NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Agenda
NERC Quarterly Technical Session

May 8, 2024 | 1:00-3:00 p.m. Eastern
Hybrid Meeting

In-Person (Board, MRC, NERC Staff ONLY)

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

Virtual Attendees
WebEx Link: Join Meeting

Introductions and Opening Remarks

NERC Antitrust Compliance Guidelines

Agenda Items

1. **Electricfication* - Update**
2. **2024 Summer Reliability Assessment* - Preview**
3. **2024 State of Reliability Report* - Preview**
4. **Interregional Transfer Capability Study* – Update**
5. **Bulk Power System Awareness* - Update**
6. **Closing Remarks and Conclude Session**

*Background materials included.

Electrification

Action
Review

Summary
Electrification is a term for replacing direct fossil fuel use (e.g., propane, heating oil, gasoline) with electricity in a way that reduces overall emissions and energy costs. There are many examples across the residential and commercial sectors where electricity is being substituted for existing processes such as heating, cooking, commercial and industrial processes.

Additionally, after almost two decades of minimal load growth at the national level, electrification, extreme weather, and local/regional point sources are beginning to drive increases. In a net-zero greenhouse gas future, electricity could provide 40 to 60 percent of end-use energy, versus 21% today. In addition, electricity could prove key to producing carbon-free fuels to “power” end-use applications that are hard or expensive to electrify. Dr. Tom Wilson, Senior Program Manager at the Electric Power Research Institute (EPRI) will lead a discussion of the key drivers of load growth, the potential pace of change, regional variations, and key uncertainties, drawing insights from EPRI and other leading research efforts.

Agenda Item 2
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2024 Summer Reliability Assessment

Action
Preview

Background
The NERC 2024 Summer Reliability Assessment (SRA) identifies, assesses, and reports on areas of concern regarding the reliability of the North American bulk power system (BPS) for the upcoming summer season. In addition, the SRA will present peak electricity supply and demand changes, as well as highlight any unique regional challenges or expected conditions that might impact the BPS. The reliability assessment process is a coordinated reliability evaluation between the Reliability Assessment Subcommittee (RAS), the Regional Entities, and NERC staff.

The final report reflects NERC's independent assessment and is aimed at informing industry leaders, planners and operators, as well as regulatory bodies so that they can be better prepared to take necessary actions to ensure BPS reliability. The report also provides an opportunity for the industry to discuss their plans and preparations for ensuring reliability throughout the upcoming summer period.

Pursuant to delegated authority from the Board of Trustees, NERC management expects to issue the SRA on or about May 15, 2024. The review schedule below identifies key milestones for the report.

Summer Reliability Assessment Review Schedule	
Date	**Description**
April	Draft sent to NERC Reliability and Security Technical Committee (RSTC)
May 7	Report sent to NERC Chief Executive Officer for approval
May 10	Report sent to NERC Board
May 14	Pre-publication Report sent to ERO Executive Committee and MRC
May 15	Report release

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2024 Summer Reliability Assessment

Status and Preliminary Findings

John Moura, Director, Reliability Assessment and Performance Analysis
Mark Olson, Manager, Reliability Assessment
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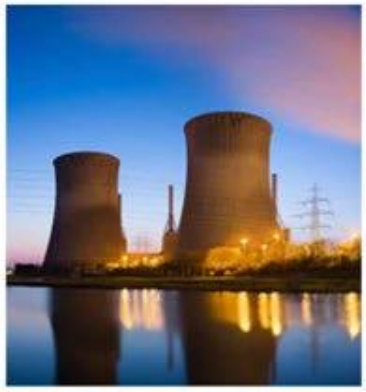

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Summary

- NERC assesses risk of electricity supply shortfalls for summer using industry's demand and resource projections
- Risk analysis is based on deterministic risk scenarios and probabilistic studies
- NERC staff will provide a preview of findings during the Board Technical Session

SRA Status

- The SRA report is reviewed by the NERC Reliability and Security Technical Committee (RSTC) in April
- NERC Staff is preparing the report for approval

SRA Schedule

Date	Milestone
April	Draft report provided to the RSTC for review and comments
May 7	Final Report sent to NERC CEO for Approval
May 10	Report sent to NERC Board
May 14	Pre-publication Report sent to ERO Executive Committee and MRC
May 15	Report Release and Industry Webinar

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Questions and Answers

Agenda Item 3
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2024 State of Reliability Report

Action
Preview

Background
The State of Reliability Report (SOR) is prepared annually to provide objective, credible, and concise information to policy makers, industry leaders, and the NERC Board of Trustees (Board) on issues affecting the reliability and resilience of the North America bulk power system (BPS). Specifically, the report:

- Identifies system performance trends and emerging reliability risks;
- Determines the relative health of the interconnected system; and
- Measures the success of mitigation activities deployed.

The key findings and recommendations of the report serve as the technical foundation for NERC's range of risk-informed efforts addressing reliability performance and serve as key inputs to the ERO Reliability Risk Priorities Report prepared by the Reliability Issues Steering Committee (RISC). The metrics measured in the report address the characteristics of an adequate level of reliability (ALR).

In developing the 2024 SOR, NERC staff and the Performance Analysis Subcommittee provide both a technical assessment for those interested in the underlying data and detailed analytics, and an overview assessment to tailor content for the policy maker and industry leader audience. NERC management expects to issue the 2024 SOR at the end of May. The review schedule below identifies key milestones for the report.

2024 State of Reliability Report Schedule	
Date	**Description**
Mid-May	NERC Board and RSTC review and comment period
End of May	Submit SOR for NERC CEO Acceptance
May 30	Report release (Target)

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2024 State of Reliability

Preliminary Key Items

Jack Norris, Engineer II
NERC Quarterly Technical Session
May 8, 2024

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The State of Reliability: Objective

- Provide objective, credible, and concise information to policy makers, industry leaders, and the NERC Board of Trustees on issues affecting the reliability and resilience of the North American bulk power system
  - Identify system performance trends and emerging reliability risks
  - Determine the relative health of the interconnected system
  - Measure the success of mitigation activities deployed
- Evaluates the 2023 operating year and historical trends

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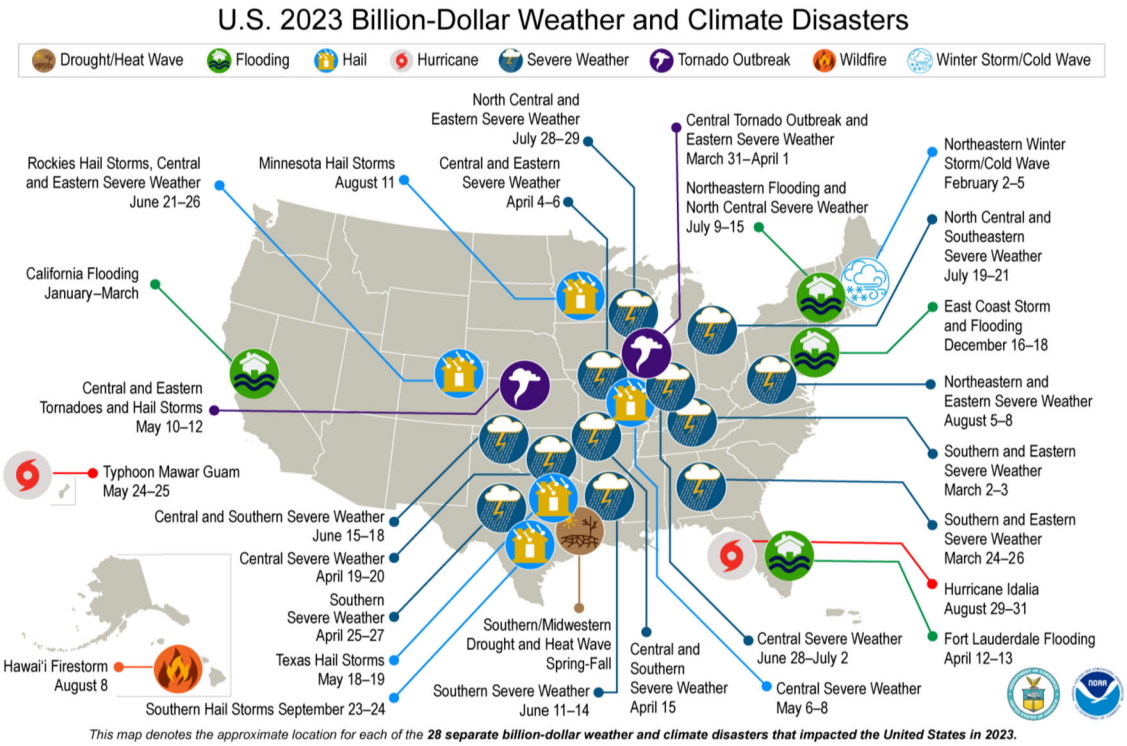
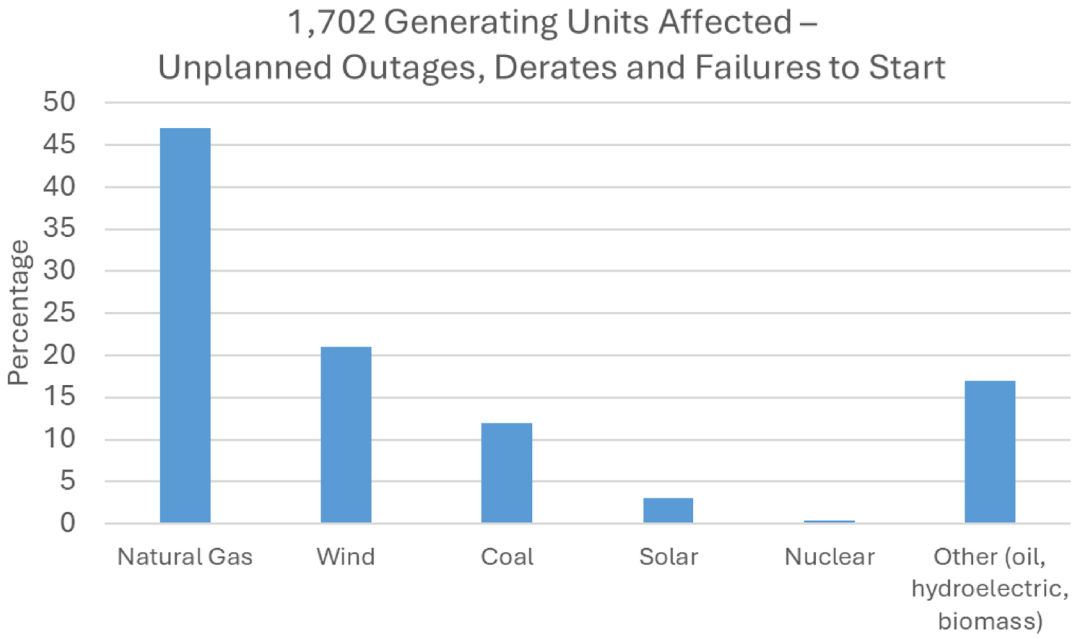
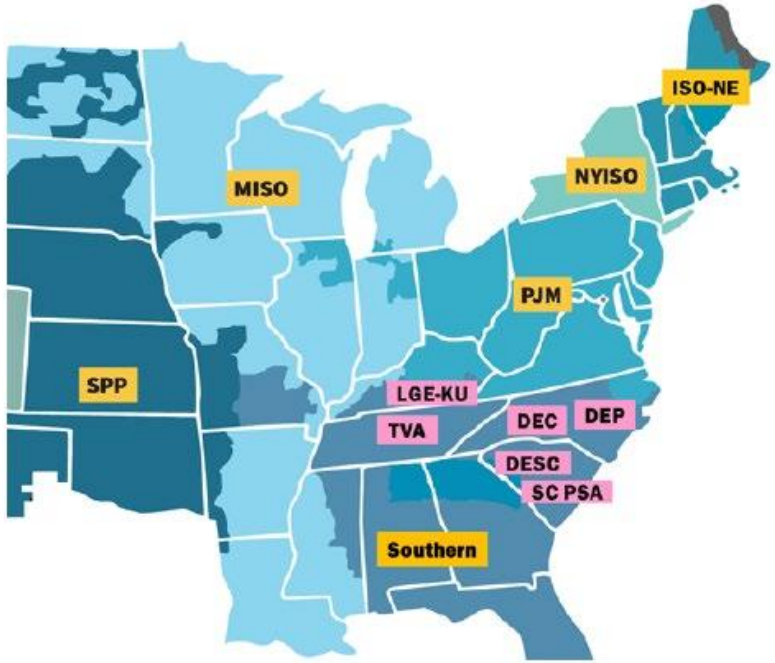
2023 Key Occurrences

