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| NPRR Number | [1005](http://www.ercot.com/mktrules/issues/NPRR1005) | NPRR Title | Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB) |
| Date of Decision | May 13, 2021 |
| Action | Recommended Approval |
| Timeline  | Normal |
| Proposed Effective Date | To be determined |
| Priority and Rank Assigned | To be determined |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions2.2, Acronyms and Abbreviations3.2.6.2.2, Total Capacity Estimate3.10.3.1, Process for Managing Changes in Updated Network Operations Model for Resource Retirements or Point of Interconnection Changes3.10.7.2, Modeling of Resources and Transmission Loads3.10.7.3, Modeling of Private Use Networks3.10.7.5.2, Continuous Telemetry of the Real-Time Measurements of Bus Load, Voltages, Tap Position, and Flows3.15, Voltage Support3.15.1, ERCOT Responsibilities Related to Voltage Support3.15.2, DSP Responsibilities Related to Voltage Support6.5.7.7, Voltage Support Service10.3.2.3, Generation Netting for ERCOT-Polled Settlement MetersSection 23, Form K: Wide Area Network (WAN) Agreement |
| Related Documents Requiring Revision/Related Revision Requests | Nodal Operating Guide Revision Request (NOGRR) 210, Related to NPRR1005, Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB)Resource Registration Glossary Revision Request (RRGRR) 025, Related to NPRR1005, Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB) |
| Revision Description | This Nodal Protocol Revision Request (NPRR) proposes the following revisions:* Revises the definition of Point of Interconnection (POI) to refer to any physical location where a Generation Entity’s Facilities connect to a Transmission Service Provider’s (TSP’s) Facilities, and removes references to Load interconnections, since the only relevant Load connection points are those associated with the Generation Entity’s generators, which are included in the term “Generation Entity’s Facilities.”
* Introduces the term “Point of Interconnection Bus (POIB)” to refer to the Electrical Bus in the substation that is closest to the Generation Resource’s POI, or any electrically equivalent Electrical Bus in that substation, for each TSP-owned substation to which the Generation Resource interconnects.
* Changes POI to POIB throughout the Protocols in appropriate cases based on the above clarifications.
* Removes the reference to POI in Section 2.1 in the definition of Aggregate Generation Resource because having a common Generator Step Up (GSU) transformer would aggregate output before the POI, and the generators’ separate outputs do not have separate POIs.
* Clarifies Section 10.3.2.3 to specify that, at a given Generation Resource Facility, generation and associated Load must either be physically metered at each POI or Service Delivery Point, or loss-compensated to the applicable POI in accordance with Section 10.3.2.2.
* Adds NPRR917, Nodal Pricing for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs), greyboxed language to Section 10.3.2.3 and removes the greybox, as there is no system implementation required for language in Section 10.3.2.3.
* Removes POI from Section 23, Form K because it is used there incorrectly.
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| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/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 current definition of the term POI requires that a POI must be at a substation (at a specified voltage level) but also that this substation must be reflected in the Standard Generation Interconnection Agreement (SGIA). This is problematic not only because many Generation Resources that are either older or Non-Opt-In Entity (NOIE)-owned do not have an SGIA, but also because the SGIA in Section 1.14 defines the POI to be the point where ownership changes from the generator to the TSP, and in many cases, the POI designated in the SGIA is at some location other than the substation. In these cases, it is not clear what point should be considered the POI under the definition of that term.In many cases where the term POI is used in the Protocols, the meaning is material to the application of the provision. For example, in paragraph (1) of Section 10.3.2.2, Loss Compensation of EPS Meter Data, POI must be understood to refer to the point of ownership change, and not necessarily the TSP’s substation, because the provision applies only when “the EPS Meter is not located at the [POI]” and would therefore have no meaning if the POI was always understood to be at the substation where the EPS Meter is located. In other cases, such as with the Voltage Support Service (VSS) requirements in Section 3.15 and Section 6.5.7.7, POI must be understood to refer to a TSP-owned substation because the TSP metering equipment used to monitor voltage is always located at the substation, and not necessarily at the point of ownership change defined in the SGIA. Given these differing uses of the term POI, ERCOT has concluded that two terms are necessary—one to refer to the point of ownership change, consistent with the definition in the SGIA, and one to refer to the substation downstream of the point of ownership change, or more precisely, to one or more buses in that substation (given that electrical differences may exist at different buses in the same substation, and that, for all instances in the Protocols where POI should be understood to refer to the downstream substation, bus-level measurements appear to be appropriate). For the sake of consistency with the SGIA, ERCOT proposes to modify the existing term POI to conform with the SGIA’s conception of the POI as the point of ownership change. At the same time, ERCOT proposes to remove the reference to the SGIA in that definition, since NOIE generators and certain older generators may not have an SGIA. For the purpose of existing POI references that may be reasonably understood to refer to some point in the TSP’s substation downstream of that point of ownership change, ERCOT is proposing a new term POIB.  |
| Credit Work Group Review | To be determined |
| PRS Decision | On 6/11/20, PRS voted unanimously via roll call to table NPRR1005. All Market Segments participated in the vote.On 5/13/21, PRS voted unanimously via roll call to recommend approval of NPRR1005 as amended by the 4/7/21 Longhorn Power comments as revised by PRS. All Market Segments participated in the vote. |
| Summary of PRS Discussion | On 6/11/20, participants discussed further refinements to definitions, and requested additional time to review potential impacts of definition changes to pending interconnections.On 5/13/21, participants reviewed the 4/7/21 Longhorn Power comments and offered additional clarifying language. |

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| Market Segment | Not Applicable |

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| **Comments Received** |
| **Comment Author** | **Comment Summary** |
| ERCOT 020421 | Accommodated baseline Protocol language updates and provided additional clarification to paragraph (1) of Section 10.3.2.3 |
| TIEC 031021 | Added a new description of a standard transmission-level Private Use Network interconnection in paragraph (2) of Section 10.3.2.3 |
| CenterPoint Energy 033021 | Offered clarifications to the POIB definition |
| Longhorn Power 040721 | Offered clarifications to the undefined term “common buswork” in paragraph (2)(b) of Section 10.3.2.3 |

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| Market Rules Notes |

Please note the baseline Protocol language in the following sections has been updated to reflect the incorporation of the following NPRRs into the Protocols:

* NPRR945, Net Metering Requirements (incorporated 1/1/21)
	+ Section 10.3.2.3
* NPRR973, Add Definitions for Generator Step-Up and Main Power Transformer (incorporated 9/1/20)
	+ Section 3.10.7.2
* NPRR980, Accounting for NSO Forced Outages and GINR Inactive Projects in the Report on the Capacity, Demand and Reserves in the ERCOT Region (effective 3/1/20)
	+ Section 3.2.6.2.2
* NPRR989, BESTF-1 Energy Storage Resource Technical Requirements (incorporated 7/1/20)
	+ Section 3.15
	+ Section 3.15.1
	+ Section 6.5.7.7
* NPRR1003, Elimination of References to Resource Asset Registration Form (incorporated 9/1/20)
	+ Section 3.2.6.2.2
* NPRR1016, Clarify Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs) (incorporated 9/1/20)
	+ Section 3.10.7.2
	+ Section 3.15
	+ Section 6.5.7.7
* NPRR1020, Allow Some Integrated Energy Storage Designs to Calculate Internal Loads (unboxed 3/15/21)
	+ Section 10.3.2.3
* NPRR1026, BESTF-7 Self-Limiting Facilities (incorporated 1/1/21)
	+ Section 3.15
* NPRR1038, BESTF-8 Limited Exemption from Reactive Power Requirements for Certain Energy Storage Resources (incorporated 11/1/20)
	+ Section 3.15
* NPRR1042, Planned Capacity Adjustment in the Report on Capacity, Demand and Reserves in the ERCOT Region (incorporated 1/1/21)
	+ Section 3.2.6.2.2
* NPRR1047, Consolidate Greybox re NPRR973 and NPRR1016 (incorporated 1/1/21)
	+ Section 3.10.7.2
* NPRR1049, Management of DC Tie Load Zone Modifications (incorporated 3/1/21)
	+ Section 3.10.3.1
* NPRR1050, Change to the Summer Commercial Operations Date Deadline for Including Planned Generation Capacity in Reports on the Capacity, Demand and Reserves in the ERCOT Region (incorporated 3/1/21)
	+ Section 3.2.6.2.2

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

* NPRR979, Incorporate State Estimator Standards and Telemetry Standards into Protocols
	+ Section 3.10.7.5.2
* NPRR995, RTF-6 Create Definition and Terms for Settlement Only Energy Storage
	+ Section 3.10.7.2
	+ Section 10.3.2.3

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| Revised Protocol Language |

## 2.1 DEFINITIONS

Point of Interconnection (POI)

Any physical location where a Generation Entity’s Facilities electrically connect to the Transmission Service Provider’s (TSP’s) Facilities.

