



Agenda

Board of Directors • Risk and Compliance Committee

April 30, 2025 • 12:45 PM – 3:00 PM (ET)

ReliabilityFirst Corporation
3 Summit Park Drive
Cleveland, OH 44131

Room: Closed, Ohio, 6th Floor; Open, 5th Floor, Suite 500

Attire: Business Casual

Closed Agenda – Location Ohio, 6th Floor

- 1. Confidential Compliance and Enforcement Matters** 12:45 pm
Presenter: Kristen Senk, Deputy General Counsel and Director, Legal and Enforcement, Matt Thomas, Director, Compliance and Monitoring, and Tom Scanlon, Senior Managing Counsel, Enforcement.
Description: Ms. Senk, Mr. Thomas, and Mr. Scanlon will present confidential matters and an overview of the confidential documents.
Reference: [Confidential Documents](#)
Action: Information and Discussion

Open Agenda

- 2. Call to Order and Appoint Secretary to Record Minutes** 1:15 pm
Presenter: Ken Seiler, Chair
- 3. Antitrust Statement** 1:20 pm
Presenter: Ken Seiler, Chair
- 4. Consent Items** 1:25 pm
Presenter: Ken Seiler, Chair
Reference: a) [Draft Minutes for the December 4, 2024 Risk and Compliance Committee Meeting](#)
b) [Enforcement Data \(Reference Materials\)](#)
Action: **Approve Consent Items**
- 5. Keynote Speaker** 1:30 pm
Presenter: Chair Daniel Scripps, Michigan Public Service Commission
Reference: [Bio](#)

- 6. Standards Overview and Update** 1:55 pm
Presenter: Soo Jin Kim, Vice President, Engineering, Standards, and PRISM, NERC
Description: Ms. Kim will provide an update on recent standards activities, with a focus on Inverter-Based Resources, the cold weather standard, and other important developments.
Reference: [Presentation](#)
Action: Information and Discussion
- 7. MISO Trends and Challenges** 2:15 pm
Presenter: Dr. Renuka Chatterjee, Vice President of Operations, MISO
Description: Dr. Chatterjee will discuss operating the grid of the future in the MISO territory, including forecasts, challenges, and mitigation strategies relating to resource adequacy.
Reference: [Presentation](#)
Action: Information and Discussion
- 8. Distributed Energy Resource (DER) Aggregators and Cybersecurity Risk** 2:40 pm
Presenter: Lindsey Mannion, Principal Technical Auditor, ReliabilityFirst
Description: Ms. Mannion will lead a discussion on DER Aggregators, explaining what they are and how they operate, and provide an overview of the new cybersecurity risks they may pose to the security of the Bulk Electric System.
Reference: [Presentation](#)
Action: Information and Discussion
- 9. Next Meeting** 2:55 pm
• August 27, 2025 • Farmington, PA
- 10. Adjourn** 3:00 pm

Roster • Risk and Compliance Committee

Ken Seiler, **Chair** • Independent (2026)
Joanna Burkey • Lead Independent (2025)
Melika Carroll • Independent (2027)
Dr. Renuka Chatterjee • MISO (T • 2027)
Lesley Evancho • Independent (2025)
Craig Grooms • Buckeye Power (S-LSE • 2026)
Robert Taylor • Invenergy (AT • 2027)

Confidential Documents

a) Draft Minutes for the December 4, 2024 Risk and Compliance Committee Meeting



RELIABILITY FIRST

PUBLIC

DRAFT - Minutes **Board of Directors • Risk and Compliance Committee**

December 4, 2024

NERC Offices • Washington, DC

Closed Session

Confidential Compliance & Enforcement Matters – Kristen Senk, RF's Deputy General Counsel and Director of Legal & Enforcement, Tom Scanlon, RF's Senior Managing Enforcement Counsel, and Matt Thomas, RF's Director of Compliance Monitoring, presented on confidential matters. Ms. Senk discussed the enforcement workload and process.

NERC Oversight Update – Mr. Thomas presented on confidential matters.

Open Session

Call to Order – Chair Joanna Burkey called to order a duly noticed open meeting of the Risk and Compliance Committee (Committee) at 1:04 pm (ET). A quorum was present, consisting of the following members of the Committee: Joanna Burkey, Chair; Lesley Evancho, Melika Carroll, and Ken Seiler. A list of others present during the Committee meeting is set forth in Attachment A.

Appoint Secretary to Record Minutes – Chair Burkey designated Niki Schaefer, ReliabilityFirst's (RF) Vice President and General Counsel, as the secretary to record the meeting minutes.

Antitrust Statement – Chair Burkey advised all present that this meeting is subject to, and all attendees must adhere to, RF's Antitrust Compliance Guidelines.

Consent Items – Chair Burkey introduced the following consent agenda items:

Agenda Item 5(a): Draft Minutes from August 21, 2024 Committee meeting

Agenda Item 5(b): Reference Materials – Registration Data

Agenda Item 5(c): Reference Materials - Enforcement Data

Agenda Item 5(d): Reference Materials - RF Committee and Subcommittee Activities

Upon a motion duly made and seconded, the Committee approved the minutes.

Keynote Speaker – Kal Ayoub, Director of FERC’s Office of Electric Reliability (OER), thanked the Board and praised RF’s outreach efforts, including the monthly Tech Talks and the annual reliability workshops. He then discussed OER’s top priorities, including gas-electric coordination and transmission reform, and highlighted the importance of an open dialogue between state and federal regulators in both of these key areas. Mr. Ayoub noted the alignment of RF’s priorities with FERC’s priorities.

Trends and Challenges in the PJM Territory – Jason Stanek, Executive Director, Government Services at PJM Interconnection (PJM), discussed reliability trends and challenges in the PJM footprint. He first covered the high levels of electricity demand growth (driven in part by data centers) and the peak demand forecast going out to 2039. Mr. Stanek then discussed PJM’s existing installed capacity mix, forecasted retirements, and the influence of policy on these retirements. He presented PJM’s queued capacity by generation type (currently dominated by solar), and shared effective load carrying capacity (ELCC) ratings by generation type.

Mr. Stanek then shared the timeline for additional capacity coming from the interconnection queue, and discussed interconnection queue reform initiatives. He also discussed the 2025/2026 Base Residual auction, noting that the reserve margin is lower than previous years. There was discussion with the Committee regarding the details of PJM’s Reliability Resource Initiative proposal, which is designed to expedite the interconnection of a limited number of shovel-ready generating resources.

Load Transfer Event – Matt Parker, Director of Electric Transmission System Operations at Dominion Energy, gave a presentation on an unplanned data center load transfer event in July 2024. He began by showing a year over year demand forecast, noting how quickly demand is increasing in the Dominion footprint and across the country. He then discussed the load transfer event, where there was a 230 kV line lockout due to a failed lightning arrester. Mr. Parker stated that there was no direct customer load impact, and that a 25,000-amp fault cleared correctly. During the event, a 1,551 MW data center load unexpectedly transferred during protection reclosing. He shared that system operators experienced a high voltage rise and then removed capacity banks in the area to return to nominal voltage.

Mr. Parker shared the next steps Dominion took, including analyzing digital fault recorder data and working with data centers to understand their internal settings and one-lines. Dominion is also partnering with NERC, PJM, and others to evaluate reliability risks and root causes of these types of events, and create action items to help prevent these events from occurring. Jennifer Sterling stated that she is happy to see Dominion working with NERC and PJM on these issues, and that this event serves as a warning sign to the industry to proactively work on data center reliability issues. There was then discussion on the differences between digital load and traditional load, diesel backup generation for data centers, and the impact of crypto mining.

Gas-Electric Coordination: Perspective from the Gas Industry – Mike Starck, Head of Power at EQT, discussed his company and its mission of affordable, more reliable, cleaner energy. He presented graphs showing how consumer energy prices are rising and how power demand is also increasing by large amounts, especially in the PJM footprint. Mr. Starck also presented graphs showing how natural gas production has dramatically increased since 2007 but has recently leveled off. He explained that in recent years, less pipelines have been built, and more pipelines have been cancelled. There was then general discussion with the Committee on various natural gas topics, gas-electric coordination and what is the ideal location of natural gas facilities (e.g., near a large pipeline, near a demand center).

Evaluation of the Committee's Performance – Matt Thomas, Director Compliance Monitoring, presented the Committee Charter and led an evaluation of the Committee's 2024 activities. The Committee confirmed during the evaluation that it met all the obligations within the Committee Charter. Upon a motion duly made and seconded, the Committee accepted the Summary of Performance of Specific Duties for 2024.

Next Meeting – Chair Burkey noted that the next Committee meeting will occur on April 30, 2025, in Cleveland, OH.

Adjourn – Chair Burkey adjourned the Committee meeting at 2:39 pm (ET).

As approved on this 30th day of April, 2025 by the
Compliance Committee,

Niki Schaefer
*Vice President General Counsel & Corporate
Secretary*

Attachment A

Others Present During the Risk and Compliance Committee Meeting

Steve Ambrose • DTE
Allison Archer • MISO
Kal Ayoub • FERC
Steve Bell • Dominion Energy
Dr. Renuka Chatterjee • MISO
Jeff Craigo • ReliabilityFirst
Craig Creamean • Exelon
Michael DeViscio • PJM
Hue DeLuca • ReliabilityFirst
Beth Dowdell • ReliabilityFirst
Chelsey Eppich • ReliabilityFirst
Tim Gallagher • ReliabilityFirst, President & CEO
Craig Grooms • Buckeye Power
Vinit Gupta • ITC
Scott Hipkins • First Energy
Diane Holder • ReliabilityFirst
Christi Klein • ReliabilityFirst
Marcus Noel • ReliabilityFirst
Matthew Parker • Dominion Energy
Nelson Peeler • Duke Energy
William Pezalla • Old Dominion
Tom Scanlon • ReliabilityFirst
Niki Schaefer • ReliabilityFirst
Kristen Senk • ReliabilityFirst
Antonio Smyth • ReliabilityFirst
Rachel Snead • Dominion Energy
Joan Soller • Wabash
Jason Stanek • PJM
Mike Starck • EQT
Jennifer Sterling • Exelon
Robert Taylor • Invenergy
Brian Thiry • ReliabilityFirst
Matt Thomas • ReliabilityFirst
Jody Tortora • ReliabilityFirst
Joe Trentacosta • SMECO
Jim Uhrin • ReliabilityFirst
Becky Webb • Exelon

b) Enforcement Data (Reference Materials)

