

RELIABILITY FIRST



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Harness knowledge

Note from the President



Dear Stakeholders,
I'd like to thank all who attended our annual Fall Workshop in Pittsburgh. Whether you joined us in-person, online or just happened to see our lineup of speakers, you likely noticed a theme.

This year we focused heavily on the interdependencies of the electric grid with other industries, with speakers from the worlds of state government, natural gas, cyber security, and water.

One of our keynote speakers from those industries was Chairman Stephen DeFrank of the Pennsylvania Public Utility Commission. As I've discussed before in this space, we have been focusing time and energy toward helping key decision makers in our states in their efforts to transition to a greener grid. NERC recently spotlighted the importance of energy policy in the [2023 ERO Reliability Risk Priorities Report](#) as well, which NERC notes can quickly impact resilience and reliability of the Bulk Power System.

Our outreach work to states is a key piece of our [2023 Strategic Plan](#). We've highlighted our strategic objectives in this plan in each issue so far this year and our third and final objective is to "*Harness knowledge to creatively and comprehensively address risks to the grid.*" This involves not only gathering and analyzing information on risks to the grid but also getting it

to the right leaders so it can help inform the very important decisions they must make.

At RF, our "why" is to work to ensure a reliable electric system because our health and safety, our economy, and our very way of life all depend on this vital service. Our "why" runs through everything we do and every action we take, including sharing our expertise with key energy decision makers. The grid is quickly evolving and the expectations being placed upon it are quickly growing. RF will work across the reliability ecosystem to help identify and address the risks associated with these changes. We, our sister Regional Entities, and NERC all serve as independent and credible resources to states on topics including transmission planning, inverter-based resources, cyber and physical security, resilience and transmission and distribution system interdependencies.

Our Fall Workshop is one example of our strategic outreach on key reliability and security topics, but our dedicated team's work in this arena goes on year-round through our monthly Tech Talks, quarterly newsletter articles and individual meetings with key stakeholders, as our Strategic Plan outlines. Our priority is and always will be ensuring a reliable electric system for the public, especially during the energy transition, and we will do all we can to leverage our expertise and resources to help in this mission.

Forward Together,

Tim

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Guest Column

Culture of Reliability Excellence: Relevant yesterday, today and tomorrow

By David R. Nevius, former NERC Senior Vice President 1979-2012

On Aug. 14, on the 20th anniversary of the 2003 Northeast Blackout, I had the distinct honor and privilege of speaking on Technical Talk with RF about that blackout and grid reliability issues overall. In addition to describing what happened that day 20 years ago, and what has happened since, I spoke briefly about a concept that has become near and dear to me – promoting a culture of reliability excellence.

In November of 2010, while serving as the secretary of the NERC Member Representatives Committee (MRC), I organized a panel discussion in which four high-level individuals from different ownership segments of the electric

industry offered their perspectives on what their respective organizations were doing to promote a culture of reliability excellence – the successes they have had, the obstacles that they have encountered, and what NERC could do to help further promote this concept.

The presentations and Q&A that followed addressed some of the differences between a culture of reliability compliance versus a culture of reliability excellence, and identified some of the characteristics, behaviors, and practices that exemplify a culture of reliability excellence. Among these were:

Commitment to reliability— This must stretch throughout the organization, from the Board of Trustees down. It should show up in the organization's vision, mission, and values as found in most Corporate Strategic Plans, and be continually reinforced through internal and external communications and by way of corporate performance measures used to drive and reward performance. The commitment to excellence cannot only be local to the organization but must also be exhibited throughout the industry.

Depth of knowledge about reliability— Educate employees on what needs to be done as well as why, and display that knowledge through a commitment to participate in the development of reliability standards that will help prepare bulk electric system operators to respond in situations that have not been examined or encountered previously.

Transparency— A real belief in reliability means there is no need to hide things, but to share both good and bad experiences so others can benefit, which is the mark of a “learning organization.” Employees need to know that they are working toward important goals, with reliability being chief among them.

Empowerment of employees— Employees should be independent and empowered to make decisions without feeling undue influence on them or fear of retribution. A culture of reliability excellence means, simply, doing the right thing.

Foundations of corporate culture lead to a culture of reliability excellence— This must be understood from the boardroom down to the boiler room before you can have a culture of reliability excellence. Maintaining a balance of high reliability, low cost, and high customer satisfaction will result in constructive regulation that allows the organization to continue to have a healthy capital program, and an appropriate amount of operations and management spending. This gets back to being able to provide high reliability balanced with low prices and high customer satisfaction. A culture

Guest Column

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of reliability excellence really reflects on the broader culture of whatever organization you are a part of.

Analogy to safety— Just as no job is so important as to jeopardize the safety of an employee or the public, no job is so important as to jeopardize the reliability of the bulk power system. The public is very interested in having reliable power and it is our responsibility to ensure that it happens. Encourage employees to tell you what they are concerned about and then those issues can be addressed proactively. When something does go wrong, you investigate what went wrong to learn what can be done to keep this from happening again in the future.

Promoting a culture of reliability excellence— This has to start at the top. It helps to develop a strategic direction for maintaining high reliability. Use training programs to ensure awareness of reliability standards and the need to meet those standards. Establish cross-functional teams to make sure the standards are given the highest priority. Invite upper management to hear results of peer reviews. Stay active to help develop the standards and promote a culture of reliability excellence internally, within a particular industry sector, and throughout the industry in general. Recognize employees for ideas and actions that promote a culture of reliability excellence. It is very important for leadership to make a “big deal” about reliability.

Reliability is more than just keeping the lights on— This gives short shrift to the importance of the industry by making it sound like keeping the lights on is a matter of comfort and convenience. It is much more than that. It is a matter of protecting public health and safety, it is a matter of protecting the economic prosperity of a nation, and it is a matter of protecting national security by protecting critical infrastructure.

Address the small things to avoid big problems— If you operate successful safety programs and you have a lot of small accidents, but you do not do enough about it, at some point you can have a very serious accident. Look for what it takes to resolve the reliability issues today and that will help establish the planning and processes to ensure that you have a reliable system and not let other priorities get in the way.

Communicate importance of reliability— It’s important to communicate the importance of reliability and safety from the standpoint of maintaining infrastructure.

