

Agenda

Board of Trustees

August 14, 2025 | 9:45 a.m. – 12:15 p.m. Mountain

In-Person

The Westin Calgary Downtown
320 4th Avenue SW
Calgary, Alberta, Canada, T2P 2S6

Conference Room: Britannia/Belaire/Mayfair Ballroom – Conference Level

Virtual Attendees

Webcast Link: [Join Meeting](#)

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Audio Only: +1-415-655-0002 US | +1-416-915-8942 Canada | Access code: 2315 521 5879

NERC Board of Trustees

Suzanne Keenan, Chair
George S. Hawkins, Vice Chair
Colleen Sidford
Larry Irving
Kenneth W. DeFontes, Jr.
Robin E. Manning
Jim Piro
Jane Allen
Susan Kelly
Kristine Schmidt
James B. Robb – President and CEO

Call to Order

Introduction and Chair's Remarks

[NERC Antritrust Compliance Guidelines](#)

Consent Agenda - Approve

1. Minutes

- a. May 8, 2025 Open Meeting*

2. Committee Membership *

- a. Compliance and Certification Committee Membership

- i. Compliance and Certification Committee Leadership
 - ii. Compliance and Certification Committee Members
- b. Personnel Certification Governance Committee Membership
- 3. Governance Documents Amendments***
 - a. CCCPP-009 -3 | NERC Compliance and Certification Committee Confidentiality Protocol
- 4. Finance and Audit**
 - a. Second Quarter Statement of Activities – **Accept**

Regular Agenda

- 5. Remarks**
 - a. Remarks by Francis Bradley, President and CEO, Electricity Canada
 - b. Remarks by Hal Kvisle, Corporate Director and Board Chair, South Bow
 - c. President’s Remarks
 - d. Board of Trustees Chair Closed Meetings Summary
- 6. Key Discussion and/or Action Items**
 - a. NERC and Regional Entity Proposed 2026 Business Plans and Budgets and Associated Assessments – **Approve**
 - b. Standards Actions*
 - i. Project 2024-01 Rules of Procedure Definitions Alignment (Generator Owner and Generator Operator) – **Adopt**
 - ii. Project 2020-06 Verifications of Models and Data for Generators – **Adopt**
 - c. 2025 ERO Reliability Risk Priorities Report* – **Accept**
 - d. Input Letter and Member Representatives Committee Meeting
 - e. Modernization of Standards Processes and Procedures (MSPP) Taskforce*
 - f. NERC.com Modernization Update

Break – 15 MINS

- 7. Reports**
 - a. Semi – Annual Standing Committee Reports to Board*
 - i. Reliability Issues Steering Committee
 - ii. Reliability and Security Technical Committee
 - iii. Standards Committee

- iv. Compliance and Certification Committee
- v. Personnel Certification and Governance Committee
- b. Board Committee Reports
 - i. Corporate Governance and Human Resources
 - ii. Finance and Audit
 - iii. Regulatory Oversight Committee
 - iv. Enterprise-wide Risk
 - v. Technology and Security
 - vi. Nominating

8. Other Matters and Adjournment

*Background materials included.

Draft Minutes Board of Trustees

May 8, 2025 | 10:30 a.m.–12:30 p.m. Eastern

NERC DC Office
1401 H Street NW, Suite 410
Washington, DC 20005

[Webex](#)

Call to Order

Ms. Suzanne Keenan, Chair, called to order the duly noticed open meeting of the Board of Trustees (Board) of the North American Electric Reliability Corporation (NERC or the Corporation) on April 4, 2025, at approximately 10:30 a.m. Eastern, and a quorum was declared present.

Present at the meeting were:

Board Members

Suzanne Keenan, Chair
George S. Hawkins, Vice Chair
Jane Allen
Kenneth W. DeFontes, Jr.
Larry Irving
Susan Kelly
Robin E. Manning
Jim Piro
James B. Robb, President and Chief Executive Officer
Kristine Schmidt
Colleen Sidford

NERC Staff

Michael Ball, Senior Vice President and Chief Executive Officer of the E-ISAC
Tina Buzzard, Director, Board Operations and Corporate Governance
Manny Cancel, Advisor to the CEO of the E-ISAC
Todd Carter, Vice President, Business Technology
Shamai Elstein, Associate General Counsel
Mathew Duncan, Vice President, E-ISAC Security Operations and Intelligence
Howard Gugel, Senior Vice President, Regulatory Oversight
Kelly Hanson, Senior Vice President and Chief Operating Officer
Fritz Hirst, Vice President, Government Affairs
Soo Jin Kim, Vice President, Engineering and Standards
Mark G. Lauby, Senior Vice President and Chief Engineer
Kimberly Mielcarek, Vice President, Communications
Darrell Moore, Director, Reliability Risk Management
Lauren Perotti, Assistant General Counsel

Sônia Rocha, Senior Vice President, General Counsel, and Corporate Secretary
Liz Saunders, Vice President, People and Culture
Camilo Serna, Senior Vice President, Strategy and External Engagement
Andy Sharp, Vice President and Chief Financial Officer
Bluma Sussman, Vice President, E-ISAC Stakeholder Engagement

NERC Antitrust Compliance Guidelines

Ms. Buzzard directed the participants' attention to the NERC Antitrust Compliance Guidelines included in the advance agenda package and indicated that all questions regarding antitrust compliance or related matters should be directed to Ms. Rocha.

Introduction and Chair's Remarks

Ms. Keenan welcomed the attendees to the meeting, including Mark Christie, Chairman, Federal Energy Regulatory Commission ("FERC") and Derek Olmstead, President and CEO Alberta MSA, CAMPUT Representative to NERC, both attending virtually. She remarked on how NERC's mission has become important at a national level, noting the pace of change in the energy industry and how NERC is engaging with its industry stakeholders and regulators to address ever more complex issues challenging reliability.

Consent Agenda

Upon motion duly made and seconded, the Board approved the consent agenda as follows:

Minutes

The draft minutes for the April 4, 2025 and February 13, 2025 meetings were approved as presented to the Board at this meeting.

Finance and Audit Financial Statements

RESOLVED, that the Board, upon recommendation of the Finance and Audit Committee ("FAC"), hereby accepts the 2024 Audited Financial Statements, substantially in the form presented to the Board at this meeting.

RESOLVED, that the Board, upon recommendation of the FAC, hereby accepts the First Quarter 2025 NERC, Combined ERO Enterprise, and Regional Entity Unaudited Statement of Activities, as presented to the Board at this meeting.

Remarks and Reports

Remarks by Derek Olmstead, President and CEO Alberta MSA, CAMPUT

Ms. Keenan introduced Mr. Olmstead, CAMPUT Representative to NERC. Mr. Olmstead remarked on NERC's continued engagement with Canadian energy regulators. He highlighted the productive discussions that took place the prior weekend at the CAMPUT meeting in Halifax, Nova Scotia on NERC Reliability Standards, the NERC Rules of Procedure, the Interregional Transfer Capability Study Canadian analysis, and other items of mutual interest.

Remarks by Mark Christie, Chairman, FERC

Mr. Robb introduced Chairman Christie of FERC. Chairman Christie remarked on how NERC's reliability assessments have improved awareness of electric supply demand imbalances across the United States, commending NERC for its honest and forthright approach to reliability issues. He noted the desire of consumers to have reliable power at reasonable costs, and he remarked on the challenges of adding more generation to meet the growing demand for power. Chairman Christie also remarked on NERC's efforts to develop Reliability Standards to address inverter-

based resource reliability issues and its participation in an upcoming Commissioner-led technical conference addressing resource adequacy issues in the ISO/RTO markets.

President's Report

Mr. Robb provided the president's report. He remarked on the recent electric reliability event in Spain, reporting that NERC has offered its assistance to the investigators. While the causes of this event are not yet fully understood, NERC will be following closely for lessons learned for the North American bulk-power system. Mr. Robb noted that NERC will be participating in an upcoming technical conference on resource adequacy and continues to advance natural gas electric coordination efforts. He also reported on the work of the Modernization of Standards Processes (MSPP) Task Force.

Mr. Robb remarked on the revised Regional Delegation Agreements being presented to the Board for approval at this meeting. He noted that these revised agreements will help advance coordination and alignment across the ERO Enterprise, particularly in the Reliability Assessment and Performance Analysis program which continues to grow in visibility and importance.

Mr. Robb then remarked on the addition of two new executives to NERC in 2025: Mr. Michael Ball, who assumed the role of Senior Vice President and CEO of the E-ISAC on April 14, and Mr. Todd Carter, who assumed the role of Vice President of Business Technology on March 3. He also noted the forthcoming retirement of Mr. Cancel, former CEO and Vice President of the E-ISAC, who has been serving as an advisor during the leadership transition. Mr. Robb remarked on Mr. Cancel's many contributions during his time at NERC and wished him well in his retirement.

The Board, upon motion duly made and seconded, approved the following resolution honoring Mr. Cancel upon his retirement:

WHEREAS, Manny Cancel, Senior Vice President and CEO of the Electricity Information Sharing and Analysis Center, of the North American Electric Reliability Corporation, has led the company's E-ISAC department since 2020; and

WHEREAS, Mr. Cancel assumed leadership during a time of turmoil and quickly stabilized the E-ISAC, focusing staff on the critical mission of assuring the reliability and security of the bulk power system; and

WHEREAS, Mr. Cancel prioritized building trust among members, other sector ISACs, and government partners, and positioned the E-ISAC as an essential part of the security fabric of the industry; and

WHEREAS, Mr. Cancel worked tirelessly to ensure industry had actionable information to address security risks as they emerged; and

WHEREAS, Mr. Cancel's collaborative spirit and genuine support have made him a trusted colleague, counselor, and cherished friend within the ERO Enterprise and to both NERC's Board of Trustees and management team, valued for his leadership instincts as much as his security expertise; and

NOW, THEREFORE, BE IT RESOLVED, that the Board of Trustees of the North American Electric Reliability Corporation does hereby convey its deepest gratitude to Manny Cancel for his years of commitment and exemplary service and honors him on the occasion of his retirement as Senior Vice President and CEO of the E-ISAC.

Mr. Robb then introduced Mr. Jason Blake, President and CEO of SERC, to provide remarks on behalf of the ERO Executive Group. Mr. Blake remarked on the improved alignment across the ERO Enterprise, particularly in the Reliability Assessments and Performance Analysis program areas. He also remarked on the continued development of ERO Enterprise state and provincial outreach programs and the ERO Enterprise's continued commitment to

efficiency and alignment across program areas. Mr. Blake reported that the development of the Regional Entity budgets is underway, with similar stakeholder engagement and transparency efforts to those used by NERC.

Report on May 5 CAMPUT and May 6, 2025 Board of Trustees Closed Meetings

Ms. Keenan reported on the May 5, 2025 meeting with CAMPUT. Ms. Keenan also reported that, on May 6, 2025, the Board met in closed session with NERC management to review NERC management activities. The Board received updates on regulatory and external affairs, the renewal of the Regional Delegation Agreements, Reliability Standards, CRISP, and discussed matters for this meeting. The Board adjourned into executive sessions with the General Counsel and the CEO, with the General Counsel separately, and in Trustees only session to discuss confidential matters.

Standards Quarterly Actions

Milestone 3 for FERC Order No. 901 Filing

Ms. Kim provided an update on the development of Reliability Standards to address the Milestone 3 directives from FERC Order No. 901, in which FERC directed NERC to develop standards addressing inverter-based resource reliability issues.

Cold Weather and Lessons Learned from the 321 Actions

Ms. Kim provided an update on the development of lessons learned from the use of the special processes in Section 321 of the NERC Rules of Procedure, noting that NERC most recently used the special processes to complete the development of proposed Reliability Standard EOP-012-3, the generator cold weather preparedness standard addressing directives from FERC in its order approving EOP-012-2.

Modernization of Standards Processes and Procedures (MSPP) Task Force

Mr. Greg Ford, MSPP Task Force Chair, and Mr. Todd Lucas, MSPP Task Force Vice Chair, provided an update on the work of the MSPP Task Force. Mr. Ford reported on the inputs and considerations used by the Task Force, including previous efforts, lessons learned from use of Section 321 of the NERC Rules of Procedure, comparison of standards processes, implementation impact, and stakeholder input. Mr. Lucas reported that the MSPP Task Force developed and published a scope document, aligned on goals and objectives, identified initial areas of opportunity, and is developing a comprehensive communications and outreach plan. Mr. Ford then reviewed the upcoming schedule of work, with the goal of presenting recommendations to the Board in the first quarter of 2026. Ms. Keenan then led a discussion among the attendees of considerations for the MSPP Task Force.

Other Matters and Reports

Input Letter and Member Representatives Committee Meeting

Ms. Keenan acknowledged the policy input provided by the Member Representatives Committee as discussed at that meeting.

Regional Delegation Agreements

Mr. Elstein presented the proposed Regional Delegation Agreements for Board approval to become effective January 1, 2026, referencing the materials included in the advance agenda package. Mr. Elstein highlighted the revisions and improvements in the proposed Regional Delegation Agreements as driving greater coordination, consistency, and collaboration across the ERO Enterprise. After discussion, and upon motion duly made and seconded, the Board approved the following resolutions:

RESOLVED, that the Board hereby approves the Amended and Restated *pro forma* Regional Delegation Agreement (“RDA”) between the North American Electric Reliability Corporation (“NERC”) and the Regional Entities, substantially in the form presented to the Board at this meeting.

FURTHER RESOLVED, that NERC senior management is hereby authorized to enter into individualized RDAs, adapted from the revised, *pro forma* RDA, with each Regional Entity to incorporate the Regional Entity-specific deviations.

FURTHER RESOLVED, that NERC management is hereby authorized to make the appropriate filings with ERO governmental authorities and take such further actions and make such further filings as are necessary and appropriate to effectuate the intent of the foregoing resolutions.

Level 3 NERC Alert Essential Actions to Industry: IBR Performance Modeling

Mr. Moore presented the proposed Level 3 NERC Alert Essential Actions to Industry: IBR Performance Modeling, referencing the materials included in the advance agenda package. After discussion, and upon motion duly made and seconded, the Board approved the following resolutions:

WHEREAS, since 2016, NERC has analyzed numerous major events totaling more than 15,000 MW of unexpected generation reduction, and NERC's analysis has indicated systemic deficiencies in industry's ability to accurately represent the performance of Inverter-Based Resources (IBR) and study the effects of IBR on the bulk power system (BPS);

WHEREAS, NERC has issued 10 major event reports and four Level 2 Alerts in response to these events, and responses show that the recommendations set forth in the Level 2 Alert, NERC guidelines, disturbance reports, and Lessons Learned, are not being implemented by Generator Owners; further, many Generator Owners indicated that they did not have the requested facility data readily available;

WHEREAS, the Board has the authority under Section 800 of the NERC Rules of Procedure to approve the issuance of Essential Actions to Industry, containing specific actions that NERC has determined are essential for certain segments of owners, operators, or users of the BPS to take to ensure the reliability of the BPS;

WHEREAS, the Board has determined that it is essential to ensure the reliability of the BPS for Transmission Owners, Transmission Planners, Planning Coordinators, and Generator Owners to take certain steps to enhance technical minimum requirements, study processes, and modeling accuracy to predict and mitigate risks posed by IBR performance during system disturbances;

NOW, THEREFORE, BE IT RESOLVED, that the Board hereby approves the Level 3 Alert Essential Actions to Industry: IBR Performance Modeling, substantially in the form presented to the Board at this meeting.

NERC Action Plan on Large Loads Integration

Mr. Lauby presented the NERC Action Plan on Large Loads Integration, referencing the materials included in the advance agenda package. Mr. Lauby reported that NERC intends to complete its initial work under this plan by the second quarter of 2026.

Board Committee Reports

Corporate Governance and Human Resources

Ms. Schmidt, Committee Chair, reported that the Corporate Governance and Human Resources Committee met in met in closed and open sessions on May 6, 2025 and May 7, 2025 respectively. At the May 6 closed meeting, the Committee discussed the results of the 2024 Board of Trustees Annual Evaluation in advance of the open session on May 7, as well as the results of the 2024 Committee self-assessment. The Committee then adjourned into executive session to receive an update on talent management and succession planning initiatives, and to approve an executive compensation matter. The Committee also received a preview from its outside consulting firm, Meridian, of the results of the 2025 compensation study.

Ms. Schmidt reported that each of the Board Committees, except Nominating, had reviewed the results of their self-evaluations in closed sessions and identified opportunities for continued improvement.

Regulatory Oversight Committee

Mr. Manning, Committee Chair, reported that the Regulatory Oversight Committee met in executive session on May 6, 2025 and in open session on May 7, 2025. At the executive session, the Committee reviewed the results of its annual self-evaluation and received updates on CMEP Matters, Reliability Standards, and vegetation management. At the May 7 open meeting, the Committee received updates on Reliability Standards matters, Standards and CMEP enhancements, and ERO regulatory programs.

Finance and Audit

Ms. Sidford, Committee Chair, reported on recent meetings of the Finance and Audit Committee. At its May 6, 2025 closed meeting, the Committee reviewed the results of its annual self-evaluation. The Committee also reviewed the 2024 financial statement audit results, received an update on the development of the 2026 Business Plan and Budget, and received an update on internal audit activities. Lastly, the Committee adjourned into executive sessions to discuss confidential matters.

At its May 7, 2025 open meeting, the Committee reviewed and recommended for Board acceptance the 2024 Year-End Audited Summary of Results and the First Quarter 2025 Unaudited Summary of Results. The Committee also received an update on the development of the 2026 Business Plan and Budget.

Enterprise-wide Risk

Mr. Piro, Committee Chair, reported that the Enterprise-wide Risk Committee met in closed session on May 6, 2025. At this meeting, the Committee reviewed its annual self-evaluation results. The Committee also received updates on aligned assurance efforts, progress under the 2025 Enterprise Risk Management Workplan and meetings of the Executive Risk Committee, and Regional Entity activities. The Committee adjourned into executive sessions to discuss confidential matters.

Technology and Security

Ms. Allen, Committee Chair, reported that the Technology and Security Committee met in closed session on May 6, 2025 and in open session on May 7, 2025. At the closed session, the Committee reviewed its self-evaluation results and received an update on cyber security posture. At the open session, the Committee received updates on business technology strategy and E-ISAC operations.

Nominating

Mr. Irving, Committee Chair, reported that the Committee will meet in June to receive an update from NERC's Trustee search firm and review the results from the annual self-assessment.

Other Matters and Adjournment

There being no further business, and upon motion duly made and seconded, the meeting was adjourned.

Submitted by,

A handwritten signature in black ink, appearing to be 'SR', with a long horizontal line extending to the right.

Sônia Rocha
Corporate Secretary

Compliance and Certification Committee Leadership

Action

Approve

Background

Pursuant to the Compliance and Certification Committee (CCC) Charter, the CCC shall have a chair and a vice chair that each serve two-year terms. The CCC Nominating Subcommittee recommends a chair and vice chair to the CCC for a vote. Under Section 1303 of the NERC Rules of Procedure, the Chairman of the Board appoints the chair and vice chair of the CCC.

The CCC Nominating Subcommittee solicited chair and vice chair nominations from July 1-15, 2025. Based on the nominations received, the CCC Nominating Subcommittee provided the recommended chair and vice chair candidates to the CCC for a vote. On July 23, 2025, the CCC approved the candidates presented below for Board appointment.

Summary

The CCC requests the Board appoint the following individuals for chair and vice chair of the CCC for the two-year term starting on January 1, 2026 and concluding on December 31, 2027:

- Chair
 - Silvia Parada Mitchell, NextEra, At-large member of CCC: Ms. Silvia Parada Mitchell serves as Senior Director of NERC Compliance at NextEra and has been a dedicated member of the CCC since 2011. With 14 years of continuous service, she brings a wealth of experience and a deep understanding of compliance challenges across the ERO Enterprise, particularly through her organization's role as a Multi-Regional Registered Entity (MRRE) operating in all six Regions. Ms. Parada Mitchell has been an active contributor to several CCC subcommittees, including over four years on the Standards Subcommittee prior to its merger with EROMS. She has served as CCC Vice Chair from 2022 to 2025 and has played key leadership roles in both EROMS and ORCS, contributing to critical initiatives such as procedure reviews, inverter-based resource (IBR) registration, and CORES testing. She currently serves as co-chair of the Standards Coordination Collaboration Group (SCCG) and is an active member of the NERC Align Users Group. Her leadership extends beyond the CCC. Ms. Parada Mitchell served as Chair and Vice Chair of the Midwest Reliability Organization (MRO) Board from 2016 to 2019 and held leadership roles during two terms on the NERC Standards Committee beginning in 2010. Ms. Parada Mitchell is committed to advancing a collaborative, risk-based compliance framework that supports reliability and continuous improvement. Her extensive leadership experience, cross-regional insight, and commitment to peer engagement make her a strong candidate to continue serving in a CCC officer role.
- Vice Chair
 - Daniela Hammons, CenterPoint Energy, Sector 1 (Investor-owned Utility) of CCC: Ms. Daniela Hammons currently serves as Director of Policy and Compliance at CenterPoint Energy and has been an active member of the CCC since 2022. With over

three years of continuous service, Ms. Hammons brings a strong foundation in compliance leadership and a proven track record of effective engagement within the CCC and across the broader ERO Enterprise. Ms. Hammons has demonstrated exceptional leadership within the CCC through her roles on the ERO Monitoring Subcommittee (EROMS). She was appointed Vice Chair of EROMS in 2023, where she led the successful review and revision of several CCC procedures that were subsequently approved by the CCC and the NERC Board of Trustees. In 2024, she was appointed Chair of EROMS, where she continues to lead the development of quarterly meeting agendas, stakeholder engagement discussions, and procedural reviews. She also serves on the CCC Executive Committee, contributing to strategic planning and coordination across subcommittees. Her leadership extends beyond the CCC. Ms. Hammons currently serves as Vice Chair of the Texas RE Member Representatives Committee and as an affiliated director on the Texas RE Board of Directors. She previously served as Chair and Vice Chair of the former Texas RE NERC Standards Review Subcommittee and is a member of the leadership team for the Edison Electric Institute (EEI) Reliability Executive Advisory Committee. Ms. Hammons' prior CCC leadership roles, combined with her extensive industry involvement and facilitation skills, make her uniquely qualified to step into the CCC Vice Chair position. Her ability to lead with clarity, foster collaboration, and drive meaningful outcomes will be a valuable asset to the CCC in the 2026–2027 term.

During discussions of the candidates, NERC staff raised concerns regarding the candidates' companies' lack of NERC membership sector diversity (NextEra and CenterPoint are both Sector 1 members), but the CCC determined that the candidates meet sector diversity as required by the CCC Charter. First, the CCC asserts that the CCC Charter does not clarify whether the "representative sector" is meant to be the NERC membership or the seat the candidate occupies. Ms. Parada Mitchell is an at-large member and Ms. Hammons is a Sector 1 member. Furthermore, the CCC Charter does not require candidates' companies to be NERC members, although it is preferred. Second, Ms. Parada Mitchell was originally Sector 6 (Merchant Electricity Generator) when joining the CCC. The CCC determined Ms. Parada Mitchell still performs work in this area to provide generator input as an at-large member. To the extent the Board deems it necessary, the CCC requests the Board waive the CCC Charter requirement for sector diversity based on the foregoing reasons in this background document.

Compliance and Certification Committee Membership

Action

Approve

Background

On May 29, 2025, the Compliance and Certification Committee (CCC) Nominating Subcommittee issued its annual request for nominations for terms beginning January 1, 2026 through December 31, 2028.¹

Consistent with the CCC Charter and CCC procedures, the CCC Nominating Subcommittee uses the following criteria when selecting nominees:

- Senior-level industry expertise;
- Knowledge of topics within the scope of the CCC;
- Experience within their respective organizations in at least one of the following areas:
 - Compliance Administration
 - Compliance Enforcement
 - Risk Management
 - NERC Registration
 - NERC Certification
 - NERC Standards;
- Geographical representation;
- Adherence to CCC expectations (if applicable);
- Participation in other ERO committees, trade organizations, membership organizations (NATF, NAGF, etc.), or regional forums;
- Input from the CCC Executive Committee;
- The nominator's and nominee's organizations' status as:
 - A NERC member,
 - A NERC registered entity,
 - A registered entity-sponsored industry/trade organization,
 - A provider of professional services to NERC registered entities;
- Nominee's qualifications to current posting;
- Only one nomination per entity/organization (including affiliates);

¹ Following NERC Board of Trustees (Board) approval

- The nominee's entity/organization does not already have a member on the CCC; and
- If a nomination is received from another entity/organization, then confirm nominee's willingness to serve.

Summary

The CCC Nominating Subcommittee met on June 23, 2025 to consider 18 nominees. After discussion, the CCC Nominating Subcommittee was in consensus to recommend the following nominees for Board approval:

- Sector 2, State/Municipal – Mike Bowman, City Utilities of Springfield, MO. Mr. Bowman is an existing member of the CCC and has over 20 years in the electric utility industry. Specifically, Mr. Bowman served as a Mid-Continent Compliance Forum Board member which provides outreach to others seeking and sharing best practices, thus providing further opportunities for CCC outreach and involvement.
- Sector 3, Cooperative Utility – Ryan Strom, Buckeye Power Inc. Mr. Strom is a registered Professional Engineer in the state of Ohio, and currently is Director of Power Delivery Engineering Services at Buckeye Power. He currently serves on ReliabilityFirst's Standards Committee and has been an active member of the RF Compliance Users Group.
- Sector 4, Federal/Provincial Utility/Federal Power Marketing Administration – As the CCC Nominating Subcommittee did not receive nominees for this Sector, this seat was converted to Member at Large.
- Sector 5, Transmission Dependent Utility – Marcus Freeman, Electricities of North Carolina. Mr. Freeman has more than 27 years of electric utility experience in operations, IT, compliance, and risk management and is the Vice President for Compliance and Risk Management at Electricities of North Carolina. Mr. Freeman's compliance and risk management background aligns with CCC's work, and he is currently a CCC member serving on the EROMS and Nominating subcommittees.
- Sector 6, Merchant Electricity Generator –Rhonda Jones, Invenergy. Ms. Jones was the only eligible Sector 6 nominee; however, Ms. Jones' 15 years of NERC Regulatory Compliance Leadership will assist the CCC well in its Compliance and Monitoring discussions. In addition, Ms. Jones' organization, Invenergy, has a presence in each of the six Regions providing a unique perspective of compliance monitoring and enforcement activities.
- Sector 9, Small End-Use Electricity Customer – Angela Schaben, Missouri Office of Public Counsel. Ms. Schaben was the only eligible Sector 9 nominee and provides a diverse set of skills that the CCC may leverage. Ms. Schaben has attended specialized training around virtualization, cybersecurity, and risk management assurance. The training, in addition to Ms. Schaben's regulatory compliance and auditing background, aligns with the CCC mission.
- Member At-large:
 - Silvia Parada Mitchell, Florida Power and Light (NextEra Energy Resources). Ms. Mitchell is the existing CCC Vice Chair and has over 30 years of operational, engineering, business management, and compliance experience in the energy field. Ms. Mitchell's current organization (NextEra) owns a diverse fleet of renewable energy and battery storage, as well as several transmission owners and operators. Ms.

Mitchell's substantial experience and exposure to a large portfolio of registrations provides the CCC with diverse perspectives.

- Tino Zaragoza, Imperial Irrigation District. Mr. Zaragoza is an existing member of the CCC. Additionally, Mr. Zaragoza has over 27 years electric utility experience, including Energy Management System and System Operations expertise. Mr. Zaragoza currently serves as the Western Interconnection Compliance Forum (WICF) Chair, which provides additional opportunities to collect feedback on CCC activities and focused discussions. In addition, he is currently a member of the Organization Registration and Certification Subcommittee (ORCS), demonstrating his openness to serve on industry stakeholder committees.
- Ashley Stringer, Oklahoma Gas and Electric. Ms. Stringer is an existing member of the CCC and was reselected based on her wealth of experience with over 20 years in compliance roles. Ms. Stringer has experience in registration, auditing, risk management, internal controls, as well as operator training. Additionally, Ms. Stringer is actively engaged as a current member by serving both the EROMS and Nominating subcommittees. Based on this experience, including her registration activities, the nominating subcommittee recommends her for reelection.
- Amy Casuscelli, Xcel Energy. Ms. Casuscelli previously served on the NERC Standards Committee and has become very familiar with the NERC Rules of Procedure. Her experience in the management and execution of the standards development process in adherence to Appendix 3A of the NERC Rules of Procedure could be valuable in the CCC's future engagement in Standards projects.

Personnel Certification Governance Committee Membership

Action

Approve

Background

The Personnel Certification Governance Committee (PCGC) is seeking Board of Trustees approval to appoint two new members to fill open seats on the committee. All PCGC members are NERC Certified System Operators (NCSO) and serve staggered two-year terms to provide balanced and continuous oversight of the System Operator Certification Program.

The proposed new members have been nominated in accordance with the PCGC charter and were selected based on their qualifications, experience, and active certification status.

Summary

Requesting approval of two new PCGC members for two-year terms ending December 2027

- Paul 'Scotty' Campbell, Entergy
 - Paul Campbell is a NERC certified system operator with twenty-five years of experience at Entergy. He currently serves as Supervisor of Transmission Control Center Training, where he leads a team of instructors and engineers responsible for initial and continuing training for more than 60 transmission operators at two separate control centers. He also oversees Entergy's credential maintenance providership and supports control center training for the Distribution Operations Centers (DOC) and System Planning and Operations (SPO) training organizations. Mr. Campbell previously served for 12 years as a system operator in both distribution and transmission roles. He also chaired the SERC System Operator Working group (SOWG).
- Kyle Adserias, LS Power
 - Kyle Adserias is a NERC certified system operator serving as a Training Specialist with LS Power Grid New York. He has been in his role at for two and a half years and has six and a half years of experience in the transmission industry. Mr. Adserias is responsible for planning and delivering all training-related duties for the transmission operators and support staff for the LS Power New York branch. This includes in-person classroom training, situational simulation training, and scheduling all external events. Prior to joining LS Power, he served for four years at the New York Independent System Operator (NYISO), where he performed Reliability Coordinator functions including balancing, interchange, outage coordination, and interregional communications. Mr. Adserias began his career as a nuclear electrician in the United States Navy serving 10 years aboard a nuclear submarine, His work managing power distribution on the submarine inspired his transition into the electric utility industry.

CCCPP-009-3 NERC Compliance and Certification Committee Confidentiality Protocol

Action

Approve

Background

Procedure CCCPP-009 -3, titled NERC Compliance and Certification Committee Confidentiality Protocol, outlines the requirements for protecting the confidentiality of information submitted to, or created by, the Compliance and Certification Committee (CCC) in the course of performing the CCC's functions as defined in the CCC Charter, the NERC Rules of Procedure (ROP), and applicable governmental orders. Pursuant to the CCC Charter, CCC procedures addressing topics within the scope of the ROP require approval by the NERC Board of Trustees.

At its meeting on October 17, 2024, the CCC approved proposed revisions to CCCPP-009-2 following a periodic review by the CCC Electric Reliability Organization Monitoring Subcommittee.

Proposed CCCPP-009-3

The proposed updates include:

- Minor administrative edits for clarity and consistency.
- Revisions to the Storage and Protection of Confidential Information section to align with current practices for safeguarding both paper and electronic records, consistent with NERC's broader confidentiality protocols.

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

NERC Compliance and Certification Committee Confidentiality Protocol

CCCPP-009-3

TBD (Board of Trustees Approved Date)

RELIABILITY | RESILIENCE | SECURITY



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Introduction

As a North American Electric Reliability Corporation (NERC) Board of Trustees (Board)-appointed stakeholder Committee serving and reporting directly to the NERC Board, the Compliance and Certification Committee (Committee or CCC) will engage with, support, and advise the NERC Board and NERC regarding the NERC Compliance Monitoring and Enforcement Program (CMEP), Organization Registration program (Registration program), Organization Certification program (Certification program), and the Reliability Standards development program in accordance with the NERC Rules of Procedure (ROP).

CCC Members and CCC Observers may receive Confidential Information¹ while serving on NERC's CCC. The purpose of this Confidentiality Protocol (Protocol) is to protect the confidentiality of information that is submitted to, or created by, the CCC for the purpose of performing the CCC's functions as defined herein, the NERC Rules of Procedure (ROP), and relevant orders of any Applicable Government Authority.

CCC Members and CCC Observers that receive, submit or create Confidential Information during the course of, or as a result of, their participation in the CCC or any function shall keep in confidence and not disclose or distribute any Confidential Information or any part thereof, in accordance with NERC ROP Section 1500.

This Protocol establishes the requirement that CCC Members sign a Non-Disclosure Agreement (NDA) when they join the CCC and that CCC Observers sign a NDA prior to accessing confidential information.

¹ Confidential Information designated as such in NERC's ROP Section 1500

Chapter 1: Applicability

This Protocol applies to any CCC Member (or Proxy)² and CCC Observer. When an individual joins the CCC, the CCC Secretary shall require the individual to sign the NDA. This NDA is considered binding whenever a CCC Member and CCC Observer receive Confidential Information pursuant to a CCC function.

It is generally expected that CCC Members and CCC Observers will receive Confidential Information when participating in the following:

- Monitoring NERC's adherence to Rules of Procedure;
- A Hearing Body for any contest regarding findings of penalties or sanctions for violation(s) of Reliability Standard(s) where NERC is acting as the Compliance Enforcement Authority (CEA) and is directly monitoring the Registered Entity for compliance with those Reliability Standards (Registered Entity by agreement with a Regional Entity or absent a delegation agreement);
- A Mediation Body to assist NERC and a Regional Entity (NERC and the Regional Entity individually a Party, collectively, the Parties) to understand and work through disagreements or disputes concerning NERC performance audits of a Regional Entity's Compliance Monitoring and Enforcement Program.
- Receiving reports about the above stated activities; and
- Occasionally in furtherance of other CCC activities.

In the event of a conflict between provisions of this Protocol and the NERC ROP, the NERC ROP governs.

² Future references to CCC Members include their Proxy.

Chapter 2: Handling of Confidential Information

Access to Confidential Information

The CCC Chair (or designate designee)³ coordinates with NERC for CCC member access to Confidential Information. The CCC Chair, CCC Secretary, or NERC Staff may share Confidential Information submitted to the CCC with the Subcommittee, Task Force or Working Group tasked to participate in any of the activities highlighted above and will oversee compliance with this Protocol.

