NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2020 Annual Report

February 2021

Contents

Letter from President and CEO Jim Robb

The year 2020 was extraordinary on so many dimensions: the COVID-19 pandemic, substantial civil unrest, a record-setting storm and wildfire season, and a contentious presidential election. But through it all, our team at NERC and across the ERO Enterprise, along with industry, rose to the occasion to continue assuring the reliability, resilience, and security of the bulk power system (BPS). All of us who are part of the reliability and security ecosystem—the Electric Reliability Organization (ERO) Enterprise, industry, our government partners, and others, such as Electric Power Research Institute (EPRI) and the North American Transmission Forum (NATF)—came together to protect our teammates and execute our mission on behalf of the North Americans who depend on a reliable supply of electricity to support their lives. While I think we will all be happy to see 2020 in the rearview mirror, we can all be very proud of what we have accomplished and what we have learned about collaboration and resilience.

The pandemic clearly was the top story of 2020, and I am proud of how we responded as a company. In February, we issued the first All-Points Bulletin of 2020 from the Electricity Information Sharing and Analysis Center (E-ISAC), warning of the developments in Wuhan, China, and the potential impacts to supply chains and, if the disease spread, on workforce limitations. Beginning in March, NERC closed its offices, and our team began teleworking; little did we know that almost one year later we would still be in that posture. We quickly learned how to engage effectively with stakeholders to address important issues, such as the security solutions we developed for the new Compliance Monitoring and Enforcement Program (CMEP) initiatives, consisting of the Align project and the Secure Evidence Locker, and continued our core monitoring function with the Regional Entities working through approaches to move work traditionally performed onsite to being performed virtually. The E-ISAC, a critical security investment for the industry and a capability we are working to strengthen, performed well through the pandemic, strengthening bridges with our government partners, growing its membership, and initiating two operational technology (OT) pilots with the vision of expanding the Cybersecurity Risk Information Sharing Program (CRISP) into the OT realm.

Our 2020 successes are due, in large part, to the collaboration that occurred across government and industry, much of it centered around the Electricity Subsector Coordinating Council (ESCC). I serve on the ESCC, and we activated the ESCC Playbook very early and held frequent calls with the Department of Energy (DOE), the Department of Homeland Security (DHS), and the Federal Energy Regulatory Commission (FERC), along with other key agencies, such as the Centers for Disease Control and Prevention (CDC) and the Department of Health and Human Services (HHS). Bringing CEOs together with government leadership, we were able to cut through bureaucracy and focus high-level attention on critical needs and share situational awareness.

Working closely with FERC, NERC was able to provide regulatory relief to industry so focus could remain on protecting workers and retooling operating protocols to maintain the reliability and security of the grid with a largely remote workforce. Other activities included supporting the efforts of the NATF to develop a pandemic planning guide for utilities to capture real-time experiences along with DOE and FERC; developing a special assessment, the *Pandemic Preparedness and Operational Assessment* on pandemic impacts on industry; and participating with the ESCC in drafting the guidance document, *Assessing and Mitigating the Novel Coronavirus* (COVID-19).

Aside from just excelling during this crisis, we took our annual look back at the progress that industry has made in our most recent State of Reliability report; 2019 was the highest performing year since we began tracking our aggregate reliability index. We should all take pride in this accomplishment.

Jim Robb
President and CEO

Another focus area in 2020 has been supply chain, which has been a NERC priority since 2016. NERC developed new standard CIP-013-2 and proposed modifications to CIP-005-7 and CIP-010-4 (collectively, the supply chain standards). In May, an executive order was issued that focused on foreign manufacturers of key components of critical infrastructure, and we followed that with a Level 2 NERC alert (our second of 2020—the first one focused on utility pandemic planning) to understand the extent of conditions and perform a risk assessment. Efforts outlined in the executive order help support activities already underway in NERC's Supply Chain Standards and other work. As we wound down the year, we faced another major challenge with the supply chain compromise, a major event that triggered another business continuity event for NERC and the activation of the ERO Crisis Action Plan. The E-ISAC continues to assist our industry with strong support from our government partners at DOE and DHS.

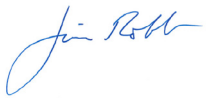
While we are pleased with our efforts to address the current challenges presented by the ongoing pandemic, we know we need to remain focused on the future. We launched several teams across NERC to help take the lessons we have learned about remote work and collaboration and think through how we can leverage collaboration technology and evolve our business model to be more effective and efficient.

We also recognize that the ongoing transformation of the grid continues. In our *2020 Long-Term Reliability Assessment*, we see the challenges presented by the changing resource mix and the need to continue strengthening engagement with our stakeholders so that the transformation to an increasingly distributed, decarbonized, and digitized system occurs in a reliable and secure way. These themes will continue to be our focus in the coming years.

In 2020, we also hired two new senior vice presidents—Manny Cancel, senior vice president of NERC and CEO of the E-ISAC, and Kelly Hanson, senior vice president and chief administrative officer—to complete the restructuring of the NERC leadership team.

So, with the pandemic continuing to rage and Mother Nature throwing her worst at us, there is a lot for us to be proud of—the North American BPS remains highly reliable and secure. I hope you enjoy reading NERC's *2020 Annual Report* and take the same pride in what industry has achieved under difficult circumstances as I do. NERC and the ERO Enterprise remain committed to remaining aware of the challenges our industry faces while keeping our eye on the reliability and security of the grid—nearly 400 million North Americans are depending on us.

Best,



Jim Robb

ERO Enterprise Vision | Mission

The vision for the ERO Enterprise, which is comprised of NERC and the six Regional Entities, is a highly reliable and secure North American BPS.

Our mission is to assure the effective and efficient reduction of risks to the reliability, resilience, and security of the grid.

ERO Enterprise Transformation

The ERO Enterprise has undergone significant social and structural change over the past several years, coalescing into an organization that values and respects NERC and the Regional Entities' individual roles and independence while aligning toward the greater good. This past year was a one of continued growth and transformation with a worldwide pandemic pushing to the forefront the criticality of the ERO Enterprise's collective mission and vision of assuring the reliability, resilience, and security of the North American BPS.

NERC and the Regional Entities are partners through which the ERO Enterprise succeeds and are committed to a number of things:

- Working together as one team and honoring each role
- Actively supporting activities while eliminating unnecessary duplication of work
- Collaborating in developing clear and consistent guidance
- Sharing information, knowledge, and resources
- Developing and sharing harmonized messages across communications
- Supporting innovation, initiatives, and the sharing of best practices

Substantial policy and technical forces continue to drive rapid change in how electricity systems are designed, planned, operated, and secured. The unique nature of the regional model and the North American footprint enables the ERO Enterprise to anticipate, adapt, and respond to the transforming reliability and security ecosystem while identifying new risks and complexities as well as their mitigations.

Jim Robb, right, honors Bob Cummings for his years of service at his retirement (March).

