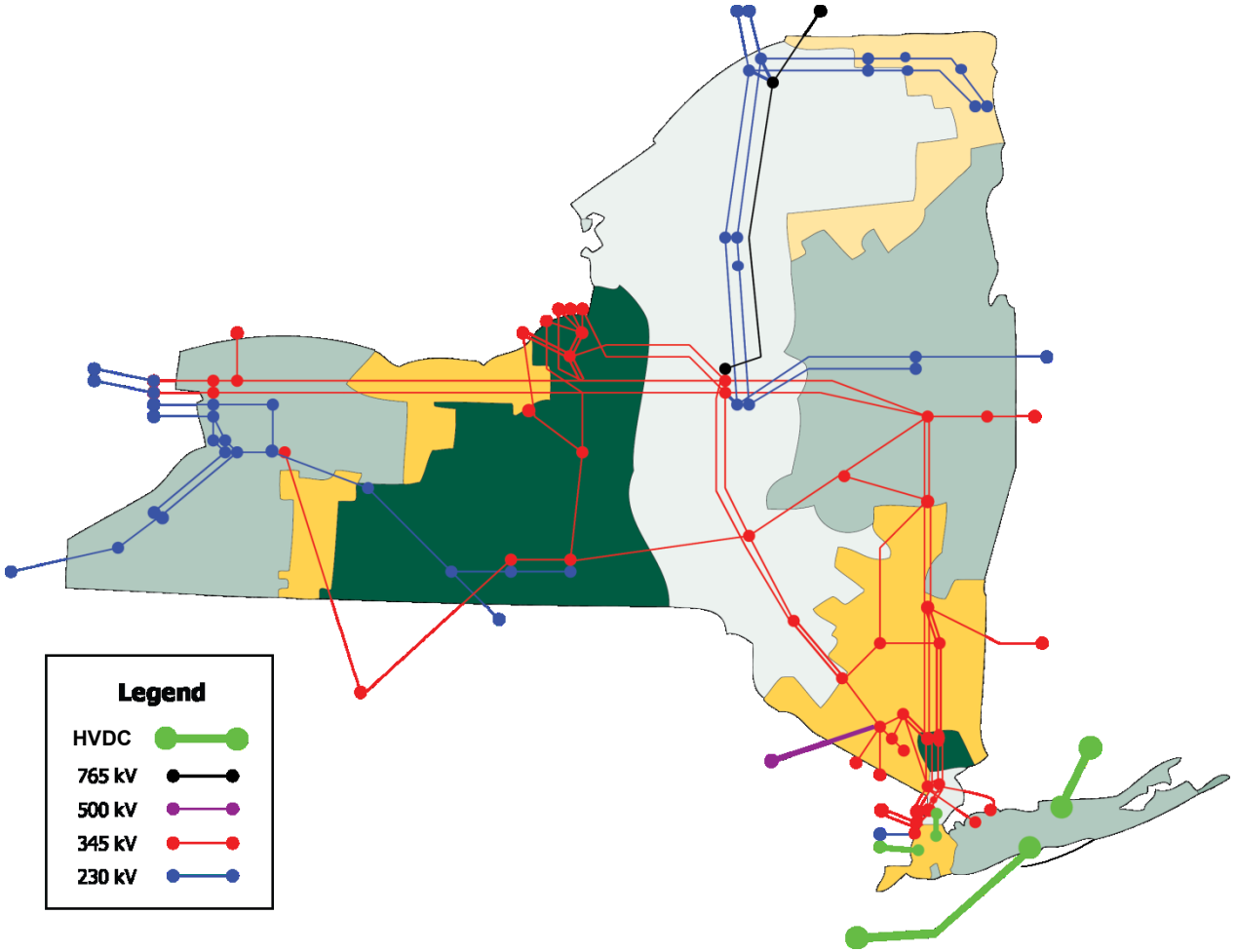


New York State Generation



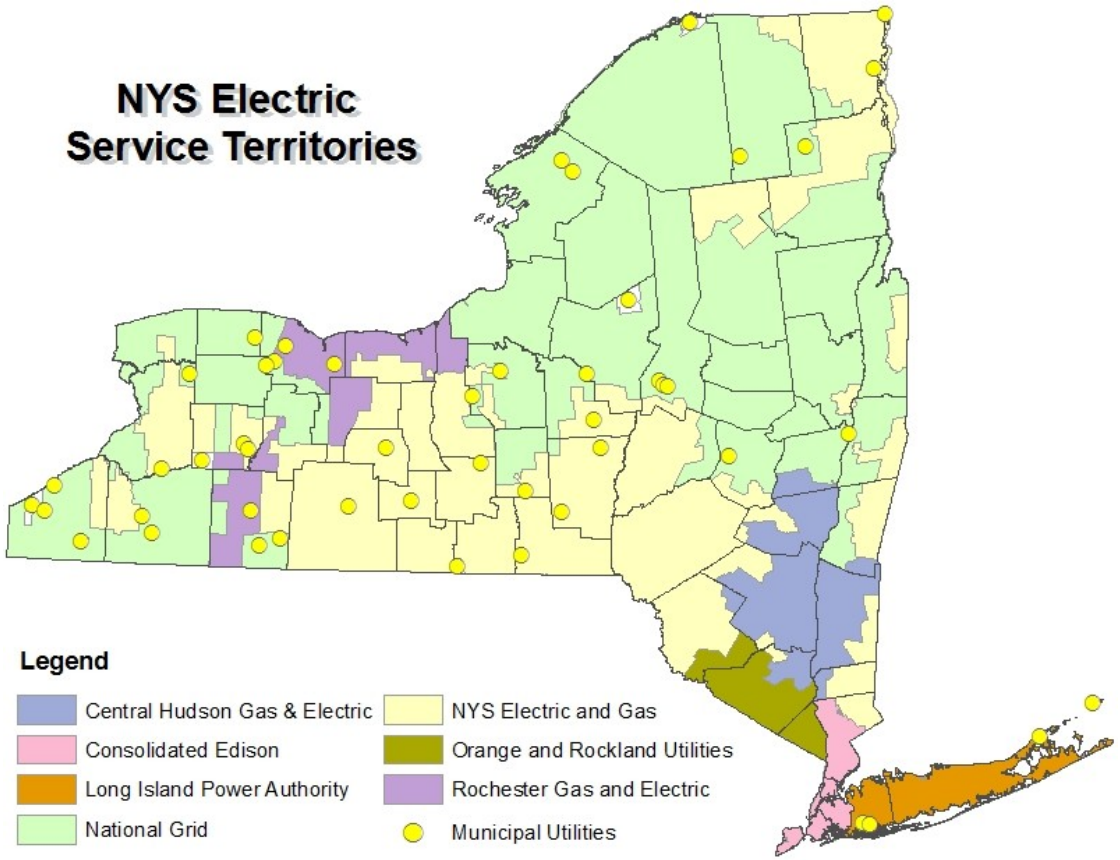
Source: NYISO, 2012

New York State High Voltage Transmission



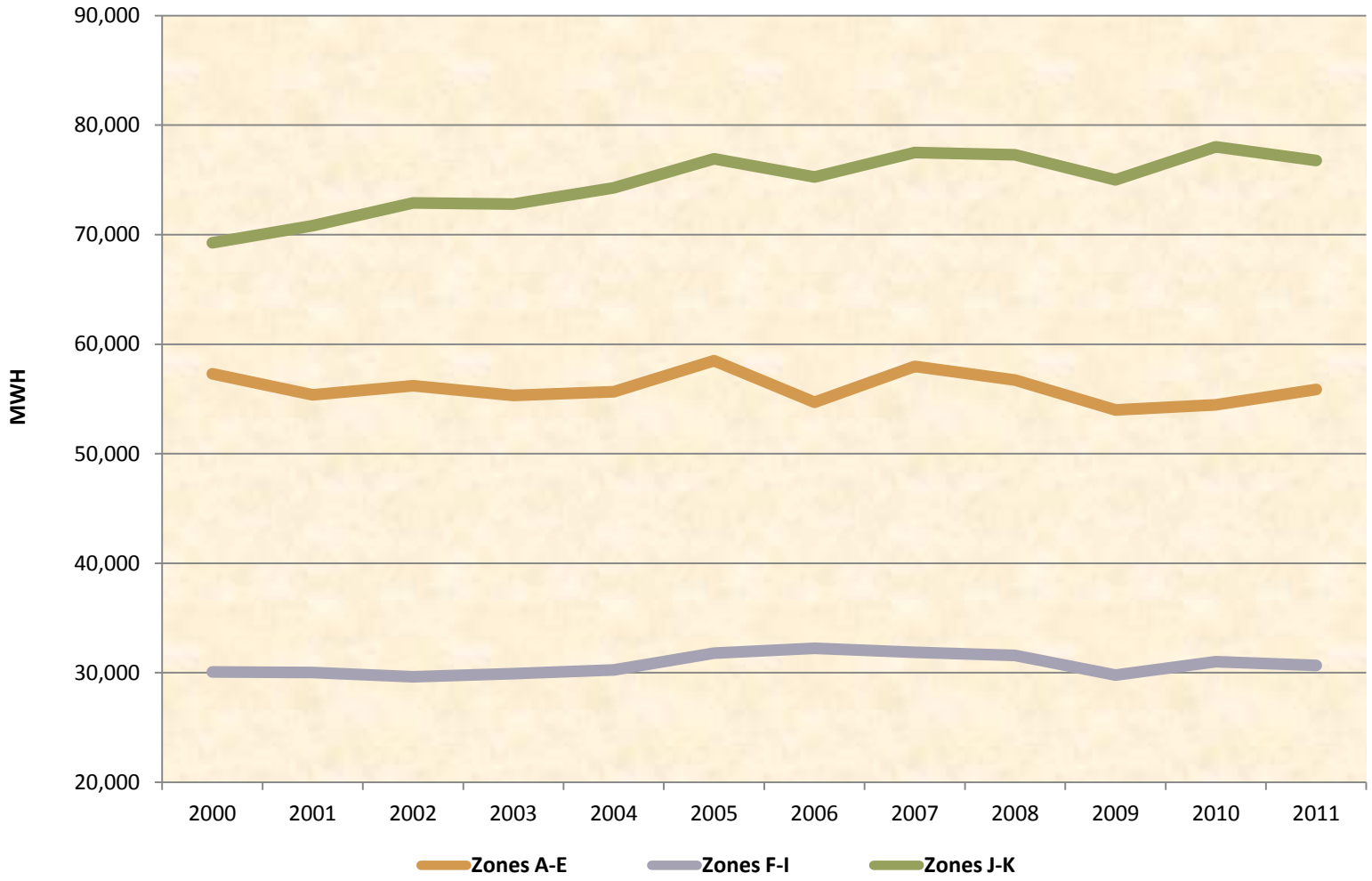