- 28 Billion+ Dollar Weather Events
- Impacts to BPS include:
  - Hurricane Idalia
  - Canadian Wildfires
- No Events Analysis Disturbance Events at Category 3 or higher
- No load unserved due to Level 3 Energy Emergency Alerts



Winter Storm Elliott Report
Major Special Studies Released in 2023





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Multi-Utility IBR Events Updates
Major Special Studies Released in 2023

- CAISO Battery Energy Storage System (BESS) Disturbance
  - Two events involving BESS
    - March 9, 2022
    - April 6, 2022
  - Main BESS causes
    - Inverter AC overcurrent tripping
    - Unbalanced AC current tripping

- Solar PV Performance Improvement
  - Two events in Southern Utah/Nevada
  - April 10, 2023
    - 345kV fault cleared normally in 3.5 cycles
    - 929 MW of solar generation lost
  - Utilities worked with inverter manufacturers to improve ride-through
  - September 29, 2023
    - 345kV non-reclosing fault cleared in 4 cycles
    - 537 MW of solar generation lost

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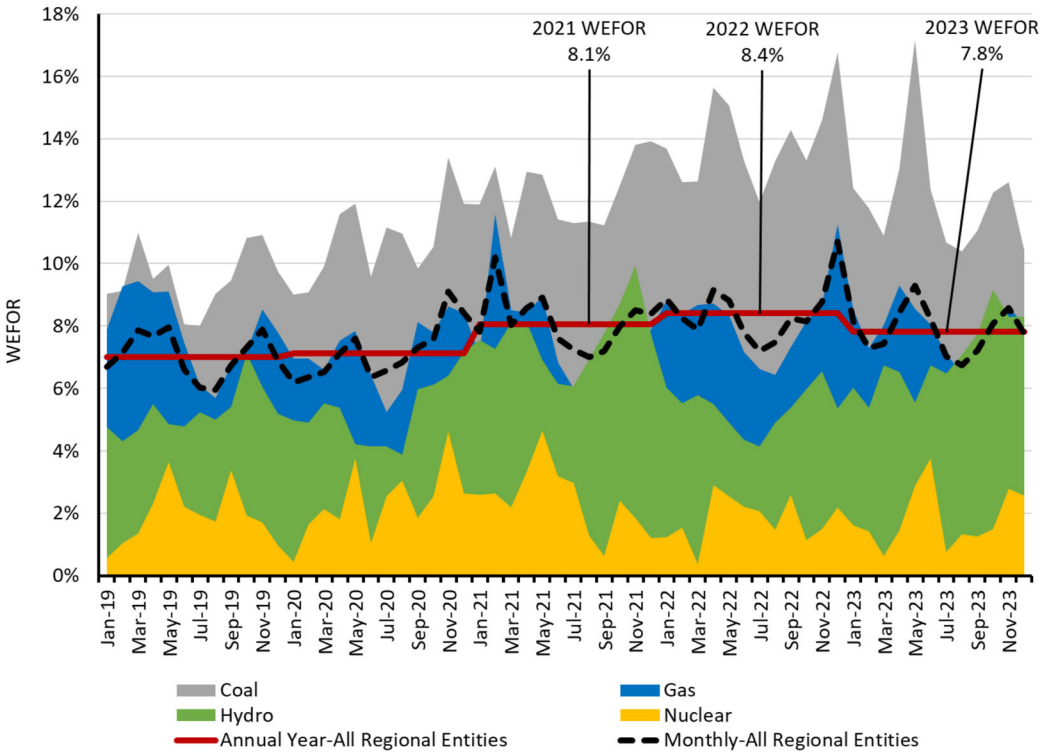
Preliminary Key Findings

- Conventional Generation Forced Outages Remain High
- Transmission Metric Variability
- Texas Interconnection Frequency Response Showing Improvement
- Major Reduction in Interconnection Reliability Operating Limit Exceedances (IROL)
- Misoperations Improvement Slowing

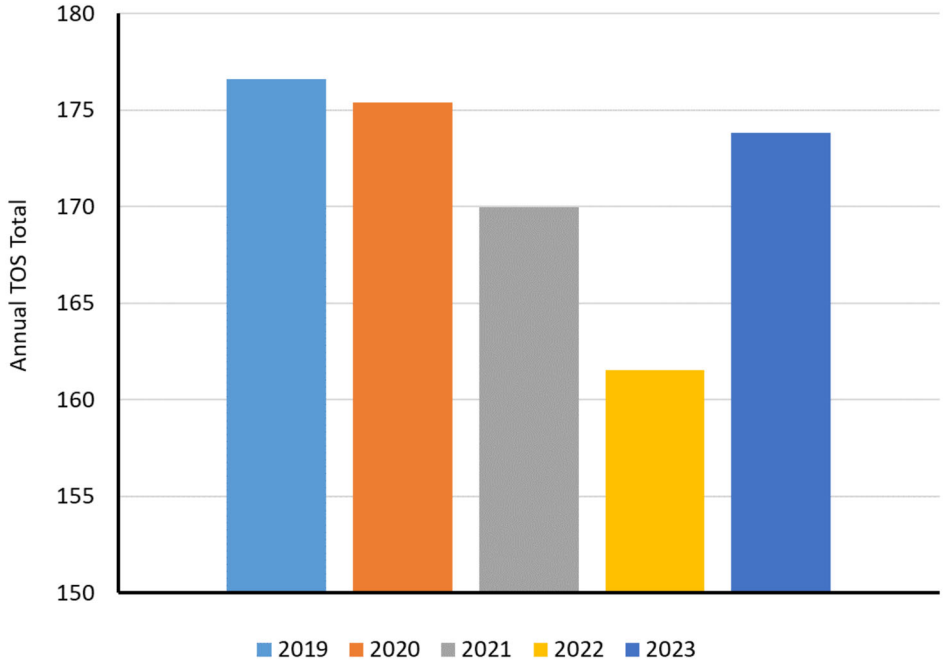
Conventional Generation Forced Outages Remain High



