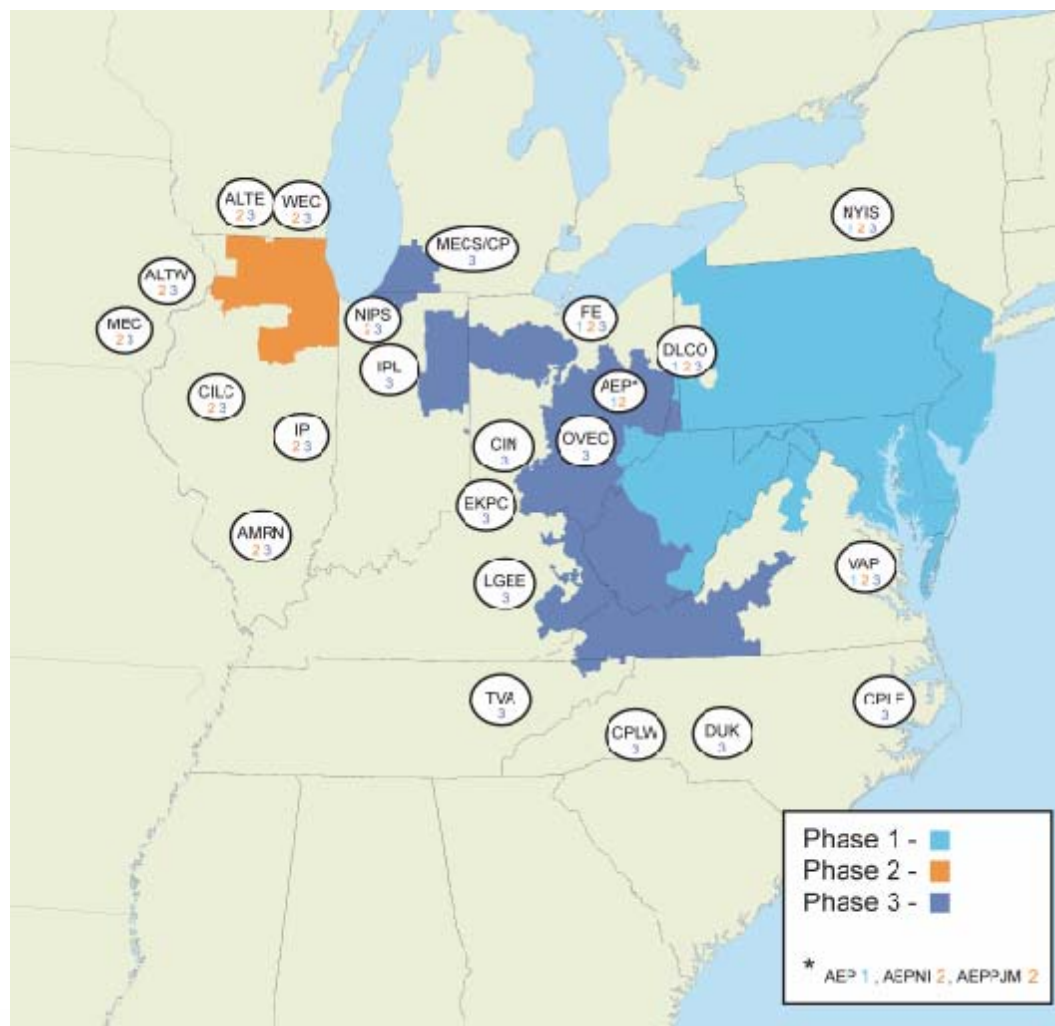




# STATE OF THE MARKET REPORT 2004

MACRUC Briefing  
Baltimore, MD  
March 14, 2005

Joseph E. Bowring  
Market Monitor



- Independent Internal Market Monitoring
  - Independent System Operator
  - ISO/RTO has no financial stake in market outcomes
  - ISO/RTO has independent Board
  - ISO and MMU are independent from all market participants
  - MMU is independent from ISO
  
- MMU Accountability
  - To FERC (per FERC MMU Orders and MM Plan).
  - To PJM Board.

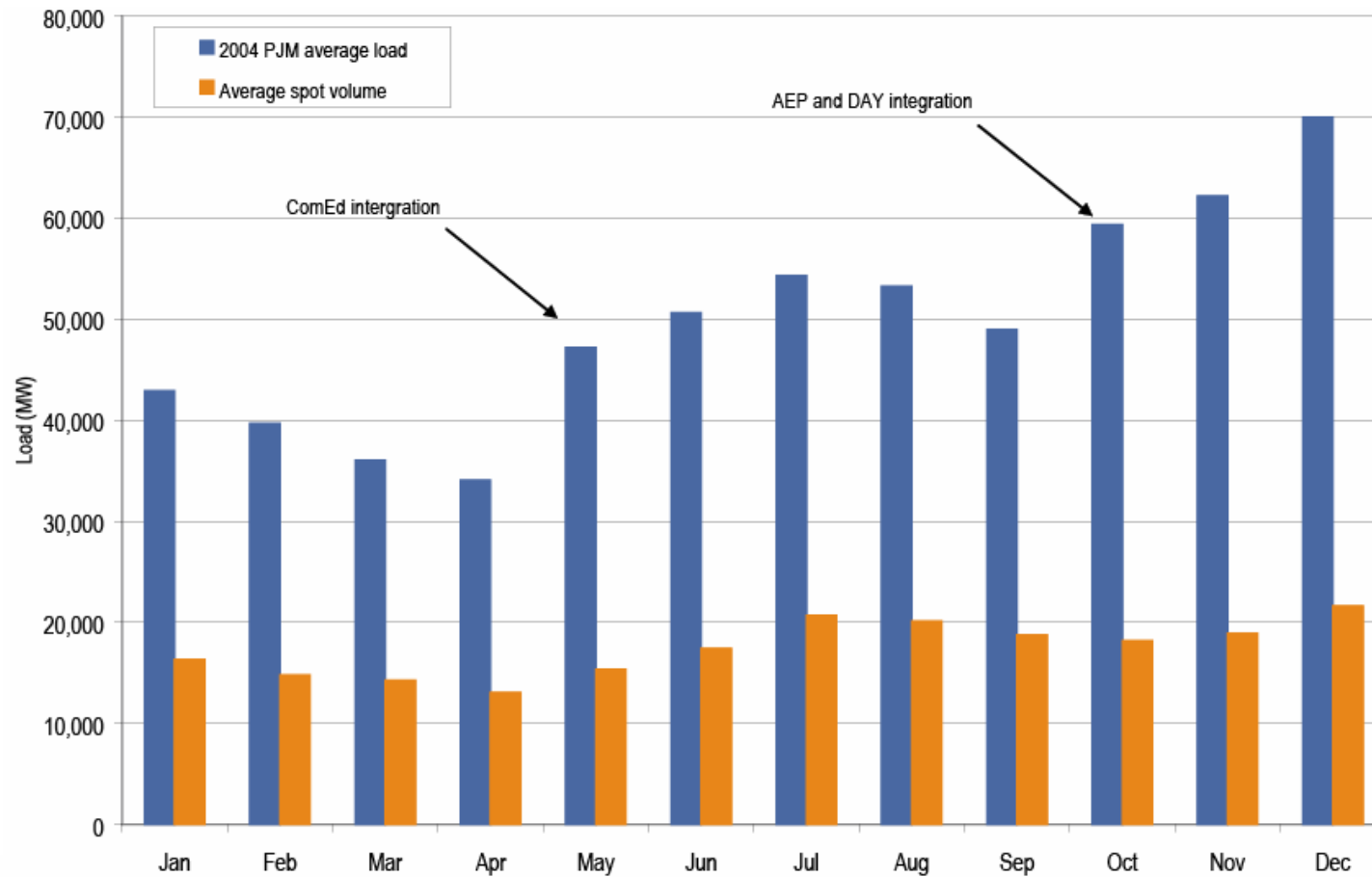
- Monitor **compliance with rules**, standards, procedures and practices of PJM.
- Monitor **actual or potential design flaws** in rules, standards, procedures and practices of PJM.
- Monitor **structural problems** in the PJM market that may inhibit a robust and competitive market.
- Monitor the potential of Market Participants to **exercise undue market power**.

- Develop/modify market rules to **facilitate competition**
- **Limit returns to market power**
- Provide **incentives to competitive behavior**
- Make **exercise of market power more difficult**

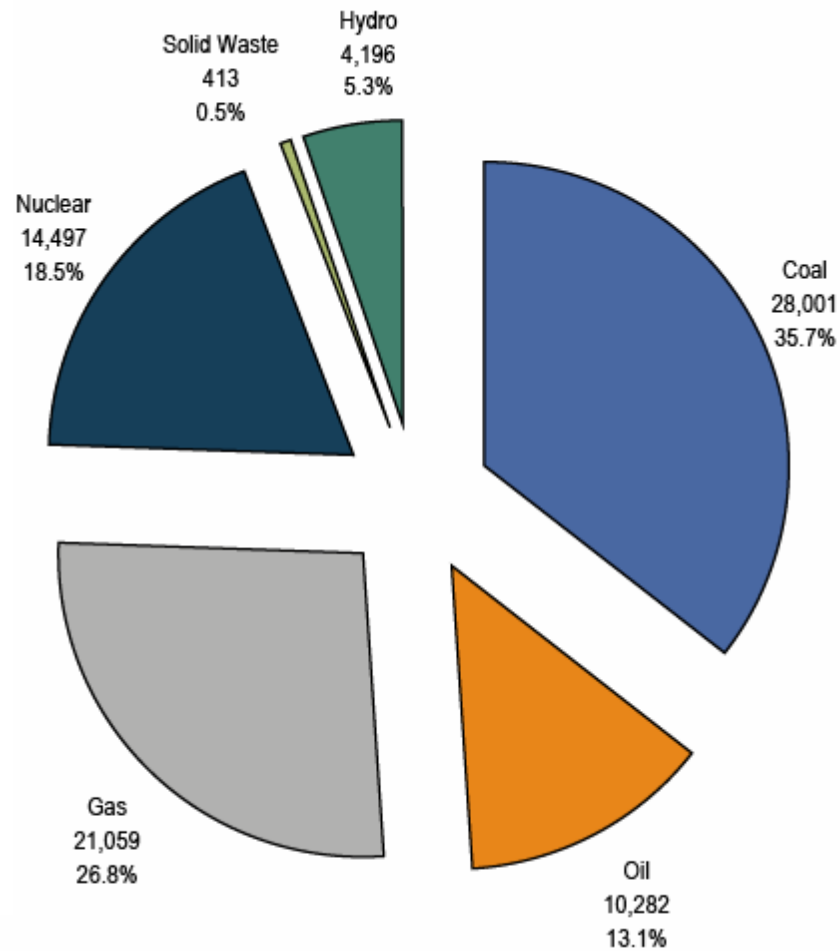
- **Energy Market** results were competitive
- **PJM Capacity Market** results were competitive
- **ComEd Capacity Market** results were reasonably competitive
- **Regulation market** results were competitive
- **Spinning market** results were competitive
- **FTR market** results were competitive



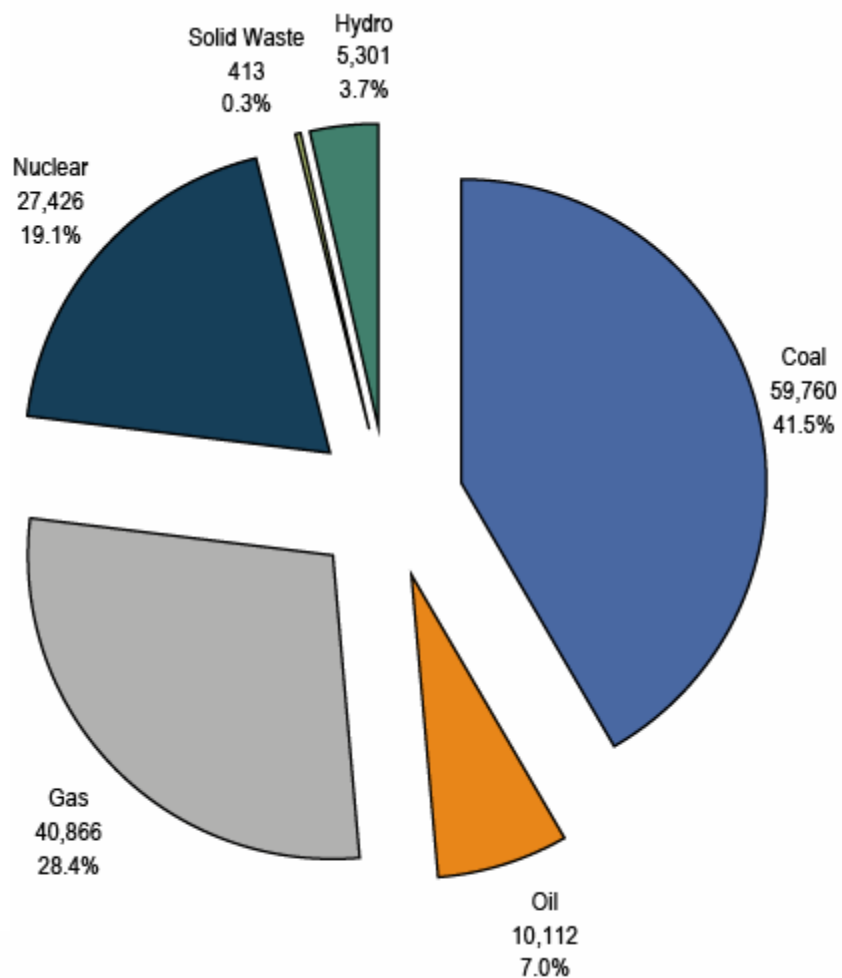
## PJM average hourly load and spot market volume: Calendar year 2004



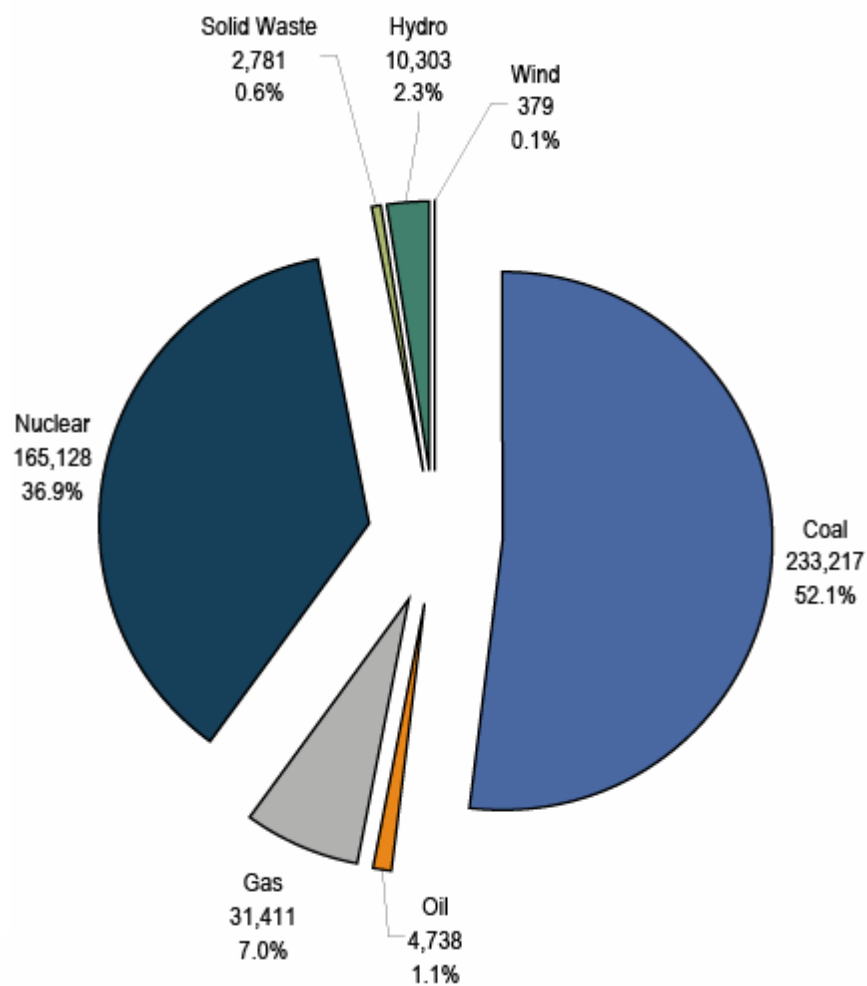
## PJM capacity by fuel source: At January 1, 2004



