

Foundation for Resilient Societies
52 Technology Way
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April 7, 2014

The Honorable Mary L. Landrieu
Chairman
Senate Energy and Natural Resources Committee
304 Dirksen Office Building
Washington DC 20510

The Honorable Lisa Murkowski
Ranking Member
Senate Energy and Natural Resources Committee
304 Dirksen Office Building
Washington DC 20510

Dear Chairman Landrieu and Ranking Member Murkowski:

Our organization is writing in regard to the upcoming April 10th hearing of the Senate Energy and Natural Resources Committee on “Keeping the lights on—Are we doing enough to ensure the reliability and security of the US electric grid?”

Our short answer is that if the current regulatory system for electric grid reliability is allowed to persist, the United States grid will continue to be vulnerable to physical attack and other threats, risking the lives of millions of Americans and putting national security at risk. Below is our analysis supporting this assertion and recommended questions for your April 10th hearing.

Who we are.

Our non-profit group, the Foundation for Resilient Societies, has the mission of scientific study and education on critical infrastructures such as the electric grid. We have spent extensive time participating in the regulatory system for electric grid reliability. We are a member of the ballot body at the North American Electric Reliability Corporation (NERC) for the physical security standard currently under development, as well as the ballot body for standards on protection of the grid against solar storms. Since 2011 we have actively participated in the Geomagnetic Disturbance Task Force at NERC. Resilient Societies is a frequent commenter on Federal Energy Regulatory Commission (FERC) dockets for electric reliability; our work is well-known to FERC staff and Commissioners. Our docket filings are available on our website: www.resilientsocieties.org.

Specific Considerations and Analysis.

NERC, the designated Electric Reliability Organization under Section 215 of the Federal Power Act, is an organization dominated and effectively controlled by electric utility interests. Seventy percent of NERC members are electric utilities. NERC members regularly vote to place representatives from large investor-owned utilities in key committee positions. While the NERC Board of Trustees is nominally independent, their election is also controlled by NERC members. With this membership and governance structure it should be no surprise that NERC acts to further the goals of for-profit electric utilities.

From our perspective as an advocate for the public, NERC has the apparent goal of limiting financial liability of utilities for cascading outages or long-term regional blackouts; this leads NERC to propose reliability standards that will protect its utility members but not protect the public interest.

How does NERC bury a standards project that has become inconvenient? Twenty-three days after a sophisticated assault on 17 transformers at the Metcalf substation in April 2013, a key NERC committee recommended to eliminate the physical security standard in development, with the rationale “No longer needed: EOP-004-2 addressed FERC’s directives for sabotage and reporting of physical threats, while CIP version 5 addressed cyber security.” The NERC Standards Committee then unanimously ratified this action 50 days after the Metcalf attack by vote on June 5, 2013. The NERC Board of Trustees, also unanimously, ratified the cancellation of the physical security project in October 2013. But for press accounts in year 2014 and a 90-day FERC reliability directive in March 2014, there would be no physical security standard under development now.

What recourse does the public have when NERC approves a defective “reliability standard,” such as the standard for protection against solar storms that is currently in rulemaking at FERC? Under Section 215 of the Federal Power Act, FERC has no authority to correct defects or substitute a better standard. FERC can accept the inadequate standard. FERC can reject the inadequate standard. Or FERC can remand the inadequate standard to NERC for revisions. When FERC remands a standard, delays for revisions at NERC can take years.

NERC makes no bones about its desire to block legislative improvement to the standard-setting system it now controls. For example, NERC CEO Gerry Cauley testified during the May 5, 2011 hearing of your committee:

FERC has the authority now under FPA Sec. 215(d)(5) to direct NERC to prepare a proposed standard to address a specific vulnerability or other matter, and to do so by a certain date. Thus, it is not clear to NERC that the vulnerability section (proposed new FPA Section 224(b)) is needed.

During the May 31, 2011 hearing of the House Energy and Commerce Committee, “Protecting the Electric Grid: The Grid Reliability and Infrastructure Defense Act,” Mr. Cauley testified:

Additional authority to address grid security vulnerabilities is not necessary. FERC already has authority under FPA Sec. 215(d)(5) to direct NERC to prepare a standard to address a specific vulnerability. Proposed new FPA Section 215A(c) is not needed.

