ENTERGY TRANSMISSION FACILITY CONNECTION REQUIREMENTS

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18	Annual Review	12/9/2025	-	DXV

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1. Introduction

This document is intended to provide Interconnection Customers (ICs) an overview of the requirements entailed with connecting to the Entergy system and is not intended to be a comprehensive guide. All new connections or modifications to existing connections to the Entergy bulk transmission system, including Entergy self-built facilities, at 69 kV or above, must comply with all applicable Entergy Transmission Standards. Such standards are considered proprietary information and can be provided to the IC upon execution of a Non-Disclosure Agreement (NDA). Such connections must comply as well with all applicable Planning, Operations and Cyber Reliability Standards of the Federal Regulatory Energy Commission's (FERC's) approved Electric Reliability Organization (ERO), which is currently the North American Electric Reliability Corporation (NERC), or its successor, and comply with supplemental requirements of the regional reliability organization (RRO), which is currently SERC Reliability Corporation (SERC). The NERC standards and SERC Supplements that are relevant to this document are primarily those which SERC classifies as Planning Standards.

NERC Standard FAC-001-4 states that its purpose is "To avoid adverse impacts on reliability of the Bulk Electric System, Transmission Owners and applicable Generator Owners must document and make Facility Interconnection Requirements available so that entities seeking to interconnect will have the necessary information." The SERC Supplement to FAC-001-4 (SERC Supplement) further details the Requirements of FAC-001-4, presenting what information must or should be available to the interconnecting customer, and to the customer that is modifying facilities connected to Transmission, including Entergy's own facilities.

This document is linked to and is intended to be used in conjunction with the **Entergy Facility Connection Requirements Website** (the Website) along with the Excel file, *Entergy Facilities Connection Spreadsheet.xls* (the Excel Spreadsheet) which is linked to that website. Together, the website, the Excel Spreadsheet and this document address the full requirements of the NERC Standard and SERC Supplement. The Website explains the scope of the project and guides the reader to the relevant NERC and SERC sources. The Excel file lists the Entergy and other industry standard documents that provide the required, detailed interconnection information the SERC Supplement advises. Some documents referenced are confidential to Entergy, and instructions for accessing those Entergy confidential documents are included on the Website.

The purpose of this document is to fulfill the guidelines of the SERC Supplement. The Supplement requires that Transmission Owners include a description of the procedures for the study of new facilities and their impacts on the interconnected transmission system including any Affected Systems external to Entergy's system. The Supplement also states that the Transmission Owner (TO) should address in its planning requirements the requirement for all facility owners or operators to notify Entergy Transmission of any modifications to the interconnected facilities and the requirement of facility owners to provide Entergy Transmission with updated data to be used for modeling the facility.

The required Self Application Statement, other required statements, and the references to the detailed sources of information are included on the Website or in the Excel Spreadsheet.

2. Purpose

The purpose of this document is to provide stakeholders with information and the tasks that would be necessary to be completed to comply with the regulatory requirements for interconnection. This document will also provide guidance to identify and provide the details of regulatory related tasks as well as the technical guidance and tasks that should be completed before requesting an interconnection.

3. Background Information

As a result of increasing demand for electrical energy and the Department of Energy's infrastructure and clean energy initiative, new generation facilities of various scales are being built nationwide. The need for transmission infrastructure adds a lot of cost for small and medium-sized generating facilities to be able to deliver generated power to the customers. Most generating facilities may need to rely on the existing transmission facilities owned and operated by several utility entities. Entergy owns and operates a vast network of transmission systems, and many generation facilities could be interconnected to its transmission system. However, depending on the size of the new generation facilities there are several regulatory and technical requirements that shall be fulfilled to ensure the reliable operation of Entergy's transmission system. Entergy has established several policies and procedures to ensure compliance with the regulatory requirements and to ensure safe and reliable operation of transmission systems. This document is intended to summarize the requirements of those policies and procedures and such that stakeholders can identify and comply with the requirements before requesting Transmission Interconnection.

4. General Requirements

These requirements and those of the documents listed in the Excel Spreadsheet shall apply to all new generation, transmission, and end-user facilities requesting an interconnection to the Entergy Transmission System. Additionally, these requirements shall apply to all modifications made to the interconnected facilities. These requirements shall also apply to the interconnected entities that perform changes in their normal operations, which may have an impact to Entergy's obligation as a Transmission supplier.

