



Item 19: Day-Ahead Market Price Correction for Generic Transmission Constraint (GTC) Modeling Error

Dave Maggio

Director, Market Design and Analytics

Board of Directors Meeting

December 9-10, 2021

ERCOT Public

Summary

- Day-Ahead Market (DAM) prices on Operating Days (ODs) September 30 and October 6 to 12, 2021 were impacted by an input error related to the modeling of the North Edinburg to Lobo (NE_LOBO) Generic Transmission Constraint (GTC).
- Because the deadline for ERCOT to correct prices for the OD has passed, ERCOT is seeking Board determination as to whether prices should be corrected, and direction/authorization from the Board for the impacted ODs.
 - ERCOT staff has two business days to correct prices without seeking Board review.
 - It should be noted that a price correction only affects prices and will not change awarded quantities.

Request to the Board

ERCOT requests the Board:

- Review DAM Settlement Point Prices (SPPs), DAM Market Clearing Prices for Capacity (MCPCs), and DAM Locational Marginal Prices (LMPs) for Electrical Buses for certain Settlement Intervals on ODs September 30 and October 6 to 12, 2021;
- Make a determination as to whether such prices are in need of correction due to the occurrence of a data input error; and
- Direct ERCOT to correct some or all DAM LMPs, DAM MCPCs, and DAM SPPs for ODs September 30 and October 6 to 12, 2021.

Background – Input Error

- On October 13, 2021, ERCOT discovered an error related to the modeling of the NE_LOBO GTC in the DAM.
- The NE_LOBO GTC definition (interface constraint) consists of the following transmission equipment:

Line/Autotransformer Acronym	From Station (Acronym)	To Station (Acronym)	Voltage Rating (kV)	Line/Auto Rating (MVA)
1_345_138_H	Lobo 345 kV (LOBO)	Lobo 138 kV (LOBO)	345/138	675
2_345_138_H	Lobo 345 kV (LOBO)	Lobo 138 kV (LOBO)	345/138	675
LOBO_FOWLRTN1	Lobo (LOBO)	Fowlerton (FOWLRTON)	345	1329
NEDIN_POMELO1	Pomelo (POMELO)	North Edinburg (NEDIN)	345	1322*

* Line is dynamically rated. Listed rating is static nominal rating.

- The constraint represents a stability limit associated with South Texas wind farms connecting along the North Edinburg – Lobo 345 kV line.

Background – Input Error

- ERCOT’s investigation determined that a defect existed in the Common Information Model (CIM) Importer introduced by the CIM version 16 (CIM16) upgrade project.
- The CIM Importer translates the ERCOT Network Operations Model into a format that can be consumed by the Market Management System (MMS).
- The CIM upgrade project was the first CIM upgrade project undertaken by ERCOT since Nodal Go-Live.
- The modified class changes in CIM16 led to the CIM Importer interpreting the transformer (MW flow) direction incorrectly for the NE_LOBO GTC.

Background – Communication and Resolution

- On October 13, 2021, ERCOT implemented a corrected definition for the NE_LOBO GTC in the DAM as a manual workaround; the correction was effective as of OD October 14, 2021.
- ERCOT also determined that DAM prices for OD October 13, 2021, were impacted by the incorrect GTC definition and corrected prices for that OD prior to prices becoming final. ERCOT posted price correction data for OD October 13, 2021, on October 14, 2021.
- ERCOT also identified that the NE_LOBO GTC was incorrectly modeled in the DAM model load impacting ODs October 7 to 12, 2021. ERCOT issued a public notice on October 15, 2021, that DAM prices were under investigation for those ODs.

