State of the Market Report 2006

PIEOUG

March 12, 2007

Joseph Bowring

Market Monitor

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- 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.

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- 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**.

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- Energy Market results were competitive
- Capacity Market results were competitive
- Regulation Market results cannot be determined to have been competitive or to have been noncompetitive
- Spinning Market results were competitive
- FTR Market results were competitive

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- Retention and application of the improved local market power mitigation rules
- Retention of the $1,000 per MWh offer cap in the PJM Energy Market and other rules that limit incentives to exercise market power
- Implementation of the rules included in PJM's Reliability Pricing Model (RPM) Tariff
- Enhancements to PJM's rules governing operating reserve credits

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- Continued enhancements to the cost-benefit analysis of congestion and transmission investments
- Continued enhancement of PJM's posting of market data to promote market transparency.
- Provision of data for external control areas to PJM to enable improved analysis of loop flows in order to enhance the efficiency of PJM markets.
- Evaluation of additional actions to increase demand-side responsiveness to price

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- Enhancements to PJM’s scarcity pricing rules
- Implementation of targeted, flexible real-time market power mitigation in the Regulation Market.
- Consistent application of local market power rules to all constraints.
- Consideration by the FERC of ending the exemption from offer capping currently applicable to certain units, if those units exercise local market power.

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Figure A-1 PJM's footprint and its zones

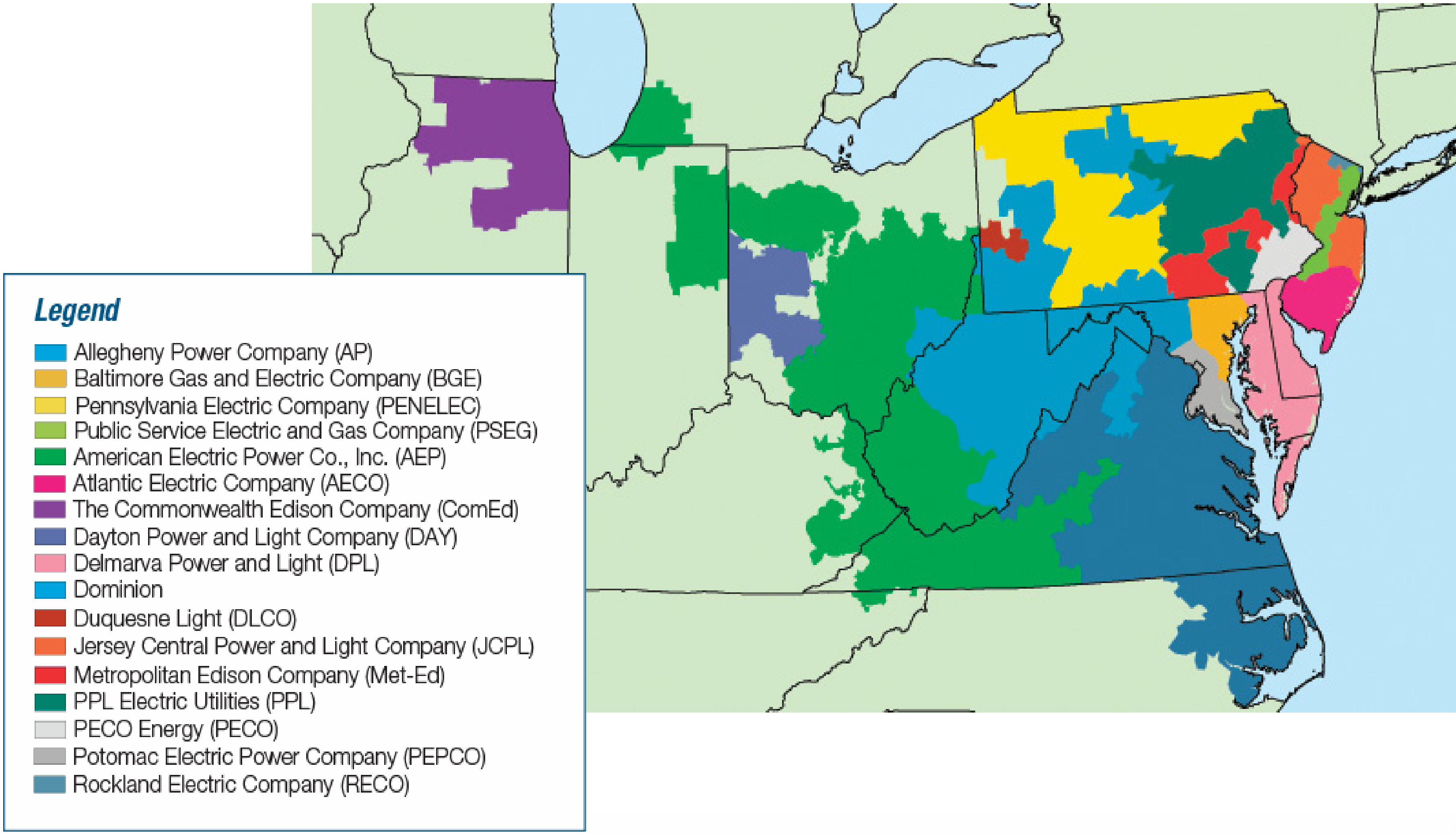

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Figure 2-1 Average PJM aggregate supply curves: Summers 2005 and 2006

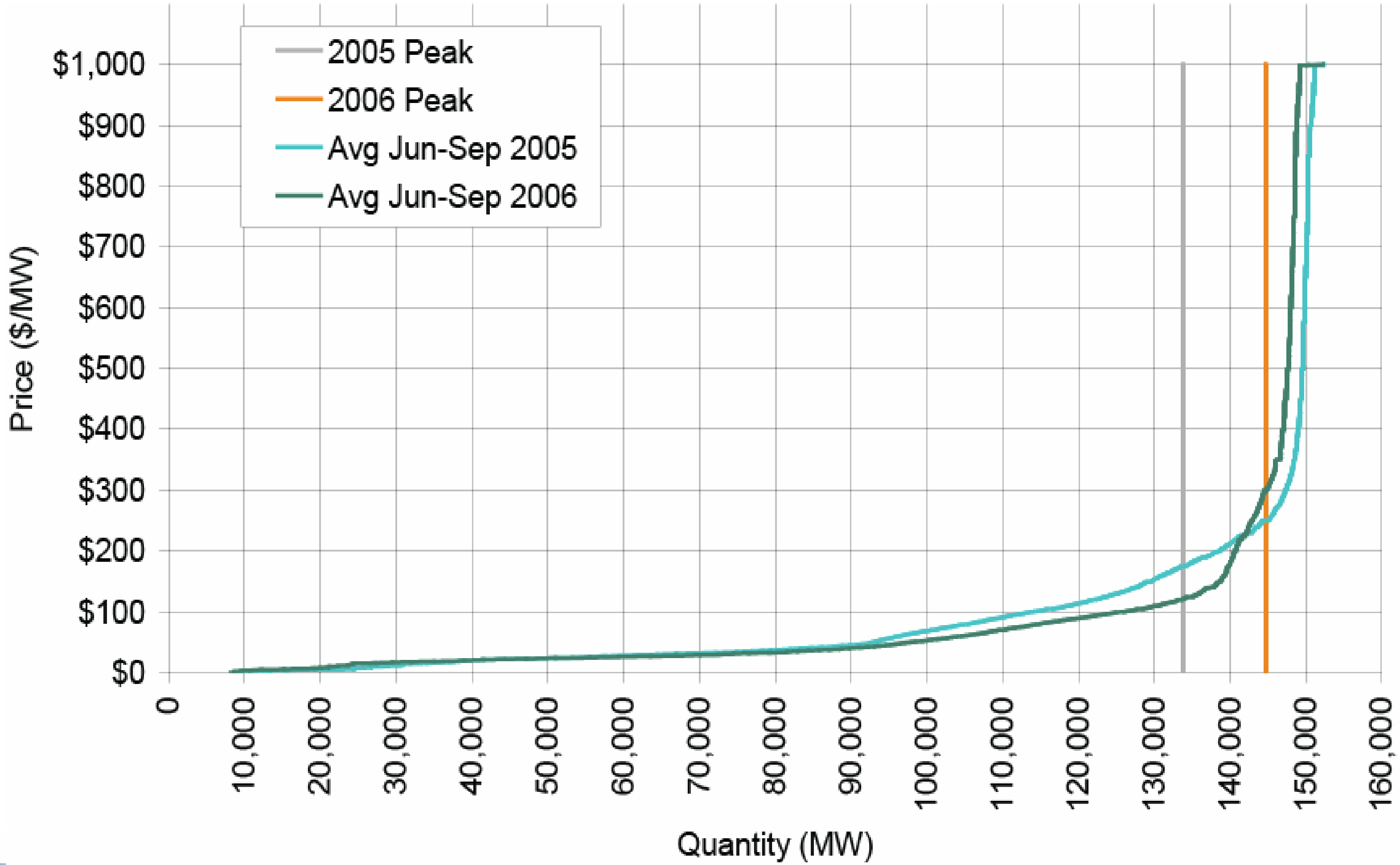

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Table 3-26 PJM capacity (By fuel source): January 1, May 31, June 1 and December 31, 2006

	1-Jan-06		31-May-06		1-Jun-06		31-Dec-06	
	MW	Percent	MW	Percent	MW	Percent	MW	Percent
Coal	67,279.2	41.3%	66,691.2	40.9%	66,511.2	40.9%	66,532.5	41.0%
Oil	10,816.4	6.6%	10,823.8	6.6%	10,866.2	6.7%	10,718.1	6.6%
Gas	45,954.3	28.2%	46,962.7	28.8%	47,199.8	29.1%	46,963.0	29.0%
Nuclear	31,229.3	19.2%	30,797.3	18.9%	30,058.3	18.5%	30,044.8	18.5%
Solid Waste	662.9	0.4%	661.9	0.4%	661.9	0.4%	719.6	0.4%
Hydroelectric	7,057.1	4.3%	7,057.1	4.3%	7,128.1	4.4%	7,132.3	4.4%
Wind	27.7	0.0%	32.5	0.0%	32.5	0.0%	32.5	0.0%
Total	163,026.9	100.0%	163,026.5	100.0%	162,458.0	100.0%	162,142.8	100.0%

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Table 3-27 PJM generation [By fuel source (GWh)]: Calendar year 2006

	GWh	Percent
Coal	411,581.2	56.8%
Oil	2,029.9	0.3%
Gas	40,044.5	5.5%
Nuclear	250,995.7	34.6%
Solid Waste	4,801.2	0.7%
Hydroelectric	14,684.7	2.0%
Wind	787.9	0.1%
Total	724,925.1	100.0%

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Table 2-2 Actual PJM footprint summer peak loads: 1999 to 2006

Year	Date	EPT Hour Ending	PJM Load (MW)	Difference (MW)
1999	06-Jul-99	1400	59,365	NA
2000	26-Jun-00	1600	56,727	(2,638)
2001	09-Aug-01	1500	54,015	(2,712)
2002	14-Aug-02	1600	63,762	9,747
2003	22-Aug-03	1600	61,500	(2,262)
2004	03-Aug-04	1700	77,887	16,387
2005	26-Jul-05	1600	133,763	55,876
2006	02-Aug-06	1700	144,644	10,881

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Figure 2-2 PJM summer peak-load comparison: Wednesday, August 2, 2006, and Tuesday, July 26, 2005

