

Reliability Standard Fundamentals

Electric Reliability
& Security for the West

Reliability Standard Fundamentals

What is a Reliability Standard and why do we have them?

Reliability Standard Fundamentals

What is a Reliability Standard?

Reliability Standard is the term used to describe the mandatory requirements that users, owners, and operators of bulk power system must follow to ensure the reliable operation of the bulk power system.

Reliability Standards impose requirements on the users, owners, and operators of the bulk power system to ensure that they fulfill their responsibilities in reliable grid operations, consistent with the basic engineering functions and concepts.

Why Do We Have Reliability Standards?

Reliability Standards are the direct result of a blackout that occurred on August 14, 2003, affecting an estimated **50 million people** and 61,800 MW of electric load throughout large portions of eastern Canada and the United States.

Although utilities successfully restored power to most customers within hours, some areas in the United States did not have power restored for several days. Parts of Ontario suffered rolling blackouts for up to two weeks before full power was restored.



Why Do We Have Reliability Standards?



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The 2003 Northeast Blackout was caused by a combination of human error and equipment failures.

- A generating plant near Cleveland, Ohio tripped offline amid high heat and high electrical demand.
- The hot day also caused power lines to sag as power losses due to higher currents heated the lines.
- A transmission line in northern Ohio sagged into overgrown trees and tripped.
- Three other transmission lines sagged into trees and switched off, forcing other power lines to shoulder the extra burden.
- Normally, the problem would have activated an alarm in the control room, but the alarm system failed.

System Outage Task Force Investigation

U.S.-Canada Power System Outage Task Force

**Final Report
on the Implementation
of the Task Force
Recommendations**

Natural Resources Canada
U.S. Department of Energy



Canada 

September 2006

Investigation efforts

Following the 2003 Northeast Blackout, a joint federal task force was formed by the governments of Canada and the U.S. to oversee the investigation. In addition to determining the initial cause of the cascading failure, the investigation of the incident also included an examination of the failure of safeguards designed to prevent a repetition of the Northeast blackout of 1965.

2003 Northeast Blackout



Final Report on the Implementation of Task Force Recommendations: Recommendation #1

Appropriate branches of government in the United States and Canada should act as required to make reliability standards mandatory and enforceable and to provide appropriate penalties for non-compliance.

Federal Power Act – Section 215



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In response to the recommendation in the Power System Outage Task Force Report, the United States Congress approved the inclusion of Section 215 in the Federal Power Act, August 8, 2005, which ***requires the Electric Reliability Organization (ERO) to develop mandatory and enforceable Reliability Standards, which are subject to Federal Energy Regulatory Commission (FERC) review and approval.***

Energy Policy Act



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Similarly, the BC government amended the [Utilities Commission Act](#) (UCA) by adding Section 125.2 in 2009 to establish the Mandatory Reliability Standards (MRS) Regulation, which describes the parties that are required to adopt reliability standards.

Who Must Comply?

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Rules of Procedure

Effective: November 28, 2023

The NERC Rules of Procedure, Section 300, addresses the requirements for developing Reliability Standards. Specifically, the language states:

“NERC shall develop and maintain Reliability Standards that apply to Bulk Power System owners, operators, and users and that enable NERC and Regional Entities to measure the reliability performance of Bulk Power System owners, operators, and users; and to hold them accountable for Reliable Operation of the Bulk Power Systems.”

Requirement Types

Results-Based Standards

Performance-
Based
Requirements

Risk-Based
Requirements

Competency-
Capability-
Based
Requirements

Results Based Standards

NERC reliability standards focus on the required actions or results (the "what") and not necessarily the methods used to accomplish those actions or results (the "how").

Performance-Based Requirements

A performance-based requirement works by defining a specific reliability objective or outcome that must be achieved by one or more entities, with a direct, observable effect (e.g., power system data/trends).

Application	Measures
• Defined performance targets • Should be observable and measurable on the bulk power system • The reliable outcome is what is being measured	• Periodic reporting of system data/results • System testing/simulation • Event-triggered response data/analysis

Performance-Based Requirements

Auto

The posted speed limits requiring drivers to operate vehicles at or under what is determined to be a safe operating speed.

O&P

“Each Transmission Owner shall prevent vegetation from encroaching within the Minimum Vegetation Clearance Distance (MVCD).”

CIP

“Issue an alarm or alert in response to detected unauthorized access through a physical access point into a Physical Security Perimeter to the personnel identified in the BES Cyber Security Incident response plan within 15 minutes of detection.”

Risk-Based Requirements

A **risk-based requirement** works to reduce the risk of failure to acceptable tolerance levels by using preventive requirements to reduce the risks of failure. A risk-based reliability requirement should be framed as: who, under what conditions (if any), shall perform what action, to achieve what particular result or outcome that reduces a stated risk to the reliability of the bulk power system?

Application	Measures
• Necessary when consequences of failure or performance-based measures are too costly • Based on defined risk strategies and objectives	• Bulk power system performance trends • Defined risk targets achieved • Performance records, logs, interviews, etc.

Risk-Based Requirements

Auto

Automobile safety inspections ask auto owners to annually inspect their vehicles to ensure they are safe to operate.

O&P

“Each Transmission Owner shall perform a Vegetation Inspection of all applicable transmission lines at least once per calendar year.”

CIP

“At least once every 35 calendar days, evaluate security patches for applicability that have been released since the last evaluation from the source or sources identified in Part 2.1.”

Competency-Based Requirements

A **competency-based requirement** defines a minimum set of capabilities an entity must have to demonstrate the ability to perform its designated reliability functions. In other words, who, under what conditions (if any), shall have what capability, to achieve what particular result or outcome needed to reduce risks to the bulk power system?

Application	Measures
• Tools and training • Communications and analysis equipment • Backup facilities	• Observe/test functionality • Certifications, qualifications • Records, logs, etc.

Competency-Based Requirements

Auto

Drivers' licenses show that the auto operator has demonstrated the knowledge needed to safely operate an auto.

O&P

"Each Transmission Owner shall document the procedures, processes, or specifications it uses to prevent the encroachment of vegetation into the MVCD."

CIP

"Require completion of the training specified in Part 2.1 prior to granting authorized electronic access and authorized unescorted physical access to applicable Cyber Assets, except during CIP Exceptional Circumstances."

Auto Safety Defense in Depth

Performance-Based

The posted speed limits requiring drivers to operate vehicles at or under what is determined to be a safe operating speed.

Risk-Based

Automobile safety inspections ask auto owners to annually inspect their vehicles to ensure they are safe to operate.

Competency-Based

Drivers' licenses show that the auto operator has demonstrated the knowledge needed to safely operate an auto.