**Point of Interconnection Bus (POIB)**

For a Generation Resource connecting to the ERCOT Transmission System through a Transmission Service Provider (TSP) substation, the Electrical Bus at that TSP substation that is electrically closest to the Generation Resource’s Point of Interconnection (POI), or any electrically equivalent Electrical Bus in that substation.

For a Generation Resource connecting to the ERCOT Transmission System through a non-TSP substation, the Electrical Bus at that non-TSP substation that is electrically closest to the Generation Resource’s POI, or any electrically equivalent Electrical Bus in that substation.

**Resource Attribute**

Specific qualities associated with various Resources (i.e., specific aspects of a Resource or the services the Resource is qualified to provide).

***Aggregate Generation Resource (AGR)***

A Generation Resource that is an aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (12) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, each of which is less than 20 MW in output, which share identical operational characteristics and are located behind the same Generator Step-Up (GSU) transformer (with a high-side voltage greater than 60 kV).

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| [NPRR973: Replace the definition “Aggregate Generation Resource (AGR)” above with the following upon system implementation of PR106:]***Aggregate Generation Resource (AGR)***A Generation Resource that is an aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (12) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, each of which is less than 20 MW in output, which share identical operational characteristics and are located behind the same Main Power Transformer (MPT). |

**Voltage Set Point**

The voltage that a Generation Resource is required to maintain at its Point of Interconnection Bus (POIB) and that is initially communicated via the Voltage Profile but may be modified by a Real-Time instruction from ERCOT, the interconnecting Transmission Service Provider (TSP), or that TSP’s agent.

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| ***[NPRR989: Replace the above definition “Voltage Set Point” with the following upon system implementation:]*****Voltage Set Point**The voltage that a Generation Resource or Energy Storage Resource (ESR) is required to maintain at its Point of Interconnection Bus (POIB) and that is initially communicated via the Voltage Profile but may be modified by a Real-Time instruction from ERCOT, the interconnecting Transmission Service Provider (TSP), or that TSP’s agent. |

## 2.2 ACRONYMS AND ABBREVIATIONS

**POIB Point of Interconnection Bus**

3.2.6.2.2 Total Capacity Estimate

(1) The total capacity estimate shall be determined based on the following equation:

**TOTCAP *s ,i* = INSTCAP *s*, *i +* PUNCAP *s, i +* WINDCAP *s, i, r* + HYDROCAP *s, i* + SOLARCAP *s,*** ***i* + RMRCAP *s,*** ***i* + DCTIECAP *s* + PLANDCTIECAP** *s* **+ SWITCHCAP *s, i* + MOTHCAP *s, i* + PLANNON *s, i* + PLANIRR *s, i, r* – LTOUTAGE *s, i* – UNSWITCH *s, i* – RETCAP *s, i***

The above variables are defined as follows:

| Variable | Unit | Definition |
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| TOTCAP *s, i* | MW | *Total Capacity*—Estimated total capacity available during the Peak Load Season *s* for the year *i.* |
| INSTCAP *s, i* | MW | *Seasonal Net Max Sustainable Rating*—The Seasonal net max sustainable rating for the Peak Load Season *s* as reported in the approved Resource Registration process for each operating Generation Resource for the year *i* excluding WGRs, hydro Generation Resource capacity, solar unit capacity, Resources operating under RMR Agreements, and Generation Resources capable of “switching” from the ERCOT Region to a non-ERCOT Region. |
| PUNCAP *s, i* | MW | *Private Use Network Capacity*—The forecasted generation capacity available to the ERCOT Transmission Grid, net of self-serve load, from Generation Resources and Settlement Only Generators (SOGs) in Private Use Networks for Peak Load Season *s* and year *i*. The capacity forecasts are developed as follows. First, a base capacity forecast, determined from Settlement data, is calculated as the average net generation capacity available to the ERCOT Transmission Grid during the 20 highest system-wide peak Load hours for each preceding three-year period for Peak Load Season *s* and year *i*. The base capacity forecast is then adjusted by adding the aggregated incremental forecasted annual changes in net generation capacity as of the start of the summer Peak Load Season *s* for forecast year *i* reported for Private Use Networks pursuant to Section 10.3.2.4, Reporting of Net Generation Capacity. This calculation is limited to Generation Resources and SOGs in Private Use Networks (1) with a Resource Commissioning Date that occurs no later than the start of the most current Peak Load Season used for the calculation, and (2) that have not been permanently retired by the start of the most current Peak Load Season used for the calculation. |
| WINDPEAKPCT *s, r* | % | *Seasonal Peak Average Wind Capacity as a Percent of Installed Capacity*—The average WGR capacity available for the summer and winter Peak Load Seasons *s* and region *r*, divided by the installed capacity for region *r*, expressed as a percentage. The Seasonal Peak Average, derived from Settlement data, is first calculated as the average capacity during the 20 highest system-wide peak Load hours for a given year’s summer and winter Peak Load Seasons. The final value is the weighted average of the previous ten eligible years of Seasonal Peak Average values where each year is weighted by its installed capacity. Eligible years include 2009 through the most recent year for which COP data is available for the summer and winter Peak Load Seasons. If the number of eligible years is less than ten, the average shall be based on the number of eligible years available. This calculation is limited to WGRs (1) with a Resource Commissioning Date that occurs no later than the start of the most current Peak Load Season used for the calculation, and (2) that have not been permanently retired by the start of the most current Peak Load Season used for the calculation. |
| WINDCAP *s, i, r* | MW | *Existing WGR Capacity*—The capacity available for all existing WGRs for the summer and winter Peak Load Seasons *s,* year *i*, and region *r*, multiplied by WINDPEAKPCT for summer and winter Peak Load Seasons *s* and region *r*. |
| HYDROCAP *s, i* | MW | *Hydro Unit Capacity*—The average hydro Generation Resource capacity available, as determined from the COP, during the highest 20 peak Load hours for each preceding three-year period for Peak Load Season *s* and year *i*. This calculation is limited to hydro Generation Resources (1) with a Resource Commissioning Date that occurs no later than the start of the most current Peak Load Season used for the calculation, and (2) that have not been permanently retired by the start of the most current Peak Load Season used for the calculation. |
| SOLARPEAKPCT *s* | % | *Seasonal Peak Average Solar Capacity as a Percent of Installed Capacity*—The average PVGR capacity available for the summer and winter Peak Load Seasons *s*, divided by the installed capacity, expressed as a percentage. The Seasonal Peak Average, derived from Settlement data, is first calculated as the average capacity during the 20 highest system-wide peak Load hours for a given year’s summer and winter Peak Load Seasons. The final value is the weighted average of the previous three years of Seasonal Peak Average values where each year is weighted by its installed capacity. This calculation is limited to PVGRs (1) with a Resource Commissioning Date that occurs no later than the start of the most current Peak Load Season used for the calculation, and (2) that have not been permanently retired by the start of the most current Peak Load Season used for the calculation. |
| SOLARCAP *s, i* | MW | *Existing PVGR Capacity*—The capacity available for all existing PVGRs for the summer and winter Peak Load Season *s* and year *i*, multiplied by SOLARPEAKPCT for summer and winter Peak Load Seasons *s.* |
| RMRCAP *s, i* | MW | *Seasonal Net Max Sustainable Rating for Generation Resource providing RMR Service*—The Seasonal net max sustainable rating for the Peak Load Season *s* as reported in the approved Resource Registration process for each Generation Resource providing RMR Service for the year *i* until the approved exit strategy for the RMR Resource is expected to be completed. |
| DCTIEPEAKPCT *s* | % | *Seasonal Peak Average Capacity for existing DC Tie Resources as a Percent of Installed DC Tie Capacity*—The average net emergency DC Tie imports for the summer and winter Peak Load Seasons *s*, divided by the total installed DC Tie capacity for Peak Load Seasons *s*, expressed as a percentage. The average net emergency DC Tie imports is calculated for the SCED intervals during which ERCOT declared an Energy Emergency Alert (EEA). This calculation is limited to the most recent single summer and winter Peak Load Seasons in which an EEA was declared. The total installed DC Tie capacity is the capacity amount at the start of the Peak Load Seasons used for calculating the net DC Tie imports. |
| DCTIECAP *s* | MW | *Expected Existing DC Tie Capacity Available under Emergency Conditions*—DCTIEPEAKPCT*s* multiplied by the installed DC Tie capacity available for the summer and winter Peak Load Seasons *s*, adjusted for any known capacity transfer limitations. |
| PLANDCTIECAP *s* | MW | *Expected Planned DC Tie Capacity Available under Emergency Conditions*—DCTIEPEAKPCT*s* multiplied by the maximum peak import capacity of planned DC Tie projects included in the most recent Steady State Working Group (SSWG) base cases, for the summer and winter Peak Load Seasons *s*. The import capacity may be adjusted to reflect known capacity transfer limitations indicated by transmission studies. |
| SWITCHCAP *s, i* | MW | *Seasonal Net Max Sustainable Rating for Switchable Generation Resource*—The Seasonal net max sustainable rating for the Peak Load Season *s* as reported in the approved Resource Registration process for each Generation Resource for the year *i* that can electrically connect (i.e., “switch”) from the ERCOT Region to another power region. |
| MOTHCAP *s, i* | MW | *Seasonal Net Max Sustainable Rating for Mothballed Generation Resource*—The Seasonal net max sustainable rating for the Peak Load Season *s* as reported in the approved Resource Registration process for each Mothballed Generation Resource for the year *i* based on the lead time and probability information furnished by the owners of Mothballed Generation Resources pursuant to Section 3.14.1.9, Generation Resource Status Updates.If the value furnished by the owner of a Mothballed Generation Resource pursuant to Section 3.14.1.9 is greater than or equal to 50%, then use the Seasonal net max sustainable rating for the Peak Load Season *s* as reported in the approved Resource registration process for the Mothballed Generation Resource for the year *i*. If the value furnished by the owner of a Mothballed Generation Resource pursuant to Section 3.14.1.9 is less than 50%, then exclude that Resource from the Total Capacity Estimate. |
| PLANNON *s, i* | MW | *New, non-IRR Generating Capacity*—The amount of new, non-IRR generating capacity available by July 1 and December 1 for the summer and winter Peak Load Seasons *s*, respectively, and year *i* that: (a) has a Texas Commission on Environmental Quality (TCEQ)-approved air permit, (b) has a federal Greenhouse Gas permit, if required, (c) has obtained water rights, contracts or groundwater supplies sufficient for the generation of electricity at the Resource, and (d) has a signed Standard Generation Interconnect Agreement (SGIA), or a public, financially-binding agreement between the Resource owner and TSP under which generation interconnection facilities would be constructed; or for a Municipally Owned Utility (MOU) or Electric Cooperative (EC), a public commitment letter to construct a new Resource. New, non-IRR generating capacity is excluded if the Generation Interconnection or Change Request (GINR) project status in the online Resource Integration and Ongoing Operations (RIOO) interconnection services system is set to “Cancelled” or “Inactive” or if the Resource was previously mothballed or retired and does not have an owner that intends to operate it. For the purposes of this section, ownership of a mothballed or retired Resource for which a new generation interconnection is sought can only be satisfied by proof of site control as described in paragraph (1)(a), (b), or (d) of Planning Guide Section 5.4.9, Proof of Site Control. |
| PLANIRR *s, i, r* | MW | *New IRR Capacity*—For new WGRs, the capacity available by July 1 and December 1 for the summer and winter Peak Load Seasons *s,* respectively, year *i*, and region *r*, multiplied by WINDPEAKPCT for summer and winter Load Season *s* and region *r*. For new PVGRs, the capacity available for the summer and winter Peak Load Seasons *s* and year *i*, multiplied by SOLARPEAKPCT for summer and winter Load Seasons *s*. New IRRs must have an SGIA or other public, financially binding agreement between the Resource owner and TSP under which generation interconnection facilities would be constructed or, for a MOU or EC, a public commitment letter to construct a new IRR. New IRR capacity is excluded if the GINR project status in the online RIOO interconnection services system is set to “Cancelled,” or “Inactive.” |
| LTOUTAGE *s, i* | MW | *Forced Outage Capacity Reported in a Notification of Suspension of Operations—*For non-IRRs whose operation has been suspended due to a Forced Outage as reported in a Notification of Suspension of Operations (NSO), the sum of Seasonal net max sustainable ratings for Peak Load Seasons *s* for year *i*, as reported in the NSO forms. For IRRs, use the PLANIRR *s, i, r* calculated for each IRR. |
| UNSWITCH *s, i*  | MW | *Capacity of Unavailable Switchable Generation Resource*—The amount of capacity reported by the owners of a switchable Generation Resource that will be unavailable to ERCOT during the Peak Load Season *s* and year *i* pursuant to paragraph (2) of Section 16.5.4, Maintaining and Updating Resource Entity Information. |
| RETCAP *s, i* | MW | *Capacity Pending Retirement*—The amount of capacity in Peak Load Season *s* of year *i* that is pending retirement based on information submitted on an NSO form (Section 22, Attachment E, Notification of Suspension of Operations) pursuant to Section 3.14.1.11, Budgeting Eligible Costs, but is under review by ERCOT pursuant to Section 3.14.1.2, ERCOT Evaluation Process, that has not otherwise been considered in any of the above defined categories. For Generation Resources and SOGs within Private Use Networks, the retired capacity amount is the peak average capacity contribution included in PUNCAP. For reporting of individual Generation Resources and SOGs in the Report on the Capacity, Demand and Reserves in the ERCOT Region, only the summer net max sustainable rating included in the NSO shall be disclosed. |
| *i* | None | Year. |
| *s* | None | Summer and winter Peak Load Seasons for year *i*. |
| *r* | None | Coastal, Panhandle, and Other wind regions. WGRs are classified into regions based on the county that contains their Point of Interconnection Bus (POIB). The Coastal region is defined as the following counties: Aransas, Brazoria, Calhoun, Cameron, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, and Willacy. The Panhandle region is defined as the following counties: Armstrong, Bailey, Briscoe, Carson, Castro, Childress, Cochran, Collingsworth, Crosby, Dallam, Deaf Smith, Dickens, Donley, Floyd, Gray, Hale, Hall, Hansford, Hartley, Hemphill, Hockley, Hutchinson, Lamb, Lipscomb, Lubbock, Moore, Motley, Ochiltree, Oldham, Parmer, Potter, Randall, Roberts, Sherman, Swisher, and Wheeler. The Other region consists of all other counties in the ERCOT Region. |