All new or modified generation, transmission, or end-user facilities shall comply with all applicable codes, industry and Entergy's current standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to the facilities identified above. These include, but are not limited to, all NERC Reliability Standards and Regional Reliability Organization Supplements to those standards that are applicable to the Functional Entity, as defined by NERC.

Facilities which are being interconnected to the Entergy transmission system must be inspected by appropriate Entergy personnel to certify that, these facility interconnection requirements have been met prior to being placed in service. Facilities and equipment must be made available for subsequent inspections as requested by Entergy.

The design, construction, and maintenance of newly built and of modified connected facilities must be coordinated with the facility owner.

The following but not limited to, information shall be provided by the interconnecting entities before sending a request for interconnection:

- Voltage level of the interconnection
- Location of the proposed interconnection
- Identification of the location on the Transmission System to which the entity desires to connect and the voltage at that location
- Proposed In-service/Backfeed Date
- Entity's study report showing reasons for a new interconnection on Entergy's system
- Description of Power flow model used in entity's analysis.
- Other additional follow up information (e.g. system model) if requested by Entergy.

5. Regulatory Requirements

5.1 NERC Requirements

PRC-024-03- Generator Frequency and Voltage Protective Relay Settings.

Frequency and voltage protection used by the generator owner requesting Interconnection shall set its settings to prevent tripping within the "no trip zone" during a frequency or voltage excursion in accordance with the NERC PRC-024-03 "R1-Attachment 1" and "R2-Attachment 2".

Any deviation from settings as required by R1 and R2 because of equipment limitation, system studies, manufacturer's advice, or experiences from actual events shall be documented and communicated to Entergy. Such communication shall take place within 30 days of finding the limitations.

Settings shall be provided to Entergy within 60 days of the request from Entergy, or if any changes have been made to the provided settings, such changes should be provided to Entergy within 60 days of making the changes.

PRC-027-Co-ordination of Protection system for performance During Faults.

The Interconnecting Facility will be responsible for establishing new protection system settings or to review the existing relay settings at the facility. Interconnecting facility shall communicate with Entergy Transmission Relay Settings group to ensure relay co-ordination and documentation of such communications comply with the requirements of PRC-027. The Interconnecting Facility shall also provide requested relay settings information by Entergy for the purpose of co-ordination in accordance with the requirement of PRC-027.

FAC-001-04-Facility Interconnection Requirements

This document will be available to the facilities seeking interconnection with the Entergy facilities. This document defines the Entergy's procedure to Interconnect a third party or Entergy's owned facilities to Entergy Transmission System.

FAC-002-Facility Interconnection Studies

MOD-026-1-Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions.

MOD-027-1-Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions.

VAR-002-04-Generator Operation for Maintaining Network Voltage Schedules

6. Planning Requirements

6.1 Generator Interconnections

Entergy Transmission planning expects customers to follow the technical guidance laid out in FAC-002, *MISO Open Access Transmission Tariff Attachment X*, and *Entergy transmission local planning guidelines and criteria.* In the case of an IBR interconnection, Entergy document *A14 Interconnection and Operating guides for Inverter-Based Resources* provides additional guidelines specific to IBR interconnections.

Entergy Planning Criteria Guidelines:
Entergy TO Planning Criteria108226.pdf (misoenergy.org)

If any further questions are needed on the technical requirements, please direct questions to the Technical Lead listed on the Entergy Facility Connection Requirements website.

6.2 Transmission Connections/Modifications

Parties planning transmission additions that affect the Entergy Transmission system, whether they are directly connected to Entergy Transmission or not, are obligated to include Entergy in its planning process.

Entergy's additions of self-build Transmission facilities may be generated by reliability studies related to NERC Reliability Transmission Planning Standards TPL-001 to -004, or they may be studied at the request of an interconnecting Transmission Owner, by a Regulator, or by an Independent Power Producer, or end-user. Economic studies may also lead to transmission additions and/or modifications.

End user Connections/Modifications:

These requirements shall apply to all new and end-use facilities connected to the Entergy transmission system. Additionally, these requirements shall apply to all modifications of existing facilities or any change in the customer operations or facilities that result in a change in Entergy's obligation to serve.
Notification of the intent to connect new facilities or to modify existing facilities already connected to the Entergy transmission system should be provided through the Project and Technical Services group otherwise the customer should visit https://goentergy.com/contact-us/

6.3 Planning Studies

The following studies are necessary to validate that IC will behave in accordance with Entergy's Planning Criteria. IBRs have an additional requirement in that a PSCAD model is necessary to approve the interconnection.