2020 Focus Areas and Work Plan

In light of this changing industry landscape, the updated *ERO Enterprise Long-Term Strategy*—approved by the NERC Board of Trustees in December 2019—concentrates on five focus areas around which NERC has aligned its performance management. This *2020 Annual Report* is structured using the same focus areas:

1. Expand risk-based focus in standards, compliance monitoring, and enforcement
2. Assess and catalyze steps to mitigate known and emerging risks to reliability and security
3. Build a strong E-ISAC-based security capability
4. Strengthen engagement across the reliability and security ecosystem in North America
5. Capture effectiveness, efficiency, and continuous improvement opportunities

Within these focus areas were several key objectives that set the table for the work performed in 2020. The *2020 Work Plan Priorities* addressed a transforming industry in which NERC must remain nimble to take on any emerging risks that may present themselves. The ERO Enterprise's mission ultimately exists to serve the public interest, and it must serve that interest by continuing to lead industry in reliability, resilience, and security initiatives for known and emerging risks.

2021 ERO Enterprise Executive Committee (EC)

Jim Robb
President and CEO
NERC
ERO Enterprise
EC Co-Chair

Sara Patrick
President and CEO
MRO
ERO Enterprise
EC Co-Chair

Jim Albright
President and CEO
Texas RE
(Effective January 1, 2021)

Manny Cancel
Senior VP, NERC
CEO, E-ISAC

Melanie Frye
President and CEO
WECC

Tim Gallagher
President and CEO
RF

Kelly Hanson
Senior VP and Chief
Administrative Officer
NERC

Lane Lanford
President and CEO
Texas RE

Mark Lauby
Senior VP and
Chief Engineer
NERC

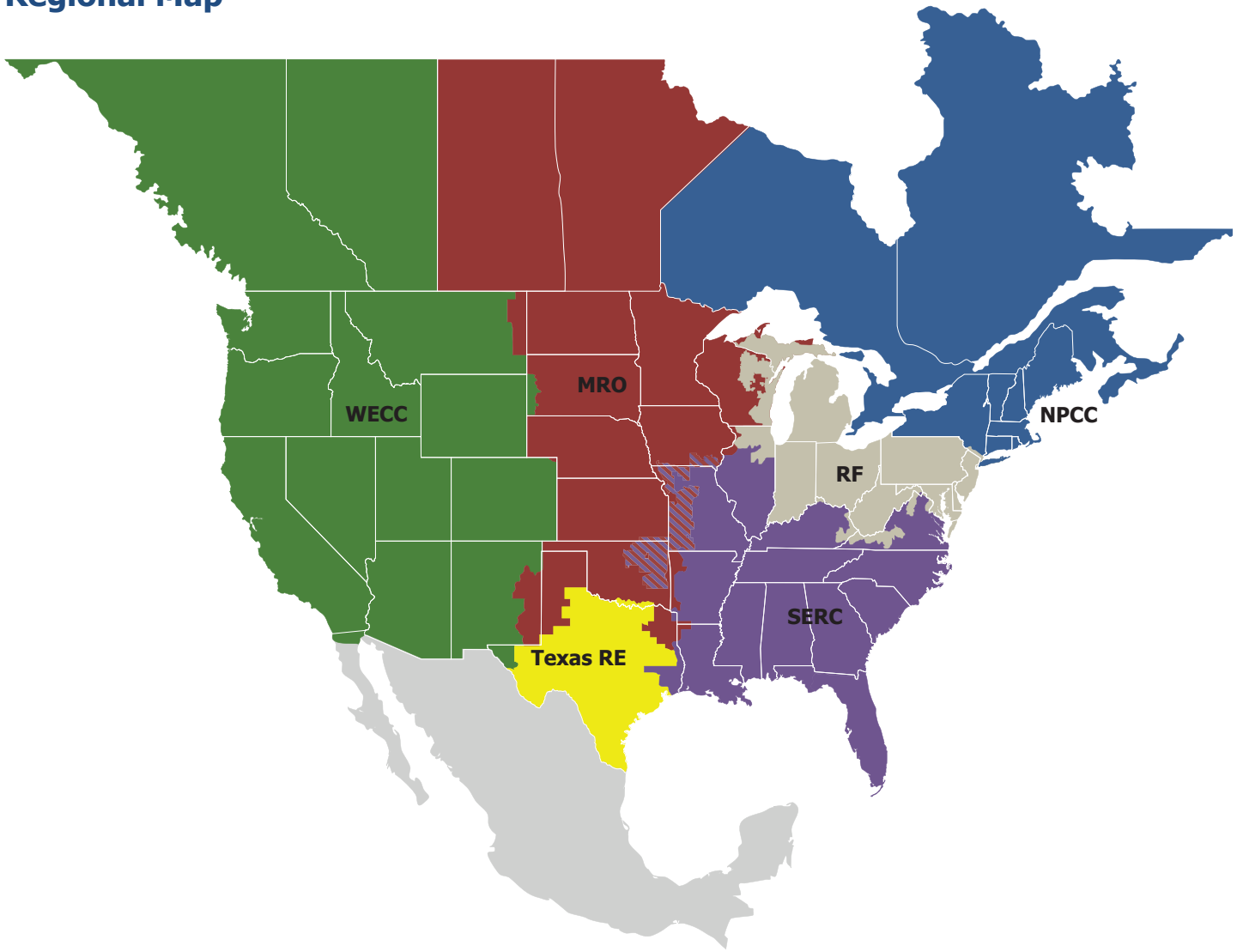
Sonia Mendonca
Senior VP, General
Counsel, and
Corporate Secretary
NERC

Jason Blake
President and CEO
SERC

Ed Schwerdt
President and CEO
NPCC

Janet Sena
Senior VP,
External Affairs
NERC

Regional Map



[Midwest Reliability Organization (MRO)]

[Northeast Power Coordinating Council (NPCC)]

[ReliabilityFirst (RF)]

[SERC Reliability Corporation (SERC)]

[Texas Reliability Entity (Texas RE)]

[WECC]

Expanding Risk-Based Focus in Standards, Compliance Monitoring, and Enforcement

The ERO Enterprise has shifted from a primarily compliance-focused approach to one that incorporates a more holistic, risk-based approach in pursuit of continuous improvement, innovation, and value-driven efforts. Compliance with Reliability Standards remains fundamental to the collective mission to maintain reliability, resilience, and security. By maintaining and expanding a risk-based focus in its operations, the ERO Enterprise is able to apply resources to the most significant reliability risks and better respond to emerging risks.

Supply Chain Risk Mitigation

The electricity industry is a vast ecosystem of asset owners, suppliers, service providers, stakeholders, and regulatory interests. The suppliers in this ecosystem play a crucial role by delivering innovative and reliable products and services that facilitate the reliable operation of the grid. Managing the cyber security risks associated with complex industrial supply chain and additional interdependencies across suppliers and service providers is critical. Without trusted suppliers working with asset owners and operators, industry will struggle to increase or maintain reliability while directly addressing the ever-increasing security threats to the grid.