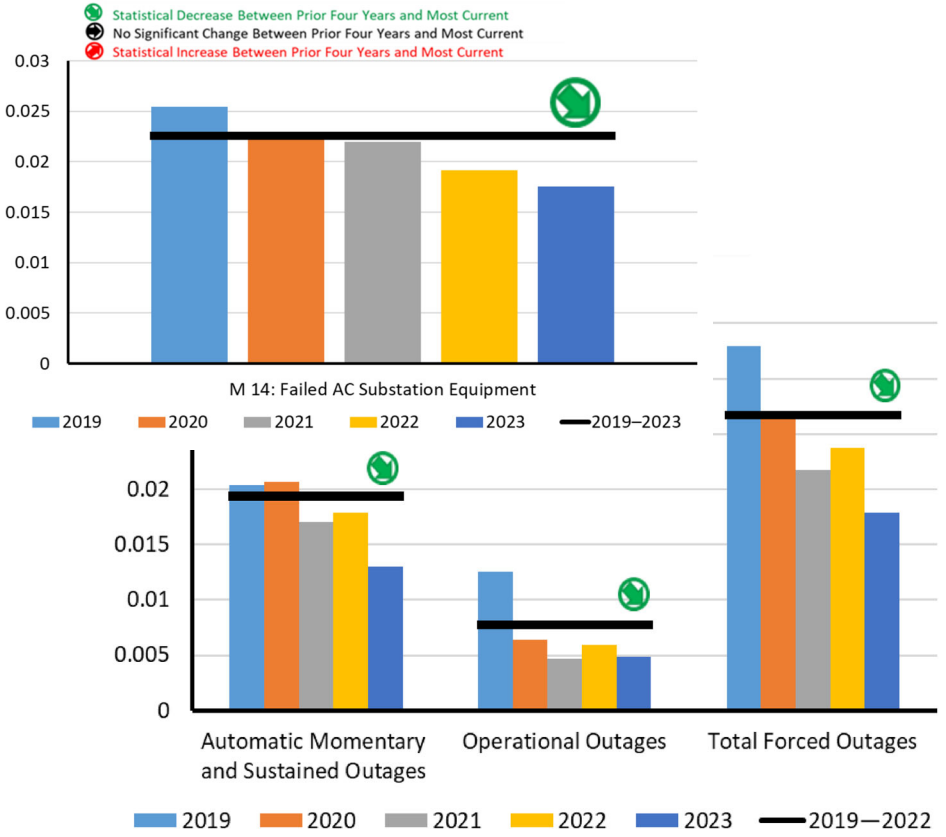
- 2023 was the third worst weighted equivalent forced outage rate (WEFOR) in the past 10 years, despite no major generation stressing events

Transmission Metric Variability

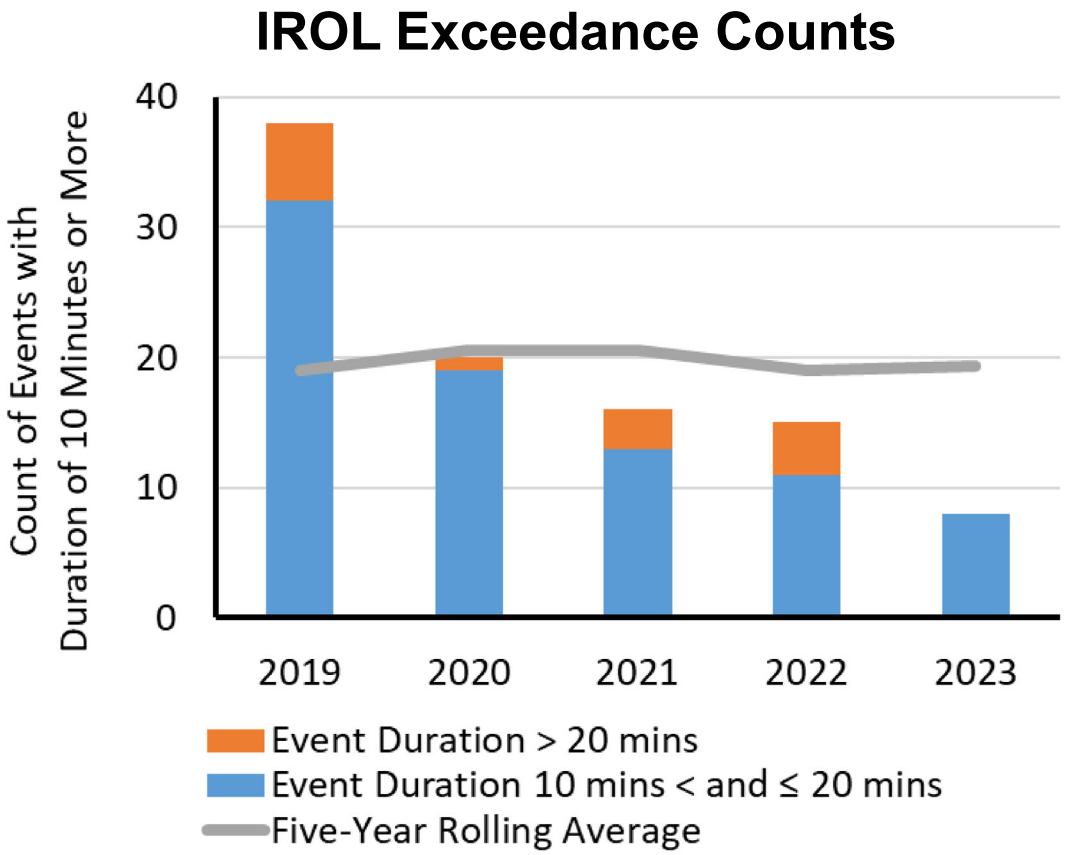
Overall Transmission Outage Severity



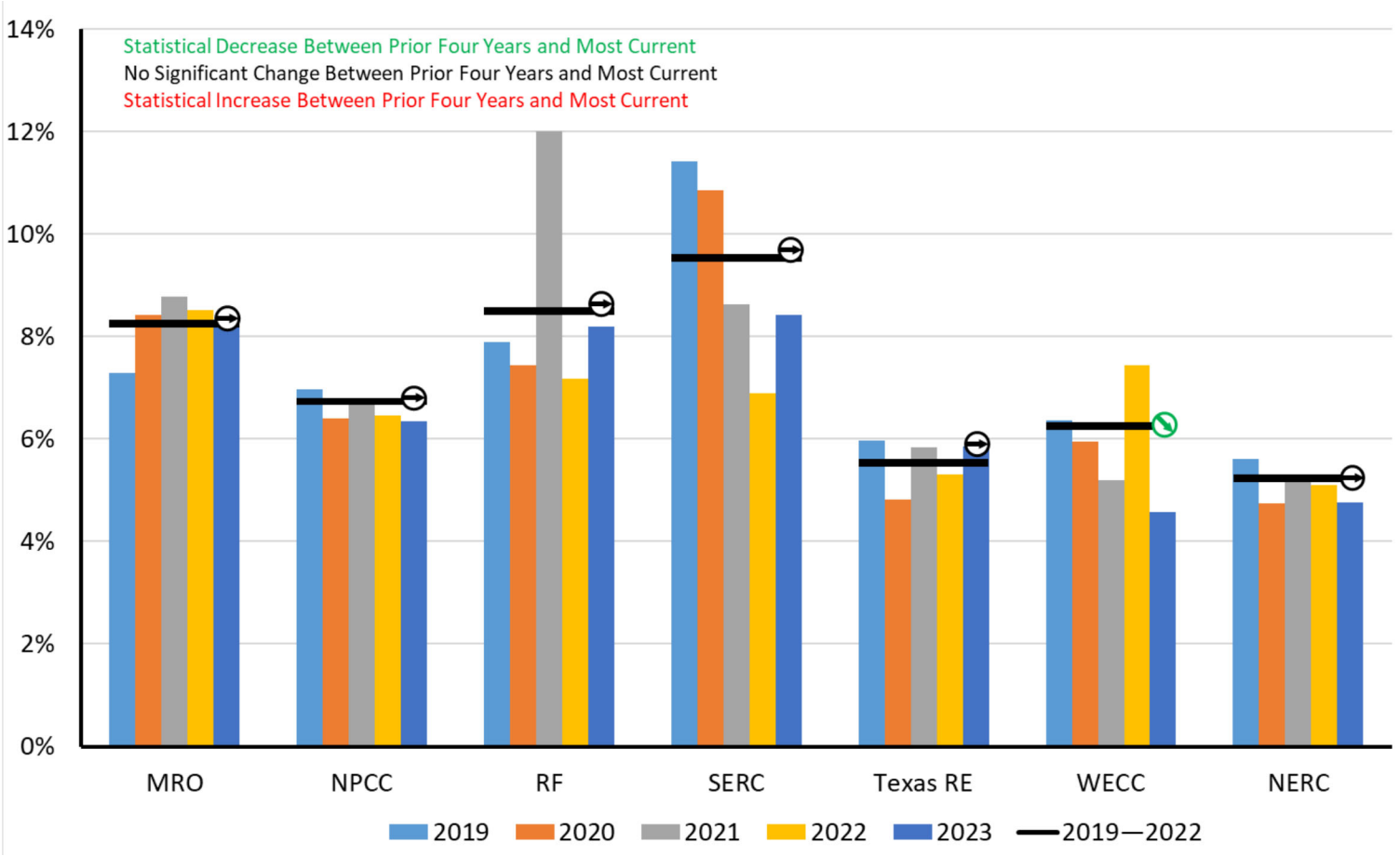
Transmission Outages by Cause



Texas Interconnection Frequency Response Improvements & IROLs Reduction



Misoperation Improvement Slowing



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Questions and Answers

Interregional Transfer Capability Study (ITCS)

Action
Update

Background
Congress passed the Fiscal Responsibility Act of 2023[1], which included a provision for NERC to conduct a study on the reliable transfer of electric power between neighboring transmission planning areas. NERC, in consultation with the Regional Entities and industry stakeholders, is conducting transfer capability studies for regional transmission areas in the United States and recommend prudent additions to transfer capability needed for reliability.

Who: NERC, in consultation with each regional entity and each transmitting utility[2] in a neighboring transmission planning region.

What: A study of total transfer capability between transmission planning regions.[3] In accomplishing this work, the study should include:

1. "Current total transfer capability, between each pair of neighboring transmission planning regions."[4] [5]
2. "A recommendation of prudent additions to total transfer capability between each pair of neighboring transmission planning regions that would demonstrably strengthen reliability within and among such neighboring transmission planning regions"; and
3. "Recommendations to meet and maintain total transfer capability together with such recommended prudent additions to total transfer capability between each pair of neighboring transmission planning regions."

