



**Austin Energy  
Facility Connection  
Requirements**

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**AUSTIN ENERGY  
FACILITY CONNECTION REQUIREMENTS**

**TABLE OF CONTENTS**

|  | <b>PAGE</b> |
|--|-------------|
| <b>1. Overview</b>   |             |
| 1.1 Document Purpose.....  | 3           |
| 1.2 Definitions .....  | 4           |
| 1.3 Contact Information .....  | 5           |
| <b>2. Interconnection Requirements for Generation, Transmission, and End-User Facilities</b> | <b>.6</b>   |
| 2.1 Interconnection Planning and Coordinated Studies.....                                    | 6           |
| 2.2 Procedures for Notification of New or Modified Facilities.....                           | 7           |
| 2.3 MW and MVAR Demand and Voltage Level .....   | 7           |
| 2.4 Breaker Duty and Surge Protection .....  | 7           |
| 2.5 System Protection and Coordination .....   | 7           |
| 2.6 Metering and Telecommunications .....  | 8           |
| 2.7 Grounding and Safety .....   | 10          |
| 2.8 Insulation and Insulation Coordination .....   | 10          |
| 2.9 Power factor, Reactive Power, and Voltage Control.....                                   | 10          |
| 2.10 Power Quality Requirements.....   | 11          |
| 2.11 Equipment Ratings .....   | 11          |
| 2.12 Large Generation Facilities.....  | 11          |
| 2.13 Maintenance (Outage) Coordination .....   | 12          |
| 2.14 Frequency and Voltage Operational Issues .....  | 12          |
| 2.15 Inspection of Existing or New Facilities .....  | 13          |
| 2.16 Communications and Procedures during Normal and Emergency Conditions .....              | 13          |
| 2.17 Small Generation Facilities .....   | 13          |
| <br>Review Log / Revision History .....  | <br>14      |

**AUSTIN ENERGY (AE)  
FACILITY CONNECTION REQUIREMENTS**

**1 OVERVIEW**

1.1 Document Purpose

This

document informs entities seeking to connect to the AE Electric Service Delivery (ESD) Transmission System of facility connection requirements. Part 2 of this document applies to generation facilities, transmission facilities, and end-user facilities and has been prepared to help insure that all requests for transmission interconnection are treated in a consistent manner. Austin Energy has a similar document for power production facilities connecting to the distribution system. Section 2.17 of this document provides directions for locating the “AE Distribution Interconnection Guide for Customer Owned Power Production Facilities less than 10 MW”. Both documents are subject to change and may be revised from time to time.

All interconnecting transmission entities requesting interconnection to Austin Energy shall plan, design, and operate their facilities, new or existing, in accordance with these Facility Connection Requirements and any applicable requirements of ERCOT, NERC, NESC, OSHA and the Texas PUC. Many of the Facility Connection Requirements mentioned herein are addressed in greater detail in the interconnection agreement between Austin Energy and the interconnecting party.

Summary of Basic Interconnection Requirements

|                               |                              |
|-------------------------------|------------------------------|
| Transmission Service Voltages | 69, 138, or 345 kV (nominal) |
| Operating Voltage Limits      |                              |
| Normal Conditions             | 98 – 105%                    |
| Contingency Conditions        | 95 – 105%                    |
| Power Factor                  |                              |
| Load                          | 0.97 pf                      |
| Generator                     | 0.95 pf                      |

For generator interconnection requests, the requirements contained in Part 2 of this document generally apply to all new generating facilities with a net rating of 10 MW or greater and which are connected to the Transmission System.

## 1.2 Definitions

1.2.1 AE System: The Electric Utility System of Austin Energy.

1.2.2 Good Utility Practice Any of the practices, methods, and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts that, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety, and expedition. Good utility practice is not intended to be limited to the optimum practice, method, or act, to the exclusion of all others, but rather is intended to include acceptable practices, methods, and acts generally accepted in the region.

1.2.3 IEEE : Institute of Electrical and Electronic Engineers

1.2.4 Interconnection: The physical means by which electric energy is received from a generating source. The principal elements of an electric interconnection include transmission and distribution circuits, transformers and switching devices such as circuit breakers, fuses and isolating disconnect switches. Supplemental elements may include sensing devices and protective relay equipment.

1.2.5 Interconnection Point: The point at which energy first enters or leaves the line or apparatus owned by the customer and leaves or enters the line or apparatus owned by AE.