In May, the U.S. government released a supply chain *Executive Order on Securing the United States Bulk-Power System*, launching a critical initiative to secure the BPS in respect to the threat of foreign adversaries creating and exploiting vulnerabilities in information and communications technology and services. Efforts outlined in the executive order help support activities already underway in NERC's supply chain standards and other work. The ERO Enterprise and the Supply Chain Working Group (SCWG) continue to undertake numerous risk mitigation efforts. These activities have included two NERC alerts, partnerships with NATF and DOE, and numerous outreach engagements, including workshops hosted by SERC and ReliabilityFirst. The SCWG has hosted several webinars and developed eight reliability guidelines focused on supply chain security risks.

In May 2020, FERC and NERC published a *Joint Staff White Paper on Supply Chain Vendor Identification – Noninvasive Network Interface Controller* to help the electricity sector, which relies on networking and telecommunications equipment, identify vendors of components on their networks so that they can take any necessary action to mitigate potential risks to the BPS. In November, the Board adopted Project 2019-03 – Cyber Security Supply Chain Risks, which adds electronic access control or monitoring systems (EACMS) to the supply chain requirements—specifically EACMS that provide electronic access control to high- and medium-impact Bulk Electric System (BES) cyber systems. In addition, physical access control systems (excluding alarming and logging) to high- and medium-impact BES cyber systems were added to the supply chain standards. In December, NERC filed CIP-005-7 – Cyber Security – Electronic Security Perimeter(s), CIP-010-4 – Cyber Security – Configuration Change Management and Vulnerability Assessments, and CIP-013-2 – Cyber Security – Supply Chain Risk Management with FERC for approval. NERC remains fully committed to its focus on supply chain risk and will continue to coordinate activities across the industry to mitigate known and emerging supply chain risks to the BES.

SCWG Reliability Guidelines

Cyber Security Risk Management Lifecycle
Guideline | Presentation | Webinar

Provenance
Guideline | Presentation | Webinar

Risk Considerations for Open Source Software
Guideline | Presentation | Webinar

Risks Related to Cloud Service Providers
Guideline | Presentation | Webinar

Secure Equipment Delivery
Guideline | Presentation | Webinar

Vendor Incident Response
Guideline | Presentation | Webinar

Vendor Risk Management Lifecycle
Guideline | Presentation | Webinar

Procurement Language
Guideline | Presentation | Webinar

Cyber Security Supply Chain Risk Standards

- CIP-005-7: Cyber Security – Electronic Security Perimeter(s)
- CIP-010-4: Cyber Security – Configuration Change Management and Vulnerability Assessments
- CIP-013-2: Cyber Security – Supply Chain Risk Management

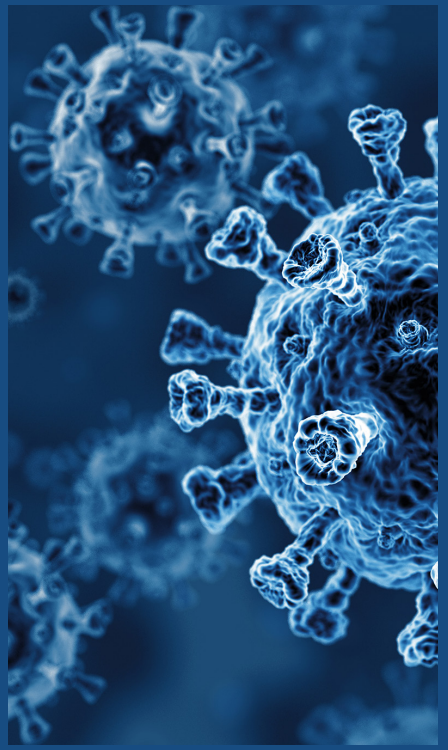
Pandemic Response, Guidance, and Activities

Over the course of 2020, COVID-19 highlighted the need for greater agility, increased collaboration, and expanding the ERO Enterprise mindset beyond compliance. The pandemic brought new risks and challenges with it and made known risks, such as cyber intrusions, more prominent. Faced with a pandemic that continued to present a threat, the ERO Enterprise quickly initiated response plans—shifting to remote work postures and virtual meetings—and coordinated actions to protect the safety and well-being of its workforces while continuing to work towards the effective and efficient reduction of risks to the reliability and security of the BPS.

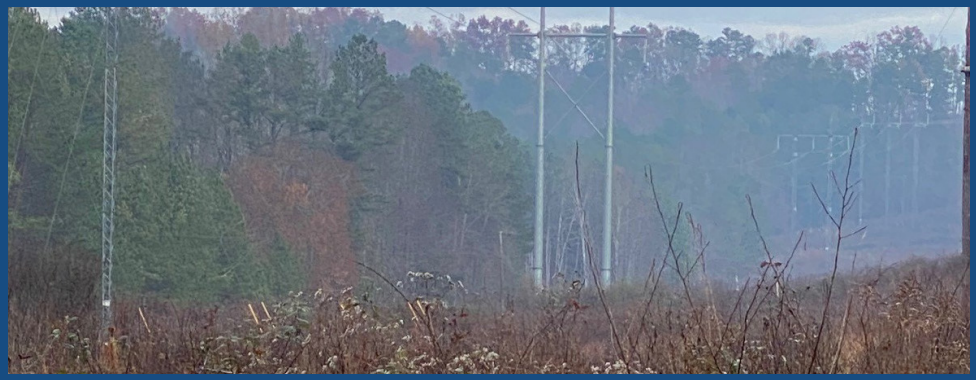
At the time of publishing this year's Annual Report, NERC continues to coordinate with industry's ESCC, NATF, EPRI, and the Canadian Electricity Association (CEA) along with government partners (e.g., DOE, DHS, the CDC, and HHS) for situational awareness and best practices during the pandemic. As part of these efforts, NERC worked with trade organizations and other entities to help develop and distribute a guidance document for dealing with the virus. The COVID-19 Activities and Resources page on NERC's website provides a comprehensive view into NERC's COVID-19 response.

NERC undertook three main initiatives to assist industry through this challenging time, including working closely with FERC to provide regulatory relief while still assuring the reliability and security of the grid:

- Lessening compliance burdens so companies could allocate resources to the current crisis
- Collecting information to promote situational awareness and sharing with industry
- Coordinating with government partners to ensure that government and industry are in alignment



In February, the E-ISAC issued an all-points bulletin through its Critical Broadcast Program, highlighting the risks of a pandemic, addressing potential supply chain issues that would result from a manufacturing slowdown in Asia, alerting entities to the possibility of workforce constraints, and suggesting entities review their supply chain risk and business continuity plans for possible activation.