Culture of compliance versus culture of reliability— Recognize that not all standards are of equal impact or importance to reliability. Perform reliability risk assessments to determine where to put the greatest effort. Look at it from the perspective of what poses a risk to reliability, rather than what poses a risk to non-compliance with the standards.

Just as these tenets of reliability excellence were discussed over a decade ago at the NERC MRC meeting, they still hold true today. Building this strong culture in your organization is vital for today and for tomorrow in our mission to keep the electric grid reliable and secure.

David Nevius can be reached via email at dnevius1946@gmail.com.

Continuous Improvement

By Sam Ciccone, Principal Reliability Consultant, Entity Engagement

Harnessing Knowledge

"We must harness curiosity, creativity, and diverse perspectives, because today's standard knowledge will not help us handle tomorrow's surprises."

— Roger Spitz - international bestselling author, President of Techidental (Climate & Foresight Strategy), and Chair of the Disruptive Futures Institute based in San Francisco

With all the changes happening in our industry, from the influx of renewable energy to the rapid retirement of experienced personnel, it is more important than ever to harness knowledge to sustain the reliability, resilience, and security of the grid. RF's strategic plan includes harnessing knowledge to address risks to the grid creatively and comprehensively.

K. Selvavinayagam and V. Jothi Francina, define harnessing knowledge as "a process that helps organizations to generate and gain knowledge, and to select, organize, disseminate, and transfer important information and expertise owned by the organization that is necessary for ... making decisions, solving problems, learning, and strategic planning."¹ Harnessing knowledge affects an organization's competitiveness. Organizations that are successful at harnessing knowledge are "better equipped to innovate, make informed decisions, and stay ahead of the curve."²

The basics of managing knowledge include identifying current and historical knowledge and recording it. This is a challenging undertaking, since information ranges from the development of operational procedures to the wisdom collected from storytelling of experienced employees. Knowledge management continuously improves knowledge harnessing, as it helps drive creativity and harness the best practices that are found throughout your organization.³ Harnessing knowledge through data analytics captures a mountain of various data to develop databases and dashboards that help us see organizational and industry trends, both positive and negative. It has helped our industry be nimbler in the face of uncertainty of the future of the grid.

Tacit or Tribal knowledge

Effective knowledge management may not always address tacit, or tribal knowledge. We've heard the phrase "tribal knowledge" being used across all industries. How is it defined and what can we do better to capture this knowledge? One definition is an "amalgam of knowledge and meaning; an often-elusive elixir, [and] artfully used it can inspire groups and organizations to higher levels of collective performance and reward."⁴ In our industry, knowledge is not limited to documents and data, but also includes the organization's collective knowledge, which is often undocumented and held by individuals. Your skilled and experienced workforce is constantly changing to bring in new personnel while tribal knowledge is leaving with an upsurge of retirements.

¹ [Harnessing Knowledge – a Strategic Tool for Continuous Development](#)

² [Harnessing Knowledge for Competitive Advantage: Strategies for effective knowledge management in organizations](#)

³ [The secret to harnessing tribal knowledge to accelerate operational excellence](#)

⁴ [The secret to harnessing tribal knowledge to accelerate operational excellence](#)

⁵ [The secret to harnessing tribal knowledge to accelerate operational excellence](#)

Camembert Cheese Mystery⁵

In short, the story is about a critical step in the aging process of cheese and how a seasoned chief affineur was able to tell if a wheel of cheese was ripe by simply poking at it. An apprentice with him tried it and never seemed to consistently tell the ripeness by this simple method.

They even brought in physicists to figure out the cheese's readiness and created experiments that still could not get the consistent results on par with the chief affineur.

Finally, it was found that it was unconscious knowledge at work, as a sommelier (wine steward) who spent much time on separate occasions with the chief affineur was able to smell the movement of the surface mold – they were unconsciously inhaling this movement of smell which gave them the proper assessment.

Continuous Improvement

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To ensure sustainably reliable and resilient grid operations, organizations can identify the individuals with such tribal knowledge, and identify the types of information items that may be intangible organizational knowledge. Tribal knowledge is challenging to harness due to several factors. How do you harness years of experience that have created what I call “muscle memory” in the experienced worker? See the “Camebert Cheese Mystery” as an interesting story about tacit knowledge.

So how can you harness tribal knowledge? It is a combination of:

- Interviewing your experienced operators and documenting the operator’s knowledge;
- Establishing communities of practice within your organization to come together to share experiences and best practices; and
- Mentoring to pair experienced workers with the next generation that will replace them to transfer this knowledge.⁶

This doesn’t come without challenges. Experienced workers may get defensive and have the thought: “this person will replace me once I give her all my secrets to success.” Reassurance from the top of the organization down to the individual managers is key to getting buy-in from the experienced and seasoned worker. The experienced worker must be reassured that this is succession planning and not meant to drive them out before they are ready to leave.

Once this reassurance is accepted, don’t just limit the new worker to sitting in their cubicle or office reading procedures on various subjects, or attending training after training. Sure, these things are important, but get them out there! Think of things like having new personnel shadow senior compliance personnel to help prepare for and observe compliance audits, or inviting new workers to tag along with an experienced worker to learn and participate in field walkdowns for facility ratings or winterization preparations.

Another challenge is the generation gap between experienced and new personnel. Personnel new to the workforce tend to think differently and

learn in diverse ways. Understanding different learning methods will help both experienced and new personnel speak the same language.

Sources anticipate that half of the workforce in the utilities sector could retire in the coming years. To complicate things, a “June 2021 study conducted by Itron Inc. found that 88% of the 500 utility executives surveyed said they were most concerned about the impact of disasters on the power grid caused by unprecedented events such as war, wildfires and extreme weather conditions.”⁷ Knowledge management can mitigate the effects of these events by delivering a more prepared workforce.

You may already be capturing knowledge such as misoperations data or procedures for identifying assets to develop facility ratings. But don’t forget to capture the tribal knowledge gained through decades of experience. Harnessing hard data and tribal knowledge together will put you in a good place that will contribute to your bottom line, and to the reliability, resilience, and security of our grid.

RF is always here to help. We provide outreach, training, and education and offer several services including Entity Engagement services (such as appraisals, self-assessments, and facilitation), and education/training through webinars, workshops and whitepapers.