NERC operations are funded by fees imposed on electric utilities, which are in turn funded by ratepayers. Via Section 215 of the Federal Power Act the Congress has created the ironic situation of American ratepayers being forced to pay for lobbying against laws which could improve electric grid reliability and better protect the public.

As a balloting participant, we have directly observed how NERC turns the standard-setting process on its head, providing liability protection for electric utilities while providing little protection for the American public. Characteristics of the NERC standards setting process include:

1. **Minimization of entities subject to mandatory standards.** For example, for standard setting on physical security, the draft standard would leave out operators of grid control rooms, despite a specific provision in the FERC Reliability Directive.¹ As another example, generator operators, who have the greatest ability to detect and quickly minimize harmful currents during solar storms, are exempted from mandatory participation in the NERC standard for solar storm “operating procedures.”²
2. **Self-directed plans by utilities as a substitute for specific requirements and measures.** As an example, no specific measures would be required in the draft NERC standard for physical security, only self-directed security plans. As another example, under the NERC-approved standard for operating procedures during solar storms there are no specific requirements for mitigative steps during storms, only self-directed plans and studies.
3. **Exemption of large portions of the Bulk Electric System.** For example, the approved standards on vegetation management and transmission relay loadability can exempt transmission lines operating between 100 kV and 200 kV, despite the inclusion of these lines in the FERC-approved definition of the Bulk Electric System.
4. **Cancellation of projects where the standard-setting process might result in real requirements upon utilities or cause public scrutiny.** We again give the example of the

¹ See the FERC Order of March 7, 2014 in Docket RD14-6-000. For NERC’s current standard setting on physical security, the toothless nature of the draft standard has been too much even for some electric utilities to accept. For example, Southwest Power Pool Standards Review Group said in its comment to the NERC standard drafting team, “...Balancing Authorities and Reliability Coordinators are not listed as applicable entities. Shouldn’t they be included also? Will FERC accept a standard without these entities being included?”

² On March 24, 2014 the Foundation for Resilient Societies petitioned FERC to remand the NERC proposed “operating procedure” standard for solar storms (EOP-010-1) to include generator operators and other improvements. See comments filed in FERC Docket RM14-1-000.

NERC Standards Committee cancelling in June 2013 the standards project for physical protection of critical grid facilities, including transmission substations. At the same June 2013 meeting, the Standards Committee voted to cancel a standards project for monitoring of critical equipment, including monitoring transformers for overheating, despite the important role of equipment monitoring in mitigating the Metcalf attack.

5. Rubber-stamping of standards by the NERC Board of Trustees.

In support of its defectively drafted standards, from time to time NERC authors pseudo-scientific studies and white papers. Characteristics of NERC studies and white papers include non-collection of real-world data and omission of bulk power system operating data inconsistent with the NERC policy position.

It appears that avoidance of legal liability and transfer of risks onto the public are core components of NERC's standard-setting process. NERC's April 1, 2014 Physical Security Standard Technical Conference revealed that the draft NERC standard for physical security will provide a liability shield for utilities through use of security consultants that are "certified" but not necessarily familiar with grid operations. The standard as currently drafted will not require protection of control rooms, generation facilities, and other critical grid assets.

Recommended Questions.

We urge your committee to conduct a diligent inquiry into the fundamental regulatory deficiencies that have caused longstanding grid vulnerability—including vulnerability to physical attack—during your upcoming April 10th hearing. Attached are suggested questions for witnesses before the committee. We ask that this letter and attachments be made part of the official record for the hearing.

Should your committee staff require additional information before the April 10th hearing, please do not hesitate to contact me by email at thomasp@resilientsocieties.org or at the number below.

