

# ERCOT Planning Guide

January 1, 2023

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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**

**January 1, 2021**

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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>GIM</b>	Generator Interconnection or Modification
<b>GINR</b>	Generation Interconnection or Change Request
<b>GMD</b>	Geomagnetic Disturbance
<b>LTSA</b>	Long-Term System Assessment
<b>RIOO</b>	Resource Integration and Ongoing Operations
<b>SSR</b>	Subsynchronous Resonance
<b>TCEQ</b>	Texas Commission on Environmental Quality

# **ERCOT Planning Guide**

## **Section 3: Regional Planning**

**January 1, 2022**

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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, Generator Interconnection or Modification. 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.

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

- (1) The purpose of Geomagnetic Disturbance (GMD) vulnerability assessments 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 GMD events. The most recent Geomagnetically-Induced Current (GIC) system models developed and maintained by ERCOT in collaboration 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 benchmark and supplemental GMD vulnerability assessments. 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 benchmark and supplemental vulnerability assessments 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.

#### **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 Power System Simulator for Engineering (PSS/E) RAWD format). Also, the submission should include accurate maps and one-line diagrams showing locations of the proposed project and feasible alternatives;
  - (b) Identification of the SSWG, Dynamics Working Group (DWG), 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;
  - (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; and
  - (h) Analysis of rejected alternatives, including cost estimates, and other factors considered in the comparison of alternatives with the proposed project.
- (2) Both transmission and distribution solutions to performance deficiencies may be considered where applicable.
  - (3) If there is any other information, not included above, that the submitting party believes is relevant to consideration of the need for any submitted project, the submitting party 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 (SWGR) capacity available to the ERCOT Region.
- (4) ERCOT may, in its discretion, set a Generation Resource to out of service in the Regional Transmission Plan base cases prior to receiving a Notification of Suspension of Operations (NSO) if the Resource Entity notifies ERCOT of its intent to retire/mothball the Generation Resource and/or makes a public statement of its intent to retire/mothball the Generation Resource. ERCOT must provide reasonable advance notice to the RPG of any proposed Generation Resource retirements/mothballs and allow an opportunity for stakeholder comments.
  - (a) ERCOT will post and maintain the current list of Generation Resources that will be set to out of service pursuant to paragraph (4) above on the ERCOT website.
- (5) In its Regional Transmission Plan studies, ERCOT shall first consider transmission needs without Remedial Action Scheme (RAS) actions. After evaluating these needs, ERCOT may model a RAS in the Regional Transmission Plan cases only if ERCOT's initial studies did not identify a transmission project to exit the RAS or if a transmission project to exit the RAS is not expected to be in service by the season and year the case represents.
- (6) 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 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 review in accordance with Protocol Section 3.11.4.1, Project Submission. All project submissions should be sent electronically to [rpg\\_submittal@ercot.com](mailto:rpg_submittal@ercot.com). The RPG project review consists of the following steps:

- (a) ERCOT will provide electronic copies of RPG project review submittals by email to the RPG within five Business Days of receipt and solicit comments or questions from the RPG;
- (b) ERCOT will assign a unique project identification number (RPG project number) to the RPG project review submittals according to the following convention:

#### **yrRPGxxx**

where: yr is the calendar year the RPG project is submitted

RPG indicates RPG project

xxx is a sequence number beginning with 001 (reset for each year)

- (c) All concerns/questions or objections about the submitted project by any stakeholder or ERCOT should be submitted by email to the RPG within 15 Business Days after ERCOT's transmittal to the RPG;
- (d) Each Entity providing comments should provide a "single" complete comment about each project by the end of the 15-Business Day comment period rather than sending multiple comments at various times or from various individuals;
- (e) Any questions related to data deficiency should be submitted to ERCOT and the submitting party immediately;
- (f) If concerns or objections about a project are received during the 15-Business Day comment period, the project will be put into "study mode." During study mode, the submitting party shall respond to any concerns or objections and provide additional information, if necessary, by email to the RPG until all concerns are resolved or until ERCOT assesses that a reasonable effort has been made to resolve all concerns or objections. A submitting party may make modifications to a Tier 3 project to address concerns or objections without having to resubmit the project so long as the modifications do not result in the project being classified as a Tier 1 or 2 project. Study mode shall end no later than 20 Business Days

following the end of the comment period, unless ERCOT finds good cause to extend study mode;

- (g) The submitting party should answer all questions and respond to all concerns in a timely manner;
- (h) 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
- (i) ERCOT will post all project submissions, the comments received, and other information and databases associated with submitted transmission projects on the MIS Secure Area.
- (j) Comments received after the 15-Business Day comment period may be considered by ERCOT or the submitting party, but a response is not required.

### **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.

### **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.

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

- (1) As required by the applicable NERC Reliability Standard, ERCOT shall employ the Geomagnetically-Induced Current (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 each transformer for the benchmark and supplemental Geomagnetic Disturbance (GMD) events. 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) with the high side terminal operated at 200 kV or higher within the ERCOT planning area shall perform the benchmark and supplemental transformer thermal impact assessment(s) as required in the applicable NERC Reliability Standard and shall provide to ERCOT any suggested actions to mitigate the impact of GICs on those transformers with the high side terminal operated at 200 kV or higher within 18 months of the date of ERCOT notification to TSPs and Resource Entities that the final GIC flow results are posted on the MIS Secure Area.

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- (3) ERCOT and the TSPs shall develop for approval by the TAC, criteria for acceptable steady-state voltage performance during the benchmark and supplemental GMD events.
  - (4) ERCOT in collaboration with the TSPs and Resource Entities shall perform the ERCOT benchmark and supplemental GMD vulnerability assessments as required in the applicable NERC Reliability Standard; and may set a Generation Resource to out of service prior to receiving an NSO if the Resource Entity notifies ERCOT of its intent to retire/mothball the Generation Resource and/or makes a public statement of its intent to retire/mothball the Generation Resource. ERCOT shall provide preliminary results of the GMD vulnerability assessments 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 assessments, including suggested actions described in paragraph (2) above.
    - (a) ERCOT will post and maintain the current list of Generation Resources that will be set to out of service pursuant to paragraph (4) above on the ERCOT website.
  - (5) ERCOT shall finalize the ERCOT benchmark and supplemental GMD vulnerability assessments, post them on the MIS Secure Area, and notify TSPs and Resource Entities of the posting.
  - (6) For each GMD vulnerability assessment that does not satisfy applicable performance requirements, each impacted TSP and Resource Entity, in collaboration with ERCOT, shall develop and document corrective action plan(s) for their facilities, and develop a timetable, subject to revision, for implementing the corrective action plan(s). For any corrective action plan proposing upgrades to the transmission system that are subject to Protocol Section 3.11.4, Regional Planning Group Project Review Process, review shall be conducted in accordance with the process described therein. For any corrective action plan that is not subject to the review process described in Protocol Section 3.11.4, ERCOT shall review the corrective action plan to ensure that it satisfies applicable performance requirements. Any corrective action plan that proposes operational actions shall be reviewed pursuant to Nodal Operating Guide Section 11, Constraint Management Plans and Remedial Action Schemes.
    - (a) If a situation beyond the control of the TSP or Resource Entity prevents implementation of a corrective action plan within the timetable for implementation required in the applicable NERC Reliability Standard, the TSP or Resource Entity shall submit a revised corrective action plan, updated timetable, and documentation supporting the request for extension of time, as required in the applicable NERC Reliability Standard, to ERCOT within 30 days of the revision of the corrective action plan.
    - (b) After receipt of all information required in the applicable NERC Reliability Standard, ERCOT shall submit the request for extension of time to the NERC Regional Entity, as required in the applicable NERC Reliability Standard, on behalf of the TSP or Resource Entity.

- (7) ERCOT shall post the GMD vulnerability assessment reports and corrective action plan(s) on the ERCOT MIS Secure Area within 90 calendar days of development or revision.
- (8) ERCOT in collaboration with TSPs and Resource Entities shall implement a process for obtaining GIC monitor data and geomagnetic field data from TSPs, Resource Entities, or other available sources as required in the applicable NERC Reliability Standard.

### **3.1.9 *Transmission Interconnection Study***

- (1) ERCOT shall perform an annual transmission interconnection study to analyze the reliability impact of any transmission projects 100 kV or above that are expected to be in-service before the completion of the next Regional Transmission Plan and were not included in the current Regional Transmission Plan, an RPG project submission, or a Generation Interconnection or Change Request (GINR) study pursuant to Section 5, Generator Interconnection or Modification.
  - (a) ERCOT shall identify a list of transmission projects 100 kV or above that need to be included in the annual transmission interconnection study and shall send the list to the TSPs that own the projects.
  - (b) Within 20 Business Days of receipt of the list, each TSP that owns an identified transmission project shall send to ERCOT a PSS/E or PowerWorld formatted incremental change file to model the project in the current Regional Transmission Plan study cases.
  - (c) ERCOT shall post a study report detailing its findings on the MIS Secure Area within 20 Business Days of completion.
- (2) After each Transmission Project Information Tracking (TPIT) update ERCOT shall identify a list of transmission projects 100 kV or above that are expected to be in-service before the completion of the next annual transmission interconnection study and were not included in the previous transmission interconnection study, Regional Transmission Plan, an RPG project submission, or a GINR study pursuant to Section 5. ERCOT shall send the list to the TSPs that own the projects.
  - (a) Within 20 Business Days of receipt of the list, each TSP that owns an identified transmission project shall send to ERCOT a study report detailing the reliability impact analysis it conducted for the project. At a minimum the report shall identify the study base case(s), contingencies, and results.
  - (b) ERCOT shall review the TSP reports and provide comments to the TSP within 20 Business Days of receipt.

# **ERCOT Planning Guide**

## **Section 4: Transmission Planning Criteria**

**June 1, 2022**

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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.
- (6) Assumed Direct Current Tie (DC Tie) imports and exports will be curtailed as necessary to meet reliability criteria in planning studies.