When: NERC must file the report with FERC within 18 months of enactment of the bill. Public comment period will occur when FERC publishes the study in the Federal Register. After submittal, FERC must provide a report to Congress within 12 months of closure of the public comment period with recommendations (if any) for statutory changes.

ERO study filing deadline: On or before December 2, 2024

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[1] H.R.3746 - 118th Congress (2023-2024): Fiscal Responsibility Act of 2023 | Congress.gov | Library of Congress

[2] "means an entity (including an entity described in section 201(f)) that owns, operates, or controls facilities used for the transmission of electric energy—(A) in interstate commerce; (B) for the sale of electric energy at wholesale." [FPA, Section 3(23)]

[3] (a) IN GENERAL.—The Electric Reliability Organization (as that term is defined in section 215(a)(2) of the Federal Power Act), in consultation with each regional entity (as that term is defined in section 215(a)(7) of such Act) and each transmitting utility (as that term is defined in section 3(23) of such Act) that has facilities interconnected with a transmitting utility in a neighboring transmission planning region, shall conduct a study of total transfer capability as defined in section 37.6(b)(1)(vi) of title 18, Code of Federal Regulations, between transmission planning regions that contains the following:" [1-3 bullets quoted above]

[4] **Total transfer capability** means the amount of electric power that can be moved or transferred reliably from one area to another area of the interconnected transmission systems by way of all transmission lines (or paths) between those areas under specified system conditions, or such definition as contained in Commission-approved Reliability Standards. [18 C.F.R. Section 37.6(b)(1)(vi)]

[5] **Neighboring transmission planning region**: implicitly means facilities connecting two adjacent systems or control areas.

Key Activities

- **Framework**
  The study framework document which described high-level project management strategy, technical study approach and schedule etc. was finalized based on Advisory Group input and posted on NERC's ITCS website.
- **Scoping Documents**
  The ITCS Project Team finalized two scoping documents to address the transfer capability analysis and to document an approach to determine prudent additions to transfer capability, referred to in the ITCS timeline as Part I and Part II. This includes case and scenario development; production, dispatch, and energy adequacy analysis; and transfer analysis. The Advisory Group reviewed the scoping documents and provided comments. Finalized scoping documents after updates were posted in March 2024 on the ITCS website.
- **Data Request**
  The Project Team, comprised of NERC and the Regional Entities, developed a data request that was sent to industry in November 2023. The requested data was used to update MOD032 base cases with the most up-to-date information on transmission topology, loads, resource forecasts, etc., for the Western and Eastern Interconnections.

  Another data request was sent to Canadian entities for the required energy data for prudent additions to transfer capability analysis. All required data has been received and is being used for analysis.
- **Study Analysis**
  NERC's consultant for Part I Transfer Capability Analysis (PowerGem) has created all the input files for the analysis and is currently performing the transfer capability analysis. Concurrently, NERC's consultant for Part II Prudent Additions Analysis (Telos Energy) has set up a model to run energy deficiency analysis which then will form the basis for recommending prudent additions to transfer capability. NERC and the Regional Entities are working to finalize the transfer capability analysis by June, 2024 and the prudent additions analysis is expected to be finalized in July, 2024.
- **Study Reports**
  The Study Report drafts will be released in four volumes.

  1. I**TCS Overview:** This report will provide a high-level overview of the study, the background, the approach and form a foundational information for subsequent reports. Expected draft to be released in June, 2024.
  2. **Part I Transfer Capability:** This report will cover results from the transfer capability analysis. The draft is expected to be ready by July, 2024.
  3. **Parts II and III Prudent Additions:** This report will include recommendations of prudent additions to transfer capability as well as recommendations to meet and maintain prudent additions. The draft is expected to be ready by August, 2024.
  4. **Canadian Analysis:** A report covering the US to Canada exports analysis and inter-provincial analysis will be released in Q1 of 2025.

  The final submission to FERC will include reports 1-3 above and expected to be officially filed in with FERC in November, 2024.

- **Stakeholder Outreach**
  The ERO Enterprise (NERC and the Regional Entities) are executing a comprehensive stakeholder outreach plan to ensure that all North American transmitting utilities can provide input into the ITCS. Regional Entities are already working with their technical committees, which is continuing throughout 2024. The study directive in Fiscal Responsibility Act requires that NERC perform the ITCS in consultation with all transmitting utilities that have facilities interconnected with a transmitting utility in a neighboring transmission planning region.

  NERC has been publishing quarterly project updates which have been posted to the NERC ITCS website.

  NERC issued a letter to all Transmission Owners, Transmission Operators, Transmission Planners and Planning Coordinators inviting them to participate in the ITCS and provide input. A future letter will be issued to the same entities in the Q3, 2024 informing of the study progress and provide another opportunity to give input on the study.

Next Steps

The Advisory Group's next meeting is scheduled for June 4, 2024 at WECC's office in Salt Lake City. The in-person meeting will allow for more in-depth discussion on topics including the review of Part I: Transfer Analysis and Part II: Prudent Additions to Transfer Capability. There will also be a virtual option. The Advisory Group's meeting schedule has been set throughout the lifecycle of the project.

The completion of the ITCS Framework and scoping documents for Part I and Part II of ITCS marks the end of Phase 0: Study Preparation. Phase 1: Analysis began in the first quarter of 2024 and is scheduled to be completed in July, 2024.

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Interregional Transfer Capability Study

John Moura, Director, Reliability Assessment and Performance Analysis

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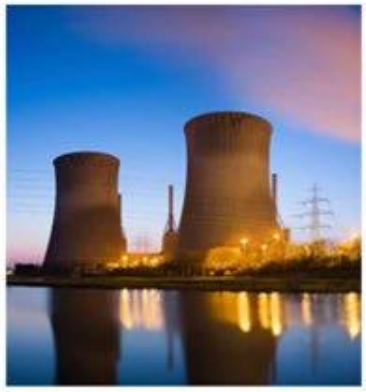
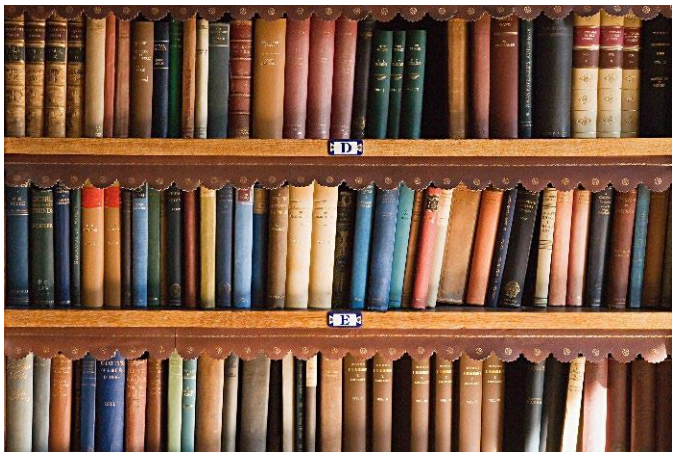