In the event that the CCC Chair has a conflict of interest in connection with a CCC matter, another CCC Member designated by the CCC Vice-Chair will administer the duties of the CCC Chair under this Protocol with respect to Confidential Information related to such matter.

Authorizing Access to Confidential Information

The CCC Chair or the CCC Secretary will verify that only CCC Members and/or CCC Observers requiring access to perform designated functions will have access to Confidential Information and that access will be provided only after NDAs have been signed and returned to the CCC Secretary.

When the CCC initiates a function that requires receipt of Confidential Information by CCC Members or CCC Observers, the CCC Secretary will ensure that CCC Members and/or CCC Observers requiring access to Confidential Information have signed a NDA and will provide confirmation to the CCC Chair.

Storage & Protection of Confidential Information

The CCC Secretary or assigned NERC Staff will ensure that Confidential Information is stored in a secure and restricted location, separate and apart from other NERC information. In doing so, the CCC Secretary or assigned NERC Staff will:

- Ensure that no person will have access to Confidential Information without the CCC Chair's authorization and without having first signed the NDA.
- Ensure Confidential Information is not removed from secure storage locations unless authorized in writing by the CCC Chair or CCC Secretary with the CCC Chair's approval.
- Ensure Confidential Information is treated, at minimum, in accordance with NERC ROP Section 1500 and any applicable laws or regulations.
- Be responsible for implementing business procedures for managing Confidential Information applicable to the CCC, in accordance with the NERC procedures for protection of similar information.
- Along with the CCC Chair, oversee all access to secure storage locations for Confidential Information, and keep Confidential Information obtained or created by the CCC separate from CCC general files and other files, and conduct periodic reviews to ensure that those who have been previously provided access to Confidential Information still require that access.

Roles and Responsibilities for Handling Confidential Information

- Submitting Entities must mark Confidential Information in accordance with NERC ROP 1500.
- Transmission of Confidential Information via email shall be avoided. If such circumstance should arise that transmission is necessary, the confidential document shall be encrypted as part of the transmission process.

³ Future references to CCC Chair include their designee

Third Party request for Confidential Information

The CCC Chair will forward requests for Confidential Information from the CCC to the CCC Secretary and assigned NERC Sponsor.

NERC will evaluate and respond to requests for Confidential Information in accordance with the ROP and inform the CCC Chair of the manner in which they have responded to the request.

Termination of Access to Confidential Information

At the direction of the CCC Chair or if determined to be necessary by NERC, the CCC Secretary will terminate access to Confidential Information for a CCC Member or CCC Observer. CCC Members and CCC Observers will surrender and certify destruction of any Confidential Information in their possession, (e.g., hard copy, laptop) to the CCC Secretary in the event that:

- A CCC Member or CCC Observer (who participated in activities requiring an NDA) to whom Confidential Information is disclosed ceases to be a CCC Member or CCC Observer;
- A CCC Member or CCC Observer changes their status in a manner that would cause it to lose its position as a CCC Member or CCC Observer;
- A CCC Member or CCC Observer ceases to require access in order to perform the CCC function; or
- The CCC Chair deems the CCC function associated with the Confidential Information to be complete.

Even if no longer a CCC Member or CCC Observer, every person who has signed a NDA will continue to be bound by the provisions of this Protocol. When a CCC Member's access to Confidential Information is terminated, access by their Proxy is also terminated.

Information No Longer Deemed Confidential

If the Submitting Entity notifies NERC that information, which is the subject of this Protocol, is no longer deemed Confidential Information in accordance with NERC ROP Section 1502.3, NERC Staff will notify the CCC Chair, as necessary.

The CCC Chair shall then notify the CCC Members and CCC Observers that information previously deemed Confidential Information shall no longer be treated as such.

Retention of Confidential Information

General Provisions

CCC Secretary will retain Confidential Information submitted or created pursuant to the CCC's functions as provided for in Section 9 of Appendix 4C to ROP and in accordance with the provisions of any applicable protective order.

Hearing Function

The CCC Secretary will ensure Confidential Information is accessible to a Hearing Panel (as is described in the Hearings Section of the CCC Charter and the applicable process and procedures) until the later of the date that the Hearing Panel:

- Issues an order terminating the proceeding;
- The proceeding becomes no longer subject to judicial review; or
- The date that any NERC proceeding relating to the Confidential Information is concluded and no longer subject to judicial review.

Chapter 3: Improper Disclosure

In accordance with the provisions in NERC ROP 1507, any person engaged in CCC, NERC, or Regional Entity activity or functions under Section 215 of the Federal Power Act or the equivalent laws of other appropriate Applicable Governmental Authorities who improperly discloses Confidential Information may, on a temporary or permanent basis, lose access under this Protocol to Confidential Information in connection with any CCC function, and may be subject to CCC action including termination of CCC membership. Nothing in this section precludes an entity whose Confidential Information was improperly disclosed from seeking a legal or equitable remedy in an appropriate court.

Chapter 4: Revision History

Date	Version Number	Comments
November 29, 2017	1.0	Approved by the Compliance and Certification Committee
September 22, 2021	2.0	Approved by the Compliance and Certification Committee
November 4, 2021		Approved by the Board of Trustees
October 16, 2024	3.0	Approved by the Compliance and Certification Committee
TBD		Approved by the Board of Trustees

Appendix A: Non-Disclosure Agreement

I am a: ☐ CCC Member
☐ CCC Observer

Authorized Proxy⁴ of: _____

It is generally expected that CCC Members and CCC Observers will receive Confidential Information when: (1) participating in (a) monitoring NERC's adherence to Rules of Procedure, (b) a Hearing Body, or (c) a Mediation Body; (2) receiving reports about the above stated activities; and, (3) occasionally in furtherance of other CCC activities.

CCC Members and CCC Observers that receive, submit or create Confidential Information during the course of, or as a result of, their participation in the CCC or any function shall keep in confidence and not disclose or distribute any Confidential Information or any part thereof, in accordance with NERC ROP Section 1500.

I hereby certify to my understanding that access to Confidential Information is provided to me pursuant to the terms and restrictions of the CCC Confidentiality Protocol. I understand that I have been given a copy of and have read the CCC Confidentiality Protocol and that I agree to be bound by it. I understand that the contents of the Confidential Information, any notes or other memoranda, or any other form of information that copies or discloses Confidential Information shall not be disclosed by me to anyone other than in accordance with the CCC.

Personnel Risk Assessment

(A personnel risk assessment is required for access to Confidential Information governed by CIP standards.)

I hereby certify that I have completed and passed, at a minimum, a personnel risk assessment as identified in the Critical Infrastructure Protection Standards to the satisfaction of my employer or client. **YES ____ NO ____.** (Check the one that applies).

Confidentiality Protocol. I acknowledge that a violation of this Certificate constitutes a violation of the NERC Rules of Procedure, the CCC Charter, and the CCC Confidentiality Protocol and that such violation may subject me to the penalties provided therein.

Signature: _____ Print Name: _____
Title: _____ Employed By: _____
Representing _____ Date: _____

TO BE COMPLETED BY THE CCC CHAIR OR STAFF COORDINATOR:

- ☐ Access granted
- ☐ Access denied

Signature: _____ Date: _____

Print Name: _____

⁴ Authorized Proxy is defined as the CCC Member's Proxy. This should be left blank for CCC Members.

Project 2024-01 Rules of Procedure Definitions Alignment (Generator Owner and Generator Operator)

Action

Adopt the following new definitions for inclusion in the [Glossary of Terms used in NERC Reliability Standards](#), and authorize staff to file with applicable regulatory authorities:

- Proposed Revised Definitions for Inclusion in the *Glossary of Terms used in NERC Reliability Standards*:
 - [\[Generator Owner\]](#)
 - [\[Generator Operator\]](#)
 - [\[Redline\]](#)
- Implementation Plan
 - [\[Implementation Plan\]](#)

Background

In March 2024, NERC proposed changes to its Rules of Procedure registry criteria to include certain non-Bulk Electric System (BES) Inverter-Based Resources (IBRs) in the Generator Owner and Generator Operator categories. NERC proposed these changes in response to a Federal Energy Regulatory Commission (FERC) directive in [Docket No. RD22-4-000](#) directing NERC to develop a work plan to address the registration of these IBRs and ensure their compliance with Reliability Standards by certain milestone dates.¹ The registry criteria for Generator Owner and Generator Operator were expanded to include IBRs below the BES threshold that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV. These additional resource types are commonly referred to as “Category 2” IBR. FERC [approved](#) the registry criteria revisions on June 27, 2024.²

In preparation for the registry criteria revisions, NERC Staff conducted a preliminary review of all active Reliability Standards in October 2023 to evaluate their potential applicability and enforceability to Category 2 IBR. Based on this review, NERC staff determined that, of the full population of active Reliability Standards, eight (8) standards could be considered applicable and enforceable to Category 2 IBR if the definitions of Generator Owner and Generator Operator were expanded to include the Category 2 IBR criteria.

Following approval of the revised registry criteria, NERC developed a Standard Authorization Request (SAR) to align the definitions for Generator Owner and Generator Operator within the *Glossary of Terms used in NERC Reliability Standards* (Glossary) and registration criteria in the NERC Rules of Procedure. This SAR proposed revising the Generator Owner and Generator

¹ See *Registration of Inverter-Based Resources*, 181 FERC ¶ 61,124 (2022).

² See *Order Approving Revisions to North American Electric Reliability Corporation Rules of Procedure and Requiring Compliance Filing*, 187 FERC ¶ 61,196, (2024).

Operator definitions in the Glossary to match registry criteria to ensure previously unregistered IBRs would be subject to NERC Reliability Standards to mitigate risks on the Bulk Power System (BPS). Furthermore, the project would ensure that NERC Reliability Standards would be applicable to these new and expanded Generator Owners and Generator Operators by May 15, 2026. In January 2025, the Standards Committee approved the SAR and assigned it to a new project, Project 2024-01 Rules of Procedure Definitions Alignment (Generator Owner and Generator Operator) following the January Standards Committee meeting.

Summary

In addressing the FERC Order No. 901 directives and SAR, the drafting team revised the *Glossary* definitions for Generator Owner and Generator Operator to align with the revised definitions of these terms in the NERC Rules of Procedure registry criteria that FERC approved on June 27, 2024.

The drafting team also developed an implementation plan for the revised Generator Owner and Generator Operator definitions, as they are used in eight (8) Reliability Standards:

- BAL-001-TRE-2 ³
- IRO-010-5
- MOD-032-1
- PRC-012-2
- PRC-017-1
- TOP-003-6.1
- VAR-001-5
- VAR-002-4.1

As noted above, these Reliability Standards would not require any further revisions to become applicable to Generator Owners and Generator Operators with assets meeting the Category 2 criteria following approval of the proposed defined terms. Other projects will consider whether other standards applicable to Generator Owners and Generator Operators should be revised to include Generator Owners and Generator Operators with assets meeting the Category 2 criteria, and if so, on what implementation timeframe.

Standards Development Process

The proposed definitions for Generator Owner and Generator Operator were posted for an initial 45-day formal comment period and ballot from March 24 to May 7, 2025. The proposed Generator Owner and Generator Operator definitions ballot received 86.48% approval and 89.89% quorum. The proposed implementation plan ballot received 70.36% approval and 90.64% quorum. The drafting team made additional non-substantive changes to the implementation plan to provide further clarification of the applicability and compliance expectations with the eight (8) Reliability Standards listed above upon approval of the revised definitions.

³ The Drafting team should collaborate with NERC and Regional Entity staff in the review and implementation of this standard.

A 10-day final ballot for the definition's implementation plan was conducted July 2 – July 14, 2025. The Generator Owner and Generator Operator definitions received 85.98% approval and 91.01% quorum. The implementation plan received 73.83% approval and 91.67% quorum.

Minority Issues

Some industry stakeholders shared concerns with the list of eight (8) Reliability Standards to become applicable to Category 2 IBR identified during the preliminary NERC analysis. NERC Staff reaffirmed this analysis and performed an update, accounting for newly effective and retired Reliability Standards.

Additionally, some industry stakeholders believed that an additional definition should be created for the non-BES IBR that meet the expanded registration criteria, as well as new definitions for unregistered IBRs and for IBR-Distributed Energy Resources (IBR-DERs) as part of this project. The drafting team concluded that the proposed changes to the Generator Owner and Generator Operator were sufficient to address the concern for a new non-BES IBR term. The drafting team further determined that the definitions related to unregistered IBR and IBR-DER were being considered by other projects. These conclusions were taken to the April 2025 Standards Committee with a recommendation by the drafting team to reject a SAR proposing these additional definitions.

Pertinent FERC Directives

Paragraph 52 of the *Order Approving Registration Work Plan*.⁴ The Implementation Plan accompanying the revised definitions for Generator Owner and Generator Operator ensures that IBR owners and operators are required to comply with applicable Reliability Standards by May 15, 2026.

Cost Effectiveness

The cost impact is unknown at this time. Updating the definitions for Generator Owner and Generator Operator in conjunction with the NERC Registry Criteria expands the number of entities that must register with NERC and comply with NERC Reliability Standards. Specific cost estimates are not known at this time.

Additional Information and Next Steps

A link to the project history and files is included here for reference: [Project 2024-01 Rules of Procedure Definitions Alignment \(Generator Owner and Generator Operator\)](#)

NERC Staff created a document, [Reliability Standards Compliance Dates for Generation Owners & Generator Operators](#), in support of the continued IBR Registration Initiative that contains information intended to provide awareness to those non-BES IBR owners and operators that meet the recently approved registration criteria for Generator Owners and Generator Operators.⁵ The document shall be maintained by NERC Standards Development, in collaboration with Registration, Compliance, Engineering, and Legal. It will be updated to align with the release of the quarterly IBR work plan information filing directed by the FERC.

⁴ *Order Approving Registration Work Plan*, 183 FERC ¶ 61,116 (2023).

⁵ Reliability Standards Compliance Dates for Generation Owners & Generator Operators; https://www.nerc.com/pa/Stand/202401%20Rules%20of%20Procedure%20Definitions%20Alignment%20GO/ComplianceDatesforGOs_GOPS.pdf

As detailed through updates resulting from the IBR Registration Initiative webinars and supplemental materials, all other Reliability Standards applicable to Generator Owners and Generator Operators, beyond those eight (8) identified in the analysis and addressed through the Project 2024-01 implementation plan, would require modifications to become enforceable for Category 2 IBRs.⁶ While NERC Staff maintains a list of all Reliability Standards applicable to Generator Owners or Generator Operators, each Reliability Standard will be individually assessed to establish applicability to Category 2 IBRs and be revised through the NERC standards development process, using open and transparent commenting and ballot periods.

To support entities during this period, the [Reliability Standards Compliance Dates for Generation Owners & Generator Operators](#) document includes all finalized and pending compliance dates for the applicability and enforceability of individual Reliability Standards applicable to Generator Owners or Generator Operators with Category 2 IBR.

⁶ Quick Reference Guide: IBR Registration Initiative; July 2025;
https://www.nerc.com/pa/Documents/IBR%20Registration%20Initiative_Quick%20Reference%20Guide.pdf

Project 2020-06 Verifications of Models and Data for Generators

Action

Adopt the following new definitions for inclusion in the [Glossary of Terms used in NERC Reliability Standards](#), and authorize staff to file with applicable regulatory authorities:

- Proposed new definitions for inclusion in the *Glossary of Terms used in NERC Reliability Standards*:
 - [\[Model Verification\]](#)
 - [\[Model Validation\]](#)
- Implementation Plan
 - [\[Implementation Plan\]](#)

Background

NERC initiated Project 2020-06 Model Verifications of Models and Data for Generators in 2021 to address a Standard Authorization Request submitted by the NERC Inverter-based Resource Performance Subcommittee (IRPS). In 2020, the IRPS published a white paper¹ summarizing the results of its review of NERC Reliability Standards, a review which it had undertaken to determine if there were opportunities to address gaps or otherwise improve the standards to assure reliability considering the unprecedented growth of Inverter Based Resources (IBRs) on the bulk power system.

On October 19, 2023, while work was underway on this project, the U.S. Federal Energy Regulatory Commission (FERC) issued Order No. 901.² In Order No. 901, FERC directed NERC to develop new or modified Reliability Standards addressing reliability concerns related to IBRs “all stages of interconnection, planning, and operations,”³ and to submit them to FERC on a three-year, staggered timeframe. This addresses a wide spectrum of reliability risks to the grid from the application of IBRs, including both utility scale and behind-the-meter or distributed energy resources. Within Order No. 901, there are four (4) milestones that include sets of directives to NERC. NERC staff has identified three (3) active projects (2020-06, 2021-01, and 2022-02) that are directly impacted by the associated FERC directives in Order No. 901 Milestone 3.

In addition, to assist readers, please see the following additional documents drafted to help keep the NERC Milestone 3 projects organized.

- [FERC Order No. 901 - Summary Information of Milestone 3](#)
- [FERC Order No. 901 - Summary Graphic of Milestone 3](#)

¹ NERC IRPTF, IRPTF Review of NERC Reliability Standards (Mar. 2020), https://www.nerc.com/pa/stand/project202104modificationstoprc0022dl/review_of_nerc_reliability_standards_white_paper_062021.pdf

² Order No. 901, *Reliability Standards to Address Inverter-Based Resources*, 185 FERC ¶ 61,042 (2023) [hereinafter Order No. 901].

³ *Id.* at P 25.

- [Standards Development Mapping of FERC Order 901 Directives and Other Guidance to Standards Development Projects](#)

In light of these multiple standards development projects to address the risks related to IBRs and modeling, NERC determined that a single drafting team would move forward with definitions for Model Verification and Model Validation that would be leveraged by other projects. The Project 2020-06 drafting team was selected to coalesce development efforts for the definitions and coordinate the proposed definitions with the other NERC projects addressing modeling issues, along with continuing work to address these concerns in Reliability Standards. The drafting team is developing dynamic modeling requirements for Model Verification and Model Validation related to non-synchronous generation. Efforts also include the integration of Category 2 IBRs as well as Bulk Electric System (BES) elements and requiring Electromagnetic Transient (EMT) modeling in the MOD-026-2 standard under development.

As a Milestone 3 project, Project 2020-06 addresses the FERC directives in Order No. 901 to develop new or modified Reliability Standards for Model Verification and Model Validation of registered IBRs. Additionally, Project 2020-06 proposes definitions for Model Verification and Model Validation to address the need for a uniform understanding of these terms. The proposed definition for Model Validation would further be incorporated into MOD-033-3 to ensure Model Validation is completed at both the generator level and the system level. Model Verification would only apply currently to MOD-026-2. These standards must be filed with FERC by November 4, 2025, in accordance with Order No. 901.

Summary

To address the goals of this project and other Reliability Standards development projects addressing modeling issues, the Project 2020-06 Model Verifications of Models and Data for Generators drafting team proposed the creation of two new defined terms for inclusion in the [Glossary of Terms used in NERC Reliability Standards](#): Model Verification, Model Validation.

The addition of the defined terms will promote a common understanding of what Model Verification and Model Validation are. These terms will also help the drafting team as it modifies MOD-026 to address dynamic modeling concerns that extend beyond the traditional BES threshold into category 2 IBRs. These proposed terms are used in the Order No. 901 “Milestone 3” Reliability Standards and will also be used in current and future standards development projects addressing modeling issues. Pending completion of work on the associated standard(s), these definitions will be filed with FERC concurrently.

Standards Development Process

The proposed definitions of Model Validation and Model Verification were developed under Project 2020-06, which was granted a waiver by the Standards Committee to meet the regulatory deadline.⁴ The definitions were posted for an initial 25-day formal comment period and ballot from April 17 through May 12, 2025. Both definitions achieved a passing approval rating.

⁴ Under the approved waiver, the initial formal comment and ballot period was reduced from 45 calendar days to as few as 25 calendar days, with ballot pools formed in the first 10 calendar days and initial ballot and non-binding poll of Violation Risk Factors (VRFs) and Violation Severity Levels (VSLs) conducted during the last 10 calendar days of the comment period. Additional formal comment and ballot period(s) were reduced from 45 calendar days to as few as 15 calendar days, with ballot(s) conducted during the last 10 calendar days of the comment period. The final ballot period was reduced from 10 calendar days to 5 calendar days.

The drafting team conducted a 10-day final ballot on the proposed definitions from June 30 through July 9, 2025.

The ballot results for the definitions and implementation plan are below.

	Initial Ballot (4/17 - 5/12/25)	Final Ballot (6/30 - 7/9/25)
Definition	Quorum / Approval	Quorum / Approval
Model Verification	89.01% / 71.75%	90.11% / 76.23%
Model Validation		
Implementation Plan	88.28% / 73.08%	89.38% / 76.73%

Minority Issues

A minority of entities may still feel that the definition should include the defined term “Facility” rather than the undefined term “facility.” The drafting team did not pursue this request as the defined term “Facility” includes only BES elements and would not include Category 2 IBR. This was resolved with a detailed response to comments and updating of the technical rationale supporting document.

Pertinent FERC Directives

These definitions help support the pending revisions to Reliability Standards MOD-026-2 and MOD-033-3 that address FERC Order No. 901 Directives P7, P85, P143, P149, P157, and P161.⁵

Cost Effectiveness

No comments were received regarding cost concerns, and the drafting team does not anticipate significant costs associated with the proposed definitions.

Additional Information

A link to the project history and files is included here for reference:

- [Project 2020-06 Verification of Models and Data for Generators](#)

⁵ Standards Development Mapping of FERC Order 901 Directives and Other Guidance to Standards Development Projects; July 2025; <https://www.nerc.com/pa/Stand/Documents/FERC%20Order%20901%20Directives%20Mapping.pdf>

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Standards Actions Update

Soo Jin Kim, Vice President, Engineering, Standards, and PRISM
Board of Trustees Open Meeting
August 14, 2025

- Revised Definitions
 - Generator Owner
 - Generator Operator
- Final Ballot – July 14, 2025
 - Definitions: **85.98%** approval; 91.01% quorum
 - Implementation Plan: **73.83%** approval; 91.76% quorum
- Reliability Benefits
 - Alignment with FERC Revised NERC Rules of Procedure registry criteria

- **Action - Adopt**
 - Defined Terms –
“Generator Owner” and “Generator Operator”



- New Definitions
 - Model Validation
 - Model Verification
- Final Ballot – July 10, 2025
 - Definitions: **76.23%** approval; 90.11% quorum
 - Implementation Plan: **76.73%** approval; 89.38% quorum
- Reliability Benefits
 - Promote unified terms for use in Reliability Standards, including FERC Order No. 901 Milestone 3 Standards development projects.

- **Action - Adopt**
 - Defined Terms –
“Model Validation” and “Model
Verification”





Questions and Answers

2025 ERO Reliability Risk Priorities Report

Action

Accept

Background

The ERO Reliability Risk Priorities Report (2025 RISC Report) presents the results of the Reliability Issues Steering Committee's (RISC)'s continued work to strategically define and prioritize risks to the reliable operation of the bulk power system (BPS) and thereby provide recommendations to the Board of Trustees (Board) regarding the approach that the ERO Enterprise, and/or industry should take to enhance reliability and manage those risks.

The RISC members consist of a diverse group of subject matter experts who bring extensive knowledge and experience. The observations, findings, and guidance presented in this report include input from industry forums, trade associations, and other industry groups through multiple channels. The RISC also received feedback through both the 2025 Leadership Summit and the RISC Emerging Risks Survey. This report relies on and extends the comprehensive assessment and corresponding recommendations to the Board made in August 2023 that have been updated and refined. This 2025 RISC Report reflects subsequent recommendations and will address discussions with representatives from the NERC standing committees and technical reports and assessments conducted by NERC and industry.

Summary

The 2025 RISC Report reflects the collective opinion and conclusions drawn from RISC membership regarding present and emerging risks and their respective priorities. The RISC assembled and reviewed information from ERO Enterprise stakeholders and policymakers. Focused subgroups then worked to determine and evaluate the current set of risk profiles, added descriptors for each, and recommended mitigating activities. Additional risks and potential mitigating activities were identified during the 2025 Reliability Leadership Summit (Leadership Summit) that NERC and the RISC hosted in February 2025. The Leadership Summit participants were comprised of industry leaders, executives, regulators, policymakers, and subject matter experts with keen perspectives on the inherent and trending risks that affect BPS reliability.

The 2025 Risk Themes include:


1. **New large loads plus changing resource mix:** The emergence of new large loads at unprecedented scale and speed, combined with new system operating experiences from an evolving resource mix, highlights the need to advance the traditional system reliability construct from capacity to energy based, and more detailed analysis of resources and load centers.
2. **Larger-scale widespread events observed:** Larger-scale reliability impact events are occurring with contributions from grid transformation effects and increased incidence of large, widespread, long-term weather system scope, severity, and duration.

3. **Natural gas interdependence:** The natural gas pipeline infrastructure (natural gas being the primary source of fuel to the dispatchable generation fleet in the next five years) must expand to meet the growing need of these new dispatchable generation units. However, This is subject to increasing risks associated with just-in-time delivery, demonstrated reliability and security challenges, and inability to scale infrastructure quickly. Further, natural gas systems are dependent on just-in-time delivery of electricity. These mutual interdependencies creates an energy interconnection requiring coupled analysis and agreed upon protocols for planning and operations.
4. **Cyber and Physical Security complexity:** The growing complexity of system equipment and operations increases security challenges and enhances the attractiveness of the grid as a target.
5. **Persistent supply chain challenges:** Persistent supply chain and workforce challenges are impacting risk mitigation and response capabilities.
6. **Volatile energy policy:** A volatile and disconnected policy landscape creates risk and further complicates the ability to mitigate risks through policy solutions.

Teresa Mogensen, RISC Chair, will present the report for Board consideration and acceptance at the August 14, 2025 Board meeting.



GRID TRANSFORMATION



RESILIENCE TO
EXTREME EVENTS



CRITICAL
INFRASTRUCTURE
INTERDEPENDENCIES



UNAUTHORISED ENTRY STRICTLY
PROHIBITED
UNAUTHORISED PERSONS ARE PROHIBITED
FROM HANDLING OR INTERFERING WITH
ELECTRICAL APPARATUS
SECURITY



ENERGY POLICY

2025 ERO Reliability Risk Priorities Report

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION



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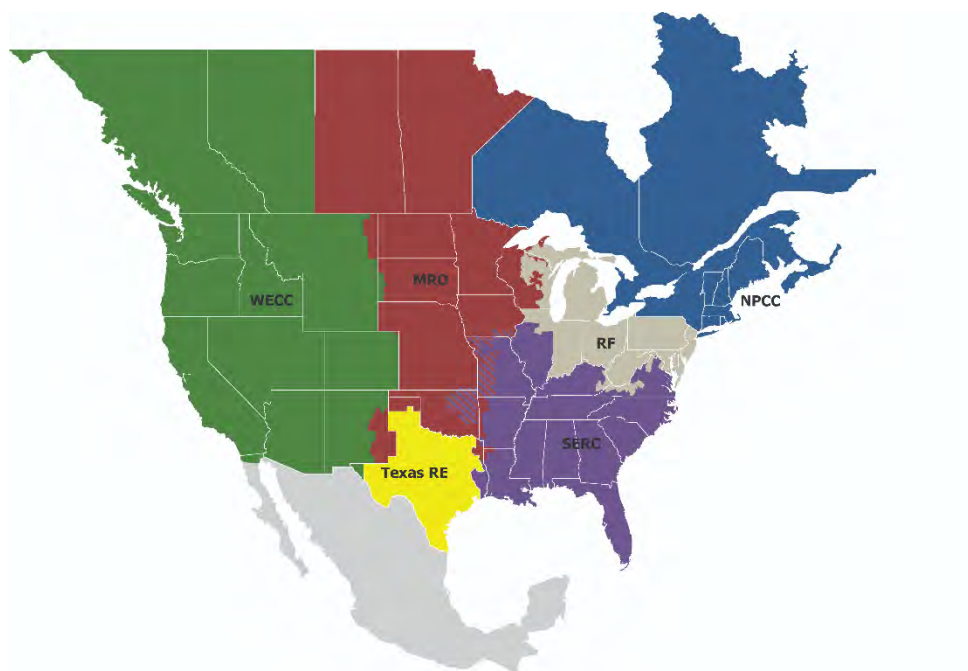
Preface

Electricity is a key component of the fabric of modern society and the Electric Reliability Organization (ERO) Enterprise serves to strengthen that fabric. The vision for the ERO Enterprise, which is comprised of NERC and the six Regional Entities, is a highly reliable, resilient, and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

Reliability | Resilience | Security

Because nearly 400 million citizens in North America are counting on us

The North American BPS is made up of six Regional Entities as shown on the map and in the corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
Texas RE	Texas Reliability Entity
WECC	WECC



RISC

The Reliability Issues Steering Committee (RISC)¹ advises the NERC Board of Trustees (Board) and provides key insights, priorities, and high-level leadership for issues of strategic importance to BPS reliability. Additionally, the RISC advises NERC committees, NERC staff, regulators, the Regional Entities, and industry stakeholders to establish a common understanding of the scope, priority, and goals for the development of solutions to address emerging reliability issues. The RISC provides guidance to the ERO Enterprise² and industry to effectively focus resources on the most critical issues to improve BPS reliability.

This *ERO Reliability Risk Priorities Report (2025 RISC Report)* presents the results of the RISC's continued work to strategically define and prioritize risks to the reliable operation of the BPS and thereby provide recommendations to the Board regarding the approach that NERC, the ERO Enterprise, and/or industry should take to enhance reliability and manage those risks.

The RISC participants include representatives from the NERC committees, the Member Representatives Committee, and "at large" industry executives. The observations, findings, and guidance presented in this report include input from industry forums, trade associations, and other industry groups through multiple channels. The RISC also received feedback through both the 2025 Leadership Summit³ and the RISC Emerging Risks Survey. This report relies on and extends the comprehensive assessment and corresponding recommendations to the Board made in August 2023 that have been updated and refined. This *2025 RISC Report* reflects subsequent recommendations and will address discussions with representatives from the NERC standing committees and technical reports and assessments conducted by NERC and industry.

¹ [Reliability Issues Steering Committee \(RISC\)](#)

² ERO Enterprise is interpreted to mean NERC, the Regional Entities, and NERC's technical committees

³ [2025 Leadership Summit Program Book](#)



Executive Summary

The 2025 RISC Report's primary objectives are to identify key risks to the BPS that merit attention and to recommend mitigating actions that align with those risks; it differs from other NERC reports in that it provides industry with strategic direction to plan for imminent risks and their mitigation. This is in contrast to the State of Reliability or event analysis reports that review data from previous years or events to draw objective conclusions about events, emerging risks, and the appropriate monitoring for their mitigation. This report compliments NERC's Long-Term Reliability Assessment, which is a data-driven assessment of potential future scenarios during the next 10 years.

The 2025 RISC Report reflects the collective opinion and conclusions drawn from RISC membership regarding present and emerging risks and their respective priorities. The RISC assembled and reviewed information from ERO Enterprise stakeholders and policymakers. Focused subgroups then worked to determine and evaluate the current set of risk profiles, added descriptors for each, and recommended mitigating activities. Additional risks and potential mitigating activities were identified during the 2025 Reliability Leadership Summit (Leadership Summit) that NERC and the RISC hosted in February 2025. The Leadership Summit participants were comprised of industry leaders, executives, regulators, policymakers, and subject matter experts with keen perspectives on the inherent and trending risks that affect BPS reliability.

Additionally, the RISC evaluated each risk based on its impact to the BPS regardless of the source or location of the risk. Recognizing that BPS operators and planners require a wide-area view of the system to provide them awareness of external conditions that could affect them, the RISC broadened the risk profiles to include risks associated with grid infrastructure impacting energy deliverability (e.g., telecom and water systems), natural gas delivery systems, and resources located on the electricity distribution system, such as distributed energy resources (DER) and customer distributed resources. Recommendations for potential mitigations of these external risks are also provided.

Critical Risk Profiles

This 2025 RISC Report includes five critical risk profiles:

1. Grid Transformation
2. Resilience to Extreme Events
3. Critical Infrastructure Interdependencies
4. Security
5. Energy Policy

Grid Transformation remains an overarching driver of new reliability risks. Grid impacts emerging from the transformations underway are very different from traditional power system behavioral assumptions, challenging the existing grid's Resilience to Extreme Events. Some events highlight other growing impacts from increasing Critical Infrastructure Interdependencies, particularly between the electric and natural gas systems. Security risk continues to evolve and grow in complexity along with the transformations. Energy Policy can further amplify or modify the impact of all of these factors, as policy direction drives transformational timelines, customer and stakeholder behavior, supply chain and workforce developments, regulatory certainty required for adequate investment, and industry attention.

Common Themes and Connections

There are important connections between and among the risk priorities and recommended actions for the ERO Enterprise and industry. While the risk profiles are presented individually, interplay between them compounds the challenge. The RISC recommends that the ERO Enterprise and industry consider these overall themes, the risk profile

specifics, and interplay between elements in charting a path to continue active awareness, better understanding, and mitigation of imminent and ever-evolving risks to the BPS

2025 Risk Themes

Substantive simultaneous change in all system dimensions (resource, grid, load), along with increasing complexity in the interactions between them, requires rethinking traditional system planning and operating approaches.