## PJM capacity by fuel source: At December 31, 2004

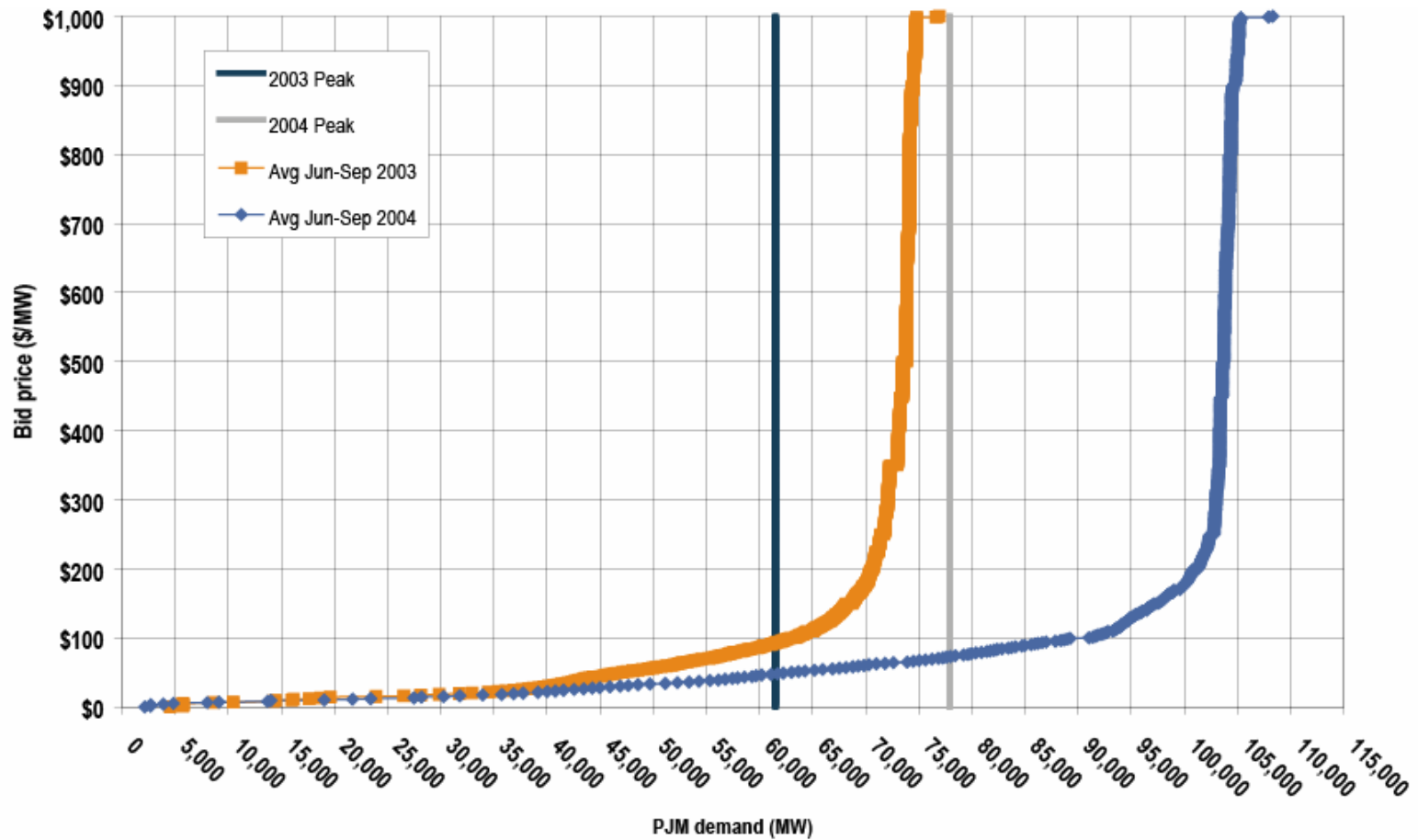


## PJM generation by fuel source (GWh): Calendar year 2004



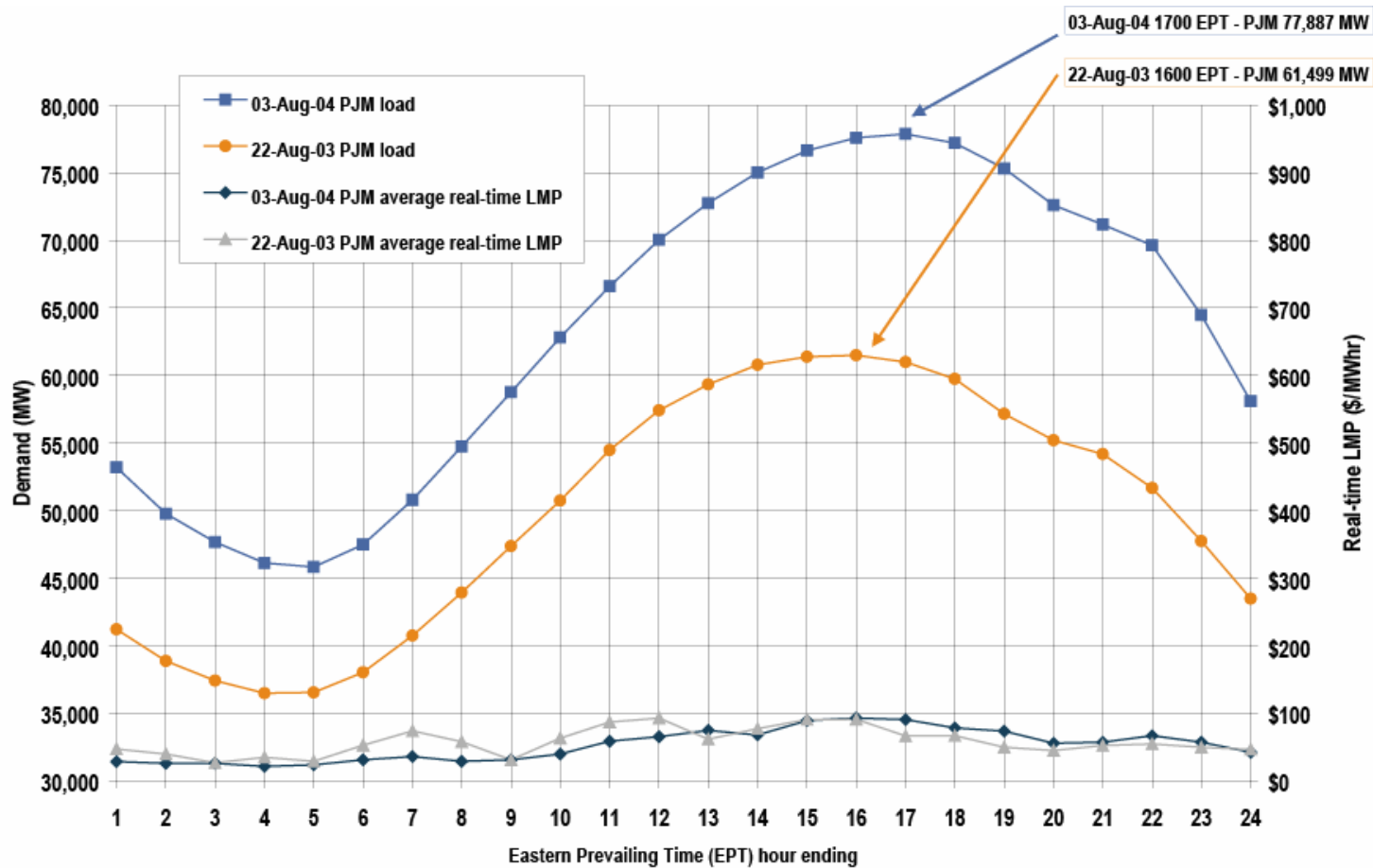


## Average PJM aggregate supply curves: Summers 2003 and 2004





## PJM peak-load comparison: Tuesday, August 3, 2004, and Friday, August 22, 2003



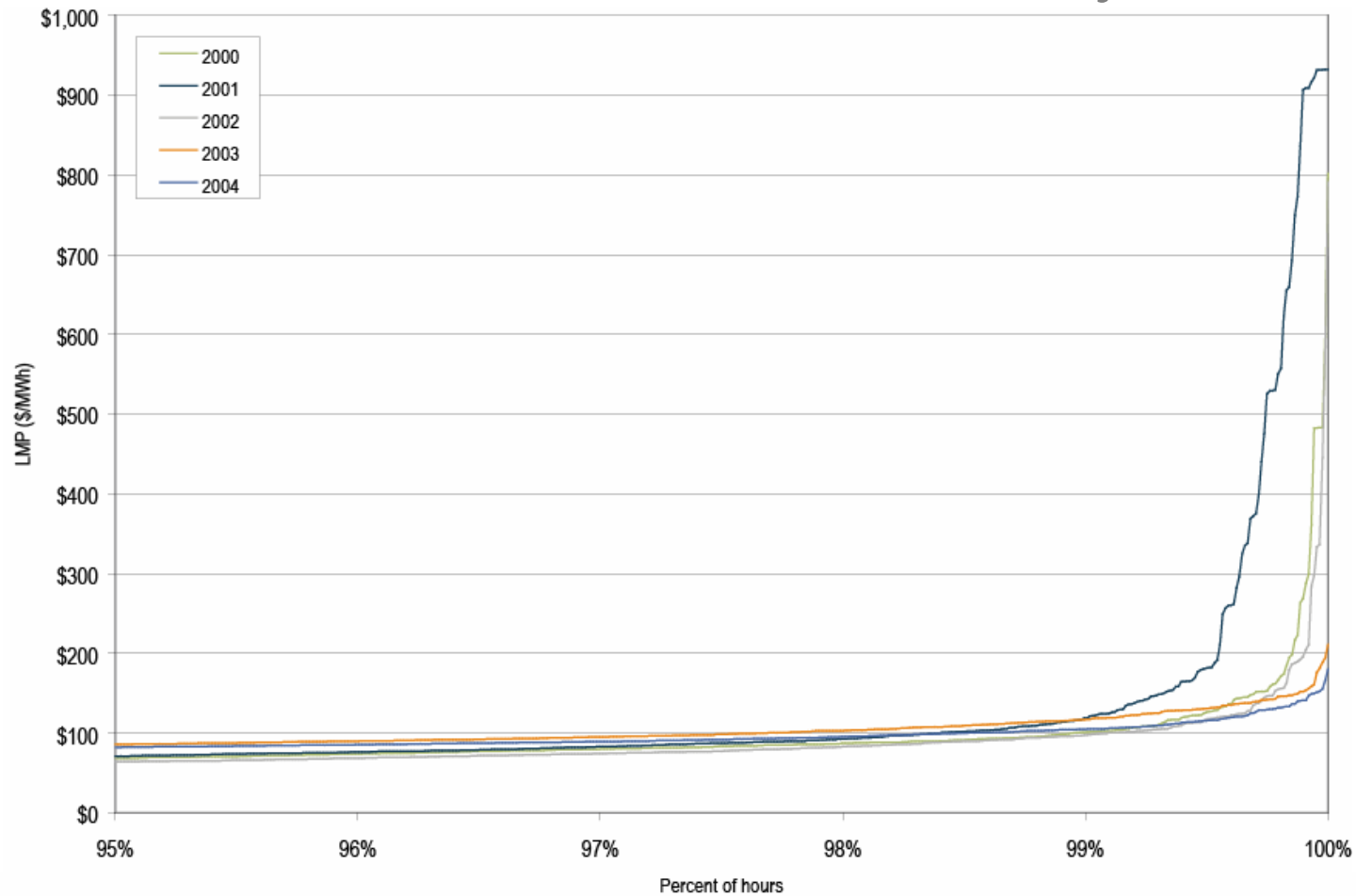


## PJM average hourly LMP (Dollars per MWh): Calendar years 1998 to 2004

	Locational Marginal Prices (LMPs)			Year-to-Year Changes		
	Average	Median	Standard Deviation	Average LMP	Median LMP	Standard Deviation
1998	\$21.72	\$16.60	\$31.45	N/A	N/A	N/A
1999	\$28.32	\$17.88	\$72.42	30.4%	7.7%	130.3%
2000	\$28.14	\$19.11	\$25.69	-0.6%	6.9%	-64.5%
2001	\$32.38	\$22.98	\$45.03	15.1%	20.3%	75.3%
2002	\$28.30	\$21.08	\$22.40	-12.6%	-8.3%	-50.3%
2003	\$38.27	\$30.79	\$24.71	35.2%	46.0%	10.3%
2004	\$42.40	\$38.30	\$21.12	10.8%	24.4%	-14.5%



# Price duration curves for the PJM Real-Time Energy Market during hours above the 95th Percentile: Calendar years 2000 to 2004

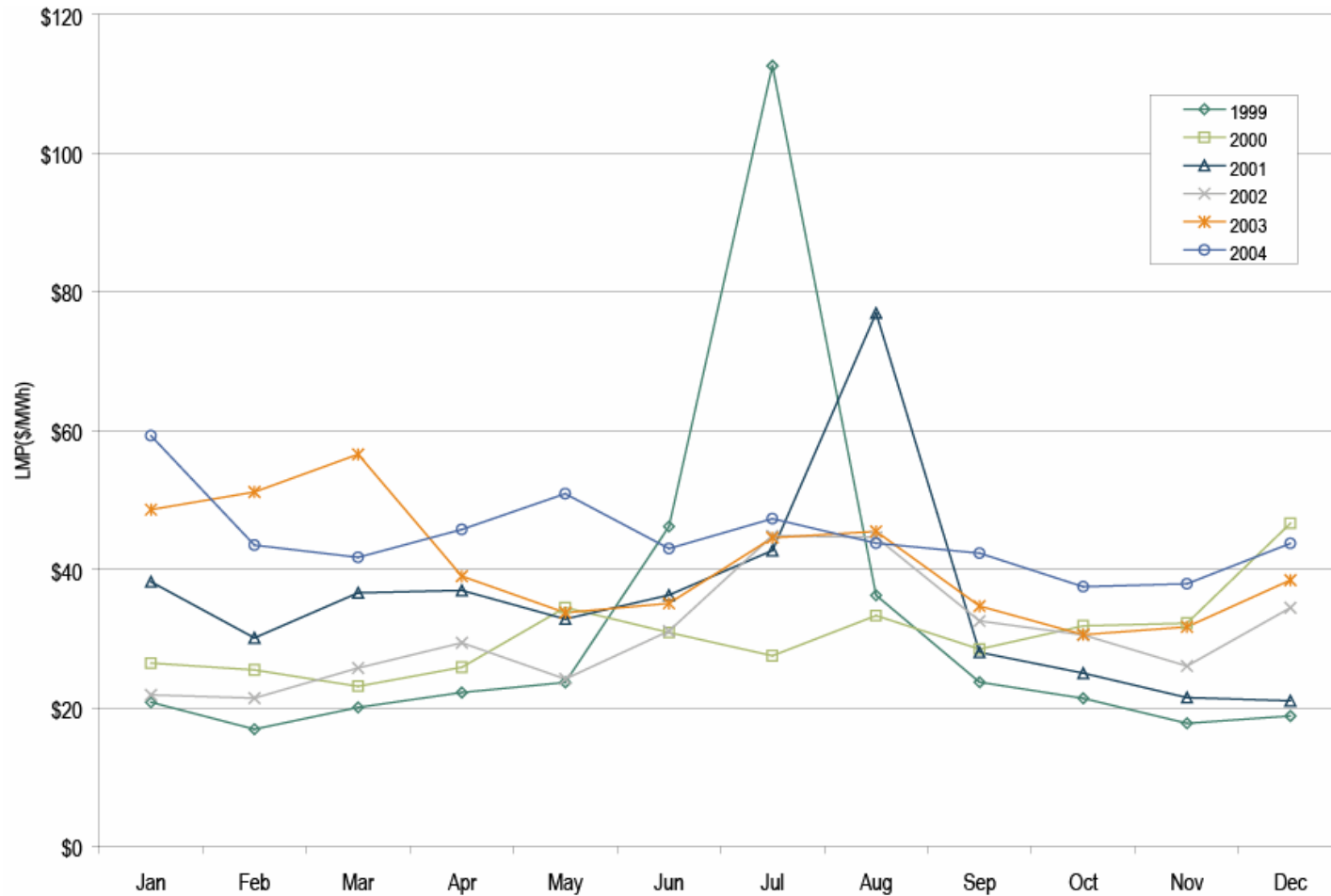




PJM load-weighted, average LMP (Dollars per MWh):  
Calendar years 1998 to 2004

	Load-Weighted Average LMP			Year-to-Year Changes		
	Average	Median	Standard Deviation	Average LMP	Median LMP	Standard Deviation
1998	\$24.16	\$17.60	\$39.29	N/A	N/A	N/A
1999	\$34.07	\$19.02	\$91.49	41.0%	8.1%	132.8%
2000	\$30.72	\$20.51	\$28.38	-9.8%	7.9%	-69.0%
2001	\$36.66	\$25.08	\$57.26	19.3%	22.3%	101.8%
2002	\$31.58	\$23.40	\$26.73	-13.9%	-6.7%	-53.3%
2003	\$41.23	\$34.95	\$25.40	30.6%	49.4%	-5.0%
2004	\$44.34	\$40.16	\$21.25	7.5%	14.9%	-16.3%

