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| NPRR Number | [1077](http://www.ercot.com/mktrules/issues/NPRR1077) | NPRR Title | Extension of Self-Limiting Facility Concept to Settlement Only Generators (SOGs) and Telemetry Requirements for SOGs |
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| Date Posted | | June 10, 2021 | |

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| Submitter’s Information | |
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| Market Segment | Not Applicable |

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| **Comments** |

ERCOT submits these comments to provide further revisions consistent with the purpose of this Nodal Protocol Revision Request (NPRR). As submitted, this NPRR requires any Qualified Scheduling Entity (QSE) representing a Settlement Only Generator (SOG) to provide real-time telemetry of certain values, including the SOG’s net real power injection. Because telemetry of net output would be required for all SOGs, this NPRR also deletes grey-boxed language previously approved in NPRR829, Incorporate Real-Time Non-Modeled Telemetered Net Generation by Load Zone into the Estimate of RTL, that would have required telemetry of a SOG’s net generation only if the QSE chose to include that net generation in its estimate of Real-Time Liability (RTL). In these comments, ERCOT introduces revisions to Section 6.3.2, Activities for Real-Time Operations, and Section 16.11.4.3.2, Real-Time Liability Estimate, to clarify that net output will now be included in the estimate of RTL for all SOGs since ERCOT will have telemetry of net output for all SOGs.

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| **Market Rules Notes** |

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

* NPRR995, RTF-6 Create Definition and Terms for Settlement Only Energy Storage
  + Section 3.8.7
  + Section 6.5.5.2

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| Revised Cover Page Language |

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| Nodal Protocol Sections Requiring Revision | 2.1, Definitions  3.8.7, Self-Limiting Facility  6.3.2, Activities for Real-Time Operations  6.5.5.2, Operational Data Requirements  16.11.4.3.2, Real-Time Liability Estimate |
| Revision Description | This Nodal Protocol Revision Request (NPRR) expands the Self-Limiting Facility concept introduced in NPRR1026, BESTF-7 Self-Limiting Facilities, to include sites with one or more Settlement Only Generators (SOGs). This NPRR also introduces a number of additional revisions to fully address requirements for generators and Energy Storage Systems (ESSs) that are connected at distribution voltage.  In order to ensure that SOGs in Self-Limiting Facilities abide by established MW Injection and MW Withdrawal limits, and in order to ensure that ERCOT operators and system planners have clear visibility into the performance of SOGs, this NPRR requires the Qualified Scheduling Entity (QSE) for any SOG to provide telemetry of the injection or withdrawal at the Point of Interconnection (POI) (for transmission-connected sites) or Point of Common Coupling (POCC) (for distribution-connected sites) as well as telemetry of gross real power injection and withdrawal at the generator terminals and the status of each SOG’s breaker. Self-Limiting Facilities that include SOGs would be subject to the same consequences as other Self-Limiting Facilities when the MW Injection or MW Withdrawal limit is exceeded. |
| Business Case | Since NPRR1026 was submitted, a number of developers have indicated to ERCOT that extending the Self-Limiting Facility concept to include SOGs would benefit the development of their facilities, primarily by allowing co-located storage and solar to share a common inverter without counting the aggregate output of each source of generation, which could trigger a more extensive interconnection process. ERCOT sees no reason that Self-Limiting Facility concept should not be extended to SOGs. However, to ensure that Self-Limiting Facility sites with SOGs comply with their established MW Injection and MW Withdrawal limits, this NPRR proposes to require telemetry of the MW Injection and MW Withdrawal values at the POI or POCC.  In addition to facilitating enforcement of Self-Limiting Facility limits, this net telemetry will provide greater visibility of SOG performance to ERCOT operations and planning personnel. However, to further support this visibility, this NPRR also requires SOGs to provide telemetry of gross real power output or withdrawal, as measured at the generator terminals. The requirement to provide these additional telemetered values will satisfy one part of Item Number 7 on the TAC Emergency Conditions List, which identifies a need to “[e]xpand registration and Real-Time data requirements for all types of resources beyond current modeling requirements (e.g., distribution-level resources) to enhance situational awareness for planning and operational purposes.” The telemetry requirements in this NPRR are consistent with ERCOT’s existing authority in Section 3.10.7.3, Modeling of Private Use Networks, to require QSEs to provide gross and net generator telemetry for Settlement Only Transmission Self-Generators, but this NPRR extends this requirement to all SOGs, so as to give ERCOT better visibility for planning and operations.  ERCOT notes that NPRR866, Mapping Registered Distributed Generation and Load Resources to Transmission Loads in the Network Operations Model, was implemented to map Settlement Only Distribution Generators (SODG) to their Common Information Model (CIM) Loads to provide better visibility to ERCOT operations using the Load telemetry. ERCOT subsequently developed in-house tools in an effort to indirectly measure the output from these generators. However, during 2021 Winter Storm Uri, the indirect measurements from Loads were ineffective for determining SODG output during Load-shed, which highlighted the operational need for telemetry. |

