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Today’s Agenda

I. What is resilience?

II. Threats

III. Roles
   i. Federal
   ii. State
   iii. Information Protection, Information Management
   iv. Cyber Security

IV. What you can do
Infrastructure Protection is a risk management problem

- Enterprise risk management applies to any decision-making being made under conditions of uncertainty.
  - Financial risk
  - Regulatory risk
- Critical Infrastructure protection risks:
  - An interruption to service, no matter what the origin, interrupts service.
  - An “all hazards” approach to preparedness helps deal with interruptions no matter the origin?
Risk management means considering a continuum:

Vulnerability: how prepared are we?
Threat: what could exploit the vulnerability?
Likelihood: how often does the event occur?
Consequence: how bad would it be?
Reliability vs. Resilience

We know how to plan for Utility System Reliability:

Minimizing:
- Frequency of Outage
- Duration of Outage
- Scale of Outage

Critical Infrastructure Protection now also needs to include a focus on Resilience:

- Flexibility (before)
- Robustness (before & during)
- Resourcefulness (during)
- Rapid recovery (after)
- Adaptability (after)

The metrics for reliability may leave important resilience investments off the table.

To approve and motivate resilience, it must be defined and be measurable for policy-makers.
Weather

REUTERS, Fort Calhoun flooded in Eastern Nebraska, June 2011.
Ask: what vulnerability? Threat / likelihood? consequence?
NARUC, 9/11/2012
Recent Weather Events

- 2007 Hurricane Katrina
- 2008 – 2009 Wildfires
- Summer 2011 Joplin MO tornado
- June 2012 North American Derecho
- Fall 2012 Superstorm Sandy
- Summer 2013 tornadoes
Non-Weather Events

- Earthquake
- Volcano
- Tsunami
- Geomagnetic Disturbance (GMD)
Human Impact

- Accidents/Negligence
- Workforce
  - Pandemic
  - Disruption to labor supply or key talent
Human - Intentional

- Physical Attacks
  - Low tech. to high tech.
  - Coordinated or wide-area attacks
    - e.g. EMP
- Cyber Security
Smarter Infrastructure is intended to improve reliability

- If you can see what you’re doing, you can respond quicker and better
- System visualization addresses some vulnerabilities...
- ... but intelligent infrastructure introduces new vulnerabilities which need to be managed if we want to be, on balance, more secure.
Smart Grid Security: Three Flavors

Conventional IT Systems + Control Systems + Electrical Infrastructure = “Smart Grid”
Why Cyber? (cont’d.)

- Ubiquity of networks and dependency on them - networks are cheaper, faster, more effective
- Ease of launching a sophisticated attack
- New activity by nation-states and advanced persistent threat
- Tools are freely available on the Internet (e.g. GLEG Agora SCADA+)
- Interdependencies between sectors
Interdependencies

• A pretty bad hypothetical scenario...
Roles (and where you fit in!)
Build Resilience
Companies and vendors

- Cyber-secure operations is the domain of companies.
- Law enforcement and National Security aren’t their – or our – jobs (generally)
- This is going to require new kinds of partnerships.
Agency most directly concerned with direct threats to the nation’s energy infrastructure, vulnerability assessments and responding to those threats

Key Offices for Energy Security:

- **FEMA** Provides emergency support and coordination to local responders and citizens with a focus on essential human needs.
- **Division of Information Analysis and Infrastructure Protection**
  - Determines security needs and priorities
  - Supports state capacity building through training just like this
  - Targets: vulnerabilities with catastrophic potential, e.g. nuclear power plants, chemical facilities, pipelines and ports
- **DHS Office for State and Local Coordination**
  - Provides primary contact for training, equipment, planning and other critical response needs
  - Coordinates communication systems from federal to state and local government
  - Distributes research, technical support, warnings and other information
Other Roles

• Law enforcement does law enforcement
• Intelligence community generates threat info
• DOE – works to address strategic energy security issues through its efforts on electricity transmission, fuel diversity, energy supplies, research and development and other similar issues
• TSA – lead federal agency for security of transportation, including pipelines
• Dept. of Commerce Office of Pipeline Safety – regulates safety-related issues in pipelines
• FERC – examines economic issues affecting security costs for utilities under its jurisdiction
• Non Feds: NERC, RTOs, Control Area Operators, Utilities
State Roles

Governor’s Office conducts overall emergency planning

Emergency Management Agency provides primary emergency response

Homeland Security, State Military or State Police prevents criminal and terrorist-caused disasters