*Figure 2-15 Monthly load-weighted, average LMP:  
Calendar years 1999 to 2004*





## PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Calendar years 2003 to 2004

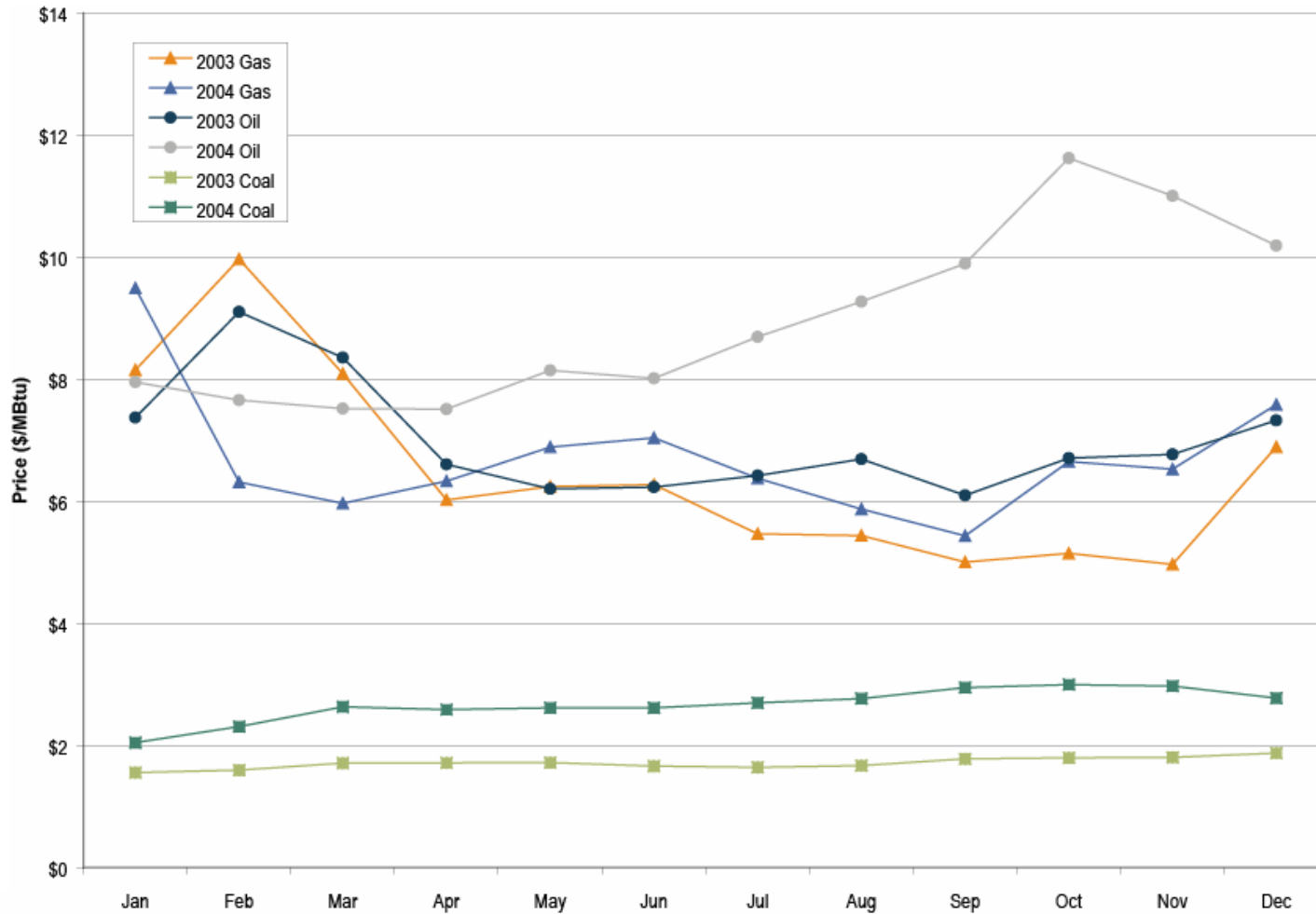
	2003	2004	Change
Average LMP	\$41.23	\$39.49	-4.2%
Median LMP	\$34.95	\$34.47	-1.4%
Standard Deviation	\$25.40	\$20.81	-18.1%



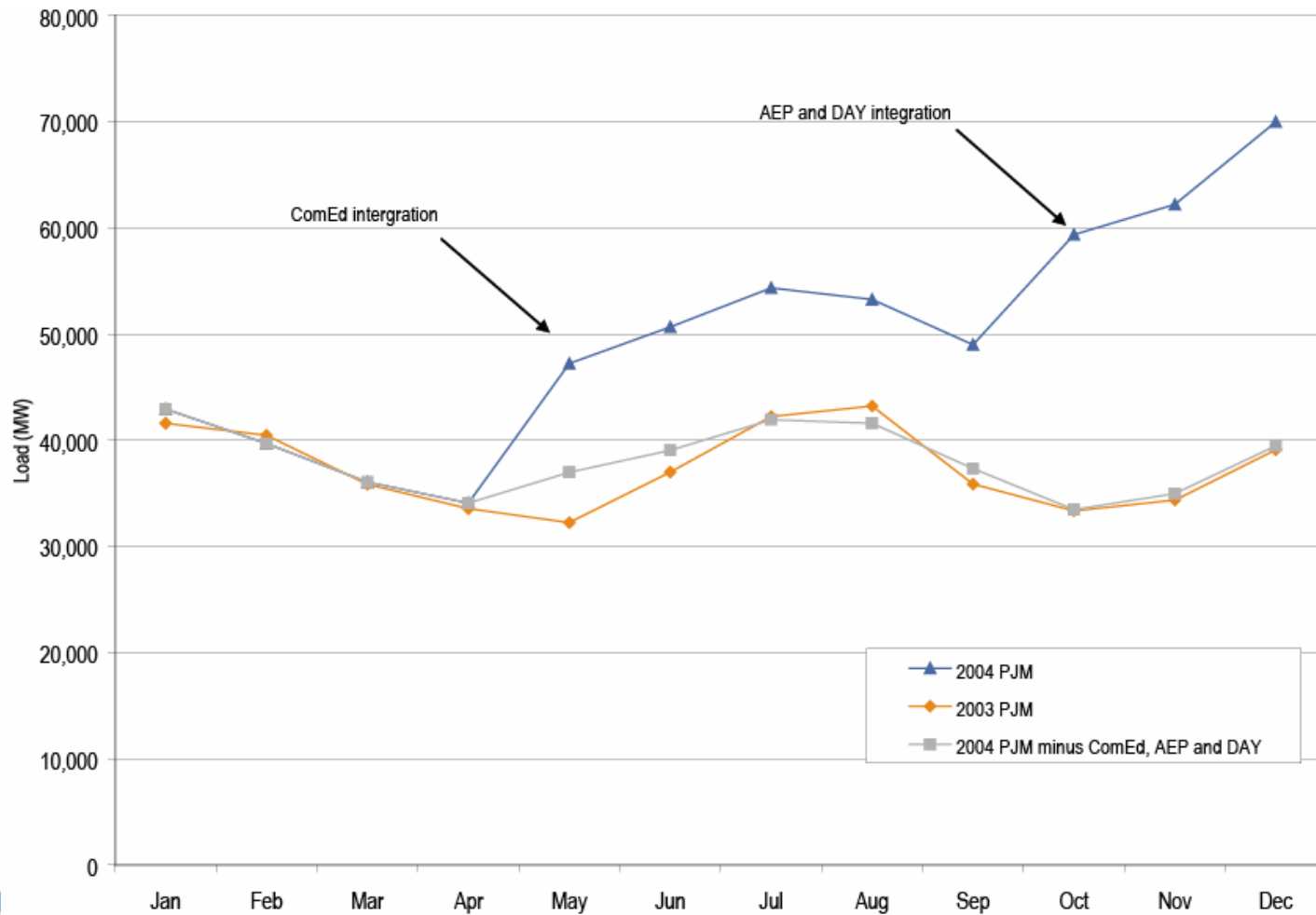
## Type of fuel used by marginal units: Calendar years 2000 to 2004

Fuel Type	2000	2001	2002	2003	2004	Phase 2	
						ComEd	PJM
Coal	48%	49%	55%	52%	56%	86%	41%
Misc	0%	0%	0%	0%	0%	0%	1%
Natural gas	18%	18%	23%	29%	31%	13%	36%
Nuclear	2%	1%	0%	1%	0%	0%	0%
Petroleum	31%	32%	21%	18%	12%	0%	22%

## Spot fuel price comparison: Calendar years 2003 to 2004

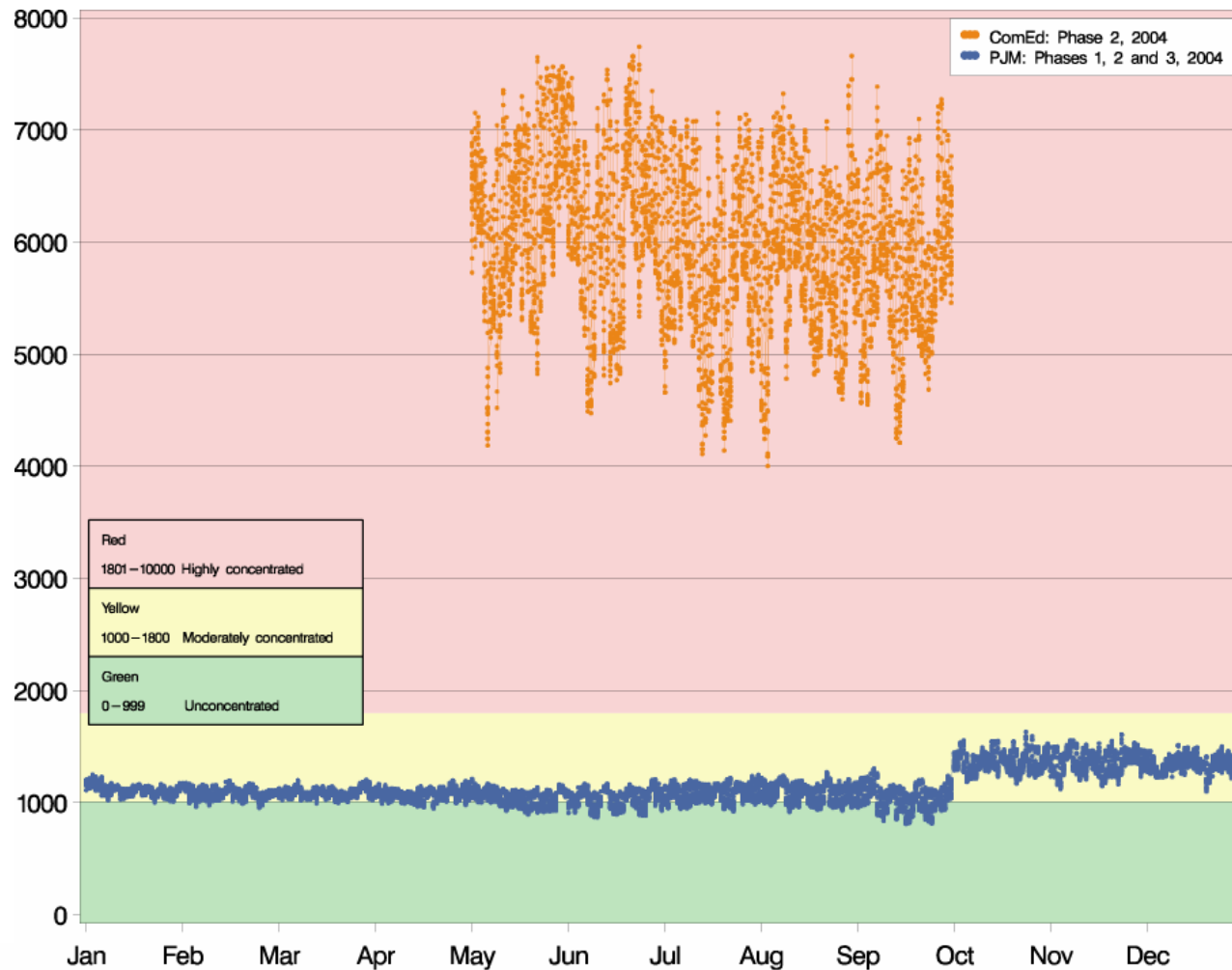


# PJM average load: Calendar years 2003 to 2004

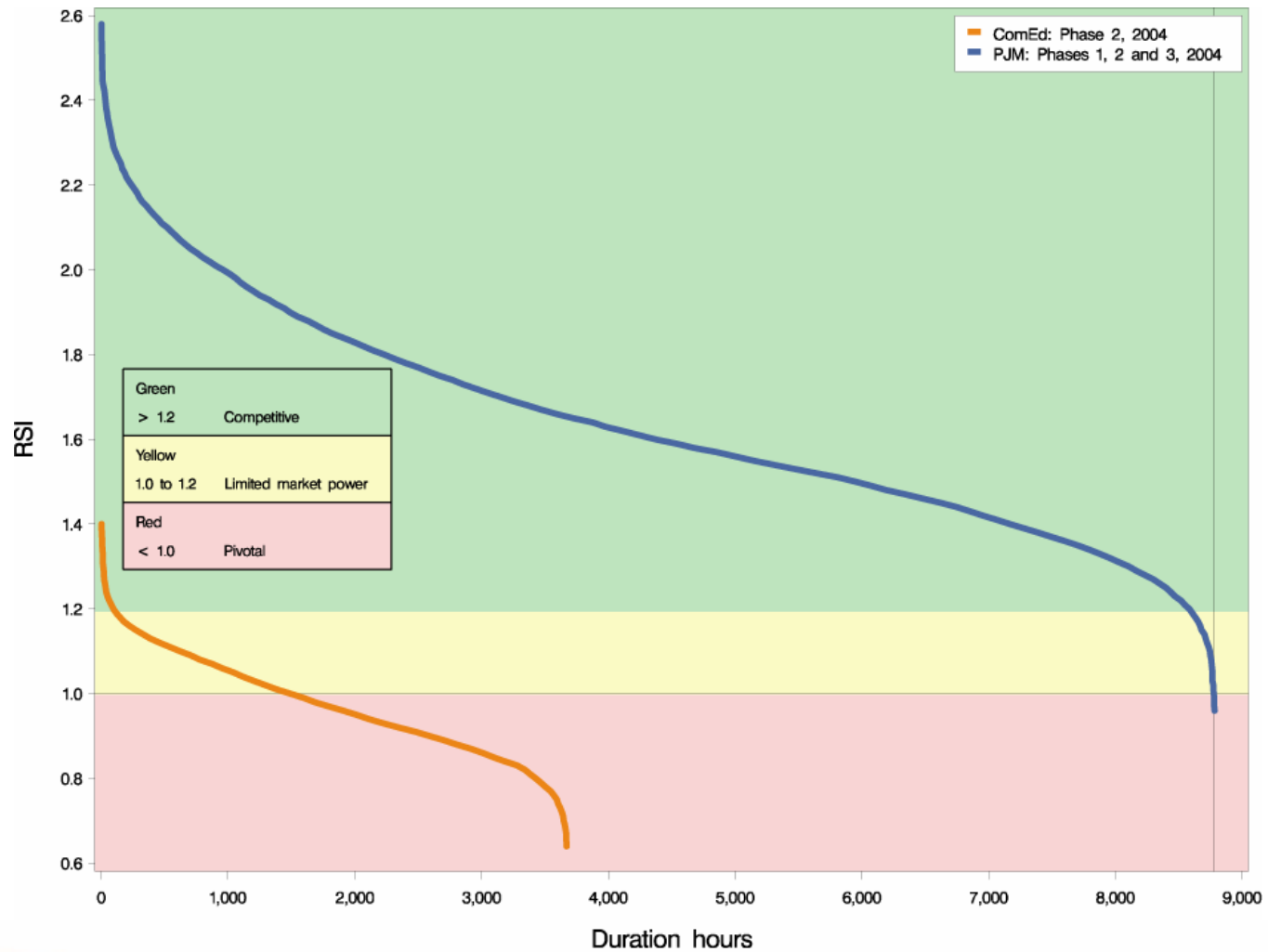




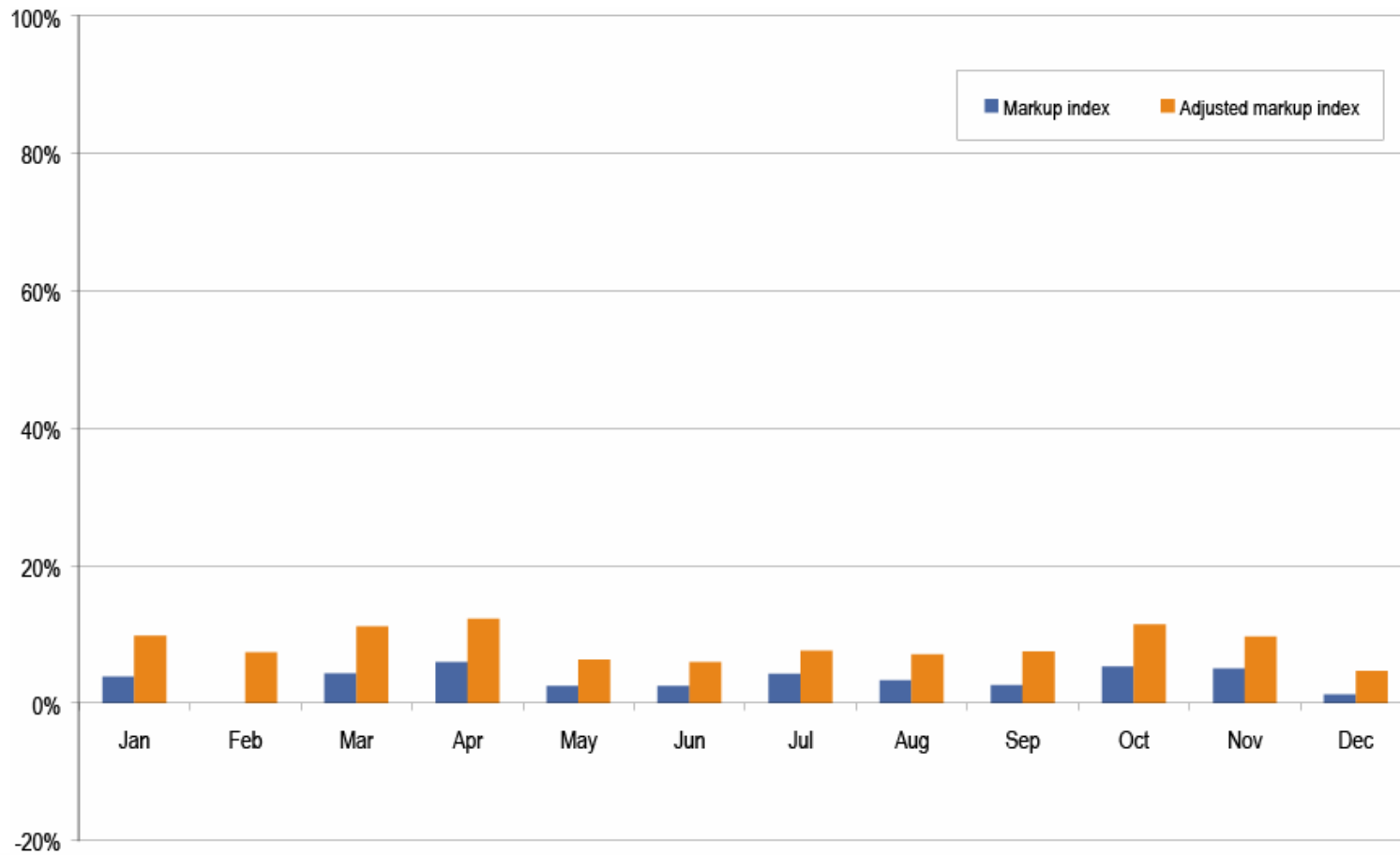
## PJM and ComEd hourly Energy Market HHI: Phases 1, 2 and 3, 2004



