Dear Stakeholders:

The theme of this newsletter is collaboration, and collaborative learning is very important to our organization and our Region. Our experts work hard every day to understand both the risks codified in the Standards and emerging risks. However, determining how to mitigate these risks is unique to each situation and entity, which makes collaboration and facilitation essential. We use collaborative learning techniques so that we can help our entities objectively learn about mitigation strategies and make unbiased decisions that improve reliability.

Inside RF, we participate in communities of practice, value stream mapping and road-mapping sessions, and kaizen events to improve processes and solve problems together. We host regular training and Lunch and Learns to ensure we are continuously learning. Our collaborative efforts are also far reaching outside of RF, as we continuously work with research networks, our entities, RTO’s, other Regions and NERC.

This issue shares some articles on collaborative learning and highlights some of the recent collaborations occurring across our footprint and beyond. The two largest RTO’s are in our Region and find many opportunities to engage and benchmark, and this newsletter discusses PJM and MISO’s proposal for a common wholesale energy market. We are constantly looking for new ways to compile our knowledge to help our entities. CIP is always a focus, and for our upcoming CIP themes report, we broadened our collaborative efforts and partnered with WECC and involved the NATF. You will also see some of the external trainings our RF staff are attending and presenting at, in addition to two of the subgroups we facilitate for our members, the generator subcommittee and our newest group, the CIP low impact entity focus group.

I, and the entire RF team, wish all of you a safe and enjoyable holiday season. And we thank you for your commitment to the reliability and resiliency of the bulk electric system.

Forward Together,

Tim

Forward Together
RF is pleased to welcome Lynnae Wilson as one of the newest members of our Board of Directors. She joins us from Vectren Energy Delivery, a Fortune 1000 energy holding company headquartered in Evansville, Indiana. Vectren’s energy delivery subsidiaries provide gas and/or electricity to more than 1 million customers in adjoining service territories that cover nearly two-thirds of Indiana and about 20 percent of Ohio. In 2015, she was recognized in the Evansville Business Journal’s ‘20 under 40’ Awards for her contributions at Vectren and in her community, and we are excited to have her join our Board. We asked Lynnae to share some of her experience and insight with us.

1. Can you please tell us about your education background and professional experience?

I received my bachelor’s degree in mining engineering at the Missouri University of Science and Technology. I have over 14 years of experience in combined gas and electric utilities, and electric generation. Prior to my experience in utilities, I worked in the mining and telecommunications industries. I’ve spent much of my professional career here at Vectren, where I have worked in various engineering and operations leadership positions.

Currently, I serve as the Vice President of Energy Delivery. I am responsible for the engineering, operation, and control of gas and electric transmission and distribution for over one million gas consumers, and approximately 145,000 electric consumers, across Indiana and Ohio. Vectren manages electric transmission assets in Indiana and Kentucky and gas transmission assets in Indiana, Kentucky, and Ohio.

2. What other professional organizations and activities are you involved in?

I am a member of the Edison Electric Institute (EEI)’s Reliability Executive Advisory Committee, the North American Transmission Forum (NATF), and the Indiana Energy Association (IEA). Outside of the energy industry, I serve on the Board of Directors (former President) for Mental Health America of Vanderburgh County, and as a mentor for the Emerging Leaders Mentoring Program.

3. Based on your experience, what is your vision for creating a more resilient Region across multiple infrastructures?

In my experience, resilient systems require resilient people to run them. Vectren has invested significant effort in building resilience among our people and our systems.

Four years ago, here at Vectren we adopted the practices of high reliability organizations through our ComplySMART© initiative. ComplySMART© is how we think about and do our work – always focused on recognizing and solving issues early, taking near misses as seriously as we take misses, resisting oversimplifications, and tapping expertise across the organization as we work. Building on ComplySMART©’s successes, a few years later, Vectren initiated a Safety Management System (SMS), first for our gas operations, and, ultimately across all operations. Those two culture changes have changed the way we think about and do our work – our work in operations, in engineering, in compliance and across our corporate business units as well. We have found great value in collaboration across departments and teams, and I see broader forms of collaboration as a value to be realized across companies within the Region. Organizations like NATF and the IEA already show us the value of collaboration and teaming on issues of interest.

4. We are focusing on collaboration in this issue, as a young leader in the industry have you seen modern collaboration tools begin to make their way into the traditional utilities?

We use several collaboration tools regularly: from visual management boards, “go to meetings,” all hands communications, to continuous improvement events and similar analytical tools. For Vectren, deploying iPhones across the organization, from the field to senior management has opened up a range of opportunities for collaboration and for sharing vital information in real time.

5. Similarly, how have you seen collaboration benefit the industry?

Building on my previous answer, the tools that enhance our abilities to collaborate and share information in real time help us become more nimble and responsive to changing conditions as well as to customer expectations. At Vectren, we have initiated an electric system modernization effort, for example, that will position Vectren to meet customer expectations related to all kinds of “smart” initiatives for their homes and their workplaces.

6. What are you most looking forward to about your term ahead on the RF Board?

I understand on a practical level NERC and RF’s compliance responsibilities as a key to system reliability and resilience. I look forward to my work on the RF Board as an opportunity for me to continue to support system reliability and resilience. I believe that collaborative efforts such as these make us all stronger and better.
We were honored to have Nick Brown, Ron Ciesiel, Tom Galloway, and Barry Kuehnle as our guest speakers during the recent Annual Meeting of Members and Fourth Quarter Board of Directors meetings in Washington, DC.

Nick Brown, President & CEO of Southwest Power Pool, Inc. (SPP), provided the keynote address at the Annual Meeting of Members. He discussed the history of SPP and its future strategic focus. Mr. Brown also discussed the SPP decision to dissolve the SPP Regional Entity and SPP’s perspective on the next steps in the process.

Ron Ciesiel, President and General Manager of SPP Regional Entity, provided the keynote address at the Fourth Quarter Board of Directors meeting. He discussed the evolution of the ERO Enterprise and the electric industry since the beginning of mandatory compliance, and praised the risk-based approach to compliance monitoring and enforcement. He also described SPP Regional Entity, including its history and its diverse registered entities. Mr. Ciesiel also provided his perspective on the dissolution of the SPP Regional Entity.

Tom Galloway, President and CEO of the North American Transmission Forum (NATF), spoke during the Fourth Quarter Board of Directors meeting regarding the NATF’s 2017 activities and its strategic goals and focus areas for 2018. He provided information on the NATF’s programs, including peer reviews; tailored assistance on key topics; educational training; information sharing; and reliability initiatives.

Barry Kuehnle, CIP Senior Advisor for the Federal Energy Regulatory Commission, spoke during the Fourth Quarter Board of Directors meeting. He discussed FERC’s recent CIP Version 5 audits of registered entities across North America, and shared lessons learned from these audits. Mr. Kuehnle also discussed FERC’s recently issued 2017 Staff Report on Lessons Learned from Commission-Led CIP Version 5 Reliability Audits. To read the report click here.
RF Thanks Our Departing Board Members

During RF’s Annual Meeting of Members in Washington, DC, RF recognized the service of two valued Board members, Hertzel Shamash and Deborah Hart, whose terms expired this year. Tim Gallagher thanked Mr. Shamash and Ms. Hart for their service, noting that the organization has greatly benefitted from their leadership and expertise.

Mr. Shamash served on the Board since 2009, representing the Transmission Sector. During his time on the Board, he provided valued guidance as Vice Chair of the Nominating & Governance Committee. Mr. Shamash is the Vice President of Resource Planning for The Dayton Power and Light Company (DP&L). He is responsible for determining the requirements of the transmission system, ensuring compliance, resource development, transmission policy, managing PJM issues, integrated resource planning, and load forecasting.

Ms. Hart served as an At-Large Director on the Board since 2013. During this time, she provided significant contributions to RF through her role on the Finance & Audit Committee and Compliance Committee. She recently retired from her role as Managing Director from Morgan Stanley & Co., LLC, and Vice President - Chief Operating Officer (North American Power & Gas) of Morgan Stanley Capital Group Inc., Morgan Stanley’s wholesale commodities trading group. In this role, she oversaw the operations of three wholly owned power generation stations in North America.

Lou Oberski Concludes Term as Board Chair

Lou Oberski’s term as Chair of the Board expired this year. He has served as RF’s Board Chair since December 2015 and has been a member of the Board since 2011. Tim Gallagher thanked Mr. Oberski for his service as Board Chair and stated that he has been a great leader for the organization. Mr. Gallagher noted that Mr. Oberski will continue on the Board as a director representing the Supplier Sector.

