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| NPRR Number | [940](http://www.ercot.com/mktrules/issues/NPRR940) | NPRR Title | Removal of Language Related to NPRR664, Fuel Index Price for Resource Definition and Real-Time Make-Whole Payments for Exceptional Fuel Cost Events |
| Date of Decision | October 8, 2019 |
| Action | Approved |
| Timeline | Normal |
| Effective Date | November 1, 2019 |
| Priority and Rank Assigned | Not applicable |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions2.2, Acronyms and Abbreviations3.14.1, Reliability Must Run3.14.1.21, Reporting Actual Eligible Fuel Costs4.4.9.2.1, Startup Offer and Minimum-Energy Offer Criteria4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps4.4.9.3.1, Energy Offer Curve Criteria4.4.9.3.3, Energy Offer Curve Caps for Make-Whole Calculation Purposes4.4.9.4.1, Mitigated Offer Cap5.6.1, Verifiable Costs5.7.1.1, RUC Guarantee5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource6.6.6.2, RMR Payment for Energy7.9.1.3, Minimum and Maximum Resource Prices9.14.7, Disputes for RUC Make-Whole Payment for Fuel Costs |
| Related Documents Requiring Revision/Related Revision Requests | Verifiable Cost Manual Revision Request (VCMRR) 023, Related to NPRR940, Removal of Language Related to NPRR664, Fuel Index Price for Resource Definition and Real-Time Make-Whole Payments for Exceptional Fuel Cost Events |
| Revision Description | This Nodal Protocol Revision Request (NPRR) removes NPRR664 grey-boxed language from the Protocols.  |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/news/presentations/2013/ERCOT%20Strat%20Plan%20FINAL%20112213.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | NPRR664 was approved by the ERCOT Board on December 9, 2014, and introduced an optional, alternative Fuel Index Price for Resources (FIPr). The system changes need to fully implement NPRR664 have not yet occurred.Based on an ongoing analysis of fuel indices within the ERCOT Region, discussions with stakeholders, the approval and implementation of other NPRRs since NPRR664 was approved, and the recommendation of the Wholesale Market Subcommittee (WMS) at its April 3, 2019, meeting, ERCOT recommends cancelling the implementation of the optional fuel index selection proposed within NPRR664. Given that using the Waha index price is optional under NPRR664, and that over the last several years the fuel price at Waha has been much lower than the price at Houston Ship Channel, there is a concern that even if ERCOT implements NPRR664—at a cost of between $150k-$250k—no current Resources would switch to the Waha index price. Accordingly, in light of the significant costs associated with implementation of NPRR664 and the low probability the optional fuel index selection set out in NPRR664 will be used, ERCOT proposes deletion of the NPRR664 gray-boxed language. Stakeholder discussions will continue on the broader topic of fuel costs and may result in additional NPRRs in the future.  |
| Credit Work Group Review | ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR940 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| PRS Decision | On 6/13/19, PRS voted to recommend approval of NPRR940 as submitted. There were two abstentions from the Independent Generator (Invenergy, Luminant) Market Segment. All Market Segments were present for the vote.On 7/17/19, PRS unanimously voted to endorse and forward to TAC the 6/13/19 PRS Report and Impact Analysis for NPRR940. All Market Segments were present for the vote. |
| Summary of PRS Discussion | On 6/13/19, there was no discussion.On 7/17/19, there was no discussion |
| TAC Decision | On 7/24/19, TAC unanimously voted to table NPRR940. All Market Segments were present for the vote. On 9/25/19, TAC unanimously voted to recommend approval of NPRR940 as recommended by PRS in the 7/17/19 PRS Report. All Market Segments were present for the vote. |
| Summary of TAC Discussion | On 7/24/19, participants noted the need to table NPRR940 in order to consider it concurrently with the related VCMRR023.On 9/25/19, there was no discussion. |
| ERCOT Opinion | ERCOT supports approval of NPRR940.  |
| Board Decision | On 10/8/19, the ERCOT Board approved NPRR940 as recommended by TAC in the 9/25/19 TAC Report. |

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| Market Segment | Not Applicable |

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| **Comments Received** |
| **Comment Author** | **Comment Summary** |
| None |  |

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| Market Rules Notes |

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

* NPRR826, Mitigated Offer Caps for RMR Resources
	+ Section 4.4.9.4.1
	+ Section 5.6.1
* NPRR838, Updated O&M Cost for RMR Resources
	+ Section 5.6.1
* NPRR970, Reliability Unit Commitment (RUC) Fuel Dispute Process Clarification
	+ Section 9.14.7
* NPRR971, Changing Energy Offer Curve caps for Make-Whole Calculation Purposes and Replacing the Real-Time Average Incremental Energy Cost
	+ Section 4.4.9.3.3

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

* NPRR896, Reliability Must-Run and Must-Run Alternative Evaluation Process (incorporated 7/1/19)
	+ Section 3.14.1

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| Proposed Protocol Language Revision |

**2.1 DEFINITIONS**

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**2.2 ACRONYMS AND ABBREVIATIONS**

***3.14.1 Reliability Must Run***

(1) RMR Service is the use by ERCOT, under contracts with Resource Entities, of capacity and energy from Generation Resources that otherwise would not operate and that are necessary to provide voltage support, stability or management of localized transmission constraints under applicable reliability criteria, where market solutions do not exist.

(a) Upon receiving a Notification of Suspension of Operations (NSO) from a Resource Entity as described in Section 3.14.1.1, Notification of Suspension of Operations, ERCOT may begin procurement of RMR Service under this Section.

(b) Before entering into an RMR Agreement, ERCOT shall assess alternatives to the proposed RMR Agreement. ERCOT shall evaluate and present in a written report posted on the Market Information System (MIS) Secure Area the information in items (i) through (iv) below. ERCOT is not limited in the number of additional scenarios it chooses to evaluate. The written report shall include an explanation as to why the items below are insufficient, either alone or in combination, to fill the requirement that will be met by the potential RMR Unit. The report shall be posted in the time frame required under paragraph (5) of Section 3.14.1.2, ERCOT Evaluation Process. The list of alternatives ERCOT must consider includes (as reasonable for each type of reliability concern identified):

(i) Re-dispatch/reconfiguration through operator instruction;

(ii) Automatic Mitigation Plans (AMPs) and Remedial Action Plans (RAPs);

(iii) Remedial Action Schemes (RASs) initiated on unit trips or Transmission Facilities’ Outages; and

(iv) Any other operational alternatives deemed viable by ERCOT.

(c) ERCOT shall minimize the use of RMR Units as much as practicable subject to the other provisions of these Protocols. ERCOT may Dispatch an RMR Unit at any time for ERCOT System security.

(d) Each RMR Unit must meet technical requirements specified in Section 8.1.1.1, Ancillary Service Qualification and Testing.

(e) ERCOT may execute RMR Agreements for no less than one month and no more than one year, with one exception. ERCOT may execute an RMR Agreement for a term longer than 12 months if the Resource Entity must make a significant capital expenditure to meet environmental regulations or to ensure availability to continue operating the RMR Unit so as to make an RMR Agreement in excess of 12 months appropriate, in ERCOT’s opinion. The term of a multi-year RMR Agreement must take into account the appropriate RMR exit strategy discussed in Section 3.14.1.4, Exit Strategy from an RMR Agreement. In the event ERCOT chooses to contract for an RMR Unit for longer than one year, ERCOT shall annually re-evaluate the need for the RMR Unit under the criteria set forth in paragraph (b) above. If ERCOT determines the RMR Unit is no longer needed, ERCOT shall enter into exit negotiations with the contract signatories to attempt to exit the contract early. However, ERCOT shall not enter into such negotiations until a Market Notice is issued providing the anticipated RMR exit time frame. The RMR standard Agreement is included in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement. ERCOT shall post each RMR Agreement in its entirety, including amendments or modifications thereto, within five Business Days of execution on the MIS Secure Area.

(f) A Generation Resource is eligible for RMR status based on criteria established by ERCOT indicating its operation is necessary to support ERCOT System reliability according to the Operating Guides. A combined-cycle generation Facility must be treated as a single unit for RMR purposes unless the combustion turbine and the steam turbine can operate separately. If the steam turbine and combustion turbine can operate separately, and the steam turbine is powered by waste heat from more than one combustion turbine, the combustion turbine accepted for RMR Service and a proportionate part of the steam turbine must be treated as a single unit for RMR purposes. If the combustion turbine accepted for RMR Service can operate separately from the steam turbine, and only the combustion turbine is accepted as an RMR Unit, the RMR energy price will be reduced by the value of the combustion turbine’s waste heat calculated at the Fuel Index Price (FIP), except when the steam turbine is Off-Line. ERCOT shall post to the MIS Secure Area the criteria upon which it evaluates whether an RMR Unit meets the test of operational necessity to support ERCOT System reliability within five Business Days of change and shall issue a Market Notice stating the determination is available. This includes the case where a unit previously identified by ERCOT as potentially needed for RMR Service is no longer needed regardless of whether an RMR Agreement was ever signed.