State Energy Office assures supplies of petroleum, heating oil, propane

Other State Agencies Departments of health, environment, social or human services department, transportation departments

At the local level Counties and Municipal Organizations
Roles of Legislatures

- Establish Agency Regulatory Oversight:
  - Reliability
  - Planning
  - Resource Diversity
- Manage information and authorize information protection
- Set liability
- Set rules for emergency situations
  - Pricing, quarantine, evacuation, coordination
- What else?
Information protection/Information Management

- Connecting information with those who need it breeds success;
- Connecting information with those who want it for the wrong reasons is a recipe for disaster.
  - What goes in the public record?
  - What legal protections exist?
  - What capacity exists to protect it from illegal or extra-legal exploitation?
Ask questions... CAREFULLY

1. “We can’t protect it so don’t share it.”
2. “We can’t protect it onsite but can see it at your site”
3. “We can protect it in a special case”
4. “We can protect it within a standard case with a secure hearing”
5. “We can protect it as a matter of course”

• Some of these approaches require people with specialized skills, clearances, or professional relationships
What You Can Do
State Actions

- Seek Information and Education
- Review Utility Commission Enabling Statutes
- Recognize Importance of and Encourage Energy Efficiency and Demand Response Programs
- Review Utility Oversight Laws for Security Implications
- Review Statutes Governing Energy Office and Duties
State Actions

- Review Statutes Influencing Energy System Diversity and Redundancy
- Review Statutes Governing Freedom of Information Laws
- Reassess Laws and Procedures Governing Open Meetings
- Evaluate State Liability Statutes
- Ensure that Industry and/or State Agencies Have Conducted Appropriate Vulnerability Studies
State Actions

- Update Statutes Governing Emergency Response for Coordination, Delegation, Flexibility and Communication
- Examine Possible Unfair Pricing Legislation in Emergencies
- Cyber Security
Questions?

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Available Resources

- Standards and Guidelines:
  - Bulk Power System: NERC CIP Standards
  - Smart Grid: NIST Interagency Report 7628 (NISTIR 7628) [http://csrc.nist.gov/publications/PubsNISTIRs.html](http://csrc.nist.gov/publications/PubsNISTIRs.html)

- NARUC has developed:
  - NARUC Critical Infrastructure Committee [http://www.naruc.org/committees.cfm?c=46](http://www.naruc.org/committees.cfm?c=46)
  - Monthly Cybersecurity Threat Briefings

- National Electric Sector Cyber Security Organization (NESCO): EnergySec formed the NESCO organization as a Public-private partnership including Utilities, federal agencies, regulators, researches, and academics

- National Electric Sector Cyber Security Organization Resource (NESCOR): EPRI was selected to serve as a research and analysis resource to the NESCO program and develop mitigation strategies, best practices and metrics

Available Resources (cont’d.)

- NASEO Smart Grid Report
- NARUC Primer
Available Resources (cont’d.)

Available Resources (cont’d.)


Thank you!

Questions?

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U. S. Department of Homeland Security Office of Infrastructure Protection
Storm Recovery—Building Stronger, Smarter Electrical Grids

CSG Policy Webinar Series
June 12, 2013
NEMA Leads in Standards Development

- **400-plus member companies**
  - 54 Industry Segments
  - Support over 1 million U.S. jobs
  - Operate more than 7,300 facilities
  - Products in the NEMA Scope
    - $100 billion U.S. domestic revenue
    - $30 billion exports

- **Promotes development and maintenance of product standards—domestic, regional, international**
  - NEMA publishes over 500 standards including the following
    - 236 NEMA Standards Publications
    - 46 ANSI/NEMA Standards
    - 266 American National Standards
  - 81 CANENA Harmonized Product Safety Standards, 6 of which are IEC based
    - Supported by 24 NEMA Product Sections
    - 44 active work programs, 21 are IEC based
  - 56 IEC and 6 ISO Technical Advisory Groups (TAGs)
  - 5 international Secretariats

- **300+ NEMA representatives on committees of other organizations**
Electrical Perspectives on Storm Recovery

Objectives

- Save Lives
- Protect Property
- Mitigate Impacts From Future Outages
  - Reliability
  - Resilience
  - Recovery

Technologies

- Smart Grid Solutions
- Microgrids, Energy Storage, Distr. Generation
- Backup Power
- Wiring, Cabling and Components
- Replacing and Relocating Electrical Equipment
- Disaster Recovery Planning
Google Crisis Map: Long Island, NY
Smart Grid Solutions