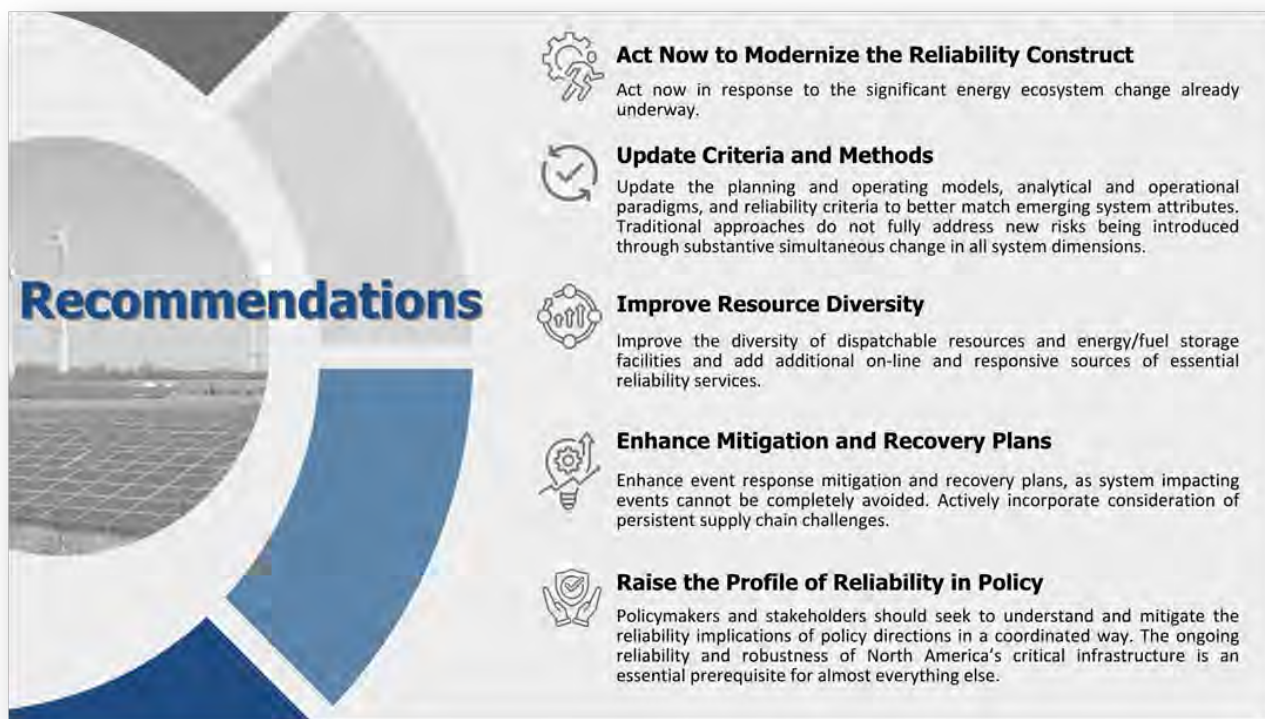
1. **New large loads plus changing resource mix:** The emergence of new large loads at unprecedented scale and speed, combined with new system operating experiences from an evolving resource mix, highlights the need to advance the traditional system reliability construct from capacity to energy based, and more detailed analysis of resources and load centers.
2. **Larger-scale widespread events observed:** Larger-scale reliability impact events are occurring with contributions from grid transformation effects and increased incidence of large, widespread, long-term weather system scope, severity, and duration.
3. **Natural gas interdependence:** The natural gas pipeline infrastructure (natural gas being the primary source of fuel to the dispatchable generation fleet in the next five years) must expand to meet the growing need of these new dispatchable generation units. However, this is subject to increasing risks associated with just-in-time delivery, demonstrated reliability and security challenges, and inability to scale infrastructure quickly. Further, natural gas systems are dependent on just-in-time delivery of electricity. These mutual interdependencies creates an energy interconnection requiring coupled analysis and agreed upon protocols for planning and operations.
4. **Cyber and Physical Security complexity:** The growing complexity of system equipment and operations increases security challenges and enhances the attractiveness of the grid as a target.
5. **Persistent supply chain challenges:** Persistent supply chain and workforce challenges are impacting risk mitigation and response capabilities.
6. **Volatile energy policy:** A volatile and disconnected policy landscape creates risk and further complicates the ability to mitigate risks through policy solutions.



2025 Recommendation Themes

To deliver ongoing system reliability in a time of increasing change and complexity, the following is required:

- More system margin to accommodate uncertainty
- More diverse resource, grid, and operating options
- More awareness of reliability implications of changes
- More comprehensive studies and assessments
- More coordination between impacting parties
- More preparation for large events and restorations
- More speed in implementing necessary measures



The RISC encourages industry to undertake the following recommendations to address the risks identified above.

1. **Act now to modernize the reliability construct:** Act now in response to the significant energy ecosystem change already underway.
2. **Update criteria and methods:** Update the planning and operating models, analytical and operational paradigms, and reliability criteria to better match emerging system attributes. Traditional approaches do not fully address new risks being introduced through substantive simultaneous change in all system dimensions.
3. **Improve resource diversity:** Improve the diversity of dispatchable resources and energy/fuel storage facilities and add additional on-line and responsive sources of essential reliability services. Assess the potential impacts through transmission enhancements.
4. **Enhance mitigation and recovery plans:** Enhance event response mitigation and recovery plans, as system impacting events cannot be completely avoided. Actively incorporate consideration of persistent supply chain challenges.

5. **Raise the profile of reliability in policy:** Policymakers and stakeholders should seek to understand and mitigate the reliability implications of policy directions in a coordinated way. The ongoing reliability and robustness of North America's critical infrastructure is an essential prerequisite for almost everything else.

Introduction

RISC Activities

This 2025 RISC Report documents the results of the RISC's continued work to identify key risks to the reliable planning and operation of the BPS and provide recommendations to mitigate those risks; this includes recommendations regarding priorities to assist the Board and NERC management as well as industry and its stakeholders. The RISC's efforts are both responsive to and in support of the Board's resolutions on the RISC's initial 2013 recommendations. The RISC continues to define and prioritize risks, develop mitigating activities, and identify accountable parties for those risks. The RISC acknowledges and appreciates the increased reliance of the Board and ERO Enterprise leadership on the results of the RISC's activities as an input for the ERO Enterprise's Long-Term Strategy Plan, the Reliability and Security Technical Committee's (RSTC) Work Plan, and NERC's Business Plan and Budget.

Overlapping Risk Profiles

Policy risk areas will overlap with the other risk profiles, and certain themes are repeated throughout this report. There are important links between the risk priorities and the recommended actions for the ERO Enterprise, policymakers, and industry. While the risk mitigation recommendations in each of the risk profiles of this report are presented individually, there are interdependencies acknowledged in this report between many of the risks that present unique challenges to the electric industry. Furthermore, many of these risks have been long recognized with commensurate NERC and industry monitoring for proper mitigation; however, other risks are newly emerging and require active management with a more aggressive immediate approach being necessary for effective foresight and mitigation.





Background and Inputs

Reliability Leadership Summit

On February 27, 2025, NERC and the RISC hosted the Reliability Leadership Summit (Summit) with leaders of the reliability and security community, including top industry executives; state, provincial, and federal regulators; and ERO Enterprise senior leadership. The summit focused on three specific areas: Grid Resiliency, Security, and Energy Policy. An open panel discussion was held at the end of the day for industry leadership to address “what keeps you up at night.” This panel session inspired a robust discussion of issues and risks facing industry and the grid.

The panel discussions underscored the importance of conducting cross-sector coordination with other industries and covered the transformation of the grid; reliability and security impacts and considerations; lessons learned and unique challenges posed by cyber and physical security risks, their evolution, and potential impacts that could cause damage; and implications of the increased critical infrastructure interdependencies and how to address the jurisdictional issues that need to be tackled to address the risks they present.

2024–25 RISC Emerging Risks Survey

For the 2025 report, the RISC issued the Emerging Risk Survey in two phases. The first phase was conducted December 22, 2024, through January 17, 2025, and contained a list of risks and asked stakeholders to identify their top five risks from the list and identify additional risks not on the list for consideration by the committee. The top five risk categories from the original list are as follows:

1. Grid Transformation
2. Cyber Security Vulnerabilities
3. Resource Adequacy and Performance
4. Energy Policy
5. Resilience to Extreme Natural Events/Extreme Events

Followed closely by the following:

1. Critical Infrastructure Interdependencies (e.g., natural gas, electric, water, communications)
2. Large Loads (e.g., data centers, crypto mining)
3. Supply Chain Capacity

Many commenters provided suggestions for combining risk areas for further evaluation. These risk profiles are in no particular order or ranking of priority, identified as follows:

- **Grid Transformation** (More inverter-based resources, fewer large synchronous generators, more advanced electronic devices like static var compensators, aggregators, IBR-GO/GOP), increased distributed energy resource (DER) and demand-response use, electrification (e.g., heat pump load)
 - Supply Chain Capacity
- **Cyber Security Vulnerabilities** (e.g., operations technology, energy management systems, IT systems, large loads, DERs and DER aggregators)
 - Cyber System Vulnerabilities
 - Physical Security Vulnerabilities (transmission and generation infrastructure protection)
 - Resilience to Extreme Natural Events/Extreme Events (e.g., hurricanes, tornadoes, wildfires, derechos)
- **Resource Adequacy and Performance** (e.g., energy assessments)

- Large Loads (e.g., data centers, crypto mining)
- Electric Vehicle Impacts (e.g., charging, load shape changes due to electric vehicle (EV) activity)
- BPS Planning (e.g., energy availability assessments, IBR/ (electromagnetic transient (EMT) modeling, capacity evaluations)
- **Energy Policy** (e.g., IBRs, EV mandates)
- **Critical Infrastructure Interdependencies** (e.g., natural gas, electric, water, communications)

The phase one survey also included an opportunity for respondents to identify emerging risks that were not on the list provided. Key emerging risks include public resistance to infrastructure development, affordability challenges, lack of financial resources for maintenance, governance issues for AI, disruption of cloud services, and inaccuracies in modeling generation and transmission. Other noted risks involve increased compliance burdens, climate change impacts, and the need for improved energy storage utilization. The survey also highlights the importance of considering cost/benefit evaluations in grid transformation and the risk of retiring conventional generators prematurely. Respondents emphasize the significance of education on electricity use and the necessity of streamlined regulatory processes for infrastructure development.

Phase two of the survey was issued January 24–February 14, 2025. The focus of this survey was to confirm the top-five risk areas identified in the phase one survey.

Participants provided their opinions on the rankings of the top five emerging risks in the industry. These risks include grid transformation, cyber security vulnerabilities, resilience to extreme natural events, resource adequacy and performance, and energy policy. Responses varied with some agreeing with the rankings and others suggesting adjustments, such as elevating the importance of resource adequacy or resilience to natural events. Participants also highlighted the interconnectedness of certain risks and suggested grouping related categories or reconsidering how specific risks are addressed. Overall, there is consensus on the importance of these risks, though opinions differ on their prioritization.

The top five risk areas that the RISC has selected for full discussion in the report are **Grid Transformation, Security, Resilience to Extreme Events, Energy Policy, and Critical Infrastructure Interdependencies**. The RISC considers these risk profiles equally impactful to the reliability, security, and resilience of the grid.

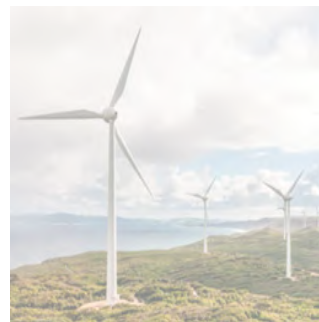
Stakeholder Comments

The report was posted for stakeholder comment on **July 7, 2025**, and the comments received were reviewed and incorporated as applicable.

Risk Profile # 1: Grid Transformation

Statement of the Risk

Grid transformation remains a significant risk to the reliable operation of the electric system as new large loads change the landscape of customer demand from organic population-driven growth to rapid investment-based deployment of data centers (including hyperscalers⁴, AI centers, and cryptocurrency) and large manufacturing. Inverter-based and natural gas resources continue to replace retired conventional thermal generation but not at the rate of retirement. Furthermore, IBRs' operational characteristics differ from those of the retiring thermal generation. As limited energy resources become more prevalent on the grid, resource adequacy and energy sufficiency remain top of mind throughout the year, especially during extreme conditions.



This report has continued to point out the evolution of these risks over its last few iterations. The efforts that NERC and industry continue to undertake are paramount to keeping the U.S. power grid “the greatest engineering achievement of the 20th century.” Efforts that require continued focus include the following:

- **Growing Demand:** Large loads and enhanced needs for flexibility will significantly influence grid transformation. Multiple factors, including data centers (including hyperscalers, AI, and cryptocurrency), onshoring of manufacturing activities, electrification of industrial processes, and commercial and residential electrification, are contributing to demand growth. Many of the large digital loads in question require more detailed modeling and control coordination to ensure reliable integration. These trends are also increasing attention on backup power systems, co-location of loads with existing or new generation, and additions of generation and storage behind the transmission point of interconnection or distribution system meter.
- **Changing Resource Mix:** There is an ongoing need to rethink the usefulness and meaning of Planning Reserve Margins as utilities contemplate integrated resource planning. Namely, energy measures (including time and impact parameters) representing the growing presence of energy constrained resources can provide deeper understanding of risk levels and resource solutions. There is an opportunity to enhance Planning Reserve Margin methodologies. The variable nature of generation profiles with more IBRs is more accurately represented using energy availability patterns.
- **Interconnection, Modeling, and Grid Management Systems:** Connecting our planning processes across the Interconnections requires consistent perspectives around capacity assessment and how coordinated operations can enhance reliability. Utilities and generation owners need to validate modeling assumptions when connected to the grid, and throughout the life of assets, to promote system stability. Integrated modeling approaches that span transmission and distribution provide comprehensive visibility into system behavior under various conditions. By evolving grid modeling data and systems, planning accuracy and operational efficiency can be improved.
- **Supply Chain and Security Risks:** The deployment of new generation to address reliability and resource adequacy is increasingly constrained by supply chain disruptions affecting critical components. Global shortages of raw materials, manufacturing bottlenecks, geopolitical trade policies, and transportation delays have significantly extended lead times for new generation procurement, assembly, and installation. In addition to generation equipment constraints, high-voltage transformers have persistently faced long lead times, posing challenges to all sources of generation. Further, sources of equipment and components need to be understood to estimate potential risks and their mitigation when the equipment is integrated into the BPS.

⁴ [Hyperscale Computing](#) is necessary in order to build a robust and scalable [cloud](#), [big data](#), [map reduce](#), or [distributed storage](#) system and is often associated with the infrastructure required to run large distributed sites such as [Google](#), [Facebook](#), [Twitter](#), [Amazon](#), [Microsoft](#), [IBM Cloud](#) or [Oracle Cloud](#)... Such companies are sometimes called “hyperscalers.”

- **Integrating Energy Storage Technologies:** Energy storage can provide flexibility for balancing system needs across multiple time frames, from frequency regulation to peak shifting. By developing compensation models and control systems that recognize the full range of storage capabilities, reliability can be cost-effectively enhanced while the integration of variable resources is supported. Thoughtful implementation of storage solutions represents an opportunity to enhance system resilience while potentially creating new value for customers. One of the primary challenges will be the move to incorporate the energy measurement of limited-duration resources into the dashboards and metrics (traditionally based on power measurements) that are used to monitor the grid.
- **Essential Reliability Services:** The foundational services that ensure grid stability—frequency response, voltage support, and ramping capability—benefit from performance-based definitions that encourage innovation across technologies. However, availability and deployment of these essential reliability services may become less certain, especially during long-term, widespread system conditions. By evolving our approach to these essential reliability services and market incentives to perform them, system stability can be maintained even while new resource types that bring valuable capabilities to the grid are welcomed. This inclusive approach creates pathways for reliable operation while supporting beneficial technological advancement.

Descriptors of the Risk

1. Large Loads and Electrification (“Large Loads”)

Growing demand and enhanced needs for flexibility will significantly influence grid transformation. Multiple factors, including data centers (including hyperscalers, AI, and cryptocurrency), onshoring of manufacturing activities, electrification of industrial processes, and commercial and residential electrification, are contributing to demand growth. Some of this load is asynchronous to the grid and digital, creating system conditions and ride-through challenges during system events. Integrating these large loads and viewing them as BPS resources for flexibility and reliability contribution, when possible, will be challenging but crucial.

These challenges provide substantial opportunities to deploy important grid enhancements. For example, the scale, value, and design of data center loads may provide flexibility through backup power systems, energy storage, and demand-side flexibility while also encouraging innovation and investment in longer-duration energy storage, emerging resources, such as small modular reactors (SMR), and novel designs of energy parks that can also contribute essential reliability services and energy when most needed.

2. Resource Adequacy and Energy Sufficiency – Traditional Planning Reserve Margins are no longer sufficient (“RA”)

Resource adequacy assessments have historically focused on ensuring generation and transmission capacity to serve peak demand with the assumption that this would be adequate to meet demand in all other hours of the year. Recent extreme events have demonstrated that assessments must look beyond this assumption, considering the magnitude, duration, energy sufficiency, and customer impact across all hours and many years. These assessments must also consider that future events may be outside of historical patterns, such as environmental impacts on resource availability, while also accounting for contributions from load resources, transmission resources, and neighboring grids. Furthermore, the pace of resource retirements is exceeding the addition of new capacity while load looks poised to grow substantially, and resources on the path to retirement may not be able to perform at the assumed levels of availability, flexibility, and reliability. Enhanced and coordinated planning for the long-term planning, operational planning, and operating time horizons will be essential.

3. Interconnection and Modeling (“Interconnection and Modeling”)

Interconnection requirements are not consistent across regions or entities and may lack performance and modeling requirements with adequate specificity, leading to undesirable performance of resources and

harmful ambiguity for prospective resource owners (including large flexible loads, IBRs, and storage). Detailed information on equipment characteristics, capabilities, settings, and limitations must be incorporated into the long-term planning, operational planning, and operating time horizons. This is particularly true for digital controls, IBRs, and power electronics-based loads and resources more broadly. Even when a useful equipment standard exists, such as the IEEE 2800 standard for future inverters connecting at transmission voltages, the system planner must specify the parameter settings for the desired performance characteristics for a given resource, the resource operator must set the parameters accordingly, the commissioning process and performance monitoring must be able to verify the desired operation of the resource, and the operator must verify that settings are maintained through the operating life of the asset.

Parallel development of control systems and operational models should match the pace of innovation with continued progress on Federal Energy Regulatory Commission (FERC) Order No. 901 (Reliability Standards to Address Inverter-Based Resources) essential for the interconnection and modeling of IBRs, and similar considerations likely to be necessary for large power electronics-based load, such as data centers. Furthermore, while FERC Order 901 refers to “standard library models” (parameterized generic models), these can be insufficient to fully reflect equipment responses—user-defined models should more accurately represent equipment responses and keep pace with the innovation of the original equipment manufacturers (OEM). Furthermore, system dynamic performance will be challenged with the growth of IBR, potentially showing the need for new model development supporting advanced system design and the development of new EMT models to reflect equipment responses.

4. Growing Supply Chain and Development Uncertainties (“Supply Chain”)

Many issues must be coordinated to speed up the completion of new resources so that their reliability contributions can benefit the BPS. Lead times for fuel sourcing and other elements of resource adequacy (e.g., transmission development, generator retirements, pipeline construction, environmental permitting, right-of-way acquisition) may require long and/or uncertain lead times. Various elements must be carefully sequenced to ensure reliability throughout transitions, and the interrelated nature and contribution of transmission, generation, and fuel sources must be appreciated and considered in resource adequacy assessments, timelines, and deployments. Large load growth from data centers and domestic manufacturing will exacerbate the need for network upgrades and new resources, and uncertainty around supply chains, international trade, import tariffs, and country restriction issues are disruptive to plans and schedules. Cyber security concerns also remain a consistent and growing risk and are discussed elsewhere (reference - Risk Profile # 4 – Security).

The ability to deploy new generation resources is critical to ensuring energy sufficiency under high-load conditions. Without timely deployment, system operators face increased risks of energy shortfalls, transmission congestion, and reserve deficiencies, particularly during peak demand periods and extreme weather events.

5. Benefits of Improved Interregional Connection (“Interregional”)

Resource planning, resource adequacy assessments, and operating practices have been constrained by political or utility boundaries that do not fully exploit the benefits of the interconnected BPS as documented by extreme events. Regional planning assessments are currently performed in collaboration with neighboring regions; however, these assessments could be improved by adding additional focus to the benefits of interregional transmission and cooperation between and across regions as an energy resource during critical resource shortage conditions. To maximize these benefits, interregional coordination of strategic transmission and generation additions, permitting, siting, and operations should be optimized to the greatest extent possible.

6. Grid Management System and Modeling Gaps (“Software Platforms”)

Technological innovations of resources and systems of resources continue to outpace grid planning models, operation planning models, and real-time grid management software. In some cases, new resource types and technology may be delayed or even prohibited from interconnecting even though their services would be useful to the grid because legacy grid management and market software platforms are onerous and expensive to update. These issues are particularly prevalent for grid-forming inverter technology, hybrid plants that combine different resource types with a unified controller, more complicated resource connections behind a single point of interconnection, and co-located generation and large load projects.

The reliable, widespread interconnection of new resource technologies will require parallel development, demonstration, and innovation in grid management software and operational/planning models at a pace that is comparable to the innovation rate of emerging technologies. This can be difficult to accomplish with legacy grid management systems and may require innovative rethinking of roles and responsibilities of market participants and the system operator. In fact, industry roles with research and development must expedite the demonstration and piloting phases to quickly and reliably interconnect new technologies to keep pace with the innovative applications of energy. Legacy grid-management platforms should be supplemented by additional modern datasets and analytics that provide high-veracity insights improving grid situational awareness. When combined into one interconnected grid, the interactions between increasing numbers of separate new resources and load control systems with their varying operating characteristics may also create new system risks and analytical complexities.

7. Integrating Energy Storage Technologies (“Storage”)

Energy storage technologies are transformative to established power system modeling practices, markets, and operational tools and procedures because they do not fit into traditional approaches for generation, load, and transmission. Battery energy storage systems (BESS) can provide a wide range of essential reliability services (e.g., fast-ramping capability, frequency response, and dynamic voltage control), often more quickly and accurately than conventional resources. However, these resources are energy-limited, which can introduce complexities accounting for and assuring that these services are available under relevant operating conditions.

New methods for assessing the benefit, opportunity costs, and state-of-charge optimization strategies to maximize the use of these resources are still being developed and understood. Storage solutions continue to transform both the distribution system and the BPS, in the long-term planning, operational planning, and operating time horizons, and many regions are actively pursuing surplus interconnection services to more fully use existing generator interconnections. This continues to unlock opportunities for faster additions of BESS or other resources that provide reliability benefit to the BPS.

Whether in combination with renewable or conventional resources, and whether connected to distribution systems or the BPS, storage and hybrid technologies will further magnify the pace of innovation and the evolution of resource capabilities during both steady-state and transient conditions. Furthermore, grid-forming (GFM) technology in BESS is a particularly cost-effective grid-stabilizing solution that supports system stability. While equipment standards for GFM inverters are still under active development, and until the impact of GFM inverters on the distribution system are better understood, GFM inverters for battery storage systems are deployed globally⁵ and their use should be encouraged.

8. Deeper Understanding of Essential Reliability Services and Newer Technologies (“ERS”)

Industry is aware of the need for essential reliability services (ERS) and other ancillary services for the reliability and stability of the power system, including the need for voltage control and reactive support, frequency response, ride-through, ramping/balancing, and other stability services. NERC has defined these

⁵ See <https://www.esig.energy/benefits-of-gfm-bess-project-team/>

services and reported on their importance to the health of the BPS in its State of Reliability report.⁶ Transformation of the resource mix can alter the provision of these ERSs. IBRs are today deploying improved capabilities, and the IBRs of tomorrow will bring enhanced capabilities with GFM functionality. The grid-supporting capabilities and potential interactions of all technologies and resources (including conventional resources, IBRs in their grid-following and GFM versions, and loads) need to be understood to accurately include them in planning and operating analyses. This is further complicated as large loads with flexible operational backup and inverter-based characteristics can impact, and consume, large amounts of these ERSs. Restoration services, such as blackstart capabilities and procedures, must also be considered. For services that may become scarce in the future, both organized and bilateral markets must anticipate and procure sufficient services to ensure reliable operations. There is potential that these ERSs are evolving in a transformed grid and need to be redefined and enhanced.

9. Consideration of Weather, Forecasting, and Combined Effects (“Forecasting”)

While weather has always affected energy demand, generation, and BPS operations, the increasingly interrelated and combined effects between resources, fuel supplies, and extreme events now make it critical to incorporate high-quality weather forecasts and datasets into modeling, scheduling, and operations in all time frames to ensure BPS reliability. Weather impacts on generation and fuel supplies remain a work in progress with NERC Reliability Standards focused on generator winterization. New plans for additional gas-fired generation may exacerbate known challenges during extreme weather conditions from reductions of natural gas production/transport, availability of gas when needed for power generation, and conflicting uses between electric generation and for heating and other customer needs. At the same time, weather affects production from solar and wind resources whether on the transmission system or distribution system or in combination with industrial complexes, data centers, or storage resources. Traditional analytical methods may not fully account for system characteristics associated with the interactions and uncertainties of the increasingly diverse system of resources and customers, particularly under extreme events or contingencies or when faced with resource, energy, or transmission insufficiencies in the operational horizon. These challenges need to be addressed in the planning and operational planning time horizon to address energy limitations in anticipation of extreme weather and its impacts.

10. Coordination and Aggregation of DERs with the BPS (“DER”)

DERs—including generation, storage, and flexible loads with behind-the-meter DERs and other IBR technologies—currently meet local distribution utility interconnection requirements and operational protocols but may pose potential challenges to the BPS in aggregate from a forecasting, planning, cyber, and operations perspective. With the implementation of FERC Order 2222 and growing prevalence of DER aggregators and virtual power plants (VPP), the historically passive unidirectional distribution system is becoming increasingly active and involved in providing core grid reliability services, and enhanced coordination between BPS owners/operators (i.e., NERC registered entities) and distribution utilities and DER/VPP operators is needed.

Certain challenges with DER aggregation could be exacerbated by large flexible loads, particularly if the DERs are connected through distribution interconnection processes due to utility jurisdictional rights under state law rather than through NERC registration and standards applicability. Visibility, control, and performance of aggregated DERs may be needed to ensure planning and operations situational awareness and overall BPS reliability.

11. Human Performance and Skilled Workforce Adequacy Concerns (“Workforce”)

The BPS continues to evolve in complexity. The industry faces significant risk in staffing skilled workers due to new complexities, advanced technologies, the convergence of engineering and IT skillsets, and competition from other industries. As an example, the industry faces a lack of skilled and experienced talent for EMT

⁶ See [State of Reliability Report](#)

studies and models, which are essential for ensuring future grid stability, redundancy, and resiliency as new technologies are interconnected to the grid.

The industry must address human performance and skilled workforce adequacy risks related to long-term development approaches, education, multi-faceted skillset requirements, and technology-related developments to achieve a workforce capable of navigating the grid transformation.

Recommendations for Mitigating the Risk

The table below lists the recommendations and draws from information in the *2023 ERO Reliability Risk Priorities Report*, the expertise of RISC members, and industry comments and feedback and aligns with efforts that are underway or starting up, including the following:

- ESIG Large Loads Task Force⁷
- ESIG Current and Completed Task Forces⁸
- NERC Essential Reliability Services Task Force Measures Framework Report⁹
- NERC 2024 State of Reliability Report¹⁰
- EPRI DCFlex¹¹
- NERC RSTC Large Load Task Force¹²

Recommendation	Timeframe	Interdependency	Risk Addressed
1. Get ahead of large load deployment: NERC's Large Loads Task Force should collaborate with the Data Center Coalition, the Electric Power Research Institute (EPRI), the Energy Systems Integration Group (ESIG), the North American Transmission Forum (NATF), North American Generator Forum (NAGF) and others to identify the risks associated with large loads, including possible mitigations, and optimize their potential to provide flexibility through backup generation and demand response. Growing demand and enhanced needs for flexibility will significantly influence grid transformation. Given that large loads, particularly data centers, are driving the increasing demand, NERC should establish strategic partnerships to ensure effective coordination with industry efforts. This collaboration could result in technical workshops, white papers, or reliability guidelines to support industry stakeholders as they interconnect more large loads.	Near Term	RA, Interconnection and Modeling, Software Platforms, ERS, Forecasting	Large Loads
2. Revisit Essential Reliability Services: NERC should revisit ERSs to consider the ongoing growth of power electronic-based resources (including IBRs and some large loads) and the use of GFM inverters with storage as vital and	Near Term	Interconnection and Modeling, Supply Chain, Software	ERS

⁷ [ESIG Large Loads Task Force](#)

⁸ [ESIG Current and Completed Task Forces](#)

⁹ [NERC Essential Reliability Services Task Force Measures Framework Report](#)

¹⁰ [NERC 2024 State of Reliability Report](#)

¹¹ [EPRI DCFlex](#)

¹² [NERC RSTC Large Loads Task Force](#)

Recommendation	Timeframe	Interdependency	Risk Addressed
<p>increasingly dispatchable sources of services. As noted throughout this section, grid transformation is driving the use and integration of IBRs, new types of digital and asynchronous large loads, large-scale storage, and other components not traditionally part of the BPS. This will have an impact on existing reliability services and may necessitate an expansion/identification of new reliability services that push beyond the traditional capabilities of conventional resources into what is possible and beneficial in the future. Building on FERC Order 901 and related Reliability Standards projects, we recommend that a list of grid-transforming technologies with reliability impact should be formally enumerated with a mapping to the reliability services view, improvements to encourage the deployment of useful capabilities, and software platform enhancements to exploit the new capabilities. This should also include recommendations for any new reliability services, both those providing system-level services and locationally specific service needs, to encourage the practical deployment of new capabilities.</p>		Platforms, Storage	
<p>3. <u>Further enhance consistent interconnection requirements for all generators, loads, and storage:</u> While NERC and industry are making good strides for interconnection of IBRs, NERC should further encourage consistent, enhanced modeling and interconnection requirements for all generators and loads to ensure that equipment characteristics, capabilities, settings, and limitations are incorporated in the planning and operations (and maintained through the life of the asset). Consistent IBR interconnection requirements should be clearly identified in interconnection agreements. NERC should leverage industry efforts, such as adoption of ongoing NATF work on IBR interconnection lifecycle guidelines to assist BPS operators in this area. To ensure that IBR plants are meeting the performance requirements during the normal operation and after any plant modification (hardware/firmware update), it will be critical to have real-time IBR plant performance monitoring to confirm that plants are meeting interconnection requirements and maintaining reliable operation to support the BPS. Further, for continued reliable operation of the existing IBR fleet connected to the BPS, grid operators may need to grant interconnection amendments to allow for coordination between grid operators and Generator Owners on</p>	Near Term	ERS, Supply Chain	Interconnection and Modeling, Large Loads

Recommendation	Timeframe	Interdependency	Risk Addressed
compliance with upcoming NERC Reliability Standards from FERC order 901 directive.			
<p>4. Encourage further efforts for interregional planning: NERC's Interregional Transfer Capability Study is a high-level initial step, but further steps should be pursued to enhance interregional and integrated planning of transmission, permitting, siting, and operations.</p> <p>The next step in enhancing interregional transfer capability (ITC) planning and producing actionable results is to consider the development of metrics that guide transmission decisions by addressing critical factors, such as reliability need, cost-effectiveness, RA contributions, and feasibility. These metrics should guide planning entities in evaluating the benefits of transfer capability enhancements compared to alternatives like the types of generation needed, demand-side management, and operational measures, while focusing on improving reliability and resilience under extreme weather conditions. By increasing transparency and respecting regional differences, this process can support informed decision-making without imposing rigid, one-size-fits-all mandates and would leverage the expertise of planning entities responsible for transmission reliability and resource adequacy. Interregional transfer capacity maximizes effectiveness to improve reliability if it can be utilized during extreme events. This transfer capability, though, can be used to hone a more Interconnection-wide resource plan. Recent occurrences, such as Winter Storm Elliott, have demonstrated that even with existing available ITC, resource adequacy remains a risk to reliability.</p>	Mid-Term	RA, ERS, DER	Interregional
<p>5. Leverage the capabilities of storage: NERC and other entities (e.g., ERCOT) should educate industry on energy storage solutions to identify system services that enhance flexibility and resilience from this technology. Planners need to begin including these benefits in operating models. Recent experience in ERCOT shows that battery storage is a dispatchable resource with rapid deployment and substantial contributions to the capacity, flexibility, stability, and ERS needs of the system. Standalone or in combination with other IBR or conventional resources, battery storage is becoming a vital component of grid transformation. ERCOT and MISO are about to require GFM inverters for new battery storage resources, which have been shown to further enhance the system benefits and</p>	Near Term	ERS, RA, Software Platforms, Interconnection and Modeling, DER	Storage

Recommendation	Timeframe	Interdependency	Risk Addressed
<p>reduce the need for some transmission reinforcements. NERC should encourage other system operators to learn from their experience. Battery storage, when viewed at the system level or when hybridized with other generation and/or load resources, is much more than simply a means to shift energy in time and provides underappreciated benefit and positive impacts.</p>			
<p>6. <u>Enhance resource adequacy and energy sufficiency methods:</u> NERC and industry should consider, and deploy in reliability assessments, resource adequacy methods that better account for real-time operational needs under a wide range of possible scenarios and events. NERC should also engage with industry for a working group focused on best practices for weather forecasting and the environmental condition impacts on both resources and demand and then use these best practices to inform the planning, operational planning, and operations time frames. Resource adequacy approaches based on Planning Reserve Margins are no longer sufficient with recent events showing that assessments must look at magnitude, duration, energy sufficiency, and customer impact across all hours and many years.</p> <p>The fundamental purpose of resource adequacy programs is to ensure real-time reliability, yet traditional resource adequacy approaches may focus on capacity reserves without accounting for real-time operational needs. Particularly in a future with growing levels of sophisticated loads and diverse resources (including power electronics-based resources and combinations), starting with a real-time reliability perspective and moving beyond traditional supply-side assumptions may be better suited to managing emerging resource adequacy planning challenges. Increasingly, interrelated and weather-driven effects between resources and fuel supplies also make it critical to incorporate high-quality weather forecasts and datasets into planning, scheduling, and operations while considering extreme events, contingencies, and resource, energy, or transmission insufficiencies that could occur in real-time operations.</p>	Near Term	Large Loads, Forecasting, Interregional	RA
<p>7. <u>Develop workforce:</u> NERC and industry should place a strategic focus on the development of the workforce for the future. This includes proactive measures to mitigate risks associated with limited availability of skilled resources and the evolving technical nature associated with grid transformation and modeling. Risk mitigation strategies should include partnerships with trade schools,</p>	Mid-Term	Skills needed across all descriptors of risk	Workforce

Recommendation	Timeframe	Interdependency	Risk Addressed
universities, K–12 engagement, teachers, and technical institutions to build a supply of capable talent along with establishing continuous learning and upskilling development programs to retain and retrain talent.			
<p>8. <u>Move to integrated planning of transmission, generation, storage, and loads:</u> Transmission planning must align with evolving resource adequacy assessments to address the growing mismatch between generation deployment timelines and load growth. Implementing scenario-based planning approaches that incorporate supply chain constraints can help stakeholders develop contingency strategies, reducing uncertainty and delays in bringing new resources on-line, and exploit storage to compensate for delays in transmission and generation deployment. Furthermore, improved coordination between Reliability Coordinators and Balancing Authorities, state and federal regulators, and developers will ensure that generation and transmission projects are sequenced appropriately, preventing misalignment that could lead to grid congestion or inadequate reserve margins. By integrating improved forecasting tools, refining interconnection processes, and aligning transmission expansion with anticipated demand growth, the grid can maintain reliability despite supply chain disruptions and the accelerated pace of electricity demand.</p>	Mid-Term	Large Loads, RA, Supply Chain, Storage, Forecasting	Interconnection and Modeling, Forecasting
<p>9. <u>Improve load forecasting methods:</u> There should be an industry-wide focus on improving forecasting and coordination within the Reliability Coordinator/Balancing Authority and transmission planning processes, particularly regarding large load additions. Enhancing long-term load forecasting methods to account for rapid demand growth will allow for more proactive infrastructure planning, helping system planners better anticipate generation and transmission needs. Specifically, load forecasting methods must evolve to accurately reflect the range of expected demand increases in the mid and long term, when firm contracts or financial commitments for new AI-driven demand cannot be relied upon. Balancing Authorities should streamline interconnection and study processes to reduce bottlenecks, ensuring that delays in approving new generation do not exacerbate reliability risks.</p>	Long Term	Large Loads, RA	Forecasting, Interconnection and Modeling
<p>10. <u>Adapt to the realities of supply chain for near-term resource and transmission needs:</u> To reduce the impact of supply chain disruptions on new generation deployment while addressing surging data center demand, industry</p>	Mid-Term	Workforce, RA, Interconnection and Modeling, Storage, DER	Supply Chain

Recommendation	Timeframe	Interdependency	Risk Addressed
and policymakers should prioritize facilitating the full suite of generation and storage options while optimizing the existing assets on grid and explore resources that do not face supply chain constraints in the near term or grid-enhancing technologies that can provide immediate available transmission capacity. New resource development timelines and costs are significantly threatened by an unprecedented confluence of risks and uncertainties in supply chains, tariffs, cyber security requirements, workforce limitations, and general business risk.			
11. <u>Use demand-side management (DSM) as a mainstream resource:</u> DSM requires a holistic consideration for system planning and accommodation in various energy markets and their role in enhancing grid reliability and resilience. As many Reliability Coordinators and Balancing Authorities have advanced demand-side management programs that are still evolving and growing at a rapid scale, it is prudent to tap into those features going forward considering the digital nature of the power grid.	Mid-Term	RA, Large Loads, Software Platforms	DER

Risk Profile # 2: Resilience to Extreme Events

Statement of the Risk

Over the last several RISC biennial reports, this profile has evolved from extreme natural events to extreme events and ultimately to the current form—Resilience to Extreme Events. This rebranding is more precise and actionable for reasons described in this section. Therefore, the *2025 Risk Report* focuses on resilience to extreme events rather than specifically focusing on extreme natural events.