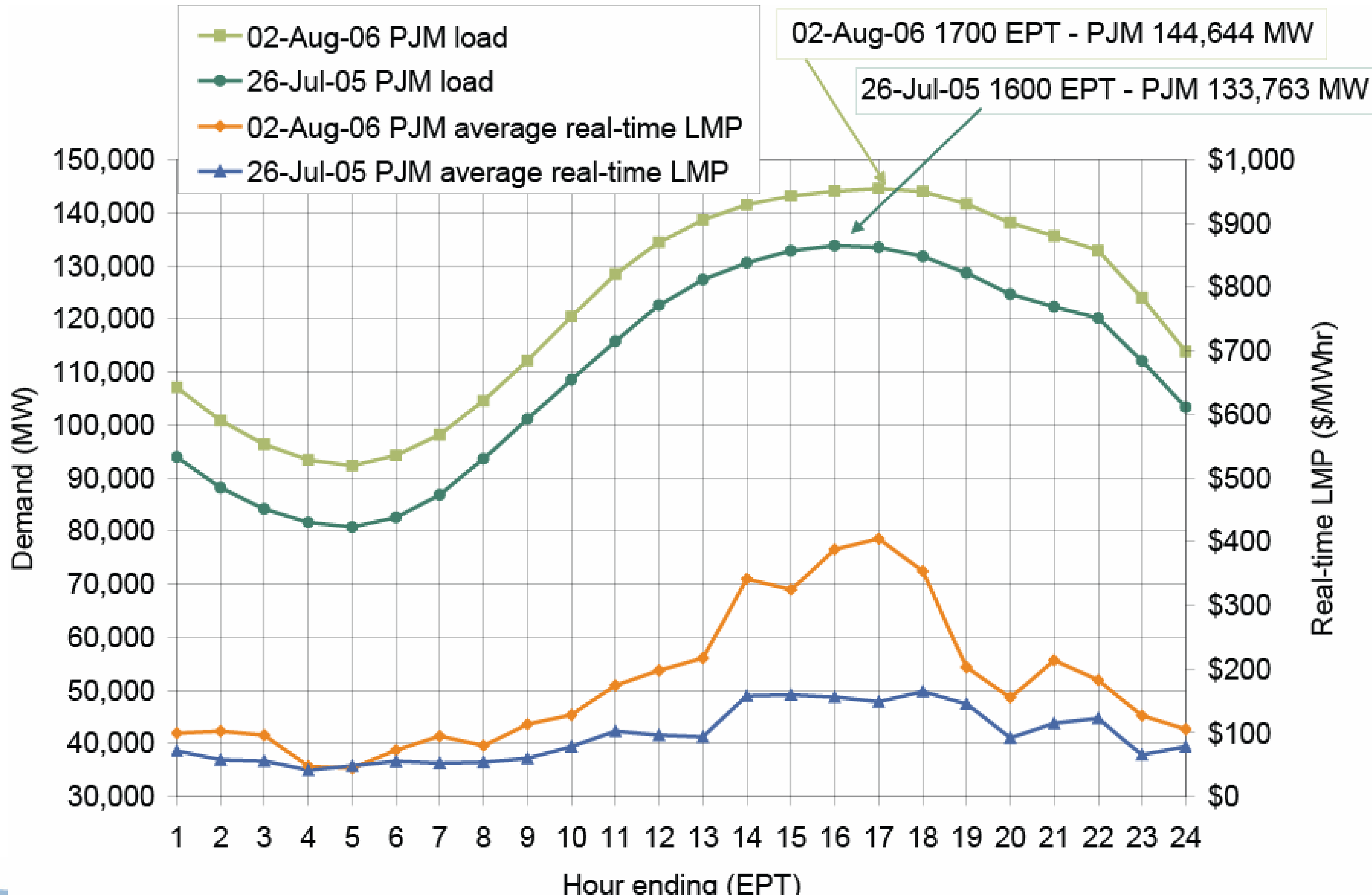

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Figure 2-8 PJM average real-time load: Calendar years 2005 to 2006

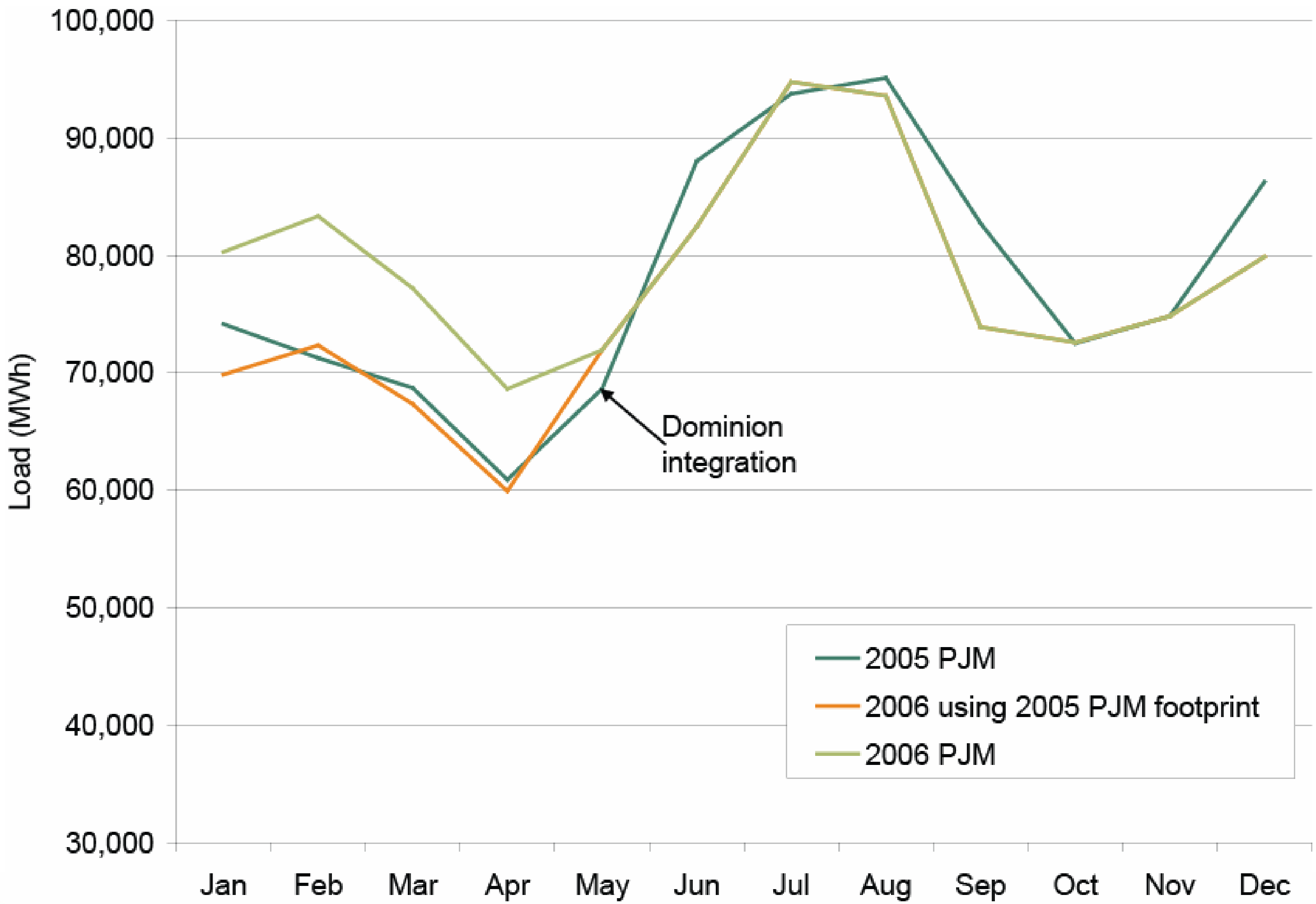

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Table 2-44 PJM average hourly LMP (Dollars per MWh): Calendar years 1998 to 2006

	Locational Marginal Price (LMP)			Year-to-Year Change		
	Average	Median	Standard Deviation	Average	Median	Standard Deviation
1998	$21.72	$16.60	$31.45	NA	NA	NA
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%	46.1%	10.3%
2004	$42.40	$38.30	$21.12	10.8%	24.4%	(14.5%)
2005	$58.08	$47.18	$35.91	37.0%	23.2%	70.0%
2006	$49.27	$41.45	$32.71	(15.2%)	(12.1%)	(8.9%)

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Table 2-46 PJM load-weighted, average LMP (Dollars per MWh): Calendar years 1998 to 2006

	Load-Weighted, Average LMP			Year-to-Year Change		
	Average	Median	Standard Deviation	Average	Median	Standard Deviation
1998	$24.16	$17.60	$39.29	NA	NA	NA
1999	$34.07	$19.02	$91.49	41.0%	8.1%	132.9%
2000	$30.72	$20.51	$28.38	(9.8%)	7.8%	(69.0%)
2001	$36.65	$25.08	$57.26	19.3%	22.3%	101.8%
2002	$31.58	$23.40	$26.73	(13.8%)	(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%)
2005	$63.46	$52.93	$38.10	43.1%	31.8%	79.3%
2006	$53.35	$44.40	$37.81	(15.9%)	(16.1%)	(0.8%)

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Figure 2-12 Monthly load-weighted, average LMP: Calendar years 2002 to 2006

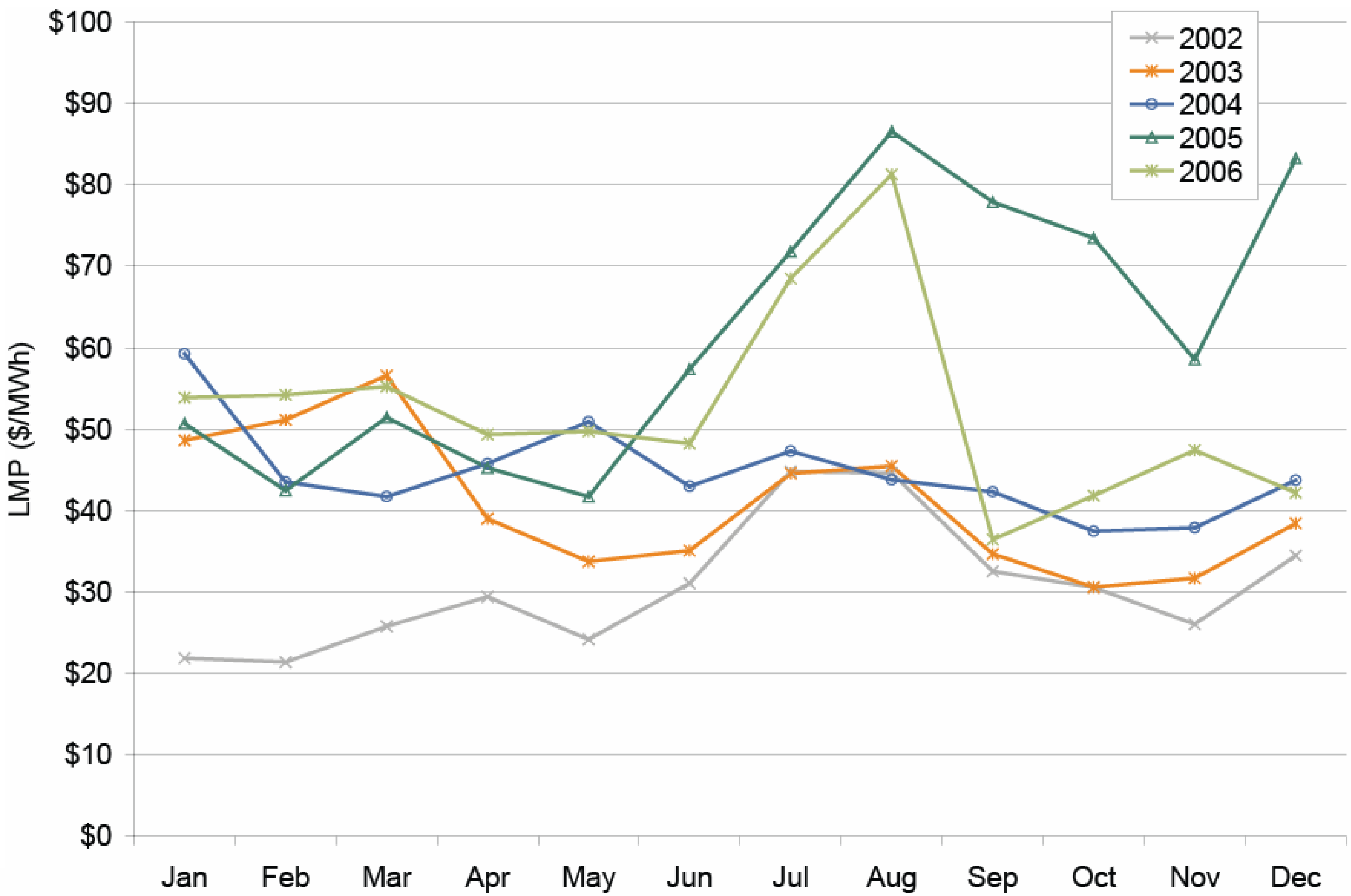

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Figure 2-13 Spot average fuel price comparison: Calendar years 2005 to 2006

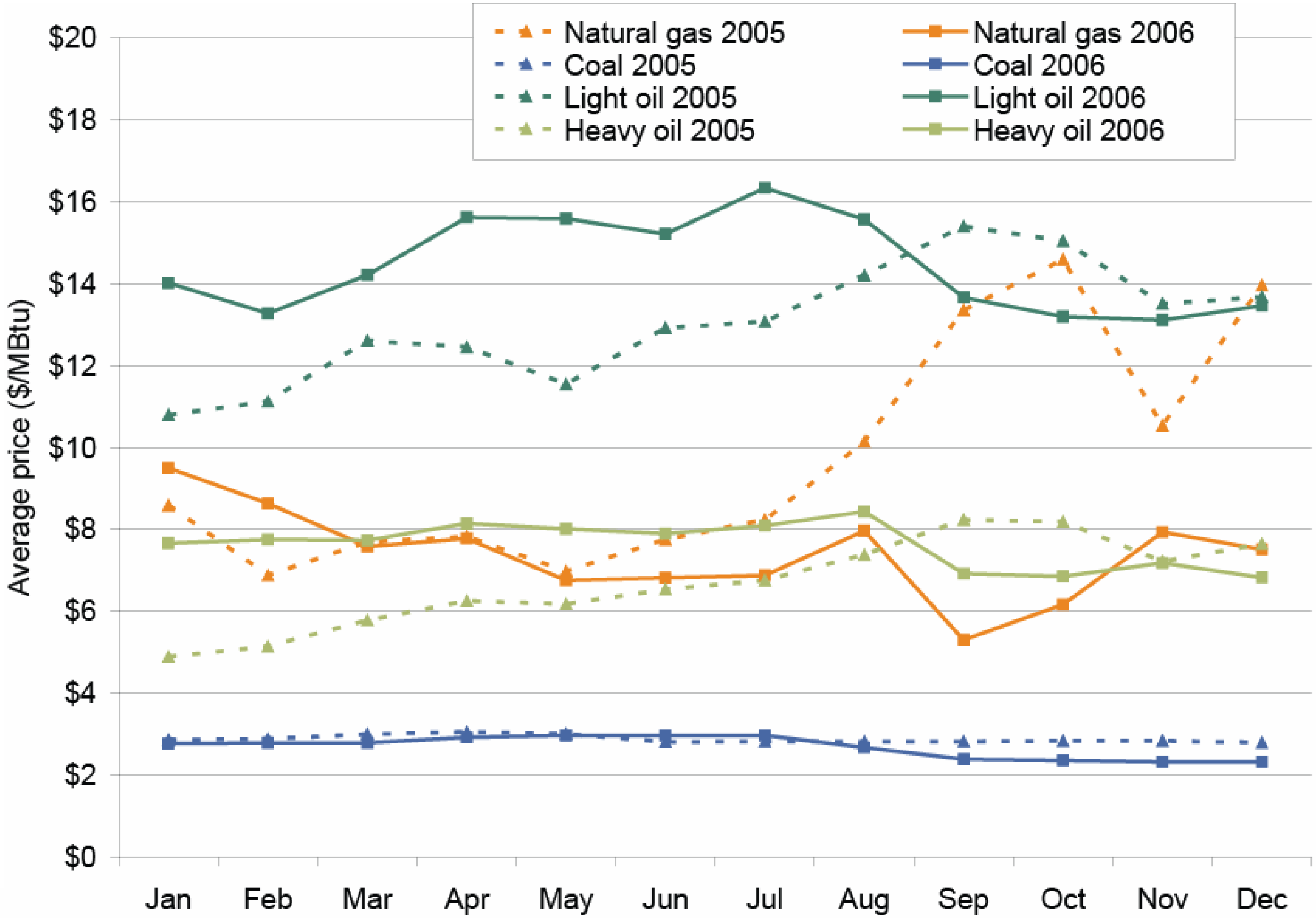

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Table 2-47 PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Year-over-year method

