RELIABILITY FIRST

2023

Annual Report

Forward Together.

TWO DECADES OF PROGRESS

2023 marked the twentieth anniversary of the blackout of August 14, 2003. This massive blackout impacted over 50,000,000 customers who lost power across Michigan, Ohio, Pennsylvania, New York, and the Province of Ontario, Canada. The outage caused widespread disruption of essential services and highlighted how dependent we are upon reliable and secure electric service.

Reliability First was born out of that blackout and the subsequent Energy Policy Act of 2005, which provided a new form of reliability assurance organization, the Electric Reliability Organization (ERO), of which we are a part. Our mission is to ensure that the electric grid is reliable and secure not only for today but also for tomorrow. RF serves the public, and our "why" is to do all we can to make sure the bulk power system is as reliable and secure as possible to ensure our safety, our health and welfare, our economy, and our very way of life.

In the years since that blackout, we have learned a tremendous amount about the vulnerabilities of our grid and have worked diligently with our industry partners to address and mitigate these risks. As time goes by, many currently working in our industry, as well as policymakers, may not recall the impact this event had on our economy, nor do many recognize how complex our bulk electric system is and the risks it faces.

As these threats evolve, we are evolving with them. First and foremost, we are staying diligent in identifying and removing well-known and well-established threats. With guidance from our Board of Directors, our partnership with NERC, and the tireless work of our staff and 300+ bulk electric system partners who produce and transport our energy, we are working to ensure we don't drift back on the progress we have made. This report highlights those essential efforts.

Second, we must continue to work proactively to identify, assess, and communicate new and emerging threats, some of which may be currently unknown, to the reliability and security of the bulk power system. It is imperative that RF work with industry to understand and address these risks when they are small and hopefully before they are experienced.

Lastly, we must continue to work with policymakers to share our knowledge and analysis so they can make informed decisions. These policy decisions have far-reaching and long-lasting impacts and must be made with a complete understanding of the risks and benefits. Much of our policy discussions are directed at the "Energy Transition." This transition involves a significant structural change to our bulk electric system regarding the supply and consumption of energy resources. We must give a voice to the risks of this transition and its impact on the reliability and resiliency of our electric grid.

As we pursue the transition to alternative energy resources, we must proceed with caution to avoid unintended consequences. We will need time, funding, and technological advancements to fully understand the environmental impact, the long-term cost to consumers, and the liability inherent in adding new asset types to our bulk electric system. We can do this if we continue to work together.

This report is a testament to that hard work and a reminder of the progress we have made over the last 20 years. We are immensely proud of the Reliability First team, our ERO counterparts, our partners at NERC, and the diligent efforts of our 300+ bulk electric system partners who collaborate across our footprint to bring us reliable, resilient, and life-changing energy resources.

