

Standard Authorization Request

WECC-0160 WECC EMT Modeling and Screening Criterion
Submitted March 10, 2026

Overview

This Standard Authorization Request (SAR) was received on March 10, 2026, and deemed complete the same day. The WECC Standards Committee (WSC) vetted this SAR at the March 24th 2026 Meeting.

The SAR was assigned the project number WECC-0160 and can be reviewed on the WECC-0160 project page in the Standard Authorization Request accordion. If you have any questions, please contact Donovan Crane at dcrane@wecc.org or by phone at (385) 408-9296.

Introduction

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Type of Request

Create, Modify, Retire, or Review a Document

Requested Action

Create New Document

Document Type

WECC Regional Criterion

Issue

NERC has identified in various disturbance reports, alerts, and technical reports that bulk power system (BPS) inverter-based resource (IBR) modeling is a systemic risk issue facing the electricity sector. This was prominently highlighted and documented in the April 2025 report titled Aggregated Report on NERC Level 2 Recommendation to Industry: Findings from IBR Model Quality Deficiencies Alert. Under FERC Order No. 901 Milestone 3 standards efforts, some modeling-related NERC Reliability Standards – namely MOD-026, MOD-032, MOD-033, etc. – are being modified to address directives from FERC as well.

In Q4 2025, WECC convened Transmission Planners (TPs) and Planning Coordinators (PCs) from across the Western Interconnection at its WECC EMT Strategic Workshop. The primary issue identified through the WECC EMT Strategic Workshop is the absence of consistent, regionally harmonized criteria governing IBR modeling (model specifications, model quality, and model performance testing, model benchmarking) and electromagnetic transient (EMT) screening methods. NERC standards are prescribing the “what” – TPs and PCs need to establish IBR modeling requirements and screening methods for the necessity of EMT studies. However, the details associated with how to implement these requirements are left to individual entities.

Some level of flexibility in IBR modeling requirements development is appreciated by TPs and PCs, yet it does create unique challenges in the West given the number of TPs and PCs in the Region. Rather than having dozens of disparate interconnection modeling requirements, stakeholders strongly encourage strong guidance, and specifically WECC-driven (e.g., Regional Criterion), that can help stakeholders align on a singular framework of requirements and practices. Harmonized requirements across entities can also help Interconnection Customers (i.e., IBR developers) and subsequent Generator Owners (GOs), who then can focus limited resources on deeply familiarizing themselves with one set of unified requirements, to the extent possible.

Screening for EMT studies is increasingly needed as the BPS is facing increasing levels of IBR penetration. Screening can help reduce the situations where detailed EMT studies are needed, and can identify portions of the system where such studies are likely needed. This scope is focused on those EMT studies pertaining to known IBR risks such as weak grid conditions and subsynchronous oscillation concerns. There are numerous methods associated with EMT



screening such as short circuit ratio (SCR)-based metrics, frequency scanning approaches, and subsynchronous oscillation (SSO) risk metrics, along with other evaluation criteria. How these methods are used and applied are not widely standardized in a formal manner for entities to effectively adopt, adapt as needed, and implement. Thus, this Regional Criterion will provide guidance and recommendations as to the recommended techniques and methods to be used by TPs and PCs in support of the FAC-002 implementation and for any long-term planning needs.

While Regional Criterion is not mandatory and enforceable, stakeholders mentioned that their organizations take Regional Criterion seriously and, if successful, would strongly support seeking alignment with and leveraging the Regional Criterion to the extent possible. Without uniformity across the Western Interconnection, process inefficiencies, errors, and risks are introduced.

Lastly, the Regional Criterion will help support better transparency and data sharing between entities, with clearer specifications and expectations on the types of information, data, models, etc., and the level of accuracy associated with the information.

References:

[https://www.nerc.com/pa/rrm/bpsa/Alerts DL/Inverter-Based_Resource_Modeling_Deficiencies_Aggregated_Report.pdf](https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/Inverter-Based_Resource_Modeling_Deficiencies_Aggregated_Report.pdf)

<https://www.wecc.org/sites/default/files/documents/meeting/2025/WECC%20EMT%20Strategic%20Workshop%20Summary.pdf>

<https://www.wecc.org/wecc-document/25161>

Applicable Entities

- Generator Owner
- Planning Authority/Coordinator
- Transmission Planner

Detailed Description

The Regional Criterion drafting team is expected to bring together ample industry best practices, references, and other material to harmonize on a set of IBR modeling requirements and screening practices for EMT studies. This section will provide some details on each of these topics; however, the description is not intended to preclude or limit the drafting team from addressing similarly related topics in these areas.