Source: NYISO, 2012

New York Transmission Owner Service Areas



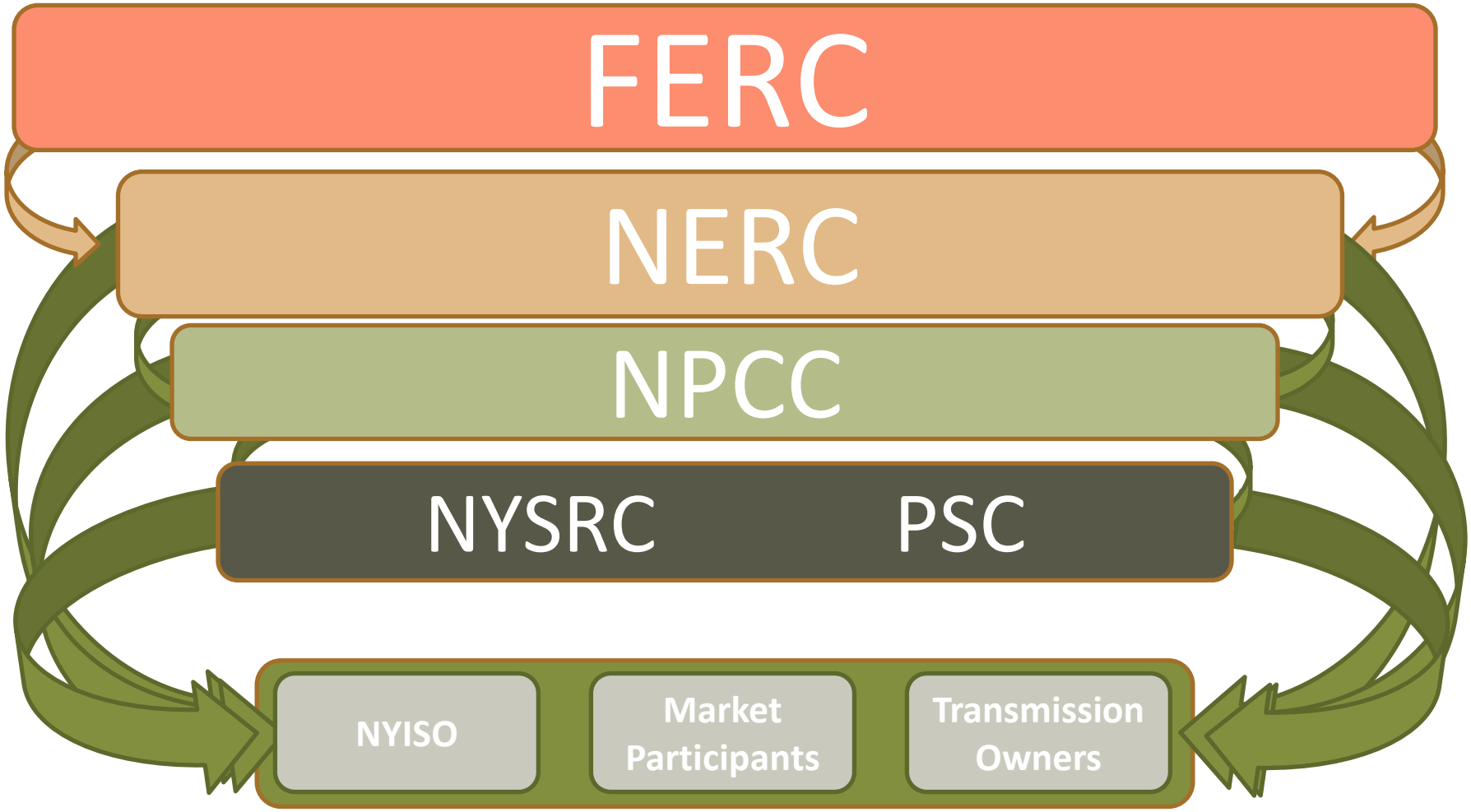
Source: DPS, 2012

Historical Load Growth
By Aggregated Wholesale Energy Load Zone