Sincerely,

Antonio Smyth - *Chair*

Tim Gallagher, President - *CEO*

TABLE OF CONTENTS

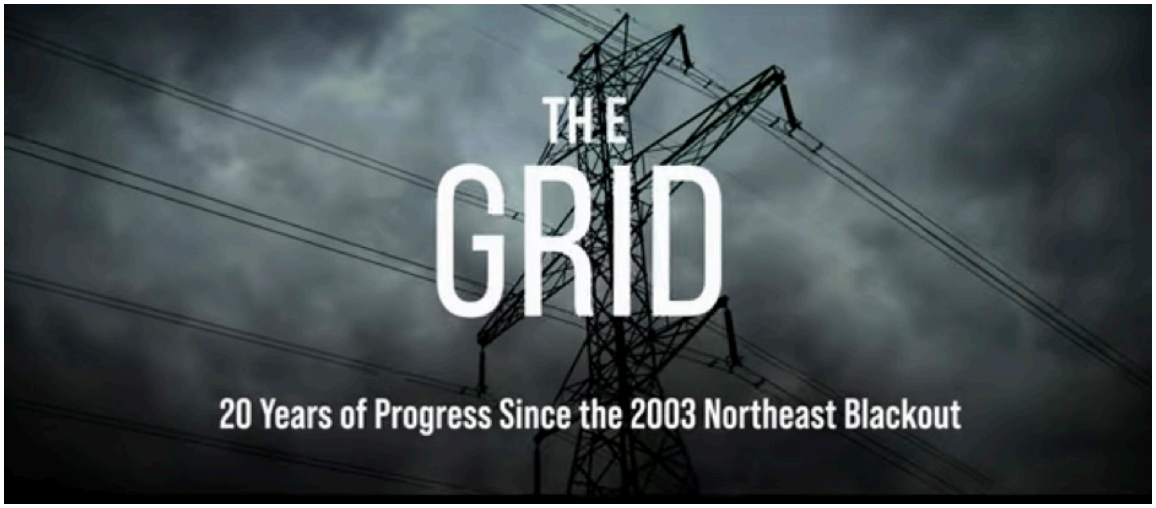
THE GRID

The Grid: 20 Years of Progress Since the 2003 Northeast Blackout

Aug. 14, 2003 marks the 20th anniversary of the 2003 Northeast blackout, which impacted 50 million North Americans across Michigan, Ohio, Pennsylvania, New York and Ontario.

The blackout, the largest ever experienced in North America, prompted the Energy Policy Act of 2005, which created an electric reliability organization (ERO) charged with developing and enforcing mandatory Reliability Standards, assessing current and future reliability trends, analyzing system events, and recommending improved practices.

This video was created by Reliability First, NERC and NPCC to reflect on the progress made since then toward a more reliable and resilient electric grid. (https://youtu.be/sKXVT0V7SQY)



ABOUT RELIABILITY FIRST

The electric grid is a vital component of our daily lives. It delivers power from its source to our homes, schools, hospitals, and businesses. The electric grid is often unseen, but it plays a crucial role in our economy, national security, and public welfare.

RF is one of six regional organizations that make up the Electric Reliability Organization (ERO) enterprise, which is responsible for ensuring the reliability and security of the North American Bulk Electric System. We receive our authority from the North American Reliability Electric Corporation (NERC) and the Federal Energy Regulatory Commission (FERC). We are responsible for mandatory and enforceable Reliability Standards developed by the industry and enforced by NERC.

Our team at RF works with regional utility companies to identify and prioritize risks to the electric grid and develop mitigation strategies. We achieve this through education, outreach, sharing of best practices, and enforcing mandated standards that regulate the bulk electric system. In addition, we conduct periodic short—and long-term assessments of grid reliability, including analysis of emerging risks.

One of the critical roles we play is working with state governments and policy makers on Energy Transition issues. As we shift from traditional energy sources like coal, nuclear, and natural gas to more renewable sources like solar and wind, policy decisions are essential to managing risks. We serve as a resource to "shine a light" on the risks and issues affecting grid reliability and security matters. We are an independent voice that state representatives can call for input on energy policy decisions.

Our footprint covers all or portions of Delaware, New Jersey, Pennsylvania, Maryland, Virginia, Illinois, Wisconsin, Indiana, Ohio, Michigan, Kentucky, West Virginia, Tennessee, and the District of Columbia. Our region is situated within the Eastern Interconnection, and we regulate not only utilities but also PJM and MISO, the two regional transmission organizations in our footprint. We work with NERC and the five other regions, MRO, NPCC, SERC, Texas RE, and WECC, towards our shared mission.

ABOUT RELIABILITY FIRST (continued)

Our work is interconnected with external stakeholders from other industries, including critical infrastructure like water, gas, communications, federal agencies, law enforcement, trade associations, and beyond. We believe that our people are our greatest asset, and their diverse backgrounds, skills, and experiences drive our success and keep the lights on.

Our Mission

To serve the public good and support health and safety through preserving and enhancing the reliability, security, and resilience of the grid.

Our People

To foster a respectful, collaborative environment where employees can be and feel like the best version of themselves.

Our Transparency

To be open and honest about what we are trying to accomplish and why, to foster productive dialogue.

Our Accountability

To act with integrity, take pride in our work and responsibility for our actions, and deliver exceptional results.