⁶ [The Power of Connections: Harnessing Tacit Knowledge Sharing for Collaborative Learning and Growth](#)

⁷ [4 Key Knowledge Management Trends within the Utilities Sector for 2023](#)

The Lighthouse

By Lew Folkerth, Principal Reliability Consultant, External Affairs



Artificial Intelligence and CIP

Tipping point

On March 14, 2023, the OpenAI companies released ChatGPT version 4. ChatGPT 4 appears to have been a tipping point in the capability and use of Artificial Intelligence (AI) for consumer applications. This has generated massive public and media attention and has raised concerns about the use of AI in operational technology (OT) systems, such as the systems we use to operate the electric grid.

What is AI?

AI is a knowledge domain of computer science that has many sub-domains, such as:

- Natural language processing (NLP) processes and generates language that humans can use to communicate with computers. If you use personal voice assistants such as Siri or Alexa, you're already using a form of NLP.



Saugatuck, Michigan – Photo: Lew Folkerth

- Machine learning (ML) takes information and "trains" a computer to perform certain tasks. The facial recognition in your smartphone is one example of how ML is changing the way we live. Self-driving cars show how far ML can be taken today.
- Generative AI extends the functions of NLP and ML to simulate the generation of knowledge.

ChatGPT, Google Bard are examples of text-based generative AI. See the sidebar on the next page for Google Bard's description of generative AI.

Other types of AI can be used to generate images from a text prompt, such as the image of a lighthouse weathering a storm by DALL-E, on the next page.

How might AI benefit reliability, resilience, or security?

There are many areas where appropriate use of AI could benefit electric operations. Here are a few examples:

- ML might be used to improve dynamic response to rapidly changing generator outputs such as solar farms on a party cloudy day.
- Generating valid alerts from massive amounts of data from devices such as such as synchrophasors or dynamic line sensors could be facilitated by using ML.

In this recurring column, I explore various questions and concerns related to the NERC Critical Infrastructure Protection (CIP) Standards. I share my views and opinions with you, which are not binding. Rather, this information is intended to provoke discussion within your entity. It may also help you and your entity as you strive to improve your compliance posture and work toward continuous improvement in the reliability, security, resilience and sustainability of your CIP compliance programs. There are times that I also may discuss areas of the Standards that other entities may be struggling with and share my ideas to overcome their known issues. As with lighthouses, I can't steer your ship for you, but perhaps I can help shed light on the sometimes-stormy waters of CIP compliance.

The Lighthouse

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- Internal Network Security Monitoring could use ML and NLP techniques to improve the accuracy of alerts and reduce false positives.

What will be needed for AI use in OT?

A key issue in using any third-party software for OT purposes is confidentiality. The most reliable way to achieve this is to keep all processing and information on locally controlled systems. Software, both free and commercial is available and public versions of some training models might be available for private use.

Any use of AI for OT should be on a computer that is trusted and secured. As a good practice, any AI should be able to show how its output is derived from its input, so that you can see and document how answers are generated. Any BES Cyber System Information (BCSI) used as input to the AI processes must be identified to ensure that

confidentiality is not compromised.

Precautions for today

While efforts are under way to enable use of third-party services (e.g., cloud services) within the CIP Standards, those changes are not ready yet. For now, you must keep tight control of all BCSI.

To ensure this continued control, look at modifying your cybersecurity policies and your information protection plan to address the use of AI.

External AI services should not be accessible from control networks. This should already be the case for CIP-005 compliance. I also recommend that access to external AI systems be blocked for business systems within a control environment such as a generating plant or Control Center. This may help prevent data leakage through inadvertent use of AI systems by operating personnel.

You should keep abreast of developments in this area. The use of AI has the potential to transform every area of human endeavor but must be used with extra caution in any area where safety, reliability, resilience or security is an issue.

Requests for assistance

If you are an entity registered within the RF Region and believe you need assistance in sorting your way through this or any compliance-related issue, remember RF has the Assist Visit program. Submit an Assist Visit Request via the RF website [here](#).

Back issues of The Lighthouse, expanded articles and supporting documents are available in the [RF CIP Knowledge Center](#).

Low to Bard: Describe generative AI

Bard Response [edited for brevity]: Generative AI is a type of artificial intelligence (AI) that can create new content, such as text, images, or music. It is powered by machine learning algorithms that are trained on large data sets of existing content.

The algorithms learn to identify patterns in the data and then use those patterns to generate new content that is similar to the original data.

Generative AI is a powerful tool that has the potential to revolutionize many industries. However, it is important to be aware of the potential risks of using generative AI, such as the creation of fake news and deepfakes.

It is also important to use generative AI in a responsible way that respects the privacy and safety of others.

Feedback

Please provide any feedback you may have on these articles. Suggestions for topics are always welcome and appreciated.

Low Folkerth, Principal Reliability Consultant, can be reached [here](#).

Enforcement Explained

By: Mike Hattery, Counsel, Enforcement



2023 Enforcement Trends

A continuous point of focus for RF is transparency. With that in mind, this quarter's column discusses metrics intended to provide further visibility into RF's enforcement work in 2023.

Before diving into the metrics, it is important to discuss the limitations or caveats to what is provided.

First, the data is a broad snapshot, and while informative, it can be difficult to draw specific conclusions.

Second, we are balancing important priorities, namely transparency and security. For example, in the CIP space, we want to provide context but not highlight areas of weakness in open violations such that they can be leveraged.

Third, the data provided is limited to the RF footprint and not the ERO Enterprise as a whole.

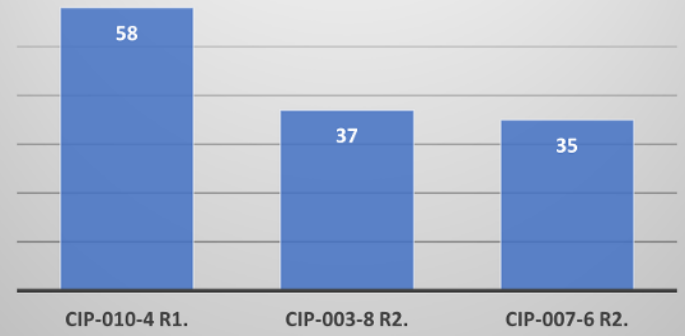
With the above in mind, we will dive into the snapshots from two angles. First, noncompliances coming in, and second, noncompliances that have been assessed at elevated risk levels.

