

# ERCOT Planning Guide

September 14, 2017

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**PUBLIC**

# **ERCOT Planning Guide**

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# **ERCOT Planning Guide**

## **Section 1: Overview**

**May 1, 2017**

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# **1 OVERVIEW**

## **1.1 Purpose**

- (1) This Planning Guide is consistent with applicable planning-related requirements of the Public Utility Commission of Texas (PUCT) Substantive Rules, Protocols and the North American Electric Reliability Corporation (NERC) Reliability Standards.
- (2) This Planning Guide provides more detail of and establishes planning requirements for organizations and Entities operating in or potentially impacting the reliability of the ERCOT System. These organizations and Entities shall comply with the requirements set forth in this Planning Guide.
- (3) In the event of a conflict between the Planning Guide and Protocols, any PUCT Substantive Rules or the NERC Reliability Standards, then such PUCT Substantive Rules, NERC Reliability Standards, and the Protocols shall control.
- (4) For application in the ERCOT Region, some NERC Reliability Standards must be adapted to fit the unique characteristics of ERCOT. Defined terminology for NERC Regional Variances, if any, is detailed in the NERC Reliability Standards.

## **1.2 Process for Planning Guide Revision**

### **1.2.1 Introduction**

- (1) A request to make additions, edits, deletions, revisions, or clarifications to this Planning Guide, including any attachments and exhibits to this Planning Guide, is called a Planning Guide Revision Request (PGRR). Except as specifically provided in other sections of this Planning Guide, this Section 1.2, Process for Planning Guide Revision, shall be followed for all PGRRs. ERCOT Members, Market Participants, Public Utility Commission of Texas (PUCT) Staff, the Reliability Monitor, the Independent Market Monitor (IMM), the North American Electric Reliability Corporation (NERC) Regional Entity, ERCOT, and any other Entities are required to utilize the process described herein prior to requesting, through the PUCT or other Governmental Authority, that ERCOT make a change to this Planning Guide, except for good cause shown to the PUCT or other Governmental Authority.
- (2) The “next regularly scheduled meeting” of the Reliability and Operations Subcommittee (ROS), the Wholesale Market Subcommittee (WMS), the Technical Advisory Committee (TAC), or ERCOT Board shall mean the next regularly scheduled meeting for which required Notice can be timely given regarding the item(s) to be addressed, as specified in the appropriate ERCOT Board or committee procedures.
- (3) The ROS shall ensure that the Planning Guides are compliant with the ERCOT Protocols. As such, the ROS will monitor all changes to the ERCOT Protocols and initiate any



PGRRs necessary to bring the Planning Guides in conformance with the ERCOT Protocols. The ROS will also initiate a Nodal Protocol Revision Request (NPRR) if such a change is necessary to accommodate a proposed PGRR prior to proceeding with that PGRR.

- (4) Throughout the Planning Guide, references are made to the ERCOT Protocols. ERCOT Protocols supersede the Planning Guide and any PGRR must be compliant with the Protocols. The ERCOT Protocols are subject to the revision process outlined in Protocol Section 21, Revision Request Process.
- (5) ERCOT may make non-substantive corrections at any time during the processing of a particular PGRR. Under certain circumstances, however, the Planning Guide can also be revised by ERCOT rather than using the PGRR process outlined in Section 1.2.
  - (a) This type of revision is referred to as an “Administrative PGRR” or “Administrative Changes” and shall consist of non-substantive corrections, such as typos (excluding grammatical changes), internal references (including table of contents), improper use of acronyms, references to ERCOT Protocols, PUCT Substantive Rules, the Public Utility Regulatory Act (PURA), NERC regulations, Federal Energy Regulatory Commission (FERC) rules, etc., and revisions for the purpose of maintaining consistency between Section 1.2 and Protocol Section 21.
  - (b) ERCOT shall post such Administrative PGRRs to the ERCOT website and distribute the PGRR to ROS at least ten Business Days before implementation. If no Entity submits comments to the Administrative PGRR in accordance with paragraph (2) of Section 1.2.3.3, ROS Review and Action, ERCOT shall implement it according to paragraph (4) of Section 1.2.6, Planning Guide Revision Implementation. If any ERCOT Member, Market Participant, PUCT Staff, NERC Regional Entity Staff, Reliability Monitor, the IMM, or ERCOT submits comments to the Administrative PGRR, then it shall be processed in accordance with the PGRR process outlined in Section 1.2.

### ***1.2.2 Submission of a Planning Guide Revision Request***

- (1) The following Entities may submit a PGRR:
  - (a) Any Market Participant;
  - (b) Any ERCOT Member;
  - (c) PUCT Staff;
  - (d) Reliability Monitor Staff;
  - (e) NERC Regional Entity Staff;
  - (f) The IMM;

- (g) ERCOT; and
- (h) Any other Entity that meets the following qualifications:
  - (i) Resides (or represent residents) in Texas or operates in the Texas electricity market; and
  - (ii) Demonstrates that Entity (or those it represents) is affected by the Customer Registration or Renewable Energy Credit (REC) Trading Program sections of the ERCOT Protocols.

### ***1.2.3 Planning Guide Revision Procedure***

#### **1.2.3.1 Review and Posting of Planning Guide Revision Requests**

- (1) PGRRs shall be submitted electronically to ERCOT by completing the designated form provided on the ERCOT website. Excluding ERCOT-sponsored PGRRs, ERCOT shall provide an electronic return receipt response to the submitter upon receipt of the PGRR.
- (2) The PGRR shall include the following information:
  - (a) Description of requested revision and reason for suggested change;
  - (b) Impacts and benefits of the suggested change on ERCOT market structure, ERCOT operations, and Market Participants, to the extent that the submitter may know this information;
  - (c) List of affected Planning Guide sections and subsections;
  - (d) General administrative information (organization, contact name, etc.); and
  - (e) Suggested language for requested revision.
- (3) ERCOT shall evaluate the PGRR for completeness and shall notify the submitter, within five Business Days of receipt, if the PGRR is incomplete, including the reasons for such status. ERCOT may provide information to the submitter that will correct the PGRR and render it complete. An incomplete PGRR shall not receive further consideration until it is completed. In order to pursue the PGRR, a submitter must submit a completed version of the PGRR.
- (4) If a submitted PGRR is complete or upon completion of a PGRR, ERCOT shall post the PGRR on the ERCOT website and distribute to ROS within three Business Days.
- (5) For any ERCOT-sponsored PGRR, ERCOT shall also post an initial Impact Analysis on the ERCOT website, and distribute it to ROS. The initial Impact Analysis will provide ROS with guidance as to potential ERCOT computer systems, operations, or business functions that could be affected by the submitted PGRR.

### **1.2.3.2 Withdrawal of a Planning Guide Revision Request**

- (1) A submitter may withdraw or request to withdraw a PGRR by submitting a completed Request for Withdrawal form provided on the ERCOT website. ERCOT shall post the submitter's Request for Withdrawal on the ERCOT website within three Business Days of submittal.
- (2) The submitter of a PGRR may withdraw the PGRR at any time before ROS recommends approval of the PGRR.
- (3) If ROS has recommended approval of the PGRR, the Request for Withdrawal must be approved by the TAC if the PGRR has not yet been approved or recommended for approval by TAC.
- (4) If TAC has recommended approval of the PGRR, the Request for Withdrawal must be approved by the ERCOT Board if the PGRR has not yet been approved by the ERCOT Board.
- (5) Once approved, a PGRR cannot be withdrawn.

### **1.2.3.3 ROS Review and Action**

- (1) Any ERCOT Member, Market Participant, PUCT Staff, Reliability Monitor Staff, NERC Regional Entity Staff, the IMM Staff, or ERCOT may comment on the PGRR.
- (2) To receive consideration, comments must be delivered electronically to ERCOT in the designated format provided on the ERCOT website within 14 days from the posting date of the PGRR. Comments submitted after the 14 day comment period may be considered at the discretion of ROS after these comments have been posted. Comments submitted in accordance with the instructions on the ERCOT website, regardless of date of submission, shall be posted on the ERCOT website and distributed to the ROS within three Business Days of submittal.
- (3) The ROS shall consider the PGRR at its next regularly scheduled meeting after the end of the 14 day comment period. The quorum and voting requirements for ROS action are set forth in the Technical Advisory Committee Procedures. At such meeting, the ROS shall take action on the PGRR. In considering action on a PGRR, the ROS shall:
  - (a) Recommend approval of the PGRR as submitted or as modified;
  - (b) Reject the PGRR;
  - (c) Defer decision on the PGRR; or
  - (d) Refer the PGRR to another ROS working group or task force, or another TAC subcommittee with instructions.

- (4) If a motion is made to recommend approval of a PGRR and that motion fails, the PGRR shall be deemed rejected by ROS unless at the same meeting ROS later votes to recommend approval of, defer, or refer the PGRR. If a motion to recommend approval of a PGRR fails via e-mail vote according to the Technical Advisory Committee Procedures, the PGRR shall be deemed rejected by the ROS unless at the next regularly scheduled ROS meeting or in a subsequent e-mail vote prior to such meeting, ROS votes to recommend approval of, defer, or refer the PGRR. The rejected PGRR shall be subject to appeal pursuant to Section 1.2.3.13, Appeal of Action.
- (5) Within three Business Days after ROS takes action, ERCOT shall post an ROS Report reflecting the ROS action on the ERCOT website. The ROS Report shall contain the following items:
  - (a) Identification of submitter of the PGRR
  - (b) Planning Guide language recommended by the ROS, if applicable;
  - (c) Identification of authorship of comments;
  - (d) Proposed effective date(s) of the PGRR;
  - (e) Recommended priority and rank for any PGRRs requiring an ERCOT project for implementation; and
  - (f) ROS action.

#### **1.2.3.4 Comments to the ROS Report**

- (1) Any ERCOT Member, Market Participant, PUCT Staff, Reliability Monitor Staff, NERC Regional Entity Staff, the IMM, or ERCOT may comment on the ROS Report. Comments submitted in accordance with the instructions on the ERCOT website, regardless of date of submission, shall be posted on the ERCOT website and distributed to the committee (i.e. ROS and/or TAC) considering the PGRR within three Business Days of submittal.
- (2) The comments on the ROS Report will be considered at the next regularly scheduled ROS or TAC meeting where the PGRR is being considered.

#### **1.2.3.5 Planning Guide Revision Request Impact Analysis**

- (1) If ROS recommends approval of a PGRR, ERCOT shall prepare an Impact Analysis based on the proposed language in the ROS Report. If ERCOT has already prepared an Impact Analysis, ERCOT shall update the existing Impact Analysis, if necessary, to accommodate the language recommended for approval in the ROS Report.

- (2) The Impact Analysis shall assess the impact of the proposed PGRR on ERCOT staffing, computer systems, operations, or business functions and shall contain the following information:
  - (a) An estimate of any cost and budgetary impacts to ERCOT for both implementation and ongoing operations;
  - (b) The estimated amount of time required to implement the PGRR;
  - (c) The identification of alternatives to the PGRR that may result in more efficient implementation; and
  - (d) The identification of any manual workarounds that may be used as an interim solution and estimated costs of the workaround.
- (3) Unless a longer review period is warranted due to the complexity of the proposed ROS Report, ERCOT shall post an Impact Analysis on the ERCOT website for a PGRR for which ROS has recommended approval of, prior to the next regularly scheduled ROS meeting, and distribute to ROS. If a longer review period is required by ERCOT to complete an Impact Analysis, ERCOT shall submit comments with a schedule for completion of the Impact Analysis.

#### **1.2.3.6 ROS Review of Impact Analysis**

- (1) After ERCOT posts the results of the Impact Analysis, ROS shall review the Impact Analysis at its next regularly scheduled meeting. ROS may revise its ROS Report after considering the information included in the Impact Analysis or additional comments received on the ROS Report.
- (2) Within three Business Days of ROS consideration of the Impact Analysis and ROS Report, ERCOT shall post the ROS Report on the ERCOT website. If ROS revises the ROS Report, ERCOT shall update the Impact Analysis, if necessary, post the updated Impact Analysis on the ERCOT website, and distribute it to the committee (i.e. ROS and/or TAC) considering the Impact Analysis. If a longer review period is required for ERCOT to update the Impact Analysis, ERCOT shall submit comments with a schedule for completion of the Impact Analysis.
- (3) If the PGRR requires an ERCOT project for implementation, at the same meeting, ROS shall assign a recommended priority and rank for the associated project.

#### **1.2.3.7 Wholesale Market Subcommittee Review**

- (1) The WMS shall monitor and review PGRRs as they work through the ROS process and may submit comments to the process as appropriate.

**1.2.3.8 ERCOT Impact Analysis Based on ROS Report**

- (1) ERCOT shall review the ROS Report and, if necessary, update the Impact Analysis as soon as practicable. ERCOT shall distribute the updated Impact Analysis, if applicable, to TAC and post it on the ERCOT website. If a longer review period is required for ERCOT to update the Impact Analysis, ERCOT shall submit comments with a schedule for completion of the Impact Analysis.

**1.2.3.9 PRS Review of Project Prioritization**

- (1) At the next regularly scheduled Protocol Revision Subcommittee (PRS) meeting after ROS recommends approval of a PGRR that requires an ERCOT project for implementation, the PRS shall assign a recommended priority and rank for the associated project.

**1.2.3.10 Technical Advisory Committee Vote**

- (1) TAC shall consider any PGRRs that ROS has submitted to TAC for consideration for which both an ROS Report and an Impact Analysis (as updated if modified by ROS under Section 1.2.3.8, ERCOT Impact Analysis Based on ROS Report) and any new or unresolved comments submitted by WMS that have been posted on the ERCOT website. The following information must be included for each PGRR considered by TAC:
  - (a) The ROS Report and Impact Analysis;
  - (b) The recommended priority and rank, if an ERCOT project is required; and
  - (c) Any comments timely received in response to the ROS Report.
- (2) The quorum and voting requirements for TAC action are set forth in the Technical Advisory Committee Procedures. In considering action on an ROS Report, TAC shall:
  - (a) Recommend approval of the PGRR as recommended in the ROS Report (with due consideration to comments provided by WMS) or as modified by TAC, including modification of the recommended priority and rank if the PGRR requires a project;
  - (b) Reject the PGRR;
  - (c) Defer decision on the PGRR;
  - (d) Remand the PGRR to ROS with instructions; or
  - (e) Refer the PGRR to another TAC subcommittee or a TAC working group or task force with instructions.

- (3) If a motion is made to recommend approval of a PGRR and that motion fails, the PGRR shall be deemed rejected by TAC unless at the same meeting TAC later votes to recommend approval of, defer, remand, or refer the PGRR. If a motion to recommend approval of a PGRR fails via email vote according to the Technical Advisory Committee Procedures, the PGRR shall be deemed rejected by TAC unless at the next regularly scheduled TAC meeting or in a subsequent email vote prior to such meeting, TAC votes to recommend approval of, defer, remand, or refer the PGRR. The rejected PGRR shall be subject to appeal pursuant to Section 1.2.3.13, Appeal of Action.
- (4) Within three Business Days after TAC takes action on a PGRR, ERCOT shall post a TAC Report reflecting the TAC action on the ERCOT website. The TAC Report shall contain the following items:
  - (a) Identification of the submitter of the PGRR;
  - (b) Modified Planning Guide language proposed by TAC, if applicable;
  - (c) Identification of the authorship of comments, if applicable;
  - (d) Proposed effective date(s) of the PGRR;
  - (e) Priority and rank for any PGRR requiring an ERCOT project for implementation;
  - (f) ROS action;
  - (g) TAC action; and
  - (h) ERCOT's position on the PGRR.
- (5) If TAC recommends approval of a PGRR, ERCOT shall forward the TAC Report to the ERCOT Board for consideration pursuant to 1.2.3.12, ERCOT Board Vote.

#### **1.2.3.11 ERCOT Impact Analysis Based on Technical Advisory Committee Report**

- (1) ERCOT shall review the TAC Report and, if necessary, update the Impact Analysis as soon as practicable. ERCOT shall distribute the updated Impact Analysis, if applicable, TAC and post it on the ERCOT website. If a longer review period is required for ERCOT to update the Impact Analysis, ERCOT shall submit comments with a schedule for completion of the Impact Analysis.

#### **1.2.3.12 ERCOT Board Vote**

- (1) Upon issuance of a TAC Report and Impact Analysis to the ERCOT Board, the ERCOT Board shall review the TAC Report and the Impact Analysis at the next regularly scheduled meeting. For Urgent PGRRs, the ERCOT Board shall review the TAC Report and Impact Analysis at the next regularly scheduled meeting, unless a special meeting is required due to the urgency of the PGRR.

- (2) The quorum and voting requirements for ERCOT Board action are set forth in the ERCOT Bylaws. In considering action on a TAC Report, the ERCOT Board shall:
  - (a) Approve the PGRR as recommended in the TAC Report or as modified by the ERCOT Board;
  - (b) Reject the PGRR;
  - (c) Defer decision on the PGRR; or
  - (d) Remand the PGRR to TAC with instructions.
- (3) If a motion is made to approve a PGRR and that motion fails, the PGRR shall be deemed rejected by the ERCOT Board unless at the same meeting the ERCOT Board later votes to approve, defer, or remand the PGRR. The rejected PGRR shall be subject to appeal pursuant to Section 1.2.3.13, Appeal of Action.
- (4) Within three Business Days after the ERCOT Board takes action on a PGRR, ERCOT shall post a Board Report reflecting the ERCOT Board action on the ERCOT website.

