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| PGRR Number | [115](https://www.ercot.com/mktrules/issues/PGRR115) | PGRR Title | Related to NPRR1234, Interconnection Requirements for Large Loads and Modeling Standards for Loads 25 MW or Greater |

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| Date | December 12, 2024 |

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| Submitter’s Information | |
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| Market Segment | Investor-Owned Utility (IOU) |

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| Comments |

CenterPoint Energy Houston Electric (CEHE) appreciates the opportunity to submit comments to Planning Guide Revision Request (PGRR) 115 and respectfully offers these comments and redline edits for consideration at the next scheduled Planning Working Group (PLWG) and Reliability and Operations Subcommittee (ROS).

CEHE is supportive of the majority of ERCOT’s November 11, 2024 comments and thereby builds upon the ERCOT comments by providing added clarity to the Large Load Interconnection Study (LLIS) process and alignment with LLIS concepts discussed at the Large Flexible Load Task Force (LFLTF) and other stakeholder forums.

1. CEHE suggests alignment of terminology:

* Replacing the term “material change” with the term “qualified change” to align with NERC FAC-002 terminology. (Section 9.2.3)
* Replace “Transmission Service Bus (TSB)” with “Load Service Point (LSP)” as defined in CEHE comments to NPRR1234. ERCOT had committed to providing diagrams that illustrate the concept of a TSB, but those have not yet been provided to stakeholders; therefore, CEHE offers a substitute definition of ERCOT’s concept that mirrors the existing definition of Point of Interconnect (POI) for Generators that can be applied to Load. (Section 9.2.5(3))
* Add “directly affected TSP” as appropriate to ensure inclusion of all affected TSPs in communication loop (9.3.2(7); 9.5.1; 9.5.2)
* Removed the phrase “Registered as a Private Use Network (PUN)” since there is ambiguity around the definition of a PUN and the scenario in which this section would apply. CEHE believes the impacted sections read much clearer with the phrase removed and ERCOT verbally agreed with this approach. (9.5.1 and 9.5.2)

1. CEHE suggests clarification to the roles and responsibilities of the parties involved in the LLIS process:
   * Because project data is not owned, managed or maintained by ERCOT, the format should not be prescribed by ERCOT. Additionally, CEHE recommends revisions to 9.1(2) to recommend the ILLE submit project data into RIOO and subsequently recommend grey-boxing the paragraph until RIOO is upgraded to accommodate this change for Large Loads.
   * If there are any qualified changes made by the ILLE to the Large Load Project Information, ERCOT shall provide technical justification to the lead TSP describing why a new Stability Study is required. (9.2.3(2))
   * The lead TSP is responsible for maintaining the Load Commissioning Plan (LCP) from Initial Energization until all transmission upgrades required to serve the Large Load are completed. (9.2.4(4))
   * Adding optionality for the lead TSP to be able to propose additional options to the LLIS study scope as necessary. (9.3.2(6)(d))
   * Clarifies that the lead TSP is the owner of the LLIS study scope. Therefore, the lead TSP should be the entity responsible for resolving any disputes regarding the study scope. It is not ideal for another entity to enforce dispute resolution upon the lead TSP. (9.3.2(8))
   * Clarifies that the ILLE dictates the load threshold and levels of Demand in the initial LCP and that the lead TSP is responsible for identifying transmission upgrades to support the load threshold being requested. As such, the lead TSP will manage the project to ensure loads do not come online before transmission upgrades are completed. (9.3.4.1(4))
   * Relative to the LLIS report, the lead TSP will consider feedback received from ERCOT and other directly affected TSPs on whether additional study is required, but is ultimately responsible for determining if additional study is required as the lead TSP is the owner of the LLIS study. (9.4(3))
   * Clarifies that the ILLE dictates the load threshold (interconnection amounts), not the TSP. Also clarifies ERCOT’s responsibility relative to determining the completion of the LLIS, and the appropriate communication structure back to the lead TSP and directly affected TSPs. (9.4(6)(a) – (d))
   * Since two entities cannot have “sole discretion”, CEHE suggests assigning the discretion to the lead TSP to determine if a change impacting any LLIS study assumptions would require modifications to the study or if a restudy is to be performed. (9.4(8))
   * Relative to Continuing Operations of Large Loads, CEHE believes it is not ideal or desirable for TSPs to manage and/or track the load limits and report to ERCOT any exceedances of peak Demand established in the LLIS. This is not an action TSPs are well-equipped to perform and suggest that any policing of peak Demand falls under the responsibility of ERCOT, if applicable. (9.6(2)(a))
2. Additionally, CEHE would like to clarify procedural steps relative to the LLIS process:
   * Removing “prior to providing the dynamic load model to ERCOT” because Dynamic Load Models are not sent to ERCOT at this point in the process (9.3.4.3(1))
   * To clarify the procedure if/when instability is identified, CEHE suggests adding “The lead TSP shall identify modifications to the ILLE’s Load Commissioning Plan (LCP) to account for time required to implement transmission upgrades to support the load(s) while mitigating any instance of instability.” (9.3.4.3(6))
3. Lastly, CEHE has two questions for which we are seeking ERCOT clarification:
   * In 9.2.3(3), relative to modifications of Large Load project information, what is meant by the phrase “the interconnecting TSP shall respect the conclusions of any completed LLIS study elements when evaluating the reliability of the modified interconnection request.”? It is unclear what is intended with this language.
   * In 9.3.4.3(4), how are “excessive frequency excursions” defined, and how are they identified?
   * In 9.6(2)(b), what is the mechanism for TSPs to communicate to ERCOT when transmission upgrades are operational? Could that be achieved through an upgraded version of RIOO?