BPS resilience to extreme events is an area of increasing focus. Reliability and resilience are related but distinct concepts:¹³ BPS reliability involves performance consistency under various reasonably expected known or historical operating conditions (keeping the lights on). Resilience, on the other hand, involves the ability of the BPS to absorb and recover quickly from significant abnormal conditions or extreme events (by moderating, if not preventing the impact, and restoring power quickly). NERC Reliability Standards incorporate both concepts with resilience called out as part of the emergency operations (EOP) family of standards. For a more detailed evaluation of NERC Reliability Standards and their contribution to resilience, see pages 8–9 of the 2018 RISC Report on Resilience.

Past NERC assessments indicated that extreme natural events (e.g., extreme temperatures, storms) caused most major BPS impacts. Extreme natural events are continuing and can impact BPS resilience in several ways, including the following:

- Increased intensity, duration, or frequency of events historically typical to a given geographic area
- Instances of historically atypical events, either to a given geographic area (e.g., wildfire) and/or new circumstances (e.g., too much, or too little wind, cloud cover or smoke impacting wind or solar generation, respectively)
- Longer-term trends (e.g., higher average temperatures impacting facility ratings)
- Impacts on supply chain and workforce due to geographically larger events

Extreme natural events, such as Hurricane Helene, underscore that extreme natural events pose challenges due to factors including location, intensity, duration, and frequency. Unpredictable weather impacts (e.g., cloud cover impacting solar) challenge operations and can complicate outage management (e.g., greater generation uncertainty challenges scheduling). In addition, manmade challenges, such as physical and cyber-attacks, are becoming more frequent and could pose significant impacts—either as an event initiator or especially if applied coincident with a severe natural event. Furthermore, many new technologies have a larger digital composition, representing an increased cyber attack surface.

Growing societal reliance on electricity and grid transformation makes the resilience context more complex. North America has become increasingly reliant on electricity, exacerbating the impact of any large-scale events. Newer technologies are yet unproven to operate in extreme conditions, warranting added integrated analysis as IBRs and DERs (including behind-the-meter generation) become more prevalent. The transforming grid additionally creates potential deficits in essential characteristics including inertia, frequency and voltage control, reactive control, and blackstart capability. Furthermore, reliance on natural gas generation is challenging due to the just-in-time and uncertain nature of that fuel supply. Planning studies confined to a single sector or region may be inadequate to assess interdependent or cross-boundary events.

Grid operators often add margin to installed equipment during routine replacement and attempt to increase redundancy and diversity during design. However, industry lacks a comprehensive and systematic approach to

¹³ Reference [NATF/EPRI Resilience definition](#) and [NERC Resilience Framework](#).

incentivize resilience investments, and the costs required to significantly “buy down” risk by hardening against high-impact but low-probability events are difficult to justify. Furthermore, the pace of industry changes further strains the timely implementation of such resilience investments. Regulators across North America in places like Texas and Florida as well as FERC are considering this issue.

Taken together, these factors emphasize the need for industry’s ability to recover rapidly from a range of impacts (e.g., an all-hazards approach) by robust mutual assistance, partnering (e.g., with first responders and government officials), strategies to assure availability of key spare parts, blackstart capability, and conducting routine drills. System planning and design need to provide for more flexibility and optionality.

Descriptors of the Risk

- **Extreme natural events, potentially exacerbated by changing climate and weather patterns, continue to present a significant risk.** This includes challenges to grid operators’ ability to cope with traditional but severe events, atypical events (e.g., eastern wildfires, prolonged cold/hot snaps), and high-impact but low-frequency events (e.g., pandemics). See 1a.–c. below.
- **There are challenges caused by human actions.** For example, physical and cyber-attacks may occur alongside natural events, potentially increasing the impact on resilience. See 2 below.
- **Grid transformation effects overlay to make the resilience context more difficult.** The factors include resource adequacy issues, evolving loads (size, pace, characteristics), reliance on other sectors (gas, communications), and supply chain security and deliverability. See 3 below.
- **Industry cannot assess and improve system resilience on pace with the rising threats.** Inadequate long-range planning tools, permitting delays, supply chain shortages, and financial recovery for resilience investments all contribute.
- **Resilience impacts cannot be completely avoided;** Industry should focus on methods to moderating impacts and promoting rapid restoration. For instance, recent Texas cold weather events showed positive results from generator winterization with limited outages and faster restoration.

Increasingly, non-weather-related extreme events and cross-sector dependence have been recognized as posing added (and potentially layered) challenges to BPS resilience. For example, the COVID-19 pandemic altered all aspects of BPS management, increasing the probability of a severe impact while making recovery even more complex (e.g., through staffing shortages, added challenges managing personnel in a remote mode, and supply chain impacts). Additionally, physical attacks have produced tangible impacts to the BPS. Furthermore, reliance on natural gas generation is challenging due to the just-in-time nature of the fuel supply and the natural gas industries’ uneven approach to winterization. And, while battery storage capacities are increasing, batteries do not provide the same level of resilience that multi-day or multi-week onsite fuel storage provide.

Historical planning and operations techniques cannot assure desired current and future performance as indicated by recent events and associated outages. For example, the BPS has increasing amounts of new technologies and resources that have not fully experienced extreme weather phenomena and may be more sensitive to extreme events in some cases. Furthermore, the new technologies have a significant digital component and represent an increased cyber attack surface and risk for cyber failures. Industry awareness of these changes and prospective performance deficits is being raised by NERC issuances (e.g., Level 3 Extreme Winter Weather Alert and Standards changes, such as EOP-11 and 12 updates). As further experience is gained with the evolving fleet of active lessons learned, the Reliability Standards program will be needed to ensure that the risks are appropriately managed.

While new technology performance does not signal that these technologies and resources are incapable of operating in extreme conditions, it does underscore the need for added integrated system analysis to address them when IBRs, DERs, and behind-the-meter generation become more prevalent. This evolving resource availability during extreme

conditions, such as lack of wind during extreme temperatures or lack of solar during winter conditions, must be considered. The precise risk of these having widespread impacts cannot yet be proven because the full penetration of these resources is yet to be realized; however, from a planning and preparation perspective, this cannot be ignored. Other risks described in this report can be “driven” by extreme events: grid transformation, cyber threats, and critical infrastructure interdependencies all have underlying issues that can be exacerbated with the advent of extreme events.

Lastly, there is no comprehensive and systematic approach to incentivize resilience investments. Grid operators routinely add margin to installed equipment during routine replacement and work to increase redundancy and diversity. However, the costs needed to “buy down” risk by hardening against high-impact but low-probability events are difficult to justify and require discussions between regulators and industry participants. Furthermore, the pace of industry changes further strains the ability to identify timely resilience investments. This places a premium on the ability to promptly recover rapidly from a range of impacts (e.g., an all-hazards approach) by robust mutual assistance, partnering with first responders and other critical entities, ensuring that sufficient blackstart capability and energy supplies are within reach when needed, and conducting routine drills.

1a. Historically Typical Natural Events

Various North American regions routinely incur severe natural events typical to that area, such as hurricanes and extreme cold weather. While the risk of these events in those regions is high, the relative impact on the BPS has been low to date. Examples of typical natural events include the following:

- **Hurricanes** can cause widespread destruction to BPS equipment, degradation of communication capabilities, loss of load, and damage to generation resources. Recovery and restoration efforts can be delayed due to the size of the storm as well as damage to interdependent infrastructure.
- **Tornadoes/Derechos** can cause localized destruction to BPS equipment, local degradation of communication capabilities, loss of load, and damage to generation resources. Damage to interconnected infrastructure can hinder recovery efforts, which can be hampered due to local damage to interdependent infrastructure. Further, high wind speeds can lead to wind generation feathering reducing resources available just when they may be needed.
- **Extreme Heat and Drought** can cause higher-than-anticipated demand, overloading and failure of BPS equipment, and degradation of resource availability. Limited water can impact hydroelectric generation and reduce cooling water capacity. Drought can also be a precursor to wildfire risk as described in the next bullet. Extreme heat usually results in low wind speeds, which reduce the wind generation output.
- **Wildfires** can be a direct threat to BPS equipment. Industry can take preemptive actions, such as de-energizing equipment, where wildfire risk is significant. Communication programs and applications, such as new sensing equipment and microgrid deployment, can address some risks. However, such action must be balanced against the added system risk from the associated reconfiguration. Furthermore, wildfires can reduce output from variable energy resources (e.g., solar) due to smoke, requiring operators to find alternative sources to make up for the loss of energy from these resources.
- **Flooding** can occur in any area and in any season of the year. The impacts from flooding include mechanical damage to BPS equipment, degradation of clearances, fuel infrastructure, personnel access, and communications capabilities.
- **Extreme Cold Weather (Polar Vortices)** can cause higher-than-anticipated demand, overloading and stress failure of BPS equipment, increased reliance on interdependent critical infrastructures, and degradation of energy availability via resource mechanical failure of units or fuel supply interruption. Examples include natural gas wellhead, processing plant, and compressor station freeze-offs.¹⁴

¹⁴ Cold Weather Project 2021-07: <https://www.nerc.com/pa/Stand/Pages/Balloting.aspx>

- **Ice Storms** can be a direct threat to BPS equipment. The impacts from these storms combined with high winds include infrastructure damage as well as limited personnel access and communication capabilities. Examples include the Eastern Canada Ice Storm of 2023.

1b. Atypical Natural Events – by Location, Frequency, or Intensity

Resilience must consider severe natural events that are historically atypical to a given area. This could include the above examples but with added intensity or frequency, gradual longer-term effects, or events atypical to a geographic area, such as the following:

- **Extreme events**, such as Hurricane Helene, which caused extensive flooding in western North Carolina. This storm was large, but the combination with torrential rain for several days prior caused unprecedented flooding.
- **Increased average temperature**, such as those experienced in 2021 when temperatures rose to 120F, challenge facility ratings assumptions.¹⁵
- **Significant low wind conditions** that impact large amounts of wind generation over a large area or (e.g., Dunkelflaute) can result in the loss of tens of gigawatts of capacity all at the same time. Recent experiences, such as that on June 7, 2023, in the Midwestern United States may signal the need for deeper analysis of these events when they happen and what resources are required to address them.

1c. High-Impact, Low-Frequency Natural Events

Other types of severe natural events, though less likely, could have a higher impact given the potentially broader geographic footprint. See the following examples:

- **Earthquakes** are possible in many areas of the United States and Canada. Depending on the scope and magnitude of the event, BPS facilities and interdependent critical infrastructure may suffer mechanical damage (e.g., communications, fuel, transportation). Earthquake recovery could be long and require further assessment and coordination among utilities and the ERO Enterprise.
- **Geomagnetic Disturbances** can induce harmonic currents in BPS circuits and equipment. In addition, the impacts of these disturbances induce direct currents that may overheat some older transformers, result in relay misoperations, and increase reactive demand and potentially damage reactive resources. Geomagnetic disturbance events can also affect communications capabilities, fuel delivery, and GPS systems.
- **Pandemics** like COVID-19 can greatly alter the way the BPS is operated. Effective telecommuting and cloud-based data exchanges enabled the grid to continue reliable operation and resulted in no major disruptions for power deliveries. However, this altered paradigm underscored the necessity of maintaining proper controls and protocols for security around both systems and human capital.

2. There are challenges caused by human action.

Manmade events could have a higher impact given the potentially broader geographic footprint and/or the potential for initiation in conjunction with a natural event. See the following examples:

- **Coordinated cyber and/or physical attacks on the BPS or generation fuel sources**, especially in conjunction with another event (e.g., hurricane, severe cold), could be especially impactful and are continuing to evolve. As recently witnessed, even unsophisticated ballistic attacks can result in load loss. Cyber threats are increasing in frequency and sophistication and are benefiting from an increased attack surface as the grid becomes more digitized. Recent important security events include the Colonial pipeline cyber attack and Moore County, North Carolina substation attacks.
- **Supply chain security challenges** at the component and subcomponent levels introduce another dimension to the security challenge along with a growing deliverability concern that could impede restoration activities.

¹⁵ In June 2021, a new maximum temperature of 120F was set in Washington State.

Furthermore, while the recent acceleration of AI provides prospective benefits to engineering and operating the BPS, it also likely adds another cyber security dimension for use by bad actors.

- **National security risks**, such as civil unrest, riots, and labor action/strikes, could create potential issues around the physical security of the BPS as well as the safety of critical personnel necessary to conduct the actions needed to maintain the reliable operation of the BPS.

3. Grid transformation effects complicate the resilience context.

Several factors combine to pose added challenges for BPS resilience: concurrent significant increases in electrical demand (see Energy Policy); dramatic changes to BPS operating characteristics (see Grid Transformation); the growing prevalence and sophistication of security threats (see Security); de facto reliance on natural gas generation (see Critical Interdependencies); and lagging construction of well-placed, highly resilient transmission. Insufficient integration of these considerations and harmonization of associated actions exacerbate the risk in the following situations:

- **Electrical demand** is projected to rise by 30% by 2050 ¹⁶ due to electrification goals and growing data-centric loads like cloud services and AI.
- **Operating characteristics** are changing across North America, including changes in peak demand timing (e.g., intra-day, winter to summer, summer to winter, peaking overnight with electric vehicle charging) and increased sensitivity to small temperature changes due to penetration of electric heat pumps with resistive heating.

4. Industry cannot keep pace with resilience threats.

- **Traditional coal- and oil-fired generation** is being retired faster than new natural gas and renewable generation can come online. This is resulting in added de facto reliance on existing natural gas-fired generation. This increases generation uncertainty given the just-in-time nature of that fuel supply and observed shortcomings in natural gas reliability experienced during recent cold weather events.
- **Construction of well-placed, highly resilient transmission** is not keeping pace with other changes. Transmission siting and permitting is historically arduous, and this combined with jurisdictional issues may result in insufficient timely construction of resilient-design, cross-regional transmission.
- **Supply chain deliverability** at the component and subcomponent level introduces a growing concern that could impede restoration activities.

5. Resilience events cannot fully be prevented; industry must add focus to moderating impacts and timely restoration

- **GridEx is a productive exercise**, but better follow-through is needed to address lessons learned. Further, utilities do not consistently employ more localized drills to improve operator interface with first responders and state and local governments.
- **Positive examples** can be taken from Texas cold weather events based on generator winterization. Outages did occur but were more limited in scope, and restoration was timelier.

¹⁶ [EIA - Annual Energy Outlook \(2025\)](#)

Recommendations for Mitigating the Risk

Extreme events and their potential BPS impacts should be rigorously assessed and prioritized to best maintain reliability and improve resiliency. Based on prediction uncertainties, it is important for industry personnel to remain vigilant and prepare for high-risk circumstances by learning from prior events, anticipating impacts, and practicing recovery efforts. Long-range and seasonal reliability assessments should consider how more prolonged and widespread events may stress the system.

Sufficient capacity and energy are needed to prepare for, operate, or when necessary, restore the BPS. The ERO and industry have mitigated some risks by efforts including a cold weather standard for generators,¹⁷ developing a joint NERC/WECC guide on effective management of wildfire,¹⁸ and forming the Energy Reliability Assessment Task Force and issuing the associated Level 3 NERC alert.¹⁹ Furthermore, certain regions may become more dependent on neighbors if generator forced outages are greater than anticipated. These dependencies should be identified.

The RISC encourages undertaking the following actions to ensure the most impact and likelihood of mitigating the risk from extreme events:

- **Conduct assessments:** The ERO Enterprise and industry should conduct event analysis reports on extreme event impacts' geographical areas, including capturing lessons learned, creating simulation models, and establishing protocols and procedures for system pre-positioning and recovery that integrate the following:
 - Critical infrastructure interdependencies (e.g., natural gas for generator fuel, telecommunications, and water)
 - Analytic data and insights regarding resilience under extreme events
 - Implement and sustain actions to address the root causes of major events, such as the FERC/NERC joint inquiries on cold weather outages in ERCOT, MISO, and SPP, and weather impacts related to Winter Storm Elliott. Augment those efforts by developing scenarios that model the effects of the changing resource mix over time and the performance of those resources during extreme events.
 - Based on those assessments and analysis, the ERO Enterprise should develop detailed potential mitigation plans and provide a roadmap for their implementation. The roadmap should include specific protocols and procedures for system restoration and system resiliency.
- **Develop better tools to measure BPS resiliency and incentivize impactful resilience investment:** The Department of Energy (DOE) is performing analyses to evaluate static, dynamic, and real-time scenarios that affect BPS reliability and resilience. Measures should consider key grid characteristics that are evolving, including system inertia; voltage, frequency, and reactive control; and blackstart capability. NERC and industry should collaborate with the DOE on these efforts to ensure that robust tools are available to evaluate potential threats to generation, transmission, and fuel supplies. And, while affordability is a key consideration for industry stakeholders (utilities, customers, and others), inadequate preparation for or recovery from resilience events have a significant economic and human toll. The industry lacks a rubric to enable systematic investment on (and financial recovery for) the most impactful resilience enhancements.
- **Accelerate planning and construction of strategic, resilient transmission:** The ERO Enterprise should collaborate with the DOE, FERC, state regulators, provincial authorities, and others to enable timely and sufficient construction of resilient transmission. For instance, prioritize transmission installation with the explicit objective of reducing resilience risk and ensuring "hardening" for anticipated risks (e.g., use of metal/concrete structures in areas of anticipated wildfire risk). It should be ensured that the increased risk

¹⁷ [Cold Weather standard for generators](#)

¹⁸ [NERC/WECC guide on effective management of wildfire](#)

¹⁹ [Level 3 NERC Alert](#)

of physical attacks on added circuit miles is more than compensated for given risk-reduction benefits associated with added redundancy, diversity, and minimization of very high-risk assets.²⁰

- **Leverage Industry forums to share lessons learned on “atypical” events and innovations, such as improved situational awareness and event prediction:** Forums coordinate information sharing on best practices around resilience efforts related to design considerations, supply chain deliverability issues, identification, and response to major storm events. Sharing experiences and best practices is critical, especially regarding recent innovations and lessons learned from atypical events. Industry has demonstrated significant improvements in coping with familiar event types. Florida utilities have significantly improved resilience and restoration from hurricanes through substantial investments in system hardening and restoration activities, even with more intense storms. However, recent resilience events often feature an impact that is atypical to a given area or utility, thereby complicating response. For instance, western utilities are familiar with wildfire. Sharing innovations and lessons learned from those entities would be beneficial to others that have not yet but likely will need to cope with wildfire. Additionally, there has been significant advancement regarding weather prediction and condition monitoring for hazards like wildfire. Efficient sharing of that key information is of significant benefit. In conjunction, NERC should continue to raise industry awareness of key vulnerabilities via various issuances (e.g., Level 3 Extreme Winter Weather Alert and Standards changes, such as EOP-11 and 12 updates).
- **Conduct drills and emergency response:** BPS operators should have formal emergency management programs that include periodic drills and exercises to prepare operators to respond to potentially larger and atypical events. These drills should feature appropriate coordination with applicable state and local resources as well as cross-sector partners. Drills should emphasize actions in response to loss of communications capability and practicing from blackstart conditions.
- **Enhance cross-regional and sector coordination:** States and any other applicable governmental authorities should meet collectively to discuss and understand impacts to ensure that they are a part of the resource adequacy and resilience discussion. This regional coordination will ensure the acknowledgement of roles in understanding the impacts, resilience investments, and implementing mitigating activities, such as formal mutual aid agreements. Similarly, the ERO should actively engage with other sectors, including natural gas and telecom.
- **Encourage closer collaboration between energy subsectors and communications:** The ability to communicate, especially during an emergency, is critical. The industry has seen the impact of communications loss exacerbate scenarios in several recent GridEx exercises. Resilient communications should be pursued in earnest.
- **Raise understanding of potential geomagnetic disturbance (GMD) and electro-magnetic pulse (EMP) events on the BPS:** The ERO Enterprise should monitor industry implementation of applicable actions to help reduce GMD and EMP impact to the BPS.

²⁰ Debt Ceiling Legislation: Interregional Transfer Capability Determination Study

Risk Profile # 2: Resilience to Extreme Events

Recommendation	Timeframe	Interdependence	Risk Addressed
1. ERO conduct assessments to clarify BPS performance to a range of initiating events and with various levels of grid renewable penetration	1–2 years	Electric, gas, water, and communications	1, 3
2. ERO work with industry partners to develop resilience metrics to prioritize and incentivize impactful resilience investment	1–2 years	Policy section	4
3. ERO work with industry and various state and federal jurisdictions to accelerate planning and construction of strategic, resilient transmission	1–5 years	Policy section	4, 5
4. Industry forums share lessons learned on “atypical” events and innovations, such as improved situational awareness and event prediction	1–2 years	Broad. Applicable to all report sections; comms and gas sectors	All. 1–5
5. Utilities and key partners conduct drills and emergency response	2–5 years	All sectors, gas, and comms primary	4, 5
6. ERO facilitate enhanced cross-regional and sector coordination	1–3 years	All sectors	2, 3
7. ERO encourage closer collaboration between energy subsectors and communications	1–3 years	Communications	3
8. Monitor new developments and share understanding of potential GMD and EMP events on BPS	3–5 years	Security	3

Risk Profile #3: Critical Infrastructure Interdependencies

Key Reliability Risks for the Critical Infrastructure Interdependencies (CII)

The interdependence of the BPS and natural gas, communications, and other critical infrastructure cannot be underestimated. The urgency to mitigate this risk is a national, state, and local issue receiving widespread attention, as can be seen in the significant work being done between BPS stakeholders and the interdependent sectors. These efforts are highlighted later in this section.



In Order of Importance

1. **Natural Gas – Extreme Events and Long-Term Supply** The natural gas pipeline infrastructure (natural gas being the primary source of fuel to the dispatchable generation fleet in the next five years) must expand to meet the growing need of these new dispatchable generation units. The interdependence of natural gas infrastructure with the BPS and the lack of comparable natural gas industry reliability standards exacerbates this risk. Also of concern is inadequate natural gas capacity and storage to support the electrical need coupled with the need for more diversity of dispatchable energy resources and ERSs. Another interdependency to consider is the natural gas infrastructure reliance on electricity to operate.
2. **Communications:** The operation of the BPS is increasingly reliant on telecommunication networks for real-time monitoring, remote control, emergency response, and system restoration.
3. **Other Critical Infrastructure (Water, Wastewater, Transportation, AI):** During extreme or critical events, the BPS incurs additional stress and competes for the use of other supporting critical infrastructure facilities. The forecasted growth of the BPS requires that these facilities also match the growth for a reliable, secure, and resilient power system.

Statement of the Risk

Disruptions to or compromises of other critical infrastructures may affect or disrupt reliable BPS operations. Likewise, BPS disruptions can impact these other critical infrastructures as well.

Significant and evolving critical infrastructure sector interdependencies are not fully understood, resulting in an incomplete understanding of the impacts of BPS disruptions on other infrastructure sectors or subsectors. Key interdependencies of the communication and natural gas critical infrastructure sectors present an elevated risk level to the BPS. Widespread and extended outages of electric and natural gas compressors can result in natural gas delivery issues across the system, impacting not only home heating but also the generation of electricity. Widespread and extended outages of communication systems have the potential to hamper situational awareness and real-time operation of the BPS. The purpose and modality of the BPS data transmitted by critical communication infrastructure may not be well understood by service providers.

The risk level posed to the BPS by water, wastewater, financial, manufacturing, and transportation is secondary in nature. Based on forecasted demand growth, these interdependencies will become more critical as all infrastructure will be strained to meet future electric power demand requirements.

Furthermore, as interdependencies continue to increase between all critical infrastructure due to the transformation of the grid, impacts on one can have a rippling effect on others. An emerging interdependency is developing between the BPS and AI with this technological advance driving the addition of large loads along with the current and future adoption of AI in the planning, operating, and optimizing of the BPS.

Loss of electric service can significantly impact all of the sectors/subsectors that are dependent on reliable, resilient, and secure energy.

Descriptors of the Risk

Natural gas interdependence with the BPS is one of the key risk areas and has two components: extreme events and long-term pipeline build to meet the load growth expectations.

Extreme events (e.g., freezing temperatures, earthquakes, tornadoes, heavy precipitation, wildfires) can have significant impact on the natural gas supply to the generation and to the supply of power to the wellheads, processing plants, pumps, and compressors that are critical to natural gas flow. Recognizing the interdependence between natural gas supply and the BPS would make the continuity of natural gas and power supply a priority for the reliability and resilience of the BPS.

The projected load growth of the BPS over the next 5–10 years makes the addition of generation that can be dispatched or scheduled very important to ensure reliability and resilience. The current projected pace of natural gas pipeline development does not align with the need to supply natural-gas-fired generation impacting resource adequacy. The natural gas pipeline infrastructure (natural gas being the primary source of fuel to the dispatchable generation fleet in the next five years) must expand to meet the growing need of these new dispatchable generation units. Gas pipeline construction takes significant time, money, and regulatory approvals, so it needs to be aligned with the power industry to ensure optimal location and capacity of the pipeline infrastructure.

The operation of the BPS is increasingly reliant on telecommunication networks for real-time monitoring, remote control, emergency response, and system restoration. As the BPS grows in complexity through IBRs, DERs, and large loads, the criticality of the interdependency risk of these on system control and communication systems increases. Disruptions, degradation, or compromise of communication networks can directly impact BPS reliability and resilience. Furthermore, these networks represent a potential attack vector for malicious actors seeking to exploit vulnerabilities in operational technology and industrial control systems (ICS). Ensuring the security, reliability, and resilience of communication infrastructure is paramount to maintaining the stability of the BPS.

BPS reliability is impacted by and impacts other sectors beyond natural gas and communications. For water interdependencies, this intersection is experienced during wildfires when pumps need to be on-line to provide firefighters with water at the same time firefighters can be calling on lines to be de-energized for the safety of their firefighting efforts. That dependency is also seen with sewer systems not being set up to be without power for extended periods, and potable water systems can be tainted if water plants are shut down due to the loss of electricity. Water also serves as a source of power production through hydro-electric facilities—with power production typically the lowest priority use of the river water (navigation, flood control, recreation, and Endangered Species Act operations being other demands on the water). This presents known and understood challenges to hydro-generation. Additional challenges are presented by the dependence on water for cooling at thermal and nuclear generation plants, which is being exacerbated by changing weather patterns, including droughts.

Recommendations to Mitigate the Risks

The table below lists the recommendations and draws from information in the *2023 ERO Reliability Risk Priorities Report*, the expertise of RISC members, and industry comments and feedback and aligns with efforts that are underway or being stood up. Those efforts include the following:

- *March 2025 NERC Reliability Insights: The Interconnected Gas and Electricity Systems*²¹
- National Association of Regulatory Utility Commissioners (NARUC) Gas-Electric Alignment for Reliability (GEAR)²²
- NERC MRC Input to the Board on Prioritizing Gas-Electric Interdependency Risk and Mitigation Efforts²³
- FERC + NARUC Current Issues Collaborative²⁴
- EPRI Supplemental Project: Nationwide Resilient Communications System (NRCS)²⁵

²¹ [March 2025 NERC Reliability Insights: The Interconnected Gas and Electricity Systems](#)

²² [Gas-Electric Alignment for Reliability \(GEAR\)](#)

²³ [Prioritizing Gas-Electric Interdependency Risk and Mitigation Efforts](#)

²⁴ [FERC + NARUC Current Issues Collaborative](#)

²⁵ [Nationwide Resilient Communications System \(NRCS\)](#)

Recommendation	Timeframe	Critical Interdependence Infrastructure	Risk Addressed
1. NERC and industry partners should continue to increase emphasis on cross-sector coordination in industry drills (e.g., NERC GridEx, Public Safety Canada's Cy-Phy Exercise, DOE drills, utility exercises (e.g., Southern California Edison Resilient Grid Exercise)). Scenario specific. Expand GridEx to include additional participants from all critical infrastructure sectors, Develop GridEx scenarios that emphasize interruptions in different critical infrastructure sectors. Critical flaw analysis should be performed, and mitigation should be implemented.	Near Term	Grid Transformation, Resilience to Extreme Events, Security	CII
2. Market structures and regulatory constructs should be reformed to better assure operational performance and fuel certainty by incentivizing and rewarding actions that promote reliability (e.g., firming fuel supply and transportation, as well as winterization investments). Formalized coordination and collaboration, including the development of standards that encompass both systems, will help assure the reliable operation of both systems.	Mid-Term	Policy	CII
3. Reform changes should be coordinated by regulatory and permitting organizations for power and natural gas. This will help to shorten the time required for projects to be developed, permitted, and constructed.	Long Term	Policy	CII
4. NERC and industry should strengthen and deepen coordination prior to seasonal extreme natural events , such as hurricanes, tornadoes, and wildfires. They should also coordinate and prepare for specific events as weather forecasts come into the near term, including positioning fuel, personnel, and incident response team communications across all impacted sectors (e.g., fire departments, natural gas, water system)	Near Term	Resilience to Extreme Events	CII
5. As the interdependence is strong between the electric and natural gas sub-sectors, these sectors should jointly create weatherization standards. In areas where weatherization standards already exist, benchmarking of performance versus those standards should be performed.	Mid Term	Policy	CII

Recommendation	Timeframe	Critical Interdependence Infrastructure	Risk Addressed
6. NERC and Reliability Coordinators should conduct new special assessments that address natural gas availability and pipeline common mode failures. These assessments should be implemented at the independent system operator (ISO), state, and local levels.	Near Term	Policy, Resilience to Extreme Events	CII
7. NERC should conduct a study to determine the percent of available generation with on-site or firm fuel capacity in each Regional Entity. In addition, there should be backup power to compressors and pumps for natural gas supply.	Mid-Term	Resilience to Extreme Events	CII
8. Improve Communication Protocols: Information-sharing practices between market operators and fuel providers should continue to be strengthened to further align generation capacity with fuel delivery timelines.	Near Term	Policy, Grid Transformation, Resilience to Extreme Events, Security	CII
9. Further coordinate with cloud storage and communication service providers. This will aid in identifying the purpose of the utility data/communications being transmitted or managed. Security, integrity, and availability of this data is of critical importance.	Mid-Term	Grid Transformation. Security	CII
10. EPRI and the DOE should continue their work on communication alternatives. New technologies should be explored that could assist in providing unique and hardened back-up telecommunication methods for the most critical data.	Long Term	Grid Transformation	CII

Risk Profile #4: Security

Statement of the Risk

The BPS is a vast, interconnected network that serves almost 400 million consumers across North America, and its security hinges on measures facilitated by the ERO Enterprise. BPS infrastructure continues to grow rapidly with new facilities, services, and technology integrations. This rapid expansion is increasing the cyber attack surface and raising the potential of grid-impacting coordinated attacks.



These transformative changes now include the convergence of information and operational technology, reliance on cloud-based technology, the emergence of AI technology, and potential workforce knowledge gaps. Additionally, dispersed management systems, such as those used by DER aggregators, Internet-of-Things devices, and outage management systems, and the increased automation/integration of operational technology networks are increasing the cyber attack surface while the use of cloud-based hosting or services introduces the risk of code and/or data breach vulnerabilities using third-party software and/or hardware.

Equipment used to monitor, protect, and control the BPS as well as externally connected support systems (e.g., Operations Management System (OMS), voice communications) could be directly exploited. Additionally, interdependent critical infrastructure sectors and subsectors (e.g., communications, water and natural gas used for electric power generation) can be exploited or infiltrated in a manner that impacts BPS reliability.

These vulnerabilities are exacerbated by insider threats, poor cyber hygiene, equipment technical feasibility limitations, and supply-chain considerations. Sources of potential exploitation include increasingly sophisticated attacks by nation-state, terrorist, and criminal organizations.

Cyber and physical security are interdependent aspects, as exploitation of either physical or cyber security vulnerabilities could be used to compromise the other dimension. Resultant impacts could cause asset damage or functionality loss or limit the situational awareness needed to reliably and resiliently operate or promptly restore the BPS. All these factors lead to many challenges for operational security, which is an essential element of a highly reliable and resilient BPS.

