MOD-032 Modeling Data Requirements and Reporting Procedures

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1. Introduction

NERC Standard MOD-032 requires the IESO as a Planning Coordinator/Transmission Planner/Balancing Authority 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”.

This document summarizes the IESO modeling data requirements and reporting procedures to comply with NERC Standard MOD-032, including the obligations of the Market Participants for submitting steady-state, dynamics, and short circuit modeling data to the IESO.

– End of Section –

2. Steady State Data Requirements

Transmission and Generation Owners must provide the required steady-state technical data and information to the IESO, as specified in Attachment 1 of MOD-032-1.

For new or modified facilities, data must be submitted in the relevant SIA Application Forms as part of the connection assessment process. Data must also be submitted by in-service, new or modified facilities on the Online IESO platform or another acceptable platform (e.g., Hydro One Networks Inc. (HONI) Secure Web "PSDB"). Other updates to steady-state data can be provided using the forms listed in Appendix A of Market Manual 11: Reliability Compliance.

2.1 Steady State - Bus Data (MOD-032, Attachment 1, items 1a-b) [TO]

Hydro One Networks Inc. (HONI) as a Transmission Owner shall provide bus numbers and bus nominal voltages with information for area, zone, and owner on the HONI Secure Web (PSDB) and shall provide regular updates through the database and RAW files available on the HONI PSDB. It should be noted that every 6 months, IESO sends the updated master basecase (MBC) along with the updated bus numbers with zones and owners to HONI, and then HONI shall update the HONI PSDB accordingly. Other Transmission Owners shall provide their bus data using the Online IESO.

2.2 Steady State - Aggregate Demand (MOD-032, Attachment 1, items 2a-b) [LSE]

The IESO currently represents the only load-serving entity (LSE) in Ontario, which is responsible for procuring energy to meet load demand (i.e., energy and resource adequacy). For existing loads, the IESO uses demand forecast mechanisms to determine aggregated zonal demand data, which are used along with real-time telemetry data to determine active and reactive powers as well as in-service statuses of aggregated demands at the system buses. For new or modified load facilities, the required steady-state modeling data must be submitted in the SIA application form4 IMO-FORM-1538-SIAA-Load.

2.3 Steady State - Generating Units (MOD-032, Attachment 1, items 3a-h) [GO, RP]

Generator Owners shall provide the following information related to steady-state modeling data for their generation facilities:

1. Real and reactive power capabilities (i.e., capability curves/data describing maximum and minimum power values) as specified in Section 2.1 of the Register Facility Help File.

2. Station Service Auxiliary Load information (i.e., maximum station service active and reactive power load supplied) as specified in Section 2 of the Register Facility Help File.
3. Regulated bus, as specified in Section 2 of the Register Facility Help File.
4. Machine MVA base, as specified in Section 2 of the Register Facility Help File.
5. Generator step-up transformer data, as specified in Sections 2 and 5 of the Register Facility Help File.
6. Generator Type, as specified in Section 10 of the Register Facility Help File.

For each generation facility, the in-service status and voltage set point are determined by the IESO based on the system operating conditions, while taking the outage schedule and operating limits of the facility into consideration.

For new or modified generation facilities, the required steady-sate modeling data must be submitted in the SIA application form IMO-FORM-1536-SIAA. Data must also be submitted by in-service, new or modified generation facilities on the Online IESO platform.

2.4 Steady State - AC Transmission Lines or Circuits (MOD-032, Attachment 1, items 4a-d) [TO]

Market Participants (including Transmission Owners) shall provide the following information related to steady-state modeling data for their AC transmission lines or circuits:

1. Impedance parameters (positive sequence)
2. Susceptance (line charging)
3. Ratings (normal and emergency)
4. In-service status

For new or modified transmission facilities, the required modeling data must be submitted in the SIA application form IMO-FORM-1537-SIAA. Transmission line data must also be submitted by in-service, new or modified transmission facilities on the Online IESO platform. Section 6 of the Register Facility Help File includes the data format and other additional information on the data to be shared using the Online IESO. HONI as a Transmission Owner shall provide relevant AC transmission line data on the HONI Secure Web (PSDB) and shall provide regular updates through the database and RAW files available on the HONI PSDB.