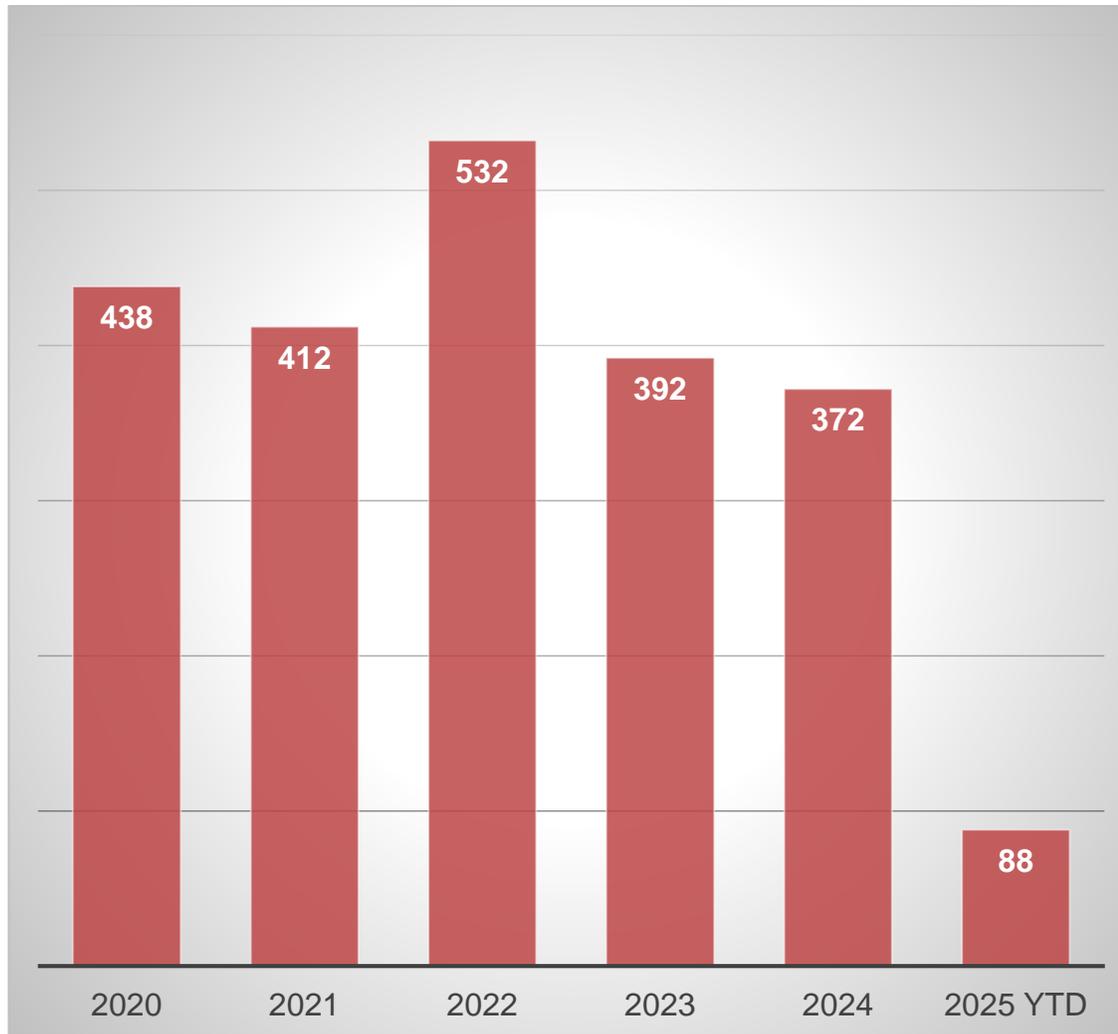
SUMMARY – ENFORCEMENT DATA

The following slides include enforcement data relating to some key enforcement metrics that ReliabilityFirst tracks.

The data shows that violation intake remains high. The overwhelming majority of violations were self-reported or self-logged as opposed to identified through a compliance monitoring engagement. Regarding violations processed (i.e., filed with NERC) between January 1, 2025, and April 8, 2025, most were lower risk violations. The team expects to process over 420 violations by year end. There is a slide summarizing ReliabilityFirst's violation inventory. Most of the cases are considered relatively new, with 57% identified in 2024 and 2025, 33% identified in 2023, 9% identified in 2022, and only 1% identified in 2021.

The last slide includes intake commentary (e.g., examples of the types of conduct at issue) for CIP-004-7 R5, CIP-003-8 R2, CIP-007-6 R2, and FAC-008-5 R6 violations based on recent intake (i.e., cases that were reported between December 2024 and present). Similar commentary was provided in the Reference Materials from the August 21, 2024, and December 4, 2024, Risk and Compliance Committee Meetings.

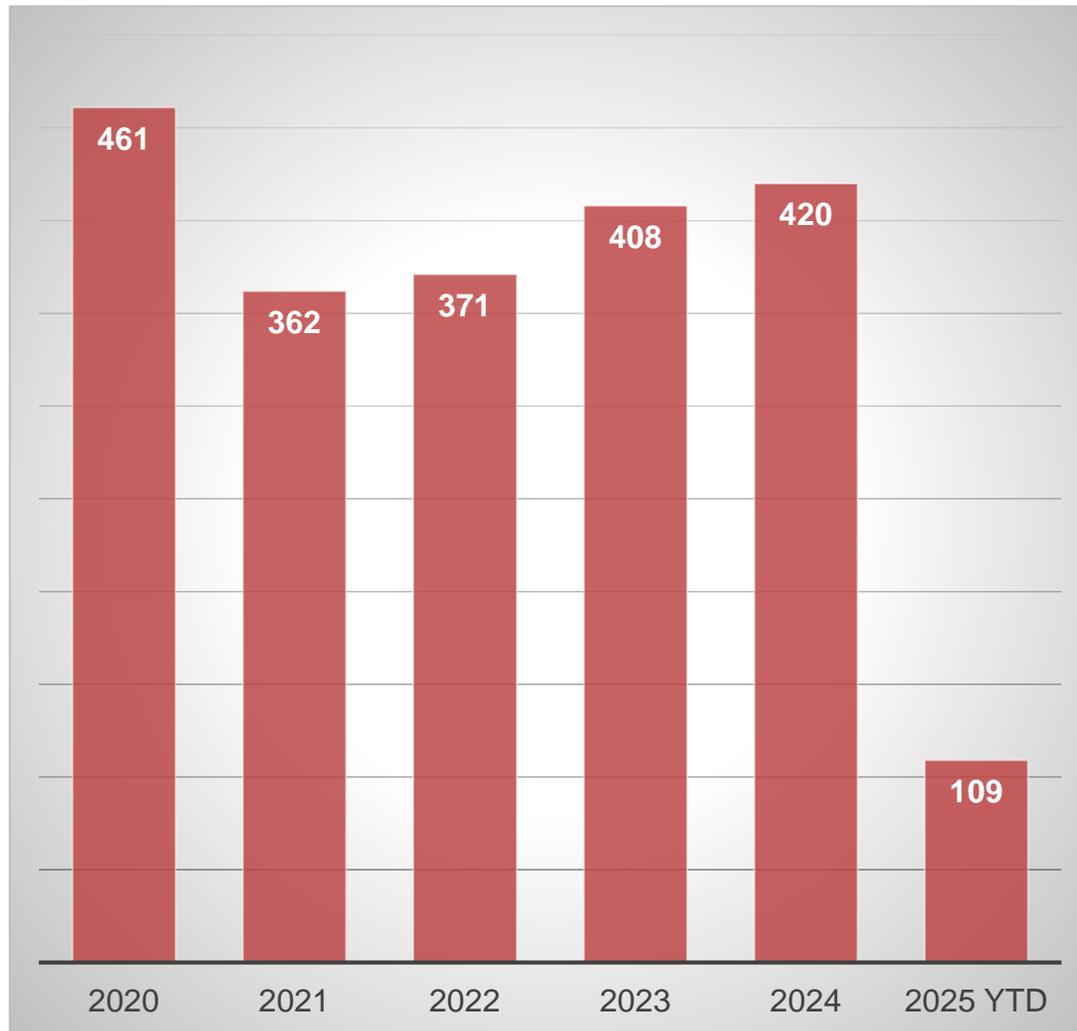
RF ANNUAL VIOLATION INTAKE



2025 Commentary:

- Year-to-date as of 4/8/2025; and
- Majority self-reported/self-logged (~74%).

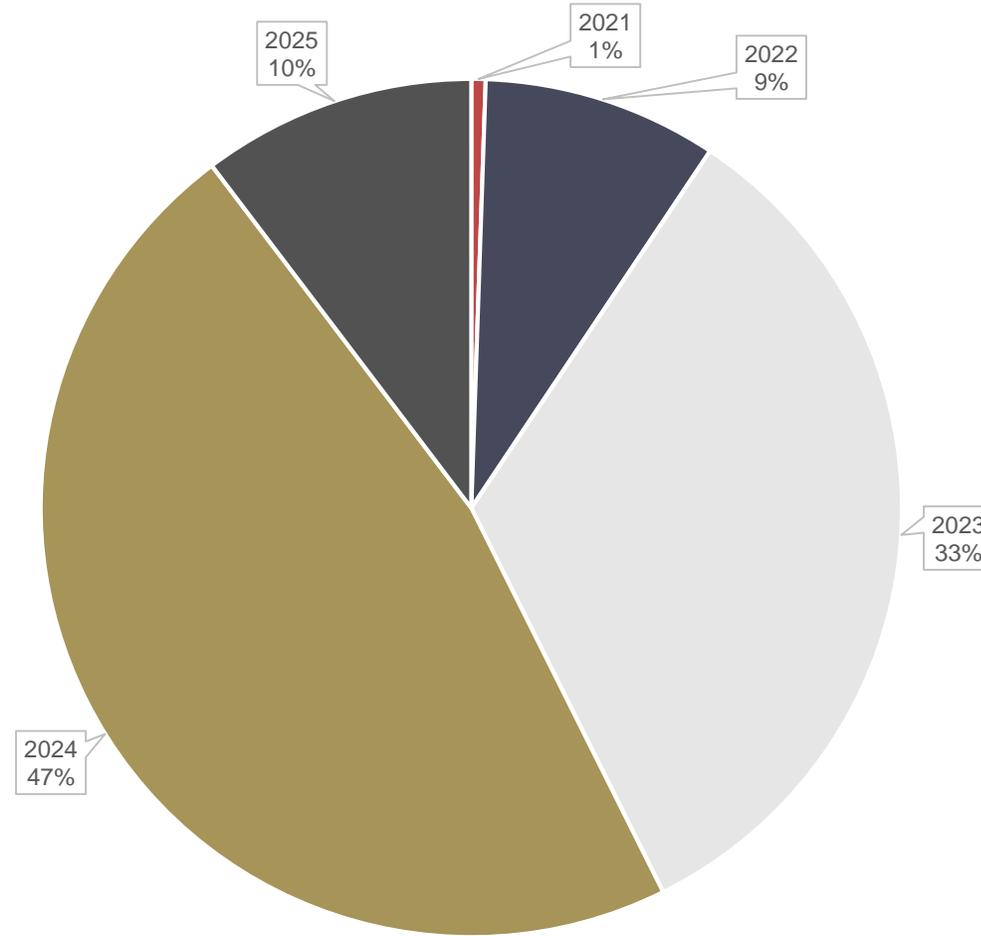
RF ANNUAL VIOLATIONS PROCESSED



2025 Commentary:

- Year-to-date as of 4/8/2025;
- ~89% were processed as Compliance Exceptions or Find, Fix, and Track Reports; and
- Majority CIP (~78%).