Background – Communication and Resolution

- ERCOT subsequently determined that the NE_LOBO GTC was also incorrectly modeled in a DAM model load that impacted ODs September 30 to October 6, 2021. Accordingly, ERCOT issued a public notice on October 22, 2021, that DAM prices were also under investigation for ODs September 30 to October 6, 2021.
- On October 28, 2021, ERCOT deployed an off-cycle release to address the underlying defect.
- Upon completion of the investigation into prices, ERCOT issued [Market Notice W-C102921-01](#) on October 29, 2021, which informed Market Participants that ERCOT would seek correction of DAM prices for ODs September 30 and October 6 to 12, 2021.
- It should be noted that Real-Time Market prices were not impacted by this error.



Impacts to the DAM

- For the impacted ODs, ERCOT reran DAM cases in a study environment with the corrected NE_LOBO GTC definition to determine price and settlement impacts.
- After reviewing the cases for the thirteen impacted ODs:
 - On four ODs, prices were not impacted by the modeling error because the NE_LOBO was not binding in the Production case or re-run case.
 - For one OD, prices were impacted by the modeling error but did not meet the “significant” threshold in Protocol Section 4.5.3(6)(b) for seeking correction of prices by the ERCOT Board.
- ERCOT found that there were eight ODs that met the criteria for significance, as defined in Protocol Section 4.5.3(6)(b), and are eligible for consideration of a price correction by the ERCOT Board.

“Significance” criteria for price correction

- Per Protocol Section 4.5.3(6)(b), ERCOT must seek correction of DAM prices by the ERCOT Board for an OD if the absolute value impact of the price correction on any single Counter-Party -- based on the sum of all original DAM Settlement Statement amounts of market participants assigned to the Counter-Party for the OD -- is greater than either:
 - (i) 2% and also greater than \$20,000; or
 - (ii) 20% and also greater than \$2,000.
- Criteria for significance for introduced by Nodal Protocol Revision Request (NPRR) 1024, Determination of Significance with Respect to Price Correction.
 - This change to the Protocols was approved by the Board on February 9, 2021 and became effective April 1, 2021.

Market-Wide Estimated Settlement Impacts by OD

OD	Change in Net Total Charges Due to ERCOT (\$ Thousands)	
9/30/2021	(33.9)	0.3%
10/6/2021	(14.6)	0.1%
10/7/2021	(54.7)	0.4%
10/8/2021	19.8	0.1%
10/9/2021	76.6	0.4%
10/10/2021	344.4	1.4%
10/11/2021	(19.1)	0.1%
10/12/2021	375.3	1.6%

All Settlement amounts are net changes in charges due to ERCOT in \$ thousands. Negative amounts are reduced charges to Market Participants; positive amounts are increased charges.

The % amount is the absolute value of the % impact relative to the previously settled net amount due to/from ERCOT.



Settlement Impacts to Counter-Parties by OD

OD	Absolute Value Impact to Counter-Party		
	Maximum Amount (\$ Thousands)	Maximum Percentage Criteria in Protocol Section 4.5.3(6)(b)(i)*	Maximum Percentage Criteria in Protocol Section 4.5.3(6)(b)(ii)**
9/30/2021	27.9	369.6%	560.0%
10/6/2021	5.9	NA	117.9%
10/7/2021	16.1	NA	225.1%
10/8/2021	27.6	3.0%	33.0%
10/9/2021	38.9	876.1%	2638.3%
10/10/2021	94.6	1409.2%	1409.2%
10/11/2021	25.0	280.3%	280.3%
10/12/2021	66.3	137.3%	209.1%

OD 10/1/2021 was also evaluated for Settlement impacts and did not meet the criteria for Board review. The maximum impact to any individual Counter-Party on OD 10/1/2021 was \$623.

* The maximum of percentage change to any single Counter-Party with an impact of more than \$20,000 (set as NA when no single Counter-Party has impact more than \$20,000).

** The maximum of percentage change to any single Counter-Party with impact more than \$2,000 (set as NA when no single Counter-Party has impact more than \$2,000).





The recommended price correction data for the Day-Ahead Market Price Correction for Generic Transmission Constraint (GTC) Modeling Error on Operating Days September 30, 2021 and October 6 to 12, 2021, will not be uploaded to Diligent Board Books, due to file size.