Vegetation Management Standard Example

Performance-Based

“Each Transmission Owner shall prevent vegetation from Each Transmission Owner shall prevent vegetation from encroaching within the Minimum Vegetation Clearance Distance (MVCD).”

Risk-Based

“Each Transmission Owner shall perform a Vegetation Inspection of all applicable transmission lines at least once per calendar year.”

Competency-Based

“Each Transmission Owner shall document the procedures, processes, or specifications it uses to prevent the encroachment of vegetation into the MVCD.”



NERC Reliability Standards

Operations & Planning Standards

NERC 693 Reliability Standards define the reliability requirements for operating and planning the North American bulk power system.

Based on FERC Order No. 693, issued by the on March 16, 2007.

Critical Infrastructure Protection Standards

NERC 706 Reliability Standards define the reliability requirements for Critical Infrastructure Protection (CIP) of the North American bulk power system.

Based on FERC Order No. 706, issued by the on January 18, 2008.

Inverter-based Resource Standards

NERC 901 Reliability Standards define the reliability requirements for inverter-based resource operating and planning the North American bulk power system.

Based on FERC Order No. 901, issued by the on October 19, 2023.

Types of Reliability Standards

NERC Reliability Standard Families

Reference	Standard Family
BAL	Resource and Demand Balancing
CIP	Critical Infrastructure Protection
COM	Communications
EOP	Emergency Preparedness and Operations
FAC	Facilities Design, Connections, and Maintenance
INT	Interchange Scheduling and Coordination
IRO	Interconnection Reliability Operations and Coordination
MOD	Modeling, Data, and Analysis
NUC	Nuclear
PER	Personnel Performance, Training, and Qualifications
PRC	Protection and Control
TOP	Transmission Operations
TPL	Transmission Planning
VAR	Voltage and Reactive

Reliability Principles

NERC requires that each reliability standard shall enable or support specific reliability principles to ensure that each standard serves a purpose in supporting the reliability of the North American bulk power systems.

NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Reliability Principles

NERC Reliability Standards are based on certain reliability principles that define the foundation of reliability for North American bulk power systems.¹ Each reliability standard shall enable or support one or more of the reliability principles, thereby ensuring that each standard serves a purpose in support of reliability of the North American bulk power systems. Each reliability standard shall also be consistent with all of the reliability principles, thereby ensuring that no standard undermines reliability through an unintended consequence.

1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented.
5. Facilities for communication, monitoring, and control shall be provided, used, and maintained for the reliability of interconnected bulk power systems.
6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
7. The reliability of the interconnected bulk power systems shall be assessed, monitored, and maintained on a wide-area basis.
8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Version History

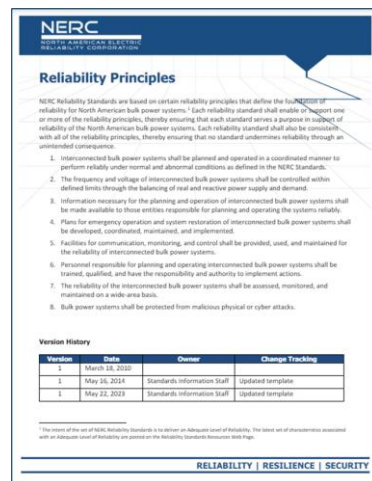
Version	Date	Owner	Change Tracking
1	March 18, 2010		
1	May 16, 2014	Standards Information Staff	Updated template
1	May 22, 2023	Standards Information Staff	Updated template

¹ The intent of the set of NERC Reliability Standards is to deliver an Adequate Level of Reliability. The latest set of characteristics associated with an Adequate Level of Reliability are posted on the Reliability Standards Resources Web Page.

RELIABILITY | RESILIENCE | SECURITY

Reliability Principles

NERC Reliability Principles



Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.

The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.

Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.

Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented.

Facilities for communication, monitoring, and control shall be provided, used, and maintained for the reliability of interconnected bulk power systems.

Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.

The reliability of the interconnected bulk power systems shall be assessed, monitored, and maintained on a wide-area basis.

Bulk power systems shall be protected from malicious physical or cyber attacks.

Regional Standards

- Allowed per [Rules of Procedure](#)
- Used if a reliability objective is not uniformly applicable
- Follow Regional Entity Reliability Standards Development Process (FERC-approved)
- Interconnection-wide or Regional-Entity-dependent
- Follows similar process of a NERC Reliability Standard (SAR, drafting team, public comments, approval by regional committees/boards, submittal to NERC board, submittal to FERC)

Jurisdiction

- United States (Contiguous 48)
 - NERC Reliability Standards approved by FERC
- Canada
 - Alberta (AB)
 - Alberta Electric System Operator's ([AESO](#)) review and adoption process. Approved by the Alberta Utilities Commission ([AUC](#))
 - British Columbia (BC)
 - British Columbia Hydro and Power Authority ([BC Hydro](#)) assesses reliability standards approved by FERC and reports to the British Columbia Utilities Commission ([BCUC](#)) on their suitability for adoption in BC. BCUC is an independent, quasi-judicial, regulatory agency that operates under and administers the Utilities Commission Act (UCA).

Jurisdictional Differences

- FAC-008
 - US
 - Revision 5 effective 10/1/2021
 - Updated from Revision 3
 - AB
 - Revision 3 effective 1/1/2019 for new facilities 1/1/2020 for existing facilities (Note U.S. Revision 3 was effective 1/1/2013)
 - Differences in applicability, functions, Requirement language
 - BC
 - Revision 5 Effective 4/1/2023

- R1.** Each Generator Owner shall have documentation for determining the Facility Ratings of its solely and jointly owned generator Facility(ies) up to the low side terminals of the main step up transformer if the Generator Owner does not own the main step up transformer and the high side terminals of the main step up transformer if the Generator Owner owns the main step up transformer. *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*
- 1.1.** The documentation shall contain assumptions used to rate the generator and at least one of the following:
- Design or construction information such as design criteria, ratings provided by equipment manufacturers, equipment drawings and/or specifications, engineering analyses, method(s) consistent with industry standards (e.g. ANSI and IEEE), or an established engineering practice that has been verified by testing or engineering analysis.
 - Operational information such as commissioning test results, performance testing or historical performance records, any of which may be supplemented by engineering analyses.
- 1.2.** The documentation shall be consistent with the principle that the Facility Ratings do not exceed the most limiting applicable Equipment Rating of the individual equipment that comprises that Facility.

Alberta Reliability Standard Facility Ratings FAC-008-AB-3



- (iii) directly connected to the **bulk electric system** and within an industrial complex with **supply transmission service** greater than 67.5 MW; or
- (iv) regardless of **maximum authorized real power rating**, material to this **reliability standard** and to the reliability of the **bulk electric system** as the **ISO** determines and publishes on the AESO website and may amend from time to time in accordance with the process set out in Appendix 1.

