Market Monitor Report

MC Webinar

IMM

March 22, 2021

Monitoring Analytics

Shortage Pricing in an Emergency

- **Recent events in ERCOT have raised the question of how high PJM prices can go under emergency conditions.**

- **There is no price cap for PJM LMP.**

- **All reserve product prices are set to shortage levels in a load shed or voltage reduction emergency.**

- **PJM energy prices can be very high when all reserve products are short and a there is a transmission constraint penalty factor:**
  - **Status quo: $5,700 per MWh**
  - **Extended ORDC: $14,000 per MWh**

Monitoring Analytics

Shortage Pricing Scenarios

A. Marginal unit marginal cost is $50 per MWh.

One reserve product short in RTO zone.

No violated transmission constraints.

B. Marginal unit marginal cost is $50 per MWh.

All reserve products are short.

No violated transmission constraints.

C. Marginal unit marginal cost is $50 per MWh.

All reserve products are short.

One violated transmission constraint.

Monitoring Analytics

Shortage Pricing Scenarios

D. **Marginal unit marginal cost is $1,000 per MWh.**

All reserve products are short.

One violated transmission constraint.

E. **Marginal unit marginal cost is $2,000 per MWh.**

All reserve products are short.

One violated transmission constraint.

Monitoring Analytics

Shortage Pricing Scenarios, Status Quo

Scenario	Energy Component of LMP	Synchronized Reserve Penalty Factor		Primary Reserve Penalty Factor		Capped Reserve Shortage Penalty Factor	Transmission Constraint Penalty Factor	Total LMP in MAD	Total LMP outside MAD
		RTO	MAD	RTO	MAD				
A	$50	$850	$0	$0	$0	$850	$0	$900	$900
B	$50	$850	$850	$850	$850	$1,700	$0	$1,750	$1,750
C	$50	$850	$850	$850	$850	$1,700	$2,000	$3,750	$3,750
D	$1,000	$850	$850	$850	$850	$1,700	$2,000	$4,700	$4,700
E	$2,000	$850	$850	$850	$850	$1,700	$2,000	$5,700	$5,700

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Shortage Pricing Scenarios, Extended ORDC

Scenario	Energy Component of LMP	Synchronized Reserve Penalty Factor		Primary Reserve Penalty Factor		Secondary Reserve Penalty Factor	Transmission Constraint Penalty Factor	Total LMP in MAD	Total LMP outside MAD
		RTO	MAD	RTO	MAD	RTO			
A	$50	$2,000	$200	$200	$200	$0	$0	$2,650	$2,250
B	$50	$2,000	$2,000	$2,000	$2,000	$2,000	$0	$10,050	$6,050
C	$50	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$12,050	$8,050
D	$1,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$13,000	$9,000
E	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$14,000	$10,000

Monitoring Analytics

Reductions in Line Ratings for Transmission Penalty Factors

Description	Frequency (Constraint Intervals)		Constraints with Reduced Line Limits (Constraint Intervals)		Average Reduction (Percentage)	
	2019	2020	2019	2020	2019	2020
PJM Internal Violated Transmission Constraints	7,046	7,374	5,465	6,779	6.88%	6.80%
PJM Internal Binding Transmission Constraints	92,366	117,867	90,033	115,866	9.08%	8.87%
Market to Market Transmission Constraints	53,263	40,722	10,699	9,841	5.54%	5.94%
All Transmission Constraints	152,675	165,963	106,197	132,486	8.61%	8.54%

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CT Pricing Logic

"We find that PJM's current approach to considering fast-start resources when determining real-time dispatch is unjust and unreasonable because it is inconsistent with the objective of minimizing system costs, may create reliability issues, and may unnecessarily increase the cost of serving load."