	2005 Load-Weighted LMP	2006 Fuel-Cost-Adjusted, Load-Weighted LMP	Change
Average	$63.46	$59.89	(5.6%)
Median	$52.93	$49.99	(5.5%)
Standard Deviation	$38.10	$38.34	0.6%

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Table 2-30 Type of fuel used by marginal units: Calendar years 2004 to 2006

Fuel Type	2004	2005	2006
Coal	60%	69%	70%
Misc	0%	1%	1%
Natural Gas	32%	23%	25%
Nuclear	0%	0%	0%
Petroleum	9%	8%	4%

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Table 2-54 Monthly average percentage of real-time self-supply load, bilateral supply load and spot supply load: Calendar years 2005 to 2006

	2005			2006			Difference in Percentage Points		
	Bilateral Contract	Spot	Self-Supply	Bilateral Contract	Spot	Self-Supply	Bilateral Contract	Spot	Self-Supply
Jan	91.0%	7.9%	1.1%	92.4%	6.5%	1.0%	1.4%	(1.4%)	(0.1%)
Feb	90.9%	8.0%	1.1%	92.5%	6.5%	1.0%	1.6%	(1.5%)	(0.1%)
Mar	90.8%	8.0%	1.2%	92.6%	6.4%	1.0%	1.8%	(1.6%)	(0.2%)
Apr	91.0%	7.7%	1.3%	92.7%	6.2%	1.0%	1.7%	(1.5%)	(0.3%)
May	91.7%	7.2%	1.1%	92.7%	6.2%	1.1%	1.0%	(1.0%)	0.0%
Jun	93.0%	6.2%	0.8%	93.2%	5.8%	1.0%	0.2%	(0.4%)	0.2%
Jul	93.1%	6.0%	0.8%	93.3%	5.8%	0.9%	0.2%	(0.2%)	0.1%
Aug	93.1%	6.0%	0.8%	93.2%	6.0%	0.8%	0.1%	0.0%	0.0%
Sep	92.9%	6.2%	1.0%	92.8%	6.1%	1.0%	(0.1%)	(0.1%)	0.0%
Oct	92.4%	6.7%	0.9%	92.2%	6.7%	1.1%	(0.2%)	0.0%	0.2%
Nov	92.0%	7.1%	0.9%	92.6%	6.3%	1.1%	0.6%	(0.8%)	0.2%
Dec	92.3%	6.9%	0.9%	92.6%	6.4%	1.0%	0.3%	(0.5%)	0.1%
Annual	92.1%	6.9%	1.0%	92.8%	6.2%	1.0%	0.7%	(0.7%)	0.0%

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Table 2-50 Components of annual PJM load-weighted, average LMP: Calendar year 2006

Element	Contribution to LMP	Percent
Coal	$20.67	38.7%
Gas	$17.23	32.3%
Oil	$2.65	5.0%
Uranium	$0.00	0.0%
Wind	$0.01	0.0%
NOX	$1.53	2.9%
SO2	$5.39	10.1%
VOM	$2.67	5.0%
Markup	$1.54	2.9%
Constrained Off	$1.06	2.0%
NA	$0.59	1.1%

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Figure 2-4 Load-weighted unit markup index: Calendar year 2006

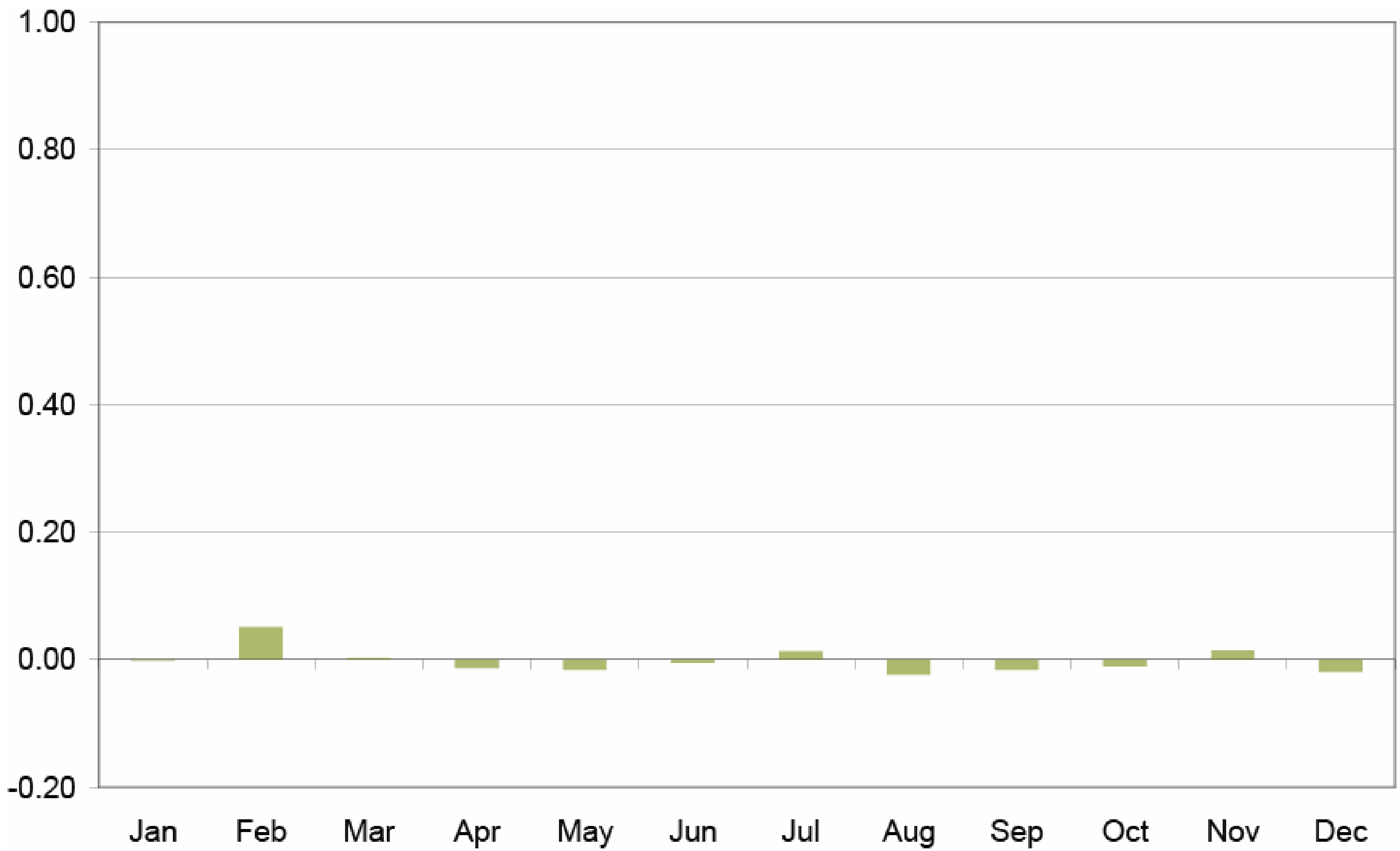

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Table 2-36 Comparison of exempt and non-exempt markup component: Calendar year 2006

	Units Marginal	Markup Component
Non-Exempt Units	667	$0.98
Exempt Units	43	$0.56

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Table 2-39 Markup contribution of exempt and non-exempt units: Calendar year 2006

	Exempt Markup Component	Non-exempt Markup Component	Total
High-Load Days	$0.11	$0.49	$0.60
Balance of Year	$0.45	$0.49	$0.94
Total	$0.56	$0.98	$1.54

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Table 2-8 Three pivotal supplier test details for regional constraints: March 1, to December 31, 2006

Constraint	Period	Average Constraint Relief (MW)	Average Effective Supply (MW)	Average Number Owners	Average Number Owners Passing	Average Number Owners Failing
5004/5005 Interface	Peak	110	397	17	14	3
	Off Peak	107	376	17	14	3
Bedington - Black Oak	Peak	57	220	12	9	3
	Off Peak	63	239	12	9	2
Kammer	Peak	83	285	17	13	4
	Off Peak	77	301	15	12	3
AP South	Peak	101	271	16	10	6
	Off Peak	97	306	15	9	6
West	Peak	138	829	17	17	0
	Off Peak	140	739	16	15	1

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Table 2-5 Annual offer-capping statistics: Calendar years 2002 to 2006

	Real Time		Day Ahead	
	Unit Hours Capped	MW Capped	Unit Hours Capped	MW Capped
2002	1.6%	0.3%	0.7%	0.1%
2003	1.1%	0.3%	0.4%	0.2%
2004	1.3%	0.4%	0.6%	0.2%
2005	1.8%	0.4%	0.2%	0.1%
2006	1.0%	0.2%	0.4%	0.1%

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Table 2-6 Offer-capped unit statistics: Calendar year 2006

Percentage of Offer-Capped Run Hours	2006 Minimum Offer-Capped Hours					
	500	400	300	200	100	1
90%	3	3	3	4	6	6
80%	4	9	10	15	20	25
75%	4	10	11	18	29	46
70%	4	10	11	20	37	72
60%	4	11	13	25	47	108
50%	4	13	15	27	49	122
25%	4	15	18	32	55	158
10%	4	15	18	35	67	212

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Table 3, Vol. I Total net revenue and 20-year, levelized fixed cost for new entry CT, CC and CP generators: Economic dispatch assumed

	CT		CC		CP	
	Economic Dispatch Net Revenue	20-Year Levelized Fixed Cost	Economic Dispatch Net Revenue	20-Year Levelized Fixed Cost	Economic Dispatch Net Revenue	20-Year Levelized Fixed Cost
1999	$74,537	$72,207	$100,700	$93,549	$118,021	$208,247
2000	$30,946	$72,207	$47,592	$93,549	$134,563	$208,247
2001	$63,462	$72,207	$86,670	$93,549	$129,271	$208,247
2002	$28,260	$72,207	$52,272	$93,549	$112,131	$208,247
2003	$10,565	$72,207	$35,591	$93,549	$169,510	$208,247
2004	$8,543	$72,207	$35,785	$93,549	$133,125	$208,247
2005	$10,437	$72,207	$40,817	$93,549	$228,430	$208,247
2006	$14,948	$80,315	$49,529	$99,230	$182,461	$267,792
Avg	$30,212	$73,221	$56,120	$94,259	$150,939	$215,690

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Figure 3-4 High-load day hourly load and average hourly load: Summer 2006