# PJM and ComEd RSI duration curve: Calendar year 2004



# Average monthly load-weighted markup indices: Calendar year 2004



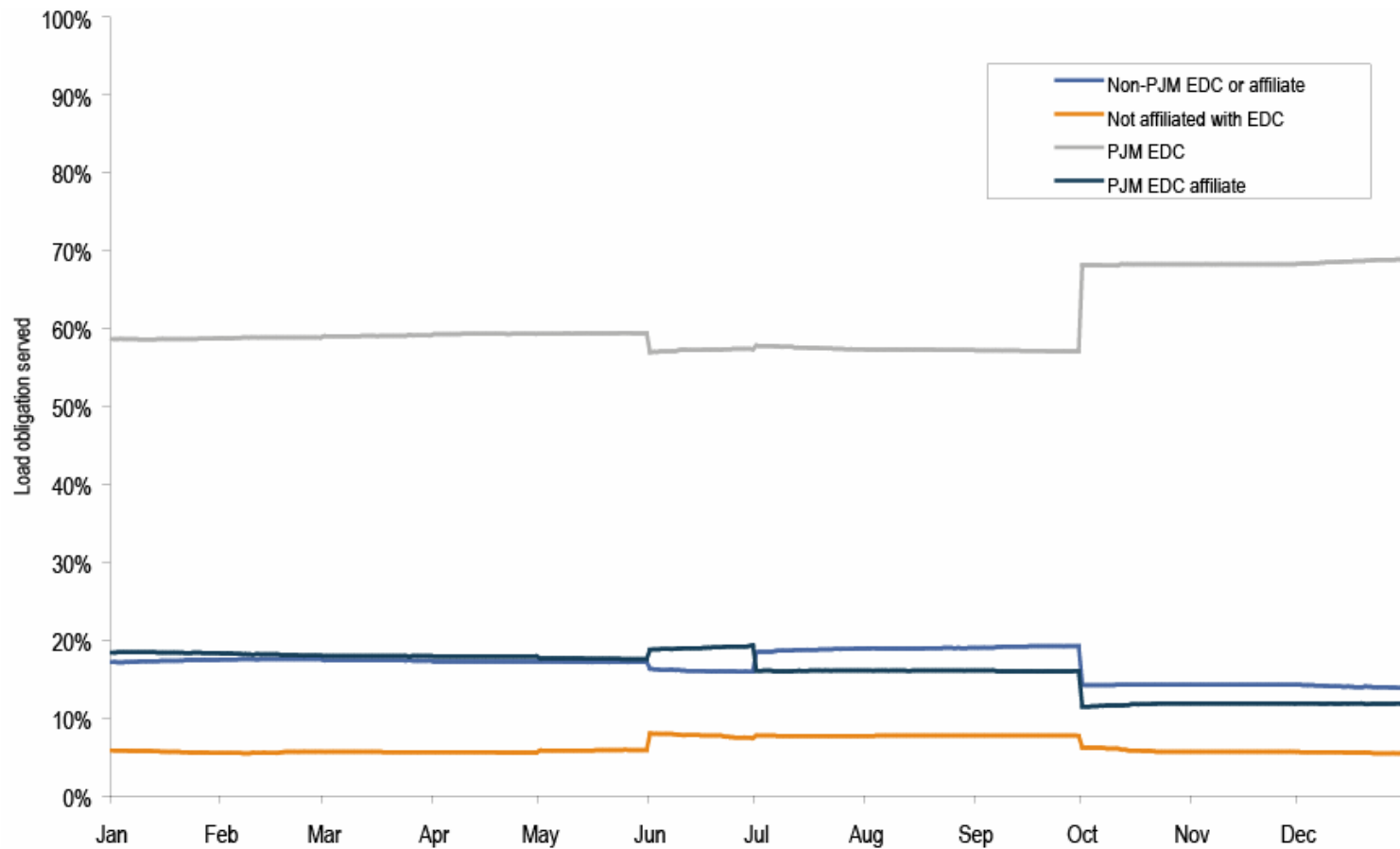


## Average real-time, offer-capped MW: Calendar years 2001 to 2004

	2001		2002		2003		2004	
	Average MW Capped	Percent	Average MW Capped	Percent	Average MW Capped	Percent	Average MW Capped	Percent
Jan	46	0.1%	90	0.3%	87	0.2%	175	0.4%
Feb	7	0.0%	46	0.2%	74	0.2%	87	0.2%
Mar	84	0.3%	24	0.1%	44	0.1%	76	0.2%
Apr	248	0.9%	62	0.2%	29	0.1%	115	0.3%
May	291	1.1%	63	0.2%	101	0.3%	257	0.5%
Jun	455	1.4%	105	0.3%	110	0.3%	167	0.3%
Jul	247	0.8%	218	0.6%	252	0.6%	332	0.6%
Aug	372	1.0%	311	0.7%	294	0.7%	450	0.8%
Sep	553	1.9%	177	0.5%	241	0.7%	268	0.5%
Oct	571	2.1%	92	0.3%	96	0.3%	77	0.1%
Nov	410	1.5%	55	0.2%	53	0.2%	110	0.2%
Dec	90	0.3%	52	0.1%	44	0.1%	202	0.3%

