
# Texas-New Mexico Power Company

# Facility Interconnection Requirements

Revision 7

April 29, 2020

# Table of Contents

## A Document Review

- This document shall be reviewed annually for completeness
- Reviews shall be coordinated by the Director, System Operations and shall include all relevant personnel.
- References to "Annual" or "Annually" in this document shall mean once per calendar year unless otherwise noted.
- Revisions to this plan will be tracked using MS Word track changes feature and noted as applicable in the revision history table in Section F. If no changes are made, the annual review shall be reflected in the Revision History and the document will be re-executed by the Director, System Operations.
- This document shall be approved by the Director, System Operations by signing and dating below.
- A DocMinder notification shall be used as an internal control to ensure timely reviews are conducted of this document.
- The latest signed copy of this page can be found in Section G: Signed Document Review Page

| Director, System Operations | Approval Date | Implementation Date |
|---|---|---|

## B Definitions and Acronyms

**End-User Facility -** All electrical equipment up to the point of interconnection to the Transmission system for the sole purpose of serving load and connected such that power is not transferred from one or more points on the Transmission system to any other point on the Transmission system.

**ERCOT –** Electric Reliability Council of Texas

**FIS –** Full Interconnection Study. A comprehensive, multiple facet study of a proposed Generation Facility interconnection or proposed Material Modification of an existing Generation Facility.

**Generation Facility –** All electrical equipment required to generate electricity and interconnect a generator up to the point of interconnection to the Transmission system.

**Good Utility Practice –** That which is described in PUCT Substantive Rule 25.5(56).

**IE –** Interconnecting Entity. Refers to a generation developer entity that has an active request in ERCOT Generation Resource Interconnection or Change Request procedure outlined in Section 5 of the ERCOT Planning Guide.

**Materially Modified –** A modification to a Generation Facility, Transmission Interconnection Facility or End-User Facility that meets the following criteria.

**For a Generation Facility with an aggregate power output of 10 MW or greater** – Any change specified in Section 5.1.1(1)(b) of the ERCOT Planning Guide.

**For a Generation Facility with an aggregate power output of less than 10 MW –** An increase in the real power capability exceeding 10% of pre-increase real power capability.

**For a Transmission Interconnection Facility –** Any of the following:

- Topology change
- Circuit impedance change
- A decrease in circuit rating exceeding 10% of pre-decrease rating
- Any reduction in the capability of a reactive resource
- Any change in the dynamic response of a reactive resource
- Any change in the protection timing or coordination
- A change in the availability exceeding one year

**For an End-User Facility** – Any of the following:

- A change in demand exceeding 10% of pre-change demand
- Installation of a motor 500 hp or larger where no motors previously existed
- Addition of a motor exceeding the size of all other motors connected within the same End-User Facility
- Any change in harmonic levels

**NERC –** North American Electric Reliability Corporation

**NERC Reliability Standards** – Documented standards that define the reliability requirements for planning and operating the North American bulk power system.

**Network Operations Model** – A power system model of the ERCOT Interconnection used for operational and planning studies. See Section 2 of the ERCOT Nodal Protocols for a more detailed definition.

**Network Operations Model Change Request** – The method for making changes to the Network Operations Model. See the document "*Network Operations Modeling Expectations for TSPs, REs, and QSEs*", located on the ERCOT website under Market Rules\Business Practice Manual, for detailed information.

**Tie-Circuit** – A set of Transmission Components that has the following attributes:

a. Is wholly contained within the bounds of a zone of protection and

b. Is comprised of a Transmission Interconnection Facility, creating a path for the transfer of power between a TNMP-owned Transmission system and a Transmission system owned by another Transmission provider.

**Transmission** – All electrical equipment designed and operated at voltages of 60 kV and higher intended for transferring power between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems. All electrical equipment intended for the transformation of voltages 60 kV and higher to voltages less than 60 kV for delivery of power to customers are excluded from this definition.

**Transmission Component** – Any single unit of electrical equipment that is intended to transfer real and/or reactive power from one point on the Transmission system to another point on the Transmission system such as a jumper, bus section, breaker, switch, line conductor, transformer, shunt capacitor, etc.

**Transmission Facility** – Used in two ways within this document:

a. A set of Transmission Components or

b. Used interchangeably with Transmission Component.

**Transmission Interconnection Facility –** All Transmission Components connected directly at a defined point of interconnection between a TNMP-owned Transmission system and a Transmission system owned by another Transmission provider.

**Transmission Service Provider** – See Section 2 of the ERCOT Nodal Protocols.

# C Facility Interconnection Requirements

## C.1 Facility Scope

### C.1.1 Generation Facilities

#### C.1.1.1 General Requirements

These requirements shall apply to all new Generation Facilities connected to the TNMP Transmission system. Additionally, these requirements shall apply to all Material Modifications of existing Generation Facilities.

a. Both TNMP and Non-TNMP Requirements Apply

All new or Materially Modified Generation Facilities shall comply with all applicable codes, standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to Generation Facilities. These include, but are not limited to, all NERC Reliability Standards, ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents. The ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents are regional reliability standards that go beyond, add detail to, or implement NERC Reliability Standards, or that cover matters not addressed in NERC Reliability Standards.

b. Inspections

Generation Facilities that are connected to the TNMP Transmission system must be made available for inspection by appropriate TNMP personnel and verified as meeting interconnection requirements prior to being placed in service. TNMP reserves the right to deny interconnect rights if the facilities do not meet applicable legal and electrical requirements. Generation Facilities must be made available for subsequent inspections as needed.

#### C.1.1.2 Planning Requirements

a. Generation Facilities 10 MW and Greater

i. An IE requesting Transmission interconnection for new generation, adding generating capacity (more than 10 MW within a year) at an existing plant, or changing the connection of an existing plant must submit an application to ERCOT in accordance with Section 5 of the ERCOT Planning Guide. The application shall include information necessary to allow timely development, design, and implementation of electric system enhancements needed to serve the IE's requirements. The information must include sufficient detail for use in establishing transfer capabilities, operating limits (including stability) and planning margins to provide both reliability and operating efficiency, designing future system facility additions, and facilitating coordinated planning.

ii. ERCOT will perform an initial screening study. If the IE agrees to continue after completion of the initial screening study, TNMP will enter into a FIS agreement with the IE.

iii. TNMP will perform a FIS to evaluate the system impact. The FIS includes a steady-state study, fault duty analysis, dynamic stability study, facility study, cost of interconnecting the Generation Facility to the Transmission system, a scope of necessary upgrades to the Transmission system, estimated time to make upgrades to the Transmission system, and may include a cost estimate for associated upgrades to the Transmission system.

iv. If the IE elects to proceed with the Generation Facility, TNMP will enter into a Standard Generation Interconnection Agreement with the IE and proceed with provision of the point of interconnection and making the necessary Transmission system upgrades.

v. Additional information can be found in Section 5 of the ERCOT Planning Guide.

b. Small Generation Connections Less Than 10 MW

i. Generation facilities 10 MW or less are classified as distributed generation and are normally interconnected to the distribution system.

