



Item 7.1: Day-Ahead and Real-Time Market Price Correction for Incorrect Transformer Ratings

Dave Maggio

Director, Market Design & Analytics

Urgent Board of Directors Meeting

ERCOT Public

October 13, 2020

Issue for Board Consideration

- Prices were impacted by an internal data input error for the Day-Ahead Market (DAM) and Real-Time Market (RTM) on various Operating Days (ODs) in June and July 2020.
 - DAM: ODs June 8-12, 15-17, 19-20, 24-25, 28-30, 2020, and July 1-6, 2020
 - RTM: OD July 1, 2020
- 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.
 - Note that awarded quantities do not change with a correction to prices.

ERCOT Recommendation

ERCOT recommends that the Board:

- Make a determination that some or all of the following were significantly affected by an internal data input error:
 - (a) Day-Ahead Settlement Point Prices (DASPPs), Day-Ahead Locational Marginal Prices (DALMPs), and DAM Clearing Prices for Capacity (MCPCs) for all Settlement Intervals on ODs June 8-12, 15-17, 19 -20, 24-25, 28-30, 2020, and July 1-6, 2020; and
 - (b) Real-Time Settlement Point Prices (RTSPPs), Real-Time Prices for Energy Metered for Resources (RTRMPRs) and Real-Time Locational Marginal Prices (RTLMPs) for certain Settlement Intervals on OD July 1, 2020.
- Direct ERCOT staff to implement the appropriate price corrections. The meeting material illustrates the corrected corresponding DAM and RTM prices.

Background - Timeline

- **February 12, 2020** – A modeling update was made in the ERCOT Network Model, where dynamic ratings were added to the model for three transmission transformers.
 - Before the change, all transformers were modeled as having static ratings. There had been interest in having dynamic ratings for certain transformers. ERCOT had worked with a TSP to update the ratings for the transformers using the existing, built-in system functionality.
 - Data Error- While applying the new dynamic ratings to the intended transformers, they were also erroneously applied to three unrelated 345/138 kV transformers. One transformer each at stations BLESSING, COLETO and LA PALMA.
 - The reason for the error is that the identifiers used to map dynamically rated transformers were not fully unique between applications. This issue was triggered from dynamically rated transformers but impacted transformers ratings which are not dynamically rated.
 - The number of transformers impacted was limited given that most transformer names are fairly unique and most transformers are not dynamically rated.
- **July 7, 2020** – ERCOT identified the root cause of the error and the impacted transformers and implemented emergency changes in the production models. ERCOT also notified the market that OD July 7, 2020 for the DAM was under investigation.
- **July 8, 2020** – ERCOT issued Market Notice M-A070820-01 regarding incorrect ratings affecting the DAM and RTM and continued investigating other days that may have been impacted. ERCOT also performed a price correction for OD July 7, 2020 for the DAM before price became final.

Background – Impacts to the DAM and RTM

- After reviewing all binding transmission constraints in DAM during the relevant time window, ERCOT found that there were 67 ODs for the DAM that had at least one constraint binding on one of the impacted transformers. These ODs occurred between February 14, 2020 and July 7, 2020.
- After reviewing all binding transmission constraints in RTM during the relevant time window, ERCOT found only one OD for the RTM that had a constraint binding on one of the impacted transformers. This OD was July 1, 2020.
- RTM and DAM ODs between June 8, 2020 and July 8, 2020 are eligible for price correction with ERCOT Board review and direction.

Price Correction Impact Review

- ERCOT's analysis used original settled quantities with corrected prices based on DAM and RTM reruns in study mode with the corrected transformer ratings.
 - 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:
 - Balancing account impacts resulting in an overpayment to Load of approximately \$8K for June, and an underpayment to Load of approximately \$15K for July. The amounts paid/refunded due to resettlement will depend on the Balancing Account balance at the time of resettlement.
 - Minimal changes to Real-Time Settlements due to Ancillary Service charges that will be reconciled based on actual Load Ratio Shares.

Price Correction Study for the DAM

- Market: DAM
- Impacted ODs: 6/8/20-6/12/20, 6/15/20-6/17/20, 6/19/20-6/20/20, 6/24/20-6/25/20, 6/28/20-7/6/20
- Price Correction Methodology: ERCOT reran the DAM in study mode on these ODs with the corrected ratings for the impacted transformers to determine price and Settlement impacts of a price correction.
- The following slides and appendix include ERCOT's analysis of those impacts using the new DAM prices.
 - Quantities (awarded MWs) do not change; only prices.

