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Responses to the Board's Request for Policy Input

John Moura, Director Reliability Assessments and Performance Analysis
Member Representatives Committee Meeting
August 17, 2022

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Policy Input Questions

1. Additional actions for 2022/2023 winter season
2. Additional actions for the 2023 summer season
3. Long-Term: Assessing new and evolving electricity market practices

2022/23 Winter NERC Actions

- Continue to aggressively execute plan
- Assessment Focus
  - Fuel inventory and transportation procurement
  - Supply chain logistics for future resources
  - Energy adequacy
- Outreach and Industry Engagement
  - Review emergency assistance agreements to improve reliability risk reduction
  - Encourage early voluntary implementation of the Cold Weather Standards
  - Issue a report identifying generator owner actions:
    - Actions to address performance issues from previous cold weather events
    - Develop/update “Lessons Learned” from generators that successfully operated in extreme weather
    - Share the results of the previous winter readiness Alert

2023 Summer NERC Actions

- Publish earlier to spur earlier action
- Increase energy assessments to cover all risk hours
  - Messaging on “Likelihood” of potential outages
- Validation of energy conservation and demand response outside of market programs
- Post-seasonal evaluation to inform next seasonal assessment
- Outreach with States:
  - Advocate the benefits of delaying unit retirements beyond next summer (where there is reliability risk)
  - Encourage additional conservation measures, demand response, and emergency public appeal technologies
  - Be open about communications with government authorities

Long-Term: Assess Market/State Resource Adequacy Practices & Mechanisms

- NERC is urged to assess market/state resource adequacy practices and mechanisms
- More information on approach
- Coordination with FERC
- Align with RISC Risk Framework and RISC Priorities
- Standardize resource and energy adequacy assessments to support market design:
  - Load forecasting and demand profiles
  - Energy adequacy metrics
    - LOLE – Likelihood of a Energy Deficiency
    - EUE – Magnitude of Unserved Energy
  - Transmission adequacy and deliverability

Other Policy Input

- NERC organize an industry task force to:
  - Assess evolving resource changes – (Generation Size Threshold)
    - BES Definition
    - Compliance Registry Criteria
- ERO Enterprise's collaboration and coordination across the industry groups and FERC on IBR performance
- Risk Framework:
  - NERC should review the RISC process to determine if the biennial activities are sufficient

Questions and Answers

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Identifying Emerging Issues for the 2022 Long-Term Reliability Assessment

John Moura, Director Reliability Assessments and Performance Analysis

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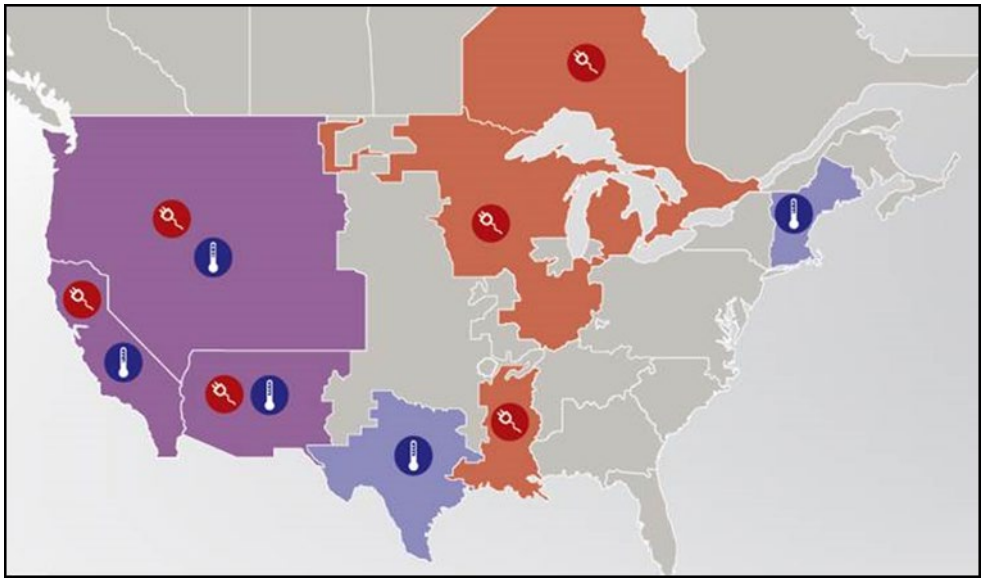
2021 LTRA Findings Recap: Areas with Anticipated Shortfalls