ii. Interconnection studies must be performed as necessary to determine the impact on the distribution system for a new facility or Material Modifications to the existing facility.

iii. Additional information concerning the interconnection of distributed generation can be found in PUC Substantive Rules 25.211, 25.212, and 25.213.

c. All Generation Facility interconnection studies are performed in accordance with NERC Reliability Standards, which promote and maintain the reliability and security of the interconnected power system. These studies will, at a minimum, consider the following factors:

i. Power-Flow Analysis

A power-flow analysis is conducted by establishing a model of the power system and simulating certain specified operating conditions. The results predict power-flow magnitudes and voltage levels under normal system conditions and during the loss of one or more individual system elements. The power-flow analysis enables the prediction of equipment overloads and the determination of excessive voltage drops, which may be encountered.

ii. Short Circuit Analysis/Breaker Rating Analysis

A short circuit (*i.e.*, fault current) analysis may be performed to determine the effect that the new generation will have on the system fault currents. These data will be used to evaluate the impact of the generation on the fault duty (*i.e.*, interrupting capability or rating) of the previously installed equipment such as circuit breakers and switches.

iii. Transient Stability Analysis

A transient stability analysis may be performed to determine the Transmission system's response to a sudden change in the state of the system due to faults on the system and unit outages. Specifically, the analysis will evaluate the Transmission

system in the area of the added generation as well as the generator's response following faults in the system.

iv. TNMP Transmission Operations representatives will provide a list of data requirements needed for the studies from the IE regarding the new Generation Facility or Material Modifications to the existing Generation Facility.

### C.1.1.3 Design Requirements

The design for Generation Facility interconnection equipment shall comply with Section C.2. Additionally, all requirements identified as a result of the Transmission studies shall be incorporated into the design process. These requirements may include the following issues:

- Supervisory control and data acquisition
- Telemetering and metering
- Equipment ratings
- Short circuit conditions
- System protection and other controls
- System grounding

TNMP will coordinate the design and construction of newly built and of modified point of interconnection facilities with the IE.

### C.1.1.4 Operations and Maintenance

All Generation Facility interconnection equipment shall be maintained and operationally tested in order to meet current requirements as specified by TNMP System Operations and TNMP transmission and/or distribution engineering groups, as further defined in the following sections of this document:

- Section C.2.1
- Section C.2.7
- Section C.2.10
- Section C.2.11
- Section C.2.13

TNMP will coordinate the maintenance of newly built and of modified point of interconnection facilities with the IE.

## C.1.2 Transmission Facilities

Addition and/or Material Modification of Transmission Facilities may be generated by internal reliability studies related to NERC Reliability Standards, by internal studies at the request of an interconnecting Transmission Owner, or by ERCOT reliability and/or economic studies. In rare instances, addition and/or Material Modification of Transmission Facilities may be studied and implemented at the request of an independent power producer.

### C.1.2.1 General Requirements

These requirements shall apply to all new Transmission Facilities connected to the TNMP Transmission system. Additionally, these requirements shall apply to all Material Modifications of existing Transmission Facilities.

a. Both TNMP and Non-TNMP Requirements Apply

All new or Materially Modified Transmission Facilities shall comply with all applicable codes, standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to Transmission Facilities. These include, but are not limited to, all NERC Reliability Standards, the ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents. The ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents are regional reliability standards that go beyond, add detail to, or implement NERC Reliability Standards, or that cover matters not addressed in NERC Reliability Standards.

b. Inspections

Transmission Facilities that are connected to the TNMP Transmission System must be made available for inspection by appropriate TNMP personnel and verified as meeting interconnection requirements prior to being placed in service. TNMP reserves the right to deny interconnect rights if the facilities do not meet applicable legal and electrical requirements. Transmission Facilities must be made available for subsequent inspections as needed.

### C.1.2.2 Planning Requirements

Notification of the intent to connect new Transmission Facilities or to Materially Modify existing Transmission Facilities already connected to the TNMP Transmission System shall be provided.

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

Prior to initiation of transmission planning studies for connection of new Transmission Facilities or for Material Modifications to existing Transmission Facilities already connected to the TNMP Transmission System, TNMP confirms the requesting entity is registered with ERCOT as a Transmission Service Provider pursuant to Section D.3.

Transmission planning studies must be performed as necessary to determine the impact on the interconnected Transmission system when connecting new and/or Materially Modified Transmission Facilities.

a. Power-Flow Analysis

A power-flow analysis is conducted by establishing a model of the power system and simulating certain specified operating conditions. The results predict power-flow magnitudes and voltage levels under the loss of any individual system element. The power-flow analysis enables the prediction of equipment overloads and the determination of excessive voltage drops, which may be encountered.

b. Short Circuit Analysis/Breaker Rating Analysis

A short circuit (*i.e.*, fault current) analysis may be performed to determine the effect that the new Transmission Facility or Materially Modified Transmission Facility will have on the system fault currents. The study results will be used to evaluate the impact of the Transmission Facility addition or Material Modification on the fault duty (*i.e.*, interrupting capability or rating) of previously installed equipment such as circuit breakers and switches.

c. Transient Stability Analysis

A transient stability analysis may be performed to determine the Transmission system's response to a sudden change in the state of the system due to faults on the system and unit outages. Specifically, the analysis will evaluate the Transmission system in the area of the added or Materially Modified Transmission Facility following faults in the system.

TNMP Transmission Planning representatives will provide a list of data requirements needed from the requestor to conduct requisite planning studies of the new Transmission Facility or Material Modifications to an existing Transmission Facility.

### C.1.2.3 Design Requirements

The design for Transmission Facilities shall comply with Section C.2. Additionally, all requirements identified as a result of the Transmission studies shall be incorporated into the design process. These requirements may include the following issues:

- Supervisory control and data acquisition
- Telemetering and metering
- Equipment ratings
- Short circuit conditions
- System protection and other controls
- System grounding

TNMP Transmission Engineering representatives will provide a list of data requirements needed from the requestor regarding the new Transmission Facility or Material Modifications to the existing Transmission Facility.

The design and construction of newly built and of modified point of interconnection facilities will be coordinated with the Transmission Facility owner.

### C.1.2.4 Operations and Maintenance

Prior to energization of any point of interconnection associated with new Transmission Facilities or with Material Modifications to existing Transmission Facilities, TNMP confirms the requesting entity has

modeled its corresponding Transmission Interconnection Facilities within the ERCOT Network Operations Model pursuant to Section D.3.

All interconnecting Transmission Facilities shall be maintained and operationally tested in order to meet current requirements as specified by TNMP System Operations and TNMP transmission engineering groups, as further defined in the following sections of this document:

- Section C.2.2
- Section C.2.3
- Section C.2.4.2
- Section C.2.5
- Section C.2.6
- Section C.2.8
- Section C.2.9
- Section C.2.11
- Section C.2.12
- Section C.2.13
- Section C.2.14

The maintenance of newly built and of modified point of interconnection facilities will be coordinated with the Transmission Facility owner.