3.10.3.1 Process for Managing Network Operations Model Updates for Point of Interconnection Bus Changes, Resource Retirements and Deletion of DC Tie Load Zones

(1) Following the permanent change in Point of Interconnection Bus (POIB) of all Resources associated with a Resource Node, ERCOT shall retain the associated Settlement Point in the Network Operations Model at its existing location or an electrically similar location until all outstanding CRRs associated with that Settlement Point have expired. Following the retirement of all Resources associated with a Resource Node, ERCOT shall move the Resource Node to a proxy Electrical Bus. The proxy Electrical Bus will be selected by finding the nearest energized Electrical Bus at the same voltage level with the least impedance equipment between the retired Resource Node and the proxy Electrical Bus. For purposes of the CRR Auction model for calendar periods that are prior to the expiration date of all CRRs associated with the Settlement Point, the Settlement Point will continue to be available as a sink or source for CRR Auction transaction submittals. For calendar months that are beyond the expiration date of all CRRs associated with the Settlement Point, the Settlement Point will not be available for transaction submittals in the associated CRR Auctions. The Settlement Point will be removed from the Network Operations Model once all associated CRRs have expired.

(2) When a Direct Current Tie (DC Tie) is to be permanently removed from service, ERCOT will delete the associated DC Tie Load Zone from the Network Operations Model after all outstanding CRRs associated with that DC Tie Load Zone have expired. The DC Tie Load Zone will continue to be available as a sink or source Settlement Point for transaction submittals in CRR Auctions for calendar periods that are prior to the scheduled deletion date of the DC Tie Load Zone; however, the DC Tie Load Zone will no longer be an available Settlement Point for transaction submittals in CRR Auctions for calendar periods that are after the scheduled deletion date of the DC Tie Load Zone.

3.10.7.2 Modeling of Resources and Transmission Loads

(1) Each Resource Entity shall provide ERCOT and its interconnecting TSP with information describing each of its Generation Resources, SOGs, and Load Resources connected to the transmission system. All Resources greater than ten MW, Generation Resources less than ten MW but providing Ancillary Service, Settlement Only Transmission Generators (SOTGs), Settlement Only Transmission Self-Generators (SOTSGs), Split Generation Resources where the physical generator being split is greater than ten MW, Private Use Networks containing Resources greater than ten MW, Wind-powered Generation Resources (WGRs), PhotoVoltaic Generation Resources (PVGRs) or Aggregated Generation Resources (AGRs) with an aggregate interconnection to the ERCOT System greater than ten MW, DC Tie Resources, and the non-TSP owned step-up transformers greater than ten MVA, must be modeled to provide equivalent generation injections to the ERCOT Transmission Grid. ERCOT shall coordinate the modeling of Generation Resources, Private Use Networks, DC Tie Resources and Load Resources with their owners to ensure consistency between TSP models and ERCOT models.