Sincerely,



Thomas S. Popik
Chairman
Foundation for Resilient Societies
603-321-1090

Attachment: Questions for Witnesses at April 10, 2014 Hearing on "Keeping the lights on—Are we doing enough to ensure the reliability and security of the US electric grid?"

cc:

Senators Corresponding with NERC on the Metcalf Attack:

Senator Dianne Feinstein

Senator Ron Wyden

Senator Harry Reid

Senator Al Franken

**Other Members of the Senate Energy and
Natural Resources Committee:**

Senator Bernard Sanders

Senator Brian Schatz

Senator Dean Heller

Senator Debbie Stabenow

Senator James E. Risch

Senator Jeff Flake

Senator Joe Manchin

Senator John Barrasso

Senator John Hoeven

FERC Commissioners:

Acting Chairman Cheryl A. LaFleur

Commissioner Philip D. Moeller

Commissioner John R. Norris

Commissioner Tony Clark

Senator Lamar Alexander

Senator Maria Cantwell

Senator Mark Udall

Senator Martin Heinrich

Senator Mike Lee

Senator Rob Portman

Senator Tim Johnson

Senator Tim Scott

Senator Tammy Baldwin

Suggested Questions for Witnesses at April 10, 2014 Hearing of Senate Energy and Natural Resources Committee

Questions for NERC

On the Metcalf Attack and Subsequent Cancellation of Relevant NERC Standards Projects

Is it correct at the time of the Metcalf substation attack in April 2013 that NERC had a standard in process for physical protection of critical grid facilities, including transformer substations, designated as “Project 2012-2 Physical Protection”?

Is it also correct that the NERC RISC Committee on May 9 and the NERC Standards Committee on June 5, 2013 voted to cancel this standards project, giving the rationale “No longer needed: EOP-004-2 addressed FERC’s directives for sabotage and reporting of physical threats, while CIP version 5 addressed cyber security” and that this cancellation was later approved by the NERC Board of Trustees?

Can you please explain why the NERC Standards Committee cancelled its project for physical security 50 days after the Metcalf attack?

Can you please explain the role of transformer temperature and oil level monitoring in preventing overheating and complete destruction of the 17 transformers whose radiators were shot out during the Metcalf Attack? Had the transformers overheated and catastrophically failed, could it have caused a cascading blackout? How long do high voltage transformers take to replace?

Is it correct that at the time of the Metcalf attack NERC had a standard in process for automated monitoring of substation transformers and other critical grid equipment?

Is it also correct that the NERC Standards Committee voted to cancel this standards project, designated as “Project 2012-01 Equipment Monitoring and Diagnostic Devices,” at their June 5, 2013 meeting and this cancellation was later approved by the NERC Board of Trustees? Can you please explain why NERC cancelled this standards project?

On Communications with Congress

Is it correct that in written response to a letter from Senators Feinstein, Franken, Wyden, and Reid that NERC CEO Gerry Cauley failed to disclose that NERC standards projects for physical security and equipment monitoring were canceled shortly after the Metcalf substation attack? Can you please explain why this information was omitted from the NERC letter to Congress?

In his February 7, 2014 reply letter to Senator Feinstein and others, NERC CEO Gerry Cauley highlighted the GridEx II grid security conference held in November 2013. This security conference simulated cyber and physical attacks on the United States electric grid.

Are you aware of a 2006 report titled “NSTAC Report to the President on Telecommunications and Electric Power Interdependencies--The Implications of Long-Term Outages” by the President’s National Security Telecommunications Advisory Committee?

Did the NERC GridEx II grid security exercise assume that all commercial telecommunications would work perfectly despite the dependence of commercial telecommunications on power from the electric grid?

Can you please comment on whether GridEx II was a realistic exercise in its assumptions about the full operability of commercial telecommunications?

Can you please comment on any mistaken impression Mr. Cauley’s letter may have created about the value of the GridEx II exercise, especially since the exercise did not address arguably one of the most critical grid vulnerabilities—telecommunications interdependency—during Long-Term Outage?

[On NERC Opposition to a Mandatory Physical Security Standard](#)

In NERC’s February 7, 2014 letter to Senator Feinstein and others regarding physical security for electric grid assets, CEO Gerry Cauley stated:

I do not believe it makes sense to move to mandatory standards at this time. There are more than 55,000 substations of 100 kV or higher across North America, and not all those assets can be 100% protected against all threats. I am concerned that a rule-based approach for physical security would not provide the flexibility needed to deal with the widely varying risk profiles and circumstances across the North American grid and would instead create unnecessary and inefficient regulatory burdens and compliance obligations.

