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BPS Reliability

Global Energy Management Institute

Bauer, College of Business, University of Houston

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DISPUTES & INVESTIGATIONS • ECONOMICS • FINANCIAL ADVISORY • MANAGEMENT CONSULTING

Critical Infrastructure Scene Setter

1. Bulk Power System's Reliability Challenges
2. Critical Infrastructure - Physical Security Threat
3. Critical Infrastructure - Cybersecurity Threat
4. BPS' CIP Compliance Challenges
5. Recommendations to consider
6. Questions to consider

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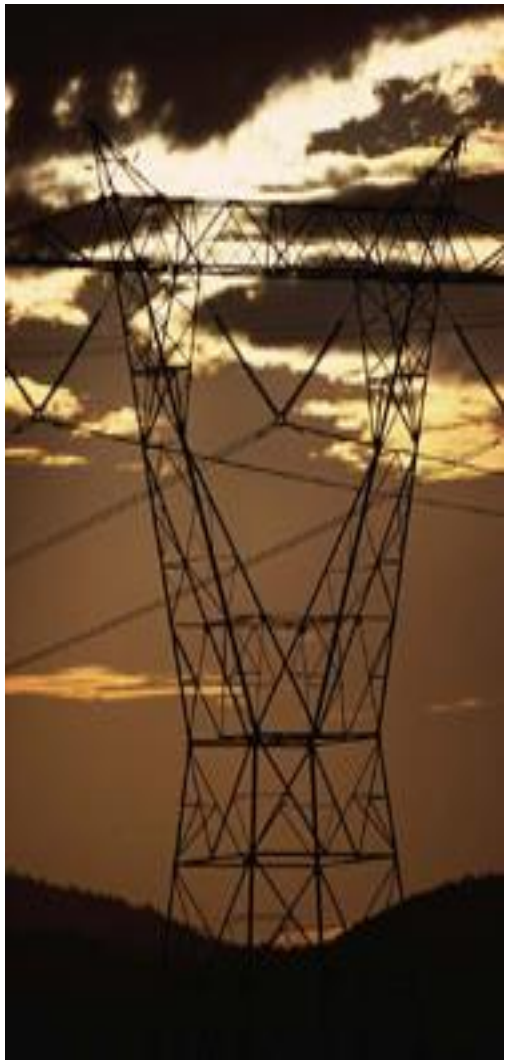
Bulk Power System's Reliability Challenges

- Threats and Vulnerabilities – Cyber and Physical
- FERC and NERC Standards
- Workforce CIP (Supply and Demand)
- Changing Resource Mix
- Mother Nature
- Political, press and public pressures
- Aging infrastructure
- Legislation – (Environmental)
- Executive Orders, and PPD-21



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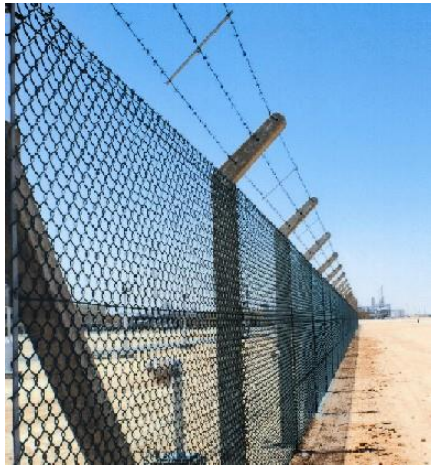
Critical Infrastructure - Physical Security Threat

- PG&E's Metcalf Substation (Sabotage)
- Arkansas – Lone Wolf… (Sabotage)
- Recent Substation Intrusion
- Explosive Devices (Terrorism)
  - Boston Marathon – soft targets
  - Maritime or Land - USS Cole
- Combined Physical and Cyber Attack (Terrorism)
  - GridEx Series



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Critical Infrastructure - Cyber Security Threat

- Aurora
- Stuxnet Discovery – Iran Centrifuges (6/25/2010)
- DuQu, Wiper, Flame, Gauss, Mahdi – Cyber Espionage, Cyber Effects (9/1/2011- 7/1/2012)
- Shamoon - Saudi Aramco and RasGas (August 2012)
- U.S. Financial Institutions – Chase, BOA, NYSE, Wells Fargo, U.S. Bancorp, PNC (DDOS Attacks, September 2012)
- Mandiant APT1 Report (February 2013)
- Cylance Report – "Operation Cleaver" (2014)
- Control Systems; SCADA – Biggest Concern…

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Bulk Power System's CIP Compliance Challenges

- NERC and FERC Standards (rate of change, the amount, the variety, the overlap…)
- Clarity of NERC Standards (CIP v5 example)
- Compliance Risk is great - $1M/event/day
- Reducing NERC Standards compliance risk
- Aggressive NERC Standards implementation timelines (2015 and 2016)

Bulk Power System's CIP Compliance Challenges (continued)

- Minimizing NERC Standards compliance risk
- Addressing concurrently CIP v5 and CIP-014 NERC Standards with aggressive and concurrent implementation timelines (2015 and 2016)
- Integration of Cyber and Physical Security Compliance needed
- Hardening of Critical Facilities
- Addressing political, media, and public pressures

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Recommendations to Consider

- Get out ahead of regulation
- Establish Compliance Programs – CIP (Cyber and Physical)
- Pirate Lessons Learned from other sectors – Regulation, Security
- Implement CIP Best Practices (Cyber and Physical Security)
- Information Share – Leverage the Electric-Subsector Information Sharing and Analytics Center (ES-ISAC)
- Continuously conduct risk assessments and address highest risk –
  - Cyber: Maturity Assessment; and Penetration Testing and Forensics
  - Physical: Critical Facilities; Threat and Vulnerability Evaluation; Security Plans

Recommendations to Consider (continued)

- Expand DOE/DHS coordination nexus – NCCIC, ICS-CERT, US-CERT
- Build the CIP workforce – highly competitive
- Consider integration of compliance and security; physical and cyber early
- Prevent – if possible, next biggest security event (Metcalf lesson learned)
- Extremely proactive with security and tell the story… (NERC lessoned learned)

Questions to consider

» Where to spend the next incremental security dollar?

» How can you possibly direct/manage the CIP regulation machine?

» Any lessons learned from the BPS experience that could assist you?

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