## C.1.3 End-User Facilities

### C.1.3.1 General Requirements

These requirements shall apply to all new End-User Facilities connected to the TNMP Transmission System. Additionally, these requirements shall apply to all Material Modifications of existing End-User Facilities.

c. Both TNMP and Non-TNMP Requirements Apply

All new or Materially Modified End-User Facilities shall comply with all applicable codes, standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to End-User Facilities. These include, but are not limited to, all NERC Reliability Standards, ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents. The ERCOT Protocols, the ERCOT Operating Guide, and other applicable ERCOT binding documents are regional reliability standards that go beyond, add detail to, or implement NERC Reliability Standards, or that cover matters not addressed in NERC Reliability Standards.

d. Inspections

End-User Facilities that are connected to the TNMP Transmission System must be made available for inspection by appropriate TNMP personnel and verified as meeting interconnection requirements prior to being placed in service. TNMP reserves the right to deny interconnect rights if the facilities do not meet applicable legal and electrical requirements. End-User Facilities must be made available for subsequent inspections as needed.

### C.1.3.2 Planning Requirements

Notification of the intent to connect new End-User Facilities or to Materially Modify existing End-User Facilities already connected to the TNMP Transmission System shall be provided.

Transmission planning studies must be performed as necessary to determine the impact on the interconnected Transmission system when connecting new and/or Materially Modified End-User Facilities.

a. Power-Flow Analysis

A power-flow analysis is conducted by establishing a mathematical model of the power system and simulating certain specified operating conditions. The results predict power-flow magnitudes and voltage levels under the loss of any individual system element. The power-flow analysis enables the prediction of equipment overloads and the determination of excessive voltage drops, which may be encountered.

b. Short Circuit Analysis/Breaker Rating Analysis

Although not typically performed as part of the assessment to integrate an End-User Facility, a short circuit (*i.e.*, fault current) analysis may be performed to determine the effect that the new End-User Facility will have on the system fault currents. The study results will be used to evaluate the impact of the End-User Facility addition or Material Modification on the fault

duty (*i.e.*, interrupting capability or rating) of previously installed equipment such as circuit breakers and switches.

c. Transient Stability Analysis

Although not typically performed as part of the assessment to integrate an End-User Facility, a transient stability analysis may be performed to determine the Transmission system's response to a sudden change in the state of the system due to faults on the system and unit outages. Specifically, the analysis will evaluate the Transmission system in the area of the added End-User Facility or Materially Modified End-User Facility, as well as the End-User Facility response following faults in the system.

d. Motor Starting Analysis

A motor starting analysis may be performed to determine the effect that the new End-User Facility or Materially Modified End-User Facility will have on Transmission system voltages. The motor starting analysis quantifies the amount of voltage sag which can be expected on the Transmission system as a result of starting motors within the End-User Facility.

TNMP Transmission Planning representatives will provide a list of data requirements needed from the requestor to conduct requisite planning studies of the new End-User Facility or Material Modifications to an existing End-User Facility.

### C.1.3.3 Design Requirements

a. The design for End-User Facilities shall comply with Section C.2. Additionally, all requirements identified as a result of the Transmission studies shall be incorporated into the design process. These requirements may include the following issues:

- Supervisory control and data acquisition
- Telemetering and metering
- Equipment ratings
- Short circuit conditions
- System protection and other controls
- System grounding

b. TNMP's standard design for transmission service to an End-User Facility connected radially from a transmission line tap specifies a transmission circuit breaker on the radial transmission feed to facilitate isolation of faults on the radial transmission feed and, when applicable, disconnection of the End-User facility for under-frequency and under-voltage conditions.

c. Under-frequency relaying may be utilized to interrupt service to End-User Facilities to meet ERCOT requirements for under-frequency load shed.

d. Under-voltage relaying may be utilized to interrupt service to End-User Facilities based on system studies conducted by TNMP, ERCOT, and/or other Transmission Service Providers.

The design and construction of newly built and of modified point of interconnection facilities will be coordinated with the End-User Facility owner.

### C.1.3.4 Operations and Maintenance

All interconnecting End-User Facilities shall be maintained and operationally tested in order to meet current requirements as specified by TNMP System Operations and TNMP transmission engineering groups. These requirements may include the following issues:

- Section C.2.1
- Section C.2.7
- Section C.2.10
- Section C.2.11
- Section C.2.13

The maintenance of newly built and of modified point of interconnection facilities will be coordinated with the End-User Facility owner.

## C.2 Interconnection Criteria Considerations

### C.2.1 Voltage Level And MW/MVAR Capacity or Demand

1. Voltage Level - Transmission Facilities may be used for providing service to commercial, industrial, and cogeneration customers when the use of distribution feeders is not practicable. Generally, the use of Transmission Facilities should be considered for the following conditions:
   a. All loads and generation over 10 MVA
   b. Locations remote from distribution facilities
   c. Remote locations where distribution facilities are not adequate
   d. Loads with nonstandard voltage requirements
   e. Loads having large surge requirements
2. MW/MVAR Capacity or Demand
   a. The End-User Facility customer shall provide TNMP with a load forecast for a 7 year period.
   b. The customer will update the forecast annually.
3. Power Factor
   a. Unless otherwise agreed, the End-User Facility customer is required to maintain at least a 95% lagging power factor at Transmission level delivery points.
   b. If the End-User Facility customer does not maintain the agreed upon power factor, TNMP may install power factor correction equipment at the customer's expense.

### C.2.2 Breaker Duty And Surge Protection

1. All power system facilities shall be designed to carry the full anticipated load under normal and contingency conditions as determined by load flow studies.
2. All power system facilities shall be designed to withstand fault currents as determined by the fault study.
3. Power circuit breaker interrupting ratings shall be greater than the duties established by fault study with sufficient margin to account for asymmetry, normal variability in dielectric characteristics, and forecasted available fault current levels.
4. Surge protection for power circuit breakers is accomplished by means of line terminal surge arresters as detailed in Section C.2.6.

### C.2.3 System Protection And Coordination

1. The interconnecting entity shall, at its expense, install, operate, and maintain adequate system protection equipment. TNMP will install any system protection equipment that may be required on its point of interconnection facilities or the surrounding Transmission system.

2. Each party's protection facilities shall be designed and coordinated with other systems in accordance with Good Utility Practice.
3. Each party shall be responsible for protection of its facilities consistent with Good Utility Practice.
4. Each party's protective relay design shall incorporate the necessary test switches to perform the tests required in item 6 below. The required test switches shall be placed such that they allow operation of lockout relays while preventing breaker failure schemes from operating and causing unnecessary breaker operations.
5. Each party shall test, operate and maintain system protection facilities in accordance with Good Utility Practice.
6. Prior to the in-service date of an interconnecting facility, each Party or its agent shall perform a complete calibration test and functional trip test of the system protection facilities. At intervals suggested by Good Utility Practice and following any apparent malfunction of the system protection facilities, each Party shall perform both calibration and functional trip tests of its system protection facilities. These tests require that all protective relays and lockout contacts be activated.
7. Requirements for Protection
    a. In compliance with Good Utility Practice, the interconnecting entity shall provide, install, own, and maintain relays, circuit breakers, and/or all other devices necessary to remove any fault contribution from the interconnecting facility to any short circuit occurring on the Transmission system not otherwise isolated by TNMP's system protection equipment, such that the removal of the fault contribution shall be coordinated with the protective requirements of the Transmission system.
    b. Such protective equipment shall include, without limitation, a disconnecting device or switch with load-interrupting capability located between the interconnecting facility and the Transmission system at a site selected upon mutual agreement of the parties.
    c. The interconnecting entity shall be responsible for protection of the interconnecting facility from such conditions as negative sequence currents, over- or under-frequency, sudden load rejection, over- or under-voltage, and generator loss-of-field.
    d. The interconnecting entity shall be solely responsible to disconnect any generating facilities and other interconnecting facility equipment if conditions on the Transmission system could adversely affect the interconnecting facility.