***[PGRR098: Insert paragraph (7) below upon system implementation:]***

- (7) Manual System Adjustments shall not increase the amount of consequential Load loss following a common tower outage, or the contingency loss of a single generating unit, transmission circuit, transformer, shunt device, FACTS device, or DC Tie Resource or DC Tie Load, with or without a single line-to-ground fault.

#### 4.1.1.2 Reliability Performance Criteria

- (1) The following reliability 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 with or without a single line-to-ground fault, 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 all Facilities in their normal state, following an outage of a Direct Current Tie (DC Tie) Resource or DC Tie Load with or without a single line-to-ground fault, 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 generating unit unavailable, followed by Manual System Adjustments, followed by a common tower outage or outage of a DC Tie Resource or DC Tie Load with or without a single line-to-ground fault, 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;
  - (d) With any single transformer, with the high voltage winding operated at 300 kV or above and low voltage winding operated at 100 kV or above 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, FACTS device, or DC Tie Resource or DC Tie Load with or without a single line-to-ground fault, 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; and
  - (e) With any single DC Tie Resource or DC Tie Load 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, FACTS device, or DC Tie Resource or DC Tie Load, with or without a single line-to-ground fault, 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.

	<b>Initial Condition</b>	<b>Event</b>	<b>Facilities within Applicable Ratings and System Stable with No Cascading or Uncontrolled Outages</b>	<b>Non-consequential Load Loss Allowed</b>
1	Normal System	Common tower outage, DC Tie Resource outage, or DC Tie Load outage	Yes	No
2	Unavailability of a generating unit, followed by Manual System Adjustments	Common tower outage, DC Tie Resource outage, or DC Tie Load outage	Yes	No
3	Unavailability of a transformer with the high voltage winding operated at 300 kV or above and low voltage winding operated at 100 kV or above, 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; 5. FACTS device; or 6. DC Tie Resource or DC Tie Load	Yes	No
4	Unavailability of a DC Tie Resource or DC Tie Load, 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; 5. FACTS device; or 6. DC Tie Resource or DC Tie Load	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.
  - (a) A Remedial Action Scheme (RAS) shall not be planned to resolve a planning criteria performance deficiency unless it is expected that system conditions will change such that the RAS will no longer be needed within the next five years.

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

- (1) 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 North American Electric Reliability Corporation (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**

- (1) 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:
  - (a) 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;
  - (b) 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; and
  - (c) 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.

- (2) 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**

- (1) 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:
  - (a) 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; and
  - (b) 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**

- (1) 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.

#### **4.1.1.7 Minimum Deliverability Criteria**

- (1) In conducting its planning analyses, ERCOT and each TSP shall ensure that an ERCOT-defined minimum percentage of capacity of each Resource described in paragraph (3) below can be delivered to serve peak system Load while meeting the following reliability criteria:
  - (a) Category P0, P1, P2-1, P3, and P7 planning events from the NERC Reliability Standard addressing Transmission System Planning Performance Requirements; and

- (b) The ERCOT-specific reliability performance criteria included in Section 4.1.1.2, Reliability Performance Criteria.
- (2) The minimum percentage of capacity referenced in paragraph (1) above shall be applied to each Resource's applicable Seasonal Net Max Sustainable Rating submitted through the Resource Registration process.
- (3) The minimum deliverability condition described in paragraph (1) applies to the following Resources:
  - (a) Any Generation Resource utilizing combined cycle, steam turbine, combustion turbine, hydro, or reciprocating engine technology; or
  - (b) Any Energy Storage Resource (ESR) meeting an ERCOT-defined minimum duration threshold.
- (4) Resources other than those described in paragraph (3) above may be redispatched as necessary to meet the requirements of this Section.
- (5) ERCOT-proposed revisions to the minimum percentage of capacity or minimum duration threshold for ESRs used to implement the requirements of this Section will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board.
  - (a) ERCOT will post the current values approved by the ERCOT Board pursuant to paragraph (5) above on the ERCOT website.

***[PGRR098: Insert Section 4.1.1.8 below on January 1, 2024:]***

#### **4.1.1.8 Maintenance Outage Reliability Criteria**

- (1) In an off-peak system condition selected in accordance with paragraph (3) below, with any transmission element included in paragraph (2) below unavailable, followed by Manual System Adjustments, followed by a common tower outage or the contingency loss of a transmission circuit, transformer, shunt device, or FACTS device, with or without a single line-to-ground fault, 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.
- (2) The unavailability of the following transmission elements shall be considered for the requirements of this section:

- (i) Any double-circuit transmission line consisting of two circuits sharing a tower of 0.5 miles or greater where both circuits must be removed from service for a maintenance outage; or
  - (ii) Any transmission circuit, transformer, shunt device, or FACTS device.
- (3) At least one off-peak system condition occurring outside of the Peak Load Season shall be selected for assessment.

# **ERCOT Planning Guide**

## **Section 5: Generator Interconnection or Modification**

**April 1, 2022**

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## **5 GENERATOR INTERCONNECTION OR MODIFICATION**

### **5.1 Introduction**

- (1) Section 5, Generator Interconnection or Modification, defines the requirements and processes used to facilitate new or modified generation interconnections with the ERCOT System. The requirements outlined in Section 5 are designed to:
  - (a) Facilitate studies to identify potential system limitations associated with the proposed interconnection of new or modified generators to the ERCOT System and to determine the facilities required to interconnect new or modified generators 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 complies with the North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, this Planning Guide, the Operating Guides, and any Applicable Legal Authority (ALA);
  - (c) Specify the communications required between Interconnecting Entities (IEs), Distribution Service Providers (DSPs), 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 ERCOT accurate data about new and modified generators to ensure that ERCOT and stakeholders have the information necessary for planning purposes.

### **5.2 General Provisions**

#### **5.2.1 *Applicability***

- (1) The requirements in Section 5, Generator Interconnection or Modification, apply to the following:
  - (a) Any Entity proposing to interconnect any generator with an aggregate nameplate capacity of one MW or greater, including but not limited to any Generation Resource or Energy Storage Resource (ESR), to the ERCOT System;
  - (b) Any Entity proposing to interconnect a Settlement Only Generator (SOG) to the ERCOT System; or
  - (c) Any Resource Entity seeking to modify a Generation Resource, ESR, or SOG that is connected to the ERCOT System by:

- (i) Increasing the real power rating from that shown in the latest Resource Registration data by one MW or greater within a single year;
  - (ii) Changing the inverter, turbine, generator, or power converter associated with a facility with an aggregate real power rating of ten MW or greater, unless the replacement is in-kind;
  - (iii) Changing or adding a Point of Interconnection (POI) to a facility with an aggregate real power rating of ten MW or greater; or
  - (iv) Increasing the aggregate nameplate capacity of a generator less than ten MW to ten MW or greater.
- (2) For the purposes of Section 5, the term “generator” includes but is not limited to a Generation Resource, SOG, and ESR.
- (3) For the purposes of determining the appropriate requirements in Section 5, a generator is considered a “large generator” if it currently has or is proposed to have an aggregate nameplate capacity of ten MW or greater. A generator is considered a “small generator” if it currently has or is proposed to have an aggregate nameplate capacity of less than ten MW.
- (4) Notwithstanding paragraph (3), above, if a Resource Entity is proposing to increase the real power rating of an existing generator by one MW or greater but less than ten MW, that generator shall be considered a small generator for the purposes of the interconnection process described in Section 5.
- (5) Notwithstanding paragraphs (3) and (4), above, if a Resource Entity is proposing to increase a generator’s real power rating by ten MW or more, or is proposing to increase a generator’s real power rating from less than ten MW to ten MW or more, that generator shall be considered a large generator for the purposes of the interconnection process described in Section 5.
- (6) For the purposes of determining the appropriate requirements in Section 5, ERCOT may require two or more separate generator interconnection requests to the same substation to follow the interconnection process applicable to the large generators, if, following the proposed change, those generators would have an aggregate nameplate capacity of ten MW or greater, and the projects are proposed by the same Entity or Affiliates.
- (7) For a new or modified generator that has been designated as a Self-Limiting Facility or as a component of a Self-Limiting Facility, the categorization of the generator as a small generator or large generator pursuant to paragraphs (3) through (5) above shall be determined using the Self-Limiting Facility’s established limit on the total MW Injection, or if applicable, the proposed increase in that value instead of the nameplate capacity of the Self-Limiting Facility.

### 5.2.2 *Initiation of Generator Interconnection or Modification*

- (1) Any Entity subject to paragraph (1) of Section 5.2.1, Applicability, must initiate a Generator Interconnection or Modification (GIM) by submitting a completed request and providing all requested information and documentation through the online Resource Integration and Ongoing Operations (RIOO) system and paying the Generation Interconnection Fee described in the ERCOT Fee Schedule in the ERCOT Protocols.
- (2) An Entity is not eligible to initiate or maintain a GIM if the Entity or any other owner of the project meets any of the company ownership (including affiliations) or headquarters criteria listed in Texas Business and Commerce Code, Sections 113.002(a)(2)(A)-(b)(2)(B) or 2274.0102(a)(2)(A)-(b)(2)(B), added by Act of June 18, 2021, 87th Leg., R.S., Ch. 975 (S.B. 2116). Any Entity that seeks to initiate a GIM shall submit an attestation Section 8, Attachment D, Attestation Regarding Compliance with the Lone Star Infrastructure Protection Act, confirming that the Entity does not meet any of the company ownership (including affiliations) or headquarters criteria listed in Texas Business and Commerce Code, Sections 113.002(a)(2)(A)-(b)(2)(B) or 2274.0102(a)(2)(A)-(b)(2)(B).
- (3) An Entity is not eligible to initiate or maintain a GIM if the real property to be utilized by or for the project is owned or controlled, in whole or in part, by an Entity that meets any of the prohibited company ownership (including affiliations) or headquarters criteria identified in the Lone Star Infrastructure Protection Act, Texas Business and Commerce Code, Sections 113.002(a)(2)(A)-(b)(2)(B) or 2274.0102(a)(2)(A)-(b)(2)(B), added by Act of June 18, 2021, 87th Leg., R.S., Ch. 975 (S.B. 2116). The Interconnecting Entity (IE) must provide an attestation Section 8, Attachment D, confirming that such prohibited ownership or control does not apply to the real property.
- (4) For the purposes of submitting a GIM:
  - (a) MW values should be determined at the generator terminals;
  - (b) If generation is serving new or existing Load then this must be identified in the RIOO request; and
  - (c) The latitude, longitude, and county are those of the station that includes the main power transformer for the subject facility.
  - (d) Failure to supply any required data may delay ERCOT processing of the interconnection application and studies and result in project cancellation.
- (5) Payment of the Generation Interconnection Fee and all other related fees payable to ERCOT must be made using an Automated Clearing House (ACH) e-check or credit card via the RIOO system. This fee is non-refundable and must be paid even if ERCOT waives the Security Screening Study described in Section 5.3.1, Security Screening Study, or cancels the project due to failure to submit complete project information. The fee must be paid for each additional interconnection request (INR) even if a fee has previously been paid for another INR associated with the same generator.