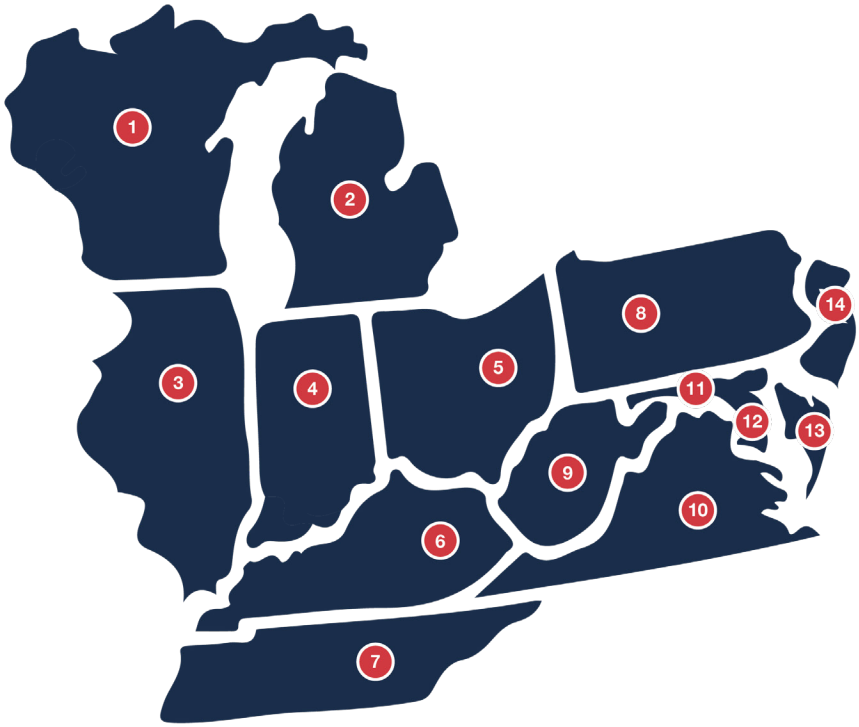
Our Fairness

To be resonable and consistent.

Our Creativity

To encourage and reward innovative ideas and approaches.

RF AT A GLANCE



1- Wisconsin
2- Michigan
3- Illinois
4- Indiana
5- Ohio
6- Kentucky
7- Tennessee
8- Pennsylvania
9- West Virginia
10- Virginia
11- Maryland
12- DC
13- Delaware
14- New Jersey

13	247,863	87M	1,153	301
states	square miles	estimated population	generating units	registered entities

RF is committed to continuously improving while being mindful of our changing operating environment. Our services are designed to assist our entities in mitigating risks to the BES through compliance and collaboration and include:

- **Engineering & System Performance**
- **Entity Engagement & Training and Outreach**
- **Enforcement**
- **Operational Analysis & Awareness**
- **Registration and Certification**
- **Resilience & Risk**
- **Risk Analysis & Mitigation; Standards**

GOVERNANCE

Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

RF has a hybrid board structure designed to represent our unique history, commitment to independence, and deep industry knowledge. Our Board structure was designed to ensure balanced representation from the various entities across our footprint. This includes three (3) at-large directors, four (4) independent directors, and eight (8) industry directors.

Our Board of Directors

Stephen Ambrose
Vice President and Chief Information Officer, DTE Energy

Patrick Cass, Lead Independent Director
Senior Vice President of Grid Planning and Intefration, Duke Energy.

Timothy R. Gallagher
President and Chief Executive Officer, ReliabilityFirst

Nelson Peeler, Vice Chair
Senior Vice President of Grid Planning and Intefration, Duke Energy.

Antonio Smith, Chair
Executive Vice President of Grid Solutions and Government Affairs, American Electric Power (AEP).

Jennifer T. Sterling
Vice President, NERC Compliance & Security, Exelon

Simon Whitelocke
Vice President of ITC Holdings Corporation and President of ITC Michigan

Joanna Burkey
Former Chief Information Security Officer, Hewlett Packard

Lesley Evancho
Chief Human Resources Officer, EQT

Scott Hipkins
Vice President, Cyber Security and CISO, FirstEnergy Corp.

