Reliability and Resiliency of the Power Grid

NSTC Subcommittee on Disaster Reduction
Washington, DC

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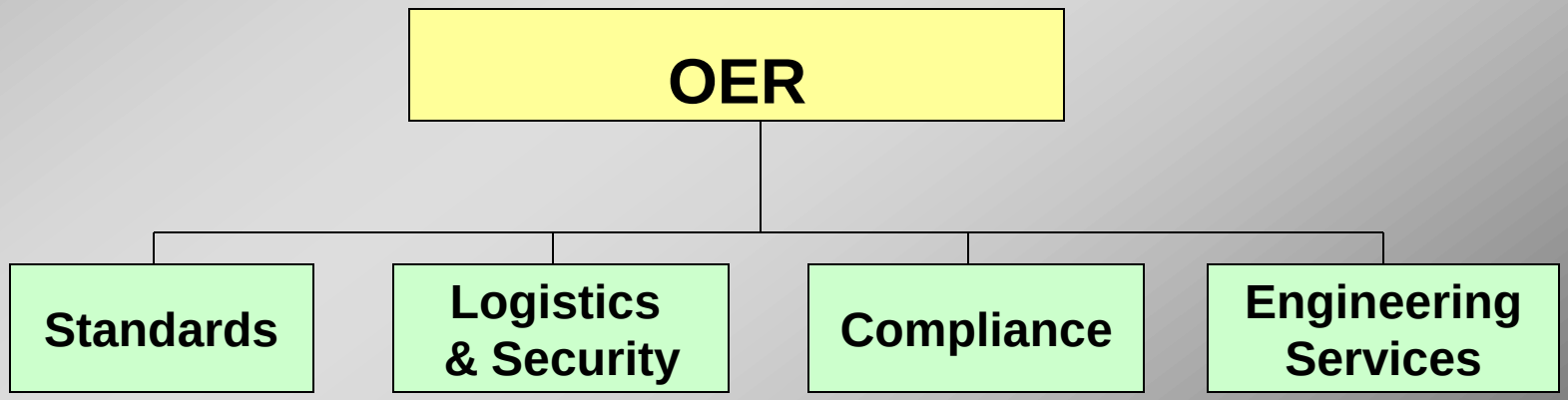
- Largest blackout in North American History strikes the United States and Canada
- 50,000,000 people interrupted
- Cost is estimated at $4-10 billion
- Congress passes, and the President signs, legislation that gives new, but indirect, authority to FERC (more later)
- Mandatory and enforceable reliability & security standards

