Control Number: 24055

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PROJECT NO. 24055

PROTOCOL REVISION	§	**PUBLIC UTILITY COMMISSION**
INFORMATIONAL FILINGS BY THE	§	
ELECTRIC RELIABILITY	§	**OF TEXAS**
COUNCIL OF TEXAS	§	

NOTICE OF ERCOT NODAL PROTOCOL REVISIONS
(SEPTEMBER 1, 2010)

COMES NOW, Electric Reliability Council of Texas, Inc. (ERCOT) and respectfully informs the Public Utility Commission of Texas (PUCT, Commission) of revisions to the ERCOT Nodal Protocols.

Summary of Revisions

In accordance with the process set forth in Section 21 of the ERCOT Protocols, ERCOT adopted Nodal Protocol Revision Requests (NPRRs) 091, 218, 228, 233, 236, 237, 242, and 245 (effective upon the Nodal Protocol Transition Plan's Texas Nodal Market Implementation Date as prescribed by Section 21.12, *Process for Transition to Nodal Market Protocol Sections*). These NPRRs were developed in the ERCOT committee process, and approved by the ERCOT Board of Directors on August 17, 2010. These NPRRs are described below.

NPRR	Description	ERCOT Nodal Protocol Sections Modified
091	***Scarcity Pricing and Mitigated Offer Cap During the Period Commencing on the Nodal Market Implementation Date and Continuing for a Total of 45 Days.*** This NPRR adds a provision that all transmission constraints are treated as non-competitive constraints during an initial 45 Operating Day period, beginning with the Texas Nodal Market Implementation Date; and requires that the System-Wide Offer Cap (SWCAP) be set to the higher of $180 or 18 mmBtu heat rate times the Fuel Index Price (FIP) during an initial 45 Operating Day period, beginning with the Texas Nodal Market	Section 3, Subsection 3.19 (Attachment A) Section 4, Subsection 4.4.11.2 (new) (Attachment B)

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	Implementation Date. This NPRR also establishes an Energy Offer Curve floor adjusted to -$50 per Megawatt Hour (MWh).	
218	***Resolution of Alignment Item A71 - Add Protocol Description of the Power Balance Penalty Factor used in the SCED.*** This NPRR will add a description of the power balance penalty factor to the Nodal Protocol sections that describe the implemented constraint set utilized in the Security-Constrained Economic Dispatch (SCED) optimization.	Section 6, Subsections 6.5.7.1.11 and 6.5.7.3 (Attachment C)
228	***Resolution of Alignment Items A2, A80, A83 and A93 – As-Built Treatment and Settlement of Combined Cycle Generation Resources in ERCOT Market Systems.*** This NPRR revises the Nodal Protocol language to include a description of the treatment and Settlement of Combined Cycle Generation Resources in the ERCOT Day-Ahead, reliability and Real-Time systems.	Section 2, Subsections 2.1 and 2.2 (Attachment D) Section 3, Subsections 3.8, 3.8.1(new), 3.8.2(new), 3.9.1, and 3.9.2 (Attachment A) Section 4, Subsections 4.5.1, 4.6.1.4(new), 4.6.4.1.1, 4.6.4.1.2, 4.6.4.1.3, and 4.6.4.1.4 (Attachment B) Section 5, Subsections 5.7.1, 5.7.1.1, 5.7.1.2, 5.7.1.3, 5.7.1.4, 5.7.2, 5.7.3, 5.7.4, 5.7.4.1, 5.7.4.1.1, 5.7.5, and 5.7.6 (Attachment E) Section 6, Subsections 6.5.5.2, 6.6.1.1, 6.6.3.1, 6.6.5, 6.6.5.1, 6.6.5.1.1, 6.6.5.1.2, 6.6.5.2, 6.6.5.3, 6.6.5.4, 6.6.6.1, 6.6.6.2, 6.6.6.3, 6.6.6.4, 6.6.6.5,

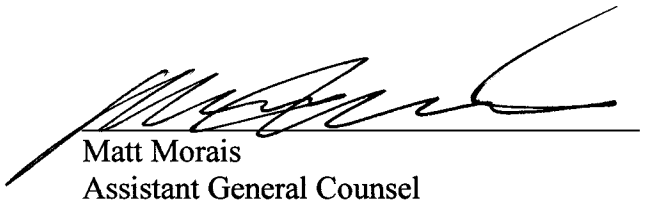
		6.6.7.1, 6.6.8.1, 6.6.9.1, and 6.7.1 (Attachment C) Section 7, Subsection 7.9.3.1 (Attachment F)
233	***Clarifying Method of Enforcing CRR Auction Limitation on Market Submissions.*** This NPRR clarifies the procedures and system configurations that will be utilized to ensure market transactions for Congestion Revenue Right (CRR) Auctions do not exceed the system capabilities.	Section 7, Subsection 7.5.2 (Attachment F)
236	***Resolution of Alignment Item A83 partially, A86, A87 partially, A88 partially, and A142 – Clarify Default Actions for Missing Data and Range of Valid Data Entries for Energy Offers.*** This NPRR clarifies system actions if the Qualified Scheduling Entity (QSE) cancels a Resource Parameter submission, if a Current Operating Plan (COP) is not submitted for any hour, and/or if a conflict in Resource Status is encountered. This NPRR also clarifies that in each hour only one Combined Cycle Generation Resource in a Combined Cycle Train may be assigned one of the On-Line Resource Status codes.	Section 2, Subsection 2.2 (Attachment D) Section 3, Subsections 3.7.1.1, 3.7.1.3, 3.8, and 3.9.1 (Attachment A) Section 4, Subsection 4.4.9.3 (Attachment B) Section 6, Subsections 6.4.3, and 6.4.4 (Attachment C)
237	***Resolution of Alignment Items A22, A143, A148, A153, A160 and A169 – Clarification of NERC Reliability Standards and MIS Posting Requirements.*** This NPRR resolves Alignment Items A22, A143, A148, A153, A160 and A169 by clarifying the role of North American Electric Reliability Corporation (NERC) Reliability Standards in relation to the Nodal Protocols and several Market Information System (MIS) posting requirements.	Section 6, Subsections 6.4.5, 6.5.2, 6.5.7.1.13, 6.5.7.5, and 6.5.7.6.1 (Attachment C) Section 8, Subsection 8.2 (Attachment G)

242	***Synchronization of Nodal Protocols with PRR792.*** This NPRR synchronizes the Nodal Protocols with Protocol Revision Request (PRR) 792, Revised Renewable Portfolio Standards Allocation Process, Pursuant to P.U.C. SUBST. R. 25.173, approved by the ERCOT Board on January 20, 2009.	Section 1, Subsection 1.3.1.1 (Attachment H) Section 14, Subsections 14.2, 14.5.2, 14.5.3 (new), 14.9.3.1, and 14.9.5 (Attachment I)
245	***Protocol Synchronization and As-Built Clarification for RUC Shortfall Calculation.*** This NPRR conforms language within Section 5.7.4.1.1, Capacity Shortfall Ratio Share, and clarifies how to perform Settlements.	Section 5, Subsection 5.7.4.1.1 (Attachment E)
	Administrative Changes. Non-substantive administrative changes were made such as formatting and correcting Section numbering and references.	Section 6, Subsections 6.4.2.1, 6.5.7.1.10, and 6.6.1 (Attachment C)

The changes to the Nodal Protocol language as revised by the above NPRRs are shown in Attachment A through I in redline format.

The ERCOT Nodal Protocols, including these revisions, may be accessed on ERCOT's website at http://nodal.ercot.com/protocols/index.html.

Respectfully submitted,



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LIST OF ATTACHMENTS

ATTACHMENT A – Section 03-090110 Redline

ATTACHMENT B – Section 04-090110 Redline

ATTACHMENT C – Section 06-090110 Redline

ATTACHMENT D – Section 02-090110 Redline

ATTACHMENT E – Section 05-090110 Redline

ATTACHMENT F – Section 07-0901010 Redline

ATTACHMENT G – Section 08-090110 Redline

ATTACHMENT H – Section 01-090110 Redline

ATTACHMENT I – Section 14-090110 Redline

ERCOT Nodal Protocols

Section 3: Management Activities for the ERCOT System

Updated: ~~August~~ September 1, 2010

(Effective upon the Nodal Protocol Transition Plan's Texas Nodal Market Implementation Date as prescribed by zonal Protocol Section 21.12, Process for Transition to Nodal Market Protocol Sections)

3 MANAGEMENT ACTIVITIES FOR THE ERCOT SYSTEM

3.7 Resource Parameters

3.7.1 Resource Parameter Criteria

3.7.1.1 Generation Resource Parameters

(1) General Resource Parameters submitted by a Resource Entity must include the following for each of its Generation Resources:

(a) The Resource's name;

(b) High Rreasonability Llimit (HRL) used in Incremental and Decremental Energy Offer Curves and to verify operator entries of High Sustained Limit (HSL);

(c) Low Rreasonability Llimit (LRL) used in Incremental and Decremental Energy Offer Curves and to verify operator entries of Low Sustained Limit (LSL);

(d) Type of Resource – steam turbine, hydro, gas turbine, combined cycle, other;

(e) Qualifying Facility (QF) status, if applicable;

(f) Normal Ramp Rate curve;

(g) Emergency Ramp Rate curve;

(h) Minimum On-Line time – The minimum number of consecutive hours the Resource must be On-Line before being shut down;

(i) Minimum Off-Line time – The minimum number of consecutive hours the Resource must be Off-Line before being restarted;

(j) Hot start time – The time, in hours, from the ERCOT notice to LSL, for a Resource in its hot-temperature state;

(k) Intermediate start time – The time interval, in hours, from the ERCOT notice to LSL, for a Resource in its intermediate temperature state; and

(l) Cold start time – The time interval, in hours, from the ERCOT notice to LSL, for a Resource in its cold-temperature state.

(2) Seasonal Resource Parameters must be submitted by a Resource Entity and must include the following for each of its Generation Resources:

(a) Seasonal gross and net MW rating;

(b) Conversion constants to be used to convert from gross MW to net MW or net MW to gross MW in accordance with ERCOT Operating Guides, if applicable;

(c) Maximum weekly starts – The maximum number of times a Resource can be started in seven consecutive days under normal operating conditions;

(d) Maximum On-Line time – The maximum number of consecutive hours a Resource can run before it needs to be shut down;

(e) Maximum daily starts – The maximum number of times a Resource can be started in a 24 hour period under normal operating conditions;

(f) Maximum weekly energy – The maximum amount of energy, in MWh, a Resource can produce in seven consecutive days;

(g) Hot-to-intermediate time – The time, in hours, after shutdown that a hot-temperature-state Resource takes to cool down to intermediate-temperature state; and

(h) Intermediate-to-cold time – The time, in hours, after shutdown that an intermediate-temperature-state Resource takes to cool down to cold-temperature state.