Ken Seiler
Vice President, System Planning, PJM

Rachel W. Snead
Director, Environmental Services, Dominion Energy

Joe Trentacosta
Senior Vice President and Chief Information Officer (CIO), Southern Maryland Electric Cooperative (SMECO)

GOVERNANCE (continued)

RF Senior Leadership

Our leadership team is passionate about ensuring the reliability and security of the Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

Jeff Craigo
Senior Vice President, Reliability & Risk.

Beth Ann Dowdell
Senior Director of Corporate Services and Treasurer

Tim Gallagher
President and Chief Executive Officer

Diane Holder
Vice President, Entity Engagement and Corporate Services

Erik Johnson
Director, Reliability Analysis

Marcus Noel
Vice President and Chief Security Officer

Niki Schaefer
Vice President and General Counsel

Kristen Senk
Director, Legal and Enforcement

Brian Thiry
Director, Entity Engagement

Matthew Thomas
Director, Compliance Monitoring

Jim Uhrin
Director, Engineering and Reliability Services

Chart

OUR STRATEGIC PLAN

In 2023, we completed the first year of our five-year Strategic Plan. This strategic plan provides a road map for our efforts based on three strategic objectives:

1

Be an Excellent Regulator

- Consistently demonstrate accountability, transparency, and efficiency through our operating model.
- Commit resources to collaboration and security.
- Build a deep knowledge of our entities and use it to serve our footprint.

2

Cultivate a Highly Engaged Talented Workforce

- Recruit, retain, and train the right people for the right roles.
- Further enhance and promote diversity, equity, and inclusion.
- Prioritize our positive workplace culture.

3

Harness Knowledge to Comprehensively Address Risk

- Quickly deploy communications to mitigate risk based on our data and perspective.
- Create targeted outreach strategies.
- Enhance our value as an independent resource to broaden our reach.

These objectives inform how we use our authority to achieve our mission. The strategic plan highlights supporting initiatives and notes how we will measure and monitor our performance. Our strategic plan is in direct alignment with our program areas and is intended to bolster the quality and responsiveness of our services.

COLLABORATION

As a regulator, RF has the authority to impose penalties on entities that violate standards. However, we know well, that "you cannot punish your way to excellence." That is why our collaborative outreach efforts are essential to helping us mitigate risks.

RF conducts monthly programs and events to bring the bulk electric system entities and partners together to share insights and provide learning opportunities, including:

- **Appraisals (Community and Entity)**
- **Assessment Tools**
- **Assist Visits**
- **Committees and Conferences**
- **Newsletters**
- **Research, Reports, and Thought Leadership**
- **Webinars and Workshops**

Appraisals (Community and Entity)

- **Community Appraisals** assess the readiness, preparedness, and resource strength of communities in our footprint to withstand long-term disruptions to electrical power and other threats.
- **Entity Appraisals** assess our registered entities' management practices to identify risks, best practices, and opportunities for improvement.

Assessment Tools

- Our **Incident Response Preparedness Assessment Tool (IRPAT)** evaluates information technology systems' readiness, preparedness, and robustness by performing simulated cyber or physical incident exercises.
- Our **Cyber Resilience Assessment Tool (CRAT)** is a qualitative self-assessment tool that allows entities to evaluate and benchmark their cyber resilience posture and effectiveness.

Assist Visits

- **RF pioneered Assist Visits** with our entities and are available to address specific program improvements or may pertain to specific approaches for implementing reliability standards.

COLLABORATION (continued)

Committees and Conferences

- RF staff participates in numerous committees as leaders and subject matter experts designed to address risk issues, including critical infrastructure protection, transmission planning, protection, generation, standards, and human performance.
- RF staff participate and present at industry conferences to share insights, research, and best practices.

Newsletters

- RF publishes a quarterly newsletter as a value-added channel to share updates on standards, discuss industry issues, communicate collaboration efforts, and share insights from research and work through our various committees and events.
- **State Outreach Newsletters –** Targeted to regional policymakers to provide pertinent information regarding risks to the BES.

