

## Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard is adopted by the NERC Board of Trustees (Board).

### Description of Current Draft

This is the ~~third~~<sup>first</sup> draft of the proposed standard for a formal 45-day additional comment period.

Completed Actions	Date
Standards Committee approved Standard Authorization Request (SAR) for posting	01/19/2022
SAR posted for comment	2/1/2022 – 3/02/2022
45-day formal <del>or informal</del> comment period with ballot	<del>6/5/31/2023 – 7/17/14/2023</del>
<u>45-day formal additional comment period with ballot</u>	<u>6/1/2023 – 7/17/2023</u>
<u>45-day formal comment period with additional ballot</u>	<u>10/6/2023 – 11/20/2023</u>

Anticipated Actions	Date
<del>45-day formal or informal comment period with ballot</del>	<del>6/1/2023 – 7/17/2023</del>
<del>45-day formal or informal comment period with additional ballot</del>	<del>10/6/2023 – 11/20/2023</del>
<del>45-day formal comment period with additional ballot</del> <del>XX-day final ballot</del>	<del>8/27/2024 – 10/10/2024</del>
<u>10-day final ballot</u>	<u>TBD</u>
Board adoption	<del>12/12/2023</del> <u>TBD</u>

## New or Modified Term(s) Used in NERC Reliability Standards

This section includes all new or modified terms used in the proposed standard that will be included in the *Glossary of Terms Used in NERC Reliability Standards* upon applicable regulatory approval. Terms used in the proposed standard that are already defined and are not being modified can be found in the *Glossary of Terms Used in NERC Reliability Standards*. The new or revised terms listed below will be presented for approval with the proposed standard. Upon Board adoption, this section will be removed.

### Term(s):

Distributed Energy Resource (DER)

Generators and energy storage technologies connected to the Distribution Provider's system, including those connected behind the meter of an end use customer, that are capable of providing Real Power in non-isolated parallel operation with the Bulk-~~Electric Power~~ System.

- Distribution Provider refers to the NERC glossary definition, rather than an entity meeting the NERC registration criteria~~not the NERC registered entity~~.

## A. Introduction

1. **Title:** Data for Power System Modeling and Analysis
2. **Number:** MOD-032-2
3. **Purpose:** To establish consistent modeling data requirements and reporting procedures for development of planning horizon cases necessary to support analysis of the reliability of the interconnected transmission system.
4. **Applicability:**
  - 4.1. **Functional Entities:**
    - 4.1.1 Balancing Authority
    - 4.1.2 Distribution Provider
    - ~~4.1.2.1.3~~ Generator Owner
    - ~~4.1.3 Distribution Provider~~
    - 4.1.4 Planning Authority and Planning Coordinator (hereafter collectively referred to as “Planning Coordinator”)
    - 4.1.5 Resource Planner
    - 4.1.6 Transmission Owner
    - 4.1.7 Transmission Planner
    - 4.1.8 Transmission Service Provider
5. **Effective Date:** See Implementation Plan.

## B. Requirements and Measures

- R1. Each Planning Coordinator and each of its Transmission Planners shall jointly develop steady-state, dynamics, and short circuit modeling data requirements and reporting procedures for the Planning Coordinator’s planning area that include: *[Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]*
  - 1.1. The data listed in Attachment 1.
  - 1.2. Specifications of the following items consistent with procedures for building the Interconnection-wide case(s):
    - 1.2.1. Data format;
    - 1.2.2. Level of detail to which equipment shall be modeled;
    - 1.2.3. Case types or scenarios to be modeled; and
    - 1.2.4. A schedule for submission of data at least once every 13 calendar months.



- R4.** Each Planning Coordinator shall make available models for its planning area reflecting data provided to it under Requirement R2 to the Electric Reliability Organization (ERO) or its designee to support creation of the Interconnection-wide case(s) that includes the Planning Coordinator’s planning area. *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*
- M4.** Each Planning Coordinator shall provide evidence, such as email records or postal receipts showing recipient and date, that it has submitted models for its planning area reflecting data provided to it under Requirement R2 when requested by the ERO or its designee.