Descriptors of the Risk

The descriptors below are divided logically into two categories. Items one through four represent the most serious current risks to the BPS. They are of equal weight in terms of likelihood, impact, and risk exposure. Items five through seven represent emerging risks due to technological changes and workforce developments.

- **Enhanced Threat Environment for Critical Infrastructure**

Advanced persistent threat (APT) actors, which include nation-states and state-sponsored entities, have shown increasing interest and capability in attacking critical infrastructure. Additionally, adversaries have shown an increased focus on ICS and operational technology as vectors for attacking critical infrastructure. Existing threats from transnational groups, organized criminals, and hackers also contribute to the overall risk environment. The tactics, tools, and techniques used by these groups are also continuing to evolve and use newer technologies to facilitate cyber compromises.

- **Grid Transformation Security**

Previously the grid had tens of thousands of devices under control, most of which were generation facilities. Grid frequency, energy balance, and stability were maintained by keeping those generation resources in tight synchrony with demand every few seconds. With increased penetration of generation, storage, and loads based on power electronics, the grid of the future will rely on millions of devices on both the transmission system and distribution systems to maintain reliability. Many of these devices will generally be smaller in

size, more numerous, and geographically dispersed and include generation resources, energy storage facilities, and end-use loads, all of which may be asynchronous to the grid. Many of these devices on distribution systems will be controlled by common technologies, protocols, and network connections. The presence of such commonalities expands the attack surface and increases the scale of potential impact of successful cyber compromise or cyber failures. Further, many distribution system resources will likely be operated by a common aggregator, likely not subject to critical infrastructure protection (CIP) standards, which creates another risk vector.

- **Physical Security**

There are several risk factors related to physical security. The E-ISAC notes that most security-related outages are caused by physical security events, including ballistic damage. Some of the largest risks are co-dependent with cyber security (e.g., computer controls for physical access) and the prospective impact of replacing long lead-time equipment (e.g., large power transformers) damaged during an attack. Additionally, there is an ongoing evolution of the physical security risk posed by drones and limitations on response capabilities with existing laws and regulations.

The increasing dependence of the BPS on vulnerable public telecommunications infrastructure also presents challenges for security professionals, and recent online chatter regarding coordinated attacks is also concerning.

The Electricity Information Sharing and Analysis Center (E-ISAC) recently highlighted that the frequency of physical security incidents causing operational impacts (customer or generation outages) to the grid remains consistent, averaging less than 3% per year since 2020. Vandalism, theft (primarily copper), ballistic damage, and intrusion (including tampering) were the most frequently reported incident types resulting in operational impacts in the last two years. The most common vandalism threat reported was cut wires, 36% of which targeted fiber-optic cabling—a concerning finding consistent with other critical infrastructure sectors. Impacts from cut wires ranged from customer outages to generation unavailability across a variety of electric assets, including third-party infrastructure. The E-ISAC assesses that 37% of grid-impacting incidents in 2024 were likely sabotage—matched by 69% of online threats assessed by E-ISAC aspiring to sabotage the grid.²⁶

- **Supply Chain Security**

The software and hardware that comprise grid systems, supplied by third parties, have vulnerabilities that need to be mitigated. Managing these vulnerabilities is a complex endeavor that goes beyond security patching and requires utilities to have mature vulnerability and risk management programs. Robust vendor relationship management beyond product acquisition is critical and includes active security assessments, vulnerability disclosure, patching sources, and secure-by-design products, among other features. Contractual security relationships need to be recognized and developed into ongoing collaboration and custodial partnerships. In addition, entities need to plan for circumstances where single-sourced products can be eliminated. These facets are critical to improving national security and the security of the grid.

- **Cyber Security Workforce**

An inability to develop and maintain a cyber security workforce for the electric industry is a critical risk for the ability to identify, assess, and mitigate cyber security risks as well as respond to and recover from cybersecurity events. The current industry workforce is aging, and industry-specific operational technology knowledge will be lost unless these challenges can be addressed. In addition, this challenge requires coupling IT security and technology skillsets with operational technology security and technology knowledge. The competition for talent is exacerbated by the rise in AI and the explosion of growth in data centers.

- **Cloud Security**

Cloud technologies, including the various delivery models (e.g., Software-as-a-Service, Infrastructure-as-a-Service), present both opportunities and risks in the electric space. Opportunities include scalability, efficiency, geographical redundancy, and cost benefits, while risks include dependency concerns, non-deterministic communications environments, and increased target value to adversary groups as more owners and operators use similar environments. Simultaneously, vendor-provided services and products needed by industry are migrating solely to cloud environments. Additionally, at the intersection of cloud and DERs, it should be evaluated how multiple sites that fall below NERC regulatory thresholds could aggregate risk of critical infrastructure workloads running via the cloud on systems not under a common control center.

- **Artificial Intelligence and Machine Learning Security**

The advent of generative AI, agentic AI, and improved machine learning is changing the cyber security landscape. As these new AI solutions become more capable and widespread, cyber threat actors will continue to use these tools to mount ever more sophisticated attacks. We have already seen phishing attempts become more difficult to identify as non-native English speakers exploit large language models (LLM) to write grammatically correct phishing attempts. Deepfakes are being used in sophisticated social engineering attacks for financial gain. With this pace of innovation in AI use cases and capabilities, cyber threat actors are leveraging AI to identify vulnerabilities and develop zero-day exploits at an unprecedented rate. In addition, once a vulnerability has been disclosed, use of these AI capabilities may significantly reduce the time window between disclosure and weaponization.

Additionally, the incorporation of AI into operational systems poses several risks:

- Overreliance on AI outputs as actionable information in the operation and planning areas
- The use of AI to develop malware, enhance phishing campaigns, and develop exploitation discovery, increasing success rate of compromises
- Targeting of new technology through maliciously poisoned machine learning training inputs to operating technology may destabilize grid operations

Recommendations for Mitigating the Risk

To continue the efforts toward mitigating the effects of the security risks, the RISC encourages the following actions in order of evaluated criticality to have the most impact and likelihood of mitigating the risk.

Recommendation	Timeframe	Interdependence	Risk Addressed
1. Through collaboration with industry stakeholder groups, such as the RSTC, NERC should continue developing best practices for grid transformation technologies (e.g., IBRs, DERs) focusing on principles like secure by design, adaptive security, and defense-in-depth across information and operational technology environments.	Near Term	Grid Transformation	Grid Transformation Security
2. NERC should establish a formal working group to address reliability dependencies between telecommunications and electric infrastructure.	Medium Term		Physical Security
3. Given the time and complexity associated with developing new standards, and the speed with which industries and tools are moving to the cloud, NERC should expedite the development of a security guideline for cloud technologies. This guidance would clarify and give examples of	Near Term	Grid Transformation, Critical Infrastructure	Cloud Security

Recommendation	Timeframe	Interdependence	Risk Addressed
permitted uses of these technologies under existing reliability standards.			
4. The E-ISAC should continue to raise awareness of tactics, techniques, and procedures used by cyber attackers (e.g., email phishing, credential theft).	Near Term		Enhanced Threat Environment
5. Industry should continue to focus on early detection and response to cyber attacks and adopt controls that can be executed to protect critical systems.	Near Term		Enhanced Threat Environment
6. The E-ISAC should continue to execute its long-term strategy to improve cyber and physical security information sharing, protection and risk analysis and increase engagement within the electric sector as well as with other ISACs.	Long Term		Enhanced Threat Environment
7. NERC has been conducting a biennial industry exercise that helps industry both prepare and react to potential BPS security threats. This exercise, known as GridEx, is a distributed-play grid exercise that enables participants to engage remotely and simulates a cyber and physical attack on the North American electric grid and other critical infrastructure. NERC should continue to expand the scope of GridEx to include and collaborate with cross-sector industries, such as natural gas, telecom, and water as well as state, local, and tribal authorities. Future exercises should increase the focus on detection strategies while continuing to improve the ability to respond and expedite recovery. The exercise should promote better follow-through by industry to address lessons learned through the activity.	Ongoing		Enhanced Threat Environment
8. The design basis for cyber failures should be explored by NERC to determine what designs are more cyber-robust than others and how to de-risk system components and potential impacts of cyber vulnerabilities.	Medium Term	Grid Transformation, Critical Infrastructure	Grid Transformation Security
9. NERC, while collaborating with industry, should continue to evaluate the need for additional assessments of the risks from attack scenarios (e.g., vulnerabilities related to drone activity, attacks on midstream or interstate natural gas pipelines or other critical infrastructure). NERC's	Near Term		Physical Security

Recommendation	Timeframe	Interdependence	Risk Addressed
lessons learned exercises have been helpful and require additional focus through seminars that educate the industry on best practices in system security planning.			
10. Through industry stakeholder groups, such as the RSTC, research risks related to reliance/dependencies between vulnerable public telecommunications infrastructure and the BPS.	Near Term		Physical Security
11. Efforts are underway to improve software supply chain security through an “energy star” type of label for secure third-party products, or, as it is called in Executive Order 14144, the United States Cyber Trust Mark. The designation can apply to products to show secure development but can also apply to trusted vendors in recognition of their security capabilities and ongoing client services to ensure diligent management of threats and vulnerabilities. NERC should collaborate with industry to support such efforts in the electric sector. Supply chain risk management and the threats from components and sub-components developed by potential foreign adversaries should continue to be addressed by the E-ISAC, other federal partners, and industry to continue diligently working to mitigate threats.	Long Term	Grid Transformation, Critical Infrastructure, Energy Policy	Supply Chain Security
12. NERC should continue to encourage conversations around enhancing supply chain risk management (SCRM) through interactions with industry and government stakeholders.	Near Term	Grid Transformation, Critical Infrastructure, Energy Policy	Supply Chain Security
13. NERC should continue to support cloud enablement for the industry through development of standards modifications and promote discussion and outreach. Furthermore, NERC should evaluate whether cloud security programs like FedRAMP can be leveraged.	Medium Term	Grid Transformation, Critical Infrastructure	Cloud Security
14. NERC and industry should continue to facilitate the development of planning approaches, models, and simulation methods that may reduce the number of critical facilities and thus mitigate the impact relative to the exposure to attack.	Near Term	Grid Transformation, Critical Infrastructure	Grid Transformation Security
15. NERC should study the implications of cyber design failures and their impact on grid reliability.	Medium Term	Grid Transformation, Critical Infrastructure	Grid Transformation Security

Recommendation	Timeframe	Interdependence	Risk Addressed
This will enable improvement opportunities and strengthen the system against cyber security threats.			
16. Industry stakeholders should continue to share physical secure bulk data logs with the E-ISAC on a voluntary basis.	Near Term		Physical Security
17. Due to the competition for talent, industry should evaluate the salaries and benefits of cyber security personnel to be competitive in this new market. In addition, allowing for workforce flexibility (work/life balance, maternity/paternity leave, remote work when possible) would be incentives to the new generation of hires. Maintaining the stability of staff would also be a positive benefit to employee retention. Expansion of the talent pool and areas of recruitment is critical to securing top talent. Extensive recruitment to high schools, trade schools, and former military/federal employees is key to developing and maintaining a leading cyber security workforce.	Medium Term		Cyber Security Workforce
18. Offering part-time employment/contract work to subject matter experts (SME) of the organization's staff to train the new hires allows for continuity of the knowledge base.	Near Term		Cyber Security Workforce
19. Through industry stakeholder groups, such as the RSTC. NERC should collaborate and develop industry guidance on best practices to mitigate potential risks posed by the use of AI technologies. This guidance should be tailored to the electric industry.	Medium Term	Grid Transformation, Critical Infrastructure, Energy Policy	AI and Machine Learning

Risk Profile #5: Energy Policy

Energy Policy Volatility as a Reliability Risk Factor

“Energy policy” refers to the legislation, regulations, and market frameworks established by the legislative bodies; federal, state, and provincial regulatory agencies; and regional transmission organizations (RTO), ISOs, and other entities that influence infrastructure development, grid operations and energy sufficiency. For this report, particular attention is directed at policies that address decarbonization, decentralization, and the planning and operation of the BPS.



Without question, energy policy can drive changes in the planning and operation of the BPS. Unfortunately, not all of these policies are specifically aligned with the physical needs of maintaining a reliable grid and may result in reliability impacts. Though the broader energy policy objective is desirable, these policies may result in reliability impacts. Accordingly, policy can affect BPS reliability and resilience and could present risks to its reliable operation. Greater alignment and consistency across state and provincial regulatory agencies, RTOs, ISOs, and regional transmission planners and operators could help address differing requirements and improve coordination, potentially enhancing reliability across the BPS.

In recent years, policy volatility has emerged as a risk driver, as rapidly changing policy perspectives can further complicate and exacerbate risks to reliability, impacting capital investment strategies and creating market uncertainty. The business certainty necessary to make investments in new generation capacity depends in part on the durability of applicable policy. Implementing major policy shifts without factoring in timeline impacts can undermine reliability, given the long-term planning and investment decisions necessary to operate a system as complex as the BPS. Sudden or large changes in policy, or short-term orders, can negatively impact the business climate with implications for energy sufficiency, the pace of interconnection of new resources, and ability to meet new demand, recently exhibited by the desire to integrate large loads. Because ensuring reliability during and after policy-driven transitions is critical, durability should be a key consideration in setting energy policy.

The implementation of policy decisions can significantly affect the reliability and resilience of the BPS, and sudden reversals in policy can compound risks. Implementation plans should be carefully considered to avoid unintended consequences affecting resource planning. For example, federal and state policy over the last decade and more have facilitated the expansion of IBRs, such as solar, wind, and battery storage. IBRs now represent as much as 90% of new generation capacity added annually and the vast majority of resources in interconnection queues with policy support and technology advances successfully making these resources economically attractive sources of energy. However, the resulting interconnection queue delays have added to project development uncertainties and encouraged more project submissions, complicating the integration studies required to ascertain grid reliability and the system planning studies needed to balance load growth projections with generation.

Implementation of policies affecting the BPS is accelerating, and extreme weather events, and physical and cyber security challenges, reliability implications are emerging with changes in the resource mix. Demonstrated risks, such as energy sufficiency, natural gas and electric interdependence, and operational reliability concerns, are becoming increasingly critical. These critical interdependent risks may intensify if energy policies shift abruptly. For instance, as projections for load growth rapidly increase, uncertainty or abrupt changes in energy policy, particularly at the federal level, may pose a risk for interconnection of new resources and consequently for energy sufficiency.

Policy Misalignment

The electric grid faces growing reliability and modernization challenges due in part to misalignment among the policy objectives, implementation plans, and timelines of various policymakers, compounded by permitting constraints and significant load growth from emerging industries, such as data centers. Such inconsistencies and conflicts can lead to delays and inefficiencies that can constrain industry's ability to respond to grid challenges.

Key risks include the following:

- **Grid Reliability:** Misaligned policies and implementation timelines, combined with permitting delays, hinder the ability to address increasing load growth and aging infrastructure upgrades. NERC and various Regional Entities and RTOs have highlighted the risk of resource additions failing to keep up with generator retirements and load growth as well as the need for ERSs to be maintained. Increased electrification coupled with rapid expansion of data centers—high-density energy consumers concentrated in specific regions—further stresses local grids, particularly where transmission and generation capacity are already constrained.
- **Infrastructure Bottlenecks:** Lengthy development and construction processes, driven in part by the wide range of jurisdictions and agencies with grid oversight, and local opposition delay both critical new transmission projects and upgrades and the addition of new generation resources needed to meet rising demand. This is particularly problematic in areas experiencing significant load growth from data centers, EV adoption, and electrification of other sectors, potentially leading to localized outages or grid instability.
- **Energy Resource Integration:** Integrating diverse power sources—such as natural gas, nuclear, and IBRs—requires enhanced transmission and storage infrastructure to meet growing demand and ready the system to address extreme weather events. Permitting delays and misaligned policies slow the deployment of these critical upgrades, further straining the system as demand from data centers, other industries and electrification continues to rise.

The interplay of federal-state policy misalignment, permitting challenges, and rising load growth underscores the need for coordinated strategies to modernize the grid, streamline permitting processes, and ensure that sufficient energy with sufficient levels of grid resilience is available in the face of growing energy demands. Emerging potential risks are increasingly concerning. Due to the interdependence of critical infrastructures (e.g., electricity, natural gas, water, transportation, and communications), potential reliability risks can be magnified when cross-industry subsectors and agencies act independently to create or implement policy. The development of Reliability Standards and processes recognizes and respects the jurisdictional authorities setting and implementing policy decisions. It will take strong collaboration and partnerships across a multitude of boundaries—state, federal, provincial, and private—to mitigate the emerging risks that we face today and ensure that the reliability of the grid is a prioritized tenet of critical infrastructure.

Technical Considerations Associated with Policy Development

Policymakers need to be sufficiently familiar with the technical challenges of operating the grid. Energy policy decisions that do not align with the operational capabilities of the electric grid will likely increase reliability risk. In the current environment, three active policy areas warrant particular attention: energy sufficiency, the emergence of load loads, and the interdependence of the natural gas and electric markets. Each area is discussed briefly below.

Energy Sufficiency

Energy sufficiency is when the resources available are able to produce enough energy to meet energy demand at any given time. With demand increasing, there is a premium on interconnecting and deploying new resources rapidly to assure energy sufficiency. Policy implementation timelines, and proposed modifications to policy, should actively consider the ability to ensure energy sufficiency.

Existing resource adequacy requirements and underlying studies have traditionally been based on a paradigm that focused on peak capacity requirements and assumed that energy sufficiency would result; traditional resource adequacy planning is capacity-focused. As the resource mix continues to rapidly change from one that was limited by

rated capacity to one where fuel/energy is constrained and weather dependent (e.g., by available wind, sunlight, or gas supply), new approaches are needed to assess and ensure energy sufficiency for all hours throughout the year. Limited-duration resources also change the way energy sufficiency is measured. It is becoming increasingly important to consider available energy and not just forecasted power. Broadly impactful, long-term, and widespread weather events are highlighting energy sufficiency issues from the changing static/dynamic characteristics of the resource mix and technology lag.

Large Loads

Data centers represent the primary large loads being integrated into the electric grid, playing a crucial role in supporting national security, economic stability, and societal functions. The reliable and timely connection of these loads is a national priority. These facilities, which can demand hundreds of megawatts at a single site and thousands of megawatts in a geographically small area, operate continuously, have minimal tolerance for power quality issues, and can be interconnected rapidly, often outpacing the development of accompanying transmission and generation. Failure to address the integration of large loads from a policy perspective could exacerbate the reliability considerations associated with energy sufficiency and resource adequacy challenges. These loads should continue to be evaluated through the NERC Large Loads Task Force and other industry forums to identify risks and mitigation strategies. Constructive engagement is underway within industry to understand performance characteristics and operational capabilities of these loads. Encouraging this collaboration to continue can help inform the development of effective policy frameworks that promote the continued growth of these large loads in an efficient and reliable manner, given the critical economic and national security interests impacted by this sector.

In addition, by regulating the development and operation of infrastructure essential for reliable power, permitting is a crucial factor that affects data center reliability and resource adequacy. This is a particular concern in this area given the speed of data center development and construction.

Natural Gas and Electric Interdependency

Natural gas and electricity markets each developed independently and because they were not designed to work together at times, are not fully coordinated in terms of operations, scheduling, or timing. Natural gas access for power generators is further challenged by other priority uses, including home heating and industrial and manufacturing processes. While progress has been made on these fronts through formal collaboration at venues like the North American Energy Standards Board (NAESB), the National Association of Regulatory Utility Commissioners (NARUC), and NERC and informal collaboration among participants of both markets, the need for additional progress has been well documented in connection with extreme weather events, such as winter storms Uri and Elliott.

Issues that further coordination efforts could address include power market challenges to natural gas pricing, advance purchasing, advance scheduling, dispatch, and cost recovery—all of which are needed to reduce generator uncertainty, including natural gas supply availability during times of system stress or very high demand. In addition, future coordination efforts should continue to focus on increased alignment of natural gas and electric scheduling and the challenges that electric generators face in accessing natural gas during critical periods, such as severe winter weather events, particularly over weekends and holidays.


Policies promoting cleaner energy sources have increased reliance on natural gas for electricity generation, while electrification of natural gas infrastructure, such as pipelines and compressors, deepens their interconnection. For instance, cold weather impacts both energy subsectors, reducing their ability to deliver energy. Decarbonization policies and renewable energy mandates further complicate this relationship, as natural gas often serves as a flexible backup for variable energy renewables. Furthermore, ERSs that are vital for the reliable operation of the BPS also become highly uncertain. Infrastructure permitting, market regulations, and emergency preparedness policies directly impact the availability and cost of natural gas for power generation and the reliability of electricity for natural gas operations.

Perhaps the most vexing dilemma is identifying potential avenues to increase and support investment in gas infrastructure. NERC and its Regional Entities have highlighted this issue across a number of reports and reliability assessments. In addition, gas infrastructure could be further challenged by the projected addition of new natural gas generation to meet new load growth. Additionally, large loads that liquify natural gas for sale and transport, whose infrastructure resides within a local electric utility footprint, represent a critical area for coordination and collaboration, particularly during extreme weather events.

The electric reliability and resilience impacts caused by ongoing challenges between the natural gas and electricity markets should be sufficiently accounted for in risk assessment, planning, and operations. Additionally, remaining challenges can continue to benefit from increased cross-industry and cross-jurisdictional communication, coordination, and collaboration. Public policy that fails to consider the challenges of gas-electric coordination will place additional pressure on grid reliability. Because the electric and natural gas industries arguably have a higher degree of critical infrastructure interdependencies, increased policy collaboration and coordination should occur between these sectors.

Recommendations for Mitigating the Risk

- Policymakers should adopt a three-pronged principles-based approach to decision making:
 - In addressing the foregoing complexities, policymakers should prioritize the principles of reliability (including resilience, and security), affordability, and environmental sustainability in their decision-making processes. Policymakers need to understand the importance of establishing a coherent strategy that aligns with these guiding principles that supports the electric industry's ability to engage in the long-term planning and investment crucial for developing the generation capacity needed to meet the expected demand. These principles could guide industry's evolution, ensuring a balanced approach as stakeholders seek to meet growing demand in the face of supply chain constraints, escalating costs, and a variety of environmental imperatives.
 - At the heart of this strategy lies the principle of reliability, which encapsulates the electric system's ability to deliver consistent service to all customers. Given the scale of current and pending reliability challenges, as policymakers consider the principle of reliability in this three-pronged approach, they must recognize the need for concerted progress on several fronts (e.g., transmission infrastructure, energy supply resource development, maturity of control systems, better planning and analytics tools, comprehensive contingency plans). This requires having all options available and points to the importance of adopting a durable "all of the above" approach that considers energy sufficiency and the full spectrum of resource options and services required to keep the BPS reliable. This includes ERSs provided by generators, such as inertia, ramping capability, voltage support, and blackstart capability. These services are foundational to maintaining grid reliability. The foremost priority for policymakers must be securing the resources necessary to ensure energy sufficiency and provide ERSs. By aligning this priority with an "all of the above" approach that recognizes development timelines and the unique capabilities of each generation technology, policymakers can effectively uphold the principle of reliability while also balancing affordability and environmental stewardship.
- Leveraging the benefits of such a consistent, principles-based policy approach requires two conditions precedent:
 - **Technical education for policymakers**
First, given the complex nature of BPS planning and operations, education for policymakers and regulators to increase awareness of both the technical challenges of operating the grid and the reliability implications of policy decisions is critical.
 - **Increased coordination and collaboration**
Second, increased coordination and collaboration between federal, provincial, and state policymakers, regulators, owners, and operators of the BPS as well as with the critical interdependent



Risk Profile #5: Energy Policy

sectors/subsectors are needed. Communication, coordination, and collaboration should be early, consistent, and clear to bridge increasingly complex jurisdictional lines.

Recommendation	Timeframe	Interdependence	Risk Addressed
1. Policymakers should adopt a three-pronged principles-based approach to decision-making.	1–2 years	Broad – applicable to all risk profiles	Policy volatility; Policy misalignment
2. Policymakers should adopt a durable “all of the above” approach that considers energy sufficiency and the full spectrum of resource options and services required to keep the BPS reliable.	1–2 years	Grid Transformation, Resilience to Extreme Events, and Critical Infrastructure Dependencies	Policy volatility; Policy misalignment
3. Prioritize technical education for policy makers	1–2 years	Broad – applicable to all risk profiles	Technical deficiencies in policy development
4. Prioritize increased coordination and collaboration	1–2 years	Broad – applicable to all risk profiles	Policy misalignment

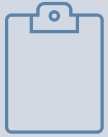
NERC

NORTH AMERICAN ELECTRIC
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2025 ERO Risk Priorities Report

Teresa Mogensen, RISC Chair
Board of Trustees Open Meeting
August 14, 2025

RELIABILITY | RESILIENCE | SECURITY



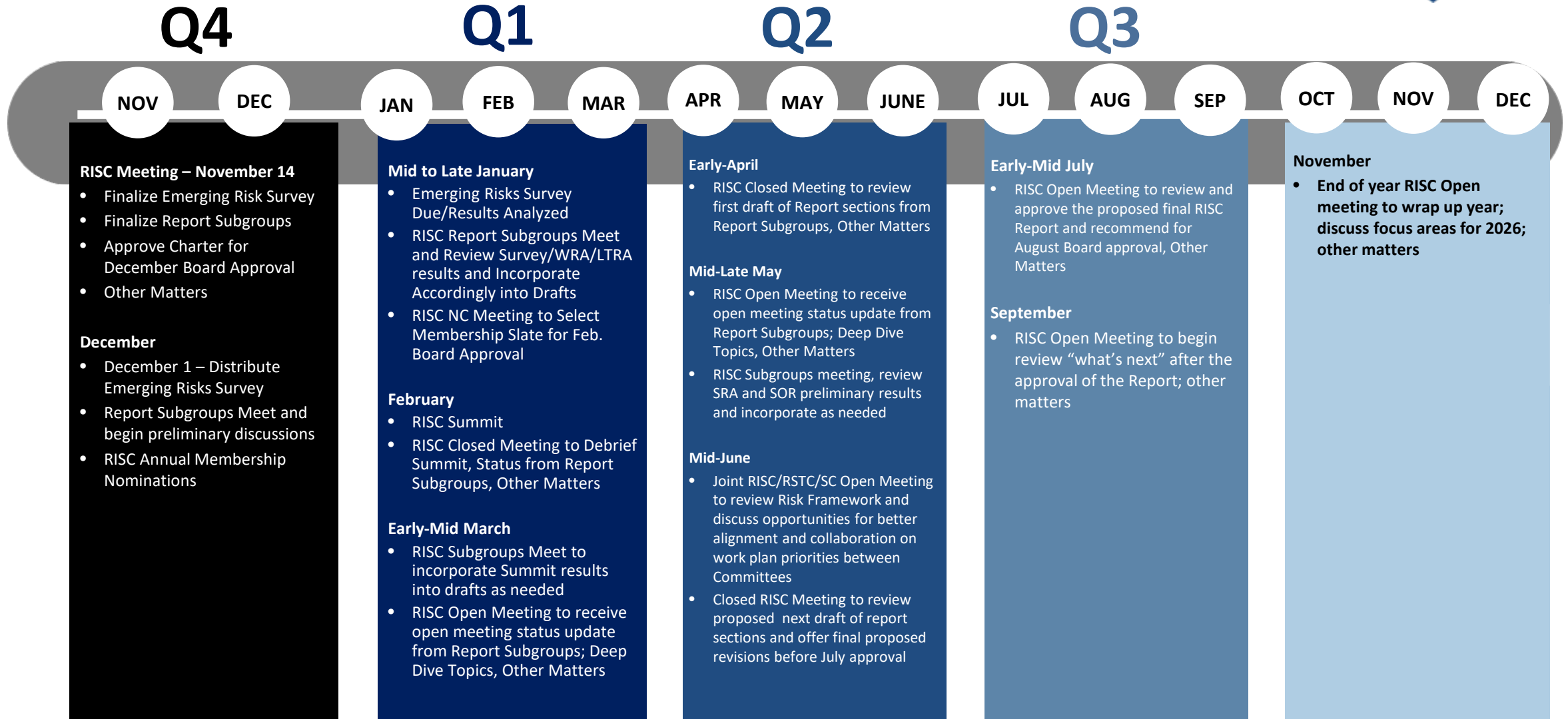
Emerging Risks Survey



Reliability Leadership Summit



ERO Reliability Risk Priorities Report



1. Grid Transformation

- a. Continues as overarching driver of new reliability risks

2. Resilience to Extreme Events

- a. Grid impacts emerging from transformations are different

3. Critical Infrastructure Interdependencies

- a. System events are highlighting growing interdependency impacts

4. Security

- a. Risk evolves and grows in complexity with transformations

5. Energy Policy

- a. Can further amplify or modify other impacts

Substantive simultaneous change in all Bulk Power System dimensions (resource, load, grid), along with **increasing complexity** in their **interactions**, requires **rethinking** traditional planning and operating paradigms and **speed** of implementing new approaches to **ensure ongoing reliability**.

Risk Themes



New Large Loads Plus Changing Resource Mix

The emergence of new large loads at unprecedented scale and speed, combined with new system operating experiences from an evolving resource mix, highlights the need to advance the traditional system reliability construct.



Larger-Scale Events Observed

Larger-scale reliability impact events are occurring, with contributions from grid transformation effects and increased incidence of large weather system scope, severity, and duration.



Natural Gas Interdependence

Natural gas is currently the most critical dispatchable electric resource but is subject to increasing risks associated with just-in-time delivery, demonstrated reliability and security challenges, and inability to scale quickly.



Security Complexity

The growing complexity of system equipment and operations increases security challenges and enhances the attractiveness of the grid as a target.



Persistent Supply Chain Challenges

Persistent supply chain and workforce challenges are impacting risk mitigation and response capabilities.



Volatile Energy Policy

A volatile and disconnected policy landscape creates risk and further complicates the ability to mitigate risks through policy solutions.

To deliver ongoing Bulk Power System (BPS) reliability in a time of increasing change and complexity, “more” is required:

- More **system margin** to accommodate uncertainty
- More **diverse resource, grid and operating options**
- More **awareness of reliability implications** of changes
- More **comprehensive studies** and assessments
- More **coordination** between impacting parties
- More **preparation** for large events and restorations
- More **speed** in implementing necessary measures.



Recommendations



Act Now to Modernize the Reliability Construct

Act now in response to the significant energy ecosystem change already underway.



Update Criteria and Methods

Update the planning and operating models, analytical and operational paradigms, and reliability criteria to better match emerging system attributes. Traditional approaches do not fully address new risks being introduced through substantive simultaneous change in all system dimensions.



Improve Resource Diversity

Improve the diversity of dispatchable resources and energy/fuel storage facilities and add additional on-line and responsive sources of essential reliability services.



Enhance Mitigation and Recovery Plans

Enhance event response mitigation and recovery plans, as system impacting events cannot be completely avoided. Actively incorporate consideration of persistent supply chain challenges.



Raise the Profile of Reliability in Policy

Policymakers and stakeholders should seek to understand and mitigate the reliability implications of policy directions in a coordinated way. The ongoing reliability and robustness of North America's critical infrastructure is an essential prerequisite for almost everything else.



Questions and Answers

Modernization of Standards Processes and Procedures Task Force

Action

Update

Background

At its February 2025 meeting, the NERC Board of Trustees (Board) passed a [resolution](#) forming an industry-led Modernization of Standards Processes and Procedures Task Force (MSPPTF) to undertake a strategic review of NERC's Reliability Standards development process. The MSPPTF's work focuses on transforming current processes and procedures to ensure that standards can be developed more efficiently and effectively to better address the complex and rapidly evolving risk landscape.

Maintaining a collaborative stakeholder-based process that reflects the balance of interests is one of the guiding principles of the initiative. All recommended changes to the processes and procedures must continue to provide for reasonable notice and opportunity for public comment, due process, openness, and balance of interests in developing reliability standards consistent with Section 215 of the Federal Power Act.

The Board appointed Greg Ford, President and Chief Executive Officer (CEO) of Georgia System Operations Corporation, to serve as Chair, and Todd Lucas, Vice President of Transmission Operations and Policy at Southern Company, as Vice Chair. MSPPTF membership also includes Board members Susan Kelly and Rob Manning, the chairs of the Standards Committee (SC), the Reliability and Security Technical Committee (RSTC), the Compliance and Certification Committee (CCC), and U.S. and Canadian industry representatives. The complete roster is available on the NERC website: [MSPP Task Force Roster](#).

The MSPPTF will provide the Board with regular updates throughout this effort with recommendations to be presented to the Board at the February 2026 meeting.

Summary

Since the last update provided to the Board in May, the task force developed a [white paper](#) on potential improvement opportunities in three areas: standards initiation, standards development, and balloting. The white paper is currently posted for stakeholder feedback through August 27, 2025, and was informed by [input](#) from a stakeholder survey.

Stakeholder feedback and input is critical to the success of this effort and the MSPPTF is implementing a robust outreach and engagement plan that includes opportunities for stakeholder input. All public resources and updates are posted, and regularly updated, on the MSPPTF webpage on the NERC website (accessible under the 'Initiatives' tab): [MSPPTF webpage](#).

At the August 14, 2025, Board meeting, Greg Ford and Todd Lucas will provide an update on the MSPPTF efforts.

Modernization of Standards Processes and Procedures (MSPP) Task Force

Greg Ford, MSPP Task Force Chair
Todd Lucas, MSPP Task Force Vice Chair
Board of Trustees Open Meeting
August 14, 2025

Transform and Modernize the Process

Re-envision a modernized standard development process to address evolving risks.