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| Revised Proposed Protocol Language |

## 2.1 DEFINITIONS

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| [NPRR1026: Insert the following definition “MW Injection” upon system implementation:]  **MW Injection**  The instantaneous Megawatt (MW) energy injected into the ERCOT System as measured at the Point of Interconnection (POI) or Point of Common Coupling (POCC). |

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| [NPRR1026: Insert the following definition “MW Withdrawal” upon system implementation:]  **MW Withdrawal**  The instantaneous Megawatt (MW) energy withdrawn from the ERCOT System as measured at the Point of Interconnection (POI) or Point of Common Coupling (POCC). |

**Point of Common Coupling**

Any point where a Distribution Service Provider’s facilities are connected to the Facilities of a Customer or a Generation Entity.

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| [NPRR1026: Insert the following definition “Self-Limiting Facility” upon system implementation:]  **Self-Limiting Facility**  A modeled generation station that includes one or more Generation Resources, Energy Storage Resources (ESRs), and/or Settlement Only Generators (SOGs) with an established limit on the total MW Injection that is less than the total nameplate capacity of all registered generators or Energy Storage Systems (ESSs) within the Facility. A Facility with one or more ESRs may also have an established limit on the MW Withdrawal that is less than the total nameplate MW Withdrawal rating of all ESRs within the facility. |

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| ***[NPRR1026: Insert Section 3.8.7 below upon system implementation:]***  ***3.8.7 Self-Limiting Facility***  (1) A Resource Entity or Interconnecting Entity (IE) for a Self-Limiting Facility may establish a MW Injection or MW Withdrawal limit by submitting an attestation in a form designated by ERCOT through the Resource Registration process. The Resource Entity or IE shall simultaneously provide a copy of the attestation to the interconnecting Transmission and/or Distribution Service Provider (TDSP). All registered generators or Energy Storage Systems (ESSs) within a Self-Limiting Facility shall be represented by a single Resource Entity and a single Qualified Scheduling Entity (QSE).  (2) A Self-Limiting Facility shall not inject or withdraw power in excess of its established MW Injection limit or its established MW Withdrawal limit.  (3) On a monthly basis, ERCOT will report to the Reliability Monitor and IMM any instance where a Self-Limiting Facility’s actual MW Injections exceeded the MW Injection limit or where actual MW Withdrawals exceeded the MW Withdrawal limit established in the Resource Registration data for the Self-Limiting Facility, based on the telemetry of the injection and withdrawal values provided by the QSE for the registered generator or ESS in the Self-Limiting Facility, as described in Section 3.9.1, Current Operating Plan (COP) Criteria, and in Section 6.5.5.2, Operational Data Requirements, or based on the meter data at the Point of Interconnection (POI) or Point of Common Coupling (POCC) for the Self-Limiting Facility.  (4) If requested by ERCOT, the relevant QSE shall provide meter data to confirm whether the established limits for a Self-Limiting Facility were violated.  (5) If ERCOT determines that a Self-Limiting Facility connected at transmission voltage has exceeded either its MW Injection limit or its MW Withdrawal limit established in the Resource Registration data by more than the greater of 5 MW or 3% of the limit, the Self-Limiting Facility shall submit a new generation interconnection request based on the installed MW capacity of the individual Resource(s) and shall deregister as a Self-Limiting Facility at the completion of the generation interconnection process. The Self-Limiting Facility shall be subject to the established MW Injection limit and any established MW Withdrawal limit until the generation interconnection process has been completed.  (6) A Distribution Service Provider (DSP) may limit injections and withdrawals from any Generation Resource, Settlement Only Generator (SOG), or ESR based on Resource Registration data and the interconnection agreement between the DSP and the IE or Resource Entity. In that case, the IE or Resource Entity shall submit the attestation required by paragraph (1) above, and shall be considered a Self-Limiting Facility.  (7) If ERCOT determines that a Self-Limiting Facility connected at distribution voltage has exceeded either its MW Injection limit or its MW Withdrawal limit established in the Resource Registration data, the Self-Limiting Facility shall submit a new generation interconnection request based on the installed MW capacity of the individual Resource(s) and shall be deregistered as a Self-Limiting Facility at the completion of the generation interconnection process. The Self-Limiting Facility shall be subject to any MW Injection or MW Withdrawal limit until the generation interconnection process has been completed.  (8) The interconnecting TDSP, at its sole discretion, may use relaying to ensure a Self-Limiting Facility does not inject or withdraw energy in excess of its MW Injection or MW Withdrawal limits in order to protect the TDSP’s limiting element(s). |