Resource Adequacy and Energy Sufficiency

- **MISO, California,** and **Ontario** | projecting capacity shortfalls
- **California, U.S. Northwest** and **Southwest** | projecting periods of insufficient energy

Extreme Weather Risks

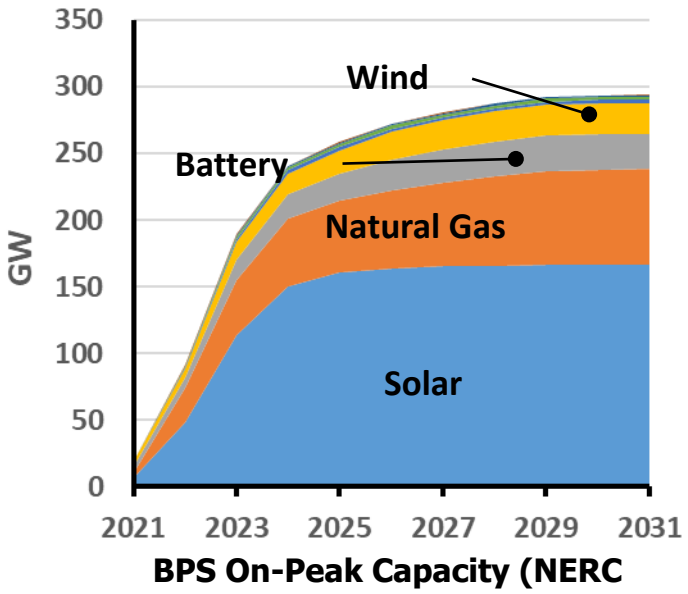
- **Texas, California,** and **U.S. Northwest** | Insufficient flexible generation for peak demand
- **New England, California,** and **Southwest** | Natural gas infrastructure limitations



Long-Term Reliability Assessment Risk Map 2022 - 2026

2021 LTRA Recap: Changing Resource Mix

- Future resource mix will be ***more variable*** and ***less fuel-diverse***



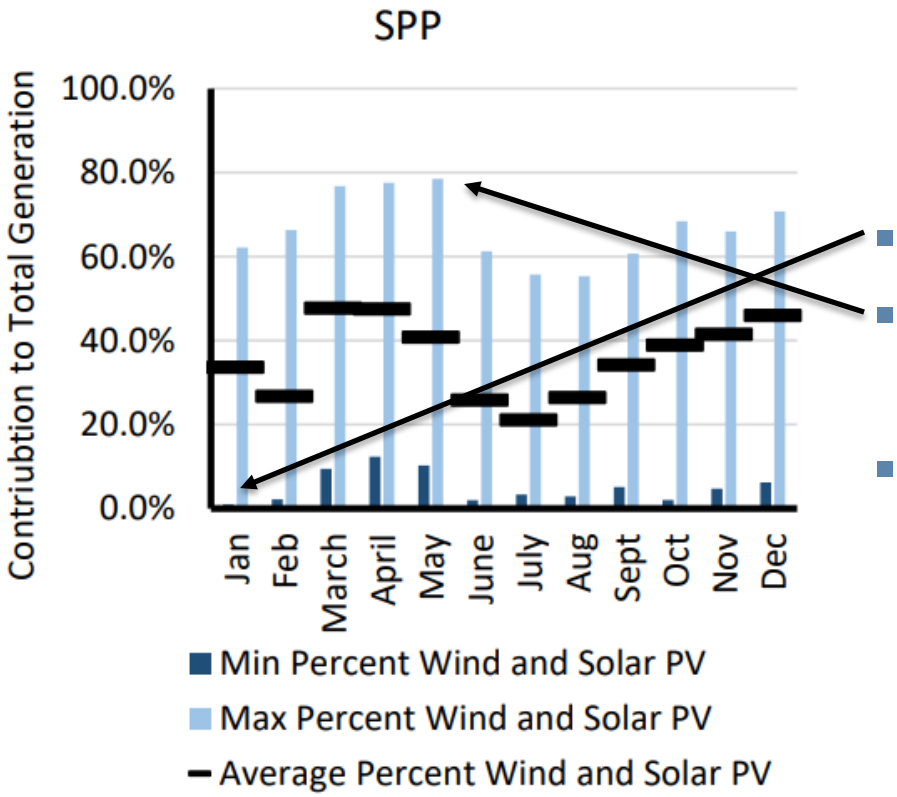
2021 Capacity at Peak Demand		
Type	Capacity (GW)	Contribution %
Natural Gas	467	47%
Coal	220	22%
Nuclear	108	11%
Solar and Wind	60	6%
All others	136	14%

Contributions at hour of peak demand. Variable energy resource (solar, wind, and some hydro) typically count less than installed nameplate capacity.