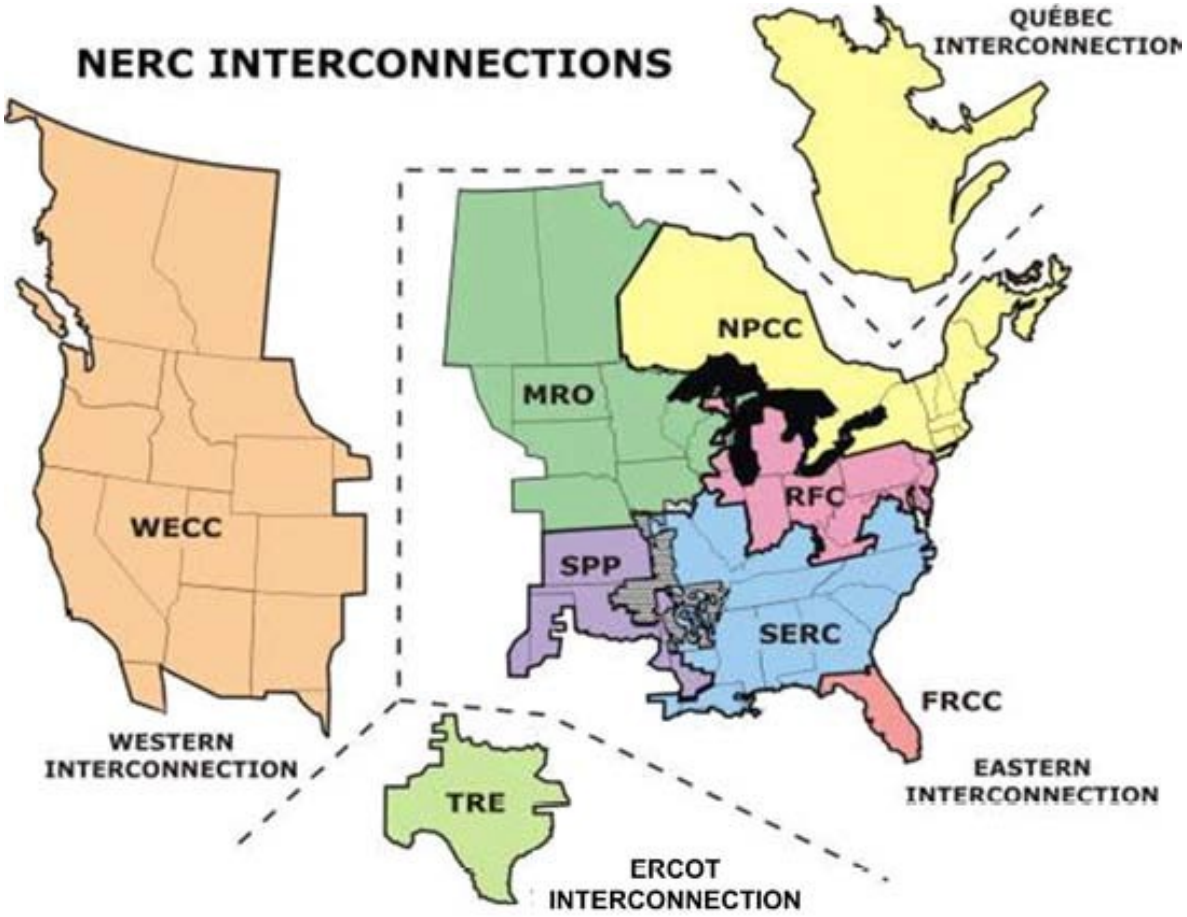


Transmission System Reliability

Reliability Oversight



NERC Interconnections



Source: NERC, 2012

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

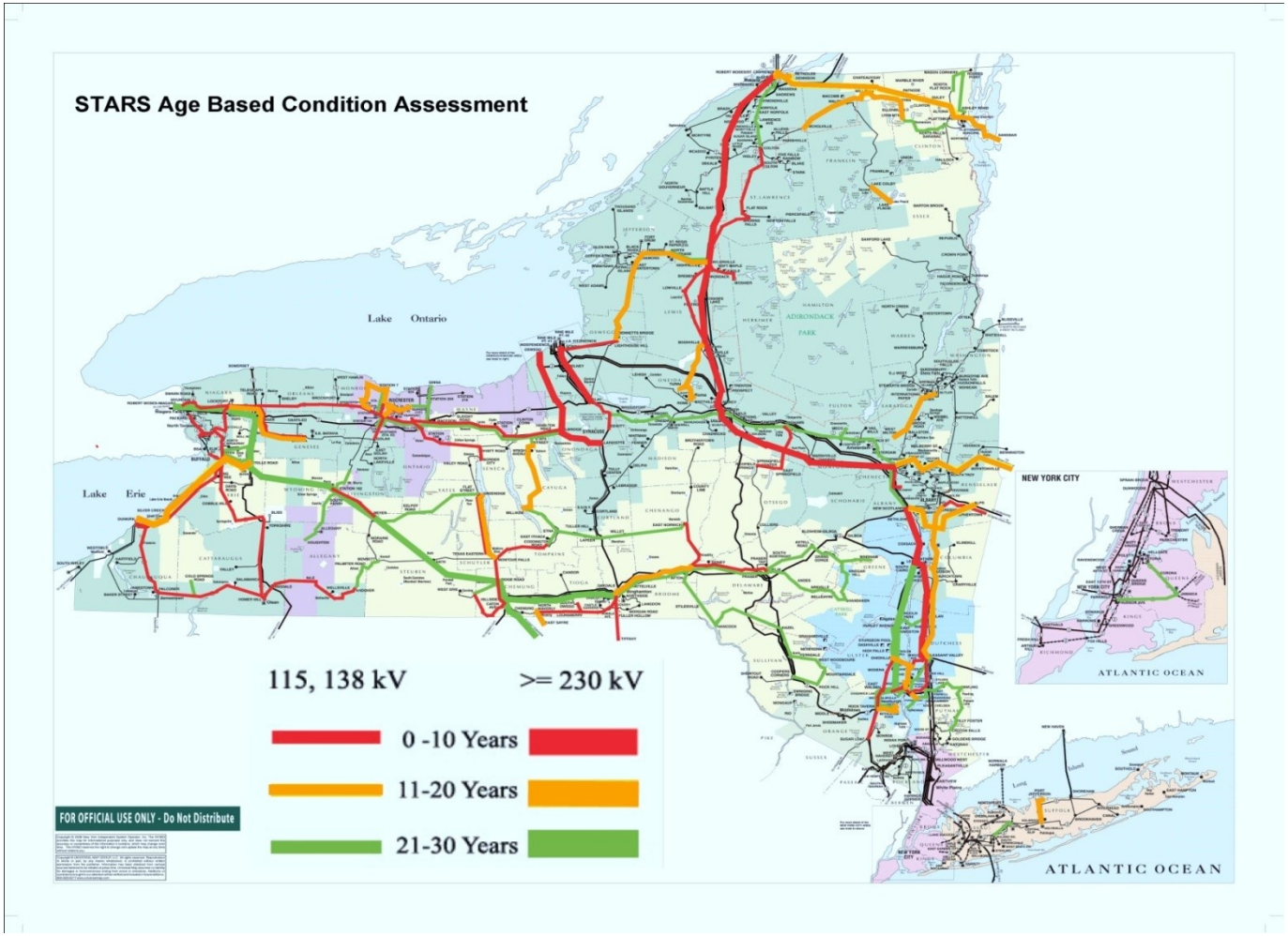
