MIDWEST RELIABILITY ORGANIZATION

RELIABILITY OF THE BULK POWER SYSTEM

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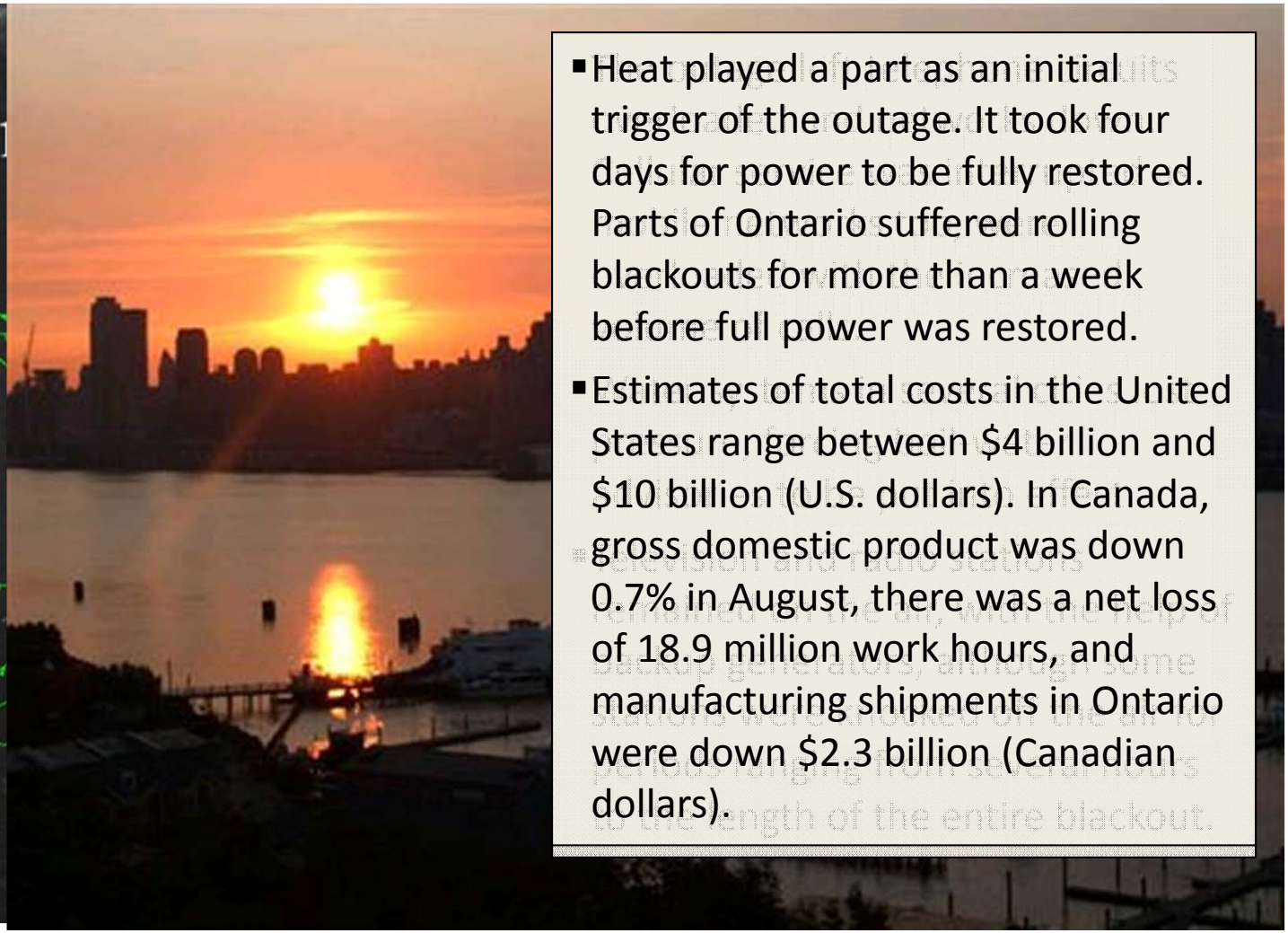
October 26, 2011