- **April 18, 2019 Order on Fast Start 206 Investigation**

- **CT pricing logic creates automatic changes to transmission line ratings, increasing the frequency of constraint violations.**

- **The IMM recommends that PJM stop using CT pricing logic immediately.**

Monitoring Analytics

Effective Capacity in Interconnection Queues

Unit Type	MW in Queue	Completion Rate Adjusted MW in Queue	Completion Rate and Derate Adjusted MW in Queue
Battery	14,824.7	801.5	801.5
CC	23,095.1	15,849.4	15,849.4
CT - Natural Gas	5,483.8	3,895.2	3,895.2
CT - Oil	31.0	17.8	17.8
CT - Other	0.0	0.0	0.0
Fuel Cell	3.0	0.9	0.9
Hydro - Pumped Storage	700.0	700.0	700.0
Hydro - Run of River	148.6	58.2	58.2
Nuclear	189.5	64.2	64.2
RICE - Natural Gas	21.3	7.0	7.0
RICE - Oil	4.0	2.2	2.2
RICE - Other	0.0	0.0	0.0
Solar	79,029.2	9,609.6	4,487.7
Solar + Storage	17,922.2	287.2	287.2
Solar + Wind	199.0	0.0	0.0
Steam - Coal	76.0	25.9	25.9
Steam - Natural Gas	11.0	9.9	9.9
Steam - Oil	0.0	0.0	0.0
Steam - Other	0.0	0.0	0.0
Wind	31,736.6	5,885.3	953.4
Wind + Storage	106.3	0.0	0.0
Total	173,581.3	37,214.3	27,160.5

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ARR/FTR Total Congestion Offset for ARR Holders

Planning Period	ARR Credits	Unadjusted FTR Credits	Day Ahead Congestion	Revenue Balancing + M2M Congestion	Total Congestion	Surplus Revenue Pre 2017/2018 Rules	Surplus Revenue 2017/2018 Rules	Post 2017/2018 Rules	Pre 2017/2018 Total ARR/FTR Offset	Percent Offset	2017/2018 (With Current Revenue Received	Percent Offset	Post 2017/2018 (With New Revenue Received	New Offset
2011/2012	$512.2	$310.0	$1,025.4	($275.7)	$749.7	($50.6)	$35.6	$113.9	$771.6	102.9%	$582.1	77.6%	$660.4	88.1%
2012/2013	$349.5	$268.4	$904.7	($379.9)	$524.8	($94.0)	$18.4	$62.1	$523.9	99.8%	$256.4	48.9%	$300.1	57.2%
2013/2014	$337.7	$626.6	$2,231.3	($360.6)	$1,870.6	($139.4)	($49.0)	($49.0)	$824.8	44.1%	$554.6	29.7%	$554.6	29.7%
2014/2015	$482.4	$348.1	$1,625.9	($268.3)	$1,357.6	$36.7	$111.2	$400.6	$867.2	63.9%	$673.4	49.6%	$962.8	70.9%
2015/2016	$635.3	$209.2	$1,098.7	($147.6)	$951.1	$9.2	$42.1	$188.9	$853.7	89.8%	$739.0	77.7%	$885.9	93.1%
2016/2017	$640.0	$149.9	$885.7	($104.8)	$780.8	$15.1	$36.5	$179.0	$805.0	103.1%	$721.6	92.4%	$864.0	110.7%
2017/2018	$427.3	$212.3	$1,322.1	($129.5)	$1,192.6	$52.3	$80.4	$370.7	$692.0	58.0%	$590.6	49.5%	$880.9	73.9%
2018/2019	$529.1	$130.1	$832.7	($152.6)	$680.0	($5.8)	$16.2	$112.2	$653.34	96.1%	$522.7	76.9%	$618.8	91.0%
2019/2020	$542.0	$91.9	$612.1	($169.4)	$442.7	($1.6)	$21.6	$157.8	$632.3	142.8%	$486.1	109.8%	$622.2	140.6%
2020/2021*	$217.9	$102.2	$488.9	($103.2)	$385.7	($19.6)	($1.8)	($1.8)	$300.49	77.9%	$215.2	55.8%	$215.2	55.8%
Total	$4,673.5	$2,448.7	$11,027.3	($2,091.6)	$8,935.7	($197.8)	$311.1	$1,534.3	$6,924.4	77.5%	$5,341.7	59.8%	$6,564.9	73.5%