3.7.1.3 Changes in Resource Parameters with Operational Impacts

The QSE representing each Resource shall have the responsibility to submit changes to Resource Parameters for those Resource Parameters related to the Current Operating Plan (COP), as described in Section 3.9, Current Operating Plan (COP), and to Real-Time operations as described in Section 6, Adjustment Period and Real-Time Operations. If the QSE cancels a Resource Parameter submission, ERCOT will use as a default the Resource Parameter that was provided through the registration or Network Operations Model Change Request (NOMCR) process.

3.8 Special Considerations for Split Generation Meters and Combined Cycle Generation Resources

3.8.1 Split Generation Resources

(1) When a generation meter is split, as provided for in Section 10.3.2.1, Generation Meter Splitting, two or more independent Generation Resources must be created in the ERCOT Network Operations Model according to Section 3.10.7.2, Modeling of Resources and Transmission Loads, to function in all respects as individual "Split Generation Resources" in ERCOT System operation. A Combined Cycle Train may not be registered in ERCOT as a Split Generation Resource.

(2) Each Qualified Scheduling Entity (QSE) representing an individual Split Generation Resource shall collect and shall submit to ERCOT the Resource Parameters defined under Section 3.7, Resource Parameters, for the individual Split Generation Resource it represents. The parameters provided must be consistent with the parameters submitted by each other QSE that represents a Split Generation Resource from the same generation facility. The parameters submitted for the individual Split Generation Resource for limits and ramp rates must be according to the capability of the individual Split Generation Resource represented by each QSE. Startup and shutdown times, time to change status and number of starts must be identical for all the individual Split Generation Resources submitted by each QSE. ERCOT shall review data submitted by each QSE representing Split Generation Resources for consistency and notify each QSE of any errors.

(3) Each Split Generation Resource may be represented by a different QSE. A Split Generation Resource must comply in all respects to the requirements of a Generation Resource specified under these Protocols.

(4) Each QSE is responsible for representing its individual Split Generation Resource in its Current Operating Plan (COP). During the Reliability Unit Commitment (RUC) Study Periods, any conflict in the Resource Status of a Split Generation Resource in the COP is resolved according to the following:

(a) If a Split Generation Resource has a Resource Status of OUT for any hour in the COP, then any other QSEs' entries in the COP for their Split Generation Resource that correspond to the same physical Resource are also considered unavailable for the hour;

(b) If the QSEs for all Split Generation Resources for a physical Resource have submitted a COP and at least one of the QSEs has an On-Line Resource Status in a given hour, then the status for all Split Generation Resources for the physical Resource is considered to be On-Line for that hour, except if any of the QSEs for that Split Generation Resource has indicated in the COP a Resource Status of OUT.

(5) ~~If an individual Split Generation Resource is On-Line, then all individual Split Generation Resources for that generation facility are considered On-Line.~~ Each QSE representing a Split Generation Resource shall update its individual Resource Status appropriately.

(6) Each QSE representing an individual Split Generation Resource may independently submit Energy Offer Curves and Three-Part Supply Offers. ERCOT shall treat each Split Generation Resource offer as a separate offer, except that all individual Split Generation Resources in a generation facility must be committed or decommitted together.

(7) Each QSE submitting verifiable cost data to ERCOT shall coordinate among all owners of a generation facility to provide individual Split Generation Resource data consistent with the total verifiable cost of the entire generation facility. ERCOT may compare the

total verifiable costs with other similarly situated Generation Resources to determine the reasonability of the cost.

3.8.2 Combined Cycle Generation Resources

(1) ERCOT shall assign a logical Resource Node for use in the Day-Ahead Market (DAM), RUC, Supplemental Ancillary Services Market (SASM), Security-Constrained Economic Dispatch (SCED) and Load Frequency Control (LFC) to each registered Combined Cycle Train. Each Combined Cycle Generation Resource registered in the Combined Cycle Train will be mapped to the Combined Cycle Train logical Resource Node for the purposes of evaluating and settling each Combined Cycle Generation Resource's Three-Part Supply Offer and Ancillary Service Offer in the DAM, RUC and SCED. Each generation unit identified in the Combined Cycle Train registration for a Combined Cycle Generation Resource configuration will be mapped to its designated Resource Node as determined in accordance with these Protocols and the Technical Advisory Committee (TAC) approved ERCOT Procedure for Identifying Resource Nodes.

(2) If any of the generation units, designated in the Combined Cycle Train registration as a primary generation unit in a Combined Cycle Generation Resource, is isolated from the ERCOT Transmission Grid because of a transmission Outage reported in the Outage Scheduler, the DAM and RUC applications shall select an alternate generation unit for use in the application.

(3) Three-Part Supply Offers and Resource-specific Ancillary Service Offers submitted for a Combined Cycle Generation Resource may only be made at the Resource's logical Resource Node. ERCOT shall use the logical Resource Node to settle these offers.

(4) In the DAM and RUC, ERCOT shall model the energy injection from each generation unit registered to the Combine Cycle Generation Resource designated in a Three Part Supply Offer as follows:

(a) The energy injection for each generation unit registered in the Combined Cycle Generation Resource designated in a Three-Part Supply Offer shall be the offered energy injection for the selected price point on the Three-Part Supply Offer's Energy Offer Curve times a weight factor as determined in paragraph (4)(b) below.

(b) The weight factor for each generation unit registered in a Combined Cycle Generation Resource shall be the generation unit's High Reasonability Limit (HRL), as specified in its ERCOT approved Resource Asset Registration Form, divided by the total of all HRL values for the generation units registered in the designated Combine Cycle Generation Resource.

(5) In the Network Operations Network Models used in the DAM, RUC and SCED applications, each generation unit identified in the Combined Cycle Train registration must be modeled at its designated point of interconnection.

(6) For Ancillary Services offered and provided from Combined Cycle Generation Resources, ERCOT shall apply, without exception, the same rules and requirements specified in these Protocols for the DAM, RUC and Adjustment Period and Real-Time markets that apply to Ancillary Services provided from any other Generation Resources.

(a) ERCOT systems shall determine the High and Low Ancillary Service Limits (HASL and LASL) for a Combined Cycle Generation Resource as follows:

(i) In Real Time, relative to the telemetered High Sustained Limit (HSL) for the Combined Cycle Generation Resource, or

(ii) During the DAM and RUC study periods, relative to the HSL in the COP.

(b) The QSE shall assure that the Combined Cycle Generation Resource designated as On-Line through telemetry or in the COP can meet its Ancillary Service Resource Responsibility.

3.9 Current Operating Plan (COP)

3.9.1 Current Operating Plan (COP) Criteria

(1) Each QSE that represents a Resource must submit a COP to ERCOT that reflects expected operating conditions for each Resource for each hour in the next seven Operating Days.

(2) Each QSE that represents a Resource shall update its COP reflecting changes in availability of any Resource as soon as reasonably practicable, but in no event later than 60 minutes after the event that caused the change.

(3) The Resource capacity in a QSE's COP must be sufficient to supply the Ancillary Service Supply Responsibility of that QSE.

(4) A COP must include the following for each Resource represented by the QSE:

(a) The name of the Resource;

(b) The expected Resource Status:

(i) Select one of the following for Generation Resources synchronized to the ERCOT System that best describes the Resource's status:

(A) ONRUC – On-Line and the hour is a RUC-Committed ~~Interval~~Hour;

(B) ONREG – On-Line Resource with Energy Offer Curve providing Regulation Service;

(C) ON – On-Line Resource with Energy Offer Curve;

(D) ONDSR – On-Line Dynamically Scheduled Resource (DSR);

(E) ONOS – On-Line Resource with Output Schedule;

(F) ONOSREG – On-Line Resource with Output Schedule providing Regulation Service;

(G) ONDSRREG – On-Line DSR providing Regulation Service;

(H) ONTEST – On-Line t~~T~~est with Output Schedule;

(I) ONEMR – On-Line EMR (available for commitment or dispatch only for ERCOT-declared Emergency Conditions; the QSE may appropriately set LSL and High Sustained Limit (HSL) to reflect operating limits); and

(J) ONRR – On-Line as a synchronous condenser (hydro) providing Responsive Reserve (RRS) but unavailable for D~~d~~ispatch by Security-Constrained Economic Dispatch (SCED) and available for commitment by RUC;~~.~~

(ii) Select one of the following for Off-Line Generation Resources not synchronized to the ERCOT System that best describes the Resource's status:

(A) OUT – Off-Line and unavailable;

(B) OFFNS – Off-Line but reserved for Non-Spinning Reserve (Non-Spin);

(C) OFF – Off-Line but available for commitment ~~by~~ in the Day-Ahead Market (DAM) and RUC; and

(D) EMR – Available for commitment only for ERCOT-declared Emergency Condition events; the QSE may appropriately set LSL and HSL to reflect operating limits; and

(iii) Select one of the following for Load Resources:

(A) ONRGL – Available for D~~d~~ispatch of Regulation Service;

(B) ONRRCLR – Available for D~~d~~ispatch of ~~Responsive Reserve~~RRS Service as a Controllable Load Resource;

(C) ONRL – Available for D~~d~~ispatch of RRS Service or Non-Spin, excluding Controllable Load Resources; and

(D) OUTL – Not available;

(c) The HSL;

(d) The LSL;

(e) The High Emergency Limit (HEL);

(f) The Low Emergency Limit (LEL); and

(g) Ancillary Service Resource Responsibility capacity in MW for:

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) RRS Service; and

(iv) Non-Spin.

(5) For Ceombined C-eycle Generation Resources, the above items are required for each operating configuration. In each hour only one Combined Cycle Generation Resource in a Combined Cycle Train may be assigned one of the On-Line Resource Status codes described above.

(a) During a RUC study period, if a QSE's COP reports multiple Combined Cycle Generation Resources in a Combined Cycle Train to be On-Line for any hour, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource with the largest HSL is considered to be On-Line and all other Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line. Furthermore, until the QSE corrects its COP, the Off-Line Combined Cycle Generation Resources as designated through the application of this process are ineligible for RUC commitment or de-commitment Dispatch Instructions.