In the CIP space, for the first time in a while, there has been a marked change at the top with the appearance of CIP-003-8 R2. For the past half decade, CIP-010-2 R1 (prior version of CIP-010-4 R1), CIP-007-6 R2, CIP-004-6 R4, and CIP-004-6 R5 have been the most violated requirements. A bit on the mainstays first. CIP-010 R1 and CIP-007-6 R2 are what we often refer to as "high-frequency conduct" requirements, meaning they govern conduct that happens frequently, and numerous and continuous acts are required to remain in compliance.

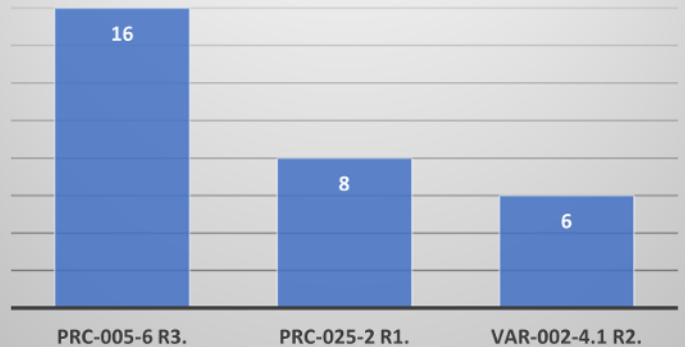
CIP-007-6 R2, for instance, captures the patching process, which includes an immense amount of individual acts in terms of identifying, reviewing, and applying patches to hundreds, or thousands of assets. Even entities with strong programs will find noncompliances involving patching, but in a strong program with effective internal controls, the duration and instance counts will be narrow. Where this is not the case, the risk will likely be elevated.

As it relates to CIP-003-8 R2, there are a couple of potential reasons for its increased frequency. First, RF has exercised increased compliance monitoring oversight of low impact facilities. Second, CIP-003-8 functions as a sort of "catch all" for high frequency acts for low impact facilities; therefore, increased volume does not necessarily reflect

Top 3 Most Violated CIP Requirements (Intake Last 12 Months)



Top 3 Most Violated Ops and Planning Requirements (Intake Last 12 Months)



Enforcement Explained

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increase of a specific failure type.

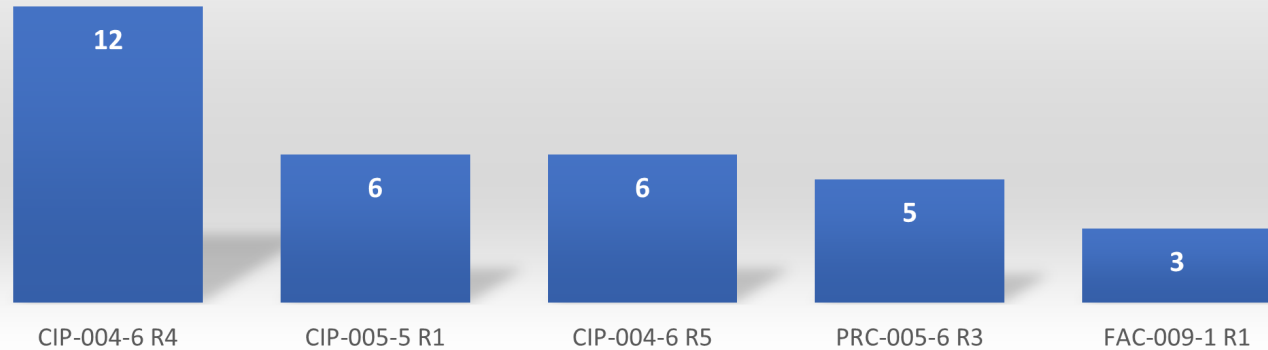
PRC-005-6 R3 and VAR-002-4.1 R2, similar to CIP-007-6 R2 and CIP-010 R1, are standards that require nearly continuous action. PRC-005-6 R3 involves monthly, quarterly, yearly, and longer-term maintenance and testing requirements, which can require a lot of planning, coordination, tracking, and individual acts when implemented across a large fleet. Similarly, many registered entities continuously strive to monitor, adhere to, and notify of departures from voltage schedules. Of note, we have also seen a concerning increase in VAR-002-4.1 R1 and R3 noncompliances, which was the basis of a recent Enforcement Explained column in the [Q2 Newsletter](#).

Despite the above discussion of high-frequency conduct standards, the facts and circumstances of each individual case impact the outcome, and there is not a requirement-level presumption of risk posed by the noncompliance. This is demonstrated by the above chart, where CIP-004-6 R4, CIP-004-6 R5, and PRC-005-6 R3 all have several noncompliances assessed at moderate risk or higher. On the PRC-005-6 side, we see elevated risk where we have broader proportional misses across the entity's program with significant durations.

On the CIP-004-6 R4 and R5 side (access management and access revocation), we are seeing an increase in issues with managing access with vendors and contractors, often involving extended durations where entities do not have strong internal controls to monitor contractor personnel changes.

If you want further context about how your entity stacks up against industry-wide markers or what we are seeing as it relates to new violations, please reach out to your case manager.

Top 5 Highest Risk Requirements (Based on 2023 Filings)



Contact Entity Engagement

We encourage registered entities to [reach out to our Entity Engagement team](#) if they have questions regarding their approach to the issues discussed in this article.

Regulatory Affairs



U.S. House of Representatives holds hearing on reliability and efficiency

On Sept. 13, the House of Representatives' Energy, Climate and Grid Subcommittee (Subcommittee) held a [legislative hearing](#) titled "Keeping the Lights On: Enhancing Reliability and Efficiency to Power American Homes." During the hearing, the Subcommittee discussed the "[Guaranteeing Reliable Infrastructure Development Act](#)" or the "GRID Act," which if made law would add provisions to Section 215 of the Federal Power Act to trigger FERC review of an agency action (from an agency other than FERC) that is likely to have a significant negative impact to bulk-power system (BPS) adequacy or reliability. Several members of the Subcommittee referenced NERC's recent [Reliability Risk Priorities Report](#) (and its identification of energy policy as a reliability risk) as a reason to support the bill. Resource adequacy was also raised as a pressing concern.