Research, Reports, and Thought Leadership

- **Interregional Transfer Capability Study (ITCS):** RF and our regional ERO counterparts are collaborating with NERC to conduct an Interregional Transfer Capability Study (ITCS). The study, directed by the Fiscal Responsibility Act of 2023, will analyze the amount of power that can be moved or transferred reliably from one area of the interconnected transmission systems to another. Transfer capability is a critical measure of addressing energy deficiencies by relying on distant resources and is vital as the resource mix continues to change.
- **Regional Risk Assessment (RRA):** Profiles the top risks to the RF footprint.
- **Resource Reliability Risk Assessment:** This assessment evaluates the region's capability to meet its planning reserve requirements under random resource outage scenarios based on historic Generator Availability Data System (GADS) outage data.
- **NERC/RF Winter and Long-Term Reliability Resource Risk Assessment:** This report is designed to identify seasonal risks associated with having enough generation resources and import capability to reliably serve anticipated load demand.

Webinars and Workshops

- Throughout the year, RF holds webinars, workshops (Monthly Tech Talks), and training programs to bring entities and stakeholders together to discuss critical topics of interest, including Protection Systems, Human Performance, Winterization, Reliability Standards, and State Energy Policy.

AN EXCELLENT REGULATOR

Strategic Plan – Be an Excellent Regulator

In our quest to "Be an Excellent Regulator," we work to ensure that we are getting better at all compliance monitoring and enforcement aspects and align our efforts based on risk.
We use Compliance Oversight Plans and Inherent Risk Assessments to guide our efforts, which are integrated into our Compliance Monitoring and Enforcement Program (CMEP). The RF CMEP is segmented into two groups:

- **Critical Infrastructure Protection (CIP)**
- **Operations and Planning (O&P)**

Our responsibility is to ensure registered entities comply with the NERC Reliability Standards through tools such as:

- **Compliance Auditing:** An in-depth look at the reliability, security, internal controls, and culture of our entities. The focus is on mandated Standards, entity performance, and the inherent risks of entity assets.
- **Self-certifications:** Monitoring methods in which an Entity completes a self-assessment of its compliance activities with applicable standards and requirements and submits substantiating evidence that validates compliance.
- **Spot checks:** Tools used to audit smaller scopes focusing on a single risk or two. These processes are designed to comply with rules and regulations at federal, state, and local levels as well as NERC Reliability Standards that impact the bulk electric system.

Photo

AN EXCELLENT REGULATOR (continued)

Noncompliance Trends and Takeaways

Environmental Factors: Naturally occurring phenomena, such as extreme weather and vegetation-related issues.

- RF adopted a new approach for performing field walk-downs, working directly with field and compliance personnel to discuss and address vegetation-related reliability risks.
- RF offers a vegetation management Community of Practice for entities interested in sharing best practices.
- Winterization: We Conducted 23 surveys and 16 entity site visits in 2023, compared to 23 surveys and 11 site visits the previous year, an increase of 45.5% in site visits.

Cyber Security: Involves the compromise of information and operational technology systems that support, monitor, and control the electric grid.

- RF is monitoring the increasing trend of violations for CIP-007-6 R2 (Security Patch Management).
- In 2023, we improved our internal control review process and conducted a pilot exercise during our February Internal Controls Workshop with the ERO to evaluate internal control programs holistically; however, particular focus was placed on Electronic Security Perimeters and System Security Management.

Supply Chain: The compromise of the availability of equipment, tools, and resources that result in the delay or disruption of system operations.

- Supply chain issues are causing delays and/or cancellations of solar projects.
- As retirements of conventional resources increase, supply chain delays could impact reliability.

Changing Resource Mix: The transformation of generating resources from traditional sources to renewables is creating new reliability risks.

- The pace of change has increased the risk of resource deficiencies as early as 2028.
- State policies related to carbon emissions and increases in customer demand could advance this risk.
- We perform planning studies evaluating high-risk generation and load change scenarios.