(b) For any hour in which QSE-submitted COP entries are used to determine the initial state of a Combined Cycle Generation Resource for a DAM or Day-Ahead Reliability Unit Commitment (DRUC) study and the COP shows multiple Combined-Cycle Generation Resources in a Combined Cycle Train to be in an On-line Resource Status, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource that has been On-Line for the longest time from the last recorded start by ERCOT systems, regardless of the reason for the start, combined with the COP Resource Status for the remaining hours of the current Operating Day, is considered to be On-Line at the start of the DRUC study period and all other COP-designated Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line.

(c) ERCOT systems shall allow only one Combined Cycle Generation Resource in a Combined Cycle Train to offer Off-Line Non-Spin in the DAM or Supplemental Ancillary Services Market (SASM).

(i) If there are multiple Non-Spin offers from different Combined Cycle Generation Resources in a Combined Cycle Train, then prior to execution of the DAM, ERCOT shall select the Non-Spin offer from the Combined Cycle Generation Resource with the highest HSL for consideration in the DAM and ignore the other offers.

(ii) Combined Cycle Generation Resources offering Off-Line Non-Spin must be able to transition from the shutdown state to the offered Combined Cycle Generation Resource On-Line state and be capable of ramping to the full amount of the Non-Spin offered.

(d) The DAM and RUC shall honor the registered hot, intermediate or cold Startup Costs for each Combined Cycle Generation Resource registered in a Combined Cycle Train when determining the transition costs for a Combined Cycle Generation Resource. In the DAM and RUC, the Startup Cost for a Combined Cycle Generation Resource shall be determined by the positive transition cost from the On-Line Combined Cycle Generation Resource within the Combine Cycle Train or from a shutdown condition, whichever ERCOT determines to be appropriate.

(6) ERCOT may accept COPs only from QSEs.

(7) A QSE representing a Wind-powered Generation Resource (WGR) must enter an HSL value that is less than or equal to the amount for that Resource from the most recent Short-Term Wind Power Forecast (STWPF) provided by ERCOT.

(8) A QSE representing a Resource that has a Resource Status of ONTEST must self-commit the Resource and must submit an Output Schedule for the Resource.

(9) If a QSE has not submitted a valid COP for any Generation Resource for any hour in the DAM or RUC Study Period, then the Generation Resource is considered to have a Resource Status as OUT thus not available for DAM awards or RUC commitments for those hours.

(10) If a COP is not available for any Resource for any hour from the current hour to the start of the DAM period or RUC study, then the Resource Status for those hours are considered equal to the last known Resource Status from a previous hour's COP or from telemetry as appropriate for that Resource.

3.9.2 Current Operating Plan Validation

(1) ERCOT shall verify that each COP, on its submission, complies with the criteria described in Section 3.9.1, Current Operating Plan (COP) Criteria. ERCOT shall notify

the QSE by means of the Messaging System if the QSE's COP fails to comply with the criteria described in Section 3.9.1 and this Section 3.9.2~~is rejected or considered invalid~~ for any reason. The QSE must then resubmit the COP within the appropriate market timeline.

(2) ERCOT may~~must~~ reject a COP that does not meet the criteria described in Section 3.9.1~~, Current Operating Plan (COP) Criteria~~.

(3) If a Resource is designated in the COP to provide Ancillary Service, then ERCOT shall verify that the COP complies with Section 3.16, Standards for Determining Ancillary Service Quantities. The Ancillary Service Supply Responsibilities as indicated in the Ancillary Service Resource Responsibility submitted immediately before the end of the Adjustment Period are physically binding commitments for each QSE for the corresponding Operating Period.

~~(4)~~ ERCOT shall notify the QSE if the sum of the Ancillary Service capacity designated in the COP for each hour, by service type~~)~~, is less than the QSE~~'~~s Ancillary Service Supply Responsibility for each service type for that hour. If the QSE does not correct the deficiency within one hour after receiving the notice from ERCOT, then ERCOT shall follow the procedures outlined in Section 6.4.8.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency~~, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency~~.

(5) A QSE may change Ancillary Service Resource designations by changing its COP, subject to Section 6.4.8.1~~, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency~~.

(6) If ERCOT determines that it needs more Ancillary Service during the Adjustment Period, then the QSE's allocated portion of the additional Ancillary Service may be s~~S~~elf-a~~A~~rranged.

(7) ERCOT systems must be able to detect a change in status of a Resource shown in the COP and must provide notice to ERCOT operators of changes that a QSE makes to its COP.

(8) A QSE representing a Resource that has an Energy Offer Curve valid for an hour of the COP~~,~~ may not designate a Resource Status of ONTEST, ONOS or ONDSR for that hour for that Resource.

3.19 Constraint Competitiveness Tests

(1) Unless the Board approves changes, the "Competitive Constraints" are the contingency/limiting Transmission Element pairs that represent the Commercially Significant Constraints (CSCs) and Closely Related Elements (CREs), as those terms were defined in the ERCOT Protocols, immediately prior to Texas Nodal Market Implementation Date. The ERCOT Board may approve changes to the Competitive Constraints from time to time, whether before the Texas Nodal Market Implementation

Date or after. A contingency/limiting Transmission Element pair is designated a Competitive Constraint by Technical Advisory Committee (TAC) approval. Among other relevant factors, TAC shall consider the results of the Test Procedures 1 and 2, as described in Section 3.19.1, Annual Competitiveness Test, in reaching its determination as to whether or not a Transmission Element pair should be considered as a Competitive Constraint. Any contingency/limiting Transmission Element pair not designated as a Competitive Constraint is deemed to be a non-competitive constraint. Notwithstanding the foregoing, as described in Section 4.4.11.2, Scarcity Pricing and Mitigated Offer Cap During Nodal Startup, for the first 45 Operating Days beginning with the Texas Nodal Market Implementation Date, all TAC approved Competitive Constraints will each be deemed to be a non-Competitive Constraint.

(2) An appropriate subcommittee approved by TAC ("TAC Subcommittee") may develop an alternative list through the analysis described below for determining Competitive Constraints.

(3) The TAC Subcommittee shall perform the following analysis with the goal of developing an objective standard for determining Competitive Constraints:

(a) Contingency analysis – based on reasonable generation dispatch that would lead into a set of elements to be studied.

(b) Constraint Competitiveness Test (CCT) - using the parameters described in Section 3.19.1, Annual Competitiveness Test; Section 3.19.2, Monthly Competitiveness Test; and Section 3.19.3, Daily Competitiveness Test.

(c) Initial analysis of the CSCs and CREs and additional proposed contingency/limiting Transmission Element pairs for possible modifications or designation to their status as a Competitive Constraint must be completed prior to the Texas Nodal Market Implementation Date and subsequent analysis shall be on-going.

(d) At a minimum, the CCT should be performed at least once per month and the results compared to the existing TAC-approved Competitive Constraints list. Based on the comparison, the TAC Subcommittee may evaluate alternative methodologies or alternative Competitive Constraints and report the results of these evaluations to the TAC.

(4) The Independent Market Monitor (IMM) may suspend a Competitive Constraint from being designated as competitive for a specified period of time necessary to allow for analysis, but not to exceed 60 days. The IMM shall notify the market of the estimated time needed to conduct the analysis. The IMM shall notify the market of any suspended Competitive Constraint before suspension.

(5) TAC shall approve the Competitive Constraints one month prior to the annual Congestion Revenue Right (CRR) Auction. Prior to each monthly CRR Auction, TAC shall approve updates to the Competitive Constraints that are applicable for the following monthly

auction. Any Competitive Constraint not determined to be competitive by TAC shall be deemed to be non-competitive.

(6) ERCOT shall post the Competitive Constraints to the Market Information System (MIS) Secure Area at least five Business Days before any change takes effect. ERCOT shall post any Competitive Constraints that have been suspended and the duration of the suspension as soon as practicable to the MIS Secure Area.

ERCOT Nodal Protocols

Section 4: Day-Ahead Operations

Updated: ~~August~~ September 1, 2010

(Effective upon the Nodal Protocol Transition Plan's Texas Nodal Market Implementation Date as prescribed by zonal Protocol Section 21.12, Process for Transition to Nodal Market Protocol Sections)

4 DAY-AHEAD OPERATIONS

4.4 Inputs into DAM and Other Trades

4.4.9 Energy Offers and Bids

4.4.9.3 Energy Offer Curve

(1) The "Energy Offer Curve" represents the QSE's willingness to sell energy at or above a certain price and at a certain quantity in the DAM or its willingness to be dispatched by SCED in Real-Time Operations.

(2) A QSE may submit Resource-specific Energy Offer Curves to ERCOT. Such Energy Offer Curves will be bounded in the DAM for each hour by the LSL and HSL of the Generation Resource specified in the COP, and bounded in SCED by the LSL and HSL of the Generation Resource as shown by telemetry.

(3) Energy Offer Curves remain active for the offered period until either:

(a) Selected by ERCOT; or

(b) Automatically inactivated by the software at the offer expiration time selected by the QSE.

(4) For any hour that is not a RUC-Committed Interval or a DAM-Committed Interval for a Resource, the QSE for that Resource may submit or change Energy Offer Curves in the Adjustment Period and a QSE may withdraw an Energy Offer Curve if:

(a) An Output Schedule is submitted for all intervals for which an Energy Offer Curve is withdrawn; or

(b) The Resource is forced Off-Line and notifies ERCOT of the Forced Outage by changing the Resource Status appropriately and updating its COP.

[NPRR207: Replace paragraph (4) above with the following upon system implementation:]

(4) For any hour that is not a RUC-Committed Interval or a RUC Notification interval or a DAM-Committed Interval for a Resource, the QSE for that Resource may submit or change Energy Offer Curves in the Adjustment Period and a QSE may withdraw an Energy Offer Curve if:

(a) An Output Schedule is submitted for all intervals for which an Energy Offer Curve is withdrawn; or

(b) The Resource is forced Off-Line and notifies ERCOT of the Forced Outage by changing the Resource Status appropriately and updating its COP.

(5) For any hour that is a RUC-Committed Interval or a DAM-Committed Interval for a Resource, a QSE for that Resource may not change an Energy Offer Curve, except as specified in paragraphs (a) and (b) below:

(a) A QSE may change the Energy Offer Curve if the Resource is required, due to external fuel curtailments, to change fuel type or source during the Adjustment Period. ERCOT shall develop reasonable procedures for QSEs to report and document such fuel curtailments.