Mr. Oberski is the Senior Policy Advisor for Dominion Resources Services, Inc. He is responsible for the administration of all aspects of Dominion’s corporate NERC compliance assurance programs and oversees Dominion’s involvement at NERC and the Regions as well as FERC and RTO policy coordination for Dominion at PJM, ISO-New England and the Midwest ISO. He is a member of the North American Energy Standards Board of Directors and past chair of its Executive Committee. Mr. Oberski is also a member of EEI’s Reliability Executive Advisory Committee and an Alternate on the SERC Board of Directors.

RF Announces New Board Leadership

RF is pleased to announce that Lisa Barton will serve as its new Board Chair and Simon Whitelocke will serve as its new Board Vice Chair.

Ms. Barton has served on the Board since 2014. She is the Executive Vice President of AEP Transmission and is responsible for the company’s Transmission organization, which includes oversight of the company’s field services, engineering, construction, planning, and system operations as well as its transmission business ventures. She has been in the energy industry since 1987 with a background that includes experience in distribution, regulatory, marketing and legal.

Mr. Whitelocke has served on the Board since 2015. He is the Vice President of ITC Holdings Corp. and President of ITC Michigan, which includes the responsibility for both ITC Transmission and METC operating companies. Prior to this role, he was Vice President and Chief Compliance Officer for ITC Holdings Corporation, where he was responsible for the corporate compliance functions of the company.
Collaborative Learning

The graphic above highlights some key aspects of collaborative learning, and you will see a similar symbol throughout this issue where we identified some level of collaborative learning was involved.

Collaborative learning is not where a “teacher” or “subject matter expert” simply fosters a discussion among “students” or “apprentices” and actively critiques or steers them into the “right” direction. It is not a “team” of people with a “task list” to research and publish a set of findings through some predetermined method of consensus (although this is closer).

The earliest Collaborative Learning groups centered on the philosophy of how to live a good life (for example, Socrates’ Lyceum.) Many of these philosopher schools still had “a teacher” guiding students, which is probably the image that comes to mind when most people think of learning.

In the 1800’s, Alcott, Emerson, Hawthorne, and Thoreau (“Concord Group”) met in Concord, Massachusetts to learn together and discuss the future of issues ranging from education to slavery. The Concord Group was much more closely aligned with collaboration than teaching. Looking back we can see that these synergistic discussions made a positive impact on American Life.

Some more recent examples of collaborative learning can be found in the formation of communities of practice over the last two decade. Etienne Wegner’s popular book called Communities of Practice from the late 90’s outlined what is required for collaborative learning to take place. Wegner describes that although there is not necessarily a “teacher” involved, structure still needs to be in place for the collaborative learning to take place efficiently.

Like other complex systems involving humans, it is difficult to measure the outcomes of collaborative learning. That is why it is crucial to focus on process when setting up collaborative learning engagements. That is because in a complex system, the process shows up in the product (think DNA/RNA, or parents/children.) There are a couple of key process roles for collaborative learning to be effective: Facilitator and Group Collective Knowledge Manager (i.e. Group Librarian.)

This issue highlights a few of our collaborative efforts. As always, RF looks forward to participating with you on future collaborative learning endeavors.

If you would like us to join in, please contact Erik Johnson.
Each year RF completes an annual resource assessment based on the data PJM and MISO provide to RF. This article will share some highlights from this year’s assessment. Based on the data received for the next 10 years, PJM is expected to meet its reserve margin target through 2027. The MISO reserve margin, which includes Existing-Certain and Tier 1 resources, satisfies its reserve margin target through 2022. The MISO reserve margin projected for 2023 is 279 MW below the reserve margin target.

Continuing in 2024, MISO projected reserve margins are 1,082 MW below the target, 1,922 MW below the target in 2025 should rebound slightly to 1,524 MW below the target in 2027. Six years lead time should be sufficient to manage resource adequacy for these last five years of this assessment. However, resource adequacy issues for these years will need to be closely monitored.

**PJM Capacity and Reserves**
- PJM resources are projected to be 194,709 MW in 2018 and then increase to 213,208 MW by the end of 2027. The reserve margin calculations include planned generation retirements, planned generation additions and changes, and a percentage of the Tier 2 projects from the generation interconnection queue. PJM is expected to meet its reserve margin target through 2027.

**PJM Demand**
- PJM RTO is projected to average a 0.13 percent load growth per year over the next ten years. The PJM RTO summer peak in 2018 is projected to be 153,951 MW and increase to 155,773 in 2027 for total internal demand (TID), and 144,764 MW in 2018 and increase to 149,536 MW in 2027 for Net Internal Demand (NID), a 10-year increase of 1,822 MW and 4,772 MW, respectively. Annualized 10-year growth rates for individual PJM transmission zones range from -0.3 percent in UGI Utilities to 0.4 percent in American Electric Power, Duke Energy Ohio and Kentucky and Dominion.

**MISO Capacity and Reserves**
- MISO resources are projected to be 145,145 MW in 2018 and then increase to 148,679 MW by the end of 2027. The reserve margin calculations include planned generation retirements, planned generation additions and changes, and a percentage of the Tier 2 and Tier 3 projects from the generation interconnection queue and satisfies the reserve target through 2022. The MISO reserve margin projected for 2023 is 279 MW below the reserve margin target. Continuing in 2024, the projected reserve margins are below the target, 1,922 MW in 2025, and rebound slightly to 1,524 MW below the target in 2027.

**MISO Demand**
- The 2017 forecasted MISO annual growth rate for 2018-2027 is approximately 0.28 percent. The MISO RTO summer peak is projected to be 125,568 MW in 2018 and 128,716 MW in 2027 for total internal demand (TID), and 119,947 MW in 2018 and 123,095 MW in 2027 for Net Internal Demand (NID), a 10-year increase of 3,148 MW in both categories.

**RF Resources**
- The amount of generation capability for 2018 in RF is 215,087 MW. Overall, there is an increase in capacity through 2027 to 228,347 MW due to capacity replacements for the expected generator retirements.

**RF Demand**
- The estimated coincident NID peak of the entire RF regional footprint for the summer of 2018 is projected to be 164,411 MW. For the summer of 2027, NID is projected to be 169,041 MW. The compound annualized growth rate (CAGR) of the NID forecast is 0.31 percent from 2018 to 2027. The TID for the summer of 2018 is projected to be 174,843 MW. For the summer of 2027, TID is projected to be 176,786 MW. The compound annualized growth rate (CAGR) of the TID forecast is 0.12 percent from 2018 to 2027.

1 Capacity categories that satisfy the reserve margin target are identified as either “Existing-Certain”, “Tier 1”, “Tier 2”, or “Tier 3” resources. “Existing-Certain” and Tier 1 resources receive 100% capacity credit, while “Tier 2” and “Tier 3” resources receive 50% and 10% capacity credit, respectively due to the uncertainty of future project completion.
Figures 1 and 2 are graphs of the reserve margins for the PJM and MISO RTOs with the potential retirements and Tier 2 capacity included and for MISO Tier 3.

Generator retirements are evaluated by the RTOs for reliability impacts as each retirement is proposed.

If the RTO determines that reliability impacts exist, the unit owner is asked to defer retirement until the reliability impacts are addressed.

In this assessment, all generator retirements are assumed to occur after any reliability concerns are addressed.

Actual transmission issues related to the retirement of generation are not included in this assessment.

Figures 3 and 4 show comparisons of actual demand data to ten year forecasts of demand.

Look for this on our new website in the RAPA section...
Since 2011, NERC has hosted a biennial Grid Exercise for industry and government organizations throughout North America. Set up as a tabletop simulation, organizations have the opportunity to demonstrate how they would respond to severe cyber and physical security threats.

These Grid Exercises are created to determine where improvements need to be made in response plans in an exciting and interactive way that does not involve any sort of compliance action.

GridEx IV was designed to challenge utilities and to really test the friction points. The 2015 cyber-attack in Ukraine, as well as the recent spreading of “Fake News” across social media, were key influencers for creating this year’s simulation.

More than 6,500 participants from 450 industry agencies and organizations participated in this year’s Grid Exercise. Participants include the utilities, RTO’s, Regions, the Department of Energy, Department of Homeland Security, FBI, and Department of Defense. While some participants actively responded to events, others simply observed the exercise.

