

ARR/FTR Market Design and Design Components: IMM Proposals

MC

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PJM ARR Proposal

- **PJM's proposals to address misalignments of ARR rights relative to congestion paid:**
 - **Guarantee 60 percent of Network Service Peak Load**
 - **Expanded source/sink combinations in ARR allocation**



Issues with PJM Stage 1A ARR Proposal

- **Guarantee 60 percent of Network Service Peak Load**
 - **Will expand Stage 1A overallocation**
 - **Stage 1A overallocations are a significant source of cross subsidies within the current ARR/FTR design**
 - Effect is not uniform across all LSEs
 - **PJM will have to reduce ARR MW/FTR MW elsewhere to guarantee FTR target allocations**
 - Effect is not uniform across all LSEs

PJM Stage 1A Allocation Proposal

Zone	Zonal Base Load: Current Stage 1A MW				PJM Proposal: Stage 1A MW				PJM Proposal Percent Increase in Stage 1 A Nominations			
	18/19	19/20	20/21	21/22	18/19	19/20	20/21	21/22	18/19	19/20	20/21	21/22
AECO	1,011.20	990.50	987.80	921.50	1,524.48	1,554.78	1,642.38	1,580.70	50.8%	57.0%	66.3%	71.5%
AEP	12,482.10	12,855.40	12,171.30	11,526.20	12,988.32	13,643.40	13,498.74	12,968.94	4.1%	6.1%	10.9%	12.5%
APS	4,768.30	4,917.60	4,734.00	4,439.20	5,252.76	5,605.32	5,757.66	5,182.56	10.2%	14.0%	21.6%	16.7%
ATSI	6,368.70	6,618.40	6,209.60	5,634.30	7,230.96	7,694.70	7,540.08	7,479.12	13.5%	16.3%	21.4%	32.7%
BGE	3,012.30	2,994.60	2,982.30	2,925.00	3,868.86	3,975.90	4,023.42	4,020.18	28.4%	32.8%	34.9%	37.4%
COMED	9,171.60	9,229.30	8,924.40	8,234.10	12,210.54	12,809.64	12,569.22	12,132.00	33.1%	38.8%	40.8%	47.3%
DAY	1,570.60	1,634.90	1,572.00	1,439.00	1,935.24	2,002.32	1,955.16	1,985.28	23.2%	22.5%	24.4%	38.0%
DEOK	2,591.00	2,651.30	2,466.20	2,322.80	3,021.60	3,116.94	3,030.96	2,985.00	16.6%	17.6%	22.9%	28.5%
DOM	9,461.20	9,698.60	9,815.70	9,749.70	11,796.84	12,739.20	11,958.30	12,036.36	24.7%	31.4%	21.8%	23.5%
DPL	1,752.70	1,775.80	1,655.80	1,671.20	2,287.50	2,401.38	2,458.68	2,451.36	30.5%	35.2%	48.5%	46.7%
DUQ	1,318.70	1,366.30	1,270.60	1,168.90	1,609.26	1,677.06	1,597.14	1,600.50	22.0%	22.7%	25.7%	36.9%
EKPC	1,268.30	1,249.80	1,167.30	1,160.00	1,716.06	2,058.48	1,844.46	1,631.82	35.3%	64.7%	58.0%	40.7%
JCPL	2,279.00	2,226.00	2,138.90	2,104.30	3,432.60	3,585.90	3,634.26	3,541.92	50.6%	61.1%	69.9%	68.3%
METED	1,427.10	1,514.10	1,403.80	1,358.80	1,738.20	1,816.68	1,791.78	1,785.78	21.8%	20.0%	27.6%	31.4%
OVEC	13.70	29.70	27.00	19.00	17.40	84.30	74.40	64.80	27.0%	183.8%	175.6%	241.1%
PECO	3,891.20	3,873.00	3,716.40	3,565.20	4,884.66	5,164.74	5,056.98	4,888.74	25.5%	33.4%	36.1%	37.1%
PEPCO	2,833.90	2,790.40	2,700.70	2,553.00	3,658.44	3,847.20	3,714.42	3,531.96	29.1%	37.9%	37.5%	38.3%
PPL	3,824.70	3,969.90	3,757.40	3,692.50	4,440.66	4,608.78	4,763.28	4,356.00	16.1%	16.1%	26.8%	18.0%
PENELEC	1,657.50	1,726.10	1,665.20	1,626.00	1,733.94	1,798.32	1,809.00	1,746.78	4.6%	4.2%	8.6%	7.4%
PSEG	4,288.90	4,259.90	4,117.00	3,980.40	5,740.14	5,986.98	5,851.50	5,734.38	33.8%	40.5%	42.1%	44.1%
RECO	143.30	142.70	140.20	134.10	241.02	248.88	235.86	238.50	68.2%	74.4%	68.2%	77.9%
Total	75,136.00	76,514.30	73,623.60	70,225.20	91,329.48	96,420.90	94,807.68	91,942.68	21.6%	26.0%	28.8%	30.9%