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(g) A Resource Entity cannot be compelled to enter into an RMR Agreement. A Resource Entity that owns or controls a Generation Resource that is uneconomic to remain in service can voluntarily petition ERCOT for contracted RMR status by following the process in this subsection. ERCOT shall determine whether the Generation Resource is necessary for system reliability based on the criteria set forth in this Section.

(h) ERCOT must contract for the entire capacity of each RMR Unit.

(i) ERCOT shall post on the MIS Secure Area all information relative to the use of RMR Units including energy deployed monthly.

(j) The Resource Entity that owns or controls the RMR Unit may not use the RMR Unit for:

(i) Participating in the bilateral energy market;

(ii) Self-providing of energy except for plant auxiliary Load obligations under the RMR Agreement; and

(iii) Providing of Ancillary Service to any Entity.

(k) ERCOT shall issue a Market Notice on the need for an RMR Unit prior to entering negotiations for the RMR Unit. Such Market Notice shall include the link to the ERCOT final RMR evaluation, the Resource name and unit code, the name of the Resource Entity, the name of the Qualified Scheduling Entity (QSE) for the Resource, the Resource MW rating by Season, and potential duration of the RMR Agreement, including anticipated start and end dates.

(l) ERCOT shall, through the issuance of Market Notices, provide the same information, contemporaneously, about the need for, or elimination of an RMR Unit to all registered Market Participants, including QSEs and Resource Entities with RMR Units.

**3.14.1.21 Reporting Actual Eligible Fuel Costs**

(1) The RMR Unit owner shall provide ERCOT with actual fuel costs on a monthly basis for the RMR Unit in a level of detail sufficient for ERCOT to verify that all fuel costs are actual and appropriate. ERCOT shall perform a true-up of the estimated fuel costs using the submitted and verified actual fuel costs for the RMR Unit. Actual cost data must be submitted on time by the Resource Entity for the RMR Unit and then verified by ERCOT so the actual cost data can be reflected in the True-Up Settlement Statement. To be considered timely for the final, actual cost data for month ‘x’ must be submitted by the 16th of the month following month ‘x.’ To be considered timely for the true-up, actual cost data for month ‘x’ must be submitted 60 days prior to the publishing date of the True-Up Settlement Statement for the first day in month ‘x.’ Any deviation in filing actual cost data in accordance with this calendar must be requested of ERCOT, by the QSE representing an RMR Unit. Such request for deviation shall contain the reason for the inability to meet the calendar and an expected date that the cost data will be provided to ERCOT. At its discretion ERCOT may choose to honor such a request. No later than two Business Days following its decision, ERCOT shall issue a Market Notice of any such request and its response thereto. In the event that actual cost data is not submitted in accordance with the timeline or is not an approved deviation for the true-up, then the cost for the portion of Eligible Cost that has not been submitted is deemed to be zero.

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(2) Actual fuel costs must be appropriate actual costs attributable to ERCOT’s scheduling and/or deployment of the RMR Unit. Actual fuel costs may include cost of fuel (including the cost of exceeding swing gas contract limits, additional gas demand costs set by fuel supply, or transportation contracts); demand fees, imbalance penalties, transportation charges, and cash out premiums. In addition, actual fuel costs may include costs incurred to:

(a) Keep the boiler(s) warmed, if approved in advance by ERCOT; and

(b) Test the RMR Unit prior to or during the term of the RMR Agreement, if approved in advance by ERCOT.

***4.4.9.2.1 Startup Offer and Minimum-Energy Offer Criteria***

(1) Each Startup Offer and Minimum-Energy Offer must be reported by a QSE and must include the following information:

(a) The selling QSE;

(b) The Resource represented by the QSE from which the offer would be supplied;

(c) The Resource’s hot, intermediate, and cold Startup Offer in dollars;

(d) The Resource’s Minimum-Energy Offer in dollars per MWh;

(e) The first and last hour of the Startup and Minimum-Energy Offers

(f) The expiration time and date of the offer;

(g) Percentage of the Fuel Index Price (FIP) to the extent that the startup and minimum energy will be supplied by gas to determine the offer cap; and

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(h) Percentage of the Fuel Oil Price (FOP) to the extent that the startup and minimum energy will be supplied by oil to determine the offer cap.

(2) Valid Startup Offers and Minimum-Energy Offers (which must be part of a Three-Part Supply Offer) must be received before 1000 for the effective DAM and DRUC.

(3) A QSE may update and submit a Startup Offer and/or Minimum-Energy Offer for a Resource during the Adjustment Period for any hours in which the Resource is not DAM- or RUC-committed before the offer is updated or submitted.

(4) The Resource’s Startup Offer must not be greater than 200% of the Resource Category Generic Startup Cost for that type of Resource listed in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, unless ERCOT has approved verifiable Resource-specific startup costs for that Resource, under Section 4.4.9.2.4, Verifiable Startup Offer and Minimum-Energy Offer Caps, in which case the Resource’s Startup Offer must not be greater than 200% of those approved verifiable Resource-specific Startup Costs.

(5) The Resource’s Minimum-Energy Offer must not be greater than 200% of the Resource Category Generic Minimum-Energy Cost for that type of Resource listed in Section 4.4.9.2.3 unless ERCOT has approved verifiable Resource-specific minimum-energy costs for that Resource, under Section 4.4.9.2.4 in which case the Resource’s Minimum-Energy Offer must not be greater than 200% of those approved verifiable Resource-specific minimum-energy costs.

(6) Prior to 1000 for the effective DAM, a QSE may submit and update a Three-Part Supply Offer for a Resource for any hours which were Weekly Reliability Unit Commitment (WRUC)-instructed.

***4.4.9.2.3 Startup Offer and Minimum-Energy Offer Generic Caps***

(1) The Resource Category Startup Offer Generic Cap, by applicable Resource category, is determined by the following Operations and Maintenance (O&M) costs by Resource category:

| **Resource Category** | **O&M Costs ($)** |
| --- | --- |
| Nuclear, coal, lignite and hydro | 7,200 |
| Combined Cycle Generation Resource with a combustion turbine ≥ 90 MW, as determined by the largest combustion turbine in the Combined Cycle Generation Resource and for each combustion turbine in the Combined Cycle Generation Resource | 6,810  |
| Combined Cycle Generation Resource with a combustion turbine < 90 MW, as determined by the largest combustion turbine in the Combined Cycle Generation Resource and for each combustion turbine in the Combined Cycle Generation Resource | 6,810 |
| Gas steam supercritical boiler | 4,800 |
| Gas steam reheat boiler  | 3,000 |
| Gas steam non-reheat or boiler w/o air-preheater  | 2,310 |
| Simple cycle greater than 90 MW  | 5,000 |
| Simple cycle less than or equal to 90 MW | 2,300 |
| Reciprocating Engines | $58 /MW \* the average of the seasonal net max sustainable ratings |
| RMR Resource | Not Applicable |
| Wind generation Resources | 0 |
| PhotoVoltaic Generation Resources (PVGRs) | 0 |
| Any Resources not defined above | 0, or as determined by the Verifiable Cost Manual |

 (2) The Resource Category Minimum-Energy Generic Cap is the cost per MWh of energy for a Resource to produce energy at the Resource’s LSL and is as follows:

(a) Hydro = $10.00/MWh;

(b) Coal and lignite = $18.00/MWh;

(c) Combined-cycle greater than 90 MW = 8 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(d) Combined-cycle less than or equal to 90 MW = 9 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(e) Gas steam supercritical boiler = 14 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(f) Gas steam reheat boiler = 14.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(g) Gas steam non-reheat or boiler without air-preheater = 16.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(h) Simple-cycle greater than 90 MW = 15.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(i) Simple-cycle less than or equal to 90 MW = 14.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(j) Reciprocating engines = 16.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Minimum-Energy Offer;

(k) RMR Resource = RMR contract estimated fuel cost using its contract I/O curve at its LSL times FIP;

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(l) Nuclear = Not Applicable;

(m) Wind generation Resources = $0;

(n) PVGRs = $0; and

(o) Other Resources not defined above = $0, or as determined by the Verifiable Cost Manual.

(3) The FIP and FOP used to calculate the Resource Category Minimum-Energy Generic Cap shall be the FIP or FOP for the Operating Day. In the event the Resource Category Minimum-Energy Generic Cap must be calculated before the FIP or FOP is available for the particular Operating Day, the FIP and FOP for the most recent preceding Operating Day shall be used. Once the FIP and FOP are available for a particular Operating Day, those values shall be used in the calculations. If the percentage fuel mix is not specified for Resource categories having the option to specify the fuel mix, then the minimum of FIP or FOP shall be used.

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(4) Items (2)(c) and (2)(d) above are determined by capacity of largest simple-cycle combustion turbine in the train.