1.2.6 Planning Criteria The Austin Energy Planning Criteria document provides details concerning the reliability philosophy used to plan Austin Energy's electric transmission system, the minimum levels of performance for Austin Energy's transmission system under normal and contingency conditions, and the types of analyses used by Austin Energy for planning and testing the performance of Austin Energy's transmission system.

1.2.7 Transmission System The transmission facilities owned, operated or controlled by Austin Energy, including conductors, circuit breakers, switches, transformers and other associated equipment used to control the transfer of energy and shall include any modifications, additions, or upgrades made to those facilities.

1.2.8 Materially Modified Interconnection A materially modified interconnection refers to a modification of an existing interconnection such that the modification has at least one of the following characteristics:

- Not implementing the modification will result in a violation of the AE/ERCOT Planning Criteria or a NERC Reliability Standard
- The project required to implement the modification is significant enough to be documented and included in the ESD Plan Book, which describes all major capital improvements to the AE transmission system
- Implementing the modification will alter steady state power-flows on at least one transmission line by more than 2%
- The project qualifies for inclusion in the ERCOT Transmission Project and Information Tracking (TPIT) report

### 1.3 Contact Information

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## **2 INTERCONNECTION REQUIREMENTS FOR GENERATION, TRANSMISSION, AND END-USER FACILITIES**

### **2.1 Interconnection Planning and Coordinated Studies**

The AE Electric Service Delivery Plan Book is published each year to recommend new projects necessary to meet electric system reliability obligations in compliance with national (North American Electric Reliability Corporation), regional (Electric Reliability Council of Texas), and internal Austin Energy planning criteria over the following five-year period. Regional load flow base cases are established for a range of generation and load configurations, with summer peak loading conditions being predominant. On each of these cases, simulations are run to determine compliance with the planning criteria throughout the planning horizon. Stability studies are also conducted based on data availability from ERCOT as well as on an "as needed" basis for generator interconnections. On an annual basis, the individual members of ERCOT cooperatively prepare load flow simulations of the interconnected system. Once the base cases are complete, contingency analyses are conducted individually by the members.

Austin Energy uses the ERCOT Planning Guide Section 5 "Generation Resource Interconnection or Change Request" for coordinated studies to interconnect large generation facilities. General procedures used for other coordinated studies involving new or materially modified existing interconnections including transmission customer (end-user) facilities are found in the ERCOT Planning Guide Section 3 "Regional Planning".

In coordination with ERCOT and other Transmission Planners, via ERCOT required processes where applicable, the minimum studies performed will be:

1. The reliability impact of the new interconnection, or materially modified existing interconnection, on affected system(s);
2. Adherence to applicable NERC Reliability Standards; ERCOT Requirements and Austin Energy system planning criteria; and Facility interconnection requirements; and
3. Steady-state, short-circuit, and dynamics studies, as necessary, to evaluate system performance under both normal and contingency conditions.

Study reports shall include study assumptions, system performance, alternatives considered, and coordinated recommendations. These studies may be performed independently or jointly with other entities and the results will be evaluated and coordinated by the entities involved.

## 2.2 Procedures for Notification of New or Modified Facilities

Austin Energy informs the ERCOT ISO and other interested parties of new or materially modified existing interconnections using the “ERCOT Transmission Project and Information Tracking (TPIT)” report tri-annually each year. The TPIT is then posted on the ERCOT website for Market Participants to access. The TPIT report is described in Section 6 of the ERCOT Planning Guide.

## 2.3 MW and MVAR Demand and Voltage Level

Austin Energy uses ERCOT Planning Guide Section 6.5 “Annual Load Data Request (ALDR)” in conjunction with the TPIT report to collect and address voltage level and MW and MVAR capacity or demand at the point of connection. Austin Energy has no wholesale customers and only one transmission level retail customer connected to its system. The transmission system shall be planned with the objective that voltages shall not exceed 105 percent nor fall below 98 percent of nominal voltage during normal conditions. Also, the transmission system voltages shall not exceed 105 percent nor fall below 95 percent of nominal voltage during contingency conditions.

