



Item 9.1: Day-Ahead Market Price Correction for Operating Days September 16-23, 2019

Carrie Bivens

Manager, Forward Markets

Board of Directors Meeting

ERCOT Public

December 10, 2019

Issue for Board Consideration

- On Operating Days (ODs) September 16 - 23, 2019, prices in the Day-Ahead Market (DAM) were impacted by a software error. Because the deadline for ERCOT to correct prices for these ODs has passed, ERCOT is seeking Board determination as to whether prices have been “significantly affected by an error,” and if so, authorization from the Board for ERCOT staff to correct prices for some/all of the affected ODs.
- ERCOT recommends that the Board:
 - a) Make a determination that DAM prices for ODs September 16 - 23, 2019, were significantly affected by a software error; and
 - b) Direct/authorize ERCOT staff to correct some or all such prices for those ODs.

Background

- **May 30, 2019** – Market Management System (MMS) system enhancement for modeling Outages in DAM and Reliability Unit Commitment (RUC)
 - Enhancement intended to only model withdrawn Outages in DAM and RUC where out-of-service equipment was under restoration
 - Software Implementation Error - MMS inadvertently modeled all withdrawn Outages for DAM and RUC; not just those undergoing restoration.
 - Outages withdrawn before their planned outage start date were erroneously modeled in the DAM as out-of-service—i.e., some in-service Transmission Elements were identified as out-of-service in ERCOT’s network model when clearing the DAM.
 - Prior to this system enhancement/software implementation error, when a transmission Outage status was withdrawn, the Outage would not be included in DAM and RUC models; DAM and RUC would not see the Outage.
- **September 24, 2019** – ERCOT became aware of the software implementation error and began investigating prices for Operating Days (ODs) May 30, 2019 through September 25, 2019, and placed an emergency patch into production the next day for OD September 26, 2019.
- **October 3, 2019** – ERCOT issued [Market Notice M-A100319-01](#)
- **October 9, 2019** – ERCOT issued [Market Notice M-A100319-02](#)

Background

Example - Pre-System Enhancement:

EQUIPMENT NAME	PLANNED START DATE	PLANNED END DATE	ACTUAL START DATE	ACTUAL END DATE	STATUS	DAM/RUC Model for 5/2
ABCD_A	5/1/2019 10:00	12/11/2019 12:00			Withd	Not Included
ABCD_B	5/1/2019 10:00	12/11/2019 12:00	5/1/2019 22:04		Withd	Not Included
ABCD_C	5/1/2019 10:00	12/11/2019 12:00	5/1/2019 22:04	5/1/2019 22:04	Withd	Not Included

Example – Post-System Enhancement:

EQUIPMENT NAME	PLANNED START DATE	PLANNED END DATE	ACTUAL START DATE	ACTUAL END DATE	STATUS	DAM/RUC Model for 9/2
ABCD_A	9/1/2019 10:00	12/11/2019 12:00			Withd	Included
ABCD_B	9/1/2019 10:00	12/11/2019 12:00	9/1/2019 22:04		Withd	Included
ABCD_C	9/1/2019 10:00	12/11/2019 12:00	9/1/2019 22:04	9/1/2019 22:04	Withd	Not Included

Unintended error

Intended change

Price Correction Study

- Market: DAM
- ODs: 09/16/2019 – 09/23/2019
- ERCOT reran DAM with correct model inputs—i.e., Outages that had been withdrawn before their planned Outage start date were identified as in-service.
- The following slides include analysis of the Settlement impacts of changing the prices to those that were a result of the new DAM solution.
 - Quantities (awarded MWs) do not change; only prices.

Price Correction Impact Review

- ERCOT's analysis used original settled quantities with corrected prices based on DAM reruns, with erroneous outages removed.
 - Note: The Settlement data provided herein is an estimate; final Settlement amounts may differ.
- All Settlement amounts are net amounts due to/from ERCOT in \$ thousands. Negative amounts are increased payments to Market Participants; positive amounts are increased charges.
- The % amount is the absolute value of the % of impact to the previously settled net amount due to/from ERCOT.
- In addition to the DAM impacts detailed herein:
 - An increased payment to Load of approximately \$300K due to the resettlement of the Congestion Revenue Right (CRR) Balancing Account.
 - Minimal changes to Real-Time Settlements due to Ancillary Service charges that will be reconciled based on actual Load Ratio Shares.