Issues with PJM Stage 1A Proposal

Zone	Total Overallocated ARR MW			
	18/19	19/20	20/21	21/22
AECO	23.00	-	-	0.60
AEP	4,394.09	2,242.90	4,610.80	3,423.70
APS	257.40	70.90	533.00	837.70
ATSI	302.60	293.20	814.30	678.60
BGE	67.90	723.70	663.50	979.30
COMED	5,177.20	3,178.90	4,948.40	3,090.90
DAY	590.90	338.20	196.60	257.70
DEOK	738.10	1,869.90	1,126.70	1,456.70
DOM	44.60	125.00	250.90	661.90
DPL	28.16	647.70	-	109.40
DUQ	9.70	55.40	131.90	74.80
EKPC	5.90	53.40	102.40	100.70
JCPL	6.91	391.90	14.70	-
METED	-	206.30	69.10	287.70
OVEC	-	-	-	-
PECO	713.50	161.60	3.20	0.40
PEPCO	58.90	233.70	365.00	287.70
PPL	-	60.90	5.60	0.60
PENELEC	-	104.00	28.80	1,538.50
PSEG	158.23	242.40	114.90	0.20
RECO				
Total	12,577.09	11,000.00	13,979.80	13,787.10

Issues with PJM Proposal: Expanded source/sink combinations in ARR allocation

- **Expanded source/sink combinations in ARR allocation**
 - **Will not improve ARR allocations.**
 - **Will not improve price discovery.**



The Purpose of the ARR/FTR Design

- **The purpose of the ARR/FTR design is to return congestion to load. (LEI at 15)**
 - **Congestion is the surplus payment by load that results from differences in LMP in a transmission constrained system.**
 - **Congestion is the surplus after generation is paid and virtuals are settled.**
 - **Congestion is paid by load.**
 - **Load should get congestion back to in order to get market results similar to pre-LMP market (average cost)**

Issues with the ARR/FTR Design

- **Load cannot claim all the congestion paid (LEI at 56-64)**
- **LEI observes several causes for this problem (“leakage”):**
 - **Limited ability for load to participate as the supply side reduces price discovery**
 - **ARR holders cannot claim all FTR paths**
 - **Misalignment of rights relative to network use**
 - **Cross subsidies among and between ARRs and FTRs**

Issues with the ARR/FTR Design

- **ARR rights assigned on a historic generation to load path basis do not align with actual network use.**
 - **Realized and available offset varies widely among customers**
- **Not all congestion paid by load can be claimed by ARR holders.**
 - **Self scheduling all allocated ARR rights would have returned less than 62 percent of congestion in the last four planning periods (17/18, 18/19, 19/20, 20/21)**
- **FTRs are available on paths that do not correspond to physical load service and do not collect congestion.**
 - **Over 50 percent of FTR MW are generator node to generator node**

Fundamental Issue: Poorly Defined Property Rights

- **Fundamental issue in any market is the definition of the property rights and who owns the rights.**
- **Efficient price discovery is not possible unless rights are well defined.**
- **Fundamental problem with the current ARR/FTR market is poorly defined property rights.**
- **Congestion belongs to load, load should have the ability to claim all congestion paid.**
- **Need to define congestion revenue rights so that is possible.**