- (6) Upon receiving the application, ERCOT will assign the project a unique identification number (INR number) according to the following convention:

yrINRxxxx

where: yr is the year the generation is anticipated to be commissioned

INR indicates it is an interconnection request

xxxx is a sequence number beginning with 0001 (reset for each year)

- (7) The proposed Commercial Operations Date for large generators meeting paragraph (1)(a) of Section 5.2.1 must be at least 15 months after the date the application is submitted or it will not be accepted. If conditions allow, the Commercial Operations Date can be changed after submission.
- (8) ERCOT will notify the IE within ten days if the GIM application fails to include the applicable fees or the information that is necessary for the GIM application to be approved.
- (9) If the IE fails to respond to ERCOT's inquiries within ten Business Days, the GIM application will be deemed incomplete and returned to the IE using the online RIOO system. The IE will be notified that action is required via a RIOO system automated email.
- (10) Once the application has been deemed materially complete, ERCOT will notify the IE of receipt of the completed application within ten Business Days.
- (11) An ERCOT-designated point of contact will be assigned to oversee the interconnection study process and answer questions concerning the interconnection process. Once assigned, the ERCOT-designated point of contact will contact the IE and will be the primary ERCOT contact for the IE.
- (12) Prior to the initial contact from the ERCOT-designated point of contact, an IE may direct questions concerning the GIM process to [ResourceIntegrationDepartment@ercot.com](mailto:ResourceIntegrationDepartment@ercot.com). All GIM-related email communication sent to the ERCOT-designated point of contact or to [ResourceIntegrationDepartment@ercot.com](mailto:ResourceIntegrationDepartment@ercot.com) shall include the associated project INR number in the subject field. If the communication is not specific to a project, the email subject field shall have the words "Generator Interconnection or Modification."
- (13) If a proposed generator that would use the same physical interconnection is to be built in phases with in-service dates more than three months apart, each phase should be treated as a separate interconnection request but may be included in the same study.

### **5.2.3 Confidentiality**

- (1) For any interconnection request involving a large generator, all data, documents or other information regarding the interconnection request, 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 a Full Interconnection Study (FIS). The FIS agreement may contain confidential cost estimates; 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 list except as otherwise required by a court or by regulatory authorities having jurisdiction.
- (2) For any interconnection request involving a small generator, all data, documents, or other information regarding the interconnection request, 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 ERCOT approves the IE's completed Resource Registration form for inclusion in the Network Operations Model, whichever occurs first.
- (3) Once the interconnection request is classified as a public project through one of these steps, ERCOT will make available the project description, the results of any economic analysis of Transmission Facilities needed to connect the generator costing over \$25,000,000, and any information developed throughout the interconnection study process about transmission improvement projects that may be submitted for Regional Planning Group (RPG) review as a result of the new generation.

### **5.2.4 Duty to Update Project Information and Respond to ERCOT and TDSP Requests for Information**

- (1) Each IE shall provide current and accurate Resource Registration information (including information describing the generator, the MPT, and any other generator-owned transmission or distribution facilities) and contact information to ERCOT and the interconnecting Transmission and/or Distribution Service Provider (TDSP), and shall promptly update that information as soon as possible, but no later than ten Business Days, following any change to that information. All TDSPs will be sent notification when ERCOT reviews and acknowledges Registration information changes in the online RIOO system. Interconnection studies that are based on outdated, false, or inaccurate data may adversely affect the safety and reliability of the ERCOT System and can result in damage to generation or transmission equipment. Failure to provide accurate Resource Registration information and contact information may result in project delays or cancellation as described in Section 5.2.6, Project Cancellation Due to Failure to Comply with Requirements.
- (2) Twice each year, each IE that has submitted an FIS request shall submit via the online RIOO system, 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 and that the

contact information is correct. The declaration shall be executed by an officer or other person having authority to bind the company and shall be submitted via the online RIOO system. 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. Failure to submit a declaration may result in project cancellation as described in Section 5.2.6.

- (3) If, after receipt of updated Resource Registration data, ERCOT, the interconnecting TDSP, or the lead Transmission Service Provider (TSP) determines that any subsequent changes to the project or to the transmission system or distribution system may affect the reliable operation of the ERCOT System or otherwise warrant new studies, then ERCOT or the TDSP may require additional studies to be performed before the proposed generator is allowed to interconnect to the ERCOT System. The IE and TDSP(s) shall develop a schedule for completing the additional studies. The TDSP shall provide the FIS studies, if applicable, to ERCOT and the other TDSPs via the online RIOO system.
- (4) If the IE increases the requested amount of capacity of any proposed large generator by more than 20% of the amount requested in the initial application, the IE shall submit a new interconnection request for the additional capacity or for the entire project.
- (5) Within ten Business Days, the IE shall notify ERCOT and the interconnecting TDSP, or, if applicable, lead TSP 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) via the online RIOO system. TDSPs will receive notification when ERCOT reviews and acknowledges the change. The new owner shall acknowledge the sale by submitting the Resource Registrations data showing the contact information for the new owners within 60 days. Failure to do so may result in project cancellation as described in Section 5.2.6.
- (6) An IE shall not transfer all or any portion of a project, including the real property to be utilized by the project, to an Entity that meets any of the prohibited company ownership (including affiliations) or headquarters criteria identified in the Lone Star Infrastructure Protection Act, Texas Business and Commerce Code, Sections 113.002(a)(2)(A)-(b)(2)(B) or 2274.0102(a)(2)(A)-(b)(2)(B), added by Act of June 18, 2021, 87th Leg., R.S., Ch. 975 (S.B. 2116). If the IE for a project changes, then the new IE shall execute and submit a new attestation in RIOO within ten Business Days of the change in ownership. If the IE for a project relocates the IE's headquarters, then the IE shall execute and submit a new attestation in RIOO within ten Business Days of the change in headquarters. If an IE or the real property that will be utilized by or for the project meets any of the prohibited company ownership or affiliation criteria, the project will be subject to cancellation in the manner described in Section 5.2.6, Project Cancellation Due to Failure to Comply with Requirements.
- (7) To support ERCOT resource adequacy and North American Electric Reliability Corporation (NERC) reliability assessment reporting requirements, the IE shall provide

the following information via the online RIOO system 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 and if available, the energization and Initial Synchronization dates;
- (b) Notification if any required air permits have been issued or permit applications have been withdrawn; and

***[PGRR082: Insert item (c) below upon system implementation and renumber accordingly:]***

- (c) Notification and dates for when generator construction has commenced or has been completed; and

- (c) A declaration of adequate water supplies (Section 8, Attachment B, Declaration of Adequate Water Supplies), unless the generator is powered by wind or PhotoVoltaic (PV) equipment or is a battery Energy Storage System (ESS).
- (8) If during the course of the GIM process, additional information is needed by ERCOT or the TDSP from the IE, the IE must respond to the request within ten Business Days. The IE will be notified that action is required by its ERCOT contact.

### **5.2.5 Inactive Status**

- (1) Any proposed large generator or proposed modification to a large generator subject to Section 5, Generator Interconnection or Modification, shall be given the status of “Inactive” if it has not met the conditions for inclusion in the ERCOT planning models, as specified in Section 6.9, Addition of Proposed Generation to the Planning Models, within two years of the date on which ERCOT posts the final FIS elements for the proposed generator to the Market Information System (MIS) Secure Area.
- (2) Any proposed small generator or proposed modification to a small generator subject to Section 5 shall be given the status of “Inactive” if it has not met the conditions for inclusion in the ERCOT Network Operations Model within six months of the date on which the interconnection request was initiated.
- (3) An IE may also elect “Inactive” status for any proposed generator after the FIS has been requested. For any interconnection-related study or process in progress when the IE elects “Inactive” status, the Entity conducting the study or performing the process may, at its own discretion, stop work on the study, not include the generator in the study, or discontinue any process related to this project.
- (4) If a proposed small or large generator had met the requirements of Section 6.9 and is included in the planning models prior to electing a status change to “Inactive”, the proposed small or large generator shall be removed from the planning models during the next available planning model case build.



- (5) A proposed small or large generator whose IE has elected “Inactive” status may elect to change to “Planned” status if ERCOT determines that it still meets the requirements of Section 6.9 and not more than two years have elapsed since the date any one or more of the studies in the most recent FIS was posted to the MIS Secure Area. If more than two years have elapsed, then the IE shall restart the FIS process for the project, unless ERCOT notifies the IE in writing that such studies are unnecessary.
- (6) A proposed small or large generator that was given the status of “Inactive” because it had not met the conditions for inclusion in the ERCOT planning models shall be assigned the status of “Planned” and included in the ERCOT planning models if ERCOT determines that the generator meets the requirements of Section 6.9, and if not more than two years have elapsed since the date any one of more of the studies in the most recent FIS was posted to the MIS Secure Area. If more than two years have elapsed since posting of the FIS, then the IE shall restart the FIS process for the project, unless ERCOT notifies the IE in writing that such studies are unnecessary.
- (7) For any proposed small or large generator with the status of “Inactive”, the IE associated with the project shall not be required to submit the semiannual declaration or any other information that would otherwise be required under this Planning Guide and ERCOT shall exclude the Resource’s capacity from each monthly Generator Interconnection Status report that is issued while the IE is in “Inactive” status.
- (8) If a transmission-connected project has been “Inactive” for five years, ERCOT may cancel the project pursuant to Section 5.2.6, Project Cancellation Due to Failure to Comply with Requirements. At any time prior to cancellation of its project, an IE may submit a request to terminate the project’s “Inactive” status and return the project to “Planned” status if ERCOT determines that the IE has provided complete and updated project information.
- (9) If a distribution-connected project has been “Inactive” for one year or the TDSP sends notification of a cancellation, ERCOT may cancel the project pursuant to Section 5.2.6. At any time prior to cancellation of its project, an IE may submit a request to terminate the project’s “Inactive” status and return the project to “Planned” status if ERCOT determines that the IE has provided complete and updated project information.