#### **1.2.3.13 Appeal of Action**

- (1) Any ERCOT Member, Market Participant, PUCT Staff, the NERC Regional Entity, the Reliability Monitor, or ERCOT may appeal an ROS action to reject, defer, or refer a PGRR directly to TAC. Such appeal to the TAC must be submitted electronically to ERCOT by completing the designated form provided on the ERCOT website within seven days after the date of the relevant ROS appealable event. ERCOT shall reject appeals made after that time. ERCOT shall post appeals on the ERCOT website within three Business Days of receiving the appeal. Appeals shall be heard at the next regularly scheduled TAC meeting that is at least seven days after the date of the requested appeal. An appeal of a PGRR to TAC suspends consideration of the PGRR until the appeal has been decided by TAC.
- (2) Any ERCOT Member, Market Participant, PUCT Staff, the NERC Regional Entity, the Reliability Monitor, the IMM, or ERCOT may appeal a TAC action to reject, defer, remand, or refer a PGRR directly to the ERCOT Board. Appeals to the ERCOT Board shall be processed in accordance with the ERCOT Board Policies and Procedures. An appeal of a PGRR to the ERCOT Board suspends consideration of the PGRR until the appeal has been decided by the ERCOT Board.
- (3) Any ERCOT Member, Market Participant, PUCT Staff, the Reliability Monitor, the IMM, or the NERC Regional Entity may appeal any decision of the ERCOT Board regarding a PGRR to the PUCT or other Governmental Authority. Such appeal to the PUCT or other Governmental Authority must be made within any deadline prescribed by the PUCT or other Governmental Authority, but in any event no later than 35 days of the date of the relevant ERCOT Board appealable event. Notice of any appeal to the PUCT or other Governmental Authority must be provided, at the time of the appeal, to



ERCOT's General Counsel. If the PUCT or other Governmental Authority rules on the PGRR, ERCOT shall post the ruling on the ERCOT website.

#### **1.2.4      *Urgent Requests***

- (1) The party submitting a PGRR may request that the PGRR be considered on an urgent timeline ("Urgent") only when the submitter can reasonably show that an existing Planning Guide provision is impairing or could imminently impair ERCOT System reliability or wholesale or retail market operations, or is causing or could imminently cause a discrepancy between a Settlement formula and a provision of the ERCOT Protocols.
- (2) The ROS may designate the PGRR for Urgent consideration if a submitter requests Urgent status or upon valid motion in a regularly scheduled meeting of the ROS. Criteria for designating a PGRR as Urgent are that the PGRR requires immediate attention due to:
  - (a) Serious concerns about ERCOT System reliability or market operations under the unmodified language; or
  - (b) The crucial nature of a Settlement activity conducted pursuant to any Settlement formula.
- (3) ERCOT shall prepare an Impact Analysis for Urgent PGRRs as soon as practicable.
- (4) ROS shall consider the Urgent PGRR and Impact Analysis, if available, at the next regularly scheduled ROS meeting, or at a special meeting called by the ROS leadership to consider the Urgent PGRR. The WMS may monitor Urgent PGRRs and shall submit comments as appropriate.
- (5) If the submitter desires to further expedite processing of the PGRR, a request for voting via email may be submitted to the ROS chair. The ROS chair may grant the request for voting via email. Such voting shall be conducted pursuant to the Technical Advisory Committee Procedures.
- (6) If recommended for approval by ROS, ERCOT shall post an ROS Report on the ERCOT website within three Business Days after ROS takes action. The TAC chair may request action from TAC to accelerate or alter the procedures described herein, as needed, to address the urgency of the situation.
- (7) Any Urgent PGRRs shall be subject to an Impact Analysis pursuant to Section 1.2.3.8, ERCOT Impact Analysis Based on ROS Report, and ERCOT Board consideration pursuant to Section 1.2.3.12, ERCOT Board Vote.

**1.2.5      *Planning Guide Revision Implementation***

- (1)      Upon ERCOT Board approval, ERCOT shall implement PGRRs on the first day of the month following ERCOT Board approval, unless otherwise provided in the Board Report for the approved PGRR.
- (2)      For such other PGRRs, the Impact Analysis shall provide an estimated amount of time required to implement the PGRR and ERCOT shall provide Notice as soon as practicable, but no later than ten days prior to the actual implementation, unless a different notice period is required in the Board Report for the approved PGRR.
- (3)      ERCOT shall implement an Administrative PGRR on the first day of the month following the end of the ten Business Day posting requirement outlined in Section 1.2.1, Introduction.

# **ERCOT Planning Guide**

## **Section 2: Definitions and Acronyms**

**September 14, 2017**

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## 2 DEFINITIONS AND ACRONYMS

### 2.1 DEFINITIONS

Relevant terms and definitions used in the Planning Guide can be found in Protocol Section 2, Definitions and Acronyms. The terms within this Section 2.1 contains terms not defined in Protocols.

#### LINKS TO DEFINITIONS:

[A](#), [B](#), [C](#), [D](#), [E](#), [F](#), [G](#), [H](#), [I](#), [J](#), [K](#), [L](#), [M](#), [N](#), [O](#), [P](#), [Q](#), [R](#), [S](#), [T](#), [U](#), [V](#), [W](#), [X](#), [Y](#), [Z](#);

[List of Acronyms](#)

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## M

### **Manual System Adjustment**

Operator actions, with consequences allowed by Section 4, Transmission Planning Criteria, in response to an outage in the ERCOT System, including, but not limited to circuit switching or changes to schedules of Generation Resources, but excluding the physical repair or replacement of any damaged equipment.

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## **2.2 ACRONYMS AND ABBREVIATIONS**

<b>CY</b>	Current Year
<b>FIS</b>	Full Interconnection Study
<b>FY</b>	Future Year
<b>GIC</b>	Geomagnetically-Induced Current
<b>GMD</b>	Geomagnetic Disturbance
<b>GINR</b>	Generation Interconnection or Change Request
<b>LTSA</b>	Long-Term System Assessment
<b>SSR</b>	Subsynchronous Resonance
<b>TCEQ</b>	Texas Commission on Environmental Quality

# **ERCOT Planning Guide**

## **Section 3: Regional Planning**

**September 14, 2017**

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## **3 REGIONAL PLANNING**

### **3.1 Communications**

#### **3.1.1 *Overview of Major Transmission Planning Activities***

- (1) The process of planning a reliable and efficient transmission system for the ERCOT Region is composed of several types of activities and studies.
- (2) The effective date for the Year 6 case is the 2014 Steady State Working Group (SSWG) Data Set B base case release date. Consideration of the Year 6 case in the Regional Transmission Plan is required starting in 2014.

##### **3.1.1.1 Long-Term System Assessment**

- (1) The Long-Term System Assessment (LTSA) is performed by ERCOT in coordination with the Regional Planning Group (RPG) on a biennial basis (in even-numbered years) and reviewed annually. The study uses scenario analysis techniques to assess the potential needs of the ERCOT System up to 20 years into the future. The role of the LTSA is not to recommend the construction of specific system upgrades, due to the high degree of uncertainty associated with the amount and location of loads and Resources in this timeframe. Instead, the role of the LTSA is to evaluate the system upgrades that are indicated under each of a wide variety of scenarios in order to identify upgrades that are robust across a range of scenarios or might be more economic than the upgrades that would be determined considering only needs of Years 1 to 6 in the Regional Transmission Plan development.

##### **3.1.1.2 Regional Transmission Plan**

- (1) The Regional Transmission Plan is developed annually by ERCOT, in coordination with the RPG and Transmission Service Providers (TSPs). The Regional Transmission Plan addresses regional and ERCOT-wide reliability and economic transmission needs and the planned improvements to meet those needs for the upcoming six years starting with the SSWG base cases. These planned improvements include projects previously approved by the ERCOT Board, projects previously reviewed by the RPG, new projects that will be refined at the appropriate time by TSPs in order to complete RPG review, and the local projects currently planned by TSPs. Combined, these projects represent ERCOT's plan which addresses the reliability and efficiency of the ERCOT System in order to meet North American Electric Reliability Corporation (NERC) Reliability Standards, the Protocols, Operating Guides and this Planning Guide. Projects that are included in the Regional Transmission Plan are not considered to have been endorsed by ERCOT until they have undergone the appropriate level of RPG Project Review as outlined in Protocol Section 3.11.4, Regional Planning Group Project Review Process, if required. The

process used by ERCOT to develop the Regional Transmission Plan is outlined in Section 3.1.4, Regional Transmission Plan Development Process.

- (2) ERCOT shall post the Regional Transmission Plan to the Market Information System (MIS) Secure Area by December 31 of each year.
- (3) ERCOT shall include in the Regional Transmission Plan report a list of Transmission Facilities that are loaded above 95% of their applicable Ratings for the following conditions:
  - (a) Normal system conditions; or
  - (b) Following the contingency loss of a single generating unit, transmission circuit, transformer, or common tower outage.

#### **3.1.1.3 Regional Planning Group Project Reviews**

- (1) Except for minor transmission projects that have only localized impacts and projects that are directly associated with the interconnection of new Generation Resources, all transmission projects in the ERCOT Region undergo a formal review by the RPG in accordance with Protocol Section 3.11.4, Regional Planning Group Project Review Process. In addition, ERCOT performs an independent analysis of the need for major transmission projects that are submitted for RPG Project Review. The affirmative result of this review is formal endorsement of the project by ERCOT. This ERCOT project endorsement is intended to support, to the extent applicable, a finding by the Public Utility Commission of Texas (PUCT) that a project is necessary for the service, accommodation, convenience, or safety of the public within the meaning of Public Utility Regulatory Act, TEX. UTIL. CODE ANN. § 37.056 (Vernon 1998 and Supp. 2007) and P.U.C. SUBST. R. 25.101, Certification Criteria.

#### **3.1.1.4 Generation Interconnection Process**

- (1) This process facilitates the interconnection of new generation units in the ERCOT Region by assessing the transmission upgrades necessary for new generating units to operate reliably. The process to study interconnecting new generation or modifying an existing generation interconnection to the ERCOT Transmission Grid is covered in Section 5, Generation Resource Interconnection or Change Request. The generation interconnection study process primarily covers the direct connection of generation Facilities to the ERCOT Transmission Grid and directly-related projects. Additional upgrades to the ERCOT Transmission Grid that might be cost-effective as a result of new or modified generation may be initiated by any stakeholder through the RPG Project Review procedure described in Protocol Section 3.11.4, Regional Planning Group Project Review Process, at the appropriate time, subject to the confidentiality provisions in Section 5.

***[PGRR057: Insert Section 3.1.1.5 below upon system implementation:]***

### **3.1.1.5 Geomagnetic Disturbance (GMD) Vulnerability Assessment**

- (1) The purpose of the Geomagnetic Disturbance (GMD) vulnerability assessment is to provide a coordinated assessment and corrective action plan(s) for the ERCOT System to meet ERCOT and NERC GMD reliability performance criteria for a GMD event. The most recent Geomagnetically-Induced Current (GIC) system models developed and maintained by ERCOT in conjunction with the TSPs and Resource Entities as described in Section 6.11, Process for Developing Geomagnetically-Induced Current (GIC) System Models, shall be used as the basis for the ERCOT GMD vulnerability assessment. Projects that are included in the corrective action plan(s) are not considered to have been endorsed by ERCOT until they have undergone the appropriate level of RPG Project Review as outlined in Protocol Section 3.11.4, Regional Planning Group Project Review Process, if required. The process used by ERCOT to develop the GMD vulnerability assessment is outlined in Section 3.1.8, Planning Geomagnetic Disturbance (GMD) Activities.

### **3.1.2 Regional Planning Group Project Submission**

- (1) Transmission projects that are proposed for RPG Review, pursuant to Protocol Section 3.11.4.1, Project Submission, shall be submitted according to the provisions outlined in Section 3.1.2.1, All Projects, through 3.1.2.3, Other Information.

#### **3.1.2.1 All Projects**

- (1) The submittal of each transmission project (60 kV and above) for RPG Project Review should include the following elements:
  - (a) The proposed project description including expected cost, feasible alternative(s) considered, transmission topology and Transmission Facility modeling parameter data, and all study cases used to generate results supporting the need for the project in electronic format (powerflow data should be in PTI PSS/E RAWD format). Also, the submission should include accurate maps and one-line diagrams showing locations of the proposed project and feasible alternatives (AutoCad-compatible format preferred);
  - (b) Identification of the SSWG base cases or Regional Transmission Plan powerflow cases used as a basis for the study and any associated changes that describe and allow accurate modeling of the proposed project;

- (c) Description and data for all changes made to the SSWG base cases or Regional Transmission Plan cases used to identify the need for the project, such as Generation Resource unavailability and area peak Load forecast;
- (d) A description of the reliability and/or economic problem that is being solved;
- (e) A description of the Subsynchronous Resonance (SSR) impact of the proposed project to the generation facilities in the system pursuant to Protocol Section 3.22.1, Subsynchronous Resonance Vulnerability Assessment, and potential SSR Countermeasure plan for any identified SSR vulnerability, if applicable;
- (f) Desired/needed in-service date for the project, and feasible in-service date, if different; and
- (g) The phone number and email address of the single point of contact who can respond to ERCOT and RPG participant questions or requests for additional information necessary for stakeholder review.

#### **3.1.2.2 Projects That Are Not Included in the Current Regional Transmission Plan**

- (1) For projects that are not included in the current Regional Transmission Plan, the following elements should be included in the submission. While it is not necessary, if any of these additional elements are available for projects that are included in the Regional Transmission Plan, they should be included in the submittal of these projects as well.
  - (a) Analysis of rejected alternatives, including cost estimates, effect upon transfer capability, and other factors considered in the comparison of alternatives with the proposed project;
  - (b) Assumptions modeled in performance studies such that credible performance deficiencies can be identified through study;
  - (c) Results of performance analyses that are consistent with system operating practices and procedures; and
  - (d) Documentation of the process used to identify specific performance deficiencies (reliability and economic).
- (2) Both transmission and non-transmission solutions to performance deficiencies may be considered where applicable.

### 3.1.2.3 Other Information

- (1) If there is any other information, not included above, that the submitter believes is relevant to consideration of the need for any submitted project, they should include that information in the project submission.

### 3.1.3 Project Evaluation

- (1) ERCOT and the RPG shall evaluate proposed transmission projects using a variety of tools and techniques as needed to ensure that the system is able to meet applicable reliability criteria in a cost-effective manner. For most proposed projects, several alternatives will be identified to meet the reliability criteria or other performance improvement objectives that the proposed project is designed to meet. The project alternative with the expected lowest cost over the life of the project is generally recommended, subject to consideration of the expected long-term system needs in the area, and consideration of the relative operational impacts of the alternatives.
- (2) In some cases, one alternative may be to dispatch the system in such a way that all reliability requirements are met, even without the proposed transmission project or any transmission alternative, resulting in a less efficient dispatch than what would be required to meet the reliability requirements if the proposed project was in place. Consideration of the merits of this alternative relative to the proposed transmission project is more complex. To facilitate the discussion and consideration of these alternatives, ERCOT has adopted certain definitions and practices, described in paragraph (4) of Protocol Section 3.11.2, Planning Criteria, and Sections 3.1.3.1, Definitions of Reliability-Driven and Economic-Driven Projects, and 3.1.3.2, Reliability-Driven Project Evaluation below.
- (3) In conducting an independent review of any project, ERCOT may, in its discretion, make adjustments to the planning case to ensure that the case reaches a solution. When conducting an independent review of any project classified as Tier 1 pursuant to Protocol Section 3.11.4, Regional Planning Group Project Review Process, ERCOT must provide reasonable advance notice to the RPG of any proposed adjustments and an opportunity for stakeholder comment on them.
- (4) As part of its independent review of any project classified as Tier 1 pursuant to Protocol Section 3.11.4, ERCOT shall:
  - (a) Perform a generation sensitivity analysis. The generation sensitivity analysis will evaluate the effect that proposed Generation Resources in or near the study area will have on a recommended transmission project. Generation Resources that have signed Standard Generation Interconnection Agreements (SGIAs) but were not included in the study cases because they did not meet all of the requirements for inclusion in the cases pursuant to Section 6.9, Addition of Proposed Generation to the Planning Models, will be included in the sensitivity analysis. ERCOT shall not consider the results of the generation sensitivity analysis in determining project need during its independent review of the project; and

- (b) Evaluate impacts related to the Load scaling used in the study on any constraints resulting in project recommendations. The results of this evaluation shall be included in the final recommendations in the independent review.

### **3.1.3.1 Definitions of Reliability-Driven and Economic-Driven Projects**

- (1) Proposed transmission projects are categorized for evaluation purposes into two types:
  - (a) Reliability-driven projects; and
  - (b) Economic-driven projects.
- (2) The differentiation between these two types of projects is based on whether a simultaneously-feasible, security-constrained generating unit commitment dispatch is expected to be available for all hours of the planning horizon that can resolve the system reliability issue that the proposed project is intended to resolve. If it is not possible to simulate a dispatch of the Generation Resources such that all reliability criteria are met without the project, and the addition of the project allows the reliability criteria to be met, then the project is classified as a reliability-driven project. If it is possible to simulate a dispatch of the Generation Resources in such a way that all reliability criteria are met without the project, but the project may allow the reliability criteria to be met at a lower total cost, then the project is classified as an economic-driven project. When performing a simulation of the generating unit commitment and dispatch, only contingencies and limits that would be considered in the operations horizon shall be simulated.