IBR Modeling Requirements

The IBR modeling requirements are intended to specify the technical details associated with submitted models from Interconnection Customers/GOs to TPs and PCs. These requirements should include, at a minimum, the following topics:

- IBR plant model specifications regarding modeling level of detail, format, equipment representation, etc.
- Phasor domain transient (PDT) standard library model specifications, linking to the ERO Approved Criteria for Acceptable Models and WECC acceptable model list
- PDT user-defined model specifications, aligned with FERC Order 2023 obligations, NERC Dynamic Model Recommendations, and focused on compatibility and usability
- EMT model specifications, leveraging the Electranix Corporation specifications and other industry references, including consideration of adopting the dynamic link library (DLL) wrapper real-code model standard. This should also include a unified format for how IBR models (EMT and PDT) are submitted to TPs and PCs, defining standardized inputs/output or other features.
- IBR unit and power plant controller (PPC) model validation report requirements (as recommended in IEEE 2800.2-2026) for PDT UDM (and possibly standard library model) and EMT models for improved model accuracy. IBR unit (i.e. single inverter or a wind turbine) model and PPC model are the only parts of the IBR plant model that can be validated prior to commissioning, based on manufacturer tests. Requiring IBR unit and PPC model validation and ensuring that IBR plant model is built based on the validated IBR unit and PPC models improves overall IBR plant model accuracy. This includes requirements that the OEM provide a PDT standard library model reflective of the technology that represents the product to the best of its ability, and documents known discrepancies or issues with the model relative to actual performance.
- IBR plant and model documentation requirements for improved model usability
- Unified IBR model performance tests, that codify and prescribe a specific set of tests that can be conducted on each model to ensure they meet a minimum bar of performance expectations; leverage industry experience (e.g., ISO/RTOs with experience/requirements or practices from IEEE 2800.2-2026).
- Model verification checklist to ensure site-specific IBR plant models match as-planned or as-built/as-left settings
- IBR model benchmarking specifications that define (qualitatively or quantitatively) acceptable levels of models matching each other; include benchmarking between standard library and user-defined PDT models and EMT models.

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- Data sharing requirements related to models, POI information, and other necessary information to effectively meet the established modeling requirements.
 - Model portability and forward compatibility requirements to ensure long-term interoperability of models across simulation platforms and software versions.
 - Grid-side data provisions to the Interconnection Customer (e.g., SCR, short circuit level, etc.) for use in model performance testing and control system tuning.

The level of detail and specifications for each of the items listed above should be addressed by the drafting team, based on group discussion and leveraging industry references (including, but not limited to, those provided in this SAR).

EMT Screening Practices

Screening for when/where to run EMT studies is included as part of the revisions to FAC-002-5 as part of NERC Project 2022-04 EMT Modeling. The latest revision of the standard includes a requirement for TPs and PCs to “establish and maintain a documented process to determine the necessity of steady-state, short-circuit, and phasor-domain-based or EMT-based dynamic studies for evaluating the reliability impact of the new interconnection, or existing interconnection seeking to make a qualified change...” In essence, these processes should apply screening approaches, techniques, and tools to determine the necessity of EMT studies.

The drafting team should review and agree upon the types of screening methods that are recommended for EMT studies pertaining to IBR risks – such as system strength/SCR, IBR penetration level, risks of controller interactions, etc. The screening approaches should be catalogued, with sufficient details and specifications pertaining to each methodology where possible. For example, the drafting team may want to develop an SCR-based metric approach(es) and define thresholds where appropriate. If the team cannot agree on actual limits, then the framework could be adapted uniformly by industry stakeholders.

The methods may want to consider any of the following, where applicable:

- Scenarios and base cases
- Contingency conditions
- Proximity limits
- IBR penetration levels
- Critical BPS equipment proximity



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- Event-driven studies
 - Other factors

The drafting team should also consider suitable methods and approaches to share of EMT screening results between TPs, PCs, and WECC to help improve system-wide availability and information sharing about possible weak grid issues or other IBR-related EMT study needs. This may include TPs and PCs reporting their EMT screening results to WECC or could include WECC conducting screening assessments and reporting findings to TPs and PCs.

Most Affected Reliability Principle Identified

Reliability Principle

Reliability Principle 1 – Interconnected bulk electric systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.