Transmission System Operations

- 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

New York State
Transmission Assessment and Reliability Study



Source: STARS, 2012

Distribution System Reliability

Distribution Reliability

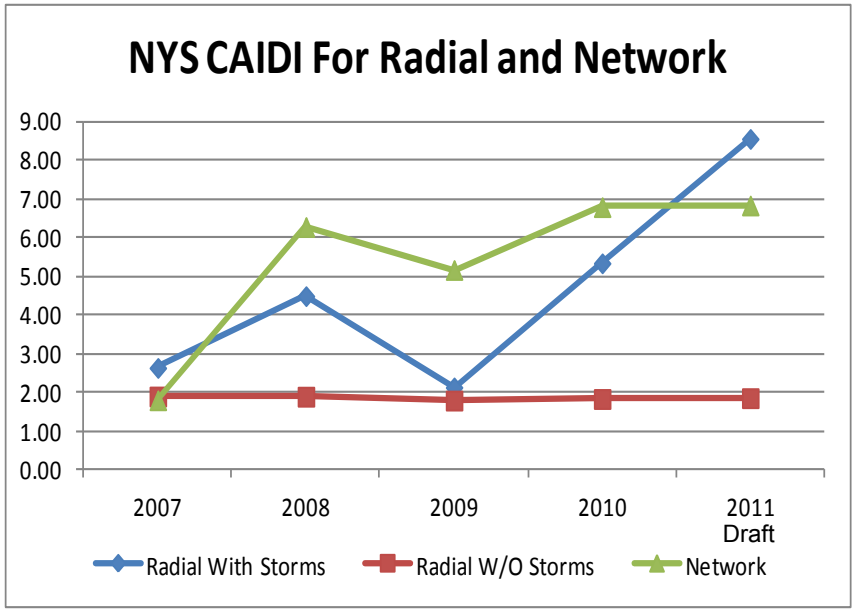
- Annual Reliability Report
- Reliability Improvements
- Power Quality Issues
- Electric Utility Emergency Plans
- Storm Mitigation