Please refer to the ERCOT website at:

<https://www.ercot.com/calendar/event?id=1635171859710>

to view this information.



Date: December 2, 2021
To: Board of Directors
From: Dave Maggio
Subject: Day-Ahead Market Price Correction for Operating Days September 30 and October 6 to 12, 2021

Issue for the ERCOT Board of Directors

ERCOT Board of Directors Meeting Date: December 9-10, 2021

Item No.: 19

Issue:

Pursuant to paragraph (6) of Protocol Section 4.5.3, Communicating DAM Results, whether the ERCOT Board of Directors (Board) should approve price corrections for Day-Ahead Market (DAM) Locational Marginal Prices (LMPs), DAM Market Clearing Prices for Capacity (MCPCs), and DAM Settlement Point Prices (SPPs) on Operating Days (ODs) September 30 and October 6 to 12, 2021, that were affected by a data input error.

Background/History:

Paragraph (3) of Protocol Section 4.5.3 requires ERCOT to correct DAM prices when a market solution is determined to be invalid or invalid prices are identified in an otherwise valid market solution.

Whenever possible, ERCOT must correct erroneous prices before prices are final. DAM prices are final at 1000 on the second Business Day after the OD. However, if ERCOT determines that DAM prices are erroneous and need correction after prices are final, then ERCOT must seek Board approval of the price correction. The Board may review and approve a price correction only if ERCOT, within 30 days of the impacted OD, determines the price correction is significant and notifies Market Participants that ERCOT intends to seek Board approval of a price correction. See Protocol Section 4.5.3(6).

For purposes of determining whether a DAM price correction would be “significant” and should be presented to the Board for approval, ERCOT is required to calculate the impact of the price correction on DAM Settlement Statement(s) of Counter-Parties for the Operating Days at issue. More specifically, and per Protocol Section 4.5.3(6)(b), ERCOT must seek Board approval of a price correction if the change in DAM Settlement Statement(s) would result in an absolute value impact to any single Counter-Party, based on the sum of all original DAM Settlement Statement amounts of Market Participants assigned to the Counter-Party, of greater than: (i) 2% and also greater than \$20,000; or (ii) 20% and also greater than \$2,000.

In determining whether DAM prices should be corrected, the Board may rely on the following causes as a basis for finding a price correction is required due to an invalid market solution or invalid prices in a valid market solution:

- Data Input Error: Missing, incomplete, or incorrect versions of one or more data elements input to the market applications.
- Software Error: Including software implementation errors in DAM pre-processing, DAM clearing process, and/or DAM post processing.
- Inconsistency with the Protocols or Public Utility Commission of Texas (PUCT) Substantive Rules: Specific circumstances may result in prices that are in conflict with such Protocol language or the PUCT Substantive Rules.

See ERCOT Protocol Sections 4.5.3(4).

On October 14, 2021, ERCOT became aware of a data input error related to the modeling of the North Edinburg to Lobo (NE_LOBO) Generic Transmission Constraint (GTC) in the DAM. After review, ERCOT determined that the GTC was incorrectly defined in the DAM for ODs September 30 to October 13, 2021, and that this error may have impacted DAM prices on those ODs. This issue did not impact Real-Time Market prices.

ERCOT's investigation determined that the incorrect GTC definition occurred due to a defect in the Common Information Model (CIM) Importer introduced by the CIM version 16 (CIM16) upgrade project. ERCOT instituted a manual workaround to address the defect and corrected the GTC definition as of the DAM for OD October 14, 2021. ERCOT deployed a permanent fix for the defect in an off-cycle release on October 28, 2021.

Pursuant to Protocol Sections 4.5.3(4) and (6), ERCOT corrected prices impacted by this error for OD October 13, 2021, before prices became final. Further, pursuant to Protocol Section 4.5.3(3), ERCOT issued public notices on October 15 and 22, 2021, stating that prices for the remaining ODs impacted by the incorrectly defined GTC—*i.e.*, September 30 to October 12, 2021—were under investigation.