Monitoring Analytics

Zonal ARR/FTR Total Congestion Offset for ARR Holders

Zone	ARR Credits	Adjusted FTR Credits	Balancing+ M2M Charge	Surplus Allocation	Total Offset	Day Ahead Congestion	Balancing Congestion	M2M Payments	Total Congestion	Offset
AECO	$2.5	$0.0	($1.3)	($0.1)	$1.2	$4.8	($0.9)	($0.3)	$3.6	33.5%
AEP	$23.5	$16.5	($15.4)	($1.7)	$24.6	$83.7	($10.7)	($3.9)	$69.1	35.6%
APS	$19.3	$10.7	($5.9)	($1.0)	$24.1	$31.4	($4.2)	($1.5)	$25.8	93.2%
ATSI	$11.9	$0.1	($8.0)	($0.4)	$4.0	$37.6	($5.7)	($2.0)	$29.8	13.6%
BGE	$34.3	$2.0	($3.9)	($1.2)	$32.4	$18.7	($2.6)	($1.0)	$15.1	213.9%
ComEd	$21.3	$7.7	($11.9)	($0.9)	$17.2	$56.7	($8.1)	($3.0)	$45.6	37.7%
DAY	$3.5	$0.3	($2.1)	($0.1)	$1.7	$9.0	($1.5)	($0.5)	$7.0	24.1%
DEOK	$14.2	$1.6	($3.3)	($0.6)	$12.5	$13.3	($2.3)	($0.8)	$10.2	122.5%
DLCO	$3.3	$0.1	($2.3)	($0.1)	$1.1	$5.9	($1.3)	($0.6)	$4.1	27.1%
Dominion	$4.4	$49.9	($1.7)	($1.3)	$52.7	$68.0	($14.6)	($0.4)	$52.9	99.5%
DPL	$16.6	$3.8	($13.0)	($0.6)	$7.4	$25.9	($2.0)	($3.3)	$20.6	35.9%
EKPC	$1.8	$0.0	($1.6)	($0.1)	$0.2	$6.7	($1.1)	($0.4)	$5.2	4.1%
EXT	$0.3	$0.0	($6.5)	($0.0)	($6.2)	$13.7	($3.4)	($1.6)	$8.6	(72.4%)
JCPL	$3.5	$0.0	($2.9)	($0.1)	$0.6	$11.0	($2.0)	($0.7)	$8.2	7.5%
Met-Ed	$2.0	$0.4	($1.9)	($0.1)	$0.5	$13.2	($2.1)	($0.5)	$10.5	4.4%
OVEC	$0.0	$0.0	$0.0	$0.0	$0.0	$0.8	($0.1)	$0.0	$0.7	0.0%
PECO	$8.8	$0.2	($4.9)	($0.3)	$4.0	$17.5	($3.2)	($1.2)	$13.0	30.7%
PENELEC	$3.5	$2.9	($2.1)	($0.2)	$4.4	$12.0	($1.6)	($0.5)	$9.8	44.6%
Pepco	$15.1	$2.2	($3.5)	($0.6)	$13.8	$15.1	($2.4)	($0.9)	$11.8	116.9%
PPL	$13.6	$1.8	($5.0)	($0.5)	$10.4	$21.8	($3.3)	($1.3)	$17.3	60.5%
PSEG	$14.3	$0.0	($5.6)	($0.5)	$8.8	$21.3	($3.9)	($1.4)	$16.0	54.8%
RECO	$0.1	$0.0	($0.2)	($0.0)	($0.1)	$0.8	($0.2)	($0.0)	$0.6	(11.3%)
Total	$217.9	$100.4	($103.2)	($10.4)	$215.2	$488.9	($77.3)	($25.9)	$385.7	55.8%

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Congestion Offset if All ARRs Self Scheduled