Entergy may request more data than listed below, this is to ensure a proper study can be performed. For more information on necessary information please contact the appropriate point of contact on the Entergy Facility Connection Requirements webpage and be aware that you may be contacted by Entergy to provide further information. To help expedite this process it is recommended that the IC identify a technical lead and contact information be provided to Entergy.

Short Circuit: This test involves a CAPE model of the proposed facilities. Its purpose is to determine if the available equipment is capable of handling the increased fault current on the system.
To complete the IC must provide the proposed location, Generator data, Main step-up transformer, and any lines from the collector station to the point of interconnection with the Entergy system.

Steady state load flow: This test is performed in PSSE, the test is to find any assets that are overloaded due to the new interconnection.
To complete, a PSSE load flow model of the planned Interconnection must be provided. This will be submitted to MISO and Entergy will receive the model through the MISO process.

Dynamic: This test is performed to ensure the proposed machine operates within the defined stability limits of *Entergy transmission local planning guidelines and criteria*
To complete this test a dynamic .dyr model must be provided from the interconnection customer.

PSCAD/EMT: This study is performed for IBR interconnection customers. A PSCAD model is required to verify that the IBR performs in accordance with Entergy's guidelines laid out in *A.14* as well as *Entergy transmission local planning guidelines and criteria*.
To complete this study a PSCAD model must be provided to Entergy. Before even reviewing the model, the model is validated with parameters listed on our PSCAD model verification checklist. Entergy will not move forward with any studies until the checklist is fulfilled.

Reactive power: This is a simple check to ensure that the Interconnection customer supplies at least 1/3rd of the maximum real power output as reactive power. This is verified with the provided load flow model.

7. Design Requirements

7.1 Substation Design Requirements

Point of Interconnection (POI) Switchyard/Substation Requirements

New generator interconnections requested on an Entergy transmission line shall be at minimum, a three-breaker ring configuration switchyard in accordance with current Entergy standards, IEEE standards, the National Electric Code (NEC), and the National Electric Safety Code (NESC). It is recommended that the new Entergy POI Switchyard will be located such that it is near the transmission line corridor and public road. Topographical constraints should also be considered when locating the new POI switchyard including but not limited to existing waterways, pipelines, and infrastructure. Network upgrades are required to accommodate the new POI switchyard including but not limited to remote end substation upgrades and transmission line modifications.

New generator interconnections requested at an existing Entergy substation/switchyard would require the addition of Transmission Owner Interconnection Facilities (TOIF), and any Network Upgrade (NU) modifications necessary to accommodate the interconnection. Additions and modifications may include but are not limited to the following:

- New Transmission Owner Interconnection Facilities (TOIF)
- Network Upgrades (NU)
    - Substation/Switchyard site expansion
    - Control house expansion
    - Relay Upgrades
    - Upgrades due to increased capacity
    - Grounding study and upgrades due to fault current contribution and site expansion
    - Interconnection of grounding system to Entergy's grounding system(s)
    - Transmission shielding study and upgrade shielding to accommodate site expansion
    - Any modifications necessary to meet Entergy Standards, IEEE Standards, and NESC Code

Interface & Collector Station Requirements

The Point of Change of Ownership (PCO) shall be the first structure outside of the POI Substation/Switchyard and shall be owned and maintained by the IC.

The IC shall provide the circuit breaker(s) or other acceptable load/fault interrupting device(s) which meets all applicable IEEE Standards. The interrupting device(s) shall be located on the IC side of the Point of Change of Ownership between its facilities (transmission line, generator step-up transformers and generator(s)) and the Entergy Transmission system. The breaker(s) shall be capable of interrupting the maximum fault current available and be capable of withstanding twice the normal system voltage. The values for fault currents available from the Entergy system prior to the IC's interconnection shall be supplied by Entergy.

A disconnecting device shall be located near the Point of Change of Ownership. The IC shall pay for the disconnecting device that Entergy shall design, install, own, and maintain on the utility's side of the POI. It is required that the IC install an additional visible air gap disconnecting device which is electrically connected to the line side of the IC's interrupting device.