6.3.2 Activities for Real-Time Operations

(1) Activities for Real-Time operations begin at the end of the Adjustment Period and conclude at the close of the Operating Hour.

(2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

| **Operating Period** | **QSE Activities** | **ERCOT Activities** |
| --- | --- | --- |
| During the first hour of the Operating Period |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating Period  Review the list of Off-Line Available Resources with a start-up time of one hour or less  Review and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailments  Snapshot the Scheduled Power Consumption for Controllable Load Resources |
| Before the start of each SCED run | Update Output Schedules for DSRs | Validate Output Schedules for DSRs  Execute Real-Time Sequence |
| SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy prices |
| During the Operating Hour | Telemeter the Ancillary Service Resource Responsibility for each Resource  Acknowledge receipt of Dispatch Instructions  Comply with Dispatch Instruction    Review Resource Status to assure current state of the Resources is properly telemetered  Update COP with actual Resource Status and limits and Ancillary Service Schedules  Communicate Resource Forced Outages to ERCOT  Communicate to ERCOT Resource changes to Ancillary Service Resource Responsibility via telemetry in the time window beginning 30 seconds prior to the five-minute clock interval and ending ten seconds prior to that five-minute clock interval | Communicate all binding Base Points, Dispatch Instructions, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves, and Real-Time Reserve Price Adders for Off-Line Reserves and LMPs for energy and Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand, total Low Ancillary Service Limit (LASL), total High Ancillary Service Limit (HASL), Real-Time On-Line Reliability Deployment Price Adder using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs)  Monitor Resource Status and identify discrepancies between COP and telemetered Resource Status  Restart Real-Time Sequence on major change of Resource or Transmission Element Status  Monitor ERCOT total system capacity providing Ancillary Services  Validate COP information  Monitor ERCOT control performance  Distribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves and Real-Time Reserve Price Adders for Off-Line Reserves, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total On-Line LASL, total On-Line HASL, Real-Time On-Line Reliability Deployment Price Adder created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effective  Post LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective  Post on the ERCOT website the projected non-binding LMPs created by each SCED process for each Resource Node, the projected total Real-Time reserve amount for On-Line reserves and Off-Line reserves, the projected Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders, and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, total LASL, total HASL, Real-Time On-Line Reliability Deployment Price Adder and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post on the MIS Certified Area the projected non-binding Base Points for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs)  Post the Settlement Point Prices for each Settlement Point immediately following the end of each Settlement Interval  Post the Real-Time On-Line Reliability Deployment Price, Real-Time Reserve Price for On-Line Reserves and the Real-Time Reserve Price for Off-Line Reserves immediately following the end of each Settlement Interval  Post parameters as required by Section 6.4.9, Ancillary Services Capacity During the Adjustment Period and in Real-Time, on the ERCOT website |