ERCOT conducted the “significance” analysis required by Protocol Section 4.5.3(6)(b) and determined that the GTC definition error described above impacted DAM prices for certain ODs to a degree that qualifies the DAM prices for those ODs for review by the Board. ERCOT issued a Market Notice on October 29, 2021, informing Market Participants that it would seek Board review of DAM prices for ODs September 30 and October 6 to 12, 2021. See Market Notice W-C102921-01.

Accordingly, ERCOT requests that the Board:

- (a) Review DAM SPPs, DAM MCPCs, and DAM LMPs for ODs September 30 and October 6 to 12, 2021;
- (b) Make a determination as to whether such prices are in need of correction due to the occurrence of a data input error; and
- (c) Direct ERCOT to correct some or all DAM SPPs, DAM MCPCs, and DAM LMPs for ODs September 30 and October 6 to 12, 2021.

If the Board directs ERCOT to correct some or all DAM SPPs, DAM MCPCs, and DAM LMPs for ODs September 30 and October 6 to 12, 2021, the corrected prices will be applied to previously-awarded quantities. Award quantities are not changed as part of a price correction.

Attached hereto are documents containing corrected DAM SPPs, DAM MCPCs, and DAM LMPs for ODs September 30 and October 6 to 12, 2021, as follows:

- **Attachment A** – Price Correction DAM SPPs
- **Attachment B** – Price Correction DAM MCPCs
- **Attachment C** – Price Correction DAM LMPs for Electrical Buses (EBLMPs)

Relevant Protocol Language

4.5.3 Communicating DAM Results

- (3) ERCOT shall monitor Day-Ahead MCPCs and Day-Ahead hourly LMPs for errors and if there are conditions that cause the price to be questionable, ERCOT shall notify all Market Participants that the DAM prices are under investigation as soon as practicable.
- (4) ERCOT shall correct prices for an Operating Day when a market solution is determined to be invalid or invalid prices are identified in an otherwise valid market solution, accurate prices can be determined, and the impact of the price correction is significant. The following are some reasons that may cause an invalid market solution or invalid prices in a valid market solution.
 - (a) Data Input error: Missing, incomplete, or incorrect versions of one or more data elements input to the DAM application may result in an invalid market solution and/or prices.
 - (b) Software error: Pricing errors may occur due to software implementation errors in DAM pre-processing, DAM clearing process, and/or DAM post processing.

- (c) Inconsistency with these Protocols or the Public Utility Commission of Texas (PUCT) Substantive Rules: Pricing errors may occur when specific circumstances result in prices that are in conflict with such Protocol language or the PUCT Substantive Rules.
- (5) For purposes of a price correction performed prior to 1000 on the second Business Day after the Operating Day, the impact of a price correction is considered significant, as that term is used in paragraph (4) above, for the Operating Day when:
- (a) The absolute value change to any single DAM Settlement Point Price at a Resource Node or Day-Ahead MCPC is greater than \$0.05/MWh;
 - (b) The price correction would require ERCOT to change more than ten DAM Settlement Point Prices and Day-Ahead MCPCs; or
 - (c) The absolute value change to any DAM Settlement Point Price at a Load Zone or Hub is greater than \$0.02/MWh.
- (6) All DAM LMPs, MCPCs, and Settlement Point Prices are final at 1000 of the second Business Day after the Operating Day.
- (a) However, after DAM LMPs, MCPCs, and Settlement Point Prices are final, if ERCOT determines that prices qualify for a correction pursuant to paragraph (4) above and that ERCOT will seek ERCOT Board review of such prices, it shall notify Market Participants and describe the need for such correction as soon as practicable but no later than 30 days after the Operating Day. Failure to notify Market Participants within this timeline precludes the ERCOT Board from reviewing such prices. However, nothing in this section shall be understood to limit or otherwise inhibit any of the following:
 - (i) ERCOT's duty to inform the PUCT of potential or actual violations of the ERCOT Protocols or PUCT Rules and its right to request that the PUCT authorize correction of any prices that may have been affected by such potential or actual violations;
 - (ii) The PUCT's authority to order price corrections when permitted to do so under other law; or
 - (iii) ERCOT's authority to grant relief to a Market Participant pursuant to the timelines specified in Section 20, Alternative Dispute Resolution Procedure.
 - (b) Before seeking ERCOT Board review of prices, ERCOT will determine if the impact of the price correction is significant, as that term is used in