Potential DAM Price Correction Settlement Impacts

	Energy Purchases		Energy Sales		PTP Purchases		CRR Settlements		AS Payments		Make-whole Payment	
6/8/2020	(214.1)	0.4%	211.0	0.4%	6.9	0.5%	(7.9)	0.4%	6.3	0.2%	(0.4)	97.4%
6/9/2020	(566.1)	2.6%	569.5	2.8%	15.2	0.4%	(21.9)	0.6%	42.3	5.2%	0.0	0.0%
6/10/2020	5.1	0.0%	(5.0)	0.0%	0.0	0.0%	(0.2)	0.0%	0.9	0.2%	0.0	0.0%
6/11/2020	262.6	2.0%	(260.9)	2.1%	17.1	1.0%	(19.9)	0.9%	(13.2)	3.0%	0.0	0.0%
6/12/2020	465.9	3.4%	(462.9)	3.4%	9.1	0.9%	(10.5)	0.7%	(19.7)	4.5%	0.0	0.0%
6/15/2020	893.5	5.8%	(895.8)	6.0%	14.7	1.3%	(9.3)	0.7%	(33.3)	6.7%	0.4	84.2%
6/16/2020	(0.0)	0.0%	(0.1)	0.0%	(0.9)	0.0%	1.1	0.0%	(0.0)	0.0%	(0.0)	0.0%
6/17/2020	61.5	0.5%	(59.2)	0.5%	1.5	0.0%	(2.6)	0.1%	(2.5)	0.6%	(0.0)	0.8%
6/19/2020	(0.2)	0.0%	0.5	0.0%	(0.4)	0.0%	(0.3)	0.0%	(0.0)	0.0%	0.0	0.0%

Note: all Settlement amounts are net amounts due to/from ERCOT in \$ thousands.

Potential DAM Price Correction Settlement Impacts

	Energy Purchases		Energy Sales		PTP Purchases		CRR Settlements		AS Payments		Make-whole Payment	
6/20/2020	(0.1)	0.0%	(0.2)	0.0%	0.3	0.0%	0.8	0.1%	(0.0)	0.0%	0.0	0.0%
6/24/2020	118.2	0.9%	(117.6)	0.9%	1.7	0.7%	(1.2)	0.4%	(0.4)	0.1%	0.0	100.0%
6/25/2020	(42.9)	0.3%	42.6	0.4%	(0.2)	0.0%	0.3	0.0%	0.7	0.2%	0.0	0.0%
6/28/2020	51.4	0.5%	(52.6)	0.6%	0.5	0.0%	0.7	0.0%	(2.1)	0.6%	(0.5)	1.0%
6/29/2020	61.4	0.5%	(68.4)	0.6%	(6.6)	0.3%	11.2	0.4%	(3.5)	0.8%	0.0	0.1%
6/30/2020	(1.2)	0.0%	(0.6)	0.0%	(3.7)	0.2%	4.5	0.1%	0.0	0.0%	0.0	0.0%
7/1/2020	(1.5)	0.0%	3.2	0.0%	(4.6)	0.2%	3.5	0.2%	0.1	0.0%	(0.0)	0.0%
7/2/2020	3.8	0.0%	(6.9)	0.0%	(1.0)	0.1%	4.2	0.3%	0.1	0.0%	0.0	0.0%
7/3/2020	(4.4)	0.0%	13.7	0.1%	(16.4)	1.7%	11.5	1.1%	(0.6)	0.1%	0.0	0.0%

Note: all Settlement amounts are net amounts due to/from ERCOT in \$ thousands.

Potential DAM Price Correction Settlement Impacts

	Energy Purchases		Energy Sales		PTP Purchases		CRR Settlements		AS Payments		Make-whole Payment	
7/4/2020	13.9	0.1%	(5.1)	0.0%	(1.3)	0.1%	(4.1)	0.3%	(0.1)	0.0%	0.0	0.0%
7/5/2020	(1.3)	0.0%	6.0	0.0%	(12.3)	1.5%	9.2	1.0%	0.5	0.1%	0.0	0.0%
7/6/2020	11.5	0.1%	0.7	0.0%	(23.8)	2.5%	17.1	1.5%	(0.0)	0.0%	0.0	0.0%
7/7/2020*	(35.8)	0.2%	49.7	0.3%	(5.0)	0.5%	(0.3)	0.0%	(2.6)	0.6%	0.0	0.0%

Note: all Settlement amounts are net amounts due to/from ERCOT in \$ thousands.

* For 7/7/2020, corrected DAM prices were posted prior to becoming final.

Price Correction Study for the RTM

- Market: RTM
- Impacted OD: 7/1/2020
- Price Correction Methodology: ERCOT reran the impacted SCED intervals in study mode with correct ratings on the impacted transformers to determine price and Settlement impacts of a price correction.
- The following slide and appendix include ERCOT's analysis of those impacts using the new RTM prices.

Potential RTM Price Correction Settlement Impacts

	Energy Imbalance		PTP Obligation		RENA		Emergency Energy	
7/1/2020	(303.4)	19.9%	518.1	29.4%	(213.7)	62.0%	60.1	1814.2%

Note: all Settlement amounts are net amounts due to/from ERCOT in \$ thousands.