The IC shall install step-up transformer(s) between its generator(s) and/or inverter-based resources and the point of change of ownership with Entergy in a manner which isolates the zero-sequence network circuit of the IC facilities from the zero-sequence network circuit of the Entergy transmission system. This is to provide maximum operating flexibility and to minimize possible adverse effects on Entergy's other Transmission system customers. The step-up transformers' winding configuration shall be coordinated with Entergy Transmission. Unless otherwise approved by Entergy, the IC interconnection step-up transformers shall be installed with a solidly grounded wye winding configuration on the transmission owner side and a delta-winding configuration on the IC generator side. This configuration is necessary to provide a sufficient zero sequence source for detecting ground faults on the interconnected transmission system. At the discretion of Entergy Transmission, a current limiting reactor may be required in the neutral of the wye winding. If required, the IC shall be responsible for the design, specification, and installation of the neutral reactor.

Inverter Based Resources (IBR)

IBR's may utilize generator step-up transformers connected with a solidly grounded wye winding on the transmission owner side of the transformer and a solidly grounded wye connected winding on the IBR side of the transformer with an internal closed delta tertiary winding. As an alternative, transformers with a delta connected winding on the IBR side of the transformer and a solidly grounded wye connection on the transmission owner side of the transformer may be used when approved in advance by Entergy.

7.2 System Protection and Co-ordination Design Requirements

The IC shall be responsible for providing protective devices meeting all applicable ANSI standards, including IEEE C37.90 and Entergy specified protection guidelines and standards at the time of interconnection. The installed protective devices shall be capable of protecting the IC generating equipment against faults and disturbances on the Entergy system or on the systems of others, and on its own system. The IC shall be responsible for the design, installation and operation of the generator and associated interconnection protective relaying equipment in accordance with Entergy Transmission Planning requirements and NERC Planning Standards.

The IC generator protective relaying scheme shall provide protective functions consistent with industry standards for transmission system connected generation equipment.

For each interconnection request, Entergy Transmission planning personnel shall perform or cause to be performed dynamic transmission system studies of specific system faults identified as potential threats to system stability. These studies shall be performed for the purpose of determining the minimum acceptable clearing times required to maintain system stability for the identified, detectable faults.

The protective relaying equipment installed shall satisfy the minimum acceptable clearing requirements as determined by Entergy Transmission Planning. Additional relaying schemes may be required to ensure stability of the transmission system if critical clearing time requirements cannot be achieved with normal relaying schemes (e. g.: trip one generator for any fault on a specific line, regardless of fault clearing time, if loss of that line causes instability).

The IC's protective relay design shall incorporate necessary test switches. The test switches shall be placed so that they allow operation of the lockout relays while preventing breaker failure schemes from operating and causing unnecessary breaker operations.

Interconnection protective devices on the IC's system must be consistent with Entergy Transmission protection practices. Settings of interconnection protective devices on the IC's system shall be specified by the IC to coordinate with area transmission system protective relaying and shall be reviewed by Entergy personnel prior to interconnection. Such review shall not be construed as confirmation or endorsement of the design or as any warranty of safety, durability or reliability of the equipment specified.

The IC shall be solely responsible for implementation of protective device settings on its system. When modifications to the area transmission system or IC system require changes to IC protective relay settings, the IC shall be responsible for specifying the revised settings, obtaining Entergy Transmission review of the revised settings and implementing the required protective relay setting revisions. Entergy review of relay settings shall not be construed as confirmation or endorsement of the design or as any warranty of safety, durability or reliability of the equipment specified.

IC shall be responsible for providing the detailed electrical equipment characteristics necessary to assess the impact of the generator(s) on the transmission system available fault current. Entergy shall perform or cause to be performed a detailed study of the available transmission system fault currents. Where installation of the IC facilities increases the available fault current on the area transmission system above the interrupting rating of installed protective devices, the IC shall be responsible for all costs associated with the design, specification and installation of the required upgrades. At the discretion of Entergy Transmission, the IC may be required to design and install fault current limiting equipment.

Entergy reserves the right, without obligation, to observe, perform or cause to be performed tests and/or inspections of any of the IC's protective equipment essential to the interconnection including, but not limited to, relays, circuit breakers, protective devices, RTUs and related equipment. Inspection may include simulated test tripping of the IC's interconnection breakers by the protective relays.