- Resulting ERO priorities for reducing risks during grid transformation
  - Improve BES resilience for wide area long-duration extreme temperatures
  - Focus on energy sufficiency
  - Enhance suite of reliability standards: cyber, cold weather, energy sufficiency, and inverter performance

2022 State of Reliability Report

- **Resource Mix Changes** – Beyond "Installed Capacity" and "On-Peak Capacity" representations
  - **FOCUS ON:** Largest Capacity Contribution to Total Generation Serving Load



- **Min:** 0.7%
- **Max:** 79%
- **Total:** 30 GW Installed (2021LTRA)

Preliminary LTRA Topics

- **Standing key finding:**
  - Year 1 – 5 resource and energy adequacy assessment
  - Year 6 – 10 emerging trends in resource capacity and demand
- Identification of areas with energy shortfall risk using results of biennial *Probabilistic Assessment* and energy analysis
- Energy risk analysis of extreme wide-area weather events and their effect on peak demand, generation, and transfers
- Assessing the impact of forecasted and potential generation retirements and resource additions on:
  - Resource capacity and energy risks
  - Fuel supply and transportation risks and gas-electric interdependency
  - Availability of Essential Reliability Services (ERS)

Emerging Risks

- Early retirement of generation or delayed resource additions that could exacerbate the risk of capacity or energy shortfalls
- Electrification influence on the growth in peak demand, net energy projections, and changes to area peak-seasons
- Trends in changing resource mix and implications for reliability:
  - Increasing battery and hybrid resources
  - Inverter-based resource growth and risks from unaddressed performance issues or unanticipated output variability
  - Transmission projections and anticipated needs for new resource additions
  - Accommodating increased amounts of distributed energy resources

What are we missing?

2022 LTRA Milestones

2022 Long-Term Reliability Assessment Review Schedule	
Date	**Description**
August 31 – September 1	Reliability Assessments Subcommittee (RAS) Meeting / Preliminary Findings Discussion
September 26	Draft Report sent to NERC Reliability and Security Technical Committee (RSTC)
November 29	Report sent to NERC Board
December 14	NERC Board Conference Call to accept the report
December 15	Report release

Preliminary Topics Discussion

Questions and Answers

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Strategy for Strengthening Industry Action to Address Emerging Risks

John Moura, Director, Reliability Assessment and Performance Analysis
Member Representatives Committee Meeting
August 17, 2022

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Incorporated Your Guidance and Input

- *Inverter-Based Resource Strategy: Ensuring Reliability of the Bulk Power System with Increased Levels of BPS-Connected IBRs*
  - Industry is facing risks to reliability that are quickly emerging and require accelerated response
  - *Grid Transformation* – RISC HIGH PRIORITY
  - After deploying a number of mitigations, the risk remains high
  - Industry experts are highly engaged, open, and transparent about the challenges
  - But with the amount of expected across generation queues and the rapid pace of interconnection the ERO remains concerned

