Recent Issues in Electric Grid Physical Security

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October 8, 2014

Congressional Research Service

What I will be talking about

- What CRS is and does
- Recent issues in grid physical security
- Power grid physical security initiatives
- Some open questions
- How academia can help

A little about CRS

- Congressional agency
- Legislative policy analysis
- Non-partisan
- Serves only Congress
- 620 staff (340 experts)
- Confidential consultations, seminars, testimony, written products, etc.

RSI is one of five research divisions

- American Law
- Domestic Social Policy
- Foreign Affairs, Defense, and Trade
- Government and Finance
- **Resources, Science, and Industry**
- Knowledge Services Group

- Public lands and natural resources
- Environment & climate
- Agriculture, food and fisheries
- **Energy & minerals**
- Civilian/military R&D
- Telecommunications
- Space & earth science
- Transportation
- **Critical infrastructure**
- **Industry structure & regulation**

Energy infrastructure policy is active

- **Current issues**
  - Shale gas infrastructure
  - Pipeline safety
  - LNG / crude oil exports
  - Keystone XL pipeline
  - Grid / SCADA security
  - Renewables policy
- **New legislation**
  - Keystone XL (2011)
  - Pipeline Safety (2012)
- **Ongoing activities**
  - Appropriations
  - Proposed legislation
  - Oversight

CRS Energy Infrastructure Team

- 20+ analysts and information experts
- Cross-divisional
  - RSI, Law, Trade

CRS works on various grid issues

- *Critical Infrastructure Background and Policy*
- *Electric Utility Infrastructure Vulnerabilities*
- *The Smart Grid and Cybersecurity Regulatory Policy*
- *Regulatory Incentives for Electricity Transmission*
- *Federal Laws Relating to Cybersecurity*
- *Energy Storage Technology Assessment*
- *Physical Security of the U.S. Power Grid*

Now for the disclaimer

Any comments presented herein are for background only. CRS takes no position on legislation or executive branch activities.

Grid attacks are a concern in Congress

Substation Attacks

- PG&E – 500 kV Substation (Metcalf, CA, 2013)
- Other physical attacks
  - UniSource Energy (Nogales, AZ, 2013)
  - Entergy Arkansas – 500kV (Lonoke County, 2013)
  - Progress Energy (Florida, 2005)

Press Reports

- FERC vulnerability models
- GridEx exercises

Congressional Action

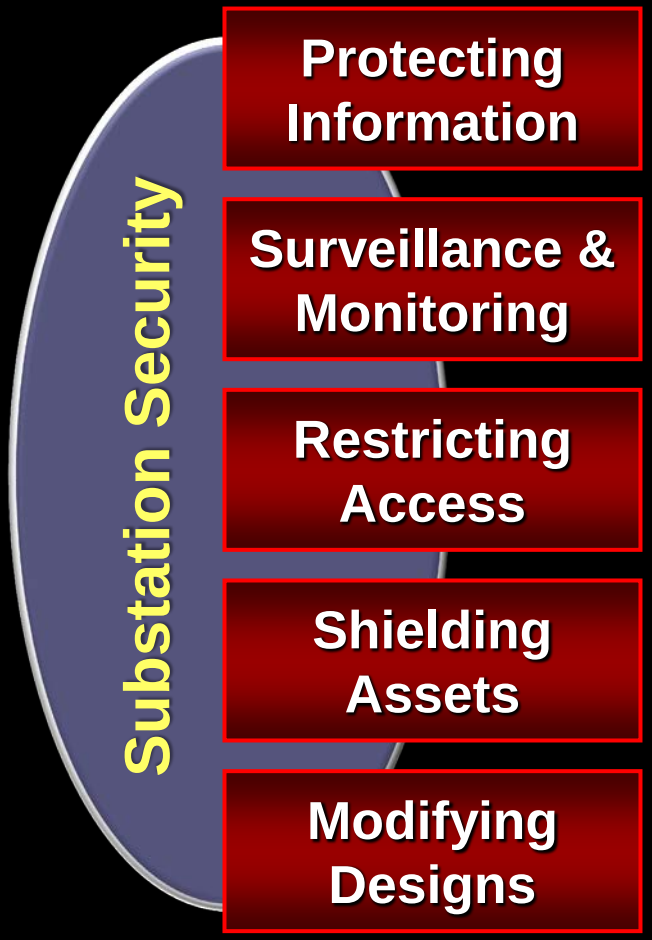
- Letters to FERC
- Grid security hearings
- FERC confirmation hearings
- FERC IG Inquiry
- Public statements
- Proposed legislation

Electric sector has ongoing initiatives

- Coordination and Information Sharing
  - DOE Sector-Specific Plan, ESCC Roadmap
- Transformer Equipment Programs
  - DHS RecX, EEI STEP, NERC Database
- Security Exercises and Simulations
  - GridEx and GridEx II, FERC “ESL” Study
- Grid Physical Security Standards
  - IEEE, NERC Guidance, FERC Best Practices
  - FERC Physical Security Regulations (NOPR)
- Company-Specific Initiatives
  - TVA, PG&E, Dominion, BPA and others

Plenty of grid physical security information, standards, and programs since 9/11

Many measures can secure substations



Engineering drawings, power flow modeling, site information, SCADA

Video, motion detectors, acoustical monitors, drones, periodic inspection

Limiting entry to employees, electronic locks, vehicle barriers, full-time guards

Opaque/hardened fences, taller fences, protective walls

Better cooling systems, harder bushings, reconfigured substation layouts

Views differ on grid physical security

"What keeps me awake at night is a physical attack that could take down the grid."

Hon. Jon Wellinghoff, former FERC Chairman

Grid security alarmists "don't know what they're talking about."

Tom Fanning, CEO, Southern Company

"We can't barricade our way out of this."

Hon. John Norris, FERC Commissioner

"We need to redouble a properly scaled and continuously improving approach to grid reliability and security."

U.S. Senator Lisa Murkowski

FERC is mandating physical security

- March 7, 2014, FERC ordered NERC to propose mandatory standards for physical security
- July 17, 2014, FERC notice of proposed rulemaking to approve NERC Reliability Standard CIP-014-1
  - Risk assessments by grid owners to identify critical assets
  - Independent verification of risk assessments
  - Mandatory threat & vulnerability assessments by grid owners
  - Develop, document, implement physical security plans
  - Independent review of assessments and security plans
- FERC reviewing comments before final rule

But grid security is still a concern

THE WALL STREET JOURNAL.

BUSINESS

PG&E Silicon Valley Substation Is Breached Again

Police Are Notified More Than Five Hours After Intruders Target Metcalf Facility

By REBECCA SMITH

Updated Aug. 28, 2014 6:37 p.m. ET

SAN FRANCISCO—A PG&E Corp. PCG -0.35% electrical substation for Silicon Valley was breached for a second time, despite the utility's efforts to bulk up security following an armed attack last year.

The Metcalf substation—south of San Jose, Calif., off U.S. Highway 101—was targeted early Wednesday morning by

Question isn’t “how?” but “how much?”

- Was Metcalf attack truly a “game changer”?
- How meaningful are grid risk assessments?
- How can you compare weather vs. security risks?
- How do you balance prevention vs. recovery?
- How do you justify costs under uncertainty?
- What are the proper roles of regulators and industry?

Some ideas on how academia can help

Potential university research

- Engineering analysis
- Physical security technologies
- Risk analysis & communication
- Probability & uncertainty studies
- Economic & flow modeling
- Regulatory policy

Research Challenges

- Limited access to actual grid information
- Security-sensitive topics and findings

Last words

Thank you for your attention!