| | 17/18 Planning Period | | | | 18/19 Planning Period | | | | 19/20 Planning Period | | | |
	SS FTR	Bal+M2M	Congestion+M2M	Offset	SS FTR	Bal+M2M	Congestion+M2M	Offset	SS FTR	Bal+M2M	Congestion+M2M	Offset
AECO	$1.8	($1.6)	$13.2	1.4%	$11.5	($1.9)	$9.7	99.3%	$2.6	($2.0)	$3.7	16.3%
AEP	$203.3	($20.4)	$189.3	96.6%	$84.9	($23.7)	$102.0	60.0%	$62.7	($26.2)	$79.9	45.7%
APS	$78.7	($7.8)	$57.2	123.9%	$37.4	($9.2)	$43.0	65.5%	$31.2	($10.1)	$30.9	68.2%
ATSI	$54.1	($10.6)	$71.2	61.0%	$45.3	($12.4)	$50.7	65.0%	$27.9	($13.5)	$35.8	40.3%
BGE	$83.1	($5.0)	$42.6	183.3%	$49.0	($5.8)	$19.2	224.9%	$53.7	($6.4)	$14.9	316.6%
ComEd	$110.9	($15.4)	$181.0	52.8%	$51.4	($17.8)	$95.9	35.1%	$40.6	($19.6)	$66.9	31.4%
DAY	$10.5	($2.8)	$21.2	36.7%	$11.2	($3.2)	$12.2	65.0%	$5.6	($3.5)	$9.5	21.3%
DEOK	$72.2	($4.3)	$37.6	180.5%	$50.4	($5.0)	$22.7	199.9%	$30.5	($5.6)	$14.5	171.6%
DLCO	$10.6	($2.2)	$12.2	68.9%	$7.2	($2.5)	$7.4	63.5%	$8.1	($3.8)	$5.0	86.2%
Dominion	$42.4	($15.8)	$133.8	19.9%	$55.8	($18.7)	$63.5	58.5%	$32.8	($2.8)	$57.7	52.1%
DPL	$38.0	($2.9)	$68.6	51.1%	$57.7	($3.4)	$58.5	92.8%	$27.3	($21.0)	$17.6	35.9%
EKPC	($3.5)	($2.1)	$20.5	(27.2%)	$0.9	($2.4)	$9.0	(16.8%)	$4.1	($2.7)	$7.2	20.3%
EXT	$3.4	($5.2)	$28.7	(6.3%)	$1.7	($7.5)	$13.6	(42.7%)	$0.9	($9.0)	$7.0	(115.0%)
JCPL	$2.7	($3.6)	$32.1	(2.7%)	$2.6	($4.2)	$19.7	(7.9%)	$2.3	($4.6)	$9.0	(25.3%)
Met-Ed	$7.6	($2.5)	$26.5	19.3%	$5.0	($2.9)	$14.0	14.9%	$0.8	($3.2)	$8.6	(27.8%)
OVEC	$0.0	$0.0	$0.0	0.0%	$0.0	$0.0	$0.0	0.0%	$0.0	$0.0	$0.3	0.0%
PECO	$15.7	($6.4)	$57.7	16.2%	$15.7	($7.5)	$28.7	28.5%	$16.8	($8.1)	$12.5	68.9%
PENELEC	$15.4	($2.7)	$30.5	41.7%	$17.5	($3.2)	$18.3	78.2%	$11.2	($3.5)	$10.6	72.2%
Pepco	$38.1	($4.8)	$39.2	84.9%	$19.5	($5.5)	$17.4	80.3%	$23.2	($6.0)	$13.3	128.9%
PPL	$14.7	($6.4)	$65.3	12.7%	$4.3	($7.6)	$35.3	(9.2%)	$39.2	($8.4)	$19.8	155.7%
PSEG	$58.6	($6.9)	$62.4	82.9%	$35.6	($8.1)	$37.5	73.5%	$21.3	($8.9)	$17.8	69.6%
RECO	($0.1)	($0)	$1.9	(17.1%)	$0.2	($0.3)	$1.7	(6.2%)	$0.2	($0.3)	$0.7	(18.0%)
Total	$858.0	($129.5)	$1,192.6	61.1%	$565.0	($152.7)	$680.2	60.6%	$443.0	($169.4)	$443.1	61.8%

Monitoring Analytics

Uplift Resettlements

- **Uplift payments are an incentive to resources to follow PJM's instructions, e.g. when to start and when to shut down (commitment instructions) and ramp up or down (dispatch instructions).**

- **Resources that operate as requested by PJM are eligible for uplift payments.**

- **Resources that do not operate as requested by PJM are not eligible for uplift payments.**

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Uplift Resettlements

- **The Market Monitor has been notifying participants and PJM when generators are paid uplift but are not following PJM's dispatch signal. The Market Monitor believes that uplift should not be paid to these units.**

- **Resources that do not intend to follow the dispatch signal should be offered accordingly (e.g. block loaded at ICAP).**

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Uplift Resettlements

- **Since 2018, the Market Monitor has identified $3.5 million of uplift payments to units that were not following the dispatch signal.**

- **Of the $3.5 million, 39 percent has been resettled.**

- **The Market Monitor continues to work with PJM to avoid the payment of unnecessary uplift and develop metrics to identify these cases.**

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