

# Electromagnetic Transient Modeling Task Force (EMTTF)

Scope Document  
December 2022

## Purpose

The purpose of the NERC Electromagnetic Transient Modeling Task Force (“EMTTF”) is to support and accelerate industry adoption of electromagnetic transient (EMT) modeling and simulation in their interconnection and planning studies of bulk power system (BPS)-connected inverter-based resources.<sup>1</sup> The EMTTF will provide guidance and reference materials to Transmission Planners (TPs) and Planning Coordinators (PCs) embarking on EMT modeling and simulations to more adequately assess BPS impacts and reliability risks of interconnecting inverter-based resources. The EMTTF will also focus on developing technical documents to support BPS planning under increasing penetrations of BPS-connected inverter-based resources.

## Activities

The EMTTF will focus on the following activities:

1. Develop a reliability guideline on EMT modeling and studies related to BPS-connected inverter-based resources, including screening criteria
  - a. Develop recommendations on model quality requirements and control processes to ensure availability of high-quality, facility-specific EMT models capable of identifying and proactively mitigating potential reliability risks
  - b. Provide guidance materials to help support Generator Owners in their development, verification, validation and maintenance/updates of EMT models
  - c. Identify existing gaps and confusions in EMT modeling space and drive clarity and industry alignment
2. Develop a repository of references and educational resources to accelerate industry adoption of EMT modeling and simulation in interconnection and planning studies of BPS-connected inverter-based resources
3. Support EMT standard drafting team efforts
4. Conduct trainings (webinars, workshops, etc.), as needed, to help enhance TP and PC adoption of EMT modeling and studies

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<sup>1</sup> Inverter-based resources generally include solar photovoltaic (PV), wind power resources, battery energy storage, high voltage dc (HVDC) systems, and flexible ac transmission system (FACTS) devices.

## Deliverables

The EMTTF will develop the following deliverables based on the aforementioned activities:

1. Reliability guideline(s), technical reference document(s), or white paper(s) related to EMT modeling and studies of BPS-connected inverter-based resource performance, including ride-through capabilities and system impacts
  - a. Two-part reliability guidelines on EMT modeling and studies (currently underway in the Inverter-Based Resource Performance Subcommittee; will be moved to EMTTF upon initiation).
  - b. Assessment of the existing modeling practices, requirements and studies being performed across North America and internationally involving BPS-connected inverter-based resources. Identification of gaps and dissemination of best-practices.
  - c. Case study on adoption of EMT modeling and studies in interconnection and planning studies for BPS-connected inverter-based resources
2. EMTTF website hosting repository of EMT modeling and study references (recommended modeling and study practices, references to educational materials, tutorials and workshop presentations, case studies, automation approaches, frequently asked questions (FAQs) gathered from event Q&A sessions, webinars, and other outreach efforts)
3. Revised or updated Reliability Guidelines previously developed by the group (if necessary)
4. Feedback to EMT standard drafting team, as needed

## Membership

As EMTTF activities are entirely public, the EMTTF is open to all industry members with expertise or interest in any of the following areas:

- EMT modeling and simulation for power systems analysis
- Understanding of converter design, controls, and manufacturing for inverter-based resources
- Plant-level controls and the relationship between these controls and individual inverter-based resource unit controls
- Inverter-based resource performance characteristics, particularly performance during faults and abnormal voltage and frequency conditions, phase angles changes, phase locked loop dynamics, etc.
- Performing transient stability simulations and modeling of inverter-based resources, including modeling and model parameters for these resources
- Performing model verification testing for inverter-based resources
- BPS angular, frequency, and voltage stability, particularly under high penetration of inverter-based resources

The EMTTF will have a Chair (or Co-Chairs) selected by the NERC Inverter-Based Resource Performance Subcommittee (IRPS) leadership and recommended for nomination by RSTC leadership. NERC staff will be assigned as staff coordinator(s).

## **Reporting and Duration**

The EMTTF reports to IRPS and will review scope and work plan regularly. EMTTF will develop materials using a consensus-based approach, and will document any minority opinions, as needed. The EMTTF is expected to complete its work plan by end of 2024.

## **Meetings**

The EMTTF will have bi-monthly meetings (every other month) supplemented with conference calls to manage continued workload throughout the year. EMTTF meetings will be mostly remote; the team may meet in-person occasionally, if applicable and necessary.