The Saga Continues…

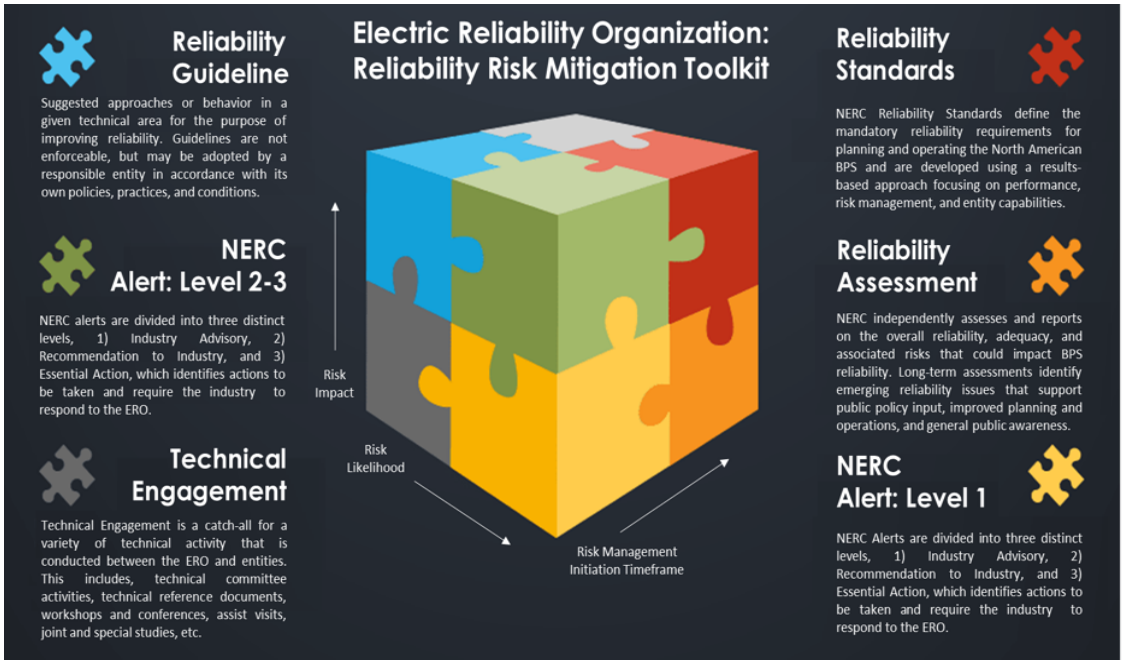
- Blue Cut Fire (2017)
- Canyon 2 Fire (2018)
- Palmdale Roost and Angeles Forest (2019)
- San Fernando (2020)
- Odessa (2021)
- CA 2021 Disturbances (2022)
- Texas Pan Handle Wind Event (2022)
- **CATEGORY 3 Event: Odessa II (2022)**

Actions Taken By the ERO

(2) Reliability Guidelines Published

(2) Level 2 NERC Alerts

Formed Working Group (Now the IRP Subcommittee), Numerous Webinars and Outreach Events, Modeling Assessments, Coordination with IEEE standards development



Standards Gap Review, CMEP Practice Guides, SARs submitted to SC

(6) Event Disturbance Reports

ERO Risk Management Framework

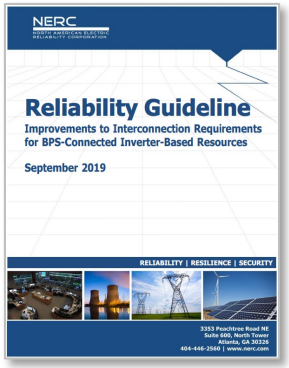
[2021 ERO Reliability Risk Priorities Report]

May 2022 Policy Input Request

- Specifically for the inverter-based resource challenges, what other actions should the ERO Enterprise take to ensure known reliability gaps with BPS-connected inverter-based resource performance are addressed?

Three-Pronged Approach

- **#1: Industry Adopt NERC Reliability Guidelines**
  - Industry Engagement, Outreach, Education, and Collaboration
  - Best Practices and Education



- **#2: Improvements to FERC Generator** Interconnection Procedures and Agreements
  - Focused Improvements to Commissioning Processes
  - IEEE P2800-2022

- **#3: Enhancements to NERC Reliability Standards**
  - Addressing Model Quality Issues and Inadequate Reliability Studies
  - Post-Event Performance Validation and Addressing Abnormal Performance Issues

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Other Actions

- Risk-Based Compliance Activities
- NERC Alert Level 3
- BES Definition and Registration
- Event and Disturbance Analysis, Lessons Learned