(b) A QSE may change the Energy Offer Curve if the Resource suffers a partial Forced Outage by truncating the Energy Offer Curve at the Resource's HSL as modified by the partial Forced Outage.

[NPRR207: Insert paragraph (6) and renumber accordingly upon system implementation:]

(6) For any hour that is a RUC Notification interval for a Resource, a QSE for that Resource may not increase an Energy Offer Curve, except as specified in paragraphs (a) and (b) below:

(a) A QSE may change the Energy Offer Curve if the Resource is required, due to external fuel curtailments, to change fuel type or source during the Adjustment Period. ERCOT shall develop reasonable procedures for QSEs to report and document such fuel curtailments.

(b) A QSE may change the Energy Offer Curve if the Resource suffers a partial Forced Outage by truncating the Energy Offer Curve at the Resource's HSL as modified by the partial Forced Outage.

(6) If a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE and set the Output Schedule equal to the then current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

4.4.11 System-Wide Offer Caps

4.4.11.2 Scarcity Pricing and Mitigated Offer Cap During Nodal Startup

(1) During the period starting with the Texas Nodal Market Implementation Date and continuing for a total of 45 Operating Days, the SWCAP is set by ERCOT on a daily basis at the higher of $180 per MWh or 18 mmBtu per MWh times the FIP, expressed in dollars per MWh for energy and dollars per MW per hour for Ancillary Services. However, if a Market Participant burns fuel oil rather than natural gas during this period and the Generation Resource's Settlement Point Price does not cover the cost incurred by the Market Participant to provide energy or Ancillary Services, the Market Participant may dispute the use of the FIP times 18 mmBtu or the $180 per MWh with ERCOT. Such a dispute shall be filed with ERCOT with supporting documentation sufficient to

prove the amount and cost of fuel oil burned in supplying energy or Ancillary Services, as measured by Real-Time metered generation, during the period in question. If the dispute is approved by ERCOT, the change in cost resulting from the dispute shall be uplifted to the entire market on a Load Ratio Share (LRS) basis. By the end of the next Business Day following the applicable Operating Day, ERCOT shall post the updated value of the PNM and the current SWCAP on the MIS Public Area. During this same 45-day period the Energy Offer Curve floor shall be adjusted to -$50 per MWh.

(2) ERCOT shall provide notice to the market on the 45th Operating Day that the SWCAP will be set as determined in accordance with paragraph (1) of Section 4.4.11, System-Wide Offer Caps, effective at 0000 hrs on the 46th Operating Day.

(3) During the period starting with the Texas Nodal Market Implementation Date and continuing for a total of 45 Operating Days, ERCOT shall treat all contingency/limiting Transmission Element pairs identified on the TAC-approved Competitive Constraint List as non--Competitive Constraints for the purposes of the two-step SCED methodology in paragraph (5) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(4) ERCOT shall provide notice to the market on the 45th Operating Day that the TAC approved Constraint Competitive List will become effective at 0000 hrs on the 46th Operating Day for the purposes of the two-step SCED methodology in paragraph (5) of Section 6.5.7.3.

4.5 DAM Execution and Results

4.5.1 DAM Clearing Process

(1) At 1000 in the Day-Ahead, ERCOT shall start the Day-Ahead Market (DAM) clearing process.

(2) Prior to execution of the DAM, ERCOT shall complete a Day-Ahead Simultaneous Feasibility Test. This test uses the Day-Ahead Updated Network Model topology and evaluates all Congestion Revenue Rights (CRRs) for feasibility to determine hourly oversold quantities.

(3) The purpose of the DAM is to economically and simultaneously clear offers and bids described in Section 4.4, Inputs into DAM and Other Trades.

(4) The DAM uses a multi-hour mixed integer programming algorithm to maximize bid-based revenues minus the offer-based costs over the Operating Day, subject to security and other constraints, and ERCOT Ancillary Service procurement requirements.

(a) The bid-based revenues include revenues from DAM Energy Bids and Point-to-Point (PTP) Obligation Bids.

(b) The offer-based costs include costs from the Startup Offer, Minimum Energy Offer, and Energy Offer Curve of any Resource that submitted a Three-Part

Supply Offer, DAM Energy-Only Offers, CRR Offers, and Ancillary Service Offers.

(c) Security constraints specified to prevent DAM solutions that would overload the elements of the ERCOT Transmission Grid include the following:

(i) Transmission constraints – Transfer limits on energy flows through the ERCOT Transmission Grid, e.g., thermal or stability limits. These limits must be satisfied by the intact network and for certain specified contingencies.

These constraints may represent:

(A) Thermal constraints – protect transmission facilities against thermal overload.

(B) Generic constraints – protect the ERCOT Transmission Grid against transient instability, dynamic stability or voltage collapse.

(C) Power flow constraints – the energy balance at required Electrical Buses in the ERCOT Transmission Grid must be maintained.

(ii) Resource constraints – the physical and security limits on Resources that submit Three-Part Supply Offers:

(A) Resource output constraints – the Low Sustained Limit (LSL) and High Sustained Limit (HSL) of each Resource; and

(B) Resource operational constraints – includes minimum run time, minimum down time, and configuration constraints.

(iii) Other constraints –

(A) Linked offers – the DAM may not select any one part of that Resource capacity to provide more than one Ancillary Service or to provide both energy and an Ancillary Service in the same Operating Hour. The DAM may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service or energy in the same Operating Hour, provided that a Generation Resource may not offer, and the DAM may not select, linked Energy and Off-Line Non-Spinning Reserve (Non-Spin) Ancillary Service offers in the same Operating Hour.

(B) The sum of the awarded Ancillary Service capacities for each Resource must be within the Resource limits specified in the Current Operating Plan (COP) and Section 3.18, Resource Limits

in Providing Ancillary Service, and the Resource parameters as described in Section 3.7, Resource Parameters.

(C) Block Ancillary Service Offers for a Load Resource – blocks will not be cleared unless the entire quantity block can be awarded.

(D) Block CRR Offers and PTP Obligation Bids – blocks will not be cleared unless the entire time block can be awarded.

(E) Combined Cycle Generation Resources – The DAM may commit a Combined Cycle Generation Resource in a time period that includes the last hour of the Operating Day only if that Combine Cycle Generation Resource can be shutdown.

(d) Ancillary Service needs for each Ancillary Service include the needs specified in the Ancillary Service Plan that are not part of the Self-Arranged Ancillary Service Quantity and that must be met from available DAM Ancillary Service Offers while co-optimizing with DAM Energy Offers. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service. See Section 4.5.2, Ancillary Service Insufficiency, for what happens if insufficient Ancillary Service Offers are received in the DAM.

[NPRR131: Replace paragraph (4)(d) above with the following upon system implementation:]

(d) Ancillary Service needs for each Ancillary Service include the needs specified in the Ancillary Service Plan that are not part of the Self-Arranged Ancillary Service Quantity plus the quantity of Ancillary Service Trades with ERCOT, and that must be met from available DAM Ancillary Service Offers while co-optimizing with DAM Energy Offers. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service. See Section 4.5.2, Ancillary Service Insufficiency, for what happens if insufficient Ancillary Service Offers are received in the DAM.

(5) ERCOT shall determine the appropriate Load distributions to allocate offers, bids, and source and sink of CRRs at a Load Zone across the Electrical Buses that are modeled with Load in that Load Zone. The default distribution is the State Estimator hourly distribution for the seven days before the Operating Day. If ERCOT decides, in its sole discretion, to change this distribution for reasons such as anticipated weather events or holidays, ERCOT shall select a State Estimator distribution from a proxy day reasonably reflecting the anticipated distribution in the Operating Day. ERCOT may also modify this distribution to account for predicted differences in network topology between the proxy day and Operating Day. ERCOT shall develop a methodology, subject to Technical Advisory Committee (TAC) approval to describe the modification of the proxy day bus-load distribution for this purpose.

(6) ERCOT shall allocate offers, bids, and source and sink of CRRs at a Hub using the distribution factors specified in the definition of that Hub in Section 3.5.2, Hub Definitions.

(7) A Resource that has a Three-Part Supply Offer cleared in the DAM may be eligible for make whole payment of the Startup Offer and Minimum Energy Offer submitted by the Qualified Scheduling Entity (QSE) representing the Resource under Section 4.6, DAM Settlement.

(8) The directional network element flows for PTP Options declared for settlement in Real-Time must be properly accounted for in determining available transmission network capacity in the DAM. In the event the available transmission capability in the DAM cannot accommodate all PTP Options declared for settlement in Real-Time, any PTP Option declared for settlement in Real-Time that impacts overloaded directional network elements must be appropriately derated for DAM modeling purposes only, in proportion to that impact. The derated MW of PTP Options declared for settlement in Real-Time will be settled in the DAM if their Minimum Reservation Prices are less than or equal to the DAM prices for corresponding PTP Options. Otherwise, the derated MW will be settled in Real-Time.

(9) The DAM settlement is based on hourly MW awards and on Day-Ahead hourly Settlement Point Prices. All PTP Options settled in the DAM are settled based on the Day-Ahead Settlement Point Prices.

(10) The Day-Ahead Market Clearing Price for Capacity (MCPC) for each hour for each Ancillary Service is the Shadow Price for that Ancillary Service for the hour as determined by the DAM algorithm.

(11) If the Day-Ahead MCPC cannot be calculated by ERCOT, the Day-Ahead MCPC for the particular Ancillary Service is equal to the Day-Ahead MCPC for that Ancillary Service in the same Settlement Interval of the preceding Operating Day.

(12) If the Day-Ahead Settlement Point Prices cannot be calculated by ERCOT, all CRRs shall be settled based on Real-Time Prices. Settlements for all CRRs shall be reflected on the RT Settlement Statement.