#### **5.2.6      *Project Cancellation Due to Failure to Comply with Requirements***

- (1) If at any time ERCOT determines that an IE with a project in “Planned” status has failed to meet any requirement of the ERCOT Protocols or this Planning Guide, including, without limitation, any requirement to provide materially accurate or complete information concerning any proposed small or large generator, ERCOT may send a notice of potential cancellation to the IE via email or through the online RIOO system. The notice of potential cancellation shall describe the failure and provide notice of ERCOT’s intent to cancel the project if the failure is not remedied.
- (2) Within 60 days of receiving ERCOT’s notification of potential cancellation, the IE shall correct the failure or provide information that explains to ERCOT’s satisfaction why the

IE cannot reasonably comply with ERCOT requirements or why the failure to comply cannot reasonably be remedied.

- (3) If the IE fails to respond to ERCOT's notice of potential cancellation within 60 days, or if ERCOT determines that, notwithstanding the IE's response, the IE has neither satisfactorily resolved the deficiency nor provided an explanation that, in ERCOT's sole judgment, justifies the deficiency, ERCOT may cancel the IE's project no sooner than 30 days after providing notice to the IE that the project will be canceled.
- (4) If at any time before cancellation ERCOT determines that the IE did not fail to meet any requirement of the ERCOT Protocols or the Planning Guide or that any failure has been satisfactorily remedied, then ERCOT shall notify the IE that the concern has been resolved and the potential cancellation has been rescinded.
- (5) At any time prior to cancellation, an IE may request a change in the status of the project to "Inactive" status as provided in Section 5.2.5, Inactive Status.
- (6) Once a project is canceled, it is permanently removed from the GIM process and must be resubmitted to be reconsidered for interconnection.

#### **5.2.7      *Voluntary Project Cancellation***

- (1) An IE may cancel the GIM process at any time upon providing written notice of cancellation via the RIOO system. The RIOO system will notify ERCOT and TDSPs of any cancellation. Cancellation of the GIM process does not affect any obligation the IE may have previously incurred, including any obligation to render payment to the TSP for FIS studies.

#### **5.2.8      *Interconnection Agreements and Procedures***

##### **5.2.8.1      *Standard Generation Interconnection Agreement for Transmission-Connected Generators***

- (1) As a condition for obtaining transmission service, an IE for any transmission-connected generator must execute a Standard Generation Interconnection Agreement (SGIA) with its TSP. A template of the SGIA can be found on the ERCOT website.
- (2) The TSP must submit a change request via the online RIOO system to transmit a copy of the signed SGIA to ERCOT within ten Business Days of execution.
- (3) The TSP must submit a change request via the online RIOO system to transmit a copy of any public, financially-binding agreement between the IE and the TSP, other than an SGIA, under which the interconnection for a transmission-connected generator will be constructed. The agreement must be submitted within ten Business Days of execution.

- (4) The TSP must submit a change request via the online RIOO system within ten Business Days of receiving both a notice to proceed with construction of the interconnection for the transmission-connected generator and the financial security sufficient to fund the interconnection facilities pursuant to either agreement addressed in paragraphs (2) or (3) above.

***[PGRR088: Insert paragraph (5) below upon system implementation:]***

- (5) Within ten Business Days of providing the TSP both the notice to proceed with construction of the interconnection for the Generation Resource and the financial security sufficient to fund the interconnection facilities pursuant to the SGIA, the IE must submit a change request via the online RIOO system to provide the financial security amount if it is not redacted in the public version of the SGIA filed with the Public Utility Commission of Texas (PUCT). ERCOT will include in the monthly Generator Interconnection Status report the name of the interconnecting TSP and the total amount of financial security sufficient to fund the interconnection facilities, if provided by the IE.

#### **5.2.8.2 Interconnection Agreement for Distribution-Connected Generators**

- (1) Each IE for a distribution-connected generator must provide ERCOT and the relevant TSP a copy of its fully executed applicable Distribution Service Provider (DSP) interconnection agreement, or a letter attesting that the interconnection agreement with the DSP has been executed, as a condition for interconnecting a proposed generation project at distribution voltage in ERCOT.

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

- (1) A Municipally Owned Utility (MOU) or Electric Cooperative (EC) developing a proposed generator that will interconnect to its own system is not required to execute an interconnection agreement. However, an MOU or EC must execute an SGIA or other appropriate interconnection agreement if its proposed generator would interconnect with another TDSP'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 generator and to interconnect such generator with its own transmission or distribution facilities 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 interconnection agreement for all purposes. The MOU or EC shall submit the letter to ERCOT via the online RIOO system.

***[PGRR081 and PGRR092: Insert applicable portions of Section 5.2.9 below upon system implementation of NPRR1026 or NPRR1077, respectively:]***

**5.2.9 Self-Limiting Facilities**

- (1) An Interconnecting Entity may elect to designate any proposed new or modified Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) as a component of a Self-Limiting Facility for the purposes of the GIM process. Upon such designation, all studies and tests undertaken pursuant to this Section 5 or that may otherwise be required as a condition for interconnection shall use the Self-Limiting Facility's proposed MW Injection limit as the maximum potential injection to the ERCOT System, and, if applicable, shall use the Self-Limiting Facility's MW Withdrawal limit as the maximum potential withdrawal from the ERCOT System, notwithstanding the nameplate capacity values provided.
- (2) Any Generation Resource, ESR, or SOG that has been studied and tested in the GIM process as a component of a Self-Limiting Facility may not, at any time during or after this process, increase the MW Injection limit or MW Withdrawal limit of the Self-Limiting Facility beyond the value or values that were used in these studies and tests without re-initiating the GIM process to evaluate the impacts of the increased value or values.

**5.3 Interconnection Study Procedures for Large Generators**

- (1) The provisions in this Section establish the procedures for conducting the Security Screening Study and Full Interconnection Study (FIS) for each new or modified large generator, as that term is defined by paragraph (3) of Section 5.2.1, Applicability.

**5.3.1 Security Screening Study**

- (1) For each Generator Interconnection or Modification (GIM) submitted for a large generator, 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).
  - (a) 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, Generator Interconnection or Modification, will be assessed pursuant to Protocol Section 3.22.1.2, Generation Resource or Energy Storage Resource Interconnection Assessment.
  - (b) At its sole discretion, ERCOT may waive the requirement for a Security Screening Study for a GIM.

- (2) The results of the Security Screening Study will provide an indication of the level at which the proposed generator can expect to operate simultaneously with other known generators 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 GIM process, and in accordance with the Protocols, all data, documents, and other information required by ERCOT from an IE related to a request for interconnection 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 interconnection requests 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 that will inform the IE about the suitability of the proposed Point of Interconnection (POI) for the proposed MW amount. This report does not imply any commitment by ERCOT or any TSP to recommend or construct 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, via the online Resource Integration and Ongoing Operations (RIOO) system, of its desire to pursue an FIS, otherwise ERCOT shall consider the GIM withdrawn by the IE. ERCOT will begin initiation and coordination of the FIS only after receiving this Notification and all required items from the IE for the FIS application to be approved. TSPs will receive a RIOO system automated email when ERCOT determines the FIS application is complete.
- (6) After the expiration of the 180-day period, an IE must submit a new GIM 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.
- (7) For any interconnection request that proposes either a large generator that would be interconnected at distribution voltage or a qualifying modification to a large generator that is interconnected at distribution voltage, ERCOT will not initiate a Security Screening Study or propose any FIS kickoff meeting until the IE first provides written confirmation from the affected Distribution Service Provider (DSP) stating that the DSP has evaluated the proposed project, determined that the interconnection of the generator at distribution voltage is electrically feasible, and identified the necessary upgrades to accommodate the proposed interconnection. In conducting a Security Screening Study for such an interconnection request, ERCOT shall evaluate only the transmission-level impacts, if any, of the proposed generator, and the affected DSP shall provide ERCOT any information concerning the DSP's facilities or the proposed generator

interconnection as may be requested by ERCOT for the purpose of completing the Security Screening Study.