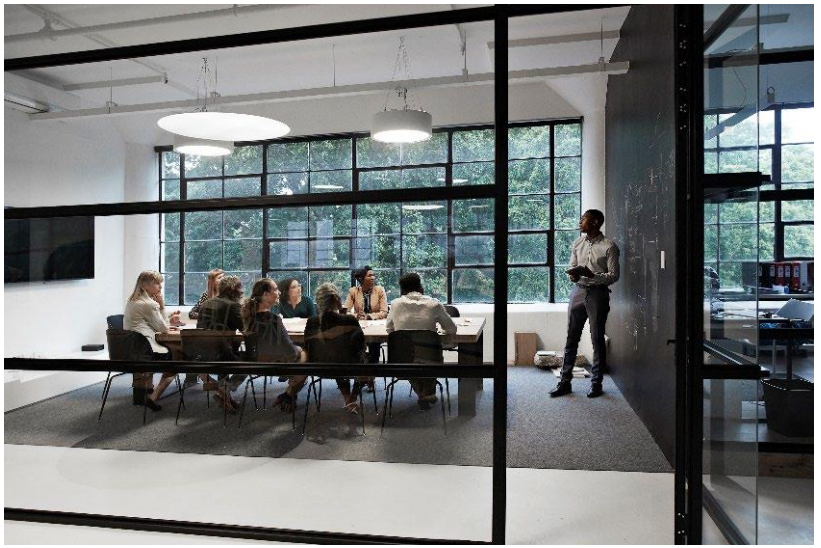
Project Goals & Objectives

Comprehensive Study



Reliable and Data Driven

Stakeholder Engagement



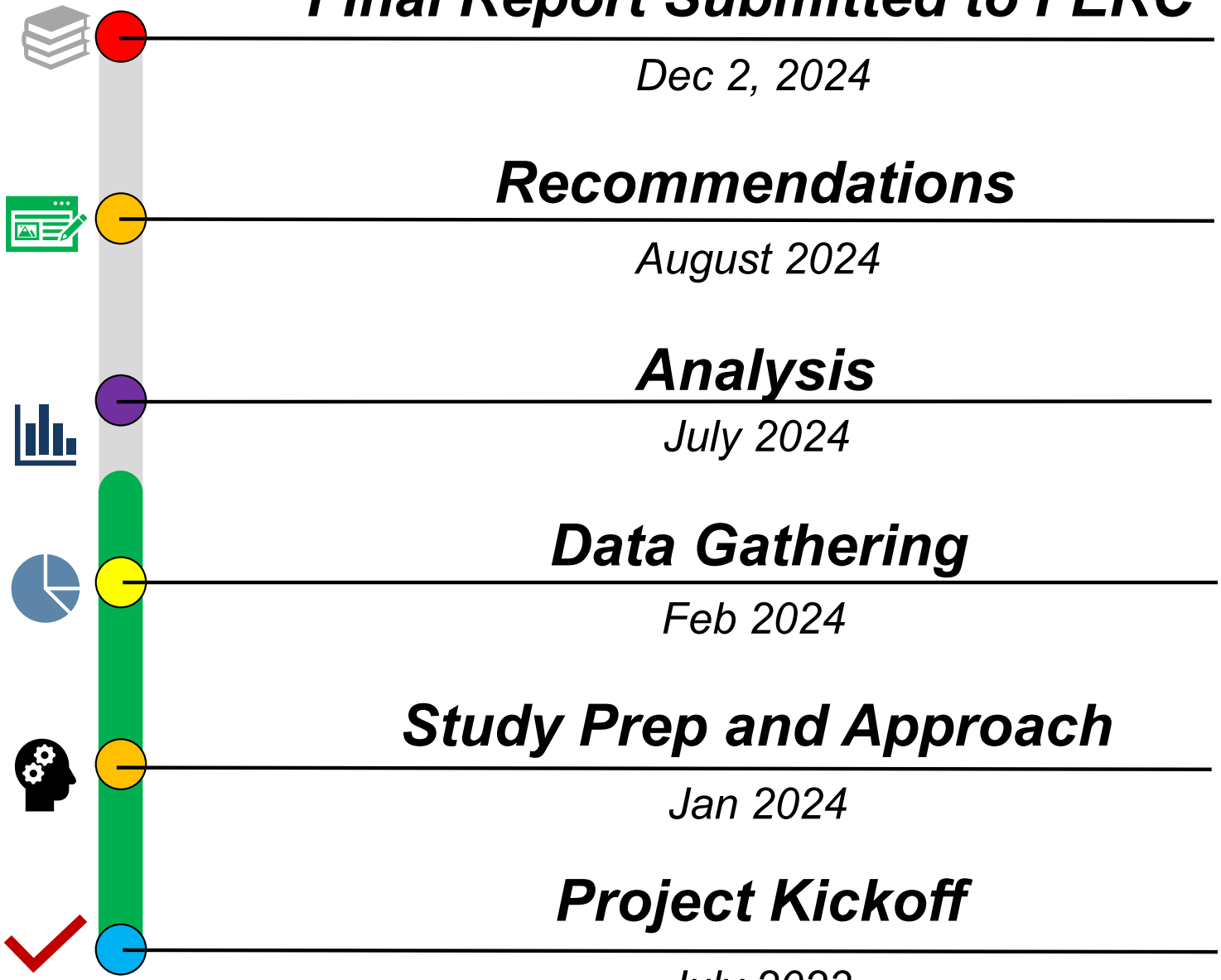
ITCS Scope – Fiscal Responsibility Act 2023

Part I: Calculate current transfer capability

Part II: Recommend prudent additions to transfer capability

Part III: Recommend how to meet and maintain transfer capability

Project Status and Timeline



Technically Prudent Additions

What is technically prudent addition to transfer capability?

- Beneficial to reliability
- Serve load under extreme conditions
- Without creating other reliability problems

FERC precedent provides that "prudence" means a determination of whether a reasonable entity would have made the same decision in good faith under the same circumstances, and at the relevant point in time.

In more recent proceedings, FERC has described prudent decisions:

(1) enhance ability to restore service;
(2) achieve significant efficiencies;
(3) reduce higher costs or time delays;
(4) make efficient use of resources to ensure reliability of the transmission grid.

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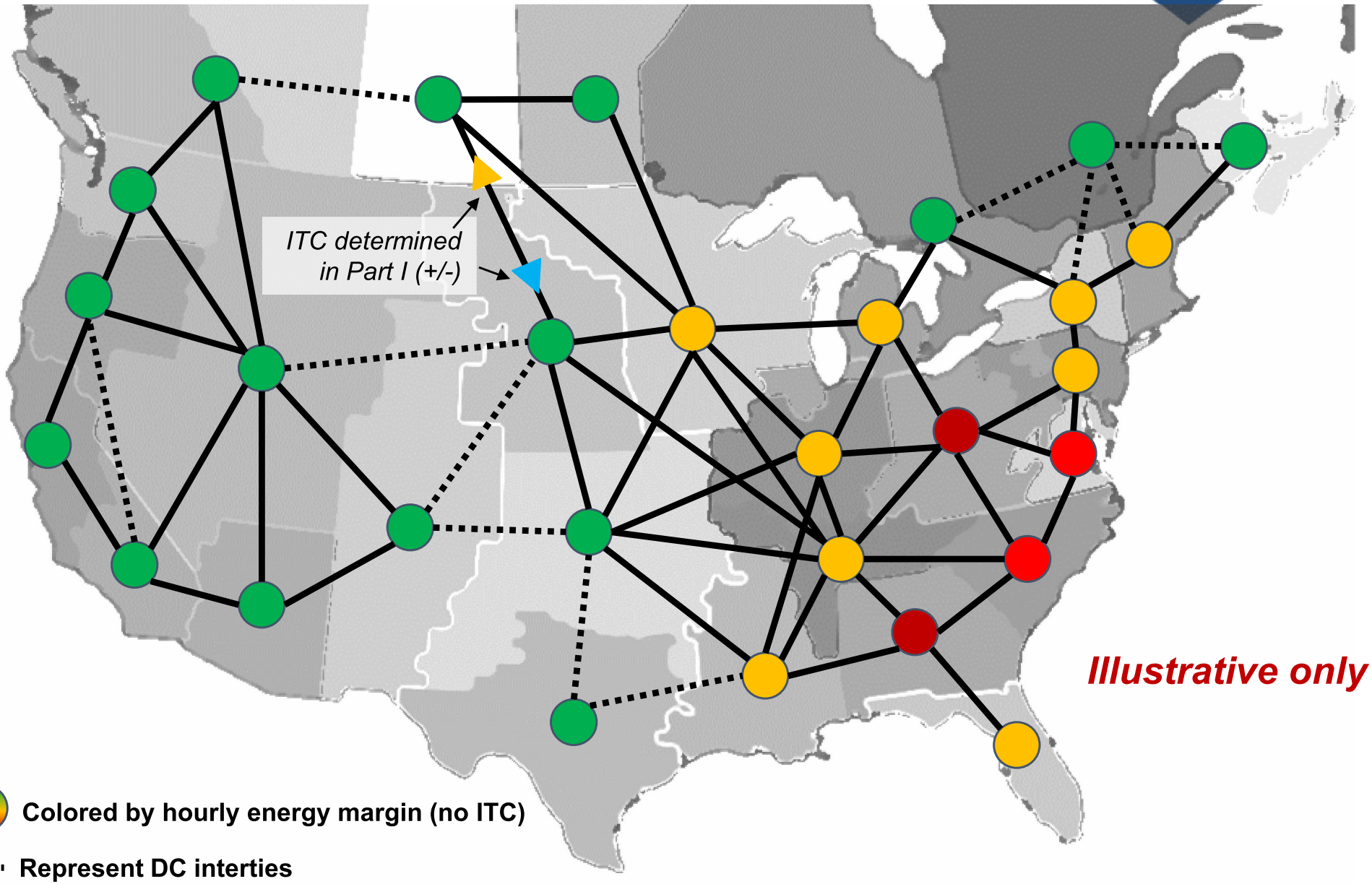
Pipe and Bubble Model for Prudent Additions



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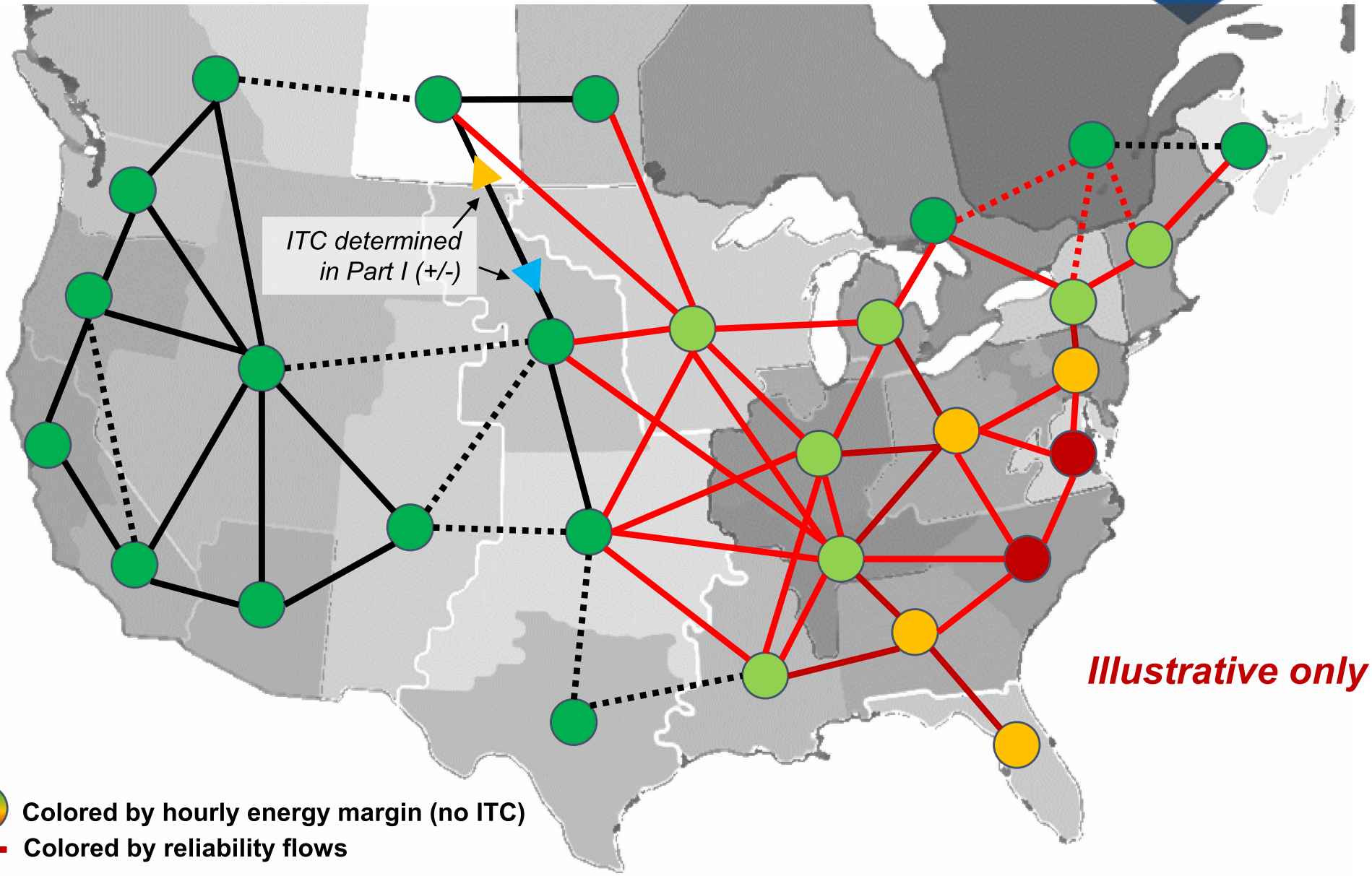
Pipe and Bubble Model for Prudent Additions