## 2.4 Breaker Duty and Surge Protection

AE’s Breaker Duty and Surge Protection requirements are covered in the AE Substation Design Reference Manual under the sections of 2.2 Distribution Switchgear, 2.3 Circuit Breakers and Circuit Switchers and 2.12 Surge Arrestors. These guides identify and comply with applicable IEEE, ANSI, NESC and OSHA standards and specifications. Overstressing of breakers causing equipment damage and reduction in service life and transient over-voltages causing flashovers and serious damage to equipment should be avoided. These documents provide guidelines to prevent these events from happening.

## 2.5 System Protection and Coordination

AE’s System Protection and Coordination requirements are described in the Protective Relay Coordination Process document. This process document is contained in the AE Reliability Process Manual and provides guidance on the minimum requirements for proper system protection and coordination. Specific requirements for protection system and coordination are determined during the conceptual and design stages of a project. When AE enters into mutually agreed upon system protection, setting and coordination

requirements with other entities such requirements must comply with applicable NERC Reliability Standards, IEEE standards and specifications, and ERCOT Nodal Operating Guides Section 6.2.

## 2.6 Metering and Telecommunications

Certain AE Metering and telecommunications requirements are described in section REL 1.6 Metering and Telemetry of the Relay Design Manual. Other requirements are described in the Data and Voice Communications Process document contained in the AE Reliability Process Manual.

ERCOT requirements for metering and telecommunications are found in the following documents:

- [ERCOT Settlement Metering Operating Guide](#)
- [ERCOT Nodal Operating Guides; Section 7; Telemetry and Communication](#)
- [ERCOT Nodal Protocols; Section 10: Metering](#)

2.6.1 Project specific requirements for operational metering, settlement metering and telecommunications are determined during the design phase and documented in the interconnection agreement. General requirements are listed below.

### Instrument Transformers Used for Settlement Metering

All current and voltage transformers used for settlements must conform to 0.3 percent accuracy or better and shall meet or exceed other requirements as stipulated by ERCOT Protocols and Operating Guides.

### Instrument Transformers Used for Operational Metering

All current and voltage transformers used for Operational Metering shall be of sufficient accuracy as per ERCOT Protocols and Operating Guides. It is understood that the same meters used for settlements may also be used to provide TDSP/ERCOT operational data.

### Metering Communications

A dial-up phone line (POTS line) capable of at minimum 1200 baud and/or an internal network connection (fiber or Ethernet) shall be provided for ERCOT and Austin Energy MV-90 translation departments to interrogate the meters for power and energy billing units in accordance with ERCOT Protocols and Operating Guides.



2.6.2 This section defines the AUSTIN ENERGY TDSP's SCADA policy and responsibilities for connecting Transmission and Generation Facilities to AUSTIN ENERGY TDSP transmission system.

#### SCADA Policy

The AUSTIN ENERGY TDSP SCADA policy is to install a Remote Terminal Unit (RTU) at substations connected to the AUSTIN ENERGY TDSP transmission system.

The RTU shall monitor the status and/or control transmission system switching devices, Customer load, transmission bus voltage and select alarms and indication. The RTU shall be operated by AE System Operations through an AUSTIN ENERGY TDSP provided communications system using AUSTIN ENERGY TDSP's preferred RTU protocol – Harris 6000 or DNP.

#### RTU specification

AUSTIN ENERGY TDSP shall provide the RTU. The RTU will be installed in a climate-controlled environment (control house) and shall require 125 VDC power and 120 VAC power. For locations with a small point count application, like a single transformer, inline substation, AUSTIN ENERGY TDSP will use a small, 24"x36"x12" RTU mounted on a 24" wide rack. For locations with a larger point count application, AUSTIN ENERGY TDSP will install a 24"x24"x 84" RTU in a cabinet and a 24" wide Supervisory Interface Panel (SIP). Both installations require front and back access. RTUs are capable of control (DO), status (DI), analog telemetering (AI) or interrogating select IEDs with a RS-232 connection by DNP protocol.

#### **AUSTIN ENERGY TDSP Responsibility**

AUSTIN ENERGY TDSP shall provide, install and maintain:

- An AUSTIN ENERGY TDSP RTU
- Communication system between AUSTIN ENERGY TDSP Energy Control Center (ECC) and the RTU
- Cable and conduit between AUSTIN ENERGY TDSP equipment and the RTU
- Termination between AUSTIN ENERGY TDSP RTU and Customer SCADA cables

#### **Customer Responsibility**

The Customer shall operate within the metered boundaries of ERCOT and shall provide, install and maintain:

- Analog load values per transformer – MW, MVar, Amps.
- Shielded cable from transducer or meter to RTU Supervisory Interface Panel (SIP).