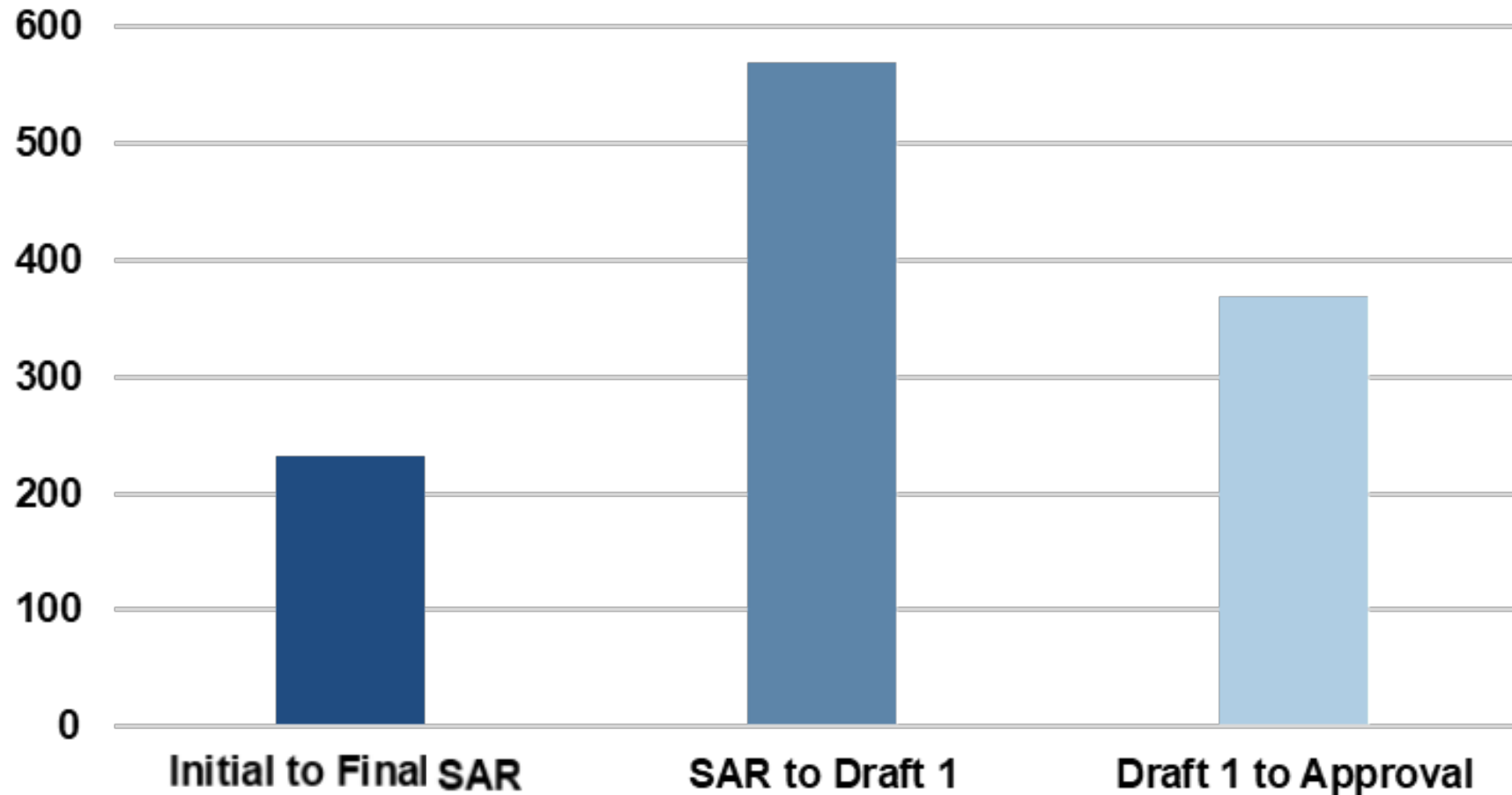
Create Efficiencies

Identify areas of opportunity and recommendations to save time and remove redundant steps in the current process.

Develop a Trusted Process

Provide clear opportunities for stakeholder input, due process, openness, and balance of interests.

Duration of Each Process Step (in days)



March



**Stood Up
Task
Force**

April



**April
Workshop**

May - June



**Industry
Feedback
Survey**

May - July



**Opportunities
Developed**

June

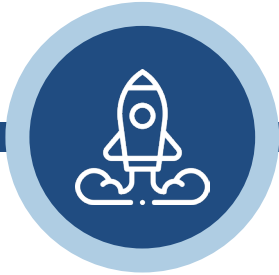


**June
Workshop**

July

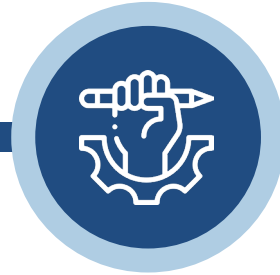


**White
Paper
Posted for
Comment**



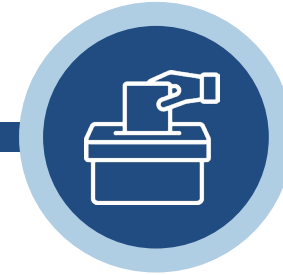
Standards Initiation

- Implement a biannual review and prioritization process
- Centralize the process through the Reliability and Security Technical Committee



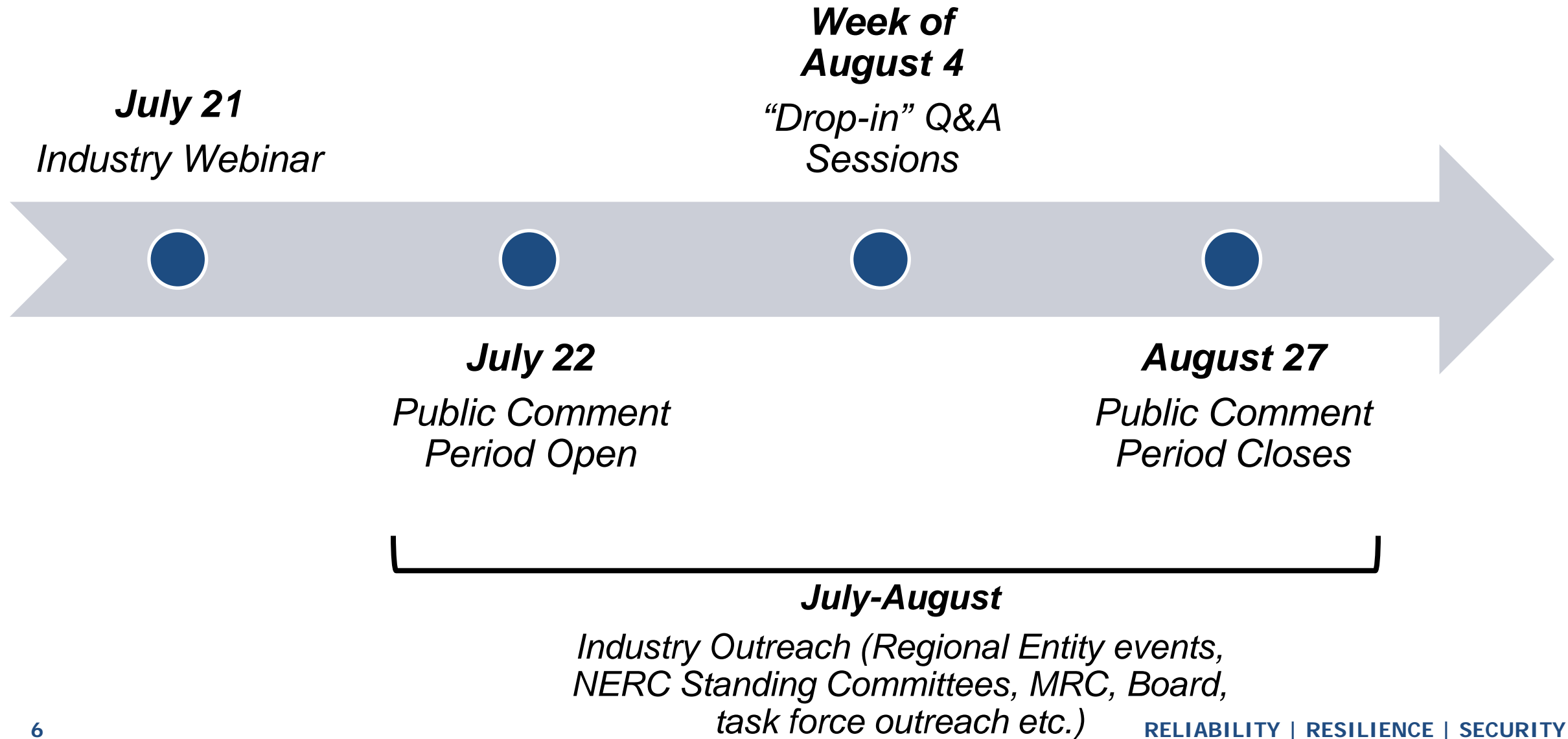
Standards Development

- Form a new group or panel to coordinate standards drafting with AI assistance
- Outsource standards drafting
- Implement incremental process changes



Balloting

- Create a standing ballot body
- Implement a notice and comment process for proposed standards
- Implement incremental changes to Registered Ballot Body framework



Q2 2025

- Developed scope document
- Identified areas for improvement
- Solicit stakeholder input

Q3 2025

- Develop white paper of potential improvement opportunities
- Solicit stakeholder input
- Develop draft recommendations

Q4 2025

- Solicit stakeholder input
- Finalize recommendations

Q1 2026

- Present recommendations to NERC Board

Communications and Engagement

- Individual task force engagement
- General communications to and broad engagement with industry and stakeholders
- Updates to NERC's Board, MRC, Standing Committees, and Industry Groups

- Several resources are available to keep industry and stakeholders informed throughout this critical project:
 - [MSPPTF Scope](#)
 - [MSPPTF Roster](#)
 - [MSPP FAQs](#)
 - [MSPPTF External Engagements](#)
- Resources and forthcoming engagements are posted on the [MSPPTF webpage](#) (under the Initiatives tab [NERC homepage](#)).
- The MSPPTF publishes a monthly update at the beginning of each month to provide an overview of recent activity and upcoming work.

Monthly Update

The screenshot shows the MSPPTF Monthly Update webpage. The header features the MSPPTF logo and the title 'Modernization of Standards Processes & Procedures'. Below the header, there is a paragraph explaining the speed of risks to the reliability, security, and resilience of the bulk power system and the NERC Board's resolution. The main content area is divided into sections: '2025 June Update', 'Background', 'Key Activities', 'Stakeholder Outreach', 'Key Resources', and a timeline. The timeline shows the progression from Q2 2025 to Q1 2026, with key milestones for each quarter. A 'Communications and Engagement' section at the bottom details various activities like stakeholder input, recommendations, and updates to the NERC Board.

2025 June Update
This is the second in a series of updates that summarize ongoing activities related to the MSPPTF initiative.

Background
The MSPPTF is focusing on transforming current processes and procedures to ensure that standards can be developed more efficiently and effectively to better address the complex and rapidly evolving risk landscape. It is considering the spectrum of the current standards program, including processes, balloting, drafting, and the roles of team and committee members. The MSPPTF is also reviewing prior standard improvement efforts and recent Section 321 actions for lessons learned.

Key Activities
Since the last update, the MSPPTF has identified and prioritized three areas of opportunity for improvement in the standards process and is conducting a deep dive into: 1) standards initiation/standard authorization requests, 2) standards development/drafting, and 3) balloting. The task force is meeting this month to develop an initial outline of recommended changes.

Stakeholder Outreach
The MSPPTF also released a [survey](#) that provides stakeholders with the opportunity to offer ideas for consideration to transform current standards processes and procedures. The survey (which is due on June 5) is anonymous, and while the task force will not directly respond to comments, survey feedback will be considered as the initial outline of recommended changes is developed. The initial outline will be posted this summer for additional stakeholder input.

Key Resources
Several resources are available to keep industry and stakeholders informed throughout this critical project, including the [MSPPTF webpage](#) (located under the Initiatives tab on the [NERC homepage](#)), the [MSPPTF Scope](#), the [MSPPTF Roster](#), and [MSPPTF FAQs](#).

Questions? Please email mpp@nerc.net.

Timeline:

Q2 2025	Q3 2025	Q4 2025	Q1 2026
Developed scope document	Develop strawman draft of recommendations	Solicit stakeholder input	Present recommendations to NERC Board
Identified areas for improvement	Solicit stakeholder input	Finalize recommendations	
Solicit stakeholder input	Refine draft recommendations		

Communications and Engagement

Individual task force engagement	General communications to and broad engagement with industry and stakeholders	Updates to NERC's Board, MRC, Standing Committees, and Industry Groups
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Questions and Answers

Questions?

Email mspp@nerc.net

NERC.com Modernization Project

Action Update

The Vision

Just as our industry is undergoing a transformation, NERC's new website is also being transformed. The website modernization project supports our 2025 work plan priority that seeks to deliver innovative platforms to enhance the user experience and elevate outreach and engagement.

The new website places a high priority on the user experience by featuring a robust search feature, more intuitive navigation, the ability to post more visual materials to attract more users – all built upon meaningful analytics and a content strategy that better reflects who NERC is as an organization.

Stakeholder Engagement and Feedback

Establishing a new website is a detailed, thoughtful process that involves precise and intentional communications from early-stage development to post-launch. As part of a comprehensive communications strategy, we engaged with our stakeholders – both internal and external – throughout this year-long process. Engagement opportunities have included:

- One-on-one interviews with NERC staff, chairs/co-chairs from the Member Representatives Committee (MRC) and the NERC standing committees.
- A survey sent to NERC staff, the Board of Trustees (Board), MRC, standing committees, the Regional Entity CEOs, the ERO Enterprise Collaboration Group chairs (and asked them to share with their groups), the ERO Communications Group, the trades and forums and trade communicators.

What stakeholders told us was most important fell unanimously under the category of “improving the user experience:”

- Enhanced search capabilities, 82%
- Better organized, up-to-date content, 80%
- More intuitive ways to navigate the site, 74%

Project Phases

From the survey feedback, we developed our Project and Implementation plan. Because of the complexity and change management implications, we are undertaking this project in three phases: **Crawl, Walk, Run**. This 2024-2025 work plan priority (Agility) will change the way both NERC staff and our stakeholders use the website. This is a momentous change in mindset, and we do not want to overwhelm users with *too much* capability and change.

To ensure success, we are taking a measured, incremental approach to provide a solid base of functionality that stakeholders told us is most important to them. This will allow stakeholders the opportunity to use the new website and provide feedback to inform our work in the **Walk** phase.

What to Expect – Crawl

Based on our requirements and the feedback received from our stakeholder survey, the **Crawl** phase will focus on improving the user experience with:

- More intuitive navigation with fewer categories and silos.
- More robust, intelligent search function.
- More streamlined, current documents and ease of finding projects, initiatives on the front page.
- More accessible language and a fresher, heuristic design with multimedia capability – gone are the days of text heavy pages and photo carousels.
- Scalability from your laptop, cell phone or tablet.
- An Events calendar that is searchable and includes links to the agendas, registration, and meeting materials, and allows users to easily add events to their calendars.

Stakeholder Feedback Opportunity

Gathering feedback from our stakeholders is critical to the project's success so we are providing an opportunity to comment prior to launching the new website. We want to allow the NERC team and external stakeholders the chance to use the site and evaluate the functionality, then provide comments before we launch the new website.

We will send an announcement when the new website—the beta site—is ready. This beta site will run behind the scenes in parallel with our current website, which will still be our public-facing website until we launch the new site. During this feedback period, we will be seeking:

- Overall impression of the new site
- Any challenges encountered
- Features liked
- Functionality for subsequent phases

We have developed an easy-to-use form to provide comments, which will be used to address any critical issues and to prioritize subsequent **Walk and Run phases**.

When to Expect the New Website

While the hard job of migrating and validating the content is ongoing, we are excited about the continued progress we have made and what the new website represents—a future-focused platform for elevating our outreach and engagement efforts with the **user experience** at the top of mind.

We expect to launch the stakeholder feedback opportunity at the **end of Q3/beginning of Q4** – with the launch of the Crawl phase of the website in Q4; however, it is critical that we get this correct. While we are driving toward a Q4 launch date, if we have not substantially **improved the**

user experience by that time, we will take the time needed to do so. This project is a transformation of how we use and view the website not only now but into NERC's future.

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NERC.com Modernization Project

Kimberly Mielcarek, Vice President, Corporate and External Communications
Board of Trustees Open Meeting
August 14, 2025

RELIABILITY | RESILIENCE | SECURITY

Discovery Sessions

- NERC departments
- MRC chair
- Committee chairs



Stakeholder Survey

- Targeted emails
- Posted to NERC.com
- Shared via NERC social media, video



**2025 WPP
in Action**



Crawl

Improving the User Experience



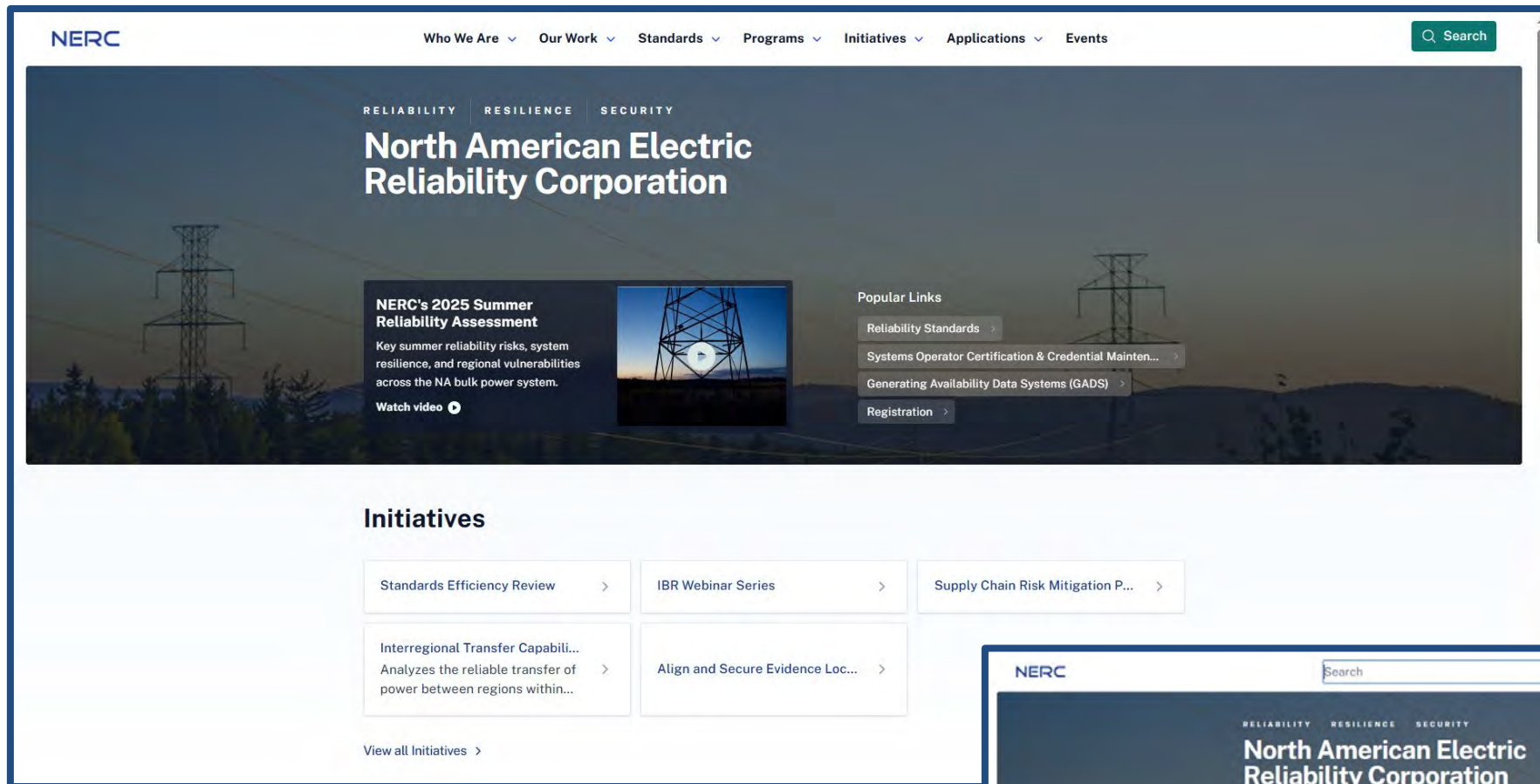
Walk

Generating Meaningful Analytics

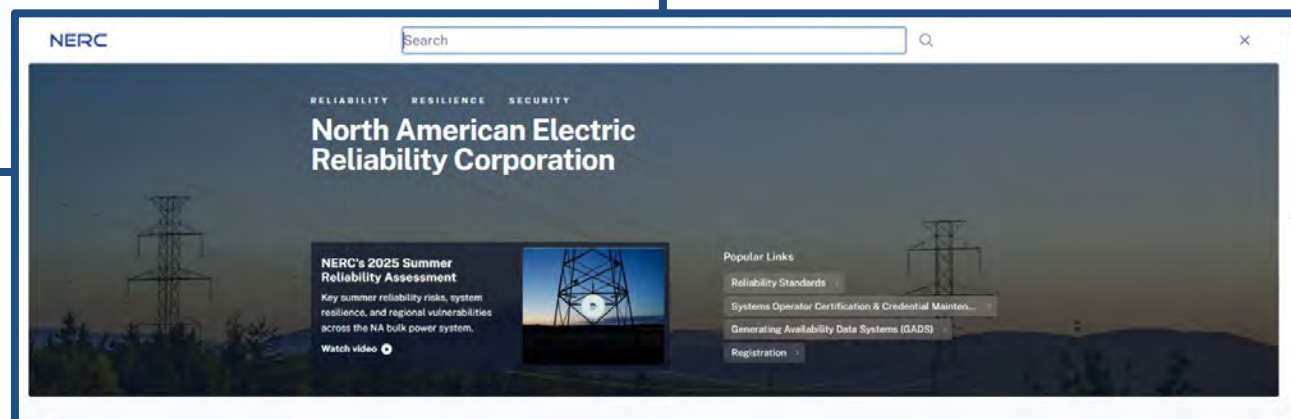


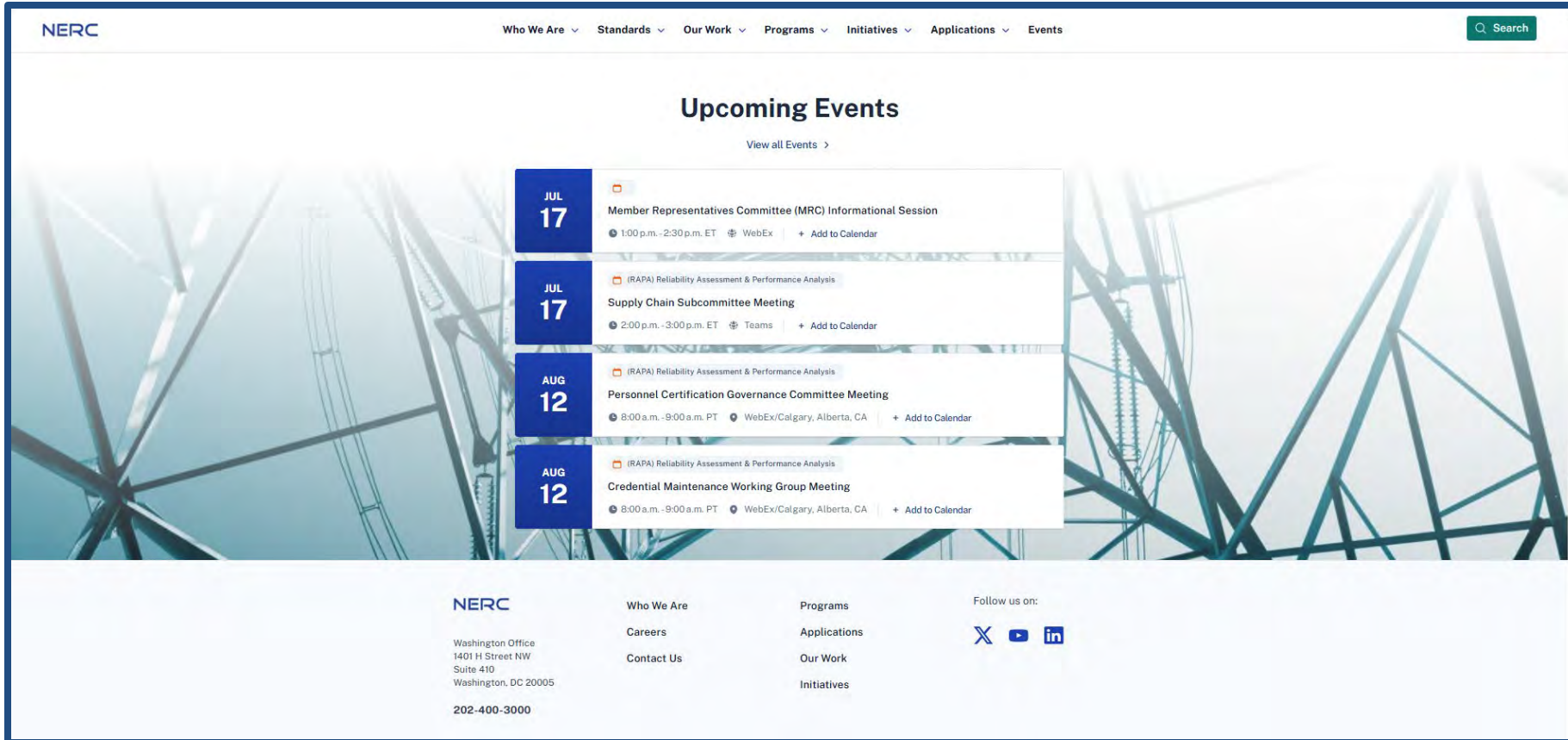
Run

Integrating New Technology
(e.g., artificial intelligence, logins,
fuzzy search, etc.)



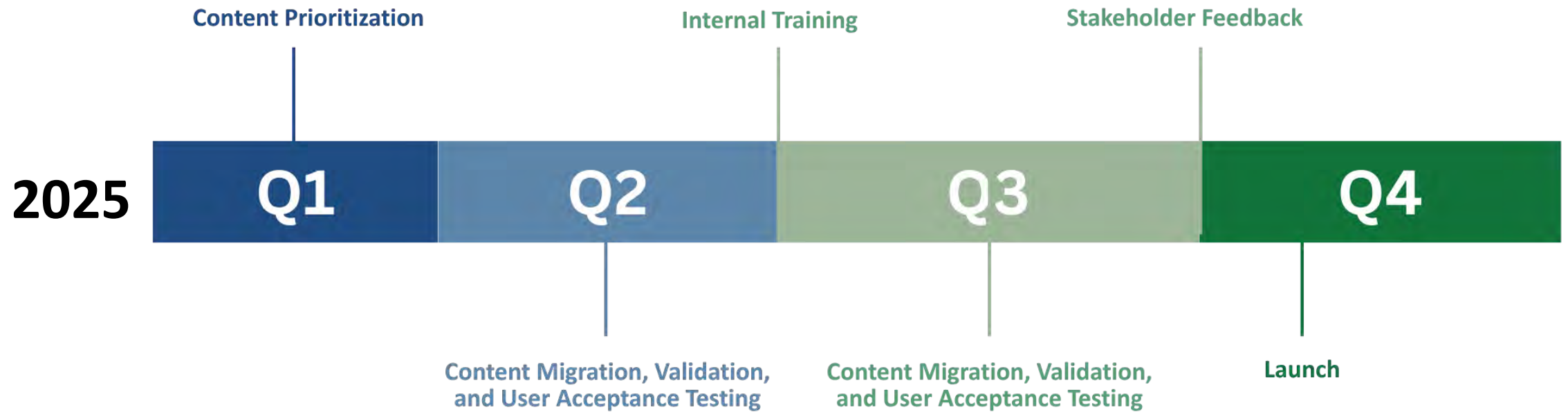
- Intuitive navigation
- Robust search functionality
- Streamlined, current documents
- Scalable view for cell phones and tablets





- Consolidated view of all events and meetings
- Filters by category, date, and format (e.g., in-person/virtual)
- Direct links to agendas, materials, and registration
- Add events to calendar







Questions and Answers

Reliability Issues Steering Committee Report

Action

Information

Summary

The Reliability Issues Steering Committee (RISC) convened the 2025 Reliability Leadership Summit on February 27, 2025, which served as a platform for dialogue among key stakeholders in the electric reliability sector. This prestigious event attracted over 100 influential leaders, including senior executives from leading energy companies, representatives from Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs), state utility regulators, prominent federal officials, and top leadership from the NERC along with various Regional Entities.

The Summit provided an invaluable opportunity for these stakeholders to collaborate, discuss critical challenges, and explore innovative solutions to enhance electric reliability. The insights and findings generated during the Summit are included in the RISC's biennial report for 2025, which aims to inform future initiatives and policies within industry.

In conjunction with the Summit, the RISC also participated in a joint meeting with both the Reliability and Security Technical Committee (RSTC) and the Standards Committee (SC). During this collaborative meeting, each committee chair took the opportunity to present their primary objectives, key work products, and potential avenues for inter-committee collaboration. The leadership of RISC shared its preliminary draft themes for the upcoming 2025 Risk Priorities Report and provided a detailed timeline for its anticipated release.

With the new administration now fully in place, the committee welcomed two new non-voting members: Kal Ayoub from the Federal Energy Regulatory Commission, representing the United States Federal Government, and Alec Warzin from Natural Resources Canada, representing the Canadian Federal Government. Both members have been appointed as per the membership slate approved by the Board of Trustees (Board) in February and will serve terms that expire on January 31, 2026. Their expertise is expected to enhance the committee's discussions and initiatives.

Future Activities

Looking ahead, the 2025 ERO Reliability Risk Priorities Report detailing the findings from the Summit will be presented to the Board for approval during the upcoming Board meeting in August. If the report receives acceptance, it will be published on the RISC website, allowing broader access to its findings and recommendations.

Additionally, an open joint meeting involving the RISC, RSTC, and SC is scheduled for September 15. This meeting aims to foster better alignment and collaboration regarding the work plan priorities across the committees, ensuring a unified approach to addressing the industry's challenges.

In November, the RISC plans to host an open meeting dedicated to discussing focus areas and strategic initiatives for 2026. This meeting will provide stakeholders with the opportunity to contribute their insights and shape the future direction of the Committee.

In addition, as part of its governance structure, the RISC will initiate the nomination process for At-Large seats that are set to expire on January 31, 2026. This process will allow for the inclusion of new perspectives and expertise in the Committee as it continues its important work in enhancing electric reliability across North America.

Reliability and Security Technical Committee Report

Action

Information

Reliability and Security Technical Committee (RSTC) Highlights

To enhance efficiency and ensure timely decision-making, the RSTC has implemented an interim conference call between its quarterly meetings to review and approve key items. This change allows for necessary approvals to move forward without waiting for the next scheduled meeting, providing added agility and flexibility in addressing risks.

On June 11, 2025, the RSTC, Reliability Issues Steering Committee (RISC), and Standards Committee (SC) conducted a joint meeting. During this meeting, a panel session was held with the chairs of each committee and NERC staff. Each committee chair presented their primary objectives, work products, and opportunities for collaboration. RISC leadership discussed the initial draft themes for the 2025 Risk Priorities Report, while RSTC leadership outlined how the committee prioritizes its work plan items. Additionally, SC leadership reviewed high-priority standards projects and explained how the SC monitors the progress of standard development.

The following are additional highlights from the June and July RSTC meetings:

RSTC Work Plan Priority Items Approved	
Work Plan Item	Group
Reliability Guideline: DER Forecasting and Relationship to BPS Studies	System Planning Impacts from Distributed Energy Resources Working Group (SPIDERWG)
White Paper: Case Study on Adoption of EMT Modeling and Studies in Interconnection and Planning Studies for BPS-connected IBRs	Electromagnetic Transient Modeling Working Group (EMTWG)
White Paper #1: Characteristics and Risks of Emerging Large Loads	Large Loads Task Force (LLTF)
2025 RSTC Work Plan Priorities: Items Under Development:	
Work Plan Priorities	Group
Motor Vehicle Electrification	Electric Vehicle Task Force (EVTF)
Inverter-Base Resources Studies and Commissioning	Inverter-Based Resource Performance Subcommittee (IRPS)
Large Load Gaps and Reliability Guideline	LLTF
Data Center Load Modeling and Technical Reference Document Update	Load Modeling Working Group (LMWG)
Energy Assessments	Reliability Assessment Subcommittee (RAS)
BAL-003 Standard Technical Assistance	Resources Subcommittee (RS)
Integrating Synchrophasors and Adding Oscillation Events to Reliability Coordinator Information System	Synchronized Measurement Working Group (SMWG)
DER Aggregation	SPIDERWG
Physical Security Guideline Update	Security Working Group (SWG)

Upcoming Activities

- 2025 ERO Risk Priorities Report Review and Annual Strategic Plan Update
- RSTC Chair and Vice Chair Nominations
- Annual Sunset Review of Working Groups and Task Forces
- Sector Nominations / Elections (October/November)
- At-large Nominations (December 2024) and slate selection (January 2025)
- FRAA Endorsement (review and endorse)
- Long-Term Reliability Assessment (review and comment period)
- Winter Reliability Assessment (review and comment period)

Standards Committee Report

Action Inform

Standards Committee (SC) Highlights

The SC is committed to effectively execute on the standards prioritization initiatives which has been demonstrated over the past several months. The extreme cold weather project (Project 2024-03 Revisions to EOP-012-2) Reliability Standard EOP-012-3 was adopted by the NERC Board on April 4, 2025, and filed with Federal Energy Regulatory Commission (FERC) on April 10, 2025. At the April 16, 2025, SC meeting, a new Canadian-Specific Revisions to EOP-012-3 Standard Authorization Request (SAR) was accepted and authorized for formal posting. The SAR seeks Canadian-specific revisions to the proposed EOP-012-3 Reliability Standard that would be designed to reflect the geographical differences that are present in Canada where peak demand typically occurs during winter months and where generating units are economically constrained to be suitable for winter operation and address differences in regulatory frameworks that make several of the FERC-directed changes in EOP-012 for the U.S. impractical to implement in the Canadian jurisdictions.

FERC Order 901 Milestone 3 projects are currently underway and have been very active with industry. FERC Order 901 Milestone 3 projects held two joint industry engagement workshops thus far in 2025. The first workshop was held in mid-January 2025 that focused on ensuring consistency and transparency across the related projects. All the FERC Order No. 901 Milestone 3 projects requested the use of waivers at the April SC meeting that allows the projects to post for shorter formal balloting periods. The objective of the second workshop focuses on industry comments from the initial ballots to bring forth potential solutions to the next iteration of the second ballot.

During the March 2025 meeting, the SC authorized the initial posting of the Generator Owner and Generator Operator definitions which subsequently passed its initial ballot. The final ballot of the definition concluded on July 14, 2025, and achieved an 85.98% approval. At that same meeting, a summary of self-assessment results was presented in conjunction with the Standards Committee Process Subcommittee (SCPS) kick-off of the Rule 321 Guidance Document Working Group, and the kickoff of the Project Scope Efficiencies group.