Again, CEHE appreciates the opportunity to provide these comments and we look forward to a fruitful discussion at PLWG and ROS.

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| Revised Cover Page Language |

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| Planning Guide Sections Requiring Revision | 2.1, Definitions  4.1.1.1, Planning Assumptions  4.1.1.2, Reliability Performance Criteria  5.2.10, Required Interconnection Equipment (new)  5.3.5, ERCOT Quarterly Stability Assessment  6.6, Modeling of Large Loads (new)  6.6.1, Modeling of Large Loads Not Co-Located with a Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) (new)  6.6.2, Modeling of Large Loads Co-Located with an Existing Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) (new)  6.6.3, Modeling of Large Loads Co-Located with a Proposed Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) (new)  6.10, Contingency Filing Requirements  9, Large Load Additions at New or Modification of Existing Load Interconnection(s) (new)  9.1, Introduction (new)  9.2, General Provisions (new)  9.2.1, Applicability of the Large Load Interconnection Study Process (new)  9.2.2, Submission of Large Load Project Information and Initiation of the Large Load Interconnection Study (LLIS) (new)  9.2.3, Modification of Large Load Project Information (new)  9.2.4, Load Commissioning Plan (new)  9.2.5, Required Interconnection Equipment (new)  9.3, Interconnection Study Procedures for Large Loads (new)  9.3.1, Large Load Interconnection Study (LLIS) (new)  9.3.2, Large Load Interconnection Study Scoping Process (new)  9.3.3, Large Load Interconnection Study Description and Methodology (new)  9.3.4, Large Load Interconnection Study Elements (new)  9.3.4.1, Steady-State Analysis (new)  9.3.4.2, System Protection (Short-Circuit) Analysis (new)  9.3.4.3, Dynamic and Transient Stability Analysis (new)  9.4, LLIS Report and Follow-up (new)  9.5, Interconnection Agreements and Responsibilities (new)  9.5.1, Interconnection Agreement for Large Loads not Co-Located with a Generation Resource Facility Registered as a Private Use Network (new)  9.5.2, Interconnection Agreement for Large Loads Co-Located with one or more Generation Connected to Resource Facilities Registered as a Private Use Network (new)  9.6, Initial Energization and Continuing Operations for Large Loads (new) |

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| Market Rules Notes |

Please note the baseline Planning Guide language in the following sections(s) has been updated to reflect the incorporation of the following PGRR(s) into the Planning Guide:

* PGRR098, Consideration of Load Shed in Transmission Planning Criteria (unboxed 8/1/24)
  + Section 4.1.1.1
* PGRR113, Related to NPRR1198, Congestion Mitigation Using Topology Reconfigurations (incorporated 8/1/24)
  + Section 4.1.1.2

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| Revised Proposed Guide Language |

## 2.1 DEFINITIONS

**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.

(7) Each Large Load included in a planning study shall be set to a level of Demand consistent with the current Load Commissioning Plan.

(8) 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, flexible alternating current transmission system (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 all Facilities in their normal state, following an outage of a Large Load with or without a three-phase 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 generating unit unavailable, followed by Manual System Adjustments, followed by a common tower outage, the opening of a line section without a fault, 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;

(e) 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, the opening of a line section without a fault, or the contingency loss of a single generating unit, transmission circuit, transformer, shunt device, flexible alternating current transmission system (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

(f) With any single DC Tie Resource or DC Tie Load unavailable, followed by Manual System Adjustments, followed by a common tower outage, the opening of a line section without a fault, 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.

| **Initial Condition** | | **Event** | **Facilities within Applicable Ratings and System Stable with No Cascading or Uncontrolled Outages** | **Non-consequential Load Loss Allowed** |
| --- | --- | --- | --- | --- |
| 1 | Normal System | Common tower outage, DC Tie Resource outage, DC Tie Load outage, or the outage of a Large Load | Yes | No |
| 2 | Unavailability of a generating unit, followed by Manual System Adjustments | Common tower outage, DC Tie Resource outage, DC Tie Load outage, or opening of a line section without a fault | 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; opening of a line section without a fault; 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; Opening of a line section without a fault; 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.

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| ***[PGRR113: Replace item (a) above with the following upon system implementation of NPRR1198:]***  (a) A Remedial Action Scheme (RAS) or Constraint Management Plan (CMP) shall not be planned to resolve a planning criteria performance deficiency unless it is expected that system conditions will change such that the RAS or CMP will no longer be needed within the next five years. |

***5.2.10 Required Interconnection Equipment***

(1) Each Point of Interconnection (POI) for a Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) interconnected at transmission voltage to the ERCOT System must have a permanent configuration consisting of a station with breakers capable of interrupting fault current to sectionalize the transmission lines connecting the station to the ERCOT System. The breakers shall be under the remote control of the applicable TO and capable of being operated remotely to comply with an instruction from ERCOT.