RF has been participating since the onset of GridEx, and enjoyed the unique challenges of GridEx IV. Representatives from RF participated on the GridEx Working Group in developing the scenario for GridEx IV. Once the master scenario was finalized, RF developed injects (simulated events) specific to RF resources, including our IT Infrastructure and our corporate communications capabilities.

The purpose of these custom injects was to test recently improved internal processes and procedures related to Event Analysis, Situation Awareness, Incident Identification and Response, and Emergency Communications.

Throughout the 2-day exercise, RF staff collaborated with participating staff from NERC, our RTOs, and Registered Entities to understand how the scenario was unfolding and what our entities were experiencing as a result of the exercise. We were also able to identify how RF could assist our entities’ response to the scenario.

Going forward, RF will participate in NERC-led discussions to capture lessons learned across the ERO and will incorporate those lessons learned, as well as our own internal lessons learned into continuing to improve our internal processes and procedures.

We will continue to work with others within the ERO to improve communications between and among NERC, the Regional Entities and the Registered Entities so we are all better prepared should a real event of the magnitude simulated in GridEx IV occur.
Training and Collaboration

The Association for Talent Development (ATD) 2016 “State of the Industry Report,” notes that companies spent an average of $1,252 per employee on training; with employees participating in approximately 33.5 hours of training during the calendar year. The report also noted that 84 percent of employees in Best Performing Organizations are receiving the training they need compared with 16 percent in the worst performing companies.1

While the Return on Investment for training is a complex and often lengthy process to measure; there are some identifiable elements that indicate the value of training. Quality training provides not only the knowledge and skills you need but should also energize you and create commitment to and engagement in your organization and its mission. Additionally, quality training programs create many opportunities for collaboration.

During each phase of a training program, from the request to the evaluation of training, opportunities exist for collaboration and team work in order to ensure that the training is relevant, engaging and effective.

Once a request is submitted and enters into the analysis phase, collaboration is a necessity to correctly identify the specific areas that the training should address and the best methods to do so. During this stage teams should include all key stakeholders, from front line associates and managers to the executive team. Including all of these levels permits each of these functions to understand and agree with the need for and the approach of the training.

During the Design and Development phases, collaboration between the Subject Matter Experts (SMEs) and the training team ensures that the training program contains information that is correct, relevant and designed at the appropriate level of future participants.

This is a great opportunity for these individuals to gain an understanding of each other’s discipline. The SMEs can gain appreciation for the process, time and effort needed to create a quality training program, while the trainers are able to learn more about the business.

The primary goal of the Implementation phase is to deliver the content, however this phase should never be a one-way process. The classroom time should not only provide content to the participants but also facilitate discussion among the group. During these discussions, collaboration permits student experiences and knowledge to supplement and impact the course content.

The final phase of training, Evaluation; offers a great opportunity for collaboration. During this phase, constructive feedback is solicited. This feedback can influence the materials and methods of future sessions.

As you can see, collaboration is needed during each phase of a training program. This collaboration ensures that the training is both informative and impactful. So, when you have an opportunity to work with your training department to create a learning program … don’t hesitate, collaborate!

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RF Facilitated Groups

A key component of collaborative learning is that it is strategically facilitated, and RF facilitates a wide variety of opportunities for our members. We’d like to draw your attention to two specific groups to highlight the diversity of our offerings.

**Generator Subcommittee Recap**

On October 20, 2017 the RF Generator Subcommittee Meeting hosted a meeting, a full year after the group’s first meeting this time last year. The Subcommittee meets twice a year, and was created as a forum to share stories of near misses and success stories in a collaborative atmosphere.

The most recent meeting included an update from NERC staff on Mandatory GADS reporting for wind units. Mike Ketchens from RF led a discussion on generator physical security (CIP-014-2), its current impact on Transmission and how this may impact Generation in the future. Don Urban, also from RF presented a review of staff visits to generating plants from the previous year. Best Practices observed by the RF Winterization Visit teams from the 2016-2017 winter period were reviewed and discussed.

Also, RF’s approach to ensuring winter readiness for the upcoming 2017-2018 winter period was explained. Then the group held a round table discussion and planned future in person meetings.

**CIP Low Impact Focus Group**

Our newest group, the CIP Low Impact Focus Group (CIPLIFG), is tailored to assist entities that have assets containing low impact BES Cyber Systems, or are new to CIP compliance. The monthly meetings began in July, and the group is inclusive of small and large entities.

This group, facilitated by CIP Subject Matter Experts, is led by Lew Folkerth, Principle Reliability Consultant. The intent of the CIPLIFG is to allow members to share approaches and work with our CIP Subject Matter Experts to see what upcoming standards and compliance will look like. Additionally, the group has an open communication channel to ensure there is an ongoing forum to ask questions and raise concerns.

Past monthly meeting topics included reviewing emerging cyber security Standards. Possible topics for future meetings include:

- Low Impact Compliance Documentation and Evidence;
- Field Experiences;
- Low Impact Physical Access Controls;
- and an Introduction to CIP Requirements, Compliance, and Audits for Low Impact.

The group currently has 158 members. If you would like to join please email Lew Folkerth here.
RF completes a seasonal assessment based on information PJM and MISO provide. This article will share some highlights from the Assessment. For the upcoming winter of 2017/2018, both MISO and PJM are expected to have adequate resources based on their planning reserve requirements.

Below are the statistics that support this conclusion and our analysis on outage risk, which also supports there should not be an issue supplying demand to RF Region this winter.

**PJM Capacity and Reserves**

- PJM net capacity resources, which includes existing certain and net scheduled interchange for the 2017/2018 winter, are projected to be 184,071 MW. The projected reserves for the PJM RTO during the 2017/2018 winter peak are 51,774 MW, which equates to a 39.1% planning reserve margin for the Net Internal Demand of 132,297 MW. This is greater than the PJM planning reserve margin requirement for the planning year of 16.6%. The planning reserve margin for this winter is similar to the 2016/2017 forecast level of 39.7 percent, due to flat load growth and new capacity replacing retired generation since last winter.

**MISO Capacity and Reserves**

- MISO net capacity resources for the 2017/2018 winter are 142,114 MW. The current projected reserves for the MISO for the 2017/2018 winter peak are 42,729 MW, which equates to a 30.0% planning reserve margin for the Net Internal Demand of 99,385 MW. This is greater than the MISO planning reserve margin requirement of 15.8% for the planning year. The planning reserve margin for this winter is higher than the 2016/2017 forecast level of 35.4 percent, due to an increase of participation in MISO’s demand side management program and an increase of capacity in MISO’s market.

**RF Regional Resources**

- ReliabilityFirst’s net capacity resources for the 2017/2018 winter are projected to be 205,508 MW. The projected reserves for the ReliabilityFirst footprint for the 2017/2018 winter peak is 63,742 MW. The Total Internal Demand is forecast to be 144,183 MW with demand side management of 2,417 MW, which equates to a Net Internal Demand of 141,766 MW. Since PJM and MISO are projected to have adequate resources to satisfy their respective reserve margin requirements, the ReliabilityFirst footprint is also projected to have sufficient resources for the 2017/2018 Winter period.

**Random Generator Outage Risk Analysis**

The following analysis evaluates the risk associated with random outages that may reduce the available capacity resources below the load obligations of PJM or MISO.

The stacked bar charts in Exhibits 1 and 2 are based on forecasted Winter 2017/2018 demand and capacity resource data for the PJM and MISO RTOs. The daily operating reserve requirement for PJM and MISO at the time of the peak demand is also included as a load obligation. The range of expected generator outages is included for scheduled and random outages. The random outages are based on actual NERC Generator Availability Data System (GADS) outage data from December, January, and February 2012 through 2016.

**Resources:**

The committed resources in PJM and MISO are represented by the Resources bar in shades of blue and only include the net interchange that is a capacity commitment to each market. Additional interchange transactions that may be available at the time of the peak are not included as they are not firm commitments to satisfying each RTO’s reserve margin requirement.

**Demand:**

The firm demand and the demand that can be contractually reduced as a Demand Response resource are shown in shades of green. The firm demand constitutes the Net Internal Demand, with Total Internal Demand including the Demand Response. Between the NID and DR bars is the daily Operating Reserve requirement.

There are two sets of stacked Demand bars on the chart, one representing the 50/50 demand forecast and the second the 90/10 demand forecast. Since DR is utilized first to reduce the load obligation when there is insufficient capacity, this part is at the top of the Demand bar.

