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| NPRR Number | [1191](https://www.ercot.com/mktrules/issues/NPRR1191) | NPRR Title | Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater |
| Date Posted | August 1, 2023 |
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| Requested Resolution  | Normal |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions2.2, Acronyms and Abbreviations3.1.1, Role of ERCOT3.1.5.11, Evaluation of Transmission Facilities Planned Outage or Maintenance Outage Requests3.2.6.2.1, Peak Load Estimate3.3.2, Types of Work Requiring ERCOT Approval3.15, Voltage Support3.15.3, Generation Resource Requirements Related to Voltage Support3.22, Subsynchronous Resonance3.22.1, Subsynchronous Resonance Vulnerability Assessment3.22.1.1, Existing Generation Resource Assessment3.22.1.2, Generation Resource or Energy Storage Resource Interconnection Assessment3.22.1.3, Transmission Project Assessment3.22.1.4, Large Load Interconnection Assessment (new)3.22.1.4, Annual SSR Review3.22.2, Subsynchronous Resonance Vulnerability Assessment Criteria3.22.3, Subsynchronous Resonance Monitoring6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder6.5.7.12, Large Load Ramp Rate Limitations (new)6.5.9.4.1, General Procedures Prior to EEA Operations16.20, Provision of Information by a Customer with a Load of 25 MW or More (new)16.20.1, Designation of a Qualified Scheduling Entity by a Registered Curtailable Load (new)Section 23, Form R: Qualified Scheduling Entity Acknowledgment of Designation for Customer with Large Load (new)ERCOT Fee Schedule |
| Related Documents Requiring Revision/Related Revision Requests | Nodal Operating Guide Revision Request (NOGRR) 256, Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or GreaterPlanning Guide Revision Request (PGRR) 111, Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or GreaterResource Registration Guide Revision Request (RRGRR) 036, Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater |
| Revision Description | This Nodal Protocol Revision Request (NPRR) and the related PGRR, NOGRR, and RRGRR establish registration, interconnection, and operational requirements for Customers with “Large Loads”—defined in this NPRR to refer to Facilities with an aggregate peak power Demand of 75 MW or more. ERCOT proposes these requirements based upon its experience with the interim large Load interconnection process implemented on March 25, 2022, analysis of operational events, and the discussion of various issues concerning Large Loads explored by the Large Flexible Load Task Force (LFLTF). This NPRR establishes, *inter alia*, Large Load registration requirements. Under these requirements, Customers interconnecting Large Loads will be able to designate whether they intend to operate as firm Loads or Load Resources. The NPRR also adds a new Load Resource type, the Registered Curtailable Load (RCL). The RCL category refers to a Load that is subject to curtailment in response to an ERCOT instruction prior to ERCOT’s declaration of an Energy Emergency Alert (EEA). RCLs will not be subject to Security-Constrained Economic Dispatch (SCED) nor eligible to provide Ancillary Services.Additionally, this NPRR facilitates the addition of a new study process for Large Loads seeking to interconnect to the ERCOT system within two years. This process is described in the accompanying PGRR. This NPRR also adds several provisions that affect the operation of Large Loads. Customers that choose not to register their Large Loads as Controllable Load Resources (CLRs) will be subject to ramping limits to ensure frequency stability and to allow ERCOT’s management of transmission congestion. This NPRR also adds a requirement that any Resource Entity that adds 20 MW of more of Load at any Facility with an existing Generation Resource shall submit a new Reactive Power study. The study must demonstrate the continued compliance of the Generation Resource with Voltage Support Service (VSS) requirements. This NPRR also establishes specific Subsynchronous Oscillation (SSO) requirements for Large Loads and revises and supplements SSO-related definitions, in addition to clarifying existing SSO requirements. Voltage-ride through requirements for Large Loads are addressed in the related NOGRR.This NPRR also revises the calculation of the Peak Load Estimate to explicitly account for Large Load impacts in the forecasts used in ERCOT’s Capacity, Demand, and Reserves reports.This NPRR also revises the price adders to account for deployments of RCLs.Furthermore, although the primary focus of this NPRR is Loads that are 75 MW or larger, this NPRR also requires a Customer with an aggregate peak Demand of 25 MW or more at a site behind one or more common Points of Interconnection (POIs) or Service Delivery Points to provide ERCOT with information and Load parameter data that is specified in the accompanying Resource Registration Glossary Revision Request. Such registration will provide ERCOT visibility of the locations of these Loads for operational and planning purposes. Finally, this NPRR adds a fee for Large Load Interconnection Study Requests to the ERCOT Fee Schedule.These revisions address various planning, modeling, and operational concerns that have been identified thus far relating to Large Loads. But as the impacts of flexible Large Loads on the grid become better understood, additional rules may be necessary to address any such risks. |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](https://www.ercot.com/files/docs/2018/12/13/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | The ERCOT System is experiencing an unprecedented increase in the number of Load Facilities that are each sizeable enough to potentially affect the reliable operation of the Texas power grid. For example, since January 1, 2022, a total of 2,973 MW of Large Loads (those equaling 75 MW or more at a site) have received ERCOT approval to energize in two years or fewer. That amount is more than five times the Demand of the City of Lubbock and does not include other Large Loads seeking to interconnect to the ERCOT System under slower time frames. Additionally, as of July 24, 2023, there are 55 proposed Customer interconnections, equaling a total of 16,199 MW with requested energization dates on or before December 31, 2024. For perspective, that is almost one-fifth of the recent ERCOT record peak demand of 82,592 MW on July 18, 2023. Moreover, a notable portion of Customers with Large Loads have the ability to rapidly vary their Demand. Such changes, if large and fast enough, can pose challenges for maintaining frequency and voltage within the physical limits of the ERCOT System and the requirements established by the North American Electric Reliability Corporation (NERC). Indeed, over the last twelve months there have been multiple instances where large and rapid changes in Large Load Demand caused or contributed to the severity of a grid event. For example, during a low-voltage event on December 7, 2022, on the 138-kilovolt (kV) transmission lines near Odessa, in West Texas, Load quickly dropped by a total of approximately 1,560 MW. Although ERCOT has limited visibility regarding Customers’ Loads (which, indeed, is among the reasons why this NPRR and the accompanying Revision Requests are needed), data indicates the reduced Loads included large data centers, oil and gas facilities, and industrial facilities. During this event, frequency spiked to 60.235 Hz and did not return to 60 Hz until more than 12 minutes later. This event is one example in which ERCOT observed that Large Loads did not ride through a low-voltage condition, and that failure created a risk to frequency control.Since January 1, 2023, there have been 49 SCED intervals where the change in Large Load Demand exceeded the total amount of Regulation procured by ERCOT. In another 372 intervals, the change in Large Load Demand exceeded 50% of the Regulation procured by ERCOT. ERCOT expects the incidence and magnitude of such exceedances to increase as more Large Loads, especially those with business models that rely on modifying their Demand in response to wholesale prices, continue to proliferate. As a result, absent these variations in Demand being accounted for in SCED, ERCOT may be required to procure more Regulation Service to ensure system frequency is maintained. Participation of Large Loads in the existing CLR option will avoid this outcome because their ramping behavior will be coordinated with the needs of the grid via SCED.Moreover, due in part to ERCOT’s limited visibility regarding Customers’ electrical Facilities and their operations, ERCOT is observing greater error in its Load forecasts. Such error is particularly problematic during extreme or unusual Operating Days when having an accurate forecast is most critical for reliability. ERCOT also recognizes that requiring a Customer with an aggregate peak Demand of 25 MW or more at a site behind one or more common Points of Interconnection (POIs) or Service Delivery Points to provide certain information for ERCOT visibility is a new and novel approach to addressing a growing reliability concern. ERCOT has historically not had a direct relationship with such Customers. ERCOT looks forward to stakeholder feedback on this issue – including alternatives such as the Customer providing the necessary information to the interconnecting utility who can then give it to ERCOT. To address the risks to reliability discussed above, this NPRR and the accompanying Revision Requests proposes practicable solutions. These Revision Requests are informed by, among other things, stakeholders’ contributions in the Large Flexible Load Task Force and the interim ERCOT process established to study Large Loads seeking to interconnect sooner than the two-year time frame contemplated in the traditional planning process. ERCOT appreciates stakeholders’ engagement thus far and looks forward to their further comments. |

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| Market Rules Notes |

Please note that the following NPRR(s) also propose revisions to the following section(s):

* NPRR1175, Revisions to Market Entry Financial Qualifications and Continued Participation Requirements
	+ ERCOT Fee Schedule
* NPRR1176, Update to EEA Trigger Levels
	+ Section 6.5.9.4.1
* NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources
	+ Section 6.5.7.3.1

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| Proposed Protocol Language Revision |

## 2.1 DEFINITIONS

**Large Load**

One or more Facilities at a single site with an aggregate peak Demand greater than or equal to 75 MW behind one or more common Points of Interconnection (POIs) or Service Delivery Points.

**Large Load Interconnection Study (LLIS)**

The set of studies conducted by a Transmission Service Provider (TSP) for the purpose of identifying any electric system improvements or enhancements required to reliably interconnect a Customer with a Large Load meeting the requirements of Planning Guide Section 8.2.2, Applicability. These studies may include steady-state studies, system protection (short-circuit) studies, dynamic and transient stability studies, facility studies, and sub-synchronous oscillation studies.

Controllable Load Resource

A Load Resource capable of controllably reducing or increasing consumption under Security-Constrained Economic Dispatch (SCED) control by ERCOT.

**Registered Curtailable Load (RCL)**

A Load interconnected to the ERCOT System at transmission voltage in which the Customer has registered with ERCOT that the Load will curtail in response to an ERCOT instruction to maintain system reliability. The Load does not receive instructions from SCED and is not a Load Resource.

**Initial Energization**

The first time a Generation Resource, Settlement Only Generator (SOG), or Large Load facility’s equipment connects to the ERCOT System during commissioning.

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| ***[NPRR995: Replace the above definition “Initial Energization” with the following upon system implementation:]*****Initial Energization**The first time a Generation Resource, Energy Storage Resource (ESR), Settlement Only Energy Storage System (SOESS), Settlement Only Generator (SOG), or Large Load facility’s equipment connects to the ERCOT System during commissioning. |

Interconnecting Large Load Entity (ILLE)

Any Entity that has submitted a request to interconnect a Large Load to the ERCOT system.

**Subsynchronous Oscillation (SSO)**

Coincident oscillation occurring between two or more Transmission Elements or Generation Resources at a natural harmonic frequency lower than the normal operating frequency of the ERCOT System (60 Hz).

***Induction Generator Effect (IGE)***

An electrical phenomenon in which a resonance involving a Generation Resource or Load and a series compensated transmission system results in electrical self-excitation of the Generation Resource or Load at a subsynchronous frequency.

***Subsynchronous Control Interaction (SSCI)***

The interaction between a series capacitor compensated transmission system and the control system of Generation Resources or Load.

Subsynchronous Ferroresonance (SSFR)

Coincident oscillation occurring between a transformer and a series capacitor-compensated transmission system at a natural harmonic frequency lower than the normal operating frequency of the ERCOT System (60 Hz).

Subsynchronous Resonance (SSR)

Coincident oscillation occurring between Generation Resources and a series capacitor compensated transmission system at a natural harmonic frequency lower than the normal operating frequency of the ERCOT System (60 Hz), including the following types of interactions:

***Torque Amplification***

An interaction between one or more Generation Resources and a series compensated transmission system in which the response results in higher transient torque during or after disturbances than would otherwise occur.

***Torsional Interaction***

Torsional Interaction is the interplay between the mechanical system of a turbine generator and a series compensated transmission system.

**Subsynchronous Oscillation (SSO) Countermeasures**

Any equipment or any procedure to mitigate the SSO vulnerability, including but not limited to the following types of countermeasures:

Subsynchronous Oscillation (SSO) Protection

A countermeasure that includes, but is not limited to, disconnecting the affected equipment, Load, or Generation Resource.

Subsynchronous Oscillation (SSO) Mitigation

A countermeasure that includes, but is not limited to, equipment installation, controller adjustment, or a procedure to mitigate the SSO vulnerability without disconnecting the affected equipment, Load, or Generation Resources.

## 2.2 ACRONYMS AND ABBREVIATIONS

**ILLE** Interconnecting Large Load Entity

**LLIS** Large Load Interconnection Study

**RCL** Registered Curtailable Load

**SSFR** Subsynchronous Ferroresonance

***3.1.1 Role of ERCOT***

(1) ERCOT shall coordinate and use reasonable efforts, consistent with Good Utility Practice, to accept, approve or reject all requested Outage plans for maintenance, repair, and construction of both Transmission Facilities and Resources within the ERCOT System. ERCOT may reject an Outage plan under certain circumstances, as set forth in these Protocols.