## 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 periods 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 with Requirements R1 through R4, and Measures M1 through M4, since the last audit, 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 entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

**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.

### Violation Severity Levels

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	Lower	The Planning Coordinator and Transmission Planner(s) developed steady-state, dynamics, and short circuit modeling data requirements and reporting procedures, but failed to include less than or equal to 25% of the required components specified in Requirement R1.	The Planning Coordinator and Transmission Planner(s) developed steady-state, dynamics, and short circuit modeling data requirements and reporting procedures, but failed to include greater than 25% but less than or equal to 50% of the required components specified in Requirement R1.	The Planning Coordinator and Transmission Planner(s) developed steady-state, dynamics, and short circuit modeling data requirements and reporting procedures, but failed to include greater than 50% but less than or equal to 75% of the required components specified in Requirement R1.	The Planning Coordinator and Transmission Planner(s) did not develop any steady-state, dynamics, and short circuit modeling data requirements and reporting procedures required by Requirement R1;  OR The Planning Coordinator and Transmission Planner(s) developed steady-state, dynamics, and short circuit modeling data requirements and reporting procedures, but failed to include greater than 75% of the required components specified in Requirement R1.

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R2	Long-term Planning	Medium	<p>The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but failed to provide less than or equal to 25% of the required data specified in Attachment 1;</p> <p>OR</p> <p>The Balancing Authority, Generator Owner, Distribution Provider, Resource</p>	<p>The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but failed to provide greater than 25% but less than or equal to 50% of the required data specified in Attachment 1;</p> <p>OR</p> <p>The Balancing Authority, Generator Owner, Distribution</p>	<p>The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but failed to provide greater than 50% but less than or equal to 75% of the required data specified in Attachment 1;</p> <p>OR</p> <p>The Balancing Authority, Generator Owner, Distribution</p>	<p>The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider did not provide any steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s);</p> <p>OR</p> <p>The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s)</p>



R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but less than or equal to 25% of the required data failed to meet data format, shareability, level of detail, or case type specifications; OR The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider failed to	Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but greater than 25% but less than or equal to 50% of the required data failed to meet data format, shareability, level of detail, or case type specifications; OR The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or	Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but greater than 50% but less than or equal to 75% of the required data failed to meet data format, shareability, level of detail, or case type specifications; OR The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or	and Planning Coordinator(s), but failed to provide greater than 75% of the required data specified in Attachment 1; OR The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or Transmission Service Provider provided steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s), but greater than 75% of the required data failed to meet data format, shareability, level of detail, or case type specifications;

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			provide steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s) within the schedule specified by the data requirements and reporting procedures, but did provide the data in less than or equal to 15 calendar days after the specified date.	Transmission Service Provider failed to provide steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s) within the schedule specified by the data requirements and reporting procedures, but did provide the data in greater than 15 but less than or equal to 30 calendar days after the specified date.	Transmission Service Provider failed to provide steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s) within the schedule specified by the data requirements and reporting procedures, but did provide the data in greater than 30 but less than or equal to 45 calendar days after the specified date.	OR The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner or Transmission Service Provider failed to provide steady-state, dynamics, and short circuit modeling data to its Transmission Planner(s) and Planning Coordinator(s) within the schedule specified by the data requirements and reporting procedures but did provide the data in greater than 45 calendar days after the specified date.
<b>R3</b>	<b>Long-term Planning</b>	<b>Lower</b>	The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission	The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission	The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission	The Balancing Authority, Generator Owner, Distribution Provider, Resource Planner, Transmission Owner, or