### **5.3.2      *Full Interconnection Study***

- (1) An FIS consists of the set of steady-state, stability, short-circuit, facility, and/or other relevant studies that are necessary to determine the reliability impact of a large generator on affected Transmission Facilities and identify the Transmission Facilities that are needed to reliably interconnect the new or modified generator to the ERCOT System. 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) For an interconnection request involving a large generator interconnecting at distribution voltage, the FIS shall evaluate only the transmission-level impacts, if any, of the proposed generator, and the affected DSP shall provide the lead TSP all information concerning the DSP's facilities or the proposed generator interconnection as may be requested by the TSP for the purpose of completing any one or more FIS studies.
- (3) To initiate an FIS, the IE must submit each of the following via the online RIOO system:
  - (a) A request to proceed with the FIS via the online RIOO system;
  - (b) Complete Resource Registration data in the format prescribed by ERCOT with applicable information required for interconnection studies identified in the Resource Registration Glossary for the applicable Resource type. This information includes, among other things, the appropriate dynamic model for the proposed generator and results of the model quality tests and associated simulation files as described in paragraph (5)(c) of Section 6.2, Dynamics Model Development, subject to performance and usability verification by the lead TSP with approval from ERCOT through the FIS process. Dynamic model data shall be provided using the appropriate dynamic model template. Paragraph (5) of Section 6.2 and the Dynamics Working Group Procedure Manual contain more detail and IE dynamics data requirements. Data submitted for transient stability models shall be compatible with the current version of the planning and operations model software as described in the Dynamics Working Group Procedure Manual. 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 all software packages;
  - (c) An FIS Application Fee as described in the ERCOT Fee Schedule in the ERCOT Nodal Protocols, with the MW amount determined based on:
    - (i) The MW of additional installed capacity for GIMs not meeting paragraph (1)(c)(ii) of Section 5.2.1, Applicability; or

- (ii) Total MW capacity for GIMs meeting paragraph (1)(c)(ii) of Section 5.2.1;
- (d) Proof of site control as described in Section 5.3.2.1, 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; 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.
- (4) The IE can request an FIS for an active project before completion of the Security Screening Study or at any other time after ERCOT deems the initial GIM application complete, but must comply with the timeline set forth in paragraph (5) of Section 5.3.1, Security Screening Study. Requesting both studies at the same time may shorten the overall time to complete the GIM process due to overlap of work on both studies.
- (5) Payment of the ERCOT FIS Application Fee does not affect the IE's independent responsibility to pay for FIS studies conducted by the TSP or for any DSP studies.
- (6) ERCOT shall manage a confidential email list (Transmission Owner Generation Interconnection) to facilitate communication of confidential GIM-related information among TSP(s) and ERCOT. Membership to this email list will be limited to ERCOT and appropriate TSP personnel.
- (7) If any of the items required for the FIS request pursuant to paragraph (3) above are deemed not acceptable by ERCOT or are not submitted, then the IE must submit any omitted items and resolve and resubmit any deficient items. If the FIS request is not deemed complete by ERCOT within 60 days of submission of the FIS request, the FIS will be considered to have not been requested for the purpose of meeting paragraph (5) of Section 5.3.1. If the 180-day limit specified in paragraph (5) of Section 5.3.1 has expired, the GIM will be cancelled immediately. If the 180-day limit has not expired and the deficiency is not resolved before the 180-day limit, the GIM will be cancelled upon expiration of the 180-day limit.

#### **5.3.2.1 Proof of Site Control**

- (1) To establish proof of site control for the purposes of paragraph (3)(d) of Section 5.3.2, Full Interconnection Study, 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) If the IE fails to maintain site control at any point before the date the generator is fully constructed, ERCOT will consider the interconnection request 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.

#### **5.3.2.2 Full Interconnection Study Scoping Process**

- (1) Within ten Business Days of the IE's submission of the items required by paragraph (3) of Section 5.3.2, Full Interconnection Study, ERCOT will designate a TSP to lead the FIS and will contact that TSP to schedule an FIS kickoff meeting. ERCOT will select the lead TSP based upon a preliminary analysis of the most likely POI, or for a distribution-connected project, the most likely transmission substation for the proposed interconnection. 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 kickoff 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 notify all other TSP(s) of the FIS request via the online RIOO system. 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. 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.
- (3) Each TSP desiring to participate in the FIS shall promptly notify the lead TSP via email. The lead TSP must include all interested TSPs in the FIS to the extent such involvement is reasonable.



- (4) At the FIS kickoff meeting, the IE will present the proposed project 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) Any SSR studies required under Protocol Section 3.22.1.2, Generation Resource or Energy Storage Resource Interconnection Assessment, shall be scoped at the same time as the FIS but do not need to be included as part of the FIS.
- (6) Following the kickoff meeting, the IE and the TSP(s) must agree to the terms of the FIS study as a condition for proceeding with the FIS studies. The FIS study agreement must include all assumptions, timetables, study costs, and payment schedules, and the determination of all requirements for interconnection. The IE and TSP(s) may divide the FIS into distinct study phases, each requiring IE approval to proceed. All payments for the FIS studies shall be remitted directly to the TSP(s) completing the studies.
  - (a) The FIS must include all study elements required by Section 5.3.2.4, Full Interconnection Study Elements, unless ERCOT and the TSP(s) determine that one or more studies should not be performed. ERCOT and the TSP(s) shall consider the Security Screening Study and any information provided by the IE when developing the FIS scope.
  - (b) The requirement for one or more of the FIS study elements identified in Section 5.3.2.4 may be waived for projects involving any distribution-connected generator or any project meeting paragraph (1)(c)(ii) of Section 5.2.1, Applicability, if mutually agreed upon by ERCOT and the TSP(s). In order to aid in the determination of whether or not FIS study waivers are appropriate, ERCOT and the TSP(s) may request additional data and information from the IE beyond what is required by Section 5.2.2, Initiation of Generator Interconnection or Modification, Section 5.3.2, and Section 5.5, Generator Commissioning and Continuing Operations.
- (7) The TSP(s) shall submit the FIS study agreement via the online RIOO system. The online RIOO system will provide notification via an email to ERCOT and other TSP(s) of availability of the FIS study agreement for review and comment. Comments must be made within ten Business Days.
- (8) If the IE and TSP(s) cannot agree to the terms of the FIS study within 60 days, ERCOT will attempt to mediate an agreement. If mediation is unsuccessful, ERCOT will cancel the interconnection request if the IE does not agree to the proposed terms within ten days of being notified that the mediation was unsuccessful.
- (9) The TSP shall notify ERCOT by submitting a change request via the online RIOO system within ten Business Days of the following events:
  - (a) Signing of the FIS study agreement; and
  - (b) Funding of the FIS study agreement.

### **5.3.2.3 Full Interconnection Study Description and Methodology**

- (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 agreement, and not all of the study elements specified below must be included if the IE and the TSP agree that one or more studies are unnecessary. The primary purpose of the FIS is to determine the most effective and efficient manner in which to achieve the proposed project 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 generator 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 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 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 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.

### **5.3.2.4 Full Interconnection Study Elements**

#### ***5.3.2.4.1 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 projects 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. The study shall identify any system limitations that would prevent the generator from achieving full output.
- (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 evaluating the validity of the anticipated violations.

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

- (1) The FIS agreement will specify locations where available short-circuit fault duty will be identified, calculated, and documented.
- (2) If any of the required transmission system facilities identified in the FIS facility study associated with the GIM 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.

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

- (1) At the discretion of the lead TSP or ERCOT, the lead TSP will perform transient stability studies if necessary to meet NERC Reliability Standards, Protocols, this Planning Guide or the Operating Guides applicable to the generator or to the ERCOT System. If the lead TSP conducting a stability study decides such study is not required, the lead TSP shall provide a written justification in lieu of the study report.

- (2) When performing such studies, all operational and planned generators which have met the requirements of Section 6.9, Addition of Proposed Generation to the Planning Models, in the area of the study shall be dispatched at full net output in at least one of the scenarios/cases evaluated by the lead TSP. The dispatch level may be reduced to respect any published stability limits or to reach a power flow solution. If any Generation Resources in the study area are not dispatched at full output, the study report shall include the technical rationale. Any resulting increase in generation will be balanced as addressed in the FIS 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 generator shall not be included in the stability study base case.
- (4) Transient stability studies will analyze the performance of the proposed generator 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 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 after the FIS is deemed complete and posted to the Market Information System (MIS) Secure Area in accordance with Section 5.3.2.5, FIS Report and Follow-up:
  - (a) The IE and TSP shall investigate alternative solutions to resolve the instability through changes to the proposed generator and report their findings to ERCOT. If changes to the generator 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 generator 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 its 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 have been met for the proposed generator.

- (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 when a market solution is not available, in accordance with Section 5.3.5, ERCOT Quarterly Stability Assessment, prior to Initial Synchronization.

#### **5.3.2.4.4 Facility Study**

- (1) The facility study provides complete details of the transmission and substation facilities needed to connect a generator to a new or existing substation on the ERCOT Transmission Grid. These details include conceptual design descriptions, construction milestones, and cost estimates. A facility study is not required for a large generator interconnecting directly to a DSP's distribution facilities unless transmission facilities are required to be constructed.
- (2) In conducting the facility study, if the lead TSP determines that the costs of the Transmission Facilities needed to connect the proposed generator are expected to exceed \$25,000,000, the lead TSP will submit a change request via the online RIOO system to communicate this finding to ERCOT and other TSP(s) 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 Transmission Facilities needed to connect the proposed generator;
  - (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 generator for the study; and
  - (d) The estimated cost of the facilities.
- (3) The lead TSP will notify the RPG email list via email within ten Business Days following the later of the completion of the facility study or the signing of an SGIA when the cost of the Transmission Facilities needed to connect the generator is expected to be greater than \$25,000,000.

#### **5.3.2.5 FIS Report and Follow-up**

- (1) The TSP(s) will submit to ERCOT and to the other TSP(s) via the online RIOO system a preliminary report of findings and recommendations for each of the FIS elements.

- (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 and an email will be sent to notify 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, via the online RIOO system, to ERCOT and all TSPs. The TSP(s) conducting the FIS shall submit via the online RIOO system, the SSR analysis, if required, as a separate document from the remainder of the report.
- (4) Each final study element report will be available via the online RIOO system after the report has been deemed complete and marked “final” and will be posted to the MIS Secure Area within ten Business Days. Coincident with posting of the final FIS study element reports to the MIS Secure Area, ERCOT will notify the TSP and the IE when each study element report is posted. The TSP shall provide a copy of each final report to the IE upon request.
- (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.
- (7) Should the IE wish to proceed with any proposed transmission-connected project, the IE must execute a new or amended SGIA with the appropriate TSP within 180 days following the completion of the FIS (includes all major study element(s) reports). Failure to do so may result in a cancellation as described in Section 5.2.6, Project Cancellation Due to Failure to Comply with Requirements.
- (8) If during the time after the FIS is completed and before Initial Synchronization, 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 and, if applicable, SSR studies. If the changes are determined by ERCOT and lead TSP(s) to have the potential to materially alter the conclusions documented in the FIS, the lead TSP(s) will make appropriate modifications to one or more FIS study elements. The updated FIS reports will be submitted via the online RIOO system. 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. Initial Synchronization of the generator may be delayed pending completion of these modifications to the FIS.