Do you still believe the NERC position opposing a physical security standard to be appropriate? If the NERC position opposing a physical security standard has changed, can you explain why?

Is it correct that the FERC Reliability Directive on physical security of the electric grid specifically requires protection of grid control rooms?

Is it further correct that the NERC standard for physical security as currently drafted leaves out protection for control rooms?

Can you explain why NERC is developing a standard that is apparently not in compliance with the express scope of the FERC directive?

On Compliance with Section 215 of the Federal Power Act

Is it correct that Section 215 of the Federal Power Act requires that NERC conduct a public standard-setting process?

Is it correct that a draft physical security standard was completed by the April 1, 2014 NERC technical conference, yet the standard was not posted on the NERC website nor otherwise made public, despite the standard being reviewed at the technical conference?

Why was the draft standard not promptly posted? Does this kind of non-disclosure put the public at a disadvantage in reviewing draft standards?

Is it correct that NERC has a pattern and practice of withholding its technical reports from public view for periods of time after approval by the NERC Board of Trustees and that during this time NERC technical reports are circulated to selected parties in Washington, D.C.?

Is it further correct that the NERC bylaws specifically state that NERC technical reports shall be made public 24 hours before the report is presented at the NERC Board of Trustees meeting?

Why does NERC appear to operate in a manner noncompliant with its own bylaws and Section 215 of the Federal Power Act?

On Lobbying Activities of NERC

Is it correct that NERC maintains an office in Washington DC for the purpose of coordinating with Congress and federal officials?

Is it further correct that NERC has prepared talking points in opposition to legislation that would enable FERC to impose FERC-initiated regulations and that NERC may have coordinated its talking points with industry lobbyists?

Is it correct that the operations of NERC are financed by fees assessed on regional entities and furthermore that the ultimate sources of NERC's funding are the nation's electricity ratepayers?

Is it appropriate for NERC to lobby for or against legislation when that lobbying is financed by electricity ratepayers?

On the Independent NERC Board of Trustees

Is it correct that NERC has an independent Board of Trustees, per the FERC-approved bylaws of NERC?

How many standards have been approved by the NERC Board of Trustees since NERC's designation by FERC as the designated Electric Reliability Organization?

How many standards voted on by the NERC ballot body and sent to the NERC Board of Trustees for approval have been sent back for rework or otherwise disapproved before submission to FERC?

Of the 10 independent trustees on NERC's board, how many were previously employed in the electric utility industry or otherwise have ties to that industry?

Of the current voting NERC membership, how many are representatives of the electric utility industry? Is it correct that the NERC membership elects the NERC Board of Trustees?

On Protection of the Electric Grid from Solar Storms

Is it correct that the March 1989 blackout in Québec, Canada conclusively proved that solar storms can cause widespread cascading outage?

Why in the intervening 25 years did NERC not introduce a standard to protect electric grids against solar storms on its own initiative?

Is it correct that in its technical report dated March 2012 that NERC downplayed the risk of solar storms to the electric grid, saying that a grid collapse resulting from a solar storm could be recovered in only hours or days?

Do you view a widespread grid outage of "hours or days" as being acceptable to the American public?

Questions for FERC

On Interdependency between the Electric Grid and the Natural Gas Distribution System

Has FERC conducted any studies or technical conferences on the interdependence of the electric grid and natural gas supply and distribution system?

Does FERC have any initiatives to assure reliable natural gas supplies for electricity generation?

Are states with electrically powered pumps on their gas pipelines more vulnerable to long-term grid outage?

Have utilities in the State of California predominantly installed electrically powered pumps on their gas pipelines?

Some generation facilities have significant fuel reserves stored on-site while others rely on energy sources that are immediately transported or intermittent. For example, gas-fired generation plants rely on fuel delivered by pipeline and not stored on-site. Wind and solar generation operates only when the wind is blowing or sun is shining. In contrast, coal-fired plants store significant quantities of fuel on-site, enhancing grid reliability. In past years, coal-fired plants typically had 30 to 60 days of fuel stored on-site, providing a substantial degree of “fuel resilience.” In a March 13, 2014 article in the Wall Street Journal titled “Surge in Rail Shipments of Oil Sidetracks Other Industries,” an executive close to big utility companies said, “The railroads tell us they aren't serving power plants until their inventories are in single-digit days.”