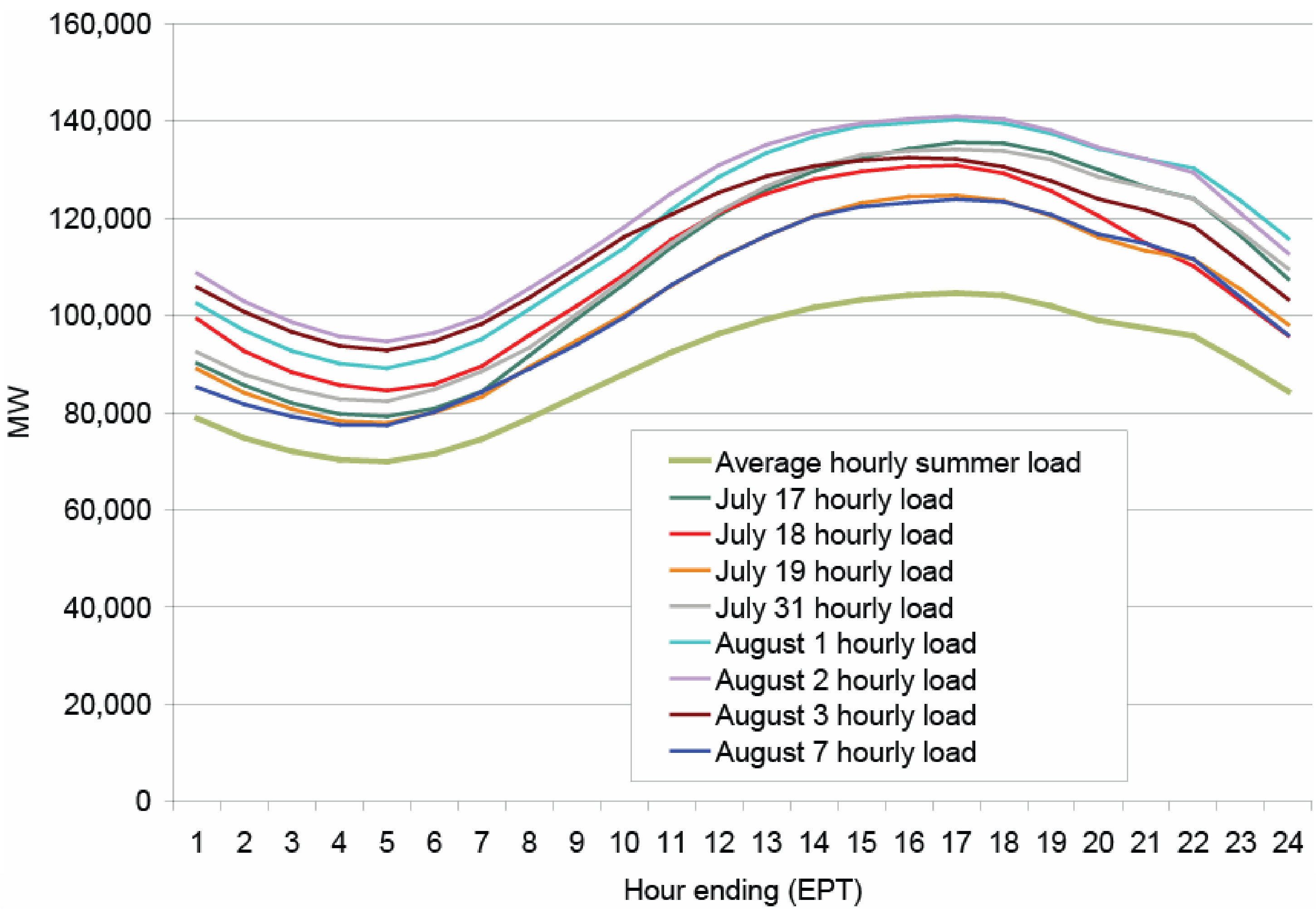

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Figure 3-5 Net within-hour resources: July 17 to July 19, and July 31, 2006

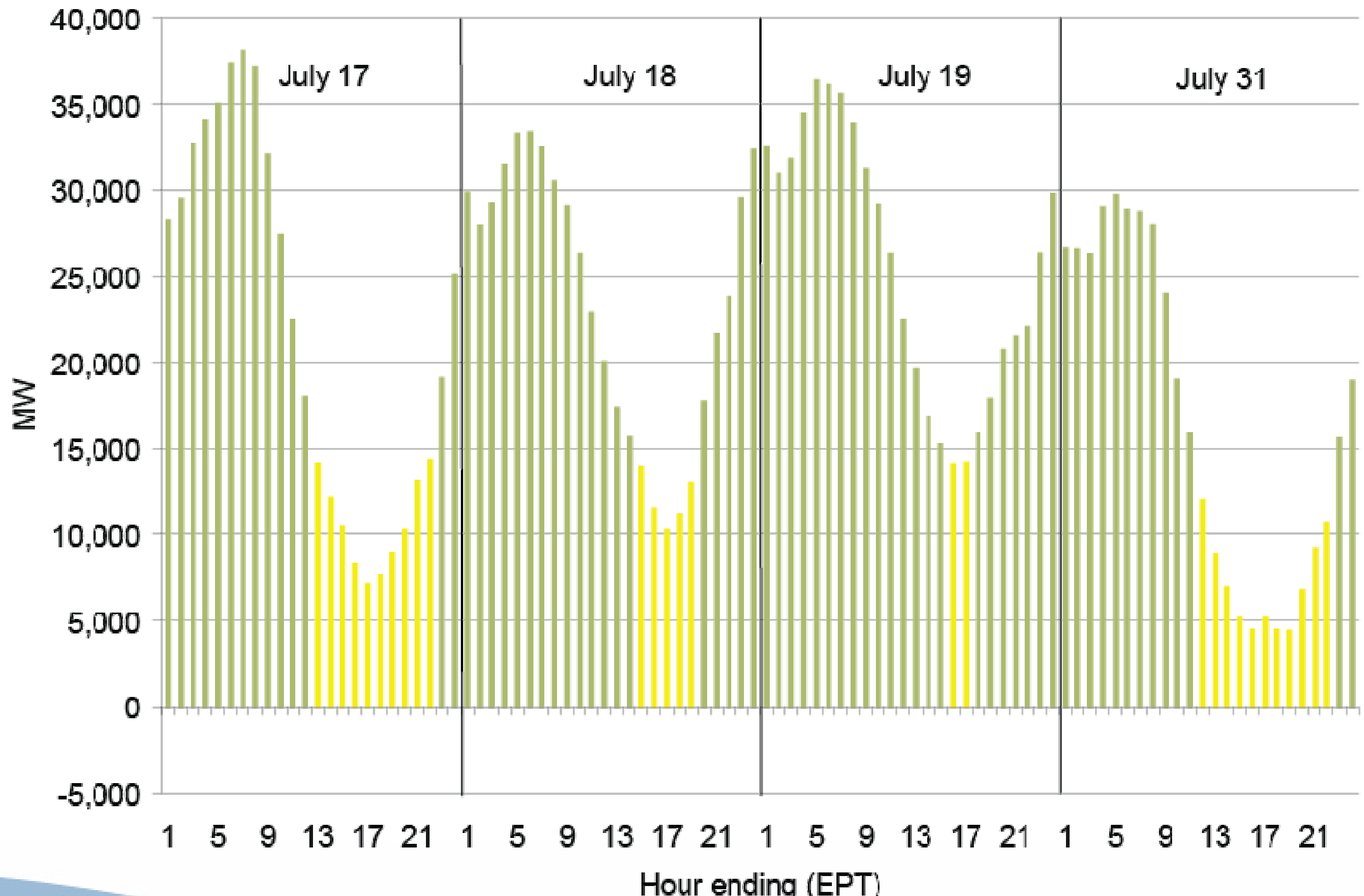

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Figure 3-6 Net within-hour resources: August 1 to August 3, and August 7, 2006

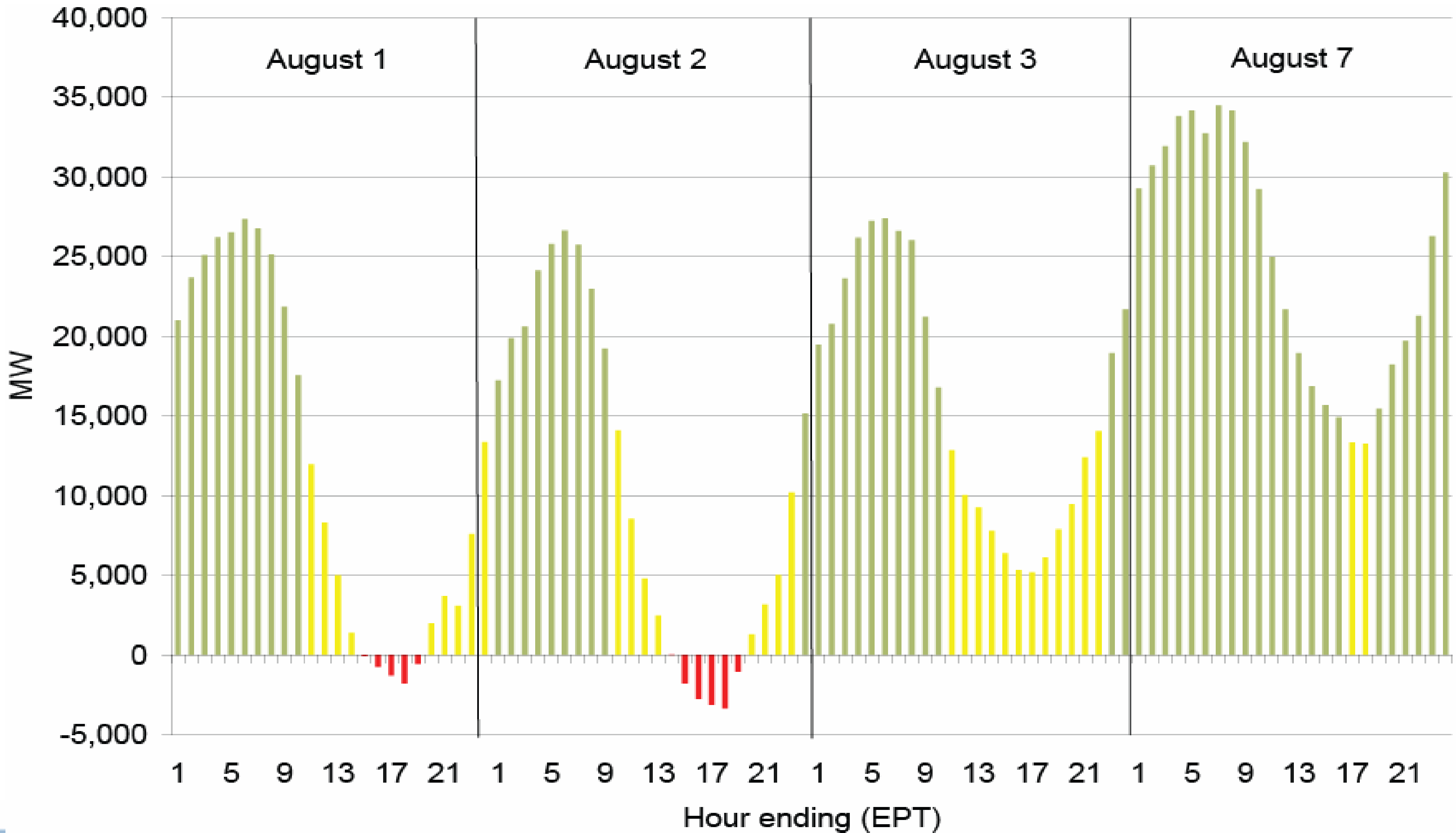

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Figure 3-11 Monthly average balancing operating reserve rate: Calendar years 2002 to 2006

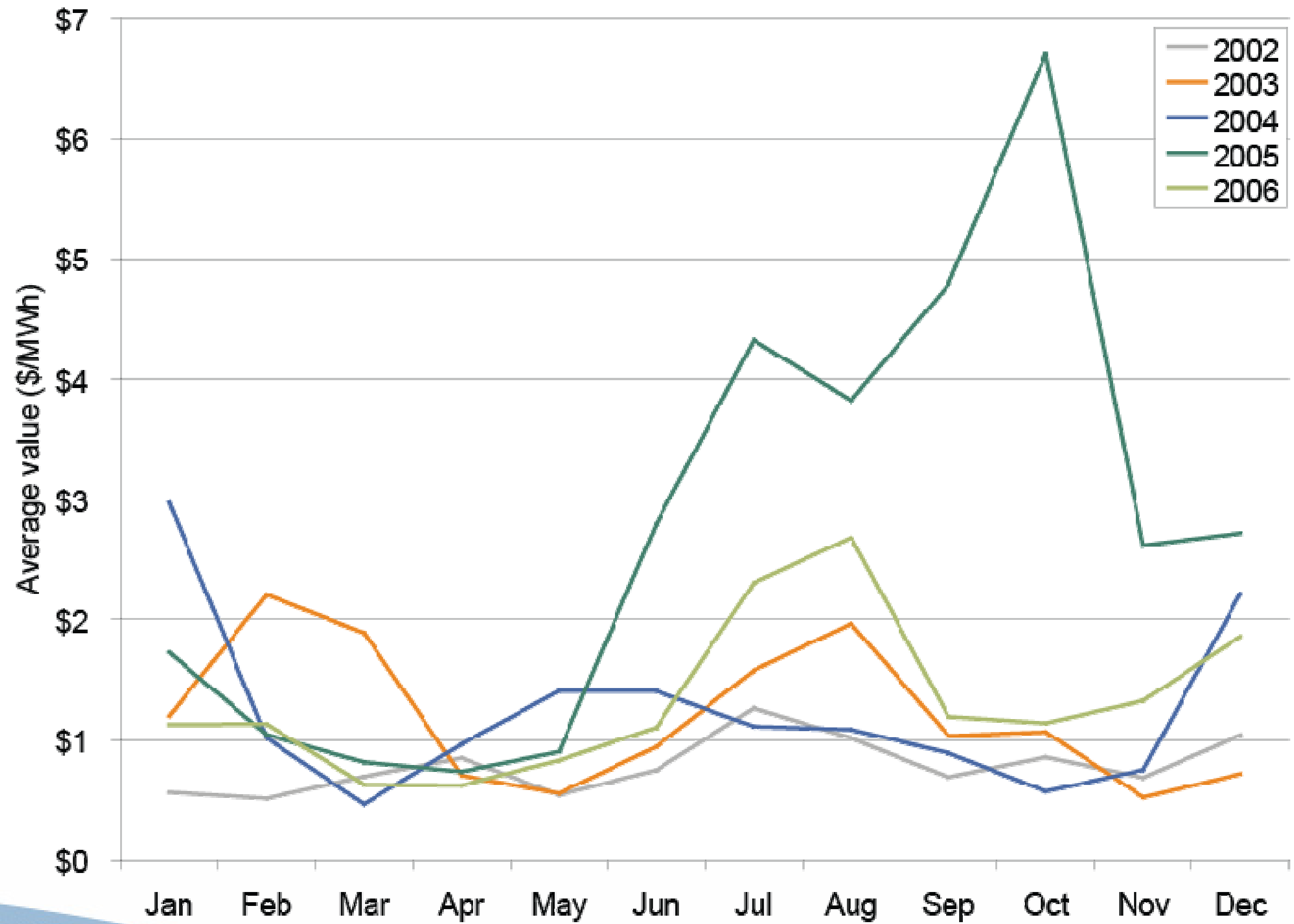

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Table 3-41 Total day-ahead and balancing operating reserve charges: Calendar years 1999 to 2006