***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 and Large Loads subject to the requirements of Section 9.2.1, Applicability of the Large Load Interconnection Study Process, connecting to the ERCOT System.

(a) For large generators with planned Initial Synchronization in the period under study, the assessment shall derive the conditions to be studied with consideration given to the results of the FIS stability studies.

(b) For new Large Loads and Load modifications subject to the requirements of Section 9.2.1, with planned Initial Energization in the period under study, the assessment shall derive the conditions to be studied from the most current Load Commissioning Plan and with consideration given to the results of the LLIS stability studies.

(c) ERCOT may study conditions other than those identified in the FIS or LLIS 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. Loads described in paragraph (1)(b) above that are not included in the assessment as result of failing to meet the prerequisites by the deadlines as listed in the table below will not be eligible for Initial Energization during that three-month period. The timeline for the quarterly stability assessment shall be in accordance with the following table:

|  |  |  |
| --- | --- | --- |
| **Generator Initial Synchronization or Large Load Initial Energization Date** | **Last Day for an IE, Resource Entity, or TSP to meet prerequisites as listed in paragraphs (4) and (5) below** | **Completion of Quarterly Stability Assessment** |
| 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, Resource Entity, or TSP 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 shall 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) The following prerequisites must be satisfied prior to the inclusion of a new Large Load or Load modification subject to the requirements of Section 9.2.1 in the quarterly stability assessment:

(a) The Large Load has met the requirements of Section 9.4, LLIS Report and Follow-up, and Section 9.5, Interconnection Agreements and Responsibilities;

(b) The Load Commissioning Plan has been updated to reflect the results of the LLIS as required by paragraph (1) of Section 9.2.4, Load Commissioning Plan;

(c) The interconnecting TSP has provided to ERCOT the dynamic load model it received from the ILLE per paragraph (1) of Section 9.3.4.3, Dynamic and Transient Stability Analysis, and written affirmation that no changes to the project information have been communicated by the ILLE, per Section 9.2.3, Modification of Large Load Project Information, that would invalidate the model.(d) The following elements must be complete;

(i) Reactive Power Study, if required according to Protocol Section 3.15, Voltage Support; and

(ii) SSO Study, if required according to Protocol Section 3.22.1.4, Large Load Interconnection Assessment; and

(e) The data used in the studies identified in paragraph (c) above is consistent with data used in the final LLIS studies approved per Section 9.4, LLIS Report and Follow-up.

(6) At any time following the inclusion of a large generator or applicable Large Load in a stability assessment, but before the Initial Synchronization of the generator or Initial Energization of the Large Load, if ERCOT determines, in its sole discretion, that the generator or Large Load no longer meets the prerequisites described in paragraphs (4) or (5) above, or that an IE or ILLE has made a change to the design of the generator or Large Load that could have a material impact on ERCOT System stability, then ERCOT may refuse to allow Initial Synchronization of the generator or Initial Energization of the Large Load. ERCOT shall include the generator or Large Load in the next quarterly stability assessment period that commences after identification of the qualified change or after the generator or Large Load meets the prerequisites specified in paragraphs (4) or (5) above, as applicable. If ERCOT determines, in its sole discretion, that the change to the design of the generator or Large Load would not have a material impact on ERCOT System stability, then ERCOT may not refuse to allow Initial Synchronization of the generator or Initial Energization of the Large Load due to this change.

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

**6.6 Modeling of Large Loads**

***6.6.1 Modeling of Large Loads Not Co-Located with a Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG)***

(1) The interconnecting Transmission Service Provider (TSP) shall not add a new Large Load or Load modification subject to the requirements of Section 9.2.1, Applicability of the Large Load Interconnection Study Process, to the Network Operations Model until the following conditions have been met:

(a) The LLIS has been completed and results communicated per paragraph (6) of Section 9.4, LLIS Report and Follow-up;

(b) The TSP has satisfied all conditions of 9.5.1, Interconnection Agreement for Large Loads not Co-Located with a Generation Resource Facility Registered as a Private Use Network.

***6.6.2*** ***Modeling of Large Loads Co-Located with an Existing Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG)***

(1) The addition of a new Large Load to an existing Generation Resource, ESR, or SOG, or the modification of an existing Load at the Generation Resource, ESR, or SOG, subject to the requirements of Section 9.2.1, Applicability of the Large Load Interconnection Study Process, is considered a material modification of the Resource Registration as described in paragraph (8) of Section 6.8.2. The Resource Entity (RE) shall update the Resource Registration data to reflect the new or increased Load.

(2) The RE shall not update the Resource Registration data to reflect the new or increased Load until the following requirements have been satisfied:

(a) ERCOT has communicated the completion of the LLIS as described in paragraph (6) of Section 9.4, LLIS Report and Follow-up; and

(b) All required interconnection agreements have been executed and acknowledged by all parties as prescribed in Section 9.5.2, Interconnection Agreement for Large Loads Co-Located with one or more Generation Resource Facilities Registered as a Private Use Network.

***6.6.3 Modeling of Large Loads Co-Located with a Proposed Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG)***

(1) A new Large Load co-located with a proposed Generation Resource, ESR, or SOG shall be included in the data provided by the IE or RE during the Resource Registration process.

