## Electricity Trading: Value Added or Value Removed?

### HEPG Tucson, Arizona December 12, 2013

### Joe Bowring



### **UTC Cleared Volumes**





# PJM cleared up-to congestion transactions by type (MW): January 2005 through September of 2013



### **Virtual Activity**



#### Day-ahead and real-time loads average hourly volumes): January through September of 2013



# Difference between day-ahead and real-time loads (average daily volumes): January 2012 through September of 2013



#### Day-ahead and real-time generation (average hourly volumes): **January through September of 2013**



# Difference between day-ahead and real-time generation (average daily volumes): January 2012 through September of 2013



Monthly average percentage of real-time self-supply load, bilateral-supply load and spot-supply load based on parent companies: 2012 through 2013

		2012			2013		Difference i	n Percenta	ge Points
	Bilateral		Self-	Bilateral			Bilateral		Self-
	Contract	Spot	Supply	Contract	Spot	Self-Supply	Contract	Spot	Supply
Jan	8.9%	22.0%	69.1%	10.4%	22.3%	67.3%	1.5%	0.2%	(1.8%)
Feb	8.8%	21.2%	70.0%	10.5%	22.0%	67.5%	1.7%	0.8%	(2.4%)
Mar	9.4%	23.6%	67.1%	10.4%	24.2%	65.4%	1.1%	0.6%	(1.6%)
Apr	9.4%	23.8%	66.8%	10.7%	24.2%	65.1%	1.3%	0.4%	(1.6%)
May	8.6%	23.5%	67.9%	10.9%	25.4%	63.6%	2.4%	1.9%	(4.3%)
Jun	8.7%	22.3%	69.0%	10.7%	25.0%	64.3%	2.0%	2.7%	(4.8%)
Jul	8.0%	22.7%	69.3%	10.2%	25.2%	64.7%	2.2%	2.5%	(4.6%)
Aug	8.5%	23.6%	67.9%	10.2%	24.5%	65.3%	1.7%	0.8%	(2.6%)
Sep	9.1%	24.4%	66.5%	10.1%	24.2%	65.7%	1.1%	(0.2%)	(0.9%)
Oct	9.6%	25.5%	64.9%						
Nov	9.9%	23.9%	66.3%						
Dec	10.2%	22.6%	67.3%						
Annual	9.0%	23.2%	67.8%	10.5%	24.1%	65.4%	1.4%	0.9%	(2.3%)

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# PJM INC and DEC bids by type of parent organization (MW): January 2012 through September 2013

	2012 (Jan - S	Sep)	2013 (Jan - Sep)		
	Total Virtual Bids		Total Virtual Bids		
Category	MW	Percentage	MW	Percentage	
Financial	47,082,084	35.8%	26,283,017	26.1%	
Physical	84,316,277	64.2%	74,273,099	73.9%	
Total	131,398,361	100.0%	100,556,116	100.0%	



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# PJM up-to congestion transactions by type of parent organization (MW): January 2012 through September 2013

	2012 (Jan -	Sep)	2013 (Jan - Sep)		
	Total Up-to		Total Up-to		
Category	Congestion MW	Percentage	Congestion MW	Percentage	
Financial	235,531,919	95.2%	308,437,367	94.9%	
Physical	11,950,279	4.8%	16,406,890	5.1%	
Total	247,482,198	100.0%	324,844,257	100.0%	



#### Annual FTR Auction patterns of ownership by FTR direction: Planning period 2013 to 2014

			FTR	Direction	
Trade Type	Organization Type	Self-Scheduled FTRs	Prevailing Flow	Counter Flow	All
Buy Bids	Physical	Yes	9.2%	0.2%	7.0%
		No	36.1%	17.5%	31.5%
		Total	45.3%	17.8%	38.5%
	Financial	No	54.7%	82.2%	61.5%
	Total		100.0%	100.0%	100.0%
Sell Offers	Physical		20.7%	19.0%	20.2%
	Financial		79.3%	81.0%	79.8%
	Total		100.0%	100.0%	100.0%