### **3.1.3.2 Reliability-Driven Project Evaluation**

- (1) For reliability-driven projects, the comparison of project costs generally includes only the relative capital costs of the alternatives. In the case of Tier 1 and 2 projects, any differences in expected ERCOT System production costs between the alternatives may be included in the consideration of the relative costs of the alternatives, due to larger potential impacts on losses and congestion of these projects.

### **3.1.4 Regional Transmission Plan Development Process**

- (1) As prescribed by Section 3.1.1.2, Regional Transmission Plan, the purpose of the Regional Transmission Plan is to provide a coordinated plan for the ERCOT System. This Section describes the process used by ERCOT to develop the Regional Transmission Plan. While unanticipated changes in Load and generation may require additional projects to be needed that were not included in the current Regional Transmission Plan, or require additional evaluation of projects included in the current Regional Transmission Plan when they are submitted for RPG Project Review, the Regional Transmission Plan provides a reasonable and supportable basis for analyses of the planned ERCOT Transmission Grid.

### **3.1.4.1 Development of Regional Transmission Plan**

- (1) The planning process begins with computer modeling studies of the generation and Transmission Facilities and substation Loads under normal conditions in the ERCOT System. Contingency conditions along with changes in Load and generation that might be expected to occur in operation of the ERCOT Transmission Grid are also modeled. To maintain adequate service and minimize interruptions during Outages, model simulations are used to identify adverse results based upon the planning criteria and to examine the effectiveness of various problem-solving alternatives.
- (2) The effectiveness of each alternative will be evaluated under a variety of possible operating environments because Loads and operating conditions cannot be predicted with certainty. As a result, repeated simulations under different conditions are often required. In addition, options considered for future installation may affect other alternatives so that several different combinations must be evaluated, thereby multiplying the number of simulations required.
- (3) Once feasible alternatives have been identified, the process is continued with a comparison of those alternatives. To determine the most favorable, the short-range and long-range benefits of each alternative must be considered including operating flexibility and compatibility with future plans.

#### **3.1.4.1.1 Regional Transmission Plan Cases**

- (1) The starting base cases for the Regional Transmission Plan development are created by removing all Tier 1, 2, and 3 projects that have not received RPG acceptance or, if applicable, ERCOT endorsement from the most recent SSWG base cases.
- (2) ERCOT shall set all non-seasonal Mothballed Generation Resources to out of service in the Regional Transmission Plan reliability base cases. ERCOT shall add proposed Generation Resources that have met the criteria for inclusion in Section 6.9, Addition of Proposed Generation to the Planning Models, to the Regional Transmission Plan base cases.
- (3) ERCOT shall update the Regional Transmission Plan reliability and economic base cases to reflect any updates to the amount of Switchable Generation Resource capacity available to the ERCOT Region.
- (4) ERCOT may, in its discretion, make other adjustments to any Regional Transmission Plan base case to ensure that the case reaches a solution. ERCOT must provide reasonable advance notice to the RPG of any proposed adjustments and an opportunity for stakeholder comment on them.



### 3.1.4.2 Use of Regional Transmission Plan

- (1) If a project submitted for RPG review is included in the Regional Transmission Plan, and no changes are identified which would affect the need for the proposed project through the 21-day comment period described in Section 3.1.5, Regional Planning Group Comment Process, then the Regional Transmission Plan may serve as the ERCOT Independent Review of the proposed project, if required.
- (2) Tier 1, 2, and 3 projects that are included in the Regional Transmission Plan should be submitted for RPG Project Review at an appropriate lead time. Generally, this lead time should be sufficient to allow the review to be completed before the TSP reaches the decision point at which it must initiate the engineering and procurement in order to meet the required in-service date, but not farther in advance than is necessary. In general, these lead times will be three to four months for Tier 3 projects and six to seven months for Tier 1 and 2 projects.
- (3) Tier 1, 2, and 3 projects that are included in the Regional Transmission Plan but do not reach this decision point before the development of the next year's Regional Transmission Plan begins will be removed from the case used to develop the Regional Transmission Plan and will be re-evaluated as a part of the development of this subsequent Regional Transmission Plan.

### 3.1.5 Regional Planning Group Comment Process

- (1) Any stakeholder may initiate an RPG project as accordance with Protocol Section 3.11.4.1, Project Submission. The RPG Project Review procedure is designed to review projects in a manner commensurate with the cost and impact to the market and to system reliability of the project, based on the Tier into which the project is grouped. The RPG Project Review procedure for submitted projects in all Tiers consists of the following steps.
  - (a) ERCOT will provide electronic copies of RPG Project Review submittals to the RPG within seven days of receipt and solicit comments or questions from the RPG;
  - (b) All concerns/questions or objections about the submitted project by any stakeholder or ERCOT should be submitted to the RPG within 21 days after ERCOT's transmittal to the RPG;
  - (c) Each Entity providing comments should provide a "single" complete comment about each project by the end of the 21-day review period rather than sending multiple comments at various times or from various individuals. A single comment will help ERCOT and the project submitter keep track of the comments and develop an appropriate response;
  - (d) Any questions related to data deficiency should be submitted to ERCOT and the submitter immediately;

- (e) If concerns or objections about a project are received, the project will be put into “study mode” until all concerns are resolved or until ERCOT assesses that a reasonable effort has been made to resolve all concerns, generally no more than an additional 28 days;
- (f) Project submitters should answer all questions and respond to all concerns in a timely manner;
- (g) Comments should be based on Good Utility Practice and sound engineering judgment. Suggestions should be able to be implemented by the TSP constructing and operating the project; and
- (h) ERCOT will post all project submissions, the comments received, and other information and databases associated with submitted transmission projects on its website.

### **3.1.6 *Notify PUCT of Recommended Transmission Projects***

- (1) ERCOT will notify the PUCT of the disposition of all Tier 1 or 2 projects and of the designated TSPs for those projects. ERCOT will then support ERCOT-endorsed projects in future Certificate of Convenience and Necessity (CCN) proceedings required for those projects through the use of filed supporting documents and testimony if necessary.

***[PGRR042: Insert Section 3.1.7 below on January 1, 2018:]***

### **3.1.7 *Steady State Transmission Planning Load Forecast***

- (1) ERCOT shall use the following process for determining the Load level to be used in the starting base cases for the Regional Transmission Plan and in the steady-state evaluation of a Tier 1 project pursuant to Protocol Section 3.11.4, Regional Planning Group Project Review Process:
  - (a) ERCOT will compare the ERCOT 90/10 Load forecast with the summed SSWG bus-level Load forecast for each Weather Zone.
  - (b) If the ERCOT 90/10 Load forecast is higher, ERCOT will use this forecast for the Weather Zone.
  - (c) If the SSWG Load forecast is higher than or equal to the ERCOT 90/10 Load forecast, but below the ERCOT 90/10 Load forecast plus a boundary threshold determined in accordance with paragraph (f) below, ERCOT will use the SSWG Load forecast for the Weather Zone.
  - (d) If the SSWG Load forecast is higher than or equal to the ERCOT 90/10 Load forecast plus the boundary threshold, ERCOT will use the ERCOT 90/10 Load

forecast plus the boundary threshold for the Weather Zone.

- (e) If a TSP(s) believes that the ERCOT 90/10 Load forecast plus the boundary threshold does not adequately represent the Weather Zone or an area within the Weather Zone, the TSP(s) may present ERCOT with additional information to justify using a higher Load forecast, including the SSWG Load forecast, for that Weather Zone. ERCOT, in its sole discretion, may choose to use a higher Load forecast than indicated in paragraph (d) above if it reasonably determines that the Load forecast indicated in paragraph (d) above does not adequately represent the Weather Zone or an area within the Weather Zone. If ERCOT uses a Load forecast higher than the ERCOT 90/10 Load forecast plus the boundary threshold in the evaluation of a Tier 1 project, ERCOT must explain and document the basis for that choice, using aggregated information as needed to shield Protected Information, in its independent review.
- (f) ERCOT-proposed revisions to the boundary threshold used to implement the requirements of this section will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board.

***[PGRR057: Insert Section 3.1.8 below upon system implementation:]***

### **3.1.8 Planning Geomagnetic Disturbance (GMD) Activities**

- (1) As required by the applicable NERC Reliability Standard, ERCOT shall employ the GIC system models described in Section 6.11, Process for Developing Geomagnetically-Induced Current (GIC) System Models, to perform simulations to identify maximum effective GIC flow in the high side wye-grounded transformers for the worst case geoelectric field orientation for the benchmark GMD event. ERCOT shall provide the preliminary GIC flow results to the TSPs and Resource Entities for comment before finalizing the results. Upon consideration of the comments, ERCOT shall make the maximum effective GIC flows in the high side wye-grounded transformers available to TSPs and Resource Entities by posting this data on the ERCOT MIS Secure Area.
  - (a) Upon written request from the TSP or Resource Entity who owns a high side wye-grounded transformer within the ERCOT planning area that is included in the ERCOT GIC system models, ERCOT shall perform simulations to make effective GIC time series available no later than 90 calendar days after ERCOT's receipt of such written requests.
- (2) Each TSP and Resource Entity that owns a high side wye-grounded transformer(s) within the ERCOT planning area shall perform transformer thermal impact assessments as required in the applicable NERC Reliability Standard and shall provide to ERCOT any suggested actions to mitigate the impact of GICs on its transformers.
- (3) ERCOT and the TSPs shall develop for approval by the Technical Advisory Committee

(TAC), criteria for acceptable steady-state voltage performance during the benchmark GMD event.

- (4) ERCOT shall perform the ERCOT GMD vulnerability assessment as required in the applicable NERC Reliability Standard. ERCOT shall provide preliminary GMD vulnerability assessment results to the TSPs and Resource Entities for comment before finalizing the results. Upon request, ERCOT shall make available to the TSPs the GIC system models and other model information used for the GMD vulnerability assessment, including suggested actions described in paragraph (2) of Section 3.1.8.
- (5) ERCOT and the TSPs shall develop and document corrective action plan(s) as required in the applicable NERC Reliability Standard.
- (6) ERCOT shall post the GMD vulnerability assessment report and corrective action plan(s) on the ERCOT MIS Secure Area.

**ERCOT Planning Guide**  
**Section 4: Transmission Planning Criteria**

May 1, 2015

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## **4 TRANSMISSION PLANNING CRITERIA**

### **4.1 Introduction**

- (1) ERCOT employs both reliability criteria and economic criteria in evaluating the need for transmission system improvements. The economic criteria are included in Protocol Section 3.11.2, Planning Criteria. This Planning Guide provides the reliability criteria.
- (2) The ERCOT System consists of those generation and Transmission Facilities (60 kV and higher voltages) that are controlled by individual Market Participants and that function as part of an integrated and coordinated system.
- (3) To maintain reliable operation of the ERCOT System, it is necessary that all stakeholders observe and subscribe to certain minimum planning criteria. The criteria set forth in this Section 4.1 constitute the aforementioned minimum planning criteria. Tests outlined herein shall be performed to determine conformance to these minimum criteria; however, ERCOT recognizes that events more severe than those outlined in these criteria could cause grid separation and other tests may also be performed.
- (4) The complexity and uncertainty inherent in the planning and operation of the ERCOT System make exhaustive studies impracticable; therefore, to gain maximum benefit from the limited number of tests performed, the selection of the specific tests and the frequency of their performance will be made solely upon the basis of the expected value of the reliability information obtainable from the test.
- (5) ERCOT shall perform steady-state, short circuit, and dynamic analyses appropriate to ensure the reliability of the ERCOT System and identify appropriate solutions.
- (6) Each Transmission Service Provider (TSP) will perform steady-state, short circuit, and dynamic analyses appropriate to ensure the reliability of its portion of the ERCOT System and implement appropriate solutions to meet the reliability performance criteria in this Section 4.1.
- (7) The base cases created by the Steady-State Working Group (SSWG) and System Protection Working Group (SPWG) are available for use by Market Participants.
- (8) If a TSP has its own planning criteria in addition to those defined in this Planning Guide, the TSP shall provide documentation of those criteria to ERCOT. ERCOT shall post the documentation on the Market Information System (MIS) Secure Area. The TSP shall notify ERCOT of any changes to their planning criteria and provide revised documentation within 30 days of such change.

### **4.1.1 Reliability Criteria**

#### **4.1.1.1 Planning Assumptions**

- (1) A contingency loss of an element includes the loss of an element with or without a single line-to-ground or three-phase fault.
- (2) A common tower outage is the contingency loss of a double-circuit transmission line consisting of two circuits sharing a tower for 0.5 miles or greater.
- (3) Unavailability of a single generating unit includes an entire Combined Cycle Train, if no part of the train can operate with one of the units Off-Line as provided in the Resource Registration data.
- (4) The contingency loss of a single generating unit shall include the loss of an entire Combined Cycle Train, if that is the expected consequence.
- (5) The following assumptions may be applied to the SSWG base cases for use in planning studies:
  - (a) Reasonable variations of Load forecast;
  - (b) Reasonable variations of generation commitment and dispatch applicable to transmission planning analyses on a case-by-case basis may include, but are not limited to, the following methods:
    - (i) Production cost model simulation, security constrained optimal power flow, or similar modeling tools that analyze the ERCOT System using hourly generation dispatch assumptions;
    - (ii) Modeling of high levels of intermittent generation conditions; or
    - (iii) Modeling of low levels of or no intermittent generation conditions.

#### **4.1.1.2 Reliability Performance Criteria**

- (1) The following performance criteria (summarized in Table 1, ERCOT-specific Reliability Performance Criteria, below) shall be applicable to planning analyses in the ERCOT Region:
  - (a) With all Facilities in their normal state, following a common tower outage, all Facilities shall be within their applicable Ratings, the ERCOT System shall remain stable with no cascading or uncontrolled Islanding, and there shall be no non-consequential Load loss.



- (b) With any single generating unit unavailable, followed by Manual System Adjustments, followed by a common tower outage, all Facilities shall be within their applicable Ratings, the ERCOT System shall remain stable with no cascading or uncontrolled Islanding, and there shall be no non-consequential Load loss.
- (c) With any single 345/138 kV transformer unavailable, followed by Manual System Adjustments, followed by a common tower outage, or the contingency loss of a single generating unit, transmission circuit, transformer, shunt device, or FACTS device, all Facilities shall be within their applicable Ratings, the ERCOT System shall remain stable with no cascading or uncontrolled Islanding, and there shall be no non-consequential Load loss. An operational solution may be planned on a permanent basis to resolve a performance deficiency under this condition.
- (d) Assessments, including proposed solutions, associated with criteria in paragraph (c), above, and line 3 of Table 1 below, shall be completed by no later than May 1, 2015.

Initial Condition		Event	Facilities within Applicable Ratings and System Stable with No Cascading or Uncontrolled Outages	Non-consequential Load Loss Allowed
1	Normal System	Common tower outage	Yes	No
2	Unavailability of a generating unit, followed by Manual System Adjustments	Common tower outage	Yes	No
3	Unavailability of a 345/138 kV transformer, followed by Manual System Adjustments	Common tower outage; or Contingency loss of one of the following: 1. Generating unit; 2. Transmission circuit; 3. Transformer; 4. Shunt device; or 5. FACTS device	Yes	No

Table 1: ERCOT-specific Reliability Performance Criteria

- (2) ERCOT and the TSPs shall endeavor to resolve any performance deficiencies as appropriate. If a Transmission Facility improvement is required to meet the criteria in

this Section 4.1.1.2, but the improvement cannot be implemented in time to resolve the performance deficiency, an interim solution may be used to resolve the deficiency until the improvement has been implemented.

#### **4.1.1.3 Voltage Stability Margin**

In conducting its planning analyses, ERCOT and each TSP shall ensure that the voltage stability margin is sufficient to maintain post-transient voltage stability under the following study conditions for each ERCOT or TSP-defined area:

- (a) A 5% increase in Load above expected peak supplied from resources external to the ERCOT or TSP-defined areas and operating conditions in categories P0 and P1 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements; and
- (b) A 2.5% increase in Load above expected peak supplied from resources external to the ERCOT or TSP-defined areas and operating conditions in categories P2 through P7 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements.

#### **4.1.1.4 Steady State Voltage Response Criteria**

In conducting its planning analyses, ERCOT and each TSP shall ensure that all transmission level buses above 100 kV meet the following steady state voltage response and post-contingency voltage deviation criteria:

- (1) 0.95 per unit to 1.05 per unit in the pre-contingency state following the occurrence of any operating condition in category P0 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements.
- (2) 0.90 per unit to 1.05 per unit in the post-contingency state following the occurrence of any operating condition in categories P1 through P7 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements.
- (3) Following the occurrence of any operating condition in categories P1 through P7 of the NERC Reliability Standard further analysis to assess voltage stability is required in the event of a post-contingency steady-state voltage deviation that exceeds 8% at any load-serving bus above 100 kV, exclusive of buses on a radial system that serve only Resource Entities and/or Load. After further analysis, ERCOT and the TSPs shall endeavor to resolve any voltage instability.

If a TSP has communicated to ERCOT that a Facility has unique characteristics and may operate outside of the above ranges and deviation (e.g. Facilities located near a series capacitor) or that the Facility needs to be operated in a more restrictive range (e.g. a nuclear plant, UVLS relay

settings) or its system is designed to operate with different voltage limits or voltage deviation then the TSP's specified limits will be considered acceptable.