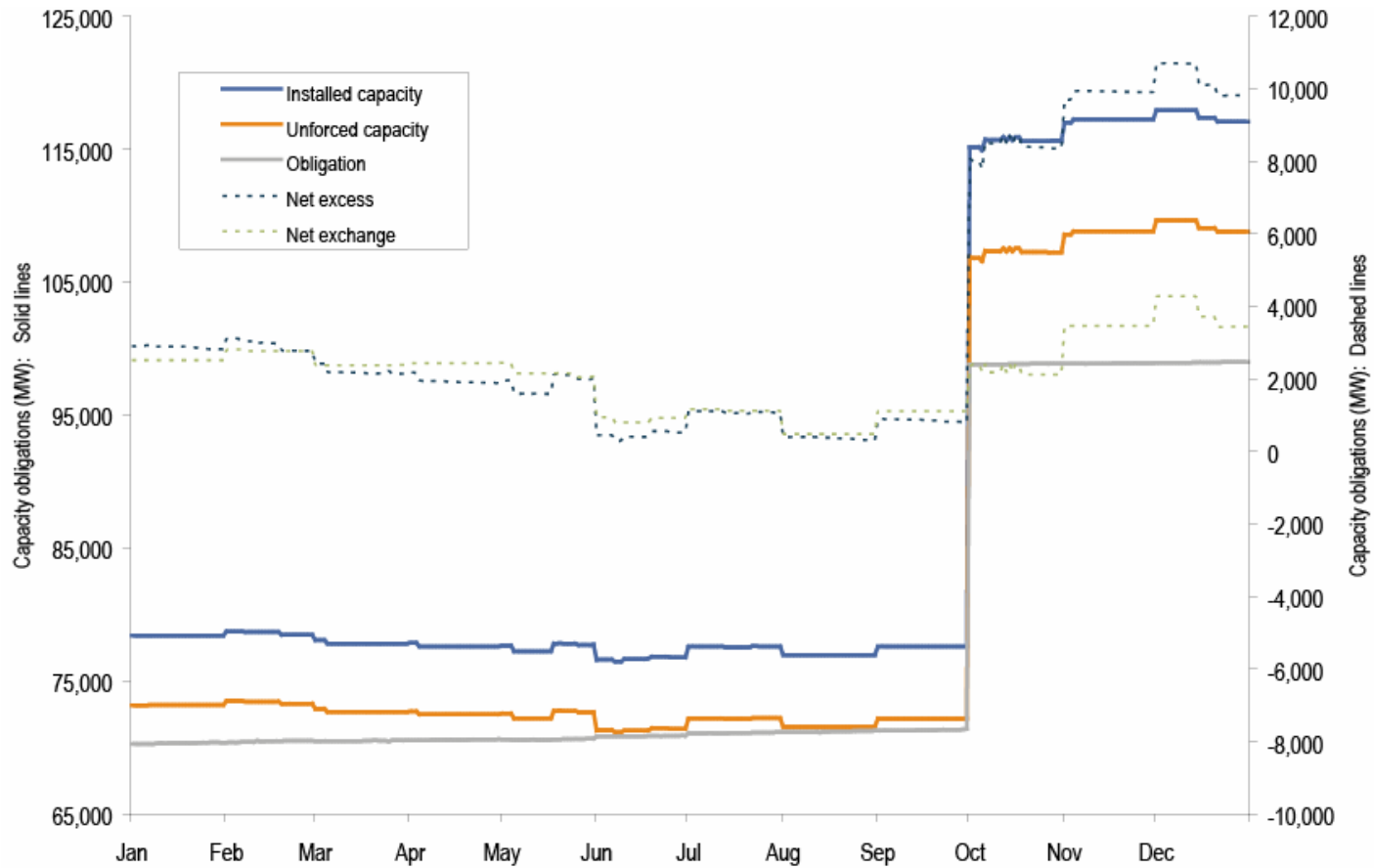


## PJM Capacity Market load obligation served (Percent): Calendar year 2004



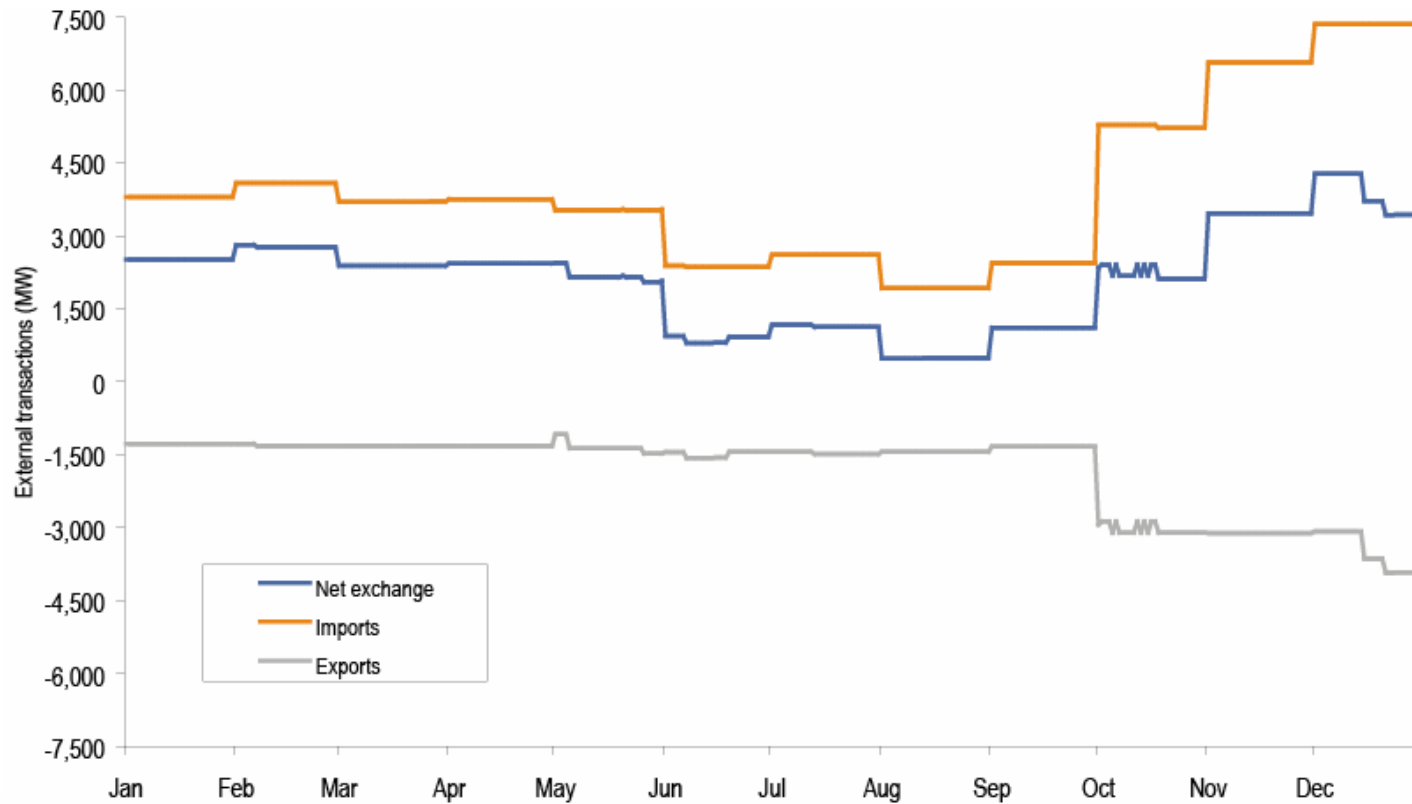


## Capacity obligations to the PJM Capacity Market: Calendar year 2004



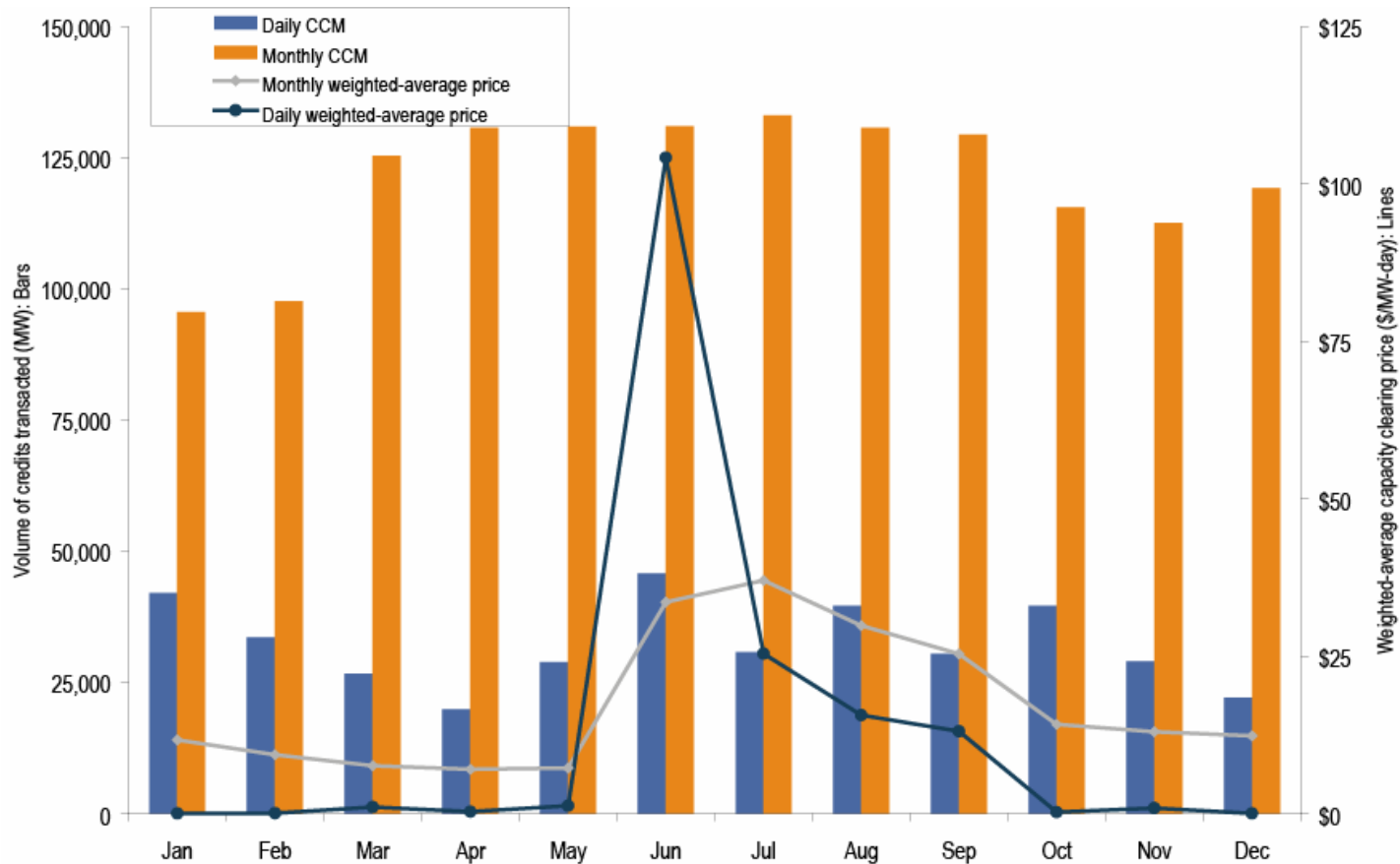


## External PJM Capacity Market transactions: Calendar year 2004



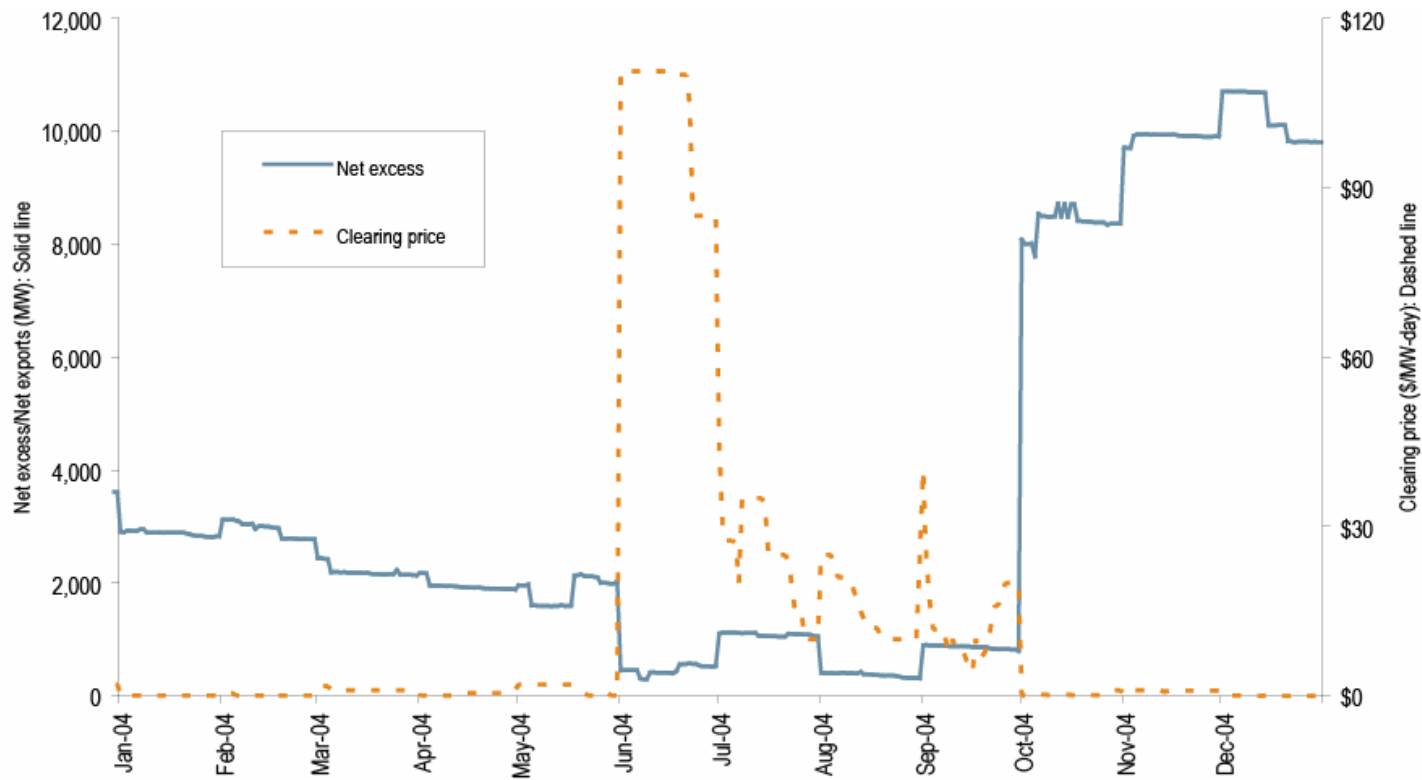


# PJM Daily and Monthly Capacity Credit Market (CCM) performance: Calendar year 2004



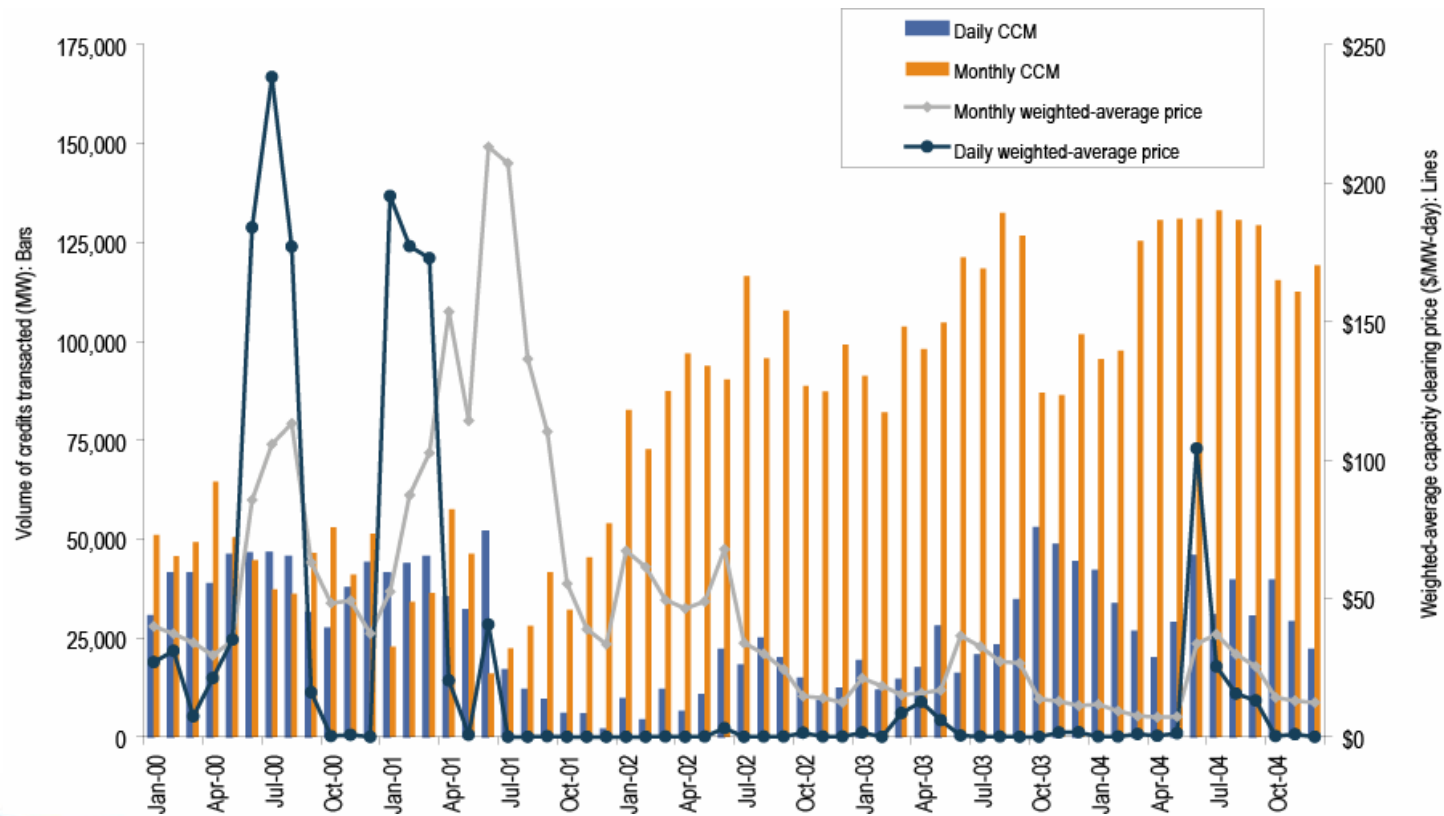


## The PJM Capacity Market's net excess vs. capacity credit market-clearing prices: Calendar year 2004

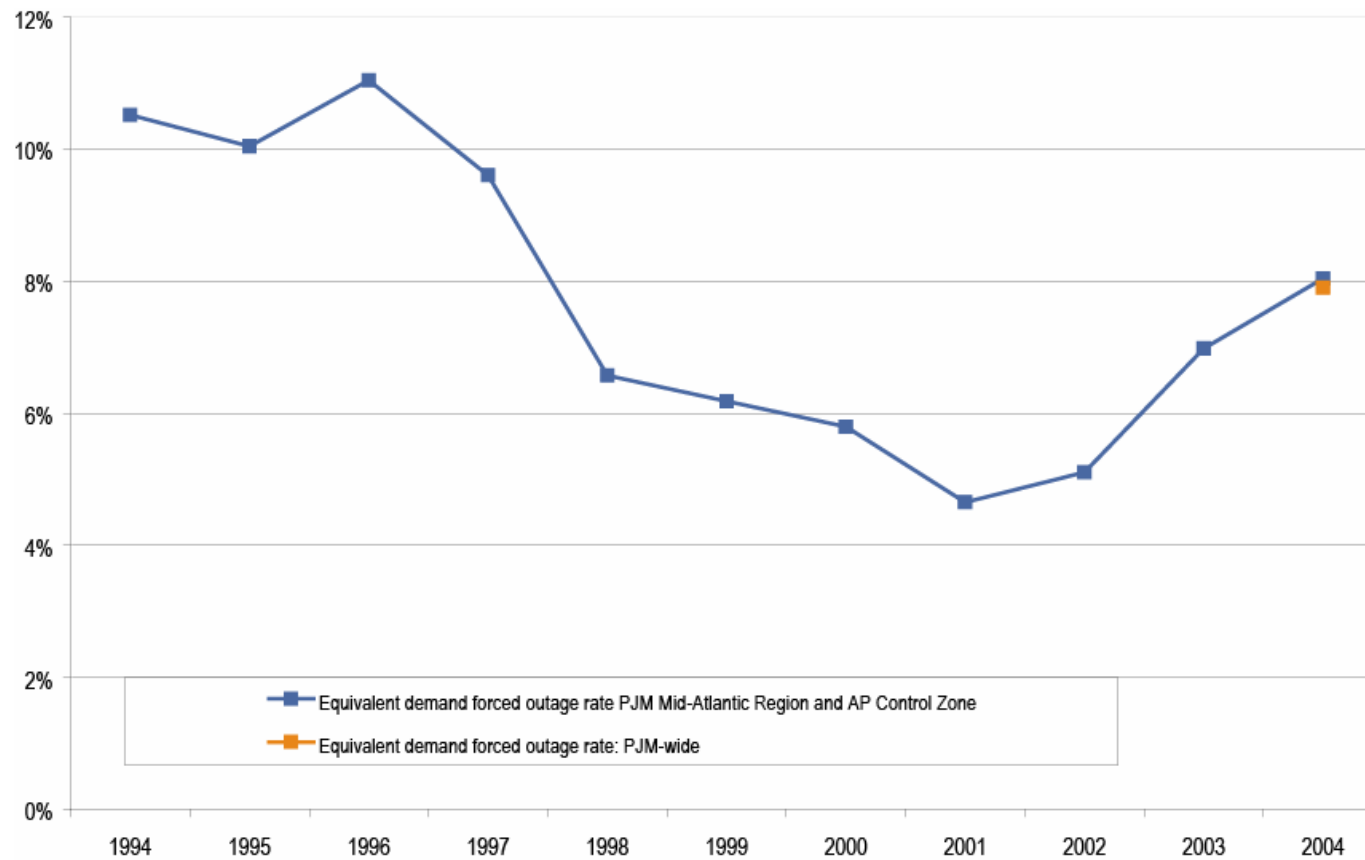




## PJM Daily and Monthly Capacity Credit Market (CCM) performance: Calendar years 2000 to 2004

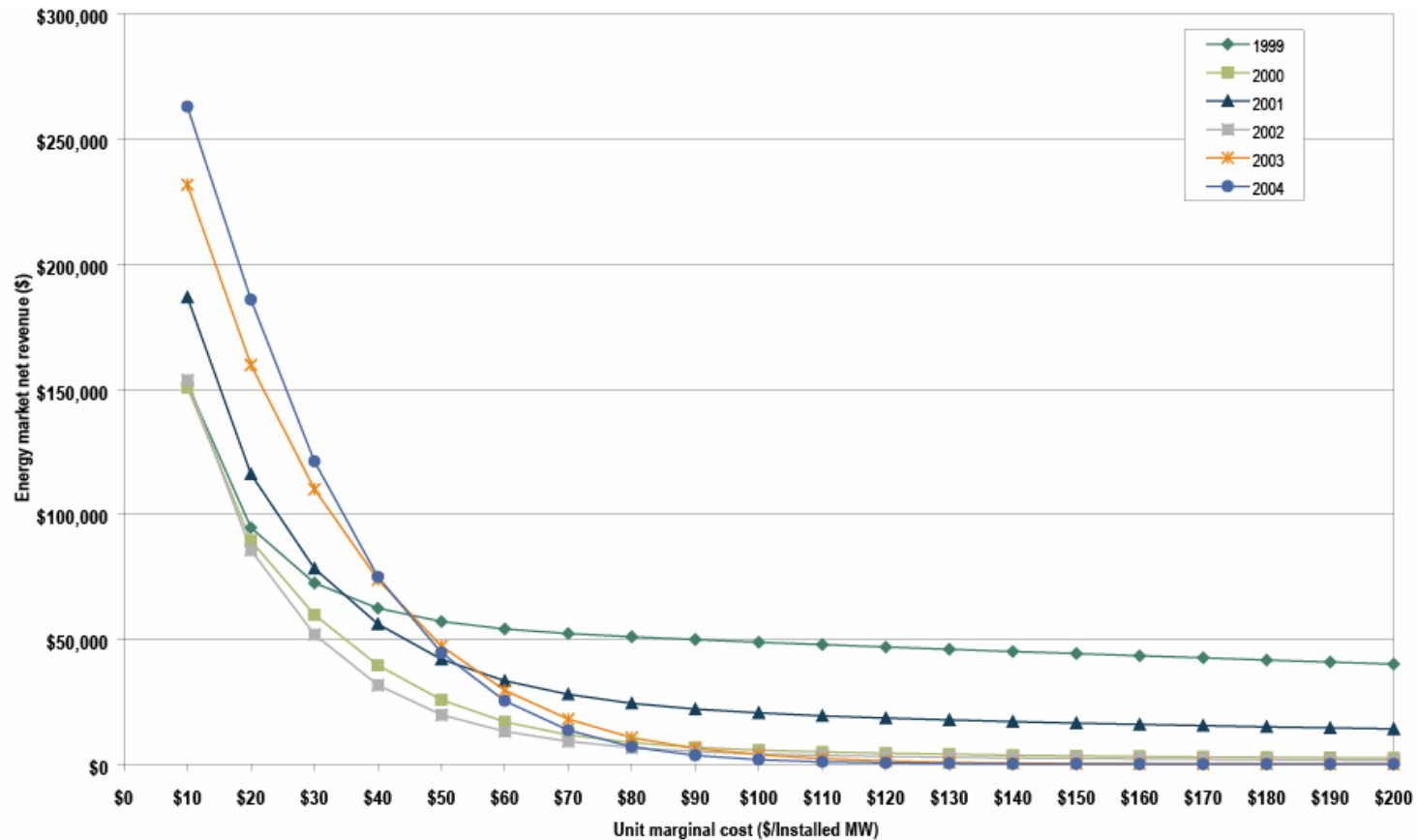


## Trends in PJM equivalent demand forced outage rate (EFORd): Calendar years 1994 to 2004





## PJM energy market net revenue by unit marginal cost: Calendar years 1999 to 2004





## PJM net revenue

Table 1.

Unit Type	First Year Operating Fixed Cost	20 Year Levelized Fixed Cost	Perfect Dispatch Average Net Revenue 1999 to 2004	Realistic Dispatch Average Net Revenue 1999 to 2004
Combustion Turbine (CT)	\$61,726	\$72,207	\$44,314	\$36,195
Combined Cycle (CC)	\$79,969	\$93,549	\$77,107	\$52,243
Pulverized Coal (CP)	\$178,019	\$208,247	\$141,747	\$137,015

Table 2.