Promoting RELIABILITY and Mitigating RISKS to the Bulk Power System

Context
In the Beginning-2003 Blackout



- Heat played a part as an initial trigger of the outage. It took four days for power to be fully restored. Parts of Ontario suffered rolling blackouts for more than a week before full power was restored.
- Estimates of total costs in the United States range between $4 billion and $10 billion (U.S. dollars). In Canada, gross domestic product was down 0.7% in August, there was a net loss of 18.9 million work hours, and manufacturing shipments in Ontario were down $2.3 billion (Canadian dollars).

Context

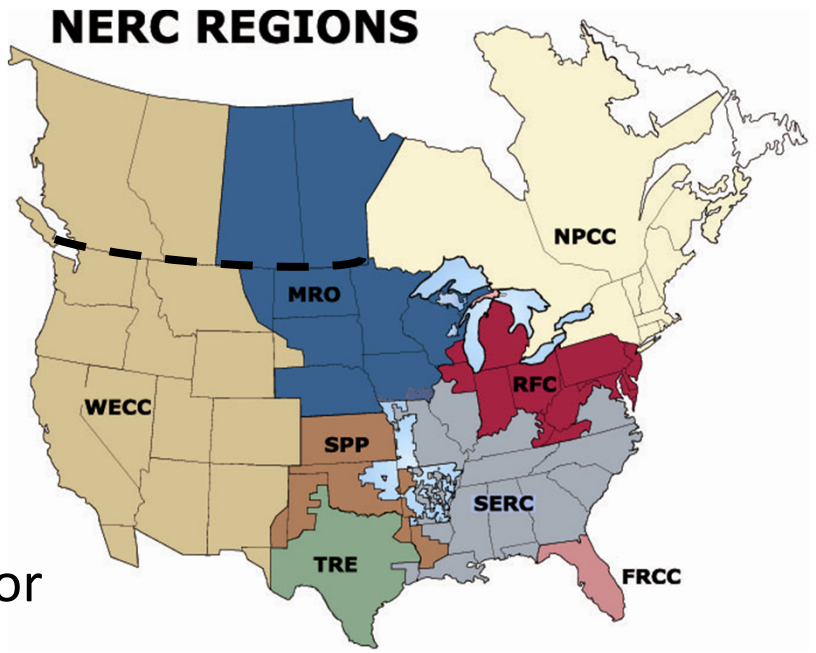
Energy Policy Act of 2005 Responds to 2003 Blackout

- **Created Electric Reliability Organization (ERO) to operate internationally (2005)**
- **North American Electric Reliability Corporation (NERC) designated as the ERO subject to oversight by the Federal Energy Regulatory Commission (FERC) and Canadian and Mexican governmental authorities (2006)**
- **Provides mandatory compliance with reliability standards and failure to comply is subject to fines of up to $1M per day**
- **Midwest Reliability Organization (MRO) is one of six Regional Entities (REs) in the Eastern Interconnection and is one of eight REs that enforce compliance with the mandatory standards on behalf of NERC**