In the event that utilization of all DR is not sufficient to balance capacity with load obligations, system
operators may first reduce operating reserves prior to interrupting firm load customers. The yellow (second) section of the Demand bar represents the operating reserves.

Between the Resources bar and the Demand bars is the Outage bar. While scheduled outages during the winter season are generally minimal, there are scheduled outages planned during the winter that are reflected in the amount of Scheduled Maintenance (colored gray) in the Outage bar. The remainder of the Outage bar represents the entire range of random outages (pink shows 100 percent of the random outages; rose shows less than 100 percent down to 10 percent of the random outages; and red shows less than 10 percent down to 0.2 percent of the random outages on the chart) which occurred during the five-year reference period.

**Outages:**

In the following discussion of the random outages, the analysis of random outages exceeding certain reserve margin targets will be presented as a probability. These probabilities are not based on a true statistical analysis of the available daily random outage data. Rather than statistical probabilities, these numbers represent the percentage of the daily outages during the five prior winter periods that would have exceeded the reserve margin that is listed. They are discussed as probabilities as a matter of convenience in describing the analysis results.

To the left side of the range of random outages are probability percentages related to the amount of random outages that equal or exceed the amount of outages shown above that line on the Outage bar. Moving from top to bottom of the Outage bar represents an increasing amount of random outages, with a decreasing probability for random outages.

In Exhibit 1 for PJM, the random outages represented by the bar above the 100% point is 1,384 MW. This means that the probability of there being at least 1,384 MW of random generation outages is 100%. Similarly, at the 10% point, the outages represented by the bar above the 10% point is 21,249 MW (1,384 MW + 19,865 MW). There is a 10% probability that there will be at least 21,249 MW of outages. As shown by the probabilities and corresponding amounts of random outages, the distribution of random outages is not linear throughout the range of outages observed.

To the right of the Outage bar are the probabilities of the random outages that correspond to different levels of demand obligation.

Exhibit 2 contains the information to perform the same analysis for MISO. The top of the 90/10 Demand obligation with the operating reserves has a 1% probability that Demand Response will be required.

Since the calculated probabilities are very low for the 90/10 (high demand) scenarios, RF does not expect PJM or MISO to have problems supplying their winter peak demand.
Data Bites: Have Your Pie, but Avoid 3D too.

A large part of Data Analytics relates to visualization of the data. This article is the first in a series of articles on data visualization and how different visualization tools help or hinder the understanding of data. To start the series, we will discuss the pie chart.

The pie chart is considered to be “evil” by many data scientists. This is largely because of its consistent misuse. While the pie chart is not without value, one must be careful to understand its shortcomings as well as its strengths to use it effectively.

To illustrate some of the challenges with pie charts, what follows is a simple example of how the same data can be shown in different ways and how those different visualizations affect the reader’s ability to understand the data.

To start, consider the following set of hypothetical data.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Violations</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC-001-3</td>
<td>50</td>
<td>39%</td>
</tr>
<tr>
<td>ABC-001-7</td>
<td>47</td>
<td>37%</td>
</tr>
<tr>
<td>ABC-002-4</td>
<td>20</td>
<td>16%</td>
</tr>
<tr>
<td>ABC-002-6</td>
<td>10</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>127</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The table makes it easy to see the patterns in the data. Now, consider the same data in the following pie chart:

Can you tell how many more violations occurred with ABC-002-4 versus ABC-002-6?

How about ABC-001-3 versus ABC-002-6? Does ABC-001-3 have more violations or does ABC-001-7? These are questions that are challenging to answer with a pie chart without the actual values being shown.

However, including the actual values is not ideal and detracts from the visual appeal of the chart. Therefore, if you conclude that data labels are necessary in your pie chart, you should ask yourself why your chart doesn’t communicate that information on its own and how you might better visualize the data.

In the case of pie charts without labels, the issue is a simple human cognitive challenge; people are not very good at accurately judging area, especially the area of circles.

Some relative estimates can be made such as ABC-002-4 had more violations than ABC-002-6, but to say that it is exactly twice as many is cognitively challenging. However, humans are good at judging length. In fact, humans in general have an easier time with rectangles than with circles. To illustrate, let us consider the following bar chart.

Can you tell how many more violations occurred with ABC-002-4 versus ABC-002-6?

How about ABC-001-3 versus ABC-002-6? Does ABC-001-3 have more violations or does ABC-001-7?

The answers to these questions are very clear and easy to assess in a bar chart. The bar chart takes advantage of the human ability to quickly comprehend and judge length. As a result, it can communicate much more about the set of data in this case.

Continued on page 14
Now, consider another data science “evil,” the 3D pie chart. Sure it looks cool, but the 3D pie chart is considered among the absolute worst forms of data visualization by data scientists because it does not effectively communicate anything. Consider the cognitive challenges of the regular pie chart; these are present with the 3D pie chart along with distortion of perspective.

In this case, the wrong perspective is used, making it appear that ABC-001-7 had the most violations by far. Consequently, this chart should never be considered as an option for any data visualization simply because it is so misleading and cognitively impossible to infer anything meaningful.

**So, when can you use a pie chart?**

There are two cases of where a pie chart may be the right visualization method. Most data scientists agree it is best applied with you have three or fewer categories. Some data scientists will allow up to five or six categories. The pie chart loses its communicative capabilities after that point. The two primary times to use a pie chart are:

- To show no more than two or three parts of a whole with three or fewer categories. The pie chart can show at quick glance that all parts add up to 100 percent. However, a properly designed and titled bar graph can also achieve this.

- To focus attention on proportions easily measured by the human eye (i.e., halves and quarters.)

In most other cases, the data visualization best practice is to use bar graphs instead of pie charts for the display of quantitative information, and to never use a 3D pie chart.

**References**

“How (and why) are pie charts considered ‘evil’ by data visualization experts?” Data Science Forum, Quora, to learn more click here.

“Understanding Pie Charts”, eagereyes, to learn more click here.

“The Worst Chart in the World” Walter Hickey, Business Insider, to learn more click here.


“Why Pie Charts Are the Worst” Lindsay Kolowich, RAMP The InsightSquared Blog, to learn more click here.
PJM Interconnection (PJM) and Midcontinent Independent System Operator (MISO) are working together, through an open stakeholder process, to refine a joint and common wholesale energy market covering their respective regions. The joint and common market is designed to improve system reliability, customer-focus, clarity of market rules, and operations and price transparency, among other benefits.

The joint and common market harnesses the resources of both organizations to achieve many of the benefits of a single energy market. Certain market functions will be undertaken jointly and others through common processes. This will provide non-discriminatory access and promote more efficient use of the electric system to better meet the needs of all customers and stakeholders using the electric power grid in each footprint.

The joint effort has already achieved improvements for customers, such as coordinated transaction scheduling (CTS), which was implemented earlier this year to optimize the efficiency of interchange transactions between the PJM and MISO footprints.

PJM and MISO will operate the joint and common market, managing the Real-Time and Day-Ahead markets and handling various services such as planning, scheduling, operations, and settlements and billing.

The conceptual framework envisions that all market participants will conduct business through a market portal accessed through the Internet or a virtual private network.

Information would flow between market participants and the portal, and the portal would provide such services as security, customer relations and support, graphical display and messaging, web content management and data manipulation.

For additional information on this joint PJM/MISO initiative, click here.
Maximizing the Benefit of Baseline and Change Management

In this recurring column, I explore various CIP issues. I share with you my views and opinions, which are not binding, but rather are intended to provoke discussion within your entity and to be helpful to you as you and your entity strive for continuous improvement in the reliability, security, resiliency, and sustainability of your CIP compliance programs. There are times that I may also discuss areas of the standards that other entities may be struggling with and attempt to share ideas to help you overcome 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.

My focus in this article is on baselines. I’ll discuss what baselines are, why they’re useful for cybersecurity operations, and how to maximize the benefits of baselines.

What is a baseline?

There are two types of security practice known as a “baseline.” The first type, as described by NIST SP800-128 in the sidebar, deals with the configuration of a system and is useful for detecting changes made by normal update processes, such as patches or version releases. The second type, as pioneered by Gene Kim and Gene Spafford at Purdue University, monitors individual files in a system for unexpected or unauthorized change and is useful for detecting malicious changes to a system. CIP-010-2 R1 requires a baseline of the type described by NIST SP800-128.

A baseline is not and should never be a static list, but a living document that will change as system changes are made. A baseline by itself is not a complete change control system; it is, rather, a significant component of a change control system.

Why do we need baselines?