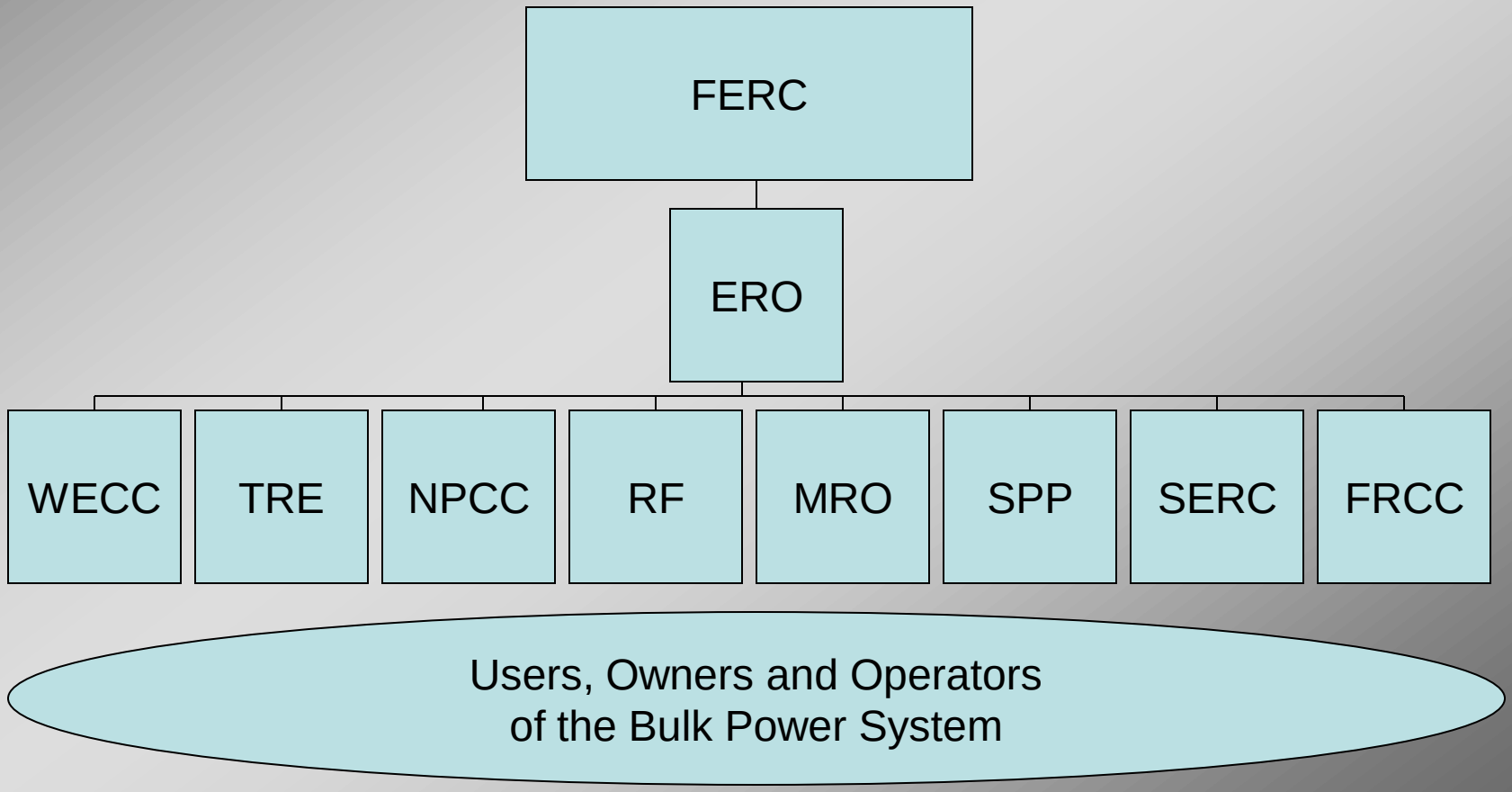
Office of Electric Reliability

High Level Org Chart

- Office is divided according to function
- Experienced engineers – technical and industry knowledge
- Initiates research when necessary