(2) ERCOT’s responsibilities with respect to Outage Coordination include:

(a) Approving or rejecting requests for Planned Outages and Maintenance Outages of Transmission Facilities for Transmission Service Providers (TSPs) in coordination with and based on information regarding all Entities’ Planned Outages and Maintenance Outages;

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| ***[NPRR857: Replace paragraph (a) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(a) Approving or rejecting requests for Planned Outages and Maintenance Outages of Transmission Facilities for Transmission Service Providers (TSPs) and Direct Current Tie Operators (DCTOs) in coordination with and based on information regarding all Entities’ Planned Outages and Maintenance Outages; |

(b) Assessing the adequacy of available Resources, based on planned and known Resource Outages, relative to forecasts of Load, Ancillary Service requirements, and reserve requirements;

(c) Coordinating all Planned Outage and Maintenance Outage plans and approving or rejecting Outage plans for Planned Outages of Resources;

(d) Coordinating and approving or rejecting Outage plans for Planned Outages of Reliability Must-Run (RMR) Units under the terms of the applicable RMR Agreements;

(e) Coordinating and approving or rejecting Outage plans associated with Black Start Resources under the applicable Black Start Unit Agreements;

(f) Coordinating and approving or rejecting Outage plans affecting Subsynchronous Resonance (SSR) vulnerable Generation Resources that do not have SSO Mitigation in the event of five or six concurrent transmission Outages;

(g) Coordinating and approving or rejecting changes to existing Resource Outage plans;

(h) Monitoring how Planned Outage schedules compare with actual Outages;

(i) Posting all proposed and approved schedules for Planned Outages, Maintenance Outages, and Rescheduled Outages of Transmission Facilities on the Market Information System (MIS) Secure Area under Section 3.1.5.13, Transmission Report;

(j) Creating and posting aggregated MW of Planned Outages for Resources on the MIS Secure Area under Section 3.2.3, Short-Term System Adequacy Reports;

(k) Monitoring Transmission Facilities and Resource Forced Outages and Maintenance Outages of immediate nature and implementing responses to those Outages as provided in these Protocols;

(l) Establishing and implementing communication procedures:

(i) For a TSP to request approval of Transmission Facilities Planned Outage and Maintenance Outage plans; and

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| ***[NPRR857: Replace item (i) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(i) For a TSP or a DCTO to request approval of Transmission Facilities Planned Outage and Maintenance Outage plans; and |

(ii) For a Resource Entity’s designated Single Point of Contact to submit Outage plans and to coordinate Resource Outages;

(m) Establishing and implementing record-keeping procedures for retaining all requested Planned Outages, Maintenance Outages, Rescheduled Outages, and Forced Outages; and

(n) Planning and analyzing Transmission Facilities Outages.

**3.1.5.11 Evaluation of Transmission Facilities Planned Outage or Maintenance Outage Requests**

(1) ERCOT shall evaluate requests, approve, or reject Transmission Facilities Planned Outages and Maintenance Outages according to the requirements of this section. ERCOT may approve Outage requests provided the Outage in combination with other proposed Outages does not cause a violation of applicable reliability standards. ERCOT shall reject Outage requests that do not meet the submittal timeline specified in Section 3.1.5.12, Submittal Timeline for Transmission Facility Outage Requests. ERCOT shall consider the following factors in its evaluation:

(a) Forecasted conditions during the time of the Outage;

(b) Outage plans submitted by Resource Entities and TSPs under Section 3.1, Outage Coordination;

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| ***[NPRR857: Replace item (b) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(b) Outage plans submitted by Resource Entities, TSPs, and DCTOs under Section 3.1, Outage Coordination; |

(c) Forced Outages of Transmission Facilities;

(d) Potential for the proposed Outages to cause irresolvable transmission overloads or voltage supply concerns based on the indications from contingency analysis software;

(e) Potential for the proposed Outages to cause SSR vulnerability to Generation Resources that do not have SSO Mitigation in the event of five or six concurrent transmission Outages;

(f) Previously approved Planned Outages, Maintenance Outages, and Rescheduled Outages;

(g) Impacts on the transfer capability of Direct Current Ties (DC Ties); and

(h) Good Utility Practice for Transmission Facilities maintenance.

(2) When ERCOT approves a Maintenance Outage, ERCOT shall coordinate the timing of the appropriate course of action with the requesting TSP.

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| ***[NPRR857: Replace paragraph (2) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(2) When ERCOT approves a Maintenance Outage, ERCOT shall coordinate the timing of the appropriate course of action with the requesting TSP or DCTO.  |

(3) When ERCOT identifies that an HIO has been submitted with 90-days or less notice, ERCOT may coordinate with TSP to make reasonable efforts to minimize the impact.

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| ***[NPRR857: Replace paragraph (3) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(3) When ERCOT identifies that an HIO has been submitted with 90-days or less notice, ERCOT may coordinate with the TSP or DCTO to make reasonable efforts to minimize the impact. |

***3.2.6.2.1 Peak Load Estimate***

(1) ERCOT shall prepare, at least annually, a forecast of the total peak Load for both summer and winter Peak Load Seasons for the current year and a minimum of ten future years using an econometric forecast, taking into account econometric inputs, weather conditions, demographic data and other variables as deemed appropriate by ERCOT. The firm Peak Load Season estimate shall be determined by the following equation:

**FIRMPKLD *s, i* = TOTPKLD s, *i* – LRRRS *s, i* –LRECRS *s, i* –LRNSRS­ *s, i* – ERS *s, i* – CLR *s, i* – NFIRMLL *s, i* – ENERGYEFF *s, i***

The above variables are defined as follows:

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| **Variable** | **Unit** | **Definition** |
| FIRMPKLD *s, i* | MW | *Firm Peak Load Estimate*—The Firm Peak Load Estimate for the Peak Load Season *s* for the year *i.*  |
| TOTPKLD *s, i* | MW | *Total Peak Load Estimate*—The Total Peak Load Estimate for the Peak Load Season *s* for the year *i.* |
| LRRRS *s, i* | MW | *Load Resource providing RRS*—The amount of RRS a Load Resource is providing for the Peak Load Season *s* for the year *i*. |
| LRECRS *s, i* | MW | *Load Resource providing ECRS*—The amount of ECRS a Load Resource is providing for the Peak Load Season *s* for the year *i*. |
| LRNSRS *s, i* | MW | *Load Resource providing Non-Spinning Reserve (Non-Spin)*—The estimated amount of Non-Spin that Load Resources are providing for the Peak Load Season *s* for the year *i.*  |
| ERS *s, i* | MW | *Emergency Response Service (ERS)*—The estimated amount of ERS for the Peak Load Season *s* for the year *i* calculated as follows:

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| **Year (i)** | **Winter Peak Load** | **Summer Peak Load** |
| Current Year (i = 1) | The simple average of the amount of ERS procured by ERCOT for the current year Standard Contract Term of December 1 to March 31 for the ERS Time Periods covering all or any part of Hour Ending 0600 and Hour Ending 1800. | The amount of ERS procured by ERCOT for the current year Standard Contract Term of June 1 through September 30 for an ERS Time Period covering all or any part of Hour Ending 1800. |
| Second Year (i = 2) | The current year Winter Peak Load ERS amount escalated by the compound annual growth rate of the three Winter Peak Load ERS amounts preceding the current year. | The current year Summer Peak Load ERS amount escalated by the compound annual growth rate of the three Summer Peak Load ERS amounts preceding the current period. |
| Third Year (i = 3) | The second year Winter Peak Load ERS amount escalated by the compound annual growth rate of the three Winter Peak Load ERS amounts preceding the current year. | The second year Summer Peak Load ERS amount escalated by the compound annual growth rate of the three Summer Peak Load ERS amounts preceding the current year. |
| Years after Third Year (i > 3) | Equal to third year amount. | Equal to third year amount. |

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| CLR *s, i* | MW | *Amount of Controllable Load Resource*—Estimated amount of Controllable Load Resource that is available for Dispatch by ERCOT during the current year *i* for the Peak Load Season *s* not already included in LRRRS, LRECRS, or LRNSRS. This value does not include Wholesale Storage Load (WSL). |
| NFIRMLL *s, i* | MW | *Amount of Non-Firm Large Loads*—Estimated amount of non-netted Large Load that is not already included in CLR, LRRRS, or LRNSRS. |
| ENERGYEFF *s, i* | MW | *Amount of Energy Efficiency Programs Procured*—Estimated amount of energy efficiency programs procured by Transmission and/or Distribution Service Providers (TDSPs) pursuant to P.U.C. Subst. R. 25.181, Energy Efficiency Goal, for the Peak Load Season *s* for the year *i.* ERCOT may also consider any energy efficiency and/or Demand response initiatives reported by NOIEs. |
| *I* | None | Year. |
| *S* | None | Peak Load Season. |

***3.3.2 Types of Work Requiring ERCOT Approval***

(1) Each TSP, QSE and Resource Entity shall coordinate with ERCOT the requirements of Section 3.10, Network Operations Modeling and Telemetry, the following types of work for any addition to, replacement of, or change to or removal from the ERCOT Transmission Grid:

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| ***[NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]***(1) Each TSP, DCTO, QSE, and Resource Entity shall coordinate with ERCOT the requirements of Section 3.10, Network Operations Modeling and Telemetry, the following types of work for any addition to, replacement of, or change to or removal from the ERCOT Transmission Grid: |

(a) Transmission lines;

(b) Equipment including circuit breakers, transformers, disconnects, and reactive devices;

(c) Large Load interconnections;

(d) Resource interconnections; and

(e) Protection and control schemes, including changes to Remedial Action Plans (RAPs), Supervisory Control and Data Acquisition (SCADA) systems, Energy Management Systems (EMSs), Automatic Generation Control (AGC), Remedial Action Schemes (RASs), or Automatic Mitigation Plans (AMPs).

**3.15 Voltage Support**

(1) ERCOT, in coordination with the Transmission Service Providers (TSPs), shall establish and update, as necessary, the ERCOT System Voltage Profile and shall post it on the Market Information System (MIS) Secure Area. ERCOT, the interconnecting TSP, or that TSP’s agent, may modify the Voltage Set Point described in the Voltage Profile based on current system conditions.

(2) All Generation Resources that are connected to Transmission Facilities (including self-serve generating units) and that have a gross generating unit rating greater than 20 MVA or those units connected at the same Point of Interconnection Bus (POIB) that have gross generating unit ratings aggregating to greater than 20 MVA, that supply power to the ERCOT Transmission Grid, shall provide Voltage Support Service (VSS).

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| ***[NPRR989: Replace paragraph (2) above with the following upon system implementation:]***(2) All Generation Resources (including self-serve generating units) and Energy Storage Resources (ESRs) that are connected to Transmission Facilities and that have a gross unit rating greater than 20 MVA or those units connected at the same Point of Interconnection Bus (POIB) that have gross unit ratings aggregating to greater than 20 MVA, that supply power to the ERCOT Transmission Grid, shall provide Voltage Support Service (VSS). |

(3) Except as reasonably necessary to ensure reliability or operational efficiency, TSPs should utilize available static reactive devices prior to requesting a Voltage Set Point change from a Generation Resource.