4.4.9.3.1 Energy Offer Curve Criteria

(1) Each Energy Offer Curve must be reported by a QSE and must include the following information:

(a) The selling QSE;

(b) The Resource represented by the QSE from which the offer would be supplied;

(c) A monotonically increasing offer curve for both price (in $/MWh) and quantity (in MW) with no more than ten price/quantity pairs;

(d) The first and last hour of the Offer;

(e) The expiration time and date of the offer;

(f) List of Ancillary Service Offers from the same Resource;

(g) Inclusive or exclusive designation relative to other DAM offers; and

(h) Percentage of FIP and percentage of FOP for generation above LSL subject to the sum of the percentages not exceeding 100%.

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(2) An Energy Offer Curve must be within the range of -$250.00 per MWh and the SWCAP in dollars per MWh. The software systems must be able to provide ERCOT with the ability to enter Resource-specific Energy Offer Curve floors and caps.

(3) The minimum amount per Resource for each Energy Offer Curve that may be offered is one MW.

***4.4.9.3.3 Energy Offer Curve Caps for Make-Whole Calculation Purposes***

(1) The following Energy Offer Curve Caps must be used for the purpose of make-whole Settlements:

(a) Nuclear = $15.00/MWh;

(b) Coal and Lignite = $18.00/MWh;

(c) Combined Cycle greater than 90 MW = 9 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(d) Combined Cycle less than or equal to 90 MW = 10 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(e) Gas - Steam Supercritical Boiler = 10.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(f) Gas Steam Reheat Boiler = 11.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(g) Gas Steam Non-reheat or boiler without air-preheater = 14.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(h) Simple Cycle greater than 90 MW = 14 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(i) Simple Cycle less than or equal to 90 MW = 15 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(j) Reciprocating Engines = 16 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

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(k) Hydro = $10.00/MWh;

(l) Other = SWCAP;

(m) RMR Resource = RMR contract price Energy Offer Curve;

(n) Wind Generation Resources = $0.00/MWh; and

(o) PhotoVoltaic Generation Resource (PVGR) = $0.00/MWh.

(2) ERCOT shall produce an annual report each April that provides the amount of DAM and RUC Make-Whole Payments during the previous calendar year for Resources categorized as Other, per item (1)(l) above, as a percentage of the total amount of DAM and RUC Make-Whole Payments made during the previous calendar year. The report shall be based on final Settlements and include the total number of Resources classified as Other. ERCOT shall present this report annually to the appropriate Technical Advisory Committee (TAC) subcommittee. If there are no Make-Whole Payments for Resources categorized as Other for a given calendar year, then ERCOT will not be required to produce the annual report.

(3) Items in paragraphs (1)(c) and (d) above are determined by capacity of largest simple-cycle combustion turbine in the train selected.

(4) The FIP and FOP used to calculate the Energy Offer Curve Cap for Make-Whole Payment calculation purposes shall be the FIP or FOP for the Operating Day. In the event the Energy Offer Curve Cap for Make-Whole Payment calculation purposes must be calculated before the FIP or FOP is available for the particular Operating Day, the FIP and FOP for the most recent preceding Operating Day shall be used. Once the FIP and FOP are available for a particular Operating Day, those values shall be used in the calculations. If the percentage fuel mix is not specified or if no Energy Offer Curve exists, then the minimum of FIP or FOP shall be used.

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***4.4.9.4.1 Mitigated Offer Cap***

(1) Energy Offer Curves may be subject to mitigation in Real-Time operations under Section 6.5.7.3, Security Constrained Economic Dispatch, using a Mitigated Offer Cap (MOC). ERCOT shall construct an incremental MOC curve in accordance with Section 6.5.7.3 such that each point on the MOC curve is calculated as follows:

MOC *q, r, h* = Max [GIHR *q, r* \* Max(FIP, WAFP *q, r, h*), (IHR *q, r* \* FPRC *q, r* + OM *q, r*) \* CFMLT *q, r*]

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Where,

If a QSE has submitted an Energy Offer Curve on behalf of a Generation Resource and the Generation Resource has approved verifiable costs, then

FPRC *q, r* = Max(WAFP *q, r, h*, FIP + FA *q, r*) \* RTPERFIP *q, r* / 100 + FOP \* RTPERFOP *q, r* / 100

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If a QSE has not submitted an Energy Offer Curve on behalf of a Generation Resource and the Generation Resource has approved verifiable costs, then

FPRC *q, r* = Max(WAFP *q, r, h*, FIP + FA *q, r*) \* GASPEROL *q, r* / 100 + FOP \* OILPEROL *q, r* / 100 + (SFP + FA *q, r*) \* SFPEROL *q, r* / 100

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The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MOC *q, r, h* | $/MWh | *Mitigated Offer Cap per Resource*—The MOC 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. |
| GIHR *q, r* | MMBtu/MWh | *Generic Incremental Heat Rate*—The generic, single-value, incremental heat rate. For Generation Resources with a Commercial Operations Date on or before January 1, 2004, the generic incremental heat rate shall be set to 10.5. For Generation Resources that have a Commercial Operations Date after January 1, 2004, this value shall be set to 14.5. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| IHR *q, r* | MMBtu/MWh | *Verifiable Incremental Heat Rate per Resource*—The verifiable incremental heat rate curve for Resource *r,* as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The natural gas index price as defined in Section 2.1, Definitions. |
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| RTPERFIP *q, r* | none | *Fuel Index Price Percentage*—The percentage of natural gas used by Resource *r* to operate above LSL, as submitted with the energy offer curve. |
| FOP | $/MMBtu | *Fuel Oil Price*—The fuel oil index price as defined in Section 2.1. |
| RTPERFOP *q, r* | none | *Fuel Oil Price Percentage*—The percentage of fuel oil used by Resource *r* to operate above LSL, as submitted with the energy offer curve. |
| SFP | $/MMBtu | *Solid Fuel Price—*The solid fuel index price is $1.50.  |
| FPRC *q, r* | $/MMBtu | *Fuel Price Calculated per Resource*—The calculated index price for fuel for the Resource based on the Resources fuel mix. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
| GASPEROL *q, r* | none | *Percent of Natural Gas to Operate Above LSL*—The percentage of natural gas used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OILPEROL *q, r* | none | *Percent of Oil to Operate Above LSL*—The percentage of fuel oil used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SFPEROL *q, r* | none | *Percent of Solid Fuel to Operate Above LSL*—The percentage of solid fuel used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| FA *q, r* | $/MMBtu | *Fuel Adder*—The fuel adder is the average cost above the index price Resource *r* has paid to obtain fuel. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| OM *q, r* | $/MWh | *Variable Operations and Maintenance Cost above LSL*—The O&M cost for Resource *r* to operate above LSL, including an adjustment for emissions costs, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| CFMLT *q, r* | none | *Capacity Factor Multiplier*—A multiplier based on the corresponding monthly capacity factor as described in paragraph (1)(d) below.  |
| WAFP *q, r, h* | $/MMBtu | *Weighted Average Fuel Price*—The volume-weighted average intraday, same-day and spot price of fuel submitted to ERCOT during the Adjustment Period for a specific Resource and specific hour within the Operating Day, as described in paragraph (1)(f) below.  |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *h* | none | The Operating Hour.  |

(a) For a Resource contracted by ERCOT under paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority, ERCOT shall increase the O&M cost such that every point on the MOC curve is greater than the SWCAP in $/MWh.

(b) The MOC for Energy Storage Resources shall be calculated in accordance with Verifiable Cost Manual Appendix 10, Procedures for Evaluating Costs and Caps for Energy Storage Resources.

(c) For Quick Start Generation Resources (QSGRs) the MOC shall be adjusted in accordance with Verifiable Cost Manual Appendix 7, Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for Quick Start Generation Resources (QSGRs).

(d) The multipliers for the MOC calculation above are as follows:

(i) 1.10 for Resources running at a ≥ 50% capacity factor for the previous 12 months;

(ii) 1.15 for Resources running at a ≥ 30 and < 50% capacity factor for the previous 12 months;

(iii) 1.20 for Resources running at a ≥ 20 and < 30% capacity factor for the previous 12 months;

(iv) 1.25 for Resources running at a ≥ 10 and < 20% capacity factor for the previous 12 months;

(v) 1.30 for Resources running at a ≥ 5 and < 10% capacity factor for the previous 12 months;

(vi) 1.40 for Resources running at a ≥ 1 and < 5% capacity factor for the previous 12 months; and

(vii) 1.50 for Resources running at a less than 1% capacity factor for the previous 12 months.

(e) The previous 12 months’ capacity factor must be updated by ERCOT by the 20th day of each month using the most recent data for use in the next month. ERCOT shall post to the MIS Secure Area the capacity factor for each Resource before the start of the effective month.