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| [NPRR829, NPRR904, NPRR917, NPRR1000, NPRR1006, NPRR1010: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR829, NPRR904, NPRR917, NPRR1000, or NPRR1006; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:   | **Operating Period** | **QSE Activities** | **ERCOT Activities** | | --- | --- | --- | | During the first hour of the Operating Period |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating Period  Review the list of Off-Line Available Resources with a start-up time of one hour or less  Review and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailments  Snapshot the Scheduled Power Consumption for Controllable Load Resources | | SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy and Ancillary Service prices | | During the Operating Hour | Acknowledge receipt of Dispatch Instructions  Comply with Dispatch Instruction    Review Resource Status to assure current state of the Resources is properly telemetered  Update COP and telemetry with actual Resource Status and limits and Ancillary Service capabilities  Submit and update Ancillary Service Offers  Communicate Resource Forced Outages to ERCOT | Communicate all binding Base Points, Updated Desired Set Points (UDSPs), Ancillary Service awards, Dispatch Instructions, LMPs for energy, Real-Time MCPCs for Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Transmission and/or Distribution Service Provider (TDSP) standard offer Load management MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs). In communicating Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicable.  Monitor Resource Status and identify discrepancies between COP and telemetered Resource Status  Restart Real-Time Sequence on major change of Resource or Transmission Element Status  Monitor ERCOT total system capacity providing Ancillary Services  Validate COP information  Monitor ERCOT control performance  Distribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and Real-Time MCPCs for each Ancillary Service, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points and Ancillary Service awards from SCED with the time stamp the prices are effective  Post on the ERCOT website the nodal prices for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs). These prices shall include Real-Time Reliability Deployment Price Adders for Energy created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effective  Post LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective  Post every 15 minutes on the ERCOT website the aggregate net injection from Settlement Only Generators (SOGs)  Post on the ERCOT website the projected non-binding LMPs for each Resource Node and Real-Time MCPCs for each Ancillary Service created by each SCED process and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, Real-Time Reliability Deployment Price Adder for Energy, Real-Time On-Line Reliability Deployment Price Adders for Ancillary Service, and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post on the MIS Certified Area the projected non-binding Base Points and Ancillary Service awards for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections. In posting Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicable.  Post each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs)  Post on the ERCOT website, the Settlement Point Prices for each Settlement Point and the Real-Time price for each SODG and SOTG immediately following the end of each Settlement Interval  By Settlement Interval, post the 15-minute Real-Time Reliability Deployment Price for Energy, and the 15-minute Real-Time Reliability Deployment Price for Ancillary Service for each of the Ancillary Services. | |

(3) At the beginning of each hour, ERCOT shall post on the ERCOT website the following information:

(a) Changes in ERCOT System conditions that could affect the security and dynamic transmission limits of the ERCOT System, including:

(i) Changes or expected changes, in the status of Transmission Facilities as recorded in the Outage Scheduler for the remaining hours of the current Operating Day and all hours of the next Operating Day; and

(ii) Any conditions such as adverse weather conditions as determined from the ERCOT-designated weather service;

(b) Updated system-wide Mid-Term Load Forecasts (MTLFs) for all forecast models available to ERCOT Operations, as well as an indicator for which forecast was in use by ERCOT at the time of publication;

(c) The quantities of RMR Services deployed by ERCOT for each previous hour of the current Operating Day; and

(d) Total ERCOT System Demand, from Real-Time operations, integrated over each Settlement Interval.

(4) No later than 0600, ERCOT shall post on the ERCOT website the actual system Load by Weather Zone, the actual system Load by Forecast Zone, and the actual system Load by Study Area for each hour of the previous Operating Day.

(5) ERCOT shall provide notification to the market and post on the ERCOT website Electrical Bus Load distribution factors and other information necessary to forecast Electrical Bus Loads. This report will be published when updates to the Load distribution factors are made. Private Use Network net Load will be redacted from this posting.