At the May 2025 meeting, the SC appointed three (3) supplemental candidates to Project 2020-06 Verifications of Models and Data for Generators as many of the original drafting team members rolled off due to increased workload from FERC Order No. 901. Additionally, the SC rejected the IBR Registration and Standards Applicability Glossary Update SAR assigned to Project 2024-01 Rules of Procedure Definitions Alignment Generator Owner and Generator Operator on the basis that the scope of the SAR was being addressed in other projects. Project 2021-03 CIP-002 was assigned a new SAR that seeks to centralize the identification of Protected Cyber Assets (PCA), Electronic Access Control or Monitoring Systems (EACMS), and Physical Access Control Systems (PACS) as "CIP applicable" systems in a single standard, which will bring clarity to industry and regulators alike.

During the June 2025 meeting, the SC rejected the CIP-002 Communications Protocol Converters SAR that was submitted from Project 2021-03 CIP-002 on the basis that the SAR did not clearly define the reliability risks to the BES and that the scope of work of the SAR does not meet the CIP-002, CIP-003, and CIP-005 requirements or purpose. Two low-priority projects received authorization to solicit supplement members. An update was provided on the Rule 321 Guidance Document development from the SCPS and on the progress Project Scope Efficiencies group.

The SC accepted the Internal Network Security Monitoring SAR at its July 2025 meeting. The scope of this SAR is to revise Reliability Standard CIP-015-1 and if necessary, create or revise NERC Glossary Terms and/or existing Reliability Standards to address the FERC Order No. 907 directive.

A special election was held from February through April 2025 for segment 2 and the vacant segment 8 seat from the 2025-2026 term election. Both segments were filled at the conclusion of the special election. Currently, a special election is being held for segment 6 and the SC has received two (2) nominations thus far.

Topics for Board of Trustees (Board) Feedback

In the SC's ongoing effort to determine opportunities for input to assist in meeting its strategic work plan and Charter obligations, the following are areas that the SC would welcome any feedback or guidance from the Board. For the August meeting, we would welcome any feedback from the Board on item number 1. Over future meetings we will seek feedback from the Board on the other areas but of course welcome feedback and guidance at any time.

1. Feedback on Current Initiatives and Priorities:
 - a. What is your assessment of our current approaches and methods in addressing FERC directives?
 - b. What is your assessment of our current initiatives and their alignment with NERC's overall strategic objectives?
2. Expectations for Future Initiatives:
 - a. What are your expectations for the SC in terms of supporting NERC's strategic goals over the next 3-5 years?
 - b. Are there emerging risks or challenges that you believe we should prioritize in our future work plans?
3. Collaboration and Communication:
 - a. How can we improve publicizing the solicitation for drafting team nominations to help encourage more robust industry participation? Observer participation?
 - b. How can we improve our communication and collaboration with the Board of Trustees to ensure alignment and transparency? Other Committees?

Collaboration Activities

The Standing Committees continue working to streamline risk framework and project prioritization efforts, largely through increased engagement and collaboration. The Reliability Issues Steering Committee, Reliability and Security Technical Committee, and the Standards Committee conducted a joint meeting in June 2025 to discuss an overview of each committee, the SAR development process, and future collaboration opportunities.

This Modernization of Standard Processes and Procedures (MSPP) Task Force efforts are currently underway, and the chairman of the SC provides consistent updates to the Committee. The MSPPTF will develop recommendations for the modernization of standards development processes and procedures and present them to the Board at its February 2026 meeting.

Upcoming Activities

- FERC Order 901 Milestone 3 Standards deadlines for November 2025
- FER Order 907 Internal Network Security Monitoring CIP-015-1 – deadline for September 1, 2026
- Completion of Remaining High Priority Projects

For additional information regarding the Committee and more detail on actions taken over the last two quarters, please visit our webpage for agendas and minutes: [SC Webpage](#)

Compliance and Certification Committee Board Report

Action

Information

Compliance and Certification Committee (CCC) Highlights

At its second quarter meeting, the CCC addressed two items highlighted below consistent with its 2025 CCC Work Plan to support the Electric Reliability Organization (ERO) effectiveness through focused discussions:

- The CCC held a comprehensive discussion to raise awareness and set expectations about the current and future use of compliance abeyance related to approved standards. The CCC is most interested in how abeyance is applied to the Compliance Monitoring and Enforcement Program (CMEP) and any impacts on compliance and enforcement activities. Subsequently, NERC staff communicated CCC feedback to Regional Entity staff and will inform future discussions surrounding abeyance.
- The CCC held a focused discussion assessing how stakeholders use NERC's CMEP and Organization Registration and Certification Program (ORCP) Reports and the CMEP Annual Implementation Plans. These documents provide useful information about NERC programs, and both the CCC and NERC assessed ways to enhance the value of the reports across the ERO Enterprise.

2024 Stakeholders Perception Report

As the CCC continues to complete its 2025 work plan and charter obligations, the CCC presented the 2024 Stakeholder Perceptions Report earlier in the open meeting for approval. The 2024 Stakeholder Perceptions Report provides NERC with an assessment of stakeholders' perceptions regarding the policies, programs, practices, and effectiveness of the NERC CMEP and ORCP.¹ In 2024, the Committee focused on Standards Prioritization and the Role of CMEP, Value and Use of Guidance Tools in Support of Agility and Reliability, Use of Compliance Monitoring Processes (Compliance Audits & Self-Reports), and Best Use of Align Capability/Secure Evidence Locker (SEL) Feedback.

The Program and comments generally illustrated positive trends in evaluations, indicating industry's view of continued enhancements to the ERO Enterprise programs, efficiency, and effectiveness. In addition, the CCC developed recommendations for the ERO Enterprise to consider in its efforts to continuously improve its programs. These recommendations are provided in the 2024 Stakeholder Perceptions Report, although the CCC collaborates with the ERO Enterprise throughout the year on feedback and recommendations throughout the year.

¹ The 2024 report is the fourth report provided by the CCC in this format since NERC's comprehensive Stakeholder Perception Surveys were eliminated in 2019. Topics are addressed at CCC meetings each quarter, covering a wide variety of issues related to programs under the purview of the CCC.

Collaboration Activities

The CCC and other Standing Committees continue to support the outreach efforts of NERC and the Board of Trustees (Board) associated with the work of the Modernization of Standards Processes and Procedures Task Force (MSPPTF). The Board established the MSPPTF in February 2025, with recommendations to be presented to the Board in February 2026. The Chair of the CCC along with the Chairs of the other Standing Committees have been asked to provide updates to committee members and other interested parties during their respective quarterly meetings.

The CCC also continues its work supporting the NERC Internal Audit team with several committee members serving as observers to the current audit of the CMEP and ORCP.

The CCC continues to look for productive approaches to bring industry perspectives to efforts by NERC to enhance the CMEP program.

Upcoming Activities

- Quarterly meeting, July 22-24, 2025 at the Canadian Energy Regulator offices in Calgary, Alberta. Included is a Focused Discussion regarding the use of Internal Controls.
- Development of 2026 Work Plan
- Q4 CCC Meeting
 - Industry Review of Align Tool
 - Self-Reporting Training Session
- 2026-28 Sector and At-large Nominations
- CCC Charter and Subcommittee Scope Review
- Annual review of appropriate process documentation
- CCC Observer participation in NERC Internal Audits of the Regional Entities (ROP Appendix 4A Audits)

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Stakeholders' Perception Feedback Report

Compliance and Certification Committee (CCC)

July 2025

RELIABILITY | RESILIENCE | SECURITY



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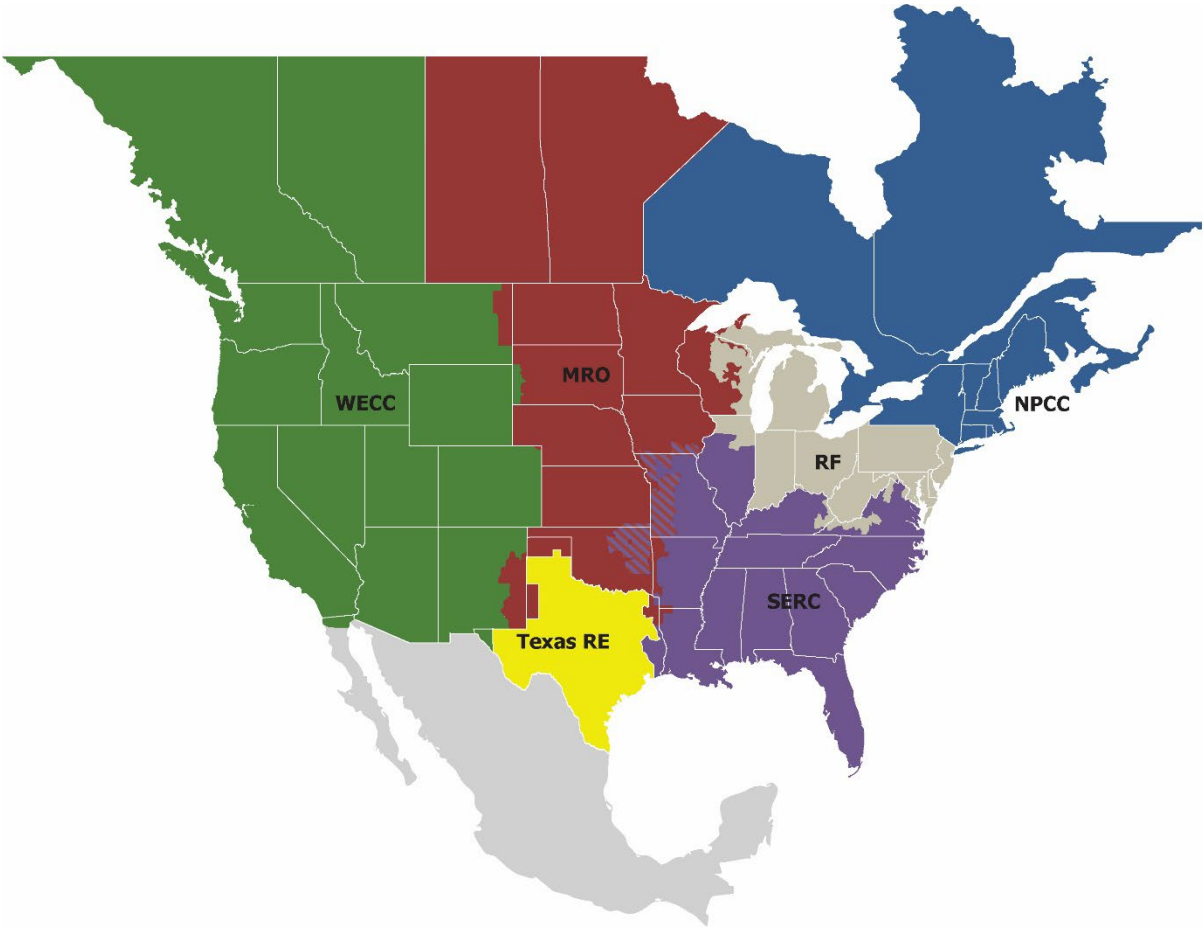
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Preface

Electricity is a key component of the fabric of modern society and the Electric Reliability Organization (ERO) Enterprise serves to strengthen that fabric. The vision for the ERO Enterprise, which is comprised of NERC and the six Regional Entities, is a highly reliable, resilient, and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

Reliability | Resilience | Security
Because nearly 400 million citizens in North America are counting on us

The North American BPS is made up of six Regional Entities as shown on the map and in the corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
Texas RE	Texas Reliability Entity
WECC	WECC

Executive Summary

In 2024, the Compliance and Certification Committee (CCC) conducted its Stakeholders' Perception Program ("Program") with a focus on topics identified as high-risk, high-impact, or undergoing significant change. Through structured quarterly engagement, the Program gathered meaningful insights into industry experiences, perceptions, and recommendations across a range of ERO Enterprise activities.

Overall, feedback from stakeholders reflected a positive trajectory—highlighting continued improvements in program effectiveness, operational efficiency, and transparency. The following summary outlines the key themes and recommendations that emerged throughout the year.

Quarter 1 Topic: Standards Prioritization and the Role of CMEP - Industry Experience Summary:

- Stakeholders emphasized the value of Small Group Advisory (SGA) sessions and Reliability Standards Audit Worksheets (RSAWs) in supporting implementation of new and revised Reliability Standards.
- NERC reinforced the SGA sessions' role as a critical outreach mechanism and expressed interest in expanding accessibility and participation.
- Feedback pointed to variation in how new Standards are interpreted and audited across Regions and a need for Regional Entity input in Standards development as well as transparency into Standards prioritization.
- Recommendations focus on increased Regional Entity involvement in Standards Development and SGAS, more consistent Standard interpretation and audit readiness, and greater clarity on how prioritization influences project timing and execution.

Quarter 2 Topic: Value and Use of Guidance Tools in Support of Agility and Reliability - Industry Experience Summary:

- Stakeholders provided input on guidelines and guidance documents that have been developed in support of reliability that are in the pre-compliance space. These include NERC Alerts, Reliability Guidelines, Security Guidelines, Technical Reference Documents, White Papers, and Lessons Learned.
- High stakeholder engagement confirmed the value of guidance documents when timely and specific, often prompting meaningful organization discussion.
- Guidance was used to inform internal improvements, reinforce best practices and identify enhancements beyond compliance.
- Areas for improvement included document discoverability, clarity of purpose and authority, and consistency in review and communication.
- Recommendations center on usability and transparency, with suggestions for clearer messaging, improved website structure and expanded use of practical examples.

Quarter 3 Topic: Use of Compliance Monitoring Processes (Compliance Audits & Self-Reports) – Industry Experience Summary:

- The shift to risk-based compliance monitoring yielded several benefits, including clear audit communication, more focused scopes and efficiency gains.
- Self-logging and self-reporting programs were seen as constructive when enabling early resolution of low-risk issues.
- Opportunities for improvement remain in standardizing the Inherent Risk Assessment (IRA) process, aligning Compliance Oversight Plans (COPs) and refining audit coordination.

- Recommendations include enhanced audit planning visibility, streamlined low-risk issue processing, and consistent program execution across the Regions.

Quarter 4 Topic: Best Use of Align’s Capability/Progress on Align/Security Evidence Locker (SEL) Fixes- Industry Experience Summary:

- Stakeholders valued Align’s centralized structure and task visibility through the dashboard.
- User guides, training materials, and outreach bulletins supported adoption and improved usability.
- As engagement with Align and SEL deepens, users flagged useability challenges, administrative burden and persistent security concerns.
- Feedback also highlighted issues across specific modules (e.g. the Audit, Self-Log and Technical Feasibility Exception (TFE)) and persistent limitations in SEL access and integration.
- Recommendations target improved notification and tracking, secure alternatives to SEL, and greater transparency through a published enhancement roadmap.

Looking Ahead - In 2025, the CCC will build on these insights by continuing to explore emerging risks and stakeholder experiences with the following planned quarterly engagement topics:

- Q1 - Use of Compliance Monitoring Processes - Self Certification
- Q2 - Compliance Monitoring and Enforcement (CMEP) and Organization Registration and Certification (ORCP) Reports
- Q3 - Internal Controls
- Q4 - Align/SEL and/or Registration-Related Issues

The CCC appreciates the opportunity to present this Stakeholders’ Perception Report, which captures diverse industry perspectives on ERO Enterprise programs within its chartered scope. The CCC remains committed to collaboration in identifying improvements and advancing initiatives that deliver value across the stakeholder community.

Introduction

In the capacity of a NERC Board of Trustees (Board)-appointed stakeholder committee serving and reporting directly to the NERC Board under a NERC Board-approved charter, as approved by FERC, and as set forth in the Rules of Procedure (ROP), the CCC will engage with, support, and advise the NERC Board and its Regulatory Oversight Committee (ROC) regarding all facets of the NERC CMEP, ORCP and the Reliability Standards development program in accordance with the NERC Rules of Procedure (ROP).

Included in the duties of the CCC, as described in the CCC Charter, is the responsibility to provide comments and recommendations to the NERC Board and its ROC, the Board's Enterprise-wide Risk Committee (EWRC), and NERC staff with respect to stakeholders' perceptions of the policies, programs, practices, and effectiveness of the CMEP and ORCP. The CCC Process and Procedure ("CCCPP")-008¹ describes the program and associated processes utilized by the CCC to fulfill this responsibility:

- As noted in the NERC Board approved CCC Charter, monitoring by the CCC is ongoing and does not preclude, interfere with, or replace, in whole or in part, the Board's responsibility to conduct and provide such reviews of these programs as required by FERC regulations, 18 C.F.R. § 39.3(c): "The Electric Reliability Organization shall submit an assessment of its performance three years from the date of certification by the Commission, and every five years thereafter."
- The CCC will provide NERC an assessment of stakeholders' perceptions regarding the policies, programs, practices, and effectiveness of the NERC CMEP and ORCP using the processes described below. Information received from these monitoring processes will be vetted by the CCC and shared with NERC Management, the EWRC, the Board, and the ROC.
- The CCC and NERC Staff will work in collaboration to assess stakeholders' perceptions on initiatives and/or issues related to policies, programs, practices, and effectiveness. This process may be included as part of the CCC's annual work plan, which is prepared by CCC leadership and approved by NERC's Board. Initiatives and/or issues to gauge stakeholders' perceptions may include, but may not be limited to, new standards development and implementation, outreach and education, CMEP tools, and/or initiatives linked to internal audit recommendations.

The program was designed to contribute observations and potential recommendations in support of ERO Enterprise success as follows:

- Lead efforts to develop a successor to the ERO Effectiveness Survey by soliciting input on objectives, content, and delivery of assessments of ERO effectiveness, without creating duplicative work for industry or the ERO Enterprise.
- Ensure that information gathered from industry provides insights that can be used to improve the efficiency and effectiveness of the CMEP.
- Evaluate results of assessments and provide recommendations for the ERO Enterprise and the Board.

As an additional consideration, the executions of the work plan can serve as a feedback loop for consideration in engagement planning for the collaborative efforts of the CCC and NERC Internal Audit. This is an important collaboration, which allows the CCC to help further inform Internal Audit as it prepares for and executes audits related to the NERC CMEP, Registration Program, and Certification Program.

¹ [CCCPP-008 Program for Monitoring Stakeholders' Perceptions](#)

In addition to those items noted above, the stakeholders' perception process serves as an input to assess and ensure the effectiveness of the ERO Enterprise programs as a contribution to the continuous improvement loop as described in the ERO Enterprise Framework to Address Known and Emerging Reliability and Security Risks ("Framework"). As an excerpt from the Framework describes, "The ERO's mission requires establishing a consistent framework to identify, prioritize, and address known and emerging reliability and security risks. The Framework to Address Known and Emerging Reliability and Security Risks identifies the policies, procedures, and programs developed by the ERO to support its mission and incorporates them into an iterative six-step risk management framework. The mitigation of risks to Bulk Electric System (BES) reliability and security are classified according to the likelihood of the risk occurring and the severity of its impact. The ERO's policies, procedures, and programs are mapped to target risk mitigation against severity and likelihood. Further, the associated Whitepaper reviews how resilience is an important component of reliability risk management. Finally, the whitepaper considers the application of ERO policies, procedures, and programs, within time required to apply the mitigation and the likelihood and severity".²

The CCC serves as one input to the Framework in support of the ERO ecosystem. Its role is to gather and provide input regarding a subset of the programs – referenced as critical – in support of the ERO mission and mitigation of risk to BPS reliability and security. The CCC continues to work with NERC Management and the NERC Standing Committee Coordination Group (SCCG) to formalize the processes between the NERC standing committees and ensure that all NERC committees represent a continuous improvement loop in support of reliability and security.

One of the tools that the CCC utilizes to close the continuous improvement loop in support of reliability and security is through focused discussions with the ERO Enterprise. This report contains stakeholders' perceptions and feedback from the focused discussions held in 2024. In several of the focused discussions, ERO Enterprise staff provided presentations and discussion materials to collaborate with framing the discussion and seeking feedback from the industry on specific aspects of the program. The CCC appreciates the partnership in these discussions and found great value in the information provided by the ERO Enterprise as a critical inject to the process to ensure the feedback is informed with facts and opportunities for robust dialogue.

The following quarterly summaries highlight the CCC's engagement efforts and the insights shared by industry participants throughout 2024.

² [Framework to Address Known and Emerging Reliability and Security Risks](#)

Chapter 1: Q1 Standards Prioritization and Role of CMEP

The goal of the discussion was to offer NERC and the Regional Entities an opportunity to present an overview of the CMEP's role in Standards Development and to provide industry feedback.

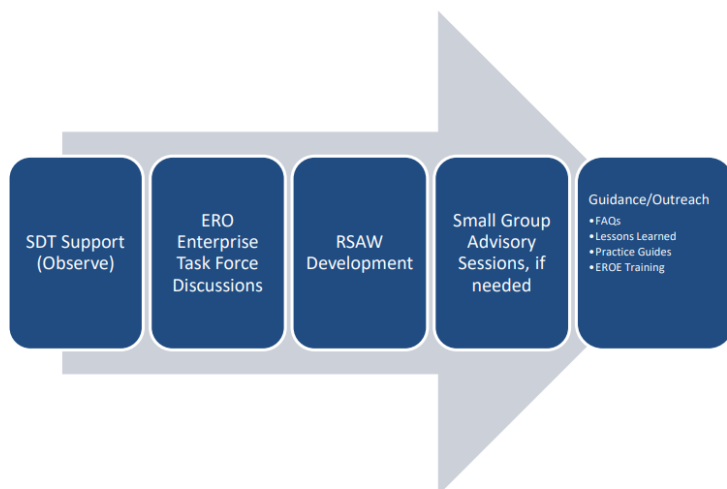
Background:

NERC Reliability Standards are developed using an industry-driven process ensuring they are open to all persons who are directly and materially affected by the reliability of the BPS; provides for reasonable notice and opportunity for comment; and enables the development of standards in a timely manner. NERC's standards development process is defined in the Standard Processes Manual.³

To help determine the impact of potential risk to BPS reliability, NERC uses a variety of feedback mechanisms, including, but not limited to, the ERO CMEP, RISC reports, Events Analysis (EA), as well as any published EA Lessons Learned. The Regional Entities also have feedback mechanisms in place to solicit comments from industry.

NERC Standards Projects have been increasing in quantity; coinciding with an increasing pace of technological changes in the industry. Additionally, many of these projects are identified as higher priority with strict timelines as they may be associated with FERC Order directives or NERC corporate goals. NERC and industry have been driving prioritization efforts to assure available resources are focused on the most critical issues through a formalized and consistent approach.

The process flow is illustrated below.



What follows highlights the salient contributions and reflections from the discussion.

Successes, Opportunities, and Recommendations

In support of the effective implementation of new and revised Reliability Standards, discussions focused on Standards prioritization, the role of Small Group Advisory Sessions, industry participation and the development and application of RSAWs NERC, the Regional Entities, and industry stakeholders reflected on their experiences and identified the following as valuable:

³ [NERC Standard Process Manual](#)

- Small Group Advisory Sessions were viewed as highly valuable, particularly for Standards with higher residual risk and an effective means of engagement.
- These sessions provided targeted implementation support and fostered interactive dialogue between CMEP staff and Registered Entities
- NERC affirmed the value of these sessions as an outreach tool and expressed interest in expanding awareness and participation.

While these efforts have supported stronger implementation outcomes, stakeholders identified additional opportunities to improve efficiency and refine future program execution:

- **Regional Entity Feedback in Standards Development:** Stakeholders noted that Regional Entities are not consistently engaged in the development of new or modified Reliability Standards, which may limit visibility into the region-specific risk perspectives.
 - **Recommendation:** Encourage Regional Entity participation in the Standards development process to ensure those perspectives are captured and inform more comprehensive outcomes.
- **Audit Alignment for New Standards:** Inconsistent Regional Entity involvement in SGA sessions may contribute to variability in audit approaches when new or revised Standards take effect.
 - **Recommendation:** Promote broader Regional Entity participation in SGA sessions. Increase awareness, offer alternate session formats (e.g., group settings vs. one-on-one), and prioritize building trust.
- **RSAW Availability and Relevance:** Industry continues to rely on RSAWs to understand expectations for evidence and controls via the Compliance Assessment Approach section. As well, they are tools for entities to gather and refine their information prior to entering into Align during a Compliance Audit. However, with the emergence of the CIP Evidence Request Tool (ERT), there may be opportunities to streamline RSAWs for CIP Standards.
 - **Recommendation:** Assess potential retirement of CIP-related RSAWs that may be redundant with ERT requests. Retain RSAWs for O&P Standards, where no comparable tool exists.
- **Standards Prioritization Transparency:** Although stakeholders appreciate Standards being ranked by priority, they observed that this designation has not led to tangible scheduling adjustments in the development timeline.
 - **Recommendation:** Clarify how prioritization influences the sequencing and scheduling of Standards development. Consider deferring medium- and lower-priority work to concentrate resources and attention on high-priority Standards.

Chapter 2: Q2 Value and Use of Guidance Tools in Support of Agility and Reliability

The goal of the discussion was to provide industry feedback on the use of guidance tools that support a reliable and secure bulk power system.

Background:

There are several types of guidelines and guidance documents that have been developed in support of reliability that are in the pre-compliance space. They may address an emerging issue or reliability concern that is not fully realized to the point of being addressed by a reliability standard. These types of guidelines and guidance documents are separate and apart from CMEP guidance and formal reliability standards. Review and incorporation of key concepts from these guidelines and guidance documents into industry practices may provide confidence that reliability risks are being mitigated without the need for a formal reliability standard or are being addressed during the reliability standard development cycle. There is also guidance or engineering / security frameworks, principles and standards that are developed by other organizations – IEEE, NIST, EPRI, etc.

Examples of these types of documents that are included in the NERC Ecosystem include NERC Alerts, Reliability Guidelines, Security Guidelines, Technical Reference Documents, White Papers, and Lessons Learned. NERC Alerts are developed by NERC and distributed to industry stakeholders when NERC discovers, identifies, or is provided with information that is critical to ensuring the reliability of the bulk power system. The Reliability Standards Technical Committee (RSTC) develops Reliability Guidelines, Security Guidelines, Technical Reference Documents, and White Papers to share key practices and information on specific issues critical to promote and maintain a highly reliable and secure bulk power system. Lessons Learned documents, developed collaboratively between NERC, Regional Entities, and registered entities, are a resource enabling industry to identify problems, find solutions and document processes.

What follows highlights the salient contributions and reflections from the discussion.

Successes, Opportunities and Recommendations

There was demonstrated strong engagement in disseminating the guidance documentation, underscoring the value, particularly when the guidance is timely and specific, prompting meaningful organizational discussion. The documents have been used to:

- Drive internal improvements
- Inform or reinforce best practices
- Provide ideas for enhancements that extend beyond compliance.

Given the volume and varying approaches to the development, dissemination, and use of guidance materials, several areas were identified for improvement.

- **Information overload resulting from email-based distribution**
 - **Recommendation:** Explore opportunities to streamline communication of guidance materials. Consider options such as including in the weekly Standards, Compliance, and Enforcement Bulletin.
- **Limited discoverability and navigability of documents on the NERC website**
 - **Recommendation:** Improve access by organizing documents by topic rather than committee, enhancing searchability, and linking related materials where applicable. As well, incorporating into the NERC One Stop Shops on the Standards and Compliance pages would start to tie all the related information together.
- **Need for clarity regarding non-binding nature of guidance**

- **Recommendation:** Include consistent language noting the voluntary nature of guidance, particularly in contexts such as CMEP engagements.
- **Lack of transparency in the development and review process**
 - **Recommendation:** Clearly define and document the process used to develop and periodically review guidance documents. Clarify how long documents remain valid and under what criteria they are retired or revised.
- **Absence of metrics to evaluate usage and impact**
 - **Recommendation:** Develop measurable objectives and implement mechanisms to track utilization, ensuring ongoing relevance and value.
- **Desire for practical examples to support implementation**
 - **Recommendation:** Where guidance has incorporated illustrative examples is very useful and utilizing this in more of the guidance would enhance applicability and stakeholder understanding.

Chapter 3: Q3 Use of Compliance Monitoring Processes (Compliance Audits & Self-Reports)

The goal of the discussion was to provide industry feedback on experiences with NERC Compliance Monitoring and Enforcement Program (“CMEP”) processes, specifically Compliance Audits and Self-Reports.

Background:

The CMEP is used by NERC and the Regional Entities to monitor, assess, and enforce compliance with Reliability Standards within the United States. The CMEP is documented in NERC Rules of Procedure Appendix 4C and is implemented in Canada and Mexico consistent with laws and agreements in effect with Applicable Governmental Authorities.

The CMEP consists of the following compliance monitoring processes: Compliance audits, Self-Certifications, Spot Checks, Compliance Investigations, Self-Reports, Self-Logging, Periodic Data Submittals, Complaints, Preliminary Screen.

With the shift to risk-based activities, industry has observed a significant change in the way these processes are conducted.

Compliance Audits

NERC and the Regional Entities perform risk-based Compliance Audits as required by the NERC ROP and based on criteria established by NERC. All Registered Entities are on a risk-based audit schedule. Entities registered as Reliability Coordinators, Balancing Authorities, and Transmission Operators are on a minimum three-year audit schedule but may be engaged with more often. Additionally, NERC and the Regional Entities may initiate an unscheduled Compliance Audit of any registered entity at any time. The Regional Entities determine the scope of the Compliance Audit through risk-based processes, including Inherent Risk Assessments (IRAs), internal controls, and other inputs.

Self-Reports

Self-Reports are encouraged at the time a registered entity becomes aware that it has, or may have, violated a Reliability Standard. A Self-Report will include a risk assessment of the noncompliance, a description of the extent of the noncompliance, the cause of the noncompliance, and the actions that have been taken or will be taken to mitigate the noncompliance, including preventing recurrence.

What follows highlights the salient contributions and reflections from the discussion.

Successes, Opportunities and Recommendations

In response to the shift toward risk-based compliance monitoring processes, the industry stakeholders reflected on their experiences, highlighting areas where this transition has delivered value:

For Compliance Audits:

- Improved clarity of expectations, with some regions providing frequent status updates throughout the audit process.
- Clearer direction and coordination from Regional Entities in certain jurisdictions.
- Strengthened engagement and communication between Registered Entities and Regional Audit Teams.
- Narrowed audit scopes, attributed in part to effective application of the IRAs in some regions

For Self-Reports:

- Positive feedback on participation in the self-logging program.
- Noted consistency gains from the use of the Align tool.

Compliance Exceptions:

- Many stakeholders noted that Compliance Exceptions effectively addressed low-risk issues early, helping to resolve minor concerns expediently.

While the transition to risk-based compliance monitoring has produced positive outcomes, stakeholders identified several areas where greater consistency, efficiency, and transparency could strengthen implementation.

- **Inherent Risk Assessment (IRA) Process:** Timing and execution of IRAs vary across and within Regional Entities, and the results are not consistently documented or clearly linked to audit scopes.
 - **Recommendation:** Define a consistent, timely approach for conducting and communicating IRA and COP results. Increase transparency by documenting the methodologies and criteria used in the IRA process.
- **Audit Coordination and Engagement Fatigue:** Some Registered Entities cited repeated audits over short timeframes, contributing to resource strain.
 - **Recommendation:** Leverage alternative oversight methods, such as self-certifications, to reduce audit frequency and associated burden on both Regional Entities and Registered Entities.
- **COP Timing and Alignment:** Stakeholders noted variability in COP frequency and timing across and within regions, with limited linkage between risk profiles and audit scope.
 - **Recommendation:** Explore opportunities to better align audit scope with COPs and provide greater visibility into Regional Entity risk prioritization to support more strategic compliance planning.
- **Self-Report Processing and Efficiency:** Processing times vary widely; with some reports remaining unresolved for extended periods and limited communication throughout.
 - **Recommendation:** Improve efficiency by assessing the value of addressing older, low-risk violations. Consider developing an expedited path, similar to the self-logging program, for inherently low-risk, common violations with established mitigation approaches.
- **Self-Logging Program Consistency:** Participation criteria and administrative requirements vary by region; in some cases, effort levels match or exceed those of full Self-Reports.
 - **Recommendation:** Review regional program requirements to identify opportunities for greater consistency and reduced administrative burden for participants.⁴

⁴ Enforcement has implemented a process across the ERO Enterprise which provides consistency.

Chapter 4: Q4 Best Use of Align’s Capability/Progress on Align/SEL Fixes

The goal of the discussion was to provide industry feedback to the NERC Align team related to the operations of the Align Tool and the SEL.

Background:

Three CCC representatives currently participate in the Align Users Group, a stakeholder group that meets monthly to provide timely input to the Align team regarding issues with the use of the Align/SEL tool.

In recent years, the CCC has used its Quarter 4 focused discussion format to engage industry stakeholders in gathering feedback on Align/SEL tool functionality, user experience, and opportunities for enhancement. These discussions have served as a key outreach mechanism, informing CCC insights with firsthand industry perspectives.

For Quarter 4, the CCC asked industry to take a deeper look at specific Align modules (of particular interest to the Align team), and to share observations on the effectiveness of outreach and support efforts by both the Align team and the broader ERO Enterprise.

The following summary captures the key themes, reflections, and input shared during that discussion.

Successes, Opportunities, and Recommendations

As Align and SEL continue to evolve, industry stakeholders reflected on their day-to-day experiences with the tools, noting areas where functionality and support have delivered meaningful value:

- The centralized nature of the Align system, covering all registrations and all Regions (with varying adoption across Canada), has improved visibility and usability through features such as a consolidated dashboard of upcoming due dates.
- Align user guides and training videos were widely regarded as helpful and easy to navigate, with timely updates appreciated by participants.
- Regular outreach bulletins have contributed to better awareness and have supported ongoing tool adoption.

As industry becomes more familiar with existing modules and new ones are released, opportunities remain to enhance useability and performance. Several recurring themes have emerged where targeted improvements could strengthen overall functionality and user experience.

- **Data Security:** Many Registered Entities remain concerned about the security of sensitive information entered into Align and SEL. Given that entities do not control the system, there is hesitation to input their most critical data, especially under the belief that they would remain accountable in the event of a breach, not NERC.
- **Administrative Burden:** Registered Entities have reported increased effort and time required to submit information or respond to Requests for Information (RFI) within Align. For audits and self-certifications, the administrative load is estimated to be two to three times higher than under prior systems. Specific challenges include:
 - The inability to print submitted forms (e.g. Audit working papers) and
 - the absence of exportable form templates, which complicates and burdens Registered Entity record-keeping.