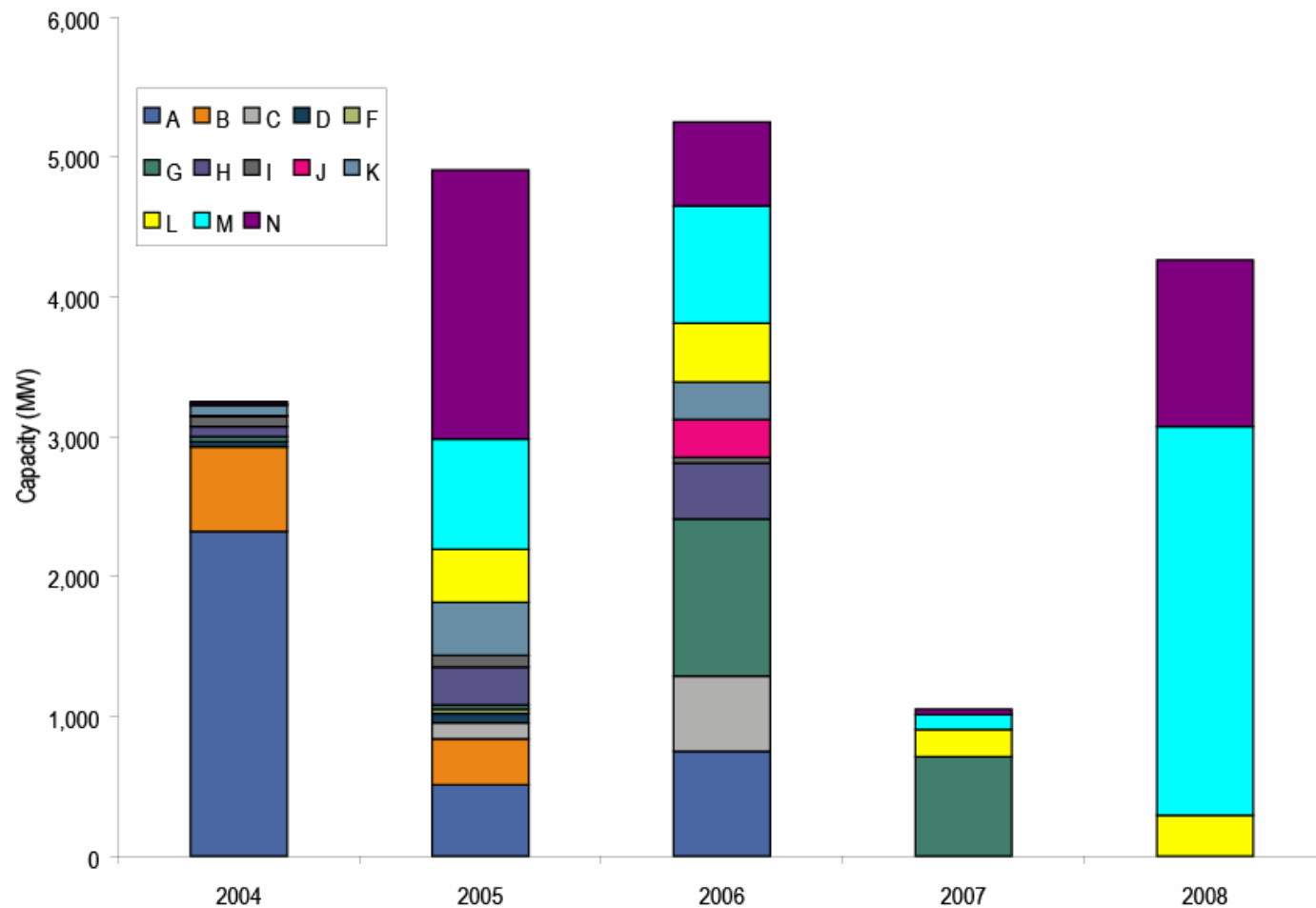
Unit Type	First Year Operating Fixed Cost	20 Year Levelized Fixed Cost	Perfect Dispatch Net Revenue 2004	Realistic Dispatch Net Revenue 2004
Combustion Turbine (CT)	\$61,726	\$72,207	\$15,829	\$8,685
Combined Cycle (CC)	\$79,969	\$93,549	\$58,657	\$36,446
Pulverized Coal (CP)	\$178,019	\$208,247	\$146,203	\$134,420



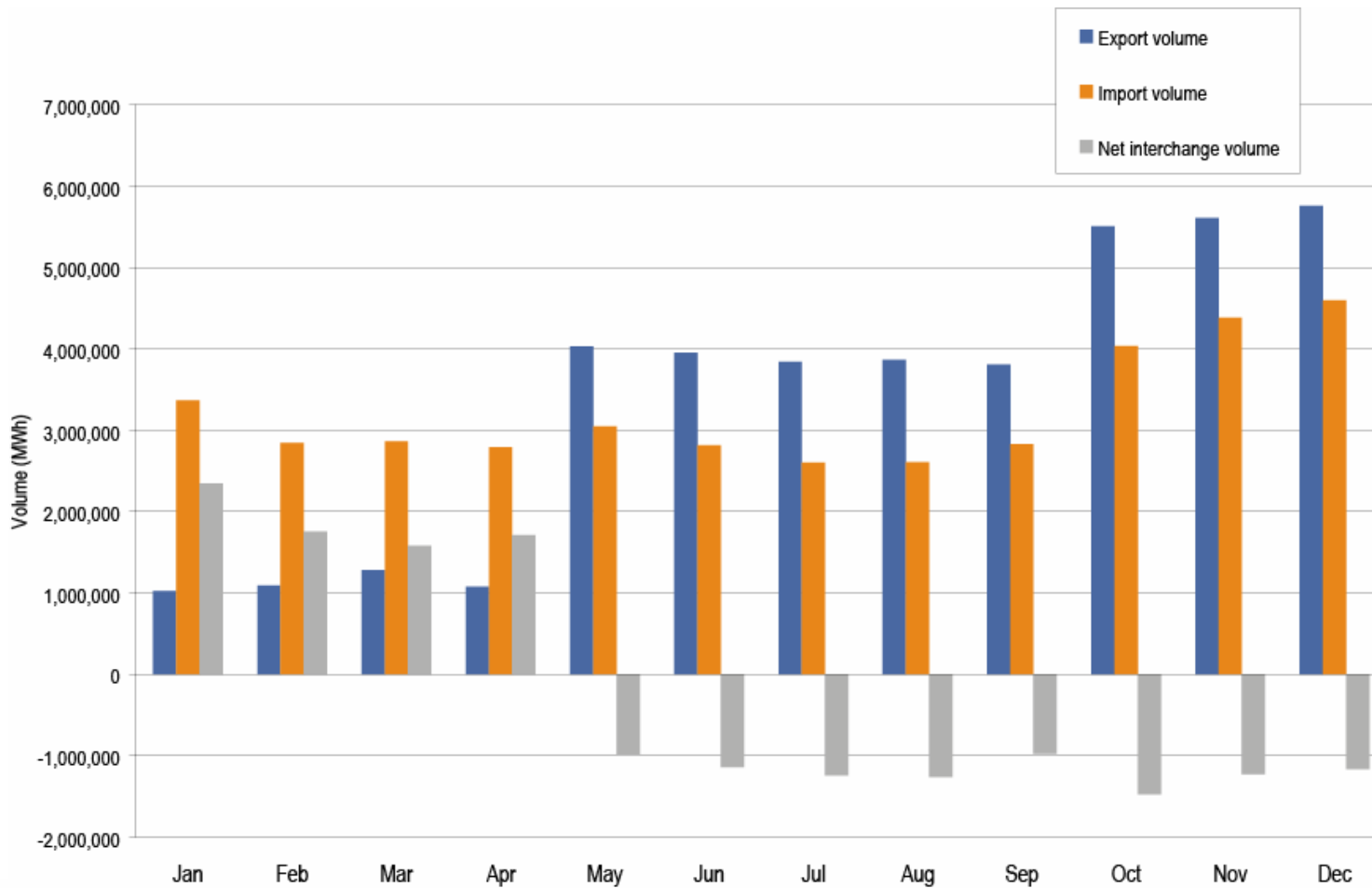
## New entrant first year and 20-year levelized fixed costs by plant type (Dollars per installed MW-year)

	First Year Fixed Cost	20-Year Levelized Fixed Cost
CP	\$178,019	\$208,247
CC	\$79,969	\$93,549
CT	\$61,726	\$72,207

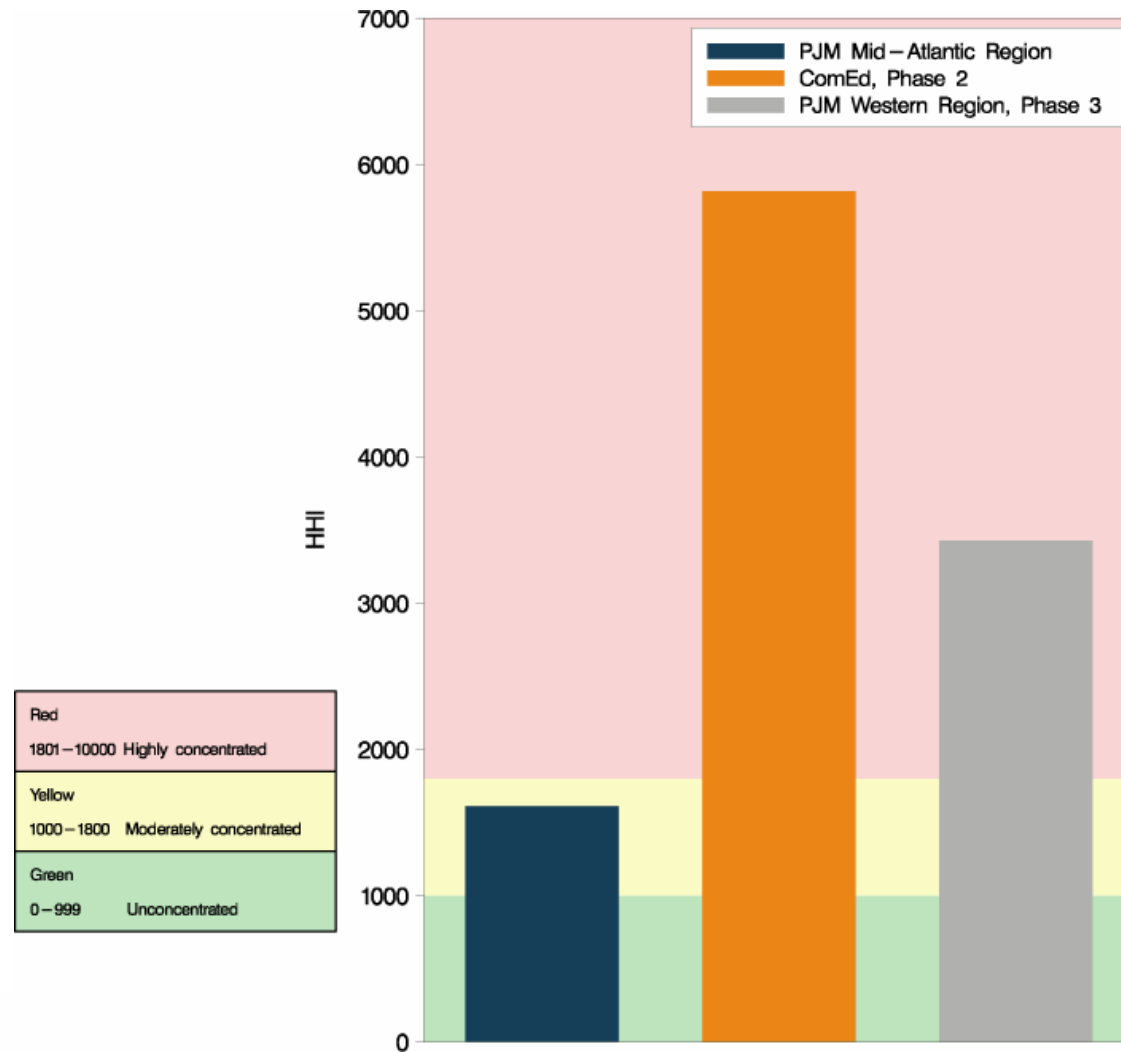
# Queued capacity by in-service date: At December 31, 2004