Interconnection Process Reforms

NEWS RELEASES

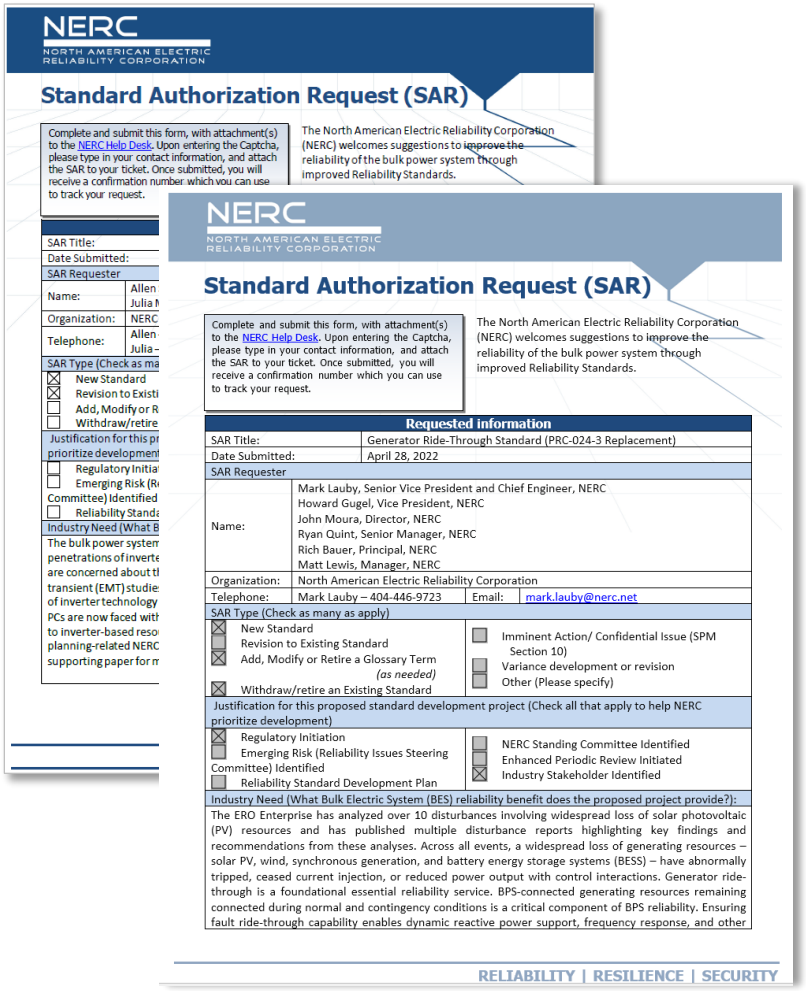
FERC Proposes Interconnection Reforms to Address Queue Backlogs

June 16, 2022

Key areas of reform:

- Implement a first-ready, first-served cluster study process
- Improve interconnection queue processing speed:
- Incorporate technological advancements into the interconnection process
- Update modeling and performance requirements for system reliability

EMT Modeling and Studies; Generator Protection and "Ride-Through



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Standard Authorization Request (SAR)

Complete and submit this form, with attachment(s) to the NERC Help Desk. Upon entering the Captcha, please type in your contact information, and attach the SAR to your ticket. Once submitted, you will receive a confirmation number which you can use to track your request.

The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:	Generator Ride-Through Standard (PRC-024-3 Replacement)		
Date Submitted:	April 28, 2022		
SAR Requester			
Name:	Mark Lauby, Senior Vice President and Chief Engineer, NERC Howard Gugel, Vice President, NERC John Moura, Director, NERC Ryan Quint, Senior Manager, NERC Rich Bauer, Principal, NERC Matt Lewis, Manager, NERC		
Organization:	North American Electric Reliability Corporation		
Telephone:	Mark Lauby – 404-446-9723	Email:	mark.lauby@nerc.net

SAR Type (Check as many as apply)

- [x] New Standard
- [ ] Revision to Existing Standard
- [x] Add, Modify or Retire a Glossary Term *(as needed)*
- [x] Withdraw/retire an Existing Standard
- [ ] Imminent Action/ Confidential Issue (SPM Section 10)
- [ ] Variance development or revision
- [ ] Other (Please specify)

Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)

- [x] Regulatory Initiation
- [ ] Emerging Risk (Reliability Issues Steering Committee) Identified
- [ ] Reliability Standard Development Plan
- [ ] NERC Standing Committee Identified
- [ ] Enhanced Periodic Review Initiated
- [x] Industry Stakeholder Identified

Industry Need (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):

The ERO Enterprise has analyzed over 10 disturbances involving widespread loss of solar photovoltaic (PV) resources and has published multiple disturbance reports highlighting key findings and recommendations from these analyses. Across all events, a widespread loss of generating resources – solar PV, wind, synchronous generation, and battery energy storage systems (BESS) – have abnormally tripped, ceased current injection, or reduced power output with control interactions. Generator ride-through is a foundational essential reliability service. BPS-connected generating resources remaining connected during normal and contingency conditions is a critical component of BPS reliability. Ensuring fault ride-through capability enables dynamic reactive power support, frequency response, and other

