

NERC Update

Rich Bauer
NERC Reliability Assessment and Performance Analysis
WECC PCS
June 6, 2024

RELIABILITY | ACCOUNTABILITY



- **Standard Developments**
- **Disturbance Reports**
- **Texas Wind Events**

185 FERC ¶ 61,042
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 40

[Docket No. RM22-12-000; Order No. 901]

Reliability Standards to Address Inverter-Based Resources

(Issued October 19, 2023)

AGENCY: Federal Energy Regulatory Commission

ACTION: Final rule

SUMMARY: The Federal Energy Regulatory Commission (Commission) is directing the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization, to develop new or modified Reliability Standards that address reliability gaps related to inverter-based resources in the following areas: data sharing; model validation; planning and operational studies; and performance requirements. The Commission is also directing NERC to submit to the Commission an informational filing within 90 days of the issuance of this final rule that includes a detailed, comprehensive standards development plan providing that all new or modified Reliability Standards necessary to address the inverter-based resource-related reliability gaps identified in this final rule be submitted to the Commission by November 4, 2026.

DATES: This rule is effective [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

North
American
Electric
Reliability
Corporation

Digitally signed by
North American
Electric Reliability
Corporation
Date: 2024.01.18
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Reliability Standards to Address
Inverter-Based Resources

Docket No. RM22-12-000

**INFORMATIONAL FILING OF THE NORTH AMERICAN RELIABILITY
CORPORATION REGARDING THE DEVELOPMENT OF RELIABILITY
STANDARDS RESPONSIVE TO ORDER NO. 901**

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Corporation
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*Counsel for the North American Electric
Reliability Corporation*

January 17, 2024

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Standards Development Strategy to Address FERC Order 901

November 2023

RELIABILITY | RESILIENCE | SECURITY



- Key Factors to Include in Strategy
 - Prioritization of NERC Standards Projects
 - Continual coordination between NERC Engineering, Legal, and Standards
 - Ongoing communication to industry
 - Balance with other high priority work

Reliability Standards Under Development

High Priority - Completed by 2024

2016-02 Modifications to CIP Standards - CIP-002, CIP-003, CIP-004, CIP-005, CIP-006, CIP-007, CIP-008, CIP-009, CIP-010, CIP-011, CIP-012-1

2020-02 Modifications to PRC-024 (Generator Ride-through)*

2020-06 Verifications of Models and Data for Generators* (IBR Definitions Only)

2021-03 CIP-002

2021-04 Modifications to PRC-002-2*

2022-03 Energy Assurance with Energy-Constrained Resources

2023-02 Analysis and Mitigation of BES Inverter-Based Resource Performance Issues*

2023-03 Internal Network Security Monitoring (INSM)

2023-04 Modifications to CIP-003

2023-06 CIP-014 Risk Assessment Refinement

2023-07 Transmission System Planning Performance Requirements for Extreme Weather

Medium Priority - Completed By 2025 and Beyond

2021-01 Modifications to MOD-025 and PRC-019*

2023-01 EOP-004 IBR Event Reporting*

2023-09 Risk Management for Third-Party Cloud Services

Low Priority

2017-01 Modifications to BAL-003 Phase II

2019-04 Modifications to PRC-005-6

2021-02 Modifications to VAR-002-4.1*

2021-08 Modifications to FAC-008

2022-02 Modifications to TPL-001-5.1 and MOD-032-1*

2022-04 EMT Modeling*

2022-05 Modifications to CIP-008 Reporting Threshold

2023-05 Modifications to FAC-001 and FAC-002 *

2023-08 Modifications of MOD-031 Demand and Energy Data

Standards Announcement

Project 2020-06 Verifications of Models and Data
for Generators
Inverter-based Resource Definitions

Additional Ballot Results

[Now Available](#)

The formal comment period and additional ballots for **Inverter-based Resource Definitions** concluded **8 p.m. Eastern, Monday, April 8, 2024**.