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| ***[NPRR973: Replace paragraph (1) above with the following upon system implementation of PR106:]***(1) Each Resource Entity shall provide ERCOT and its interconnecting TSP with information describing each of its Generation Resources, SOGs, and Load Resources connected to the transmission system. All Resources greater than ten MW, Generation Resources less than ten MW but providing Ancillary Service, Settlement Only Transmission Generators (SOTGs), Settlement Only Transmission Self-Generators (SOTSGs), Split Generation Resources where the physical generator being split is greater than ten MW, Private Use Networks containing Resources greater than ten MW, Wind-powered Generation Resources (WGRs), PhotoVoltaic Generation Resources (PVGRs) or Aggregated Generation Resources (AGRs) with an aggregate interconnection to the ERCOT System greater than ten MW, Direct Current Tie (DC Tie) Resources, and the non-TSP owned MPTs greater than ten MVA, must be modeled to provide equivalent generation injections to the ERCOT Transmission Grid. ERCOT shall coordinate the modeling of Generation Resources, Private Use Networks, DC Tie Resources and Load Resources with their owners to ensure consistency between TSP models and ERCOT models. |

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| ***[NPRR1016: Replace paragraph (1) above with the following upon system implementation:]***(1) Each Resource Entity shall provide ERCOT and its interconnecting TSP with information describing each of its Generation Resources, SOGs, and Load Resources connected to the ERCOT System. All Transmission Generation Resources (TGRs), Settlement Only Transmission Generators (SOTGs), Settlement Only Transmission Self-Generators (SOTSGs), and the non-TSP MPTs greater than ten MVA, must be modeled to provide equivalent generation injections to the ERCOT Transmission Grid. ERCOT shall coordinate the modeling of Generation Resources, Private Use Networks, and Load Resources with their owners to ensure consistency between TSP models and ERCOT models. |

(2) Each Resource Entity representing either a Load Resource or an Aggregate Load Resource (ALR) shall provide ERCOT and, as applicable, its interconnecting DSP and TSP, with information describing each such Resource as specified in Section 3.7.1.2, Load Resource Parameters, and any additional information and telemetry as required by ERCOT, in accordance with the timelines set forth in Section 3.10.1, Time Line for Network Operations Model Changes. ERCOT shall coordinate the modeling of ALRs with Resource Entities. ERCOT shall coordinate with representatives of the Resource Entity to map Load Resources to their appropriate Load in the Network Operations Model.

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| ***[NPRR1016: Insert paragraph (3) below upon system implementation and renumber accordingly:]***(3) Each Resource Entity representing a Distribution Generation Resource (DGR) or Distribution Energy Storage Resource (DESR) that is registered with ERCOT pursuant to Section 16.5, Registration of a Resource Entity, shall provide ERCOT, its interconnecting DSP, and the TSP that interconnects the DSP to the transmission system with information describing each of its DGR or DESR facilities, and additional information and telemetry as required by ERCOT and the interconnecting DSP. ERCOT shall coordinate with representatives of the Resource Entity to represent the registered DGR or DESR facilities at their appropriate Electrical Bus in the Network Operations Model.  |

(3) Each Resource Entity representing a Distributed Generation (DG) facility that is registered with ERCOT pursuant to paragraph (5) of Section 16.5, Registration of a Resource Entity, shall provide ERCOT, its interconnecting DSP, and the TSP that interconnects the DSP to the transmission system with information describing each of its registered DG facilities, and additional information and telemetry as required by ERCOT. ERCOT shall coordinate with representatives of the Resource Entity to map registered DG facilities to their appropriate Load in the Network Operations Model.

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| ***[NPRR1016: Replace paragraph (3) above with the following upon system implementation:]***(3) Each Resource Entity representing a Settlement Only Distribution Generator (SODG) facility that is registered with ERCOT pursuant to paragraph (5) of Section 16.5 shall provide ERCOT, its interconnecting DSP, and the TSP that interconnects the DSP to the transmission system with information describing each of its SODG facilities, and additional information and telemetry as required by ERCOT. ERCOT shall coordinate with representatives of the Resource Entity to map registered SODG facilities to their appropriate Load in the Network Operations Model. |

(4) Each Resource Entity representing a Split Generation Resource shall provide information to ERCOT and TSPs describing an individual Split Generation Resource for its share of the generation facility to be represented in the Network Operations Model in accordance with Section 3.8, Special Considerations for Split Generation Meters, Combined Cycle Generation Resources, Quick Start Generation Resources, Hydro Generation Resources, and Energy Storage Resources. The Split Generation Resource must be modeled as connected to the ERCOT Transmission Grid on the low side of the generation facility main power transformer.

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| ***[NPRR973 and NPRR1016: Replace applicable portions of paragraph (4) above with the following upon system implementation of PR106 or upon system implementation, respectively:]***(4) Each Resource Entity representing a Split Generation Resource shall provide information to ERCOT and TSPs describing an individual Split Generation Resource for its share of the generation facility to be represented in the Network Operations Model in accordance with Section 3.8, Special Considerations for Split Generation Meters, Combined Cycle Generation Resources, Quick Start Generation Resources, Hydro Generation Resources, Energy Storage Resources, Distribution Generation Resources, and Distribution Energy Storage Resources. The Split Generation Resource must be modeled as connected to the ERCOT Transmission Grid on the low side of the generation facility MPT. |

(5) ERCOT shall create a DC Tie Resource to represent an equivalent generation injection to represent the flow into the ERCOT Transmission Grid from operation of DC Ties. The actual injection flow on the DC Tie from telemetry provided by the facility owner(s) is the DC Tie Resource output.

(6) TSPs shall provide ERCOT with information describing all transmission Load connections on the ERCOT Transmission Grid. Individual Load connections may be combined, at the discretion of ERCOT, with other Load connections on the same transmission line to represent a Model Load to facilitate state estimation of Loads that do not telemeter Load measurements. ERCOT shall define “Model Loads”, which may be one or more combined Loads, for use in its Network Operations Model. A Model Load cannot be used to represent Load connections that are in different Load Zones.

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| ***[NPRR857: Replace paragraph (6) above with the following upon system implementation:]***(6) Each TSP and DCTO shall provide ERCOT with information describing all transmission Load connections on the ERCOT Transmission Grid. Individual Load connections may be combined, at the discretion of ERCOT, with other Load connections on the same transmission line to represent a Model Load to facilitate state estimation of Loads that do not telemeter Load measurements. ERCOT shall define “Model Loads”, which may be one or more combined Loads, for use in its Network Operations Model. A Model Load cannot be used to represent Load connections that are in different Load Zones.  |

(7) ERCOT may require TSPs to provide additional Load telemetry to provide adequate modeling of the transmission system in accordance with Section 3.10.7.5, Telemetry Standards. When the TSP does not own the station for which additional Load telemetry is being requested, the TSP shall request that the owner make the telemetry available. The TSP shall notify ERCOT if the owner does not comply with the request.

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| ***[NPRR857: Replace paragraph (7) above with the following upon system implementation:]***(7) ERCOT may require TSPs and DCTOs to provide additional Load telemetry to provide adequate modeling of the transmission system in accordance with Section 3.10.7.5, Telemetry Standards. When the TSP or DCTO does not own the station for which additional Load telemetry is being requested, the TSP shall request that the owner make the telemetry available. The TSP or DCTO shall notify ERCOT if the owner does not comply with the request.  |

(8) ERCOT shall create a DC Tie Load to represent an equivalent Load withdrawal to represent the flow from the ERCOT Transmission Grid from operation of DC Ties. The actual withdrawal flow on the DC Tie from telemetry provided by the facility owner(s) is the DC Tie Load output.

(9) Each TSP shall also provide information to ERCOT describing automatic Load transfer (rollover) plans and the events that trigger which Loads are switched to other Transmission Elements on detection of Outage of a primary Transmission Element. ERCOT shall accommodate Load rollover plans in the Network Operations Model

(10) Loads associated with a Generation Resource in a common switchyard as defined in Section 10.3.2.3, Generation Netting for ERCOT-Polled Settlement Meters, and served through a transformer owned by the Resource Entity is treated as an auxiliary Load and must be netted first against any generation meeting the requirements under Section 10.3.2.3.

(11) For purposes of Day-Ahead Market (DAM) Ancillary Services clearing, transmission Outages will be presumed not to affect the availability of any Load Resource for which an offer is submitted. In the event that ERCOT contacts a TSP and confirms that load will not remain connected during a transmission Outage, ERCOT will temporarily override the energization status of the load in DAM to properly reflect the status during the Outage.