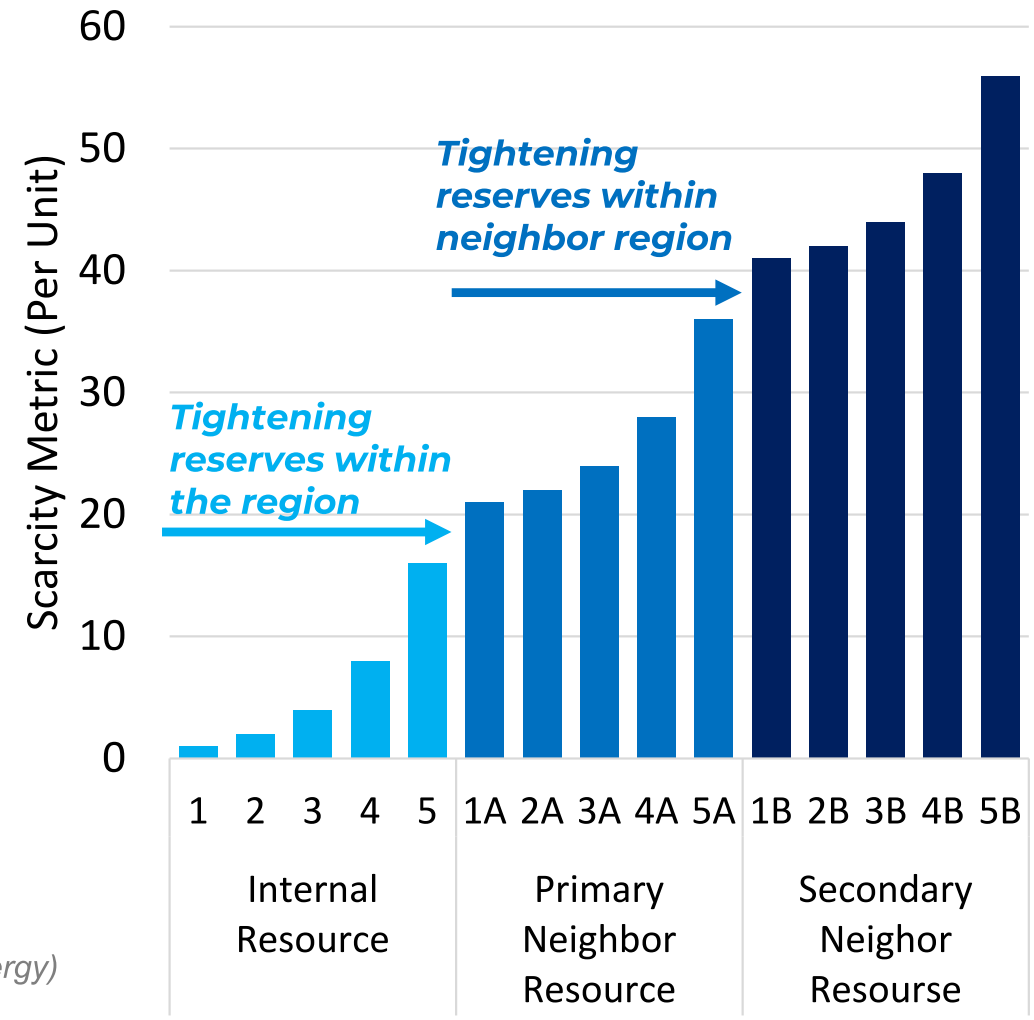
Method for prioritizing new ITC

How to prioritize which regions to use for ITC:

(1) Assume a region uses its own resources first
(reliability rather than economic dispatch)

(2) Prioritize nearby regions for support (neighboring Source/Sink)

(3) Prioritize Source regions with more relative surplus



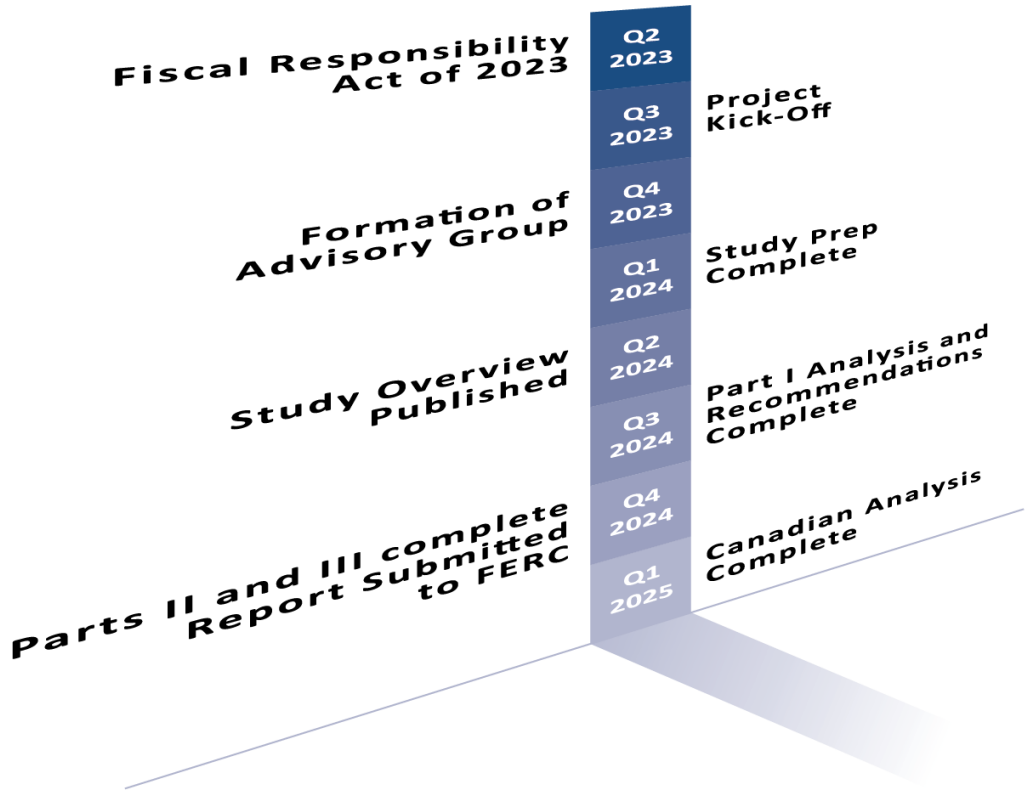
Source: ESIG Transmission Resilience Task Force (Telos Energy)
https://www.esig.energy/transmission-resilience/

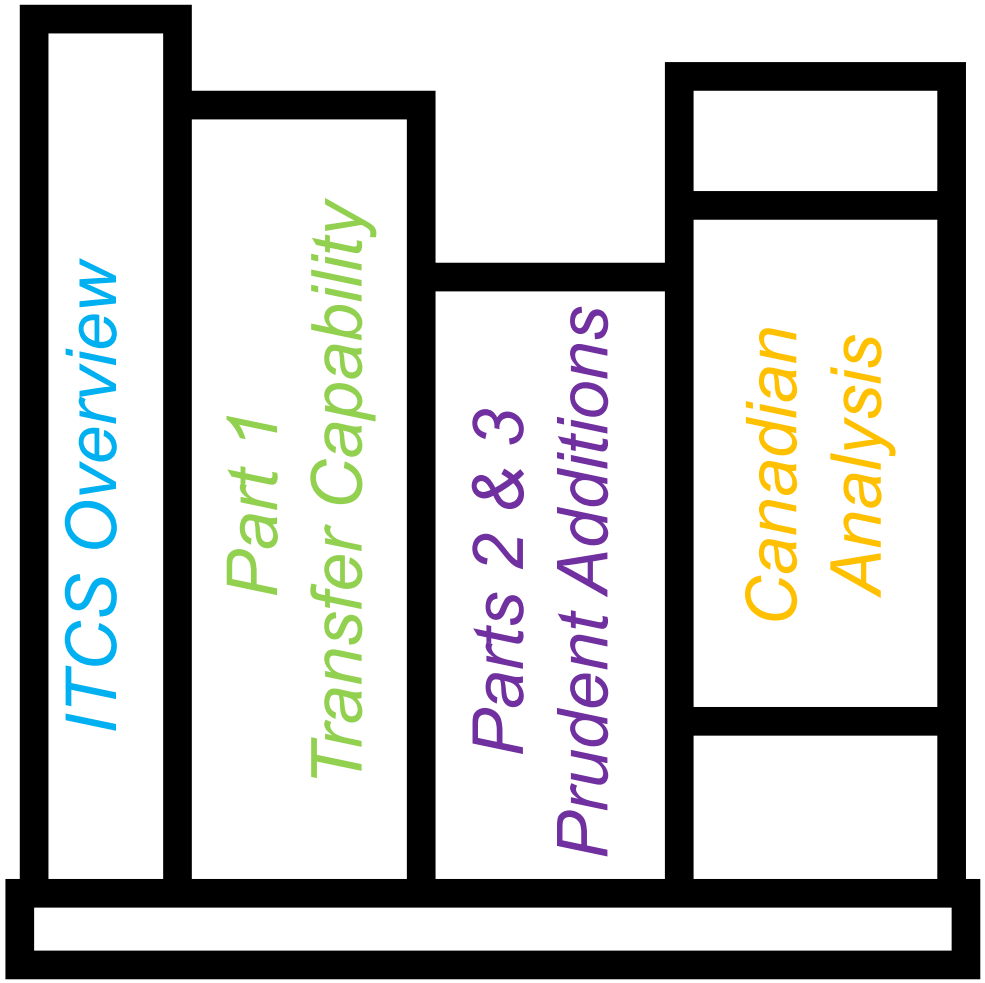
Proposal: Develop a shadow price method to prioritize which regions should increase ITC