In March, NERC issued a public Level 2 alert on contingency planning, asking registered entities to report the status of their emergency pandemic plans, and postponed on-site audits and other on-site activities through the end of 2020. In October, this date was extended until the end of Q1 2021. In January 2021, the ERO Enterprise further extended the date until June 30, 2021 to allow registered entities to continue to focus their resources on keeping their workforces safe. In coordination with registered entities, the ERO Enterprise has had success throughout 2020 in coordinating remote virtual audits and other activities that were originally scheduled to be onsite in 2020. The ERO Enterprise will return to on-site activities as it becomes safe to do so and in a manner that prioritizes risk.

In April, FERC approved NERC's motion to defer the implementation of seven Reliability Standards with effective dates or phased-in implementation dates in the second half of 2020 to help assure grid reliability amid the impacts posed by the coronavirus pandemic.

In May, the ERO Enterprise released guidance that provided additional regulatory relief related to registered entities' COVID-19 response and temporarily expanded the Self-Logging Program. Due to the ongoing pandemic, the ERO Enterprise extended this expansion until the end of Q1 2021 to allow all registered entities to self-log instances of potential noncompliance with minimal or moderate risk related to their pandemic response.

Throughout the rest of the year, NERC continued to evaluate the circumstances based on risk and safety priorities to determine whether additional guidance and extensions were needed. These efforts continue to enable the ERO Enterprise to fulfill its unique and vital mission of assuring the reliability, resilience, and security of the North American BPS during this uncertain time.

Key Resources

ESCC Resource Guide
NATF-NERC-DOE-FERC Epidemic/Pandemic Response Plan Resource
ERO Enterprise Guidance: Potential Noncompliance Related to Coronavirus Impacts
COVID-19 Logging Spreadsheet - Template
Level 2 NERC Alert
Joint NERC–FERC Industry Guidance for COVID-19
FAQs for Joint NERC–FERC Industry Guidance
Pandemic Preparedness and Operational Assessment (Spring 2020)

Industry Resources

Electric Power Research Institute (EPRI)
Electricity Subsector Coordinating Council (ESCC)
Federal Energy Regulatory Commission (FERC)
North American Transmission Forum (NATF)
Western Area Power Administration (WAPA)

Assessing and Catalyzing Steps to Mitigate Known and Emerging Risks to Reliability and Security

As a core element of its mission, the ERO Enterprise works closely with industry, forums, government, and other organizations to perform ongoing analysis of significant known reliability risks to the BPS. The ERO Enterprise also collaborates with these subject matter experts and other stakeholders as appropriate to assess emerging risks that result from grid transformation, extreme natural events, cyber and physical security vulnerabilities, and critical infrastructure interdependencies. Lastly, the ERO Enterprise collects substantial amounts of data and information on the ongoing performance of the BPS along with projected system conditions. The evaluation of early indicators of risk supported by data and analysis drives actions that support BPS reliability across industry.

State of Reliability

NERC's *2020 State of Reliability*, which looks at performance during the previous year, found that the BPS continued to perform at a very high level of reliability in 2019 in the face of rapid, significant changes to the generation resource mix. The report identified seven key findings and four high-level recommendations for the system planners, industry, and the ERO Enterprise.

While performance trends for generation, transmission, and protection and control measures were positive, and metrics showed improvement in numerous areas, it remains key that the ERO Enterprise and industry continue to improve models and planning approaches in order to operate a system with a significantly different resource mix. The *2020 State of Reliability* report recommended that system planners evaluate the need for flexibility as industry and policymakers consider conventional generation retirements. Additionally, the report recommended that the ERO Enterprise and industry should develop comparative measurements and metrics to understand the different dimensions of resilience during the most extreme events and how system performance varies with changing conditions. The report also recommended that the ERO Enterprise and industry continue to work closely together to understand and share information on cyber and physical security threats and mitigate the risks posed by these threats through a variety of approaches, including resilient system design, consequence-informed planning and operation, and practicing response and recovery processes. With appropriate insight, careful planning, and continued support, industry will continue to navigate the challenges in a manner that maintains reliability.

Pandemic Prepardness and Operational Assessment

In addition to preparing and publishing traditional reliability assessments, NERC also produces special assessments of emerging risks. As COVID-19 reached North America, it elevated the electricity sector's reliability risk profile due to potential workforce disruptions, supply chain interruptions, and increased cyber security threat. COVID-19 introduced significant uncertainty that was without precedent and highly challenging even for the most prepared of industries. In April, NERC published a special report—*Pandemic Preparedness and Operational Assessment: Spring 2020*—reviewing reliability considerations and operational preparedness during the pandemic and providing recommendations for industry as well as lessons learned from international experience.

In the assessment, NERC did not identify a specific threat or degradation to the reliable operation of the BPS due to COVID-19, but NERC did warn that prolonged periods of operator sequestration and deferred equipment maintenance increase industry's risk profile and could exacerbate impacts to the BPS over the summer and potentially over the longer-term horizon. However, as pandemic mitigation and containment strategies continue, industry has continued to rise to the challenge, coordinating effectively with government partners and taking aggressive steps to confront these threats to grid reliability.

Summer Reliability Assessment and Winter Reliability Assessment

As the pandemic progressed, the ERO Enterprise continued to stress a priority focus on protecting the workforce, including system and power plant operators as highlighted in both of NERC's seasonal reliability assessments.

In the *2020 Summer Reliability Assessment*, NERC found that projected resources were at or above the levels needed to satisfy summer peak demand under anticipated weather in nearly all assessment areas despite COVID-19 introducing significant uncertainty into demand and some risk to generation resource availability. Anticipated Reserve Margins indicated that the assessment areas were prepared to meet potential peak demand with or without pandemic-related demand reductions. NERC identified several areas, including California and its neighbors, where extreme heat could lead to grid operating emergencies.

SRA Key Findings

- Sufficient capacity resources expected to be in service.
- Maintenance and preparations for summer operations impacted by pandemic.
- Protecting critical electric industry workforce during the pandemic remains a priority for reliability and resilience.
- Late-summer wildfire season in western United States and Canada poses risk to BPS reliability.

In the *2020–2021 Winter Reliability Assessment*, NERC found that sufficient resource capacity were in place across North America to meet demand under harsh winter conditions. The assessment identified higher risk areas susceptible to emergency operating actions. During extreme and prolonged winter conditions, vital natural gas fuel supplies for electricity generation may be at risk in New England, California, and the southwestern United States. High reliance on natural-gas-fired generation and limited natural gas infrastructure elevates reliability risk in these areas.