3. Requirements

R1 Each **legal owner** of a **generating unit** and **legal owner** of an **aggregated generating facility** must have documentation for determining the **facility ratings** of its facilities:

- (a) up to the low side terminals of the step-up transformer if the **legal owner** of the **generating unit** or **legal owner** of the **aggregated generating facility** does not own the step-up transformer; or
- (b) including the step-up transformer and associated terminal equipment (as applicable based on ownership) if the **legal owner** of the **generating unit** or **legal owner** of the **aggregated generating facility** owns the step-up transformer.

R1.1 The documentation must contain assumptions used to rate the facilities and at least one (1) of the following:

- (a) design or construction information such as design criteria, ratings provided by equipment manufacturers, equipment drawings and/or specifications, engineering analyses, method(s) consistent with industry standards (e.g. the American National Standards Institute and the Institute of Electrical and Electronic Engineers ("IEEE")), or an established engineering practice that has been verified by testing or engineering analysis; or
- (b) operational information such as commissioning test results, performance testing or historical performance records, any of which may be supplemented by engineering analyses.

R1.2 The documentation must be consistent with the principle that the **facility ratings** do not exceed the most limiting applicable **equipment rating** of the individual equipment that comprises that facility.

Reliability Standards

BAL-005-1 – Balancing Authority Control

A. Introduction

1. **Title:** Balancing Authority Control
2. **Number:** BAL-005-1
3. **Purpose:** This standard establishes requirements for acquiring data necessary to calculate Reporting Area Control Error (Reporting ACE). The standard also specifies a minimum periodicity, accuracy, and availability requirement for acquisition of the data and for providing the information to the System Operator.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1. Balancing Authority

Effective Date: See Implementation Plan for BAL-005-1

B. Requirements and Measures

- R1.** The Balancing Authority shall use a design scan rate of no more than six seconds in acquiring data necessary to calculate Reporting ACE. *[Violation Risk Factor: Medium]*
[Time Horizon: Real-time Operations]
- M1.** Each Balancing Authority will have dated documentation demonstrating that the data necessary to calculate Reporting ACE was designed to be scanned at a rate of no more than six seconds. Acceptable evidence may include historical data, dated archive files; or data from other databases, spreadsheets, or displays that demonstrate compliance.
- R2.** A Balancing Authority that is unable to calculate Reporting ACE for more than 30-consecutive minutes shall notify its Reliability Coordinator within 45 minutes of the beginning of the inability to calculate Reporting ACE. *[Violation Risk Factor: Medium]*
[Time Horizon: Real-time Operations]
- M2.** Each Balancing Authority will have dated records to show when it was unable to calculate Reporting ACE for more than 30 consecutive minutes and that it notified its Reliability Coordinator within 45 minutes of the beginning of the inability to calculate Reporting ACE. Such evidence may include, but is not limited to, dated voice recordings, operating logs, or other communication documentation.
- R3.** Each Balancing Authority shall use frequency metering equipment for the calculation of Reporting ACE: *[Violation Risk Factor: Medium]* *[Time Horizon: Real-time Operations]*
 - 3.1. that is available a minimum of 99.95% for each calendar year; and,
 - 3.2. with a minimum accuracy of 0.001 Hz.

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- **Title:** Provides the name and focus on standard.
- **Standard Number:** Abbreviation-**Number**-**Version**-**Errata**-**Interpretation** (i.e., CIP-**002**-**5.1**a)
- **Purpose:** This tells us why the standard was established. This gives us the reason that voters decided this was important to include in compliance standard.
- **Applicability:** What functions must comply with the standard? Which Registered Entity functions are assigned these reliability requirements?

Reliability Standards

BAL-005-1 – Balancing Authority Control

A. Introduction

1. **Title:** Balancing Authority Control
2. **Number:** BAL-005-1
3. **Purpose:** This standard establishes requirements for acquiring data necessary to calculate Reporting Area Control Error (Reporting ACE). The standard also specifies a minimum periodicity, accuracy, and availability requirement for acquisition of the data and for providing the information to the System Operator.
4. **Applicability:**
 - 4.1. **Functional Entities:**
 - 4.1.1. Balancing Authority

Effective Date: See Implementation Plan for BAL-005-1

B. Requirements and Measures

- R1.** The Balancing Authority shall use a design scan rate of no more than six seconds in acquiring data necessary to calculate Reporting ACE. *[Violation Risk Factor: Medium]*
[Time Horizon: Real-time Operations]
- M1.** Each Balancing Authority will have dated documentation demonstrating that the data necessary to calculate Reporting ACE was designed to be scanned at a rate of no more than six seconds. Acceptable evidence may include historical data, dated archive files; or data from other databases, spreadsheets, or displays that demonstrate compliance.
- R2.** A Balancing Authority that is unable to calculate Reporting ACE for more than 30-consecutive minutes shall notify its Reliability Coordinator within 45 minutes of the beginning of the inability to calculate Reporting ACE. *[Violation Risk Factor: Medium]*
[Time Horizon: Real-time Operations]
- M2.** Each Balancing Authority will have dated records to show when it was unable to calculate Reporting ACE for more than 30 consecutive minutes and that it notified its Reliability Coordinator within 45 minutes of the beginning of the inability to calculate Reporting ACE. Such evidence may include, but is not limited to, dated voice recordings, operating logs, or other communication documentation.
- R3.** Each Balancing Authority shall use frequency metering equipment for the calculation of Reporting ACE: *[Violation Risk Factor: Medium]* *[Time Horizon: Real-time Operations]*
 - 3.1. that is available a minimum of 99.95% for each calendar year; and,
 - 3.2. with a minimum accuracy of 0.001 Hz.