The voting statistics are listed below, and the details can be accessed on the [Ballot Results](#) page.

	Quorum / Approval
Inverter-Based Resource (IBR)	83.33% / 67.55%
IBR Unit	83.27% / 61.07%
IBR-related Definitions Implementation Plan	83.21% / 70.04%

PRC-024-4 — Frequency and Voltage Protection Settings for Synchronous Generators and Synchronous Condensers

A. Introduction

1. **Title:** Frequency and Voltage Protection Settings for Synchronous Generators and Synchronous Condensers
2. **Number:** PRC-024-4
3. **Purpose:** To assure that protection of synchronous generators and synchronous condensers do not cause tripping during defined frequency and voltage excursions in support of the Bulk Power System (BPS).
4. **Applicability:**

4.1. Functional Entities:

- 4.1.1. Generator Owners that apply protection listed in Sections 4.2.1 and 4.2.2.
- 4.1.2. Transmission Owners that apply protection listed in Section 4.2.3.
- 4.1.3. Transmission Owners (in the Quebec Interconnection only) BES generator step-up (GSU) transformer or main power transformer (MPT)¹ and apply protection listed in Section 4.2.1.
- 4.1.4. Planning Coordinators (in the Quebec Interconnection only) apply protection listed in Section 4.2.1.

PRC-029-1 – Frequency and Voltage Ride-through Requirements for Inverter-Based Generating Resources

A. Introduction

1. **Title:** Frequency and Voltage Ride-through Requirements for Inverter-Based Generating Resources
2. **Number:** PRC-029-1
3. **Purpose:** To ensure that Inverter-Based Resources (IBRs) remain connected and perform operationally as expected to support of the Bulk Power System (BPS) during and after defined frequency and voltage excursions.
4. **Applicability:**
 - 4.1 **Functional Entities:**
 - 4.1.1. Generator Owner
 - 4.1.2. Transmission Owner¹
 - 4.2 **Facilities:** For purposes of this standard, the term “applicable Inverter-Based Resource” or “applicable Inverter-Based Resources” refers to the following:
 - 4.2.1. BPS IBRs
 - 4.2.2. IBR Registration Criteria
5. **Effective Date:** See Implementation Plan for Project 2020-02 – PRC-029-1

Standards Announcement

Project 2020-02 Modifications to PRC-024 (Generator Ride-through)

Initial Ballot and Non-binding Poll Results

[Now Available](#)

The initial ballots and non-binding polls of the associated Violation Risk Factors and Violation Severity Levels for **Project 2020-02 Modifications to PRC-024 (Generator Ride-through)** concluded **8 p.m. Eastern, Monday, April 22, 2024**.

The voting statistics are listed below, and the details can be accessed on the [Ballot Results](#) page.

	Ballot	Non-binding Poll
	Quorum / Approval	Quorum / Supportive Opinions
PRC-024-4	91.51% / 61.73%	89.37% / 63.79%
PRC-029-1	91.01% / 25.37%	88.45% / 25.15%
Implementation Plan	91.14% / 37.50%	N/A

Standard Authorization Request (SAR)

Complete and submit this form, with attachment(s) to the [NERC Help Desk](#). Upon entering the Captcha, please type in your contact information, and attach the SAR to your ticket. Once submitted, you will receive a confirmation number which you can use to track your request.