4.6 DAM Settlement

4.6.1 Day-Ahead Settlement Point Prices

4.6.1.4 Day-Ahead Settlement Point Prices at the Logical Resource Node for a Combined Cycle Generation Resource

ERCOT shall calculate the DASPP for each hour at the logical Resource Node for the Combined Cycle Generation Resource as follows:

(a) The DASPP at a logical Resource Node shall be the sum of a weight factor as determined in paragraph (b) below times the Day-Ahead LMP at each of the

Resource Nodes of the generation units registered in the Combined Cycle Train registration for the Combined Cycle Generation Resource designated in the Three-Part Supply Offer:

Where:

$$DASPP = \sum_{CCGR\_PhyR} DALMP_{CCGR\_PhyR} * DACCGRWF_{CCGR\_PhyR}$$

The above variables are defined as follows:

Variable	Unit	Definition
DASPP	$/MWh	*Day-Ahead Settlement Point Price at a logical Resource Node for a Combined Cycle Train*—The DAM Settlement Point Price at the logical Resource Node for a Combined Cycle Generation Resource for the hour.
$DALMP_{CCGR\_PhyR}$	$/MWh	*Day-Ahead Locational Marginal Price at a Resource Node for a generation unit registered in the Combined Cycle Generation Resource*—The Day-Ahead LMP at the Resource Node of a generation unit designated in the Combined Cycle Train registration for the Combined Cycle Generation Resource.
$DACCGRWF_{CCGR\_PhyR}$	~~N~~none	*Day-Ahead Combined Cycle Generation Resource Weighting Factor*—The DAM Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource.
CCGR_PhyR	none	A generation unit designated in a Combine Cycle Train for the Combined Cycle Generation Resource.

(b) The weight factor for each generation unit designated in the Combined Cycle Train registration for the Combined Cycle Generation Resource shall be the generation unit's High Reasonability Limit (HRL), as specified in its ERCOT approved Resource Asset Registration Form, divided by the total of all HRL values for the generation units designated in the Combined Cycle Generation Resource registration.

Where:

$$DACCGRWF_{CCGR\_PhyR} = HRL_{CCGR\_PhyR} / \sum_{CCGR\_PhyR} HRL_{CCGR\_PhyR}$$

The above variables are defined as follows:

Variable	Unit	Definition
$DACCGRWF_{CCGR\_PhyR}$	none	*Day-Ahead Combined Cycle Generation Resource Weighting Factor*—The DAM Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource.
HRL_{CCGR_PhyR}	MW	*High Reasonability Limit*—The HRL as specified in the ERCOT-approved Resource Asset Registration Form for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource.

CCGR_PhyR	none	A generation unit designated in a Combined Cycle Train for the Combined Cycle Generation Resource.

4.6.2 Day-Ahead Energy and Make-Whole Settlement

4.6.2.3 Day-Ahead Make-Whole Settlements

4.6.2.3.1 Day-Ahead Make-Whole Payment

(1) ERCOT shall pay the QSE a Day-Ahead Make-Whole Payment for an eligible Resource, except that the Day-Ahead Make-Whole RMR Revenue amount is calculated but not paid for any RMR Unit, for each Operating Hour in a DAM-commitment period.

(2) Any Ancillary Service Offer cleared for the same Operating Hour, QSE, and Generation Resource as a Three-Part Supply Offer cleared in the DAM shall be included in the calculation of the Day-Ahead Make-Whole Payment.

(3) The guaranteed cost, energy revenue, and Ancillary Service revenue calculated for each Combined Cycle Generation Resource are each summed for the Combined Cycle Train, and the the Day-Ahead Make-Whole Amount is calculated for the Combined Cycle Train.

(4) The Day-Ahead Make-Whole Payment to each QSE for each DAM-committed Generation Resource (excluding RMR Uunits) is calculated as follows:

$$DAMWAMT_{q,p,r,h} = (-1) * \text{Max}\left(0, DAMGCOST_{q,p,r} + \sum_h DAEREV_{q,p,r,h} + \sum_h DAASREV_{q,r,h}\right) * DAESR_{q,p,r,h} / \left(\sum_h DAESR_{q,p,r,h}\right)$$

~~Where:~~

~~$$DAMGCOST_{q,p,r} = SUO_{q,p,r} + \sum_h (MEO_{q,p,r,h} * LSL_{q,p,r,h}) + \sum_h (DAAIEC_{q,p,r,h} * (DAESR_{q,p,r,h} - LSL_{q,p,r,h}))$$~~

~~$$DAEREV_{q,p,r,h} = (-1) * DASPP_{p,h} * DAESR_{q,p,r,h}$$~~

~~$$DAASREV_{q,r,h} = ((-1) * MCPCRU_{DAM,h} * PCRUR_{r,q,DAM,h}) + ((-1) * MCPCRD_{DAM,h} * PCRDR_{r,q,DAM,h}) + ((-1) * MCPCRR_{DAM,h} * PCRRR_{r,q,DAM,h}) + ((-1) * MCPCNS_{DAM,h} * PCNSR_{r,q,DAM,h})$$~~

(54) The Day-Ahead Make-Whole RMR Revenue to~~for~~ each QSE for each DAM-committed RMR Unit is calculated as follows:

$$DAMWRMRREV_{q,p,r,h} = (-1) * Max(0, DAMGCOST_{q,p,r} + \sum_h DAEREV_{q,p,r,h} + \sum_h DAASREV_{q,r,h}) * DAESR_{q,p,r,h} / (\sum_h DAESR_{q,p,r,h})$$

(6) The Day-Ahead Make-Whole Guaranteed Costs are calculated for each eligible DAM-Committed Generation Resource (including RMR Units) as follows:

For non-Combined Cycle Trains,

~~Where:~~

$$DAMGCOST_{q,p,r} = DASUO_{q,p,r} + \sum_h (DAMEO_{q,p,r,h} * DALSL_{q,p,r,h}) + \sum_h (DAAIEC_{q,p,r,h} * (DAESR_{q,p,r,h} - DALSL_{q,p,r,h}))$$

For Combined Cycle Trains,

$$DAMGCOST_{q,p,r} = DASUO_{q,p,r} + \sum_h (DAMEO_{q,p,r,h} * DALSL_{q,p,r,h}) + (Max(0, DASUO_{afterCCGR} - DASUO_{beforeCCGR})) + \sum_h (DAAIEC_{q,p,r,h} * (DAESR_{q,p,r,h} - DALSL_{q,p,r,h}))$$

(7) The Day-Ahead Make-Whole Revenue is calculated for each DAM-Committed Generation Resource (including RMR Units) as follows:

$$DAEREV_{q,p,r,h} = (-1) * DASPP_{p,h} * DAESR_{q,p,r,h}$$

$$DAASREV_{q,r,h} = ((-1) * MCPCRU_{DAM,h} * PCRUR_{r,q,DAM,h}) + ((-1) * MCPCRD_{DAM,h} * PCRDR_{r,q,DAM,h}) + ((-1) * MCPCRR_{DAM,h} * PCRRR_{r,q,DAM,h}) + ((-1) * MCPCNS_{DAM,h} * PCNSR_{r,q,DAM,h})$$

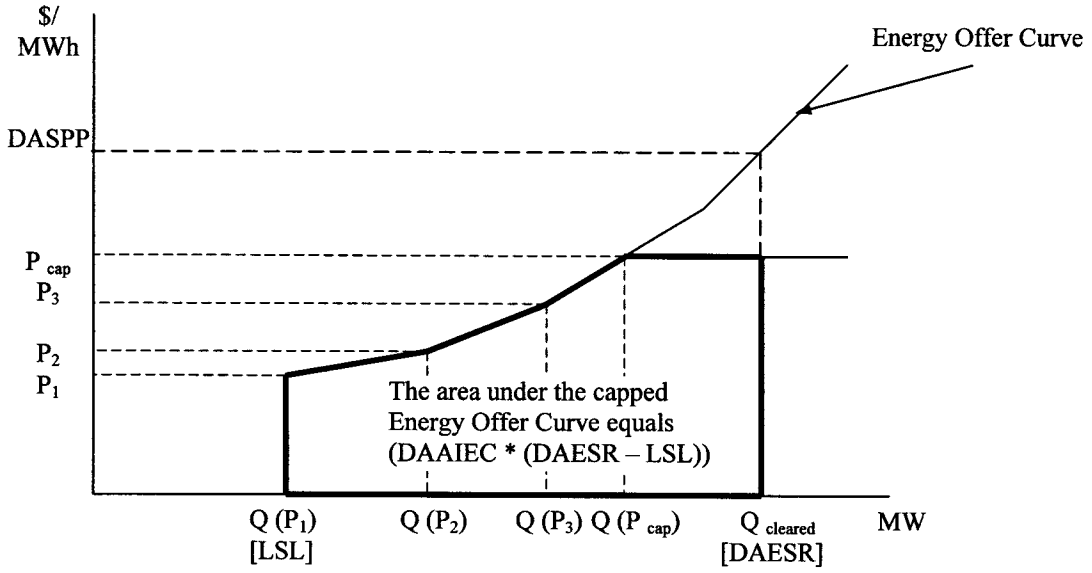
The above variables are defined as follows:

Variable	Unit	Definition
DAMWAMT $_{q, p, r, h}$	$	*Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource per hour*—The payment to QSE *q* to make-whole the Startup Cost and eEnergy cCost of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource.
DAMWRMRREV $_{q, p, r, h}$	$	*Day-Ahead Make-Whole RMR Revenue per QSE per Settlement Point, per RMR Resource, per hour*—The revenue calculated but not paid to QSE *q* to make-whole the Startup Cost and eEnergy cCost of the RMR Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource that is an RMR Resource is committed in the DAM, revenue is calculated for the Combined Cycle Train for the Combined Cycle Generation Resource.
DAMGCOST $_{q, p, r}$	$	*Day-Ahead Market Guaranteed Amount per QSE per Settlement Point per Resource*—The sum of the Sstartup Ceost and the operating energy costs of the DAM-committed Resource *r* at Resource Node *p* represented by QSE *q*, for the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DAEREV $_{q, p, r, h}$	$	*Day-Ahead Energy Revenue per QSE per Settlement Point per Resource by hour*—The revenue received in the DAM for Resource *r* at Resource Node *p* represented by QSE *q*, based on the DAM Settlement Point Price, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DAASREV $_{q, r, h}$	$	*Day-Ahead Ancillary Service Revenue per QSE per Resource by hour*—The revenue received in the DAM for Resource *r* represented by QSE *q*, based on the Market Clearing Price for Capacity (MCPC) for each Ancillary Service in the DAM, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DASPP $_{p, h}$	$/MWh	*Day-Ahead Settlement Point Price by Settlement Point by hour*—The DAM Settlement Point Price at Resource Node *p* for the hour *h*.
DAESR $_{q, p, r, h}$	MW	*Day-Ahead Energy Sale from Resource per QSE by Settlement Point per Resource by hour*—The amount of energy cleared through Three-Part Supply Offers in the DAM for Resource *r* at Resource Node *p* represented by QSE *q* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
PCRUR $_{r, q, DAM, h}$	MW	*Procured Capacity for Reg-Up from Resource per Resource per QSE per hour in DAM*—The Regulation Up (Reg-Up) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCRU $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Up per hour in DAM*—The DAM MCPC for Reg-Up for the hour *h*.
PCRDR $_{r, q, DAM, h}$	MW	*Procured Capacity for Reg-Down from Resource per Resource per QSE per hour in DAM*—The Regulation Down (Reg-Down) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCRD $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Down per hour in DAM*—The DAM MCPC for Reg-Down for the hour *h*.