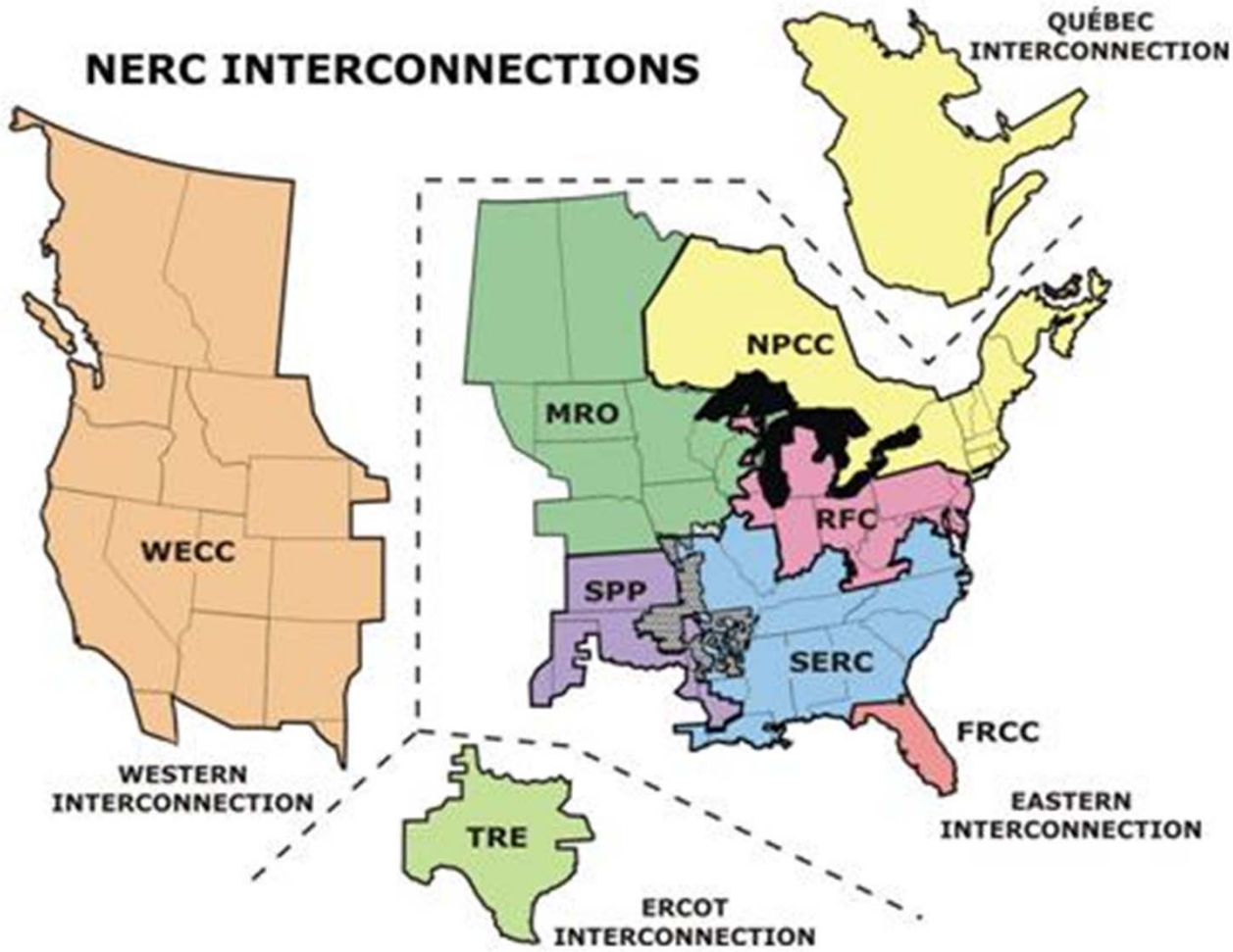
** Section 215 and FERC Orders Numbers 672 and 693 are the foundational reliability legislation and regulation.*