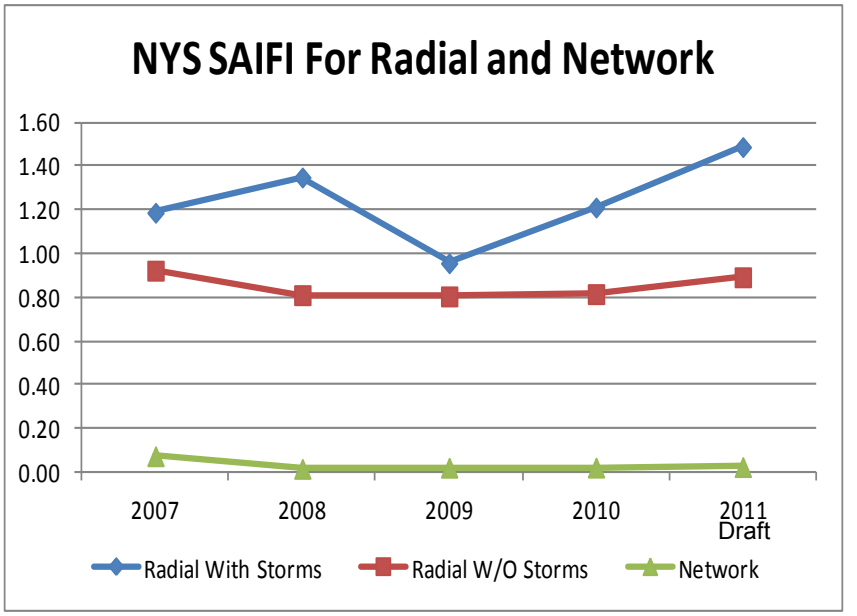
Distribution Reliability Metrics

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

Distribution Performance

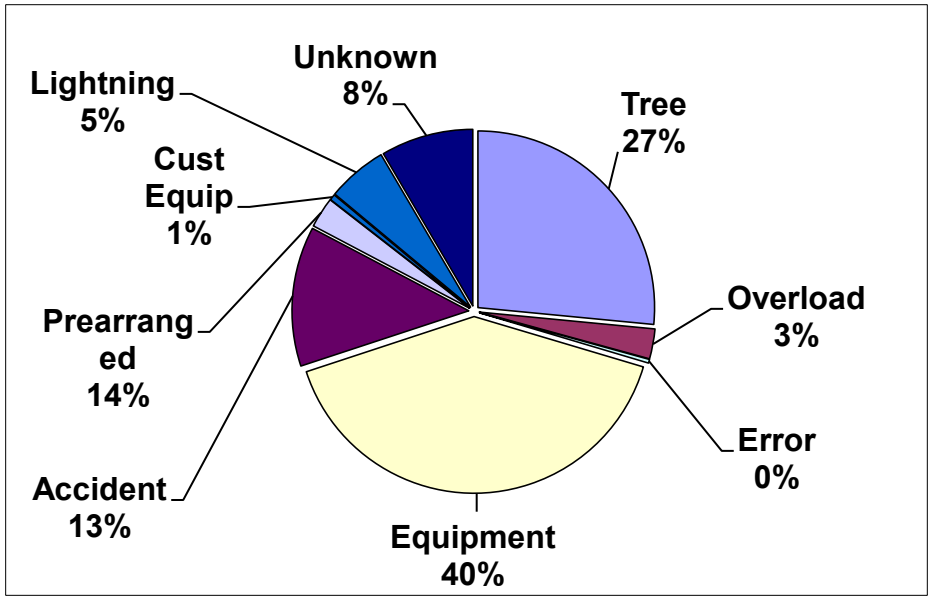




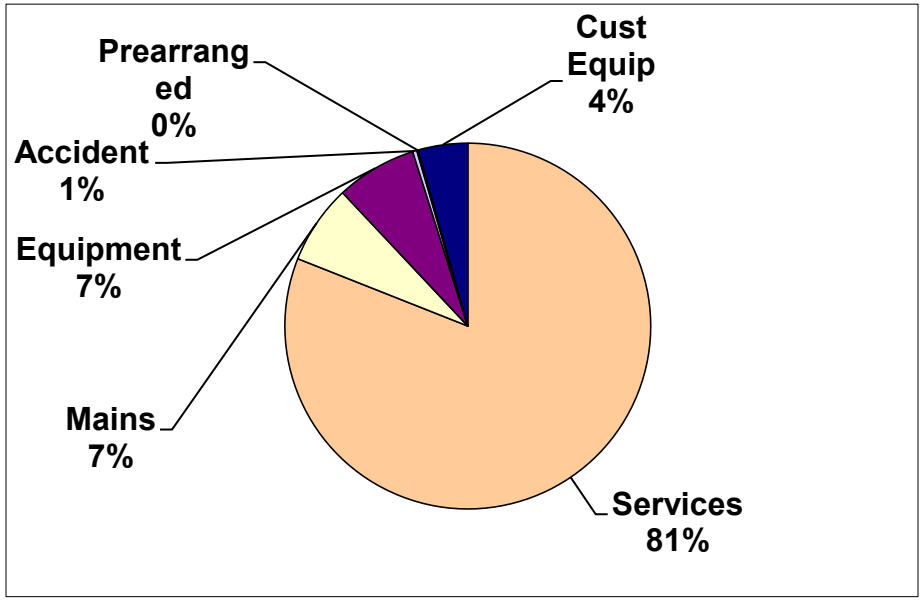
Note: 2011 Values are draft, does not include LIPA outage data from Hurricane Irene