(f) During the Adjustment Period, a QSE representing a Resource may submit Exceptional Fuel Cost as a volume-weighted average fuel price for use in the MOC calculation for that Resource. To qualify as Exceptional Fuel Cost, the submission must meet the following conditions:

(i) For all Resources, the weighted average fuel price must exceed FIP for the applicable Operating Day, plus a threshold parameter value of $1/MMBtu, plus the applicable fuel adder. For Resources without approved verifiable costs, the fuel adder will be set to the default value assigned to Resources with approved verifiable costs, as defined in the Verifiable Cost Manual. The threshold parameter value in this paragraph shall be recommended by the Wholesale Market Subcommittee (WMS) and approved by the Technical Advisory Committee (TAC). ERCOT shall update the threshold value on the first day of the month following TAC approval unless otherwise directed by the TAC. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.

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(ii) Fixed cost (fees, penalties and similar non-gas costs) may not be included in the calculation of the weighted average fuel price.

(iii) All intra-day, same day, and spot fuel purchases must be included in the calculation of the weighted average fuel price in paragraph (1) above. These must account for at least 10% of the total fuel volume burned by the applicable Resource for the hour for which the weighted average fuel price is computed. As noted in paragraph (l) below, the methodology used in the allocation of the cost and volume of purchased fuel to the Resource for the hour is subject to validation by ERCOT.

(iv) Weighted average fuel prices must be submitted individually for each Operating Hour for which they are applicable. Values submitted outside of the Adjustment Period will be rejected and not used in the calculation of the MOC for the designated Operating Hour.

(g) ERCOT may notify the Independent Market Monitor (IMM) if a QSE submits an Exceptional Fuel Cost.

(h) No later than five Business Days after an Operating Day for which an Exceptional Fuel Cost is submitted, ERCOT shall issue a Market Notice indicating the affected Operating Hours and the number of Resources for which a QSE submitted Exceptional Fuel Cost for a particular Operating Day.

(i) No later than 1700 Central Prevailing Time (CPT) on the 15th day following an Exceptional Fuel Cost submission, the submitting QSE shall provide ERCOT with the calculation of the weighted average fuel price, intraday or same-day fuel purchases, and any available supporting documentation. Such information may include, but is not be limited to, documents of the following nature: relevant contracts between the QSE or Resource Entity and fuel supplier, trade logs, transportation, storage, balancing and distribution agreements, calculation of the weighted average fuel price, or any other documentation necessary to support the Exceptional Fuel Cost price and volume for the applicable period(s).

(j) No later than 1700 Central Prevailing Time (CPT) on the 60th day following an Exceptional Fuel Cost submission, the submitting QSE shall provide ERCOT with all supporting documentation not previously provided to ERCOT. No supporting documentation will be accepted after the 60th day.

(k) The accuracy of submitted Exceptional Fuel Cost and the need for purchasing intraday or same-day gas must be attested to by a duly authorized officer or agent of the QSE representing the Resource. The attestation must be provided in a standardized format acceptable to ERCOT and submitted with the other documentation described in paragraph (i) above.

(l) ERCOT will use the supporting documentation to validate the Exceptional Fuel Cost for the applicable period. Validation will include, but not be limited to, the cost and the quantity of purchased fuel, Resource-specific heat rates, and the methodology used in the allocation of the cost and volume of purchased fuel to the Resource for the applicable hour used in the weighted average fuel price calculation. In connection with the validation process ERCOT may request additional documentation or clarification of previously submitted documentation. Such requests must be honored within ten Business Days.

(m) At ERCOT’s sole discretion, submission and follow-up information deadlines may be extended on a case-by-case basis.

***5.6.1 Verifiable Costs***

(1) The Qualified Scheduling Entity (QSE) is responsible for submitting verifiable costs unless both the QSE and Resource Entity agree that the Resource Entity will have this responsibility, in which case both the QSE and Resource Entity shall submit an affidavit to ERCOT stating this arrangement. Notwithstanding the foregoing, QSEs that submit Power Purchase or Tolling Agreements (PPAs) do not have the option of allowing Resource Entities to file verifiable costs.

(2) Make-Whole Payments for a Resource are based on the Startup Offers and Minimum-Energy Offers for the Resource, limited by caps. Until ERCOT approves verifiable unit-specific costs for that Resource, the caps are the Resource Category Startup Generic Cap and the Resource Category Minimum-Energy Generic Cap. When ERCOT approves verifiable unit-specific costs for that Resource the caps are those verifiable unit-specific costs. A QSE or Resource Entity may file verifiable unit-specific costs for a Resource at any time, but it must file those costs no later than 30 days after five Reliability Unit Commitment (RUC) events for that Resource in a calendar year. A RUC event begins when a Resource receives a RUC instruction to come or stay On-Line and ends the later of when the Resource shuts down or the end of the Operating Day. The most recent ERCOT-approved verifiable costs must be used going forward.

(3) These unit-specific verifiable costs may include and are limited to the following average incremental costs:

(a) Allocation of maintenance requirements based on number of starts between maintenance events using, at the option of the QSE or Resource Entity, either:

(i) Manufacturer-recommended maintenance schedule;

(ii) Historical data for the unit and actual maintenance practices; or

(iii) Another method approved in advance by ERCOT in writing;

(b) Startup fuel calculations based on recorded actual measured flows when the data is available or based on averages of historical flows for similar starts (for example, hot, cold, intermediate) when actual data is not available. Startup fuel will include filing separately the startup fuel required to reach breaker close and fuel after breaker close to Low Sustained Limit (LSL). Any fuel required to shutdown a Resource will be submitted as the fuel from breaker open to shutdown;

(c) Operation costs;

(d) Chemical costs;

(e) Water costs; and

(f) Emission credits.

(4) Standard Operations and Maintenance (O&M) costs pursuant to paragraph (6) below may be used in lieu of the incremental O&M costs set forth in items (3)(a), (c), (d) and (e) above.

(5) These unit-specific verifiable costs may not include:

(a) Fixed costs, which are any cost that is incurred regardless of whether the unit is deployed or not; and

(b) Costs for which the QSE or Resource Entity cannot provide sufficient documentation for ERCOT to verify the costs.

(6) At their election, QSEs or Resource Entities may receive standard O&M costs for both startup and minimum energy. This election may be made by submitting an election form to ERCOT. If a QSE or Resource has received final approval for actual verifiable O&M costs under the verifiable cost process, it may not elect to receive standard O&M costs.

(a) Until December 31, 2011, standard O&M costs are defined as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Resource Category****Start Year = 2009** | **Cold Startup ($/start)** | **Intermediate Startup ($/start)** | **Hot Startup ($/start)** | **Variable O&M ($/MWh)** |
| Aeroderivative simple cycle commissioned after 1996 | 1,000.00 | 1,000.00 | 1,000.00 | 3.94 |
| Reciprocating Engine | $58/MW \* the average of the Seasonal net max sustainable ratings | $58/MW \* the average of the Seasonal net max sustainable ratings  | $58/MW \* the average of the Seasonal net max sustainable ratings | 5.09 |
| Simple cycle ≤ 90 MW | 2,300.00 | 2,300.00 | 2,300.00 | 3.94 |
| Simple cycle ≥ 90 MW | 5,000.00 | 5,000.00 | 5,000.00 | 3.94 |
| Combined cycle: for each Combined-Cycle Configuration, the Startup Cost for that configuration is the sum of the Startup Costs for each unit within that configuration as follows: |  |  |  | 3.19 |
| Combustion turbine < 90 MW | 2,300.00 | 2,300.00 | 2,300.00 |  |
| Combustion turbine ≥ 90 MW | 5,000.00 | 5,000.00 | 5,000.00 |  |
| Steam turbine | 3,000.00 | 2,250.00 | 1,250.00 |  |
| Gas-steam non-reheat boiler | 2,310.00 | 1,732.50 | 866.25 | 7.08 |
| Gas-steam reheat boiler | 3,000.00 | 2,250.00 | 1,125.00 | 7.08 |
| Gas-steam supercritical boiler | 4,800.00 | 3,600.00 | 1,800.00 | 7.08 |
| Nuclear, coal, lignite and hydro | 7,200.00 | 5,400.00 | 2,700.00 | 5.02 |
| Renewable | Not Applicable | Not Applicable | Not Applicable | 5.50 |