2.5 Steady State - DC Transmission Systems (MOD-032, Attachment 1, item 5) [TO]

There are no DC Transmission Systems in the IESO grid, and consequently this is not applicable.

2.6 Steady State - Transformers (MOD-032, Attachment 1, items 6a-h) [TO]

Market Participants (including Transmission Owners) shall provide the following information related to steady-state modeling data for their voltage/phase-shifting transformers:

1. Nominal voltages of windings
2. Impedance(s)
3. Tap ratios (voltage or phase angle)
4. Minimum and maximum tap position limits
5. Number of tap positions (for both the ULTC and NLTC)
6. Regulated bus (for voltage regulating transformers)
7. Ratings (normal and emergency)
8. In-service status

For new or modified transformer facilities that are required to go through the Connection Assessment process, the relevant transformer data must be submitted to the IESO using the SIA Application Form IMO-FORM-1537-SIAA.

Transformer data must also be submitted by in-service, new, or modified transformer facilities using either the Online IESO portal or another acceptable platform (e.g., HONI Secure Web "PSDB"). Section 5 of the Register Facility Help File includes the data format and other additional information on the data to be shared using the Online IESO. HONI as a Transmission Owner shall provide relevant transformer data on the HONI Secure Web (PSDB) and shall provide regular updates through the database and RAW files available on the HONI PSDB.

2.7 Steady State - Reactive Compensation (MOD-032, Attachment 1, items 7a-e) [TO]

Market Participants (including Transmission Owners) shall provide the following information related to steady-state modeling data for their reactive compensation devices (shunt capacitors and reactors):

1. Admittances (MVars) of each capacitor and reactor
2. Regulated voltage band limits (if mode of operation not fixed)
3. Mode of operation (fixed, discrete, continuous, etc.)
4. Regulated bus (if mode of operation not fixed)
5. In-service status

For new or modified reactive compensation equipment that are required to go through the Connection Assessment process, the relevant reactive compensation equipment data must be submitted to the IESO using the SIA Application Form IMO-FORM-1537-SIAA.

Data must also be submitted using either the Online IESO portal or another acceptable platform (e.g., HONI Secure Web "PSDB"). Section 9 of the Register Facility Help File includes the data format and other additional information on the data to be shared using the Online IESO. HONI as a Transmission Owner shall provide relevant reactive compensation equipment data on the HONI Secure Web (PSDB) and shall provide regular updates through the database and RAW files available on the HONI PSDB.

2.8 Steady State - Static VAR Systems (MOD-032, Attachment 1, items 8a-d) [TO]

Applicable Market Participants and Transmission Owners shall provide all relevant steady-state modeling data for their FACTS devices (such as Static VAR Compensation devices, STATCOMS, Fixed/Switched Shunts, Series Capacitors, etc.) using either the Online IESO portal or another acceptable platform (e.g., HONI Secure Web "PSDB"). Section 7 of the Register Facility Help File includes the data format and other additional information on the data to be shared using the Online IESO. HONI as a Transmission Owner shall provide relevant reactive compensation equipment data on the HONI Secure Web (PSDB) and shall provide regular updates through the database and RAW files available on the HONI PSDB.

The data to be provided by Market Participants includes reactive limits; fixed/switched shunt data, if applicable; in-service status; and any other data requested by the IESO for modeling purposes. The voltage set point of each static VAR device is determined by the IESO based on the system operating conditions, while taking the operating limits of the device into consideration.

For new or modified static VAR facilities that are required to go through the Connection Assessment process, the relevant FACTS devices data (including Static VAR Systems) must also be submitted to the IESO using the SIA Application Form IMO-FORM-1537-SIAA.

2.9 Steady State - Other Information (MOD-032, Attachment 1, item 10) [BA, GO, LSE, TO, TSP]

Any other steady-state information required to effectively model the interconnected transmission system can be requested by the IESO and must be provided by Market Participants using either the Online IESO portal or another acceptable platform (e.g., HONI Secure Web "PSDB").