David Ortiz, Director of FERC's Office of Electric Reliability, provided [testimony](#), and discussed FERC's reliability priorities of: (1) protecting the grid from cyber and physical attacks, (2) preparing for extreme weather, and (3) ensuring reliability as the resource mix changes; as well as actions taken by FERC and the ERO to address these priorities. Regarding the GRID Act, Mr. Ortiz stated that FERC and the ERO have the expertise to understand and comment on potential reliability impacts from other agencies' proposals and are ready to assist. He stated that FERC doesn't have the capacity at this time to perform detailed assessments such as interconnection-wide modeling and analysis. He added that FERC could develop this capacity, but it could be duplicative of other organizations like the DOE's national laboratories.

NERC Senior VP testifies at House Energy and Commerce Committee on cyber and physical threats to electric infrastructure

On July 18, Manny Cancel (NERC Senior VP and CEO of the Electricity Information Sharing and Analysis Center (E-ISAC)) [testified before the House Energy and Commerce Committee's Oversight and Investigations Subcommittee](#) on emerging cyber and physical threats. The purpose of the hearing was to discuss the types of threats that pose the most danger to the electric grid, and mitigation strategies. During his testimony, he talked about ransomware and cybersecurity threats posed by China, Russia, Iran, and North Korea. He also discussed the increasing number of physical attacks on substations, such as recent attacks in North Carolina, and the plot to attack the grid in Baltimore.

The other witnesses were Sam Chanoski, Technical Relationship Manager at Idaho National Laboratory; Dr. Paul N. Stockton, Senior Fellow at Johns Hopkins University's Applied Physics Laboratory; and Bruce Walker, President and Chief Security Office at the Alliance for Critical Infrastructure Security, Inc. Dr. Stockton discussed how the increase in inverter-based resources on the grid adds new cyber and physical attack vulnerabilities, and Mr. Walker noted that increasing reliance on natural gas (e.g., gas-electric interdependencies) increases risks to the grid as well.

FERC and NERC hold Physical Security Technical Conference

FERC and NERC held a joint Physical Security Technical Conference on Aug. 10 in response to a recommendation in [NERC's Evaluation of the Physical Security Reliability Standard and Physical Security Attacks to the Bulk Power System](#) that was filed with FERC in April. FERC Chair Willie Phillips and NERC CEO Jim Robb opened the conference and provided remarks stressing the importance of physical security and the discussions to take place. There were four panels with representatives from the federal government (DOE, FBI), registered entities, NERC and the Regions, and other organizations such as Pacific Northwest National Lab.

Panel one focused on the appropriate applicability criteria for CIP-014, and panel two discussed the appropriate minimum level of physical protection in CIP-014. Discussion in these panels included potentially replacing the CIP-014 applicability criteria with a risk assessment process or adding a timeframe for periodic re-evaluation of facilities under the applicability criteria. Other comments included making the standard risk-based, tailored, and evolve over time as threats emerge, as each facility has different risks and needs.

Panels three and four discussed solutions beyond CIP-014 and best practices for prevention, protection, response, and recovery. Discussion in these panels included the value of transformer sharing programs, standardization of equipment, and addressing supply chain issues in order to replace damaged transformers following an attack more easily. Panelists also discussed the value of the E-ISAC and other industry forums for information sharing, peer reviews, and sharing best practices. Other physical security strategies discussed included a defense-in-depth approach, the use of resilience maturity models, vulnerability assessments, penetration testing, and training for operators to recognize physical attacks on the system and how to react to them.



FERC issues Order 2023, reforming the generation interconnection process

On July 28, FERC approved a [landmark final rule, Order 2023](#), to reform and streamline the generation interconnection process. During the FERC meeting where the Commissioners approved the Order, FERC Chair Willie Phillips discussed the critical need for interconnection reform. He noted that at the end of 2022 more than 2,000 GW of generation and storage were waiting in interconnection queues across the U.S. (as much generation capacity as all the power plants now operating in the U.S.), and projects have up to a five-year wait to connect to the grid.

Order 2023 requires all public utilities to adopt revised pro forma generator interconnection procedures and agreements to “ensure that customers can interconnect to the transmission system in a reliable, efficient, transparent, and timely manner.” Order 2023 includes the following reforms to the interconnection process:

- Implements a “first-ready-first-served” cluster study process to improve the efficiency of the interconnection process and minimize delays.
 - Transmission providers will conduct larger interconnection studies encompassing numerous proposed generating facilities (cluster studies), rather than separate studies for each individual generating facility.
 - Interconnection customers will be subject to specific financial commitments, including financial deposits and site control conditions, to enter and remain in the interconnection queue. This is to discourage speculative, commercially non-viable interconnection requests from clogging up the queue.
- Creates firm deadlines and penalties if transmission providers fail to complete their interconnection studies on time.
- Requires transmission providers to use a standardized and transparent affected systems study process that includes uniform modeling standards.
- Incorporates technological advancements into the interconnection process, including consideration of advanced transmission technologies in the interconnection study process.
 - Also requires transmission providers to use operating assumptions in interconnection studies that reflect the proposed charging behavior of electric storage resources.
- Updates modeling and performance requirements for inverter-based resources to ensure continued system reliability. These requirements stem from NERC’s reliability recommendations regarding recent events involving the unexpected loss or momentary cessation of inverter-based resources.

Senate Energy and Natural Resources Committee holds hearing on opportunities to reform permitting process

On July 26, the Senate Energy and Natural Resources Committee held a [hearing](#) on opportunities for Congress to reform the permitting process for electric transmission lines, pipelines, and energy production on federal lands. Panelists included AEP Executive Vice President (and RF Board Chair) Antonio Smyth and Jason Stanek, former chair of the Maryland Public Service Commission.

Mr. Smyth talked about the changing resource mix and the criticality of maintaining reliability in the face of these changes. He discussed how significant transmission investment will be needed to improve resilience and meet future demand requirements. He also suggested reforms in transmission planning (such as longer time horizons and more scenarios), cost allocation, and permitting. Mr. Smyth’s testimony is available [here](#).

Mr. Stanek discussed the different roles of the states and the federal government in permitting, and the importance of importance of federal and state authorities working together in a timely manner to review and permit energy projects. He noted that the federal government and states have been working cooperatively to discuss these issues through the Joint Federal-State Task Force on Electric Transmission. Mr. Stanek’s testimony is available [here](#).