#### **4.1.1.5 Transient Voltage Response Criteria**

In conducting its planning analyses, ERCOT and each TSP shall ensure that all transmission level buses above 100 kV meet the following transient voltage response criteria:

- (1) For any operating condition in category P1 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, voltage shall recover to 0.90 p.u. within five seconds after clearing the fault.
- (2) For any operating condition in categories P2 through P7 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, voltage shall recover to 0.90 p.u. within ten seconds after clearing the fault.

#### **4.1.1.6 Damping Criteria**

In conducting its planning analyses, ERCOT and each TSP shall ensure that, for any operating condition in categories P1 through P7 of the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, ERCOT and each TSP shall ensure that power oscillation within the range of 0.2 Hz to 2 Hz decays with a minimum 3% damping ratio.

# **ERCOT Planning Guide**

## **Section 5: Generation Resource Interconnection or Change Request**

September 14, 2017

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## **5 GENERATION RESOURCE INTERCONNECTION OR CHANGE REQUEST**

### **5.1 Introduction**

- (1) This Section 5, Generation Resource Interconnection or Change Request, defines the requirements and processes used to facilitate new or modified generation interconnections with the ERCOT System. The requirements outlined in this Section 5 are designed to:
  - (a) Determine the facilities required to directly interconnect new or modified generation to the ERCOT System;
  - (b) Ensure that the interconnection of the new or modified generation is accomplished in a manner that maintains the reliability of the ERCOT System and is in compliance with the North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, this Planning Guide and the Operating Guides;
  - (c) Increase the quality of communications between Interconnecting Entities (IEs), Transmission Service Providers (TSPs), and ERCOT;
  - (d) Provide for the best available information on future capacity additions for use in identifying, forecasting, and analyzing both short and long-range ERCOT capabilities, demands, and reserves; and
  - (e) Provide accurate initial data about the proposed Generation Resource to ERCOT to ensure that ERCOT and stakeholders have the information necessary for planning purposes.
- (2) The requirements and processes in this Section 5 conform to all applicable Public Utility Commission of Texas (PUCT) rules, NERC Reliability Standards, Protocols, and provisions in this Planning Guide and the Operating Guides. In the event of a conflict between this Section 5 and any PUCT rules, NERC Reliability Standards, and the Protocols, then such PUCT rules, NERC Reliability Standards, or Protocols shall control.

#### **5.1.1 *Applicability***

- (1) The requirements in this Section 5, Generation Resource Interconnection or Change Request, are applicable, to the following:
  - (a) Any Entity proposing a new All-Inclusive Generation Resource, including a storage device, with an aggregate power output (gross Generation Resource output minus auxiliary Load directly related to the Generation Resource) of ten MW or greater, planning to interconnect to transmission in the ERCOT System; or

- (b) Resource Entities that are seeking to:
  - (i) Upgrade the summer or winter Net Dependable Capability of an All-Inclusive Generation Resource by ten MW or greater within a single year;
  - (ii) Re-power an All-Inclusive Generation Resource of ten MW or greater; or
  - (iii) Change or add a Point of Interconnection (POI) of an All-Inclusive Generation Resource of ten MW or greater.
- (2) Interconnection requirements for on-site Distributed Generation (DG) are not subject to this Section 5 but are addressed in P.U.C. SUBST. R. 25.211, Interconnection of On-Site Distributed Generation (DG), and P.U.C. SUBST. R. 25.212, Technical Requirements for Interconnection and Parallel Operation of On-Site Distributed Generation.

### **5.1.2 Responsibilities**

- (1) In accordance with this Planning Guide, an IE is responsible for providing generator model and data, adhering to timelines specified herein, analyzing and installing protective Facilities to protect its equipment, and installing Facilities as identified by ERCOT or the interconnecting TSP if required to protect Transmission Elements from hazards created by the proposed Generation Resource.
- (2) In accordance with this Planning Guide, ERCOT is responsible for coordinating studies, identifying potential reliability risks to the ERCOT Transmission Grid, and reviewing the proposed Generation Resource design for compliance with any operational standards established in the Protocols, this Planning Guide, Nodal Operating Guides, and Other Binding Documents.
- (3) TSPs are responsible for conducting and reviewing Generation Interconnection or Change Requests (GINRs) as described in Section 5.4.2.1, Full Interconnection Study Process Overview.
- (4) With respect to Subsynchronous Resonance (SSR) issues, an IE shall be responsible for installing appropriate SSR Countermeasures pursuant to Protocol Section 3.22.1, Subsynchronous Resonance Vulnerability Assessment.

## **5.2 Generation Interconnection Process**

- (1) The ERCOT generation interconnection process is designed in accordance with P.U.C. SUBST. R. 25.198, Initiating Transmission Service, which delegates to ERCOT the responsibility for implementing the transmission interconnection process.

**5.2.1      *Generation Interconnection or Change Request Application***

- (1) Any Entity seeking to interconnect a new All-Inclusive Generation Resource of ten MW or greater to the ERCOT System, upgrade the summer or winter Net Dependable Capability of an All-Inclusive Generation Resource by ten MW or greater within a single year, re-power an All-Inclusive Generation Resource of ten MW or greater, or change or add a Point of Interconnection (POI) of an All-Inclusive Generation Resource of ten MW or greater, as described in Section 5.1.1, Applicability, must submit the required Resource Registration data, in the format prescribed by ERCOT, available on the Market Information System (MIS) Public Area, and pay the applicable fees described in Section 5.7.2, Interconnection Study Fees.
- (2) All Generation Interconnection or Change Request (GINR) applications and supporting data submissions shall be delivered to ERCOT by email to [GINR@ercot.com](mailto:GINR@ercot.com). Applications and supporting data shall be sent as discrete file attachments. The application with signature may be submitted in PDF form if desired but the supporting data shall be sent as a Microsoft Excel file attachment so that data may be easily extracted to reduce transcription errors.
- (3) All GINR applications sent via email shall have the words “Generation Interconnection or Change Request” in the first line of the address field or in the subject field of an email request.
- (4) The Interconnecting Entity (IE) shall include in the GINR application all information necessary to allow for timely development, design, and implementation of any electric system improvements or enhancements required by ERCOT and the Transmission Service Provider (TSP) to reliably meet the interconnection requirements of the proposed Generation Resource. This information shall be of sufficient detail for use in determining transfer capabilities, operating limits (including stability), and planning margins to provide both reliability and operating efficiency as well as facilitating coordinated planning for future transmission system additions.
- (5) ERCOT will notify the IE within seven Business Days through telephone call or email if the GINR application fails to include the applicable fees or the information that is necessary to perform the initial screening interconnection studies.
- (6) If the IE fails to respond to ERCOT’s inquiries within ten Business Days, the GINR will be deemed incomplete and rejected. ERCOT shall notify the IE if such condition occurs.
- (7) Once the application has been deemed materially complete, ERCOT will date-stamp the application, add the interconnection request to the ERCOT interconnection list, and notify the IE of receipt of the completed application within ten Business Days. The IE should note that the date stamp is not a reservation of transmission capacity, either planned or unplanned.
- (8) An ERCOT designated point of contact will be assigned to oversee the interconnection study process and answer questions concerning the interconnection screening study and process. Once assigned, the ERCOT designated point of contact will contact the IE and



will be the primary ERCOT contact for interconnection studies. If during the course of the studies, additional information is needed by ERCOT from the IE, ERCOT will immediately notify the IE and the IE will have ten Business Days to answer the request for additional information without impacting the study timeline.

- (9) Prior to the initial contact from the ERCOT designated point of contact, IEs should direct questions concerning the generation interconnection or change process to [GINR@ercot.com](mailto:GINR@ercot.com). The IE should contact its assigned Wholesale Client Services Representative with any queries that are not related to the interconnection studies.
- (10) If proposed Generation Resources that would use the same physical transmission interconnection are to be built in stages with in-service dates more than one year apart, each stage should be treated as a separate interconnection request but may be included in the same study.

### **5.2.2      *Generation Interconnection or Change Request Submission Requirements***

- (1) In order to consider the GINR, a Security Screening Study Fee shall be submitted to ERCOT along with the GINR application as prescribed in Section 5.2.1, Generation Interconnection or Change Request Application. The Security Screening Study Fee is non-refundable. The IE may wire funds to ERCOT to comply with the fee requirements.
- (2) For instructions on how to wire the funds to ERCOT, email [GINR@ercot.com](mailto:GINR@ercot.com) requesting the account and wiring information.
- (3) If submitting the payment via standard mail, email [GINR@ercot.com](mailto:GINR@ercot.com) to alert ERCOT to this method of submission. Checks shall be made payable to the Electric Reliability Council of Texas, Inc. (referencing GINR on the memo line) and mailed to the following address:

ERCOT Treasury  
RE: Generation Interconnection Request  
7620 Metro Center Drive  
Austin, TX 78744

- (4) ERCOT will assign a unique name to all GINRs according to the following convention:

#### **yrINRxxxxp**

where:      yr is the calendar year the generation is anticipated to be online  
              INR indicates interconnection request  
              xxxx is a sequence number beginning with 0001 (reset for each year)  
              p is an optional, sequential alphabetical identifier beginning with ‘a’ to be used for phased projects

- (5) All correspondence relating to a specific GINR, security screening or Full Interconnection Study (FIS) shall reference the unique project identification number once it has been assigned by ERCOT.

### **5.3 Full Interconnection Study Request**

- (1) Any Interconnecting Entity (IE) seeking a Full Interconnection Study (FIS) for interconnection to the ERCOT System must submit the following to ERCOT:
  - (a) A Notice to proceed with the FIS;
  - (b) Resource Registration data in the format prescribed by ERCOT with applicable information required for interconnection studies identified in the Resource Registration Glossary;
  - (c) A Stability Modeling Fee as prescribed in Section 5.7.3, Stability Modeling Fee;
  - (d) Proof of site control as described in Section 5.4.9, Proof of Site Control; and
  - (e) A declaration in Section 8, Attachment C, Declaration of Department of Defense Notification, certifying that:
    - (i) The IE has notified the Department of Defense (DOD) Siting Clearinghouse of the proposed Generation Resource and requested an informal or formal review as described in 32 C.F.R. § 211.1 (2013); or
    - (ii) The IE's proposed Generation Resource is not required to provide notice to the DOD and Federal Aviation Administration (FAA) because the project does not meet the criteria requiring notice to the FAA under 14 C.F.R. § 77.9 (2010).
- (2) Transmission Service Providers (TSPs) may charge additional fees for their interconnection studies.
- (3) All FIS requests and supporting data submissions shall be delivered to ERCOT by email. The supporting data shall be sent as discrete file attachments.
- (4) The IE shall include the associated project identification number (INR number) in the subject field of the email.
- (5) The IE shall include in the FIS request all information necessary to allow for timely development, design, and implementation of any electric system improvements or enhancements required by ERCOT and the TSP to reliably meet the interconnection requirements of the proposed generation. This information shall be of sufficient detail for use in determining transfer capabilities, operating limits (including stability), and planning margins to provide both reliability and operating efficiency as well as facilitating coordinated planning for future transmission system additions.

- (6) Upon receipt of the FIS request, the ERCOT designated point of contact will continue to be the primary ERCOT contact for the IE, ensuring Resource Registration data is communicated to the TSP. The ERCOT designated point of contact will initiate a meeting between the TSP(s) and the IE. If during the course of the studies, additional information is needed from the IE, ERCOT will immediately notify the IE and the IE will have ten Business Days to answer the request for additional information without impacting the study timeline.

### **5.3.1 Full Interconnection Study Submission Requirements**

- (1) When an FIS is requested, a Stability Modeling Fee must be submitted to ERCOT as prescribed by Section 5.7.3, Stability Modeling Fee. The Stability Modeling Fee is non-refundable. The IE may wire funds to ERCOT to comply with the fee requirements.
- (2) For instructions on how to wire the funds to ERCOT, send an email to [GINR@ercot.com](mailto:GINR@ercot.com) requesting the account and wiring information.
- (3) If submitting the payment via standard mail, please make the check payable to the Electric Reliability Council of Texas, Inc. Please contact [GINR@ercot.com](mailto:GINR@ercot.com) to alert ERCOT to this method of submission for the application.
- (4) Submission of the data via email shall be addressed to [GINR@ercot.com](mailto:GINR@ercot.com). All design data shall be submitted electronically.
- (5) The IE shall submit the Resource Registration data as specified in Section 5.7.1, Generation Resource Data Requirements, and as defined in the Resource Registration Glossary.
- (6) The Resource Registration data and all updates shall be submitted by the IE and sent to the assigned ERCOT designated point of contact and to [GINR@ercot.com](mailto:GINR@ercot.com). ERCOT will forward this information along with a change report to the TSP(s) for use in the FIS. The TSP may request additional information necessary to perform the FIS from the IE directly. The IE must provide this information to the TSP and ERCOT in order to facilitate the completion of the FIS in a timely manner.
- (7) The planning submissions of the Resource Registration data are considered planning data and shall accurately reflect the design of the facility. Please note this process does not satisfy the Resource Registration submissions requirements contained in the Protocols, but the use of this format is intended to facilitate the preparation of the data required for that process and the continuity of data between the interconnection study process and the data submitted for Resource Registration.

### **5.3.2 Modifications to Request Declarations of Resource Data Accuracy**

- (1) The IE shall maintain communication with ERCOT and the TSP at all stages of the generation interconnection process. As soon as possible, but in no event later than ten

Business Days after any relevant change, the IE shall notify both ERCOT (via email at [GINR@ercot.com](mailto:GINR@ercot.com)) and the TSP of any changes that would affect the technical attributes and/or timeline of the project.

- (2) The IE shall update the Resource Registration data as soon as possible, but no later than ten Business Days, following any change to the proposed facility and shall submit the updated information to ERCOT and the TSP. This obligation to update continues even after any interconnection agreement is signed.
- (3) Twice each year, each IE that has submitted an FIS request shall submit, for each proposed facility, the declaration in Section 8, Attachment A, Declaration of Resource Data Accuracy, stating that, as of the date of submission, the most recently submitted data on the current version of the Resource Registration form accurately reflects the anticipated characteristics of the proposed Resource. The declaration shall be executed by an officer or other person having authority to bind the company and shall be submitted to ERCOT via email at [GINR@ercot.com](mailto:GINR@ercot.com). Each IE shall submit one declaration for each project no earlier than March 1 and no later than March 15 each year, and shall submit another declaration for each proposed facility no earlier than September 1 and no later than September 15 each year.
- (4) If, after receipt of an updated Resource Registration data, ERCOT or the TSP determines that any subsequent changes to the project may affect the reliable operation of the ERCOT System or otherwise warrant new studies, then ERCOT may require additional studies to be performed before the proposed Generation Resource is allowed to interconnect to the ERCOT System. The IE and TSP(s) shall develop a schedule for completing the additional studies. The TSP shall provide the FIS studies to ERCOT and the other TSPs through the confidential email list. If these additional studies show that the project would not meet the operational standards specified in the Protocols, this Planning Guide, the Operating Guides, or Other Binding Documents, ERCOT may require the IE to demonstrate its compliance with these standards as a condition for energization of the proposed Generation Resource.
- (5) If the IE increases the requested amount of capacity of the proposed Generation Resource by more than 20% of the amount requested in the screening study, ERCOT shall require the IE to submit a new Generation Interconnection or Change Request (GINR) for the additional capacity or for the entire project. ERCOT may, at its discretion, require the IE to submit a new GINR for significant capacity decreases or capacity increases of less than 20%, particularly if other changes to the request are also made, such as changes to the Commercial Operations Date. ERCOT's determination as to whether new studies are needed in no way affects the ongoing obligations of the IE and TSP to comply with North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, this Planning Guide and the Operating Guides.
- (6) Within ten Business Days, the IE shall notify ERCOT and the relevant TSP(s) of any change in ownership and shall provide conclusive documentary evidence of the ownership change (such as a purchase/sale agreement or a document executed by both parties confirming the transaction).

- (7) To support ERCOT resource adequacy and NERC reliability assessment reporting requirements, the IE shall provide ERCOT with the following information for the proposed Generation Resource as soon as possible, but in no event later than ten Business Days after the information is available or has been updated:
- (a) Revisions to the initial projected Commercial Operations Date;
  - (b) Notification if any required air permits have been issued or permit applications have been withdrawn; and
  - (c) Notification and dates for when generator construction has commenced (defined as the start of site development) or been completed.

## **5.4 Study Processes and Procedures**

### **5.4.1 *Security Screening Study***

- (1) For each Generation Interconnection or Change Request (GINR), ERCOT will conduct a steady-state Security Screening Study, including power-flow and transfer studies, based on the expected in-service year to identify potential generation dispatch limitations based on the site proposed by the Interconnecting Entity (IE). The Security Screening Study is a high level review of the project and generally includes a number of initial assumptions from both ERCOT and the IE. In accordance with P.U.C. SUBST. R. 25.198, Initiating Transmission Service, ERCOT will establish the scope of the Security Screening Study that will include a determination of the need for a more in-depth Subsynchronous Resonance (SSR) study. The SSR vulnerability of all Generation Resources applicable under Section 5, Generation Resource Interconnection or Change Request, will be assessed pursuant to Protocol Section 3.22.1.2, Generation Resource Interconnection Assessment.
- (2) The results of the Security Screening Study will provide an indication of the level at which the proposed Generation Resource can expect to operate simultaneously with other known Generation Resources in the area before significant transmission additions or enhancements may be required. During the course of the Security Screening Study, ERCOT may consult with the affected Transmission Service Provider(s) (TSP(s)), if needed, to identify the most efficient means of providing transmission service.
- (3) During the Security Screening Study phase of the GINR process, and in accordance with the Protocols, all data, documents, and other information required by ERCOT from an IE related to a request for GINR are considered Protected Information pursuant to Protocol Section 1.3.1.1, Items Considered Protected Information, to the extent that such information is not otherwise publicly available. Accordingly, ERCOT shall not publicly release any of the protected data, documents, or other information during the Security Screening Study phase except to TSPs. Information about GINRs in the Security Screening Study phase will only be released publicly in aggregated amounts.