	Total Operating Reserve Credits	Annual Credit Change	Operating Reserve as Percent of Total Billing	Day-Ahead $/MWh	Day-Ahead Change	Balancing $/MWh	Balancing Change
1999	$133,897,428	NA	7.5%	NA	NA	NA	NA
2000	$216,985,147	62.1%	9.6%	$0.341	NA	$0.535	NA
2001	$290,867,269	34.0%	8.7%	$0.275	(19.5%)	$1.070	100.2%
2002	$237,102,574	(18.5%)	5.0%	$0.164	(40.4%)	$0.787	(26.4%)
2003	$289,510,257	22.1%	4.2%	$0.226	38.2%	$1.197	52.0%
2004	$414,891,790	43.3%	4.8%	$0.230	1.7%	$1.236	3.3%
2005	$682,781,889	64.6%	3.0%	$0.076	(66.9%)	$2.758	123.1%
2006	$322,315,152	(52.8%)	1.5%	$0.078	2.6%	$1.331	(51.7%)

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Figure 4-3 PJM import and export transaction volume history: Calendar years 1999 to 2006

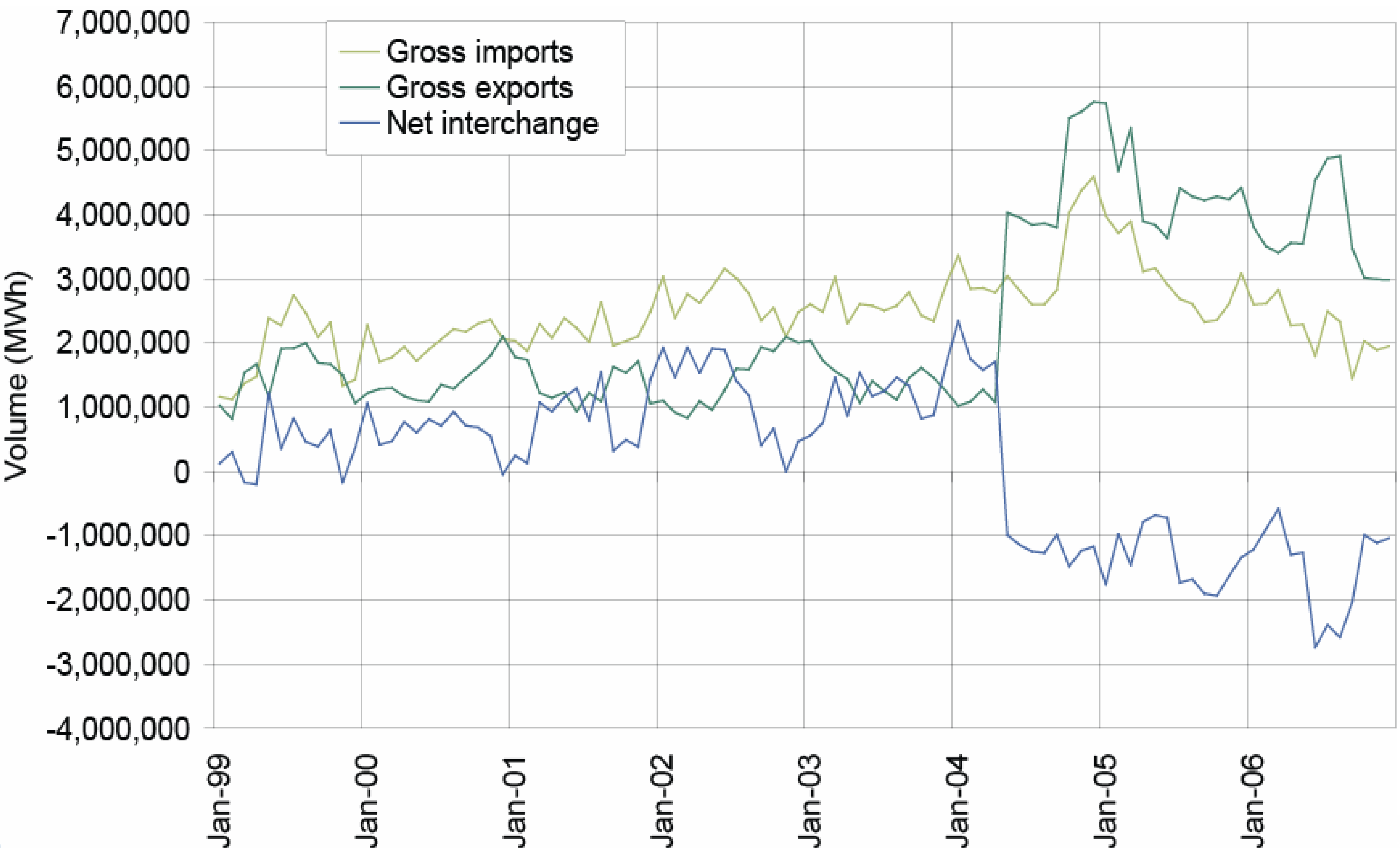

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Figure 4-13 PJM/MECS interface average actual minus scheduled volume: Calendar year 2006

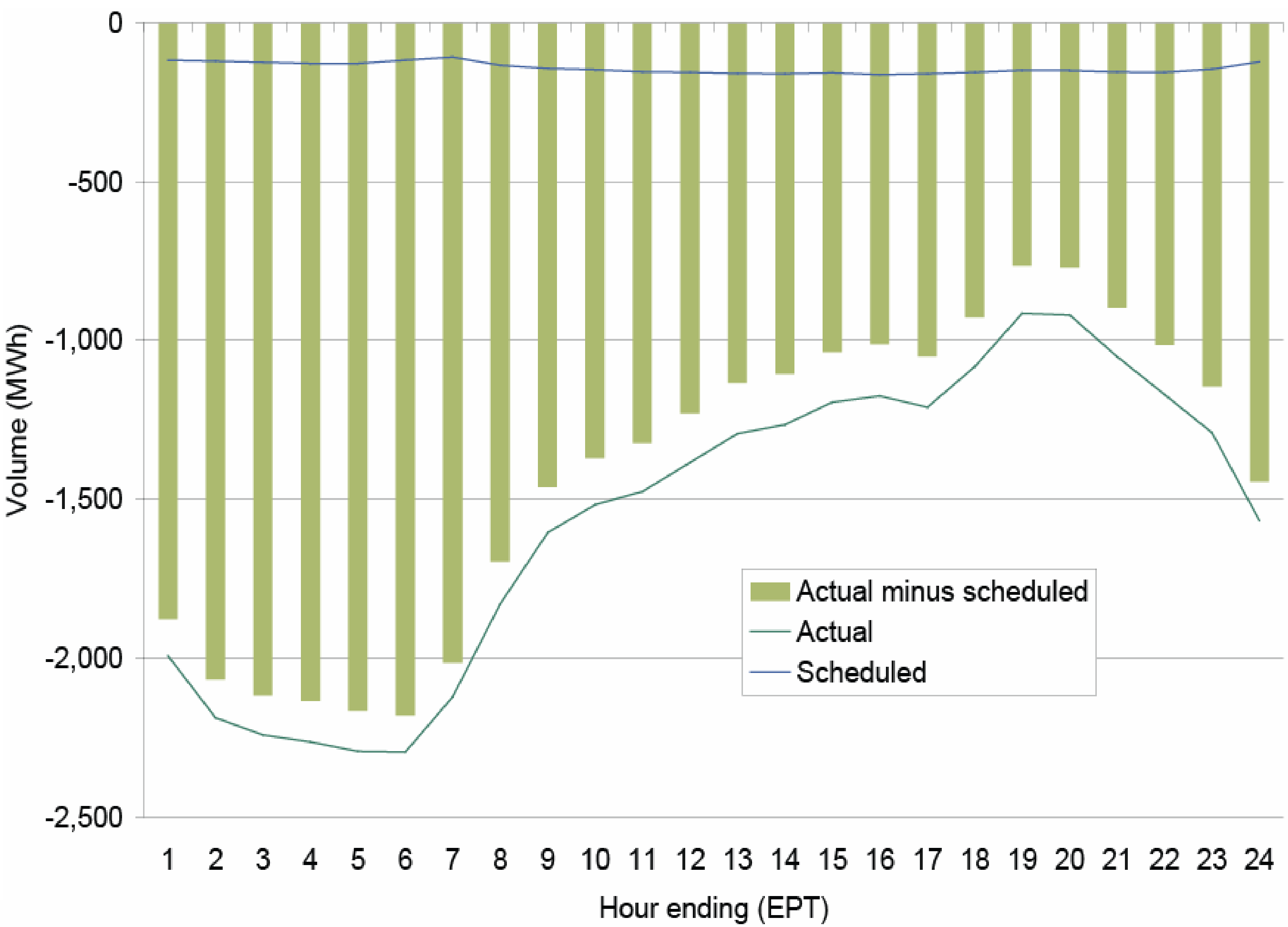

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Figure 4-14 PJM/TVA average flows: January 1 to September 30, 2006, preconsolidation

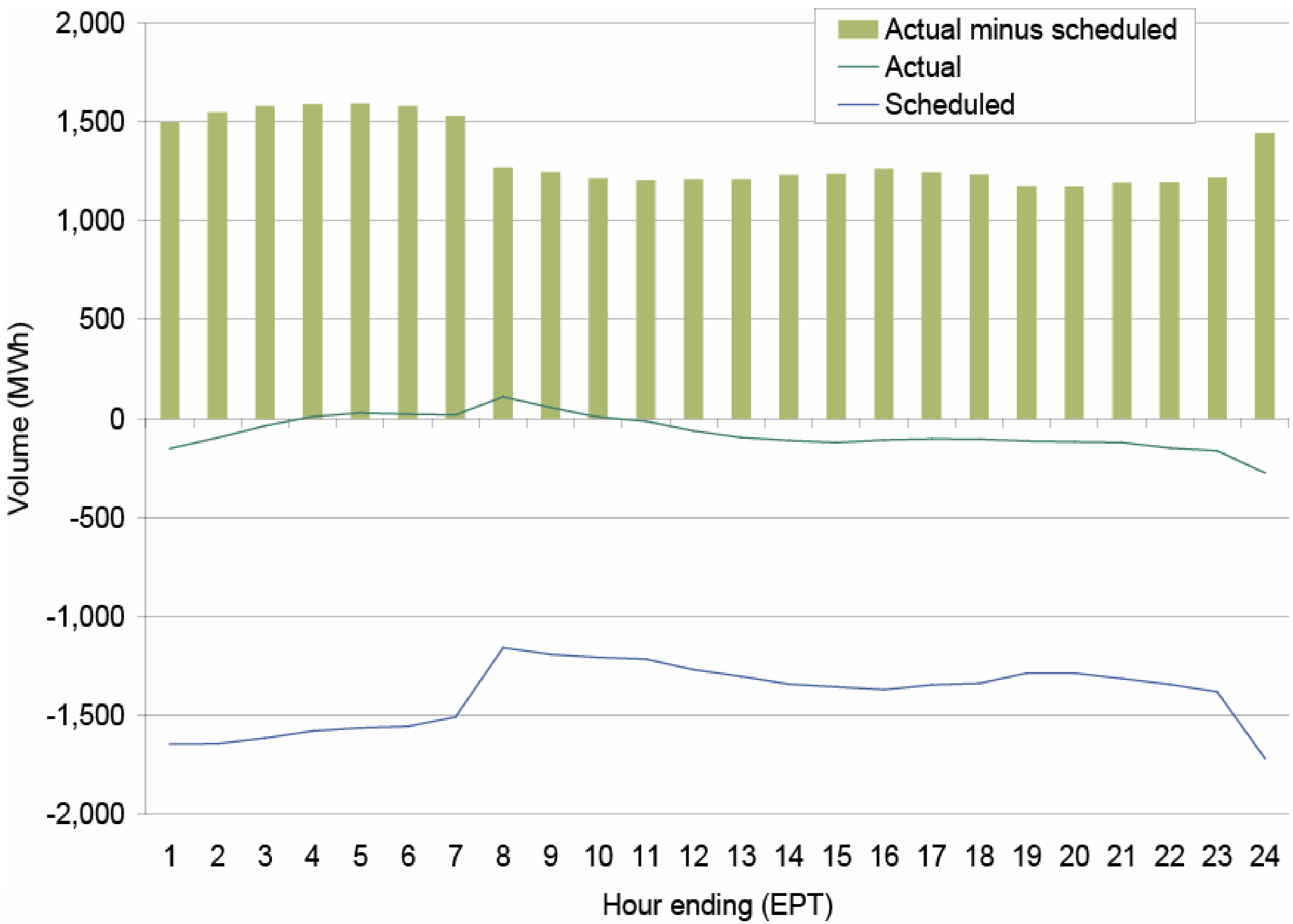

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Figure 4-15 PJM/TVA average flows: October 1 to December 31, post consolidation