Document Information

[https://www.wecc.org/system/files/webform/standard_authorization_request_f/2471/WECC SAR Form for IBR Modeling and EMT Regional Criteria - FINAL.pdf](https://www.wecc.org/system/files/webform/standard_authorization_request_f/2471/WECC_SAR_Form_for_IBR_Modeling_and_EMT_Regional_Criteria_-_FINAL.pdf)

Reference Uploads

NERC Materials:

- Project 2022-04: <https://www.nerc.com/standards/reliability-standards-under-development/2022-04-emt-modeling>
- Project 2020-06 Verifications of Models and Data for Generators (MOD-026-2): <https://www.nerc.com/standards/reliability-standards-under-development/2020-06-verifications-of-models-and-data-for-generators>; https://www.nerc.com/globalassets/standards/projects/2020-06/final-ballot--mod-026/2020-06-mod-026-2-standard-final-ballot-clean_102025.pdf
- IBR Registration Initiative and Materials: <https://www.nerc.com/initiatives/ibr-registration-initiative-quick-reference-guide>
- Level 2 Alert on IBR Modeling Deficiencies: [https://www.nerc.com/pa/rrm/bpsa/Alerts DL/Inverter-Based_Resource_Modeling_Deficiencies_Aggregated_Report.pdf](https://www.nerc.com/pa/rrm/bpsa/Alerts_DL/Inverter-Based_Resource_Modeling_Deficiencies_Aggregated_Report.pdf)
- NERC Disturbance Reports: <https://www.nerc.com/our-work/reports/event-analysis-reports>
- NERC Dynamic Model Recommendations: <https://www.nerc.com/globalassets/programs/rapa/dynamic-modeling-recommendations.pdf>

WECC Materials:

- WECC EMT Strategic Workshop Summary: <https://www.wecc.org/sites/default/files/documents/meeting/2025/WECC%20EMT%20Strategic%20>



[Workshop%20Summary.pdf](#)

- WECC EMT Strategic Workshop Presentations: <https://www.wecc.org/wecc-document/25161>

OATI OASIS:

- https://www.oasis.oati.com/cwo_default.htm

Modeling Requirements References:

- Electranix PSCAD Modeling Requirements: <https://www.electranix.com/pscad-model-requirements/>
- MISO Modeling Requirements (BPM-015 Appendix): <https://www.misoenergy.org/legal/rules-manuals-and-agreements/business-practice-manuals/>
- CAISO EMT Model Requirements:
<https://www.caiso.com/Documents/CaliforniaISOElectromagneticTransientModelingRequirements.pdf>
- ERCOT Modeling Requirements: <https://www.ercot.com/services/rq/integration/> (under Model Quality Guideline);
https://www.ercot.com/files/docs/2021/01/07/Resource_Interconnection_Handbook_v1.95_10282025.docx; https://www.ercot.com/files/docs/2021/04/20/Model_Quality_Guide.zip

IEEE:

- IEEE 2800-2022: <https://standards.ieee.org/ieee/2800/10453/>
- IEEE P2800.2: <https://standards.ieee.org/ieee/2800.2/10616/>

Other:

- Note that the ESIG 2026 Spring Workshop will hold a panel session on screening approaches, which may serve as a useful reference by the drafting team. Presentations and recordings will be posted here after the workshop <https://www.esig.energy/event/2026-spring-technical-workshop/>
- SPP HVDC Criteria: <https://www.spp.org/documents/74919/spp%20hvdc%20planning%20manual.pdf>
- WIRAB Template Facility Interconnection Requirements for IBRs:
<https://www.westernenergyboard.org/harmonizing-ibr-interconnection-requirements-in-the-west/>;
<https://www.westernenergyboard.org/facility-interconnection-requirements-fir-template-download/>

Provide additional comments

The WECC EMT Strategic Workshop was attended by 77 people spanning NERC, WECC, ESIG, Transmission Planners, Planning Coordinators, equipment manufacturers, national laboratories, generator developers, and other industry subject matter experts. The attendance also included a few attendees from across North America. The workshop strongly highlighted that there is a window of opportunity and thus a sense of urgency from TP and PC technical teams to move this effort forward. With the impending NERC Reliability Standards under development and expected to be passed within the next year or so, TPs and PCs will be developing and/or enhancing their technical requirements, improving business practices, and training staff on implementing these within their organizations.

Hence, if stakeholders can leverage a regionally aligned Regional Criterion, it presents a tremendous opportunity and benefit for all stakeholders who will be mandatorily pursuing these same efforts



across the Region. The level of detail needed within the proposed Regional Criterion far exceeds what would go in a NERC Reliability Standard or WECC Regional Reliability Standard or WECC Regional Variance; thus, a voluntary WECC-driven Regional Criterion fits stakeholder needs effectively and efficiently.

This SAR was developed as an outcome of the WECC EMT Strategic Workshop and involved the following individuals who participated in the SAR drafting meetings:

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