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| NPRR Number | [904](http://www.ercot.com/mktrules/issues/NPRR904) | NPRR Title | Revisions to Real-Time On-Line Reliability Deployment Price Adder for ERCOT-Directed Actions Related to DC Ties and to Correct Design Flaws |
| Date of Decision | August 13, 2019 |
| Action | Approved |
| Timeline  | Normal |
| Effective Date | Upon system implementation |
| Priority and Rank Assigned | Priority – 2019; Rank – 2720 |
| Nodal Protocol Sections Requiring Revision  | 6.3.2, Activities for Real-Time Operations6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder |
| Related Documents Requiring Revision/Related Revision Requests | None |
| Revision Description | This Nodal Protocol Revision Request (NPRR) revises the categories of ERCOT-directed actions that trigger the Real-Time On-Line Reliability Deployment Price Adder (RTRDPA) pricing run to include Direct Current Tie (DC Tie) related actions in order for prices to reflect current system conditions and corrects identified flaws with current RTRDPA design. |
| 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 | This NPRR corrects identified flaws with the current RTRDPA design and will address the impacts of ERCOT-directed actions related to DC Ties that may cause prices to not reflect system conditions in Real-Time. By including these additional categories of ERCOT actions, the pricing signals in times of scarcity will be more accurate and have a positive impact on Resource adequacy and mitigate price reversal to some extent. Correcting the flaws in the current RTRDPA design is urgently needed for the RTRDPA to provide meaningful price adders that is more consistent with intended outcomes. |
| Credit Work Group Review | ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR904 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| PRS Decision | On 11/15/18, PRS unanimously voted to table NPRR904 and refer the issue to WMS. All Market Segments were present for the vote.On 5/9/19, PRS voted to recommend approval of NPRR904 as amended by the 5/8/19 REMC comments. There was one abstention from the Consumer (Occidental) Market Segment. All Market Segments were present for the vote.On 6/13/19, PRS voted to endorse and forward to TAC the 5/9/19 PRS Report and Impact Analysis for NPRR904 with a recommended priority of 2019 and rank of 2720. There were three abstentions from the Consumer (Occidental), Cooperative (LCRA), and Municipal (DME) Market Segments. All Market Segments were present for the vote. |
| Summary of PRS Discussion | On 11/15/18, there was no discussion.On 5/9/19, participants reviewed the 5/8/19 REMC comments.On 6/13/19, participants reviewed the business case and Impact Analysis for NPRR904. |
| TAC Decision | On 7/24/19, TAC unanimously voted to recommend approval of NPRR904 as recommended by PRS in the 6/13/19 PRS Report. All Market Segments were present for the vote.  |
| Summary of TAC Discussion | On 7/24/19, there was no discussion. |
| ERCOT Opinion | ERCOT supports approval of NPRR904 in order to address flaws in the design of the RTRDPA and to adjust for certain actions related to DC Ties that may adversely impact price formation in the ERCOT wholesale market. |
| Board Decision | On 8/13/19, the ERCOT Board approved NPRR904 as recommended by TAC in the 7/24/19 TAC Report. |

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| **Comments Received** |
| Comment Author | **Comment Summary** |
| WMS 011119 | Requested PRS continue to table NPRR904 to allow further review by the Wholesale Market Working Group (WMWG) |
| ERCOT 030119 | Raised topics for stakeholder review as part of NPRR904 discussions along with revisions to limit the Generation To Be Dispatched (GTBD) on a DC Tie to the last advisory limit |
| REMC 030519 | Proposed additional revisions in response to the issues raised in the 3/1/19 ERCOT comments |
| IMM 031319 | Raised topics for stakeholder review as part of NPRR904 discussions |
| REMC 031919 | Provided responses to the topics raised in the 3/13/19 IMM comments |
| REMC 042319 | Proposed revisions to the 3/5/19 REMC comments to reinstate the previously deleted 1,250 MW limit within Section 6.5.7.3.1 |
| WMS 050719 | Endorsed NPRR904 as amended by the 4/23/19 REMC comments |
| ERCOT 050719 | Proposed revisions to the 4/23/19 REMC comments changing the snapshot in time for the advisory limit from the last posted value to the advisory limit as of 1000 in the Day-Ahead |
| REMC 050819 | Proposed additional edits to the 5/7/19 ERCOT comments to use the higher of the snapshot at 0600 in the Day-Ahead or any subsequent advisory limit |

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| **Market Rules Notes** |

Please note administrative changes have been made below and authored as "ERCOT Market Rules".