(2) The Large Load shall not be included in the Network Operations Model until the following requirements have been satisfied:

(a) ERCOT has communicated the completion of the LLIS as described in paragraph (6) of Section 9.4, LLIS Report and Follow-up;

(b) All required interconnection agreements have been executed and acknowledged by all parties as prescribed in Section 9.5.2, Interconnection Agreement for Large Loads Co-Located with one or more Generation Resource Facilities Registered as a Private Use Network; and

(c) All applicable requirements of Section 6.9 have been completed.

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), 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, all contingencies representing the Outage of a Large Load, and any other contingencies described in the ERCOT Steady State Working Group Procedure Manual.

**9** **Large Load additions at new or MODIFICATION OF existing LOAD INTERCONNECTION(S)**

**9.1** **Introduction**

(1) This Section defines the requirements and processes used to facilitate new or modified Large Load interconnections with the ERCOT System. This process will be referred to as the Large Load Interconnection Study (LLIS) process. The requirements are designed to:

(a) Facilitate studies to identify potential system limitations and determine facilities needed to interconnect a new Large Load to or modify an existing Large Load on the ERCOT network;

(b) Facilitate orderly and organized Large Load interconnections, while allowing ERCOT to determine whether the interconnection of the proposed Large Load would comply with North American Electric Reliability Corporation (NERC) Reliability Standards, ERCOT Protocols, ERCOT Planning and Operating Guides, TSP criteria, and any Applicable Legal Authority (ALA);

(c) Specify the communications required between Interconnecting Large Load Entities (ILLEs), Transmission Service Providers (TSPs), Distribution Service Providers (DSPs), Resource Entities (REs), Interconnecting Entities (IEs), and ERCOT;

(d) Provide the best information on future Large Load additions for use in identifying, forecasting, and analyzing short- and long-range ERCOT capabilities, demands, and reserves; and

(e) Provide ERCOT accurate data about new and modified Large Load subject to the provisions detailed in section 9.2.1, Applicability of the Large Load Interconnection Study Process, to ensure that ERCOT and stakeholders have the information necessary for planning purposes.

(2) Submission of all project data described in this Section shall be submitted into RIOO by the ILLE.

(3) ERCOT shall manage a confidential email list (Transmission Owner Load Interconnection) to facilitate communication of confidential Large Load-related information among TSPs and ERCOT. Membership to this email list will be limited to ERCOT and appropriate TSP personnel.

9.2 General Provisions

***9.2.1*** ***Applicability of the Large Load Interconnection Study Process***

(1) Any request to interconnect or modify a Load Facility that meets one or more of the following criteria shall be subject to the Large Load Interconnection Study (LLIS) process:

(a) A new Large Load;

(b) A modification of any existing Load Facility that increases the aggregate peak Demand of the Facility by 75 MW or more; or

(c) A modification of an existing Large Load that changes or adds a Point of Interconnection (POI) or Service Delivery Point to a different electrical bus on a different electrical circuit.

9.2.2 Submission of Large Load Project Information and Initiation of the Large Load Interconnection Study (LLIS)

(1) For any Load request meeting one or more criteria defined in paragraph (1) of Section 9.2.1, Applicability, the following actions shall be completed prior to the initiation of the LLIS process described in Section 9.3, Interconnection Study Procedures for Large Loads.

(a) Submission of all information, including but not limited to, data required by the lead TSP to perform steady state, short circuit, motor start, stability analyses and any other studies the lead TSP deems necessary to reliably interconnect the Load. The dynamic load model to be provided for performing stability analysis will be in a format prescribed by the lead TSP and/or ERCOT;

(b) Submission of a preliminary Load Commissioning Plan that fully reflects the proposed project schedule;

(c) Written acknowledgement from the ILLE of its obligations to notify the interconnecting TSP of changes to the Large Load project information or to the Load composition, technology, or load parameters, as described in Section 9.2.3 Modification of Large Load Project Information, during the interconnection process;

(d) A formal request to initiate the LLIS process described in Section 9.3; and

(e) Payment of the LLIS Application Fee to ERCOT as described in paragraph (3).

(2) The interconnecting Transmission Service Provider (TSP) shall submit the information described in paragraphs (1)(a) through (1)(d) above on behalf of the Interconnecting Large Load Entity (ILLE).

(3) The ILLE shall pay to ERCOT the LLIS Application Fee, as described in the ERCOT Fee Schedule prior to the commencement of the LLIS. The interconnecting TSP, RE, or IE may choose to submit this fee to ERCOT on the behalf of the ILLE. Payment of the ERCOT LLIS Application Fee shall not affect the independent responsibility of the ILLE to pay for interconnection studies conducted by the interconnecting TSP or for any DSP studies.

**9.2.3 Modification of Large Load Project Information**

(1) The interconnecting Transmission Service Provider (TSP) shall update any project information submitted per paragraph (1) of Section 9.2.2 within ten Business Days of being notified by the ILLE of a qualified change.

(2) The ILLE shall notify the lead TSP if a change to the Load composition or technology occurs after the ILLE has provided the TSP with its initial dynamic load model(s) per paragraph (2) of Section 9.3.4.3, Dynamic and Transient Stability Analysis. If the change to Load composition, technology, or load parameters differs substantially from the dynamic model information used in the LLIS Stability Study as described in Section 9.3.4.3 is made at any time after the initiation of the LLIS, ERCOT shall provide technical justification to the lead TSP describing why a new Stability Study is required. The lead TSP shall perform a new Stability Study that reflects the new composition of the proposed Load when both ERCOT and the lead TSP agree such a study is needed.