#### Monthly Balance of Planning Period FTR Auction patterns of ownership by FTR direction: January through June 2013

		FTR Direction			
Trade Type	Organization Type	Prevailing Flow	<b>Counter Flow</b>	All	
Buy Bids	Physical	26.6%	16.9%	22.9%	
	Financial	73.4%	83.1%	77.1%	
	Total	100.0%	100.0%	100.0%	
Sell Offers	Physical	32.7%	32.9%	32.7%	
	Financial	67.3%	67.1%	67.3%	
	Total	100.0%	100.0%	100.0%	



# Day-ahead and real-time average LMP (Dollars per MWh): January through September of 2001 through 2013

				Difference as Percent of
(Jan - Sep)	Day Ahead	Real Time	Difference	Real Time
2001	\$36.07	\$36.00	(\$0.07)	(0.2%)
2002	\$28.29	\$28.13	(\$0.16)	(0.6%)
2003	\$41.20	\$40.42	(\$0.77)	(1.9%)
2004	\$42.64	\$43.85	\$1.22	2.9%
2005	\$54.48	\$54.69	\$0.21	0.4%
2006	\$50.45	\$51.79	\$1.34	2.7%
2007	\$54.24	\$57.34	\$3.10	5.7%
2008	\$71.43	\$71.94	\$0.51	0.7%
2009	\$37.35	\$37.42	\$0.08	0.2%
2010	\$45.81	\$46.13	\$0.32	0.7%
2011	\$45.14	\$45.79	\$0.65	1.4%
2012	\$32.16	\$32.45	\$0.29	0.9%
2013	\$37.50	\$37.30	(\$0.20)	(0.5%)



Frequency distribution by hours of PJM real-time and dayahead load-weighted hourly LMP difference (Dollars per MWh): January through September of 2007 through 2013

	20	07	20	08	20	09	20	10	20	)11	20	12	20	13
		Cumulative												
LMP	Frequency	Percent												
< (\$150)	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.02%	5	0.08%	4	0.06%
(\$150) to (\$100)	0	0.00%	1	0.02%	0	0.00%	0	0.00%	2	0.05%	6	0.17%	5	0.14%
(\$100) to (\$50)	26	0.40%	88	1.35%	3	0.05%	13	0.20%	49	0.79%	17	0.43%	9	0.27%
(\$50) to \$0	3,385	52.07%	3,730	58.08%	3,776	57.69%	4,091	62.65%	4,011	62.02%	4,112	62.97%	4,338	66.49%
\$0 to \$50	2,914	96.55%	2,448	95.32%	2,736	99.45%	2,288	97.57%	2,290	96.98%	2,343	98.60%	2,112	98.73%
\$50 to \$100	193	99.50%	264	99.33%	34	99.97%	130	99.56%	169	99.56%	61	99.53%	58	99.62%
\$100 to \$150	21	99.82%	37	99.89%	2	100.00%	20	99.86%	21	99.88%	14	99.74%	12	99.80%
\$150 to \$200	4	99.88%	4	99.95%	0	100.00%	8	99.98%	2	99.91%	10	99.89%	10	99.95%
\$200 to \$250	1	99.89%	2	99.98%	0	100.00%	1	100.00%	3	99.95%	4	99.95%	1	99.97%
\$250 to \$300	3	99.94%	0	99.98%	0	100.00%	0	100.00%	0	99.95%	1	99.97%	2	100.00%
\$300 to \$350	2	99.97%	1	100.00%	0	100.00%	0	100.00%	0	99.95%	2	100.00%	0	100.00%
\$350 to \$400	0	99.97%	0	100.00%	0	100.00%	0	100.00%	0	99.95%	0	100.00%	0	100.00%
\$400 to \$450	1	99.98%	0	100.00%	0	100.00%	0	100.00%	0	99.95%	0	100.00%	0	100.00%
\$450 to \$500	1	100.00%	0	100.00%	0	100.00%	0	100.00%	0	99.95%	0	100.00%	0	100.00%
>= \$500	0	100.00%	0	100.00%	0	100.00%	0	100.00%	3	100.00%	0	100.00%	0	100.00%



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# Monthly average of real-time minus day-ahead LMP: January through September of 2013



# PJM system hourly average LMP: January through September of 2013



#### Real-time load-weighted hourly LMP minus day-ahead loadweighted hourly LMP: January through September of 2013



#### PJM, NYISO and MISO real-time and day-ahead border price averages: January through September, 2013



#### Demand Response revenue by market: 2002 through September 2013



### **UTC Analysis: Impact on price convergence**

- Study results show that UTCs affected LMP through impacts on dispatch and unit commitment.
- Study results show no evidence to support the claim that UTCs contributed to overall day ahead and real time price convergence.
- Study results show that the impact of UTCs on day ahead and real time LMP differences varied by pricing node, by hour and by day, in both magnitude and direction.