## C.2.4 Metering And Telecommunications

### C.2.4.1 Metering and Telecommunications for Generation Facilities and End-User Facilities

1. **General.** Each Party shall comply with ERCOT requirements. Unless otherwise agreed by the Parties, TNMP shall install metering equipment at the point of interconnection prior to any operation of the interconnecting facility and shall own, operate, test, and maintain such metering equipment. Power flows to and from the interconnecting facility shall be measured at or, at TNMP's option, compensated to, the point of interconnection. TNMP will provide metering quantities, in analog and/or digital form, to the interconnecting entity upon request.

2. **Check Meters**. The interconnecting entity, at its option and expense, may install and operate, on its premises and on its side of the point of interconnection, one or more check meters to check TNMP's meters. Such check meters shall be for check purposes only.

3. **Standards**. TNMP shall install, calibrate, and test revenue quality metering equipment in accordance with applicable ERCOT requirements and ANSI standards. Operational telemetry is not required to be revenue quality metering.

4. **Testing of Metering Equipment**. TNMP will inspect and test all interconnection metering equipment that is required to be revenue quality upon installation and annually thereafter. TNMP will give reasonable notice of the time when any inspection or test will take place, and the interconnecting entity may have representatives present at the test or inspection.

5. **Metering Data**. The metered data shall be telemetered to one or more locations designated by TNMP and one or more locations designated by the interconnecting entity. Such telemetered data shall be used, under normal operating conditions, as the official measurement of the amount of energy delivered to or from the point of interconnection.

6. **Interconnecting Entity Obligations**. The interconnecting entity shall maintain satisfactory operating communications with TNMP's Transmission system dispatcher or representative designated by TNMP. Where applicable, the interconnecting entity shall provide a standard voice line for remote interrogation of meters. The interconnecting entity shall also provide any dedicated data circuit(s) necessary to provide interconnecting entity data to TNMP as may be set forth in an interconnection agreement. If applicable, the data circuit(s) shall extend from the interconnecting facility to the location(s) specified by TNMP. Any required maintenance of such communications equipment shall be performed by the interconnecting entity.

7. **Remote Terminal Unit**. Prior to the in-service date of an interconnecting facility, a Remote Terminal Unit, or equivalent data collection and transfer equipment acceptable to the parties, shall be installed by TNMP to gather accumulated and instantaneous data to be telemetered to the location(s) designated by TNMP through use of communication path(s). The communication protocol will be specified by TNMP. At a minimum, instantaneous analog real power and reactive power flow information must be telemetered directly to the location(s) specified by TNMP.

8. Each party will promptly advise the other party if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the attention and/or correction by the other party. The party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.

### C.2.4.2 Metering and Telecommunications for Transmission Interconnection Facilities

1. **General**. Each party shall comply with ERCOT requirements. Metering is required at both ends of a Tie-Circuit for operational monitoring purposes.

   a. TNMP shall install metering equipment as needed at the TNMP-owned terminal of all Tie-Circuits. Such metering equipment can vary depending on the location but typically consists of breaker bushing current transformers, voltage instrument transformers, and a device such as a microprocessor relay for converting instantaneous analog current and voltage quantities to instantaneous analog real and reactive power quantities.

   b. Interconnecting Transmission providers shall install metering equipment as needed at the interconnecting Transmission provider's terminal of all Tie-Circuits for operational monitoring purposes.

2. **Standards**. Both TNMP and the interconnecting Transmission provider shall install, calibrate, and test their respective Tie-Circuit metering equipment in accordance with applicable ERCOT requirements and ANSI standards.

3. **Metering Data**. Metering data for Tie-Circuits shall be telemetered for operational monitoring purposes.

   a. Metering data from the TNMP-owned terminal of all Tie-Circuits:

      i. Shall be telemetered to one or more locations designated by TNMP.

      ii. Can be telemetered to one or more locations designated by the interconnecting Transmission provider if requested and appropriately coordinated.

   b. Metering data from the interconnecting Transmission provider-owned terminal of all Tie-Circuits shall be telemetered for TNMP's use by at least one of the following methods:

      i. Available through ICCP.

      ii. Telemetered to one or more locations designated by TNMP.

4. **Interconnecting Transmission Provider Obligations**. The interconnecting Transmission provider shall maintain satisfactory operating communications with TNMP's Transmission system dispatcher or representative designated by TNMP. The interconnecting Transmission provider shall provide any dedicated data circuit(s) necessary to provide metering data from the interconnecting Transmission provider's terminal of a Tie-Circuit to TNMP as may be set forth in an interconnection agreement. If applicable, the data circuit(s) shall extend from the interconnecting Transmission provider's end of a Tie-Circuit to the location(s) specified by TNMP. Any required maintenance of such communications equipment shall be performed by the interconnecting Transmission provider.

5. **Remote Terminal Unit**.

   a. Prior to the in-service date of a Tie-Circuit, a Remote Terminal Unit, or equivalent data collection and transfer equipment, shall be installed at the TNMP-owned terminal of the Tie-Circuit by TNMP to gather instantaneous data to be telemetered to the location(s) designated by TNMP through use of communication path(s). The communication protocol will be specified by TNMP. At a minimum, instantaneous analog real power and reactive power flow information must be telemetered directly to the location(s) specified by TNMP.

   b. If metering data from the interconnecting Transmission provider-owned terminal of a Tie-Circuit will not be available through ICCP, a Remote Terminal Unit, or equivalent data collection and transfer equipment acceptable to the parties, shall be installed by either TNMP or the interconnecting Transmission provider prior to the in-service date of the Tie-Circuit to gather instantaneous data associated with the Transmission provider-owned terminal of a Tie-Circuit to be telemetered to the location(s) designated by TNMP through use of communication path(s). The communication protocol will be specified by TNMP. At a minimum, instantaneous analog real power and reactive power flow information must be telemetered directly to the location(s) specified by TNMP.

6. Each party will promptly advise the other party if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the attention and/or correction by the other party. The party owning such equipment shall correct such error or malfunction as soon as reasonably feasible.