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| ***[NPRR1016: Replace paragraph (11) above with the following upon system implementation:]***(11) If the Day-Ahead Market (DAM) determines, in the processing of Outages, that a Load Resource, DGR, or DESR is de-energized in the ERCOT Network Operations Model, the de-energized Resource will be eligible to receive Ancillary Service awards in the DAM, but will not be eligible to receive energy awards in the DAM. |

(12) A Resource Entity may aggregate Intermittent Renewable Resource (IRR) generation equipment together to form an IRR (WGR or PVGR) if the generation equipment is behind the same main power transformer and is the same model and size, and the aggregation does not reduce ERCOT’s ability to model pre- and post-contingency conditions. A Resource Entity may also aggregate IRR generation equipment that is not the same model and size together with an existing IRR only if:

(a) The mix of IRR generation equipment models and sizes causes no degradation in the dynamic performance of the IRR represented by the parameters modeled by ERCOT in operational studies and the aggregation of IRR generation equipment does not limit ERCOT’s ability to model the ERCOT Transmission Grid and the relevant contingencies required for monitoring pre- and post-contingency system limits and conditions;

(b) The mix of IRR generation equipment is included in the Resource Registration data submitted for the WGR;

(c) All relevant IRR generation equipment data requested by ERCOT is provided;

(d) With the addition of dissimilar IRR generation equipment, the existing IRR shall continue to meet the applicable Protocol performance requirements, including but not limited to Primary Frequency Response, dynamic capability and Reactive Power capability, at the POIB; and

(e) Either:

(i) No more than the lower of 5% or ten MW aggregate capacity is of IRR generation equipment that is not the same model or size from the other equipment within the existing IRR; or

(ii) The wind turbines that are not the same model or size meet the following criteria:

(A) The IRR generation equipment has similar dynamic characteristics to the existing IRR generation equipment, as determined by ERCOT in its sole discretion;

(B) The MW capability difference of each generator is no more than 10% of each generator’s maximum MW rating; and

(C) For WGRs, the manufacturer’s power curves for the wind turbines have a correlation of 0.95 or greater with the other wind turbines within the existing WGR over wind speeds of 0 to 18 m/s.

3.10.7.3 Modeling of Private Use Networks

(1) ERCOT shall create and use network models describing Private Use Networks according to the following:

(a) A Generation Entity with a Resource located within a Private Use Network shall provide data to ERCOT, for use in the Network Operations Model, for each of its individual generating unit(s) located within the Private Use Network in accordance with Section 3.3.2.1, Information to Be Provided to ERCOT, if it meets any one of the following criteria:

(i) Contains a generator greater than ten MW and is registered with the PUCT according to P.U.C. Subst. R. 25.109, Registration of Power Generation Companies and Self-Generators, as a power generation company; or

(ii) Is part of a Private Use Network which contains more than one connection to the ERCOT Transmission Grid; or

(iii) Contains generation registered to provide Ancillary Services.

(b) A Generation Entity with an SOTSG shall provide to ERCOT annually, or more often upon change, the following information for ERCOT’s use in the Network Operations Model, for each of its individual generating unit(s) located within the Private Use Network:

(i) Equipment owner(s);

(ii) Equipment operator(s);

(iii) TSP substation name connecting the Private Use Network to the ERCOT System;

(iv) At the request of ERCOT, a description of Transmission Elements within the Private Use Network that may be connected through breakers or switches;

(v) Net energy delivery metering, as required by ERCOT, to and from the Private Use Network and the ERCOT System at the POIB;

(vi) For each individual generator located within the Private Use Network, the gross capacity in MW and its reactive capability curve;

(vii) Maximum and minimum reasonability limits of the Load located within the Private Use Network;

(viii) Outage schedule for each generation unit located within the Private Use Network, updated as changes occur from the annually submitted information; and

(ix) Other interconnection data as required by ERCOT.

(c) Energy delivered to ERCOT from an SOTSG shall be settled in accordance with Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone.

(d) ERCOT shall ensure the Network Operations Model properly models the physical effect of the loss of generators and Transmission Elements on the ERCOT Transmission Grid equipment loading, voltage, and stability.

(e) ERCOT may require the owner or operator of a Private Use Network to provide information to ERCOT and the TSP on Transmission Facilities located within the Private Use Network for use in the Network Operations Model if the information is required to adequately model and determine the security of the ERCOT Transmission Grid, including data to perform loop flow analysis of Private Use Networks.

(f) ERCOT shall review submittals of modeling data from owners or operators of Private Use Networks assure that it will result in correct analysis of ERCOT Transmission Grid security.

3.10.7.5.2 Continuous Telemetry of the Real-Time Measurements of Bus Load, Voltages, Tap Position, and Flows

(1) Each TSP or QSE shall provide telemetry of voltages, flows, and Loads on any modeled Transmission Element to the extent such may be required to estimate all transmission Load withdrawals and generation injections to and from the ERCOT Transmission Grid using the SE and as needed to achieve the State Estimator Standards with consideration given to the economic implications of inaccurate LMP results versus the cost to remedy.

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| ***[NPRR857: Replace paragraph (1) above with the following upon system implementation:]***(1) Each TSP, DCTO, and QSE shall provide telemetry of voltages, flows, and Loads on any modeled Transmission Element to the extent such may be required to estimate all transmission Load withdrawals and generation injections to and from the ERCOT Transmission Grid using the SE and as needed to achieve the State Estimator Standards with consideration given to the economic implications of inaccurate LMP results versus the cost to remedy. |

(2) Each QSE that represents a Split Generation Resource, with metering according to Section 3.8, Special Considerations for Split Generation Meters, Combined Cycle Generation Resources, Quick Start Generation Resources, Hydro Generation Resources, and Energy Storage Resources, shall provide ERCOT with telemetry of the actual equivalent generator injection of its Split Generation Resource and the Master QSE shall provide telemetry in accordance with Section 6.5.5.2, Operational Data Requirements, on a total Generation Resource basis. ERCOT shall calculate the sum of each QSE’s telemetry on a Split Generation Resource and compare the sum to the telemetry for the total Generation Resource. ERCOT shall notify each QSE representing a Split Generation Resource of any errors in telemetry detected by the SE.

(3) Each TSP shall provide telemetered measurements on modeled Transmission Elements to ensure SE observability, per the Telemetry Standards, of any monitored voltage and power flow between their associated transmission breakers to the extent such can be shown to be needed in achieving the State Estimator Standards. On monitored non-Load substations, each TSP shall install, at the direction of ERCOT, sufficient telemetry such that there is an “N-1 Redundancy.” An N-1 Redundancy exists if the substation remains observable on the loss of any single measurement pair (kW, kVAr) excluding station RTU communication path failures. In making the determination to request additional telemetry, ERCOT shall consider the economic implications of inaccurate representation of Load models in LMP results versus the cost to remedy.

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| ***[NPRR857: Replace paragraph (3) above with the following upon system implementation:]***(3) Each TSP and DCTO shall provide telemetered measurements on modeled Transmission Elements to ensure SE observability, per the Telemetry Standards, of any monitored voltage and power flow between their associated transmission breakers to the extent such can be shown to be needed in achieving the State Estimator Standards. On monitored non-Load substations, each TSP and DCTO shall install, at the direction of ERCOT, sufficient telemetry such that there is an “N-1 Redundancy.” An N-1 Redundancy exists if the substation remains observable on the loss of any single measurement pair (kW, kVAr) excluding station RTU communication path failures. In making the determination to request additional telemetry, ERCOT shall consider the economic implications of inaccurate representation of Load models in LMP results versus the cost to remedy. |

(4) The accuracy of the SE is critical to successful market operations. For this reason it is a critical objective for ERCOT to maintain reasonable and accurate results of the SE. ERCOT shall use all reasonable efforts to achieve that objective, including the provision of legitimate constraints used in calculating LMPs.

(5) Each TSP, QSE and ERCOT shall develop a continuously operated program to maintain telemetry of all Transmission Element measurements to provide accurate SE results as per the State Estimator Standards. For any location where there is a connection of multiple, measured, Transmission Elements, ERCOT shall have an automated process to detect and notify ERCOT System operators if the residual sum of all telemetered measurements is more than:

(a) Five percent of the largest line Normal Rating at the SE Bus; or

(b) Five MW, whichever is greater.

If a location chronically fails this test, ERCOT shall notify the applicable TSP or QSE and suggest actions that the TSP or QSE could take to correct the failure. Within 30 days, the TSP or QSE shall take the actions necessary to correct the failure or provide ERCOT with a detailed plan with a projected time frame to correct the failure. ERCOT shall post a notice on the MIS Secure Area of any SE Buses not meeting the State Estimator Standards, including a list of all measurements and the residual errors on a monthly basis.

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| ***[NPRR857: Replace paragraph (5) above with the following upon system implementation:]***(5) Each TSP, DCTO, QSE, and ERCOT shall develop a continuously operated program to maintain telemetry of all Transmission Element measurements to provide accurate SE results as per the State Estimator Standards. For any location where there is a connection of multiple, measured, Transmission Elements, ERCOT shall have an automated process to detect and notify ERCOT System operators if the residual sum of all telemetered measurements is more than:(a) Five percent of the largest line Normal Rating at the SE Bus; or (b) Five MW, whichever is greater. If a location chronically fails this test, ERCOT shall notify the applicable TSP, DCTO, or QSE and suggest actions that the TSP, DCTO, or QSE could take to correct the failure. Within 30 days, the TSP, DCTO, or QSE shall take the actions necessary to correct the failure or provide ERCOT with a detailed plan with a projected time frame to correct the failure. ERCOT shall post a notice on the MIS Secure Area of any SE Buses not meeting the State Estimator Standards, including a list of all measurements and the residual errors on a monthly basis.  |

(6) ERCOT shall implement a study mode version of the SE with special tools designed for troubleshooting and tuning purposes that can be used independently of any other ERCOT process that is dependent on the Real-Time SE. ERCOT shall implement a process to recognize inaccurate SE results and shall create and implement alternative Real-Time LMP calculation processes for use when inaccurate results are detected. ERCOT must be guided in this by the State Estimator Standards.