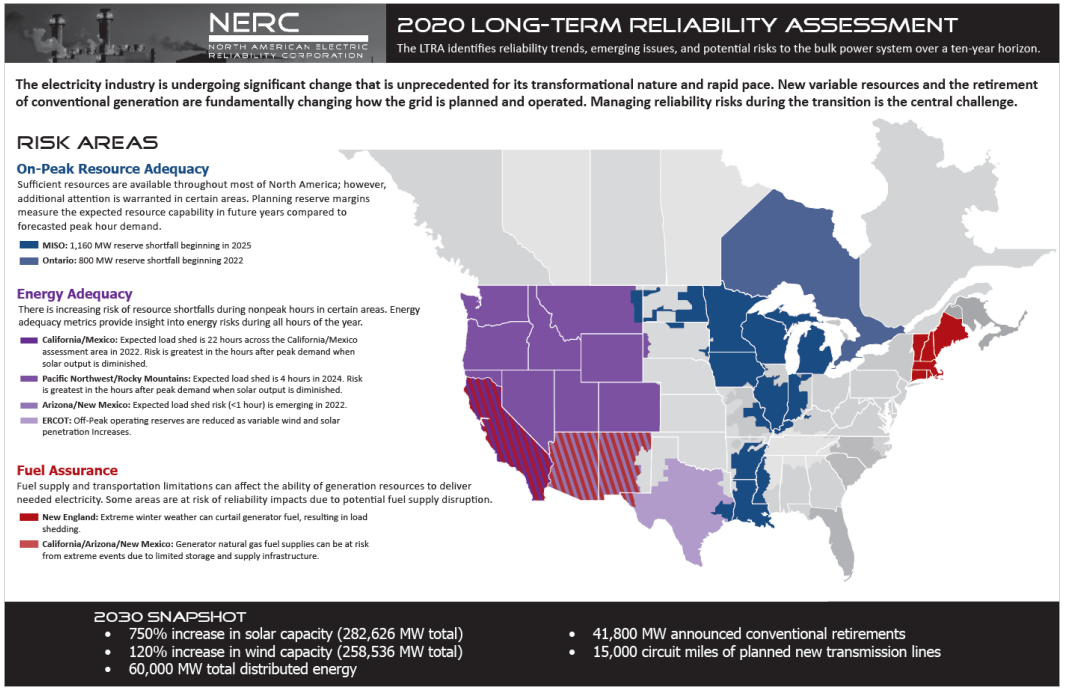
WRA Key Findings

- Sufficient capacity resources are expected to be in service.
- Fuel and energy assurance risk remains a reliability concern.
- Extreme weather continues to pose risk to BPS reliability.
- The ongoing pandemic is causing increased uncertainty in electricity demand projections and presents cyber security and operating risks.
- Post-2020 hurricane season restoration efforts may continue in hard-hit areas along the Gulf Coast, where storm damage has degraded the transmission system that supplies local areas.

Long-Term Reliability Assessment

The *2020 Long-Term Reliability Assessment (LTRA)*—the ERO Enterprise's independent assessment and comprehensive report on the adequacy of planned BPS resources to meet electricity demand across North America over the next 10 years—found that there is sufficient electricity resource capacity to meet demand in all but two assessment areas while the electricity sector is undergoing significant and rapid changes that are unprecedented and transformational. Even where system capacity is shown as sufficient, some areas demonstrate potential for inadequate energy to serve demand. Specifically, nearly all parts of the Western Interconnection, ERCOT, and MISO show levels of increased risk over the next five years. Additionally, the integration of variable energy resources (primarily wind and solar), the continued growth of distributed energy resources (DERs), and the retirement of conventional generation are fundamentally changing how the BPS is planned and operated; a prime example of this is the increased exposure to fuel assurance risks that have emerged in New England and the Southwest, where there is an increasing reliance on natural gas generation.

The *2020 LTRA* highlighted the need for increased attention to planning and operating the grid in a more complex environment. In order to ensure reliability during this next phase of change, the ERO Enterprise, industry, and policymakers must come together to address the emerging resource and energy adequacy issues. Such extraordinary evolution presents new challenges but also new opportunities for reliability, resilience, and security.



Cyber Planning for Response and Recovery Study

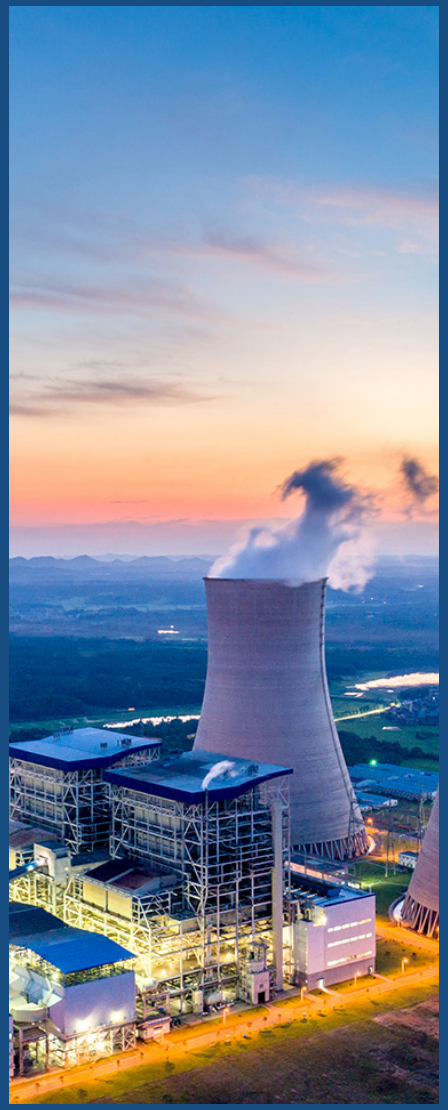
Cyber security continues to be a focus of the ERO Enterprise, especially as cyber intrusions became more prominent over the course of 2020. In September, FERC, NERC, and the Regional Entities released a joint study on *Cyber Planning for Response and Recovery*, outlining best practices for the electricity industry. The joint staffs of FERC and the ERO Enterprise developed the study after interviewing subject matter experts from eight utilities of varying size and function. The study included the joint staffs' observations on their defensive capabilities and on the effectiveness of their incident response and recovery (IRR) plans. The study concluded that effective IRR plans are important resources for addressing cyber threats and that effective IRR plans should be in place and response teams should be prepared to detect, contain, and, when appropriate, eradicate cyber threats before they can harm utility operations.

Best Practices for Effective IRR Plans

- Contain well-defined personnel roles, promote accountability and empower personnel to act without unnecessary delays, and use supporting technology and automated tools while recognizing the importance of human performance
- Require well-trained personnel who are constantly updating their skills and incorporate lessons learned from past incidents or tests
- Use baselining so personnel can detect significant deviations from normal operations and use flowcharts or decision trees to determine quickly when the utility reaches a predefined risk threshold and a suspicious set of circumstances qualifies as an event
- Remove all external connections when activated, consider the possibility that a containment strategy may trigger predefined destructive actions by the malware, and employ evidence collection and continued analysis to determine whether an event indicates a larger compromise
    - Consider the resource implications of incident responses of indeterminate length
    - Implement lessons learned from previous incidents and simulated activities

Building a Strong E-ISAC-Based Security Capability

Reducing OT and information technology (IT) risks to the electricity industry is crucial to the cyber and physical security of BPS equipment and facilities in North America. Achieving this objective depends on the effectiveness and efficiency of NERC's E-ISAC. In 2020, the E-ISAC improved its capabilities through use of augmented tools and better strategic planning to meet the needs of a dynamic and growing membership. The EISAC's extension of its Watch Operations function to 24/7 coverage is a great symbol of these enhancements. To advance its services for asset owners and operators (AOOs) across North America, the E-ISAC is focused on developing collaborative, indispensable partnerships within industry and government to assure the future security and resilience of the BPS through high-quality analysis and rapid information sharing.