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| ***[NPRR989: Replace paragraph (3) above with the following upon system implementation:]***(3) Except as reasonably necessary to ensure reliability or operational efficiency, TSPs should utilize available static reactive devices prior to requesting a Voltage Set Point change from a Generation Resource or ESR. |

(4) Each Generation Resource required to provide VSS shall comply with the following Reactive Power requirements in Real-Time operations when issued a Voltage Set Point by a TSP or ERCOT:

(a) An over-excited (lagging or producing) power factor capability of 0.95 or less determined at the generating unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 0.95 per unit to 1.04 per unit, as measured at the POIB;

(b) An under-excited (leading or absorbing) power factor capability of 0.95 or less, determined at the generating unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 1.0 per unit to 1.05 per unit, as measured at the POIB;

(c) For any Voltage Set Point outside of the voltage ranges described in paragraphs (a) and (b) above, the Generation Resource shall supply or absorb the maximum amount of Reactive Power available within its inherent capability and the capability of any VAr-capable devices as necessary to achieve the Voltage Set Point;

(d) When a Generation Resource required to provide VSS is issued a new Voltage Set Point, that Generation Resource shall make adjustments in response to the new Voltage Set Point, regardless of whether the current voltage is within the tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource Requirements;

(e) Reactive Power capability shall be available at all MW output levels and may be met through a combination of the Generation Resource’s Unit Reactive Limit (URL), which is the generating unit’s dynamic leading and lagging operating capability, and/or dynamic VAr-capable devices. This Reactive Power profile is depicted graphically as a rectangle. For Intermittent Renewable Resources (IRRs), the Reactive Power requirements shall be available at all MW output levels at or above 10% of the IRR’s nameplate capacity. When an IRR is operating below 10% of its nameplate capacity and is unable to support voltage at the POIB, ERCOT, the interconnecting TSP, or that TSP’s agent may require an IRR to disconnect from the ERCOT System for purposes of maintaining reliability;

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| ***[NPRR989, NPRR1038, and NPRR1026: Replace applicable portions of paragraph (4) above with the following upon system implementation of NPRR989 for NPRR989 and NPRR1038; or upon system implementation for NPRR1026:]***(4) Each Generation Resource and ESR required to provide VSS shall comply with the following Reactive Power requirements in Real-Time operations when issued a Voltage Set Point by a TSP or ERCOT: (a) An over-excited (lagging or producing) power factor capability of 0.95 or less determined at the unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 0.95 per unit to 1.04 per unit, as measured at the POIB;(b) An under-excited (leading or absorbing) power factor capability of 0.95 or less, determined at the unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 1.0 per unit to 1.05 per unit, as measured at the POIB; (c) For any Voltage Set Point outside of the voltage ranges described in paragraphs (a) and (b) above, the Generation Resource or ESR shall supply or absorb the maximum amount of Reactive Power available within its inherent capability and the capability of any VAr-capable devices as necessary to achieve the Voltage Set Point;(d) When a Generation Resource or an ESR required to provide VSS is issued a new Voltage Set Point, that Generation Resource or ESR shall make adjustments in response to the new Voltage Set Point, regardless of whether the current voltage is within the tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource and Energy Storage Resource Requirements;(e) For Generation Resources, the Reactive Power capability shall be available at all MW output levels and may be met through a combination of the Generation Resource’s Corrected Unit Reactive Limit (CURL), which is the generating unit’s dynamic leading and lagging operating capability, and/or dynamic VAr-capable devices. This Reactive Power profile is depicted graphically as a rectangle. For Intermittent Renewable Resources (IRRs), the Reactive Power requirements shall be available at all MW output levels at or above 10% of the IRR’s nameplate capacity. When an IRR is operating below 10% of its nameplate capacity and is unable to support voltage at the POIB, ERCOT, the interconnecting TSP, or that TSP’s agent may require an IRR to disconnect from the ERCOT System for purposes of maintaining reliability. For ESRs, the Reactive Power capability shall be available at all MW levels, when charging or discharging, and may be met through a combination of the ESR’s CURL, and/or dynamic VAr-capable devices. For any ESR that achieved Initial Synchronization before December 16, 2019, the requirement to have Reactive Power capability when charging does not apply if the Resource Entity for the ESR has submitted a notarized attestation to ERCOT stating that, since the date of Initial Synchronization, the ESR has been unable to comply with this requirement without physical or software changes/modifications, and ERCOT has provided written confirmation of the exemption to the Resource Entity. The exemption shall apply only to the extent of the ESR’s inability to comply with the requirement when the ESR is charging.(f) For any Generation Resource or Energy Storage Resource (ESR) that is part of a Self-Limiting Facility, the capabilities described in paragraphs (a) and (b) above shall be determined based on the Self-Limiting Facility’s established MW Injection limit and, if applicable, established MW Withdrawal limit. |

(5) As part of the technical Resource testing requirements prior to the Resource Commissioning Date, all Generation Resources must conduct an engineering study, and demonstrate through performance testing, the ability to comply with the Reactive Power capability requirements in paragraph (4), (7), (8), or (9) of this Section, as applicable. Any study and testing results must be accepted by ERCOT prior to the Resource Commissioning Date.

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| ***[NPRR989: Replace paragraph (5) above with the following upon system implementation:]***(5) As part of the technical Resource testing requirements prior to the Resource Commissioning Date, all Generation Resources and ESRs must conduct an engineering study, and demonstrate through performance testing, the ability to comply with the Reactive Power capability requirements in paragraph (4), (7), (8), or (9) of this Section, as applicable. Any study and testing results must be accepted by ERCOT prior to the Resource Commissioning Date. |

(6) Except for a Generation Resource subject to Planning Guide Section 5.2.1, Applicability, a Generation Resource that has already been commissioned is not required to submit a new reactive study or conduct commissioning-related reactive testing, as described in paragraph (5) above.

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| ***[NPRR989: Replace paragraph (6) above with the following upon system implementation:]***(6) Except for a Generation Resource or an ESR subject to Planning Guide Section 5.2.1, Applicability, a Generation Resource or an ESR that has already been commissioned is not required to submit a new reactive study or conduct commissioning-related reactive testing, as described in paragraph (5) above. |

(7) Wind-powered Generation Resources (WGRs) that commenced operation on or after February 17, 2004, and have a signed Standard Generation Interconnection Agreement (SGIA) on or before December 1, 2009 (“Existing Non-Exempt WGRs”), must be capable of producing a defined quantity of Reactive Power to maintain a set point in the Voltage Profile established by ERCOT in accordance with the Reactive Power requirements established in paragraph (4) above, except in the circumstances described in paragraph (a) below.

(a) Existing Non-Exempt WGRs whose current design does not allow them to meet the Reactive Power requirements established in paragraph (4) above must conduct an engineering study using the Summer/Fall 2010 on-peak/off-peak Voltage Profiles, or conduct performance testing to determine their actual Reactive Power capability. Any study or testing results must be accepted by ERCOT. The Reactive Power requirements applicable to these Existing Non-Exempt WGRs will be the greater of: the leading and lagging Reactive Power capabilities established by the Existing Non-Exempt WGR’s engineering study or testing results; or Reactive Power proportional to the real power output of the Existing Non-Exempt WGR (this Reactive Power profile is depicted graphically as a triangle) sufficient to provide an over-excited (lagging) power factor capability of 0.95 or less and an under-excited (leading) power factor capability of 0.95 or less, both determined at the WGR’s set point in the Voltage Profile established by ERCOT, and both measured at the POIB.

(i) Existing Non-Exempt WGRs shall submit the engineering study results or testing results to ERCOT no later than five Business Days after its completion.

(ii) Existing Non-Exempt WGRs shall update any and all Resource Registration data regarding their Reactive Power capability documented by the engineering study results or testing results.

(iii) If the Existing Non-Exempt WGR’s engineering study results or testing results indicate that the WGR is not able to provide Reactive Power capability that meets the triangle profile described in paragraph (a) above, then the Existing Non-Exempt WGR will take steps necessary to meet that Reactive Power requirement depicted graphically as a triangle by a date mutually agreed upon by the Existing Non-Exempt WGR and ERCOT. The Existing Non-Exempt WGR may meet the Reactive Power requirement through a combination of the WGR’s URL and/or automatically switchable static VAr-capable devices and/or dynamic VAr-capable devices. No later than five Business Days after completion of the steps to meet that Reactive Power requirement, the Existing Non-Exempt WGR will update any and all Resource Registration data regarding its Reactive Power and provide written notice to ERCOT that it has completed the steps necessary to meet its Reactive Power requirement.

(iv) For purposes of measuring future compliance with Reactive Power requirements for Existing Non-Exempt WGRs, results from performance testing or the Summer/Fall 2010 on-peak/off-peak Voltage Profiles utilized in the Existing Non-Exempt WGR’s engineering study shall be the basis for measuring compliance, even if the Voltage Profiles provided to the Existing Non-Exempt WGR are revised for other purposes.

(b) Existing Non-Exempt WGRs whose current design allows them to meet the Reactive Power requirements established in paragraph (4) above (depicted graphically as a rectangle) shall continue to comply with that requirement. ERCOT, with cause, may request that these Existing Non-Exempt WGRs provide further evidence, including an engineering study, or performance testing, to confirm accuracy of Resource Registration data supporting their Reactive Power capability.

(8) Qualified Renewable Generation Resources (as described in Section 14, State of Texas Renewable Energy Credit Trading Program) in operation before February 17, 2004, required to provide VSS and all other Generation Resources required to provide VSS that were in operation prior to September 1, 1999, whose current design does not allow them to meet the Reactive Power requirements established in paragraph (4) above, will be required to maintain a Reactive Power requirement as defined by the Generation Resource’s URL that was submitted to ERCOT and established per the criteria in the ERCOT Operating Guides.

(9) New generating units connected before May 17, 2005, whose owners demonstrate to ERCOT’s satisfaction that design and/or equipment procurement decisions were made prior to February 17, 2004, based upon previous standards, whose design does not allow them to meet the Reactive Power requirements established in paragraph (4) above, will be required to maintain a Reactive Power requirement as defined by the Generation Resource’s URL that was submitted to ERCOT and established per the criteria in the Operating Guides.

(10) For purposes of meeting the Reactive Power requirements in paragraphs (4) through (9) above, multiple generation units including IRRs shall, at a Generation Entity’s option, be treated as a single Generation Resource if the units are connected to the same transmission bus.

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| ***[NPRR989: Replace paragraph (10) above with the following upon system implementation:]***(10) For purposes of meeting the Reactive Power requirements in paragraphs (4) through (9) above, multiple units including IRRs shall, at a Resource Entity’s option, be treated as a single Resource if the units are connected to the same transmission bus. |

(11) Generation Entities may submit to ERCOT specific proposals to meet the Reactive Power requirements established in paragraph (4) above by employing a combination of the URL and added VAr capability, provided that the added VAr capability shall be automatically switchable static and/or dynamic VAr devices. A Generation Resource and TSP may enter into an agreement in which the proposed static VAr devices can be switchable using Supervisory Control and Data Acquisition (SCADA). ERCOT may, at its sole discretion, either approve or deny a specific proposal, provided that in either case, ERCOT shall provide the submitter an explanation of its decision.

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| ***[NPRR989: Replace paragraph (11) above with the following upon system implementation:]***(11) Resource Entities may submit to ERCOT specific proposals to meet the Reactive Power requirements established in paragraph (4) above by employing a combination of the CURL and added VAr capability, provided that the added VAr capability shall be automatically switchable static and/or dynamic VAr devices. A Resource Entity and TSP may enter into an agreement in which the proposed static VAr devices can be switchable using Supervisory Control and Data Acquisition (SCADA). ERCOT may, at its sole discretion, either approve or deny a specific proposal, provided that in either case, ERCOT shall provide the submitter an explanation of its decision. |

(12) A Generation Resource and TSP may enter into an agreement in which the Generation Resource compensates the TSP to provide VSS to meet the Reactive Power requirements of paragraph (4) above in part or in whole. The TSP shall certify to ERCOT that the agreement complies with the Reactive Power requirements of paragraph (4).

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| ***[NPRR989: Replace paragraph (12) above with the following upon system implementation:]***(12) A Resource Entity and TSP may enter into an agreement in which the Generation Resource or ESR compensates the TSP to provide VSS to meet the Reactive Power requirements of paragraph (4) above in part or in whole. The TSP shall certify to ERCOT that the agreement complies with the Reactive Power requirements of paragraph (4). |

(13) Unless specifically approved by ERCOT, no unit equipment replacement or modification at a Generation Resource shall reduce the capability of the unit below the Reactive Power requirements that applied prior to the replacement or modification. The addition of 20 MW or more of Load to a Facility that includes one or more Generation Resources constitutes a modification to the Generation Resource that requires a new Reactive Power study.

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| ***[NPRR989: Replace paragraph (13) above with the following upon system implementation:]***(13) Unless specifically approved by ERCOT, no unit equipment replacement or modification at a Generation Resource or ESR shall reduce the capability of the unit below the Reactive Power requirements that applied prior to the replacement or modification. The addition of 20 MW or more of Load to a Facility that includes one or more Generation Resources constitutes a modification to the Generation Resource that requires a new Reactive Power study. |

(14) Generation Resources shall not reduce high reactive loading on individual units during abnormal conditions without the consent of ERCOT unless equipment damage is imminent.

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| ***[NPRR989: Replace paragraph (14) above with the following upon system implementation:]***(14) Generation Resources or ESRs shall not reduce high reactive loading on individual units during abnormal conditions without the consent of ERCOT unless equipment damage is imminent. |

(15) All WGRs must provide a Real-Time SCADA point that communicates to ERCOT the number of wind turbines that are available for real power and/or Reactive Power injection into the ERCOT Transmission Grid. WGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following:

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| ***[NPRR989: Replace paragraph (15) above with the following upon system implementation:]***(15) All WGRs must provide a Real-Time SCADA point that communicates to ERCOT the number of wind turbines that are available for real power and Reactive Power injection into the ERCOT Transmission Grid. WGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following: |

(a) The number of wind turbines that are not able to communicate and whose status is unknown; and

(b) The number of wind turbines out of service and not available for operation.