- (4) Upon completion of the Security Screening Study, ERCOT will present the IE with a preliminary report indicating future transmission additions or enhancements that may be required to accommodate the proposed additional generation or Generation Resource modification at the specified in-service year. This report will inform the IE about any additional transmission improvements estimated to be required for the continued security and reliability of the ERCOT System. This report does not imply any commitment by ERCOT or any TSP to recommend or construct these transmission additions or enhancements. The report will also contain a description of the SSR assessment performed as part of the Security Screening Study and any conclusions resulting from the SSR assessment.
- (5) Within 180 days of the date ERCOT notifies the IE of the Security Screening Study results, the IE must notify ERCOT in writing of its desire to pursue a Full Interconnection Study (FIS), or the GINR will be withdrawn. ERCOT will notify the TSP(s) and will begin initiation and coordination of the FIS only after receiving this Notification from the IE.
- (6) After the expiration of the 180-day period, an IE must submit a new GINR for a Security Screening Study and must again pay the appropriate fee. The IE will also be required to submit any updates or changes in the project's data to ERCOT.

#### **5.4.2      *Full Interconnection Study***

- (1) An FIS consists of the set of steady-state, dynamic, short-circuit, facility studies, along with other relevant studies that are necessary to determine the reliability impact on affected Transmission Facilities and identify the Transmission Facilities that are needed to reliably interconnect the new or modified Generation Resource to the ERCOT System, in accordance with the Planning Guides. The FIS is not intended to determine the deliverability of power from the proposed Generation Resource to market or to ensure that the proposed Generation Resource does not experience any congestion-related curtailment.
- (2) The IE must provide the appropriate Stability Modeling Fee and proof of site control.
- (3) The IE can request an FIS at any time after ERCOT deems the initial GINR application complete, which can be before completion of the Security Screening Study, but must respect the timeline set forth in paragraph (5) of Section 5.4.1, Security Screening Study. Requesting both studies at the same time may shorten the overall time to complete the GINR process due to overlap of work on both studies.
- (4) ERCOT shall manage a confidential email list (Transmission Owner Generation Interconnection) to facilitate communication of confidential GINR-related information among TSP(s) and ERCOT. Membership to this email list will be limited to ERCOT and appropriate TSP personnel.

**5.4.2.1 Full Interconnection Study Process Overview**

- (1) Within five Business Days of receiving Notice to proceed with an FIS, proof of site control and the correct fee(s) from the IE, ERCOT will designate a TSP to lead the FIS and will contact that TSP to schedule an FIS scope meeting. ERCOT will select the lead TSP based upon a preliminary analysis of the most likely Point of Interconnection (POI). If an IE has previously developed a generation project in ERCOT with the selected TSP, the IE, ERCOT, and the TSP may agree to forgo the scope meeting. If they so agree, the timeline for the IE and TSP to reach agreement on the FIS scope will start on the date ERCOT notifies the TSP of the IE's decision to proceed with the FIS.
- (2) ERCOT will promptly send Notification of the FIS to all other TSP(s) via the confidential Transmission Owner Generation Interconnection email list. It is the responsibility of each TSP to determine if the proposed project would have a material impact on its Transmission Facilities and to decide whether and to what extent it should participate in the FIS.
- (3) Each TSP desiring to participate in the FIS shall promptly notify the lead TSP. The lead TSP must include all interested TSPs in the FIS to the extent such involvement is reasonable.
- (4) At the FIS scope meeting, the IE will present the proposed GINR and ERCOT will review the results of the Security Screening Study. The lead TSP will facilitate a general discussion of the preliminary study scope of work for the FIS.
- (5) Pursuant to Protocol Section 3.22.1.2, Generation Resource Interconnection Assessment, in the event that the Security Screening Study performed by ERCOT identifies a possible SSR risk, ERCOT or the affected TSP(s) may require additional SSR studies be performed and may require an IE to provide additional detailed modeling data on the proposed Generation Resource in support of these studies. The SSR studies shall be scoped at the same time as the FIS but do not need to be included as part of the FIS. (6)  
The IE and the TSP(s) must reach agreement on the FIS scope within 60 days of the FIS scope meeting. The assistance of more than one TSP may be required in areas where Transmission Facilities are provided by multiple TSPs. In these cases it may be necessary for the IE to execute study agreements with multiple TSPs.
- (7) The FIS scope agreement must include all assumptions, timetables, study cost estimates and payment schedules, and the determination of all requirements for interconnection. The FIS must include all studies required by this section. The IE and the TSP(s) shall consider the Security Screening Study and other preliminary studies and documents provided by the IE when developing the FIS scope. The IE and TSP(s) may divide the FIS into distinct study phases, each requiring IE approval to proceed.
- (8) The TSP(s) shall send the FIS scope to the confidential Transmission Owner Generation Interconnection email list for review and comment by ERCOT and other TSP(s). Comments must be made within ten Business Days.

- (9) If the IE and TSP(s) cannot agree to the FIS study scope within the 60-day period, ERCOT will attempt to mediate an agreement. If mediation is unsuccessful, ERCOT will consider whether the IE's GINR should be terminated. If the request is terminated, the IE will be required to file a new GINR and pay all appropriate fee(s) for any new generation project.

#### **5.4.2.2 Full Interconnection Study Elements**

- (1) The FIS consists of a series of distinct study elements. The specific elements that will be included in a particular FIS will be stated in the FIS study scope agreement. The primary purpose of the FIS is to determine the most effective and efficient manner in which to achieve the proposed GINR while continuing to maintain the reliability of the ERCOT System by ensuring compliance with all North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, this Planning Guide and the Operating Guides. The scenarios and base cases being used for these studies to determine potential transmission limitations will be documented in the FIS study scope.
- (2) Each proposed All-Inclusive Generation Resource that requires a separate physical transmission interconnection will be treated as an individual study to be analyzed separately from all other such requests unless otherwise agreed by the IE and TSP(s) in the interconnection study scope agreement.
- (3) The FIS process includes developing and analyzing various computer model simulations of the existing and proposed ERCOT generation/transmission system. The results from these simulations will be utilized by the TSP(s) to determine the impact of the proposed interconnection.
- (4) The TSP(s) will also examine normal transmission operations as well as potentially adverse, or contingency, conditions in order to identify and analyze the reliability and effectiveness of various interconnection design alternatives in alleviating or mitigating any undesirable performance of the interconnection under a variety of operating conditions. The study should include analysis demonstrating the adequate reliability of any temporary interconnection configurations.
- (5) In comparing interconnection alternatives, the TSP(s) will consider such information as interconnection cost and construction schedule, impact to short and long-range reliability, operational flexibility, and compatibility with future transmission plans. The TSP(s) may consider interconnection alternatives not suggested by the IE.
- (6) The TSP(s) may reserve the right to update the final FIS report to reflect changes to the ERCOT System (i.e. new Standard Generation Interconnection Agreements (SGIAs)) after the report is completed and before the SGIA is executed.
- (7) All studies undertaken will be performed in compliance with all applicable Public Utility Commission of Texas (PUCT) rules, NERC Reliability Standards, Protocols, this Planning Guide and the Operating Guides, Good Utility Practice, and the guidelines below unless otherwise directed by ERCOT.



### **5.4.3      *Steady-State Analysis***

- (1) The steady-state interconnection study base case shall be created from the most recently approved Steady State Working Group (SSWG) base case. TSP(s) or ERCOT may remove any future (currently nonexistent) facility from the steady-state interconnection study base case if either determines that the facility may significantly affect the interconnection study results and the facility has not already undergone appropriate review by the Regional Planning Group (RPG). In addition, ERCOT and TSP(s) may include other publicly disclosed GINRs in the steady-state interconnection study base case. ERCOT may request a list of the interconnection requests included in the FIS by the TSP(s). Modifications to the SSWG base case, necessary to evaluate the study results, shall be documented in the FIS but not to the extent that documenting the modifications would reveal Protected Information.
- (2) The TSP(s) shall perform contingency analyses as required by the NERC Reliability Standards, Protocols, this Planning Guide and the Operating Guides and identify any additional facilities that may be necessary to ensure that expected system performance conforms to these standards. All facilities necessary to reliably interconnect the proposed generation will be determined and clearly identified in the report for this part of the FIS. Any facility that cannot be constructed or otherwise completed in time to accommodate Initial Synchronization will be identified and reported to the IE along with any likely limitations of generation output that may result.
- (3) Loss-of-generation analyses shall assume that the lost generation will be replaced from all remaining Generation Resources in proportion to their nominal capacity (i.e., inertial response), and shall consider the generation limit of each Generation Resource.
- (4) The lead TSP is responsible for completing an analysis of any contingency events or Outages that could result in a violation of the NERC Reliability Standards, Protocols, this Planning Guide and the Operating Guides, regardless of which TSP owns the facilities involved. The results of this analysis will be shared with TSP(s) that have facilities involved in planning criteria violations and those affected TSP(s) will be responsible for attempting to evaluate the validity of the anticipated violations.

### **5.4.4      *System Protection (Short-Circuit) Analysis***

- (1) The FIS scope agreement will specify locations where available short-circuit fault duty will be identified, calculated, and documented.
- (2) If any of the required transmission system improvements associated with the GINR result in violations of the TSP's short circuit criteria, the TSP shall plan and provide facilities to address such violations. The TSP will determine the maximum available fault currents at the interconnection substation for determining switching device interrupting capabilities and protective relay settings.

### 5.4.5 *Dynamic and Transient Stability (Unit Stability, Voltage) Analysis*

- (1) At the discretion of the TSP(s) or ERCOT, the TSP will perform transient stability studies if necessary to meet NERC Reliability Standards, Protocols, this Planning Guide or the Operating Guides applicable to the Generation Resource or the ERCOT System.
- (2) If the TSP(s) in charge of these stability studies decides not to conduct the studies, the TSP(s) must provide a written justification in lieu of the study report. When performing such studies, all existing or publicly committed Generation Resource in the area of the study will normally be represented at full net output, although some Combined Cycle Generation Resources or coal plants might be modeled at full gross output (including auxiliary load). Any resulting increase in generation will be balanced as addressed in the FIS scope agreement.
- (3) Stability study base cases shall be formed from the latest available approved SSWG base cases consistent with the most recently approved Dynamics Working Group (DWG) stability data base. The initial transmission configuration in the area of study included in a stability study base case shall be identical to that used in the steady-state studies of the same period. Any previously identified transmission improvements that will not be in service prior to the Initial Synchronization of the proposed Generation Resource shall not be included in the stability study base case.
- (4) Transient stability studies will analyze the performance of the proposed Generation Resource and the ERCOT System in terms of angular stability, voltage stability and excessive frequency excursions. Additional studies may include small signal stability or critical clearing time analyses where the number of cycles for which a transmission line can sustain a fault without causing loss of synchronism of any of the Resource is compared to the response of the protection systems. Such studies should incorporate reasonable and conservative assumptions regarding plant operating conditions. Proposed analyses shall be identified and defined in the FIS scope agreement.
- (5) All stability studies shall be performed in accordance with NERC Reliability Standards, Protocols, this Planning Guide and the Operating Guides. The stability study portion of the FIS shall document any instability identified through performance of the study.
- (6) If the TSP identifies instability (other than instability identified for extreme events) in the stability portion of the FIS, the following steps will be taken subsequent to the FIS being deemed complete and posted in the Market Information System (MIS) Secure Area in accordance with Section 5.4.8, FIS Study Report and Follow-up:
  - (a) The IE and TSP shall investigate alternative solutions to resolve the instability through changes to the proposed Generation Resource and report their findings to ERCOT. If changes to the Generation Resource are determined by ERCOT to be feasible, the IE shall implement the changes prior to Initial Synchronization.
  - (b) If ERCOT determines that changes to the proposed Generation Resource are not feasible to resolve the identified instability, ERCOT shall notify the TSP and IE,

and the TSP shall investigate a transmission improvement to resolve the instability and report their findings to ERCOT.

- (c) If ERCOT determines that a proposed transmission improvement is feasible to resolve the identified instability the TSP shall proceed with implementing the transmission improvement, in accordance with Protocol Section 3.11.4, Regional Planning Group Project Review Process, identified in paragraph (6)(b) above after the requirements of Section 6.9, Addition of Proposed Generation to the Planning Models, have been met for the proposed Generating Resource.
- (d) If the transmission improvement identified in paragraph (6)(b) or (c) above cannot be implemented prior to Initial Synchronization, ERCOT shall determine the appropriate operating limit, including evaluating the feasibility of a proposed Remedial Action Scheme (RAS) that may mitigate the limit, in accordance with Section 5.9, Quarterly Stability Assessment, prior to Initial Synchronization.

#### **5.4.6      *Facility Study***

- (1) At a minimum, the facility study provides complete details and estimated cost of the facility requirements for the direct interconnection of the proposed Generation Resource project to the TSP.
- (2) The facility study will provide conceptual design descriptions, construction milestones, and detailed cost estimates for all direct interconnection-related transmission and substation facilities proposed to be installed in accordance with the findings and recommendations of the FIS.

#### **5.4.7      *Economic Study***

- (1) ERCOT shall perform an independent economic analysis of the transmission projects that are identified through this process as being needed for the direct connection of the proposed Generation Resource and that are expected to cost more than \$25,000,000. This economic analysis is performed only for informational purposes, and no ERCOT endorsement will be provided.
- (2) If the lead TSP determines that the costs of the recommended direct interconnection facilities for the proposed Generation Resource are expected to exceed \$25,000,000, the lead TSP will communicate this finding to ERCOT and other TSP(s) via the confidential Transmission Owner Generation Interconnection email list within ten Business Days of such determination. This communication will include all available information upon which that finding is based, including but not limited to:
  - (a) A description of the direct interconnection facilities;
  - (b) Information necessary to modify a power-flow case to include those facilities;

- (c) Any information obtained from the IE that would be helpful in modeling the proposed Generation Resource for the study; and
  - (d) The estimated cost of the facilities.
- (3) The IE shall provide to ERCOT any requested information necessary to accurately represent the Generation Resource in the economic study.
  - (4) ERCOT will generally complete this economic study within 90 days, and will inform the TSP(s) and IE if additional time is required. ERCOT will provide the results of the economic study to the IE and to the TSP(s) via the confidential “Transmission Owner Generation Interconnection” email list.

#### **5.4.8 *FIS Study Report and Follow-up***

- (1) The TSP(s) will present a preliminary report of its findings and recommendations for each of the study elements to ERCOT, and to the other TSP(s) via the confidential Transmission Owner Generation Interconnection email list.
- (2) Any questions, comments, proposed revisions, or clarifications by any party shall be made in writing to the TSP(s) within ten Business Days after the issuance of each study report, which may cover one or more study elements. ERCOT can extend this review period by an additional 20 Business Days by notifying the affected TSP(s) and the IE that it needs additional time to review the report.
- (3) After considering the information received from ERCOT and other TSPs, the study element(s) report will be deemed complete and a final report shall be provided to ERCOT and all TSPs. The TSP(s) conducting the FIS shall submit the sub-synchronous oscillation analysis, if required, as a separate document from the remainder of the report. The ten Business Day review period will be used by ERCOT to determine if any transmission upgrades proposed and clearly identified in the Steady-State Study Report need to be submitted to the RPG review process. Protocol Section 3.11, Transmission Planning, provides more information on the process to review transmission upgrades that are unrelated to the direct connection of new or modified generation.
- (4) ERCOT shall post to the MIS Secure Area the final study element(s) report within ten Business Days after the study element(s) report has been deemed complete. After being posted, the TSP(s) shall send the final study element(s) report to the IE. Study element(s) reports shall not be sent to the IE prior to being posted to the MIS Secure Area.
- (5) The study element(s) report shall not contain sensitive information including, but not limited to, confidential plant design information including stability study model data and parameters and contingencies causing instability. The TSP(s) shall provide this information to ERCOT and other TSP(s) upon request.
- (6) The TSP issuing the final FIS element(s) report shall indicate that the report is the final report required by the FIS. At the end of the ten Business Day review period following

the issuance of the final FIS element(s) report, the FIS will be deemed complete and the IE and TSP may execute an SGIA. If an economic study of the direct interconnection facilities is required, pursuant to Section 5.4.7, Economic Study, and has not yet been completed, the IE and TSP may agree that the completion of the economic study is not required before the FIS is deemed complete.

- (7) Should the IE wish to proceed with the proposed GINR, the IE must execute an SGIA with the respective TSP within 180 days following the completion of the FIS (includes all major study element(s) reports).
- (8) If during the time after the FIS is completed and before meeting Section 6.9, Addition of Proposed Generation to the Planning Models, requirements changes occur that substantially differ from the assumptions used for the FIS, ERCOT and the TSP(s) shall determine the impact of the changes on the results of the FIS. All changes shall be submitted to ERCOT through the Resource Registration process for a change comparison. If the changes are determined by ERCOT to have the potential to materially alter the conclusions documented in the FIS, the TSP(s) will make appropriate modifications to the FIS. The updated FIS reports will be submitted to ERCOT and to the other TSP(s) via the confidential Transmission Owner Generation Interconnection email list. Any questions, comments, proposed revisions, or clarifications by any party shall be made in writing to the TSP(s) within ten Business Days after the issuance of an updated study report.