GridEx V

A prominent E-ISAC-led training opportunity for industry and government organizations is the NERC grid security exercise, GridEx, which takes place every two years. The exercise is a critical training milestone for utilities to practice their response plans for cyber and physical attacks intended to affect the reliable operation of the grid. In March 2020, NERC released its *GridEx V Lessons Learned Report*, which highlighted exercise participation from more than 7,000 security professionals at nearly 530 industry and government organizations.

With a scenario reflecting the persistent and evolving geopolitical threats from nation-state actors who target industrial control systems (ICS), utilities across North America comprised the majority of the organizations that participated in GridEx V. Due in part to targeted E-ISAC outreach on GridEx V, participation from public power and electricity cooperatives doubled from the previous GridEx. Increased participation from interdependent industries—including natural gas utilities, water utilities, and telecommunications companies—benefited the GridEx V experience as a whole.

GrixEx VI Schedule

GridEx VI is scheduled to take place in November 2021. A team of industry subject matter experts is developing a scenario that involves complex cyber and physical security challenges designed to overwhelm even the most prepared utility. NERC encourages participating organizations to collaborate with neighboring utilities, government partners, and defense-critical facilities in order to strengthen the collective defense necessary for grid security.

Cybersecurity Risk Information Sharing Program

One of the tools that assists utilities with participation in GridEx and response to real-world cyber incidents is the E-ISAC's Cybersecurity Risk Information Sharing Program (CRISP). CRISP is a unique capability for utilities, providing threat and trend analysis that participants cannot get anywhere else. The E-ISAC manages CRISP in partnership with DOE's Pacific Northwest National Laboratory and Argonne National Laboratory. In 2020—in partnership with DOE, the National Rural Electric Cooperative Association (NRECA), and a vendor—the E-ISAC launched two CRISP pilot projects focused on OT. The purpose of the OT pilots is identifying potential cyber threats to utilities' ICS by capturing raw and/or refined operational technology data, comparing it to CRISP IT data, and developing new analytic capabilities inside the E-ISAC. These pilots will help the E-ISAC meet its core responsibility of advising utilities on the detection and mitigation of ICS threats from the most advanced and persistent international adversaries.

E-ISAC Long-Term Strategy

A focus within CRISP—and other E-ISAC services—on risk mitigation for OT threats is envisioned in the *E-ISAC Long-Term Strategic Plan*, which the E-ISAC updated in October 2020. The update refines the plan's goals and priorities to address the evolving needs of industry members, partners, including those in government, and other stakeholders.

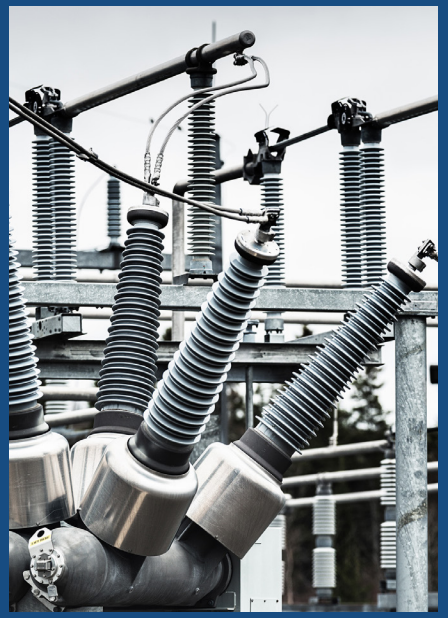
The plan's refined elements include making the most of existing resources while containing costs, recognizing the importance of ongoing stakeholder guidance, driving value through strategic relationships, evaluating the extension of E-ISAC services to the downstream natural gas sector, and identifying the variety of actions that are required to address the needs of a diverse membership. E-ISAC membership—in accordance with the strategic plan and a maturing member relations program—grew substantially in 2020, surging in excess of 20% to more than 1,000 AOOs across North America. The membership rise fueled a nearly 40% increase in the number of E-ISAC Portal users. The E-ISAC Portal included a significantly greater number of E-ISAC posts in 2020, partly because of Watch Operation's move to a 24-hours-a-day, seven-days-a-week operation.

The flexible, determined nature of BPS threat actors requires a collective vigilance and constant focus across industry and government on improving strategies and tactics to continually strengthen cyber and physical defenses. In 2020, the E-ISAC worked effectively with its members and partners to advance high-quality cyber and physical programs and initiatives to meet industry's needs, despite the challenge of the pandemic and NERC staff working remotely. In 2021 and beyond, building on collaboration between the E-ISAC and its stakeholders is imperative to the reliability, security, and resilience of the North American BPS.

More than 1,000 E-ISAC Members | 40% Increase in Portal Users

Strengthening Engagement across the Reliability and Security Ecosystem in North America

With the United States borders to Canada and Mexico restricted to essential travel through December, the importance of cross-border collaboration efforts was at an all-time high in 2020. In the face of these restrictions, United States, Canadian, and Mexican engagement remained strong—fostered by the relationships built over the years and the mutual dedication to working hand-in-hand in support of reliability, resilience, and security of the BPS—enabling the successful management of both severe weather events and the global pandemic in 2020.



North American Engagement

From the onset of the pandemic, NERC and Regional Entity staff worked closely with Canadian regulators and industry on response activities and regulatory discretion. More than 25 utility regulators from nine Canadian provinces and Canada's federal government met with NERC's Board of Trustees in August. This meeting exchanged valuable information on activities and cross-border coordination, supporting reliable operation of the interconnected grid during pandemic conditions. Session participants, including CEOs from NERC's Regional Entities with Canadian territory in their footprints, discussed the status of Reliability Standards and enforcement activities within the provinces and key efforts in the Regional Entities. This year, the Board of Trustees welcomed a new trustee, Jane Allen, to fill the Canadian trustee position previously held by David Goulding, who retired in January 2020.