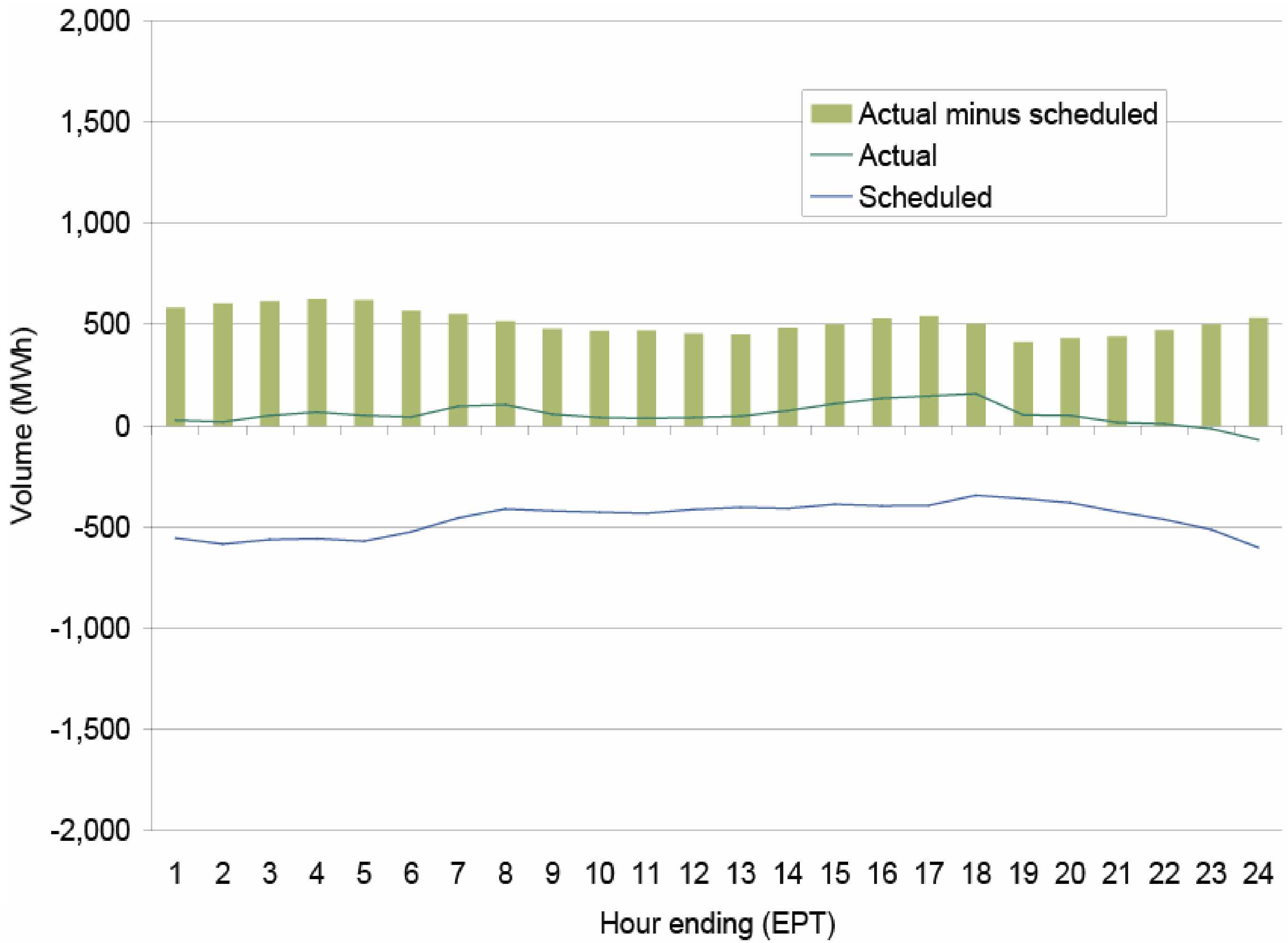

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Figure 4-16 Southwest actual and scheduled flows: Calendar year 2006

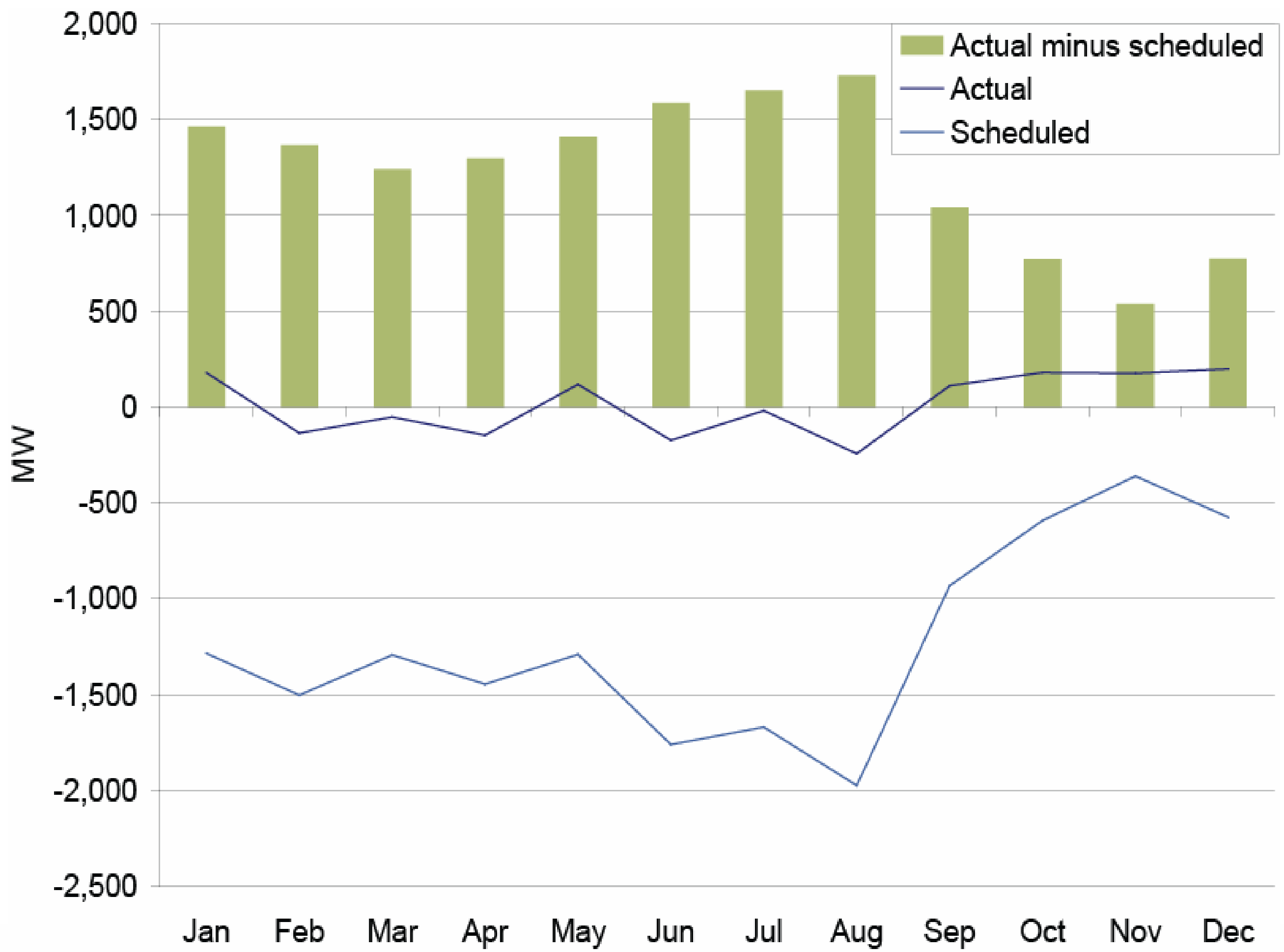

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Figure 4-17 Southeast actual and scheduled flows: Calendar year 2006

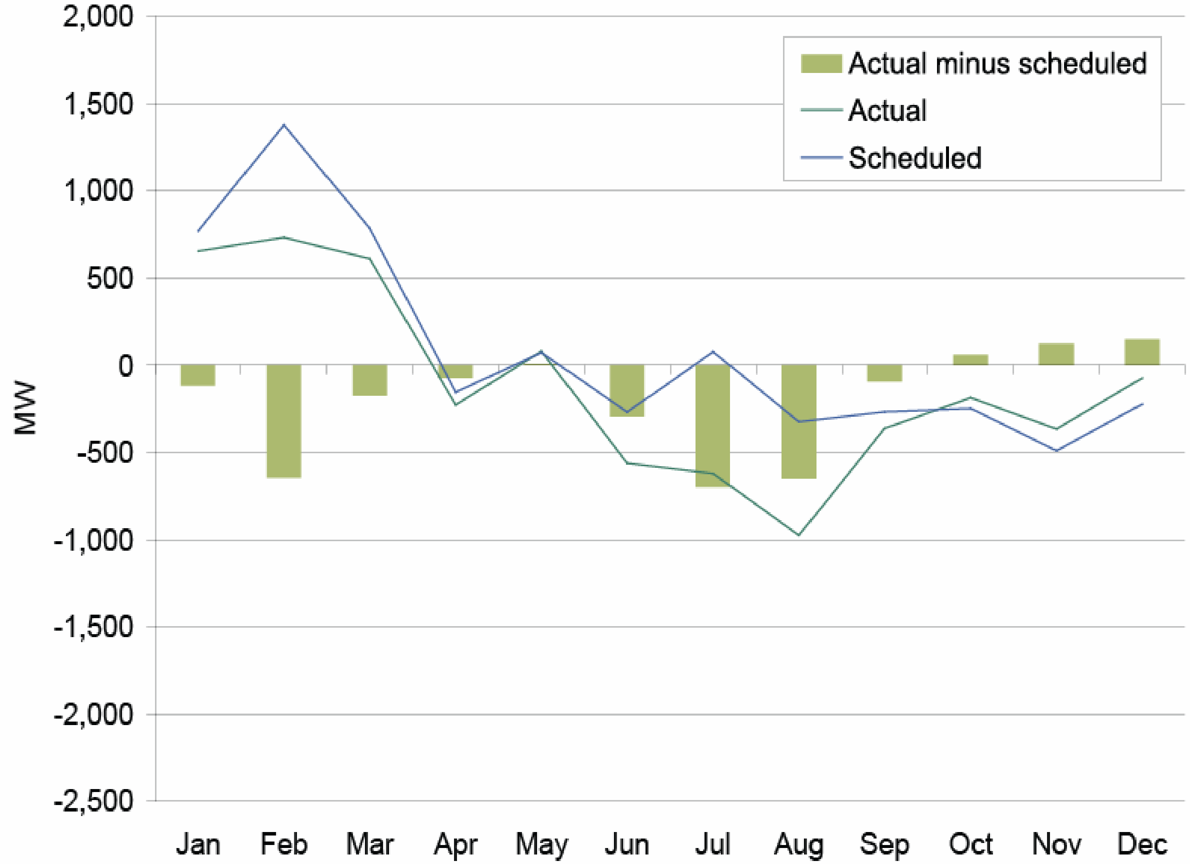

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Figure 4-21 Number of PJM automatic ramp reservation denials by month: January 2005 to July 2006