## C.2.5 Grounding And Safety Issues

1. Each interconnecting facility substation shall include a ground grid that is solidly connected to all metallic structures and other non-energized metallic equipment. This grid shall limit the ground potential gradients to such voltage and current levels that will not endanger the safety of people or damage equipment located in, or immediately adjacent to, the station under normal and fault conditions.
2. The ground grid sizing, configuration, and materials shall be selected based upon local soil conditions and maximum available electrical fault current magnitudes. In areas where ground grid voltage rises would not be within acceptable and safe limits (due, for example, to high soil resistivity or limited substation space), additional grounding rods and grounding wells shall be used to reduce the ground grid resistance to acceptable levels.
3. If a new ground grid is close to another substation, the two ground grids may be isolated or connected. If the ground grids are to be isolated, there shall be no metallic ground connections between the two substation ground grids. If the ground grids are to be interconnected, the interconnecting ground grid conductor cables shall be sized sufficiently to withstand fault currents and control ground grid voltage rises.
4. TNMP will approve any connection to a TNMP substation ground grid. New interconnections of Transmission lines and/or generation may increase fault current levels at nearby substations. Modifications may be required to the ground grids of existing substations to ensure that the ground grid voltage rises within safe levels. The connection study will determine if modifications are required and the estimated cost.
5. Grounding design criteria shall be based upon the following standards:

   ANSI/IEEE Std 80 - *Guide for Safety in AC Substation Grounding*

   IEEE Std 81 *Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System*

   IEEE Std 367 - *Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault*

## C.2.6 Insulation And Insulation Coordination

1. Transmission line insulators must comply with the Transmission line voltage and any adjustment factors pertinent to the geographical area of installation.
2. Line terminal surge arresters are required for 69 kV, 138 kV and 345 kV Transmission lines. The MCOV value for the arresters shall be 110% of nominal voltage minimum but may be higher if operating conditions or switching surge analysis indicates otherwise.
3. Electrical power equipment arresters such as those protecting power transformers, shunt reactors and shunt capacitor banks will follow the same minimum MCOV requirements as the Transmission line surge arresters in Item 2. The MCOV level must also coordinate with the BIL of the shunt equipment which it protects. The protective margin between the arrester and the equipment BIL is 17% minimum.
4. Surge arrester energy absorption levels of standard arresters are sufficient unless switching surge studies indicate otherwise.

## C.2.7 Voltage And Power Factor Control

### C.2.7.1 Generator Requirements

1. The Generation Facility shall not cause excessive voltage excursions. The Generation Facility operator shall operate its plant in such manner that the voltage levels on the Transmission system are in the same range as if the plant was not connected to the Transmission system. The Generator Facility owner shall provide an automatic method of disconnecting its plant Transmission system to protect against excessive voltage excursions.
2. The plant shall not cause excessive voltage flicker on the Transmission system. Flicker is to be measured at the point of interconnection and shall not exceed 1.5% or the Borderline of Visibility Curve Voltage Flicker Chart of ANSI/IEEE Standard 141-1993, whichever is less.
3. The operating frequency of the plant shall not deviate from the frequency of the Transmission system. Plant under-frequency relays shall be set the same as TNMP's under-frequency relays, so that the plant will not separate from the Transmission system during under-frequency conditions until all of TNMP's under-frequency load shedding equipment has operated.
4. The plant shall not introduce excessive distortion of the Transmission system waveforms; voltage and current; telephone interference; or carrier interference at the point of interconnection. IEEE Standard 519 shall be used as a guide.
5. The plant shall be disconnected from the Transmission system on occurrence of an outage or fault on the Transmission interconnect facilities serving the plant radially. The Generation Facility owner is responsible for the electrical stability of its plant and providing adequate protective relaying so that critical fault clearing times are met.
6. In accordance with ERCOT requirements, the power factor of the plant will be +/- 0.95. For synchronous generators, the generator voltage-var schedule, voltage regulator, and transformer ratio settings will be jointly determined by TNMP and Generator to ensure proper coordination of voltages and regulator action. In cases where starting or load changes on induction generators will have an adverse impact on the Transmission system voltage, TNMP is to be consulted on techniques required to bring voltage changes to acceptable levels.
7. The plant's interconnected generator excitation system shall conform to any applicable criteria specified in American National Standards Institute Standard C50.13-2014. The Generation Facility owner shall install and operate a power system stabilizer for the generator's excitation system, in accordance with ERCOT Requirements.

### C.2.7.2 End User Requirements

1. End-User entities are required to maintain at least 97% lagging power factor at distribution level delivery points and at least 95% lagging power factor at Transmission level delivery points.
2. End-User entities shall not cause excessive voltage flicker on the Transmission system. Flicker is to be measured at the point of interconnection and shall not exceed 1.5% or the Borderline of Visibility Curve Voltage Flicker Chart of ANSI/IEEE Standard 141-1993, whichever is less.
3. End-User entities shall not introduce excessive distortion of the Transmission system waveforms; voltage and current; telephone interference; or carrier interference at the point of interconnection. IEEE Standard 519 shall be used as a guide.
4. End-User entities shall be disconnected from the Transmission system on occurrence of an outage or fault on the Transmission interconnect facilities serving the End-User Facility radially. The End-User

entity is responsible for the electrical stability of its facility and providing adequate protective relaying so that critical fault clearing times are met.

## C.2.8 Power Quality

1. Neither party's facilities shall cause excessive voltage flicker nor introduce excessive distortion to the sinusoidal voltage or current waves as defined by ANSI Standard C84.1-2016, in accordance with IEEE Standard 519, or any applicable superseding electric industry standard. In the event of a conflict between ANSI Standard C84.1-2016, or any applicable superseding electric industry standard, ANSI Standard C84.1-2016, or the applicable superseding electric industry standard, shall control.
2. Voltage fluctuations may be noticeable as visual lighting variations (flicker) and can damage or disrupt the operation of electronic equipment. *IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems* (IEEE Standard 519-2014) provides definitions and limits on acceptable levels of voltage fluctuation. The Facility shall comply with the limits set by IEEE Standard 519-2014.
3. Harmonics can cause telecommunications interference and thermal heating in transformers and can disable solid-state equipment and create resonant over-voltages. In order to protect equipment from damage, harmonics must be managed and mitigated. The facility shall not cause voltage and current harmonics on the TNMP Transmission system that exceed the limits specified in IEEE Standard 519-2014. Harmonic distortion is defined as the ratio of the root mean square (rms) value of the harmonic to the rms value of the fundamental voltage or current. Single frequency and total harmonic distortion measurements may be conducted at the point of interconnection, facility, or other locations on the TNMP Transmission system to determine whether the facility is the source of excessive harmonics.
4. If the parties determine that such flicker or harmonic distortion described above in Items 1, 2, and 3 are caused by the facility and corrective actions taken by facility owner do not resolve the problem, TNMP shall notify facility owner of the continuing problem and may curtail, interrupt or reduce deliveries of electricity, or disconnect the facility, in accordance with Good Utility Practice until the problem is resolved in accordance with IEEE Standard 519-2014. The facility owner shall be responsible for all damages caused by or that result from flicker or harmonic distortion due to the facility operation.