Please note the baseline Protocol language in the following section(s) has been updated to reflect the incorporation of the following NPRR(s) into the Protocols:

* Administrative Change (incorporated 10/26/18)
	+ Section 6.5.7.3.1
* NPRR842, Study Area Load Information (unboxed 2/8/19)
	+ Section 6.3.2
* NPRR884, Adjustments to Pricing and Settlement for Reliability Unit Commitments (RUCs) of On-Line Combined Cycle Generation Resources (incorporated 1/1/19)
	+ Section 6.5.7.3.1
* NPRR889, RTF-1 Replace Non-Modeled Generator with Settlement Only Generator (incorporated 1/1/19)
	+ Section 6.3.2

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

* NPRR917, Nodal Pricing for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs)
	+ Section 6.3.2

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| Proposed Protocol Language Revision |

***6.3.2 Activities for Real-Time Operations***

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

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

| **Operating Period** | **QSE Activities** | **ERCOT Activities** |
| --- | --- | --- |
| During the first hour of the Operating Period  |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating PeriodReview the list of Off-Line Available Resources with a start-up time of one hour or lessReview and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailmentsSnapshot the Scheduled Power Consumption for Controllable Load Resources |
| Before the start of each SCED run | Update Output Schedules for DSRs | Validate Output Schedules for DSRsExecute Real-Time Sequence |
| SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy prices |
| During the Operating Hour | Telemeter the Ancillary Service Resource Responsibility for each ResourceAcknowledge receipt of Dispatch InstructionsComply with Dispatch Instruction Review Resource Status to assure current state of the Resources is properly telemeteredUpdate COP with actual Resource Status and limits and Ancillary Service Schedules Communicate Resource Forced Outages to ERCOT Communicate to ERCOT Resource changes to Ancillary Service Resource Responsibility via telemetry in the time window beginning 30 seconds prior to the five-minute clock interval and ending ten seconds prior to that five-minute clock interval | Communicate all binding Base Points, Dispatch Instructions, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves, and Real-Time Reserve Price Adders for Off-Line Reserves and LMPs for energy and Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand, total Low Ancillary Service Limit (LASL), total High Ancillary Service Limit (HASL), Real-Time On-Line Reliability Deployment Price Adder using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs)Monitor Resource Status and identify discrepancies between COP and telemetered Resource StatusRestart Real-Time Sequence on major change of Resource or Transmission Element StatusMonitor ERCOT total system capacity providing Ancillary ServicesValidate COP informationMonitor ERCOT control performanceDistribute by ICCP, and post on the MIS Public Area, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves and Real-Time Reserve Price Adders for Off-Line Reserves, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total On-Line LASL, total On-Line HASL, Real-Time On-Line Reliability Deployment Price Adder created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effectivePost LMPs for each Electrical Bus on the MIS Public Area. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective

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| ***[NPRR829 and NPRR889: Insert applicable portions of the paragraph below upon system implementation:]***Post every 15 minutes on the MIS Public Area the aggregate net injection from Settlement Only Generators (SOGs) that provide Real-Time telemetry to ERCOT, consistent with paragraph (12) of Section 6.5.5.2, Operational Data Requirements. This data shall not be displayed if less than five QSEs or less than 750 megawatts of net injection utilize the option to telemeter Real-Time output for use in the calculation of Real-Time Liability (RTL) as described in Section 16.11.4.3.2, Real-Time Liability Estimate. |

Post on the MIS Public Area the projected non-binding LMPs created by each SCED process for each Resource Node, the projected total Real-Time reserve amount for On-Line reserves and Off-Line reserves, the projected Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders, and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, total LASL, total HASL, Real-Time On-Line Reliability Deployment Price Adder and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections Post on the MIS Certified Area the projected non-binding Base Points for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projectionsPost each hour on the MIS Public Area binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs) Post the Settlement Point Prices for each Settlement Point immediately following the end of each Settlement Interval Post the Real-Time On-Line Reliability Deployment Price, Real-Time Reserve Price for On-Line Reserves and the Real-Time Reserve Price for Off-Line Reserves immediately following the end of each Settlement Interval Post parameters as required by Section 6.4.9, Ancillary Services Capacity During the Adjustment Period and in Real-Time, on the MIS Public Area |

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

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

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

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

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

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

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

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

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

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

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

(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (11) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority;

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

(d) Deployed Emergency Response Service (ERS);

(e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval;

(f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;

(g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;

(h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval;

(i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;

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

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

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

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

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| ***[NPRR884: Insert paragraph (b) below upon system implementation and renumber accordingly:]***(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity, set the LSL, LASL, and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction. |

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

(i) If the Generation Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Down Ramp Rate), or LASL; and

(ii) If the Generation Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Up Ramp Rate), or HASL.

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

(i) If the Controllable Load Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Up Ramp Rate), or LASL; and

(ii) If the Controllable Load Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Down Ramp Rate), or HASL.

(d) Add the deployed MW from Load Resources other than Controllable Load Resources to GTBD linearly ramped over the 10-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the amount of MW added to GTBD during the restoration period will be determined by validated telemetry. The TAC shall review the validity of the prices for the bid curve at least annually.

(e) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracts. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect the restoration of load using a linear curve over the ten hour restoration period. The restoration period shall be reviewed by TAC at least annually, and ERCOT may recommend a new restoration period to reflect observed historical restoration patterns.

(f) Add the MW from DC Tie imports during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.

(g) Add the MW from DC Tie export curtailments during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator. The MW added to GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for exports on that tie as of 0600 in the Day-Ahead or subsequent advisory export limit minus the aggregate export on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.

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

(i) Subtract the MW from DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. The MW subtracted from GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for imports on that tie as of 0600 in the Day-Ahead or subsequent advisory import limit minus the aggregate import on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.

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

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

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

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

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

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

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

(q) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (o) and (p) above.