Baselines are commonly used for three major purposes:

1. To document a system’s configuration. A baseline provides a very detailed picture of a system’s configuration. As I discuss below, this picture can include the hardware platform, the virtual environment hypervisor (if any), the operating system or controlling firmware, application software, configuration files and registry entries, ports, and many other items of detail.

2. To establish items subject to change control. Change control is necessary for high reliability systems. Information Technology (IT) practice has shown that uncontrolled changes or insufficient testing of changes contributes significantly to system downtime. A baseline should contain every configuration item that can affect the reliable operation of the device. Then those configuration items can be managed by a change control process.

3. To enable the detection of unauthorized changes. In order to detect when an unauthorized change has been made to the configuration of a system, you need to know the expected configuration of the system. Then, by comparing the expected configuration of the system to the actual configuration of the system, you will find not only that the system was changed but also what was changed.

How do we maximize the benefit of baselines?

The creation and maintenance of a baseline requires a substantial investment of time and money. It is good business sense and good security practice to maximize that investment by using the baseline for multiple purposes. In order to obtain maximum benefit from the creation and maintenance of the baseline, it must include sufficient detail about the system to be useful without becoming too burdensome. Other than the configuration items required by the Standards, you should balance the usefulness of the baseline with the effort required to maintain any configuration items that are beyond the Standard.

Change Authorization and Testing. The baseline is the basis for change authorization and testing required by CIP-010-2 R1. The Standard covers verification of security controls and, for high impact BES Cyber Systems, testing of changes to ensure that security controls are not affected. But baseline change management can be leveraged to cover functional testing to ensure that your real-time systems are not impacted by unexpected effects of a change.

Detection of Unauthorized Changes. The baseline is the basis for detection of unauthorized changes required by CIP-010-2 R2. In the event an unauthorized change is detected, CIP-010-2 also requires an investigation. I think an audit team will want to know that your investigation of an unauthorized change has answered, or attempted to answer, these questions: What is the extent of the unauthorized change? Who made the change? Was the change malicious? What steps were taken to prevent a recurrence of this or a similar issue?

Patch Management. The baseline is required to include the operating system, firmware, and application software. These items should be transferred to the patch management program of CIP-007-6 R2 (Systems Security Management). This ensures that your patch management program does not miss a piece of installed software. It
also assists you during a compliance engagement because an audit team will expect to see this link, so it is best to be able to document that your detailed baseline is used in this manner.

Ports and Services. One of the required elements of the baseline is “Any logical network accessible ports” (CIP-010-2 R1 Part 1.1.4). Each listening network port is held open by an underlying service or other program. For example, network port TCP/443 may be held open for connections by a web server. Any connection to this port is directed to the web server for action and response. In my opinion, the best way to document the network ports in use is to identify the services (or other programs) that hold open listening ports, and then identify the ports or port ranges that the underlying service can listen on.

If you maintain the separation of need (business need) for each service (and the service’s ports) in the baseline, your compliance documentation for CIP-007-6 R1 (Ports and Services) becomes a simple extract from the baseline documentation and has the added benefit of being under change management for compliance assurance.

Incident Response Plans and Recovery Plans. An established detailed baseline is an excellent way to document what’s “normal” on your systems. This information is critical for incident response teams and recovery teams. In my opinion, having this information at their fingertips will speed and enhance a team’s performance in the identification, containment, eradication, and recovery phases of incident response, and in the recovery of Cyber Assets in the event of an emergency. If you don’t agree with me, I suggest you run two operational exercises of a Reportable Cyber Security Incident (so you can take credit for testing your incident response plan).

Run the first exercise without giving the team access to the baseline; run the second test a few months later and provide the team with the current baseline. Measure the team’s response time and effectiveness in each exercise. If you do this, I would appreciate hearing about your experience.

What configuration items should be included in the baseline?

In my opinion, a detailed baseline should include many configuration items beyond what is minimally required by CIP-010-2 R1. Here are my suggestions for configuration items to include in your baseline; those required by the Standard are marked [Required]:

**Hardware.** The baseline’s hardware configuration items should include not just the computer model and serial number, but any devices that can be changed without changing the core computer. I would certainly include any expansion cards such as network interfaces and graphics adapters. I would also include items such as external or internal hard drives, the type and quantity of system memory installed, any normally connected devices such as printers or scanners, and any other items that are needed for operation of the device.

**System Management.** Also include in the hardware baseline any system management processors such as “Integrated Lights Out” (ILO) or similar devices. These devices may also need to be on your list of BES Cyber Assets or Protected Cyber Assets.

**External Physical Connections.** Other than power connections, you should have a record of any external connections in the hardware baseline. Ethernet, serial, fibre channel, USB, and any other external connections should be recorded.

**Network Parameters.** Include in your baseline any static network parameters that can affect the operation of the system. If you use static IP addresses, for example, those should be kept in the baseline for recovery purposes.

**Externally Supplied Software [Required].** I am breaking the software category into two parts, for reasons you will see in the discussion of custom software, below.

Any software supplied from an external source must be included in the baseline (see Lew’s Recommended List). This is true no matter how the software is provisioned or stored.

**Custom Software [Required].** This appears to be a catch-all category to ensure that all software is included in the baseline, including software written in-house. Essentially any software, including scripts, that does not fall into the “externally supplied software” category above should be classed as “custom software.”

**Ports and Services [Required].**

As discussed above, the best way to document the configuration items related to network ports is to document the program or service that is holding open a listening port, and identify the port or range of ports that program or service can hold open.

**Firewall Rules.**

While firewall rules are not explicitly required to be included in the baseline, those rules do need to be under change control. I strongly recommend that you either keep in-scope firewall rules in the baseline for the firewall, or have a separate formal change management program for those firewall rules.
Patches and Updates [Required].
The language of the Standard actually says “security patches,” but you must know the version of any software you’re running. I recommend keeping a record in the baseline of all patches and updates applied, whether they are security patches or not.

Anti-malware.
The type and version of your anti-malware software should already be included in the baseline as commercial software. You may also want to include in the baseline significant parameters that affect the operation of the anti-malware, such as frequency of scheduled scans and the types of data streams subject to real-time scans. Note that signature files are tracked by a separate process and should not be in the baseline.

In some cases, a Windows registry entry or a Unix/Linux configuration file may have a significant impact on security or reliability. You might use a process similar to the one suggested for scripts, above, to identify applicable registry entries or configuration files for inclusion in the baseline.

Can automated tools be used to create and maintain the baseline?
For entities with substantial numbers of in-scope systems, automated tools are probably the only way to sustain the baseline processes required by CIP-010-2. Keep in mind that no tool can do everything. All tools that I’m aware of require a significant amount of manual effort to implement, and also to maintain and operate. A solid process and effective internal controls to monitor and check the implementation are necessary even with the aid of automated tools.

For example, many tools rely on the Windows registry to determine the list of installed software. But some applications, such as Oracle, do not place a record of their installation in the registry location that is expected by the configuration management tools. As a result, you may need to manually add Oracle to the baseline, and manually track any Oracle changes that take place.

Requests for Assistance
If you are an entity registered within RF and believe you need assistance in sorting your way through this or any compliance related issue, remember RF has the Assist Visit program. All you need to do is submit an Assist Visit Request via the rfirst.org web site here.

Your approach to the identification of scripts should be covered at a high level in the applicable policy. Details of the script identification parameters, how the scripts are identified, how they are documented in the baseline, and how changes are detected should be in your process required by CIP-010-2 R1.

Baseline, whether it be for anti-malware or scripts, should be maintained to ensure the protection of critical systems.

Is compliance risk increased by going above and beyond the Standard?
Many of my suggestions above go beyond the requirements of the Standard. RF (and, in my understanding, the ERO as a whole) refrains from punishing an entity when an entity fails in the execution of a process in an area that goes beyond the Standard. For example, if you keep a detailed hardware inventory in your baseline as recommended above and you fail to authorize the replacement of a failed hard drive, your audit team might give you a recommendation to improve your process, but would not issue a finding of possible non-compliance (PNC).

Feedback
Please share any feedback you may have on these articles. Suggestions for topics are always appreciated. I may be reached here.
Clean Power Plan Update

On October 10, 2017, President Trump’s appointee for the head of the U.S. Environmental Protection Agency (EPA) signed a proposal to repeal the Obama-Era Clean Power Plan. Scott Pruitt (R-Okla.), who was confirmed by the U.S. Senate to serve as the Administrator of the EPA in February of 2017, made the announcement at an event with coal miners in eastern Kentucky.