IMM Proposal Corrects Issues Raised

- **Clearly define property rights: Congestion Revenue Right (CRR)**
- **Congestion belongs to load that paid it.**
- **Return 100 percent of congestion to the load that paid it.**
 - **Congestion is the surplus is caused by differences in LMP in a transmission constrained system**
- **Load has the right to sell all or any portion of its congestion revenue rights at prices of its choosing.**

IMM Proposal Corrects Issues Raised

- **Certainty about return of actual congestion paid**
- **No hold back of system capability to guarantee FTR funding**
- **No end of year surplus allocation needed**
 - **No surplus exists if all congestion revenue rights are allocated**

Proposed Design of FTR Market

- **If all or a portion of the CRR was sold and load moves from one LSE to another LSE:**
 - **The auction price (revenue from the sale of the CRR) from any CRR sold moves with the load.**
 - **The congestion revenue rights of any unsold CRR move with the load.**



IMM Proposal Achieves Purpose of the ARR/FTR Design

- **The purpose of the ARR/FTR design is to return congestion to load.**
 - **Returns 100 percent of congestion to load as default state**
- **The CRR design:**
 - **Dual property right that provides load with a 100 percent perfect offset to congestion by default**
 - **Clearly defines property rights**
 - **Provides basic mechanism for actual price discovery in market for offsets**

IMM Proposal Reduces Market Risk

- **Reduced risk of default relative to current construct**
 - **No underfunding**
 - **No cross subsidies**
 - **No negative rights**
 - Congestion is never negative
 - **No flipping of the value of rights**
 - **Default risk is limited to seller and buyer, not market as a whole**
 - In the case of a default, actual congestion returns to the load.

IMM Position on Path Based Hedges

- **There is a place for path based hedging instruments in an LMP market.**
- **The PJM market does not require path based hedges funded and subsidized by load.**
- **These hedges would be self funded, based on the interaction of prevailing and counterflow bids and offers.**
- **Network based congestion revenue rights can coexist with path based hedges.**



ARR and FTR Total Congestion Offset for ARR Holders: 2011/2012 through 2020/2021 (\$M)

Revenue									Pre 2017/2018 (Without Balancing)		2017/2018 (With Balancing)		Post 2017/2018 (With Balancing and Surplus)		Effective Offset	
Planning Period	ARR Credits	Unadjusted FTR Credits	Day Ahead Congestion	Balancing + M2M Congestion	Total Congestion	Surplus Revenue Pre 2017/2018 Rules	Surplus Revenue 2017/2018 Rules	Post 2017/2018 Rules	Total	Percent	Current	Percent	New	New	Cumulative Revenue	Offset
									ARR/FTR Offset	Percent Offset	Revenue Received	Percent Offset	Revenue Received	New Offset		
2011/2012	\$515.6	\$310.0	\$1,025.4	(\$275.7)	\$749.7	(\$50.6)	\$35.6	\$113.9	\$775.0	103.4%	\$585.5	78.1%	\$663.8	88.5%	\$775.0	103.4%
2012/2013	\$356.4	\$268.4	\$904.7	(\$379.9)	\$524.8	(\$94.0)	\$18.4	\$62.1	\$530.7	101.1%	\$263.2	50.2%	\$306.9	58.5%	\$530.7	101.1%
2013/2014	\$339.4	\$626.6	\$2,231.3	(\$360.6)	\$1,870.6	(\$139.4)	(\$49.0)	(\$49.0)	\$826.5	44.2%	\$556.3	29.7%	\$556.3	29.7%	\$826.5	44.2%
2014/2015	\$487.4	\$348.1	\$1,625.9	(\$268.3)	\$1,357.6	\$36.7	\$111.2	\$400.6	\$872.2	64.2%	\$678.4	50.0%	\$967.8	71.3%	\$872.2	64.2%
2015/2016	\$641.8	\$209.2	\$1,098.7	(\$147.6)	\$951.1	\$9.2	\$42.1	\$188.9	\$860.2	90.4%	\$745.5	78.4%	\$892.3	93.8%	\$860.2	90.4%
2016/2017	\$648.1	\$149.9	\$885.7	(\$104.8)	\$780.8	\$15.1	\$36.5	\$179.0	\$813.1	104.1%	\$729.6	93.4%	\$872.1	111.7%	\$813.1	104.1%
2017/2018	\$429.6	\$212.3	\$1,322.1	(\$129.5)	\$1,192.6	\$52.3	\$80.4	\$370.7	\$694.2	58.2%	\$592.8	49.7%	\$883.1	74.1%	\$592.8	49.7%
2018/2019	\$531.6	\$130.1	\$832.7	(\$152.6)	\$680.0	(\$5.8)	\$16.2	\$112.2	\$655.87	96.4%	\$525.3	77.2%	\$621.3	91.4%	\$621.3	91.4%
2019/2020	\$547.6	\$91.9	\$612.1	(\$169.4)	\$442.7	(\$1.6)	\$21.6	\$157.8	\$637.9	144.1%	\$491.7	111.1%	\$627.9	141.8%	\$627.9	141.8%
2020/2021	\$392.7	\$179.9	\$899.6	(\$256.2)	\$643.4	(\$43.2)	(\$0.0)	(\$0.0)	\$529.31	82.3%	\$316.4	49.2%	\$316.4	49.2%	\$316.4	49.2%
2021/2022*	\$157.2	\$97.8	\$378.8	(\$46.9)	\$331.9	(\$15.2)	(\$5.1)	(\$5.1)	\$239.7	72.2%	\$202.9	61.1%	\$202.9	61.1%	\$202.9	61.1%
Total	\$5,047.3	\$2,624.1	\$11,816.8	(\$2,291.5)	\$9,525.3	(\$236.6)	\$307.8	\$1,531.0	\$7,434.8	78.1%	\$5,687.6	59.7%	\$6,910.9	72.6%	\$7,039.0	73.9%