RF INVENTORY BY YEAR REPORTED



INTAKE COMMENTARY

Standard and Requirement ¹	Summary of Requirement	Intake Volume	Examples of Issues/Comments
CIP-004-7 R5	Access revocation	15	<ul style="list-style-type: none"> Delinquent revocation of physical and electronic access for employees and contractors
CIP-003-8 R2	Security Management Controls (Low Impact Bulk Electric System Cyber Systems)	8	<ul style="list-style-type: none"> Most instances focus on Cyber Security Incident Response Plans (CSIRP), including plan adequacy and plan testing²
CIP-007-6 R2	Security patch management	5	<ul style="list-style-type: none"> Instances reflect failures to identify patch sources, untimely patch evaluation, and untimely patch applications
FAC-008-5 R6	Establish Facility Ratings consistent with Facility Ratings methodology	5	<ul style="list-style-type: none"> Facility Rating accuracy is critical to modeling, analysis, planning, operations, and relaying, and Facility Ratings continue to be an area of focus³

1 - CIP-010-4 R1 and CIP-004-7 R4 violation intake remain high. Please refer to Reference Materials from the August 21, 2024, Risk and Compliance Meeting for intake commentary specific to these Standards/Requirements, which is still pertinent today.

2 - Please refer to Reference Materials from the December 4, 2024, Risk and Compliance Meeting for additional intake commentary specific to CIP-003-8 R2, which is still pertinent today. The current commentary reflects a shift in reported issues to focus on CSIRP creation and testing.

3 - Please refer to the 2025 ERO Enterprise Compliance Monitoring and Enforcement Program Implementation Plan: <https://www.nerc.com/pa/comp/CAOneStopShop/ERO%20CMEP%20Implementation%20Plan%20v2.0%20-%202025.pdf>.

Bio



Dan Scripps
Commissioner, Michigan Public Service

Dan Scripps was appointed by Governor Gretchen Whitmer to the Michigan Public Service Commission in February 2019 and named Chair in July 2020. His term expires July 2, 2029. As a Commissioner, Mr. Scripps has been an active participant in multiple state energy advisory groups, including the Michigan Council on Climate Solutions, the Upper Peninsula Energy Task Force, the Michigan Dam Safety Task Force, and an

Interdepartmental Workgroup on Propane Security.

Chair Scripps is the immediate past president of the Organization of MISO States and the Mid-America Regulatory Conference. He previously chaired the Regional Expansion Criteria and Benefits Working Group for the Midcontinent Independent System Operator (MISO), helping to develop consensus around cost allocation for the largest-ever portfolio of electric transmission projects in U.S. history.

Mr. Scripps is a member of the Board of Directors of the National Association of Regulatory Utility Commissioners (NARUC) and serves on the Joint Federal-State Task Force on Electric Transmission; the Task Force on Emergency Preparedness, Recovery, and Resiliency; and the Gas-Electric Alignment for Reliability. He is a member of NARUC's Committees on Critical Infrastructure, Gas, and International Relations, and the Washington Action Program. He's also been an active participant with NARUC's international programs, participating in regulatory engagements on four continents.

Mr. Scripps previously served in the Michigan House of Representatives, where he chaired the Banking and Financial Services committee and served on committees dealing with energy, telecommunications, and environmental protection. He has also worked with state and national clean energy trade and philanthropic organizations and practiced law in the Washington D.C. office of a leading global law firm, where he advised regulated utilities, project developers, and financial institutions on cutting edge domestic and international energy projects.

Mr. Scripps is a graduate of Alma College and the University of Michigan Law School. He lives with his family in northern Michigan.

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

IBR Registration and Standards Update

April 2025

RELIABILITY | RESILIENCE | SECURITY

Rules of Procedure Definitions Alignment (GO and GOP) (Project 2024-01)

- Revised Definitions of GO and GOP
- Develop Implementation Plan



NERC Glossary Term: Generator Owner (GO)	
Definitions Proposed for Retirement	Entity that owns and maintains generating Facility(ies).
Modified Definitions	<u>The Entity that: 1) owns and maintains generating Facility(ies) (Category 1 GO); or 2) owns and maintains non-BES Inverter-Based Resource(s) 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 (Category 2 GO).</u>

NERC Glossary Term: Generator Operator (GOP)	
Definitions Proposed for Retirement	The entity that operates generating Facility(ies) and performs the functions of supplying energy and Interconnected Operations Services.
Modified Definitions	The entity that: <u>1) operates generating Facility(ies) and performs the functions of supplying energy and Interconnected Operations Services (Category 1 GOP); or 2) operates non-BES Inverter-Based Resource(s) 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 (Category 2 GOP):</u>

FERC Approval

- TBD

Definition Implementation (Category 1)

- Effective 1st Day of the 1st Calendar Qtr

Definition Implementation (Category 2)

- PRC-028-1, PRC-029, & PRC-030-1 based on their Implementation Plans
- Eight Standards the later of May 15th, 2026

- BAL-001-TRE-2

- PRC-012-2

- VAR-001-5

- IRO-010-5

- PRC-017-1

- VAR-002-4.1

- MOD-032-1

- TOP-003-6.1

- **NERC Analysis Approach**

- Identified Standards using “BES” or other terms
- Reviewed for reliability gaps, compliance gaps, or ambiguity
- Assessed eight Standards were deemed applicable and enforceable by revising GO/GOP only

- **Supplemental Guide**

- Will be maintained in the [IBR Registration Initiative Quick Reference Guide](#)
- Includes: **What** standards need to be complied with for category 2 and **When**



- 45-day Formal Comment Period Open through May 7, 2025
- Ballot Pools Forming through April 22, 2025
- IBR Registration and Standards Applicability Glossary Update SAR

- NERC Project 2024-01 Project Page ([link](#)).
- NERC Project 2024-01 Standards Authorization Request ([link](#)).
- FERC Order 901 ([link](#)).
- Quick Reference Guide: IBR Registration Initiative ([link](#)).
- Reliability Standards Compliance Dates for Generator Owners & Generator Operators ([link](#)).
- ERO Enterprise CMEP Practice Guide([link](#)).



Questions and Answers

MISO



MISO: Trends & Challenges

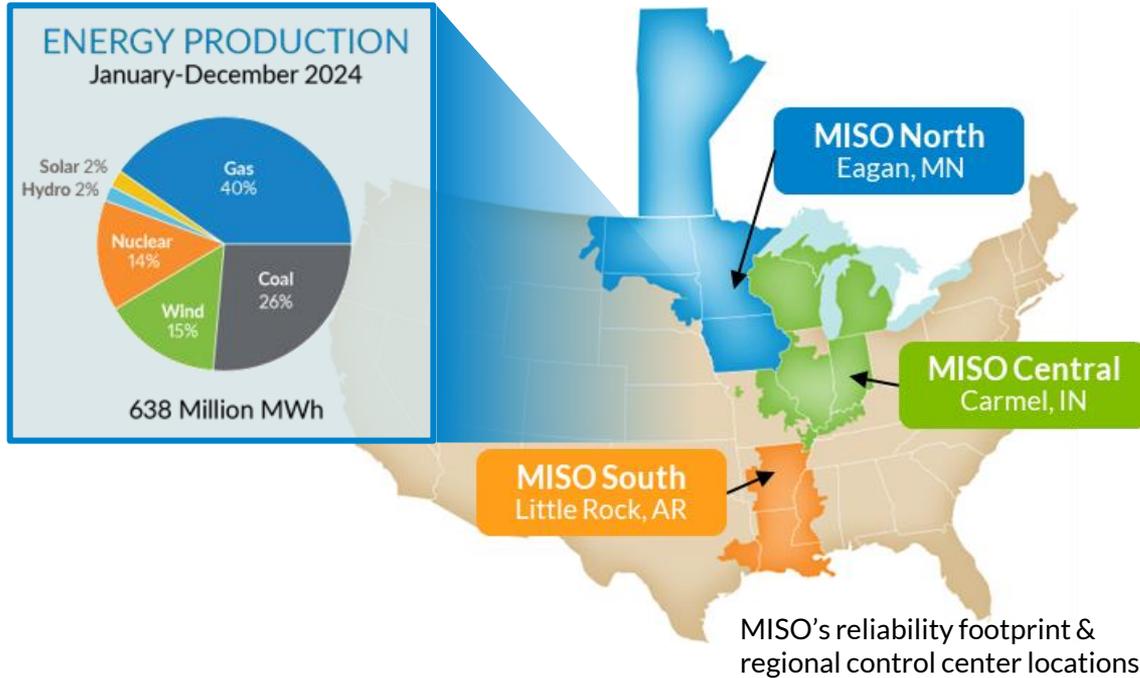
Resource Adequacy Evolution
& the Reliability Imperative

Presented to:
ReliabilityFirst Risk and Compliance Committee

Dr. Renuka Chatterjee

April 30, 2025

MISO is an independent, not-for-profit Regional Transmission Organization (RTO) serving 15 U.S. states and one Canadian province

