Electricity – Vital to America
Risk Curve with Actual Events

- 2003 Eastern Interconnection Blackout
- 1996 Western – August 10
- 1989 Quebec – Solar Flare
- 2008 South Florida
- 2007 – August 4 Disturbance
- 2007 – August 25 Disturbance

Cumulative Normalized Occurrences/Year

$G_{loss} = 5$ units
$T_{loss} = 4$ circuits

Preliminary Results – NOT FOR CITATION
International regulatory authority for electric reliability in North America

- Develop & enforce reliability standards
- Analyze system outages and near-misses, recommend improved practices
- Assess current and future reliability
- Promote cyber and physical security
NERC Structure and Regional Entities

- Independent board
- FERC oversight and participation
- Members committee
- Regional entities
NERC Programs

- Standards
- Compliance monitoring and enforcement
- Event analysis and investigations
- Training and education
- Reliability assessment and performance metrics
- Critical infrastructure protection
Cybersecurity

- Nine mandatory critical infrastructure protection standards
- Electricity Subsector Coordinating Council (ESCC)
- Electricity Sector-Information Sharing & Analysis Center
  - Bi-directional information sharing and government coordination
  - Security analysis and metrics development
  - Secure communications

- Security alerts:
  - VPN vulnerability
  - Aurora
  - Stuxnet
  - “Night Dragon”
  - Geo-magnetic disturbances
Coordinating with DHS, DOD, DOE
- CyberStorm III, Grid Security Conference
- Industry access to government developed security tools
- Risk management guidelines for the electricity sector
- Scenarios for better design basis and resilience against emerging threats

Current activities
- Geomagnetic Disturbance Task Force
- Cyber Attack Task Force
- Severe Resilience Task Force
- Spare Equipment Task Force
Cybersecurity Legislation

- Congress is looking at several approaches to comprehensive cybersecurity legislation.
- NERC agrees there is a need for comprehensive federal authority to address cybersecurity *emergencies*.
- NERC believes we have the authority we need to address *vulnerabilities*.
- NERC wants to ensure that existing processes for cybersecurity are incorporated in any federal policy contemplated.
- NERC is supportive of any effort to further improve and facilitate information sharing from the federal government to the private sector.
FOCUS: High Likelihood, High Consequence

Emerging Issues Risk Evolution:

- Planning to Accommodate Variable Generation
- Operating Variable Generation
- Environmental Regulation
- Critical Infrastructure Protection
- Model Enhancements
- Increased Gas Generation to Support Variable Generation

6–10 Years
NERC Reliability Assessments

• Peak demand forecasts
• Resource adequacy
• Transmission adequacy
• Key issues and emerging Trends
• Special assessments
  ▪ Variable generation
  ▪ EPA regulations
• The economic recession and demand-side management leads to higher Planning Reserve Margins

• Unprecedented change in the generation fuel mix is projected during the next ten years,
  – Increases in gas-fired, wind, solar, and nuclear generation

• Bulk transmission development begins to take shape

• Cross-industry communication and coordination is key to successful planning and operations
Projected Reserve Margins

Year when Reserve Margin (RM) drops below NERC Reference Margin Level:

\( \frac{\text{Anticipated RM}}{\text{Adjusted Potential RM}} \)
Special Assessments

- EPA Report October 2010
  - Identify potential outcomes of future EPA Regulations
  - Quantify potential impacts to Planning Reserve Margins
  - Examine unit retirements triggered
  - Provide results to NERC’s stakeholders, industry leaders, policymakers, regulators, public
  - Highlights the affected Regions/Subregions
2018 Reserve Margin Levels

Scenario Results

- (APCR) Reserve Margin - Reference Case
- (APCR) Reserve Margin - Moderate Case
- (APCR) Reserve Margin - Strict Case
- NERC Reference Level
Recommendations

• Regulators
  – Consider pace and aggressiveness of regulation timing and impacts to the bulk power system
• Industry
  – Employ tools to mitigate potential issues
• NERC
  – Further assess the implications of regulations as greater certainty emerges around industry obligations, technologies, timelines, and targets
  – LTRA incremental update November 2011