Causes of Distribution Interruptions

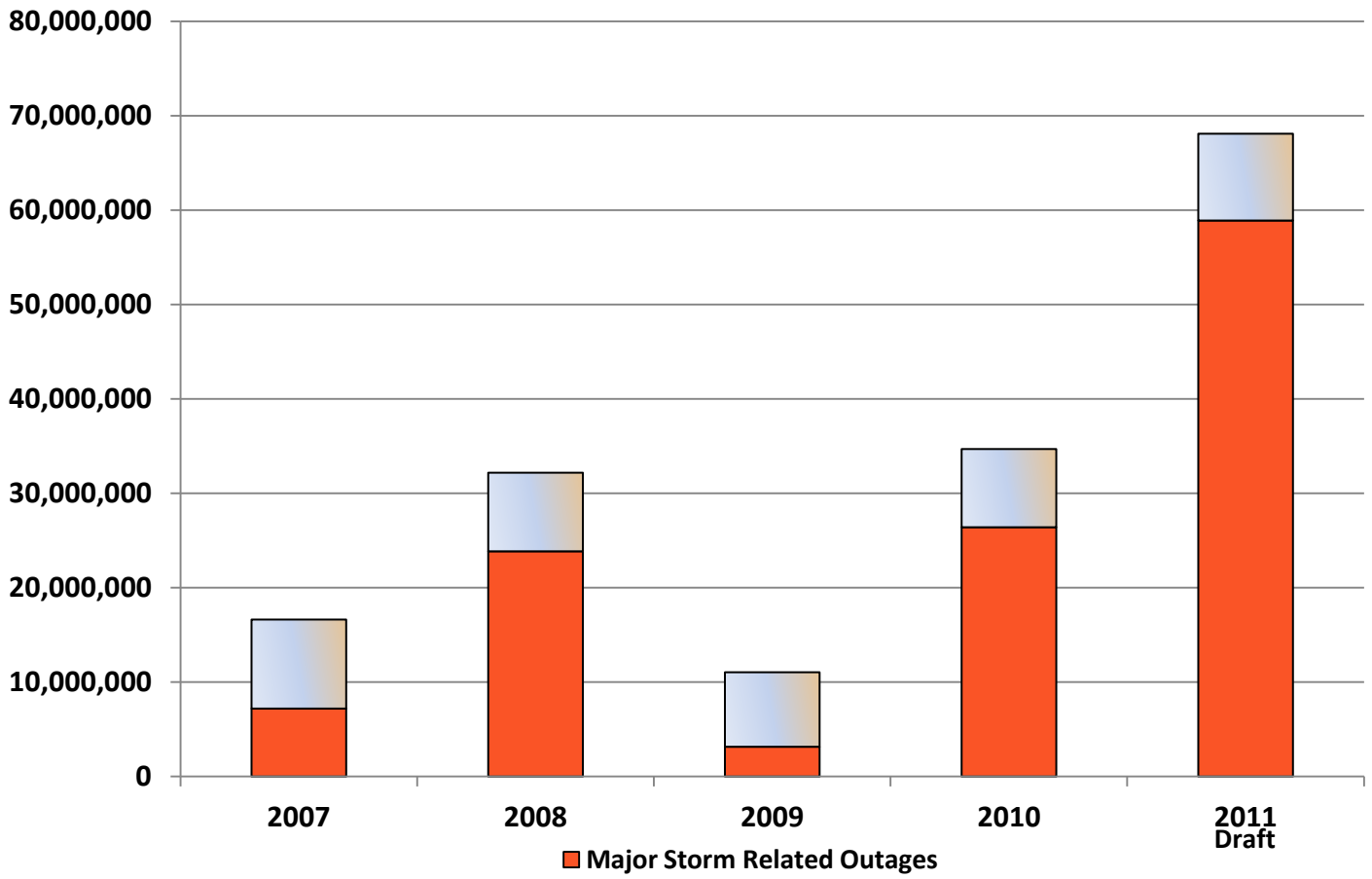
Radial Interruptions



Network Interruptions



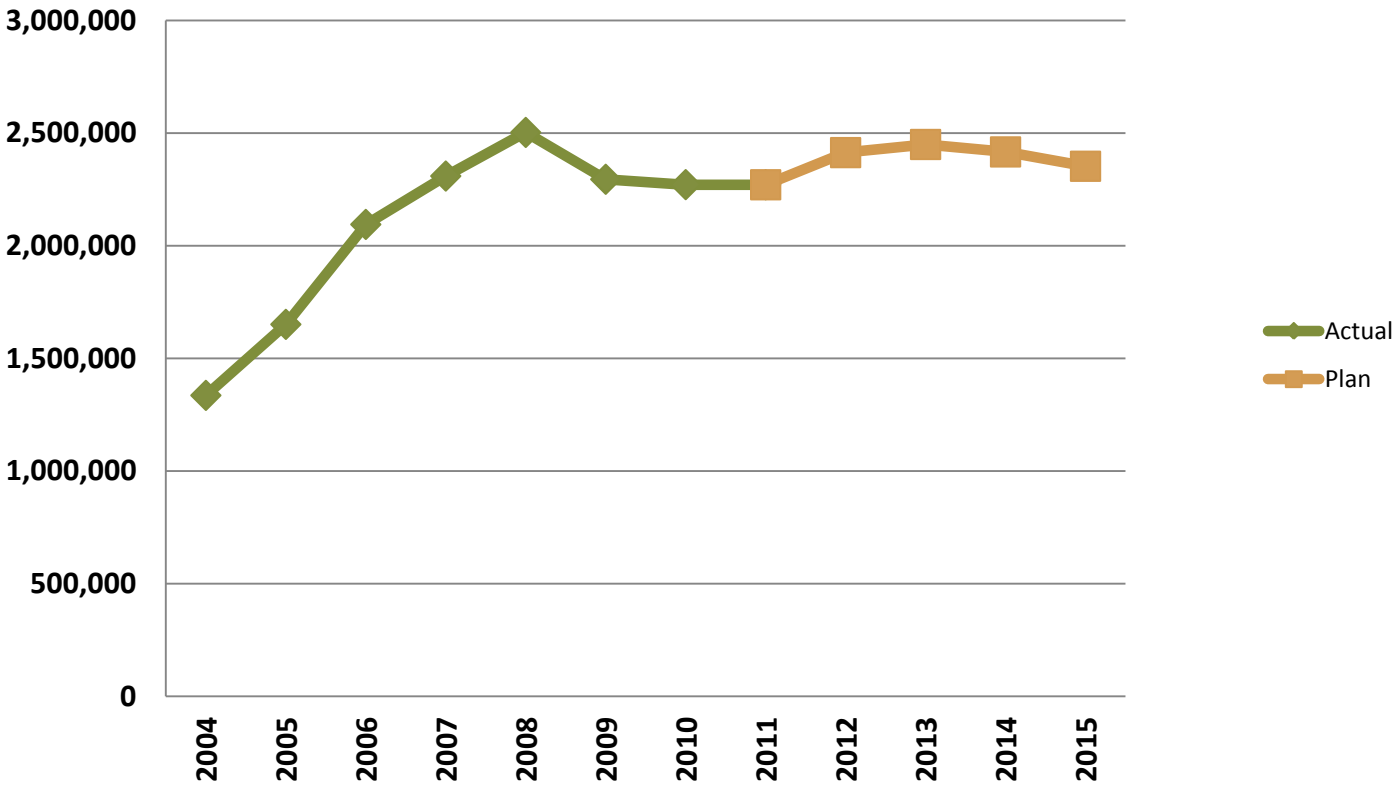
Number of Customer-Hour Interruptions