Regional Entities

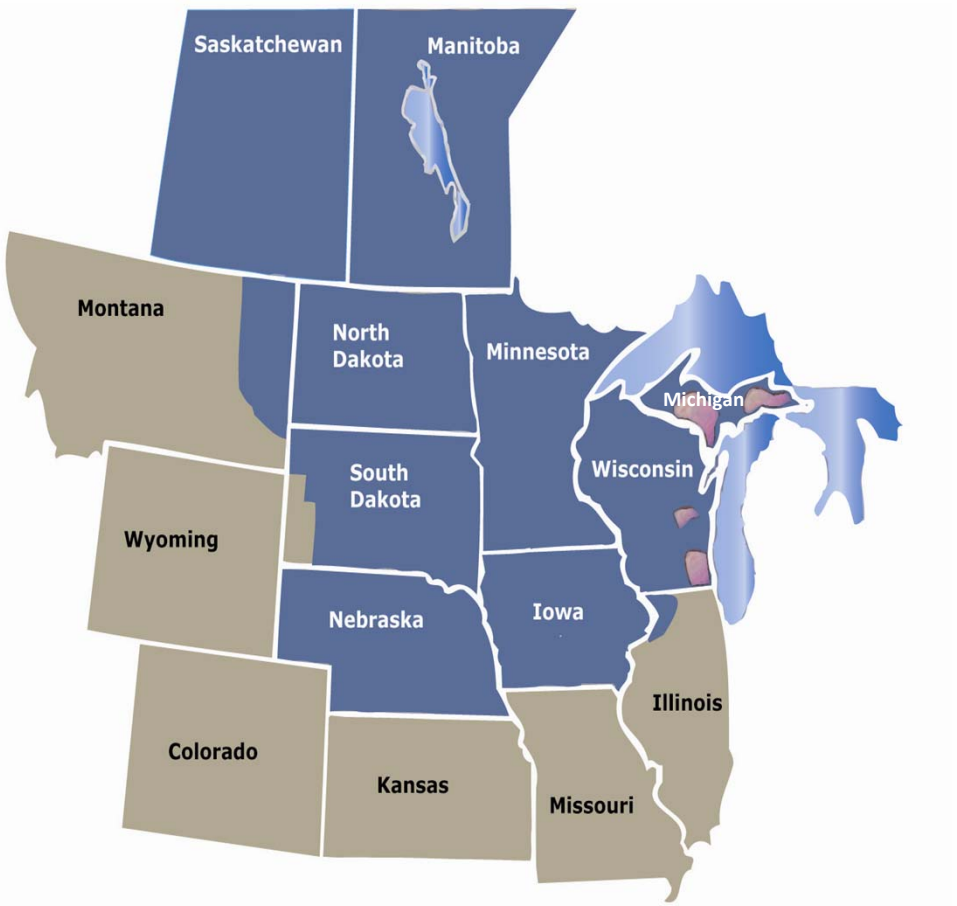
- **In their respective regions, each Regional Entity is responsible for:**
  - Developing and implementing reliability standards;
  - Enforcing compliance with those standards;
  - Providing seasonal and long-term assessments of the bulk power system's ability to meet demand for electricity; and
  - Providing an appeals and dispute resolution process.



NERC Interconnections



About MRO



MRO Region

- 8 States
- 2 Canadian Provinces
- 1M Square Miles
- 140 Registered Entities serving 20M people
- 3 Reliability Coordinators and 6 Planning Authorities
- 450 Registered Functions
- Total net energy to load is 300M MW hours
- Long distances from generation to load creates unique stability and technical issues in the MRO region
- Mix of organized and bi-lateral markets
- Large public power – many shared facilities
- History of cooperation on reliability matters

About MRO
Governance Matters: Role Clarity, By Design

- **Delegated authority means MRO "steps in the shoes" of government**
  - MRO carries a "public trust" obligation in its work
  - MRO has zero affiliations with Registered Entities or registered functions
- **MRO has a balanced industry sector stakeholder board**
  - Advantages: technical insights from industry very valuable and improves quality
  - Disadvantages: overcoming and perception of potential conflicts necessitates extra vigilance to assure there are no conflicts or discriminatory determinations
- **Industry Sectors**
  - Canadian Utility
  - Cooperative
  - Federal Power Marketing Agency
  - Generator and/or Power Marketer
  - Investor Owned Utility
  - Large End Use
  - Municipal Utility
  - Small End-Use
  - Transmission System Operator