The North American Electric Reliability Corporation (NERC) welcomes suggestions to ~~improve the~~ reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:	PRC-002-2 Disturbance Monitoring and Reporting Requirements		
Date Submitted:	June 10, 2020 (Revised on November 16, 2021, and April 5, 2023)		
SAR Requester			
Name:	Allen Shriver, Chair Jeffery Billo, Vice Chair Revised by Project 2021-04 SAR Drafting Team		
Organization:	Inverter-Based Resource Performance Task Force (IRPTF)		
Telephone:	Allen: 561-904-3234 Jeffery: 512-248-6334	Email:	Allen.Shriver@NextEraEnergy.com Jeff.Billo@ercot.com
SAR Type (Check as many as apply)			
<input checked="" type="checkbox"/> New Standard	<input type="checkbox"/> Imminent Action/ Confidential Issue (SPM Section 10)		
<input checked="" type="checkbox"/> Revision to Existing Standard	<input type="checkbox"/> Variance development or revision		
<input type="checkbox"/> Add, Modify, or Retire a Glossary Term	<input type="checkbox"/> Other (Please specify)		
<input type="checkbox"/> Withdraw/retire an Existing Standard			
Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)			
<input type="checkbox"/> Regulatory Initiation	<input checked="" type="checkbox"/> NERC Standing Committee Identified		
<input type="checkbox"/> Emerging Risk (Reliability Issues Steering Committee) Identified	<input type="checkbox"/> Enhanced Periodic Review Initiated		
<input type="checkbox"/> Reliability Standard Development Plan	<input checked="" type="checkbox"/> Industry Stakeholder Identified		
Industry Need (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):			
<p>The NERC Inverter-based Resource Performance Task Force (IRPTF) undertook an effort to perform a comprehensive review of all NERC Reliability Standards to determine if there were any potential gaps or improvements based on the work and findings of the IRPTF. The IRPTF identified several issues as part of this effort and documented its findings and recommendations in a white paper. The "IRPTF Review of NERC Reliability Standards White Paper" was approved by the Operating Committee and the Planning Committee in March 2020. Among the findings noted in the white paper, the IRPTF identified issues with PRC-002-2 that should be addressed.</p> <p>The purpose of PRC-002-2 is to have adequate data available to facilitate the analysis of BES disturbances. Requirements R1 and R5 specify where sequence of events recording (SER) and fault</p>			

- IRPS SAR
- Need Monitoring Requirements for IBR facilities

PRC-002-5 – Disturbance Monitoring and Reporting Requirements

A. Introduction

1. **Title:** Disturbance Monitoring and Reporting Requirements
2. **Number:** PRC-002-5
3. **Purpose:** To have adequate data available to facilitate analysis of Bulk Electric System (BES) Disturbances.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1. Reliability Coordinator
 - 4.1.2. Transmission Owner
 - 4.1.3. Generator Owner
 - 4.2. **Facilities:** BES Elements, excluding Inverter-Based Resources
5. **Effective Date:** See Implementation Plan

PRC-028-1 – Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources

A. Introduction

1. **Title:** Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources
2. **Number:** PRC-028-1
3. **Purpose:** To have adequate data available from Inverter-Based Resources (IBR) to facilitate analysis of IBR performance during Bulk Electric System (BES) Disturbances.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1. Transmission Owner that owns equipment as identified in section 4.2
 - 4.1.2. Generator Owner that owns equipment as identified in section 4.2
 - 4.2. **Facilities:** The Elements associated with (1) BES Inverter-Based Resources; and (2) Non-BES Inverter-Based Resources 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.
5. **Effective Date:** See Implementation Plan

- Draft 1 posted 9/2023
- Draft 2 posted 4/2024
- Draft 3 posted 6/5/2024

Standards Announcement

Project 2021-04 Modifications to PRC-002
– Phase II

Additional Ballots and Non-binding Polls Results

[Now Available](#)

Additional ballots and non-binding polls of the associated Violation Risk Factors and Violation Severity Levels for Project 2021-04 Modifications to PRC-002 - Phase II concluded 8 p.m. Eastern, April 11, 2024.

The voting statistics are listed below, and the details can be accessed on the [Ballot Results](#) page.