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- **Effective Date:** When does the entity need to be ready?
- **Requirements and Measures:** The requirements specify who shall do what under what conditions and the evidence needed to demonstrate compliance.
- **Other:** Compliance, Regional Variances, Interpretations, Associated Documents, Rationale

FAC Standard Example

B. Requirements and Measures

- R1.** Each applicable Transmission Owner and applicable Generator Owner shall manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s), operating within their Rating and all Rated Electrical Operating Conditions of the types shown below⁴ [*Violation Risk Factor: High*] [*Time Horizon: Real-time*]:
- 1.1.** An encroachment into the MVCD as shown in FAC-003-Table 2, observed in Real-time, absent a Sustained Outage,⁵
 - 1.2.** An encroachment due to a fall-in from inside the ROW that caused a vegetation-related Sustained Outage,⁶
 - 1.3.** An encroachment due to the blowing together of applicable lines and vegetation located inside the ROW that caused a vegetation-related Sustained Outage,⁷
 - 1.4.** An encroachment due to vegetation growth into the MVCD that caused a vegetation-related Sustained Outage.⁸
- M1.** Each applicable Transmission Owner and applicable Generator Owner has evidence that it managed vegetation to prevent encroachment into the MVCD as described in R1. Examples of acceptable forms of evidence may include dated attestations, dated reports containing no Sustained Outages associated with encroachment types 2 through 4 above, or records confirming no Real-time observations of any MVCD encroachments. (R1)

Requirement Language
(Performance-based)

Measure Language

Requirements and Measures Guidelines

Requirement	Measure
Calls for document	Require the responsible entity to provide that document
Calls for document having timing-related aspects such as “current” or “updated”	Evidence must include references to dates
Is to verify something	Include the criteria for verification and the evidence to support that the verification was conducted
Is for verification to be executed on some periodic basis	Evidence must include references to dates
Is to take an action	Include evidence that the action was performed
Is for action under specified conditions or with some specified frequency	Include evidence of the conditions under which the action was performed or a reference to the times when action took place, to support the frequency

Regional Standards

- FAC-501-WECC Transmission Maintenance
 - To ensure the Transmission Owner of a transmission path identified in Attachment B, Major WECC Transfer Paths in the Bulk Electric System, including associated facilities has a Transmission Maintenance and Inspection Plan (TMIP); and performs and documents maintenance and inspection activities in accordance with the TMIP
- BAL-001-TRE Primary Frequency Response in the ERCOT Region
 - To maintain interconnection steady-state frequency within defined limits

Regional Standards

Regional Reliability Standards

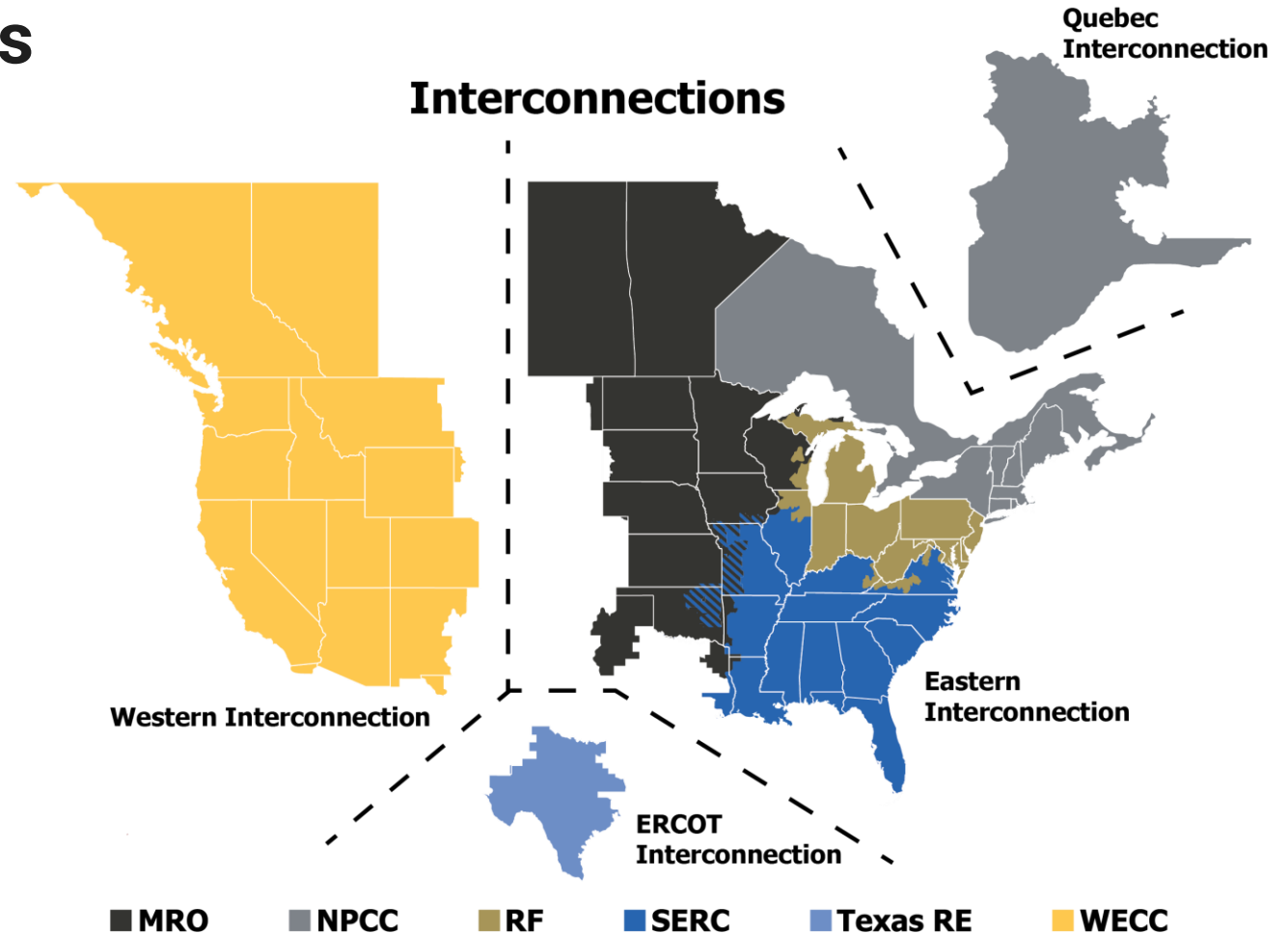
Regional Reliability Standards are applicable only in the interconnection for which the standard is designated. Regional Reliability Standards are more stringent than continent-wide Reliability Standards, including a regional difference that addresses a unique risk or physical difference to that interconnection that the continent-wide Reliability Standard does not address.