* four months of 2021/2022 planning period



Zonal ARR and FTR Total Congestion Offset for ARR Holders: 2020/2021 Planning Period(\$M)

Zone	Adjusted ARR Credits	FTR Credits	Balancing+ M2M Charge	Surplus Allocation	Day Ahead Total Offset	Balancing Congestion	Balancing Congestion	M2M Payments	Total Congestion	Total Offset
ACEC	\$4.4	\$0.0	(\$2.7)	(\$0.1)	\$1.7	\$8.2	(\$2.3)	(\$0.5)	\$5.5	31.2%
AEP	\$40.2	\$36.4	(\$38.1)	(\$2.4)	\$38.4	\$149.0	(\$32.2)	(\$5.9)	\$110.9	34.6%
APS	\$32.9	\$14.9	(\$14.8)	(\$1.4)	\$33.0	\$60.0	(\$12.5)	(\$2.3)	\$45.2	73.0%
ATSI	\$20.4	\$0.2	(\$19.5)	(\$0.6)	\$1.1	\$70.1	(\$16.4)	(\$3.0)	\$50.6	2.1%
BGE	\$58.4	\$3.6	(\$9.1)	(\$1.7)	\$52.8	\$34.0	(\$7.7)	(\$1.4)	\$24.8	212.7%
COMED	\$36.4	\$11.5	(\$28.5)	(\$1.2)	\$19.4	\$106.8	(\$24.2)	(\$4.4)	\$78.3	24.7%
DAY	\$5.9	\$0.8	(\$5.3)	(\$0.2)	\$1.5	\$16.3	(\$4.5)	(\$0.8)	\$11.0	13.4%
DUKE	\$24.2	\$4.9	(\$8.4)	(\$0.8)	\$20.8	\$25.8	(\$7.1)	(\$1.2)	\$17.4	119.5%
DUQ	\$5.6	\$0.2	(\$4.0)	(\$0.2)	\$1.8	\$10.4	(\$3.4)	(\$0.9)	\$6.2	29.6%
DOM	\$7.7	\$85.7	(\$37.9)	(\$1.9)	\$55.5	\$121.5	(\$32.9)	(\$0.6)	\$87.9	63.1%
DPL	\$28.6	\$8.1	(\$6.7)	(\$0.9)	\$30.1	\$46.9	(\$5.8)	(\$4.9)	\$36.2	83.2%
EKPC	\$3.0	\$0.0	(\$4.2)	(\$0.1)	(\$1.1)	\$12.6	(\$3.6)	(\$0.6)	\$8.4	(13.0%)
EXT	\$0.5	\$0.0	(\$13.8)	(\$0.0)	(\$13.3)	\$24.8	(\$13.8)	\$0.0	\$11.0	(120.7%)
JCPLC	\$6.0	\$0.0	(\$6.1)	(\$0.2)	(\$0.0)	\$19.0	(\$5.0)	(\$1.1)	\$12.9	(0.2%)
MEC	\$3.5	\$0.7	(\$5.3)	(\$0.1)	(\$1.1)	\$21.7	(\$4.6)	(\$0.7)	\$16.5	(6.9%)
OVEC	\$0.0	\$0.0	(\$0.3)	\$0.0	(\$0.3)	\$1.2	(\$0.3)	\$0.0	\$0.9	(28.8%)
PECO	\$15.0	\$0.2	(\$10.9)	(\$0.4)	\$4.2	\$35.8	(\$9.1)	(\$1.8)	\$24.9	17.0%
PE	\$6.1	\$4.9	(\$6.5)	(\$0.3)	\$4.5	\$22.9	(\$5.7)	(\$0.8)	\$16.4	27.3%
PEPCO	\$25.9	\$3.8	(\$8.3)	(\$0.8)	\$21.4	\$28.8	(\$6.9)	(\$1.3)	\$20.5	104.5%
PPL	\$24.3	\$3.4	(\$11.5)	(\$0.7)	\$16.1	\$42.3	(\$9.6)	(\$1.9)	\$30.8	52.4%
PSEG	\$24.7	\$0.0	(\$13.9)	(\$0.7)	\$10.8	\$38.9	(\$11.9)	(\$2.0)	\$25.0	43.2%
REC	\$0.2	\$0.0	(\$0.6)	(\$0.0)	(\$0.4)	\$2.6	(\$0.5)	(\$0.1)	\$2.1	(17.0%)
Total	\$373.9	\$179.3	(\$256.2)	(\$14.5)	\$297.0	\$899.6	(\$219.9)	(\$36.3)	\$643.4	46.2%

