

**NERC**

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

**ERO Enterprise Endorsed  
Implementation Guidance**

# Implementation Guidance for FAC-002-4, R6

Qualified Changes

August 2022

**RELIABILITY | RESILIENCE | SECURITY**



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# Table of Contents

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Preface.....	ii
Introduction .....	3
Problem Statement .....	3
Scope.....	3
FAC-002-4 Facility Interconnection Studies .....	3
Purpose.....	3
Applicability .....	3
Requirement R6 .....	4
<i>Example 1</i> .....	4
Periodic Review .....	7

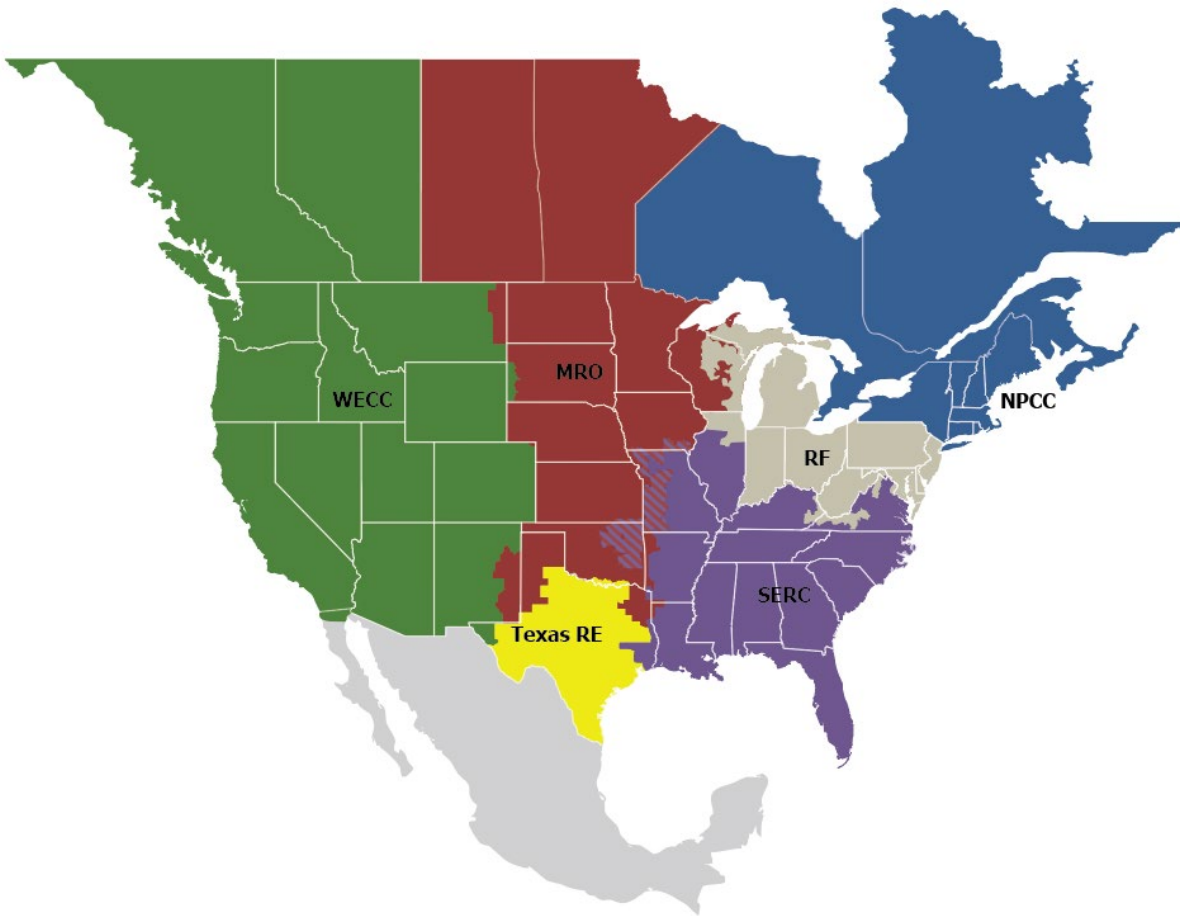
# Preface

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Electricity is a key component of the fabric of modern society and the Electric Reliability Organization (ERO) Enterprise serves to strengthen that fabric. The vision for the ERO Enterprise, which is comprised of the North American Electric Reliability Corporation (NERC) and the six Regional Entities, is a highly reliable and secure North American bulk power system (BPS). Our mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid.