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| [NPRR1010: Insert paragraphs (6) and (7) below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (6) After every SCED run, ERCOT shall post to the ERCOT website the total capability of Resources available to provide the following Ancillary Service combinations, based on the Resource telemetry from the QSE and capped by the limits of the Resource, for the most recent SCED execution:  (a) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;  (b) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;  (c) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;  (d) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;  (e) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;  (f) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;  (g) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and  (h) Capacity to provide Reg-Down.  (7) Each week, ERCOT shall post on the ERCOT website the historical SCED-interval data described in paragraph (6) above. |

6.5.5.2 Operational Data Requirements

(1) ERCOT shall use Operating Period data to monitor and control the reliability of the ERCOT Transmission Grid and shall use it in network analysis software to predict the short-term reliability of the ERCOT Transmission Grid. Each TSP, at its own expense, may obtain that Operating Period data from ERCOT or directly from QSEs.

(2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:

(a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), determination of the High Ancillary Service Limit (HASL), High Dispatch Limit (HDL), Low Dispatch Limit (LDL) and Low Ancillary Service Limit (LASL), and is consistent with telemetered HSL, LSL and Non-Frequency Responsive Capacity (NFRC);

(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;

(c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));

(d) Net Reactive Power (in MVAr);

(e) Power to standby transformers serving plant auxiliary Load;

(f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;

(g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(h) Generation Resource breaker and switch status;

(i) HSL (Combined Cycle Generation Resources) shall:

(i) Submit the HSL of the current operating configuration; and

(ii) When providing RRS, update the HSL as needed, to be consistent with Resource performance limitations of RRS provision;

(j) NFRC currently available (unloaded) and included in the HSL of the Combined Cycle Generation Resource’s current configuration;

(k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;

(l) Low Emergency Limit (LEL), under Section 6.5.9.2;

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

(o) Ancillary Service Schedule for each quantity of RRS and Non-Spin which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(i) For On-line Non-Spin, Ancillary Service Schedule shall be set to zero;

(ii) For Off-Line Non-Spin and for On-Line Non-Spin using Off-Line power augmentation technology the Ancillary Service Schedule shall equal the Non-Spin obligation and then shall be set to zero within 20 minutes following Non-Spin deployment;

(p) Ancillary Service Resource Responsibility for each quantity of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), RRS and Non-Spin. The sum of Ancillary Service Resource Responsibility for all Resources in a QSE is equal to the Ancillary Service Supply Responsibility for that QSE;

(q) Reg-Up and Reg-Down participation factors represent how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) shall be zero; and

(r) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents.

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| [NPRR863, NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR863, NPRR1014, or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), High Dispatch Limit (HDL), and Low Dispatch Limit (LDL), and is consistent with telemetered HSL, LSL, and Frequency Responsive Capacity (FRC);  (b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) Generation Resource breaker and switch status;  (i) HSL (Combined Cycle Generation Resources) shall:  (i) Submit the HSL of the current operating configuration; and  (ii) When providing ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ECRS provision;  (j) For Resources with capacity that is not capable of providing Primary Frequency Response (PFR), the current FRC of the Resource;  (k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (l) Low Emergency Limit (LEL), under Section 6.5.9.2;  (m) LSL;  (n) Configuration identification for Combined Cycle Generation Resources;  (o) For Resources with capacity that is not capable of providing PFR, the high and low limits in MW of the Resource’s capacity that is frequency responsive;  (p) For RRS, including any sub-categories of RRS, the physical capability (in MW) of the Resource to provide RRS;  (q) For Ancillary Services other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the physical capability of the Resource to provide that specific type of Ancillary Service;  (r) Five-minute blended Normal Ramp Rates (up and down);  (s) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents; and  (t) The telemetered MW of power augmentation capacity that is not On-Line for Resources that have power augmentation capacity included in HSL. |

(3) For each Intermittent Renewable Resource (IRR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the IRR generation equipment, IRR generation equipment availability, weather conditions, and whether the IRR net output is being affected by compliance with a SCED Dispatch Instruction.

(4) For each Aggregate Generation Resource (AGR), the QSE shall telemeter the number of its generators online.