ARR Allocation MW Share: 2020/2021

	Stage 1A		Stage 1B		Stage 2		Total	
	Out of Zone	In Zone	Out of Zone	In Zone	Out of Zone	In Zone	Out of Zone	In Zone
AECO	28.7%	35.6%	2.7%	26.1%	1.6%	5.4%	33.0%	67.0%
AEP	7.9%	65.8%	0.9%	23.2%	0.0%	2.2%	8.8%	91.2%
APS	8.6%	51.8%	0.8%	35.8%	0.2%	3.0%	9.5%	90.5%
ATSI	26.3%	58.5%	2.6%	9.9%	1.1%	1.6%	30.1%	69.9%
BGE	23.8%	28.6%	0.0%	27.1%	0.1%	20.4%	23.9%	76.1%
ComEd	0.0%	71.7%	0.0%	14.5%	0.0%	13.8%	0.0%	100.0%
DAY	79.7%	2.4%	5.3%	0.3%	1.5%	10.7%	86.6%	13.4%
DEOK	42.2%	31.0%	0.1%	14.9%	0.1%	11.7%	42.5%	57.5%
DLCO	73.3%	0.3%	6.5%	2.1%	8.3%	9.5%	88.1%	11.9%
Dominion	0.7%	63.8%	0.0%	34.1%	0.0%	1.4%	0.7%	99.3%
DPL	22.9%	52.5%	2.3%	12.2%	3.0%	7.2%	28.2%	71.8%
EKPC	21.0%	46.4%	0.1%	0.0%	32.0%	0.4%	53.2%	46.8%
EXT	69.7%	0.0%	30.1%	0.0%	0.2%	0.0%	100.0%	0.0%
JCPL	0.9%	56.8%	0.1%	0.9%	32.3%	9.0%	33.3%	66.7%
Met-Ed	23.2%	65.7%	0.1%	3.5%	0.4%	7.1%	23.7%	76.3%
PECO	11.1%	44.1%	2.9%	29.6%	2.1%	10.2%	16.1%	83.9%
PENELEC	15.2%	61.8%	0.0%	13.6%	1.1%	8.3%	16.3%	83.7%
Peppo	19.1%	30.2%	0.0%	1.6%	4.2%	44.9%	23.3%	76.7%
PPL	0.0%	77.5%	0.0%	8.9%	0.0%	13.6%	0.1%	99.9%
PSEG	27.8%	49.3%	3.3%	11.2%	3.7%	4.7%	34.8%	65.2%
RECO	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Total	13.6%	54.9%	1.1%	20.0%	2.3%	8.1%	16.9%	83.1%