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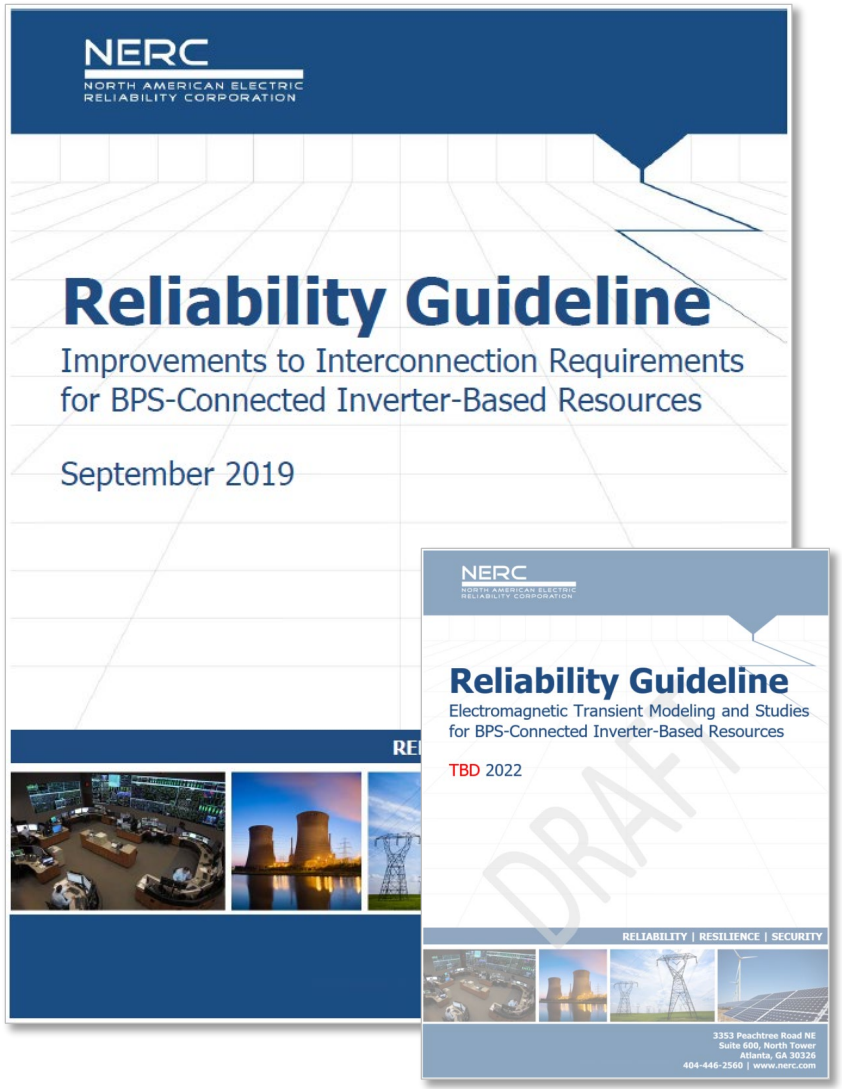

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Reliability Guideline

Improvements to Interconnection Requirements for BPS-Connected Inverter-Based Resources

September 2019

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Reliability Guideline

Electromagnetic Transient Modeling and Studies for BPS-Connected Inverter-Based Resources

TBD 2022

DRAFT

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Ongoing Industry Guidance and Technical Leadership

Questions and Answers

Update on FERC Activities

Kal Ayoub, Deputy Director, Division of Cyber Security

August 17, 2022

The views expressed in this presentation are my own and do not represent those of the Commission or any individual Commissioner.