Situational Awareness: The understanding of an environment, its elements, and how it changes with respect to time or other factors often monitored through Energy Management Systems (EMS) and Supervisory Control and Data Acquisition (SCADA) systems among others.

- Real-Time Assessments (RTAs) are critical in how the operators anticipate, respond, and react to changing conditions on the grid.

AN EXCELLENT REGULATOR (continued)

Noncompliance Trends and Takeaways (continued)

Physical Security: The protection of assets like substations, transformers, generating facilities, and control centers from threats that may compromise their intended operation.

- Physical security incidents have increased 71% since 2021. However, no physical attacks in the RF footprint.
- Advances in technology (drones) and distributed and decentralized assets pose an increasing threat.

Misoperations: The failure of a protection system to operate as intended, resulting in potential transmission outages.

- The RF region has significantly reduced the number of misoperations through compliance and collaboration efforts, such as enforcing the NERC Reliability Standards and conducting collaborative outreach through our Protection Subcommittee and other efforts.
- Misoperations have reduced from 13.64% in 2014 to 7.78% in 2023 (Q1-Q3), a 42.96% Reduction.
- Misoperations related to human performance issues have declined by 58% over the last 4 years.

Modeling: The sufficient representation of transmission and generation elements to model the electric grid and perform analysis that enhances situational awareness and system planning. The key to this is facility ratings, which are the maximum or minimum voltage, current, frequency, or real or reactive power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility.

- We monitor the time it takes entities to detect and report violations and the frequency of occurrences.
- We perform planning studies evaluating high-risk generation and load change scenarios.

Situational Awareness: The understanding of an environment, its elements, and how it changes with respect to time or other factors often monitored through Energy Management Systems (EMS) and Supervisory Control and Data Acquisition (SCADA) systems among others.

- Real-Time Assessments (RTAs) are critical in how the operators anticipate, respond, and react to changing conditions on the grid.

CULTIVATE A HIGHLY ENGAGED & TALENTED WORKFORCE

We are more than just a team – we are a community of dedicated professionals committed to ensuring the reliability and security of the electric grid. Our employees are passionate about the work they do and the impact they make on the reliability and security of the electricity grid.

At RF, we strongly encourage personal development. We expect our team members to grow both personally and professionally. We provide ample resources and opportunities to support this growth. We firmly believe that investing in our people is an investment in the future of our organization.

Diversity, Equity, Inclusion & Belonging (DEIB)

At RF, we strongly believe in promoting DEIB. We understand that our success depends on the unique perspectives, experiences, and skills of our employees, stakeholders, and partners. We are committed to cultivating a culture of belonging where everyone is valued, respected, and empowered to contribute towards our goal of ensuring the reliability, security, and resilience of the electric grid.

RF has taken several actions to improve DEIB in our organization and industry, such as:

- Establishing a council of employees from various departments and levels to provide guidance and oversight on DEIB initiatives.
- Conduct regular employee surveys and focus groups to assess the current state of DEIB.
- Providing DEIB training for all employees and managers to raise awareness and foster inclusive behaviors.
- Participating in external DEIB events and programs, such as the North American Electric Reliability Corporation (NERC) Diversity Forum and the Women in Energy Leadership Forum.
- Align DEIB goals with organizational strategy and hold senior leaders accountable for their implementation and outcomes.

The Results:

31%

Female on BOD

46%

Minorities, veterans, people with disabilities

38%

Women in leadership positions, manager, and above

We are proud of selection by the Cleveland Plain Dealer as one of the Top Workplaces for 2023.