## C.2.9 Equipment Ratings

1. The rating of a Transmission line is the current-carrying capability of the most limiting element in series between the breakers at its two end points. Unless otherwise limited by equipment installed at each of the Transmission line terminals such as breakers, current transformers (CT's), protective relays, switches, disconnects, wave traps, jumpers, or series compensation devices the rating of a Transmission line is the conductor rating. Where such equipment has a manufacturer's nameplate continuous current rating less than the conductor rating, or is configured to have a continuous current rating less than the conductor rating, that equipment's continuous rating shall determine the rating of the Transmission line as noted below. TNMP uses a MS Access database to record the most limiting ratings of Transmission and substation equipment.
2. Transformer ratings are calculated in accordance with ANSI/IEEE Standard C57.91 (2011 Loading Guide). The normal rating of a transformer is the manufacturer's highest continuous rating at 55°C

temperature rise. The emergency rating of a transformer is the manufacturer's highest continuous rating at 65°C temperature rise. TNMP Engineering does not recommend loading bulk power transformers above their nameplate rating due to the long lead times and expense required to replace them.

3. Circuit breakers are rated at 100% continuous current as per the manufacturers' nameplate rating. Interrupting ratings of existing breakers are determined on a case by case basis depending on the specific manufacturing information of the breaker. Interrupting ratings of newly installed breakers should be no less than 115% of the available fault current at the time of installation as determined by IEEE standards and equipment manufacture's data.
4. Current transformers are rated at 100% nameplate rating of the connected ratio unless determined to have additional thermal capability through manufacturer provided information or special study for an individual device.
5. Protective relays are rated according to any applicable phase overcurrent or phase step distance settings that can result in isolation of the circuit being protected during non-fault conditions.
6. Power line carrier wave-traps, switches, disconnects, series compensation devices, and other equipment should not be loaded above the manufacturers' nameplate rating.

### C.2.10 Synchronizing Facilities

1. **C**onsistent with ERCOT requirements and the parties' mutually acceptable procedures, the interconnecting entity is responsible for the proper synchronization of Generating Facilities to TNMP's Transmission system.
2. Generating Facility owners shall assume all responsibility and cost for properly synchronizing Generating Facilities for operation with the TNMP Transmission System. Synchronizing of generation will be coordinated with TNMP's System Operations Center and ERCOT.

### C.2.11 Maintenance Coordination

1. The parties shall confer to coordinate the planning, scheduling, and performance of preventive and corrective maintenance on the interconnecting facilities.
2. TNMP may interrupt interconnection service or curtail the capacity of the interconnecting facility when necessary for routine maintenance, construction, and repairs on TNMP's Transmission System. TNMP will provide the interconnecting entity with five business day notice prior to such interruption. TNMP will restore the interconnecting facilities to service as quickly as possible in accordance with Good Utility Practice.
3. To the extent practicable, TNMP will schedule any testing, shutdown, or disconnection of the interconnecting facilities and other relevant facilities that would affect the ability of the interconnecting entity to remain connected to the TNMP Transmission system, to coincide with the interconnecting entities scheduled outages or, if not possible, during times acceptable to the interconnecting entity. TNMP will restore the interconnecting facilities to service as quickly as possible in accordance with Good Utility Practice.
4. Outages will be scheduled in accordance with ERCOT requirements.
5. In the event of an unplanned outage of a party's facility that adversely affects the other party's facilities, the party that owns or controls the facility that is out of service shall restore that facility to

service as soon as practical and to promptly notify the other party as to the expected duration of the unplanned outage and, to the extent known, the reason therefore.

6. Each party shall operate, maintain, repair, and inspect, and shall be fully responsible for the facilities that it now or subsequently may own unless otherwise specified by an agreement. Each party shall be responsible for the safe installation, maintenance, repair, and condition of their respective lines and appurtenances on their respective sides of the point of change of ownership.

## C.2.12 Operational Issues

1. **General**. With respect to its performance under an agreement, TNMP will comply with all applicable rules, manuals, standards, and guidelines of the Public Utility Commission of Texas, ERCOT, NERC, or any successor agency.

2. **Obligations of TNMP.** TNMP will operate and control the TNMP Transmission system, (a) in a safe and reliable manner, (b) in accordance with Good Utility Practice, and (c) in accordance with the terms and conditions of an agreement. In the event of any conflict between the terms and conditions of an agreement and applicable planning, operational, and/or reliability criteria, protocols, and directives of ERCOT and NERC, the applicable planning, operational, and/or reliability criteria, protocols, and directives of ERCOT and NERC shall govern.

3. **Obligations of the Interconnecting Entity**.

    a. **Synchronization.** Generation Facility entities shall assume all responsibility and cost for properly synchronizing Generation Facilities for operation with the TNMP Transmission system. Synchronizing of generation will be coordinated with TNMP's System Operations Center and ERCOT.

    b. **Operation and Control.** The interconnecting entity shall operate and control the interconnecting facility (a) in a safe and reliable manner, (b) in accordance with Good Utility Practice, and (c) in accordance with the terms and conditions of the respective interconnection agreement. In the event of any conflict between the terms and conditions of the respective interconnection agreement and applicable planning, operational, and/or reliability criteria, protocols, and directives of ERCOT and NERC, the applicable planning, operational, and/or reliability criteria, protocols, and directives of ERCOT and NERC shall govern.

4. **Switching and Tagging Procedures.**

    a. Generation Facility and End-User Facility entities shall abide by TNMP's switching and tagging rules as TNMP may modify them from time to time with respect to activities at the interconnecting facilities. TNMP will notify Generation Facility and End-User Facility entities in advance of any changes in TNMP's switching and tagging rules. Generation Facility and End-User Facility entities shall ensure their personnel are trained and knowledgeable regarding TNMP's switching and tagging rules and grounding and isolation procedures.

    b. TNMP System Operations personnel will coordinate with adjacent Transmission owner operating personnel to ensure appropriate tagging is accomplished for switching associated with Tie-Lines and Transmission Interconnection Facilities.

c. The interconnecting entity acknowledges that following an electric disturbance, certain equipment at the interconnecting facility or on the TNMP Transmission system may reclose in accordance with Good Utility Practice. The interconnecting entity shall have sole responsibility for protecting the interconnecting facility and related equipment from any damage resulting from such re-closure.

d. If, for any reason, a Generation facility is disconnected from the TNMP Transmission system (by electric disturbance, line switching, or otherwise), TNMP will cause the switching device interconnecting the Generation facility to become and remain open and not reclose until TNMP approves the re-closure.

## C.2.13 Inspection Requirements For Existing or New Facilities

1. Transmission elements (e.g. lines, line rights-of-way, circuit breakers, control and protection equipment, metering, and telecommunications) that are a part of the proposed connection and could affect the reliability of the TNMP Transmission system shall be inspected and maintained in conformance with regional standards.
2. Each party shall perform routine inspection and testing of its facilities and equipment, including secondary low voltage control systems, in accordance with Good Utility Practice as may be necessary to ensure the continued interconnection of the facility with the TNMP's Transmission system in a safe and reliable manner.
3. Each party shall, at its own expense, have the right to observe the testing of any of the other party's facilities and equipment whose performance may reasonably be expected to affect the reliability of the observing party's facilities and equipment. Each party shall notify the other party in advance of its performance of tests of its facilities and equipment, and the other party may have a representative attend and be present during such testing.
4. If a party observes any deficiencies or defects on, or becomes aware of a lack of scheduled maintenance and testing with respect to, the other party's facilities and equipment that might reasonably be expected to adversely affect the observing party's facilities and equipment, the observing party shall provide notice to the other party that is prompt under the circumstance, and the other party shall make any corrections required in accordance with Good Utility Practice.