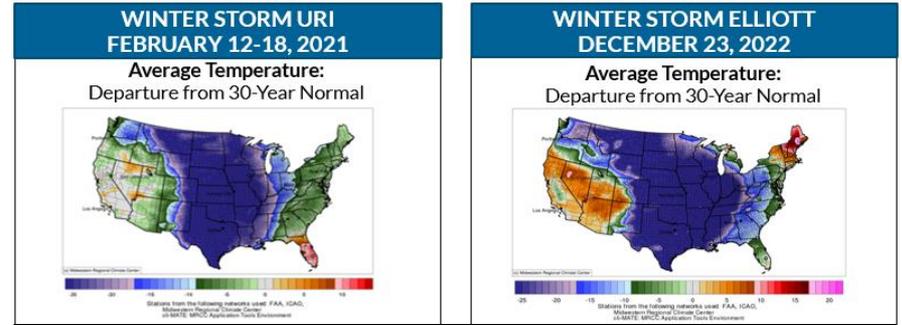


MISO KEY FACTS

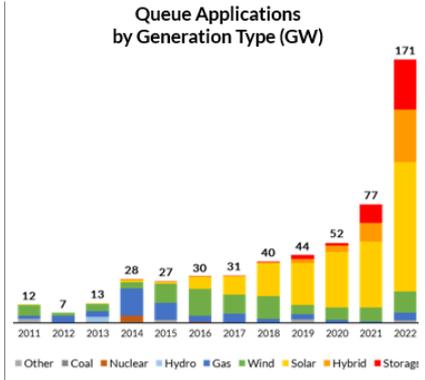
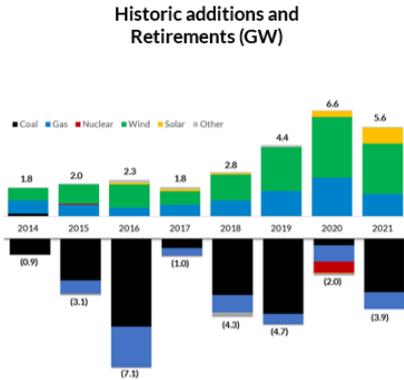
Area Served	15 U.S. States and Manitoba, Canada
Population Served	45 Million
Transmission Line	77,000 Miles
Generating Units	1460
Record Demand	127.1 GW 7/20/2011
Members	60 Transmission Owners
	144 Non-transmission Owners
Market Participants	> 500
Market Transactions	> \$40 billion
Carbon Reduction	Approximately 32% since 2014

MISO is entering a different operating & risk paradigm with increasing extreme weather events and transition to renewables

Extreme Weather Events



Fleet Transition



Non-Summer, Frequent Emergencies

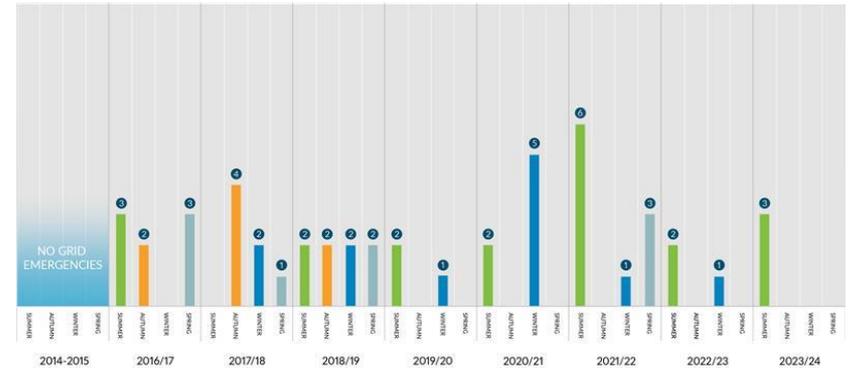
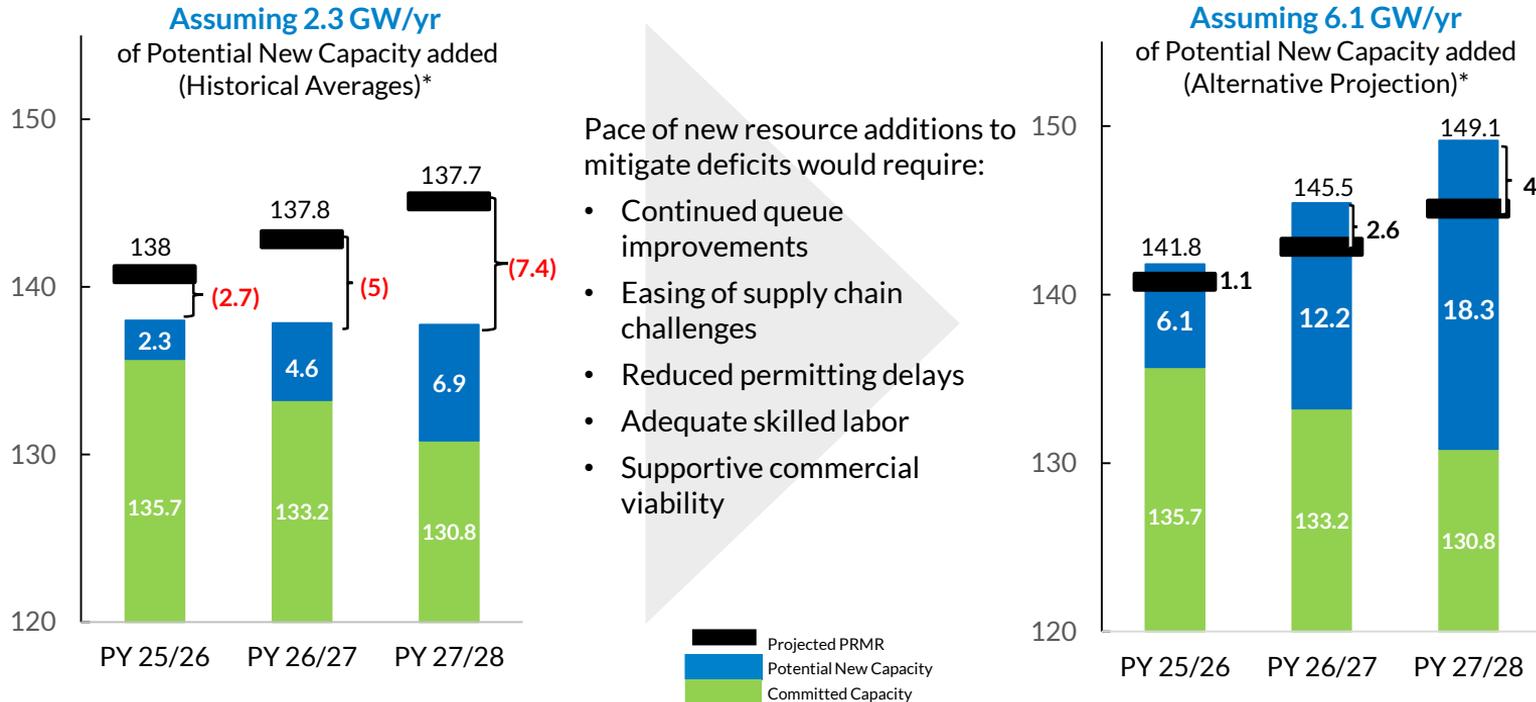


Chart indicates the number of days under a max gen alert, warning or event.

2024 OMS-MISO Survey indicates increasing capacity deficits requiring a dramatically accelerated pace of new build to mitigate

OMS - MISO Survey Resource Adequacy Projections – Summer (Accredited GW)

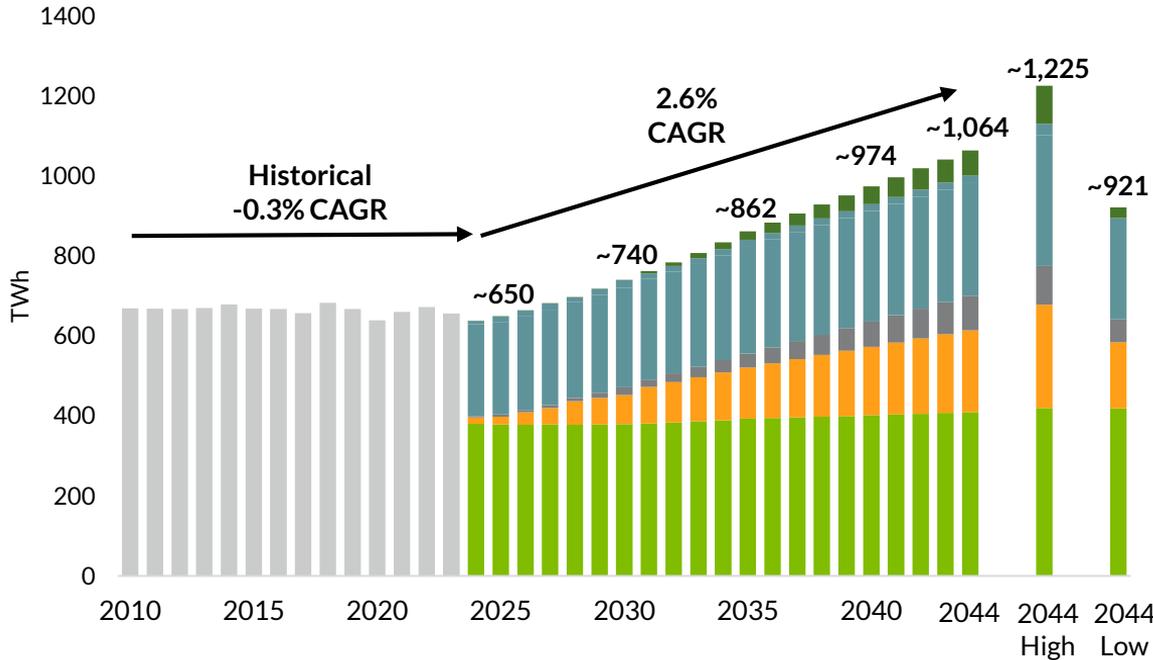


PRMR: Planning Reserve Margin Requirement All references to capacity indicate Seasonal Accredited Capacity (SAC)

* Using methods for Potential New Capacity described in 2024 OMS-MISO Survey presentation

MISO load is projected to grow ~60% through 2040

Historical¹ and Future² Potential Load Demand by Sector



	CAGR % Low-High (2024-44)	Growth TWh Low-High (2024-44)	Level of Certainty*
Hydrogen	27-32	26-95	Low
Industry Development & Reshoring	3-7	21-105	Medium
EVs	14-17	54-91	Medium- High
Data Centers	12-15	149-241	Medium- High
Building Electrification	0.45-0.54	36-43	High