	Ballot	Non-binding Poll
Standard	Quorum / Approval	Quorum / Supportive Opinions
PRC-002-5	89.42% / 79.46%	84.96% / 77.96%
PRC-028-1	89.26% / 50.03%	86.59% / 44.83%
Implementation Plan	87.96% / 66.61%	N/A

Standard Authorization Request (SAR)

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The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:	Analysis and Mitigation of BES Inverter-Based Resource Performance Issues		
Date Submitted:	12/06/2022		
SAR Requester			
Name:	Julia Matevosyan, ESIG, IRPS Chair Rajat Majumder, Orsted, IRPS Vice Chair		
Organization:	NERC Inverter-based Resource Performance Subcommittee (IRPS)		
Telephone:	Julia – 512-994-7914 Rajat – 321-390-0333	Email:	julia@esig.energy RAMAJ@orsted.com
SAR Type (Check as many as apply)			
<input checked="" type="checkbox"/> New Standard	<input type="checkbox"/> Imminent Action/ Confidential Issue (SPM Section 10)		
<input checked="" type="checkbox"/> Revision to Existing Standard	<input type="checkbox"/> Variance development or revision		
<input checked="" type="checkbox"/> Add, Modify or Retire a Glossary Term	<input type="checkbox"/> Other (Please specify)		
<input type="checkbox"/> Withdraw/retire an Existing Standard			
Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)			
<input type="checkbox"/> Regulatory Initiation	<input checked="" type="checkbox"/> NERC Standing Committee Identified		
<input type="checkbox"/> Emerging Risk (Reliability Issues Steering Committee) Identified	<input type="checkbox"/> Enhanced Periodic Review Initiated		
<input type="checkbox"/> Reliability Standard Development Plan	<input checked="" type="checkbox"/> Industry Stakeholder Identified		
Industry Need (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):			
Multiple NERC disturbance reports ¹ have identified the undesired performance of bulk power system (BPS)-connected inverter-based resources (IBRs) during grid faults, and have elaborated on the systemic and significant BPS reliability risks that these pose. These are strongly highlighted in the recent disturbance reports from 2021 including the Odessa disturbance report. ² IBRs may trip for many different reasons, may cease current injection due to inverter controls, or may have unwanted plant-level controller interactions. These types of issues have been extensively documented in the NERC reports. The resulting unexpected and unwarranted loss of generation poses a significant risk to BPS reliability.			

- IRPS SAR
- Need Requirements for Analysis of IBR Operations

- **Draft 1 posted
4/2024**

PRC-030-1 – Unexpected Inverter-Based Resource Event Mitigation

A. Introduction

1. **Title:** Unexpected Inverter-Based Resource Event Mitigation
2. **Number:** PRC-030-1
3. **Purpose:** Identify, analyze, and mitigate unexpected Inverter-Based Resource change of power output.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1. Generator Owner
 - 4.2. **Facilities:**
 - 4.2.1. Bulk Power System (BPS) Inverter-Based Resources (IBR)
5. **Effective Date:** See Implementation Plan for PRC-030-1

- Draft 2 posted
4/2024

Standards Announcement

Project 2023-02 Analysis and Mitigation of BES Inverter-Based Resource Performance Issues

Initial Ballot and Non-binding Poll Results

Now Available

Initial ballots for draft one of **PRC-030-1 Unexpected Inverter-Based Resource Event Mitigation** and non-binding poll of the Associated Violation Risk Factors and Violation Severity Levels concluded **8 p.m. Eastern, Thursday, April 18, 2024.**

Voting statistics are listed below, and the [Ballot Results](#) page provides the detailed results.

	Ballot	Non-binding Poll
	Quorum / Approval	Quorum / Supportive Opinions
PRC-030-1	92.78% / 21.19%	90.08% / 13.11%
Implementation Plan	92.81% / 30.6%	N/A

- Draft 2 posted
4/2024

Standards Announcement

Project 2023-02 Analysis and Mitigation of BES Inverter-Based Resource Performance Issues

Initial Ballot and Non-binding Poll Results

Now Available

Initial ballots for draft one of **PRC-030-1 Unexpected Inverter-Based Resource Event Mitigation** and non-binding poll of the Associated Violation Risk Factors and Violation Severity Levels concluded **8 p.m. Eastern, Thursday, April 18, 2024.**

Voting statistics are listed below, and the [Ballot Results](#) page provides the detailed results.