(3) If a qualified change is made such that the interconnection request no longer meets the applicability criteria of Section 9.2.1, Applicability, the interconnecting TSP shall respect the conclusions of any completed LLIS study elements when evaluating the reliability of the modified interconnection request.

**9.2.4 Load Commissioning Plan**

(1) The Load Commissioning Plan (LCP) shall be maintained and updated by the interconnecting Transmission Service Provider (TSP) using information provided by the Interconnecting Large Load Entity (ILLE). The LCP must specify the load increments and timeline by which the ILLE intends to increase peak Demand. The plan shall reflect the most currently available project information and shall be updated upon receipt of updated project information from the ILLE and as otherwise described in this section.

(2) Upon the completion of the LLIS, as described in Section 9.4, the interconnecting TSP shall update the preliminary LCP to reflect changes in the ILLE’s timeline to account for time needed to complete the transmission upgrades identified. If one or more levels of Demand in the Load Commissioning Plan are contingent on one or more transmission upgrade projects as determined in paragraph (6) of Section 9.4, those transmission projects shall be identified in the updated LCP.

(3) Upon the execution of any required agreements prescribed in Section 9.5, the interconnecting TSP shall update the LCP to reflect changes to the ILLE’s load increments and implementation timeline in the executed Interconnection Agreement.

(4) The lead TSP shall continue to maintain the LCP after Initial Energization until all transmission upgrades required to serve the Large Load are completed.

**9.2.5**  **Required Interconnection Equipment**

(1) Each Service Delivery Point for a Large Load not co-located with a Generation Resource, Energy Storage Resource (ESR), or Settlement Only Generator (SOG) interconnected at transmission voltage to the ERCOT System must have a permanent configuration consisting of one or more breakers capable of interrupting fault current to isolate the Large Load from the ERCOT System without interrupting flow on the associated transmission lines. The breakers shall be under the remote control of the applicable TO and capable of being operated remotely to comply with an instruction from ERCOT.

(2) Each Large Load co-located with a Generation Resource, ESR, or SOG interconnected at transmission voltage to the ERCOT System must have a permanent configuration consisting of one or more breakers capable of interrupting fault current to isolate the Large Load from the ERCOT System without isolating any of the co-located generators. The breakers shall be under the remote control of the applicable QSE and capable of being operated remotely to comply with an instruction from ERCOT.

(3) A maximum of 1,000 MW of peak Demand may be served from a single Load Service Point (LSP).

(a) Calculation of peak Demand in this paragraph shall include the totalized peak Demand of all Loads collocated with a Generation Resource as described in Protocol Section 10.3.2.3, Generation Netting for ERCOT-Polled Settlement Meters.

(b) A LSP that serves a peak Demand greater than 1000 MW on or before January 1, 2025 shall be exempt from the requirements of paragraph (3) of this Section. However, such a LSP shall nevertheless comply if, on or after January 1, 2025, the peak Demand served from that point exceeds by 75 MW or more the peak Demand served on January 1, 2025.

9.3 Interconnection Study Procedures for Large Loads

(1) This Section establishes the procedures for conducting a Large Load Interconnection Study (LLIS) for new or modified Large Loads, as defined by Section 9.2.1, Applicability of the Large Load Interconnection Study Process.

9.3.1 Large Load Interconnection Study (LLIS)

(1) An LLIS consists of the set of steady-state, stability, short-circuit and other relevant studies that are necessary to determine the reliability impact of a Large Load interconnection on affected Transmission Facilities and identify the Transmission Facilities that are needed to reliably interconnect the new or modified Large Load to the ERCOT System.

(2) If an Interconnecting Entity (IE) or Resource Entity (RE) submits a large Generation Resource interconnection request, as defined in Section 5.3, Interconnection Study Procedures for Large Generators, that also includes a co-located Large Load, the Full Interconnection Study (FIS) may be used in place of a separate LLIS. The FIS shall reflect the full requested Load amount and conform to all study requirements detailed in Sections 5.3 and 9.3 of this Planning Guide. For any deadlines or timelines set out in this section that conflict with the deadlines or timelines in Sections 5.2 and 5.3, the deadlines or timelines in Sections 5.2 and 5.3 shall govern.

(3) During the LLIS, the interconnecting TSP shall be the lead TSP unless otherwise designated by ERCOT during the study scoping process detailed in Section 9.3.2.

(4) For an interconnection request involving a Large Load interconnecting at distribution voltage, the LLIS shall evaluate only the proposed Load’s transmission-level impacts, if any. The affected Distribution Service Provider (DSP) shall provide the lead TSP with all information concerning the DSP's facilities needed to complete any required studies.

9.3.2 Large Load Interconnection Study Scoping Process

(1) ERCOT will notify the interconnecting Transmission Service Provider (TSP) after all requirements detailed in paragraph (1) of Section 9.2.2 have been met. Within ten Business Days of this notification, the lead TSP shall schedule a kick-off meeting with ERCOT and the certificated DSP to occur soon thereafter. If the proposed project is co-located with a Generation Resource, the kick-off meeting must also include the affected Resource Entity (RE) or Interconnecting Entity (IE). The lead TSP shall invite the Interconnecting Large Load Entity (ILLE) to attend the kick-off meeting. The ILLE may attend at its option.