– End of Section –

3. Dynamics Data

Dynamic models represent the electrical and mechanical behaviour of equipment during transients and transitions from one steady state to another. Dynamic models need to be specified for the following types of equipment:

1. Generators [GO, RP (for future planned resources only)]
2. Excitation Systems [GO, RP (for future planned resources only)]
3. Governors [GO, RP (for future planned resources only)]
4. Power System Stabilizers [GO, RP (for future planned resources only)]
5. Load Demands [LSE]
6. Wind Turbines [GO]
7. Photovoltaic systems [GO]
8. Static Var Systems and FACTS [GO, TO, LSE]
9. DC system models [TO]

Market Participants must submit the relevant dynamics data for their equipment using the Online IESO platform. Details on the data format and other additional information on the data to be submitted can be found in Section 4 of the Register Facility Help File.

For new or modified generating units and associated control equipment, the required dynamics data must be submitted in the SIA application form IMO-FORM-1536-SIAA. During the commissioning stage, all dynamics data for equipment installed at the facility is tested to confirm that it meets the requirements of the IESO Market Rules. Any changes to previously submitted dynamic model data at the commissioning stage must be updated on the Online IESO platform. Further information on the commissioning requirements of dynamics data is available here.

A generation facility or synchronous condenser that has been classified by the IESO as a BES facility is required to meet the periodicity of testing and model verification requirements prescribed within applicable NERC reliability standards. For in-service generating units that are subject to MOD-026 and MOD-027 standards, the dynamic models for their exciters, governors and machines, as well as test results that validate the submitted models, are to be provided to the IESO using forms 57 and 58. Although the Market Rules do not prescribe periodic testing or model validation for facilities owned by applicable Market Participants, the IESO has the authority to request such testing or validation from time to time as may be necessary, to maintain the reliability of the power system, pursuant to the Market Rules Chapter 4, Section 5.2.1. Other updates to dynamics data can be provided using the forms listed in Appendix A of Market Manual 11: Reliability Compliance.

Any other dynamics data required for modeling purposes can be requested by the IESO and must be provided by Market Participants.

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4. Short Circuit Data

For new or modified generation units, the relevant short-circuit equipment data including (but not limited to) positive sequence impedances, zero sequence impedances and mutual line impedances for generators, associated transformers, collectors and any sections connecting the units to the transmission system must be submitted to the IESO using the SIA application form IMO-FORM-1536-SIAA. The data must also be submitted by in-service, new or modified facilities on the Online IESO platform.

For new or modified transmission facilities, the relevant short-circuit equipment data including (but not limited to) positive sequence impedances, zero sequence impedances and mutual line impedances for circuit sections and transformers must be submitted to the IESO using the SIA Application Form IMO-FORM-1537-SIAA. The data must also be submitted by in-service, new or modified facilities on the Online IESO platform, or another acceptable platform (e.g., HONI Secure Web "PSDB").

Any other short-circuit information required for modeling purposes can be requested by the IESO and must be provided by Market Participants using either the Online IESO portal or another acceptable platform (e.g., HONI Secure Web "PSDB").

– End of Section –

5. Data Request Procedures

This section provides a summary of the different procedures that the IESO uses to request new and updated equipment data from Market Participants.

For all new and updated facilities, the modeling data (i.e., steady-state, dynamics, and short-circuit data) must be submitted as part of the SIA and commissioning process, as explained in Sections 2, 3 and 4 above. The requested data needs to be submitted by Market Participants to the IESO using the Online IESO portal, the forms listed in Appendix A of Market Manual 11: Reliability Compliance, or another acceptable platform (e.g., HONI Secure Web "PSDB").

All registered facilities that own/operate resources within Ontario and have data reporting obligations to the IESO under NERC Reliability Standard MOD-032 shall receive an annual notice from the IESO to be compliant with the standard requirements. If there are additions or modifications to the modeling data, Market Participants shall follow the steps specified in Sections 2, 3 and 4 above. If there is no change to the modeling data, Market Participants shall indicate the same via a written confirmation.

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