

NERC Reliability Leadership Summit and RISC Meeting (see page 9)

Reliability Leadership Summit

March 14, 2019 – Washington DC

Summary Notes

Roles:

FERC – Regulates interstate Wholesale Electric Markets and Natural Gas interstate commerce

NERC – Responsible for the Reliability Standards for Electric System reliability

DOE – Mission – National Security – works with DOD and DHS to protect the nation

Keynote – Bruce Walker - DOE

- DOE purpose (stemming from its Nuclear materials involvement) is to focus on national security.
 - Recent increasing reliance on natural gas for electricity generation is the wrong direction from a security perspective because it doubles the amount of critical infrastructure that needs protection
- DOE is building a North American Energy Systems Resiliency Model – one platform for the analysis of the energy system
- DOE has 133 hydro units in 34 states through its PMAs (Power Marketing Administrators) – These will be used as a test environment for security proposals
- 2015 FAST Act – required DOE to identify critical energy infrastructure
 - Working with DHS, DOD, NSA – first assessment is completed
- Static resilience model developed for the 10% most important facilities across the 16 sectors that are the most critical to ensure the safety and security of the US – to be used to evolve to a future “real-time” model.
 - Platform leverages the work of the 17 National Labs – in partnership with NERC and FERC – at the end of the day – everyone can use it for their own assessments
- Department of Homeland Security- looks across the all 16 sectors.
 - Includes Cyber Threats and Physical Threats
 - Threats increase with distributed resources.
 - Gas becomes more of a risk due to additional gas delivery (pipeline) concerns.
 - Risks calculated based on what it means for the country.
 - Drones are threats now.
 - Utilities do not own the air-space over their substations.
 - Foreign manufactured drones are potential increasing risk. Foreign manufactured drones have been “caught” sending information to foreign destinations.
 - China cyber espionage is the high threat actor to the power system “stealer” of information for their own use. Russia is a minor nuisance in comparison.
 - Cyber hygiene for information sharing is critical.
 - Removing single points of risk promotes resilience. Importance of incidence sharing.

DOE Research Initiatives:

- 1) Sensing technologies – use of fiber optic sensing capability to increase ability to understand system characteristics
- 2) Storage – research regarding solid state magnesium oxide battery technology – goal to reduce cost relative to existing batteries by 20%
- 3) Migration away from GPS based time synchronization to use of on-site atomic clocks to mitigate satellite communication disruption risk
- 4) Work with HUD to provide block grants for the private industry focused on CEII
- 5) Innovation challenge - look at how the system is operated with storage, flywheel, power electronics - looking at reserve margins assessments from an R&D

Panel 1 – Regulatory and Policymaking during Unprecedented Change: 9:15–10:30 a.m.

The North American Bulk Power System (BPS) is experiencing transformational change due to a shift in generation resources and accelerated technology deployment. Public policies, consumer preferences, technology, and market factors are contributing to evolutionary changes to the fuel mix. The integration of new technologies which augments changes in fuel type and the make-up of the resources being added to the system, is affecting the visibility and management of resources. Collectively, these factors are creating a new paradigm along with new reliability risks for the BPS. Regulators and policymakers are on the front lines of these challenges. This panel includes regulators and policy makers who are managing the present and the future. Panelists will provide their views on addressing risk and the collaborative effort required to better shape the energy landscape of the future.

- State policy economic, markets and/or public preference drive planning
- FERC-focus on the bulk system is too narrow.
 - Nature of load is changing to DC based loads (lighting) – complex fluorescents up to 50%
 - Distributed Energy Resources – California case.
 - Synchronous and asynchronous resource mix.
 - Challenges of state regulation (Utah) surrounded by other states with their own agendas (i.e. – states will not surrender their planning rights, or interest to support forming and RTO)
- Changing electric system (not the transmission system) due to changing nature of net load characteristics.
- DER, and resource mix changes requires FERC to collaborate with states
- No longer possible to look at the assessment of reliability from a disaggregated bulk – non-bulk perspective
- Planning for capacity alone today does not necessarily provide the other needed capabilities (essential reliability services) for reliable and resilient system operation.
- Lack of coordination between DER and bulk power system can cause uneconomic generation dispatch.
- Providing Essential Reliability Services not always rewarded by existing market rules. in Canada; need to improve the coordination between the distribution and system operator. Resource

adequacy driven in part by energy (hydro procurement), environment (emissions) and risk; a screening approach is needed – the regulator needs to remain “technology neutral”