Settings of all protective devices (e.g., current transformers, potential transformers, relays, reclosers, fuses) on the Entergy system shall be specified and implemented by Entergy. Any changes to Entergy protective relay equipment deemed necessary by Entergy Transmission due to the interconnection of the IC's generator(s) shall be made by Entergy at the IC's expense.

The IC shall be responsible for providing protective relay equipment capable of sensing an "out of step" condition and automatically separating the generator from the transmission system.

IC facilities shall NOT employ automatic reclosing equipment in generator output or interconnection circuit breakers or disconnect devices. Following automatic actuation of an interconnection interrupting device that separates the IC from the transmission system, the IC shall NOT attempt to re-establish parallel operation with the transmission system until authorized by Entergy transmission operations control center personnel.

NERC Planning Criteria requires the interconnected transmission system frequency be maintained between 59.95 Hz and 60.05 Hz. To ensure “ride-through” capability of the transmission system, ICs supplying power to the transmission system shall implement an under-frequency relay set point no greater than 58.5 Hz. Co-generating facilities receiving power from the transmission system may implement a higher underfrequency relay set point to disconnect their entire facilities.

8. Operations, Maintenance, and Records Requirements

Entergy is responsible for regular maintenance on all Entergy-owned Transmission System equipment. Entity’s maintenance practices for their transmission-connected equipment should be performed at a level that ensures the reliability of the Transmission System. Definition of maintenance programs and performance objectives, as appropriate, should be addressed with entity’s interconnection. When maintenance is scheduled, consideration needs to be given to generation maintenance, dispatch schedules, and transmission transactions which could be affected, as well as maintenance which may be performed concurrently on nearby transmission facilities which could have an adverse effect on local area voltages or the status of protection schemes. All necessary authorizations, notifications, and clearances relevant to the maintenance work to be performed must be obtained. The facility owner whether Entergy or entity, is responsible for the regularly scheduled calibration and/or maintenance of its equipment associated with the interconnection, as applicable, including, but not limited to:

- Circuit breakers
- Power transformers
- Protective relays
- Revenue metering
- Communications
- Trip circuits
- Interrupters
- Power DC sources
- Grounding system
- Transmission facilities Relevant records of maintenance work performed should be maintained

All interconnecting facilities shall be maintained and operationally tested in order to meet current requirements as specified by the System Operator.

These requirements may include the following issues:

- Communications during normal and emergency conditions
- Voltage and power factor control
- Reactive power requirements
- Maintenance coordination
- Responsibilities during emergency conditions
- Abnormal frequency and voltage operation
- Inspection requirements

These requirements are covered in the following documents:

- Typical Interconnection Agreement
- Typical Operating Agreement for Customer-Owned Substations
- Standard for Customer Built Substations

In addition to the above requirements, power quality concerns of end-use facilities are addressed by Entergy's transmission standard AM3901R01, "Transmission Power Quality Guide."

9. Environmental, Right of Way, Health, and Safety Requirements

The entity requesting interconnection to the Entergy transmission system shall provide the documentation that provides evidence of compliance with all environmental regulatory requirements applicable to development and building of the facility. That may also include the assessment conducted, inspection and compliance report provided by the regulatory agency. If there are any pending violations, those entity shall provide a copy of proposed mitigation measures and approved by the agency to correct the issues to comply. Entergy shall review the documents and decide regarding the next step in the process of approving the interconnection request. All environmental requirements will be at the expense of the IC.

The Interconnection Customer (IC) is responsible for acquiring all right of way requirements to accommodate the interconnection and shall be in terms of perpetual servitude or equivalent. All right of way requirements will be at the expense of the IC.

The entity requesting interconnection shall provide any information that may have an impact to the safety of Entergy personnel during any regular operation and maintenance activities at Entergy's facilities after putting the interconnected facility in service. If there are any design related safety issues that exist in the newly built facility or a modified facility that may have any safety related impact, those issues shall be corrected prior to interconnection, or the entity shall provide documentation of the proposed mitigation measures for Entergy's review and approval.

The Interconnection Customer (IC) shall incorporate safe work practices in the design of the substation. The substation design and construction shall allow safe operation and maintenance under all foreseeable operating conditions. Other aspects such as fire hazard and fire suppression and oil containment shall be considered and incorporated in the design. The Customer is responsible to ensure that all facilities are designed and constructed in compliance with the National Electrical Safety Code (NESC), National Electric Code (NEC), Occupational Safety and Health Administration (OSHA), and all other applicable state and local safety regulations.