- **Status Transparency and Notifications:** While the Align dashboard is generally helpful, it does not display all open or upcoming tasks, such as Periodic Data Submittals, along with their due dates. System notifications also lack detail, often requiring users to log in to determine which standard or activity, the notification pertains to.

Themes related to specific modules include:

- **Audit Module:** The field design limits the ability to clearly convey the compliance narrative. Formatting from source documents is not preserved, narrative entry is restricted to the requirement level (not allowing for sub-requirements), and evidence tables are difficult to navigate and populate.
- **Mitigation Plan Module:** User experience could be improved by enabling hyperlinking between mitigation plans and their associated self-reports or audit finding, and vice-versa. Additionally, there is no visibility into the status of milestone extension requests, and no confirmation is sent upon submission.⁵
- **Self-Log Module:** The intended efficiency benefits of the self-logging program have yet to be fully realized. Entities noted that evidence expectations and processing times remain largely comparable to those of standard self-reports.
- **Technical Feasibility Exception (TFE) Module:** Updating TFEs for material changes requires submission of an entirely new TFE, which is viewed as unnecessarily time-intensive and duplicative.

Secure Evidence Locker (SEL): Stakeholders noted several limitations related to SEL access, functionality, and integration that continue to impact user confidence and efficiency.

- Visibility into uploaded files is limited, by design, Registered Entities cannot confirm which files have been successfully submitted, making validation difficult.
- Uploads are frequently disrupted due to session timeouts, and larger files often fail to upload despite meeting the published size threshold.
- There is no direct link to the SEL from either the NERC website or within Align; instead users must manually copy and paste the SEL URL into a browser.
- SEL functionality remains constrained, for example, CIP ERT submissions cannot be modified by auditors to select samples, reducing efficiency.
- Notifications are not generated when new evidence is uploaded, limiting Regional awareness and delaying response or follow-up.

⁵ Release 7.4 will include enhancements related to extension requests and status, as well as notifications upon submission of a mitigation to a Region and upon submission of an extension request to a Region.

Recommendations:

- Continue to prioritize and implement enhancements to Align and the SEL that reduce unnecessary administrative burden on Registered Entities. Focus areas include improving task navigation, expanding form functionality (e.g. printability, exportable templates⁶), and streamlining evidence submission processes.
- Sustain efforts to identify and offer secure alternatives to the NERC hosted SEL, particularly for Registered Entities concerned about data ownership and liability in the event of a breach.
- Expand outreach efforts by publishing a high-level enhancement roadmap or summary of upcoming Align/SEL fixes and feature additions. Include projected timelines where feasible to improve transparency and stakeholder planning.

⁶ On the NERC website [Enforcement and Mitigation page](#), there is an Align template for the Self-Report and Self-Log form that can be downloaded by an entity.

Chapter 5: Conclusion

Industry feedback across the CCC's quarterly engagement activities reflected both appreciation for recent progress and thoughtful input on where further improvements could enhance the efficiency, clarity, and effectiveness of ERO Enterprise programs. This report summarizes those insights—identifying strengths, surfacing recurring challenges, and offering constructive recommendations.

In the spirit of collaboration and in continued support of the ERO Enterprise's success, the CCC respectfully submits the following observations:

Quarter 1 Topic: Standards Prioritization and the Role of CMEP - Industry Experience Summary:

- The growing maturity of implementation tools and advisory engagements like Small Group Advisory sessions reflects a strong foundation for effective rollout of new Standards. Yet, stakeholder input revealed opportunities to deepen coordination, clarify the meaning and use of prioritization, and better capture Regional perspectives during the Standards development lifecycle. Continued emphasis on collaboration and transparency will help translate prioritization frameworks and implementation support into improved consistency and outcomes.

Quarter 2 Topic: Value and Use of Guidance Tools in Support of Agility and Reliability - Industry Experience Summary:

- Industry's response to the evolving suite of guidance tools reflects a clear desire for accessible, timely, and practical resources that support reliability and continuous improvement in the pre-compliance space. Stakeholders' insights in this quarter underscore the critical role that communications strategy and document design play in maximizing the impact of guidance materials. Continued attention to usability, discoverability, and clear articulation of intent will be central to realizing the full benefit of these tools across the ERO Enterprise.

Quarter 3 Topic: Use of Compliance Monitoring Processes (Compliance Audits & Self-Reports) – Industry Experience Summary:

- The shift to risk-based compliance monitoring continues to show promise, particularly in its ability to target oversight where it matters most. At the same time, this quarter's feedback pointed to persistent variation across Regions in execution and communication practices. Realizing the full benefits of the risk-based model will require ongoing refinement of methodologies, greater transparency, and a shared understanding of expectations, both within and across Regions.

Quarter 4 Topic: Best Use of Align's Capability/Progress on Align/SEL Fixes:

- The ongoing evolution of Align and the Secure Evidence Locker reflects both a commitment to improving compliance tools and the complexity inherent in delivering a system that serves a diverse set of stakeholders. Industry's detailed feedback, gathered through the quarterly discussion, highlights meaningful progress, while also identifying tangible opportunities to reduce administrative burden, strengthen user confidence, and enhance overall system usability. Continued collaboration across the ERO Enterprise will be essential to ensure the Align platform continues to mature in a way that supports effective, risk-informed compliance oversight.

Looking ahead, the CCC intends to build on the themes and insights surfaced throughout this year's engagement activities. In 2025, stakeholder perception efforts will focus on deepening understanding of evolving reliability risks and exploring the application and effectiveness of additional compliance monitoring processes. The following quarterly topics are planned to continue advancing meaningful dialogue and collaboration across the ERO Enterprise.

- Q1 - Use of Compliance Monitoring Processes - Self Certification

- Q2 - CMEP and ORCP Reports
- Q3 - Internal Controls
- Q4 - Align/SEL and/or Registration-Related Issues

The CCC appreciates the opportunity to provide a Stakeholders' Perception Report related to the ERO Enterprise execution of the programs associated with the CCC's chartered scope of work. The report summarizes a diverse and wide area view of industry's perceptions and recommendations. There is a recognition of many areas of improvement and many areas of opportunity. The CCC looks forward to continued partnership with and support of the ERO Enterprise's success. The CCC values the opportunity to collaborate on solutions or improvements to the opportunities relative to the programs and processes that will bring value for all stakeholders.

It should be noted that while the Stakeholders' Perception Report is the culmination of industry engagement and feedback, it is intended to memorialize the discussions each year but does not suggest that subsequent actions to address issues wait for publication of this document. The CCC works throughout the year to foster collaboration with the ERO Enterprise and considers strategies that address areas of improvement as they are identified. It is our understanding that ERO Enterprise Staff incorporates many of the findings addressed in this report into internal conversations, well before the publication of this report. The following are some of the strategies which allow the CCC to continually improve:

- Communication and participation with industry groups, with a focused plan for coordination,
- Identify and participate in risk-based compliance assurance outreach, such as internal controls, and feedback discussions,
- Evaluate results and input on stakeholders' perceptions and work with NERC management on proposed resolutions,
- Participate on Align Users Group (CCC Chair, CCC Vice Chair, CCCEC Representative),
- Identify industry stakeholder groups where CCC collaboration will strengthen ERO process and approach,
- Participate in industry outreach as requested with ERO personnel on designated ERO topics.

Appendix A: 2024 Stakeholder Feedback Questions

2024 Focused Discussion Questions

1st Quarter Topic: Standards Prioritization and the Role of CMEP

- The engagement format did not incorporate pre-formulated questions.

2nd Quarter Topic: Value and Use of Guidance Tools in Support of Agility and Reliability

- How and when does your entity utilize NERC Alerts, Reliability Guidelines, Security Guidelines, Technical Reference Documents, White Papers, or Lessons Learned or other similar guidance documents?
- What considerations go into your entity's decision to utilize the guidance tools?
- Are there any issues or challenges preventing your entity from utilizing the guidance tools?
- What could NERC do to improve or increase your entity's use of the guidance tools?
- Do you have any insights, tips, or tricks in the utilization of these or other guidance tools that may be helpful to other entities?
- What does your entity find helpful about the guidance?
- How does your entity and how should industry as a whole interpret effectiveness for guidance tools?
- How can effectiveness of the guidance tools be measured industry-wide

3rd Quarter Topic: Use of Compliance Monitoring Processes

- **Compliance Audits**
 - Risk Assessments
 - Timing – are risk assessments done ahead of the audit, after or another time? What are registered entities recommending for a preferred timing?
 - Approach – are risk assessments conducted in a similar manner from assessment to assessment? If not, what are some of the differences?
 - Benefits realized:
 - Are risk assessments focusing audit scope and if so, do registered entities anticipate this to continue for future audits?
 - Is the effort to complete a risk assessment commensurate with the benefits realized from a Registered Entity perspective?
 - Are registered entities seeing consistency within the Regional Entity and/or across the Regional Entities in their approach to risk assessments and if not, what are some of the inconsistencies?
 - What would be one thing registered entities would recommend to improve the risk assessment process?
 - What positive observations do registered entities have regarding the NERC/Regional Entity treatment of Registered Entities during the Compliance Audit process?
- **Self-Reports**
 - It seems a common theme that processing of reported potential non-compliances (submittal to disposition) can take a long time.

- Are there certain points along the processing that Registered Entities are seeing take more time?
- What could the Regional Entities/NERC do to improve the processing time?
- What is something observed in another Regulatory space that improved processing time?
- Are registered entities seeing consistency within the Regional Entity and/or across the Regional Entities in the self-reporting process (including guidance, expectations, etc.) and if not, what are some of the inconsistencies?
- What do registered entities see as the most valuable aspects of self-reporting for their entity? For the industry?

4th Quarter Topic: Best Use of Align’s Capability/Progress on Align/SEL Fixes

General Impressions

- What aspect of using Align/SEL have you liked and/or is useful?
- What area of Align/SEL has been challenging?
- Have you observed that the use of the Align tool has increased consistency with how the Regions are administering the CMEP?
- Have registered entities experienced increased productivity in their interactions with the CMEP process?
- For Registered Entities registered in multiple regions, what improvements could be made in Align for Coordinated Oversight?

SEL

- Does your company use the SEL?
 - If not, is this due to security risks or other concerns?
 - If yes, have the recent SEL enhancements improved your experience with the tool?
- As an industry representative, is there a perception that there are security risks with SEL?

Modules within Align

- Self Reports/Self-Logging
 - What is one feature that brings efficiency?
 - What is one item that if fixed, would make your life easier?
- Mitigation Plans
 - What is one feature that brings efficiency?
 - What is one item that if fixed, would make your life easier?
 - For noncompliance and mitigation, do you understand the workflows for the noncompliance and mitigation issues? The Align system has diagrams for both processes in the modules. How can these diagrams be more useful?
- Periodic Data Submittals
 - What is one feature that brings efficiency?
 - What is one item that if fixed, would make your life easier?

- Self-Certification
 - What is one feature that brings efficiency?
 - What is one item that if fixed, would make your life easier?
- My Align Dashboard
 - What is one feature that brings efficiency?
 - What is one item that if fixed, would make your life easier?

Align Notifications/Data

- How could e-mail notifications triggered from the Align system and information on the My Align dashboard be improved for registered entity experience?
- Are there any specific e-mail notifications triggered from the Align system that are missing or content that would be helpful to include in future updates?
- What challenges, if any, have you experienced or continue to experience with data handling and uploading of documents, whether for Audits, Requests for Information, Self-Certifications, etc.?

Align Maintenance

- Are you aware of what changes were made in the past year? If so, what mechanisms did you use to become aware?
- Are you finding the Release Notes informative? If not, what improvements would you recommend?
- Are you aware of what is on the development radar and timing? If so, how have you received this information?
- Have you submitted tickets for issues or enhancement suggestions?
 - If you submitted an enhancement suggestion, what method did you use?
 - Did you receive communication with information on when the ticket would be addressed?
 - Did you experience a timely turn around on issues that you'd raised?
 - Are there areas that could be further improved for the support ticket process?
- What is one improvement made in the past year that has made your life easier?

Training

- Have you utilized the training materials on the Align/SEL NERC page for learning/training? If so, do you rely on the user guides, the training videos, or both?
- In what areas would you like updated training?
- For noncompliance and mitigation, there is a planned refresher training for registered entities this fall.
 - Are there any specific areas that should be included in the training?
 - What methods to communicate this planned training would you find effective?
- Align User Guides have been updated and published recently (May 2024 through present, with more upcoming) for the IRA and Compliance Oversight Plan and Noncompliance and Mitigation.
 - Were you aware of the updated guides?

- Have you reviewed the updated guides? If so, are there any suggestions for future updates or better clarification?

Outreach

- Have communications improved with the Align and SEL website and the additional notices within the weekly Standards and Compliance Bulletin?
- What information do you find most useful on the Align and SEL webpage?
- What communication channels would be effective in providing updates on project-related developments? Are there areas that are missing in communications to registered entities?

Personnel Certification Governance Committee Report

Action

Information

Background

Personnel Certification Governance Committee (PCGC) Role

The NERC PCGC is the governing body that establishes policies, sets fees, and monitors the performance of the System Operator Certification Program, and ensures that the program is financially independent.

Two working groups report to the PCGC

- The **Credential Maintenance Working Group (CMWG)** oversees the development and implementation of Credential Maintenance Program (CMP) requirements. This includes approving credential maintenance providers and structured learning activities, as well as auditing those providers and learning activities.
- The **Exam Working Group (EWG)** is responsible for developing and maintaining the NERC System Operator Certification Program exams under the general guidelines of the PCGC and in collaboration with the exam delivery and development vendor's psychometricians.

The System Operator Certification Program was established to ensure system operators demonstrate minimum knowledge and skills necessary to perform real-time operations of the Bulk Electric System. The program provides the framework for operators to obtain initial certification and maintain credentials through continuing education.

Certification is only the first step toward becoming a qualified system operator. Company-specific training, and task verification, conducted by the operator's employer, are required before an individual may perform operations independently.

Currently, only system operators who perform reliability-related tasks for a Reliability Coordinator (RC), Transmission Operator (TOP), or Balancing Authority (BA) are required to be certified under *NERC Reliability Standard PER-003-2 Operating Personnel Credentials*.¹

Summary

2025 Work Plan Update

As of mid-2025, the PCGC and its working groups have completed several milestones and are progressing on multi-year initiatives scheduled through 2026. Their efforts remain focused on advancing strategic enhancements to the credentialing and credential maintenance programs.

Key accomplishments include

- **Exam Development and Delivery Vendor Transition**

¹ <https://www.nerc.com/pa/Stand/Reliability%20Standards/PER-003-2.pdf>

- NERC successfully transitioned to a new vendor for certification exam administration in March 2025. The PCGC and EWG are currently working with exam development consultants and industry volunteers to complete an updated Job Task Analysis. This is one of the first steps required to support the move to a single credential.
- **System Operator Certification and Continuing Education Database (SOCCED)**
 - PCGC and CMWG Leadership, along with NERC Staff, have been meeting with the new SOCCED vendor to review current program business rules. This effort ensures the rules are not only aligned with how the program currently functions, but also scalable to support future changes in credential types and maintenance requirements. The new SOCCED system is currently scheduled for implementation in Q4 2026.
- **Industry Engagement**
 - Given the SOCCED platform's implementation timeline, development of a Standards Authorization Request (SAR) to revise PER-003-2 will likely begin in early 2026. The SAR is intended to facilitate the transition to a single credential and align the certification framework with updated system capabilities and program goals. This adjusted timeline allows NERC, the PCGC, and the CMWG to finalize supporting business rules ahead of SAR submission.

To prepare stakeholders for these upcoming changes, the PCGC—through its working groups—will begin developing a communication and change management plan targeting key stakeholders across industry and regulatory communities. This effort will begin in late 2025 and continue into early 2026. The goal is to foster awareness, promote readiness, and reinforce the value of a more unified future-ready certification model.

2025 Work Plan Priorities Mid-Year Update

Action

Information

Background

In support of the ERO Enterprise's mission to assure the effective and efficient reduction of risks to the reliability and security of the grid, NERC developed a three-year plan for 2023–2025 to focus on investments where the ERO can most influence change. The plan is centered on four strategic areas of focus—Energy, Security, Agility, and Sustainability—and is supported by the investments outlined in each year's annual business plan and budget (BP&B). NERC's 2025 BP&B was approved by the Board of Trustees (Board) in August 2024.

NERC is committed to reporting on the value and progress of the activities associated with its investments through its annual Work Plan Priorities (WPPs), which are NERC's highest priority items in support of the strategic areas of focus. The [2025 WPPs](#) were approved by the Board in December 2024 and are NERC's goalpost for executing Year 3 of the 2023–2025 plan. Reporting on the WPPs is integrated into reports and presentations to the Board and its committees throughout the year, and leadership provides a mid- and end-of-year update to the Board on status, challenges, and accomplishments.

Summary

For the mid-year update on the 2025 WPPs, NERC is pleased to report that all 10 WPP items are on track to be achieved by year-end. Attached is an informational overview of the expected outcomes and value the 2025 WPPs bring to further NERC's mission and promote a sustainable and secure organization.

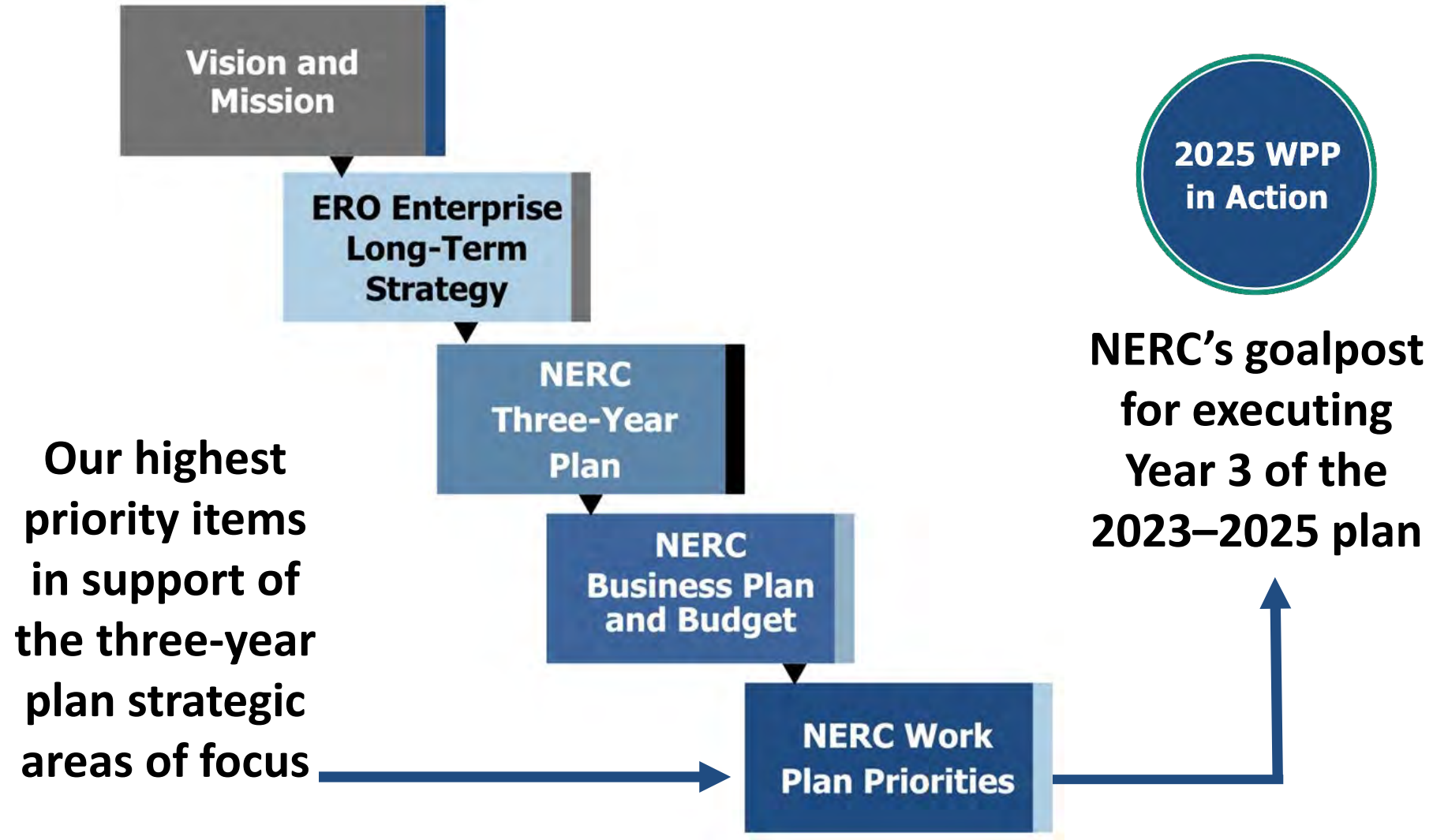
The NERC logo consists of the letters "NERC" in a bold, black, sans-serif font. Below the letters is a horizontal blue bar with a white diagonal line running from the bottom-left to the top-right.

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

2025 Work Plan Priorities Mid-Year Update

Board of Trustees Open Meeting
August 14, 2025

RELIABILITY | RESILIENCE | SECURITY





Work Plan Priority #1

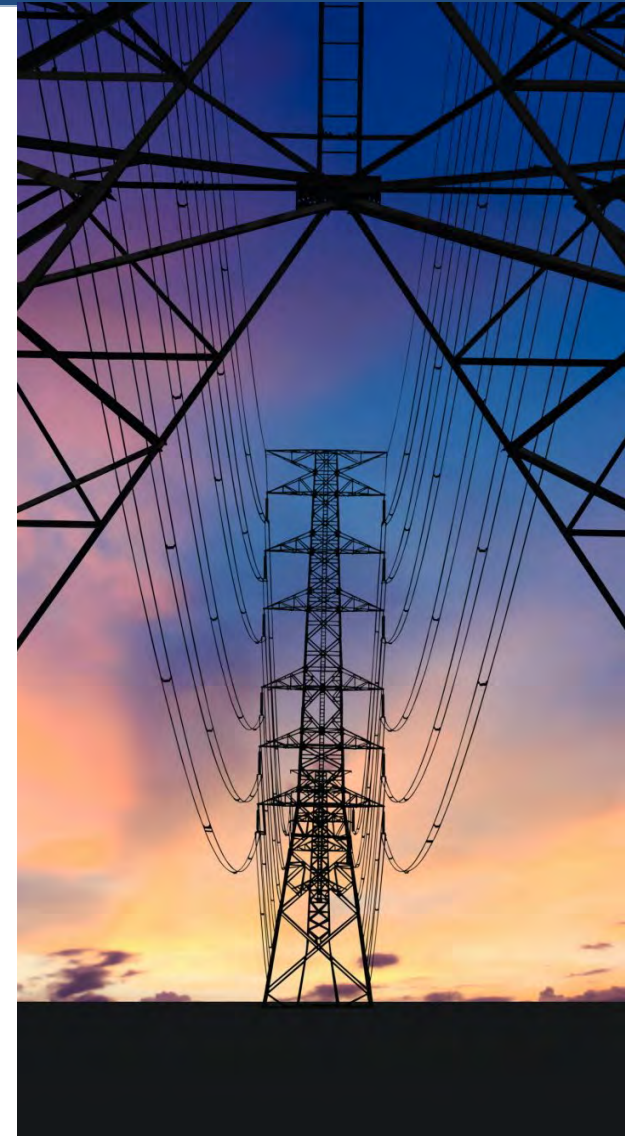
Documented, measurable, and consistent process for risk identification, prioritization, and mitigation across the ERO Enterprise

Enhanced reliability assessments capable of evaluating energy risks, including transmission adequacy for wide-area energy assessment

Work Plan Priority #2

Ensuring >96% of all generation is on the registry and responsible for compliance with approved Reliability Standards

Reliability Standards that address outstanding IBR modeling deficiencies



Work Plan Priority #3

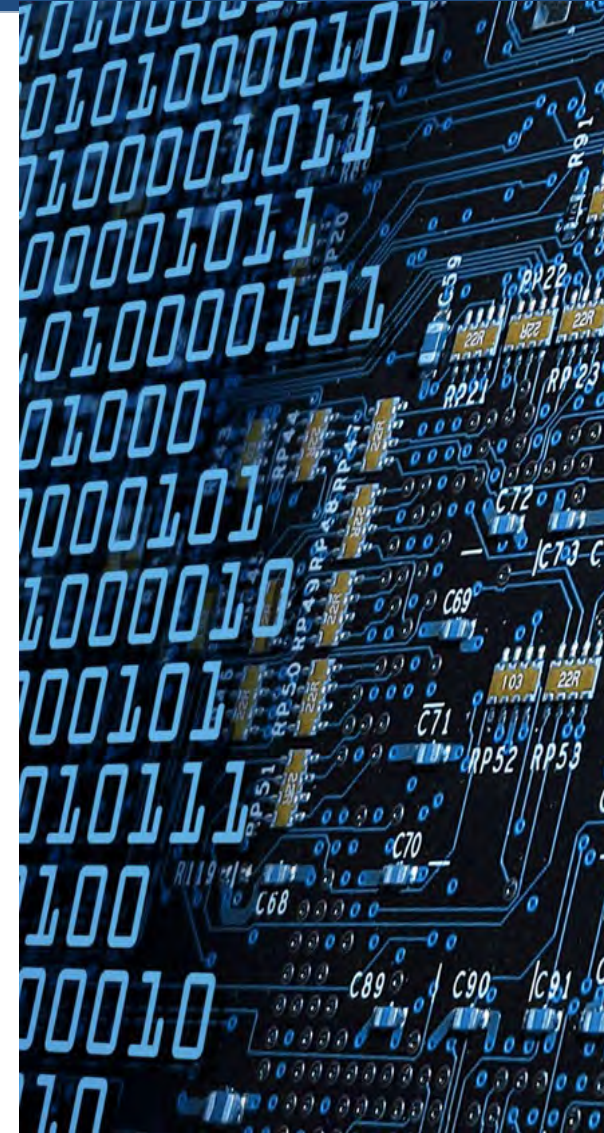
CIP standard evaluation to provide insight on emerging risks and inform a roadmap to address gaps

Work Plan Priority #4

Actionable intelligence products to inform industry on security incidents, threats, risks, and mitigation best practices

Security capability-building services aimed at small and medium-sized utilities

Creating added value to CRISP members through a new five-year strategy



Work Plan Priority #5

Clearer understanding of how new stakeholders interact with the BPS and the associated future opportunities

Work Plan Priority #6

Enhanced E-ISAC portal user experience to improve the “reach” of security information products to E-ISAC members

A more modern, easily searchable NERC website

Work Plan Priority #7

Transformation of the Reliability Standards development process to address a complex and rapidly evolving risk landscape



Work Plan Priority #8

Design of a harmonized approach to data analytics across the ERO Enterprise to improve reliability risk analysis and measure performance

AI pilot projects to improve data management and analysis solutions

Work Plan Priority #9

Enhanced HR and Finance system functionality to create efficiencies, improve user experience, and mitigate risk

Work Plan Priority #10

Increased operational efficiency through a modernized, flexible, and scalable work environment





July 24, 2025

To: NERC Board of Trustees

From: North American Generator Forum (NAGF)

Subject: NAGF 2nd Quarter 2025 Activity Report

The NAGF Board of Directors (NAGF Board) is pleased to announce their selection for NAGF's Chief Executive Officer. Dr James Merlo, a servant leader and well-known electrical industry advocate, has been serving in this capacity since April 1, 2025. James will work with the NAGF Board and the wider stakeholder community to represent their important voices to the Federal Energy Regulatory Commission (FERC), the Electric Reliability Organization (ERO), and related entities. He comes to the NAGF with vast experience in the utility space, proven leadership abilities at every level, and a strong grasp of stakeholder engagement.

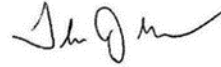
The NAGF has been able to provide comments for the majority of the standards available for comment in the 2nd quarter. Additionally, we had representation at the NERC 901 Technical Conference, the 2nd quarter Reliability and Security Technical Committee (RSTC) meeting, as well as the joint Reliability Issues Steering Committee, Standards Committee, and RSTC meetings held at the California ISO.

The NAGF would like to express its thanks and gratitude to the North American Transmission Forum and NERC for a joint meeting in the 2nd quarter to welcome our new CEO, and appreciative as well for the additional meetings with FERC and NERC staff.

The NAGF is also excited to announce our two new membership options to the Forum, Associate Membership (original equipment manufacturers, contractors, consultants, etc.) and Affiliate Membership (National Labs, Government, etc.). These new membership options allow us to expand our professional knowledge and collaboration, which is essential in some of the areas of recent interest such as inverter-based resources and large loads.

There is no shortage of work in the pursuit of reliability in the face of today's rapid changes and we look forward to our continued partnership and collaboration with industry and the ERO.

To: NERC Board of Trustees (BOT)
From: Thomas J. Galloway, NATF President and CEO
Date: July 14, 2025
Subject: NATF Periodic Report to the NERC BOT (August 2025)
Attachments: NATF External Newsletter (July 2025)



The NATF interfaces with the ERO and other external organizations on key reliability, resilience, security, and safety topics to improve performance while reducing effort duplication. Some examples are listed below and in the attached NATF external newsletter, which is also available on our public website:
www.natf.net/news/newsletters.

NATF-ERO Leadership Meetings

To promote effective coordination, NATF and ERO leadership meet periodically to discuss topics and activities and synchronize efforts. The two groups convened face-to-face in April to identify top-priority areas for coordination. Several topics are discussed in this report.

The next virtual meeting is scheduled for late July.

Inverter-Based Resources Integration / Interconnection Lifecycle

Transmission owners and providers are dealing with a high volume of inverter-based resource (IBR) interconnections. The NATF and its members recognize the challenges of managing the volume of interconnection requests, developing performance requirements for each facility, establishing interconnection agreements, overseeing construction and commissioning of these facilities, monitoring facility performance, and managing ongoing change. In response, the NATF Planning and Modeling Practice Group created an IBR Interconnection Life Cycle Program, a series of projects to develop practice documents for each stage of an IBR facility's life. The first product of this program, a practice document focused on managing IBR interconnection requests and studies, is now available to NATF members. The second product, a comprehensive practice document on interconnection agreements, is slated for release in the coming month. Next, documents will address IBR facility design validation, performance monitoring, and commissioning.

Supply Chain Security

Supply chain deliverability and security were both noted as ongoing concerns in the recent NATF-ERO coordination meeting, and the NATF and ERO are working to align on challenges related to risk validation. In the coordination meeting, NERC expressed appreciation for NATF's comments related to the recent NERC-FERC [Workshop on Supply Chain Risk Management Reliability Standards](#). NATF comments promoted the recently posted [NATF Supply Chain Risk Assessment Guidance](#), noting the document covers a graded assessment approach, periodic reviews, and resistance from suppliers/vendors. A link to this document has been provided to NERC for inclusion on the [Supply Chain Risk Mitigation](#) page on NERC's website.

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Resilience – RISC Report

NATF President and CEO Tom Galloway has been actively involved in drafting the 2025 *ERO Reliability Risk Priorities Report*. The RISC committee will present the report for NERC Board of Trustees approval next month. Tom has led the subgroup for the “Resilience to Extreme Events” risk profile.

NATF-RSTC Coordination

NATF and the NERC RSTC recognize that communication and collaboration foster better alignment between the two organizations, and both groups are actively coordinating on a process to align work plans to ensure their efforts support one another and minimize duplication. NATF and the NERC RSTC have agreed to include RSTC work plan topics related to IBR and system protection misoperations as areas for a test-case collaboration effort. Both organizations will share limited project scope details and decide whether one will lead or if tasks can be split for complementary work.

North American Transmission Forum External Newsletter

July 2025

Supply Chain Security Criteria and Risk Questionnaire Posted

The [NATF Supply Chain Security Criteria](#) and [Energy Sector Supply Chain Risk Questionnaire](#) version 6.0 documents have been posted for industry use on the [Supply Chain Industry Coordination](#) page of the NATF public website. The [Version History](#) link on that site includes prior versions and redlines. In addition, the [NATF Criteria and Questionnaire Revision Process](#) (formerly known as the *Revision Process for the Energy Sector Supply Chain Risk Questionnaire and NATF Supply Chain Security Criteria*) has been updated.

Revisions to the NATF criteria and questionnaire include updated mappings for NIST's Cybersecurity Framework (CSF) 2.0, the addition of artificial intelligence to several items, and edits to enhance clarity. The layout has been updated slightly to facilitate navigation and readability, with a new "Area of Focus" drop-down box added to the questionnaire to conserve space and improve specificity when using the optional scoring feature.

These updates were reviewed and accepted by the ERO Enterprise to ensure its continued endorsement of the two NATF CIP-013 Implementation Guidance documents: *NATF CIP-013 Implementation Guidance: Using Independent Assessments of Vendors* and *NATF CIP-013 Implementation Guidance: Supply Chain Risk Management Plans*.

On June 9, the NATF hosted a joint meeting of our Industry Organizations Forum and Supply Chain Practice Group. In the meeting, we discussed revisions to the criteria, questionnaire, and supporting documents. Representatives from NEMA and Exiger also presented on the potential impact of tariffs on energy sector supply chains. The event drew about 215 participants from a diverse range of industry sectors.

Resilience

NATF President and CEO Tom Galloway has led the Resilience subgroup drafting the 2025 *ERO Reliability Risk Priorities Report*. The report will be recommended for NERC Board of Trustees approval in August.

The NATF and Electric Power Research Institute (EPRI) held a transmission resilience summit on May 7–8 in Austin, Texas, hosted by Lower Colorado River Authority. The theme of the summit was the five elements of the [NATF-EPRI definition of resilience](#): prepare, anticipate, absorb, adapt, and recover. EPRI presented on design, grid-enhancing technologies, cyber security, artificial intelligence, communications, Climate READi, operations, and emergency management. NATF member topics included discussions of wildfire mitigation plans, system planning studies, supply chain issues and mitigating strategies, building resilience into drills/exercises, and lessons learned from recent hurricane events.

The NATF is also developing several documents to improve our members' resilience posture. Our *Design Basis Resilience Event Practices* document and tool were finished in 2024 and provide guidance for an organization to develop an appropriate suite of design basis resilience events (DBRE). Our *Common Operating Picture Practices* document is currently under development. This document is designed to guide our members when responding to an event or problem by providing relevant information on one display that is shared by all. Lastly, our *Critical Entities Practices* document is also in progress. It will explain how to identify and coordinate with critical entities that are integral to the successful operation of the transmission grid and that provide essential services/products to society at large.

For more information about the NATF, please visit <https://www.natf.net/>.

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