(7) ERCOT shall establish a system to provide overload and over/under limit alarming on all Transmission Elements monitored as constraints in the LMP models.

(8) Each TSP shall designate which telemetered measurement of the POIB voltage shall be utilized to determine compliance with Voltage Set Point instructions, and then update the designation as necessary in the Network Operations Model by submitting a NOMCR. Each TSP shall telemeter this POI kV bus measurement to ERCOT. If the TSP cannot provide a kV bus measurement at the POI, the TSP may propose an alternate location subject to ERCOT approval.

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 (including self-serve generating units) 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 and NPRR1016: Replace applicable portions of 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 5.1.1, 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 5.1.1, 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.

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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. |

(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.

3.15.1 ERCOT Responsibilities Related to Voltage Support

(1) ERCOT, in coordination with the TSPs, shall establish, and update as necessary, a Voltage Profile at the POIB for each Generation Resource required to provide VSS to maintain system voltages within established limits.

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| ***[NPRR989: Replace paragraph (1) above with the following upon system implementation:]***(1) ERCOT, in coordination with the TSPs, shall establish, and update as necessary, a Voltage Profile at the POIB for each Generation Resource and ESRs required to provide VSS to maintain system voltages within established limits. |

(2) ERCOT shall communicate to the Qualified Scheduling Entity (QSE) and TSPs the desired voltage at the POIB by providing Voltage Profiles.

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| ***[NPRR989: Replace paragraph (2) above with the following upon system implementation:]***(2) ERCOT shall communicate to the Qualified Scheduling Entity (QSE) and TSPs the desired voltage at the POIB by providing Voltage Profiles. |

(3) ERCOT, in coordination with TSPs, shall deploy static Reactive Power Resources as required to continuously maintain dynamic reactive reserves from QSEs, both leading and lagging, adequate to meet ERCOT System requirements.

(4) For any Market Participant’s failure to meet the Reactive Power voltage control requirements of these Protocols, ERCOT shall notify the Market Participant in writing of such failure and, upon a request from the Market Participant, explain whether and why the failure must be corrected.

(5) ERCOT shall notify all affected TSPs of any alternative requirements it approves.

(6) Annually, ERCOT shall review Distribution Service Provider (DSP) power factors using the actual summer Load and power factor information included in the annual Load data request to assess whether DSPs comply with the requirements of this subsection. At times selected by ERCOT, ERCOT shall require manual power factor measurement at substations and points of interconnection for Load that do not have power factor metering. ERCOT shall try to provide DSPs sufficient notice to perform the manual measurements. ERCOT may not request more than four measurements per calendar year for each DSP substation or points of interconnection for Load where power factor measurements are not available.

(7) If actual conditions indicate probable non-compliance of TSPs and DSPs with the requirements to provide voltage support, ERCOT shall require power factor measurements at the time of its choice while providing sufficient notice to perform the measurements.

(8) ERCOT shall investigate claims of TSP and DSP alleged non-compliance with Voltage Support requirements. The ERCOT investigator shall advise ERCOT and TSP planning and operating staffs of the results of such investigations.

3.15.2 DSP Responsibilities Related to Voltage Support

(1) Each DSP and Resource Entity within a Private Use Network shall meet the requirements specified in this subsection, or at their option, may meet alternative requirements specifically approved by ERCOT. Such alternative requirements may include requirements for aggregated groups of Facilities.

(a) Sufficient static Reactive Power capability shall be installed by a DSP or a Resource Entity within a Private Use Network not subject to a DSP tariff in substations and on the distribution voltage system to maintain at least a 0.97 lagging power factor for the maximum net active power measured in aggregate on the distribution voltage system. In those cases where a Private Use Network’s power factor is established and governed by a DSP tariff, a Resource Entity within a Private Use Network shall ensure that the Private Use Network meets the requirements as defined and measured in the applicable tariff.

(b) DSP substations whose annual peak Load has exceeded ten MW shall have and maintain Watt/VAr metering sufficient to monitor compliance; otherwise, DSPs are not required to install additional metering to determine compliance.

(c) All DSPs shall report any changes in their estimated net impact on ERCOT as part of the annual Load data assessment.

(d) As part of the annual Load data assessment, all Resource Entities owning Generation Resources shall provide an annual estimate of the highest potential affiliated MW and MVAr Load (including any Load netted with the generation output) and the highest potential MW and MVAr generation that could be experienced at the POIB, based on the current configuration (and the projected configuration if the configuration is going to change during the year) of the Generation Resource and any affiliated Loads.

6.5.7.7 Voltage Support Service

(1) ERCOT shall coordinate with TSPs the creation and maintenance of Voltage Profiles as described in Section 3.15, Voltage Support.

(2) ERCOT shall instruct the interconnecting TSP, or the TSP’s agent, to make Voltage Set Point adjustments, as necessary, within the Generation Resource’s Unit Reactive Limit (URL) provided to ERCOT. The interconnecting TSP, or the TSP’s agent, shall instruct any QSE or Resource Entity representing a Generation Resource to make the Voltage Set Point adjustments instructed by ERCOT, or as the TSP determines to be necessary. If ERCOT determines that a Generation Resource should be instructed to provide additional MVAr beyond its URL or that a Generation Resource’s real power output should be decreased to allow the Generation Resource to provide additional Reactive Power beyond the URL, ERCOT shall issue a Resource-specific Dispatch Instruction requiring any change in Reactive Power and/or real power output, except that ERCOT may not require a Generation Resource to exceed its excitation limits.

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| [NPRR989: Replace paragraph (2) above with the following upon system implementation:](2) ERCOT shall instruct the interconnecting TSP, or the TSP’s agent, to make Voltage Set Point adjustments, as necessary, within the Generation Resource’s or ESR’s Corrected Unit Reactive Limit (CURL) provided to ERCOT. The interconnecting TSP, or the TSP’s agent, shall instruct any QSE or Resource Entity representing a Generation Resource or ESR to make the Voltage Set Point adjustments instructed by ERCOT, or as the TSP determines to be necessary. If ERCOT determines that a Generation Resource or ESR should be instructed to provide additional MVAr beyond its URL or that a Generation Resource’s or ESR’s real power output should be decreased to allow the Generation Resource or ESR to provide additional Reactive Power beyond the URL, ERCOT shall issue a Resource-specific Dispatch Instruction requiring any change in Reactive Power and/or real power output, except that ERCOT may not require a Generation Resource or ESR to exceed its operational limits. |

(3) ERCOT and TSPs shall develop procedures for the operation of transmission-controlled reactive Resources in order to minimize the dependence on generation-supplied reactive Resources. For Generation Resources required to provide Voltage Support Service (VSS), GSU transformer tap settings must be managed to maximize the use of the ERCOT System for all Market Participants while maintaining adequate reliability.

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| [NPRR989: Replace paragraph (3) above with the following upon system implementation:](3) ERCOT and TSPs shall develop procedures for the operation of transmission-controlled reactive equipment in order to minimize the dependence on Reactive Power supplied by Generation Resources and ESRs. For Generation Resources and ESRs required to provide Voltage Support Service (VSS), GSU transformer tap settings must be managed to maximize the use of the ERCOT System for all Market Participants while maintaining adequate reliability. |

(4) Each TSP, under ERCOT’s direction, is responsible for monitoring and ensuring that all Generation Resources required to provide VSS have their dynamic reactive capability deployed in approximate proportion to their respective capability requirements.

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| [NPRR989: Replace paragraph (4) above with the following upon system implementation:](4) Each TSP, under ERCOT’s direction, is responsible for monitoring and ensuring that all Generation Resources and ESRs required to provide VSS have their dynamic reactive capability deployed in approximate proportion to their respective capability requirements. |

(5) Each Generation Resource required to provide VSS shall follow its Voltage Set Point as directed by ERCOT, the interconnecting TSP, or the TSP’s agent, within the operating Reactive Power capability of the Generation Resource.

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| [NPRR989: Replace paragraph (5) above with the following upon system implementation:](5) Each Generation Resource and ESR required to provide VSS shall follow its Voltage Set Point as directed by ERCOT, the interconnecting TSP, or the TSP’s agent, within the operating Reactive Power capability of the Generation Resource or ESR. |

(6) Each interconnecting TSP, or the TSP’s agent, shall telemeter via ICCP the Real-Time Voltage Set Point to ERCOT at the Point of Interconnection Bus (POIB) for each Generation Resource interconnected to the TSP’s system. Each interconnecting TSP, or the TSP’s agent shall modify the telemetered Voltage Set Point to match any verbal Voltage Set Point instructions as soon as practicable. ERCOT shall telemeter the Real-Time desired Voltage Set Point and the TSP-designated POIB kV measurement via ICCP to each QSE representing a Generation Resource. Each QSE representing a Generation Resource shall provide in Real-Time the desired Voltage Set Point and the associated POIB kV measurement provided by ERCOT to the Resource Entity for that Generation Resource.