Reliability - Related Activity (May – August)

- OER Director Announcement
- Joint Federal–State Task Force on Electric Transmission
- Upcoming Technical Conferences
- Extreme Weather Actions
- Proposed Rule on Transmission Planning
- Other Reliability Orders

David Ortiz, OER Director, 7/19/22

- David first joined the Commission in April 2016 as OER's Deputy Director and has served as OER's Acting Director twice since his appointment.
- Prior to joining the Commission, David served as the Deputy Assistant Secretary for Energy Infrastructure Modeling and Analysis at the U.S. Department of Energy (DOE). In this role, he led a Federal research and development office and directed focused measurement and control of the U.S. grid through advanced analytics, measurement technologies, and high-performance computing.
- Prior to his Federal service, he served as a Senior Engineer for the RAND Corporation, where he built and managed their $6 million dollar energy research and analysis program for clients including DOE's National Energy Technology Laboratory, the Bipartisan Policy Center, and the Federal Aviation Administration.
- David holds a B.S.E. in Mechanical and Aerospace Engineering from Princeton University, a M.S.E. in Mechanical and Aerospace Engineering from the University of Michigan, and a Ph.D. in Electrical Engineering and Computer Science – Control Systems from the University of Michigan.

Joint Federal-State Task Force on Electric Transmission

- ***Announced*** (June 17, 2021, in Docket No. AD21-15). The purpose is to encourage cooperation and communication between federal and state regulators on electric transmission related issues.
- ***The First meeting*** (November 10, 2021) focused on incorporating state perspectives into regional transmission planning.
- ***The Second meeting*** (February 16, 2022) focused on categories and types of transmission benefits that should be considered in transmission planning and cost allocation and its principles.
- ***The Third meeting*** (May 6, 2022) focused on examining barriers to the efficient, expeditious, and reliable interconnection of new resources through the FERC-jurisdictional interconnection processes.
- ***The Fourth meeting*** (July 20, 2022) focused on Interregional Transmission Planning and Project Development; and FERC's NOPR - Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generation Interconnection, Docket RM21-17-000 (Issued April 21,2022).

Recordings of these meetings are available at Joint Federal-State Task Force on Electric Transmission | Federal Energy Regulatory Commission (ferc.gov).

Upcoming Technical Conferences

- **Transmission Planning and Cost Management:** October 6, 2022, Docket No. AD22-8-000, will explore:

  (1) How transmission owners establish local transmission planning criteria and use their local transmission planning criteria to identify local transmission needs, and the effectiveness of cost management, transparency, and oversight measures in those processes;
  (2) How public utility transmission providers identify transmission projects in local and regional reliability transmission planning processes; and
  (3) Whether enhanced cost management, transparency, and oversight measures over:
      (a) Local and regional transmission planning processes,
      (b) The costs transmission owners expend on transmission facilities,
      (c) and the recovery of those costs through rates could help to ensure just and reasonable transmission rates.

- **Reliability Technical Conference**:

  Fall 2022 (TBD).

Extreme Weather Actions

Extreme weather has impacted the electric grid throughout its history. The severity and frequency of extreme weather events is increasing. To address this issue, the Commission took the following actions:

- Hosted a Joint FERC, NERC and Regional Entities Technical Conference on Improving Winter-Readiness of Generating Units (April 27 & 28, 2022), Docket No. AD22-4-000.
- Issued a NOPR on Transmission System Planning Performance Requirements for Extreme Weather (June 16, 2022), Docket No. RM22-10-000.
- Issued a NOPR on One-Time Informational Reports on Extreme Weather Vulnerability Assessments Climate Change, Extreme Weather, and Electric System Reliability (June 16, 2022), Docket Nos. RM22-16-000 and AD21-13-000.

NOPR on Transmission Planning Performance Requirements

- June 16, 2022 – Transmission Planning Performance Requirements for Extreme Weather, Docket No. RM22-10-000.
  - ✓NOPR addresses improving the reliability of the bulk power system to counter the risks presented by extreme weather.
  - ✓NOPR proposes to direct NERC to develop modifications to reliability standard TPL-001-5.1 to account for the risks of extreme heat and cold conditions. The NOPR also seeks comment on whether to require studies and corrective action plans for drought conditions.
  - ✓Comments are due August 26, 2022.

Other Recent Reliability Orders

- July 29, 2022 – Docket No. RR22-1-000 Delegated Letter Order approving amendments to ReliabilityFirst Corporate Bylaws.
- July 8, 2022 – Docket No. RR21-9-001 Commission Letter Order Authorizing use of CRISP Operating Reserve.
- June 16, 2022 – Docket No. RD22-3-000, approving modifications to the compliance section of Reliability Standard CIP-014.
- May 19, 2022 – Docket No. RR21-10-000, Order approving in part and denying in part revisions to NERC's Rules of Procedure.

Questions?