(16) All PhotoVoltaic Generation Resources (PVGRs) must provide a Real-Time SCADA point that communicates to ERCOT the capacity of PhotoVoltaic (PV) equipment that is available for real power and/or Reactive Power injection into the ERCOT Transmission Grid. PVGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following:

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| ***[NPRR989: Replace paragraph (16) above with the following upon system implementation:]***(16) All PhotoVoltaic Generation Resources (PVGRs) must provide a Real-Time SCADA point that communicates to ERCOT the capacity of PhotoVoltaic (PV) equipment that is available for real power and Reactive Power injection into the ERCOT Transmission Grid. PVGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following: |

(a) The capacity of PV equipment that is not able to communicate and whose status is unknown; and

(b) The capacity of PV equipment that is out of service and not available for operation.

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| ***[NPRR1029: Insert paragraph (17) below upon system implementation and renumber accordingly:]***(17) Each DC-Coupled Resource must provide a Real-Time SCADA point that communicates to ERCOT the capacity of the intermittent renewable generation component of the Resource that is available for real power and/or Reactive Power injection into the ERCOT System. Each DC-Coupled Resource must also provide Real-Time SCADA points that communicate to ERCOT the following:(a) The capacity of any PV generation equipment that is not able to communicate and whose status is unknown; (b) The capacity of any PV generation equipment that is out of service and not available for operation; (c) The number of any wind turbines that are not able to communicate and whose status is unknown; and (d) The number of any wind turbines out of service and not available for operation. |

(17) For the purpose of complying with the Reactive Power requirements under this Section 3.15, Reactive Power losses that occur on privately-owned transmission lines behind the POIB may be compensated by automatically switchable static VAr-capable devices.

***3.15.3 Generation Resource Requirements Related to Voltage Support***

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| ***[NPRR989: Replace Section 3.15.3 above with the following upon system implementation:]******3.15.3 Generation Resource and Energy Storage Resource Requirements Related to Voltage Support*** |

(1) Generation Resources required to provide VSS shall have and maintain Reactive Power capability at least equal to the Reactive Power capability requirements specified in these Protocols and the ERCOT Operating Guides.

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| ***[NPRR989: Replace paragraph (1) above with the following upon system implementation:]***(1) Generation Resources and ESRs required to provide VSS shall have and maintain Reactive Power capability at least equal to the Reactive Power capability requirements specified in these Protocols and the ERCOT Operating Guides. |

(2) Generation Resources providing VSS shall be compliant with the ERCOT Operating Guides for response to transient voltage disturbance.

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| ***[NPRR989: Replace paragraph (2) above with the following upon system implementation:]***(2) Generation Resources and ESRs providing VSS shall be compliant with the ERCOT Operating Guides for response to transient voltage disturbance. |

(3) Generation Resources providing VSS must meet technical requirements specified in Section 8.1.1.1, Ancillary Service Qualification and Testing, and the performance standards specified in Section 8.1.1, QSE Ancillary Service Performance Standards.

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| ***[NPRR989: Replace paragraph (3) above with the following upon system implementation:]***(3) Generation Resources and ESRs providing VSS must meet technical requirements specified in Section 8.1.1.1, Ancillary Service Qualification and Testing, and the performance standards specified in Section 8.1.1, QSE Ancillary Service Performance Standards. |

(4) Each Generation Resource providing VSS shall operate with the unit’s Automatic Voltage Regulator (AVR) in the automatic voltage control mode unless specifically directed to operate in manual mode by ERCOT, or when the unit is telemetering its Resource Status as STARTUP, SHUTDOWN, or ONTEST, or the QSE determines a need to operate in manual mode due to an undue threat to safety, undue risk of bodily harm, or undue damage to equipment at the generating plant.

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| ***[NPRR989: Replace paragraph (4) above with the following upon system implementation:]***(4) Each Generation Resource and ESR providing VSS shall operate with the unit’s Automatic Voltage Regulator (AVR) in the automatic voltage control mode unless specifically directed to operate in manual mode by ERCOT, or when the unit is telemetering its Resource Status as STARTUP, SHUTDOWN, or ONTEST, or the QSE determines a need to operate in manual mode due to an undue threat to safety, undue risk of bodily harm, or undue damage to equipment at the generating plant. |

(5) Each Generation Resource providing VSS shall maintain the Voltage Set Point established by ERCOT, the interconnecting TSP, or the TSP’s agent, subject to the Generation Resource’s operating characteristic limits, voltage limits, and within tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource Requirements.

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| ***[NPRR989: Replace paragraph (5) above with the following upon system implementation:]***(5) Each Generation Resource and ESR providing VSS shall maintain the Voltage Set Point established by ERCOT, the interconnecting TSP, or the TSP’s agent, subject to the Generation Resource’s or ESR’s operating characteristic limits, voltage limits, and within tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource Requirements. |

(6) The reactive capability required must be maintained at all times that the Generation Resource is On-Line.

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| ***[NPRR989: Replace paragraph (6) above with the following upon system implementation:]***(6) The reactive capability required must be maintained at all times that the Generation Resource or ESR is On-Line. |

(7) Each QSE shall send to ERCOT, via telemetry, the AVR and Power System Stabilizer (PSS) status for each of its Generation Resources providing VSS. For AVRs, an “On” status will indicate the AVR is on and set to regulate the Resource’s terminal voltage in the voltage control mode, and an “Off” status will indicate the AVR is off or in a manual mode. For PSS, an “On” status will indicate the service is enabled and ready for service, and an “Off” status will indicate it is off or out of service. Each QSE shall monitor the status of its Generation Resources’ regulators and stabilizers, and shall report status changes to ERCOT.

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| ***[NPRR989: Replace paragraph (7) above with the following upon system implementation:]***(7) Each QSE shall send to ERCOT, via telemetry, the AVR and Power System Stabilizer (PSS) status for each of its Generation Resources providing VSS. Each QSE shall send to ERCOT via telemetry the AVR status for each of its ESRs providing VSS. For AVRs, an “On” status will indicate the AVR is on and set to regulate the Resource’s terminal voltage in the voltage control mode, and an “Off” status will indicate the AVR is off or in a manual mode. For PSS, an “On” status will indicate the service is enabled and ready for service, and an “Off” status will indicate it is off or out of service. Each QSE shall monitor the status of its Generation Resources’ and ESRs’ regulators and stabilizers, and shall report status changes to ERCOT. |

(8) Each Resource Entity shall provide information related to the tuning parameters, local or inter-area, of any PSS installed at a Generation Resource.

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| ***[NPRR1026: Insert paragraph (9) below upon system implementation and renumber accordingly:]***(9) If any individual Resource within a Self-Limiting Facility is incapable of meeting its Reactive Power requirement at the POI, the QSE must bring On-Line additional Resource(s) within the Self-Limiting Facility to provide VSS as specified in paragraph (4) of Section 3.15, Voltage Support, while respecting the limit on MW Injection. |

(9) The Resource Entity for an IRR synchronized to the ERCOT System that is not capable of providing Reactive Power when not producing real power shall:

(a) When capable of providing real power, set the IRR’s Low Sustained Limit (LSL) to 0 MW, or the lowest MW level, not to exceed 1 MW, at which the IRR can provide stable Reactive Power after appropriate tuning of settings;

(b) Ensure the lowest MW point on the submitted reactive capability curve reflects 0 MVAr leading and lagging reactive capability at 0 MW;

(c) Ensure the second-lowest MW point on the submitted reactive capability curve accurately reflects the IRR’s leading and lagging reactive capability at its LSL when the LSL is not 0 MW; and

(d) Send to ERCOT, via telemetry, an AVR status of “Off” when the IRR is synchronized to the ERCOT System and not producing Reactive Power.

(10) The Resource Entity for an IRR synchronized to the ERCOT System that is capable of providing any net Reactive Power when not producing real power shall:

(a) Provide stable Reactive Power output at all MW levels at which the IRR has Reactive Power capability;

(b) When capable of providing real power, set the IRR LSL to 0 MW or the lowest MW level, not to exceed 1 MW, at which the IRR can provide stable Reactive Power after appropriate tuning of settings;

(c) Ensure the lowest MW point on the submitted reactive capability curve accurately reflects the IRR’s MVAr leading and lagging reactive capability when not producing real power;

(d) Ensure the second-lowest MW point on the submitted reactive capability curve accurately reflects the IRR’s leading and lagging reactive capability at its LSL when the LSL is not 0 MW;

(e) Send to ERCOT, via telemetry, an AVR status of “On” when the IRR is synchronized to the ERCOT System, not producing real power, and reactive control is working properly; and

(f) Meet the requirements in paragraphs (2), (4), (5), and (7) above when the IRR is synchronized to the ERCOT System and not producing real power.

(11) The Resource Entity for an IRR that is capable of providing any net Reactive Power when not producing real power may physically desynchronize its inverters from the ERCOT System instead of providing Reactive Power when not producing real power.

(12) A Resource Entity shall submit a new Reactive Power study for a Generation Resource if 20 MW or more of Load is added to a Facility that includes the Generation Resource.

**3.22 Subsynchronous Oscillation**

(1) All series capacitors shall have automatic Subsynchronous Oscillation (SSO) protective relays installed and shall have remote bypass capability.  The SSO protective relays shall remain in-service when the series capacitors are in-service.

3.22.1 Subsynchronous Oscillation Vulnerability Assessment

(1) In the SSO vulnerability assessment, each transmission circuit is considered as a single Outage. A common tower Outage of two circuits or the Outage of a double-circuit transmission line will be considered as two transmission Outages.

(2) The SSO vulnerability assessment includes the Subsynchronous Resonance (SSR) vulnerability assessment that is related to the interaction between Generation Resources and series capacitors.

3.22.1.1 Existing Generation Resource Assessment

(1) ERCOT shall perform a one-time SSR vulnerability assessment on all existing Generation Resources as described in paragraphs (a) through (f) below. For the purposes of this Section, a Generation Resource is considered an existing Generation Resource if it satisfies Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, on or before August 12, 2013.

(a) ERCOT shall perform a topology check on all existing Generation Resources.

(b) If during the topology check ERCOT determines that an existing Generation Resource will become radial to one or more series capacitors in the event of 14 or fewer concurrent transmission Outages, ERCOT shall perform a frequency scan assessment in accordance with Section 3.22.2, Subsynchronous Oscillation Vulnerability Assessment Criteria, and will provide the frequency scan assessment results to the affected Resource Entity.

(c) If the frequency scan assessment described in paragraph (b) above indicates potential SSR vulnerability, the Transmission Service Provider(s) (TSP(s)) that owns the affected series capacitor(s), in coordination with the interconnecting TSP, shall perform a detailed SSR analysis in accordance with Section 3.22.2 to determine SSR vulnerability, unless ERCOT, in consultation with and in agreement with of the affected TSP(s) and the affected Resource Entity, determines the frequency scan assessment is sufficient to determine the SSR vulnerability.

(d) If the SSR study performed in accordance with paragraph (b) and/or (c) above indicates that an existing Generation Resource is vulnerable to SSR in the event of four or fewer concurrent transmission Outages, the TSP(s) that owns the affected series capacitor(s) shall coordinate with the interconnecting TSP, ERCOT, and the affected Resource Entity to develop and implement SSO Mitigation on the ERCOT transmission system.

(e) If the SSR study performed in accordance with paragraph (b) and/or (c) above indicates that an existing Generation Resource is vulnerable to SSR in the event of five or six concurrent transmission Outages, ERCOT shall implement SSR monitoring in accordance with Section 3.22.3, Subsynchronous Resonance Monitoring.

(f) The Resource Entity shall provide sufficient model data to ERCOT within 60 days of receipt of the data request. ERCOT, at its sole discretion, may extend the response deadline.

3.22.1.2 Generation Resource or Energy Storage Resource Interconnection Assessment

(1) In the security screening study for a Generation Resource Interconnection or Change Request, ERCOT will perform a topology check and determine if the Generation Resource or Energy Storage Resource (ESR) will become radial to one or more series capacitors in the event of fewer than 14 concurrent transmission Outages.

(2) If ERCOT identifies that a Generation Resource or ESR will become radial to one or more series capacitors in the event of fewer than 14 concurrent transmission Outages, the interconnecting TSP shall perform an SSR study including frequency scan assessment and/or detailed SSR assessment for the Interconnecting Entity (IE) in accordance with Section 3.22.2, Subsynchronous Oscillation Vulnerability Assessment Criteria, to determine SSR vulnerability. The SSR study shall determine which system configurations create vulnerability to SSR. Alternatively, if the IE can demonstrate to ERCOT’s and the interconnecting TSP’s satisfaction that the Generation Resource or ESR is not vulnerable to SSR, then the interconnecting TSP is not required to perform the SSR study. If an SSR study is conducted, the interconnecting TSP shall submit it to ERCOT upon completion and shall include any SSO Mitigation plan developed by the IE that has been reviewed by the TSP.

(3) If the SSR study performed in accordance with paragraph (2) above indicates that the Generation Resource or ESR is vulnerable to SSR in the event of six or fewer concurrent transmission Outages, the IE shall develop an SSO Mitigation plan, provide it to the interconnecting TSP for review and inclusion in the TSP’s SSR study report to be approved by ERCOT, and implement the SSO Mitigation prior to Initial Synchronization.