(2) ERCOT will notify all other TSPs of the LLIS request. Each TSP may evaluate if it is directly affected by the interconnection request and determine if it should participate in the LLIS. Examples of a directly affected TSP may include, but are not limited to, a TSP whose facilities are likely to experience changes in voltage or power flow because of the Load interconnection request.

(3) Each directly affected TSP desiring to participate in the LLIS shall promptly notify the lead TSP and ERCOT and must provide a description of the expected effect of the Load interconnection on the TSP’s facilities in its notification. The lead TSP shall include all directly affected TSP(s) in the LLIS kickoff meeting.

(4) At the LLIS kickoff meeting, the lead TSP will present the proposed project and facilitate a general discussion of the preliminary study scope of work for the LLIS.

(5) Any reactive studies required under Protocol Section 3.15, Voltage Support, or SSO studies required under Protocol Section 3.22.1.4, Large Load Interconnection Assessment, shall be scoped simultaneously with the LLIS but do not need to be included as part of the LLIS. The Resource Entity responsible for the reactive study shall provide it to ERCOT directly.

(6) The lead TSP will develop a preliminary LLIS study scope within ten Business Days following the kickoff meeting.

(a) The study scope must include all study elements required by Section 9.3.4, Large Load Interconnection Study Elements, unless ERCOT and the TSP(s) determine that one or more studies are unnecessary. If a study element is deemed unnecessary, the lead TSP shall provide a written technical justification for not performing the analysis in lieu of the study report.

(b) The study scope shall specify the base cases, study assumptions, and scenarios that will be used in each LLIS element. All study assumptions related to maintenance outage scenarios required under Section 4.1.1.8, Maintenance Outage Criteria, shall be explicitly identified in the study scope.

(c) The study scope shall specify the involvement of any directly affected TSPs in the study process. In some cases, it may be necessary for the ILLE to execute study agreements with multiple TSP(s).

(d) Additional options may be proposed by the lead TSP as necessary during the LLIS process.

(7) The lead TSP shall submit the preliminary study scope for review by ERCOT and all directly affected TSPs, including TSPs which may now be directly affected due to proposed interconnection topology. Directly affected TSPs and ERCOT may provide comments on the preliminary study scope within ten Business Days of posting.

(8) Upon closing of the comment period described in paragraph (7) above, the lead TSP shall, within ten Business Days, submit a final study scope that addresses submitted comments to the extent possible. If the lead TSP, directly affected TSPs, or ERCOT cannot reach agreement on one or more aspects of the study scope, the lead TSP shall resolve any remaining dispute(s).

(9) Within five Business Days of the lead TSP submitting the final study scope, ERCOT shall approve the final study scope or return the scope to the lead TSP with comments. The lead TSP shall promptly address ERCOT comments and resubmit according to paragraph (8) above.

9.3.3 Large Load Interconnection Study Description and Methodology

(1) The primary purpose of the LLIS is to determine whether the amount of Load being requested by the ILLE can be placed in service by the desired Initial Energization date while maintaining the reliability of the ERCOT System and ensuring compliance with all North American Electric Reliability Corporation (NERC) Reliability Standards, Protocols, this Planning Guide, and the Operating Guides. The LLIS will also identify any transmission improvements needed to serve the full requested Load amount, including individual load increments requested by the ILLE in the initial Load Commissioning Plan (LCP).

(2) The LLIS consists of a series of distinct study elements. The specific elements included in a particular LLIS will be stated in the LLIS scope.

(3) Each proposed Large Load interconnection that requests more than one physical transmission interconnection will be studied as an individual study for each interconnection to be analyzed separately from all other such requests unless otherwise agreed by the ILLE and TSP(s) in the interconnection study agreement.

(4) The LLIS process includes developing and analyzing various computer model simulations of the existing and proposed ERCOT transmission system. The results from these simulations will be utilized by the TSP(s) to determine the impact of the proposed interconnection.

(5) The study shall include an analysis demonstrating the adequate reliability of any temporary interconnection configurations.

9.3.4 Large Load Interconnection Study Elements

9.3.4.1 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 appropriate for the desired Initial Energization date of the Load. The lead TSP shall remove from the study base case all transmission Facilities it determines may significantly impact study results that will not be in service before Initial Energization of the proposed Load. The steady-state analysis shall include other relevant Large Loads and transmission upgrades included in the Load Commissioning Plans (LCPs) for those Large Loads that have a complete LLIS per paragraph (6) of Section 9.4, LLIS Report and Follow-up and that have met the requirements of Section 9.5, Interconnection Agreements and Responsibilities. The lead TSP may include other transmission projects and Substantiated Load in the study base case. All modifications to the SSWG base case made as part of the study assumptions shall be documented in the LLIS report.

(2) The lead TSP shall perform contingency analyses as required by the NERC Reliability Standards, ERCOT Nodal Protocols, this Planning Guide, and the Operating Guides to identify any additional Facilities that may be necessary to ensure that results of the system performance conform to these standards. The study shall identify any system limitations that would prevent the ILLE from achieving the requested load in the desired timeframe. If the study identifies system limitations, the lead TSP shall identify potential transmission system improvements necessary to achieve the requested Load. The results of this analysis shall be shared with TSP(s) that have Facilities identified with planning criteria violations, and those affected TSP(s) will be responsible for evaluating the impact of the Large Load and the validity of the anticipated violations.