**5.3.3      *ERCOT Economic Study***

- (1) In accordance with paragraph (2) of Protocol Section 3.11.6, Generation Interconnection Process, ERCOT shall perform an independent economic analysis of the Transmission Facilities needed to connect a generator to the ERCOT Transmission Grid, including any new substation that may be needed, 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) The IE shall provide to ERCOT any requested information necessary to accurately represent the generator in the economic study.
- (3) ERCOT will endeavor to 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 online RIOO system.

**5.3.4      *Reactive Study***

- (1) The IE and the TSP shall coordinate with one another for the IE to complete the reactive study and for the TSP to have the needed data to start the FIS stability study.
  - (a) The TSP shall send the preliminary short circuit current for the proposed POI based on the most recent System Protection Working Group (SPWG) base case to the IE within 15 Business Days of an IE request after the FIS study agreement has been signed.
  - (b) The IE shall complete a preliminary reactive study to determine the reactive devices that will be needed to meet ERCOT requirements. Once determined, the IE shall add the reactive devices, if any, to the Resource Registration data and make the updated data available to ERCOT and the TSP via the online RIOO system.
  - (c) The TSP shall start the FIS stability study after all the required data is available via the online RIOO system.
- (2) Once the TSP has completed the FIS short circuit study and it is approved by ERCOT and posted to the MIS Secure Area, the IE shall complete and submit the final reactive study via the online RIOO system.

***[PGRR076: Insert paragraph (3) below upon system implementation:]***

- (3) For GINR projects attempting to meet the next quarterly stability assessment deadline, pursuant to Section 5.3.5, ERCOT Quarterly Stability Assessment, ERCOT shall approve or comment on the final reactive study according to the following timeline:
  - (a) Within 15 days if submitted at least 45 days before the quarterly stability assessment deadline. Resubmissions submitted 30 days or more before the

quarterly stability assessment deadline will be reviewed and returned within ten days;

- (b) On the day of the quarterly stability assessment deadline if submitted 30 to 44 days prior to the quarterly stability assessment deadline; or
- (c) Without guarantee that it will be reviewed prior to the quarterly stability assessment deadline if submitted less than 30 days prior to the quarterly stability assessment deadline.

### 5.3.5 *ERCOT Quarterly Stability Assessment*

- (1) ERCOT shall conduct a stability assessment every three months to assess the impact of planned large generators connecting to the ERCOT System. The assessment shall derive the conditions to be studied with consideration given to the results of the FIS stability studies for large generators, with planned Initial Synchronization in the period under study. ERCOT may study conditions other than those identified in the FIS stability studies.
- (2) Large generators that are not included in the assessment as described in this Section as result of the 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>Generator 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 large generator being included in the quarterly stability assessment:



- (a) The generator has met the requirements of Section 6.9, Addition of Proposed Generation to the Planning Models.
  - (b) The IE has provided all generator data in accordance with the Resource Registration Glossary, Planning Model column, including but not limited to steady state, system protection and stability models.
    - (i) The dynamic data model will be reviewed by ERCOT prior to the quarterly stability assessment and should be submitted by the IE 30 days before the quarterly stability assessment deadline. If this review cannot be completed prior to the quarterly stability assessment deadline, ERCOT may refuse to allow Initial Synchronization of the Generation Resource or Settlement Only Generator (SOG) in the three-month period associated with the quarterly stability assessment deadline. ERCOT shall include the Generation Resource or SOG in the next quarterly stability assessment period provided that the review of the dynamic data model has been completed prior to the next quarterly stability assessment's deadline.
  - (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 to meet the operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents prior to synchronizing the generator.
  - (d) The data used in the studies identified in paragraph (4)(c) above is consistent with data submitted by the IE as required by Section 6.9.
- (5) At any time following the inclusion of a large generator in a stability assessment, but before the Initial Synchronization of the generator, if ERCOT determines, in its sole discretion, that the generator no longer meets the prerequisites described in paragraph (4), or that an IE has made a change to the design of the generator that could have a material impact on ERCOT System stability, then ERCOT may refuse to allow Initial Synchronization of the generator, provided that ERCOT shall include the generator in the next quarterly stability assessment period that commences after identification of the material change or after the generator meets the prerequisites specified in paragraph (4), as applicable. If ERCOT determines, in its sole discretion, that the change to the design of the generator would not have a material impact on ERCOT System stability, then ERCOT may not refuse to allow Initial Synchronization of the generator due to this change.
- (6) ERCOT shall post to the MIS Secure Area a report summarizing the results of the quarterly stability assessment within ten Business Days of completion.

## **5.4 Interconnection Procedures for Small Generators**

### **5.4.1 *Small Generator Review Meetings***

- (1) Upon request by an Interconnecting Entity (IE), ERCOT, the Transmission Service Provider (TSP), and if applicable, the Distribution Service Provider (DSP) will have an initial meeting with the IE to discuss the small generator interconnection process and address general information related to the project.

### **5.4.2 *Submission of Interconnection Agreement and TSP and/or DSP Studies and Technical Requirements***

- (1) As a condition for ERCOT's acceptance of the Resource Registration form for an interconnection request involving a small generator other than a Settlement Only Generator (SOG), the following conditions must be met:
  - (a) The IE must submit a copy of a fully executed interconnection agreement or letter, as required per Section 5.2.8, Interconnection Agreements and Procedures.
  - (b) The Transmission and/or Distribution Service Provider (TDSP) to which the generator is proposed to interconnect, or in the case of a modification described in paragraph (1)(c) of Section 5.2.1, Applicability, the TDSP to which the generator currently connects, must provide written confirmation via email to ERCOT stating that all interconnection studies required by the TDSP have been completed, and indicating whether any operational limitations, including ramping limitations, maximum output limitations, or other restrictions, are expected to affect the generator's operation. If the TDSP identifies operational limitations, the TDSP must describe those limitations.
  - (c) The TDSP must provide the following information to ERCOT:
    - (i) Confirmation that the IE has provided financial security sufficient to fund the distribution system upgrades identified by the TDSP;
    - (ii) The timeline for those upgrades; and
    - (iii) Any operational limitation on the generator's operation in the interim.

### **5.4.3 *Reviews and Approval to Submit Model Information***

- (1) ERCOT shall review submitted interconnection agreements, TSP and DSP study results, and generator technical specifications.
- (2) ERCOT shall communicate within ten Business Days the need for clarification or additional information. ERCOT shall provide a reason for rejecting any information.

- (3) The IE shall have ten Business Days to submit clarifications or additional information in response to an ERCOT request.
- (4) If the IE does not respond within ten Business Days, ERCOT may place the project in “Inactive” status. Once the IE provides the information, ERCOT may place the project in “Planned” status and ERCOT shall have ten Business Days for reviews.
- (5) Once the IE has provided all required agreements, studies, and technical specifications and ERCOT reviews have been completed, the approval to submit model information will be granted and the project will be included in ERCOT systems.

#### **5.4.4      *Transmission System Reliability Impact***

- (1) ERCOT may delay the synchronization, testing, or commissioning of any generator to the extent it deems necessary to study transmission system impacts of this generator and any other proposed or existing generators. If, as a result of this study or any previous study, ERCOT determines that the generator would create or contribute to a reliability concern, ERCOT may prohibit the synchronization, testing, or commissioning of the generator until the reliability concern is addressed.

### **5.5      Generator Commissioning and Continuing Operations**

- (1) Each Interconnecting Entity (IE) shall meet the conditions established by ERCOT before proceeding to Initial Energization, Initial Synchronization, and commercial operations. These conditions may require proof of meeting applicable ERCOT requirements, which may include, but are not limited to, reactive capability, Voltage Ride-Through (VRT) standards, dynamic model template submission, Automatic Voltage Regulator (AVR), Primary Frequency Response (PFR), Power System Stabilizer (PSS), Subsynchronous Resonance (SSR) models, and telemetry.
- (2) No later than 30 days following the Resource Commissioning Date, the IE shall submit updates to the resource dynamic planning models based on “as-built” or “as-tested” data and provide a plant verification report as required by paragraph (5)(b) of Section 6.2, Dynamics Model Development. Pursuant to paragraph (5)(c) of Section 6.2, any necessary model updates shall be accompanied with model quality tests.
- (3) During continuing operations:
  - (a) Pursuant to paragraph (5)(c) of Section 6.2, any necessary model updates shall be accompanied by model quality tests.
  - (b) The Resource Entity shall provide ERCOT with a plant verification report as required by paragraph (5)(b) of Section 6.2 at the following times:
    - (i) No later than 30 days after implementing a settings change as required by paragraph (7) of Section 6.2;

- (ii) No earlier than 12 months and no later than 24 months following the later of the Resource Commissioning Date or March 1, 2021; and
- (iii) A minimum of every ten years.

# **ERCOT Planning Guide**

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

**January 1, 2023**

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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 ERCOT 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 biannual basis, and may be updated as needed on an interim basis. Each Annual Planning Model base case, biannual 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 biannual basis, and may also be updated as needed on an interim basis. These derivative base cases, biannual 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 biannual 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 ERCOT 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.

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- (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) Each TSP, or its Designated Agent, shall not include the impact of energy sources connected to the Distribution System that are registered with ERCOT and required to provide telemetry including, but not limited to, Distribution Generation Resources (DGRs), Distribution Energy Storage Resources (DESRs), or Settlement Only Distribution Generators (SODGs) in its submitted Load data as negative loads or as embedded reductions in the submitted load forecast.
  - (c) Each TSP, or its Designated Agent, shall include the impact of energy sources connected to the Distribution System that are not registered with ERCOT in its submitted Load data. The methodology used shall be consistent across all TSPs and described in the ERCOT Steady State Working Group Procedure Manual.
  - (d) 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.
  - (e) ERCOT shall utilize proposed Generation Resource model data provided by the Interconnecting Entity (IE) during the generation interconnection process in accordance with Section 5, Generator Interconnection or Modification.