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| [NPRR989 and NPRR1016: Replace applicable portions of paragraph (6) above with the following upon system implementation:](6) Each interconnecting TSP, or the TSP’s agent, shall telemeter via ICCP the Real-Time Voltage Set Point to ERCOT at the Point of Interconnection Bus (POIB) for each Generation Resource and ESRs interconnected to the TSP’s system required to provide VSS. Each interconnecting TSP, or the TSP’s agent shall modify the telemetered Voltage Set Point to match any verbal Voltage Set Point instructions as soon as practicable. ERCOT shall telemeter the Real-Time desired Voltage Set Point and the TSP-designated POIB kV measurement via ICCP to each QSE representing a Generation Resource or an ESR. Each QSE representing a Generation Resource or an ESR shall provide in Real-Time the desired Voltage Set Point and the associated POIB kV measurement provided by ERCOT to the Resource Entity for that Generation Resource or ESR. |

10.3.2.3 Generation Netting for ERCOT-Polled Settlement Meters

(1) Each Generation Resource and Settlement Only Generator (SOG) and each Load that is designated to be netted with that Generation Resource or SOG, including construction and maintenance Load that is netted with existing generation auxiliaries, must be physically metered at its POI to the ERCOT Transmission Grid or Service Delivery Point, or, in accordance with Section 10.3.2.2, Loss Compensation of EPS Meter Data, loss-compensated to its POI to the ERCOT Transmission Grid. Interval Data Recorders (IDRs) must be used to determine generator output or Load usage. In the intervals where the generation output exceeds the Load, the net must be settled as generation. In the intervals where the Load exceeds the generation output, the net must be settled as Load, and carry any applicable Load shared charges and credits.

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(2) For Settlement purposes, netting is not allowed except under the configurations described in paragraphs (a) through (e) below, and only if the service arrangement is otherwise lawful. ERCOT has no obligation to independently determine whether a site configuration that includes both Loads and Generation Resource(s) or SOGs complies with PURA or the PUCT Substantive Rules, and ERCOT’s approval of a metering proposal for such a site is not a verification of the legality of that arrangement.

(a) Single POI or Service Delivery Point ;

(b) Transmission-level interconnections where all POIs are located at the same substation, at the same voltage, and under normal operating conditions, are interconnected through common electrical equipment such as circuit breakers, connecting cables, bus bars, switches/isolators. Qualifying station arrangements include, but are not limited to, Generation and Load connected in a line bus, ring bus, double-breaker, or breaker-and-a-half configuration;

(c) Multiple POIs where the Loads and generator output are electrically connected to a common switchyard, as defined in paragraph (6) below. In addition, there must be sufficient generator capacity to serve all plant Loads for netting to occur;

(d) A Qualifying Facility (QF) with POIs, where the QF is selling energy to a thermal host, may net the Load meters of the thermal host with the QF’s generation meters when the Load and generation are electrically connected to a common switchyard. In instances in which Load is served by new on-site generation through a common switchyard, the TSP or DSP may install monitoring equipment necessary for measuring Load to determine stranded cost charges, if any are applicable, as determined under the PURA and applicable PUCT rules. For purposes of this Section, new on-site generation has the meaning as contained in Public Utility Regulatory Act, Tex. Util. Code Ann. §§ 39.252 and 39.262(k) (Vernon 1998 & Supp. 2007) (PURA); or

(e) For Generation Resources and/or Load with flow-through on a private, contiguous transmission system (not included in a TSP or DSP rate base) and in a configuration existing as of October 1, 2000, the meters at the interconnections with the ERCOT Transmission Grid may be netted for the purpose of determining Generation Resources or Load. For Settlement purposes, when the net is a Load, the metered interconnection points must be assigned to the same Load Zone and Unaccounted for Energy (UFE) zone.

(3) For Energy Storage Resource (ESR) sites, Wholesale Storage Load (WSL) must be separately metered from all other Loads and generation, and must be metered using EPS Metering Facilities.

(a) For configurations where the Resource Entity telemeters an auxiliary Load value to the EPS Meter:

(i) The total energy into the ESR must be separately metered from all other Loads and generation, and must be metered using EPS Metering Facilities and

(ii) The auxiliary Load energy shall be stored in the EPS Meter’s IDR, per channel assignments defined in the SMOG.

(b) For configurations where the WSL is not at a POI, it must be metered behind a single POI metering point, per the requirements in paragraph (3) or (3)(a) above; and

(c) WSL for a compressed air energy storage Load Resource is exempt from the requirement to be electrically connected to a common switchyard, as defined in paragraph (6) below.

(4) ERCOT shall maintain descriptions of the Metering Facilities of all common switchyards that contain multiple POIs of Loads (ESI IDs) and generation meters (EPS). The description is limited to identifying the Entities within a common switchyard and a simplified diagram showing the metering configuration of all Supervisory Control and Data Acquisition (SCADA) and Settlement Metering points.

(5) All Load(s) included in the netting arrangement for an EPS Metering Facility shall only be electrically connected to the ERCOT Transmission Grid through the EPS metering point(s) for such Facility.  Such Loads shall not be electrically connected to the ERCOT Transmission Grid through electrical connections that are not metered by the EPS metering point(s) for the Facility.

(6) For purposes of this Section, a common switchyard is defined as an electric substation Facility where the POI for Load and Generation Resources are located at the same Facility but where the interconnection points are physically not greater than 400 yards apart. The physical connections of the Load to its POI and the Generation Resource to its POI cannot be Facilities that have been placed in a TSP’s or DSP’s rate base.

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| ***[NPRR945: Insert paragraph (7) below upon system implementation:]***(7) ERCOT shall post on the ERCOT website a report listing all Generation Resources or Settlement Only Generators (SOGs) that have achieved commercial operations, excluding Decommissioned Generation Resources, Mothballed Generation Resources, and decommissioned SOGs, whose Resource Registration data indicates that the Generation Resource or SOG is part of a Private Use Network. The report must identify the name of the Generation Resource or SOG site, its nameplate capacity, and the date the Generation Resource or SOG was added to the report. The report shall not identify any confidential, customer-specific information regarding netted loads. ERCOT shall update the list at least monthly. |

**ERCOT Nodal Protocols**

**Section 23**

**Form K: Wide Area Network (WAN) Agreement**

**TBD**

**ERCOT Private Wide Area Network (WAN) Agreement**

This Private WAN Agreement (“Agreement”) is made and entered into on this       day of      ,       (“Effective Date”) by and between Electric Reliability Council of Texas, Inc. (ERCOT), a Texas non-profit corporation having an office at 7620 Metro Center Drive, Austin, Texas 78744-1654 and the undersigned entity (“Participant”) (collectively, “the Parties”), having an office at the address listed below.

**1. Scope**

1.1 This Agreement sets forth the terms, conditions and prices under which ERCOT agrees to allow Participant to interconnect Participant’s data transfer system with ERCOT’s data network and facilities for the sole purpose of transferring data between ERCOT and Participant. This Agreement also sets forth the terms and conditions to maintain operational security of the ERCOT WAN for the secure transfer of data between ERCOT and Participant.

1.2 Participant represents and warrants that Participant is a Market Participant as defined by the ERCOT Protocols and has executed (or will timely execute prior to participation as a Market Participant) all agreements required of Participant by the ERCOT Protocols (Protocols Agreement(s)). This Agreement shall terminate immediately and automatically upon the termination of all Participant’s Protocols Agreement(s). “ERCOT Protocols” shall mean the document adopted by ERCOT, including any attachments or exhibits referenced in that document, as amended from time to time that contains the scheduling, operating, planning, reliability, and settlement (including customer registration) policies, rules, guidelines, procedures, standards, and criteria of ERCOT.

1.3 Except to the extent provided otherwise in this Agreement, the terms and conditions of the Protocols Agreement(s) signed between Participant and ERCOT shall apply and be incorporated by reference into this Agreement. In the event of a conflict between this Agreement and the Protocols Agreement(s), this Agreement shall control with respect to the subject matter of this Agreement.

**2. Term of Agreement**

2.1 The initial term of this Agreement shall commence on the Effective Date and expire 12 months thereafter. The term of this Agreement shall automatically renew for a successive 12-month period on each anniversary date of the Effective Date, unless either party delivers to the other party written notice to terminate as provided herein.

2.2 If Participant wishes to terminate this Agreement, it shall notify ERCOT in writing of its desire to terminate. Termination shall be effective no sooner than 60 days following receipt of such written notice by ERCOT.

2.3 In addition to any other remedies ERCOT may have at law or in equity, ERCOT may terminate this Agreement for material breach in accordance with the default provisions set forth in the Protocols Agreement(s).