* Expected likelihood of load growth materializing

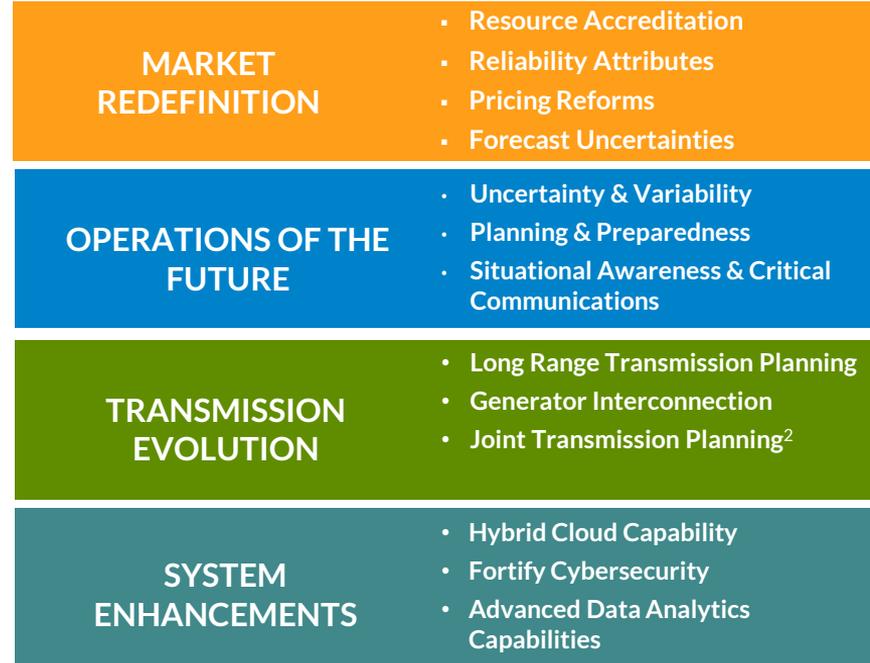
¹ Net Load ² Gross Load CAGR - Compound Annual Growth Rate

Coordinating and executing on the priorities within the Reliability Imperative is required to address challenges to reliability

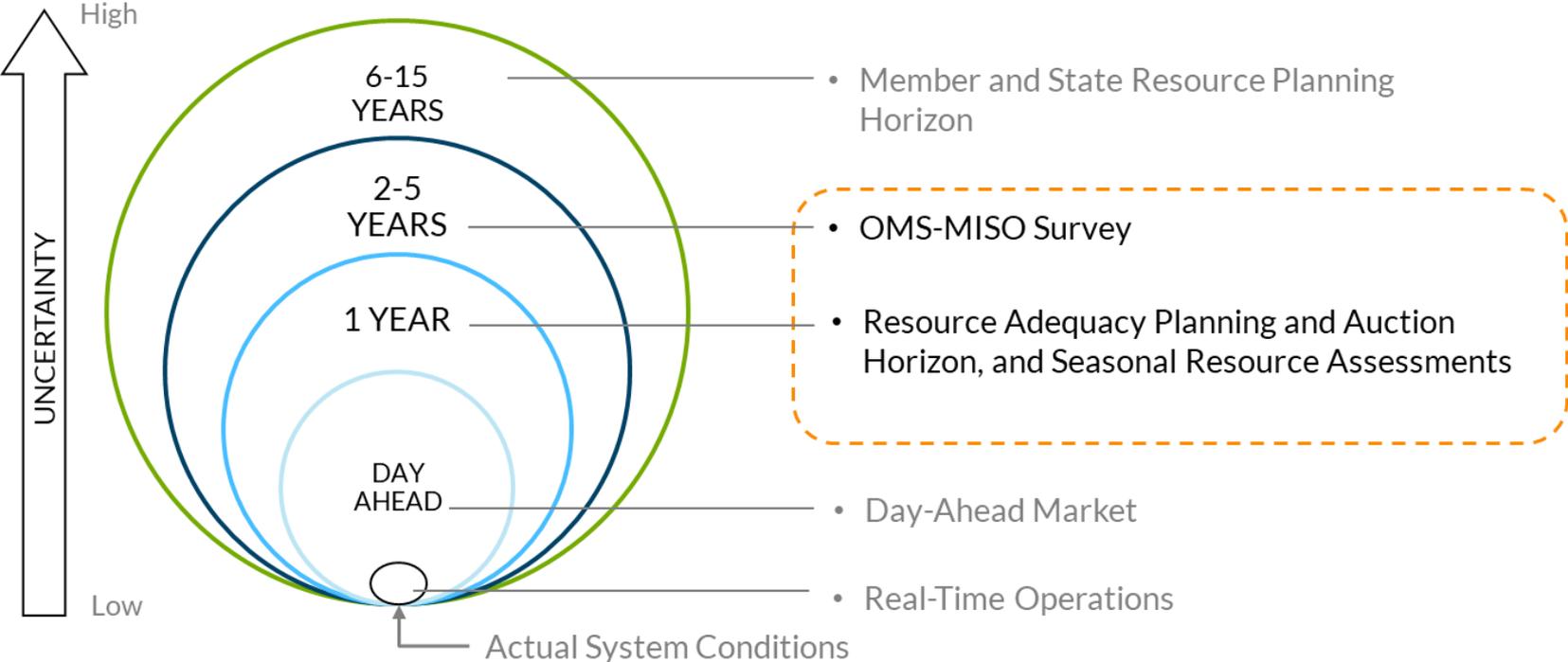
RELIABILITY CHALLENGES

- Attributes needed to ensure reliability will become more scarce
- Extreme weather events are more frequent and severe
- Large single-site load additions and incremental load growth
- Fuel-assurance issues with gas pipelines and other energy infrastructure
- Supply chain and permitting issues are delaying generation projects

KEY INITIATIVES¹



Resource Adequacy planning occurs over multiple time horizons to ultimately ensure sufficient resource availability during operations



Resource adequacy continues to be based on traditional reliability criterion...

1-in-10 LOLE

Quantifies the expected number of days that, on average, the system can be expected to experience loss of load

CURRENT USE

- Widely used across the industry
- Served MISO well in the past and will continue to do so in the near-term
- Used to calculate:
 - Planning Reserve Margin Requirements (PRMR)
 - Resource accreditation for the year and the future

RISKS

- Risk shifting to winter season
- The ability of the future resource fleet to serve load over extended periods of time

IDENTIFIED GAPS

- Does not Account for duration, severity and size of event
- Does not use multiple metrics for more robust risk characterization



...which is foundational to key components of resource adequacy

Requirements

What is needed for reliability

Measures

- Seasonal Planning Reserve Margin Requirements
- Local Reliability Requirement
- Local Clearing Requirement

Probabilistic modeling need

- Loss of Load Expectation study to establish MW needed to ensure no load shed more than one day in 10 years

Accreditation

How resources are counted

Measures

- Availability during historical risk periods
- Availability during modeled risk periods¹

Probabilistic modeling need

- Effective Load-Carrying Capability study to assess reliability contribution from wind
- Loss of Load Expectation study to establish critical hours used to set accreditation for all resources²

Pricing

What is the price of capacity

Measures

- Supply offers
- Demand curve¹
- Planning Resource Auction

Probabilistic modeling need

- Loss of Load Expectation study to establish reliability-based demand curves for use in the Planning Resource Auction

MISO continues to evolve its resource adequacy construct to meet the needs of the changing operating paradigm and associated risk profile



In tandem with the evolving resource adequacy construct, MISO continues to enhance its probabilistic model

Recent enhancements

- Cold-weather outage adder
- Planned outages
- Seasonal outage rates

Long-term focus

- Transmission Modeling
- External assistance
- Exploring Economics

Near-term focus

- Correlated events
- Planned outages
- Load forecasting
- Storage modeling
- Demand-side validation

We have completed a number of foundational initiatives

MARKET REDEFINITION

Completed

- ✓ Attributes Roadmap published
- ✓ Seasonal Resource Auction (2024-25 PRA)
- ✓ Accreditation - Direct Loss of Load (2028-29 PRA)
- ✓ Reliability Based Demand Curve (2025-26 PRA)
- ✓ Value of Loss Load FERC Filing
- ✓ Shortage Pricing FERC Filing
- ✓ Demand Response & Emergency Resources Filing

TRANSMISSION EVOLUTION

Completed

- ✓ MVP Revised Cost Allocation
- ✓ LRTP Tranche 1 Portfolio
- ✓ Joint Targeted Interconnection Queue
- ✓ LRTP Tranche 2.1 Portfolio
- ✓ Expedited Resource Addition Study (ERAS) filed

SYSTEM ENHANCEMENTS

Completed

- ✓ Protective Security Controls
- ✓ Data Governance
- ✓ Data & Analytics Platform
- ✓ Machine Learning Tool
- ✓ New Day-Ahead Market Clearing Engine

OPERATIONS OF THE FUTURE

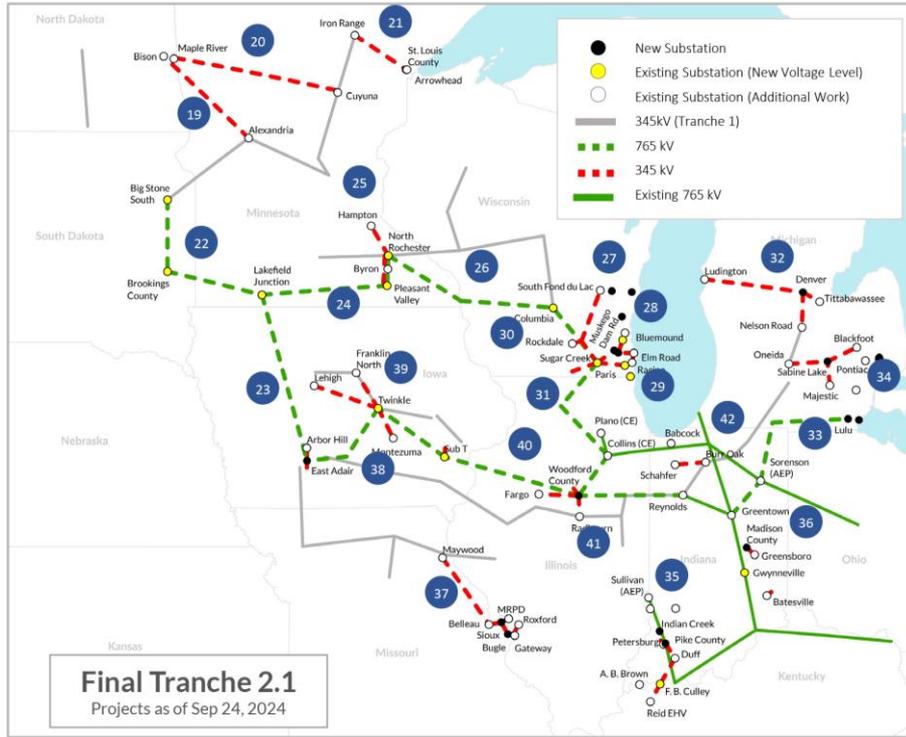
Completed

- ✓ Operator Training and Development Program
- ✓ Uncertainty Management – Wind and Solar Modeling with Risk Integration
- ✓ Predictive Outage & Congestion Management