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			Owner, or Transmission Service Provider failed to provide a written response to its Transmission Planner(s) or Planning Coordinator(s) according to the specifications of Requirement R3 within 90 calendar days (or within a longer period agreed upon by the notifying Planning Coordinator or Transmission Planner), but did provide the response within 105 calendar days (or within 15 calendar days after the longer period agreed upon by the notifying Planning Coordinator or Transmission Planner).	Owner, or Transmission Service Provider failed to provide a written response to its Transmission Planner(s) or Planning Coordinator(s) according to the specifications of Requirement R3 within 90 calendar days (or within a longer period agreed upon by the notifying Planning Coordinator or Transmission Planner), but did provide the response within greater than 105 calendar days but less than or equal to 120 calendar days (or within greater than 15 calendar days but less than or equal to 30 calendar days after the longer period agreed	Owner, or Transmission Service Provider failed to provide a written response to its Transmission Planner(s) or Planning Coordinator(s) according to the specifications of Requirement R3 within 90 calendar days (or within a longer period agreed upon by the notifying Planning Coordinator or Transmission Planner), but did provide the response within greater than 120 calendar days but less than or equal to 135 calendar days (or within greater than 30 calendar days but less than or equal to 45 calendar days after the longer period agreed	Transmission Service Provider failed to provide a written response to its Transmission Planner(s) or Planning Coordinator(s) according to the specifications of Requirement R3 within 135 calendar days (or within a longer period agreed upon by the notifying Planning Coordinator or Transmission Planner).

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
				upon by the notifying Planning Coordinator or Transmission Planner).	upon by the notifying Planning Coordinator or Transmission Planner).	
<b>R4</b>	<b>Long-term Planning</b>	<b>Medium</b>	The Planning Coordinator made available the required data to the ERO or its designee, but failed to provide less than or equal to 25% of the required data in the format specified by the ERO or its designee.	The Planning Coordinator made available the required data to the ERO or its designee, but failed to provide greater than 25% but less than or equal to 50% of the required data in the format specified by the ERO or its designee.	The Planning Coordinator made available the required data to the ERO or its designee, but failed to provide greater than 50% but less than or equal to 75% of the required data in the format specified by the ERO or its designee.	The Planning Coordinator made available the required data to the ERO or its designee, but failed to provide greater than 75% of the required data in the format specified by the ERO or its designee.

**D. Regional Variances**

None.

**E. Associated Documents**

NERC Reliability Standard MOD-032-2 Implementation Plan

NERC Reliability Standard MOD-032-2 Technical Rationale

## Version History

Version	Date	Action	Change Tracking
1	February 6, 2014	Adopted by the NERC Board of Trustees.	Developed to consolidate and replace MOD-010-0, MOD -011-0, MOD-012-0, MOD-013-1, MOD-014-0, and MOD-015-0.1
1	May 1, 2014	FERC Order issued approving MOD-032-1.	See Implementation Plan posted on the Reliability Standards web page for details on enforcement dates for Requirements.
<u>2</u>	<u>TBD</u>	<u>TBD</u>	<u>Revised under Project 2022-02</u>

MOD-032-2 – ATTACHMENT 1:

Data Reporting Requirements

The table below indicates the information that is required to effectively model the interconnected transmission system for the Near-Term Transmission Planning Horizon and Long-Term Transmission Planning Horizon. -Data must be shareable on an interconnection-wide basis to support use in the Interconnection-wide cases.- A Planning Coordinator may specify additional information that includes specific information required for each item in the table below. Each functional entity<sup>1</sup> responsible for reporting the respective data in the table is identified by brackets “[functional entity]” adjacent to and following each data item. The data reported shall be as identified by the bus number, name, and/or identifier that is assigned in conjunction with the PC, TO, or TP.