#### **5.4.9      *Proof of Site Control***

- (1) Before ERCOT will proceed with the initiation of an FIS, the IE must submit to ERCOT proof of site control. To establish proof of site control, the IE must demonstrate through an affiliated company, through a trustee, or directly in its name that:
  - (a) The IE is the owner in fee simple of the real property to be utilized by the facilities for which any new generation interconnection is sought;
  - (b) The IE holds a valid written leasehold interest in the real property to be utilized by the facilities for which new generation interconnection is sought;
  - (c) The IE holds a valid written option to purchase or obtain a leasehold interest in the real property to be utilized by the facilities for which new generation interconnection is sought; or
  - (d) The IE holds a duly executed written contract to purchase or obtain a leasehold interest in the real property to be utilized by the facilities for which new generation interconnection is sought.
- (2) The IE must notify ERCOT of any substantive change in status of the arrangement used to demonstrate site control.

- (3) The IE must maintain site control throughout the duration of the FIS and until execution of an SGIA. Otherwise, ERCOT will consider the GINR withdrawn as of the date of the loss of site control unless the applicant can show within 30 days that it has re-established site control or has established control of a new site that would not result in any material modification of any interconnection study requested under the current application.

#### **5.4.10 Confidentiality**

- (1) All data, documents or other information regarding the GINR, including the identity of the IE, will remain Protected Information until ERCOT receives written Notice from the IE that this information may be made public or until the IE requests an FIS. Since the FIS scope agreement contains possibly confidential cost estimates and represents an agreement between the IE and the lead TSP, it will remain Protected Information and will not be released to parties other than those who are members of the confidential Transmission Owner Generation Interconnection email list except as required in a court of law or by regulatory authorities having jurisdiction. Once classified as a public project through one of these steps, ERCOT will post on the ERCOT MIS Secure Area the project description, all FIS reports, the results of the economic analysis of direct interconnection facilities costing over \$25,000,000, and any information developed throughout the interconnection study process about transmission improvement projects that may be submitted for RPG review as a result of the new generation.
- (2) The lead TSP will notify the RPG email list within ten Business Days of the signing of an SGIA when the cost of the direct interconnection facilities is greater than \$25,000,000.

### **5.5 Interconnection Agreement**

#### **5.5.1 Standard Generation Interconnection Agreement**

- (1) If the Interconnecting Entity (IE) decides to proceed with the construction and completion of the proposed generation project and interconnection within the 180-day period following the completion of the Full Interconnection Study (FIS), it shall execute a Standard Generation Interconnection Agreement (SGIA) with its respective Transmission Service Provider (TSP) as a condition for obtaining transmission service, as required by P.U.C. SUBST. R. 25.195, Terms and Conditions for Transmission Service. The IE and the TSP shall use the SGIA. A template of the SGIA can be found on the ERCOT website.
- (2) Before an SGIA is signed, all studies included in the FIS scope must be completed, unless mutually agreed by the IE and the TSP. In the event the IE and the TSP agree to sign an SGIA prior to the completion of all studies included in the FIS scope, the TSP shall notify ERCOT. The IE and TSP must meet and maintain compliance with all North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, and the requirements of this Planning Guide and the Operating Guides concerning interconnection.

- (3) ERCOT does not participate in the IE's and TSP's negotiation of the SGIA.

#### **5.5.2 *Other Arrangements for Transmission Service***

- (1) In certain situations, the IE and the TSP may agree to allow the TSP to begin design or construction of facilities prior to the execution of the SGIA, or to allow the IE to delay issuing a Notice to proceed until sometime after the SGIA is signed. The TSP shall submit documentation of any alternative arrangements of this type to ERCOT within ten Business Days of executing the alternative arrangement.

#### **5.5.3 *Provisions for Municipally Owned Utilities and Cooperatives***

- (1) A Municipally Owned Utility (MOU) or Electric Cooperative (EC) developing a proposed Generation Resource that will interconnect to its own transmission system is not required to execute an SGIA. However, an MOU or EC must execute an SGIA if its proposed Generation Resource would interconnect with another TSP's facilities.
- (2) A letter from a duly authorized official from the MOU or EC confirming the Entity's intent to construct and operate the proposed Generation Resource will be deemed by ERCOT to be sufficient as a public commitment by the MOU or EC and will have the same impact as an SGIA for all purposes.

#### **5.5.4 *Notification to ERCOT Concerning Certain Project Developments***

- (1) The following notifications shall be provided to ERCOT at [GINR@ercot.com](mailto:GINR@ercot.com):
  - (a) The IE shall notify ERCOT within ten Business Days of when it has given the TSP notice to proceed with the FIS.
  - (b) The TSP must transmit a copy of the signed SGIA to ERCOT within ten Business Days of execution.
  - (c) The TSP must transmit to ERCOT within a ten Business Days of execution a copy of any financially binding agreement between the IE and the TSP under which the interconnection for a Generation Resource will be constructed.
  - (d) The TSP must transmit a written notice to ERCOT within ten Business Days after it receives both a notice to proceed with construction of the interconnection for the Generation Resource and the financial security sufficient to fund the interconnection facilities pursuant to either agreement addressed in items (b) or (c) above.
  - (e) A MOU or EC must transmit a letter from a duly authorized official to ERCOT confirming the Entity's intent to construct and operate a proposed Generation

Resource and interconnect such Generation Resource to its own transmission system.

- (f) Except for IEs proposing to interconnect Generation Resources powered by wind or photovoltaic solar energy, the IE must complete and submit Section 8, Attachment B, Declaration of Adequate Water Supplies, for each proposed Generation Resource within ten Business Days of securing the relevant water supply rights, or, for Resources that do not require a water supply right to operate (other than wind or photovoltaic solar), within ten Business Days of executing the SGIA.

## **5.6 Compliance with Operational Standards**

- (1) As permitted by paragraph (3) of Protocol Section 16.5, Registration of a Resource Entity, if at any time before initial synchronization of an All-Inclusive Generation Resource, ERCOT reasonably determines that the Resource may violate operational standards established in the Protocols, this Planning Guide, the Operating Guides, and Other Binding Documents, ERCOT may require the affected Resource Entity to demonstrate to ERCOT's reasonable satisfaction that the Generation Resource can comply with these standards before the Generation Resource is permitted to synchronize. ERCOT may refuse to allow synchronization of an All-Inclusive Generation Resource if the Resource Entity cannot demonstrate that the Generation Resource can comply with these standards.

## **5.7 Interconnection Data, Fees, and Timetables**

### **5.7.1 *Generation Resource Data Requirements***

- (1) The Interconnecting Entity (IE) shall submit with its Generation Interconnection or Change Request (GINR) the most current actual facility information (generation, substation, and transmission/subtransmission if applicable) or best available expected performance data for the physical and electrical characteristics of all proposed facilities (in sufficient detail to provide a basis for modeling) up to the Point of Interconnection (POI) with a Transmission Service Provider (TSP).
- (2) Failure to supply the required data may delay ERCOT processing of the interconnection application and studies. Recommendations resulting from these studies that are based on outdated, false, or bad data may adversely affect the safety and reliability of the ERCOT System and can result in damage to generation or transmission equipment. The IE and subsequently, the Resource Entity associated with any approved Generation Resource, must promptly submit any updates to ERCOT to ensure the long-term adequacy, reliability, and safety of the ERCOT System, as required by the Protocols, this Planning Guide, the Operating Guides, and North American Electric Reliability Corporation (NERC) Reliability Standards. Failure to comply may result in financial penalties.



- (3) In an effort to produce the best available Security Screening Study and Full Interconnection Study (FIS), ERCOT suggests that IEs begin collecting all appropriate engineering and equipment data from manufacturers as soon as the IE selects its major equipment for the proposed project.
- (4) While the duty to update data may require additional information, at a minimum, the IE shall submit the following data and information to be provided to ERCOT at each step of the process:
  - (a) Application and Security Screening Study:
    - (i) Generation Resource Information Sheet; and
    - (ii) Generation Interconnection Screening Study Request Data Sheet.
  - (b) FIS:
    - (i) Updates to the above information (if necessary);
    - (ii) Applicable data required for interconnection studies as defined in the Resource Registration Glossary applicable to the Generation Resource type;
    - (iii) Provision of the appropriate dynamic model for the proposed Generation Resource (some standard dynamic model forms are posted on the ERCOT website);
    - (iv) If alternative models are required to appropriately represent the proposed Generation Resource, an alternative model may be provided by the IE, subject to verification by the lead TSP and ERCOT; and
    - (v) In order to perform stability (transient and voltage) analyses, the IE shall provide unit stability information and data to the TSP(s) and ERCOT. The Dynamics Working Group Procedural Manual contains more detail and IE dynamics data requirements. Data submitted for transient stability models shall be compatible with ERCOT standard models (Siemens/PTI PSS/E and Powertech Labs Inc TSAT, VSAT and SSAT). If no compatible model exists, the IE shall work with a consultant or software vendor to develop and supply accurate/appropriate models along with other associated data. These models shall be incorporated into the standard model libraries of both software packages. It is recommended that generation owners and developers encourage manufacturers and software vendors to work together to develop and maintain these important models.
  - (c) Prior to start of construction:
    - (i) Any significant design changes in the generator(s) or main power transformer(s) of the proposed Generation Resource shall be provided to

ERCOT and the TSP to ensure compatibility with the existing transmission system.

- (d) Prior to the Resource Commissioning Date:
  - (i) Registration and official Resource Registration data submittal pursuant to Section 6.8.2, Resource Registration Process;
  - (ii) Updates to Resource Registration data based on “as-built” or “as-tested” data in all cases; and
  - (iii) Proof of meeting ERCOT requirements (reactive, low Voltage Ride-Through (VRT) standards, stability models, Power System Stabilizer (PSS), Subsynchronous Resonance (SSR) models).
- (e) During continuing operations:
  - (i) The IE shall provide ERCOT and the TSP with any equipment data changes which result from equipment replacement, repair, or adjustment. Unless otherwise required in the Protocols, this Planning Guide or the Operating Guides, the IE shall provide such data to ERCOT and the TSP no later than 60 days prior to the date of the actual change in equipment characteristics or during annual data update filings whichever occurs first. This requirement shall also apply to all future owners throughout the service life of the project/plant.

### **5.7.2 Interconnection Study Fees**

- (1) P.U.C. SUBST. R. 25.198, Initiating Transmission Service, states in part that the customer requesting transmission service shall be responsible for all costs associated with the completion of the Security Screening Study and the FIS.
- (2) The ERCOT Security Screening Study fee is a non-refundable fee associated with each specific interconnection request. The amount of this fee is listed in the ERCOT Fee Schedule of the Protocols. The appropriate Security Screening Study fee must be remitted for each GINR (i.e., each individual interconnection location, Commercial Operations Date, and additional Generation Resource capacity at this specific interconnection location) at the time the application is submitted to ERCOT.
- (3) The check should be made payable to the Electric Reliability Council of Texas, Inc.

### **5.7.3 Stability Modeling Fee**

- (1) The ERCOT Stability Modeling Fee is a non-refundable fee based on the MW of additional installed capacity and is paid directly to ERCOT when an FIS is requested. The amount of this fee is listed in the ERCOT Fee Schedule of the Protocols.

- (2) This fee will reimburse ERCOT for the development of stability software models for each proposed Generation Resource and allow for continually updating current models as new equipment changes are made. The check should be made payable to the Electric Reliability Council of Texas, Inc.
- (3) Payment of the Stability Modeling Fee to ERCOT does not release an IE from its obligation to provide ERCOT accurate and appropriate stability software models and data (including load data) for each of its proposed generation plants.

#### **5.7.4      *Full Interconnection Study Fee/Cost***

- (1) The FIS fee/cost shall be paid directly to the TSP(s) completing the studies associated with the FIS by the IE. The fee/cost will be agreed on and specified in the study scope agreement. The TSP(s) shall directly invoice the IE for the reasonable costs associated with undertaking and completing the FIS.
- (2) ERCOT recommends that the Generation Resource and the TSP provide for a payment methodology and include a cancellation provision in the FIS scope agreement.
- (3) If the IE cancels the proposed Generation Resource during the term of the FIS, the IE is required to immediately notify ERCOT and the lead TSP. The lead TSP should immediately notify any other TSPs that may be participating in the study, via the confidential Transmission Owner Generation Interconnection email list.
- (4) The IE is responsible for all costs associated with any work performed or non-cancelable commitments made prior to notifying ERCOT and the TSP(s) of the termination date of the project. ERCOT highly recommends the TSP(s) receive the study fee before proceeding with work.

#### **5.7.5      *Interconnection Process Timetables***

- (1) P.U.C. SUBST. R. 25.198, Initiating Transmission Service, provides deadlines for ERCOT and TSP(s) to complete and report on the required interconnection studies provided that the IE submits all required data and appropriate fee(s). Therefore, the IE must ensure that ERCOT and the TSP(s) performing these studies receive all required data in order to establish reasonable study models and assumptions that provide meaningful results and recommendations for interconnecting the proposed generating project.
- (2) Because the FIS is generally the critical path item in the GINR process, ERCOT recommends that a timetable for the FIS be developed and included in the study scope agreement. In addition, major improvements to the transmission system resulting from interconnection requests should be identified as early in the process as possible so project validity can be considered before the parties go forward with extensive interconnection studies. Once the FIS is underway, the parties may determine whether an adjustment to the original estimated completion date is necessary. Should a schedule adjustment

become necessary, the parties must provide Notice to ERCOT and the TSP(s) as soon as practicable, indicating the revised expected completion date.

- (3) The following timetable complies with P.U.C. SUBST. R. 25.198. It is intended to serve as a guideline only and the times stated are not requirements unless stated elsewhere in this section. If the number of days shown is less than 30, these are Business Days; if the number of days shown is 30 days or more, these are calendar days.

Task	Responsible Entity	Time Required to Complete (Days)
Acknowledgement of GINR Application	ERCOT	1 to 10
Notification of Additional Information Needed to Complete Application	ERCOT	1 to 15
Perform Security Screening Study (after application is deemed complete)	ERCOT	10 to 90
Decision to Pursue FIS (following issuance of Security Screening Study by ERCOT)	IE	Up to 180
Develop Scope Agreement for FIS (following IE's Notification to ERCOT of desire for FIS and remittance of appropriate fees)	IE, ERCOT, and TSP(s)	Up to 60
Perform FIS (following agreement on scope)		40 to 300
<i>Steady-State and Transfer Analysis</i>	TSP(s)	10 to 90
<i>System Protection Analysis (following Steady-State Analysis)</i>	TSP(s)	10 to 30
<i>Dynamic and Transient Stability Analysis (following System Protection Study)</i>	TSP(s)	10 to 90
<i>Facility Study</i>	TSP(s)	10 to 90
<i>SSR</i>	TSP(s) or IE	90 days prior to Initial Synchronization
Study Report Review and Acceptance (following issuance of FIS)	ERCOT, and TSP(s)	10 to 15
FIS Posted to MIS	ERCOT	Within 10 days of being

Task	Responsible Entity	Time Required to Complete (Days)
		deemed complete
Report stability resolution findings to ERCOT	TSP	Within 90
Negotiate and Execute Standard Generation Interconnection Agreement (SGIA) (following acceptance of FIS)	IE and TSP	180

## 5.8 GENERAL AND TECHNICAL STANDARDS

### 5.8.1 *Other Standards*

- (1) The North American Electric Reliability Corporation (NERC) Reliability Standards, the Protocols, this Planning Guide and the Operating Guides also contain provisions that apply to Generation Resources.

### 5.8.2 *Transformer Tap Position*

- (1) The Interconnecting Entity (IE) will contact the Transmission Service Provider (TSP) providing the interconnection before the main power transformers are placed into service and will work with the TSP to select the tap position on the main power transformers. The Generation Resource will confirm the use of this tap position with the TSP and ERCOT. The main power transformer will be considered the step-up to the transmission level voltage of the interconnection.