Variable	Unit	Definition
PCRRR $_{r, q, DAM, h}$	MW	*Procured Capacity for Responsive Reserve from Resource per Resource per QSE per hour in DAM*—The Responsive Reserve capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCRR $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Responsive Reserve per hour in DAM*—The DAM MCPC for Responsive Reserve for the hour *h*.
PCNSR $_{r, q, DAM, h}$	MW	*Procured Capacity for Non-Spin from Resource per Resource per QSE per hour in DAM*—The Non-Spin capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCNS $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Non-Spin per hour in DAM*—The DAM MCPC for Non-Spin for the hour *h*.
DASUO $_{q, p, r}$	$/start	*Day-Ahead Startup Offer per QSE per Settlement Point per Resource*—The Startup Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the first hour of the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DAMEO $_{q, p, r, h}$	$/MWh	*Day-Ahead Minimum-Energy Offer per QSE per Settlement Point per Resource per hour*—The Minimum-Energy Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DALSL $_{q, p, r, h}$	MW	*Day-Ahead Low Sustained Limit per QSE per Settlement Point per Resource per hour*—The Low Sustained Limit (LSL) of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h* as seen in the 1000 Day-Ahead snapshot. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DAAIEC $_{q, p, r h}$	$/MWh	*Day-Ahead Average Incremental Energy Cost per QSE per Settlement Point per Resource per hour*—The average incremental energy cost, calculated according to the Energy Offer Curve capped by the generic energy price, for the output levels between the DAESR and the LSL of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
q	none	A QSE.
p	none	A Resource Node Settlement Point.
r	none	A DAM-committed Generation Resource.
h	none	An hour in the DAM-commitment period.
afterCCGR	none	The Combined Cycle Generation Resource to which a Combined Cycle Train transitions.
beforeCCGR	none	The Combined Cycle Generation Resource from which a Combined Cycle Train transitions.

(8~~5~~) The calculation of the Day-Ahead Average Incremental Energy Cost for each Resource for each hour is illustrated with the picture below, where P_{cap} is the Energy Offer Curve

Cap. The method to calculate such cost is described in Section 4.6.5, Calculation of "Average Incremental Energy Cost" (AIEC).

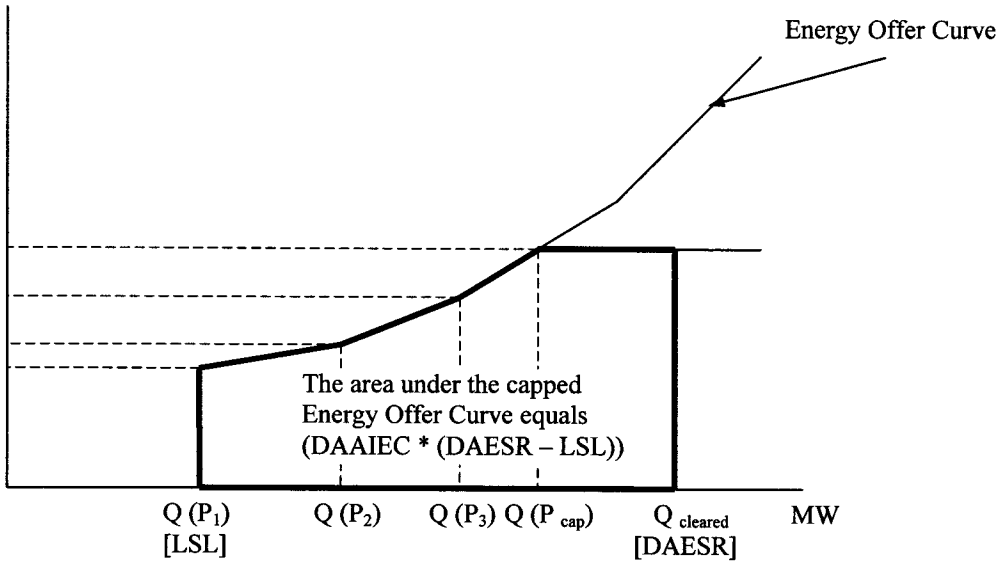


(96) The total of the Day-Ahead Make-Whole Payments to each QSE for non-RMR Generation Resources for a given hour is calculated as follows:

$$DAMWAMTQSETOT_q = \sum_p \sum_r DAMWAMT_{q,p,r}$$

The above variables are defined as follows:

Variable	Unit	Definition
DAMWAMTQSETOT $_q$	$	*Day-Ahead Make-Whole Payment QSE Total per QSE*—The total of the Day-Ahead Make-Whole Payments to QSE *q* for the DAM-committed non-RMR Generation Resources represented by this QSE for the hour.
DAMWAMT $_{q,p,r}$	$	*Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource*—The payment to QSE *q* to make-whole the Startup Cost and eEnergy cCost of Resource *r* committed in the DAM at Resource Node *p* for the hour. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource.
q	none	A QSE.
p	none	A Settlement Point.
r	none	A DAM-committed non-RMR Generation Resource.



(107) The total of the Day-Ahead Make-Whole RMR Revenue for each QSE for RMR Units for a given hour is calculated as follows:

$$DAMWRMRREVQSETOT_q = \sum_p \sum_r DAMWRMRREV_{q,p,r}$$

The above variables are defined as follows:

Variable	Unit	Definition
DAMWRMRREVQSETOT $_q$	$	*Day-Ahead Make-Whole RMR Revenue QSE Total per QSE*—The total of the Day-Ahead Make-Whole Revenue calculated for QSE *q* for DAM-committed RMR Units represented by this QSE for the hour.
DAMWRMRREV $_{q,p,r}$	$	*Day-Ahead Make-Whole RMR Revenue per QSE per Settlement Point, per RMR Resource, per hour*—The revenue calculated but not paid to QSE *q* to make-whole the Startup Cost and eEnergy cCost of the RMR Resource *r* committed in the DAM at Resource Node *p* for the hour. When a Combined Cycle Generation Resource that is an RMR Resource is committed in the DAM, revenue is calculated for the Combined Cycle
q	none	A QSE.
p	none	A Settlement Point.
r	none	A DAM-committed RMR Unit.

4.6.4 Settlement of Ancillary Services Procured in the DAM

4.6.4.1 Payments for Ancillary Services Procured in the DAM

4.6.4.1.1 Regulation Up Service Payment

ERCOT shall pay each QSE whose Ancillary Service Offers to provide Reg-Up to ERCOT were cleared in the DAM, for each hour as follows:

$$PCRUAMT_{q} = (-1) * MCPCRU_{DAM} * PCRU_{q, \sout{DAM}}$$

Where:

$$PCRU_{q, \sout{DAM}} = \sum_{r} PCRUR_{r, q, DAM}$$

The above variables are defined as follows:

Variable	Unit	Definition
$PCRUAMT_{q}$	$	*Procured Capacity for Reg-Up Amount per QSE in DAM*—The DAM Reg-Up payment for QSE *q* for the hour.
$PCRU_{q, \sout{DAM}}$	MW	*Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
$PCRUR_{r, q, DAM}$	MW	*Procured Capacity for Reg-Up from Resource per Resource per QSE in DAM*—The Reg-Up capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
$MCPCRU_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Up in DAM*—The DAM MCPC for Reg-Up for the hour.
r	none	A Resource.
q	none	A QSE.

4.6.4.1.2 Regulation Down Service Payment

ERCOT shall pay each QSE whose Ancillary Service Offers to provide Reg-Down to ERCOT were cleared in the DAM, for each hour as follows:

$$PCRDAMT_{q} = (-1) * MCPCRD_{DAM} * PCRD_{q, \sout{DAM}}$$

Where:

$$PCRD_{q, \sout{DAM}} = \sum_{r} PCRDR_{r, q, DAM}$$

The above variables are defined as follows:

Variable	Unit	Definition
$PCRDAMT_{q}$	$	*Procured Capacity for Reg-Down Amount per QSE in DAM*—The DAM Reg-Down payment for QSE *q* for the hour.

Variable	Unit	Definition
PCRD $_{q, DAM}$	MW	*Procured Capacity for Reg-Down per QSE in DAM*—The total Reg-Down Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
PCRDR $_{r, q, DAM}$	MW	*Procured Capacity for Reg-Down from Resource per Resource per QSE in DAM*—The Reg-Down capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCRD $_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Down in DAM*—The DAM MCPC for Reg-Down for the hour.
r	none	A Resource.
q	none	A QSE.

4.6.4.1.3 Responsive Reserve Service Payment

ERCOT shall pay each QSE whose Ancillary Service Offers to provide Responsive Reserve to ERCOT were cleared in the DAM, for each hour as follows:

$$PCRRAMT_{q} = (-1) * MCPCRR_{DAM} * PCRR_{q, DAM}$$

Where:

$$PCRR_{q, DAM} = \sum_{r} PCRRR_{r, q, DAM}$$

The above variables are defined as follows:

Variable	Unit	Definition
PCRRAMT $_{q}$	$	*Procured Capacity for Responsive Reserve Amount per QSE in DAM*—The DAM Responsive Reserve payment for QSE *q* for the hour.
PCRR $_{q, DAM}$	MW	*Procured Capacity for Responsive Reserve per QSE in DAM*—The total Responsive Reserve Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
PCRRR $_{r, q, DAM}$	MW	*Procured Capacity for Responsive Reserve from Resource per Resource per QSE in DAM*—The Responsive Reserve capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCRR $_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for Responsive Reserve in DAM*—The DAM MCPC for Responsive Reserve for the hour.
r	none	A Resource.
q	none	A QSE.