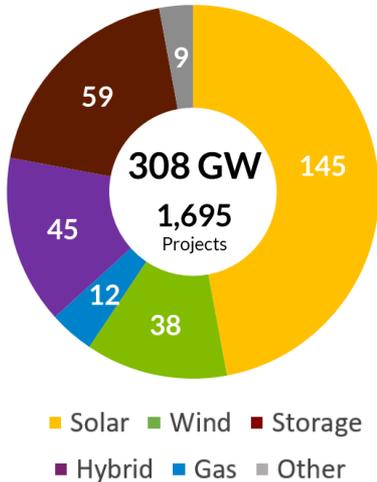
Value Proposition Efforts

MISO Long Range Transmission Planning (LRTP): Tranche 2.1 Portfolio



MISO has been actively improving the manageability of its Queue to provide a critical path to timely resource approvals, but it may take a few years to reduce Queue processing to a near one-year timeframe

Active Queue*
Nameplate Capacity (GW)



Recent Accomplishments

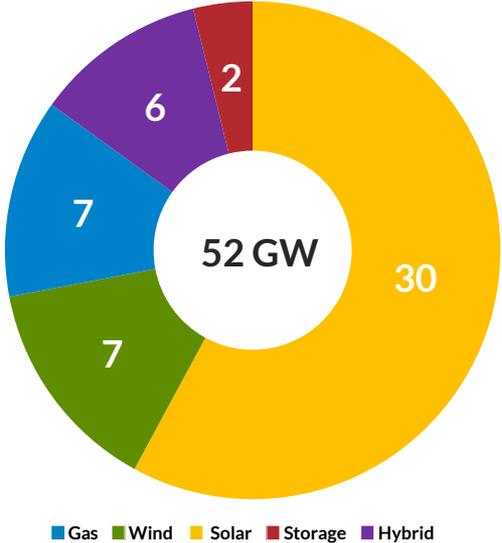
- Implemented several FERC-approved reforms
- Filed compliance with FERC Order 2023
- Received FERC approval of JTIQ framework
- Received FERC approval on Queue Cap

Current Queue Status

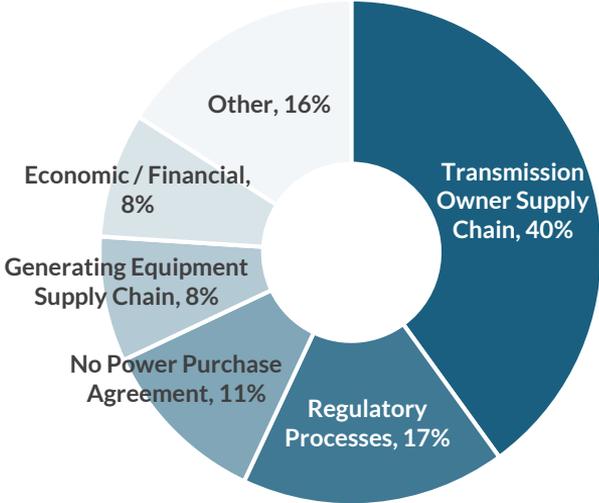
- Cycles are taking 3-4 years
- Tariff timeline for processing is approximately one year
- Late-stage dropouts from 2019-2020 require restudies and prevent processing of later cycles

While we are approving more new resources, over half have acknowledged delays in getting online; more are likely delayed

Projects with Approved Generator Interconnection Agreements, Not Online



Trending Reasons for Delays



Several interconnection queue reforms are underway to help improve the timeliness of new resources coming online

Achieving a 365-day study cycle requires:

Queue Volume Cap



New Technology & Process Improvements



Limit requests to 50% of each planning region's non-coincident peak

(Begins with the 2025 cycle)



Automate processes to reduce time-consuming steps of study process

In the interim:

(Until the earlier of the completion of the 2027 cycle or 12/31/2028)

Expedited Resource Addition Study (ERAS) proposal



Process to more quickly add generation projects identified as critical in member resource adequacy plans

MISO has proposed the Expedited Resource Adequacy Study (ERAS) process to support the timely approval of needed new resources in the interim; a FERC decision is expected by May 17



Addresses Load Serving Entities and States with resource adequacy needs that must be resolved within the next five years



Projects would be evaluated individually instead of in clusters, allowing GIA execution within months versus years



Provides a temporary solution, sunseting in 2028 after the Queue process has improved to a near one-year timeframe



Available for new projects and some existing projects already in the Queue

The ERAS proposal was developed over a six-month period with significant stakeholder input

	Where it began	Final proposal
Applicants	Load Serving Entities	LSEs, IPPs, and DPP transfer projects meeting all requirements
Process timeline	Project studied and GIA issued in 60 days	Quarterly cadence following established MISO timelines, receiving GIA in ~90 days
Required documentation	RERRA acknowledgement	RERRA acknowledgement and one of the following: <ul style="list-style-type: none"> • LSE acknowledgment to self-supply • PPA between IC and load or its LSE • Build-Own-Transfer Agreement • Other agreement between applicant and load, or its LSE, stating project will meet RA or reliability need
Commercial Operation Date	Expected COD with 2-5 years	2025/26 applicants: 3 years from submission plus 3-year grace period; 2027/28 applicants: 12/31/2028 COD plus 3-year grace period
Penalties	Requested feedback after first PAC	Projects transferring from DPP process will be subject existing tariff language (e.g. AWP and Harm Calculations)
Sunset	2028 / 2029	First of 12/31/2028 or the completion date of the 2027 DPP queue cycle

MISO recommends changes for all four Value of Lost Load relationships in the Tariff anchored by a price increase from \$3,500 to \$10,000

\$10,000



INCREASE
VOLL

\$3,500



Energy and Reserve Price Caps (LMP & MCPs)

Remains
at VOLL

ADD circuit breaker mechanisms for 4+ hours (\$5,000) & multiday (\$2,000)



Capacity Emergency Load Shed Administrative Price

Remains
at VOLL

ADD circuit breaker mechanisms for 4+ hours (\$5,000) & multiday (\$2,000)



Top of ORDC Curve Connected to VOLL

LOLP curve with new floors & cap

CHANGE floor from \$1,100/2,100 to \$600/1,100 & upper limit set at \$6,000



Emergency Demand Response Offer Cap

Remove Connection to VOLL

CHANGE to a set price of \$3,500

MISO's "Renewable Integration Impact Assessment, RIIA" studied the impacts of renewables in increments of 10% capacity

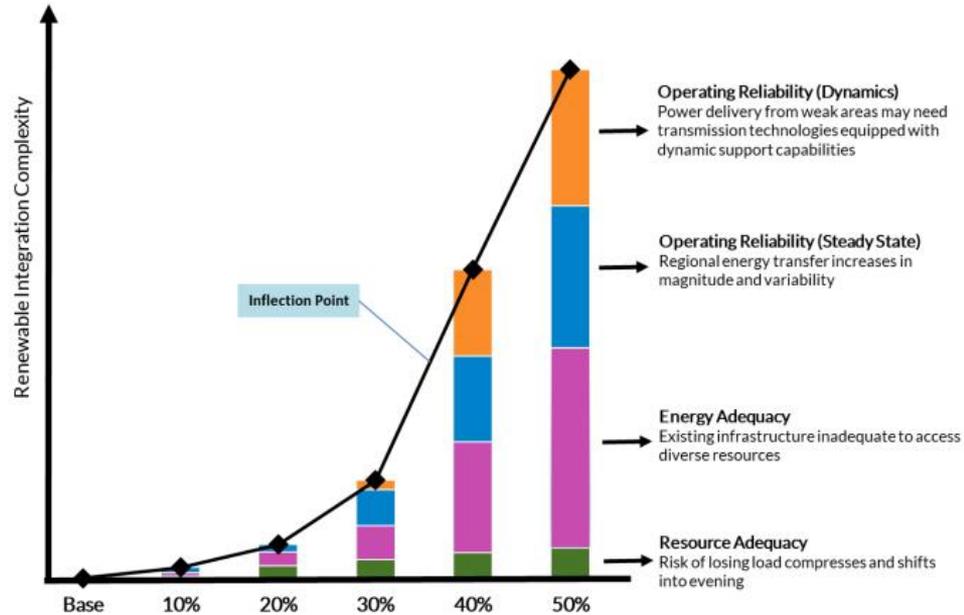


Figure 1: Increasing renewable penetration will significantly impact grid performance with complexity increasing sharply after 30% renewable penetration levels

Dr. Renuka Chatterjee

Vice President, Operations
rchatteerjee@misoenergy.org

DER and Cybersecurity Risk

CYBERSECURITY RISKS ASSOCIATED WITH DISTRIBUTED ENERGY RESOURCES

Lindsey Mannion, Principal Technical Auditor

April 30, 2025, Cleveland, OH



AGENDA

- DISTRIBUTED ENERGY RESOURCES
- CHANGING LANDSCAPE
- REGULATORY POLICIES
- REGULATORY GAPS
- CYBERSECURITY RISKS
- FUTURE IMPLICATIONS

DISTRIBUTED ENERGY RESOURCES

What are DERs?

How are they different from IBRs?