(3) Upon completion of the steady-state study as described in paragraph (2) above, the lead TSP shall identify modifications to the ILLE’s initial LCP to account for any additional time required to implement transmission upgrades in order to support the Load(s).

9.3.4.2 System Protection (Short-Circuit) Analysis

(1) The short-circuit study shall use the most recently approved System Protection Working Group (SPWG) base case appropriate for the desired Initial Energization date of the Load. The initial transmission configuration of the study area shall correspond to the configuration used in the corresponding steady-state study to the extent practicable.

(2) The lead TSP will determine the maximum available fault currents at the interconnection substation for determining switching device interrupting capabilities and protective relay settings.

9.3.4.3 Dynamic and Transient Stability Analysis

(1) The lead TSP shall not initiate the stability study prior to receiving from the ILLE dynamic load modeling information sufficient to properly model the Load in the stability studies. The TSP will check the dynamic load information according to the procedure specified in Section 3.4.4 of the DWG Procedure Manual.

(2) The stability study base case shall be created from the most recently approved Dynamics Working Group (DWG) base case appropriate for the desired Initial Energization date of the Load. The initial transmission configuration of the study area shall be consistent with the configuration used in the corresponding steady-state study to the extent practicable.

(3) All stability studies shall be performed in accordance with NERC Reliability Standards, Protocols, this Planning Guide, and the Operating Guides. Transient stability studies will analyze the performance of 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. Such studies should incorporate reasonable and conservative assumptions regarding impacted facility operating conditions.

(4) The stability study portion of the LLIS shall document any identified instability.

(5) If the lead TSP identifies instability (other than instability identified for extreme events) in the stability portion of the LLIS, the TSP shall investigate alternative solutions, including transmission improvements, to mitigate the instability. The lead TSP shall identify modifications to the ILLE’s LCP to account for time required to implement transmission upgrades to support the load(s) while mitigating any instance of instability, and shall implement the mitigation before the Initial Energization of the Large Load in accordance with Protocol Section 3.11.4, Regional Planning Group Project Review Process.

9.4 LLIS Report and Follow-up

(1) For each of the LLIS study elements, the lead TSP shall submit a preliminary study report to ERCOT and other directly affected TSPs. The report shall include a description of the study methodology and assumptions, findings, and recommendations. The report shall also identify any changes to the ILLE’s Load Commissioning Plan (LCP) to allow for transmission upgrades in accordance with the criteria in Section 9.3.4. The lead TSP may include additional information in the study report and may combine multiple LLIS study elements into a single report.

(2) ERCOT shall review the preliminary study report within ten Business Days and provide to the lead TSP any questions, comments, and proposed revisions necessary to ensure the report complies with the requirements in Section 9.3, Interconnection Study Procedures for Large Loads. ERCOT may extend this review period by an additional 20 Business Days and shall notify in writing the lead and directly affected TSPs of the extension. Directly affected TSPs may also provide questions, comments, and proposed revisions during this review period. All comments from ERCOT and directly affected TSPs shall be provided to the lead TSP in writing.

(3) After considering the responses received from ERCOT and directly affected TSPs, if the lead TSP determines additional study is required, the lead TSP shall promptly perform the additional study and submit an updated preliminary study report for review as described in paragraph (1) above.

(4) If no additional study is required as described in paragraph (3) above, the lead TSP shall prepare a final LLIS study report that incorporates all relevant feedback received in paragraph (2) above, within ten Business Days.

(5) When complete, the lead TSP shall provide the final report for the LLIS study element(s) to ERCOT and the directly affected TSPs only.

(6) The LLIS is deemed complete when the final report has been provided for all LLIS study elements. Within ten Business Days following the completion of the LLIS, ERCOT shall:

(a) Determine whether system upgrades recommended to support the Load(s) specified in the initial LCP are sufficient based on the report in paragraph (1) above;

(b) Grant conditional approval for the interconnection of Load as per the LCP that is conditioned on RPG-approved transmission upgrades and transmission upgrades not subject to RPG approval becoming operational;

(c) Identify any remaining transmission upgrades subject to RPG review as described in Section 3.11.4, Regional Planning Group Project Review Process, in the Nodal Protocols; and

(d) Communicate the completion of the LLIS to the lead TSP and directly affected TSPs.

(7) The lead TSP may provide a redacted copy of the final report for each LLIS study element to the ILLE upon request. The redacted report(s) shall conform with Nodal Protocols Section 1.3.

(8) If a qualified change that impacts one or more LLIS study assumptions occurs before the requirements of Section 9.5, Interconnection Agreements and Responsibilities, have been met, ERCOT or the lead TSP may require one or more LLIS study elements be updated. The lead TSP shall have sole discretion to determine if a change impacts any LLIS study assumptions and to require a modification of the study or a restudy be performed. Any modification of the study report shall be treated as a preliminary study and reviewed according to paragraph (1) above.