Reliability | Resilience | Security  
*Because nearly 400 million citizens in North America are counting on us*

The North American BPS is made up of six Regional Entity boundaries as shown in the map and corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



<b>MRO</b>	Midwest Reliability Organization
<b>NPCC</b>	Northeast Power Coordinating Council
<b>RF</b>	ReliabilityFirst
<b>SERC</b>	SERC Reliability Corporation
<b>Texas RE</b>	Texas Reliability Entity
<b>WECC</b>	WECC

# Introduction

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The Project 2020-05 Standard Drafting Team (SDT) drafted this Implementation Guidance to provide example approaches for compliance with FAC-002-4 Requirement R6. Implementation Guidance does not prescribe the only approach, but highlights one or more approaches that would be effective in achieving compliance with the standard. Because Implementation Guidance only provides examples, entities may choose alternative approaches that better fit their individual facts, circumstances, and system configurations.

## Problem Statement

Project 2020-05 modified FAC-001-3 and FAC-002-3 to clarify the use of “materially modifying”, particularly as it relates to compliance with the standards.

FAC-001-3 and FAC-002-3 imply that the term “materially modified” should be used to distinguish between facility changes that are required to be studied and those that need not be studied. While the existing standards do require coordination and cooperation between a Facility owner and the Transmission Planner (TP) or Planning Coordinator (PC) when a new or materially modified interconnection Facility is connected to their system, neither standard specifies what entity is responsible for determining what is considered a material modification. Further, the existing language is unclear about whether these requirements only apply when a different entity is proposing to interconnect to a Facility owner's Facility or if they also apply to the Facility owner's new or modified Facility.

Additionally, in FERC-jurisdictional areas, the term “Material Modification” means “those modifications that have a material impact on the cost or timing of any Interconnection Request with a later queue priority date.” This has led to widespread confusion across the industry regarding the correct application of these terms related to the FERC Open Access Transmission Tariff (OATT) implementation and the NERC Reliability Standards requirements.

To address the confusion described above, the SDT changed the term from “materially modified” to “qualified change”. The SDT also added a new Requirement R6 in FAC-002-4 to require the Planning Coordinator to define qualified change and make the definition publicly available.

## Scope

This Implementation Guidance applies only to FAC-002-4 Facility Interconnection Studies, Requirement R6, and includes examples related to Planning Coordinator (PC) definitions of qualified changes and how the definitions could be made publicly available. Following this Implementation Guidance does not guarantee compliance; compliance is based on the precise language of the standard, individual facts, circumstances, system configuration, quality of evidence, and other considerations.

## FAC-002-4 Facility Interconnection Studies

### Purpose

To study the impact of interconnecting new or changed Facilities on the Bulk Electric System.

### Applicability

Planning Coordinator (PC), Transmission Planner (TP), Transmission Owner (TO), Distribution Provider (DP), and Generator Owner (GO) with a fully executed Agreement to conduct a study on the reliability impact of interconnecting a third party Facility to the Generator Owner's existing Facility that is used to interconnect to the Transmission system.

## Requirement R6

**R6.** Each Planning Coordinator shall maintain a publicly available definition of qualified change for the purposes of facility interconnection. [Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]

### *Example 1*

The following tables are one example of factors a PC could consider in developing its definition of “qualified change” for purposes of required studies, and how a PC could make the definition publicly available. The PC should consider what is appropriate for their area in determining the definition of qualified change.