Standards Update

This recurring column provides our Registered Entities with relevant and recent updates to the Reliability Standards and Requirements.

General NERC Standards News

NERC seeks industry comment on proposed rules of procedure changes addressing registration of inverter-based resources

The advent and implementation of new technologies is facing the Bulk Electric System. One of the most striking advances is the increased use of inverter-based resources (IBRs). IBRs have a material impact on the Bulk Electric System and that impact is only likely to grow over the next decade. However, the current NERC Rules of Procedure guiding the registration process are being updated to capture the growth of IBRs at the direction of a November 2022 FERC Order.

On Sept. 13, 2023, NERC posted for 45-day industry comment, proposed revisions to Appendices 2, 5A and 5B of the NERC Rules of Procedure to identify and capture IBRs with Bulk Power System connections. A summary of proposed changes can be found [here](#).

Notable NERC Filings

In July-September 2023, NERC filed the following with FERC:

- On Sept. 15, 2023, NERC filed a [petition](#) with FERC for approval of revisions to the NERC rules of procedure regarding the development of Reliability Standards. The revisions are proposed to empower NERC to be more nimble in implementing Reliability Standards.
- On Sept. 15, 2023, NERC submitted an informational [filing](#) regarding the project schedule for standard drafting and modification relating to virtualization.

Notable FERC Orders

In June-September 2023, FERC filed the following:

- On July 27, 2023, FERC issued an [order](#) denying a rulemaking petition filed by the “Secure-the-Grid Coalition” around a new framework for an enhanced physical security reliability standard.
- On June 20, 2023, FERC issued an [order](#) addressing rehearing requests raised by multiple parties relating to the Extreme Cold Weather Reliability Standards Order (182 FERC ¶ 61,094). The order regarding rehearing addresses challenges that the Cold Weather Reliability Standards Order should have addressed cost recovery mechanisms.
- On June 15, 2023, FERC issued an [order](#) directing NERC to develop a new Reliability Standard or modify TPL-001-5.1 to “address reliability concerns pertaining to transmission system planning for extreme heat and cold weather events that impact the Reliable Operation of the Bulk-Power System.”



Standards Update

New Standards Projects

New Standards projects are described on the NERC [Standards](#) website, along with links to all drafts, voting results and similar materials. Please take note that some Enforcement Dates relate to specific requirements and sub-requirements of the Standard and are detailed below. Recent additions include the following:

Project	Action	Start/End Date
Project 2020-06 - Verifications of Models and Data for Generators	Initial Ballots and Non-Binding Polls	6/27/22 - 7/6/22
Project 2020-02 - Transmission - connected Dynamic Reactive	Comment Period	5/31/22 - 7/14/22
Recent and Upcoming Standards Enforcement Dates		
July 1, 2023	TPL-001-5.1 – Transmission System Planning Performance Requirements Implementation Plan	
Jan. 1, 2024	TPL-007-4 – Transmission System Planned Performance for Geomagnetic Disturbance Events (Requirements R7, 7.1-7.3, 7.3.1-7.3.2, 7.4, 7.4.1-7.4.3, 7.5, 7.5.1, R11, 11.1-11.3, 11.3.1-11.3.2, 11.4, 11.4.1-11.4.3, 11.5, and 11.5.1); CIP-004-7 – Cyber Security - Personnel & Training; CIP-011-3 – Cyber Security – Information Protection; FAC-001-4 – Facility Interconnection Requirements; FAC-002-4 – Facility Interconnection Studies	
April 1, 2024	FAC-003-5 – Transmission Vegetation Management; FAC-011-4 – System Operating Limits Methodology for the Operations Horizon; FAC-014-3 – Establish and Communicate System Operating Limits; IRO-008-3 – Reliability Coordinator Operational Analyses and Real-time Assessments; PRC-023-5 – Transmission Relay Loadability Implementation Plan; PRC-002-3 – Disturbance Monitoring and Reporting Requirements Implementation Plan; PRC-026-2 -- Relay Performance During Stable Power Swings Implementation Plan; TOP-001-6 – Transmission Operations	
Oct. 1, 2024	EOP-012-1 – Extreme Cold Weather Preparedness and Operations (Requirements 1–2 effective 4/1/28; Requirement 4 effective 10/1/29)	
April 1, 2026	CIP-003-9 – Cyber Security – Security Management Controls	

Items Posted for Comment

Posting	Action	Start Date	End Date
Modifications for FAC-008	Initial Ballots and Non-Binding Pool	10/10/23	10/19/2023
NEW Project 2020-06 – Verifications of Models and Data for Generators 	Submit Comments	9/18/2023	10/24/2023
Project 2022-01 – Reporting ACE Definition and Associated Terms	Submit Comments	9/14/2023	10/30/2023

These effective dates can be found [here](#).

Fall Workshop focuses on grid interdependencies

The 2023 RF Fall Workshop brought together 175 people at the historic Omni William Penn Hotel in downtown Pittsburgh. The event drew an additional 134 virtual attendees on Day One and 138 attendees on Day Two.

Day One was all about the interdependencies of the electric grid with other sectors, including government, natural gas, cyber security and water. Speakers from these sectors shared their expertise and then participated in a panel discussion, hosted by Kevin Walker, President and CEO of Duquesne Light Holdings, Inc.

Speakers included Chairman Stephen DeFrank of the Pennsylvania Public Utility Commission; Lesley Evancho, Chief Human Resources Officer at EQT Corporation; Matthew Luallen, Lead Research Scientist for Education Translation, University of Illinois Urbana-Champaign Information Trust Institute; and Justin Ladner, President of Pennsylvania American Water.

Day Two featured presentations from Kal Ayoub of the Federal Energy Regulatory Commission (FERC), Latrice Harkness, Jamie Calderon and Alison Oswald, of the North American Electric Reliability Corporation (NERC), Nicholas Poluch and Colleen Dolan of Talen Energy, and RF's Jim Kubrak, Zack Brinkman and Max Reisinger.

This year's event also included a Reliability Awards luncheon, in which we recognized entities for their contributions to building a more reliable and secure electric grid. See the winners on the next page.



Watt's Up at RF

Congratulations to the winners!



ITC Holdings Corp. received Achievement of Positive Observations:

- ITC volunteered to pilot the Align tool and capture lessons learned, and completed one of the first FAC-003 walkdowns.
- ITC concluded their CIP and O&P audit with 9 positive observations.
- ITC supported CIP-014 efforts by creating a video to distribute to local law enforcement as a security reminder.