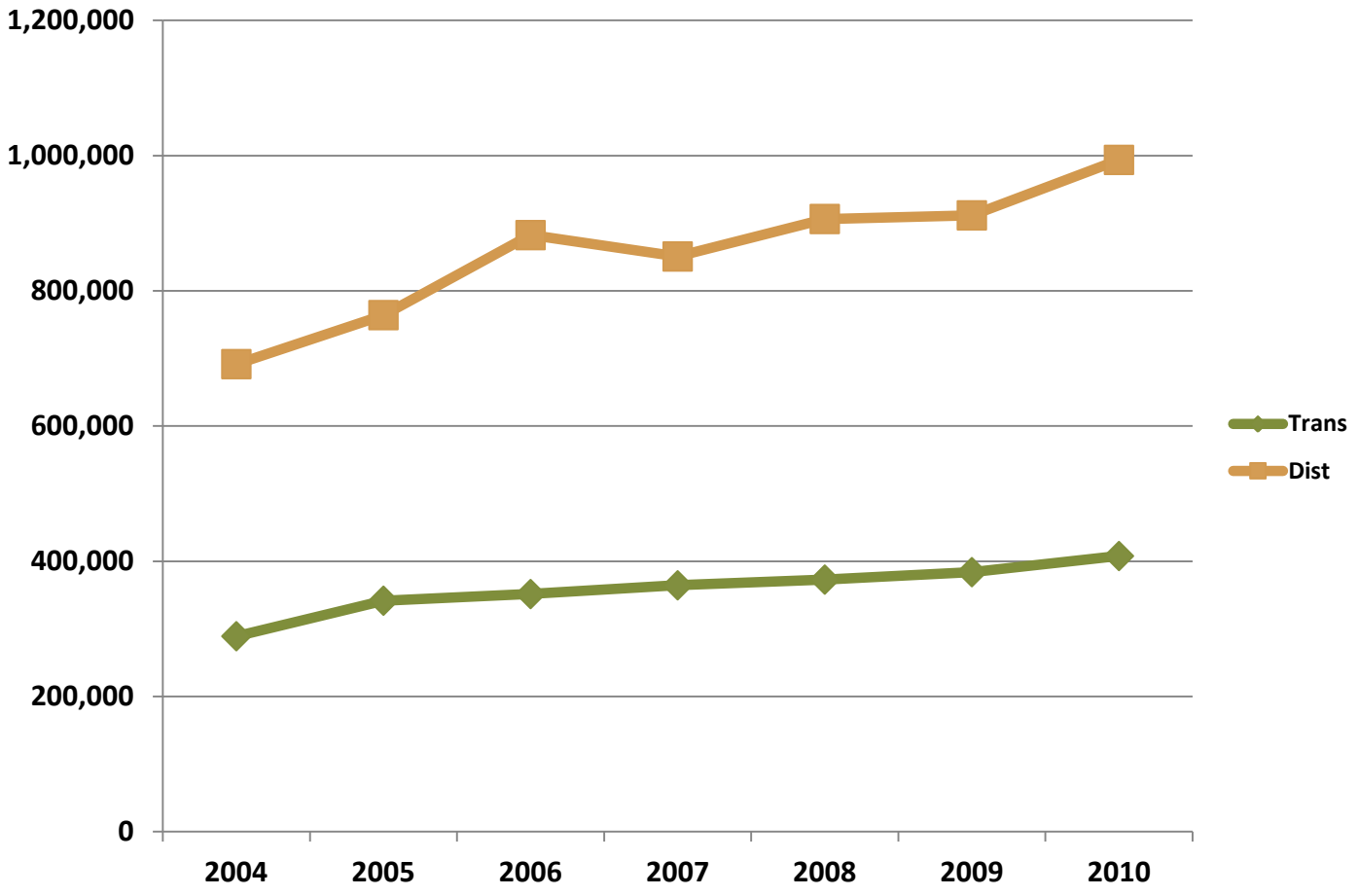
Note: 2011 Values are draft, does not include LIPA outage data from Hurricane Irene

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
  - CO_2 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?