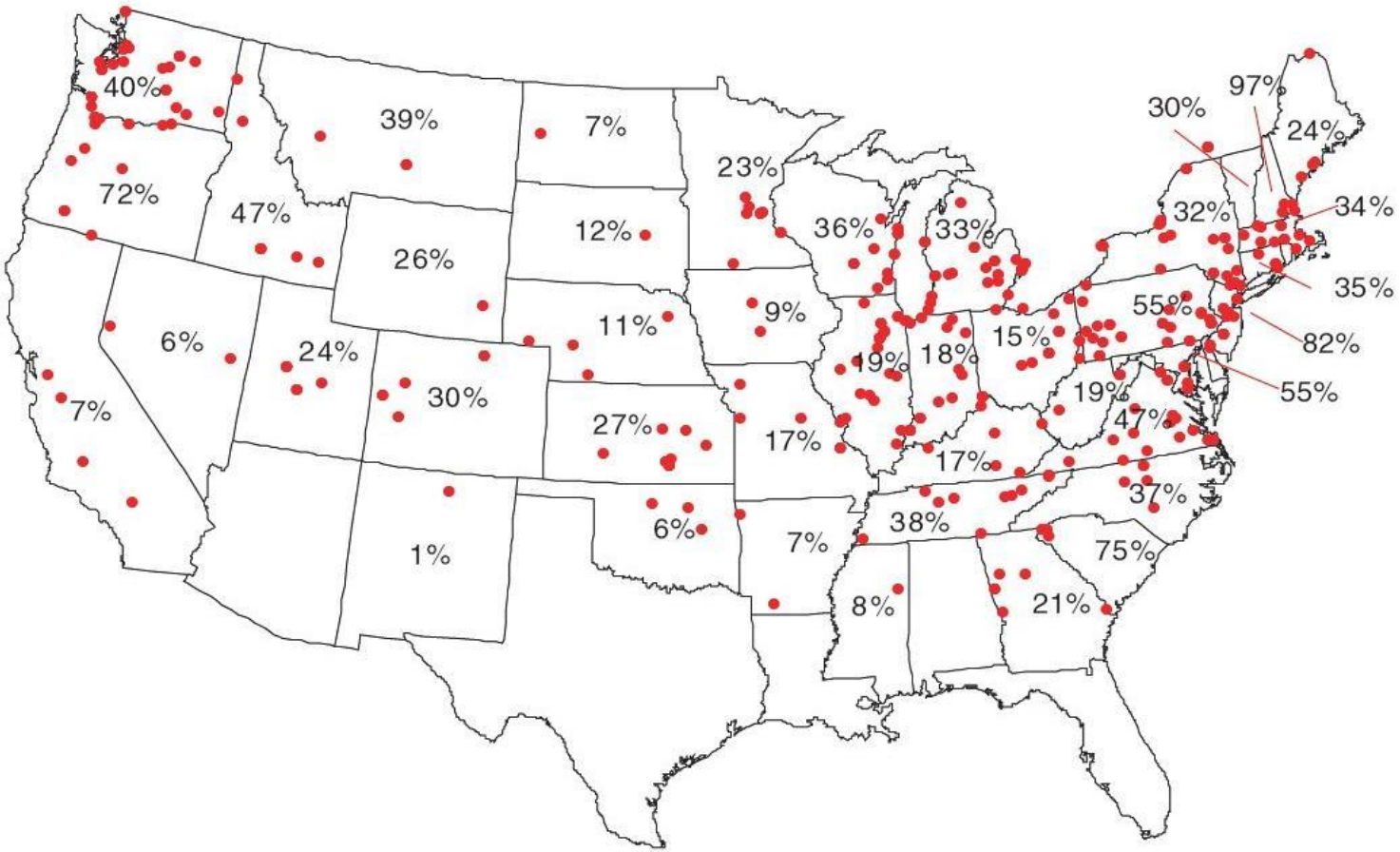


FERC's Reliability Authority



Findings of the FERC/DOE/DHS Joint EMP Study

- Study is a 3-agency initiative
- Conducted through Oak Ridge National Laboratory with Metatech as the primary subcontractor
- The study evaluated both SMD and manmade EMP
- Solar storm activity of varying intensity occurs frequently
  - 1-in100 year event last occurred in 1921
  - Its effects today may be far amplified
  - Unmitigated effects would be world-wide but in the US
    - 130,000,000 may be without power
    - Cost would range between 1 to 2 trillion dollars
    - Recovery would take years



A map showing the at-risk EHV transformer capacity (estimated at ~365 large transformers) by state for a 4800 nT/min geomagnetic field disturbance at 50° geomagnetic latitude. Regions with high percentages of at-risk capacity could experience long-duration outages that could extend multiple years. SOURCE: J. Kappenman, Metatech Corp., "The Future: Solutions or Vulnerabilities?," presentation to the space weather workshop, May 23, 2008.