Appendix

Potential DAM Price Correction Price Impacts

OD	Number of constraints with the impacted transformers	Count of Changes in Price for the 4 Hubs and 4 Competitive Load Zones across all Hourly Intervals 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	No Change
6/8/2020	2	0	24	56	58	9	0	0	45
6/9/2020	8	0	19	52	55	21	0	0	45
6/10/2020	1	0	0	26	82	51	0	0	33
6/11/2020	1	0	0	38	76	43	25	0	10
6/12/2020	3	0	0	24	71	42	24	0	31
6/15/2020	2	0	16	48	22	55	51	0	0
6/16/2020	6	0	0	0	32	0	0	0	160
6/17/2020	7	0	0	0	64	48	0	0	80
6/19/2020	3	0	0	0	25	0	0	0	167

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

* This column does not include prices that were not affected.

Potential DAM Price Correction Price Impacts

OD	Number of constraints with the impacted transformers	Count of Changes in Price for the 4 Hubs and 4 Competitive Load Zones across all Hourly Intervals 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	No Change
6/20/2020	4	0	0	1	44	1	0	0	146
6/24/2020	2	0	0	40	59	48	16	0	29
6/25/2020	1	0	0	56	63	0	0	0	73
6/28/2020	3	0	0	1	101	42	0	0	48
6/29/2020	5	0	0	7	78	38	1	0	68
6/30/2020	2	0	0	1	53	1	0	0	137
7/1/2020	8	0	0	2	72	1	0	0	117
7/2/2020	5	0	0	4	60	5	0	0	123
7/3/2020	9	0	8	30	77	52	0	0	25

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

* This column does not include prices that were not affected.

Potential DAM Price Correction Price Impacts

OD	Number of constraints with the impacted transformers	Count of Changes in Price for the 4 Hubs and 4 Competitive Load Zones across all Hourly Intervals 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	No change
7/4/2020	7	0	1	0	83	6	0	0	102
7/5/2020	14	0	0	10	73	10	0	0	99
7/6/2020	16	0	0	23	82	16	0	0	71
7/7/2020**	15	0	0	28	70	2	0	0	92

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

* This column does not include prices that were not affected.

** For 7/7/2020, corrected DAM prices were posted prior to becoming final.

Potential DAM Price Correction Settlement Impacts to Counter-Parties

OD	Maximum Impact to Counter-Parties		OD	Maximum Impact to Counter-Parties	
	Maximum Amount*	Maximum Percentage**		Maximum Amount*	Maximum Percentage**
6/8/2020	10.67	40.3%	6/20/2020	0.29	NA
6/9/2020	35.25	56.5%	6/24/2020	3.33	589.6%
6/10/2020	1.19	0.7%	6/25/2020	4.17	1.1%
6/11/2020	7.97	72.3%	6/28/2020	7.20	461.2%
6/12/2020	14.49	33.5%	6/29/2020	4.12	14.0%
6/15/2020	30.06	234.2%	6/30/2020	0.37	NA
6/16/2020	0.15	NA	7/1/2020	1.21	1.8%
6/17/2020	6.06	6.5%	7/2/2020	1.99	40.3%
6/19/2020	0.45	NA	7/3/2020	8.62	102.4%

* The maximum of absolute impact to any single Counter-Party in \$ thousands

** The maximum of percentage change to any single Counter-Party with impact more than \$500 (set as NA when no single counter party has impact more than \$500)

Potential DAM Price Correction Settlement Impacts to Counter-Parties

OD	Maximum Impact to Counter-Parties		OD	Maximum Impact to Counter-Parties	
	Maximum Amount*	Maximum Percentage**		Maximum Amount*	Maximum Percentage**
7/4/2020	2.93	2.2%	7/6/2020	7.66	36.6%
7/5/2020	4.29	8.2%	7/7/2020***	8.54	122.1%

* The maximum of absolute impact to any single Counter-Party in \$ thousands

** The maximum of percentage change to any single Counter-Party with impact more than \$500 (set as NA when no single Counter-Party has impact more than \$500)

*** For 7/7/2020, corrected DAM prices were posted prior to becoming final.

Potential RTM Price Correction Price Impacts

N	Number of impacted Settlement Intervals	Count of Changes in Price for the 4 Hubs and 4 Competitive Load Zones across all 15-minute Settlement Intervals of the Affected ODs							No Change
		< -\$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	
7/1/2020	8	8	15	10	2	11	18	0	0

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

* This column does not include prices that were not affected.

Potential RTM Price Correction Settlement Impacts to Counter-Parties

OD	Maximum Impact to Counter-Parties	
	Maximum Amount*	Maximum Percentage**
7/1/2020	46.9	1359.6%

* The maximum of absolute impact to any single Counter Party in \$ thousands

** The maximum of percentage change to any single Counter-Party with impact more than \$500 (set as NA when no single Counter-Party has impact more than \$500)