Settlement Impacts

	9/16		9/17		9/18		9/19	
Energy purchases	\$94	0.4%	\$56	0.3%	\$918	5.0%	\$152	0.8%
Energy sales	(\$205)	0.8%	(\$92)	0.5%	(\$958)	5.4%	(\$211)	1.2%
PTP purchases	\$225	10.6%	(\$25)	1.3%	\$125	7.5%	\$418	24.1%
Make-whole payments	-	-	-	-	\$7	57.3%	\$2	100%
AS payments	(\$114)	9.3%	(\$16)	1.7%	(\$71)	8.7%	(\$10)	2.0%
CRR settlements	\$7	0.2%	\$51	2.2%	(\$59)	2.9%	(\$117)	5.3%

*\$ Thousands



Settlement Impacts

	9/20		9/21		9/22		9/23	
Energy purchases	(\$58)	0.3%	\$48	0.3%	\$20	0.1%	\$406	1.1%
Energy sales	\$40	0.2%	(\$91)	0.7%	(\$26)	0.1%	(\$513)	1.5%
PTP purchases	(\$7)	0.3%	(\$25)	1.0%	\$8	0.5%	(\$64)	1.4%
Make-whole payments	\$1	7.2%	\$1	3.5%	-	-	-	-
AS payments	\$1	0.3%	(\$8)	1.4%	-	-	(\$49)	2.0%
CRR settlements	\$33	1.0%	\$77	2.2%	-	-	\$96	1.4%

*\$ Thousands



Summary of Price Impacts For Board Review

OD	Number of Impacted Transmission Lines/ Transformers	Count of Changes in Price for the 4 Hubs and 4 Competitive Load Zones across All Hours of the Affected ODs						
		< -\$10/MWh	>= -\$10/MWh & < -\$1/MWh	>= -\$1/MWh & < -\$0.1/MWh	>= -\$0.1/MWh & < \$0.1/MWh	>= \$0.1/MWh & < \$1/MWh	>= \$1/MWh & < \$10/MWh	>= \$10/MWh
9/16/19	5	1	24	67	34	38	28	0
9/17/19	3	0	3	29	64	88	8	0
9/18/19	2	0	2	67	52	7	55	9
9/19/19	1	0	6	32	47	83	24	0
9/20/19	1	0	6	44	117	25	0	0
9/21/19	1	0	2	58	90	25	17	0
9/22/19	1	0	2	12	137	39	2	0
9/23/19	5	0	1	28	102	30	29	2

Note: a positive value indicates that the corrected or proposed price is higher than the original price.





Date: December 3, 2019
To: Board of Directors
From: Kenan Ögelman
Subject: Day-Ahead Market Price Correction for Operating Days
September 16-23, 2019

Issue for the ERCOT Board of Directors

ERCOT Board of Directors Meeting Date: December 10, 2019

Item No.: 9.1

Issue:

Pursuant to paragraph 5 of Protocol Section 4.5.3, Communicating DAM Results, whether the ERCOT Board of Directors (Board) should approve price corrections for Day-Ahead Locational Marginal Prices (DALMPs), Day-Ahead Settlement Point Prices (DASPPs), and Market Clearing Prices for Capacity (MCPCs) for Operating Days September 16-23, 2019, that were affected by a software error.

Background/History:

ERCOT staff has identified a need to correct prices in the Day-Ahead Market (DAM) for Operating Days September 16-23, 2019. The impacted prices include:

- DALMPs;
- DASPPs; and
- MCPCs.

The ERCOT Protocols require ERCOT to correct prices when invalid prices are identified in an otherwise valid market solution. If ERCOT determines that prices are erroneous, ERCOT must correct the prices before they are final; prices are final at 1000 of the second Business Day after the Operating Day. However, if ERCOT determines that prices are in need correction after they are final and seeks Board review of such prices, then ERCOT must notify Market Participants, and describe the need for such correction, no later than 30 days after the Operating Day.

The Board may review and change DALMPs, DASPPs, and MCPCs if (a) ERCOT gave timely notice to Market Participants, and (b) the Board finds that such prices are “significantly affected by an error.” The Board may rely on the following reasons to find that such prices are significantly affected by an error:

- 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.
- Software Error: Pricing errors may occur due to software implementation errors in DAM pre-processing, DAM clearing process, and/or DAM post processing.

- Inconsistency with the 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.

(See Protocol Sections 4.5.3(4) and (5).)

On September 24, 2019, ERCOT became aware of an issue concerning the modeling of withdrawn Outages in the DAM and Reliability Unit Commitment (RUC) for various Operating Days in August and September 2019 (i.e., Operating Days August 20-21, 2019, and September 16-25, 2019). On May 30, 2019, ERCOT deployed a system enhancement for modeling Outages in DAM and RUC. The enhancement was intended to only model withdrawn Outages in DAM and RUC for instances where out-of-service equipment was in the process of being restored. However, ERCOT determined that certain withdrawn Outages—i.e., Outages that had been withdrawn before their planned Outage start date—were erroneously modeled in the DAM as out-of-service for the affected Operating Days. In other words, some in-service Transmission Elements were identified as out-of-service in ERCOT’s network model when clearing the DAM for the affected Operating Days. Upon discovery of the issue, ERCOT immediately implemented an emergency fix, and began investigating prices for the affected Operating Days. ERCOT has determined that DAM clearing was impacted for all of the affected Operating Days.