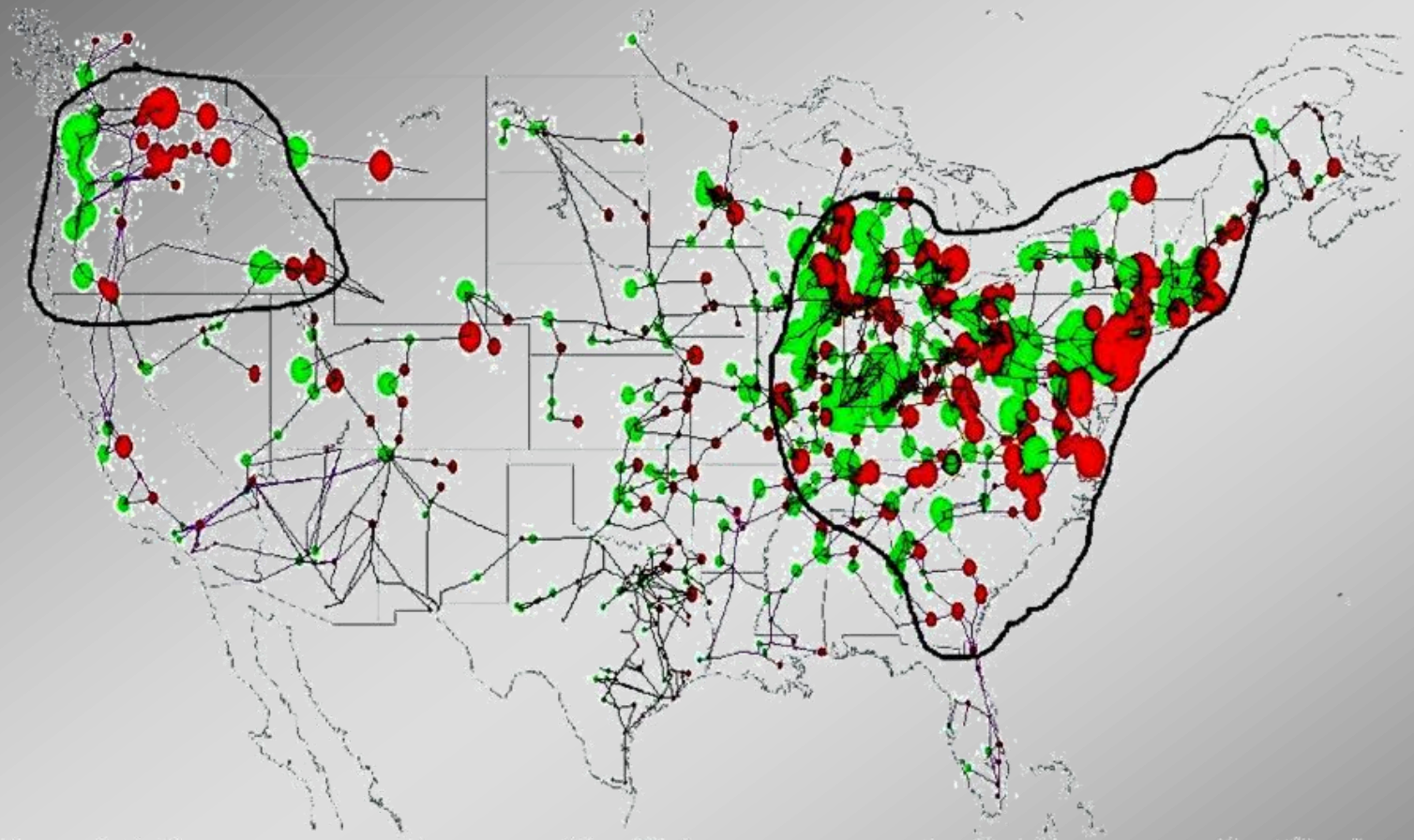


Figure 4-1. Severe geomagnetic storm with a 50 degree geomagnetic disturbance scenario. The above regions outlined are susceptible to system collapse due to the effects of the GIC disturbance.

Cyber Security of BPS

- Critical Infrastructure Protection (CIP) reliability standards CIP-002 thru CIP-009
- First approved by FERC Jan. 2008
- Required many improvements such as:
  - Critical asset identification
  - Exceptions to compliance must be approved
  - Defense in depth
  - Revocation of access authorization
- Most improvements yet to be implemented

Cyber Security of BPS

- CIP topics include:
  - What to protect
  - Management involvement
  - Security of sensitive information
  - Security training and personnel risks
  - Physical security of cyber assets
  - Change and access controls
  - Electronic security perimeters
  - Incident response and recovery plans

Impacts of Geomagnetic Disturbances on the Grid

Questions?