## C.2.14 Normal & Emergency Communications/Procedures

1. Complete, precise, and timely communication is an essential element for maintaining reliability and security of a power system. Under normal operating conditions, the major link of communication with various interconnecting facilities shall be by telephone lines. TNMP and its interconnecting entities shall maintain communications regarding key matters which shall include, but not be limited to, system paralleling or separation, scheduled or unscheduled shutdowns, equipment clearances, periodic load reports, maintenance schedules, tagging of interconnection interrupting devices, meter tests, relay tests, billing, and other routine communication. In case of emergency or abnormal operating conditions, various communication channels may be used. Emergency telephone numbers should be agreed upon by both parties prior to the actual connect date. In case of general widespread area announcements, TNMP may also use public announcements through radio and television stations.

2. At the interconnecting entity's expense, the interconnecting entity shall maintain satisfactory operating communications with TNMP's system operator, as designated by TNMP. The interconnecting entity shall provide standard voice line, dedicated voice line and facsimile communications at its facility control room through use of the public telephone system. The interconnecting entity shall also provide the dedicated data circuit(s) necessary to provide necessary interconnecting facility data to TNMP. The data circuit(s) shall extend from the interconnecting facility to a location(s) specified by TNMP. Any required maintenance of such communications equipment shall be performed at the interconnecting entity's expense, but may be performed by the interconnecting entity or by TNMP.

# D Procedural Considerations

## D.1 Procedures For Coordinated Studies of New or Materially Modified Interconnections

### D.1.1 Generation Facilities

TNMP follows the ERCOT *Generation Resource Interconnection or Change Request* procedure as documented in Section 5 of the ERCOT Planning Guide for appropriately processing requests for, and sufficiently coordinating studies for, new or materially modified interconnections. An overview of the ERCOT *Generation Resource Interconnection or Change Request* procedure is as follows:

1. The IE seeking to interconnect a new Generation Facility or Materially Modify an existing Generation Facility submits an application to ERCOT. The application includes, among other requirements, all initial data inputs necessary to study the proposed Generation Facility interconnection or Material Modification to an existing Generation Facility.
2. ERCOT conducts a screening study on the proposed Generation Facility interconnection or Material Modification to the Generation Facility. ERCOT shares the results of the screening study with the IE.
3. Based on the results of the screening study, the IE makes a decision to either proceed or not proceed with the FIS. If the IE decides to proceed with the FIS, ERCOT assigns the FIS to the appropriate Transmission provider.
4. The assigned Transmission provider conducts the FIS, which generally involves the following coordination activities for each study component of the FIS:
    a. The Transmission provider coordinates with the IE and any affected adjacent Transmission provider to conduct the study component of the proposed Generation Facility interconnection or Material Modification to an existing Generation Facility.
    b. Once the study component is complete, the Transmission provider coordinates the study component results with all other Transmission providers within the ERCOT Interconnection by providing the study report via an online ERCOT portal for review and comment.
    c. The Transmission provider revises the study component as needed to incorporate any comments received from other Transmission providers and/or ERCOT.

    The Transmission provider repeats the above coordination activities for each of the FIS study components, which includes the steady-state study, short-circuit study, dynamic stability study, and facility study.

### D.1.2 Transmission Facilities

TNMP adheres to the following ERCOT processes for coordinating studies of new and Materially Modified Transmission Facilities:

1. The ERCOT Regional Planning Group project review process described in Section 3.1.2 of the ERCOT Planning Guide and further detailed in Section 3.11.4 of the ERCOT Nodal Protocols.

2. The ERCOT Transmission Project Information Tracking process described in Section 6.4 of the ERCOT Planning Guide.

### D.1.3 End-User Facilities

TNMP coordinates with the developers and owners of End-User Facilities through its internal process for studying Transmission system impacts of new and Materially Modified End-User Facilities. Such process involves execution of a study agreement, collection of the necessary electrical system data to conduct the study, and communication between TNMP and the developer/owner of the End-User Facility at key milestones during the study process.

TNMP also coordinates with neighboring Transmission providers as needed during the End-User Facility study process when the study results indicate there to be impacts to the Transmission systems of neighboring Transmission providers. Such coordination process is a straight-forward approach of contacting the Transmission Planning department of all affected Transmission providers, clearly describing and defining the observed impacts, and coordinating with the neighboring Transmission providers as needed on short-term and long-term solutions.

## D.2 Procedures For Notifying Those Responsible For The Reliability of Affected Systems of New or Materially Modified Existing Interconnections

### D.2.1 Generation Facilities

1. Once a new or materially modified existing Generation Facility meets the requirements documented in Section 6.9(1) of the ERCOT Planning Guide, ERCOT registers the project in ERCOT's Generator Interconnection Status report, which is posted on the ERCOT secure Market Information System. Information included in this posting, among other information, is the location of the requested point of interconnection, size of the project, and fuel source.
2. TNMP submits a Network Model Change Request to ERCOT which prescribes the topology, rating information, and switching device information associated with TNMP-owned equipment within the new or Materially Modified existing interconnection.
3. Pursuant to Section 6.9(2) of the ERCOT Planning Guide, the IE finalizes its data submittal for the Generation Facility and generator owner portion of the new or Materially Modified existing interconnection through the ERCOT's resource registration process, which ultimately results in ERCOT adding the Generation Facility (for new interconnections) or modifying the Generation Facility (for Materially Modified existing interconnections) within ERCOT Network Operations Model.
4. Pursuant to Section 6.9(3) of the ERCOT Planning Guide, ERCOT notifies the Steady State Working Group, System Protection Working Group, and Dynamics Working Group that the new or Materially Modified Generation Facility will be appearing in the planning models.

### D.2.2 Transmission Facilities

1. TNMP and the interconnecting Transmission owner(s) initially coordinate by performing a study to determine the feasibility of the new or Materially Modified existing Transmission Interconnection and all required upgrades.
2. If the new or Materially Modified existing Transmission Interconnection meets the criteria documented in Section 3.11.4.3 of the ERCOT Nodal Protocols, the study will be reviewed by the ERCOT Regional Planning Group.
3. TNMP and the interconnecting Transmission owner(s) further coordinate by developing and executing an interconnection agreement for a new Transmission Interconnection or amending an existing interconnection agreement for a Materially Modified existing Transmission Interconnection.
4. TNMP submits a Network Model Change Request to ERCOT which prescribes the topology, rating information, and switching device information associated with TNMP-owned equipment within the new or Materially Modified existing Transmission Interconnection. By extension, the new or Materially Modified existing Transmission Interconnection will be included in the ERCOT planning models in the appropriate years.