The Clean Power Plan (CPP), finalized in 2015, aimed to cut emissions from the power sector 32% by 2030 compared to 2005 levels. The plan mandated that states implement a strategy for existing power plants to meet emissions standards set by the EPA. If they did not, the EPA would develop a strategy for them.

From its inception, the Clean Power Plan has generated debate at the state level. In 2015, the CPP was challenged in court by 27 states. The U.S. Supreme Court blocked implementation of the CPP in February of 2016, and legal challenges to the rule are currently suspended in the U.S. Court of Appeals for the D.C. Circuit.

The EPA is seeking public comments on the repeal proposal until January 16, 2018. Additionally, the EPA will host a two-day hearing in Charleston, West Virginia, on November 28-29 on the proposed repeal.

Utility Analytics Week

The Utility Analytics Institute (UAI) held their sixth annual Utility Analytics Week (UAW) in San Antonio, Texas from November 1-3, 2017 hosted by CPS Energy. RF’s data scientist, Dr. Kellie Anton, attended the gathering of data scientists and data champions from utilities across North America to share ideas on data analytics.

This year’s UAW included five different learning tracks; Analytics Imperatives, Customer Analytics, T&D Operations and Grid Analytics, Generation Analytics, and Solution Showcase. Many utilities shared their analytics success stories and journeys. From these learnings, the importance of a good data governance structure became apparent. It is also apparent that having a dedicated data analytics program is becoming more important to success.

There was plenty of discussion around smart grid technology and harnessing the data generated by the many devices now online and coming online. This wealth of information also is pushing utilities into the realm of artificial intelligence and cognitive computing. All of this is part of the fourth industrial revolution which is quickly changing the way society functions.

UAI will hold the Utility Analytics Summit on April 16-18, 2018 in Irvine, CA. The event will be hosted by Southern California Edison.

Transmission Owners Collaborate to Ensure Adequate Equipment Reserves

As of November 2017, more than 28 different utilities (such as PPL Electric Utilities, Ameren Corp., six Duke Energy utilities, and the Tennessee Valley Authority) have committed to join the Regional Equipment Sharing for Transmission Outage Restoration Program (RESTORE) program. The purpose of RESTORE is to assure that the grid can efficiently allocate transmission resources (particularly transformers) in a time of crisis or high demand. It is a collaborative effort among utilities from across the county designed to enhance the resilience and reliability of the grid.

Utilities find value in collaborating in these transmission equipment sharing programs because it is difficult for utilities to keep adequate reserves of transmission equipment. Transformers in particular can cost millions of dollars and take months to build and transport.

The RESTORE program is specifically targeted towards the physical and material nature of the electric grid rather than the math-driven, sensor operating network. This is because the physical, material nature of the transmission grid can create significant challenges if destabilized. RESTORE works to address the challenges of the cost and custom nature of transformer infrastructure. By joining RESTORE, utilities can share critical transmission equipment and technical aptitude in order to quicken the restoration of electric service after natural disasters and other catastrophic emergencies.
On September 28, 2017, the Department of Energy released a Notice of Proposed Rule Making (NOPR) for final action by FERC. On October 2, 2017, FERC invited comments on the proposed rule. Comments were due by October 23, 2017, with reply comments due by November 7, 2017.

The original proposed rule provided full cost recovery for merchant coal and nuclear plants with 90 days of fuel supply onsite in an attempt to keep the baseload plants online and operating. Since its proposal back in September, however, many have voiced concerns about the rule, citing it as vague and overbroad.

In the newer version of the proposal filed in the Federal Register on October 10, 2017, the DOE proposed that the cost recovery would only apply to merchant plants in ISO and RTO jurisdictions with “energy and capacity markets.” This differed from the original proposal, which was silent to a capacity market requirement.

Supporters of the DOE proposal have commented that it or a similar cost recovery package is necessary to keep at-risk coal and nuclear plants from going offline and threatening power reliability. Opponents of the proposal have commented that the DOE has shown little evidence that grid reliability is threatened, and encouraged FERC to devise broader, market-based approaches to value grid resilience.

Update: DOE NOPR Sparks Conversation Amidst FERC Decision

On December 7, 2017, Kevin McIntyre was officially sworn in as the new FERC Chairman. As the fifth commissioner sworn in, FERC now has a full panel of commissioners. McIntyre, a Republican, gives FERC a split of three Republican Commissioners and two Democratic Commissioners. Kevin McIntyre replaces Neil Chatterjee as FERC Chairman. Chatterjee had served as FERC Chairman since he joined FERC as a commissioner in August 2017.

Mr. McIntyre was nominated to FERC by President Trump in August, and confirmed by the U.S. Senate in November. For the majority of his 30-year legal career, Mr. McIntyre served as the co-head of Jones Day's Global Energy Practice. At Jones Day, he represented energy companies in various settings, particularly related to government regulation of energy markets, electric and gas utilities, and oil and gas pipelines.
This recurring column provides our Registered Entities with relevant and recent updates to the Reliability Standards and Requirements. As we have noted before, this column does not cover all updates to Reliability Standards, but we will focus on updates that might be of more significant interest to the industry. Please take note of the following changes to Standards and progress on new and revised Standards.

### Resources Posted

NERC has posted the streaming webinar and slide presentation for the September 20, 2017 Project 2015-10 – Single Points of Failure webinar.

### NERC Filings and News

#### NERC Filings

On October 23, 2017, NERC filed with FERC comments in response to the Department of Energy's proposed rule and FERC's notice inviting comments on Grid Reliability and Resilience Pricing.

On October 10, 2017, NERC filed with FERC supplemental comments in response to the notice of request for supplemental comments on the notice of proposed rulemaking issued by FERC, regarding proposed revisions to FERC's rules and regulations on primary frequency response.

On October 2, 2017, NERC filed with FERC a report in accordance with the FERC Order No. 802, evaluating whether all Control Centers with High Impact Bulk Electric System Cyber Systems should be protected under the CIP-014 Reliability Standard. NERC's 2017 filings to FERC are available here.

On October 4, 2017, NERC and Northeast Power Coordinating Council, Inc. filed with the Nova Scotia Utility and Review Board (NSUARB) joint comments in response to NSUARB requests for comments regarding NERC's 2nd Quarter 2017 Application for Approval of Reliability Standards. NERC's Canadian (Nova Scotia) filings are available here.

On September 26, 2017, NERC submitted to FERC a petition for approval of proposed Reliability Standards CIP-013-1, CIP-005-6, and CIP-010-3 addressing Supply Chain Cybersecurity Risk Management.


On September 20, 2017, NERC submitted to FERC an informational filing regarding commissioning testing of protection systems.

#### On September 5, 2017, NERC submitted to FERC an informational filing regarding Reliability Standard PRC-006-3 – Automatic Underfrequency Load Shedding. PRC-006-3 revises the regional Variance for the Québec Interconnection as necessary to account for the physical characteristics and operational practices of that Interconnection. No changes have been made to any of the continent-wide Requirements of FERC-approved Reliability Standard PRC-006-2 nor the regional Variance for the Québec Interconnection as necessary to account for the physical characteristics and operational practices of that Interconnection.

On September 26, 2017, NERC submitted to FERC a petition for approval of proposed Reliability Standards CIP-013-1, CIP-005-6, and CIP-010-3 addressing Supply Chain Cybersecurity Risk Management.

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### General NERC Standards News

#### NERC Filings

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### FERC Issuances

On November 1, 2017, FERC issued an order accepting NERC's 2018 Business Plan and Budget and the 2018 Business Plans and Budgets of the eight Regional Entities and the Western Interconnection Regional Advisory Body.

On October 24, 2017, FERC issued two letter orders approving the following items:

1. Revisions to the Violation Risk Factors for Reliability Standard BAL-002-2 – Disturbance Control Standard-Contingency Reserve for Recovery from a Balancing Contingency Event issued October 2, 2017 in Docket No. RD17-6-000; and


FERC also issued a letter order letter approving regional Reliability Standard BAL-502-RF-03 – Planning Resource Adequacy Analysis, Assessment, and Documentation. The proposed regional Reliability Standard BAL-502-RF-03 establishes common criteria, based on “one day in ten year” loss of load expectation principles, for the analysis, assessment, and documentation of resource adequacy for load in the RF Region.


FERC issued two final rules on NERC standards as well as a notice of proposed rulemaking at its open meeting on September 20, 2017.