Regional Standards

Regional Reliability Standards

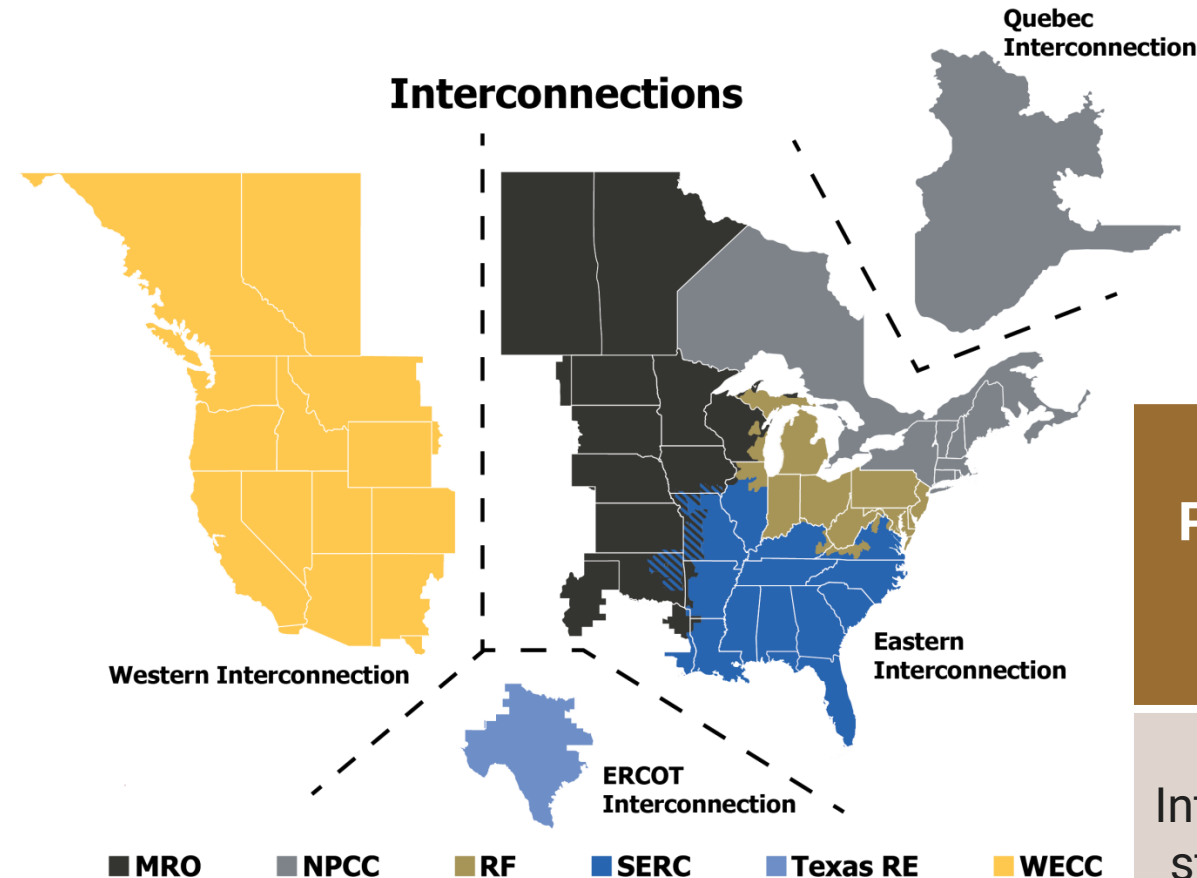
Regional Reliability Standards are applicable only in the interconnection for which the standard is designated. Regional Reliability Standards are more stringent than continent-wide Reliability Standards, including a regional difference that addresses a unique risk or physical difference to that interconnection that the continent-wide Reliability Standard does not address.



Regional Standards

FAC-501-WECC Transmission Maintenance

To ensure the Transmission Owner of a transmission path identified in Attachment B, Major WECC Transfer Paths in the Bulk Electric System, including associated facilities has a Transmission Maintenance and Inspection Plan (TMIP); and performs and documents maintenance and inspection activities in accordance with the TMIP.



BAL-001-TRE Primary Frequency Response in the ERCOT Region

To maintain Interconnection steady-state frequency within defined limits.

Compliance Section

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority:

“Compliance Enforcement Authority” means NERC or the Regional Entity, or any entity as otherwise designated by an Applicable Governmental Authority, in their respective roles of monitoring and/or enforcing compliance with mandatory and enforceable Reliability Standards in their respective jurisdictions.

1.2. Evidence Retention:

The following evidence retention period(s) identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The applicable entity shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirements R1, R3, R5, R6 and R7, for three calendar years.
- The applicable Transmission Owner and applicable Generator Owner retains data or evidence to show compliance with Requirement R4, Measure M4 for most recent 12 months of operator logs or most recent 3 months of voice recordings or transcripts of voice recordings, unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.
- If an applicable Transmission Owner or applicable Generator Owner is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

1.3. Compliance Monitoring and Enforcement Program

As defined in the NERC Rules of Procedure, “Compliance Monitoring and Enforcement Program” refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated Reliability Standard.

1.4. Additional Compliance Information

- CEA and CMEP generally boilerplate text. Evidence retention is critical when implementing a compliance monitoring tool (e.g., compliance audit).
- Additional compliance information not used often. In FAC-003's case, a periodic data submittal (PDS), a form of compliance monitoring tool, was implemented. Why? 2003 Blackout!

Regional Variances Section

- Not inconsistent with or less stringent than the NERC Reliability Standard;
- Is necessitated by a physical difference; OR
- Is an alternative methodology for same reliability objective
- NOT a Regional Standard!

Regional Variances Example

IRO-002-7 - Reliability Coordination - Monitoring and Analysis

D. Regional Variance

A. Regional Variance for the Western Electricity Coordinating Council Region

The following Interconnection-wide variance shall be applicable in the Western Electricity Coordinating Council (WECC) region.

Purpose

To develop a methodology that creates models for performing Operational Planning Analyses and Real-time Assessments.

Applicability

As used in this WECC Regional Variance, Reliability Coordinator is specific to those Reliability Coordinators providing Reliability Coordinator service(s) to entities operating within the Western Interconnection, regardless of where the Reliability Coordinator may be located.

Requirements and Measures

- D.A.7.** Each Reliability Coordinator shall, in coordination with other Reliability Coordinators, develop a common Interconnection-wide methodology to determine the modeling and monitoring of BES and non-BES Elements that are internal and external to its Reliability Coordinator Area, necessary for providing operational awareness of the impacts on Bulk Electric System Facilities within its Reliability Coordinator Area, including at a minimum: *[[Violation Risk Factor: High] [Time Horizon: Operations Planning]]*
 - D.A.7.1.** A method for development, maintenance, and periodic review of a Western Interconnection-wide reference model to serve as the baseline from which Reliability Coordinator's operational models are derived;
 - D.A.7.2.** The impacts of Inter-area oscillations;
 - D.A.7.3.** A method to determine Contingencies included in analyses and assessments;
 - D.A.7.4.** A method to determine Remedial Action Schemes included in analyses and assessments;
 - D.A.7.5.** A method to determine forecast data included in analyses and assessments; and
 - D.A.7.6.** A method for the validation and periodic review of the Reliability Coordinator's operational model for steady state and dynamic/oscillatory system response.
- M.D.A.7.** Each Reliability Coordinator will have evidence that it developed a common Western Interconnection-wide methodology, addressing modeling and

IRO-002 NERC Requirements all still apply. Introduction of multiple Reliability Coordinators required an Interconnection-wide view based on the physical makeup of the Western Interconnection.