AES Ohio was recognized for Collaboration & Audit Readiness:

- AES Ohio was transparent, collaborative, and timely with initial evidence submissions and throughout the audit process.
- AES Ohio completes quarterly FAC-003 aerial inspections and proactively communicates recurring discrepancies to TOs and PCs under PRC-026.



PPL Electric Utilities showed Innovation in Reliability:

- PPL employs proactive Dynamic Line Ratings (DLR) to ensure the grid is operating efficiently using the data provided by the DLR sensors.
- PPL investigated any CIP requirements that may apply to the sensors and discussed with RF so that they could proactively address them.



AES Indiana showed Continuous Improvement in Reliability:

- During engagements, AES Indiana ensured appropriate, highly knowledgeable SMEs were onsite and transparent with responses.
- Improvement areas identified were communicated internally and actions were implemented across the operating companies.

RF hosts Protection System and Human Performance Workshops

RF would like to thank all the speakers and attendees who participated in our 9th Annual Protection System Workshop on Aug. 2 and the 6th Annual Human Performance (HP) Workshop on Aug. 3.

The Protection System Workshop had more than 190 participants and the Human Performance workshop had over 160 participants. We hope everyone enjoyed the material that was shared and took away some new insights to help with their everyday work.

Both workshops were organized and coordinated by RF's Engineering & System Performance department. Although the event was virtual, the events provided an opportunity for Registered Entity personnel to interact with their counterparts by asking questions, learning new techniques and procedures, and sharing their real-life experiences.

If you have questions, need more information, have topic suggestions, or would like to present at future workshops, please contact John Idzior, Thomas Teafatiller, or Johnny Gest.

Protection System

The focus for the Protection System Workshop this year was on activities related to incorporating Inverter Based Resources (IBRs) into current planning and design processes. RF's Thomas Teafatiller began the workshop by reviewing the latest Protection System Misoperation trends across RF and the NERC footprint. Amos Ang (SoCal Edison) discussed short circuit modeling issues with large amounts of IBRs on the system. Manish Patel (Southern Company) gave an overview of IBR fault response and their impact on system protection.

We appreciate the feedback throughout and after the workshop. We were also pleased that most attendees found the material useful and stated they would use it in their daily work. Each year we try to further enhance our workshops, and your feedback goes a long way to help improve the experience.

Human Performance (HP)

The focus for this year's HP event was the use of a variety of approaches to reduce human error in dynamic environments. RF's Johnny Gest opened the workshop by reviewing facility outage statistics for outages caused by human error. Beth Lay, Bret Kent, and Brian Temes (Lewis Tree) presented an overview of their close call reporting program and how it has helped them reduce injuries and help employees learn from each others' experiences.

Rod Courtney (Ampirical) discussed the habits of a highly effective safety culture and gave the audience several HP tools they can use at their organizations. Dwayne Fewless (RF) reviewed human performance versus organizational performance, and how each can contribute to system events.

Dr. Scott Sheperd (Rekindle Your Heart) closed the event with a talk on how people should think about stress. His goal is to help people who are struggling to find ways to rekindle their heart, spirit and mind and rediscover the passion in their lives.

We were pleased the comments from the attendee satisfaction survey, along with suggestions for future topics and outreach efforts.

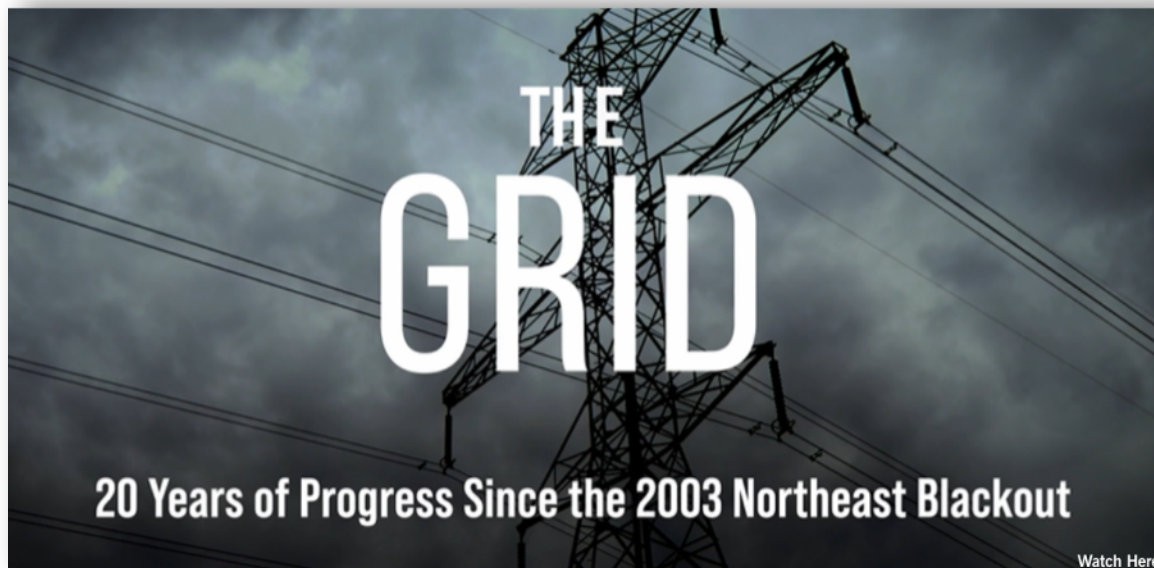
Thank you to all the speakers, attendees and those involved in the workshops for their hard work in making these events a success.

20 Years of Progress: Remembering the 2003 Northeast Blackout

August marked the 20th anniversary of the 2003 Northeast blackout, which occurred on Aug. 14, 2003, and impacted 50 million North Americans across Michigan, Ohio, Pennsylvania, New York and Ontario. To highlight the progress the ERO Enterprise has made, RF, NERC, and NPCC collaborated on a video, [The Grid – 20 Years of Progress Since the 2003 Northeast Blackout](#), reflecting on the progress made since then toward a more reliable and resilient grid.