(5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:

(a) Load Resource net real power consumption (in MW);

(b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(c) Load Resource breaker status;

(d) LPC (in MW);

(e) MPC (in MW);

(f) Ancillary Service Schedule (in MW) for each quantity of RRS and Non-Spin, which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(g) Ancillary Service Resource Responsibility (in MW) for each quantity of Reg-Up and Reg-Down for Controllable Load Resources, and RRS and Non-Spin for all Load Resources;

(h) The status of the high-set under-frequency relay, if required for qualification;

(i) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;

(j) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);

(k) Resource Status (Resource Status shall be ONRL if high-set under-frequency relay is active);

(l) Reg-Up and Reg-Down participation factor, which represents how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing FRRS-Up or FRRS-Down shall be zero; and

(m) For a Controllable Load Resource providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future.

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| [NPRR863, NPRR1010, and NPRR1029: Replace applicable portions of paragraph (5) above with the following upon system implementation for NPRR863 or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:  (a) Load Resource net real power consumption (in MW);  (b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (c) Load Resource breaker status;  (d) LPC (in MW);  (e) MPC (in MW);  (f) The Load Resource’s Ancillary Service self-provision (in MW) for RRS and/or ECRS provided via under-frequency relay;  (g) The status of the high-set under-frequency relay, if required for qualification;  (h) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;  (i) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);  (j) Resource Status;  (k) For a Controllable Load Resource providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future;  (l) For RRS, including any sub-categories of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (m) For Ancillary Service products other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the current physical capability of the Resource’s ability to provide a particular Ancillary Service product; and  (n) For a Controllable Load Resource, 5-minute blended Normal Ramp Rates (up and down). |

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| [NPRR1014 and NPRR1029: Insert applicable portions of paragraph (6) below upon system implementation and renumber accordingly:]  (6) A QSE representing an ESR connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each ESR. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation or consumption of an ESR for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), in determination of High Dispatch Limit (HDL), and Low Dispatch Limit (LDL) and is consistent with telemetered HSL, LSL and Frequency Responsive Capacity (FRC);  (b) Gross real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) ESR breaker and switch status;  (i) HSL;  (j) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (k) Low Emergency Limit (LEL), under Section 6.5.9.2;  (l) LSL;  (m) For RRS, including any sub-category of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (n) For Ancillary Services other than RRS, a blended ramp rate (in MW/min) that reflects the current physical capability of the Resource to provide that specific type of Ancillary Service; and  (o) Five-minute blended normal up and down ramp rates; |

(6) A QSE with Resources used in SCED shall provide communications equipment to receive ERCOT-telemetered control deployments.

(7) A QSE providing any Regulation Service shall provide telemetry indicating the appropriate status of Resources providing Reg-Up or Reg-Down, including status indicating whether the Resource is temporarily blocked from receiving Reg-Up and/or Reg-Down deployments from the QSE. This temporary blocking will be indicated by the enabling of the Raise Block Status and/or Lower Block Status telemetry points.

(a) Raise Block Status and Lower Block Status are telemetry points used in transient unit conditions to communicate to ERCOT that a Resource’s ability to adjust its output has been unexpectedly impaired.

(b) When one or both of the telemetry points are enabled for a Resource, ERCOT will cease using the regulation capacity assigned to that Resource for Ancillary Service deployment.

(c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been committed.

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| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (c) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been awarded. |

(d) These telemetry points shall only be utilized during unforeseen transient unit conditions such as plant equipment failures. Raise Block Status and Lower Block Status shall only be enabled until the Resource operator has time to update the Resource limits and Ancillary Service telemetry to reflect the problem.

(e) The Resource limits and Ancillary Service telemetry shall be updated as soon as practicable.  Raise Block Status and Lower Block Status will then be disabled.

(8) Real-Time data for reliability purposes must be accurate to within three percent. This telemetry may be provided from relaying accuracy instrumentation transformers.

(9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFFNS if no generation units within that Combined Cycle Generation Resource are On-Line.

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| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (9) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFF if no generation units within that Combined Cycle Generation Resource are On-Line. |

(10) A QSE representing Combined Cycle Generation Resources shall provide ERCOT with the possible operating configurations for each power block with accompanying limits. Combined Cycle Train power augmentation methods may be included as part of one or more of the registered Combined Cycle Generation Resource configurations. Power augmentation methods may include:

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

(c) Other ways of temporarily increasing the output of Combined Cycle Generation Resources; and

(d) For Qualifying Facilities (QFs), an LSL that represents the minimum energy available for Dispatch by SCED, in MW, from the Combined Cycle Generation Resource based on the minimum stable steam delivery to the thermal host plus a justifiable reliability margin that accounts for changes in ambient conditions.