(a) If the SSR study performed in accordance with paragraph (2) above indicates that the Generation Resource or ESR is vulnerable to SSR in the event of four concurrent transmission Outages, the IE may install SSO Protection in lieu of SSO Mitigation, as required by paragraph (3) above, if:

(i) The Generation Resource or ESR satisfied Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, between August 12, 2013 and March 20, 2015;

(ii) The SSO Protection is approved by ERCOT; and

(iii) The Generation Resource or ESR installs the ERCOT-approved SSO Protection prior to Initial Synchronization.

(b) For any Generation Resource or ESR that satisfied Planning Guide Section 6.9 before September 1, 2020, if the SSR study performed in accordance with paragraph (2) above indicates that the Generation Resource or ESR is vulnerable to SSR in the event of five or six concurrent transmission Outages, the IE may elect not to develop or implement an SSO Mitigation plan, in which case ERCOT shall implement SSR monitoring in accordance with Section 3.22.3, Subsynchronous Resonance Monitoring. The IE shall provide ERCOT written Notice of any such election before the Generation Resource or ESR achieves Initial Synchronization, and the Generation Resource or ESR shall not be permitted to proceed to Initial Synchronization until ERCOT has implemented SSR monitoring.

(4) ERCOT shall respond with its comments or approval of an SSR study report, which should include any required SSO Mitigation plan, within 30 days of receipt. ERCOT comments should be addressed as soon as practicable by the TSP, and any action taken in response to ERCOT’s comments on an SSR study report shall be subject to further ERCOT review and approval. Upon approval of the SSR study report, ERCOT shall notify the interconnecting TSP, and the interconnecting TSP shall provide the approved SSR study report to the IE.

3.22.1.3 Transmission Project Assessment

(1) For any proposed Transmission Facilities connecting to or operating at 345 kV, the TSP shall perform an SSO vulnerability assessment, including a topology check and/or frequency scan assessment in accordance with Section 3.22.2, Subsynchronous Oscillation Vulnerability Assessment Criteria. The TSP shall include a summary of the results of this assessment in the project submission to the Regional Planning Group (RPG) pursuant to Section 3.11.4, Regional Planning Group Project Review Process. For Tier 4 projects that include Transmission Facilities connecting to or operating at 345 kV, the TSP shall provide the SSO assessment for ERCOT’s review. For the purposes of this Section, a Generation Resource is considered an existing Generation Resource if it satisfies Planning Guide Section 6.9 at the time the Transmission Facilities are proposed.

(2) If while performing the independent review of a transmission project, ERCOT determines that the transmission project may cause an existing Generation Resource, a Generation Resource satisfying Planning Guide Section 6.9, an existing Large Load, or a Large Load satisfying Planning Guide Section 6.6 at the time the transmission project is proposed to become vulnerable to SSO, ERCOT shall perform an SSO vulnerability assessment, including topology check and frequency scan in accordance with Section 3.22.2 if such an assessment was not included in the project submission. ERCOT shall include a summary of the results of this assessment in the independent review.

(3) If the frequency scan assessment in paragraphs (1) or (2) above indicates potential SSO vulnerability in accordance with Section 3.22.2, the TSP(s) that owns the affected series capacitor(s), in coordination with the TSP proposing the Transmission Facilities, shall perform a detailed SSO assessment to confirm or refute the SSO vulnerability.

(4) Past SSO assessments may be used to determine the SSO vulnerability of a Generation Resource or a Large Load if ERCOT, in consultation with the affected TSPs, determines the results of the past SSO assessments are still valid.

(5) If the SSR study confirms a Generation Resource is vulnerable to SSR in the event of four or fewer concurrent transmission Outages, the TSP that owns the affected series capacitor(s) shall coordinate with ERCOT, the affected Resource Entity, and affected TSPs to develop and implement SSO Mitigation on the ERCOT transmission system. The SSO Mitigation shall be developed prior to RPG acceptance, if required, and implemented prior to the latter of the energization of the transmission project or the Initial Synchronization of the Generation Resource.

(6) If the SSR study confirms a Generation Resource is vulnerable to SSR in the event of five or six concurrent transmission Outages, ERCOT shall implement SSR monitoring in accordance with Section 3.22.3, Subsynchronous Resonance Monitoring, prior to the latter of the energization of the transmission project or the Initial Synchronization of the Generation Resource.

(7) If the SSO study confirms a Large Load is vulnerable to SSO in the event of six or fewer concurrent transmission Outages, the TSP that owns the affected series capacitor(s) shall coordinate with ERCOT, the affected Interconnecting Large Load Entity (ILLE), and affected TSPs to develop and implement SSO Mitigation on the ERCOT transmission system. The SSO Mitigation shall be developed prior to RPG acceptance, if required, and implemented prior to the latter of the energization of the transmission project or the Initial Energization of the Large Load.

(8) If the SSO study confirms one or more transformers associated with the Large Load is vulnerable to Sub-synchronous Ferroresonance (SSFR) in the event of one or more conditions listed below, the TSP that owns the affected series capacitor(s) shall coordinate with ERCOT, the affected Interconnecting Large Load Entity (ILLE), and affected TSPs to develop and implement SSO Mitigation on the ERCOT transmission system. The SSO Mitigation shall be developed prior to RPG acceptance, if required, and implemented prior to the latter of the energization of the transmission project or the Initial Energization of the Large Load.

(a) One single element outage;

(b) One common tower outage;

(c) Two single element outages;

(d) Two common tower outages; or

(e) One single element outage and one common tower outage.

(9) The Resource Entity shall provide sufficient model data to ERCOT within 60 days of receipt of the data request. ERCOT, at its sole discretion, may extend the response deadline.

3.22.1.4 Large Load Interconnection Assessment

(1) After initial provision of project information for a Large Load in the Resource Integration and Ongoing Operations (RIOO) system as prescribed in paragraph (2) of Section 16.20, ERCOT shall perform a topology check to determine:

(a) If the Large Load will become radial to one or more series capacitors in the event of six or fewer concurrent transmission Outages; and

(b) Whether the Large Load or any associated Facilities are expected to be susceptible to SSO.

(2) The Interconnecting Large Load Entity (ILLE) shall promptly provide all information requested by ERCOT that is needed to perform the topology check detailed in paragraph (1) above.

(3) The interconnecting TSP shall perform a detailed SSO assessment for the Load connection in accordance with Section 3.22.2, Subsynchronous Oscillation Vulnerability Assessment Criteria, to determine SSO vulnerability, if ERCOT determines that:

(a) A Large Load is vulnerable to SSO in the event of six or fewer concurrent transmission Outages; or

(b) A transformer associated with a Large Load is vulnerable to SSFR in the event of the following:

(i) One single element outage;

(ii) One common tower outage;

(iii) Two single element outages;

(iv) Two common tower outages; or

(v) One single element outage and one common tower outage.

(4) The SSO study shall determine which system configurations create vulnerability to SSO. The interconnecting TSP shall submit the study to ERCOT upon completion and shall include any SSO Countermeasures that have been reviewed by the TSP.

(5) If the SSO study performed in accordance with paragraph (3) above indicates that the Load connection is vulnerable to SSO, the ILLE shall develop an SSO Countermeasure plan, provide it to the interconnecting TSP for review and inclusion in the TSP’s SSO study report to be approved by ERCOT, and implement the SSO Countermeasures prior to Initial Energization.

(6) ERCOT shall respond with its comments or approval of an SSO study report, which shall include any required SSO Countermeasure plan, within 30 days of receipt. ERCOT comments shall be addressed as soon as practicable by the TSP, and any action taken in response to ERCOT’s comments on an SSO study report shall be subject to further ERCOT review and approval. Upon approval of the SSO study report, ERCOT shall notify the interconnecting TSP.

(7) The ILLE, through the interconnecting TSP, shall provide sufficient model data to ERCOT within 60 days of receipt of the data request. ERCOT, in its sole discretion, may extend the response deadline.

3.22.1.5 Annual SSO Review

(1) ERCOT shall perform an SSO review annually. The annual review shall include the following elements:

(a) The annual review shall include a topology check applying the system network topology that is consistent with a year 3 Steady State Working Group (SSWG) base case developed in accordance with Planning Guide Section 6.1, Steady-State Model Development. ERCOT shall post the SSO annual topology check report to the Market Information System (MIS) Secure Area by May 31 of each year.

(b) If ERCOT identifies that a Generation Resource will become radial to series capacitors(s) in the event of 14 or fewer concurrent transmission Outages, ERCOT shall perform a frequency scan assessment in accordance with Section 3.22.2, Subsynchronous Resonance Vulnerability Assessment Criteria. ERCOT shall prepare a report to summarize the results of the frequency scan assessment and provide it to the Resource Entity and the affected TSP.

(i) If the frequency scan assessment described in paragraph (b) above shows the Generation Resource has potential SSR vulnerability in the event of six or fewer concurrent transmission Outages, the TSP(s) that owns the affected series capacitor compensated Transmission Element in coordination with the interconnecting TSP shall perform a detailed SSR assessment to confirm or refute the SSR vulnerability.

(ii) Past SSR assessments may be used to determine the SSR vulnerability of a Generation Resource if ERCOT, in consultation with the affected TSPs, determines the results of the past SSR assessments are still valid.

(iii) If the SSR study confirms the Generation Resource is vulnerable to SSR in the event of four or fewer concurrent transmission Outages, the TSP that owns the affected series capacitor compensated Transmission Element shall coordinate with ERCOT, the affected Resource Entity, and affected TSPs to develop and install SSO Mitigation on the ERCOT transmission system. The SSO Mitigation shall be developed, if required, and implemented prior to the latter of the energization of the transmission project or the Initial Synchronization of the Generation Resource.

(iv) If the SSR study confirms the Generation Resource is vulnerable to SSR in the event of five or six concurrent transmission Outages, ERCOT shall implement SSR monitoring in accordance with Section 3.22.3, Subsynchronous Resonance Monitoring, prior to the latter of energization of the transmission project or the Initial Synchronization of the Generation Resource.

(v) The Resource Entity shall provide sufficient model data to ERCOT within 60 days of receipt of the data request. ERCOT, in its sole discretion, may extend the response deadline.

(c) ERCOT shall perform a topology check to identify any Large Load that becomes radial to one or more series capacitors in the event of six or fewer concurrent transmission Outages. ERCOT shall prepare a report to summarize the results of the topology check and provide it to the affected TSP. ERCOT and the affected TSP shall determine a need for further evaluation.

(i) If an SSO study confirms the Large Load or any associated Facilities are vulnerable to SSO and this risk was not previously identified during any study required by Section 3.22.1.4, the TSP that owns the affected series capacitor shall coordinate with ERCOT, the affected ILLE, and affected TSPs to develop and install SSO Countermeasures on the ERCOT transmission system. The SSO Countermeasures shall be implemented prior to the latter of the energization of the transmission project or Initial Energization of the Large Load.

(ii) The ILLE, through the interconnecting TSP, shall provide sufficient model data to ERCOT within 60 days of receipt of any data request. ERCOT, in its sole discretion, may extend the response deadline.

3.22.2 Subsynchronous Oscillation Vulnerability Assessment Criteria

(1) A Generation Resource is considered to be potentially vulnerable to SSR in the topology check if a Generation Resource will become radial to one or more series capacitors in the event of 14 or fewer concurrent transmission Outages. A frequency scan assessment and/or a detailed SSR assessment shall be required to screen for system conditions causing potential SSR vulnerability.

(2) A Large Load is considered to be potentially vulnerable to SSO in the topology check if:

(a) A Large Load will become radial to one or more series capacitors in the event of six or fewer concurrent transmission Outages; or

(b) A transformer associated with a Large Load will become radial to one or more series capacitors in the event of the following:

(i) One single element outage;

(ii) One common tower outage;

(iii) Two single element outages;

(iv) Two common tower outages; or

(v) One single element outage and one common tower outage.

(3) In determining whether a Generation Resource is considered to be potentially vulnerable to SSR in the frequency scan assessment results, the following criteria shall be considered:

(a) Induction Generator Effect (IGE) and Subsynchronous Control Interaction (SSCI):

(i) When considering the total impedance of the generator and the applicable part of the ERCOT System, if the total resistance is negative at a reactance crossover of zero Ohms from negative to positive with increasing frequency, then the generator is considered to be potentially vulnerable to IGE/SSCI;

(b) Torsional Interaction:

(i) If the sum of the electrical damping (De) plus the mechanical damping (Dm) results in a negative value then the generator is potentially vulnerable to Torsional Interaction. Dm at +/- 1 Hz of the modal frequency may be utilized to compare to De; and

(c) Torque Amplification:

(i) When considering the total impedance of the generator and the ERCOT system, if a 5% or greater reactance dip, or a reactance crossover of zero Ohms from negative to positive with increasing frequency, occurs within a +/- 3 Hz complement of the modal frequency, then the generator is considered to be potentially vulnerable to Torque Amplification. The percentage of a reactance dip is on the basis of the reactance maximum at the first inflection point of the dip where the reactance begins to decrease with increasing frequency.