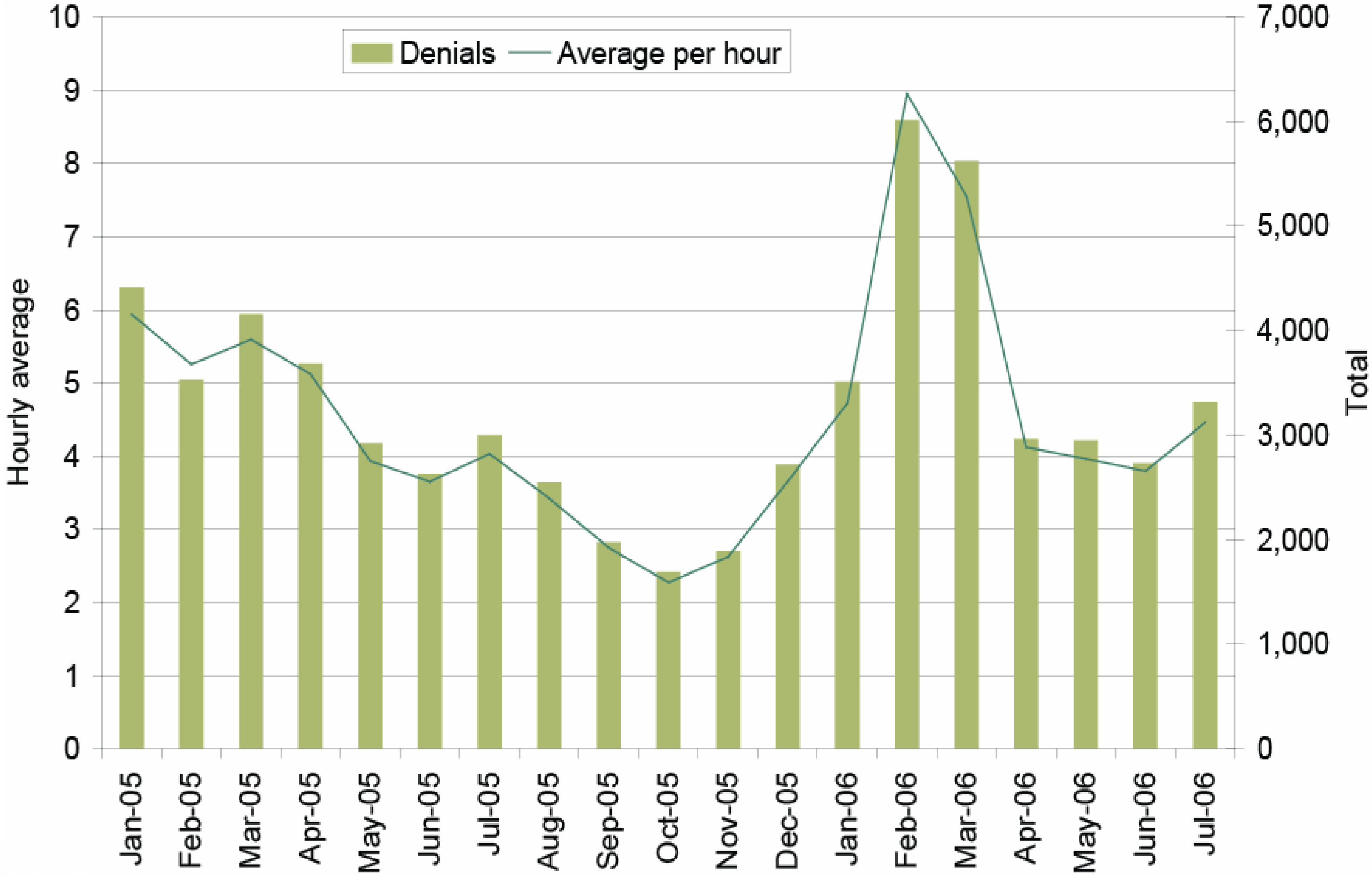

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Figure 4-22 Distribution of expired ramp reservations in the hour prior to flow [old rules (theoretical) and new rules (actual)]: October to December 2006

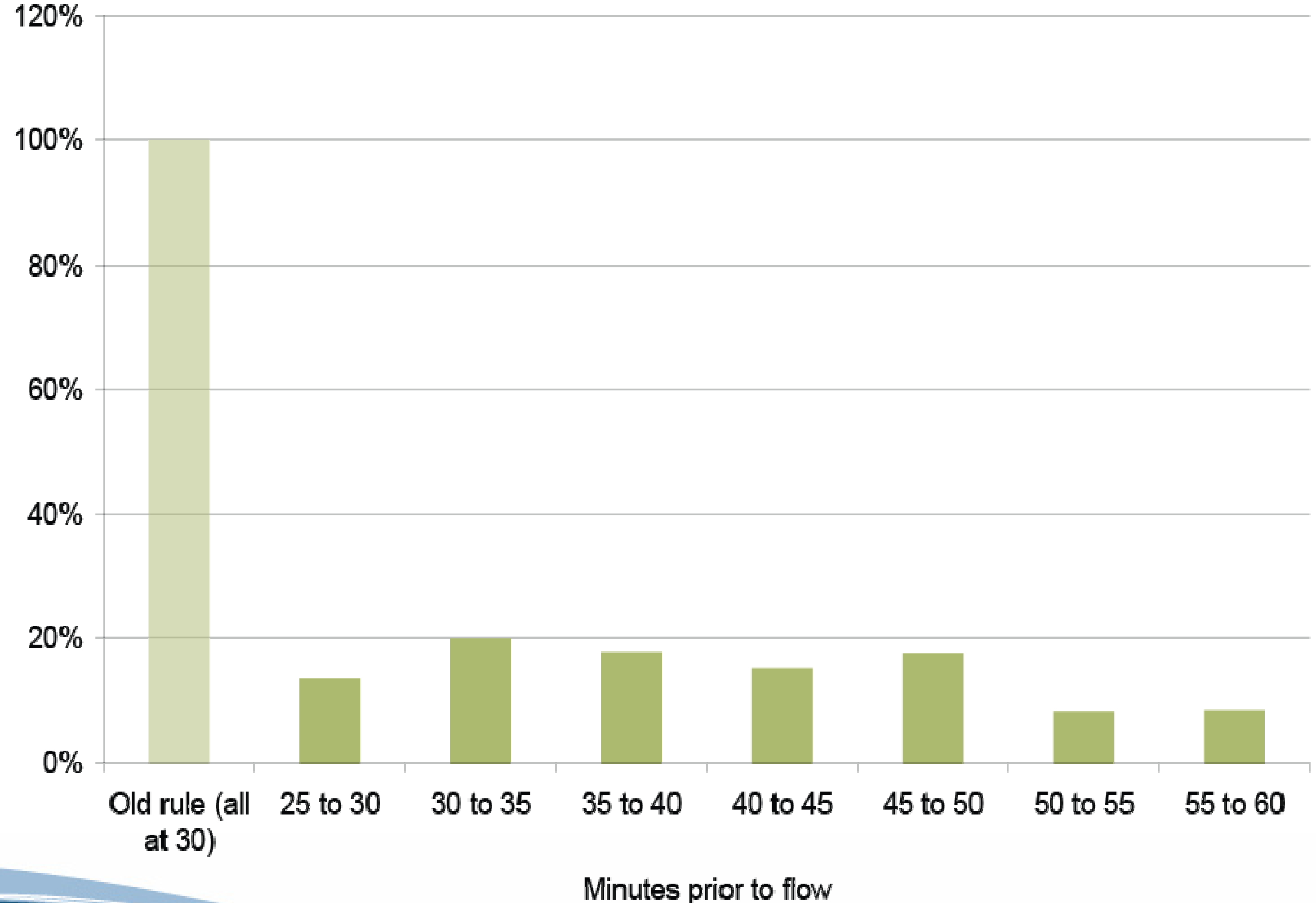

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Figure 5-1 Capacity obligation for the PJM Capacity Market: Calendar year 2006

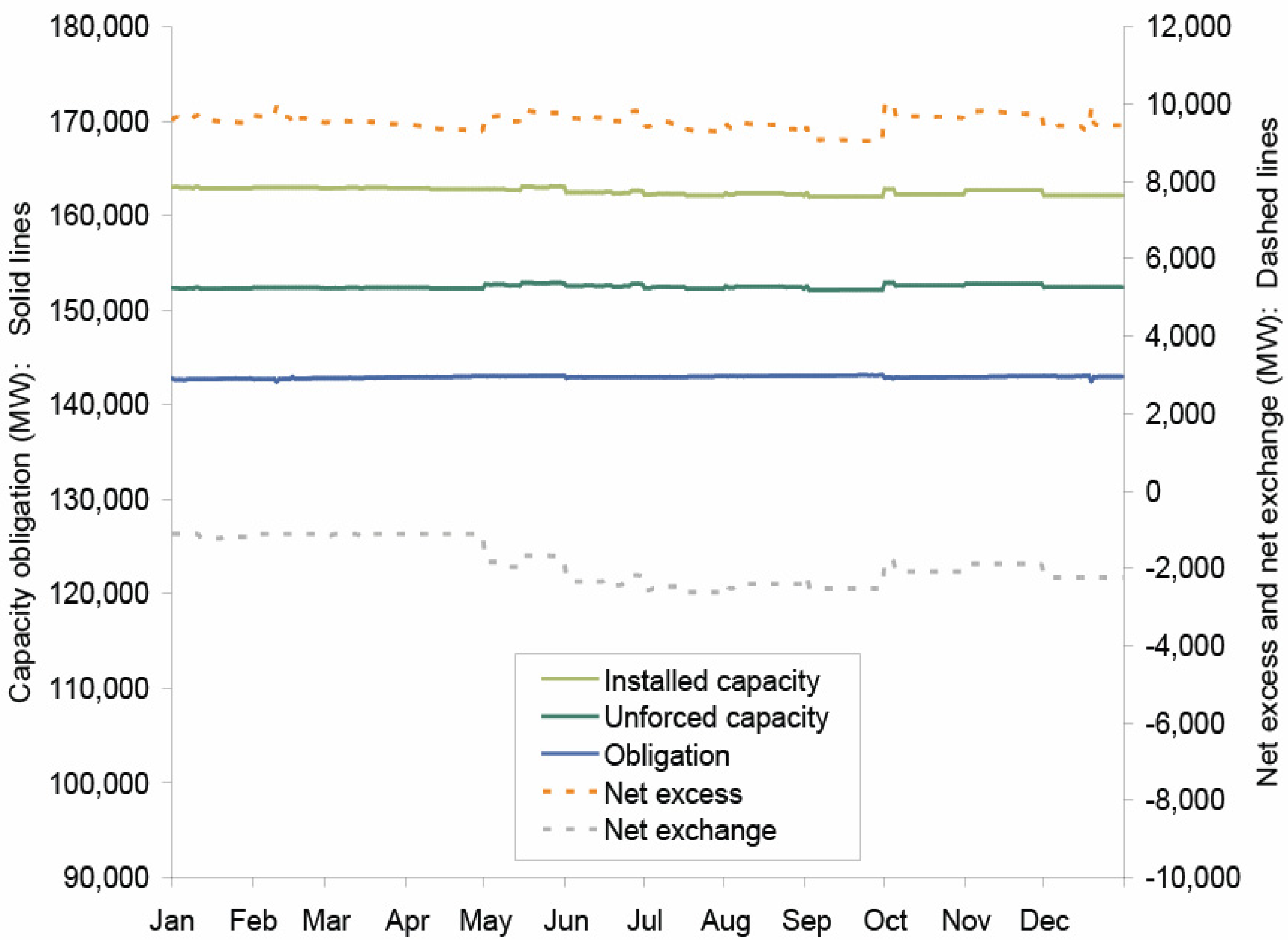

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Figure 5-5 PJM Daily and Monthly/Multimonthly CCM performance: Calendar year 2006

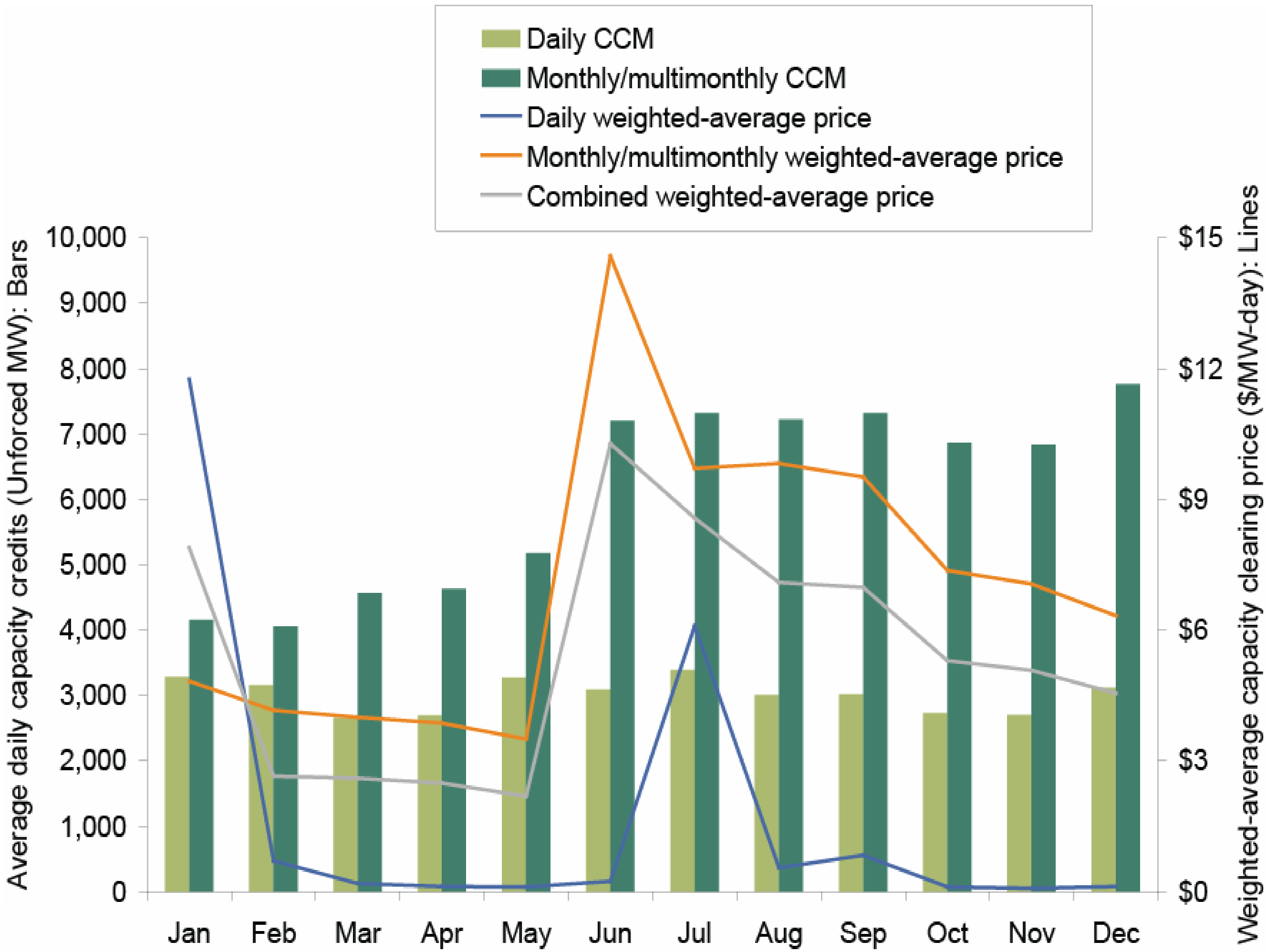

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Figure 5-6 PJM Daily and Monthly/Multimonthly CCM performance: June 1999 to December 2006