<b>Example 1 - Qualified Changes for End-User Facilities</b>		
<b>Category</b>	<b>Description</b>	<b>Detailed Example(s)</b>
1	Increase in Demand	<p><b>Example 1:</b></p> <ul style="list-style-type: none"> <li>Annual increase in Demand exceeding 10%</li> </ul> <p><b>Example 2:</b></p> <ul style="list-style-type: none"> <li>Increase in Demand of 75 MW or greater within the next two years; or</li> <li>Increase in Demand of 20 MW or greater within the next two years for a third-party Facility interconnected to a Generator Owner’s Facility</li> </ul>
2	Addition of equipment that would significantly impact the composite load model used to represent a Facility	<p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Installation of a motor 1,000 hp or larger where no motors previously existed; or</li> <li>Addition of a motor exceeding the size of all other motors connected within a Facility with at least 500 hp of motors</li> </ul>
3	Changes in protection schemes or settings	Changes in settings for under-frequency load shedding
4	Changes in harmonic levels	Addition or removal of steel casting or steel smelter loads
5	A change in end-user Facility topology that may affect power flows on the BES	<p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>Changes to interruptible loads being interrupted during peak load periods</li> <li>Addition of distribution energy resources (DER) more than 0.5 MW at a distribution substation</li> </ul>

<b>Example 1 - Qualified Changes for Transmission</b>		
<b>Category</b>	<b>Description</b>	<b>Detailed Example(s)</b>
1	Change in Rating	<p><b>Example 1:</b></p> <ul style="list-style-type: none"> <li>• Change in the facility thermal rating by greater than 5%</li> </ul> <p><b>Example 2:</b></p> <ul style="list-style-type: none"> <li>• Change in the facility impedance by greater than 5%</li> </ul> <p><b>Example 3:</b></p> <ul style="list-style-type: none"> <li>• Change in facility voltage class</li> </ul>
3	Change in Protection Coordination	Change in the protection coordination that would alter the way a facility would switch
4	Change in topology	Change in topology that would alter power flows on the BES

<b>Example 1 - Qualified changes for Generation</b>	
<b>Description</b>	<b>Detailed Example(s)</b>
Change in Generator Output	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Change that affects its Seasonal Real Power or Reactive Power capability by more than 10 percent of the last reported and/or verified capability and change is expected to last more than six months.</li> <li>• Change in power factor capability of the generator</li> </ul>
Change of GSU	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Change of GSU that results in any of the following differences <ul style="list-style-type: none"> <li>▪ Reduction in rating by more than 10%</li> <li>▪ Impedance change by more than 10% <ul style="list-style-type: none"> <li>○ Change in transformer losses</li> <li>○ Change in transformer saturation differences</li> </ul> </li> </ul> </li> </ul>
Change in Generator Characteristics	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Change in the inertia of the Generator by more than 10% (synchronous generators only)</li> <li>• Change in steady state transient and sub-transient reactance of the Generator or generator Interconnection Facilities by more than 10% (synchronous or induction generators only)</li> <li>• Transmission Planner requested Generator facility projects in MOD-027 or MOD-026 resulting in changes that alter the equipment response characteristic.</li> <li>• Changes to a generator's electromagnetic transient models.</li> </ul>
Change in Protection System of the generator facilities or generator interconnection facilities	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Changes in relay settings as required in PRC-024 R3 to report changes or limitations to Transmission Planner and Planning Coordinator within 30 days. <ul style="list-style-type: none"> <li>▪ include high and low frequency settings along with delay times if applicable</li> <li>▪ include high and low voltage settings along with delay times if applicable</li> </ul> </li> </ul>
Inverter Based Resource (IBR) Only: Change in Inverter or inverter settings or	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Change of 10% or more of the inverter-based resource units at a facility that is not replacement in-kind.</li> <li>• Change in any control settings <ul style="list-style-type: none"> <li>▪ resulting in a difference in frequency or voltage support of the Inverter Based Resource</li> <li>▪ resulting in a difference in when the IBR discontinues current injection to the GRID (i.e. blocking commands)</li> </ul> </li> </ul>
Unplanned change in governor or governor settings	Uncharacteristic changes that result in how the generator responds to grid frequency deviations and is expected to last more than six months.
Unplanned change in exciter or exciter settings or	Uncharacteristic changes that result in how the generator responds to grid voltage deviations and is expected to last more than six months.
Change in power system stabilizer	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Addition or removal of power system stabilizer</li> <li>• Setting changes of power system stabilizer</li> </ul>

**Example 1 – Publicly Available**

- Planning Coordinator posts its definition of “qualified change” to its public facing website.

**Periodic Review**

This document will be reviewed and updated upon initiation of a standards development project to modify the FAC-002-4 Standard.

Periodic Review				
Reviewed By	Title	Comments / Notes	Review Date	Next Review