About MRO
Unique Aspects of the Region

- **Region dates to 1940's (regional planning and economic reserve sharing)**
- **Many shared and jointly owned facilities have resulted in joint registrations**
  - MRO takes a strict "line of sight" approach to registration; must be precise as to who does what (2003 Blackout Report); emphasizes an accurate "inventory" of bulk electric system facilities
- **Large element of public power in the Region**
- **Canada is an important trading partner to the Region**
- **Many registered entities in MRO also in other Regions due to physical /geographic locations of assets**

Electric Reliability Standards

- **Applies to "Bulk Power System"**
  - "Facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof)"
  - Bulk Power System (BPS) "does not include facilities in the local distribution of electric energy"
- **Governs "Registered Entities" are those owners and operators of the bulk power system and include**
  - ✓ IOUs
  - ✓ Cooperatives
  - ✓ Municipals
  - ✓ Government Entities
  - ✓ RTOs
  - ✓ ISOs
  - ✓ Transmission Owners
  - ✓ Generation and Other facilities owners
- **Other arrangements with Canadian and Mexican governments**

Mandatory Standards
Registration Criteria

- **Registered Entities are subject to mandatory reliability standards if they meet a "bright line" criteria, which includes:**
  - Load-serving entity peak load is > 25 MW and is directly connected to the bulk power (>100 kV) system, or;
  - Load-serving entity is designated as the responsible entity for facilities that are part of a required under frequency load shedding (UFLS) program designed, installed, and operated for the protection of the bulk power system
  - Distribution provider system serving >25 MW of peak load that is directly connected to the bulk power system.
  - Distribution provider is the responsible entity that owns, controls, or operates facilities that are part of any of the following protection systems or programs designed, installed, and operated for the protection of the bulk power system:
    - ✓ **a required UFLS program, special protection system, transmission protection system**
  - Individual generating unit > 20 MVA (gross nameplate rating) and is directly connected to the bulk power system

Mandatory Standards
Scope

- **NERC Reliability Standards cover a wide variety of topics [1]**
  - Response and demand balancing
  - Communications
  - Critical infrastructure protection
  - Emergency preparedness and operations
  - Facilities design, connections and maintenance
  - Interchange scheduling and coordination
  - Interconnection reliability, operations and coordination
  - Modeling data and analysis
  - Nuclear
  - Personnel performance, training and qualifications
  - Protection and control
  - Transmission operators
  - Transmission planning
  - Voltage and reactors

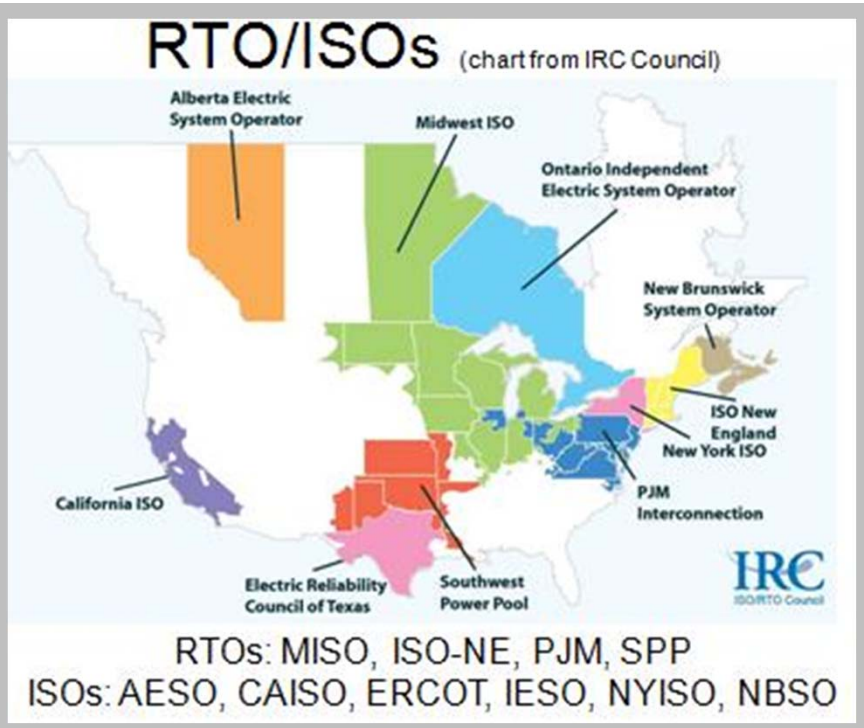
[1] http://www.nerc.com/page.php?cid=2/20