<p style="text-align: center;"><b>steady-state</b></p> <p style="text-align: center;"><i>(Items marked with an asterisk indicate data that vary with system operating state or conditions.- Those items may have different data provided for different modeling scenarios)</i></p>	<p style="text-align: center;"><b>dynamics</b></p> <p style="text-align: center;"><i>(If a user-written model(s) is submitted in place of a generic or library model, it must include the characteristics of the model, including block diagrams, values and names for all model parameters, and a list of all state variables)</i></p>	<p style="text-align: center;"><b>short circuit</b></p>
<ol style="list-style-type: none"> <li>1. Each bus [TO]                             <ol style="list-style-type: none"> <li>a. nominal voltage</li> <li>b. area, zone and owner</li> </ol> </li> <li>2. Aggregate Demand<sup>2</sup> [DP]                             <ol style="list-style-type: none"> <li>a. real and reactive power*</li> <li>b. in-service status*</li> </ol> </li> <li>3. Generating Units<sup>3</sup> [GO, RP (for future planned resources only)]                             <ol style="list-style-type: none"> <li>a. real power capabilities - gross maximum and minimum values</li> <li>b. reactive power capabilities - maximum and minimum values at real power capabilities in 3a above</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Generator [GO, RP (for future planned resources only)]</li> <li>2. Excitation System [GO, RP (for future planned resources only)]</li> <li>3. Governor [GO, RP (for future planned resources only)]</li> <li>4. Power System Stabilizer [GO, RP (for future planned resources only)]</li> <li>5. <u>Aggregate Demand</u><sup>2</sup> [DP]</li> <li>6. Wind Turbine Data [GO]</li> <li>7. Photovoltaic systems [GO]</li> <li>8. Static Var Systems and FACTS [GO, TO, DP]</li> </ol>	<ol style="list-style-type: none"> <li>1. Provide for all applicable elements in column “steady-state” [GO, RP, TO]                             <ol style="list-style-type: none"> <li>a. Positive Sequence Data</li> <li>b. Negative Sequence Data</li> </ol> </li> </ol>

<sup>1</sup> For purposes of this attachment, the functional entity references are represented by abbreviations as follows: Balancing Authority (BA), Generator Owner (GO), Distribution Provider (DP), Planning Coordinator (PC), Resource Planner (RP), Transmission Owner (TO), Transmission Planner (TP), and Transmission Service Provider (TSP).

<sup>2</sup> For purposes of this item, aggregate Demand is the gross Demand aggregated at each bus under item 1 that is identified by a Transmission Owner as a load serving bus rather than the net Demand that incorporates offsets due to output from Distributed Energy Resources. -A Distribution Provider is responsible for providing this information, generally through coordination with the Transmission Owner or as specified in the joint PC/TP modeling data requirements and reporting procedures developed per R1.

<sup>3</sup> Including synchronous condensers and pumped storage.