(4) The detailed SSO assessment shall include an electromagnetic transient program analysis or similar analysis. A Generation Resource or Large Load is considered to be vulnerable to SSO if any of the following criteria are met:

(a) For a Generation Resource, the SSR vulnerability results in more than 50% of fatigue life expenditure over the expected lifetime of the unit;

(i) If the fatigue life expenditure is not available, the highest torsional torque caused by SSR is more than 110% of the torque experienced during a transmission fault with the series capacitors bypassed;

(b) For a Generation Resource or a Large Load, the oscillation, if any, is not damped; or

(c) For a Generation Resource or a Large Load, the oscillation, if any, results in disconnection of any transmission or generation facilities.

3.22.3 Subsynchronous Resonance Monitoring

(1) For purposes of SSR monitoring, a common tower Outage loss of a double-circuit transmission line consisting of two circuits sharing a tower for 0.5 miles or greater is considered as one contingency.

(2) ERCOT’s responsibilities for SSR monitoring shall consist of the following activities if a Generation Resource is vulnerable to SSR in the event of five or six concurrent transmission Outages identified in the SSR vulnerability assessment and does not implement SSO Mitigation:

(a) ERCOT shall identify the combinations of Outages of Transmission Elements that may result in SSR vulnerability and provide these Transmission Elements to the affected Resource Entity and its interconnected TSP;

(b) ERCOT shall monitor the status of these Transmission Elements identified in paragraph (a) above;

(c) If the occurrence of Forced and/or Planned Outages results in a Generation Resource being three contingencies away from SSR vulnerability, ERCOT will identify options for mitigation that would be implemented if an additional transmission Outage were to occur, including communications with TSPs to determine potential Outage cancellations and time estimates to reinstate Transmission Facilities;

(d) If the occurrence of Forced and/or Planned Outages results in a Generation Resource being two contingencies away from SSR vulnerability, ERCOT shall take action to mitigate SSR vulnerability to the affected Generation Resource. ERCOT shall consider the actions in the following order unless reliability considerations dictate a different order. Actions that may be considered are:

(i) No action if the affected Generation Resource is equipped with SSO Protection and has elected for ERCOT to forego action to mitigate SSR vulnerability;

(ii) Coordinate with TSPs to withdraw or restore an Outage within eight hours if feasible;

(iii) If the actions described in (i) and (ii) above are not feasible, ERCOT shall promptly take necessary steps to identify and mitigate the impacts to the ERCOT System caused by bypassing the affected series capacitor(s) and direct the TSP(s) to bypass the affected series capacitors(s); or

(iv) Other actions specific to the situation, including, but not limited to, Verbal Dispatch Instruction (VDI) to the Resource’s Qualified Scheduling Entity (QSE).

(e) If the occurrence of Forced and/or Planned Outages results in a Generation Resource being one contingency away from SSR vulnerability, ERCOT shall promptly take necessary steps to identify and mitigate the impacts to the ERCOT System caused by bypassing the affected series capacitor(s) and direct the TSP(s) to bypass the affected series capacitor(s).

(f) If the occurrence of Forced and/or Planned Outages results in a Generation Resource being two or fewer contingencies away from SSR vulnerability, ERCOT shall notify the QSE representing the affected Generation Resource by voice communication as soon as practicable that the SSR vulnerability scenario has occurred; initiate the mitigation actions described in paragraphs (2)(d)(i) through (iv) above; and provide additional notifications to the QSE of each relevant topology change until the affected Generation Resource(s) is at least three contingencies away from SSR vulnerability.

**6.5.7.3.1Determination of Real-Time On-Line Reliability Deployment Price Adder**

(1) The following categories of reliability deployments are considered in the determination of the Real-Time On-Line Reliability Deployment Price Adder:

(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority;

(c) Deployed Load Resources other than Controllable Load Resources;

(d) Deployed ERS;

(e) Real-Time DC Tie imports during an EEA where the total adjustment shall not exceed 1,250 MW in a single interval;

(f) Real-Time DC Tie exports to address emergency conditions in the receiving electric grid;

(g) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;

(h) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;

(i) Deployed Registered Curtailable Load, as described in paragraph (2) of Section 6.5.9.4.1, General Procedures Prior to EEA Operations; and

(j) ERCOT-directed firm Load shed during EEA Level 3, as described in paragraph (3) of Section 6.5.9.4.2, EEA Levels.

(2) The Real-Time On-Line Reliability Deployment Price Adder is an estimation of the impact to energy prices due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, after the two-step SCED process and also after the Real-Time On-Line Reserve Price Adder and Real-Time Off-Line Reserve Price Adder have been determined, the Real-Time On-Line Reliability Deployment Price Adder is determined as follows:

(a) For RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line, set the LSL, LASL, and LDL to zero.

(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity, set the LSL, LASL, and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction.

(c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:

(i) Set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Down Ramp Rate), or LASL; and

(ii) Set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Up Ramp Rate), or HASL.

(d) For all Controllable Load Resources excluding ones with a telemetered status of OUTL:

(i) Set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Up Ramp Rate), or LASL; and

(ii) Set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Down Ramp Rate), or HASL.

(e) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually.

(f) Add the deployed MW from Registered Curtailable Load to GTBD linearly ramped over a 30-minute ramp period. The amount of deployed MW is calculated from the applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Registered Curtailable Load deployed and a price/quantity pair of $700/MWh for the last MW of Registered Curtailable Load deployed in each SCED execution. After recall instruction, GTBD shall be adjusted to reflect restoration on a linear curve over a one-hour restoration period.

(g) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).

The above parameter is defined as follows:

| **Parameter** | **Unit** | **Current Value\*** |
| --- | --- | --- |
| RHours | Hours | 4.5 |
| \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.  |

(h) Add the MW from Real-Time DC Tie imports during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.

(i) Subtract the MW from Real-Time DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.

(j) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.

(k) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.

(l) Perform a SCED with changes to the inputs in items (a) through (j) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.

(m) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.

(n) Perform a SCED with the changes to the inputs in items (a) through (k) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy offer Curves.

(o) Determine the positive difference between the System Lambda from item (n) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(p) Determine the amount given by the Value of Lost Load (VOLL) minus the sum of the System Lambda of the second step in the two step SCED process described in paragraph (10)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder.

(q) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (n) and (p) above except when ERCOT is directing firm Load shed during EEA Level 3. When ERCOT is directing firm Load shed during EEA Level 3 to either maintain sufficient PRC or stabilize grid frequency, as described in paragraph (3) of Section 6.5.9.4.2, the Real-Time On-Line Reliability Deployment Price Adder is the VOLL minus the sum of the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder. Once ERCOT is no longer directing firm Load shed, as described above, the Real-Time On-Line Reliability Deployment Price Adder will again be set as the minimum of items (o) and (p) above.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, and NPRR1105: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*****6.5.7.3.1Determination of Real-Time Reliability Deployment Price Adder**(1) The following categories of reliability deployments are considered in the determination of the Real-Time Reliability Deployment Price Adder for Energy, and the Real-Time Reliability Deployment Price Adders for Ancillary Services:(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (142) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority; (c) Deployed Load Resources other than Controllable Load Resources;(d) Deployed ERS;(e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval; (f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;(h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval; (i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(j) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;(k) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;(l) ERCOT-directed deployment of TDSP standard offer Load management programs;(m) ERCOT-directed deployment of distribution voltage reduction measures; (n) ERCOT-directed deployment of Off-Line Non-Spin and(o) Deployed Registered Curtailable Load, as described in paragraph (2) of Section 6.5.9.4.1, General Procedures Prior to EEA Operations.(2) The Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Services are estimations of the impact to energy prices and Real-Time MCPCs due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, the Real-Time Reliability Deployment Price Adder for Energy and Real-Time Reliability Deployment Price Adders for Ancillary Services are determined as follows:(a) For Off-Line Non-Spin Resources that are brought On-Line by ERCOT deployment instruction, RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line:(i) Set the LSL and LDL to zero;(ii) Remove all Ancillary Service Offers; and(iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for all capacity between 0 MW and the HSL of the Resource.(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity:(i) Set the LSL and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction;(ii) Set the maximum Ancillary Service capabilities of the Resource equal to the minimum of their current value and COP Ancillary Service capabilities of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction; and(iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for the additional capacity of the Resource, defined as the positive difference between the Resource’s current telemetered HSL and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction. (c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:(i) If the Generation Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the Generation Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL. (d) For all On-Line ESRs:(i) If the ESR SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the ESR SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.(e) For all Controllable Load Resources excluding ones with a telemetered status of OUTL:(i) If the Controllable Load Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the Controllable Load Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.(f) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually. (g) Add the deployed MW from Registered Curtailable Load to GTBD linearly ramped over a 30-minute ramp period. The amount of deployed MW is calculated from the applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Registered Curtailable Load deployed and a price/quantity pair of $700/MWh for the last MW of Registered Curtailable Load deployed in each SCED execution. After recall instruction, GTBD shall be adjusted to reflect restoration on a linear curve over a one-hour restoration period. (h) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).The above parameter is defined as follows:

| **Parameter** | **Unit** | **Current Value\*** |
| --- | --- | --- |
| RHours | Hours | 4.5 |
| \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.  |

(i) Add the MW from DC Tie imports during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.(j) Add the MW from DC Tie export curtailments during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator. The MW added to GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for exports on that tie as of 0600 in the Day-Ahead or subsequent advisory export limit minus the aggregate export on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.(k) Subtract the MW from DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. (l) Subtract the MW from DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. The MW subtracted from GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for imports on that tie as of 0600 in the Day-Ahead or subsequent advisory import limit minus the aggregate import on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.(m) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.(n) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.(o) Add the deployed MWs from TDSP standard offer Load management programs to GTBD, if ERCOT instructs TDSPs to deploy their standard offer Load management programs. The amount of deployed MW is the value ERCOT provided for all TDSP standard offer Load management programs in the most current May Report on Capacity, Demand and Reserves in the ERCOT Region, unless modified as specified in this paragraph. If ERCOT is informed that all or a portion of a TDSP’s standard offer Load management program has been fully exhausted, or has been expanded as the result of a Public Utility Commission of Texas (PUCT) proceeding, ERCOT will remove the associated MW value of any exhausted capacity from the amount of deployed MW or, in the case of an expansion, ERCOT will request an updated MW value from the relevant TDSPs to use in place of the May Report on Capacity, Demand and Reserves in the ERCOT Region value for that year. The initial value ERCOT will use for deployed MW under this paragraph for each calendar year, as well as any subsequent changes to this value, will be communicated to Market Participants in a Market Notice. After recall, an approximation of the amount of un-restored TDSP standard offer Load management programs shall be used. GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”) defined by item (h) above. (p) Perform a SCED with changes to the inputs in items (a) through (n) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.(q) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.(r) Perform a SCED with the changes to the inputs in items (a) through (n) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.(s) The Real-Time Reliability Deployment Price Adder for Energy is equal to the positive difference between the System Lambda from item (r) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.(t) For each individual Ancillary Service, the Real-Time Reliability Deployment Price Adder for Ancillary Service is equal to the positive difference between the MCPC for that Ancillary Service from item (r) above and the MCPC for that Ancillary Service.  |

6.5.7.12 Large Load Ramp Rate Limitations

(1) Each Large Load that is approved to interconnect after March 25, 2022, and that is also registered as a Controllable Load Resource shall limit its telemetered ramp rate to 20% of its registered peak Demand per minute.

(2) Each Large Load that has been approved to interconnect after March 25, 2022, that is not registered as a Controllable Load Resource shall limit its ramp rate, as measured in aggregate across the Large Load’s Points of Interconnection (POI) or Service Delivery Points, as follows:

(a) When reducing Demand, the Large Load shall not exceed 5% of its registered peak Demand per minute or 20 MW per minute, whichever is more limiting; and

(b) When increasing Demand, the Large Load shall not exceed 2% of its registered peak Demand per minute or eight MW per minute, whichever is more limiting.

(3) The requirements of paragraph (2) above shall apply to a Large Load co-located with one or more Generation Resources when the site is operating as a net Load on the ERCOT System.

(4) The ramp rate requirements of paragraphs (1) through (3) above shall not apply to a Large Load during a limited compliance transition period if ERCOT approves a compliance plan that was submitted to ERCOT by the Customer with the Large Load on or before January 1, 2024. The compliance plan shall describe the technical limitations that prevent compliance, a work plan to achieve compliance by a reasonable date, and a ramp rate mitigation plan describing the Large Load’s best efforts to adhere to the ramp rate limitation during the applicable compliance transition period.