Part 3 Scope: Meet and Maintain

- Additional studies and analysis
- Infrastructure upgrades
- Grid enhancing technologies
- Resource additions
- Markets & regulatory recommendations

ITCS Timeline and Report Strategy





Stakeholder Input and Feedback Channels

MONTHLY ADVISORY GROUP MEETINGS

NERC AND REGIONAL TECHNICAL COMMITTEES

PRESENTATIONS TO STATE AND PROVINCIAL REGULATORS

PRESENTATIONS TO INTERESTED INDUSTRY GROUPS

For more information:

- *https://www.nerc.com/pa/RAPA/Pages/ITCS.aspx*
- *itcs@nerc.net*

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Questions and Answers

Bulk Power System Awareness

Action
Update

Background
NERC's Bulk Power System Awareness (BPSA) group acquires and disseminates timely, accurate, and complete information regarding the current status of the bulk power system (BPS) and threats to its reliable operation, to enable the ERO Enterprise to effectively assure the reliability of the BPS. During major system disturbances, extreme weather, fires, hurricanes, physical events, and geomagnetic disturbances, etc., the BPSA facilitates effective communications between the ERO Enterprise, industry, and government stakeholders.

NERC BPSA, in collaboration with the E-ISAC and the ERO Enterprise Situation Awareness teams, maintains a near real-time situation awareness of conditions on the BPS. Notifies the Industry of significant BPS events that have occurred in one area, and which have the potential to impact reliability in other areas. Maintains and strengthens high-level communications, coordination, and cooperation with governments and government agencies regarding real-time conditions.

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Bulk Power System Awareness

Situational Awareness Q2 2024

Darrell Moore, Director Situation Awareness and Personnel Certification/Credential Maintenance

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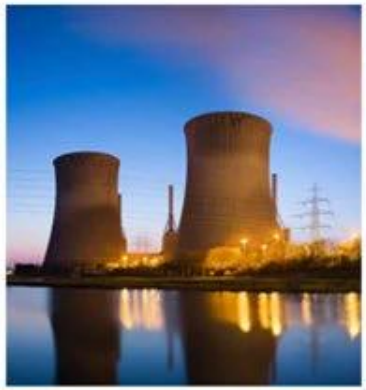

2024 Q2 Overview

For the first Quarter 2024, no widespread significant events were observed or reported on the North American Bulk Power System (BPS).

Total Solar Eclipse Path over North America

A total solar eclipse crossed North America on Monday April 8. Through proactive planning and posturing, system operators maintained bulk power system reliability during the event. There were no reported or observed impacts to the BPS.

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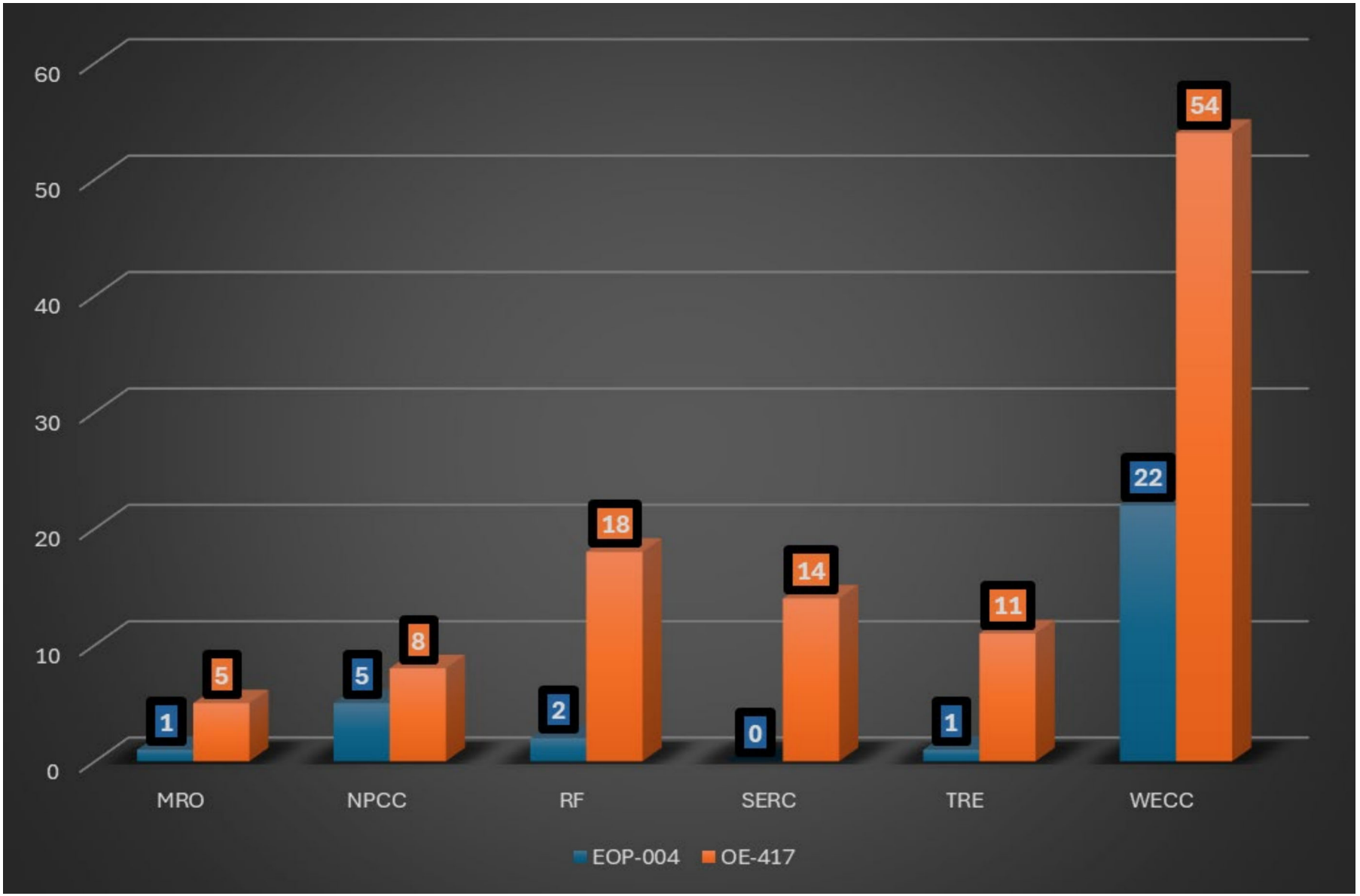
2024 Q1 Mandatory Reports by Region



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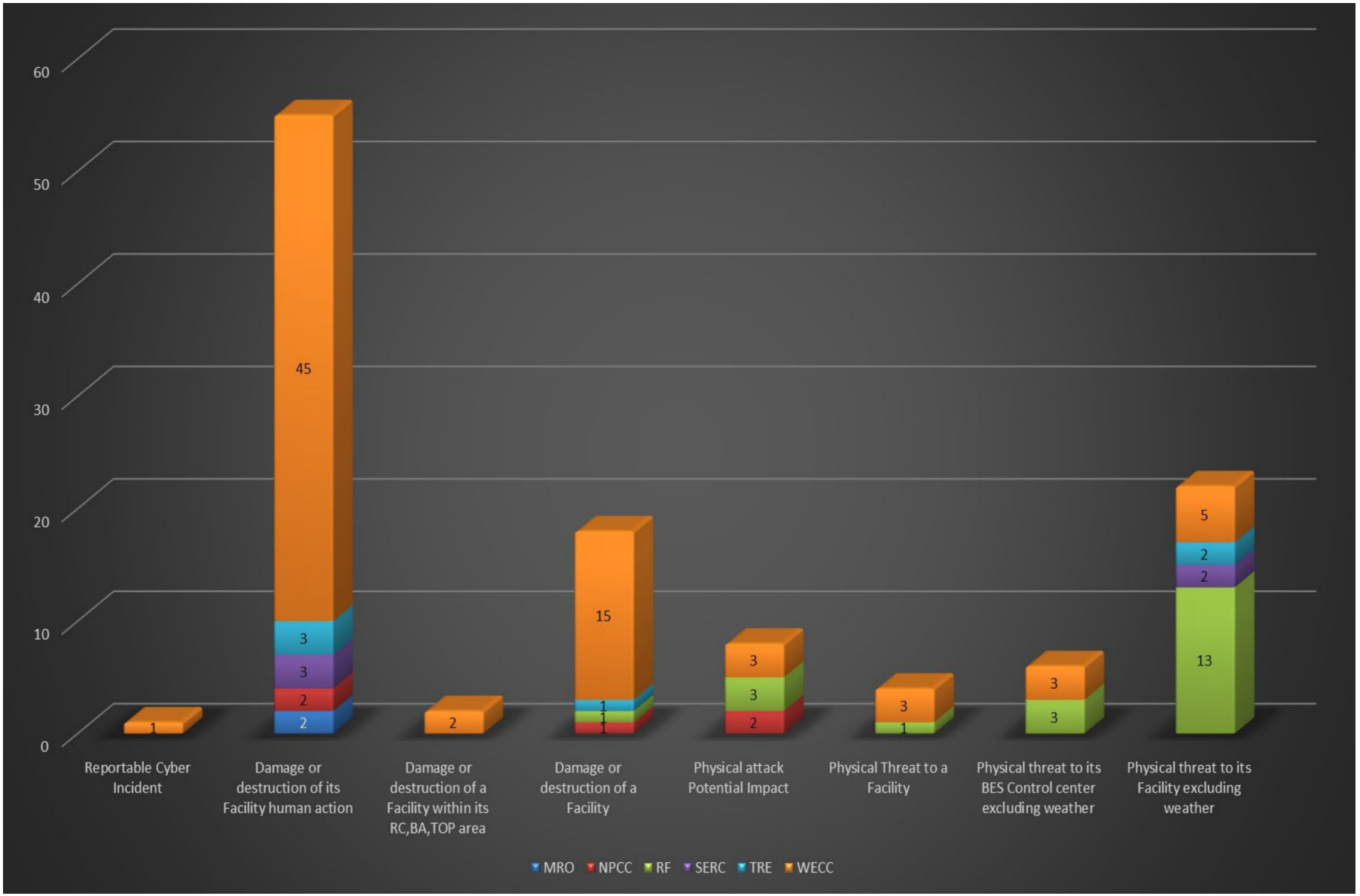
2024 Q1 Cyber & Physical Security Reports by Region