- DOE doesn’t regulate – from a DOE/DHS perspective, the risk is in the interdependency across the US parsed against the States’ policies – which drives certain types of investments that does not comport with good energy reliability – good energy principles need to be respected. “You cannot regulate physics.”
- Expected response of current generating units not consistent with their original design (ramping of baseload coal units) creates regulatory/reliability challenges
- Industry should take a proactive approach – don’t wait for something to happen – think ahead of what could happen, and take appropriate step to mitigate potential impact
 - lack of DER coordination
 - ensure transition is managed in an orderly fashion through planned implementation

Panel 2 – Identification and Mitigation of Significant Risks to Reliability: 10:45 a.m.–12:00 p.m.

The nation's critical infrastructure serves as the backbone of our nation's economy, security, and health. Maintaining the security of our nation's critical infrastructure, both physical and cyber, and addressing reliability challenges from extreme natural events, will continue to be a high priority for industry, policy makers, and regulators. As the risk landscape evolves, efforts will be needed to further our understanding of the impacts from new potentially disruptive events which challenge the security and reliability of the BPS.

Do opportunities exist for industry to further strengthen BPS security, reliability, and resilience through careful planning so new technology integration supports reliability and organizational goals, while at the same time not increasing vulnerabilities? Beyond the current NERC Reliability Standards, how can industry include security perspectives alongside reliability and resilience of the BPS in its planning and operations? This panel will also discuss existing and emerging international, national, and regional BPS reliability risks. Potential mitigation approaches and next generation modeling requirements will also be discussed.

- Future needs – resiliency – assessments that identify threats/risks
- Challenges – replacing assets over 40 years old – proposals for off-shore wind projects, DER & micro-grids
- Dependency on natural gas is an issue in the west; trend of replacing the retiring large coal units with strictly gas-fired generation.
- Need to know how many inverter-based resources collectively respond to events; learning curve – risks reduced each time an event happens and steps are taken as a result.
 - Changing load shape due to DER
 - 15 years ago, you never saw a baseload coal plant respond to system load ramping characteristics as observed now.
 - Hydro and gas resources provide for very good frequency response; loss of large resources in the southwest can reduce system voltage support.
 - Not unusual to see low loads from 10:00 am through mid-day
 - Concern over low inertial response during that time period - trend of dispatching down higher cost traditional units to allow for maximum renewable output.

Panel 3 – Providing Assurance for the Availability of Adequate Fuel Delivery to Satisfy Energy Needs: **1:30–2:45 p.m.**

As the system transforms to a future generation-mix that includes gas, wind, solar, and battery at higher levels than the current levels, the ability to assure sufficient energy is available to meet the needs of consumers is being emphasized. To assure resource adequacy and operational reliability, addressing this transition is crucial. How should industry, policy makers, and the ERO Enterprise work together to ensure sufficient infrastructure is in place to assure that generation and necessary fuel resources are available to support the continued reliable operation of the BPS during this transition?