(5) Load Resources that are Large Loads shall comply with the restrictions in paragraph (2) above except when responding to an ERCOT Ancillary Service deployment signal or when a high set UFLS relay deploys to provide RRS as described in paragraph (4)(b) of Section 3.17.2, Responsive Reserve Service.

(6) Large Loads approved to energize prior to March 25, 2022, are exempt from the requirements of paragraphs (1) through (5) above as long as no material changes to site Facilities are made. A Customer with a Large Load that is exempt shall promptly notify ERCOT in the event that any equipment is to be retired, replaced, or otherwise modified, or if the overall peak Demand of the Load is to be increased by one MW or greater. Such notification shall be made via a modification of the Load’s registration in RIOO as described in Section 16.20. ERCOT, in its sole discretion, will determine if the exemption will remain valid.

***6.5.9.4.1*** ***General Procedures Prior to EEA Operations***

(1) Prior to declaring EEA Level 1 detailed in Section 6.5.9.4.2, EEA Levels, ERCOT may perform the following operations consistent with Good Utility Practice:

(a) Provide Dispatch Instructions to QSEs for specific Resources to operate at an Emergency Base Point to maximize Resource deployment so as to increase PRC levels on other Resources;

(b) Commit specific available Resources as necessary that can respond in the timeframe of the emergency. Such commitments will be settled using the HRUC process;

(c) Start RMR Units available in the time frame of the emergency. RMR Units should be loaded to full capability;

(d) Utilize available Resources providing RRS, ECRS, and Non-Spin services as required;

(e) Instruct TSPs and DSPs or their agents to reduce Customer Load by using existing, in-service distribution voltage reduction measures if ERCOT determines that the implementation of these measures could help avoid entering into EEA and ERCOT does not expect to need to use these measures to reduce the amount of Load shedding that may be needed in EEA Level 3. A TSP, DSP, or their agent shall implement these instructions if distribution voltage reduction measures are available and already installed. If the TSP, DSP, or their agent determines in their sole discretion that the distribution voltage reduction would adversely affect reliability, the voltage reduction measure may be reduced, modified, or otherwise changed from maximum performance to a level of exercise that has no negative impact to reliability; and

(f) ERCOT shall use the PRC and system frequency to determine the appropriate Emergency Notice and EEA levels.

(2) When PRC falls below 3,100 MW and is not projected to be recovered above 3,100 MW within 30 minutes following the deployment of Non-Spin, ERCOT may deploy some or all Registered Curtailable Loads (RCLs) as described in Nodal Operating Guide Section 4.5.3.1, General Procedures Prior to EEA Operations.

(3) When PRC falls below 3,000 MW and is not projected to be recovered above 3,000 MW within 30 minutes following the deployment of Non-Spin and all Registered Curtailable Loads, ERCOT may deploy available contracted ERS-10 and ERS-30 via an XML message followed by a VDI to the QSE Hotline. The ERS-10 and ERS-30 ramp periods shall begin at the completion of the VDI.

(a) ERS-10 and ERS-30 may be deployed at any time in a Settlement Interval. ERS-10 and ERS-30 may be deployed either simultaneously or separately, and in any order, at the discretion of ERCOT operators.

(b) Upon deployment, QSEs shall instruct their ERS Resources in ERS-10 and ERS-30 to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4, Event Performance Criteria for Emergency Response Service Resources, until either ERCOT releases the ERS-10 and ERS-30 deployment or the ERS-10 and ERS-30 Resources have reached their maximum deployment time.

(c) ERCOT shall notify QSEs of the release of ERS-10 and ERS-30 via an XML message followed by VDI to the QSE Hotline. The VDI shall represent the official notice of ERS-10 and ERS-30 release.

(d) Upon release, an ERS Resource shall return to a condition such that it is capable of meeting its ERS performance requirements as soon as practical, but no later than ten hours following the release.

**16.5 Registration of a Resource Entity**

(1) A Resource Entity owns or controls a Generation Resource, Settlement Only Generator (SOG), or Load Resource connected to the ERCOT System. Each Resource Entity operating in the ERCOT Region must register with ERCOT. To become registered as a Resource Entity, an Entity must execute a Standard Form Market Participant Agreement (using the form in Section 22, Attachment A, Standard Form Market Participant Agreement), designate Resource Entity Authorized Representatives, contacts, and a User Security Administrator (USA) (per the Application for Registration as a Resource Entity), and demonstrate to ERCOT’s reasonable satisfaction that it is capable of performing the functions of a Resource Entity under these Protocols. The Resource Entity shall provide Resource Registration data pursuant to Planning Guide Section 6.8.2, Resource Registration Process, for each Generation Resource, SOG, or Load Resource through ERCOT registration, except for Distributed Generation (DG) with an installed capacity equal to or lower than the DG registration threshold that has chosen not to register with ERCOT. A Resource Entity may submit a proposal to register the aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (13) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, as an Aggregate Generation Resource (AGR) which ERCOT may grant at its sole discretion. A Resource Entity may submit a proposal to register a SOG consisting of an Energy Storage System (ESS) or a combination of ESS and non-ESS generation. The Resource Entity must identify all components of the SOG as part of the Resource Registration process.

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| ***[NPRR995 and NPRR1002: Replace applicable portions of paragraph (1) above with the following upon system implementation:]*** (1) A Resource Entity owns or controls a Generation Resource, Energy Storage Resource (ESR), Settlement Only Generator (SOG), Settlement Only Energy Storage System (SOESS), or Load Resource connected to the ERCOT System. Each Resource Entity operating in the ERCOT Region must register with ERCOT. To become registered as a Resource Entity, an Entity must execute a Standard Form Market Participant Agreement (using the form in Section 22, Attachment A, Standard Form Market Participant Agreement), designate Resource Entity Authorized Representatives, contacts, and a User Security Administrator (USA) (per the Application for Registration as a Resource Entity), and demonstrate to ERCOT’s reasonable satisfaction that it is capable of performing the functions of a Resource Entity under these Protocols. The Resource Entity shall provide Resource Registration data pursuant to Planning Guide Section 6.8.2, Resource Registration Process, for each Resource, SOG, or SOESS through ERCOT registration, except for Distributed Generation (DG) with an installed capacity equal to or lower than the DG registration threshold that has chosen not to register with ERCOT. A Resource Entity may submit a proposal to register the aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (13) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, as an Aggregate Generation Resource (AGR) which ERCOT may grant at its sole discretion. If a Resource Entity intends to register one or more Energy Storage Systems (ESSs) and one or more non-ESS generators as SOGs at the same site, the Resource Entity must provide an affidavit attesting to the amount of ESS and non-ESS capacity at the site as a condition for registration.  |

(2) Prior to commissioning, Resources Entities will regularly update the data necessary for modeling. These updates will reflect the best available information at the time submitted.

(3) Once ERCOT has received a new or amended Standard Generation Interconnection Agreement (SGIA) or a letter from a duly authorized official from the Municipally Owned Utility (MOU) or Electric Cooperative (EC) and has determined that the proposed Generation Resource or SOG meets the requirements of Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, ERCOT shall review the description of the proposed Generation Resource or SOG in Exhibit “C” (or similar exhibit) to the SGIA and the data submitted pursuant to Planning Guide Section 6.8.2 to assess whether the Generation Resource or SOG, as proposed, would violate any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents. ERCOT must provide its determination to the Transmission Service Provider (TSP) and the owner of the proposed Generation Resource or SOG within 90 days of the date the Generation Resource or SOG meets the conditions for review. Notwithstanding the foregoing, this determination shall not preclude ERCOT from subsequently determining that the Generation Resource or SOG violates any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents or from taking any appropriate action based on that determination.

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| ***[NPRR995 and NPRR1002: Replace applicable portions of paragraph (3) above with the following upon system implementation:]*** (3) Once ERCOT has received a new or amended Standard Generation Interconnection Agreement (SGIA) or a letter from a duly authorized official from the Municipally Owned Utility (MOU) or Electric Cooperative (EC) and has determined that the proposed Generation Resource, ESR, SOG, or SOESS meets the requirements of Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, ERCOT shall review the description of the proposed Generation Resource, ESR, SOG, or SOESS in Exhibit “C” (or similar exhibit) to the SGIA and the data submitted pursuant to Planning Guide Section 6.8.2, to assess whether the Generation Resource, ESR, SOG, or SOESS, as proposed, would violate any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents. ERCOT must provide its determination to the Transmission Service Provider (TSP) and the owner of the proposed Generation Resource, ESR, SOG, or SOESS within 90 days of the date the Generation Resource, ESR, SOG, or SOESS meets the conditions for review. Notwithstanding the foregoing, this determination shall not preclude ERCOT from subsequently determining that the Generation Resource, ESR, SOG, or SOESS violates any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents or from taking any appropriate action based on that determination. |

(4) An Interconnecting Entity (IE) shall not proceed to Initial Synchronization of a Generation Resource, Settlement Only Transmission Generator (SOTG), or Settlement Only Transmission Self-Generator (SOTSG) in the event of any of the following conditions:

(a) Pursuant to paragraph (3) above, ERCOT has reasonably determined that the Generation Resource, SOTG, or SOTSG may violate operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents, and the Resource Entity has not yet demonstrated to ERCOT’s satisfaction that the Generation Resource, SOTG, or SOTSG can comply with these standards;

(b) The requirements of Planning Guide Section 5.3.5, ERCOT Quarterly Stability Assessment, if applicable, have not been completed for the Generation Resource, SOTG, or SOTSG; or

(c) Any required Subsynchronous Resonance (SSR) studies, SSO Mitigation Plan, SSO Protection, and SSR monitoring if required, have not been completed and approved by ERCOT.

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| ***[NPRR995 and NPRR1002: Replace applicable portions of paragraph (4) above with the following upon system implementation:]*** (4) An Interconnecting Entity (IE) shall not proceed to Initial Synchronization of a Generation Resource, ESR, Settlement Only Transmission Generator (SOTG), Settlement Only Transmission Self-Generator (SOTSG), or Settlement Only Transmission Energy Storage System (SOTESS) in the event of any of the following conditions:(a) Pursuant to paragraph (3) above, ERCOT has reasonably determined that the Generation Resource, ESR, SOTG, SOTSG, or SOTESS may violate operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents, and the Resource Entity has not yet demonstrated to ERCOT’s satisfaction that the Generation Resource, ESR, SOTG, SOTSG, or SOTESS can comply with these standards;(b) The requirements of Planning Guide Section 5.3.5, ERCOT Quarterly Stability Assessment, if applicable, have not been completed for the Generation Resource, ESR, SOTG, SOTSG, or SOTESS; or(c) Any required Subsynchronous Resonance (SSR) studies, SSR Mitigation Plan, SSR Protection, and SSR monitoring if required, have not been completed and approved by ERCOT. |

(5) DG with an installed capacity greater than one MW, the DG registration threshold, which exports energy into a Distribution System, must register with ERCOT.

(6) A Resource Entity representing an Energy Storage Resource (ESR) shall register the ESR as both a Generation Resource and a Controllable Load Resource.

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| ***[NPRR1002: Replace paragraph (6) above with the following upon system implementation:]*** (6) A Resource Entity representing an ESR shall register the ESR as an ESR. ERCOT systems, including the Energy and Market Management System (EMMS) and Settlement system, shall continue to treat the ESR as both a Generation Resource and a Controllable Load Resource until such time as all ERCOT systems are capable of treating an ESR as a single Resource. |

**16.20** **Provision of Information by a Customer with a Load of 25 MW or More**

(1) A Customer that has one or more Facilities at a single site with an aggregate peak Demand of 25 MW or more behind one or more common Points of Interconnection (POIs) or Service Delivery Points connected to the ERCOT System shall provide ERCOT, via the Resource Integration and Ongoing Operations (RIOO) system, with all Customer information and Load parameter data required by the Resource Registration Glossary. The Customer shall provide the required Customer information and Load parameter data within 60 days of the aggregate peak Demand equaling or exceeding 25 MW.

(a) If the Load is a Large Load, the Customer shall also indicate, via the RIOO system, whether the Large Load will be a firm Load, Registered Curtailable Load, Controllable Load Resource, or a Load Resource that is not controllable.

(b) If a Customer subject to paragraph (a) above indicates the Load is a Controllable Load Resource or a Load Resource that is not controllable, it shall pass the required qualification tests for the elected registration within 60 days if not already qualified. ERCOT, at its sole discretion, may extend this deadline.