Additionally, NERC executives participated in several Canadian events. Jim Robb, NERC's president and CEO, participated in a panel as part of the New England-Canada Business Council's Energy Trade and Technology conference, Energy and Environmental Leadership in Times of Unprecedented Uncertainty, which focused on all sectors of energy trade and cooperation between the northeastern United States and its largest energy partner, Canada. Manny Cancel, senior vice president of NERC and CEO of the E-ISAC, delivered keynote remarks to senior industry leaders at the Ontario Independent Electricity System Operator (IESO) annual Cyber Security Executive Briefing. Cancel discussed the current threat landscape, the benefits of the Canadian industry's partnership with the E-ISAC, the use of E-ISAC products and services by Canadian members, and opportunities for stronger collaboration.

Howard Gugel, left, participates in the Reliability Impacts of Grid Transformation *panel at the February MRC meeting*

This year provided numerous opportunities for continued engagement and robust communication with NERC's government and industry partners—such as FERC, DOE, DHS, EPRI, and the ESCC—as well as the states, including utility commissions, policymakers, and consumer advocates. A key initiative in 2020 was an effort to leverage Regional Entities' reliability expertise for engagement with state entities with assistance from NERC's External Affairs department. Under this state outreach program, ERO Enterprise staff work closely with all stakeholders to increase communication with the states regarding ERO Enterprise efforts on reliability and security, including assessments. Other highlights of state engagement included numerous briefings for state utility regulators and a joint meeting of NERC Board members, NERC executives, and regional CEOs with the Electricity Committee of the National Association of Regulatory Utility Commissioners (NARUC). In addition, the 2020 annual August meeting of the NERC Board, NERC executives, regional CEOs from NPCC, MRO, and WECC, and and Canadian regulators took place virtually and was well attended by representatives from nine provinces.

NERC continues to support NATF and the North American Generator Forum in addressing existing and emerging risks to reliability. In 2020, NERC partnered with NATF, DOE, and FERC to create an *Epidemic/Pandemic Response Plan* to complement an organization's business or operations continuity plans. The response plan focused on planning and preparedness, response, and recovery activities specific to the outbreak of a severe epidemic/pandemic.

NERC has also taken steps to share experiences and lessons learned with regulators and industry in Europe. Under an Administrative Arrangement that provides for information sharing with the European Union, NERC convened two webinars in 2020 with representatives from the Directorate-General for Energy (DG-ENER), the European Network of Transmission System Operators for Electricity (ENTSO-E), and the Delegation of the European Union to the United States (EU Delegation); FERC and the NATF also took part in these discussions. These were engaging conversations in which participants exchanged key experiences on their first-hand involvement with their response during the pandemic and their approach to maintaining system reliability and security. NERC also participated in virtual technical exchanges with power industry organizations beyond North America, including entities in Peru, Uruguay, Saudi Arabia, Republic of Korea, Costa Rica, and Chile. These were great opportunities to communicate the value of the ERO model.

Due to the pandemic, several planned joint conferences for 2020, including the inaugural Electric Power Human Performance Improvement Symposium with NATF and the Transmission Resiliency Summit with NATF and EPRI, were canceled. Continuous engagement and collaboration with regulators and policymakers is integral to supporting a reliable and secure grid, and NERC looks forward to reconvening these conferences when it is safe to do so.

Capturing Effectiveness, Efficiency, and Continuous Improvement Opportunities

The criticality of identifying and implementing mechanisms to achieve greater ERO Enterprise-wide effectiveness, efficiency, and cost savings was brought to the forefront by the pandemic. During the past year, industry and the ERO Enterprise faced unprecedented resource, economic, supply chain, and workforce demands. In response, NERC and the Regional Entities identified current and ongoing efforts to enhance the efficiency of ERO Enterprise operations and improve the effectiveness of executing statutory functions. In 2020, the ERO Enterprise focused on three main objectives: the continued development of the Align project and the ERO Enterprise Secure Evidence Locker (ERO SEL), standards efficiency review, and the implementation of the Reliability and Security Technical Committee (RSTC).

Align and ERO Enterprise Secure Evidence Locker

In May, the Board approved an updated timeline for the Align project as well as the investment and funding strategy for the ERO SEL. Align will move all compliance monitoring and enforcement business processes to a common standardized platform, resulting in a consistent application of the ERO Enterprise Compliance Monitoring and Enforcement Program (CMEP) and a more secure method of managing and storing CMEP evidence and data. The original project timeline was impacted by supply chain and data security concerns. The ERO SEL—a key component of NERC's reimagined suite of CMEP work and data management tools—will provide a secure, isolated environment to collect and protect compliance monitoring and enforcement evidence, which will significantly reduce risk of loss or exposure of evidence and harmonize evidence collection processes.

The Align project team spent the balance of 2020 developing and testing the ERO SEL and preparing to train the registered entities, Regional Entities, and NERC staff who will be using Align during its initial release in the first half of 2021. The team also developed registered and Regional Entity newsletters, FAQs, webinars, and other resources, all of which are available on the Align project page.

ERO SEL Purpose

- Ensure proper chain of custody management for registered entity evidence through compartmentalized access provided to select authorized users
- Monitor and limit the length of time that evidence is within the possession of the ERO Enterprise
- Eliminate the creation of evidence copies to limit exposure and destroy evidence on a schedule to ensure that evidence is for kept the least amount of time necessary

Standards Efficiency Review

Over the last few years, NERC has worked to transform its body of standards into a mature state while shifting the focus of the Standards Program to periodic reviews, FERC directives, emerging risks, standard authorization requests (SAR), and the standards efficiency review (SER). In 2018, NERC began using both internal ERO Enterprise resources and industry resources to evaluate for retirement potential Reliability Standard Requirements that may no longer be necessary to support reliability or address current risks to the BPS. The SER Phase 2 team is responsible for evaluating the operating & planning (O&P) and critical infrastructure protection (CIP) NERC Reliability Standards as informed by implementation experiences, compliance practices, and the development and recommendation of standards-based solutions. These solutions are intended to reduce inefficiencies and unnecessary regulatory burdens for the purpose of supporting continued safe, secure, and reliable operations.

In 2020, the O&P SER team submitted a SAR for the simplification of data exchange requirements and is currently reviewing industry comments. The CIP SER team completed the first phase of analysis, initially proposing several requirements for retirement before determining it would be better to modify the requirements. The CIP SER team formed three subteams to comprehensively evaluate industry feedback. The teams identified potential requirements for modification and are currently engaged in further evaluation in parallel with development of the rationale to address the justification for meeting the security and reliability objectives of the requirements. Once the draft rationale is complete, anticipated first quarter of 2021, the subteams will present their findings with a recommendation for next steps to appropriate stakeholders. Additionally, the CIP SER team reviewed industry comments of recommended retirements and will continue its work into 2021.

Reliability and Security Technical Committee Transition Planning and Implementation

In February, the Board of Trustees approved the appointment of sector and at-large representatives for the RSTC, a newly formed committee drawing from diverse industry stakeholder expertise to study, mitigate, and/or eliminate emerging risks to the BPS. The RSTC replaced three legacy committees—the Critical Infrastructure Protection Committee, Operating Committee, and Planning Committee—to create a forum for aggregating ideas and interests; draw from diverse industry stakeholder expertise; and leverage that expertise to identify solutions to study, mitigate, and/or eliminate emerging risks to the BPS for the benefit of industry stakeholders, the Board of Trustees, and ERO Enterprise staff and leadership.