ARR Allocation Revenue Share: 2020/2021

	Stage 1A		Stage 1B		Stage 2		Total	
	Out of Zone	In Zone	Out of Zone	In Zone	Out of Zone	In Zone	Out of Zone	In Zone
ACEC	44.3%	18.2%	6.4%	27.7%	0.5%	2.9%	51.2%	48.8%
AEP	10.4%	68.4%	0.8%	17.9%	0.0%	2.4%	11.2%	88.8%
APS	15.0%	61.0%	1.1%	22.3%	0.0%	0.6%	16.1%	83.9%
ATSI	94.0%	2.3%	0.3%	1.3%	2.4%	-0.3%	96.7%	3.3%
BGE	79.0%	12.8%	0.5%	4.7%	1.9%	1.1%	81.3%	18.7%
COMED	0.0%	92.1%	0.0%	3.5%	0.0%	4.4%	0.0%	100.0%
DAY	88.3%	0.2%	2.0%	0.1%	9.4%	0.0%	99.7%	0.3%
DOM	0.8%	75.5%	0.0%	23.2%	0.0%	0.5%	0.8%	99.2%
DPL	35.3%	52.5%	1.5%	8.3%	0.4%	2.0%	37.2%	62.8%
DUKE	75.5%	16.4%	0.0%	4.1%	0.4%	3.4%	76.0%	24.0%
DUQ	80.6%	0.0%	6.9%	-0.1%	5.7%	7.0%	93.1%	6.9%
EKPC	79.0%	11.9%	0.2%	0.0%	8.9%	0.0%	88.1%	11.9%
EXT	50.0%	0.0%	49.6%	0.0%	0.4%	0.0%	100.0%	0.0%
JCPLC	-0.1%	7.6%	0.1%	0.6%	84.7%	7.2%	84.7%	15.3%
MEC	39.7%	58.9%	1.3%	0.5%	0.1%	-0.4%	41.0%	59.0%
PE	38.2%	53.5%	0.1%	6.2%	0.0%	2.1%	38.3%	61.7%
PECO	1.9%	75.1%	5.0%	16.1%	0.2%	1.7%	7.1%	92.9%
PEPCO	88.1%	7.7%	1.3%	0.3%	0.2%	2.4%	89.6%	10.4%
PPL	0.0%	88.5%	0.0%	10.3%	0.1%	1.1%	0.0%	100.0%
PSEG	34.6%	46.8%	2.6%	2.7%	7.7%	5.7%	44.9%	55.1%
REC	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Total	32.7%	52.0%	0.9%	11.1%	1.4%	1.9%	35.0%	65.0%

Offset Available to Load if All ARR's Self Scheduled: 2018/2019 through 2020/2021 Planning Periods