On October 3, 2019, ERCOT notified Market Participants of the software error, and described the need for correction. ERCOT informed Market Participants that although Operating Days August 20-21, 2019, were affected by the software error, ERCOT would not be seeking Board review of prices for those Operating Days because the timeline under Protocol Section 4.5.3(5) precludes Board review. ERCOT further informed Market Participants that it corrected prices for Operating Days September 24, 2019 and September 25, 2019 in accordance with ERCOT Protocol Section 4.5.3(4). ERCOT advised that it was continuing to investigate the remaining Operating Days (i.e., September 16-23, 2019), and would provide an updated notice with respect to which Operating Days’ ERCOT would seek Board review of prices for. (See Market Notice M-A100319-01.)

On October 9, 2019, ERCOT notified Market Participants that DAM clearing was impacted for Operating Days September 16-23, 2019, and ERCOT would be seeking Board review of DAM prices for those Operating Days. (See Market Notice M-A100319-02.)

Accordingly, ERCOT requests that the Board: (a) review DALMPs, DASPPs, and MCPCs for Operating Days September 16-23, 2019; (b) make a determination as to whether such prices were significantly affected by a software error; and (c) authorize ERCOT to correct some or all DALMPs, DASPPs, and MCPCs for Operating Days

September 16-23, 2019. Attached hereto are documents containing the corrected prices for the DALMPs, DASPPs, and MCPCs for Operating Days September 16-23, 2019 as follows:

- **Attachment A** – Price Correction DAM SPPs;
- **Attachment B** – Price Correction DAM LMPs; and
- **Attachment C** – Price Correction DAM MCPCs.

It is important to note that while this issue affected models used by RUC, ERCOT has reviewed RUC instructions for the Operating Days at issue and does not believe any were associated with transmission congestion or other system conditions that may have arisen out of this modeling issue. Moreover, this issue did not affect pricing outcomes in the Real-Time Market, as ERCOT System topology in Real-Time is based on telemetry, rather than information from the Outage Scheduler.

Relevant Protocol Sections:

4.5.3 Communicating DAM Results

- (4) ERCOT shall correct prices when: (i) a market solution is determined to be invalid or (ii) invalid prices are identified in an otherwise valid market solution, unless accurate prices cannot be determined. The following are some reasons that may cause these conditions.
 - (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) 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 are in need of correction and seeks 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) 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 are significantly affected by an error.
- (c) 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 are significantly affected by an error.

Key Factors Influencing Issue:

A Market Management System (MMS) system enhancement for modeling Outages in the DAM was intended to only model withdrawn Outages where out-of-service equipment was under restoration. MMS inadvertently modeled all withdrawn Outages for DAM, not just those undergoing restoration. Outages withdrawn before their planned Outage start date were erroneously modeled in the DAM as out-of-service—i.e., some in-service Transmission Elements were identified as out-of-service in ERCOT's network model when clearing the DAM. Prior to this system enhancement/software implementation error, when a transmission Outage status was withdrawn, the Outage would not be included. Prices were different when the Outage was included versus when it was not.

Settlement analysis indicates that energy purchases/sales were impacted by as much as \$950K, depending on the Operating Day, and Point-to-Point purchases were impacted by as much as \$420K. The single largest impact to a QSE invoice is approximately \$200K.

Conclusion/Recommendation:

ERCOT recommends that the Board make a determination as to whether DALMPs,



DASPPs, and MCPCs for Operating Days September 16-23, 2019 were significantly affected by the above-referenced software error; and direct/authorize ERCOT to correct some or all DALMPs, DASPPs, and MCPCs for those Operating Days.



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

WHEREAS, paragraph (5) of Protocol Section 4.5.3 (September 1, 2019 version), Communicating DAM Results, authorizes the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) to approve a price correction only upon a finding that Day-Ahead Locational Marginal Prices (DALMPs), Day-Ahead Settlement Point Prices (DASPPs) or Market Clearing Prices for Capacity (MCPCs) have been significantly affected by an error; and

WHEREAS, pursuant to paragraph (5)(a) of Protocol Section 4.5.3, ERCOT gave timely notice to Market Participants that Day-Ahead Market (DAM) prices for Operating Days September 16-23, 2019, were in need of correction, and 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 DALMPs, DASPPs and MCPCs for Operating Days September 16-23, 2019, as such prices were significantly affected by software error;

THEREFORE, BE IT RESOLVED, that the Board hereby (1) determines that the DALMPs, DASPPs and MCPCs affected by a software error on Operating Days September 16-23, 2019 were significantly affected by such software error, and (2) authorizes ERCOT staff to implement the appropriate price corrections pursuant to paragraph (5) of Protocol Section 4.5.3.

CORPORATE SECRETARY'S CERTIFICATE

I, Vickie G. Leady, Assistant Corporate Secretary of ERCOT, do hereby certify that, at its December 10, 2019 meeting, the ERCOT Board passed a motion approving the above Resolution by _____.

IN WITNESS WHEREOF, I have hereunto set my hand this ____ day of December, 2019.

Vickie G. Leady
Assistant Corporate Secretary