Other Sections

- Interpretations
- Supplemental reference documents
- Version history
- Tables/attachments

Appendix 1

Questions

Energy Sector Security Consortium, Inc. (EnergySec) submitted a Request for Interpretation (RFI) seeking clarification of Criterion 2.1 of Attachment 1 in Reliability Standard CIP-002-5.1 regarding the use of the phrase “shared BES Cyber Systems.”

The Interpretation Drafting Team identified the following questions in the RFI:

1. Whether the phrase “shared BES Cyber Systems” means that the evaluation for Criterion 2.1 shall be performed individually for each discrete BES Cyber System at a single plant location, or collectively for groups of BES Cyber Systems?
2. Whether the phrase “shared BES Cyber Systems” refers to discrete BES Cyber Systems that are shared by multiple units, or groups of BES Cyber Systems that could collectively impact multiple units?
3. If the phrase applies collectively to groups of BES Cyber Systems, what criteria should be used to determine which BES Cyber Systems should be grouped for collective evaluation?

Responses

Question 1: Whether the phrase “shared BES Cyber Systems,” means that the evaluation for Criterion 2.1 shall be performed individually for each discrete BES Cyber System at a single plant location, or collectively for groups of BES Cyber Systems?

The evaluation as to whether a BES Cyber System is shared should be performed individually for each discrete BES Cyber System. In the standard language of CIP-002-5.1, there is no reference to or obligation to group BES Cyber Systems. Requirement R1, part 1.2 states “Identify *each* of the medium impact BES Cyber Systems according to Attachment 1, Section 2...” Further, the preamble of Section 2 of CIP-002-5.1 Attachment 1 states “*Each BES Cyber System*...associated with any of the following [criteria].” (emphasis added)

Additionally, the Background section of CIP-002-5.1 states that “[i]t is left up to the Responsible Entity to determine the level of granularity at which to identify a BES Cyber System within the qualifications in the definition of BES Cyber System.” The Background section also provides:

The Responsible Entity should take into consideration the operational environment and scope of management when defining the BES Cyber System boundary in order to maximize efficiency in secure operations. Defining the boundary too tightly may result in redundant paperwork and authorizations, while defining the boundary too broadly could make the secure operation of the BES Cyber System difficult to monitor and assess.

Standards Effective Date

- Effective Date
 - The date upon which the Reliability Standard goes into effect. On the Effective Date of a Reliability Standard, the Reliability Standard becomes mandatory and enforceable, and applicable entities are responsible for compliance with the Requirements in the Reliability Standard. An Implementation Plan may also provide for a delayed or “Phased-In Implementation Date” for specific Requirements (or parts) contained within the Reliability Standard for which a longer implementation period is appropriate.
- Phased-In Implementation Date (if applicable)
 - The date, following the Effective Date of the Reliability Standard, upon which implementation of a specific Requirement (or part) is first required, as specified in the Implementation Plan for the Reliability Standard. In some instances, there may be a need to provide entities additional time beyond the Reliability Standard’s Effective Date to comply with a particular Requirement (or part). In those instances, the Implementation Plan will provide a Phased-In Implementation Date specific to that Requirement (or part). The “Phased-In Implementation Date” thus represents the later date that entities must begin complying with that particular Requirement (or part).
- Determined through the Standards Development Process by industry and approved by FERC.

Question

What types of Requirements are there in NERC Reliability Standards?

- a. True/false
- b. Multiple choice
- c. Performance-, risk-, and competency-based
- d. Reliability-, security-, and mitigation-based