(b) For the period beginning January 1, 2012 and ending December 31, 2012, standard O&M costs shall be reduced by 10% from the levels specified in the table in paragraph (a) above as follows:

| **Resource Category** | **Cold Startup ($/start)** | **Intermediate Startup ($/start)** | **Hot Startup ($/start)** | **Variable O&M ($/MWh)** |
| --- | --- | --- | --- | --- |
| **Start Year = 2009** |
| Aeroderivative simple cycle commissioned after 1996 | 900.00 | 900.00 | 900.00 | 3.55 |
| Reciprocating Engine | $52.20/MW \* the average of the Seasonal net max sustainable ratings | $52.20/MW \* the average of the Seasonal net max sustainable ratings | $52.20/MW \* the average of the Seasonal net max sustainable ratings | 4.58 |
| Simple cycle ≤ 90 MW | 2,070.00 | 2,070.00 | 2,070.00 | 3.55 |
| Simple cycle ≥ 90 MW | 4,500.00 | 4,500.00 | 4,500.00 | 3.55 |
| Combined cycle: for each Combined-Cycle Configuration, the Startup Cost for that configuration is the sum of the Startup Costs for each unit within that configuration as follows: |  |  |  | 2.87 |
| Combustion turbine < 90 MW | 2,070.00 | 2,070.00 | 2,070.00 |  |
| Combustion turbine ≥ 90 MW | 4,500.00 | 4,500.00 | 4,500.00 |  |
| Steam turbine | 2,700.00 | 2,025.00 | 1,125.00 |  |
| Gas-steam non-reheat boiler | 2,079.00 | 1,559.25 | 779.63 | 6.37 |
| Gas-steam reheat boiler | 2,700.00 | 2,025.00 | 1,012.50 | 6.37 |
| Gas-steam supercritical boiler | 4,320.00 | 3,240.00 | 1,620.00 | 6.37 |
| Nuclear, coal, lignite and hydro | 6,480.00 | 4,860.00 | 2,430.00 | 4.52 |
| Renewable | Not Applicable | Not Applicable | Not Applicable | 4.95 |

(c) Beginning January 1, 2013 and going forward, standard O&M costs shall be reduced by 20% from the levels specified in the table in paragraph (a) above as follows:

| **Resource Category** | **Cold Startup ($/start)** | **Intermediate Startup ($/start)** | **Hot Startup ($/start)** | **Variable O&M ($/MWh)** |
| --- | --- | --- | --- | --- |
| **Start Year = 2009** |
| Aeroderivative simple cycle commissioned after 1996 | 800.00 | 800.00 | 800.00 | 3.15 |
| Reciprocating Engine | $46.40/MW \* the average of the Seasonal net max sustainable ratings | $46.40 /MW \* the average of the Seasonal net max sustainable ratings | $46.40 /MW \* the average of the Seasonal net max sustainable ratings | 4.07 |
| Simple cycle ≤ 90 MW | 1,840.00 | 1,840.00 | 1,840.00 | 3.15 |
| Simple cycle ≥ 90 MW | 4,000.00 | 4,000.00 | 4,000.00 | 3.15 |
| Combined cycle: for each Combined-Cycle Configuration, the Startup Cost for that configuration is the sum of the Startup Costs for each unit within that configuration as follows: |   |   |   | 2.55 |
| Combustion turbine < 90 MW | 1,840.00 | 1,840.00 | 1,840.00 |   |
| Combustion turbine ≥ 90 MW | 4,000.00 | 4,000.00 | 4,000.00 |   |
| Steam turbine | 2,400.00 | 1,800.00 | 1,000.00 |   |
| Gas-steam non-reheat boiler | 1,848.00 | 1,386.00 | 693.00 | 5.66 |
| Gas-steam reheat boiler | 2,400.00 | 1,800.00 | 900.00 | 5.66 |
| Gas-steam supercritical boiler | 3,840.00 | 2,880.00 | 1,440.00 | 5.66 |
| Nuclear, coal, lignite and hydro | 5,760.00 | 4,320.00 | 2,160.00 | 4.02 |
| Renewable | Not Applicable | Not Applicable | Not Applicable | 4.40 |

(d) If the QSE or Resource Entity chooses to utilize the standard O&M costs for O&M, standard O&M costs will be used by ERCOT going forward until either:

(i) Verifiable variable O&M costs are filed; or

(ii) ERCOT notifies the QSE or Resource Entity to update its verifiable costs as set forth in either paragraph (9) or (10) below. If a Resource is receiving standard O&M costs, it may reelect standard O&M costs when resubmitting verifiable costs.

(7) When submitting verifiable costs for combined cycle Resources, the QSE or Resource Entity must elect standard O&M costs for all Combined-Cycle Configurations or verifiable costs for all Combined-Cycle Configurations within the combined cycle train.

(8) QSEs submitting PPAs as Resource-specific verifiable costs documentation are subject to the guidelines detailed below and in the Verifiable Cost Manual.

(a) Only QSEs offering Three-Part Supply Offers for a specific Resource may submit a PPA as verifiable costs documentation.

(b) A QSE submitting a PPA as verifiable costs documentation must represent 100% of the Resource’s capacity.

(c) Only PPAs:

(i) Signed prior to July 16, 2008; and

(ii) Not between Affiliates, subsidiaries or partners will be accepted as verifiable cost documentation.

(d) Verifiable costs for PPAs shall be capped at the level of the highest comparable Resource (referred to as the reference Resource) specific verifiable costs approved by ERCOT without a PPA. The ERCOT approved verifiable costs for a PPA shall be equal to the lesser of:

(i) The cap as described in paragraph (d) above; and

(ii) The costs from the PPA.

(e) ERCOT shall use the Resource actual fuel costs submitted by the QSE for startup and operation at minimum-energy level (LSL), and shall use the Resource Category Startup Offer Generic Costs as the cap for the O&M portion of the Startup Costs until ERCOT receives and approves comparable Resource specific verifiable costs.

(f) PPAs will no longer be accepted as verifiable cost documentation after the primary term of the contract expires.

(g) ERCOT shall produce a report each April that provides the percentage of RUC Make-Whole Payments for Resources with PPAs during the 12 months of the previous calendar year. If there are no Make-Whole Payments for Resources with PPAs, ERCOT shall not produce the annual report. The report shall be based on the final Settlements and include the total number of Resources that used a PPA for their most recent verifiable cost submission that was approved by ERCOT. ERCOT shall present the results of this study to the appropriate Technical Advisory Committee (TAC) subcommittee.

(h) Notwithstanding anything to the contrary in this Section 5.6.1, QSEs representing PPAs may, at any time, submit data from a Resource as verifiable costs documentation and such documentation will be accepted for consideration by ERCOT. A QSE submitting verifiable costs documentation pursuant to this paragraph shall not be required to submit a PPA to ERCOT for consideration for verifiable cost recovery.

(9) ERCOT shall notify a QSE to update verifiable cost data of a Resource when the Resource has received more than 50 RUC instructions meeting the criteria in Section 5.6.2, RUC Startup Cost Eligibility, in a year, but ERCOT may not request an update more frequently than annually.

(10) ERCOT shall notify a QSE to update verifiable cost data of a Resource if at least five years have passed since ERCOT previously approved verifiable cost data for that Resource.

(11) Within 30 days after receiving an update Notice from ERCOT under either paragraph (9) or (10) above, a QSE or Resource Entity must submit verifiable cost data for the Resource. Despite the provisions in paragraph (2) above, if the QSE or Resource Entity does not submit verifiable cost data within 30 days after receiving an update Notice, then ERCOT shall determine payment using the Resource Category Startup Offer Generic Cap, Resource Category Minimum-Energy Offer Generic Cap, and a zeroed value for variable O&M Cost as described in Section 4.4.9.4.1, Mitigated Offer Cap, in accordance with the schedule established in this section until updated verifiable costs are approved. If the 30-day deadline has been reached before the start of the tenth day before the end of the month, the Resource’s verifiable costs will revert back to generic costs beginning on the first day of the following month. If the 30-day deadline falls within the last ten days of the month, the Resource’s verifiable costs will revert back to generic costs on the first day of the second month following the deadline month.

(12) Resource Entities that represent Reliability Must-Run (RMR) Resources shall submit to ERCOT, Startup and variable O&M Cost estimates to be used by ERCOT as proxies for verifiable Startup Cost and minimum-energy verifiable cost and for Settlement. The ERCOT-approved verifiable Startup Cost estimate will equal the startup fuel estimate times the sum of the appropriate Fuel Index Price (FIP) or Fuel Oil Price (FOP) and the fuel adder, plus the startup O&M. The ERCOT-approved minimum-energy verifiable cost estimate will equal the heat rate from the RMR Agreement contract times the sum of the appropriate FIP or FOP and the fuel adder, plus the variable O&M. The O&M cost estimates shall be revised monthly to be consistent with the latest actual costs for the RMR Unit submitted in accordance with Section 3.14.1.14, Reporting Actual RMR Eligible Costs. The O&M values will be effective until updated costs have been submitted to ERCOT.

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**5.7.1.1 RUC Guarantee**

(1) The allowable Startup Costs and minimum-energy costs of a Resource committed by RUC is the RUC Guarantee. The RUC Guarantee minimum-energy costs are prorated according to the actual generation when the Resource’s average output during a 15-minute Settlement Interval is below the corresponding LSL.

(2) The SUPR, MEPR and LSL used to calculate the RUC Guarantee for a Combined Cycle Train are the SUPR, MEPR and LSL that correspond to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-committed for the hour.

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| ***[NPRR884: Replace paragraph (2) above with the following upon system implementation:]***(2) The SUPR, MEPR and LSL used to calculate the RUC Guarantee for a Combined Cycle Train are the SUPR, MEPR and LSL that correspond to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-committed for the hour. If the RUC-Committed Interval is a RUC for Additional Capacity (RUCAC)-Interval, then the SUPR, MEPR, and LSL that corresponds to the QSE-committed Combined Cycle Generation Resource is also used to calculate RUC Guarantee for a Combined Cycle Train. |

(3) For an Aggregate Generation Resource (AGR), the Startup Cost shall be scaled according to the maximum number of its generators online during a contiguous block of RUC-committed intervals, as indicated by telemetry, compared to the total number of generators registered to the AGR and used in the approved verifiable cost for the AGR.