	Ballot	Non-binding Poll
	Quorum / Approval	Quorum / Supportive Opinions
PRC-030-1	92.78% / 21.19%	90.08% / 13.11%
Implementation Plan	92.81% / 30.6%	N/A

Standard Authorization Request (SAR)

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The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information			
SAR Title:		Generator Owner and Generator Operator Definition Alignment	
Date Submitted:		April 25, 2024	
SAR Requester			
Name:		Alison Oswald	
Organization:		NERC	
Telephone:		404-275-9410	Email: alison.oswald@nerc.net
SAR Type (Check as many as apply)			
<input type="checkbox"/> New Standard	<input type="checkbox"/> Imminent Action/ Confidential Issue (SPM Section 10)		
<input type="checkbox"/> Revision to Existing Standard	<input type="checkbox"/> Variance development or revision		
<input checked="" type="checkbox"/> Add, Modify or Retire a Glossary Term	<input type="checkbox"/> Other (Please specify)		
<input type="checkbox"/> Withdraw/retire an Existing Standard			
Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)			
<input checked="" type="checkbox"/> Regulatory Initiation	<input type="checkbox"/> NERC Standing Committee Identified		
<input checked="" type="checkbox"/> Emerging Risk (Reliability Issues Steering Committee) Identified	<input type="checkbox"/> Enhanced Periodic Review Initiated		
<input type="checkbox"/> Reliability Standard Development Plan	<input type="checkbox"/> Industry Stakeholder Identified		
What is the risk to the Bulk Electric System (What Bulk Electric System (BES) reliability benefit does the proposed project provide?):			
<p>The project will address concerns regarding the reliability impacts of inverter-based resources (IBRs) on the Bulk-Power System that do not meet the current definition of Bulk Electric System (BES) and have not historically been required to be registered with NERC for compliance with the NERC Reliability Standards. Such concerns are discussed in detail in the Federal Energy Regulatory Commission (FERC) November 17, 2022 order in Docket No. RD22-4-000, in which FERC directed NERC to develop a work plan to address the registration of these IBRs and ensure their compliance with Reliability Standards by certain milestone dates. <i>See Registration of Inverter-Based Resources</i>, 181 FERC ¶ 61,124 (Nov. 17, 2022).</p> <p>In March 2024, NERC proposed changes to its Rules of Procedure registry criteria to include certain non-BES IBRs in the Generator Owner (GOs) and Generator Operator (GOP) categories. Revising the GO and GOP definitions in the NERC Glossary of Terms to match the registry criteria will ensure these previously</p>			

- Draft 2 posted 4/2024

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

Related Files

Status

The nomination period for **Project 2024-01 Rules of Procedure Definitions Alignment (Generator Owner and Generator Operator)** is open through **8 p.m. Eastern, Monday, July 1, 2024.**

The SAR will be posted for REVIEW ONLY at this time and will have a future commenting period to be determined upon FERC approval of the proposed ROP changes. An additional announcement will be communicated once the SAR commenting period is open.

Background

The project will address concerns regarding the reliability impacts of inverter-based resources (IBRs) on the Bulk-Power System that do not meet the current definition of Bulk Electric System (BES) and have not historically been required to be registered with NERC for compliance with the NERC Reliability Standards. Such concerns are discussed in detail in the Federal Energy Regulatory Commission (FERC) November 17, 2022 order in [Docket No. RD22-4-000](#), in which FERC directed NERC to develop a work plan to address the registration of these IBRs and ensure their compliance with Reliability Standards by certain milestone dates. *See Registration of Inverter-Based Resources*, 181 FERC ¶ 61,124 (Nov. 17, 2022).