(9) If the requirements of Section 9.5, Interconnection Agreements and Responsibilities, have not been satisfied within 180 days after the communication of the completion of the LLIS by ERCOT as described in paragraph (7) above, ERCOT may notify the lead TSP that the project is subject to cancellation. Upon receipt of this notification, the lead TSP may submit a project status update to ERCOT that includes a request for an extension and provides an opinion on whether any of the completed LLIS elements require restudy. If no such project status update is received within 30 days from the date the notice is issued, ERCOT may consider the project cancelled.(10) If the Large Load has not met the requirements for Initial Energization as described in paragraph (1) of Section 9.6, Initial Energization and Continuing Operations for Large Loads, within 365 days after the Initial Energization date identified in the LLIS study report, the lead TSP shall provide an opinion to ERCOT on whether any of the completed LLIS elements require restudy.

***9.5*** ***Interconnection Agreements and Responsibilities***

9.5.1 Interconnection Agreement for Large Loads not Co-Located with a Generation Resource Facility

(1) For a Large Load not co-located with a Generation Resource Facility, ERCOT shall not allow Initial Energization prior to receiving one of the following:

(a) Confirmation from the lead TSP that:

(i) All required interconnection agreements or equivalent service extension agreements with the Interconnecting Large Load Entity (ILLE) and directly affected TSP(s) have been executed;

(ii) The lead TSP has received written acknowledgement from the ILLE of the ILLE’s obligations to:

(A) Notify the directly affected TSP(s) of changes to the Large Load project information or to the Load composition, technology, or load parameters as described in Section 9.2.3 Modification of Large Load Project Information; and

(B) Maintain Load consumption at or below the level(s) of peak Demand established in the Load Commissioning Plan;

(iii) The lead TSP has received notice to proceed with the construction of all required interconnection Facilities; and

(iv) The lead TSP and directly affected TSP(s) have received the financial security, applicable payments, or other agreements required to fund all required interconnection Facilities; or

(b) A letter from a duly authorized person from a Municipally Owned Utility (MOU) or Electric Cooperative (EC) confirming its intent to construct and operate applicable Large Load and interconnect such Large Load to its transmission system.

9.5.2 Interconnection Agreement for Large Loads Co-Located with one or more Generation Resource Facilities

(1) For a Large Load co-located with a Generation Resource Facility, ERCOT shall not allow Initial Energization prior to receiving one of the following:

(a) Confirmation from the lead TSP that:

(i) All required interconnection agreements and/or equivalent service extension or other agreements with the Resource Entity (RE), Interconnecting Entity (IE), and Interconnecting Large Load Entity (ILLE) have been executed;

(A) If the required agreements include a new Standard Generation Interconnection Agreement (SGIA) or an amendment to an existing SGIA, a copy of this agreement shall be provided to ERCOT once executed per Section 5.2.8.1, Standard Generation Interconnection Agreement for Transmission-Connected Generators; or

(B) If no new or amended agreements are required, the lead TSP shall so notify ERCOT and state affirmatively it agrees to energize the new Load per the approved LLIS studies;

(ii) The lead TSP has received written acknowledgement from either the ILLE, or the RE on behalf of the ILLE, of the obligations to:

(A) Notify the directly affected TSP(s) of changes to the Large Load project information or to the Load composition, technology, or load parameters as described in Section 9.2.3 Modification of Large Load Project Information; and

(B) Maintain Load consumption at or below the level(s) of peak Demand established in the Load Commissioning Plan; and

(iii) The lead TSP has received notice to proceed with the construction of all required interconnection Facilities; and

(iv) The lead TSP and directly affected TSP(s) have received the financial security required, applicable payments, or other agreements to fund all required interconnection Facilities; or

(b) A letter from a duly authorized person from a Municipally Owned Utility (MOU) or Electric Cooperative (EC) confirming its intent to construct and operate applicable Large Load and interconnect such Large Load to its transmission system.

9.6 Initial Energization and Continuing Operations for Large Loads

(1) Each Large Load shall meet the conditions established by ERCOT before proceeding to Initial Energization. These conditions may include, but are not limited to:

(a) Inclusion of the Load in the Network Operations Model in accordance with Section 6.6, Modeling of Large Loads;

(b) Verification that all required telemetry is operational and accurate;

(c) Completion of the requirements of Planning Guide Section 5.3.5, ERCOT Quarterly Stability Assessment;

(d) Completion and approval of any required Subsynchronous Oscillation (SSO) studies, SSO Mitigation Plan, SSO Countermeasures, and SSO monitoring, if required; and

(e) Submission of a current Load Commissioning Plan meeting the requirements of Section 9.2.4, Load Commissioning Plan.

(2) During continuing operations:

(a) If the interconnecting TSP or ERCOT identifies that a Large Load has exceeded a limit on peak Demand established in the LLIS and Load Commissioning Plan, ERCOT will request that the TSP coordinate with the ILLE to resolve the exceedance.

(b) The applicable TSP shall notify ERCOT when a transmission upgrade identified in a Load Commissioning Plan becomes operational. ERCOT must give written approval before Demand may increase.

(c) Pursuant to Section 9.5, Interconnection Agreements and Responsibilities, if a Large Load modifies its facilities such that a previously provided dynamic load model is invalid, the Large Load shall notify and provide an updated model to the lead TSP that provides service to the Large Load. The lead TSP shall subsequently provide this updated dynamic load model to ERCOT.