4.6.4.1.4 Non-Spinning Reserve Service Payment

ERCOT shall pay each QSE whose Ancillary Service Offers to provide Non-Spin to ERCOT were cleared in the DAM, for each hour as follows:

$$PCNSAMT_{q} = (-1) * MCPCNS_{DAM} * PCNS_{q, DAM}$$

Where:

$$PCNS_{q, DAM} = \sum_{r} PCNSR_{r, q, DAM}$$

The above variables are defined as follows:

Variable	Unit	Definition
$PCNSAMT_{q}$	$	*Procured Capacity for Non-Spin Amount per QSE in DAM*—The DAM Non-Spin payment for QSE *q* for the hour.
$PCNS_{q, DAM}$	MW	*Procured Capacity for Non-Spin per QSE in DAM*—The total Non-Spin Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
$PCNSR_{r, q, DAM}$	MW	*Procured Capacity for Non-Spin from Resource per Resource per QSE in DAM*—The Non-Spin capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
$MCPCNS_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for Non-Spin in DAM*—The DAM MCPC for Non-Spin for the hour.
r	none	A Resource.
q	none	A QSE.

ERCOT Nodal Protocols

Section 6: Adjustment Period and Real-Time Operations

Updated: ~~August~~ September 1, 2010

(Effective upon the Nodal Protocol Transition Plan's Texas Nodal Market Implementation Date as prescribed by zonal Protocol Section 21.12, Process for Transition to Nodal Market Protocol Sections)

6 ADJUSTMENT PERIOD AND REAL-TIME OPERATIONS

6.4 Adjustment Period

6.4.2.1 Output Schedules for Resources Other than Dynamically Scheduled Resources

(1) An Output Schedule for a non-DSR Resource may be submitted and updated only during the Adjustment Period. An Output Schedule for a non-DSR Resource may be submitted and updated for each five-minute interval for each Operating Hour.

(2) For a Resource that is not a DSR and that is On-Line, the following provisions apply:

(a) The Output Schedule for a Qualifying Facility (QF) not submitting an Energy Offer Curve is considered to be equal to the telemetered output of the QF at the time that the SCED runs;

(b) The Output Schedule for Intermittent Renewable Resources (IRR) not submitting Energy Offer Curves is considered to be equal to the telemetered output of the Resource at the time that the SCED runs; and

(c) ERCOT shall create proxy Energy Offer Curves for the Resource under Section 6.5.7.3, Security Constrained Economic Dispatch, paragraph (3)(a).

6.4.3 Energy Offer Curve

(1) A detailed description of Energy Offer Curve and validations performed by ERCOT is in Section 4.4.9, Energy Offers and Bids.

(2) For an On-Line RMR Unit, ERCOT, in its sole discretion, shall submit either an Output Schedule or an Energy Offer Curve considering contractual constraints on the Resource and any other adverse effects on, or implications arising from, the RMR Agreement, that may occur as the result of the Dispatch of the RMR Unit. If ERCOT chooses to submit an Energy Offer Curve instead of an Output Schedule, the Energy Offer Curve must be based on the RMR Agreement input/output curve and the fuel budget for the RMR Unit.

(3) If a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE. Except for IRRs, QF Resources, and DSRs, ERCOT shall ~~and~~ create an Output Schedule equal to the then-current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

6.4.4 Incremental and Decremental Energy Offer Curves

A QSE for a DSR may submit an "Incremental Energy Offer Curve" and a "Decremental Energy Offer Curve" in addition to the Output Schedule for the DSR. The Incremental and Decremental

Energy Offer Curves prices must be within the range of -$250.00 per MWh and the System-Wide Offer Cap (SWCAP) in dollars per MWh with the quantity within the range of the High Reasonability Limit (HRL) and Low Reasonability Limit (LRL) as described in Section 3.7.1.1, Generation Resource Parameters. The first price/quantity pair for both the Incremental and Decremental Energy Offer Curves must provide an energy price at LRL and the last price/quantity pair must provide a price at HRL. At every MW value of the curves, the price of the Incremental Energy Offer Curve must be greater than the Decremental Energy Offer Curve. Incremental and Decremental Energy Offer Curves are subject to the same requirements for the same criteria and validations performed by ERCOT as provided in Section 4.4.9, Energy Offers and Bids.

6.4.5 Resource Status

(1) ERCOT shall use the telemetered Resource Status for all applications requiring status of Resources during the Operating Hour, including SCED and, Load Frequency Control (LFC), and Network Security Analysis processes. QSEs shall provide ERCOT with accurate telemetry of the current capability of each Resource including the Resource Status, Ramp Rates, HSL, and LSL and a text reason for any Resource where a Ramp Rate is deviating from a standard Ramp Rate curve for the Resource, or the HSL is less than, or LSL is greater than, the normal high and low limits set in Section 3.7.1, Resource Parameter Criteria.

(2) ERCOT shall perform the following validations during the Operating Period:

(a) Each QSE shall provide the Real-Time operating status of each Resource to ERCOT by telemetry using the status codes in the Current Operating PlanCOP for Real-Time as described in Section 3.9, Current Operating Plan (COP); and

(b) Five minutes before the end of each hour, ERCOT shall identify inconsistencies between the telemetered Resource Status and the Resource Status stated in the COP for that Resource in the next hour. On detecting an inconsistency, ERCOT shall provide a notice of inconsistent Resource Status to the QSE using the Messaging System.

6.5 Real-Time Energy Operations

6.5.2 Operating Standards

ERCOT and each TSP shall operate the ERCOT Transmission Grid under pursuant to NERC Reliability Standards, these Protocols, and Good Utility Practice. The requirements of the NERC Reliability Standards shall prevail , to the extent there are any inconsistencies with these Protocols or Good Utility Practice. they are not inconsistent with these Protocols, Good Utility Practice and NERC standards and policies. These Protocols control to the extent of any inconsistency between the Protocols and any of the following documents:

(a) The Operating Guides;

(b) ~~The NERC standards and policies and the~~ ERCOT procedures manual~~, supplied by NERC and ERCOT, respectively, as references~~ for ERCOT Operators to use during normal and emergency operations of the ERCOT Transmission Grid;

(c) Specific operating procedures and RAPs submitted to ERCOT by individual Transmission Facilities owners or operators to address operating problems on their respective grids that could affect operation of the ERCOT Transmission Grid; and

(d) Guidelines established by the ERCOT Board, which may be more stringent than those established by NERC for the secure operation of the ERCOT Transmission Grid.

6.5.5 QSE Activities

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 standards and policies, 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 ~~ERCOT~~ the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT as a result of Section 3.7, Resource Parameters. 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 and LSL;

(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with ~~ERCOT~~ 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 as a result of Section 3.7;

(c) Gross Reactive Power (in Megav~~-V~~olt-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;

(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) Configuration identification for Combined Cycle Generation Resources;

(n~~m~~) 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;

(o~~n~~) Ancillary Service Resource Responsibility for each quantity of Regulation Up (Reg-Up), Regulation Down (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; and

(p~~o~~) Reg-Up and Reg-Down Services participation factors represent how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s).

(3) For each Wind-powered Generation Resource (WGR), the QSE shall set the HSL equal to the current net output capability of the facility within one SCADA cycle after receiving the last SCED Base Point Dispatch Instruction from ERCOT. The HSL telemetered to ERCOT for the WGR shall not be changed until the receipt of the next Base Point. If the Base Point received from ERCOT is less than the telemetered HSL minus two MW, then the WGR shall respond to the Base Point Dispatch Instruction and shall be considered curtailed. During any curtailed SCED intervals, the WGR HSL shall be updated within one SCADA cycle after the receipt of a subsequent SCED Base Point with a value which

represents the WGR's estimated, non-curtailed output potential. This estimated, non-curtailed output potential shall be based upon turbine availability, wind speed at the WGR and application of the appropriate wind/power curves. During SCED intervals when the telemetered Base Point of the WGR exceeds the last HSL telemetered to ERCOT minus two MW, the WGR shall be considered as not curtailed. HSLs telemetered to ERCOT for WGRs that are not curtailed shall be based on the WGRs' actual net output as stated above in this Section 6.5.5.2.

(4) 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;

(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, the Scheduled Power Consumption that represents zero Ancillary Service deployments;

(j) For a Controllable Load Resource, net Reactive Power (in MVAr);

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

(l) Reg-Up and Reg-Down services participation factor, which represents how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource.

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

(6) 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.

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

(8) 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.

~~(a) Each configuration for a power block of combined-cycle Resources is considered as a single Resource unless the different units of the combined-cycle Resource have separate injection points to the ERCOT Transmission Grid. Units with separate injection points to the ERCOT Transmission Grid may be aggregated with ERCOT approval only after ERCOT implements software to accept and implement incremental and decremental generation disaggregation weightings for each combined cycle unit's operating mode.~~

~~(b) Each QSE shall use continuous telemetry to report changes to Combined-Cycle Configurations. Changes must be reported by changing the Resource Status in Real-Time and in the COP for that Resource representing the desired Combined-Cycle Configuration. Each QSE shall provide ERCOT with the elements comprising each Combined-Cycle Configuration for a Resource through Real-Time telemetry and by appropriate entries in the COP.~~

~~(c) Each QSE shall provide individual telemetered generator output (MW and MVAr) and Resource Status that indicates the Combined-Cycle Configuration to be used in SCED and Reliability Unit Commitment (RUC).~~

(9) A QSE representing combined-cycle Resources shall provide ERCOT with the possible operating configurations for each power block with accompanying limits ~~and price points~~. Combined Cycle Train p~~P~~ower augmentation methods ~~must~~ may only be ~~made available to ERCOT~~ included as part of one or more of the registered Combined Cycle Generation Resource configurations. ~~Price points for the range of the~~ The Energy Offer Ceurve in the Three-Part Supply Offer ~~represented by~~ that includes the offered ~~the~~ power augmentation method ~~must~~ may reflect the price of the added capability. Such power augmentation methods may include:

(a) Combustion turbine inlet air cooling (CTIAC) methods;

(b) Duct firing;

(c) Other ways of temporarily increasing the output of combined-cycle Resources; and

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

6.5.7 Energy Dispatch Methodology

6.5.7.1 Real-Time Sequence

6.5.7.1.10 Network Security Analysis Processor and Security Violation Alarm

(1) Using the input provided by the State Estimator, ERCOT shall use the NSA processor to perform analysis of all contingencies remaining in the active list. For each contingency, ERCOT shall use the NSA processor to monitor the elements for limit violations. ERCOT shall use the NSA processor to verify Electrical Bus voltage limits to be within a percentage tolerance as outlined in the ERCOT Operating Guides. Contingency security violations for transmission lines and transformers occur if:

(a) The predicted post-contingency MVA exceeds 100% of the Emergency Rating after adjustments for Real-Time weather conditions applicable to the contingency are incorporated; and

(b) An RAP or SPS is not defined allowing relief within the time allowed by the security criteria.