	18/19 Planning Period				19/20 Planning Period				20/21 Planning Period			
	Bal+M2M		Congestion	Offset	Bal+M2M		Congesti	Offset	Bal+M2M		Congesti	Offset
	ARR Only	Charges	+M2M		ARR Only	Charges	on+M2M		ARR Only	Charges	on+M2M	
ACEC	\$11.5	(\$1.9)	\$10.0	96.2%	\$2.6	(\$2.1)	\$3.7	15.6%	\$1.8	(\$2.7)	\$5.5	-16.4%
AEP	\$84.9	(\$24.2)	\$105.4	57.6%	\$62.7	(\$28.2)	\$81.9	42.1%	\$77.3	(\$38.1)	\$110.9	35.3%
APS	\$37.4	(\$9.0)	\$44.7	63.5%	\$31.2	(\$10.4)	\$31.9	65.1%	\$42.0	(\$14.8)	\$45.2	60.3%
ATSI	\$45.3	(\$12.5)	\$52.3	62.8%	\$27.9	(\$13.9)	\$36.8	38.1%	\$30.7	(\$19.5)	\$50.6	22.1%
BGE	\$49.0	(\$6.1)	\$20.0	215.0%	\$53.7	(\$6.7)	\$15.3	308.0%	\$79.7	(\$9.1)	\$24.8	284.2%
COMED	\$51.4	(\$16.7)	\$96.3	36.1%	\$40.6	(\$19.8)	\$65.2	31.9%	\$69.6	(\$28.5)	\$78.3	52.4%
DAY	\$11.2	(\$3.3)	\$12.8	61.8%	\$5.6	(\$3.9)	\$9.7	17.4%	\$8.0	(\$5.3)	\$11.0	24.9%
DUKE	\$50.4	(\$5.3)	\$23.6	191.2%	\$30.5	(\$6.0)	\$14.9	164.2%	\$40.9	(\$8.4)	\$17.4	187.2%
DUQ	\$7.2	(\$2.5)	\$7.7	61.5%	\$8.1	(\$3.2)	\$5.1	95.2%	\$8.9	(\$4.0)	\$6.2	79.7%
DOM	\$55.8	(\$18.4)	\$66.0	56.7%	\$32.8	(\$16.9)	\$59.2	26.9%	\$117.0	(\$37.9)	\$87.9	90.0%
DPL	\$57.7	(\$4.0)	\$59.0	91.0%	\$27.3	(\$8.7)	\$17.4	107.3%	\$56.4	(\$6.7)	\$36.2	137.4%
EKPC	\$0.9	(\$2.3)	\$9.5	-14.5%	\$4.1	(\$2.9)	\$7.4	16.8%	\$6.6	(\$4.2)	\$8.4	29.3%
EXT	\$1.7	(\$4.8)	(\$4.1)	76.7%	\$0.9	(\$2.2)	(\$1.7)	74.3%	\$0.3	(\$13.8)	\$11.0	-122.3%
JCPLC	\$2.6	(\$4.2)	\$20.3	-7.8%	\$2.3	(\$4.6)	\$9.2	-25.5%	\$0.9	(\$6.1)	\$12.9	-40.2%
MEC	\$5.0	(\$3.3)	\$14.6	11.8%	\$0.8	(\$4.2)	\$8.7	-38.5%	\$8.0	(\$5.3)	\$16.5	16.5%
OVEC	NA	NA	NA	NA	NA	\$0.1	\$0.5	NA	NA	(\$0.3)	\$0.9	NA
PECO	\$15.7	(\$7.4)	\$29.9	27.7%	\$16.8	(\$8.2)	\$13.4	63.8%	\$14.0	(\$10.9)	\$24.9	12.4%
PE	\$17.5	(\$4.2)	\$17.5	76.0%	\$11.2	(\$3.8)	\$10.8	69.1%	\$13.5	(\$6.5)	\$16.4	42.8%
PEPCO	\$19.5	(\$5.4)	\$18.2	77.8%	\$23.2	(\$6.1)	\$13.7	124.3%	\$37.3	(\$8.3)	\$20.5	141.7%
PPL	\$4.3	(\$7.7)	\$36.6	-9.1%	\$39.2	(\$8.5)	\$20.5	149.9%	\$43.7	(\$11.5)	\$30.8	104.5%
PSEG	\$35.6	(\$8.8)	\$38.5	69.6%	\$21.3	(\$8.9)	\$18.4	67.2%	\$43.2	(\$13.9)	\$25.0	117.0%
REC	\$0.2	(\$0.9)	\$1.1	-68.7%	\$0.2	(\$0.3)	\$0.6	-22.6%	\$1.0	(\$0.6)	\$2.1	21.0%
Total	\$565.0	(\$152.7)	\$680.0	60.6%	\$443.0	(\$169.4)	\$442.7	61.8%	\$700.9	(\$256.2)	\$643.4	69.1%

FTR Percentage of MW By Source and Sink Node Type: 2019/2020 Annual Auction

Source Type	Sink Type					
	Aggregate	Generator	Hub	Interface	Residual Metered Aggregate	Zone
Aggregate	1.8%	5.1%	0.2%	0.0%	0.2%	0.4%
Generator	11.1%	53.7%	4.2%	0.7%	5.3%	8.4%
Hub	0.3%	0.8%	0.5%	0.0%	0.3%	1.3%
Interface	0.1%	0.4%	0.0%	0.0%	0.1%	0.1%
Residual Metered Aggregate	0.1%	0.5%	0.0%	0.0%	0.0%	0.0%
Zone	0.4%	1.4%	0.6%	0.0%	0.5%	1.3%