2.4 ERCOT may also terminate this Agreement upon 60 days’ written notice to Participant if ERCOT amends the form of this standard form agreement. In such event, ERCOT shall provide Participant the opportunity to execute a new standard form agreement regarding the subject matter of this Agreement.

2.5 In the event of any termination of this Agreement, Participant shall reimburse ERCOT for ERCOT’s expenses incurred hereunder prior to notice of termination. If this Agreement has been terminated except as proved under Section 2.4 above, ERCOT may remove from Participant’s premises any equipment for which ERCOT has not received payment and Participant shall reimburse ERCOT for the cost of such removal.

**3. Interconnection with and use of ERCOT WAN**

3.1 Participant shall interconnect its facilities with ERCOT in a manner consistent with and defined by ERCOT. ERCOT shall define and demarcate the location of interconnection with the ERCOT WAN.

3.2 ERCOT shall provide, in accordance with its reasonable discretion and control, the design, engineering, procurement, and installation of the equipment and facilities necessary to interconnect Participant’s Facilities to the ERCOT WAN. Participant shall reimburse ERCOT for ERCOT’s expenses incurred in design, engineering, procurement, and installation of such equipment and facilities for each such new installation. The reimbursed costs for each new installation shall not exceed the fees designated in the ERCOT Fee Schedule. Only ERCOT-authorized personnel shall conduct network problem diagnosis and administrative functions, including, but not limited to, provisioning, monitoring, and auditing the ERCOT WAN. Participant will reimburse ERCOT’s cost of performing or acquiring such services per month per installation during the initial term hereof and any subsequent renewal terms. The monthly cost per installation shall not exceed the fees designated in the ERCOT Fee Schedule. Participant will also reimburse ERCOT’s cost of providing or acquiring data transport service to Participant, which cost will vary according to Participant’s location.

3.3 With respect to access to the ERCOT WAN, Participant will comply with ERCOT’s security and safety procedures and requirements, including, but not limited to, access restrictions, sign in, and identification requirements. Participant will also comply with all ERCOT policies and procedures regarding use of the ERCOT WAN (as such policies and procedures may be amended from time to time), including, but not limited to, the document entitled “Communicating with ERCOT,” the document entitled “QSE Qualification Testing,” the ERCOT Operating Guides and ERCOT Protocols.

3.4 Participant shall consistently maintain the security of its computer systems (including the interconnection with the ERCOT WAN, support equipment, systems, tools, and/or data required under this Agreement) in accordance with industry standards for computer system security.

3.5 Participant shall maintain operational security of the ERCOT WAN for the uninterrupted transfer of data between ERCOT and Participant. Participant agrees that the integrity of the data provided through the WAN is essential, and will take all steps and responsibility for ensuring the integrity of such data. Such steps shall include, at a minimum, ensuring the prevention of any remote electronic connections by unauthorized persons or organizations through Participant’s network to the ERCOT WAN connection point. Particularly, Participant’s systems must deny any connectivity with Participant’s internet access point to unauthorized persons or organizations.

3.6 If ERCOT determines, within its reasonable discretion, that Participant is not in compliance with this Agreement or ERCOT’s security procedures and requirements, ERCOT may prohibit Participant from transferring data using the WAN.

3.7 Where one Party’s information resides on the other Party’s computer system, the Party in control of the computer system shall take, or cause the custodian of the computer system to take commercially reasonable measures to prevent unauthorized access to such information by others who have access to that computer system. Each Party agrees that it, its employees, agents and representatives who have access to its computer systems at its facilities will not use the WAN and/or the interconnection with the ERCOT WAN to obtain or to attempt to obtain unauthorized access to information of the other Party or information of a third party that may reside on the other Party’s computer system.

**4. Network Maintenance and Management**

4.1 As part of the WAN Application, Participant has provided ERCOT contact information for network maintenance and management. Participant may change such contact information by submitting a Notice of Change of Information (NCI) (Section 23, Form E) to ERCOT, and referring specifically to this Agreement.

4.2 Participant will not use any service provided under this Agreement in a manner that impairs the quality of service to other WAN users. Participant shall cooperate with ERCOT in the testing of interconnection to the WAN and in the prevention or correction of disruption or loss of service over the WAN.

4.3 ERCOT agrees to provide Participant reasonable written notice of changes in the information necessary for the transmission and routing of data using ERCOT’s facilities or networks, as well as other changes that affect the interoperability of those respective facilities and networks.

4.4 Participant agrees to notify the ERCOT Help Desk immediately of any intrusion or virus event within its network or systems connected to the ERCOT WAN so that ERCOT can take steps to ensure the integrity of the rest of the WAN.

**5. Compensation**

5.1 Participant agrees to reimburse ERCOT for ERCOT’s expenses incurred in the design, engineering, procurement, and installation of equipment and facilities hereunder. Participant further agrees to pay ERCOT for any additional services rendered by ERCOT under this Agreement; to the extent such expenses and chargers are assessed pursuant to Section 3.2 above.

5.2 ERCOT will remit a bill to Participant to reflect the charges required and permitted pursuant to Section 3.2 above under this Agreement, any applicable taxes, and other costs or charges that are the responsibility of Participant, but were incurred by ERCOT. Payment is due within 30 days of receipt of the bill.

5.3 Payments shall be made either through bank draft or wire transfer, as agreed upon by the parties. Interest shall accrue on any past due amount at the lesser of: (a) 18% per annum; or (b) the maximum rate permitted by applicable law. If Participant fails to make payment within 30 days of receipt of the bill, ERCOT may, at its option, terminate this Agreement.

**6. Liability**

6.1 EXCEPT TO THE EXTENT REQUIRED BY STATE OR FEDERAL LAW, ERCOT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY AS TO MERCHANT ABILITY OR FITNESS FOR INTENDED OR PARTICULAR PURPOSE WITH RESPECT TO EQUIPMENT OR SERVICES PROVIDED HEREUNDER. ADDITIONALLY, ERCOT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, CONCERNING PARTICIPANT’S (OR ANY THIRD PARTY’S) RIGHTS WITH RESPECT TO INTELLECTUAL PROPERTY OR THIRD PARTY CONTRACT RIGHTS, INCLUDING WHETHER SUCH RIGHTS WILL BE VIOLATED BY PARTICIPANT’S INTERCONNECTION WITH ERCOT’S WAN OR PARTICIPANT’S USE OF THE OTHER EQUIPMENT OR FACILITIES FURNISHED UNDER THIS AGREEMENT.

6.2 Each Party understands and acknowledges that third parties might obtain unauthorized remote access to the other Party’s computer systems, and further, that there exists the possibility that such third parties may attempt unauthorized access to the computer systems or information thereon, that computer viruses may be transmitted, and that damage might result to a Party’s computer systems or data thereon, or that the confidentiality of a Party’s information may thereby be breached. ACCORDINGLY, EACH PARTY SHALL BE SOLELY AND EXCLUSIVELY RESPONSIBLE FOR SAFEGUARDING ITS OWN COMPUTER SYSTEMS AND INFORMATION THEREON FROM SUCH UNAUTHORIZED ACCESS OR DAMAGE OCCURRING THROUGH THE INTERCONNECTION WITH ERCOT UNDER THIS AGREEMENT AND FOR THE ACTIONS OF ITS EMPLOYEES, AGENTS, AND REPRESENTATIVES WHO USE ITS COMPUTER SYSTEMS.

**7. Notices**

Except as provided herein for operational communications, all notices required to be given under this Agreement shall be in writing, and shall be deemed delivered three days after being deposited in the U.S. mail, first class postage prepaid, registered (or certified) mail, return receipt requested, addressed to the other Party at the address specified in this Agreement or shall be deemed delivered on the day of receipt if sent in another manner requiring a signed receipt, such as courier delivery or Federal Express delivery. ERCOT may change its address for such notices by delivering to Participant a written notice referring specifically to this Agreement. Participant may change its address for such notices by submitting an NCI (Section 23, Form E) to ERCOT and referring specifically to this Agreement.

**8. Entire Agreement and Amendments**

8.1 This Agreement constitutes the entire agreement between the Parties concerning the subject matter hereof and supersedes any prior agreements, representations, statements, negotiations, understandings, proposals or undertakings, oral or written, with respect to the subject matter expressly set forth herein.

8.2 Neither Party will be bound by an amendment, modification or additional term unless it is reduced to writing and signed by an authorized representative of the Party sought to be bound.

*Each person whose signature appears below represents and warrants that he or she has authority to bind the Party on whose behalf he or she has executed this Agreement.*

*Executed and Agreed:*

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| Electric Reliability Council of Texas, Inc.:Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Printed Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_7620 Metro Center DriveAustin, Texas 78744-1654(512) 225-7000 | Participant:      Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:      Printed Name:      Title:      Address:      City, State, Zip:      Type of Organization:      Organized Under the Laws of:       |