SOLAR PANELS



WIND



BATTERIES



EV CHARGERS



GENERATORS



THERMAL STORAGE



CO-GENERATION

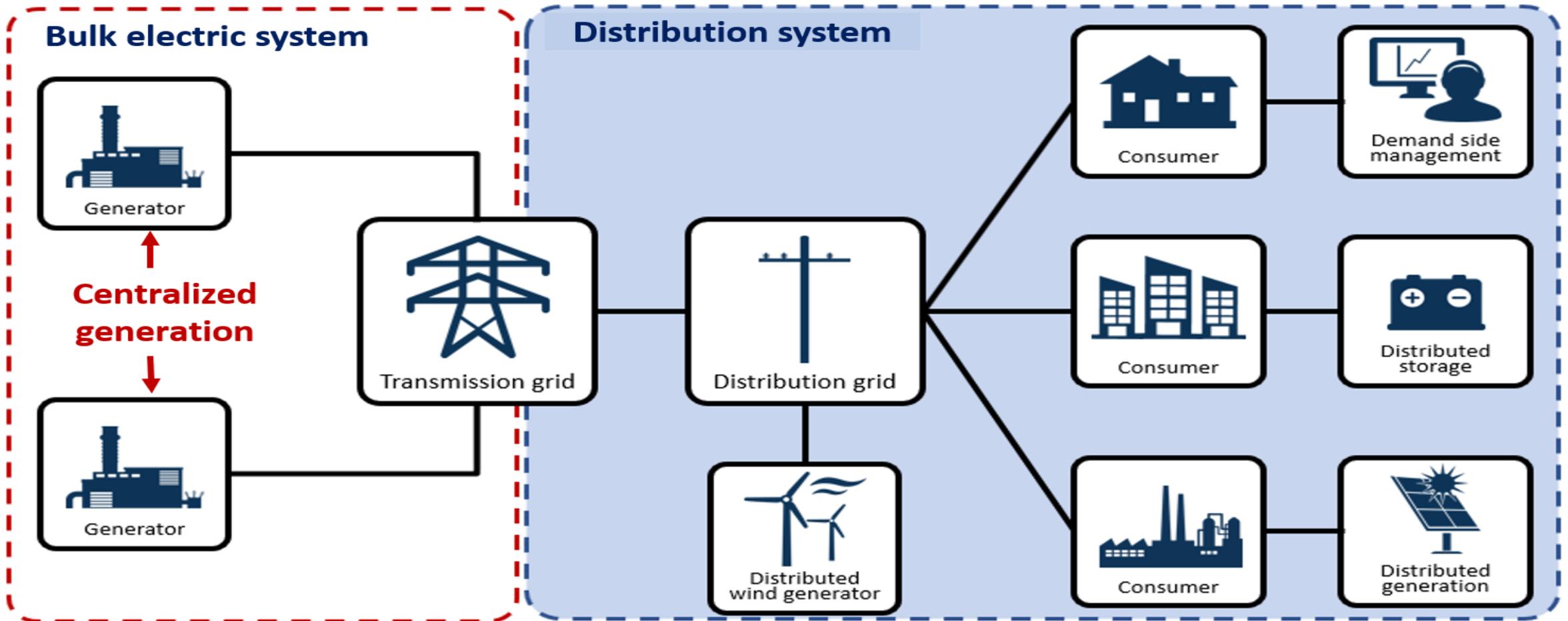


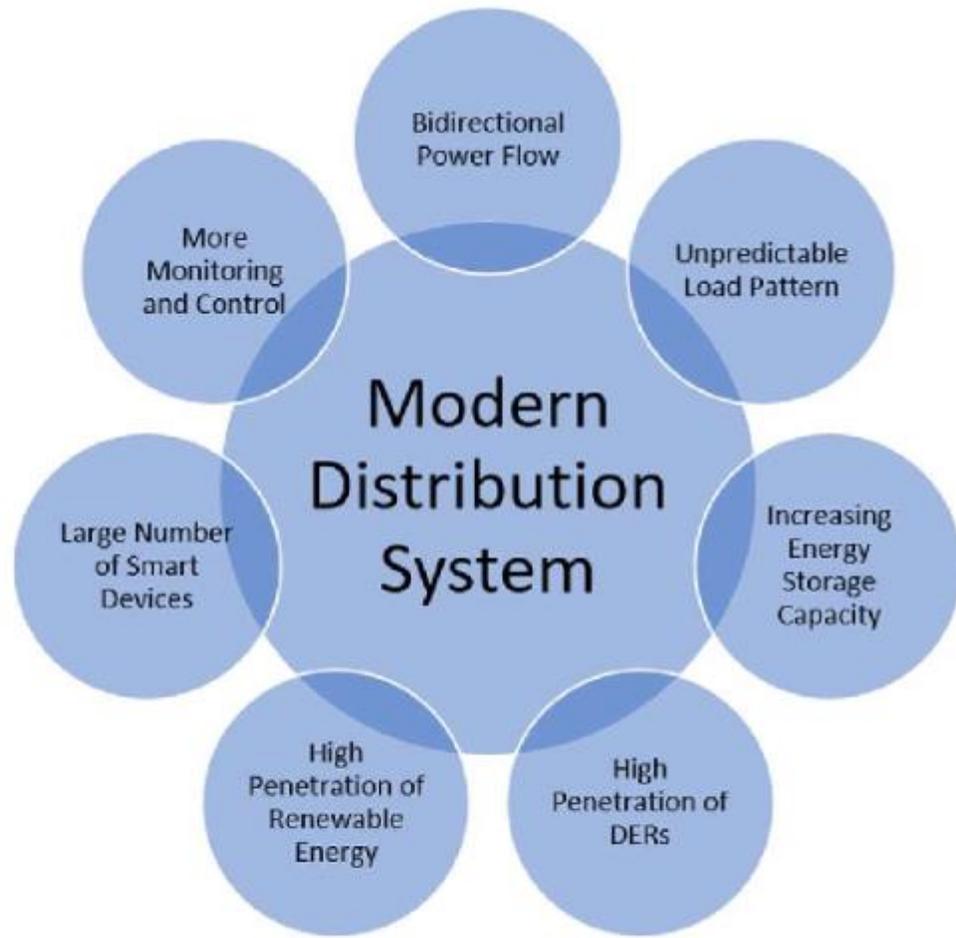
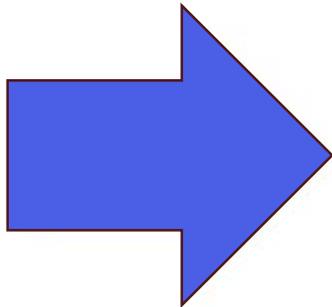
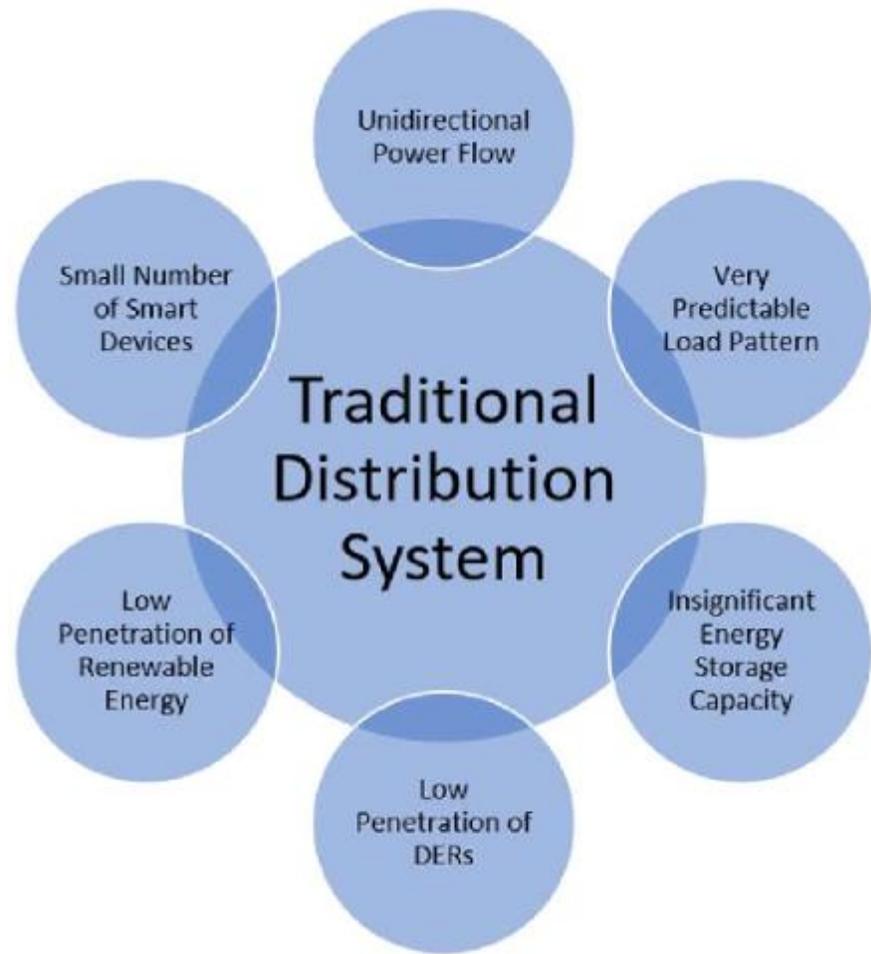
HYDRO ELECTRIC



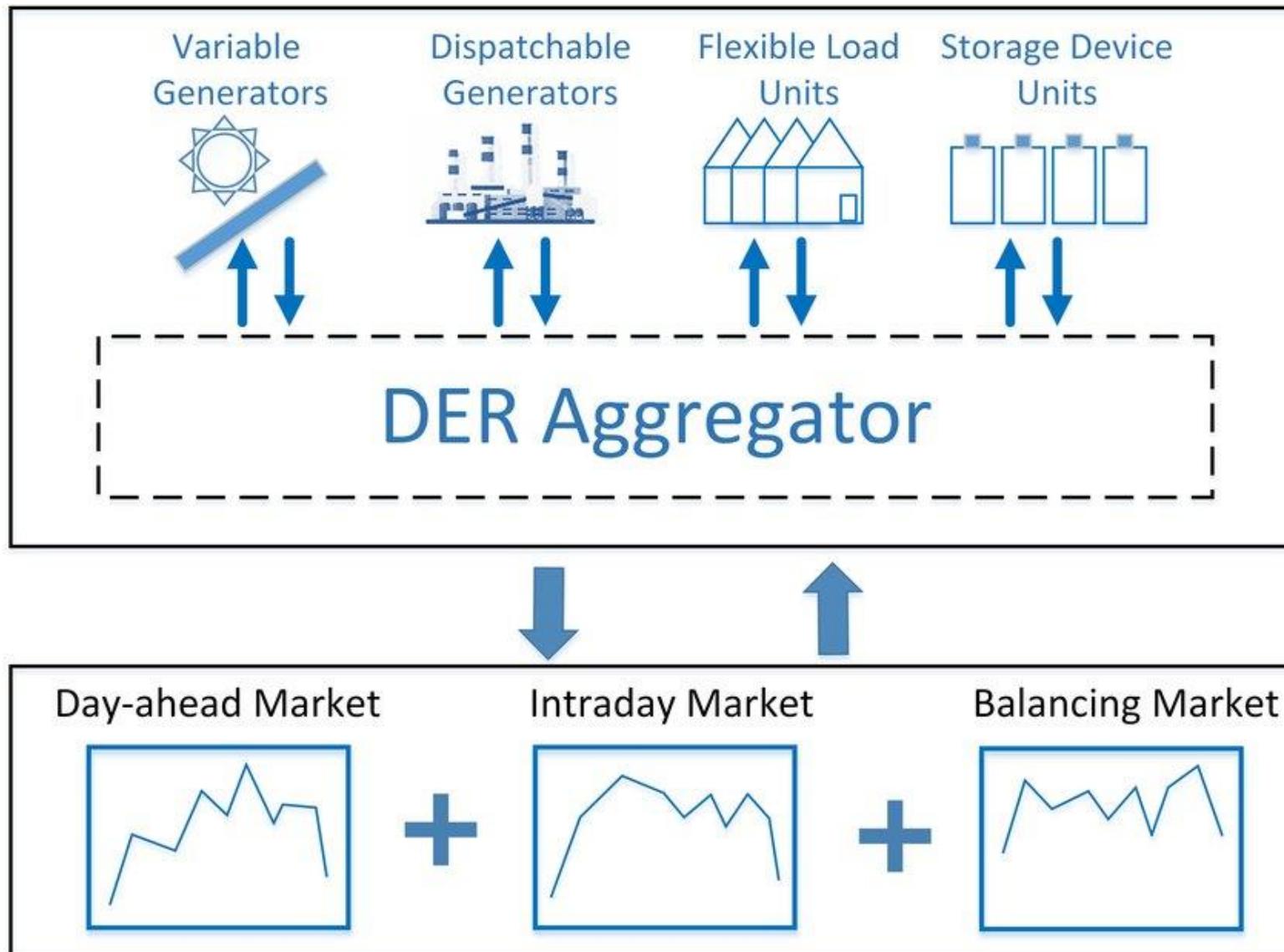
FUEL CELLS

DISTRIBUTED ENERGY RESOURCES





DER AGGREGATORS



HOW ARE THEY COMMUNICATING WITH THE BPS?