Matrix: ARR

#	Track/Theme	Design Components ¹	Priority	Status Quo	IMM Proposal
1	1. ARRs	Availability and Assignment of Congestion rights to Load		Stage 1 – source points only from designated active historical resources or Qualified Replacement Resources Stage 2 – source points any available generator, interface, hub, zone Must always sink at load settlement point/aggregate	Rights to all congestion allocated to the load that paid it, based on actual network congestion DA and RT Rights to all congestion allocated to the load that paid it, based on actual network congestion DA and RT
1a.		Allocation mechanism			
1b.		ARR nomination point availability			Physical load points/export interface
2		Congestion Right Election (Claim or Sell Options)		Annual, 24H Obligation "Price taker" from average 4 round annual auction prices	Set reserve prices for the sale of any portion of congestion that will be paid in a given period.
3		Auction Surplus		Auction surplus goes to FTR deficiencies first, residual allocated to ARR holders on ARR weighted basis	NA, All rights are assigned, no unassigned rights
4		Congestion Surplus		Congestion surplus goes to FTR deficiencies first, residual allocated to ARR holders on ARR weighted basis	NA. All rights are assigned, no unassigned rights.
5		Model details		Annual Model with modeled constraints, line limits and outages based on DA snap shot, Monthly updates during planning year. Objective to guarantee target allocation payouts.	Actual DA model and RT model of every actual market day
6		Amount of guaranteed ARRs		Stage 1A up-to ZBL share on historical source and sink paths only.	Full congestion paid in planning year.
7		Incremental ARR product types		EE, Merchant, RTEP	Eliminate IARR, inconsistent with network use.
7a.		IARR model development and SFT assumptions and procedures		Model document available here: https://www.pjm.com/-/media/markets-ops/ftr/pjm-iarr-model-development-and-analysis.ashx	Eliminate IARR, inconsistent with network use.

Matrix: FTRs

#	Track/Theme	Design Components ¹	Priority	Status Quo	IMM Proposal
8	2. FTRs	FTR Auction bid limits		10,000 per period, auction, round by corporate entity	NA
9		FTR Option paths and clearing mechanism		Path availability limited by historical pricing and source/sink node type. Price calculated for all eligible Option paths.	All rights are options, no negative values possible
10		Invalid FTR Paths		FTR paths that clear with < 0.1% impact on any constraint not cleared. FTRs with a zero clearing price will only be awarded if there is a minimum of one binding constraint in the auction period for which the FTR path sensitivity is non-zero (0.1% threshold).	None.
11		FTR product & class types		24H, On peak, Off peak (M-F 2300-0700, Weekend all day). Monthly or Annual product.	Product types for congestion made available to market would match what was sold by rights holders. Product types can be as flexible as requested by the market.
12		Bilateral transaction functionality		Post, Accept, Confirm. Indemnification from defaults	All bilateral arrangements must be on a PJM platform subject to PJM credit criteria.
13	Source of Congestion dollars allocated to FTRs		DA ahead only, balancing and M2M assigned to load on load ratio basis.	All congestion (DA+Balancing+M2M)	
14	Available Rights not allocated or directly claimable by load (FTR Biddable points)			Paths not associated with ARR source and sink pairs (sets)	NA
15	FTR Forfeiture Rule			Flow based, per M-6 section 8.6	NA



Matrix: Transparency

#	Track/Theme	Design Components ¹	Priority	Status Quo	IMM Proposal
16	3. Transparency and Simplicity	Network model posted information		Base topology, outages, selected interface limits, m2m flow, loop flow, uncompensated flow, contingencies modeled	Actual DA model and RT model of every actual market day. OASIS.
17		Network model posting frequency		Base models posted quarterly; outages, interface limits posted per auction, aggregate and PAR definitions, model mapping files	OASIS
18		Outage modeling		Binary outages, entire model period	Actual by Day
19		Bid submission upload capability Implementation date		Bids can be submitted through FTR center, or browserless via XML. N/A	

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