- MISO – Illinois legislature bill to accelerate renewables.
 - 40% by 2030 and 100% by 2050. Zero carbon by 2030
- New England - In the past – energy inputs were stable and predictable, but not now.
 - IRP not a solution if you do not have control over the resources chosen.
 - Gas is an identified winter energy security risk; renewables help, but not when the wind doesn't blow, the sun doesn't shine – need to optimize the use of existing infrastructure
 - Proposed to market based solution to get least cost.
 - Multi day ahead commitment.
 - Allow purchase several days out. As much as seven days
 - Seasonal forward market
 - Co-optimize with multi day market.
 - Contingency reserves
 - Energy imbalance reserves
- EROT – 8% reserve margin
 - Tight early May last year due to unusually early hot weather – gas pipelines were on maintenance
 - Adequacy of fuel supply – forecast of next day availability - energy only market has limitations
- Florida reliance on natural gas has increased dramatically
 - In 2001 – only one interstate gas pipeline in Florida;
 - Second pipeline (Gulf States) - supported 6,700 MW of additional cc units
 - 2013 two additional pipelines
 - 2017 – additional pipeline (Sable Trail) – today 2.4 Bcf natural gas delivery.
 - Back-up still important – 3-5 resupply (oil) by truck or ship; 5 Bcf in gas storage.
 - Pipeline coordination/communication important.
- BPA is one of DOE's PMAs – shift from central resources to DERs – increases in wind and solar generation.
 - Moving toward 100% renewable by 2045; 18,000 MW in interconnection queue - ~8,000 wind, ~4,000 solar, ~1,500 gas, ~4,500 storage.
 - Risks – no wind during low hydro (now run-off) days; shows need for more situational awareness, understanding of load characteristics, coordination of fuel supplies.

Panel 4 – Open Discussion:

3:00–4:15 p.m.

In this open-format discussion, Summit attendees will share thoughts and ideas on the priority and significance of BPS reliability risks. This discussion will concentrate on distilling the observations and themes discussed in the earlier panels, identifying potential blind spots or risks not revealed during the Summit panels or from general industry experience, and outlining strategic approaches for consideration by the ERO Enterprise, industry, policy makers, regulators, and other stakeholders in addressing significant emerging reliability risks. Discussion items can be, but are not limited to, practical BPS operations and planning, policy development at the FERC, NERC, or Regional Entity level (*e.g.*, standards and requirements), critical infrastructure protection, etc. See reference material: [2018 ERO Reliability Risk Priorities Report](#).

Nelson Peeler, vice president, chief transmission officer, Duke Energy

Charles King, vice president and chief information officer, Kansas City Power and Light Co.

- Nothing that was unknown was brought forward – rather nuances regarding existing challenges.
- Need to recognize regional differences – a lot more interdependencies to consider and plan for (cross sector, internet related)
- Supply chain considerations important – recognize it’s almost impossible for one organization to make a widget today
- Opportunity for government partners to responsibly share actionable information
- How to incent black start units in the face of public policy mix requirements/changes
- Need for observability of Behind the Meter DER resources
 - Avoid operation in an unsecure state.
- Need for additional reliability assurance metrics
- How to keep generators providing energy reserve (‘headroom’) for reliable operations
- Does it take large blocks of DER to trip during contingencies before NERC steps in? What if the initiating event was cyber related? How does DER work with UFLS?
- Inverter based resources need to know what is required (IEEE 1547) – Can NERC reach down into the distribution system, or is it up to the IEEE, the utilities, the states? California passed a rule to extend CIP-014 to distribution system level.
- DER is frequency following. At some point you need a local ‘heartbeat’ rather than relying on the system frequency.
- ERCOT has some DER requirements (restrictions) based on signal strength (local ‘heartbeat’)

Closing Remarks

What is missing?

- Other sectors – communications, water/wastewater/pipeline, electricity. What cross sector coordination is being performed? Fuel supply, transportation, communications, water and wastewater.
- Chris Root- VT- DER can become a planning and operating contingency. When does NERC step into the picture if DER impacts the bulk power system? Load forecasts take weather input, but how do you forecast DER 4-5 days out.
- IEEE 1547 handles ride through but not forecasting.
 - Connecting utility has the burden to set the requirements for the DERs connected.
- RE-examination of event reports (e.g. Blue Cut fire). The last event showed that 200 MW of behind the meter DER did go away in addition to the utility scale generation (1,100 MW).
- What if it is a cyber event, not generated by a power system event?
- IEEE 1547 looking for guidance to utilities. Requirements for capability and for stability. How do the settings get established? How are those requirements used? State interconnection standards are a potential place where that will be dealt with.