#### Node hours that day ahead and real time LMP was closer with or without UTC in PJM's Alstom Simulation: May 2, 4, 22, 23 and 27





### **UTC Analysis: Impact on congestion**

- Study results show that UTCs significantly increased day ahead congestion.
  - UTCs increased the number of constraints that bind in the day ahead market.
  - UTCs affected the hours that the constraints bind.
  - UTCs affected the shadow prices of the constraints in the day ahead market.



### **UTC Analysis: Impact on congestion**

- Study results show that UTCs increase negative balancing congestion.
  - Removing UTCs reduced the number of day ahead constraints and day ahead congestion
  - Removing UTCs made day ahead results more consistent with real time constraints and real time congestion.
  - Removing UTCs reduced negative balancing congestion.



### **UTC Analysis: Impact on congestion**

 Comparison of total constraint hours by hour day ahead with and without UTC and real time: May 2, 4, 23, 24, 27





### **IMM Uplift Recommendations**

- To reduce uplift costs and to improve the allocation of uplift costs:
  - Reallocation of uplift paid to units supporting the Con Edison – PSEG wheeling contracts.
  - Reallocation of no load and startup costs of units providing reactive services.
  - Implementation of the IMM proposed changes to lost opportunity cost calculations.
  - Elimination of internal bilateral transactions from the deviations calculation.
  - Allocation of operating reserve charges to up-to congestion transactions
  - Complete transparency of all uplift credits and recipients.



### **Impact of MMU Recommendations**

#### Uplift cost per transaction (Jan – Sep 2013):

		Current Rates	Proposed Rates	Change	Change
	Transaction	(\$/MWh)	(\$/MWh)	(\$/MWh)	(%)
	INC	3.663	0.189	(3.474)	(94.8%)
	DEC	3.782	0.218	(3.564)	(94.2%)
East	DA Load	0.119	0.028	(0.090)	(76.0%)
	RT Load	0.076	0.058	(0.018)	(23.9%)
	Deviation	3.663	0.189	(3.474)	(94.8%)
	INC	1.726	0.141	(1.584)	(91.8%)
	DEC	1.844	0.170	(1.675)	(90.8%)
West	DA Load	0.119	0.028	(0.090)	(76.0%)
	RT Load	0.053	0.035	(0.018)	(33.8%)
	Deviation	1.726	0.141	(1.584)	(91.8%)
	East to East	NA	0.407		
UTC	West to West	NA	0.311		
	East to/from West	NA	0.359		



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### **UTC Analysis: FTR Funding**

- Study results show that UTCs contributed significantly to FTR underfunding relative to target allocations.
- For the five days studied, the removal of UTCs changed FTR funding relative to target allocations from a deficit of -\$4.1 million to a net surplus of \$537 thousand, a gain in funding relative to target allocations of \$4.7 million.
- For the five days studied, removing UTCs reduced target allocations from \$16,241,505 to \$7,780,223. The reduction was \$8,461,282, or 52 percent.



### **FTR Funding**



### **Total PJM Congestion**



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# Proposed solutions to FTR revenue shortfalls

- Correct reporting of monthly payout ratio
- Eliminate portfolio subsidies (netting)
- Eliminate subsidies to counterflow FTRs
- Eliminate geographic subsidies
- Improve transmission outage modeling
- Reduce FTR sales on underfunded paths
- Implement seasonal ARR allocation
- Eliminate overallocation of ARRs in first round





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# Impact of proposed measures for 2012 to 2013 planning period

Торіс	Payout Ratio PP 2	012-2013
Reported		67.8%
Elimination of Netting		84.6%
Counter Flow Adjustment		88.6%
Stage 1A Requirement		93.3%