(4) The RUC Guarantee is calculated for non-Combined Cycle Trains as follows:

RUCG *q, r, d* = (SUPR *q, r, s* \* RUCSUFLAG *q, r, s*) + (MEPR *q, r, i* \* Min ((LSL *q, r, i* \* (¼)), RTMG *q, r, i*))

(5) The RUC Guarantee is calculated for Combined Cycle Trains as follows:

RUCG *q, r, d* = ******(SUPR *q, r,* s \* RUCSUFLAG *q, r,* s) +

  ******(MAX (0, SUPR - SUPR)) +

 (MEPR *q, r, i* \* Min ((LSL *q, r, i* \* (¼)), RTMG *q, r, i*))

(a) If a Combined Cycle Train transitions to a RUC-committed configuration from a QSE-committed or other RUC-committed configuration, the transition is calculated as follows:

 MAX (0, SUPR *afterCCGR* – SUPR *beforeCCGR*)

(b) If a Combined Cycle Train transitions to a QSE-committed configuration from a RUC-committed configuration, the transition is calculated as follows:

 MAX (0, SUPR *beforeCCGR* – SUPR *afterCCGR*)

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| ***[NPRR884: Replace paragraph (5) above with the following upon system implementation:]***(5) The RUC Guarantee is calculated for Combined Cycle Trains as follows:RUCG *q, r, d* = (SUPR *q, r,* s \* RUCSUFLAG *q, r,* s) +  (MAX (0, SUPR - SUPR)) + (RUCGME *q, r, i*)Where, If a Combined Cycle Train transitions to a RUC-committed configuration from a QSE-committed or other RUC-committed configuration between two contiguous hours, or to a RUC-committed configuration from a QSE-committed configuration within the same hour due to a RUCAC, the transition is calculated as follows:MAX (0, SUPR *afterCCGR* – SUPR *beforeCCGR*) If a Combined Cycle Train transitions to a QSE-committed configuration from a RUC-committed configuration, the transition is calculated as follows:MAX (0, SUPR *beforeCCGR* – SUPR *afterCCGR*)If the interval *i* is a RUC-Committed Interval that is not a RUCAC, then:RUCGME *q, r, i* = MEPR *q, r, i* \* Min ((LSL *q, r, i* \* (¼)), RTMG *q, r, i*)If the interval *i* is a RUCAC of a previously QSE-Committed Interval, then:RUCGME *q, r, i* = Max [0, MEPR *q, afterCCGR, i* \* Min ((LSL *q, afterCCGR, i* \*  (¼)), RTMG *q, r, i*) – MEPR *q, beforeCCGR, i* \* (LSL *q, beforeCCGR, i* \* (¼))] |

(6) If a validated Three-Part Supply Offer has been submitted for a Resource for the RUC, then the RUC Guarantee for that Resource is based on the minimum of the Startup Offer in that validated Three-Part Supply Offer and Startup Cap and the lesser of the Minimum-Energy Offer in that validated Three-Part Supply Offer and the Minimum-Energy Offer Cap. If a validated Three-Part Supply Offer has not been submitted for a Resource for the RUC and ERCOT has not yet approved verifiable unit-specific costs for the Resource, then the RUC Guarantee for a Resource is based on the Resource Category Startup Generic Cap and the Resource Category Minimum-Energy Generic Cap. If a validated Three-Part Supply Offer has not been submitted for a Resource for the RUC and ERCOT has approved verifiable unit-specific costs for the Resource, then the RUC Guarantee for a Resource is based on the most recent ERCOT-approved verifiable unit-specific costs for that Resource.

**For a Resource which is not an AGR,**

If the QSE submitted a validated Three-Part Supply Offer,

 Then, SUPR *q, r,* s = Min (SUO *q, r, s*, SUCAP *q, r, s*)

 MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)

 Otherwise, SUPR *q, r, s* = SUCAP *q, r, s*

 MEPR *q, r, i* = MECAP *q, r, i*

If ERCOT has approved verifiable Startup Costs and minimum-energy costs for the Resource,

 Then, SUCAP *q, r, s* = verifiable Startup Costs *q, r, s*

 MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*

 Otherwise, SUCAP *q, r, s* = RCGSC *s*

 MECAP *q, r, i* = RCGMEC *i*

**For AGRs,**

If the QSE submitted a validated Three-Part Supply Offer,

Then, SUPR *q, r,* s = Min (SUO *q, r, s*, SUCAP *q, r, s*)

 MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)

 Otherwise, SUPR *q, r, s* = SUCAP *q, r, s*

 MEPR *q, r, i* = MECAP *q, r, i*

If ERCOT has approved verifiable Startup Costs and minimum-energy costs for the Resource,

 Then, SUCAP *q, r, s* = Max c (AGRRATIO *q, p, r*) \* verifiable Startup Costs *q, r, s*

 MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*

 Where, AGRRATIO *q, p, r* = AGRMAXON *q, p, r* / AGRTOT *q, p, r*

 Otherwise, SUCAP *q, r, s* = Max c (AGRRATIO *q, p, r*) \* RCGSC *s*

 MECAP *q, r, i* = RCGMEC *i*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCG *q, r, d* | $ | *RUC Guarantee*—The sum of eligible Startup Costs and minimum-energy costs for Resource *r* represented by QSE *q* during all RUC-Committed Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, guaranteed costs are calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
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| --- | --- | --- | --- |
| ***[NPRR884: Insert the following variable “RUCGME q, r, i” upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| RUCGME *q, r, i* | $ | *RUC Minimum-Energy Guarantee by interval*—The guaranteed costs for Resource *r* represented by QSE *q* for minimum energy for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Guarantee is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. During RUCAC-Intervals for a Combined Cycle Train, minimum energy cost is calculated as the difference between the minimum energy cost between the RUC-committed configuration and the QSE-committed configuration. |

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| SUPR *q, r, s* | $/Start | *Startup Price per start*—The Settlement price for Resource *r* represented by QSE *q* for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SUO *q, r, s* | $/Start | *Startup Offer per start*—Represents an offer for all costs incurred by Generation Resource *r* represented by QSE *q* in starting up and reaching the Resource’s LSL for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SUCAP *q, r, s* | $/Start | *Startup Cap*—The amount used for AGR *r* or Resource *r* represented by QSE *q* for the start *s* as Startup Costs. The cap is the Resource Category Startup Offer Generic Cap (RCGSC) unless ERCOT has approved verifiable unit-specific Startup Costs for that Resource, in which case the startup cap is the scaled verifiable unit-specific Startup Cost for the AGR or the verifiable unit-specific Startup Cost for non-AGRs. The verifiable unit-specific Startup Cost will be determined as described in Section 5.6.1, Verifiable Costs, minus the average energy produced during the time period between breaker close and LSL multiplied by the heat rate proxy “H” multiplied by the appropriate Fuel Index Price (FIP), Fuel Oil Price (FOP) or solid fuel price, for AGR and non-AGR Resources. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
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| AGRRATIO *q, p, r* | none | *Aggregate Generation Resource Ratio per QSE per Settlement Point per Aggregate Generation Resource*—A value which represents the ratio of the maximum number of generators online during an hour, as indicated by telemetry, compared to the total number of generators registered to the AGR *r* represented by QSE *q* at the Settlement Point *p* and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR. |
| AGRMAXON *q, p, r* | none | *Aggregate Generation Resource Maximum Online per QSE per Settlement Point per Aggregate Generation Resource*—The maximum number of generators registered to the AGR *r* represented by QSE *q* at the Settlement Point *p* online during an hour, as indicated by telemetry. The value is only applicable if the Resource is an AGR. |
| AGRTOT *q, p, r* | none | *Aggregate Generation Resource Total per QSE per Settlement Point per Aggregate Generation Resource*—The total number of generators registered to the AGR *r* represented by QSE *q* at the Settlement Point *p* and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR. |
| RCGSC *s* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| RUCSUFLAG *q, r, s* | none | *RUC Startup Flag*—The flag that indicates whether or not the start *s* for Resource *r* represented by QSE *q* is eligible for RUC Make-Whole Payment. Its value is one if eligible; otherwise, zero. See Section 5.6.2, RUC Startup Cost Eligibility, and Section 5.6.3, Forced Outage of RUC-Committed Resource, for more information on startup eligibility. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. When one or more Combined Cycle Generation Resources are committed by RUC, the RUC Startup Flag is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| MEPR *q, r, i* | $/MWh | *Minimum-Energy Price*—The Settlement price for Resource *r* represented by QSE *q* for minimum energy for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEO *q, r, i* | $/MWh | *Minimum-Energy Offer*—Represents an offer for the costs incurred by Resource *r* represented by QSE *q* in producing energy at the Resource’s LSL for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MECAP *q, r, i* | $/MWh | *Minimum-Energy Cap*—The amount used for Resource *r* represented by QSE *q* for the Settlement Interval *i* for minimum-energy costs. The minimum cost is the Resource Category Minimum-Energy Generic Cap (RCGMEC) unless ERCOT has approved verifiable unit-specific minimum energy costs for that Resource, in which case the Minimum-Energy Cap is the verifiable unit-specific minimum energy cost. See Section 5.6.1 for more information on verifiable costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RCGMEC *i* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource, according to Section 4.4.9.2.3, for the Operating Day. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation*—The metered generation of Resource *r* represented by QSE *q* for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the Current Operating Plan (COP). 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 Settlement Point. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *i* | none | A 15-minute Settlement Interval within the hour that includes a RUC-commitment. |
| *s* | none | A start that is eligible to have its costs included in the RUC Guarantee. |
| *t* | none | A transition that is eligible to have its costs included in the RUC Guarantee. |
| *c* | none | A contiguous block of RUC–Committed Hours. |
| *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. |