**Order No. 836** approves Reliability Standards BAL-005-1 – Balancing Authority Control and FAC-001-3 – Facility Interconnection Requirements and the retirement of currently effective Reliability Standards BAL-005-0.2b, BAL-006-2 and FAC-001-2.

**Order No. 837** approves Reliability Standard PRC-012-2 – Remedial Action Schemes. The purpose of PRC-012-2 is to ensure that remedial action schemes do not introduce unintentional or unacceptable reliability risks to the bulk electric system. The final rule also approves the retirement of Reliability Standards PRC-015-1 and PRC-016-1 as well as NERC’s request to withdraw proposed Reliability Standards PRC-012-1, PRC-013-1 and PRC-014-1, which were previously pending before FERC.

Both final rules become effective 60 days after their publication in the federal register.

FERC also issued a notice of proposed rulemaking (NPR) for proposed Emergency Preparedness and Operations (EOP) Reliability Standards EOP-004-4 – Event Reporting, EOP-005-3 – System Restoration from Blackstart Resources, EOP-006-3 – System Restoration Coordination and EOP-008-2 – Loss of Control Center Functionality. NERC will review the NPR and submit comments as appropriate.
Standards Update

NERC News

General Compliance and Enforcement News

Supply Chain Risk Mitigation Initiative Page Launched

On August 10, 2017, the NERC Board of Trustees adopted proposed Reliability Standards CIP-005-6, CIP-010-3, and CIP-013-1 (Supply Chain Standards), addressing cyber security supply chain risk management issues, and approved the associated implementation plans. Concurrently, the NERC Board adopted additional resolutions related to their implementation and evaluation. The resolutions outlined six actions to assist in the implementation and evaluation of the Supply Chain Standards and other action to address potential supply chain risks for assets not currently subject to the Supply Chain Standards.

NERC has initiated a collaborative program with industry, trade organizations, and key stakeholders to manage the effective mitigation of supply chain risks. The Supply Chain Risk Mitigation Initiative Page consolidates and shares Supply Chain-related documents and deliverables for industry stakeholders, and it will be regularly updated as new information becomes available in support of accomplishing the resolution’s actions.

Release of Three New Reliability Standard Audit Worksheets

Three new Reliability Standard Audit Worksheets (RSAWs) have been posted to the RSAW homepage under the heading ‘Current RSAWs for Use.’ BAL-002-2 – Disturbance Control Performance - Contingency Reserve for Recovery from a Balancing Contingency Event becomes effective on January 1, 2018. IRO-018-1(i) – Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities and TOP-010-1(i) – Real-time Reliability Monitoring and Analysis Capabilities becomes effective on April 1, 2018.

NERC and Regional Entities Release Regional Program Information Matrix

As part of the ERO Enterprise Program Alignment Process (Program Alignment), NERC and the Regional Entities developed the Regional Program Information Matrix. The Regional Program Information Matrix provides general information regarding the Regional Entities’ processes and timing around key Compliance Monitoring and Enforcement Program activities. The matrix provides transparency for certain regional processes that may differ, but where these differences are permitted per the NERC Rules of Procedure and other ERO Enterprise guidance. Additional information regarding the ERO Enterprise Program Alignment Process can be found on the NERC’s website.

Compliance Guidance Content Updated

Three new proposed Implementation Guidance documents have been posted on the Compliance Guidance page.

NERC Releases One New Reliability Standard Audit Worksheet

A new Reliability Standard Audit Worksheet (RSAW) for PRC-026-1 Relay Performance During Stable Power Swings has been posted to the RSAW homepage under the “Current RSAWs for Use.” PRC-026-1 becomes effective on January 1, 2018.

Newly Effective Standards

The following standards became effective on October 1, 2017:

- COM-001-3 Communications
- IRO-002-5 Reliability Coordination, Monitoring and Analysis
- PRC-006-3 Automatic Underfrequency Load Shedding

Update to ERO Enterprise Guide for Internal Controls

On September 22, 2017, NERC and the Compliance and Certification Committee posted an updated version of the ERO Enterprise Guide for Internal Controls. The update was focused on enhancing registered entity understanding of the benefits of internal controls and how the use of internal controls supports compliance with the NERC Reliability Standards and overall reliability and security of the bulk power supply.

Resources Posted

The ERO Enterprise recently conducted an industry webinar on the 2018 Compliance Monitoring and Enforcement Program (CMEP) Implementation Plan. The streaming webinar and slide presentation have been posted.

Updates Made to Compliance Guidance Content

The NERC Compliance Guidance web page has been updated as described below.

Proposed Implementation Guidance – Two new proposed Implementation Guidance documents have been posted:

- CIP-004-6 R3 – Personnel Risk Assessment for Nuclear GOP
- MOD-027-1 R2 – Clarification of MOD-027-1 Attachment 1 Row 7 Verification Condition for Generator Owners

ERO Enterprise-Endorsed Implementation Guidance – One new ERO Enterprise-endorsed Implementation Guidance document (i.e., MOD-033-1 – Methodology Reference Document) has been posted.

Guidance Under Development – A new “Implementation Guidance Under Consideration” section has been added. This section includes information on guidance under development, or under consideration for development.

ERO Enterprise Non-Endorsed Implementation Guidance – This tracking spreadsheet has been updated to include the following:

PRC-004-5(i) Standard Application Guide – The ERO Enterprise declined to endorse this document as it could cause an entity to be in non-compliance because it is not clear that an entity which does not elect to include similar Protection System components, or locations, within its CAP shall have documentation of the evaluation and the timeline to make necessary corrections.
Recent and Upcoming Standards Enforcement Dates

January 1, 2018
- BAL-002-2 Disturbance Control Standard — Contingency Reserve for Recovery from a Balancing Contingency Event
- BAL-502-RF-03 Planning Resource Adequacy Analysis, Assessment and Documentation
- PRC-006-SERC-02 Automatic Underfrequency Load Shedding Requirements
- PRC-026-1 Relay Performance During Stable Power Swings (Requirement 1)

April 1, 2018
- IRO-018-1 Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities
- TOP-010-1 Real-time Reliability Monitoring and Analysis Capabilities

July 1, 2018
- CIP-009-6 Cyber Security — Recovery Plans for BES Cyber Systems (Requirement 2,3)
- CIP-010-2 Cyber Security — Configuration Change Management and Vulnerability Assessments (Requirements 3,2,3,2,1,3,2,2)
- MOD-026-1 Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions (Requirements R2,2,1,2,1,6)
- MOD-027-1 Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions (Requirements R2,2,1,2,1,5)
- TOP-001-4 Transmission Operations
- TPL-007-1 Transmission System Planned Performance for Geomagnetic Disturbance Events (Requirement 2)

September 1, 2018
- CIP-003-6 Cyber Security — Security Management Controls (Requirement 2, Att. 1, Sec. 2 and 3)

January 1, 2019
- BAL-005-1 Balancing Authority Control
- FAC-001-3 Facility Interconnection Requirements
- TPL-007-1 Transmission System Planned Performance for Geomagnetic Disturbance Events (Requirement 5)

January 1, 2020
- PRC-026-1 Relay Performance During Stable Power Swings (Requirements 2-4)

July 1, 2020
- PRC-002-2 Disturbance Monitoring and Reporting Requirements (50% compliance for Requirements 2-4, 6-11)

January 1, 2021
- PRC-012-2 Remedial Action Schemes
- TPL-007-1 Transmission System Planned Performance for Geomagnetic Disturbance Events (Requirement 6, 6.1-6.4)

January 1, 2022
- TPL-007-1 Transmission System Planned Performance for Geomagnetic Disturbance Events (Requirements 3,4,7)

July 1, 2022
- PRC-002-2 Disturbance Monitoring and Reporting Requirements (Requirements 2-4, 6-11)
- VAR-501-WECC-3 Power System Stabilizer (Requirement 3 has an effective date of July 1, 2022 for units placed in service prior to final regulatory approval.)