## 5.9 Quarterly Stability Assessment

- (1) ERCOT shall conduct a stability assessment every three months to assess the impact of planned new All-Inclusive Generation Resources connecting to the ERCOT System. The assessment shall derive the conditions to be studied with consideration given to the results of the Full Interconnection Study (FIS) stability studies for the All-Inclusive Generation Resources with planned Initial Synchronization in the period under study. ERCOT may study conditions other than those identified in the FIS stability studies.
- (2) All-Inclusive Generation Resources that are not included in the assessment as described in this Section as result of the Interconnecting Entity (IE) failing to meet the prerequisites by the deadlines as listed in the table below will not be eligible for Initial Synchronization during that three month period. The timeline for the quarterly stability assessment shall be in accordance with the following table:

<b>All-Inclusive Generation Resource Initial Synchronization Date</b>	<b>Last Day for an IE to meet prerequisites as listed in paragraph (4) below</b>	<b>Completion of Quarterly Stability Assessment</b>
Upcoming January, February, March	Prior August 1	End of October
Upcoming April, May, June	Prior November 1	End of January
Upcoming July, August, September	Prior February 1	End of April
Upcoming October, November, December	Prior May 1	End of July

- (3) If the last day for an IE to meet prerequisites or if completion of the quarterly stability assessment as shown in the above table falls on a weekend or holiday, the deadline will extend to the next Business Day.
- (4) Prerequisites to be satisfied prior to the planned new All-Inclusive Generation Resource being included in the quarterly stability assessment:
- (a) The All-Inclusive Generation Resource has met the requirements of Section 6.9, Addition of Proposed Generation to the Planning Models.
  - (b) The IE has provided all All-Inclusive Generation Resource data in accordance with the Resource Registration Glossary, Planning Model column, including but not limited to steady state, system protection and stability models.
  - (c) The following elements must be complete:
    - (i) FIS studies;
    - (ii) Reactive Power Study; and
    - (iii) System improvements or mitigation plans that were identified in these studies as required prior to synchronizing a new All-Inclusive Generation Resource in order to meet the operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents.
  - (d) The data used in the studies identified in paragraph (4)(c) above is consistent with All-Inclusive Generation Resource data submitted by the IE as required by Section 6.9.
- (5) At any time following the inclusion of an All-Inclusive Generation Resource in a stability assessment, but before the Initial Synchronization of the All-Inclusive Generation Resource, if ERCOT determines, in its sole discretion, that the All-Inclusive Generation Resource no longer meets the prerequisites described in paragraph (4), or that an IE has

made a change to the design of the All-Inclusive Generation Resource that could have a material impact on ERCOT System stability, then ERCOT may refuse to allow Initial Synchronization of the All-Inclusive Generation Resource, provided that ERCOT shall include the All-Inclusive Generation Resource in the next quarterly stability assessment period that commences after identification of the material change or after the All-Inclusive Generation Resource meets the prerequisites specified in paragraph (4), as applicable. If ERCOT determines, in its sole discretion, that the change to the design of the All-Inclusive Generation Resource would not have a material impact on ERCOT System stability, then ERCOT may not refuse to allow Initial Synchronization of the All-Inclusive Generation Resource due to this change.

- (6) ERCOT shall post to the Market Information System (MIS) Secure Area a report summarizing the results of the quarterly stability assessment within ten Business Days of completion.

# **ERCOT Planning Guide**

## **Section 6: Data/Modeling**

**July 1, 2017**

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## 6 DATA/MODELING

### 6.1 Steady-State Model Development

- (1) To adequately simulate steady-state system conditions, it is necessary to establish and maintain steady-state data and simulation ready study cases in accordance with the Steady State Working Group Procedure Manual. These case models, known as steady-state base cases, shall contain appropriate equipment characteristics and system data, and shall represent projected system conditions that provide a starting point for each required season and year.
  - (a) The Annual Planning Model base cases, which represent the annual peak load conditions, as prescribed in Protocol Section 3.10.2, Annual Planning Model, shall be developed annually, updated on a triannual basis, and may be updated as needed on an interim basis. Each Annual Planning Model base case, triannual updates, and off-cycle updates shall be posted on the Market Information System (MIS) Secure Area to ensure availability of the most accurate steady-state base cases.
  - (b) Additional steady-state base cases, such as seasonal base cases, shall also be developed annually, updated on a triannual basis, and may also be updated as needed on an interim basis. These derivative base cases, triannual updates, and off-cycle updates shall be posted on MIS Secure Area to ensure availability of the most accurate steady-state base cases.
  - (c) Off-cycle updates not associated with the triannual update shall be posted in a timely manner and include:
    - (i) Corrections to significant errors discovered in modeling or major changes in operation configuration that affect the steady-state base cases; or
    - (ii) A significant change in the scope or timing of a transmission project or the development of a new transmission project that impacts either of the next two summer base cases.
  - (d) Off-cycle updates that are posted as described in paragraphs (1)(a) through (c) above shall be in the form of a Power System Simulator for Engineering (PSS/E) formatted incremental change file.
  - (e) All steady-state base cases and incremental change files on the MIS Secure Area shall be available for use by Market Participants.
  - (f) The Steady State Working Group Procedure Manual describes each base case that is required to be built. The schedule for posting all steady-state base cases shall be made available on the MIS Secure Area.

- (2) Transmission Service Providers (TSPs) and ERCOT shall develop the steady-state base cases. The steady-state base cases are derived from the Network Operations Model to ensure consistency of key characteristics, including Ratings, impedance and connectivity for Transmission Facilities that are common between the Network Operations Model and each steady-state base case. Minor differences between the models will occur for several reasons. For example:
  - (a) The Network Operations Model is converted from a “breaker, switch, and AC line segment” convention to an equivalent steady-state base case “bus and branch” convention. This conversion reduces the number of breakers/switches that may be included in the steady-state base case model and may combine buses separated by breakers/switches in the Network Operations Model.
  - (b) Additional detailed modeling may be added to the converted Network Operations Model for planning purposes.
  - (c) Future projects are added to the converted Network Operations Model that do not exist in the Network Operations Model past the model build date used to extract a snapshot from the Network Operations Model.
- (3) Using the Network Model Management System (NMMS), ERCOT and TSPs shall create steady state models that represent current and planned system conditions from the following data elements:
  - (a) Each TSP, or its Designated Agent, shall provide its respective transmission network steady-state model data, including load data.
  - (b) ERCOT shall utilize the latest available Resource Entity and Private Use Network model data submitted to ERCOT by the Resource Entity and the Private Use Network owners through the Resource registration process for Resource Entities.
  - (c) ERCOT shall utilize proposed Generation Resource model data provided by the Interconnecting Entity (IE) during the generation interconnection process in accordance with Section 5, Generation Resource Interconnection or Change Request.
  - (d) ERCOT shall determine the operating state of Generation Resources (MW, MVar) using a security-constrained economic dispatch tool.
  - (e) ERCOT shall determine the import/export levels of asynchronous transmission interconnections based on historical data.

## 6.2 Dynamics Model Development

- (1) To adequately simulate dynamic and transient events in the ERCOT System, it is necessary to establish and maintain dynamics data and simulation-ready study cases

representing the dynamic capability and frequency characteristics of machines and equipment connected to the ERCOT System.

- (2) Dynamics data is the network data and mathematical models required in accordance with the Reliability and Operations Subcommittee (ROS)-approved Dynamics Working Group Procedural Manual for simulation of dynamic and transient events in the ERCOT System.
- (3) For Resource Entities, dynamics data includes the data needed to represent the dynamic and transient response of Resource Entity-owned devices and/or Loads including but not limited to generating units, plants, and other equipment when connected to the ERCOT System including the data for any privately owned transmission system or collection system used to connect the Resource to the ERCOT System.
- (4) For Transmission Service Providers (TSPs), dynamics data needed to represent the dynamic and transient capability of TSP-owned devices including but not limited to Load shedding relays, protective relays, FACTS devices (e.g., DVARs, SVC, STATCOM, SMES), Direct Current Ties (DC Ties), variable-frequency transformers automatically switched shunts, and transformers with automatic load tap changers.
- (5) All dynamics data must be compatible with the current version of the planning model software as described in the Dynamics Working Group Procedural Manual.
- (6) The Facility owner shall provide appropriate dynamics data to ERCOT including the data for a planned Facility.
- (7) Dynamics data for a planned Facility will be updated by the Facility owner upon completion of the design for the Facility.
- (8) Updated dynamics data for an existing Facility shall be provided to ERCOT when field tests, inspections, or other information demonstrates that the dynamics data should be changed to accurately represent the dynamic characteristics of the Facility.
- (9) Dynamics Data is considered Protected Information pursuant to Protocol Section 1.3, Confidentiality.
- (10) Dynamics data shall be provided with the legal authority to provide the information to all TSPs. If any of the information is considered Protected Information, the Facility owner shall indicate as such.

### **6.2.1 Dynamics Data Requirements for Resources**

- (1) A Resource Entity shall submit new or updated dynamics data in accordance with Section 5, Generation Resource Interconnection or Change Request. The Resource Entity shall provide all dynamics data as described in the Dynamics Working Group Procedural Manual. The Resource Entity shall provide an accurate and appropriate model and model parameters. Resource Entities are encouraged to use standard models to represent the Resource's dynamic and transient capability and response. If no appropriate standard

model is available, the Resource Entity shall submit a model, model documentation, and the associated model parameters to ERCOT for inclusion in simulation-ready study cases as described in the Dynamics Working Group Procedural Manual.

- (2) A Resource Entity is responsible for tuning and validating the parameters that go into their models to ensure that the models produce an accurate representation of a device's capability and response. If ERCOT, the interconnecting TSP, or the Dynamics Working Group (DWG) identifies inappropriate or incomplete dynamics data, ERCOT shall take action to resolve discrepancies with the Resource Entity.

### **6.2.2      *Dynamics Data Requirements for Load Resources***

- (1) ERCOT shall provide the updated Load Resource relay models.
- (2) Load Resource relay models shall be updated as describe in the Dynamics Working Group Procedural Manual.

### **6.2.3      *Dynamics Data Requirements for and Transmission and/or Distribution Service Providers***

- (1) The owner of under-frequency Load shedding equipment shall provide necessary data to model under frequency Load shedding relays for their portion of the ERCOT System as described in the Dynamics Working Group Procedural Manual.
- (2) The owner of under voltage Load shedding equipment shall provide necessary data to model under voltage Load shedding relays for their portion of the ERCOT System as described in the Dynamics Working Group Procedural Manual.
- (3) When requested by ERCOT or a Transmission and/or Distribution Service Provider (TDSP), the owner of protective relays, control systems, and Remedial Action Schemes (RASs) shall provide dynamics data needed to simulate their action.
- (4) The DWG shall document appropriate Load model data as described in the Dynamics Working Group Procedural Manual for use in dynamic simulations.
- (5) The owner of a dynamic element connected to the transmission system shall provide the dynamic data needed to simulate the action of the device in dynamic simulations to ERCOT and the TDSP to which the element is connected. Examples of dynamic elements include, but are not limited to, static-Volt-Ampere reactive (VAr) compensators, DC Ties, variable frequency transformers, switched shunt devices, and transformers with automatic tap changers.

#### **6.2.4      *Dynamics Data Screening and Maintenance***

- (1) In order to maintain simulation-ready base cases and associated dynamics data files for use in dynamic simulations, ERCOT, in consultation with the DWG, shall perform dynamic simulations called flat-start simulations as described in the Dynamics Working Group Procedural Manual.
- (2) The schedule for producing the flat start simulations will be reviewed annually and submitted to the ROS.
- (3) Transmission owners shall review the completeness and applicability of dynamics data used in the flat start simulation for equipment connected to their system. The model should be appropriate for the equipment and the data shall be appropriate for the model.
- (4) ERCOT shall contact the appropriate TSP or Resource Entity to resolve any dynamics data problems, incomplete or missing data, encountered while preparing the flat start simulation.
- (5) Upon completion of each flat start simulation, ERCOT shall distribute an electronic copy of all files necessary to replicate the flat start simulation as described in the Dynamics Working Group Procedural Manual to the DWG.
- (6) ERCOT and the DWG shall document assumptions made, data created, and data changed during the creation of a flat start simulation.
- (7) ERCOT shall be responsible for storing all of the dynamics data and shall maintain a repository of dynamics data with tuned parameters and any submitted revisions.
- (8) Within 30 days of receipt, ERCOT shall forward all dynamics data received to the TSP to which the dynamics device is connected.

#### **6.2.5      *Dynamics Data Recorder***

- (1) ERCOT, in consultation with the DWG, shall prepare a list of locations, based on criteria contained in the Dynamics Working Group Procedural Manual, which require the installation of devices capable of recording ERCOT Transmission Grid events with sufficient resolution to serve as a benchmark for dynamic simulations.

### **6.3      *Process for Developing Short Circuit Cases***

- (1) This Section describes the process for the development of the short circuit cases used for planning purposes. Section 6, Disturbance Monitoring and System Protection, of the Operating Guides describes other non-planning aspects relating to system protection and disturbance monitoring requirements.

- (a) ERCOT shall collect the short circuit data sets or data updates developed by each Transmission Service Provider (TSP) and shall compile and maintain the short circuit cases.
- (b) During the first quarter of each calendar year, ERCOT shall compile and distribute the Current Year (CY) short circuit case to the System Protection Working Group (SPWG).
- (c) During the second quarter of each calendar year, ERCOT shall compile and distribute the Future Year (FY) short circuit cases for years two through five to the SPWG.
- (d) The transmission and generation systems of each Facility owner in ERCOT shall be represented completely including positive and zero sequence data. Generation Resource data shall be provided by the Resource Entity.
- (e) Each common bus within both the short circuit case and the corresponding steady-state load flow case shall have a matching bus name and matching bus number. Each additional bus added to the short circuit case as necessary to perform short circuit studies shall be assigned a name and bus number that does not conflict with pre-existing names and bus numbers used in the current set of load flow cases.
- (f) The positive sequence impedance of Transmission Elements used in both the load flow and short circuit cases shall be the same.
- (g) Zero sequence data shall include mutual impedance of multi-circuit transmission lines and of adjacent circuits within the same right-of-way, unless the TSP considers such impedance to be insignificant for studies made from this data.

## **6.4 Transmission Project Information and Tracking Report and Data Requirements**

### **6.4.1 *Transmission Project Information and Tracking Report***

- (1) The ERCOT Transmission Project and Information Tracking (TPIT) report presents the current triannual status of the transmission projects (60 kV and above) that have a material impact to the flow of power in the ERCOT System. The TPIT report communicates the status to the stakeholders through the TPIT Database. The TPIT Database has four primary sections:
  - (a) Future Projects;
  - (b) Completed Projects;
  - (c) Cancelled Projects; and

- (d) Regional Transmission Plan Projects.
- (2) Transmission projects listed in the current TPIT Future Projects and Completed Project sections are generally modeled in the current set of steady-state base cases used for transmission planning studies except for, but not limited to the following exceptions:
  - (a) Any project that requires Regional Planning Group (RPG) review and has not completed the review process;
  - (b) Any project with a projected in-service date beyond the six-year planning horizon; or
  - (c) Any project that consists of only a Remedial Action Scheme (RAS) or an Automatic Mitigation Plan (AMP) (which is not typically modeled);
  - (d) In addition, each project listing includes a data field that delineates whether that project is included in the aforementioned Steady State Working Group (SSWG) cases.

#### **6.4.2 *ERCOT Responsibilities***

- (1) ERCOT shall prepare TPIT updates using data supplied by each Transmission Service Provider (TSP), or its Designated Agent. ERCOT shall maintain a section within the TPIT Database that describes each data element as well as identify the Entity responsible for supplying the data within each data element. The updated TPIT Database shall be posted triannually on the Market Information System (MIS) Secure Area. The format and schedule for data collection and verification of the TPIT Database shall be determined by ERCOT and communicated to the appropriate Market Participants in a timely manner.

#### **6.4.3 *TSP Responsibilities***

- (1) TPIT provides information on transmission projects that are included in current TSP plans or included in the Regional Transmission Plan. Each TSP shall provide information for its transmission projects to ERCOT as outlined in the TPIT Procedures.

#### **6.4.4 *Regional Transmission Plan Projects in Transmission Project Information and Tracking Report***

- (1) Each year, with input from stakeholders, ERCOT develops a Regional Transmission Plan that identifies a set of reliability-driven and economic-driven transmission projects based on the current steady-state base cases. Transmission projects identified in the Regional Transmission Plan are typically at varying stages within the planning process and thus, are subject to change. When a Regional Transmission Plan project is deemed appropriate for inclusion in the steady-state base cases, the TSP shall initiate inclusion of the project



in the Future Projects section of TPIT, and ERCOT shall assign a TPIT project number. The project shall also remain in the Regional Transmission Plan section of the TPIT.

## **6.5 Annual Load Data Request**

- (1) The Transmission and/or Distribution Service Provider (TDSP) or its Designated Agent must provide Load data each year to allow necessary ERCOT System reliability analysis and planning and to meet requirements of North American Electric Reliability Corporation (NERC). Each TDSP or its Designated Agent is responsible for providing historical and forecasted Load data to ERCOT for all Loads connected to its system as outlined in the Annual Load Data Request Form Instructions. Data supplied in the Annual Load Data Request (ALDR) is considered Protected Information.
- (2) Some or all of the following factors may be considered when developing Load forecast data:
  - (a) Economic;
  - (b) Demographic;
  - (c) Customer trends;
  - (d) Conservation;
  - (e) Improvements in the efficiency of electrical energy uses;
  - (f) Other changes in the end uses of electricity; and
  - (g) Weather effects.
- (3) Each Distribution Service Provider (DSP) or its Designated Agent directly interconnected with the ERCOT Transmission Grid shall provide annual Load forecasts to ERCOT as outlined in the Annual Load Data Request Form Instructions.
- (4) For each substation not owned by either a Transmission Service Provider (TSP) or a DSP, the owner shall provide a substation Load forecast to the directly-connected TSP sufficient to allow it to adequately include that substation in its ALDR response.
- (5) The TDSP or its Designated Agent shall coordinate with the appropriate working group as described in the Annual Load Data Request Form Instructions for issues with data submissions.
- (6) Load data that is incomplete, not timely submitted on the schedule, or not in the format defined in the Annual Load Data Request Form Instructions will be considered missing data. For these missing Load data, ERCOT shall calculate Loads based on historical data and insert these Loads into the Load flow cases during Data Set A and Data Set B annual updates.