### D.2.3 End-User Facilities

1. If the planning study for a new or Materially Modified existing End-User Facility interconnection described in Section C.1.3.2 indicates planning criteria violations on the system of one or more adjacent Transmission owners, TNMP notifies transmission planning staff of the affected Transmission owner(s) and coordinates as needed to assist the affected Transmission owner(s) with evaluation of the planning criteria violations.
2. After TNMP becomes obligated to construct a new interconnection or modify an existing interconnection for a new or Materially Modified existing End-User Facility through an interconnection agreement, TNMP submits a Network Model Change Request to ERCOT which prescribes the topology, rating information, and switching device information associated with both the interconnection and the new or Materially Modified existing End-User Facility. By extension, both the interconnection and the new or Materially Modified existing End-User Facility will be included in the ERCOT planning models in the appropriate years.

## D.3 Procedures for Confirming New or Materially Modified Transmission Facilities are within ERCOT's Metered Boundaries

At two stages during the process of establishing a new Transmission Facility interconnection or Materially Modifying an existing Transmission Facility interconnection with a requesting entity, TNMP conducts confirmations to help ensure the interconnecting entity has made appropriate provisions with ERCOT to operate within its metered boundaries, as follows:

1. TNMP will commence planning studies for proposed new or Materially Modified Transmission Facility interconnections only if the requesting entity is registered with ERCOT as a Transmission Service Provider. Before TNMP initiates planning studies for proposed new or Materially Modified Transmission Facility interconnections as described in Section C.1.2.2, TNMP transmission planning personnel confirm the requesting entity is registered with ERCOT as a Transmission Service Provider by referencing ERCOT's Transmission Service Provider roster and/or by contacting TNMP's ERCOT client services representative.
2. TNMP will energize new or Materially Modified Transmission Facility interconnections only if the requesting entity has modeled its associated Transmission Interconnection Facilities within the ERCOT Network Operations Model. Before TNMP energizes the new or Materially Modified Transmission Facility, TNMP system operations personnel confirm the requesting entity-owned Transmission Interconnection Facilities are modeled in the ERCOT Network Operations Model by referencing the appropriate Network Operations Model version and/or by requesting Network Operations Model Change Request information from the requesting entity.

## E Reference Standards

ERCOT Protocols, Operating Guide, Planning Guide, and other ERCOT binding documents

Public Utility Commission of Texas Substantive Rules

IEEE1547 *Standard for Interconnecting Distributed Resources with Electric Power Systems (including use of IEEE 1547.1 testing protocols to establish conformity)*

UL 1741 *Inverters, Converters, and Controllers and Interconnection System Equipment for Use with Distributed Energy Resources*

NESC C2 - *National Electrical Safety Code*

NFPA 70 (2020), *National Electrical Code*

IEEE Std C37.90.1-2012, *IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays And Relay Systems Associated With Electric Power Apparatus*

IEEE Std C37.90.2 -2004 (R2010), *IEEE Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers*

IEEE Std C37.108-2002, *IEEE Guide for the Protection of Network Transformers*

IEEE Std C57.12.44-2014, *IEEE Standard Requirements for Secondary Network Protectors*

IEEE Std C62.41.2-2002, *IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits*

IEEE Std C62.45-2002 (R2008), *IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits*

ANSI/IEEE Std 80 - *Guide for Safety in AC Substation Grounding*

IEEE Std 81 - *Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System*

ANSI C84.1-2016 *Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)*

IEEE Std 100-2000, *IEEE Standard Dictionary of Electrical and Electronic Terms*

*NEMA MG 1-2016, Motors and Generators*

IEEE Std 367 - *Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault*

IEEE - 487 - *Electrical Protection of Communications Facilities Serving Electric Supply Locations -- General Considerations*

IEEE Std 519-2014, *IEEE Recommended Practice and Requirements for Harmonic Control in Electrical Power Systems*

IEEE - 837 - *Standard for Qualifying Permanent Connections Used in Substation Grounding*

## F Revision History

| Revision Number | Date | Description | By | Approval |
|---|---|---|---|---|
| 0 | 12/21/07 | Original document | R. McDaniel | R. McDaniel |
| 1 | 9/1/10 | Review and minor changes | A. Aars | R. McDaniel |
| 2 | 12/12/12 | Review, motor starting requirement addition, end-user facility requirement additions | Hudson / McDaniel | R. McDaniel |
| 3 | 10/5/15 | Revised for compliance with FAC-001-2, added a section for definitions and acronyms, general review, added a signed document review page for management implementation, various formatting adjustments. | Hudson Lona | Hudson |
| 4 | 12/9/16 | Annual review. Minor changes involving corrections to section references and formatting corrections. | Hudson Lona | Hudson |
| 5 | 3/7/18 | 1. Annual review.<br>2. Revised Section B, *Definitions and Acronyms*, to eliminate confusion around the difference between a Transmission Facility and a Transmission Interconnection Facility.<br>3. Replaced "transmission" with the defined term "Transmission" throughout the document.<br>4. Revised Section C.2.4 to make a clear distinction between metering associated with Transmission points of interconnection and metering associated with Generation Facilities and End-User Facilities. | Hudson Mansion | Hudson |
| 6 | 12/21/18 | Revised for compliance with FAC-001-3. | Hudson Lona | Hudson |
| 7 | 3/29/20 | 1. Annual review.<br>2. Revised Section B, *Definitions and Acronyms*, to elaborate on Network Operations Model- | Hudson | Hudson |

| | | | | |
|---|---|---|---|---|
| | | related definitions.<br>3. Revised Section C.1.3.3, Design Requirements, to reflect TNMP's current practice of installing breakers on line taps for End-User Facilities and the potential need for UFLS and UVLS relaying.<br>4. Revised standard references in Sections C.2.5, C.2.8, and E.<br>5. Struck operating procedures language in Section C.2.12(5).<br>6. Revised Section D.2.1 to provide clarity and reflect current practices in ERCOT for communicating finalization of the generation interconnection process.<br>7. Revised Section D.2.2 to elaborate on current practices related to communicating establishment of and modifying Transmission Interconnections.<br>8. Revised Section D.2.3 to elaborate on communicating establishment of and modifying End-User Facility interconnections.<br>9. Other minor edits. | | |

# G Signed Document Review Page

TNMP Facility Interconnection Requirements Revision 7

**A Document Review**

- This document shall be reviewed annually for completeness
- Reviews shall be coordinated by the Director, System Operations and shall include all relevant personnel.
- References to "Annual" or "Annually" in this document shall mean once per calendar year unless otherwise noted.
- Revisions to this plan will be tracked using MS Word track changes feature and noted as applicable in the revision history table in Section F. If no changes are made, the annual review shall be reflected in the Revision History and the document will be re-executed by the Director, System Operations.
- This document shall be approved by the Director, System Operations by signing and dating below.
- A DocMinder notification shall be used as an internal control to ensure timely reviews are conducted of this document.
- The latest signed copy of this page can be found in Section G: Signed Document Review Page

| Director, System Operations | Approval Date | Implementation Date |
|---|---|---|
| [signature] | 4/29/20 | 4/29/20 |