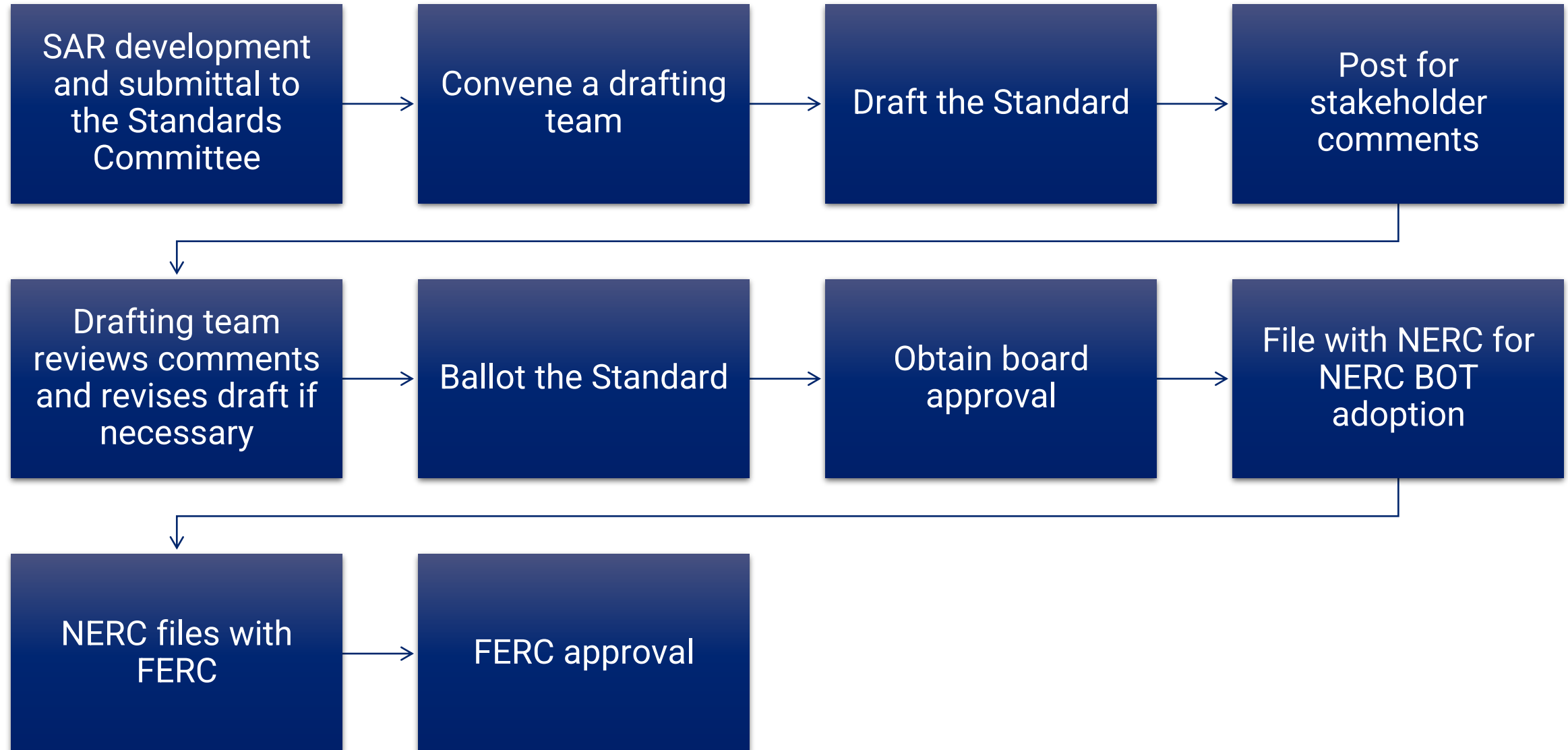


SARs and the Standards Staff Support

SAR Submittal Process

- There is a FERC-approved process for submitting a standard authorization request (SAR)
 - NERC process
 - Continent-wide Standard
 - WECC process
 - Regional Standard
 - Regional Variance to a NERC Continent-wide Standard
 - Regional Criterion

Standard Development Process



Standard Authorization Request



Any person or entity may submit a SAR

- The SAR identifies the need, scope, affected parties, and requirements of the proposed project



The Standards Committee reviews the SAR for completeness and scope



Once deemed complete and within WECC's/NERC's authority, the SAR is presented to the Standards Committee for disposition

Present the SAR to the WSC/NERC SC

To be accepted by the Standards Committee, the SAR must:

- Contain a description of the requested action
- Define purpose, scope, affected parties, and any other relevant information
- Must be within WECC's/NERC's scope

Convene a Drafting Team

- Notice sent to the public via email and WECC Weekly
 - Drafting team nominees are volunteers and subject matter experts
 - Generally looking for five to nine volunteers
- Standards Committee approves the drafting team

Draft the Standard

- Drafting team meetings are generally two-hour calls
- Review the SAR for the purpose
- Draft requirements that support the purpose
 - Standards staff may help with wording and format
 - Usually takes several meetings

Post for Stakeholder Comments

- Draft Standard is posted for public comments
 - General or guiding questions may be included on the comment form.
 - Comments are meant to guide the drafting team or identify needed changes.

Drafting Team Reviews Comments

- All comments must be reviewed and considered by the drafting team.
 - Drafting team must provide responses to comments received.
- Based on comments received, the drafting team may revise the Standard.
 - Any substantive revisions require that the Standard be posted for comment again.
 - This process may be repeated several times.

Ballot the Standard

- Once the drafting team believes no additional revisions are necessary, they seek Standards Committee approval to ballot the Standard.
- A ballot pool is formed from members of the ballot body.
 - The WECC ballot body is entities who have registered with WECC to vote on WECC Standards and Criteria, and been vetted by WECC as eligible.
 - The ballot pool is stakeholders from the ballot body interested or affected by the proposed Standard or Criterion.
 - Each ballot pool is formed individually.

Ballot the Standard (cont.)

- Weighted segment voting is used.
 - Because each voting segment is weighted, no single segment may defeat a standard.
- A 2/3 quorum is required.
- A 2/3 majority is required.

Obtain Board Approval

- If a standard or criterion passes the ballot, it will be presented to the WECC board for approval at their next meeting.
 - The ballot results and supporting documents are provided.
- If the board approves a Regional Criterion, it will become effective in accordance with the associated implementation plan.
- If the WECC board approves a WECC Regional Reliability Standard or a WECC variance to a NERC Reliability Standard, it is filed with NERC for NERC board adoption.

NERC Board Adoption

- Multiple supporting documents are filed with NERC for its board to consider.
- There is a NERC requirement that, after the WECC board approval, the document must be posted for a mandatory 45-day NERC comment period.
 - This is not another bite at the apple. Stakeholders should participate in the WECC process.
 - The NERC posting asks questions of a procedural nature rather than technical.

NERC Files with FERC

- If the NERC board adopts the document, NERC prepares a filing from NERC and WECC to send to FERC for consideration.
- FERC may approve, approve and direct further action, or remand the document.
- If FERC approves the WECC standard, it becomes effective as outlined in the implementation plan.
- Once effective, it becomes mandatorily enforceable with potential monetary sanctions for noncompliance.

What Does the Standards Committee Do?

Guide and oversee the Standards Development Process

- Reliability Standards
- Commenting
- Balloting
- Filing with NERC and FERC

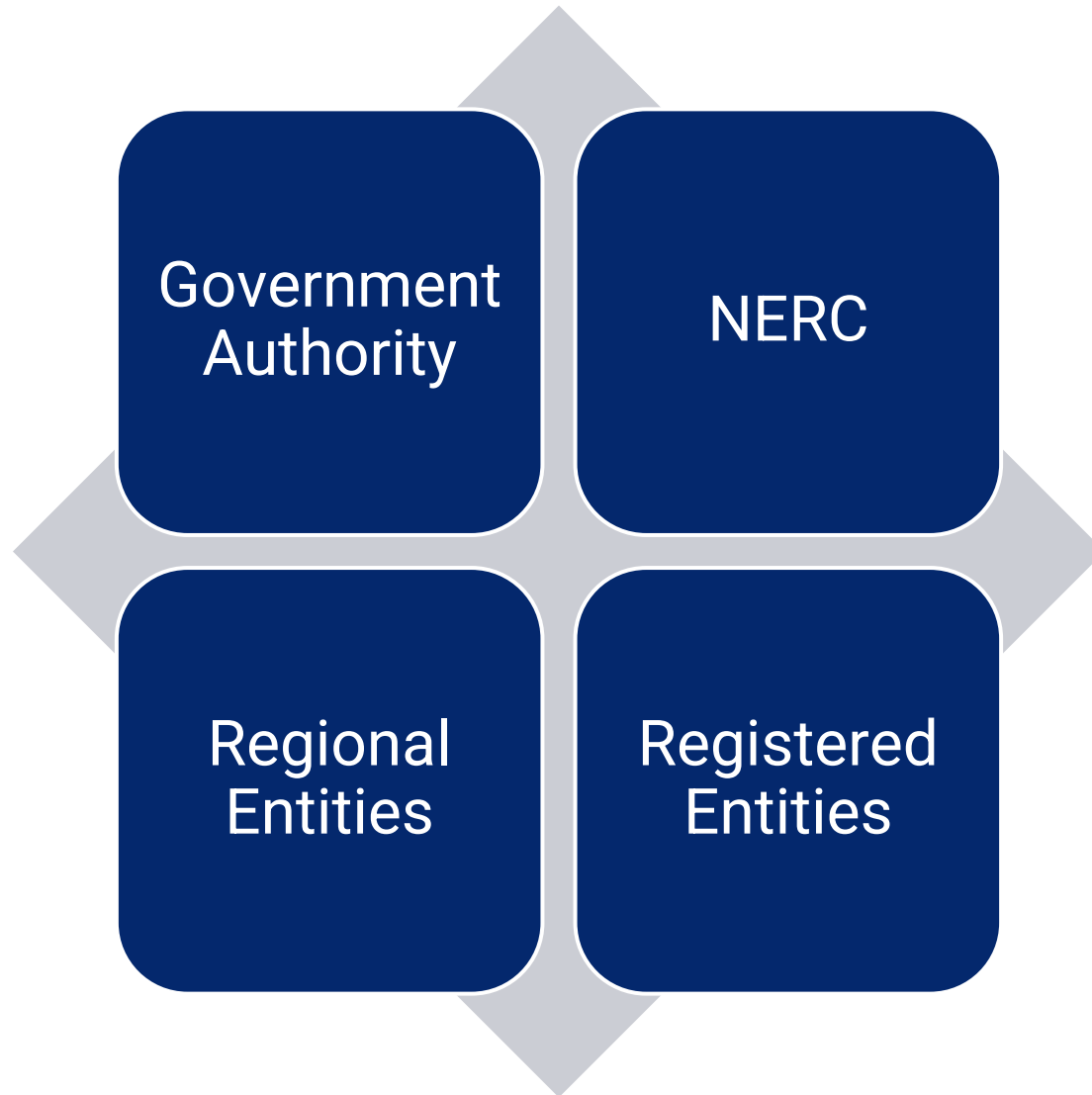
What Doesn't the Standards Committee Do?