(2) A Customer proposing to interconnect to the ERCOT System one or more Facilities at a single site with an aggregate peak Demand of 25 MW or more behind one or more common POIs or Service Delivery Points shall provide ERCOT, via the RIOO system, with all Customer information data and Load parameter data required by the Resource Registration Glossary. If the proposed Load is subject to the requirements of Planning Guide Section 9.2.2, Submission of Large Load Project Information, the Customer information and Load parameter data shall be provided prior to the initiation of the Large Load Interconnection Study (LLIS). All other Customers shall provide the Customer information and Load parameter data within 30 days after signing an interconnection agreement with the interconnecting Transmission Service Provider (TSP). The proposed Load shall not be eligible for inclusion in the ERCOT Network Operations Model until the requirements of this paragraph have been met. Once eligible, the Load will be included in the Network Operations Model in accordance with the timeline defined in paragraph (3) of Section 3.10.1.

(a) If the proposed load is a Large Load, the Customer shall also indicate, via the RIOO system, whether the Large Load will be a firm Load, Registered Curtailable Load, Controllable Load Resource, or a Load Resource that is not controllable.

(b) Pursuant to paragraph (2) of Planning Guide Section 9.6, a Load designated in paragraph (a) above as a Controllable Load Resource or a Load Resource that is not controllable shall not exceed ten MW of peak Demand following Initial Energization until after the Resource Commissioning Date.

(3) Any Customer subject to paragraphs (1) and/or (2) above shall update the information submitted to the RIOO system within five Business Days of a material change.

***16.20.1 Designation of a Qualified Scheduling Entity by a Registered Curtailable Load***

(1) A Customer electing to register its Facility as a Registered Curtailable Load (RCL) shall designate a Qualified Scheduling Entity (QSE) that will provide accurate telemetry of the RCL’s Demand to ERCOT on behalf of the Customer and timely instruct the RCL to cease consumption consistent with ERCOT instructions in the event of an RCL deployment as described in Section 6.5.9.4.1. The Customer shall acknowledge that it bears sole responsibility for selecting and maintaining a QSE as its representative. The Customer shall include a written statement from the designated QSE acknowledging that the QSE accepts responsibility for the accurate telemetry of the RCL’s Demand and timely instruction to the RCL in the event of an RCL deployment under these Protocols (Section 23, Form R, Qualified Scheduling Entity Acknowledgment of Designation for Customer with Large Load). The RCL’s QSE designation must be submitted to ERCOT no later than 45 days prior to the RCL’s Network Operations Model change date, as described in Section 3.10.1, Time Line for Network Operations Model Changes.

(2) A Customer with one or more RCLs may change its designated QSE with written notice to ERCOT; however, the Customer may not change its designated QSE more than once in any consecutive three-day period. The Customer shall maintain a QSE at all times.

(3) If the representation of a Customer with one or more RCLs by its designated QSE will terminate or if the Customer intends to be represented by a different QSE, the Customer shall provide the name of the newly designated QSE to ERCOT along with a written statement from the designated QSE acknowledging that the QSE accepts responsibility for the accurate telemetry of the RCL’s Demand and timely instruction to the RCL in the event of an RCL deployment under these Protocols (Section 23, Form R, Qualified Scheduling Entity Acknowledgment of Designation for Customer with Large Load).

(4) The following apply to all Registered Curtailable Loads:

(a) The designated QSE shall install all telemetry required by these Protocols for the requesting Customer and schedule point-to-point data verification with ERCOT.

(b) The designated QSE shall submit telemetry data descriptions to ERCOT to meet ERCOT’s normal model update process.

(c) The TSP or Resource Entity as appropriate must submit any changes in system topology or telemetry on behalf of the Customer according to Section 3.3.2.1, Information to Be Provided to ERCOT.

(d) The effective date for the newly designated QSE shall be in accordance with Section 3.10.1, Time Line for Network Operations Model Changes.

(e) ERCOT may request the Customer to develop a transition implementation plan to be approved by ERCOT that sets appropriate deadlines for completion of all required data and telemetry verification and cutover testing activities with ERCOT.

**ERCOT Nodal Protocols**

**Section 23**

**Form R: Qualified Scheduling Entity Acknowledgment of Designation for Customer with Large Load**

**TBD**

Date Received: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Qualified Scheduling Entity (QSE) Acknowledgment**

**Acknowledgment by Designated QSE for**

**Accurate Telemetry and Load Curtailment Responsibilities with ERCOT**

The Customer below has named the QSE listed below as its designated QSE to represent the Customer for providing accurate telemetry of Customer’s Load to ERCOT at the designated Electric Service Identifier(s) (ESI ID(s)) and timely instruction to the Customer to cease consumption consistent with ERCOT instructions in the event of a deployment of Registered Curtailable Load (RCL).

The Customer’s designated QSE, listed below, hereby acknowledges that it does represent the Customer and that it shall be responsible for providing accurate telemetry of the Customer’s Load to ERCOT and timely instructing the Customer to cease consumption consistent with ERCOT instructions in the event of an RCL Deployment pursuant to the ERCOT Protocols.

The requested effective date for such representation is:      [[1]](#footnote-1)\*\*

or

Establish partnership at the earliest possible date [ ]

Acknowledgment by **QSE**:

|  |  |
| --- | --- |
| Signature of AR for QSE: |  |
| Printed Name of AR: |       |
| Email Address of AR: |       |
| Date: |       |
| Name of Designated QSE: |       |
| DUNS of Designated QSE: |       |

Acknowledgment by **Customer**:

|  |  |
| --- | --- |
| Signature of Officer or Executive with authority to bind the Customer: |  |
| Printed Name of Officer or Executive with authority to bind the Customer: |       |
| Email Address of Officer or Executive with authority to bind the Customer:  |       |
| Date: |       |
| Name of Customer: |       |
| ESI ID(s) of Customer that are subject to this acknowledgment: |       |

**ERCOT Fee Schedule**

***Effective TBD***

The following is a schedule of ERCOT fees currently in effect. These fees are not refundable unless ERCOT Protocols provide otherwise.

|  |  |  |
| --- | --- | --- |
| **Description**  | **Nodal Protocol Reference** | **Calculation/Rate/Comment** |
| Private Wide Area Network (WAN) fees | 9.16.2 | Actual costs of procuring, using, maintaining, and connecting to the third-party communications networks and related hardware that provide ERCOT WAN communications. The portion of costs for ERCOT’s work regarding an initial installation or reconfiguration of an existing installation will not exceed $7,000. The portion of the monthly network management fee for ERCOT’s work will not exceed $450 per month. |
| ERCOT Generation Interconnection fee (Not Refundable) | NA | Application to interconnect generation to the ERCOT System.$5,000 (less than or equal to 150 MW)$7,000 (greater than 150 MW) |
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| --- | --- | --- | --- |
| ***[NPRR1153: Replace “ERCOT Generation Interconnection fee” above with the following upon system implementation:]***

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| ERCOT Load Resource Registration and Generator Interconnection or Modification fees  | NA | $500 for registration of a new Load Resource. If a Resource Entity seeks to increase the MW size of an existing Load Resource by more than 20% or change the Load Resource’s registration between non-Controllable Load Resource and Controllable Load Resource, it will incur a registration fee of $500.The term “generator,” as used in this fee schedule relating to interconnection fees and Full Interconnection Study (FIS) Application fees, includes Generation Resources, Energy Storage Resources (ESRs), and Settlement Only Generators (SOGs) but, as reflected below, Settlement Only Distribution Generators (SODGs) will incur a different fee amount than transmission connected SOGs. The following fee amounts apply for the registration of a new generator: $2,300 for SODGs; $8,000 for generators that are less than 10 MW (other than SODGs); and$14,000 for generators that are 10 MW or greater.If a Resource Entity for an existing SODG seeks to change its registration to a Distribution Generation Resource (DGR) it will incur a registration fee of $8,000.If a Resource Entity seeks to make a modification that is covered by paragraph (1)(c) of Planning Guide Section 5.2.1, Applicability, to an existing generator it will incur a registration fee in association with the modification request. If, at the time the modification is submitted, the cumulative MW amount of the modification and any other modifications that have been submitted for that generator within the last 12 months amount to less than 10 MW, the registration fee will be $2,300. If, at the time the modification is submitted, the cumulative MW amount of the modification and any other modifications that have been submitted for that generator within the last 12 months amount to 10 MW or greater, the registration fee will be $14,000. |

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| Full Interconnection Study (FIS) Application fee (Not Refundable) | NA | $15 per MW – to support ERCOT system studies and coordination. Applicable MW amount per Planning Guide Section 5, Generator Interconnection or Modification. |
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| ***[NPRR1153: Replace “Full Interconnection Study (FIS) Application fee” above with the following upon system implementation:]***

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| Full Interconnection Study (FIS) Application fee | NA | $3,000 for an FIS Application relating to a new generator.$2,700 for an FIS Application relating to modification of an existing generator. |

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| Qualified Scheduling Entity (QSE) Application fee | 9.16.2 | $500 per Entity |
| Subordinate QSE (Sub-QSE) Application fee | 9.16.2 | $500 per Sub-QSE |
| Large Load Interconnection Study (LLIS) fee | NA | $14,000 |
| Competitive Retailer (CR) Application fee | 9.16.2 | $500 per Entity |
| Congestion Revenue Right (CRR) Account Holder Application fee | 9.16.2 | $500 per Entity |
| Independent Market Information System Registered Entity (IMRE) fee | 9.16.2 | $500 per Entity |
| Resource Entity Application fee | 9.16.2 | $500 per Entity  |
| Transmission and/or Distribution Service Providers (TDSPs) | 9.16.2 | $500 per Entity |
| Weatherization Inspection fees | NA | Resource Entities with Generation Resources or Energy Storage Resources (ESRs) and Transmission Service Providers (TSPs) shall pay fees to ERCOT for costs related to weatherization inspections conducted pursuant to 16 Texas Administrative Code (TAC) § 25.55, Weather Emergency Preparedness, as provided below. TSPs shall pay an inspection fee of $3,000 for each of their substations or switching stations that are inspected.Each Resource Entity with Generation Resources or ESRs shall pay an inspection fee calculated as the Semiannual Generation Resource Inspection Costs \* (Resource Entity MW Capacity/Aggregate MW Capacity). ERCOT will perform this calculation twice per calendar year and gather the necessary MW capacity data for that six-month period on one of the last 15 Business Days at the end of the period. Terms used in this formula are defined as follows: Semiannual Generation Resource Inspection Costs = the sum of outside services costs, ERCOT internal costs, and overhead costs related to weatherization inspections, less inspection fees that will be invoiced to TSPs, for that six-month period. Resource Entity MW Capacity = the total MW capacity associated with a Resource Entity with Generation Resources or ESRs. To calculate these amounts, ERCOT will query the Resource Integration and Ongoing Operations-Resource Services (“RIOO-RS”) for a report that lists the total MW capacity (real power rating) for all generation assets associated with each Resource Entity.Aggregate MW Capacity = the total of all the Resource Entity MW Capacity amounts. To calculate this amount, ERCOT will query the RIOO-RS for a report that lists the total MW capacity (real power rating) for all Generation Resources and ESRs associated with all Resource Entities.ERCOT will issue Invoices semiannually in the months of January and July for the preceding six-month period to the Resource Entities and TSPs that owe inspection fees. Payment of the fee will be due within 30 days of the Invoice date and late payments will incur 18% annual interest. Entities that fail to pay their Invoice on time will be publicly reported in a filing with the Public Utility Commission of Texas (PUCT). Further payment terms and instructions will be included on the Invoice. |
| Voluminous Copy fee | NA | $0.15 per page in excess of 50 pages |
| Actual Costs associated with Information Requests  | NA | ERCOT will provide an estimate to the requestor of any vendor or third-party costs ERCOT deems appropriate to fulfill the information request. If the requestor approves the cost estimate, the requestor must pay all such costs as instructed by ERCOT before the information will be delivered to the requestor.  |
| ERCOT Labor Costs for Information Requests | NA | $15 per hour of ERCOT time.If ERCOT determines that a request will involve a substantial burden on ERCOT employee or contractor time to fulfill the request, ERCOT will provide an estimate to the requestor of the anticipated labor costs. If the requestor approves the cost estimate, the requestor must pay all such labor costs as instructed by ERCOT before the information will be delivered to the requestor. |
| ERCOT Training fees for courses that award Continuing Education Hours (CEHs)  | NA | $25 per North American Electric Reliability Corporation (NERC) CEH. Examples of such trainings include, without limitation, the Operator Training Seminar and Black Start Training. |
| Cybersecurity Monitor fee for Non-ERCOT Utilities that participate in the Texas Cybersecurity Monitor Program | NA | The Cybersecurity Monitor fee amount varies from year to year. The current fee amount is posted on ERCOT’s website here:<https://www.ercot.com/services/programs/tcmp> |

1. \*\* *Actual effective date will depend on time needed to implement the relationship in ERCOT systems once ERCOT has received all necessary information (a minimum of three Business Days), and may be later than the requested effective date. ERCOT will notify the parties of the actual effective date*. [↑](#footnote-ref-1)