- **Key Components**
  - Smart Meters
  - Sensors
  - Distribution Automation
  - Global Information Systems
  - Outage Management Systems
  - Cybersecurity

- **Benefits**
  - Fault identification
  - Automated re-routing of electric power around damaged areas
  - Verification of power restoration
  - Volt/Var control
  - Multi-path communications
Microgrids, Storage & Distributed Generation

- **Components**
  - Generation Source
  - Distribution System
  - Monitoring & Control
  - Grid Sensing
  - Islanding Capability

- **Benefits**
  - Extreme Reliability
  - Fukushima vs. NYC
    - Hundreds evacuated from Bellevue and NYU hospital during Sandy
    - Zero evacuations from Tohoku Fukushi University following Fukushima earthquake and tsunami

*Photo: UC-San Diego Microgrid Project  www.ucsd.edu*
Backup Power Generation

- **Components**
  - Generation Source
  - Fuel Source
  - LOCATION
  - MAINTENANCE & TESTING

- **Benefits**
  - Readily available on the commercial market
  - Variable sizes for every load requirement and budget
  - Allows local load shaping (demand response)

Diagram: How it Works
www.amazon.com
Wiring, Cabling & Components

- **Components**
  - High-voltage underground transmission
  - Medium-voltage distribution
  - Cable-in-conduit
  - Self-healing 600V Underground Distribution (UD) Cables
  - Arc- and Ground-Fault Circuit Interrupters (AFCI/GFCI)

- **Benefits**
  - Resiliency
  - Submersible Technologies

*Photo: Superconducting Transmission Cable  www.greenresearch.com*
Replacing and Relocating Equipment

❖ Components
  ▪ Risk Assessment
  ▪ Storm Threat
  ▪ Criticality of the device
  ▪ Site Accessibility
  ▪ Environmental Assessment
  ▪ Facility Hardening

❖ Benefits
  ▪ Increased Resilience
  ▪ Increased Reliability
  ▪ Faster Recovery

Photo: South Street Seaport Museum
www.nycreconnects.com
Disaster Recovery Planning

❖ Components
  ▪ Assessment
  ▪ Planning
  ▪ Implementation
  ▪ Information Resources
    • Sources During the Storm
    • Responders/Collaborators

❖ Benefits
  ▪ Protect lives
  ▪ Save property
  ▪ Faster Recovery

Diagram: DR Mind Map
www.workingworld.ca
What can states do?

- Start dialog with utility commissions and other utility stakeholders to develop a state-wide implementation plan for smart grid
- Ensure your state has an updated disaster recovery plan
- Evaluate statutes and regulatory policies that might be prohibitive to microgrids
- Adopt and enforce the most current building codes to promote safety and protect property
References

- National Electrical Manufacturers Association (NEMA)
  - www.nema.org/smartgrid
  - Electrical Standards Product Guide (ESPG)
    - http://www.nema.org/Communications/Pages/ESPG.aspx
    - Wire & Cable standards
  - Evaluating Water-Damaged Electrical Equipment

- National Institute of Standards and Technology (NIST)
  - www.nist.gov/smartgrid
  - NISTIR 1108R2 - Framework & Roadmap for Smart Grid
  - NISIR 7628 - Cybersecurity

- National Fire Protection Association (NFPA)
  - www.nfpa.org
  - NFPA 70 - National Electrical Code

- US Dept. of Energy
  - Office of Electricity (OE)
  - PNNL Report 13277

- Underwriters Laboratories
  - UL Standard 2200

- North American Electric Reliability Corporation (NERC)
  - Critical Infrastructure Protection Standards (NERC-CIP)

- Smart Grid Interoperability Panel
  - www.sgip.org
Questions and Discussion

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“Governors in the Northeast have access to more than $50 billion in reconstruction funds recently allocated by Congress. They can use it to put in ‘traditional’ gear and thereby return their regions to where they were in 1975. Or they can use that same money to put in "smart" gear and leapfrog their regions into this century. May I suggest that you download the NEMA paper and forward it to your state lawmakers?”

-- Jesse Berst, SmartGridNews.com, February 27, 2013
STORM RECOVERY—BUILDING STRONGER, SMARTER ELECTRICAL GRIDS

WEDNESDAY, JUNE 12 | 2 p.m. EDT

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