- As an option, provide analog values from the IED via DNP utilizing RS-232 connection(s).
- For Customer-owned and remotely switched equipment directly connected to AUSTIN ENERGY TDSP transmission system, SCADA control and status shall be provided for AUSTIN ENERGY TDSP's use per the interconnect agreement.
- Cables from the Customer panel(s) to the AUSTIN ENERGY TDSP TDSP RTU SIP.
- Schematics and wiring diagrams for Customer equipment connected to the AUSTIN ENERGY TDSP's RTU.
- 120 VAC and 125 VDC power sources for AUSTIN ENERGY TDSP RTU.
- Communication system between the AUSTIN ENERGY TDSP RTU and the Customer RTU

## 2.7 Grounding and Safety

AE's substation grounding and safety philosophy and design procedure are detailed in the AE Substation Design Reference Manual section 3.1 Substation Grounding and 3.2 Substation Shielding. These guidelines indentify the applicable IEEE, ANSI and NESC grounding and safety standards and specifications and shall be met to satisfy AE's facility connection requirements. Adequate grounding provides for a safe working environment for personnel under normal and abnormal conditions; protection of substation equipment; prevention of electrostatic buildup and good ground relay sensitivity.

## 2.8 Insulation and Insulation Coordination

AE's insulation and insulation coordination philosophy are detailed in section 4.1 Insulation Coordination and Appendix A.1 Insulation Coordination of the AE Substation Design Reference Manual. These guides identify and comply with the applicable IEEE standards and specifications. Insulation Coordination is the correlation of protective devices and electrical insulation systems and the goal is to provide the most economical application of equipment consistent with reliability and survival of protective devices.

## 2.9 Power factor, Reactive Power, and Voltage Control

Austin Energy uses an internal "Voltage and Reactive Guide" document to address voltage, reactive power, and power factor control requirements for facility connections. The guide is an outline of general guidelines for system operation of AE's Transmission and

Distribution System. The object of the guide is to provide for bus voltage control and availability of reactive power sources that will result in a secure and reliable system.

## 2.10 Power Quality Requirements

The requirements on power quality for interconnection with AE facilities comply with PUCT rule (chapter 25 Substantive Rules Applicable to Electric Service Providers, Subchapter 1 Transmission and Distribution, Division 2 Transmission and Distribution Applicable to All Electric Utilities, 25.212 Technical Requirements for Interconnection and Parallel Operations of On-Site Distributed Generation).

## 2.11 Equipment Ratings

Austin Energy uses an internal “Transmission Facility Ratings Methodology” document to address equipment ratings. Transmission conductor ratings are established in accordance with IEEE Standard 738-2006. The overall rating for a transmission facility is determined using the Most Limiting Series Element (MLSE) database and includes the normal and emergency rating of each element that comprises a transmission facility such as the conductor, a circuit breaker or air switch. A facility rating shall equal the most limiting applicable equipment rating of the individual equipment that comprises that facility. Planned loading on autotransformers, during normal or contingency conditions shall be limited to 100 percent of the auto-transformer’s continuous megavolt-ampere (MVA) rating as specified by the manufacturer, unless AE Electric Service Delivery Engineers have established alternate 2-hour and/or 15-minute ratings. Planned transmission line loading shall be such that National Electrical Safety Code line-to-ground clearances shall be maintained for all anticipated normal and contingency conditions (NERC contingency categories A, B, C and D).

## 2.12 Large Generation Facilities

### 2.12.1 Interconnecting Generating Units Larger than 10 MW

The interconnection process begins when the new generator contacts ERCOT with a request for possible interconnection. The process proceeds in accordance with ERCOT Planning Guide Section 5 “Generation Interconnection or Change Request Procedure”. The ERCOT “Standard Generation Interconnection Agreement (SGIA) is used for interconnections with large generation facilities and can be found on the ERCOT website. New Generators should note that Article 5 and Exhibit ‘C’ of the SGIA are of particular interest. Section 5.5 addresses requirements for Metering, Telemetry and Communications

for Generation interconnections. Section 5.6 addresses System Protection and other Control Requirements. Exhibit 'C' addresses specific interconnection details.