Key Challenges

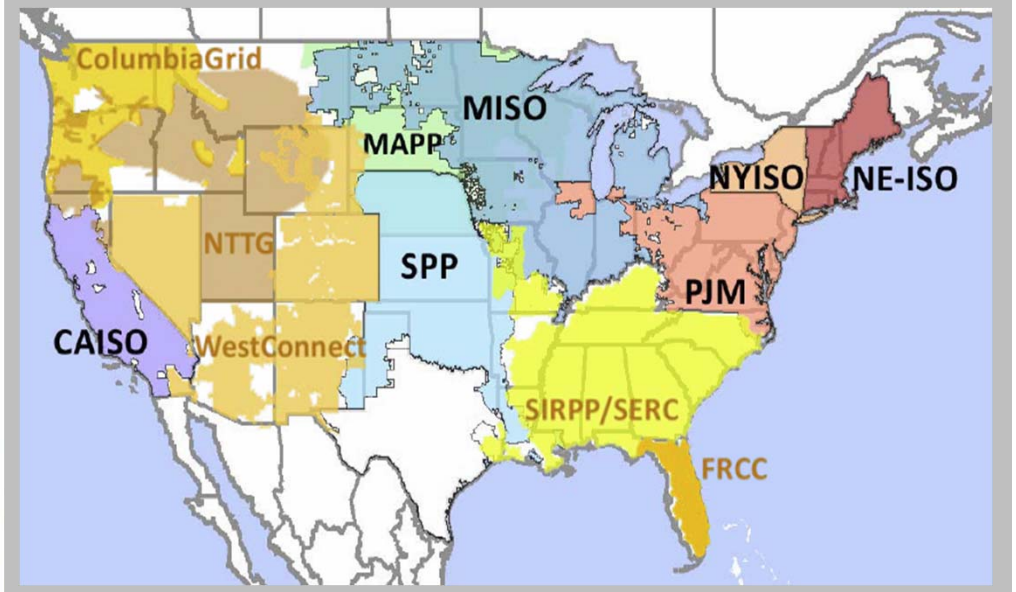
- **Informal arrangements no longer practical**
  - Formal and written agreements
    - ✓ Relationships among utilities
    - ✓ Relationships between utilities and large customers
- **"Line of sight" for all facilities and systems that impact the bulk electric system**
  - Owner
  - Maintainer
  - Operator
- **Managing complex risk across a "network"**
  - Networked system results in many interdependencies
    - ✓ Load shedding
    - ✓ Generators and other facilities tied to the bulk electric system

Key Challenges

- **The "wake of re-regulation" resulted in fragmented, swiss-cheese markets (bilateral, Midwest ISO, SPP RTO, MAPP)**
  - Alignment/Changes in Reliability Coordinators and Planning Authorities geography (ex. Midwest ISO, SPP RTO, MAPP)
  - Understanding and managing seams is vital; who does what for whom - registration



Transmission Planning Map



Future Outlook

- **FERC Order 1000**
  - Designed to support efficient and cost-effective transmission planning and fair allocation of new transmission facility costs to provide increased access to low cost electricity.
- **MRO's initiatives**
  - Simplifying and lowering the cost of compliance with standards
    - ✓ "Streamline" and reduce "adminstrivia fire drills" to maintain focus on essential purpose: Reliability
  - Provide more certainty, sooner on expectations
    - ✓ Leveraging industry experts to develop guidance, best practices, and framework to improve reliability and address risks

Questions

- **For more information:**
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  - External Affairs and Communications: (651) 855-1721, Miggie Cramblit