<p style="text-align: center;"><b>steady-state</b></p> <p style="text-align: center;"><i>(Items marked with an asterisk indicate data that vary with system operating state or conditions. - Those items may have different data provided for different modeling scenarios)</i></p>	<p style="text-align: center;"><b>dynamics</b></p> <p style="text-align: center;"><i>(If a user-written model(s) is submitted in place of a generic or library model, it must include the characteristics of the model, including block diagrams, values and names for all model parameters, and a list of all state variables)</i></p>	<p style="text-align: center;"><b>short circuit</b></p>
<ul style="list-style-type: none"> <li>c. station service auxiliary load for normal plant configuration (provide data in the same manner as that required for aggregate Demand under item 2, above).</li> <li>d. regulated bus* and voltage set point* (as typically provided by the TOP)</li> <li>e. machine MVA base</li> <li>f. generator step up transformer data (provide same data as that required for transformer under item 6, below)</li> <li>g. generator type (hydro, wind, fossil, solar, nuclear, etc.)</li> <li>h. in-service status*</li> <li>4. AC Transmission Line or Circuit [TO]               <ul style="list-style-type: none"> <li>a. impedance parameters (positive sequence)</li> <li>b. susceptance (line charging)</li> <li>c. ratings (normal and emergency)*</li> <li>d. in-service status*</li> </ul> </li> <li>5. DC Transmission systems [TO]</li> <li>6. Transformer (voltage and phase-shifting) [TO]               <ul style="list-style-type: none"> <li>a. nominal voltages of windings</li> <li>b. impedance(s)</li> <li>c. tap ratios (voltage or phase angle)*</li> <li>d. minimum and maximum tap position limits</li> <li>e. number of tap positions (for both the ULTC and NLTC)</li> <li>f. regulated bus (for voltage regulating transformers)*</li> <li>g. ratings (normal and emergency)*</li> <li>h. in-service status*</li> </ul> </li> <li>7. Reactive compensation (shunt capacitors and reactors) [TO]               <ul style="list-style-type: none"> <li>a. admittances (MVars) of each capacitor and reactor</li> <li>b. regulated voltage band limits* (if mode of operation not fixed)</li> <li>c. mode of operation (fixed, discrete, continuous, etc.)</li> <li>d. regulated bus* (if mode of operation not fixed)</li> <li>e. in-service status*</li> </ul> </li> <li>8. Static Var Systems [TO]               <ul style="list-style-type: none"> <li>a. reactive limits</li> <li>b. voltage set point*</li> <li>c. fixed/switched shunt, if applicable</li> <li>d. in-service status*</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>9. DC system models [TO]</li> <li>10. <u>Aggregate</u>-Distributed Energy Resource (DER) data including whether DER is subject to tripping in conjunction with UFLS and/or UVLS<sup>4</sup> [DP, <del>TO where DER is directly connected to the TO system and not through a DP</del>]</li> <li>11. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, DP, TO, TSP]</li> </ul>	<ul style="list-style-type: none"> <li>c. Zero Sequence Data</li> <li>2. Mutual Line Impedance Data [TO]</li> <li>3. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, DP, TO, TSP]</li> </ul>

<p style="text-align: center;"><b>steady-state</b></p> <p style="text-align: center;"><i>(Items marked with an asterisk indicate data that vary with system operating state or conditions. - Those items may have different data provided for different modeling scenarios)</i></p>	<p style="text-align: center;"><b>dynamics</b></p> <p style="text-align: center;"><i>(If a user-written model(s) is submitted in place of a generic or library model, it must include the characteristics of the model, including block diagrams, values and names for all model parameters, and a list of all state variables)</i></p>	<p style="text-align: center;"><b>short circuit</b></p>
<p>9. <del>Aggregate</del> Distributed Energy Resource (DER) data<sup>4</sup> [DP, <del>TO where DER is directly connected to the TO system and not through a DP</del>]<sup>5</sup></p> <ul style="list-style-type: none"> <li>a. Location (bus from item 1)</li> <li>b. Real power capability</li> <li>c. <del>Generator-DER</del> type (solar, battery, <del>diesel generator</del>, etc.)</li> <li>d. DER capabilities related to ride-through, voltage control and/or frequency control or information that can be used to infer those capabilities for modeling purposes.</li> </ul> <p>10. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, DP, TO, TSP]</p>		

<sup>4</sup> ~~The joint PC/TP modeling data requirements and reporting procedures developed per R1 will specify data flow processes and the required level of aggregation. The PC or TP may need to coordinate with the DP or TO to determine appropriate equivalent distribution system impedance. For purposes of this item, the Distribution Provider to which DER is connected is responsible for reporting DER data, generally through coordination with the Transmission Owner, in accordance with PC/TP modeling data requirements and data reporting procedures developed under Requirement R1.- The PC or TP may need to coordinate with the DP or TO to determine appropriate equivalent distribution system impedance.~~

<sup>5</sup> ~~Where DER is connected to an unregistered Distribution Provider, the next closest electrically connected registered entity (DP or TO) shall request DER data and pass through available information. An unregistered Distribution Provider is an unregistered entity meeting the NERC Glossary of Terms definition of Distribution Provider. This footnote is also applicable to item 10 under the “dynamics” column.~~