#### 2.12.2 Synchronizing Facilities

Improper synchronizing on the electrical system may lead to damage and loss of equipment for AE and other entities. New Generators seeking to interconnect with Austin Energy are responsible for synchronization to the AE Transmission System. Austin Energy is not responsible for the design of the Generation Facility's synchronization controls or relaying.

#### 2.13 Maintenance (Outage) Coordination

Austin Energy requires generation, transmission, and end-user entities to operate and maintain interconnection facilities in accordance with Good Utility Practice. The interconnected entity shall coordinate its operations to maintain continuity of services to its respective customers to the extent practicable. Planned facility maintenance that will cause a deviation from the normal power and energy flow on the interconnection facilities shall be scheduled at a mutually agreeable time. No changes shall be made in the normal operation of the interconnection facilities without the mutual agreement of Austin Energy. Austin Energy and the interconnected entity shall, to the extent necessary to support continuity of operations, coordinate the operation of protective devices on the facilities they operate in the proximity of the interconnection.

#### 2.14 Frequency and Voltage Operational Issues

Austin Energy and the interconnected generator, transmission or end-user entity shall design and install all apparatus and necessary protective devices on its respective side of the Point of Interconnection to reasonably minimize the likelihood of voltage and frequency abnormalities, originating in the system of one party, from affecting the system of the other party.

Under-frequency load shedding and generator under-frequency relay settings must be maintained consistent with ERCOT Nodal Operating Guides, Section 2.6 "Requirements for Under-Frequency Relaying" in order to maintain the dynamic stability of the interconnected system.

## 2.15 Inspection of Existing or New Facilities

Regarding inspection of Existing or New Facilities, AE reserves the right to require a field inspection of the interconnection facilities for compliance with minimum safety code requirements and installation rules and standards for electric service established for the AE service area.

## 2.16 Communications and Procedures during Normal and Emergency Conditions

During normal conditions, Austin Energy and the interconnected generation, transmission, or end-user entity shall assist each other in implementing all transmission switching functions as necessary to safely and efficiently operate the transmission system. Austin Energy and the interconnected entity shall notify each other and ERCOT of any abnormal relaying configuration that may affect reliability. The interconnected entity is expected to fully cooperate with Austin Energy system operators.

During emergency conditions, Austin Energy and the interconnected generation, transmission, or end-user entity shall comply with ERCOT Operating Guide Section 4 “Emergency Operation” and shall render available emergency assistance to each other provided each entity has completed implementation of its own emergency procedures. These actions shall not, however, violate safety, equipment, or regulatory or statutory requirements. Austin Energy and the interconnected entity shall notify each other and ERCOT of any abnormal relaying configuration that may affect reliability. The interconnected entity is expected to fully cooperate with Austin Energy system operators.

## 2.17 Small Generation Facilities

The Austin Energy interconnection guide for power production units smaller than 10 MW is located on the AE website at:

[AustinEnergy.com](#) › [Contractors](#) › [Electric Service Design & Planning](#) › [Distribution Interconnection Guide](#)

## Review Log:

This document shall be reviewed periodically, as necessary by changes in NERC or Texas RE Standards or changes in AE operational processes.

| Reviewed By:                | Title   | Date          |
|-----------------------------|---|---------------|
| James Armke                 | Manager, T&D Planning and Regulatory Analysis   | May 21, 2015  |
| Lisa Martin                 | Transmission Service Compliance Program Manager   | June 25, 2015 |
| James Armke,<br>Jeanie Doty | Manager, T&D Planning and Regulatory Analysis,<br>Program Manager, Reliability Compliance | January 2016  |

## Revision History

The change history below reflects the date changes to this document or its structure became final.

| Version | Description of change   | Date             |
|---------|---|------------------|
| V 01.00 | Initial document  | May 2010         |
| V 02.00 | Annual document review and edits, update ERCOT references   | May 2011         |
| V 03.00 | Annual document review and edits  | May 23, 2012     |
| V 04.00 | Annual review and edits, clarify references to ERCOT market rules and other documents.  | May 23, 2013     |
| V 04.01 | Annual review, update references to AE Distribution Interconnection Guide   | May 23, 2014     |
| V 04.02 | Annual review; added review log and signature block for Director, Reliability Compliance  | June 25, 2015    |
| V 05.00 | Modified document include “material modifications of existing interconnection Facilities” and the minimum studies to be conducted in relation to a new or modified Facility. Changed the order of the Review Log and Review History and added these to the Table of Contents. | February 2, 2016 |