In 2020, the RSTC focused on transition planning and implementation; RSTC and subgroup structure evaluation; reviewing, updating, developing reliability guidelines and reference documents; and coordinating with the Reliability Issues Steering Committee (RISC). For transition planning and implementation, the RSTC began by aligning its strategic objectives and focus areas to the ERO Enterprise strategic plan. From there, the RSTC was able to clearly establish the oversight responsibilities, rationalize subgroup structure and define consistent metrics for success, and align processes across subgroups to ensure consistency. The various subcommittees, working groups, and task forces within the RSTC are now organized into three program areas with unique focuses, as shown in the RSTC Program Areas table, in order to better support continued grid reliability.

RSTC Program Areas		
Performance Monitoring **Focus: Monitoring and Analysis**	**Risk Mitigation** **Focus: Mitigate Existing and Emerging Risks**	**Reliability and Security Assessment** **Focus: Emerging Issues**
Event Analysis Subcommittee (EAS)	Electric-Gas Working Group (EGWG)	Reliability Assessment Subcommittee (RAS)
EMS Working Group (EMSWG)	EMP Working Group (EMPWG)	Probabilistic Assessment Working Group (PAWG)
Failure Modes and Mechanisms Task Force (FMMTF)	Geomagnetic Disturbance Task Force (GMDTF)	Security Integration and Technology Enablement Subcommittee (SITES)
Performance Analysis Subcommittee (PAS)	Inverter-Based Resource Performance Working Group (IRPWG)	
Real Time Operating Subcommittee (RTOS)	Load Modeling Working Group (LMWG)	
Synchronized Measurement Working Group (SMWG)	Power Plant Modeling and Verification Task Force (PPMVTF)	
Resources Subcommittee (RS)	Security Working Group (SWG)	
Reserves Working Group (RWG)	Security and Reliability Training Working Group (SRTWG)	
Frequency Working Group (FWG)	Supply Chain Working Group (SCWG)	
	System Planning Impacts from Distributed Energy Resources Working Group (SPIDERWG)	
	System Protection and Control Working Group (SPCWG)	

Letter from NERC Board Chair Roy Thilly

2020 was a very unusual year for NERC and for us all. The hardships of the pandemic have been many. Our Board is extremely pleased with Jim Robb's leadership and with the hard work and commitment demonstrated by NERC and the Regional Entities' employees. NERC and the Regional Entities have moved seamlessly to working from home and adapting compliance and enforcement processes to changed circumstances while keeping a firm eye on ever-increasing cyber threats from bad actors. The ERO has put employee safety first without hesitation while never faltering in meeting their joint mission to preserve and enhance the reliability of the North American grid essential to everyone's health, safety, comfort, and economic well-being.

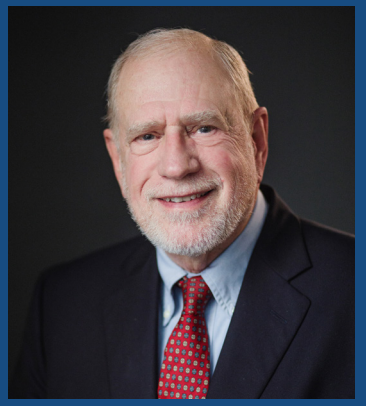
Most importantly, the electricity industry has maintained the very high reliability of the grid while implementing their pandemic crisis plans. Industry has safeguarded and isolated essential operating centers, power plants, and transmission workers and dealt with very substantial severe weather events in the midst of the pandemic. Many lessons have been learned not through failure, but through success.

As with many businesses, the experience of operating remotely will change the way NERC works in the future. Working remotely has been productive and efficient for most people and has led to reduced meeting and travel costs and increased efficiency. The technology to accommodate these changes is advancing dramatically due to demand.

At the same time, the personal relationships developed and nurtured through meeting in-person are sorely missed by our Board and crucial to mission success. The discussions and debates that occur when we are together cannot be matched online, at least not yet. NERC is well-positioned to take advantage of what it has learned. The key will be flexibility.

NERC enters 2021 with the strongest, most productive collaborative relationship between NERC and the Regional Entities in its history. This is a huge achievement. Our model relies on many pieces working in unison—heavy reliance on industry expertise to develop standards, guidelines, lessons learned, and risk identification and assessments; regional compliance and enforcement structures that recognize geographic differences; and strong, independent, and highly credible management and oversight by NERC. This complex, but brilliant, model is working incredibly well.

The success of this model is crucial because risks to the grid are constantly changing. Cyber and physical attacks present major threats that require constant attention. Severe weather risks from hurricanes, droughts, unprecedented hot spells, and wildfires are growing. The rapid decarbonization of the BPS and growth in distributed generation on distribution systems are creating new and sometimes unanticipated reliability challenges. NERC's job is to identify the risks these major changes pose and the ways that those risks can be addressed so reliability is protected as this transformation takes place.



Roy Thilly
Board Chair

While it is impossible to eliminate all risk or predict the future, we can say with confidence that NERC, the Regional Entities, and industry are well-positioned to succeed.

In closing, I would like to thank our Board for allowing me to serve as chair for the last four years, NERC's many stakeholders and the Regional Entity CEOs for their support and engagement, and Jim Robb and NERC's senior management for their leadership and collaboration. One of the most important jobs a Board does is selecting an organization's CEO. We are all very pleased with the excellent job Jim Robb is doing for reliability and with the transition and cultural transformation he has led since joining NERC three years ago.

I am also very pleased with the highly cooperative, mission-driven relationship that has been forged between NERC and the Regional Entities. Our Board and the Regional Entities have worked together to design governance mechanisms to ensure the independence and credibility of our standards, compliance and enforcement processes, and outcomes. Every regional board now includes independent directors. Regional consolidation into six Regional Entities has been accomplished seamlessly, eliminating conflict of interest concerns and improving efficiency.

With the support and engagement of industry leaders, NERC has dramatically expanded the expertise and scope of E-ISAC to address the constantly changing cyber and physical security threats the grid faces. I am confident that NERC, the Regional Entities, and industry will be able to protect and enhance our already highly reliable, resilient, and secure BPS as industry transitions to a low-carbon future. It has been an honor to have played a small part in these efforts, driven by the hard work of others.

Roy Thilly

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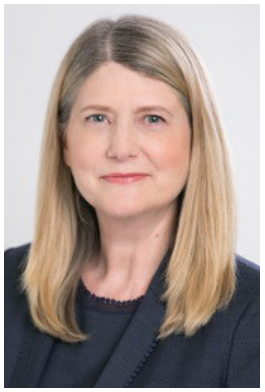

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