## **6.6 Intentionally Left Blank**

## **6.7 Data Dictionary**

- (1) The Data Dictionary provides additional bus data that is not included in the steady-state base cases or network model data. The Steady State Working Group Procedure Manual defines the requirements for the planning portion of the Data Dictionary.
- (2) The following items pertain to data updates:
  - (a) Transmission Service Providers (TSPs) shall submit all pertinent Data Dictionary data for each bus in its transmission system for Steady State Working Group (SSWG) models as specified in the Steady State Working Group Procedure Manual.
  - (b) ERCOT shall provide pertinent Resource Entity data for the Data Dictionary.
  - (c) Interim information is provided pursuant to Section 6.4.1, Transmission Project Information and Tracking Report. TSPs may revise bus data for the Data Dictionary as necessary to reflect changes.
- (3) ERCOT shall make available a copy of the ERCOT Steady State Planning Data Dictionary and contingency files on the Market Information System (MIS) Secure Area per the Steady State Working Group Procedure Manual and in accordance with the schedule posted on the MIS Secure Area for Annual Planning Model Data Submittal.

## **6.8 Resource Registration Procedures**

- (1) In accordance with Protocol Sections 3.7, Resource Parameters, 3.10, Network Operations Modeling and Telemetry, and 16.5, Registration of a Resource Entity, a Resource Entity shall register each All-Inclusive Generation Resource with ERCOT. The Resource Entity shall submit Resource Registration data and information through the Resource Registration process pursuant to Section 6.8.2, Resource Registration Process, and made available on the Market Information System (MIS) Public Area.

### **6.8.1 Resource Registration**

- (1) A Resource Entity shall submit complete Resource Registration data pursuant to Section 6.8.2, Resource Registration Process, for each All-Inclusive Generation Resource prior to inclusion in applicable ERCOT systems.
- (2) All data elements requested in the Resource Registration process will be contained in the Resource Registration Glossary. Changes, deletions or additions to the data elements in the Resource Registration Glossary will be made in accordance with the revision process specified for the Resource Registration Glossary.

- (3) ERCOT shall post the Resource Registration Glossary on the MIS Public Area.
- (4) ERCOT shall post a detailed Resource Registration Guide on the MIS Public Area that provides detailed instructions and explanations required for Resource Registration data and shall conform to the Resource Registration Glossary.
- (5) ERCOT shall make available related documents for Resource Registration on the MIS Public Area and shall notify Market Participants when changes are made to the Resource Registration process and requirements, including Resource Registration forms, the Resource Registration Glossary, and the Resource Registration Guide.
- (6) As required by Section 5, Generation Resource Interconnection or Change Request, Generation Resources shall provide accurate initial data for inclusion in the ERCOT Network Operations Model. The data will be used to model future generation for Steady-State Working Group (SSWG), Dynamics Working Group (DWG), and System Protection Working Group (SPWG) base cases.

#### **6.8.2      *Resource Registration Process***

- (1) A Resource Entity shall submit the Resource Registration data for All-Inclusive Generation Resources as described in the Resource Registration Glossary.
- (2) Upon receipt of the Resource Registration data, ERCOT shall review the completeness and accuracy of the data submission. ERCOT shall provide notice of acceptance and/or deficiencies to the Resource Entity.
- (3) ERCOT shall provide notice to the Resource Entity if the Resource Registration data is accepted, which is not the same as an approved Network Operations Model Change Request (NOMCR). The acceptance of the Resource Registration data only means that the registered data moves to the next step of being converted to a NOMCR. After acceptance and/or approval, the data is still subject to various and continuous validation processes.
- (4) If ERCOT's notice reports deficiencies through the data submission process or through subsequent validation processes, the Resource Entity shall make necessary changes specified and re-submit the Resource Registration data as necessary, until acceptance of the total set of registered data is granted.
- (5) Upon acceptance of the Resource Registration data, ERCOT shall provide the Resource Entity with the model ready date on which the Resource Registration data will be implemented in production. Although a model ready date has been provided, subsequent data corrections may be required as a result of validation processes.
- (6) If a Resource Entity desires that the submitted Resource Registration data become effective earlier than the schedule established in Protocol Section 3.10.1, Time Line for Network Operations Model Changes, it may submit a request for interim update as described in the Resource Registration Guide.

- (7) ERCOT shall notify each Resource Entity when applicable changes to the model are processed and implemented in accordance with Protocol Section 3.10.1.
- (8) A Resource Entity shall revise the Resource Registration data as required by this Section to reflect changes in any data related to an All-Inclusive Generation Resource.
- (9) The Resource Entity must submit updated Resource Registration data containing changes made for the reasons below for an All-Inclusive Generation Resource:
  - (a) Within ten Business Days of ERCOT approval of a Net Dependable Capability test to reflect the results of the test;
  - (b) Within ten Business Days of ERCOT approval of a reactive capability test to reflect the results of the test;
  - (c) Within ten Business Days of a request by ERCOT to check or update specific Resource Registration data; and
  - (d) Within ten Business Days of a known change to any Resource Registration data.

## **6.9 Addition of Proposed Generation to the Planning Models**

- (1) For generation meeting the conditions of paragraph (1) of Section 5.1.1, Applicability, ERCOT will include applicable generation in the base cases created and maintained by the Steady State Working Group (SSWG) once each of the following has occurred:
  - (a) The Interconnecting Entity (IE) provides all data required in the Security Screening Study, if the Full Interconnection Study (FIS) has not started, or the FIS, if the FIS has started;
  - (b) ERCOT determines that the IE has received all necessary Texas Commission on Environmental Quality (TCEQ)-approved air permits or that no such permits are required;
  - (c) The IE submits a completed Declaration of Adequate Water Supplies (Section 8, Attachment B, Declaration of Adequate Water Supplies; generation types exempt from this requirement are cited in Attachment B); and
  - (d) ERCOT receives one of the following:
    - (i) A signed Standard Generation Interconnection Agreement (SGIA) from the Transmission Service Provider (TSP) and a written notice from the TSP that the IE has provided:
      - (A) A notice to proceed with the construction of the interconnection; and

- (B) The financial security required to fund the interconnection facilities; or
  - (ii) A public, financially binding agreement between the IE and the TSP under which the interconnection for the applicable generation will be constructed along with:
    - (A) A written notice from the TSP that the IE has provided notice to proceed with the construction of the interconnection; and
    - (B) The required financial security; or
  - (iii) A letter from a duly authorized official from a Municipally Owned Utility (MOU) or Electric Cooperative (EC) confirming the Entity's intent to construct and operate applicable generation and interconnect such generation to its own transmission system.
- (2) Upon receiving notice from ERCOT that the IE has met the requirements of paragraph (1) above, the IE shall provide within 60 days the remaining required data as specified in the Resource Registration Glossary, Planning Model column, using the applicable Resource Registration process. The purpose of submitting the data is for modeling of the applicable generation in the base cases created and maintained by the System Protection Working Group (SPWG) and the Dynamics Working Group (DWG).
  - (3) Once the IE has met these requirements, ERCOT will notify the SSWG, SPWG, and DWG that the applicable generation will be included in the base cases created and maintained by these working groups.

## **6.10 Contingency Filing Requirements**

- (1) Each Transmission Service Provider (TSP), or the entity designated as its modeling entity in Appendix A to the Steady State Working Group Procedure Manual, shall provide updates to the ERCOT contingency list corresponding to the steady-state base cases for the TSP's existing system and planned future Transmission Facilities. ERCOT shall post the list to the Market Information System (MIS) Secure Area. The list shall be reviewed and updated as described in the Steady State Working Group Procedure Manual. At a minimum, the list shall contain all required category P1, P2, P4, P5, and P7 contingencies, as described in the NERC Reliability Standard addressing Transmission System Planning Performance Requirements, all contingencies representing the Forced Outage of a double circuit (two circuits on the same structures in excess of 0.5 miles in length), and any other contingencies described in the Steady State Working Group Procedure Manual.

## 6.11 Process for Developing Geomagnetically-Induced Current (GIC) System Models

- (1) To adequately simulate Geomagnetic Disturbance (GMD) events, it is necessary to establish and maintain GIC system models and conduct geomagnetic disturbance vulnerability assessments to determine whether the ERCOT System can withstand performance requirements of the benchmark geomagnetic disturbance event described in North American Electric Reliability Corporation (NERC) Reliability Standards. These models, known as GIC base cases, shall contain appropriate system data, and shall represent projected system conditions that provide a starting point for the required year(s).
  - (a) Transmission Service Providers (TSPs) and ERCOT shall develop the GIC base cases. These base cases are derived from the steady-state base cases developed by Steady-State Working Group (SSWG) for the near-term transmission planning horizon to ensure consistency between the system topology in the SSWG base cases and GIC system models.
  - (b) Each TSP, or its Designated Agent, shall provide its respective transmission network GIC model data in accordance with the GIC System Model Procedure Manual.
  - (c) Each Resource Entity, or its Designated Agent, shall provide its respective Resource Entity-owned generating units, plants, transmission lines, shunt devices and Generation Step Ups (GSUs) connected to the ERCOT System in accordance with the GIC System Model Procedure Manual and the Resource Registration Glossary.
  - (d) ERCOT shall aggregate the GIC system model data supplied by each TSP and Resource Entity and shall compile and maintain the GIC system models. Upon completion of compiling the data for the GIC base cases, ERCOT shall post these cases on the ERCOT Market Information System (MIS) Certified Transmission Service Provider Information page for review and comments as described in the GIC System Model Procedure Manual.
  - (e) Guidelines and formats for the GIC system model data and model maintenance can be found in the GIC System Model Procedure Manual.
  - (f) GIC data is considered Protected Information pursuant to Protocol Section 1.3, Confidentiality.

***[PGRR057: Insert paragraph (2) below upon system implementation:]***

- (2) Each TSP and Resource Entity shall provide to ERCOT a list of GMD event contingencies as described in the applicable NERC Reliability Standard for use in the GMD vulnerability assessment as outlined in Section 3.1.8, Planning Geomagnetic Disturbance (GMD) Activities.



# **ERCOT Planning Guide**

## **Section 7: Market Data Transparency**

**August 1, 2017**

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**7     MARKET DATA TRANSPARENCY .....1**

    7.1   PLANNING DATA AND INFORMATION .....**ERROR! BOOKMARK NOT DEFINED.**

## 7 MARKET DATA TRANSPARENCY

### 7.1 *Planning Data and Information*

- (1) The information available on the applicable Market Information System (MIS) (i.e., Public, Secure or Certified Areas) includes, but is not limited to, planning information pertaining to the following:
  - (a) Long-term planning;
  - (b) Regional transmission planning;
  - (c) Steady state data;
  - (d) Resource integration;
  - (e) Case studies and files used in planning;
  - (f) Model information; and
  - (g) Data and information available to specific groups of Market Participants.
    - (i) Market Participants with a nondisclosure agreement with ERCOT have designated sections on the MIS that allow access to the certified posting of group information.
    - (ii) Market Participants may access the artifacts posted for their respective groups on the MIS Secure Area.
- (2) The list below includes both data set and designated MIS classification of the available planning data and information. Where the information is classified as “Certified,” the appropriate Market Participant category or group is also indicated.

<b>Data Set</b>	<b>Classification</b>
Aggregated Wind Output	Public
Annual Planning Model Data Submittal Schedule	Secure
Demand and Energy Monthly Reports	Secure
Dynamic Data Information	Certified (all Transmission Service Providers (TSPs))
Economic Studies of Transmission Projects for New Generation	Secure
ERCOT Long-Term System Assessment	Secure

ERCOT Steady State Planning Contingency Files	Secure
ERCOT System Operating Limit (SOL) Methodology	Public
Generation Data Forms	Secure
Documents Initiating a Generation Interconnection or Change Request	Certified (all TSPs)
GINR Security Screening Studies and Supporting Documents	Secure
Sub-Synchronous Oscillation Studies and Supporting Documents	Certified (all TSPs)
FIS: Steady-State, System Protection, Stability, and Facility Studies and Supporting Documents (except for Protected Information)	Secure
FIS: Draft Steady-State, System Protection, Stability, and Facility Studies and Supporting Documents	Certified (all TSPs)
IMM and Topology Processor Supporting Documents	Certified (all TSPs)
PDCWG Group Documents and Project Files	Certified (PDCWG members)
Planning Horizon Transmission Capability Methodology	Public
Public Generation Information	Public
RAP Review Cases	Certified (all TSPs)
RARF Generator Data	Certified (specific Resource Entity)
Regional Planning Group Projects	Secure
Regional Transmission Plan Postings	Secure
Seasonal Voltage Profile Studies	Certified (all TSPs)
Special Planning Studies	Secure
Steady State Power Flow Base Cases	Secure
Steady State Power Flow Case Data	Certified (all TSPs)
Steady State Topology Processor Files	Secure
Steady State TPIT Procedures	Secure
System Protection Short Circuit Data	Secure
Transient Stability Screening Study for ERCOT System	Certified (all TSPs)
TSP Planning Criteria and Procedures	Secure
Voltage Stability Screening Study for ERCOT System	Certified (all TSPs)

# **ERCOT Planning Guide**

## **Section 8**

### **Attachment A: Declaration of Resource Data Accuracy**

**January 1, 2014**

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### **Declaration of Resource Data Accuracy**

**Name of Interconnecting Entity:**

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**Name and INR number of Project:**

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**Declaration Submission Period:**

☐ March 1-15, 20\_\_\_\_

☐ September 1-15, 20\_\_\_\_

By signing below, I certify that I am knowledgeable about the design of the above-named project, and that the Resource registration form most recently submitted to ERCOT for the above-named project accurately reflects the anticipated characteristics of the proposed Resource.

I further certify that I am authorized to execute and submit this declaration on behalf of the Interconnecting Entity listed above, and that the statements contained herein are true and correct.

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Signature

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Name

---

Title

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Date

# **ERCOT Planning Guide**

## **Section 8**

### **Attachment B: Declaration of Adequate Water Supplies**

**July 1, 2017**

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### **Declaration of Adequate Water Supplies**

An Interconnecting Entity (IE) must submit this attestation form to notify ERCOT that water rights, contracts or groundwater supplies sufficient for generation of electricity have been obtained or that water supplies are not required for the generation of electricity at each proposed Generation Resource. Section 6.9, Addition of Proposed Generation to the Planning Models, requires an IE to submit this form before ERCOT may include certain proposed Generation Resources in the base cases created and maintained by the Steady State Working Group (SSWG), the System Protection Working Group (SPWG), and the Dynamics Working Group (DWG). Any IE that proposes to interconnect a Generation Resource powered by wind, photovoltaic solar, or battery energy storage Resources does not need to submit this form. However, any IE proposing to interconnect any other type of Generation Resource must submit this form, even if the IE's proposed Resource will not use water.

Each IE should submit this attestation for each unique Generation Resource Interconnection Request (GINR) within ten Business Days of securing the relevant water supply rights, or, for Generation Resources that do not require water supplies to operate, within ten Business Days of executing the Interconnection Agreement with the TSP. The attestation should be signed by an officer or other individual with authority to bind the IE. The IE should submit the attestation and the necessary attachments to ERCOT via email at [GINR@ercot.com](mailto:GINR@ercot.com).

### **ATTESTATION**

**Name of Interconnecting Entity:**

---

**Name and GINR Number of Project:**

---

By signing below, I certify that I am knowledgeable about the above-named project, and hereby represent as follows (check one of the following):

☐ No water rights, contracts or groundwater supplies are needed for the above-named proposed Generation Resource to generate electricity.

☐ The IE, the owner of the proposed Generation Resource, or another similarly situated party has secured water rights, contracts or groundwater supplies sufficient for the generation of electricity at the above-named proposed Generation Resource. A copy of the relevant contract(s), permit(s) and/or groundwater adequacy studies is attached to this declaration. The right(s) or contract(s) allows the Generation Resource owner or operator access to water according to the following terms (describe basic terms, including quantity, duration, and conditions of access):

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Signature

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Name

---

Title

---

Date



# **ERCOT Planning Guide**

## **Section 8**

### **Attachment C: Declaration of Department of Defense Notification**

**November 1, 2016**

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**Declaration of Department of Defense Notification**

**Interconnecting Entity (IE):**\_\_\_\_\_

**This declaration applies to the following proposed Generation Resource:**\_\_\_\_\_

**Check the below listed attestation(s) which apply to the Generation Resource.**

I hereby attest that:

- \_\_\_\_\_ This IE has notified the Department of Defense (DOD) Siting Clearinghouse of the above listed proposed Generation Resource and requested that it perform an Informal Review and/or Formal Review as described in 32 C.F.R. § 211.1 (2013);
- \_\_\_\_\_ This IE has completed the formal review process for the Generation Resource with the Department of Defense (DOD) Siting Clearinghouse and Federal Aviation Administration (FAA), as described in 14 C.F.R. § 77.7 (2010) and 32 C.F.R. § 211.6 (2013); or
- \_\_\_\_\_ The above listed proposed Generation Resource is exempt from the requirement to seek review from the Department of Defense (DOD) and the Federal Aviation Administration (FAA), as described in 14 C.F.R. § 77.7 (2010) and 32 C.F.R. § 211.6 (2013).

By signing below, I certify that I am an officer, executive, or authorized employee with authority to bind the IE listed above, that I am authorized to execute and submit this declaration on behalf of each IE listed above, and that, to the best of my knowledge, the statements contained herein are true and correct.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

# **ERCOT Planning Guide**

## **Section 9: [RESERVED]**

**May 1, 2011**

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9    **[RESERVED]** .....1

**9      [RESERVED]**