# PJM real-time imports and exports: Calendar year 2004

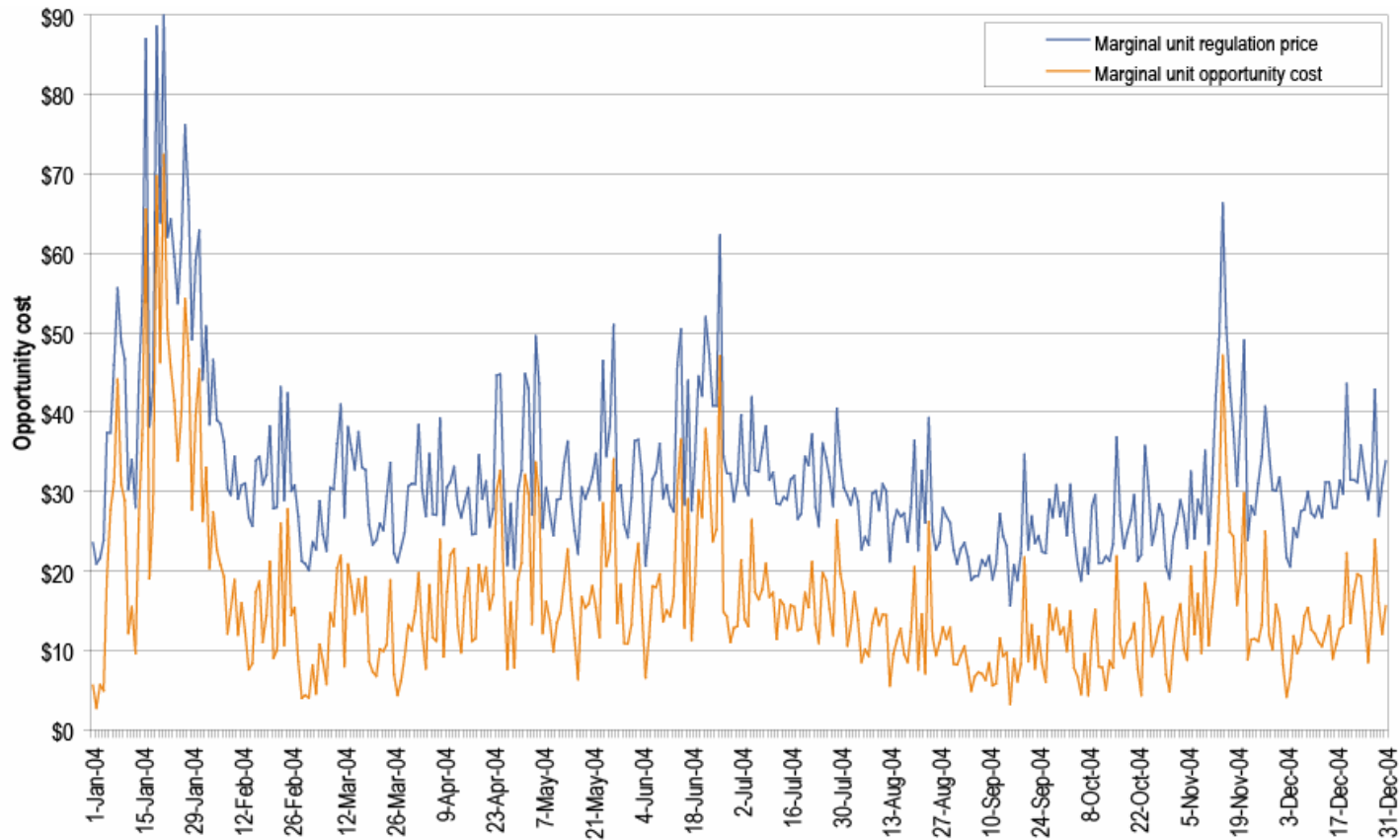


# PJM system Regulation Market HHI: Calendar year 2004



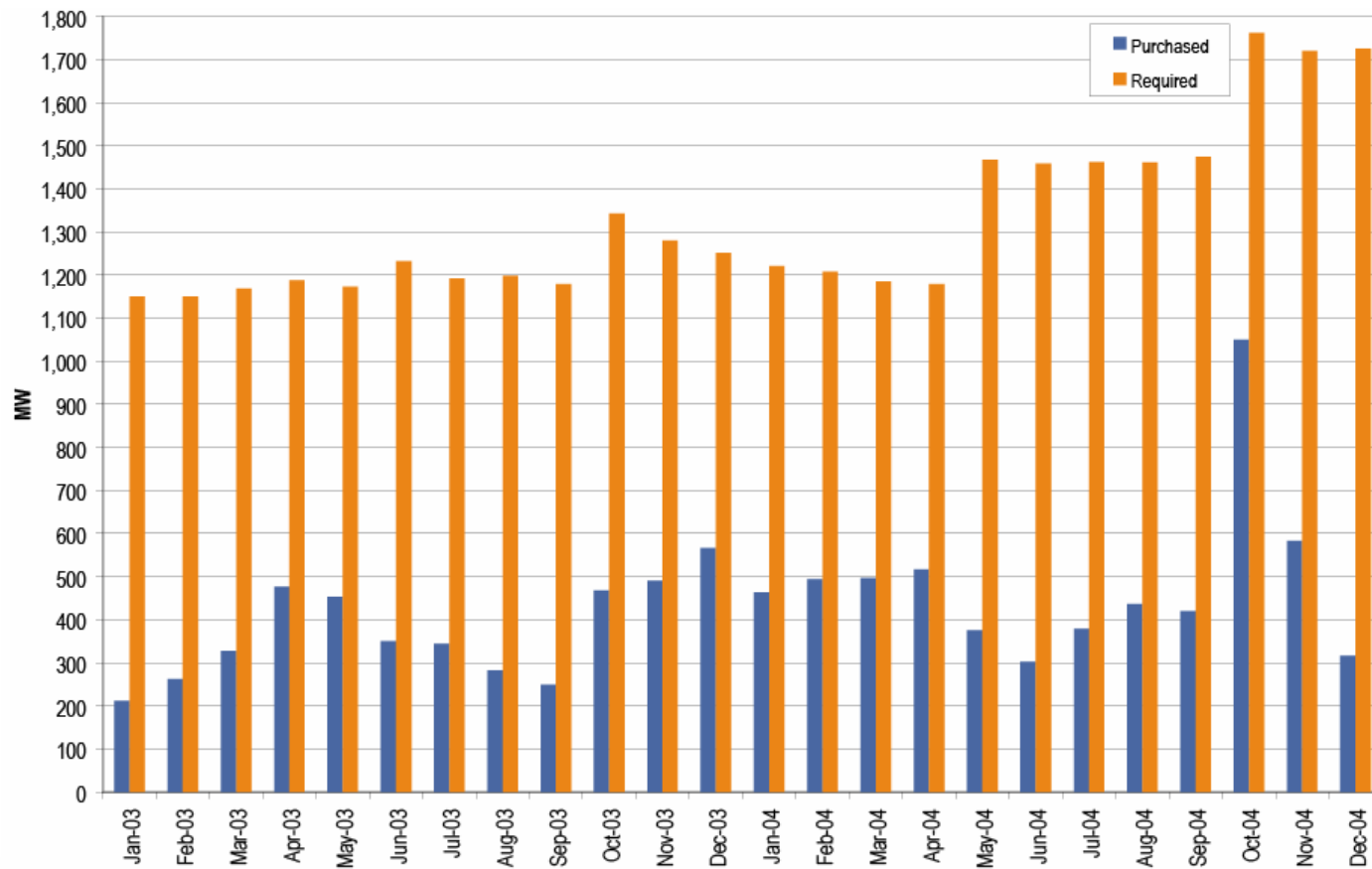


## PJM Mid-Atlantic Region daily average regulation clearing price and estimated opportunity costs: Calendar year 2004

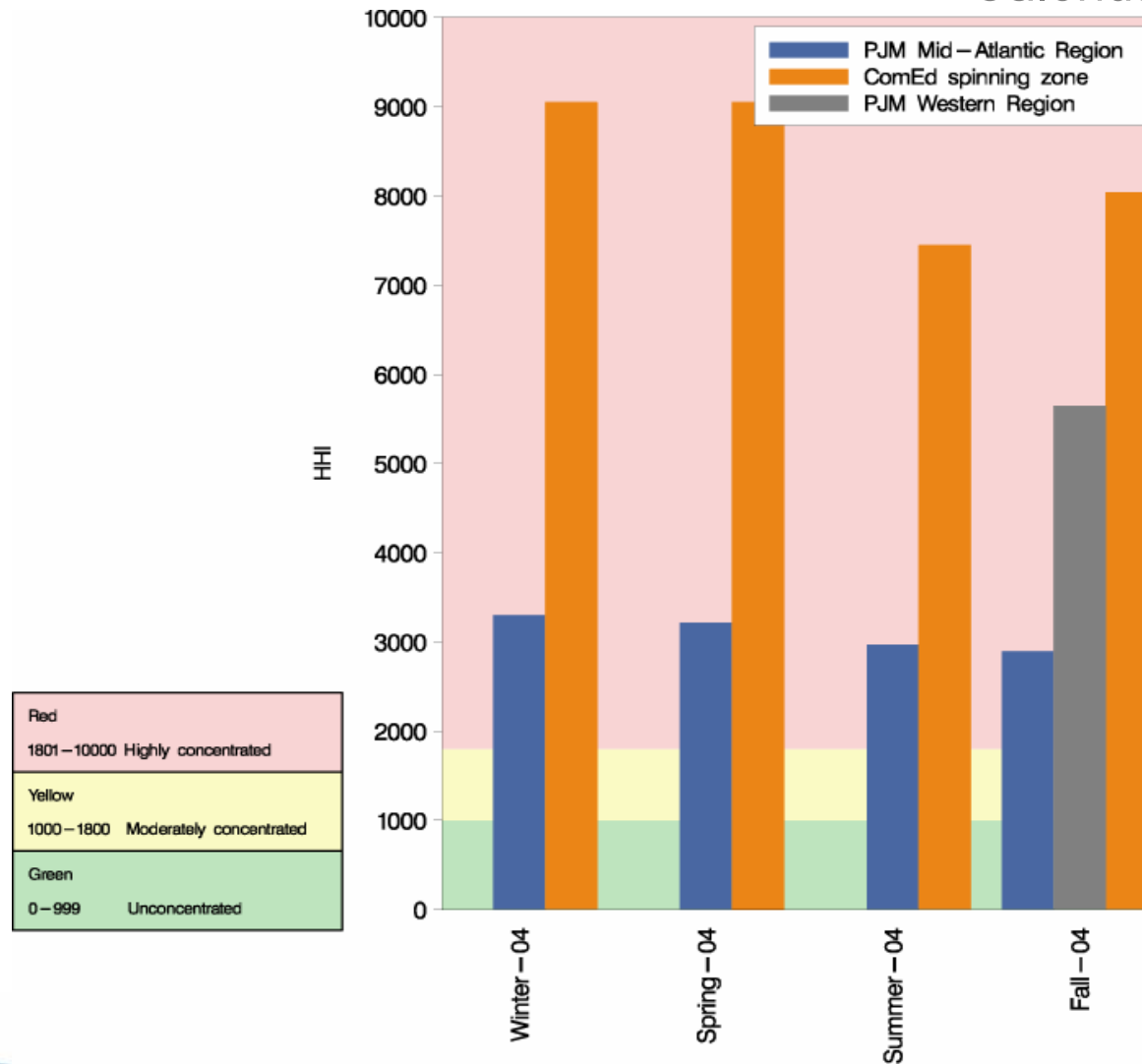




## PJM Control Area average hourly required spinning vs. Tier 2 spinning purchased: Calendar years 2003 to 2004

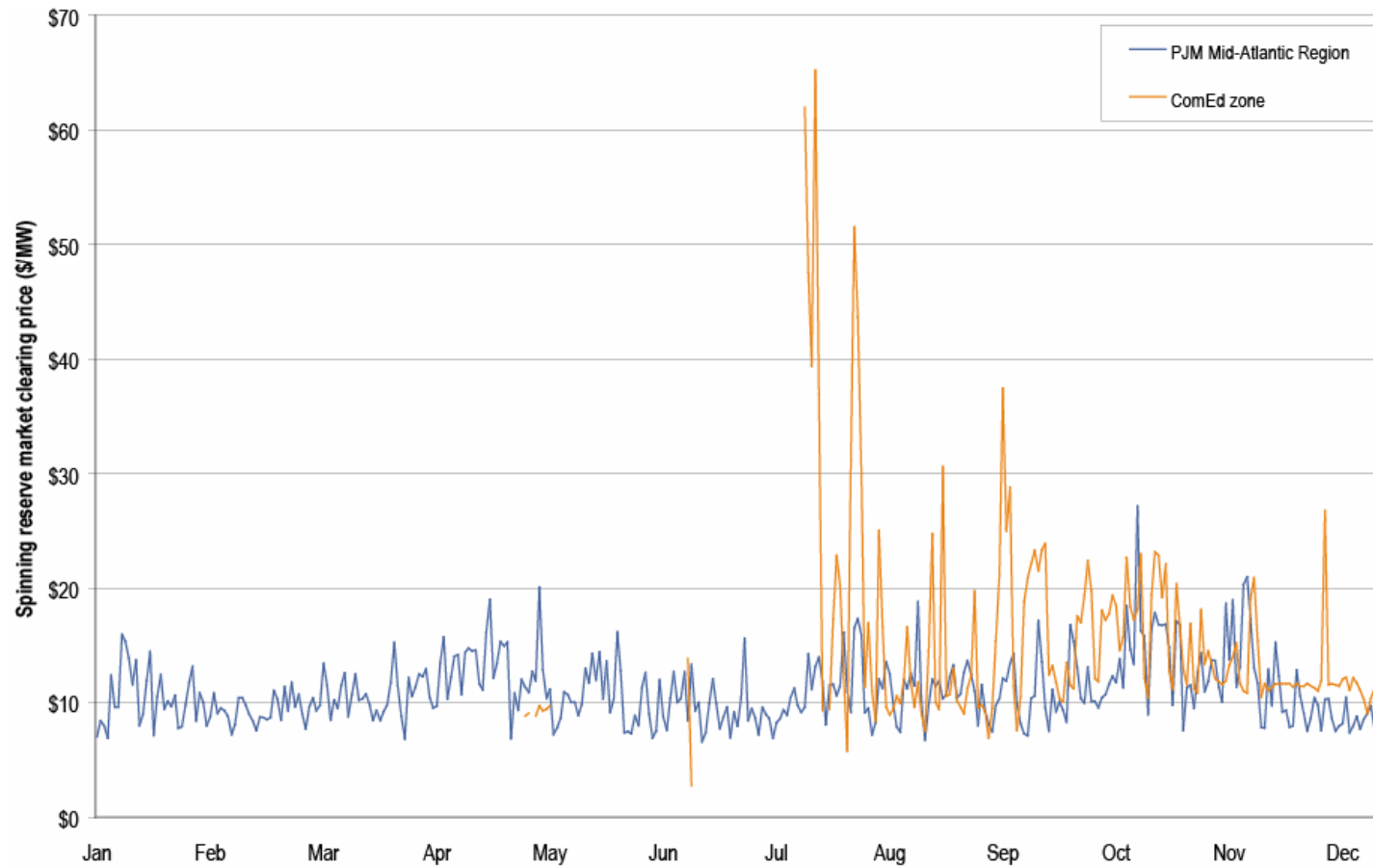


# PJM system Spinning Reserve Market HHI: Calendar year 2004





## PJM daily average spinning reserve market-clearing prices: Calendar year 2004





Total annual PJM congestion [Dollars (millions)]:  
Calendar years 1999 to 2004

	Congestion Charges	Percent Increase	Total PJM Billing	Percent of PJM Billing
1999	\$53	N/A	N/A	N/A
2000	\$132	149%	\$2,300	6%
2001	\$271	105%	\$3,400	8%
2002	\$430	59%	\$4,700	9%
2003	\$499	16%	\$6,900	7%
2004	\$808	62%	\$8,700	9%
Total	\$2,193	N/A	N/A	N/A

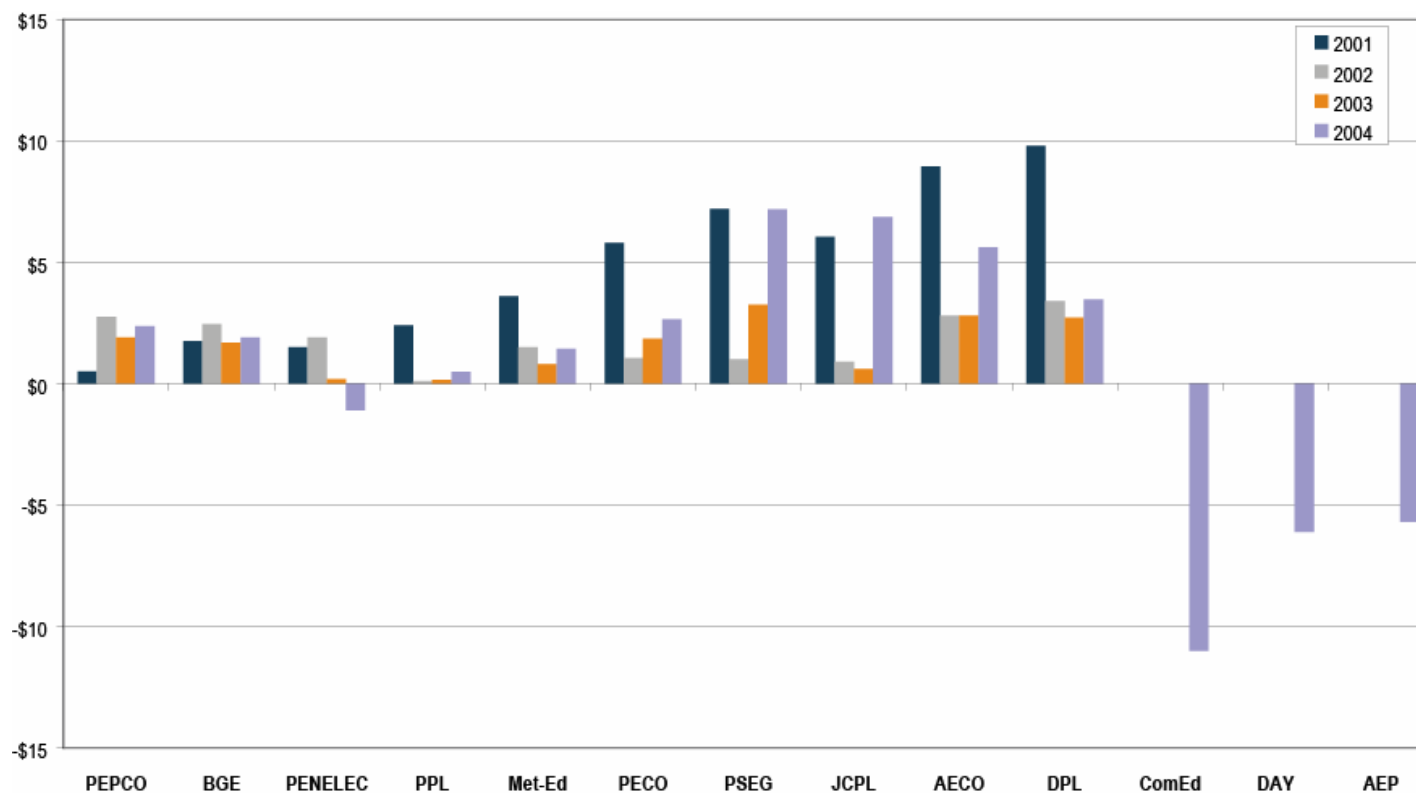


# Monthly PJM congestion accounting summary [Dollars (millions)]: By planning period

Planning Period 2003 to 2004		Congestion Charges	FTR Target Allocations	Congestion Credits	FTR Payout Ratio	Credits Deficiency	Credits Excess
	Jan-03	\$66	\$94	\$66	70%	\$29	\$0
	Feb-03	\$14	\$18	\$14	77%	\$4	\$0
	Mar-03	\$52	\$42	\$42	100%	\$0	\$10
	Apr-03	\$27	\$23	\$23	100%	\$0	\$4
	May-03	\$27	\$41	\$27	67%	\$14	\$0
	Jun-03	\$52	\$57	\$52	90%	\$6	\$0
	Jul-03	\$96	\$85	\$85	100%	\$0	\$10
	Aug-03	\$59	\$53	\$53	100%	\$0	\$6
	Sep-03	\$42	\$44	\$42	95%	\$2	\$0
	Oct-03	\$32	\$33	\$32	97%	\$1	\$0
	Nov-03	\$18	\$17	\$17	100%	\$0	\$1
	Dec-03	\$15	\$13	\$13	100%	\$0	\$2
	Jan-04	\$57	\$54	\$54	100%	\$0	\$3
	Feb-04	\$22	\$16	\$16	100%	\$0	\$6
	Mar-04	\$21	\$18	\$18	100%	\$0	\$3
	Apr-04	\$23	\$25	\$23	92%	\$2	\$0
	May-04	\$59	\$62	\$59	95%	\$3	\$0
	Total	\$680	\$696	\$635	91%	\$60	\$45
Values After Excess Congestion Charges Distributed							
	\$680	\$696	\$680	98%	\$16	\$0	
Planning Year 2004 to 2005 (through December 31, 2004)							
	Jun-04	\$64	\$67	\$64	95%	\$3	\$0
	Jul-04	\$116	\$114	\$114	100%	\$0	\$1
	Aug-04	\$121	\$128	\$121	94%	\$7	\$0
	Sep-04	\$47	\$47	\$47	99%	\$0	\$0
	Oct-04	\$46	\$39	\$39	100%	\$0	\$7
	Nov-04	\$74	\$81	\$74	91%	\$7	\$0
	Dec-04	\$160	\$150	\$150	100%	\$0	\$9
	Total	\$627	\$627	\$609	97%	\$18	\$18

