

WECC EMT Strategic Workshop Summary

November 2025

The WECC EMT Strategic Workshop brought together grid planners, utilities, inverter-based resource (IBR) developers, and industry stakeholders from across the Western Interconnection. Together, they examined the current landscape of electromagnetic transient (EMT) modeling and studies, fostering open, collaborative discussions. A clear consensus emerged:

WECC stakeholders strongly recommend coordinated, harmonized IBR performance and modeling requirements, EMT screening approaches, and interconnection study processes to mitigate bulk power system (BPS) reliability risks, improve efficiency, and reduce costs.

Why EMT Modeling is Critical Now

The rapid growth of IBRs, reliability issues with weaker grid areas, proliferation of AI-driven data centers, high voltage direct current (HVDC) transmission developments, and complex controller interactions now make EMT-level analysis essential for maintaining BPS reliability. EMT studies have transitioned from niche analyses to a core competency and central requirements for interconnection and planning assessments.

A recurring theme emerged: the need for accurate, verified, high-quality EMT models, delivered at the right time in the interconnection process. Timely and reliable models are crucial to prevent study delays, operational inefficiencies, and reliability gaps. Legacy sites often lack adequate models, generic models obscure real control behaviors, and late-stage model revisions can expose issues when they are hardest to address. Consistent and transparent model collection, verification, quality checks, and performance testing are essential.

IBR Modeling Requirements and Performance Testing

Panel discussions highlighted the challenges of ensuring model accuracy throughout an IBR plant's lifecycle. Developers coordinate a complex process across original equipment manufacturers (OEM), contractors, power plant controller (PPC) vendors, consultants, and third parties; while utilities need dependable models to assess grid performance. Misaligned schedules, inconsistent requirements, and reverse-engineered models designed just to "pass the test" all present reliability risks and can delay projects.

Stakeholders agreed that clear, harmonized IBR modeling requirements—including model quality tests, verification steps, and performance conformity tests—are essential to ensuring models truly and accurately represent as-left field equipment behavior. Standardized test benches (such as those developed by Electranix, IEEE 2800-2022, ERCOT, IESO, and others) and automation tools were identified as key to streamlining assessments and driving regional consistency.

Screening: Identifying Where EMT Study are Needed

Grid planners described a range of screening methods: SCR-based thresholds, impedance-based indicators, N-x radiality, and others. While not every project requires EMT analysis, targeted EMT studies in high-risk areas are indispensable for BPS reliability. A unified, Western Interconnection-wide approach and strategy—modeled after structured screening tools used by ERCOT or IESO—would minimize redundant custom approaches and help focus limited technical resources.

Large-Scale EMT Study Realities

Presenters highlighted the growing scale and complexity of modern EMT analyses, now necessary for large IBR clusters, AI data centers, HVDC systems, grid-forming (GFM) deployment, and major transfer paths. These studies require specialized staff, strong internal capabilities, high-performance computing access, and committed management support. The overarching takeaway: EMT expertise is a strategic necessity for Transmission Planners, and regional alignment would significantly ease workloads.

Harmonization: The Central Theme

Throughout the workshop, harmonization stood out as the most urgent need and theme. Without coordination, the West risks a patchwork of inconsistent modeling requirements, acceptance tests and criteria, documentation expectations, and testing timelines. This fragmentation burdens developers, OEMs, and planners alike, and can lead to rework, slower interconnection, and increased BPS reliability risks.

A unified regional framework would provide:

- Consistent, accurate models across the Western Interconnection
- Shorter interconnection timelines by avoiding conflicting processes
- Confidence that IBRs meet performance requirements and are verified as-left conditions
- Fewer undetected control interactions, unexpected behavior, and other BPS reliability risks
- Lower engineering costs and reduced workloads

Participants emphasized that harmonization is not aspirational, but an immediate necessity for keeping pace with the evolving grid.

A Call to Action

The workshop concluded with broad agreement: the Western Interconnection stands at a pivotal crossroads. As NERC standards and IEEE 2800-2022 adoption advance, the region has a timely opportunity to establish a unified interconnection-wide foundation for IBR modeling, test criteria, and EMT study approaches. This would “raise the floor,” reduce fragmentation, and provide a common set of expectations that developers, OEMs, and planners can follow with confidence.

Without alignment, the West faces reliability risks and other challenges:

- Persistent inconsistencies in model submissions
- Longer interconnection timelines
- Conflicting requirements and obligations

- Higher IBR interconnection costs
- Gaps in screening, testing, and verification
- Latent reliability risks that may only surface in real-time operations

The workshop underscored both the complexity of these challenges and the collective willingness to pursue a unified approach. Next steps involve distilling these themes into a harmonized framework, developed collaboratively by industry stakeholders, so that the Western Interconnection can manage risks, accelerate interconnection of new resources, and safeguard BPS reliability.