Additional closing thoughts

- How do we get ahead of the risks, instead of reacting to them
- It took the Blue Cut fire to mobilize us (SPIDER & IRPTF) – may not have that luxury the next time.
- Importance of the recognizing the technologies leading to the end state – batteries, for instance in 10 years – but it is natural gas in front of us now.
- What are the real loads when the DERs are operating?
- NERC RISC has the responsibility for prioritization of NERC's work

Questions posed on behalf of NYSRC

1. Does the panel agree that our understanding of the performance and modeling of inverter based resources is:

- A. Lagging their rate of penetration into the BPS, and
- B. Thus presents a reliability risk in the near future?

(ANS) A. yes, B yes

2. If the answers to the prior questions are yes, then would the panel consider the worth of establishing a national project to physically test and develop practical models for the integration of inverter-based resources into the BPS (like Project EHV/UHV in the 1970s)?

DOE has a Resilience and Risk plan. NERC has SPIDER and IBRPTF

1. Is the panel aware of any efforts to modulate (increase or decrease) the real and/or reactive power of bps inverter-based resources on a wide area basis as a response to contingencies on the power system? Panel not really qualified, but points to IEEE and NERC for handling.

(Ans) No - Chris Root of VT Power asked similar question.

- A. For normal events? Not controlling behind the meter centrally? – No, in fact some states would oppose it based on other comments.
- B. For extreme (beyond criteria) events? No

2. Is the panel aware of any efforts or research to extend control to “behind the meter” resources on the distribution level? No, not centrally. Local intelligences is being developed, but based on heartbeat of frequency. There is a need for a local heartbeat to use to keep DER running rather than system frequency. DOE would point to atomic clocks.

NERC Reliability Issues Steering Committee Meeting

March 15, 2019 – Washington DC

Summary Notes

- RISC plans to distinguish between inherent vs. residual risks more explicitly in its next RISC report
 - Not all risks are uniformly relevant geographically (gas in northeast, wildfires in west)
 - E.g. Wildfire Preventive switching – will this add to the bulk system reliability risks in the west?
- Perhaps add a local risk category to the next report?
- Solar and wind are more impacted by weather-sub point to resource mix risk profile.
- New Risks (RISC to decide - Composite of existing risk – or a new risk?)
- Climate change –extreme weather not going to be added back (had been eliminated earlier)
- Heavy offshore wind generation will curtail due to high wind
 - Not an issue yet because wind is not built yet.
- Identifying what data needs to be secured.
- Increase in probability of attack
 - CIPC presentation on the issue of emergent risks – not just storms, other climate related change e.g. flooding, plant cooling limitations, broaden to include environment change driven risk.
 - Cyber security – malevolent adversaries. 2013 Metcalf cross sector attack. Fiber attacks are continuing. Probing communications impacts on other sectors. Hotel breach is providing access to where employees are.
 - Equipment Vendors – all products are going to open architecture. Connection between distribution and transmission system are getting tighter. Availability of open data to adversaries through openness policies.
- Bulk Power System planning – generator retirements – knowing when they will retire and performance will be different (cycling coal). Official channels are coming way too late in the process. The incentive is to make it public as late as possible.
- The next cycle of the RISC process will incorporate the use of a risk survey template to get industry feedback and include industry's thoughts into the report.
 - New Risk Survey template to be sent to industry for input
 - The risk survey template was adjusted by RISC based on Leadership Summit and their individual opinion. The survey ranking can be used to work out residual risk level. Difference between baseline impact and baseline likelihood is the residual risk.
 - Survey distribution was developed. Involvement of external organizations (UTC, Gas, DOE, NARUC, ISO/RTO Council, Trade Organizations, etc.).

- Results of the survey will be used as input to the selection of risks for the updated RISC report.
- Inventory of risks goes return to NERC for operating plan by April 29
 - NERC Board of Trustees meets in May for a closed session and will use the inputs
- RISC meets Mid May to review and settle risks for next report.
- Suggestion: Report may center on items that are the most acute and use an appendix for the total list of risk profiles.
- New Risk Metrics Assignment from the BoT
 - BoT wants to have the performance metrics revised for future years and wants RISC input to the industry metrics.
 - Also, BoT wants to know if there are more meaningful metrics for the 2019 dashboard. RISC will comment on the specific package of metrics for the near term.
 - The Forums will be involved in the review.

3/15/2019