- (f) ERCOT shall determine the operating state of Generation Resources (MW, MVar) using a security-constrained economic dispatch tool.
- (g) 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 Procedure 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., SVC, STATCOMs), Direct Current Ties (DC Ties), variable-frequency transformers, automatically switched shunts, and transformers with automatic load tap changers.

***[PGRR101: Replace paragraph (4) above with the following upon system implementation of NPRR1133:]***

- (4) For Transmission Service Providers (TSPs) and owners of Direct Current Ties (DC Ties), dynamics data includes the data needed to represent the dynamic and transient capability of dynamic devices including but not limited to Load shedding relays, protective relays, FACTS devices (e.g., SVC, STATCOMs), DC Ties, variable-frequency transformers, automatically switched shunts, and transformers with automatic load tap changers.
- (5) The owner of a generator Facility or any dynamic device shall provide appropriate dynamics data to ERCOT, including the data for a planned Facility, in accordance with the Dynamics Working Group Procedure Manual. The dynamic data shall include the following:
  - (a) A model with parameters that accurately represent the dynamics of the device and that is compatible with the current version of the planning and operations model

software as described in the Dynamics Working Group Procedure Manual. If a user written model is provided:

- (i) The data shall also include a model manual containing a technical description of the model characteristics, including descriptions for all model parameters and variables, a list of which parameters are commonly tuned for site-specific settings, and a description of procedures and considerations for using the model in dynamic simulations, including steady state representation and limitations for model adequacy and usability in the planning model software; and
  - (ii) The user-written model shall allow the user to determine the allocation of machine identifiers (bus numbers, bus names, machine IDs etc.) without restriction.
- (b) Verification reports that support the model data based on documented field settings shall be provided as specified in the Dynamics Working Group Procedure Manual for Generation Resources, Energy Storage Resources (ESRs), and for Transmission Elements represented by a dynamic model. The reports shall demonstrate that the model parameters which are commonly tuned match site-specific settings implemented in the field. For new Generation Resources and ESRs, these reports shall be provided as required in paragraph (2) of Section 5.5, Generator Commissioning and Continuing Operations. For existing Generation Resources and ESRs, these reports shall be provided as required in paragraph (3) of Section 5.5. For Transmission Elements represented by a dynamic model, these reports shall be provided no later than two years following energization of new equipment and updated a minimum of every ten years.
- (c) Results of model quality tests and associated simulation files that demonstrate acceptable performance of the models in the planning model software as described in the Dynamics Working Group Procedure Manual. These shall be provided whenever a new or updated dynamic model is provided to ERCOT representing a Generation Resource, ESR, or Transmission Element. The purpose of these tests is to ensure the quality of the provided dynamic data and models for use in numerous system studies and ensure consistency across planning software platforms. Therefore, the Facility owner shall also assess sufficient sensitivities, including but not limited to Voltage Set Point at the Point of Interconnection (POI), real power output, and Reactive Power output to ensure acceptable model performance over the entire range of operating conditions. An explanation shall be provided for review if model responses do not match.
  - (i) All site-specific dynamic models required to represent the Facility shall be included in the model quality tests. These tests can be performed in a simple test system without requiring ERCOT System information.
  - (ii) For Intermittent Renewable Resource (IRR) equipment aggregated together to form an IRR in accordance with paragraph (13) of Protocol

Section 3.10.7.2, Modeling of Resources and Transmission Loads, the dynamic model shall represent the aggregated IRR.

- (iii) Results for the following model quality tests shall be provided to demonstrate acceptable model performance. Additional details about each test, including the set up and description of desirable response, are included in the Dynamics Working Group Procedure Manual.
  - (A) Flat start test: A no-disturbance test shall be performed to demonstrate appropriate model initialization and the Facility's dynamic response under a no-disturbance condition.
  - (B) Small voltage disturbance test: A voltage step increase and decrease shall be applied to the POI to demonstrate the Facility's dynamic response.
  - (C) Large voltage disturbance test:
    - (1) For IRRs, ESRs, and inverter-based transmission equipment, the high and low Voltage Ride-Through (VRT) profiles as described in Nodal Operating Guide Section 2.9.1, Voltage Ride-Through Requirements for Intermittent Renewable Resources Connected to the ERCOT Transmission Grid, shall be applied to the POI to demonstrate the Facility's dynamic response.
    - (2) For Resources other than IRRs, ESRs, and inverter-based equipment, a fault shall be applied to the POI to demonstrate the Facility's dynamic response.
  - (D) Small frequency disturbance test: A frequency step increase and decrease shall be applied to the POI to demonstrate the Facility's dynamic response.
  - (E) System strength test: The model for IRRs and inverter-based Resources shall be tested under a few equivalent short circuit ratios, as described in the Dynamics Working Group Procedure Manual. This tests the robustness of the model to varying system conditions.
- (d) Inverter-Based Resources (IBRs) shall provide results of the unit model validation to demonstrate that the PSCAD model, as described in the Dynamics Working Group Procedure Manual, accurately represents the dynamic responses of all inverter-based dynamic devices within the Facility. This validation is not intended to be site-specific; rather it is intended to be a hardware type test, where models representing different inverter hardware are benchmarked for accuracy. Validation results for a specific model of inverter can be submitted for multiple uses of that model of inverter.

- (i) The validation results shall be included when submitting a PSCAD model to ERCOT.
  - (ii) Results for the following unit model validation tests shall be provided to demonstrate model accuracy. Additional details about each test are included in the Dynamics Working Group Procedure Manual.
    - (A) Step change in voltage;
    - (B) Large voltage disturbance (VRT tests);
    - (C) System strength test;
    - (D) Phase angle jump test; and
    - (E) Subsynchronous test.
- (6) Dynamics data for a planned Facility will be updated by the Facility owner upon completion of the design for the Facility.
- (7) 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.
- (8) Dynamics Data is considered Protected Information pursuant to Protocol Section 1.3, Confidentiality.
- (9) 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 Generation Resources and Settlement Only Generators***

- (1) A Resource Entity shall submit new or updated dynamics data in accordance with Section 5, Generator Interconnection or Modification. The Resource Entity shall provide all dynamics data as described in paragraph (5) of Section 6.2, Dynamics Model Development, and the Dynamics Working Group Procedure 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, in its sole discretion, may reject the submitted dynamics data and will provide the Resource Entity an explanation for the rejection. The Resource Entity shall take action to resolve discrepancies and provide updated dynamics data to ERCOT and the interconnecting TSP within 30 days.

### **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 described in the Dynamics Working Group Procedure Manual.

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

***[PGRR101: Replace the title for Section 6.2.3 above with the following upon system implementation of NPRR1133:]***

### **6.2.3      *Dynamics Data Requirements for Transmission and/or Distribution Service Providers, Direct Current Tie Facility Owners, and Direct Current Tie Operators***

- (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 Procedure 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 Procedure 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 Procedure 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.

***[PGRR101: Insert paragraph (6) below with the following upon system implementation of NPRR1133 and renumber accordingly:]***

- (6)      Each DC Tie Facility owner shall provide the dynamic data needed to simulate the action of any dynamic elements located at its Facility in dynamic simulations to its DCTO, and the DCTO shall submit the data to ERCOT. The DC Tie Facility owner is responsible for the accuracy and completeness of the data submitted to ERCOT through its DCTO.

- (6) The owner of a dynamic element connected to the transmission system shall verify the dynamic models through comparison with operational data of actual events or test results within five years of energization and a minimum of every ten years thereafter. Industry accepted testing techniques shall be used for testing, measuring and calculating the modeling parameters. The owner of the dynamic element shall document and retain results for the model verification effort. Documentation shall include the operational data used to verify the modeling parameters.

#### **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 Procedure 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 Procedure 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.

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

- (1) This Section describes the process for the development of the short circuit cases used for planning purposes. Nodal Operating Guide Section 6, Disturbance Monitoring and System Protection, 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 contains the status of the transmission projects (60 kV and above) that have a material impact to the flow of power in the ERCOT System updated by the Steady State Working Group (SSWG).
- (2) The transmission projects listed in the TPIT report are typically projects that are planned for completion by a Transmission Service Provider (TSP) within the near-term planning horizon. Projects that may not be listed in the TPIT report include:
  - (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 last year for which an ERCOT SSWG case is posted; or
- (c) Any project that consists of only a Remedial Action Scheme (RAS) or an Automatic Mitigation Plan (AMP) (which is not typically modeled).

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

- (1) ERCOT shall prepare the TPIT report using data supplied by each TSP, or its Designated Agent.
- (2) ERCOT shall update the TPIT report with updated information provided through the SSWG case build or SSWG update process.
- (3) ERCOT shall publish the TPIT report on the ERCOT website on a triannual basis.

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

- (1) The TSP responsible for submitting model data used in the SSWG case build or SSWG case update shall provide information for its transmission projects to ERCOT.
- (2) The TSP shall provide transmission project data for inclusion in the TPIT report as specified in the ERCOT Steady State Working Group Procedure Manual.

#### **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.

#### **6.4.5      *Content of the Transmission Project Information and Tracking Report***

- (1) The TPIT report shall contain:
  - (a) A section that describes each data field and the Entity responsible for providing the data within each field;
  - (b) A section for future projects;



- (c) A section for completed projects;
- (d) A section for cancelled projects;
- (e) A section for projects approved in the ERCOT Regional Transmission Plan;
- (f) A section containing transmission owner project contact information; and
- (g) A section summarizing cost information.

## **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) ERCOT shall annually provide each DSP with a list of registered Distributed Generation (DG) facilities in the DSP's territory, including information about how each facility is mapped to its designated Load in the Network Operations Model. This list will be posted

to the Market Information System (MIS) Certified Area. In conjunction with the ALDR process, the DSP shall verify that each DG facility on the list is correctly mapped to its Load in the Network Operations Model. TSPs shall cooperate with ERCOT and the DSP to verify that each DG facility on the list is correctly mapped to its Load in the Network Operations Model.

- (6) 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.
- (7) 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 ERCOT 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 ERCOT 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 ERCOT 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 Generation Resource, Settlement Only Generator (SOG), or Load 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 ERCOT website.