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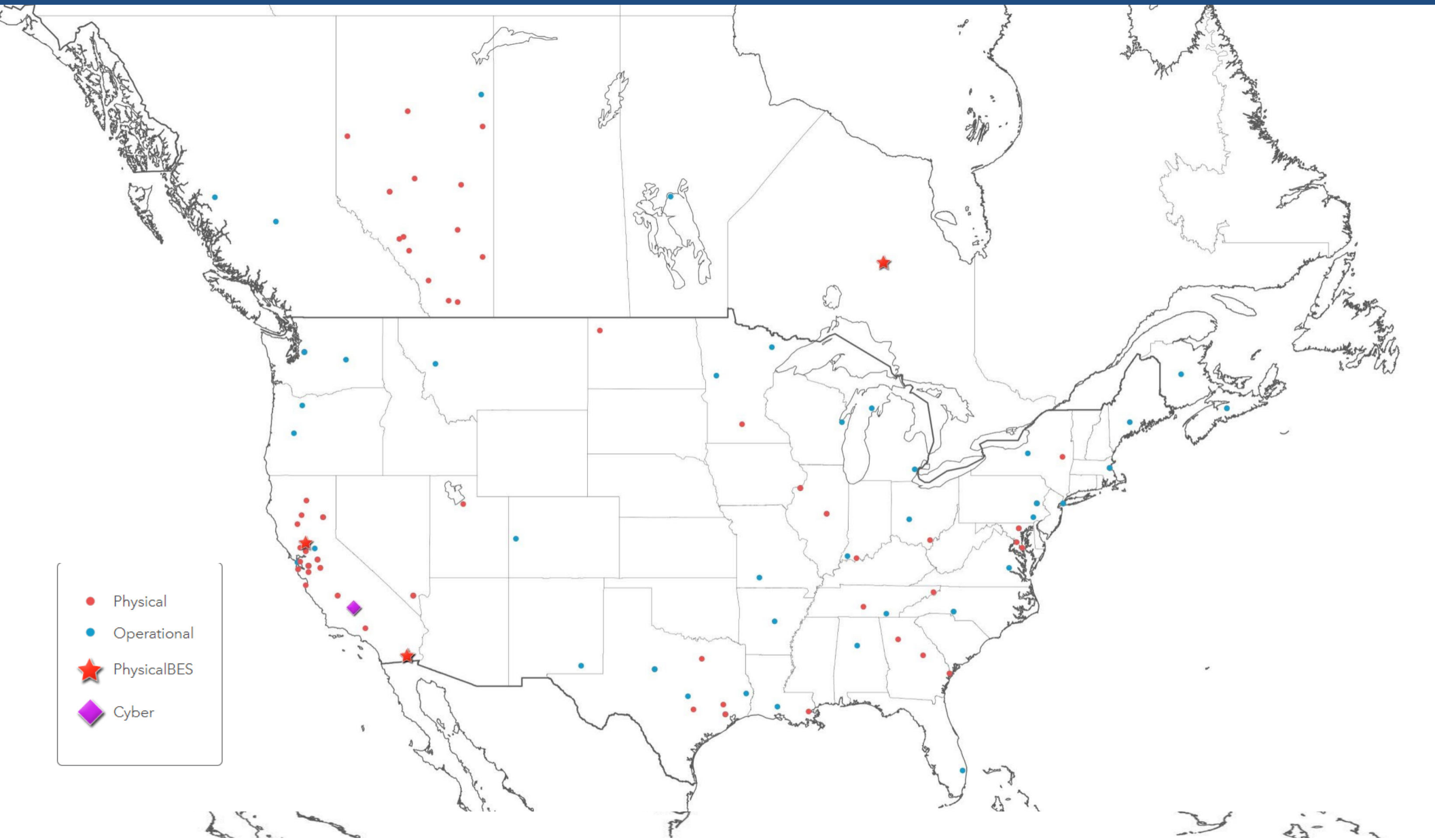
2024 Q1 Events
United States & Canada



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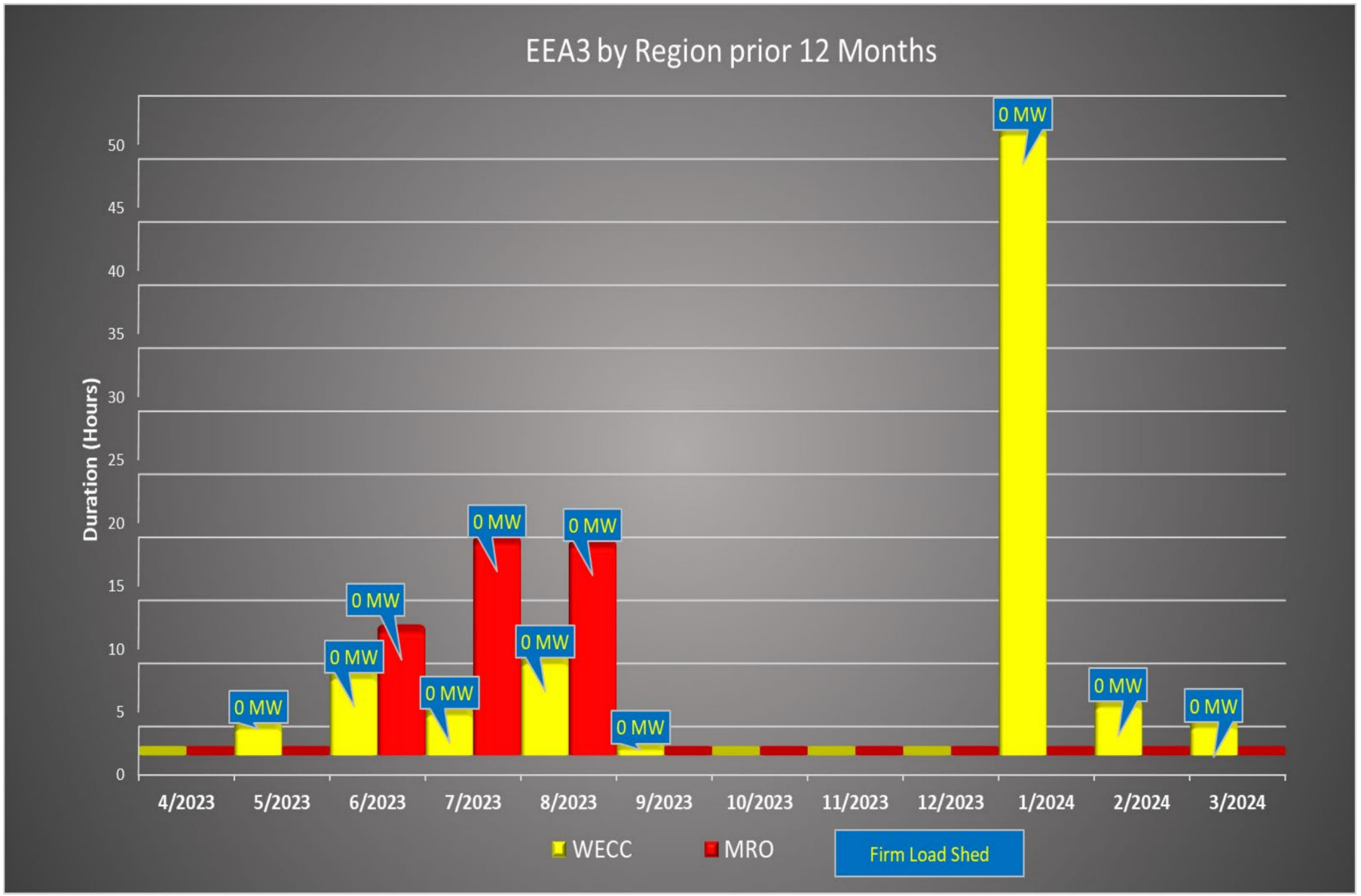
Energy Emergency Alert (EEA) 3 Reports 12 Month View



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Questions and Answers