paragraph (4) above, by calculating the potential changes to the DAM Settlement Statement(s) of any Counter-Party on the given Operating Day. ERCOT shall seek ERCOT Board review of prices if the change in DAM Settlement Statement(s) would result in the absolute value impact to any single Counter-Party, based on the sum of all original DAM Settlement Statement amounts of Market Participants assigned to the Counter-Party, to be greater than:

- (i) 2% and also greater than \$20,000; or
 - (ii) 20% and also greater than \$2,000.
- (c) The ERCOT Board may review and change DAM LMPs, MCPCs, or Settlement Point Prices if ERCOT gave timely notice to Market Participants and the ERCOT Board finds that such prices should be corrected for an Operating Day.
- (d) In review of DAM LMPs, MCPCs, or Settlement Point Prices, the ERCOT Board may rely on the same reasons identified in paragraph (4) above to find that the prices should be corrected for an Operating Day.

Key Factors Influencing Issue:

- Due to a data input error, DAM LMPs, DAM MCPCs, and DAM SPPs for ODs September 30 and October 6 to 12, 2021, were incorrect and cannot be corrected by ERCOT without approval from the Board.
- The DAM price corrections for these ODs satisfy the criteria for “significance” set forth in Protocol Section 4.5.3(6)(b).

Conclusion/Recommendation:

ERCOT recommends that the Board find that DAM LMPs, DAM MCPCs, and DAM SPPs for ODs September 30 and October 6 to 12, 2021, should be corrected, and direct ERCOT to correct DAM prices for the impacted ODs.



ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.
BOARD OF DIRECTORS RESOLUTION

WHEREAS, paragraph (6) of Protocol Section 4.5.3, Communicating DAM Results, authorizes the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) to approve a price correction for certain prices if ERCOT has determined that such prices have been significantly affected by an error;

WHEREAS, pursuant to paragraph (6) of Protocol Section 4.5.3, ERCOT gave timely notice to Market Participants that Day-Ahead Market (DAM) Locational Marginal Prices (LMPs), Market Clearing Prices for Capacity (MCPCs), and DAM Settlement Point Prices (SPPs) for Operating Days (ODs) September 30 and October 6 to 12, 2021, were incorrect; that a price correction for each of those ODs met the criteria for “significance” in Protocol Section 4.5.3(6)(b); and that ERCOT would be seeking Board review of such prices; and

WHEREAS, after due consideration of the alternatives, the Board deems it desirable and in the best interest of ERCOT to correct DAM LMPs, DAM MCPCs, and DAM SPPs on ODs September 30 and October 6 to 12, 2021, that were affected by data input errors;

THEREFORE, BE IT RESOLVED, that the Board hereby (1) determines that DAM LMPs, DAM MCPCs, and DAM SPPs for ODs September 30 and October 6 to 12, 2021, were affected by a data input error, and (2) directs ERCOT staff to implement the appropriate price corrections pursuant to Protocol Section 4.5.3.

CORPORATE SECRETARY’S CERTIFICATE

I, Jonathan M. Levine, Assistant Corporate Secretary of ERCOT, do hereby certify that, at its December 9-10, 2021 meeting, the Board passed a motion approving the above Resolution by _____.

IN WITNESS WHEREOF, I have hereunto set my hand this ____ day of December, 2021.

Jonathan M. Levine
Assistant Corporate Secretary