### **6.8.1 Resource Registration**

- (1) A Resource Entity shall submit complete Resource Registration data pursuant to Section 6.8.2, for each Generation Resource, SOG, or Load 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 ERCOT website.
- (4) ERCOT shall post a detailed Resource Registration Guide on the ERCOT website 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 ERCOT website 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, Generator Interconnection or Modification, 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 Generation Resources, SOGs, or Load 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 a Generation Resource, SOG, or Load Resource.
- (9) The Resource Entity must submit updated Resource Registration data containing changes made for the reasons below for a Generation Resource, SOG, or Load 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 large generators meeting the conditions of paragraph (1) of Section 5.2.1, 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) has posted to the online Resource Integration and Ongoing Operations (RIOO) systems 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) The IE has posted to the online RIOO system documentation that it has received all necessary Texas Commission on Environmental Quality (TCEQ)-approved air permits or that no such permits are required and ERCOT has accepted the IE's submission;
- (c) The IE has submitted via the online RIOO system 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 via the online RIOO system:
  - (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 large generator 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) For small generators meeting the conditions of paragraph (1) of Section 5.2.1, ERCOT will include applicable generation in the base cases created and maintained by the SSWG, SPWG, and DWG once ERCOT has determined that the IE has submitted all data required on the Resource Registration form and after inclusion of the generator in the Network Operations Model.
- (4) 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 ERCOT 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 ERCOT 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 North American Electric Reliability Corporation (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 ERCOT Steady State Working Group Procedure Manual.

***[PGRR098: Replace paragraph (1) above with the following upon system implementation:]***

- (1) Each Transmission Service Provider (TSP), or the entity designated as its modeling entity in Appendix A to the ERCOT 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 ERCOT 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 North American Electric Reliability Corporation (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), all contingencies representing the Outage of a double circuit (two circuits on the same structure in excess of 0.5 miles in length) where both circuits must be taken out for a maintenance outage, and any other contingencies described in the ERCOT 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 Geomagnetically-Induced Current (GIC) system models and conduct geomagnetic disturbance vulnerability assessments to determine whether the ERCOT System can meet the performance requirements of the benchmark and supplemental geomagnetic disturbance event described in North American Electric Reliability Corporation (NERC) Reliability Standards. These GIC system models shall contain appropriate system data, and shall represent projected system conditions that provide a starting point for the required year(s).
  - (a) ERCOT, in collaboration with Transmission Service Providers (TSPs) and Resource Entities, shall develop and maintain the GIC system models. The GIC system models 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) ERCOT, in collaboration with TSPs and Resource Entities, may set a Generation Resource to out of service prior to receiving a Notification of Suspension of Operations (NSO) if the Resource Entity notifies ERCOT of its intent to retire/mothball the Generation Resource and/or makes a public statement of its intent to retire/mothball the Generation Resource.
    - (i) ERCOT will post and maintain the current list of Generation Resources that will be set to out of service pursuant to paragraph (1)(b) above on the ERCOT website.
  - (c) Each TSP, or its Designated Agent, shall provide its respective transmission network GIC model data in accordance with the GIC System Model Procedure Manual.
  - (d) 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.

***[PGRR074: Replace paragraph (d) above upon system implementation of NPRR973:]***

- (d) Each Resource Entity, or its Designated Agent, shall provide its respective Resource Entity-owned generating units, plants, transmission lines, shunt devices, Main Power Transformers (MPTs), and Generator Step-Ups (GSUs) connected to the ERCOT System in accordance with the GIC System Model Procedure Manual and the Resource Registration Glossary.

- (e) ERCOT shall aggregate the GIC system model data supplied by each TSP and Resource Entity and shall compile the data to form the GIC system models. Upon completion of compiling the data for the GIC system models, ERCOT and the TSPs shall review and finalize the GIC system models. Upon completion of the review of the GIC system models, ERCOT shall post these models on the ERCOT Market Information System (MIS) Certified Transmission Service Provider Information page.
  - (f) Guidelines and formats for the GIC system model data and model maintenance can be found in the GIC System Model Procedure Manual.
  - (g) GIC data is considered Protected Information pursuant to Protocol Section 1.3, Confidentiality.
- (2) Each TSP and Resource Entity shall provide ERCOT for use in the GMD vulnerability assessments as outlined in Section 3.1.8, Planning Geomagnetic Disturbance (GMD) Activities:
- (a) A list of equipment potentially removed from service as a result of protection system operation or misoperation due to harmonics that could result from the benchmark GMD event.
  - (b) A list of equipment potentially removed from service as a result of protection system operation or misoperation due to harmonics that could result from the supplemental GMD event.
- (3) TSPs and Resource Entities may refer to a Reliability and Operations Subcommittee (ROS)-approved methodology for developing the equipment lists described in paragraph (2) above. TSPs and Resource Entities are not required to submit the equipment lists described in paragraph (2) above until 30 days after ROS approves a methodology.

## **6.12 Addition of a Proposed DC Tie to the Planning Models**

- (1) For a proposed Direct Current Tie (DC Tie) that will not be owned by a Transmission Service Provider (TSP), ERCOT will include the applicable DC Tie in the base cases created and maintained by the Steady State Working Group (SSWG), System Protection Working Group (SPWG), and the Dynamics Working Group (DWG), and will notify the SSWG, SPWG, and DWG once ERCOT receives:
- (a) A signed interconnection agreement from the TSP and a written notice from the TSP that the DC Tie developer has provided:
    - (i) A notice to proceed with the construction of the interconnection;
    - (ii) The financial security required to fund the interconnection facilities; and
  - (b) The data required under paragraph (2) below.



- (2) ERCOT will provide notice to the DC Tie developer of the specific data ERCOT requires to model the DC Tie after ERCOT receives the information required under paragraph (1)(a) above.
  - (a) ERCOT retains discretion to request any data it deems necessary to model the new DC Tie.
  - (b) The DC Tie developer shall provide the data to ERCOT within 60 days of receiving the notice from ERCOT specifying the data required.

# **ERCOT Planning Guide**

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

**December 17, 2021**

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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 ERCOT website or applicable Market Information System (MIS) (i.e., 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. Information classified as “Public” is available on the ERCOT website.

<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 (LTSA) (except for Protected Information)	Secure
ERCOT LTSA	Certified (all TSPs)
ERCOT Steady State Planning Contingency Files	Secure
ERCOT System Operating Limit (SOL) Methodology	Public
Generation Data Forms	Secure
Generator Interconnection Status (GIS) Report	Public
Geomagnetically-Induced Current (GIC) Flow Information	Secure
Geomagnetic Disturbance (GMD) Vulnerability Assessment Postings (except for Protected Information)	Secure
GMD Vulnerability Assessment Postings	Certified (all TSPs)
Documents Initiating a Generation Interconnection or Change Request (GINR)	Certified (all TSPs)
GINR Security Screening Studies and Supporting Documents	Secure
Sub-synchronous Oscillation Studies and Supporting Documents	Certified (all TSPs)
Full Interconnection Study (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)
Independent Market Monitor (IMM) and Topology Processor Supporting Documents	Certified (all TSPs)
Performance, Disturbance, Compliance Working Group (PDCWG) Group Documents and Project Files	Certified (PDCWG members)
Public Generation Information	Public
Remedial Action Plan (RAP) Review Cases	Certified (all TSPs)
Resource Registration Data	Certified (all TSPs)
Regional Planning Group Projects	Secure
Regional Transmission Plan Postings (except for Protected Information)	Secure
Regional Transmission Plan Postings	Certified (all TSPs)
Seasonal Voltage Profile Studies	Certified (all TSPs)
Special Planning Studies (except for Protected Information)	Secure

Special Planning Studies	Certified (all TSPs)
Steady State Power Flow Base Cases	Secure
Steady State Power Flow Case Data	Certified (all TSPs)
Steady State Topology Processor Files	Secure
Steady State Transmission Project and Information Tracking (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, 2019**

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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 and the project contact information in the online Resource Integration and Ongoing Operations (RIOO) system is correct.

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

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Title

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Date



# **ERCOT Planning Guide**

## **Section 8**

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

**January 1, 2019**

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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 Transmission Service Provider (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 the online Resource Integration and Ongoing Operations (RIOO) system.

### **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

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Title

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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 8**

### **Attachment D: Attestation Regarding Compliance with the Lone Star Infrastructure Protection Act**

**April 1, 2022**

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**Attestation Regarding Compliance with the Lone Star Infrastructure Protection Act**

**Name of Interconnecting Entity (IE):**

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**IE's Interconnection Request (INR) number:**

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Check the one box that applies [do not check both boxes]:

1. With respect to the above referenced IE and INR number and with respect to each Entity with an ownership interest in the real property to be utilized by the above referenced IE's project ("Property Owner"), I hereby attest that:

☐

NONE of the following statements in paragraphs (A) - (C) are TRUE.

☐

ONE OR MORE of the following statements in paragraphs (A) - (C) are TRUE.

(A) The IE or Property Owner, or a wholly owned subsidiary, majority-owned subsidiary, parent company, or affiliate of the IE or Property Owner, is owned by:

- (i) individuals who are citizens of China, Iran, North Korea, Russia, or a designated country;<sup>1</sup> or
- (ii) a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, or a designated country; or

(B) The majority of stock or other ownership interest of the IE or Property Owner, or a wholly owned subsidiary, majority-owned subsidiary, parent company, or affiliate of the above referenced IE or Property Owner is held or controlled by:

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<sup>1</sup> The term "designated country" as used in this attestation shall have the same meaning as the definition of that term in Texas Business and Commerce Code, Section 113.001(4), added by Act of June 18, 2021, 87<sup>th</sup> Leg. R.S. Ch. 975 (S.B. 2116).

- (i) individuals who are citizens of China, Iran, North Korea, Russia, or a designated country; or
- (ii) a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, or a designated country; or
- (C) The IE or Property Owner, or a wholly owned subsidiary, majority-owned subsidiary, parent company, or affiliate of the IE or Property Owner is headquartered in China, Iran, North Korea, Russia, or a designated country.

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 attestation on behalf of each IE listed above, and that 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]**