RF IN OUR COMMUNITIES

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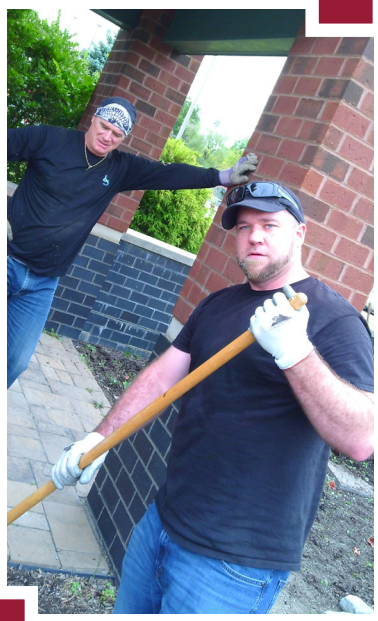

HARNESS KNOWLEDGE TO COMPREHENSIVELY ADDRESS RISK

REGIONAL RISK PROFILE

As part of our strategic plan to Harness Knowledge to Comprehensively Address Risk, RF completed its Regional Risk Assessment (RRA), identifying eight (8) top risk factors and their priority for the region. As the risks to the (BES) continue to evolve, RF has updated its activities, approaches, and programs accordingly.

Priority	Risk	Description
1	**Environmental Factors**	Naturally occurring phenomena, such as extreme weather and vegetation related issues.
2	**Cyber Security**	The steps and means to protect the collection of information technology systems that monitor and control the electric grid.
3	**Supply Chain**	The compromise or impact to the availability of equipment, tools, and resources (e.g. raw materials, etc.)
4	**Changing Resource Mix**	Public inputs and market conditions, along with the influence of regulatory and socio-economic policies, are continuing to drive both the retirement and acceleration of different resource types.
5	**Physical Security**	The protection of assets like substations, transformers, generating facilities, and control centers from threats that may compromise the unintended operation or purpose of those assets.
6	**Misoperations**	The failure of a protection system to operate as intended, resulting in the exacerbation of unplanned transmission outages that re not being actively monitored or planned.
8	**Modeling**	Having sufficient representation of transmission and generation elements to model the electric grid and perform analysis that enhances situational awareness and system planning.
9	**Situational Awareness**	Comprising the availability of information (e.g., unexpected outages of tools, or planned outages without appropriate coordination or oversight) that leaves system operators without visibility to some or all of the systems they operate.

STATE OUTREACH

Strategic Plan - Harness Knowledge to Comprehensively Address Risk

RF and the ERO Enterprise have focused on serving as technical resources for the state's policy-making bodies on risk and reliability issues during this critical time of energy transition.

With experts in power system engineering, control room operations, planning, and cyber and physical security, we are an independent, credible resource for state policymakers to rely upon.

We discuss and testify on important reliability and security issues when needed. Three areas of specific concern when engaging with state policymakers are:

Addressing the Pace of Change:	As retirements to existing resources occur, how do we address the gaps left behind?
Understanding Resource Adequacy:	How do we ensure enough supply to meet demand? Do we fully understand resource availability and its impact on providing reliable electric service?
Essential Reliability Services:	Do we understand the technical aspects of grid reliability based on power system dynamics that keep the grid balanced and stable (voltage/frequency/ramping capability)? How do resource losses and introducing new resources with different characteristics impact the BES from a technical perspective?

We work hard to provide sound guidance on risks to the grid, so our policymakers have the information they need to act in our state's best interests.
2023 State Outreach testimonies included:

- **Feb –** Pennsylvania Senate
- **April –** Illinois Senate
- **Nov –** Joint PA/OH Senate
- **Dec –** WV Joint House / Senate

OUR VALUE

RF was created in response to the 2003 blackout, which had a tremendous impact on our region. Our region lost lives and billions of dollars in business activity. Our reliance on the bulk electric system has grown exponentially since then and remains highly reliable and secure. That is why RF, its regional ERO partners, and NERC's work are vital to our communities and our way of life.

Consumers pay about a nickel a month for our collective services. That comes with the peace of mind of knowing that when the switch is flipped, the lights will come on.

BODY PARAGRAPH FONT OPTIONS

Helvetica Neue (current)
Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

Calibri
Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

Aileron
Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

DM Sans
Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

Aktiv Grotesk
Our leadership team is passionate about ensuring the reliability and security of our Bulk Power System, while hiring and supporting top-caliber employees to support this mission.

2023 HIGHLIGHTS - SCORECARD