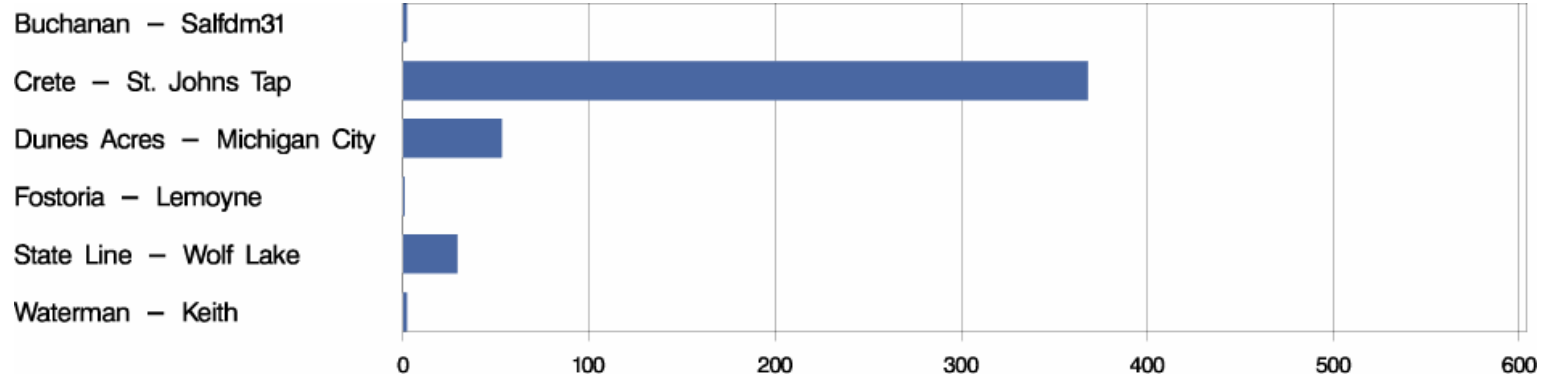


## Annual zonal LMP differences (Reference to Western Hub): Calendar years 2001 to 2004

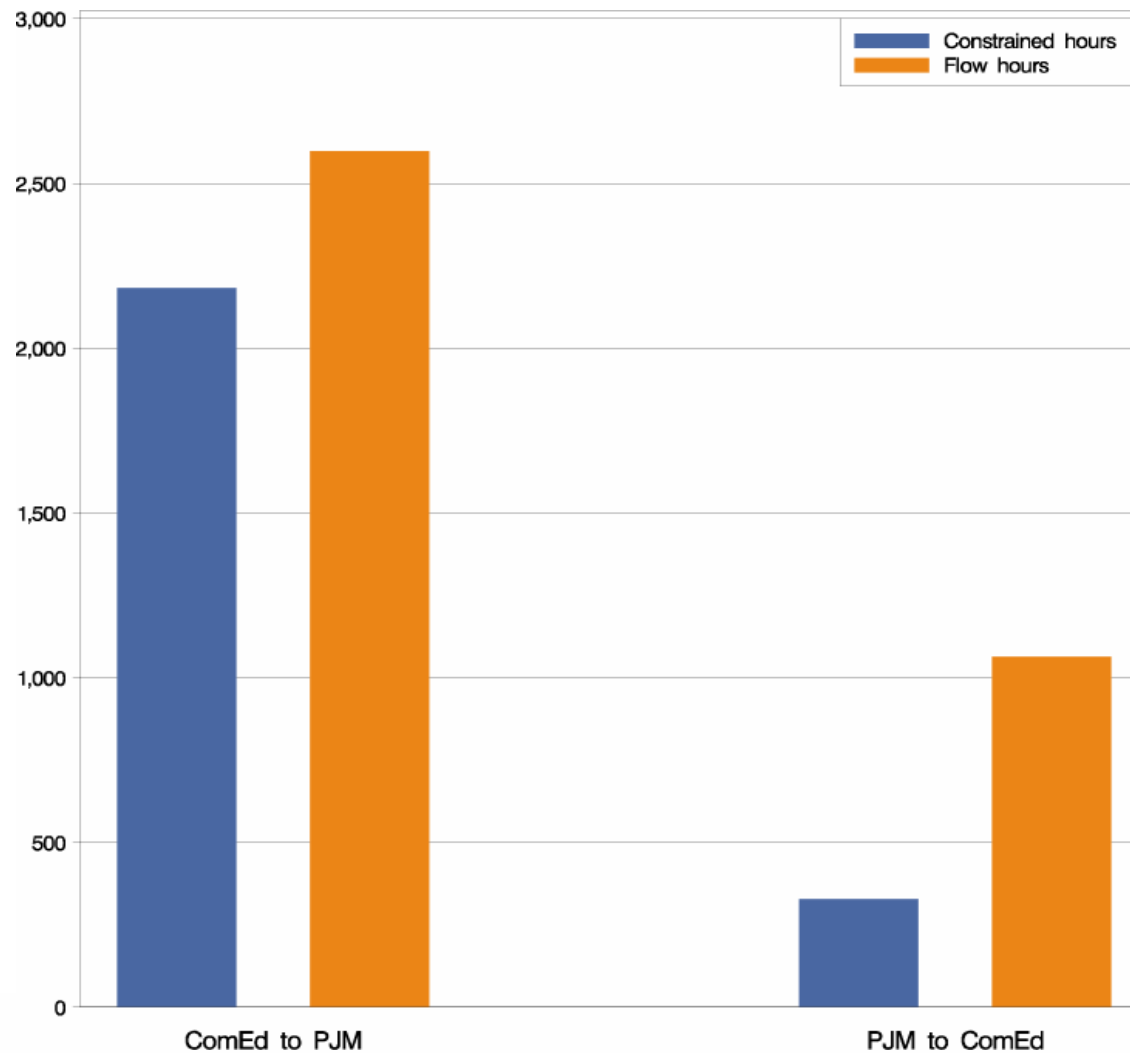




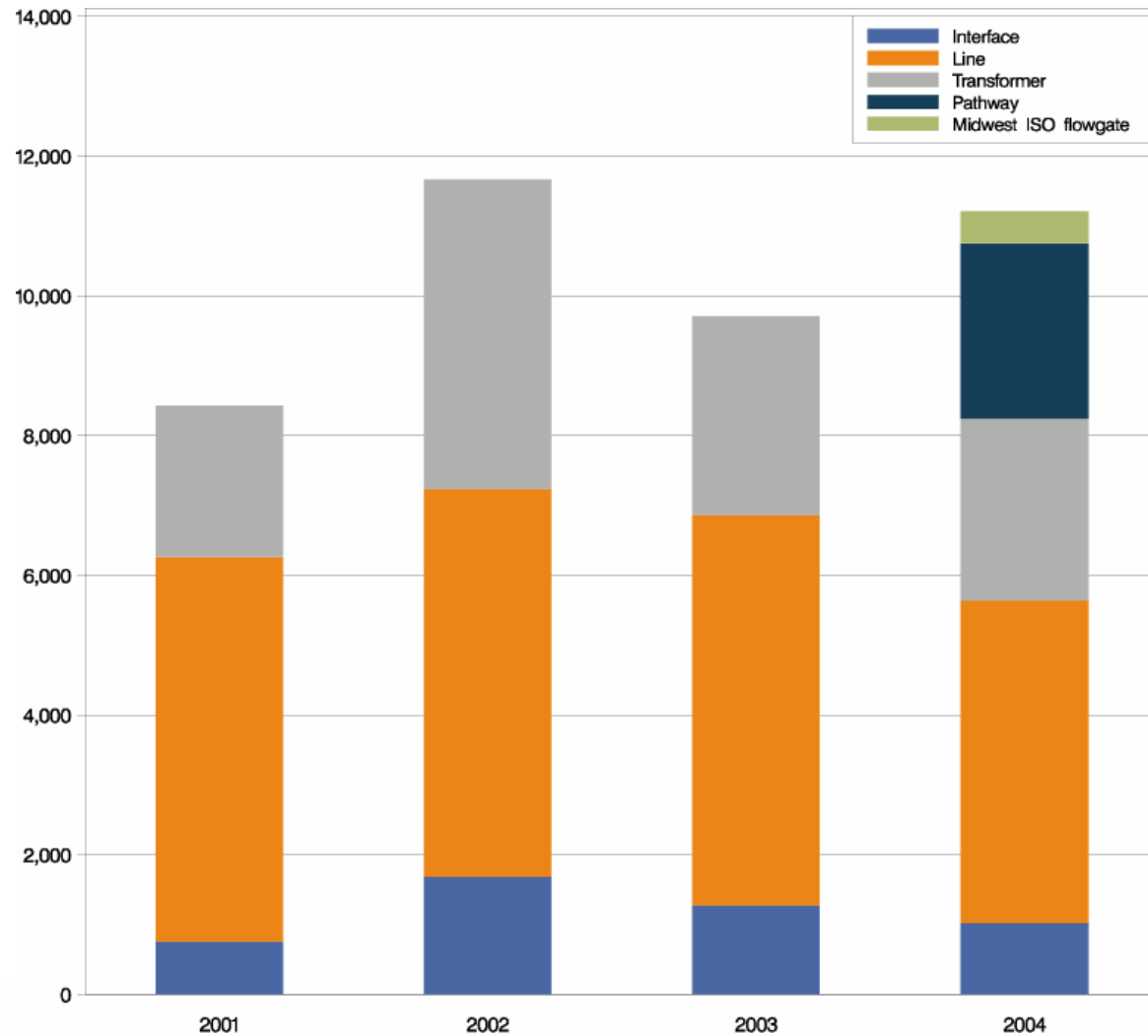
## Midwest ISO flowgates impacting PJM dispatch: Calendar year 2004



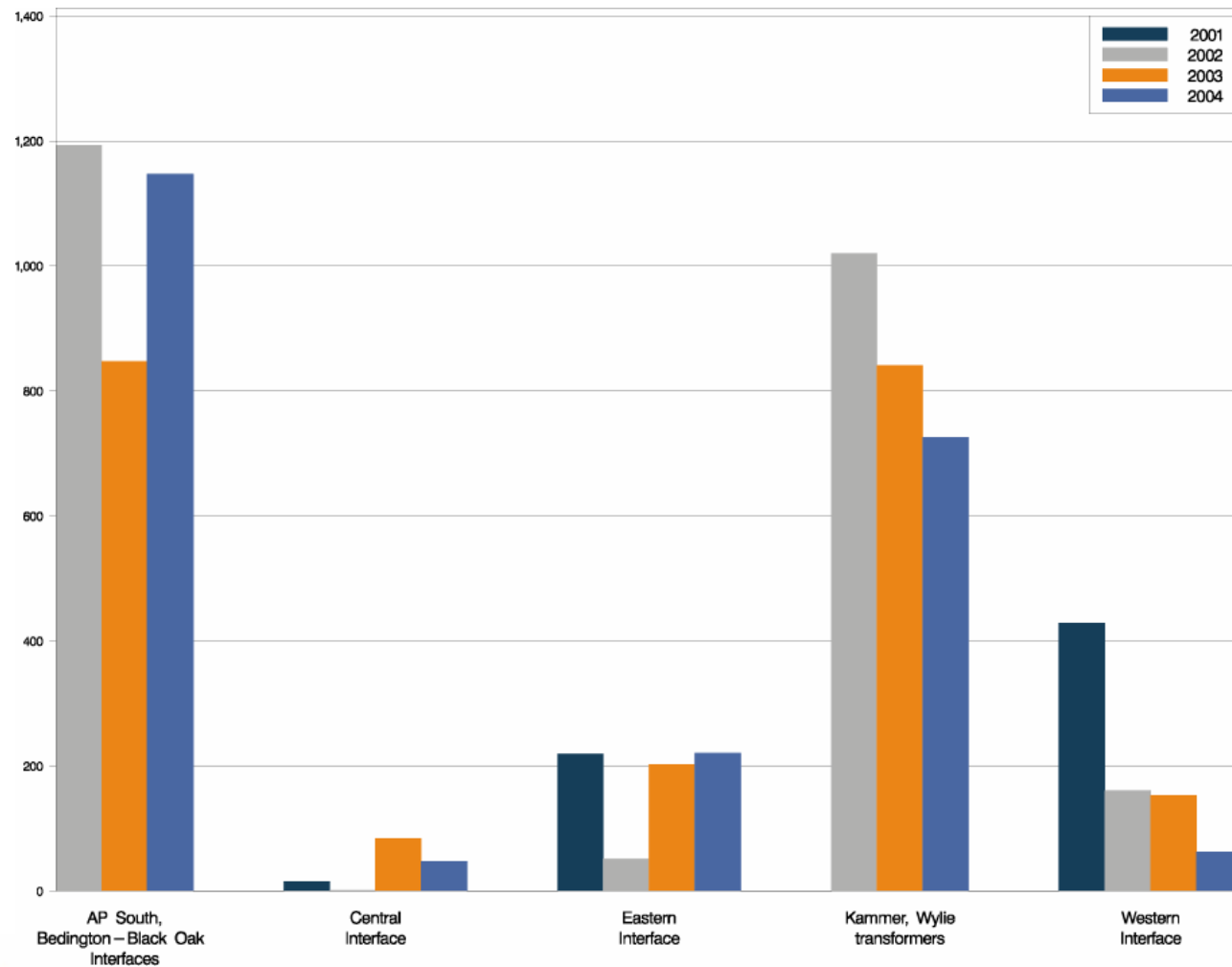
# Pathway directional flows and hours of congestion: Phase 2, 2004



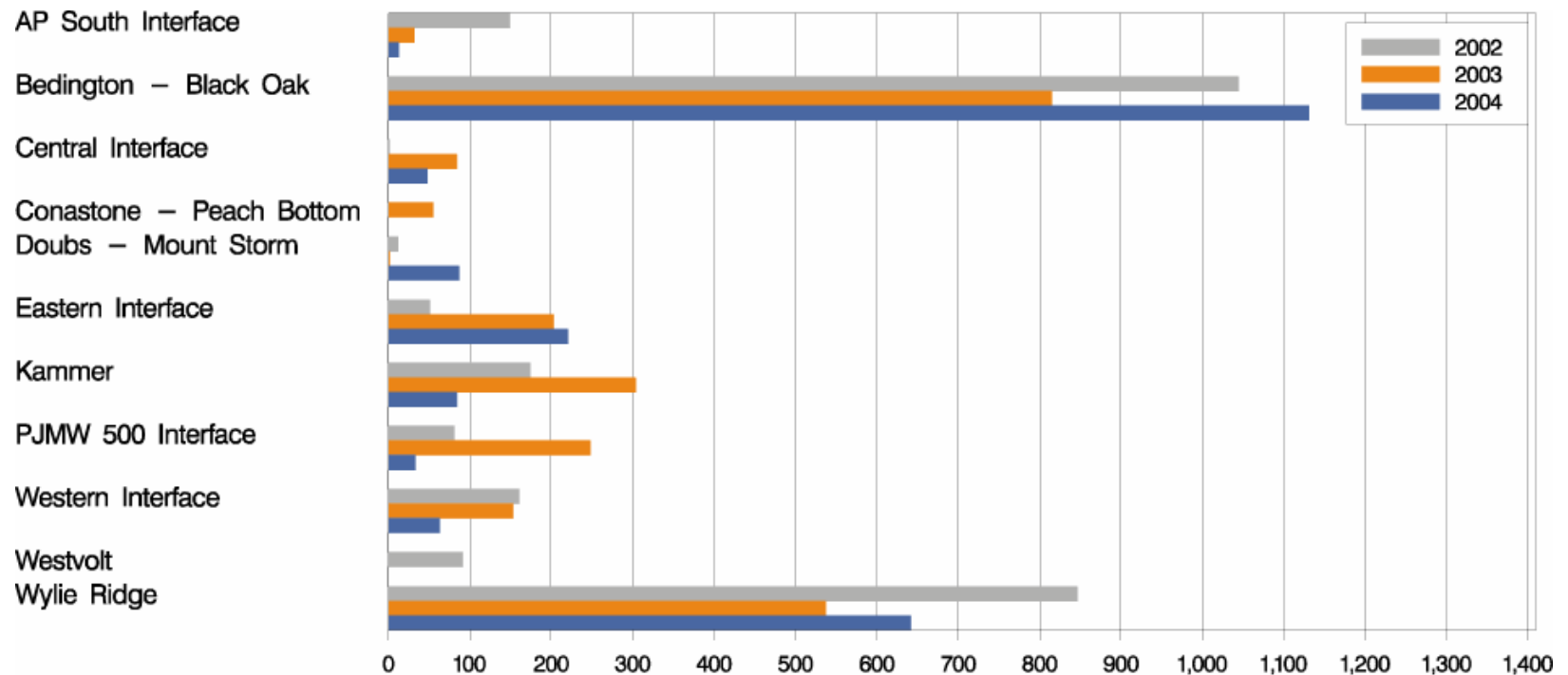
## Congestion-event hours by facility type: Calendar years 2001 to 2004



## Regional constraints and congestion-event hours by facility: Calendar years 2001 to 2004



# 500 kV zone congestion-event hours by facility: Calendar years 2002 to 2004





## ARR and self-scheduled FTR congestion hedging by control zone: Planning period 2004 to 2005 through December 31, 2004