(11) A QSE representing Generation Resources other than Combined Cycle Generation Resources may telemeter an NFRC value for their Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval of the Generation Resource’s NFRC quantity.

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| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (11) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (11) A QSE representing a Generation Resource other than a Combined Cycle Generation Resource may provide FRC telemetry for the Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval. |

(12) A QSE representing an Energy Storage Resource (ESR) shall provide the following Real-Time telemetry data to ERCOT for each ESR:

(a) Maximum Operating State of Charge, in MWh;

(b) Minimum Operating State of Charge, in MWh;

(c) State of Charge, in MWh;

(d) Maximum Operating Discharge Power Limit, in MW; and

(e) Maximum Operating Charge Power Limit, in MW.

(13) In accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, ERCOT shall make the data specified in paragraph (12) available to any requesting TSP or DSP at the requesting TSP’s or DSP’s expense.

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(14) A QSE representing a Settlement Only Generator (SOG) shall provide ERCOT the following Real-Time telemetry:

(a) Net real power injection at the Point of Interconnection (POI) or Point of Common Coupling (POCC) for each site with one or more SOGs;

(b) For any site with one or more ESSs that are registered as an SOG, net real power withdrawal at the POI or POCC;

(c) For each inverter at the site, gross real power output measured at the generator terminals for all SOGs that are located behind that inverter, separately aggregated by fuel type;

(d) For SOGs at the same site that are not located behind an inverter, gross real power output measured at the generator terminals for all SOGs, separately aggregated by fuel type;

(e) For any site with one or more ESSs registered as an SOG, for each inverter, gross real power withdrawal by all such ESSs that are located behind that inverter, as measured at the generator terminals; and

(f) Generator breaker status.

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| [NPRR885: Insert paragraph (15) below upon system implementation:]  (15) A QSE representing a Must-Run Alternative (MRA) shall telemeter the MRA MW currently available (unloaded) and not included in the HSL. |

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| [NPRR1029: Insert paragraph (16) below upon system implementation:]  (16) A QSE representing a DC-Coupled Resource shall provide the following Real-Time telemetry data in addition to that required for other Energy Storage Resources (ESRs):  (a) Gross AC MW production of the intermittent renewable generation component of the DC-Coupled Resource, which includes the portion of the intermittent renewable generation used to charge the Energy Storage System (ESS) and/or serve auxiliary Load on the DC side of the inverter; and  (b) Gross AC MW capability of the intermittent renewable generation component of the DC-Coupled Resource, based on Real-Time conditions. |

***16.11.4.3.2 Real-Time Liability Estimate***

(1) ERCOT shall estimate RTL for an Operating Day as the sum of estimates for the following RTM Settlement charges and payments:

(a) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node, using Real-Time Metered Generation (RTMG) as generation estimate;

(b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate;

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| [NPRR829: Replace item (b) above with the following upon system implementation:]  (b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate and Real-Time telemetry of net generation as the generation estimate; |

(c) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(d) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(e) Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

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| [NPRR1054: Delete item (e) above upon system implementation and renumber accordingly.] |

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| [NPRR917: Insert item (f) below upon system implementation and renumber accordingly:]  (f) Section 6.6.3.9, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG), using the Real-Time telemetry of net generation as the outflow estimate and the Real-Time Price for each SODG or SOTG site; |

(f) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules; and

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| [NPRR1013: Insert items (g)-(k) below upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly:]  (g) Section 6.7.5.1, Regulation Up Payments and Charges;  (h) Section 6.7.5.2, Regulation Down Payments and Charges;  (i) Section 6.7.5.3, Responsive Reserve Payments and Charges;  (j) Section 6.7.5.4, Non-Spinning Reserve Payments and Charges; and  (k) Section 6.7.5.5, ERCOT Contingency Reserve Service Payments and Charges. |

(g) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time.