***5.7.3 Payment When ERCOT Decommits a QSE-Committed Resource***

(1) If ERCOT decommits a QSE-committed Resource during the RUC process earlier than its scheduled shutdown within the Operating Day, then no compensation is due to the affected QSE from ERCOT.

(2) If ERCOT decommits a QSE committed Resource that is not scheduled to shutdown within the Operating Day, then ERCOT shall pay the affected QSE an amount as calculated below for the hours of decommitment. The number of continuous decommitted hours used in the calculation are the hours beginning with the first decommitted hour until the earlier of:

(a) The hour ERCOT determines that the Resource may again be at LSL; and

(b) The end of the last hour of the Operating Day.

(3) If ERCOT decommits a QSE-committed Resource not scheduled to shutdown within the Operating Day, and the decommitment period spans more than one Operating Day, the RUC Decommitment Payment Amount shall be calculated and paid in the Operating Day in which the RUC decommitment originated. The number of continuous decommitted hours used in the calculation are the hours beginning with the first decommitted hour until the end of the last hour of the Operating Day in which the RUC decommitment originated.

(4) The payment for a RUC Cancellation instruction for a Resource is settled for each hour through an adjustment in the RUC Decommitment Payment Amount as shown in paragraph (8) below.

(5) ERCOT shall produce a report each April that provides the percentage of the RUC Decommitment Payment Amounts that are a result of RUC cancellations during the 12 months of the previous calendar year. The report shall be based on the Final Settlements. ERCOT shall present the results of this study to the appropriate Technical Advisory Committee (TAC) subcommittee. If there are no RUC Decommitment Payment Amounts for a given calendar year, then ERCOT will not be required to produce the annual report.

(6) The SUPR, MEPR and LSL used to calculate payment when ERCOT decommits a QSE-committed Combined Cycle Train is the SUPR, MEPR and LSL that corresponds to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-decommitted in the first hour of a contiguous decommitted period.

(7) If the SUPR used to calculate payment when ERCOT decommits a QSE-committed AGR is based upon approved verifiable cost for all of the generators associated with the AGR, ERCOT shall scale the startup payment according to the number of generators of the AGR that started following the decommitment. ERCOT shall make the adjustment no later than on Final Settlement.

(8) The payment for a RUC decommitment instruction for a Resource, including RMR Units, is calculated for each hour as follows:

RUCDCAMT*q,r,h* = (-1) \* Max (0, (SUPR*q,r,s* - (Max (0, MEPR*q,r,i* - RTSPP*p,i*) \* (LSL*q,r,i* \* (¼))))) / NCDCHR*q,r,h*

Where:

If the QSE submitted a validated Three-Part Supply Offer for the Resource*,*

Then, SUPR*q,r,s* = Min (SUO*q,r,s*, SUCAP *q,r,s*)

 MEPR*q,r,i* = Min (MEO*q,r,i*, MECAP *q,r,i*)

Otherwise, SUPR*q,r,s* = SUCAP*q,r,s*

 MEPR*q,r,i* = MECAP*q,r,i*

If ERCOT has approved verifiable Startup Costs and minimum-energy costs for the Resource,

Then, SUCAP*q,r,s* = verifiable Startup Costs*q,r,s*

 MECAP*q,r,i* = verifiable minimum-energy costs*q,r,i*

Otherwise, SUCAP*q,r,s* = RCGSC*s*

 MECAP*q,r,i* = RCGMEC*i*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCDCAMT*q,r,h* | $ | *RUC Decommitment Payment Amount*—The payment to the QSE for the Resource that was decommitted by ERCOT but that was not scheduled to shut down in the Operating Day, for each decommitted hour of the Operating Day. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources. |
| SUPR*q,r,s*  | $/Start | *Startup Price per start*—The Settlement price for Resource *r* for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SUO*q,r,s* | $/Start | *Startup Offer per start*—Represents an offer for all costs incurred by Generation Resource *r* in starting up and reaching the Resource’s LSL. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
| SUCAP*q,r,s* | $/Start | *Startup Cap*—The amount used for Resource *r* as Startup Costs. The cap is the Resource Category Startup Offer Generic Cap (RCGSC) unless ERCOT has approved verifiable unit-specific Startup Costs for that Resource, in which case the Startup Cap is the verifiable unit-specific Startup Cost. The verifiable unit-specific Startup Cost will be determined as described in Section 5.6.1, Verifiable Costs, minus the average energy produced during the time period between breaker close and LSL multiplied by the heat rate proxy “H” multiplied by the appropriate FIP, FOP, or solid fuel price. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
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| RCGSC*s* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Startup Offer Generic Cap cost for the category of the Resource, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| MEPR*q,r,i* | $/MWh | *Minimum-Energy Price*—The Settlement price for Resource *r* for minimum energy for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEO*q,r,i* | $/MWh | *Minimum-Energy Offer*—Represents an offer for the costs incurred by Resource *r* in producing energy at the Resource’s LSL for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MECAP*q,r,i* | $/MWh | *Minimum-Energy Cap*—The amount used for Resource *r* for minimum-energy costs. The minimum cost is the Resource Category Minimum-Energy Generic Cap (RCGMEC) unless ERCOT has approved verifiable unit-specific minimum energy costs for that Resource, in which case the Minimum-Energy Cap is the verifiable unit-specific minimum energy cost. See Section 5.6.1 for more information on verifiable costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RCGMEC*i* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Minimum-Energy Generic Cap cost for the category of the Resource, according to Section 4.4.9.2.3. |
| LSL*q,r,i*  | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTSPP*p,i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource’s Settlement Point for the Settlement Interval *i*. |
| NCDCHR*q,r,h* | none | *Number of Continuous Decommitted Hours*—The number of continuous decommitment hours for Resource *r* within an Operating Day. When one or more Combined Cycle Generation Resources are decommitted by RUC, the Number of Continuous Decommitted Hours is calculated for the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources. |
| *q* | none | A QSE. |
| *r* | none | A RUC-decommitted Generation Resource. |
| *h* | none | An hour in the RUC decommitment period. |
| *p* | none | A Resource Node Settlement Point. |
| *s* | none | A start. |
| *i* | none | A 15-minute Settlement Interval within the contiguous decommitted period. |

**6.6.6.2 RMR Payment for Energy**

(1) Payment for energy on the Initial Settlement and settlements executed before true-up and before actual cost data is submitted must be calculated using the estimated input/output curve and startup fuel as specified in the RMR Agreement, the actual energy produced and the FIP. The payment for energy for all other settlements must be based on actual fuel costs for the RMR Unit. The payment for energy for each hour is calculated as follows:

**RMREAMT *q, r*= (-1) \* (((FIP + RMRCEFA *q, r*) \* RMRSUFQ *q, r* / RMRH *q, r*) \* RMRALLOCFLAG *q, r* + (((FIP + RMRCEFA *q, r*) \* RMRHR *q, r, i* + RMRVCC *q, r*) \* RTMG *q, r, i*))**

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. |
| RMRSUFQ *q, r* | MMBtu | *Reliability Must-Run Startup Fuel Quantity per QSE per Resource*⎯The Estimated Start Up Fuel specified in the RMR Agreement for RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRH *q, r,h* | hour | *Reliability Must-Run Hours*—The number of hours during which RMR Unit *r* represented by QSE *q* is instructed On-Line for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRALLOCFLAG *q, r* | none | *Reliability Must-Run Startup Flag per QSE per Resource by hour*—The number that indicates whether or not the startup fuel cost of RMR Unit *r* represented by QSE *q* is allocated to the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The startup fuel cost will be allocated equally to all contiguous intervals for which there is an eligible start. The RMRALLOCFLAG q, r value is 1 if the startup fuel cost is allocated; otherwise, its value is 0.The RMRALLOCFLAG q, r for eligibility is determined in Sections 5.6.2, RUC Startup Cost Eligibility, and 5.6.3, Forced Outage of a RUC-Committed Resource, for start-up payments and commitments in either the RUC or DAM. |
| RMRHR *q, r, i* | MMBtu /MWh | *Reliability Must-Run Heat Rate per QSE per Resource by Settlement Interval by hour*—The multiplier determined based on the input/output curve and the Real-Time generation of RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. The value is initially set to zero. For resettlements, see item (2) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i,* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCEFA*q, r* | $/MMBtu | *Reliability Must-Run Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The fuel adder will be subsequently trued up to reflect actual fuel costs as set forth in item (1) above. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval. |