The blackout, the largest ever experienced in North America, prompted the Energy Policy Act of 2005, which created an electric reliability organization (ERO) charged with developing and enforcing mandatory Reliability Standards, assessing current and future reliability trends, analyzing system events, and recommending improved practices.

[Click here](#) to read more about the video and the anniversary of the 2003 Northeast Blackout.



Outreach Recap



RF is committed to providing timely and pertinent information to our entities and stakeholders. Our monthly, open webinars provide a forum to address topics and questions relevant to reliability, resilience, and security. During our Technical Talks with RF, we host a range of speakers and subject matter experts across the industry.

The Technical Talks with RF are typically the third Monday of each month (but may be moved to accommodate our speakers or to avoid holidays). Our calendar of upcoming events, with agendas and the Webex link to join, can be found on our website [rfirst.org](https://www.rfirg.com/first.org).

Starting Q3 of 2023 and into next year, we will offer a Technical Talk - State Policy Edition once a quarter. These Technical Talks will focus on the grid transformation, energy policy and advances in technology to support green energy generation.

Some of the speakers this quarter have included:

Christmas in July

Level 3 NERC Alert – Cold Weather Preparations for Extreme Weather Events

Darrell Moore, Director, Situation Awareness, NERC

- Extreme weather, specifically winterization and cold weather preparation, is one of the major challenges that the RF region faces annually. In light of recent cold weather events, NERC issued a Level 3 (essential action) NERC Alert. Darrell provided an overview of the eight essential actions in the NERC Alert, and a timeline for completion as we prepare for next winter.

Compliance Monitoring Update – New Standards and Audit Approach / Walkdowns

Ash Chappell, Technical Auditor, RF

- With the recent implementation of EOP-011-2 and the future implementation of EOP-012-1, there are new NERC Reliability Standards in place and coming soon to preserve and enhance the reliability of the Bulk Power System. Ash discussed what to expect during a compliance monitoring engagement regarding RF's audit approach and how these standards will be assessed in the field.

RF Winterization Program – Surveys and Field Visits

Joseph Jagodnik, Senior Reliability Consultant, RF

- For almost ten years, RF has been collaborating with Generators outside of the audit space with annual surveys and site visits. RF will continue this program as we have seen it pay dividends on reliable operations during cold weather. Joe provided an update on what we learned from the visits last winter, and our approach for the winter of 2023-2024.

August: 20th Anniversary of the 2003 Northeast Blackout: What the Bulk Electric System was like before this event, what's changed since, and the path forward

Joseph McClelland, Director of the Office of Energy Infrastructure Security, FERC

David Nevius, former Senior Vice President (retired), NERC

- Joe McClelland and Dave Nevius shared their industry perspective at the time of the 2003 Northeast Blackout and

Watt's Up at RF

reflected on how things have changed since then, both at the FERC and NERC/ERO level, and looked ahead to the challenges of the future.

Inside the control room at NY ISO during the 2003 Northeast Blackout

Steve Swan, Principal Technical Auditor, Operations & Planning, RF

- RF's Steve Swan remembers Aug. 14, 2003 well. In fact, he was working as an operator inside the NY ISO control room at the time the blackout occurred. He shared his perspective from the historic day and his takeaways from the experience, 20 years later.

September: State Policy Edition

Delaware State Senator Stephanie Hansen, 10th District

- Senator Hansen highlighted the success of the Delaware Energy Stakeholders' Group formed to develop and discuss energy legislation in Delaware. The group is comprised of about two dozen members from a wide range of stakeholders and interest groups to provide different viewpoints on the important topics at hand. RF has recently joined the group, presented at meetings, and participated in the discussions.

The group consists of representatives from all of Delaware's utilities, the Public Service Commission, Public Advocate, environmental and conservative organizations, the Department of Natural Resources, the Delaware Sustainable Energy Utility, PJM, members of the legislature, and others.

Dr. Lars Schernikau, Energy Economist, Entrepreneur, Commodity Trader, Author, Investor & Strategic Advisor

- Dr. Schernikau discussed the energy economics, return on

investment, and raw material inputs in relation to the energy transition. He shared his insight on emerging technologies and how they support our clean energy future.

Abe Silverman, Director, Non-Technical Barriers to the Clean Energy Transition - Columbia University CGEP

- Abe Silverman shared his experience and expertise with interconnection, transmission planning and transmission cost allocation. He offered a deep dive into how states are thinking about contracted capacity versus realized capacity and what success looks like in our clean energy future while maintaining reliability.

If you have missed any past Technical Talks with RF, the presentations can be found on our website under "[Technical Talk with RF](#)".

Upcoming Oct. 23, 2023 Technical Talk with RF

Join us for our upcoming Technical Talk with RF on Monday, Oct. 23 from 2 – 3:30 p.m. EST.

The presentations will include Tom Alrich, independent consultant and blogger, sharing his thoughts on cyber security and CIP in the cloud, followed by RF's Shon Austin, principal technical auditor, discussing Project 2019-02 BES Cyber System Information Access Management.

Calendar of Events



The complete calendar of RF Upcoming Events is located on our website [here](#).

Date	RF Upcoming Events
10-23-23	Technical Talk with RF
11-13-23	Technical Talk with RF
12-6-23	Q4 Board of Directors Committee Meetings
12-7-23	Annual Meeting of Members and Q4 Board of Directors Meeting
12-11-23	Technical Talk with RF

Industry Events

Date	Industry Upcoming Events
10-19-23	FERC Open Meeting; 10-11 am EST
10-20-23	PJM Reliability Standards & Compliance Subcommittee
11-1-23	NERC 2023 NERC-NATF-EPRI Annual Transmission Planning and Modeling Workshop
11-2-23	NERC 2023 NERC-NATF-EPRI Annual Transmission Planning and Modeling Workshop
11-7-23	MISO Reliability, Resource Adequacy Subcommittee Meetings
11-8-23	MISO Reliability, Resource Adequacy Subcommittee Meetings
11-8-23	NERC Board Meetings
11-9-23	NERC Board Meetings
11-9-23	FERC Annual Reliability Technical Conference; 9 am - 5 pm EST
11-13-23	PJM Member Committee Information Webinar
11-16-23	FERC Open Meeting; 10-11 am EST
12-7-23	MISO Annual Meeting and Board of Directors Open Session; 8:30-11:00 am EST
12-21-23	FERC Open Meeting; 10-11 am EST

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