In March 2024, NERC proposed changes to its Rules of Procedure registry criteria to include certain non-BES IBRs in the Generator Owner (GOs) and Generator Operator (GOP) categories. Revising the GO and GOP definitions in the NERC Glossary of Terms to match the registry criteria will ensure these previously unregistered IBRs will be subject to the NERC Reliability Standards and mitigate their impacts on the BPS.

- **SDT
forming
until 7/1**

Standard Authorization Request (SAR)

Complete and submit this form, with attachment(s) to the [NERC Help Desk](#). Upon entering the Captcha, please type in your contact information, and attach the SAR to your ticket. Once submitted, you will receive a confirmation number which you can use to track your request.

The North American Electric Reliability Corporation (NERC) welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards.

Requested information		
SAR Title:	Federal Energy Regulatory Commission (FERC) Order No. 901 – Milestone 3, Part 2: IBR Model Validation	
Date Submitted:	4/29/24	
SAR Requester		
Name:	Alex Shattuck, Jamie Calderon, JP Skeath	
Organization:	North American Electric Reliability Corporation (NERC)	
Telephone:	470-259-0109 (Alex Shattuck) 404-960-0568 (Jamie Calderon) 404-823-1365 (JP Skeath)	Email: Alex.Shattuck@nerc.net Jamie.Calderon@nerc.net John.Skeath@nerc.net
SAR Type (Check as many as apply)		
<input checked="" type="checkbox"/> New Standard	<input type="checkbox"/> Imminent Action/ Confidential Issue (SPM Section 10)	
<input checked="" type="checkbox"/> Revision to Existing Standard	<input type="checkbox"/> Variance development or revision	
<input checked="" type="checkbox"/> Add, Modify or Retire a Glossary Term	<input type="checkbox"/> Other (Please specify)	
<input checked="" type="checkbox"/> Withdraw/retire an Existing Standard		
Justification for this proposed standard development project (Check all that apply to help NERC prioritize development)		
<input checked="" type="checkbox"/> Regulatory Initiation	<input checked="" type="checkbox"/> NERC Standing Committee Identified	
<input checked="" type="checkbox"/> Emerging Risk (Reliability Issues Steering Committee) Identified	<input type="checkbox"/> Enhanced Periodic Review Initiated	
<input checked="" type="checkbox"/> Reliability Standard Development Plan	<input type="checkbox"/> Industry Stakeholder Identified	
What is the risk to the Bulk Electric System (BES) reliability benefit does the proposed project provide?:		
<p>This Standards Authorization Request (SAR) is initiated by NERC, with consultation of the Reliability Security Technical Committee, to address directives issued by the Federal Energy Regulatory Commission (FERC) in Order No. 901. FERC issued Order No. 901 on October 19, 2023, which includes directives on new or modified NERC Reliability Standard projects. FERC Order No. 901 addresses a wide spectrum of reliability risks to the grid from the application of inverter-based resources (IBRs); including both utility scale and behind-the-meter or distributed energy resources (DERs).</p> <p>Within the Order, are four milestones that include sets of directives to NERC. In the Order, FERC has directed NERC to propose new or modified standards to mitigate reliability gaps in the current NERC Reliability Standards related to IBRs. Specifically, FERC directed NERC to develop new or modified</p>		

- MOD-033/MOD-026/MOD-027/FAC-002
- SAR posted thru 6/26

NERC Disturbance Reports



<https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx>

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

2023 Southwest Utah Disturbance

Southwestern Utah: April 10, 2023
Joint NERC and WECC Staff Report

August 2023

RELIABILITY | RESILIENCE | SECURITY



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2022 California Battery Energy Storage System Disturbances

California Events: March 9 and April 6, 2022
Joint NERC and WECC Staff Report

September 2023

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Systemic Near Miss Wind Events in Texas

Predictors of Future Major Disturbances

2024

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Questions

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