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(2) If the RMR actual fuel cost is filed in accordance with the timeline in these Protocols, the monthly RMR variable cost component is calculated for the subsequent resettlements as follows:

**RMRVCC *q, r*= (RMRMFCOST *q, r* + RMREAMT *q, r, f, h*) /**

**(RTMG *q, r, i*)**

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRMFCOST *q, r* | $ | *Reliability Must-Run Monthly actual Fuel Cost per QSE per Resource*—The monthly actual fuel cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval*—The Real-Time energy from RMR Unit *r* represented by QSE *q* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMREAMT *q, r, f, h* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour *h,* from the former Settlement Statement *f*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *h* | none | An hour in the month. |
| *i* | none | A 15-minute Settlement Interval in the month. |
| *f* | none | Amount from former settlement run. |

(3) The total of the payments for energy to each QSE for all RMR Units represented by this QSE for a given hour is calculated as follows:

**RMREAMTQSETOT *q* = RMREAMT *q, r***

The above variables are defined as follows:

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| **Variable** | **Unit** | **Definition** |
| RMREAMTQSETOT *q* | $ | *Reliability Must-Run Energy Amount QSE Total per QSE*⎯The total of the energy payments to QSE *q* for all RMR Units represented by this QSE for the hour. |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

**7.9.1.3 Minimum and Maximum Resource Prices**

(1) For purposes of Section 7.9.1, Day-Ahead CRR Payments and Charges, Settlements data published to the MIS Secure Area shall include the association of the Resource Category for each Generation Resource. The following prices specified in paragraphs (2) and (3) below are used in the CRR hedge value calculation for CRRs settled in the DAM.

(2) Minimum Resource Prices of source Settlement Points are:

**MINRESPR** *j* **= Min ( MINRESRPR** *j, r* **)** *r*

Where:

Minimum Resource Prices for Resources located at source Settlement Points (**MINRESRPR** *j, r*) are:

(a) Nuclear = -$20.00/MWh;

(b) Hydro = -$20.00/MWh;

(c) Coal and Lignite = $0.00/MWh;

(d) Combined Cycle greater than 90 MW = Fuel Index Price (FIP) \* 5 MMBtu/MWh;

(e) Combined Cycle less than or equal to 90 MW = FIP \* 6 MMBtu/MWh;

(f) Gas -Steam Supercritical Boiler = FIP \* 6.5 MMBtu/MWh;

(g) Gas Steam Reheat Boiler = FIP \* 7.5 MMBtu/MWh;

(h) Gas Steam Non-Reheat or Boiler without Air-Preheater = FIP \* 10.5 MMBtu/MWh;

(i) Simple Cycle greater than 90 MW = FIP \* 10 MMBtu/MWh;

(j) Simple Cycle less than or equal to 90 MW = FIP \* 11 MMBtu/MWh;

(k) Diesel = FIP \* 12 MMBtu/MWh;

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(l) Wind = -$35/MWh;

(m) PhotoVoltaic (PV) = -$10;

(n) Reliability Must-Run (RMR) Resource = RMR contract price Energy Offer Curve at Low Sustained Limit (LSL); and

(o) Other = -$20/MWh.

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MINRESPR *j* | $/MWh | *Minimum Resource Price for source*—The lowest Minimum Resource Price for the Resources located at the source Settlement Point *j*. |
| MINRESRPR *j* | $/MWh | *Minimum Resource Price for Resource*—The Minimum Resource Price for the Resources located at the source Settlement Point *j*. |
| *r* | none | A Generation Resource located at the source Settlement Point *j*. |
| *j* | none | A source Settlement Point. |

(3) Maximum Resource Prices of sink Settlement Points are:

**MAXRESPR** *k* **= Max (MAXRESRPR** *k, r* **)** *r*

Where:

Maximum Resource Prices for Resources located at sink Settlement Points **(MAXRESRPR** *k, r* **)** are:

(a) Nuclear = $15.00/MWh;

(b) Hydro = $10.00/MWh;

(c) Coal and Lignite = $18.00/MWh;

(d) Combined Cycle greater than 90 MW = FIP \* 9 MMBtu/MWh;

(e) Combined Cycle less than or equal to 90 MW = FIP \* 10 MMBtu/MWh;

(f) Gas -Steam Supercritical Boiler = FIP \* 10.5 MMBtu/MWh;

(g) Gas Steam Reheat Boiler = FIP \* 11.5 MMBtu/MWh;

(h) Gas Steam Non-Reheat or Boiler without Air-Preheater = FIP \* 14.5 MMBtu/MWh;

(i) Simple Cycle greater than 90 MW = FIP \* 14 MMBtu/MWh;

(j) Simple Cycle less than or equal to 90 MW = FIP \* 15 MMBtu/MWh;

(k) Diesel = FIP \* 16 MMBtu/MWh;

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(l) Wind = $0/MWh;

(m) PV = $0/MWh;

(n) RMR Resource = RMR contract price Energy Offer Curve at HSL; and

(o) Other = $100/MWh.

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MAXRESPR *k* | $/MWh | *Maximum Resource Price for source*—The highest Maximum Resource Price for the Resources located at the sink Settlement Point *k*. |
| MAXRESRPR *k* | $/MWh | *Maximum Resource Price for Resource*—The Maximum Resource Price for the Resources located at the sink Settlement Point *k*. |
| *r* | none | A Generation Resource located at the sink Settlement Point *k*. |
| *k* | none | A sink Settlement Point. |

***9.14.7 Disputes for RUC Make-Whole Payment for Fuel Costs***

(1) If the actual price paid for delivered natural gas for a specific Resource during a Reliability Unit Commitment (RUC)-Committed Interval is greater than Fuel Index Price (FIP) \* 1.X, then the QSE may file a Settlement dispute for that Resource’s RUC Make-Whole Payment. The maximum amount that may be recovered through this dispute process is the difference between the RUC Guarantee based on the actual price paid and a fuel price of FIP \* 1.X. The QSE must provide documentation (invoices) that identifies intra-day costs of natural gas consumed during the RUC-Committed Interval. Such documentation is necessary to justify recovery of natural gas costs, which is limited to the actual fuel amount (MMBtus) consumed during RUC-Committed Intervals. All documentation submitted by the QSE for natural gas costs incurred intra-day must show a nexus from the seller or distributor of natural gas products to the QSE, Resource Entity or Generation Entity as the ultimate buyer. The QSE must demonstrate that the seller or distributor has procured natural gas fuel intra-day. Power Purchase or Tolling Agreements (PPAs) filed as documentation of proof of fuel costs will not be accepted unless it meets the criteria in paragraph (4) below.

 (2) If the actual price paid for the delivered fuel oil used to replace oil consumed during a RUC-Committed Interval is greater than Fuel Oil Price (FOP), then the QSE may file a Settlement dispute for the Resource’s RUC Make-Whole Payment. The QSE must provide documentation that identifies purchases of fuel oil by the QSE, Resource Entity or Generation Entity to replace oil consumed for a RUC-Committed Interval. In addition, the QSE must provide proof that the Resource actually consumed fuel oil during the RUC-Committed Interval. Proof of actual consumption may be based on the Resource’s technical specifications or flow meters as appropriate. Documentation of fuel oil purchases must show that these were made no later than seven Business Days after the end of the last consecutive RUC-Committed Interval. Such documentation is necessary to justify recovery of replacement fuel oil costs which is limited to the actual gallons/barrels of fuel oil consumed during RUC-Committed Intervals.

(3) If the QSE representing the Generation Resource made a Three-Part Supply Offer into the DAM based on FIP and had to run on fuel oil in a RUC-Committed Hour, the QSE may file a Settlement dispute to recover the difference between the RUC Guarantee based actual price paid for delivered fuel oil minus the offer price.

(4) A QSE submitting documents for the recovery of fuel costs for RUC deployments other than those specifically discussed in paragraph (1) above must either:

(a) Request to have such documents approved by the ERCOT Board during an Executive Session at the next regularly scheduled meeting of the ERCOT Board. If the ERCOT Board approves the inclusion of such documentation as proof of fuel purchases, the QSE must file a Nodal Protocol Revision Request (NPRR) in accordance with Section 21, Revision Request Process, to add this category of documentation to the process for approval of RUC Make-Whole Payments; or

(b) Have incurred the cost of the fuel with a PPA signed prior to July 16, 2008 that is not between Affiliates, subsidiaries, or partners.

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