New Standards Projects

Several new Standards projects and new project phases are underway. Projects are described on the NERC Standards website, along with links to all drafts, voting results, and similar materials. Recent additions include the following projects:

Current and upcoming Ballots
- Project 2016-02 Modifications to CIP Standards | CIP-012-1; Additional Ballot and Non-binding Poll; 12/01/17 – 12/11/17
- Project 2016-04 Modifications to PRC-025-1 | PRC-025-2; Additional Ballot and Non-binding Poll; 12/04/17 – 12/13/17

Posed for Comment
- Project 2016-02 Modifications to CIP Standards | CIP-012-1; Comment Period; 12/01/17 – 12/11/17
- Project 2016-04 Modifications to PRC-025-1 | PRC-025-2; Comment Period; 12/04/17 – 12/13/17

RF Planning Resource Adequacy Analysis, Assessment and Documentation (BAL-502-RF-03)

FERC approved the RF Planning Resource Adequacy Analysis, Assessment and Documentation (BAL-502-RF-03) Regional Standard on October 16, 2017 (see attached NERC announcement). The revised BAL-502-RF-03 Standard will have an effective date of January 1, 2018. RF would like to thank all stakeholders who participated in the drafting, commenting and voting process.
2017 WECC Human Performance Conference

On October 24-27 WECC hosted its annual Human Performance Conference in Salt Lake City, UT. This year’s theme was Lighting the Path. RF’s Dr. Kellie Anton attended and shared ideas with other human performance thought leaders. The event is part of WECC’s Human Performance Working Group’s (HPWG) outreach and education program.

This year’s HPC was kicked off with an inspiring talk from Baltimore Gas and Electric’s Monika Bay. Ms. Bay shared BGE’s journey to a just culture and how fairness and perceived fairness impact overall human performance. Her talk was followed by Consumer Energy’s Safety Culture Team sharing their journey and efforts to create a culture of safety at Consumers.

In addition to several entities sharing their human performance program journeys, there were several psychologists that shared with the attendees techniques to help people succeed. This became a theme throughout the conference as ideas were shared on cognitive limitations and how in many cases the human is set up to fail. The goal is to understand the cognitive limits of humans and help set them up for success.

WECC will hold another HPC in the Autumn of 2018. NERC will hold its Human Performance Conference this Spring on 27-29 March 2018 in Atlanta, GA.

RF and WECC to Issue Joint Report on CIP Themes

To combat the ever changing physical and cyber-threats landscape, entities continue to improve their tools, expertise, and defense strategies. Yet, despite these efforts to stay ahead of security threats, entities are sometimes held back by deficiencies or limitations in their corporate structure, culture, or resources.

In 2014, RF, in coordination with NERC and several stakeholders, began analyzing data around potential themes in these deficiencies and limitations and released its findings in early 2015 in the first edition of the CIP themes report.

Now, RF and WECC have been working together to analyze the data in both Regions around potential themes. Both Regions handle large volumes of noncompliance and their territories cover all or parts of 27 states, Washington D.C., and parts of Canada and Mexico. This collaboration has helped identify new areas for improvement and potential resolutions to some of the deficiencies and allowed for validation of the data in each Region.

RF and WECC, in coordination with NERC and several stakeholders from both Regions, plan to issue a joint report in early 2018 in order to help drive entities to continue to assess and strengthen their CIP programs and thus mitigate security risks.

Winter Readiness Assessments

RF has developed a collaborative process to look at winter readiness across our Region and share Best Practices and Lessons Learned across the ERO. We use risk-based criteria to select entities to participate in the winter preparation process. Survey responses are evaluated and any additional requests for information (RFIs) are developed, as needed, to gain a better understanding of an entity's level of cold weather readiness and mitigation of previous cold weather-related issues. If a generating facility is selected for an onsite visit, items for discussion and spot check are listed on the meeting agenda, which allows the entity to collect the necessary information and arrange for SME participation. Any Best Practices and Lessons Learned observed during the site visit are reviewed and discussed with the plant staff.

RF recently issued a revised Best Practices/Lessons Learned presentation. This presentation encompasses not only items identified during the recent winter preparation process, but areas from previous plant visits and those recognized by other Regions. As you will see from the report, although the occurrence of frozen critical transmitters appears to be lessening, freezing and/or icing of combustion turbine inlet air filters appears to be a continual problem causing trips or de-rates.
On November 14, RF President and CEO Tim Gallagher had the privilege of addressing the Southern Maryland Electric Cooperative’s (SMECO) Board of Directors at their November Board meeting in Hughesville, Maryland. SMECO has been a very strong and valued member of RF since our inception.

During the meeting, Tim congratulated SMECO leadership on their exemplary compliance performance over the past 10 years, shared the need to remain in constant vigilance when dealing with critical infrastructure threats and overall security posture, talked about themes that have led other companies RF works with to fall out of compliance with CIP requirements, and presented challenges the industry will face moving forward. Tim also thanked Joe Slater, SMECO CEO, and the entire SMECO board for lending us Ken Capps who has served on the RF Board for over 10 years. RF stands ready to deal with these challenges with SMECO and all of our industry partners.

Jeffrey L. Craigo has been promoted to the position of VP of Reliability Assurance & Monitoring. Mr. Craigo joined ReliabilityFirst in March of 2013 and recently served as Senior Director of Reliability Assurance.

Mr. Craigo is a graduate of Ohio University, with a Bachelor’s of Science degree in Industrial & Systems Engineering. He has a diverse background in quality systems, manufacturing, strategic sourcing, and leadership spanning multiple industries, including the automotive, electrical, hydraulics, and medical device industries.

Since starting at RF, Mr. Craigo has been responsible for the compliance monitoring and reliability assurance organizations. He has provided strategic policy leadership to management and staff and provides input into auditing practices and continuous improvement initiatives with grid reliability as the primary goal across the industry. With his new role, he looks forward to working collaboratively with multiple stakeholders across the industry to continuously improve reliability.

On a personal level, Mr. Craigo has three children Whitney, Clay and Jamey, with his wife Yvonne of 25 years. He stays busy outside the office by coaching girls high school basketball with his wife in their community. While not on the basketball court you can find him fly fishing for trout in the local river or fishing for smallmouth and walleye in Lake Erie.

Bheshaj Krishnappa presented the topic “Cyber Resilience Metrics for Bulk Power Systems” at Industrial Control Systems Joint Working Group (ICSJWG) Fall 2017 meeting held in Pittsburgh, PA on September 12, 2017.

ICSJWG was established by the Department of Homeland Security Industrial Control Systems Cyber Emergency Response Team. The meeting is a vibrant stakeholder community of all Critical Infrastructure Sectors between federal agencies and departments, as well as private asset owners/operators of industrial control systems. The presentation gathered a lot of interest from the Department of Energy and industry stakeholders looking for methods to measure and increase cyber resilience.

Bheshaj Krishnappa presented on this topic again at the Cyber Resilient Energy Delivery Consortium (CRED) Workshop held at Pacific Northwest National Laboratory, Richland, WA on November 28, 2017. He also participated in a panel discussion on “Cybersecurity Research Needs - an Energy Sector Perspective” during the workshop. The presentation gathered a lot of interest from the Department of Energy and industry stakeholders looking for methods to measure and increase cyber resilience.

On October 16-17, The Energy Bar Association (“EBA”) hosted a mid-year energy forum to discuss a diverse set of issues in the energy sector. The event included roundtables and presentations from various stakeholders including a CEO roundtable, as well as discussions regarding Oil and Pipeline transactions and offshore wind development.

Pertinent to ReliabilityFirst, the EBA held a session on the resiliency of energy infrastructure. Jason Blake, ReliabilityFirst’s Vice President and General Counsel, attended the aforementioned events as well as the final affair of the forum, dinner with the FERC commissioners.
The New Jersey Board of Public Utilities Generic Solar Proceedings

The New Jersey Board of Public Utilities is scheduling public hearings for interested parties to comment on the state of the New Jersey Solar Market. These are scheduled to be held on December 4, 5, and 8th. New Jersey continues to make the issue of production of clean solar power an issue of importance within the state. The economic and financial models of solar energy have changed due to significant technology changes and therefore New Jersey is soliciting input into the development of their solar market. All interested parties can participate in generic proceedings to review all aspects of the current solar market in New Jersey.

To learn more about the proceedings and schedule of events click here.

The New Jersey Board of Public Utilities Supplier Diversity Annual Conference

The New Jersey Board of Public Utilities hosted its annual conference on Supplier Diversity at Rutgers University. The event helps explain contracting opportunities to everyone from the state’s utilities to diverse business owners, particularly minorities, women and service disabled veteran-owned businesses. The event showcased the Supplier Diversity Development Council (SDDC) and their efforts in addition to the diversity efforts of the state’s utilities council.

Conference presenters advised the representatives of minority-owned firms on what needs to be done in order to qualify for a contract, what they need to consider while bidding on a contract, and provided information on requirements that may need to be implemented internally to be in a position to win and successfully complete a contract. For more SDDC information, resources and events, click here.
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