Has FERC conducted any studies or technical conferences on the impact of retirement of coal-fired plants on grid reliability and also on the impact of less coal now stored on-site at power plants?

Has FERC considered any policies to take into consideration the resilience of natural gas-fired electric generation plants as this fuel source now supplies nearly 30% of US electric power and is expanding significantly further?

On Vulnerability of Long-Distance Electricity Transmission

Some states lack local generation and as a result must import electricity over long-distance transmission lines that may be vulnerable to terrorist attack or solar storms. For example, the State of California imports 25% of its electricity.

Has FERC performed state-by-state studies of the vulnerability of electricity transmission to terrorist attack or other disruption?

What policy initiatives could mitigate the dependence of individual states and their populations on long-distance electricity transmission?

Are you aware that a representative of the Department of Homeland Security disclosed in September 2012 in a public industry forum that an attack on only six transformer substations in the Eastern interconnection could bring down the electric grid east of the Mississippi river for a period of months?

Do you believe that the locations of transmission “choke points” are commonly known in the electric utility industry? What should be done to protect these choke points?

On the NERC Standard Setting Process

How long did NERC take to set a standard on so-called “vegetation management” around transmission lines, otherwise called tree-trimming, after the 2003 Northeast Blackout affecting 50 million people, initiated by a tree limb contacting a transmission line?

How long did NERC take to set standards for cyber security?

When NERC proposes a technically defective standard, what options does FERC have?

When a technically defective standard is remanded by FERC to NERC, what is the range of delay that can be expected before finally setting a corrected standard?

In the NERC document, “Reliability Standards for the Bulk Electric Systems of North America, Updated April 3, 2014,” NERC has placed the text of Standard “EOP-010-1 — Geomagnetic Disturbance Operations.” FERC opened a rulemaking docket on this standard, with comments due by March 24, 2014, and significant public comments in opposition to the proposed standard were placed on the docket. Is promulgation of NERC standards “approved” by the NERC Board of Trustees, without formal approval by FERC via the federal administrative rulemaking process, consistent with federal law?

Questions for Pacific Gas & Electric

On the Metcalf Attack

Why did PG&E initially characterize the well-planned and coordinated Metcalf Substation attack of April 2013 as mere “vandalism”?

Is it correct that the Metcalf substation attackers shot through a chain-link fence that gave clear view to transformers within the yard?

Is it correct that in the intervening year between the Metcalf substation attack and the FERC Physical Security order of March 2014, PG&E had not installed opaque fencing for the Metcalf substation?

On Reliability of Electric Power for Silicon Valley

Is it correct that the Metcalf substation is one of only three 500kV substations serving the San Francisco metropolitan area?

Is it correct that the Metcalf substation is the only major substation serving Silicon Valley and its dense concentration of internet companies?

Is it correct that an analysis by the California Public Utilities Commission has concluded that the Metcalf substation is already overloaded on hot summer days, resulting in voltage sags for customers in Silicon Valley?

Has PG&E proposed plans for a backup substation to support Silicon Valley?

Have major internet firms in Silicon Valley complained to Pacific Gas & Electric about the reliability and quality of their grid power? How does PG&E intend to address any complaints?

Questions for Trade Groups

On Effectiveness of Self-Regulation

Is it correct that trade groups often advocate for the ability of electric utilities to develop their own plans for grid protection instead of relying on mandatory “one size fits all” solutions?

Every car and driver is different, yet speed limits apply to all equally. Aren’t speed limits a “one size fits all” solution?

When a utility develops its own plan for grid protection, what assurance does the public have that this plan will be effective?

As a general matter, should electric utilities be allowed to manage the protection of their own facilities rather than having mandatory regulations written and imposed by governmental entities?

Did self-regulation result in significant protection for the Metcalf substation?

Do you support inclusion of control rooms in the physical security standard now under development at NERC?