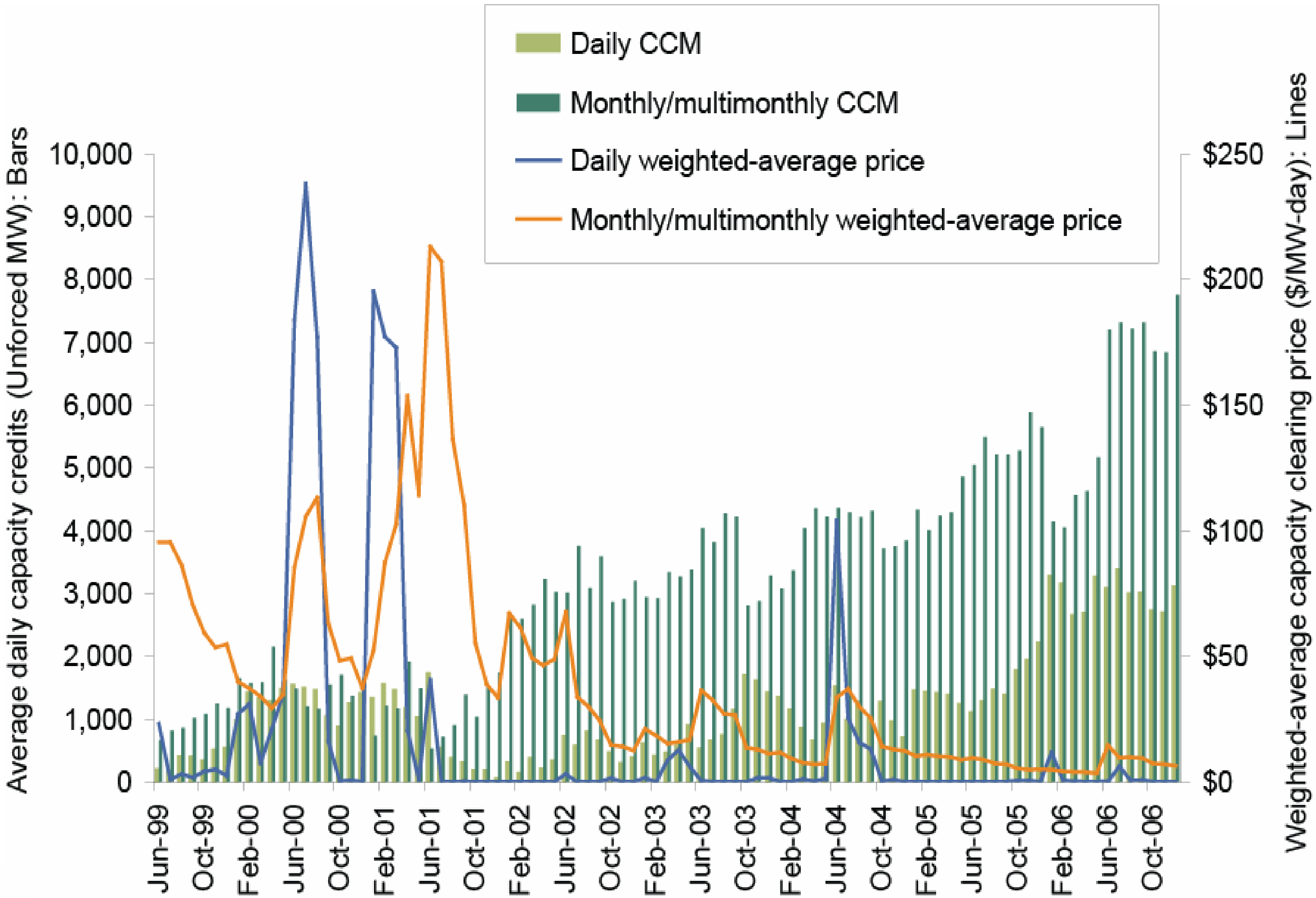

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Figure 5-8 Trends in the PJM equivalent demand forced outage rate (EFORd): Calendar years 2002 to 2006

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Table 6-4 Regulation market pivotal suppliers: Calendar year 2006

Market Definition	Hours with One Pivotal Supplier (Percent)	Hours with Three Pivotal Suppliers (Percent)
Price ≤ RMCP * 1.05	7%	79%
Price ≤ RMCP * 1.5	0%	26%

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Table 7-2 Total annual PJM congestion [Dollars (millions)]: Calendar years 2002 to 2006

	Congestion Charges	Percent Change	Total PJM Billing	Percent of PJM Billing
2002	$453	NA	$4,700	10%
2003	$464	2%	$6,900	7%
2004	$750	62%	$8,700	9%
2005	$2,092	179%	$22,630	9%
2006	$1,603	(23%)	$20,945	8%
Total	$5,362		$63,875	8%

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Table 7-12 Regional constraints summary (By facility): Calendar years 2005 to 2006

			Congestion Costs (Millions)				Event Hours			
			2005		2006		2005		2006	
Constraint	Type	Location	Day Ahead	Balancing	Day Ahead	Balancing	Day Ahead	Real Time	Day Ahead	Real Time
Bedington - Black Oak	Interface	500	$607.3	($25.3)	$486.1	$5.5	4,569	1,924	3,875	1,812
5004/5005 Interface	Interface	500	$216.4	($17.7)	$105.4	$0.6	1,906	782	1,738	341
AP South	Interface	500	$57.1	($0.6)	$76.2	$4.6	441	39	639	237
West	Interface	500	$45.7	($1.2)	$55.5	$0.9	589	370	981	328
Kammer	Transformer	500	$147.7	($8.6)	$41.7	$5.7	3,414	1,749	2,043	688
Doubs - Mount Storm	Line	500	$138.7	($13.1)	$38.0	$0.5	548	545	240	50
Central	Interface	500	$44.8	($0.9)	$15.8	($0.1)	1,261	67	699	15
East	Interface	500	$96.3	($1.8)	$12.9	$0.2	1,371	148	324	11
Fort Martin - Pruntytown	Line	500	$14.7	($0.2)	$5.9	($0.0)	136	21	111	22
Harrison Tap - Kammer	Line	500	$0.1	($0.1)	$0.6	$0.2	1	14	51	52
Elroy - Hosensack	Line	500	$0.0	$0.3	$0.0	$0.0	0	40	0	4
Harrison - Harrison Tap	Line	500	$0.0	($0.1)	$0.0	$0.0	0	26	0	3
Alburtis - Branchburg	Line	500	$0.0	($0.0)	$0.0	$0.0	0	3	0	0
Belmont - Harrison	Line	500	$0.0	($0.3)	$0.0	$0.0	0	4	0	0
Branchburg - Elroy	Line	500	$0.3	($0.3)	$0.0	$0.0	10	8	0	0

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Table 2-66 Demand-side response programs: Summer, 2006

Programs	MW Registered
PJM Programs	
PJM Economic Load-Response Program	1,101
PJM Emergency Load-Response Program	1,081
PJM Active Load-Management Resources	1,679
PJM ALM Resources Included in Load-Response Program	(350)
Total PJM Programs	3,511
Additional Programs Reported By Customers in PJM Survey	
MW under DSR Programs Administered by LSEs' in PJM Territory	
Competitive LSEs' Reported Curtailable Load	138
Distribution LSEs' Reported Direct Load Control Load not in ALM	177
Distribution LSEs' Reported Other Demand Response not in ALM	12
Distribution LSEs' Reported Other (Price-Sensitive) Regulated Retail Rate Load	356
Distribution LSEs' Reported Regulated Interruptible Load	162
Total MW under DSR Programs Administrated by LSEs' in PJM Territory	845
MW with Full and Partial Exposure to Real-Time LMP	
Competitive LSEs' Reported Load - Dynamically Priced	1,644
Competitive LSEs' Reported Load - Other Contract Mechanism	109
Distribution LSEs' Reported LMP-Based Load	594
Total MW with Full and Partial Exposure to Real-Time LMP	2,347
Net Load, Including Survey Responses	6,703

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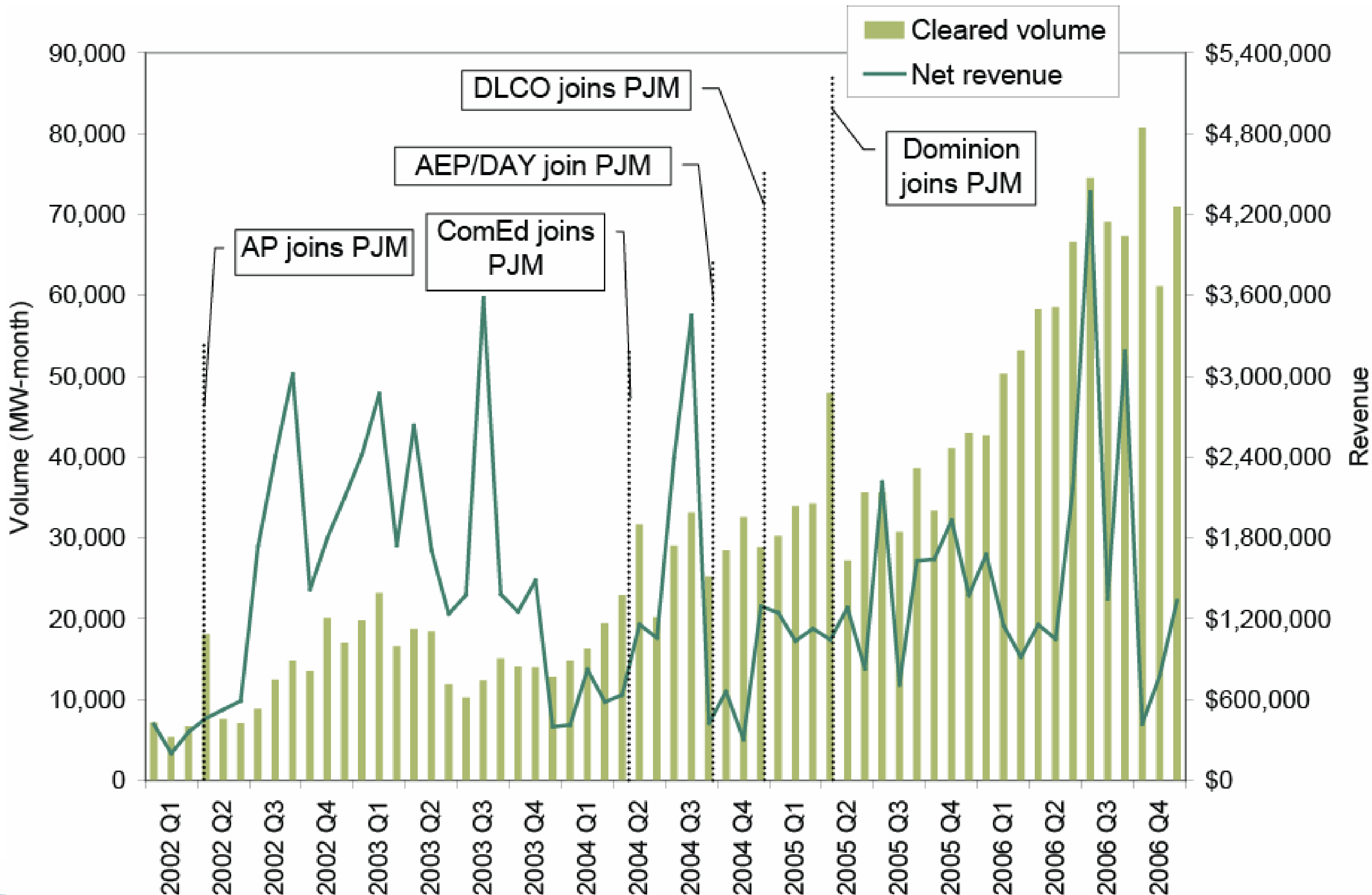
Figure 8-7 Monthly FTR auction cleared volume and net revenue: Calendar years 2002 to 2006



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