Does not—

- Write the Standards
- Approve the Standards

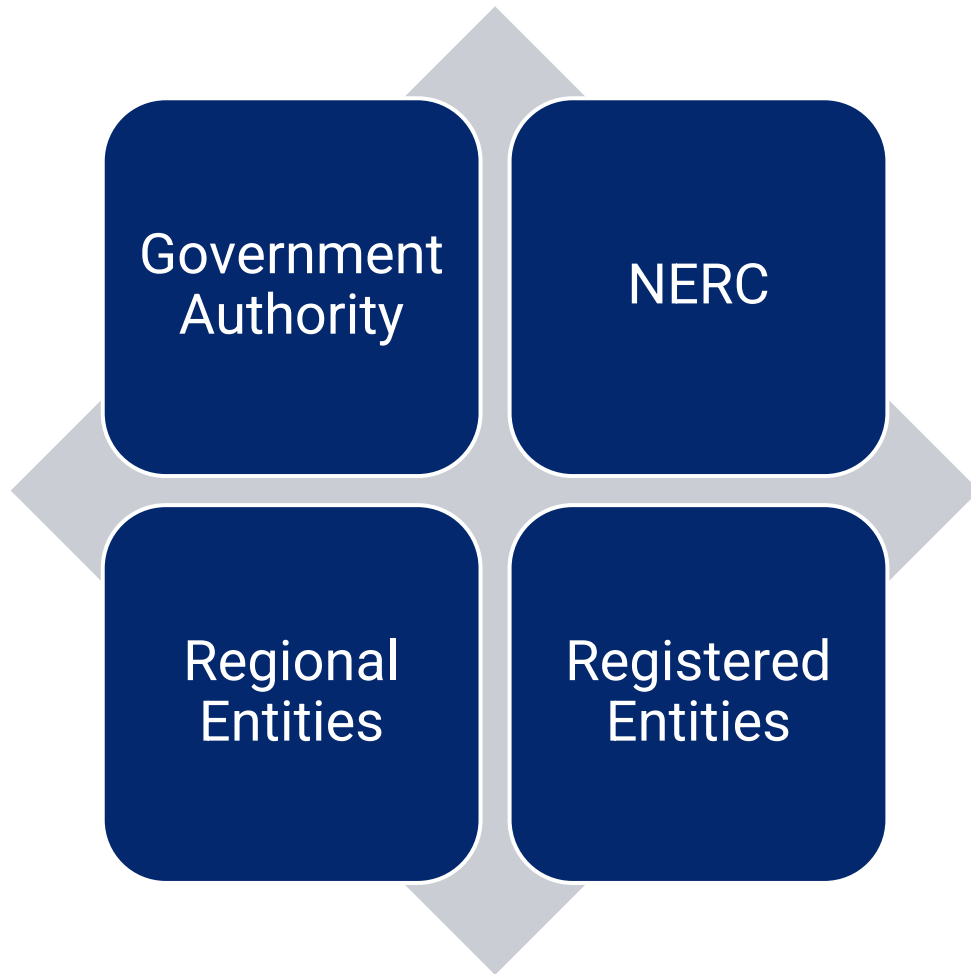
Involved stakeholders draft and approve Standards

Stakeholders



There are four distinct stakeholders that are affected and accountable for the successful design and implementation of the Reliability Standards.

Stakeholders



The **Government Authority** is the agency responsible for the governance of the electric system in their state, province, or country. Examples would be FERC, BCUC, State Public Service Commissions, etc.

NERC is the Electrical Reliability Organization (ERO) responsible for establishing and enforcing reliability standards for the BPS. NERC is subject to oversight from both FERC and Canadian governmental authorities.

The ERO Enterprise has six **Regional Entities** responsible for the unique needs of their regional constituents while ensuring that all parts of the interconnected electric system are reliably operated. WECC is a Regional Entity.

Registered Entities are those required by law to register with NERC and comply with NERC Reliability Standards.

Reliability Standards Resources



[NERC Standards Page](#)

NERC's webpage is the most comprehensive source of information on the development of Reliability Standards. All current projects, teams, and processes can be located here.



[WECC Standards Page](#)

WECC's web page features regional criteria and reliability standards for all parts of the Western Interconnection including Alberta, British Columbia, Mexico and the United States.



[NERC One-Stop Shop](#)

Links to standards, implementation plans, project pages, Reliability Standards Audit Worksheets, FERC Orders, and compliance guidance. Link located on NERC Standards page.

Reliability Standards Resources



Mandatory Enforcement Standards

Standards that are currently enforceable in the United States.



Future Enforceable Standards

Standards that are approved by FERC, but not yet enforceable in the United States.



Filed and Pending Regulatory Approval

Standards adopted by the NERC board of trustees and filed with FERC for approval but not yet approved by FERC.

Reliability Standards Resources



Standards Pending Regulatory Filing

Standards adopted by the board but not yet filed with FERC.



Inactive Standards

Standards that have been superseded by another and are no longer enforceable.



Standards Pending Inactive

Standards that have been superseded by other standards are not enforceable.



ENGAGE WITH WECC





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