Chapter 1: Security Controls Available to DERs and DER Aggregators

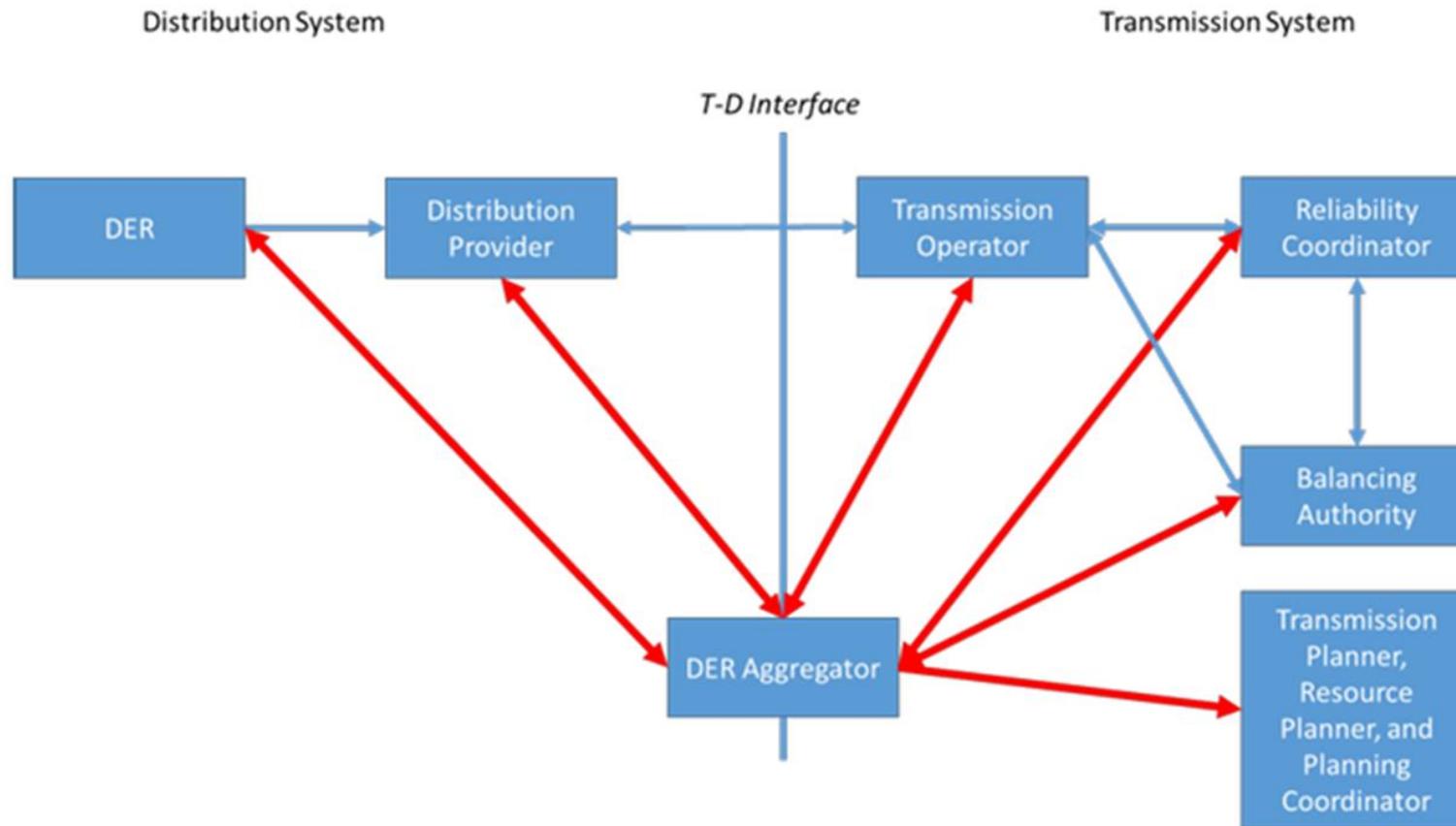


Figure 1.1: High-level Diagram of Added Communication for DER, DER aggregators, and the BES¹⁵

REGULATORY GAPS

- Not addressed in NERC registration criteria.
- Distribution system has changed – no longer passive.
- Voluntary requirements.
- Reliability and regulatory gap.
- No cybersecurity related standards. (TLP-001, MOD-032-1)



CYBERSECURITY

- Widening attack surface
- Diverse ownership
- Lack of defined roles/responsibilities
- Emerging technology
- New software
- Lack of oversight
- Lack of security baselines
- Lack of security basic requirements (patching, AV)

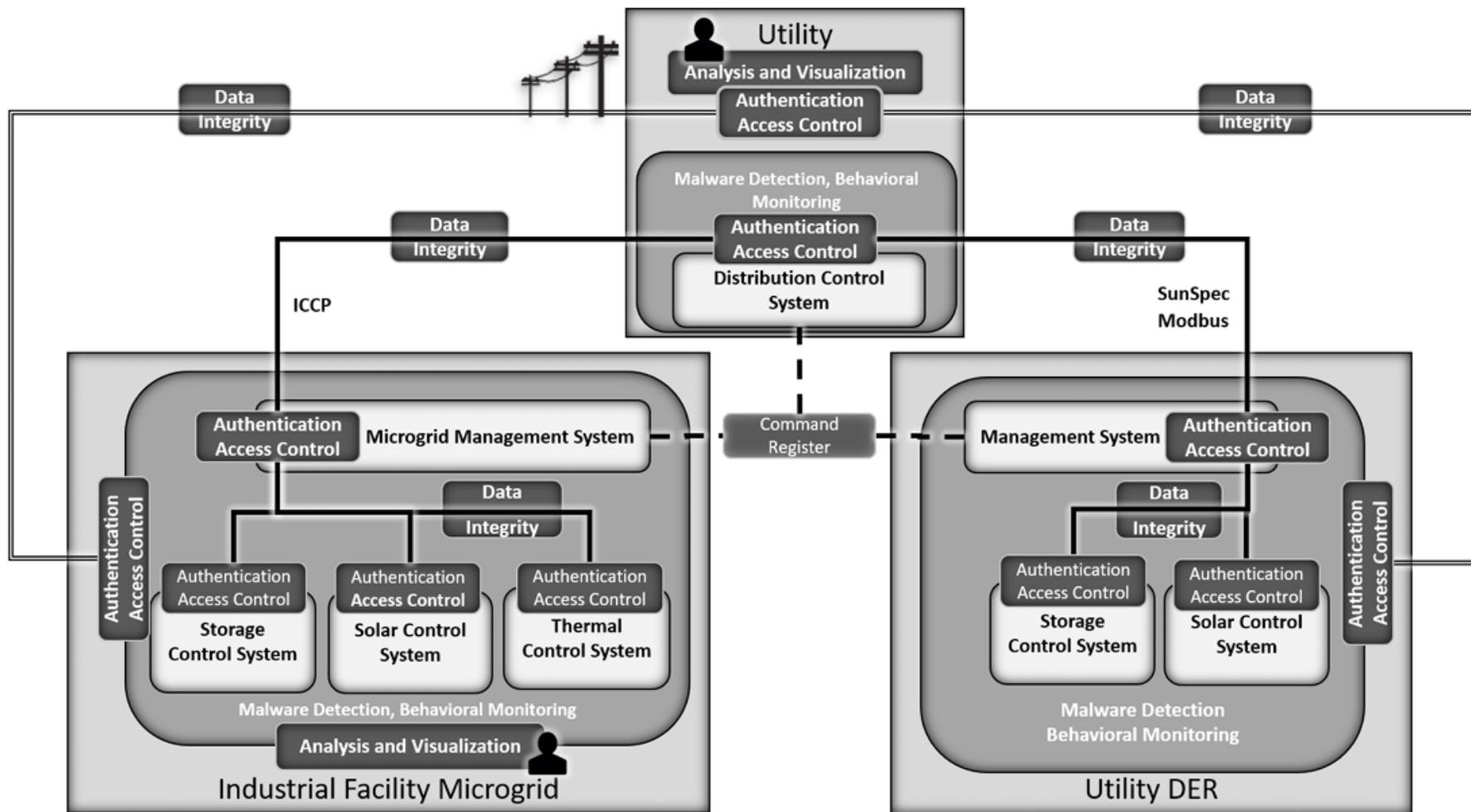


Cybersecurity Attacks on US Critical Infrastructure

- Littleton Electric Light and Water Department
- APT/ Nation State Actor
- Discovered - November 2023 since February 2023, for more than 300 days.
- Targeting routers and engaging with geographic information systems (GIS).
- Theft of SCADA and OT data



SECURING DERS



SECURING DISTRIBUTED ENERGY RESOURCES (NIST, 2022)

FUTURE OF DERS

- Continued growth – Increased penetration
- Diverse Owners
- Increased Interconnectivity
- New Software
- New Technologies
- Lack of Oversight – NERC CIP
- Increased Attack Surface



Questions and Answers



INDUSTRY PERSPECTIVE

- Quick Reference guide
- Distributed Energy Report – 2017 -Acknowledge distribution side is no longer passive
- Technical Brief on Data Collection Recommendations for Distributed Energy Resources – 2018
- Cyber Security for Distributed Energy Resources and DER Aggregators - 2022
- Privacy and Security Impacts of DER and DER Aggregators Joint SPIDERWG/SITES White Paper - September 2023
- ***DER Special Assessment** DER Aggregators, the Bulk Power System, and Recommended Risk Mitigations – Upcoming Release.*