(2) When the NSA processor notifies ERCOT of a security violation, ERCOT shall immediately initiate the process described in Section 6.5.7.1.11, Transmission Network and Power Balance Constraint Management.

(3) If the SCED does not resolve an insecure state, ERCOT shall attempt to relieve the insecure state by:

(a) Confirming that pre-determined relevant RAPs are properly modeled in the system;

(b) Re-Dispatching generation through the mechanism of over-riding HDLs and LDLs to provide more capacity to SCED;

(c) After declaring a Watch, as appropriate, manual Dispatch of generation;

(d) Removing non-cascading contingency overload/constraints from the SCED process; and

(e) If all other mechanisms have failed, ERCOT may authorize the use of a Mitigation Action Plan (MAP) previously reviewed by the appropriate TSP or DSP. An MAP is a set of pre-defined actions taken beyond normal RAPs under emergency circumstances to relieve transmission security violations.

(3) NSA must be capable of analyzing contingencies, including the effects of automatically deployed SPSs and RAPs. The NSA must fully integrate into the evaluation and deployment of these SPSs and RAPs and notify the ERCOT Operator of the application of these SPSs and RAPs to the solution.

(4) The Real-Time NSA may employ the use of appropriate ranking and other screening techniques to further reduce computation time by executing one or two iterations of the contingency study to gauge its impact and discard further study if the estimated result is inconsequential.

6.5.7.1.11 Transmission Network and Power Balance Constraint Management

(1) ERCOT may not allow any contingency anticipated to be active in SCED, identified by NSA, until it has verified that the contingency is accurate and appropriate given the current operating state of the ERCOT Transmission Grid. ERCOT shall continuously post to the MIS Secure Area any active contingencies in SCED and any contingencies that it has determined to be inaccurate or inappropriate and thus excluded from SCED under Section 5.5.1, Security Sequence. The ERCOT System Operator will flag for further review by ERCOT any contingencies deemed inaccurate or inappropriate.

(2) ERCOT shall establish a maximum Shadow Price for each network constraint as part of the definition of contingencies. The cost calculated by SCED to resolve an additional MW of congestion on the network constraint is limited to the maximum Shadow Price for the network constraint. ~~ERCOT shall develop a policy for setting maximum Shadow Prices for approval through the Protocol Revision Request (PRR) process.~~

(3) ERCOT shall establish a maximum Shadow Price for the power balance constraint. The cost calculated by SCED to resolve either the addition or reduction of one MW of dispatched generation on the power balance constraint is limited to the maximum Shadow Price for the power balance constraint.

(4) ERCOT shall determine the methodology for setting maximum Shadow Prices for network constraints and for the power balance constraint. Following review and recommendation by TAC, the ERCOT Board shall review the recommendation and approve a final methodology.

(5) The process for setting the maximum Shadow Prices as described above shall require ERCOT to obtain ERCOT Board approval of the values assigned to these caps along with the effective date for application of the cap. Within two Business Days following approval by the ERCOT Board, ERCOT shall post the Shadow Price caps and effective dates on the MIS Public Area.

(63) When ERCOT identifies a binding network constraint on a repeated basis ERCOT shall have procedures established to contact the appropriate TSP and validate the accuracy of the Network Operations Model according to paragraph (5) of Section 3.10.4, ERCOT Responsibilities.

(74) If ERCOT determines that rating(s) in the Network Operations Model or configuration of the Transmission Facilities are not correct, then the TSP will provide the appropriate data submittals to ERCOT to correct the problem upon notification by ERCOT.

6.5.7.1.13 Data Inputs and Outputs for the Real-Time Sequence and SCED

(1) Inputs: The following information must be provided as inputs to the Real-Time Sequence and SCED. ERCOT may require additional information as required, including:

(a) Real-Time data from TSPs including status indication for each point if that data element is stale for more than 20 seconds;

(i) Transmission Electrical Bus voltages;

(ii) MW and MVAr pairs for all transmission lines, transformers, and reactors;

(iii) Actual breaker and switch status for all modeled devices; and

(iv) Tap position for auto-transformers;

(b) State Estimator results (MW and MVAr pairs and calculated MVA) for all modeled Transmission Elements;

~~(c) Logic equations to determine the in- or out-of-service state of a transmission line or transformer;~~

(cd) Transmission Element ratings from TSPs;

(i) Data from the Network Operations Model:

(A) Transmission lines – Normal, Emergency, and 15-Minute Ratings (MVA); and

(B) Transformers and Auto-transformers – Normal, Emergency, and 15-Minute Ratings (MVA) and tap position limits;

(ii) Data from QSEs:

(A) Generator step-up transformers tap position;

(B) Resource HSL (from telemetry); and

(C) Resource LSL (from telemetry); and

(de) Real-Time weather, from WGRs, and where available from TSPs or other sources. ERCOT may elect to obtain other sources of weather data and may utilize such information to calculate the dynamic limit of any Transmission Element.

(2) ERCOT shall validate the inputs of the Resource Limit Calculator as follows:

(a) The calculated SURAMP and SDRAMP are each greater than or equal to zero; and

(b) Other provision specified under Section 3.18, Resource Limits in Providing Ancillary Service.

(3) Outputs for ERCOT Operator information and possible action include:

(a) Operator notification of any change in status of any breaker or switch;

(b) Lists of all breakers and switches not in their normal position;

~~(c) Result of logic equation calculation of the in and out status of transmission lines and transformers;~~

(cd) Operator notification of all Transmission Element overloads detected from telemetered or State-Estimated data;

(~~ee~~d) Operator notification of all Transmission Element security violations; and

(ef) Operator summary displays:

(i) Transmission system status changes;

(ii) Overloads;

(iii) System security violations; and

(iv) Base Points.

(4) Every hour, ERCOT shall post on the MIS Secure Area the following information:

(a) Status of all breakers and switches used in the NSA except breakers and switches connecting Resources to the ERCOT Transmission Grid;

(b) Transmission flows and voltages from the State Estimator, excluding transmission flows and voltages for Private Use Networks;

(c) Individual transmission Load on Electrical Buses, sum of the Load on each Electrical Bus in each Load Zone, and total Load on Electrical Buses in the ERCOT System, the sum of ERCOT generation, and flow on the DC Ties, all from the State Estimator;

(d) Transformer flows, voltages and tap position from the State Estimator, excluding transformer flows, voltages and tap position for Private Use Networks;

(e) All binding transmission constraints and the contingency or overloaded element pairs that caused such constraint;

(f) All Shadow Prices on binding transmission constraints; and

(g) The 15-minute average of Loads on the Electrical Buses from State Estimator results.

6.5.7.3 Security Constrained Economic Dispatch

(1) The SCED process is designed to simultaneously manage energy, the system power balance and network congestion through Resource Base Points and calculation of LMPs every five minutes. The SCED process uses a two-step methodology that applies mitigation prospectively to resolve network Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves and Output Schedules to produce a least cost dispatch of On-Line Generation Resources to the total current generation requirement determined by LFC, subject to power balance and network ~~transmission~~ constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP.

(2) The SCED solution must monitor cumulative deployment of Regulation Services and ensure that Regulation Services deployment is minimized over time.

(3) For use as SCED inputs, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows:

(a) Non-wind-powered generation and Dynamically Scheduled Resources (DSRs) without Energy Offer Curves

ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:

(i) Each non-~~wind-powered Generation Resource~~WGR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve; and

(ii) Each DSR that has not submitted Incremental and Decremental Energy Offer Curves.

MW	Price (per MWh)
HSL	SWCAP
Output Schedule MW plus 1 MW	SWCAP minus $0.01

Output Schedule MW	-$249.99
LSL	-$250.00

(b) DSRs with Energy Offer Curves

For each DSR that has submitted incremental and decremental Energy Offer Curves, ERCOT shall create a monotonically increasing proxy Energy Offer Curve. That curve must consist of the incremental Energy Offer Curve that reflects the available capacity above the Resource's Output Schedule to its HSL and the decremental Energy Offer Curve that reflects the available capacity below the Resource's Output Schedule to the LSL. The curve must be created as described below:

MW	**Price (per MWh)**
Output Schedule MW plus 1 MW to HSL	Incremental Energy Offer Curve
LSL to Output Schedule MW	Decremental Energy Offer Curve

(c) Non-wind-powered Generation Resources without full-range Energy Offer Curves

For each non-wind-powered Generation Resource for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource's available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource using the System-Wide Offer Cap (SWCAP) above the highest point on the Energy Offer Curve to the Resource's HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:

MW	**Price (per MWh)**
HSL (if more than highest MW in Energy Offer Curve)	SWCAP
1 MW above highest MW in Energy Offer Curve (if less than HSL)	SWCAP minus $0.01
Energy Offer Curve	Energy Offer Curve
1 MW below lowest MW in Energy Offer Curve (if more than LSL)	-$249.99
LSL (if less than lowest MW in Energy Offer Curve)	-$250.00

(d) WGR

(i) For each wind-powered Resource that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

MW	**Price (per MWh)**

HSL	SWCAP
HSL minus 1 MW	-$249.99
LSL	-$250.00

(ii) For each wind-powered Resource for which its QSE has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

MW	**Price (per MWh)**
HSL (if more than highest MW in Energy Offer Curve)	SWCAP
1 MW above highest MW in Energy Offer Curve (if less than HSL)	SWCAP minus $0.01
Energy Offer Curve	Energy Offer Curve
1 MW below lowest MW in Energy Offer Curve (if more than LSL)	-$249.99
LSL (if less than lowest MW in Energy Offer Curve)	-$250.00

(4) The creation of a proxy Energy Offer Curve by ERCOT under this Section does not constitute the submission of an offer by a QSE for purposes of paragraph (2) of Section 1.3.3, Expiration of Confidentiality.

(5) The two-step SCED methodology referenced in paragraph (1) above is:

(a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints. Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT under this Section, are used in the SCED to determine "Reference LMPs."

(b) The second step is to execute the SCED process to produce Base Points, Shadow Prices, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:

(i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node or the appropriate Mitigated Offer Cap and bounded at the lesser of the Reference LMP (from Step 1) at the Resource Node or the appropriate Mitigated Offer Floor; and

(ii) Observe all Competitive and Non-Competitive Constraints.

(c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the