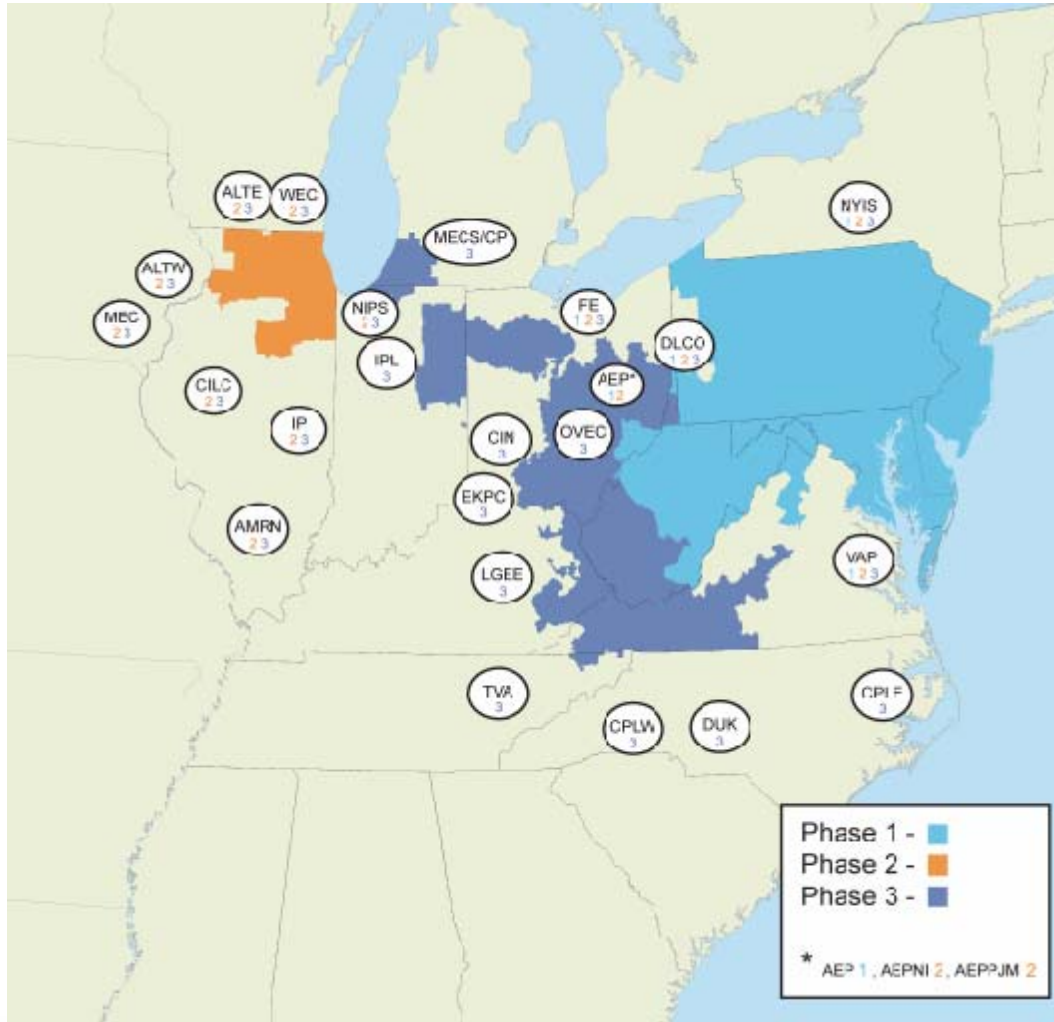


# State of the Market Report 2004

Briefing  
Washington, D.C.  
March 8, 2005

Joseph E. Bowring  
Market Monitor



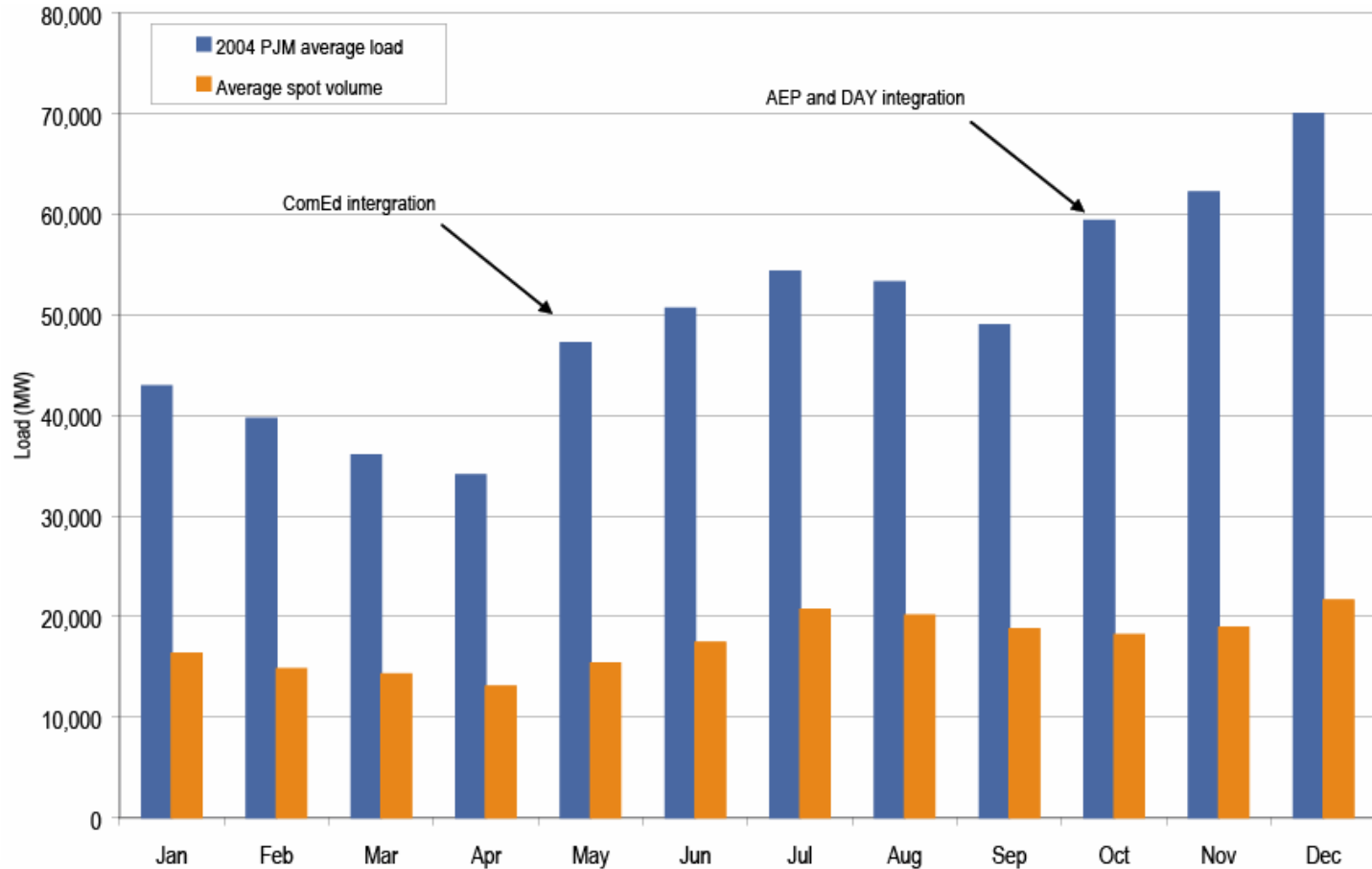
- Independent Internal Market Monitoring
  - Independent System Operator
  - ISO/RTO has no financial stake in market outcomes
  - ISO/RTO has independent Board
  - ISO and MMU are independent from all market participants
  - MMU is independent from ISO
  
- MMU Accountability
  - To FERC (per FERC MMU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

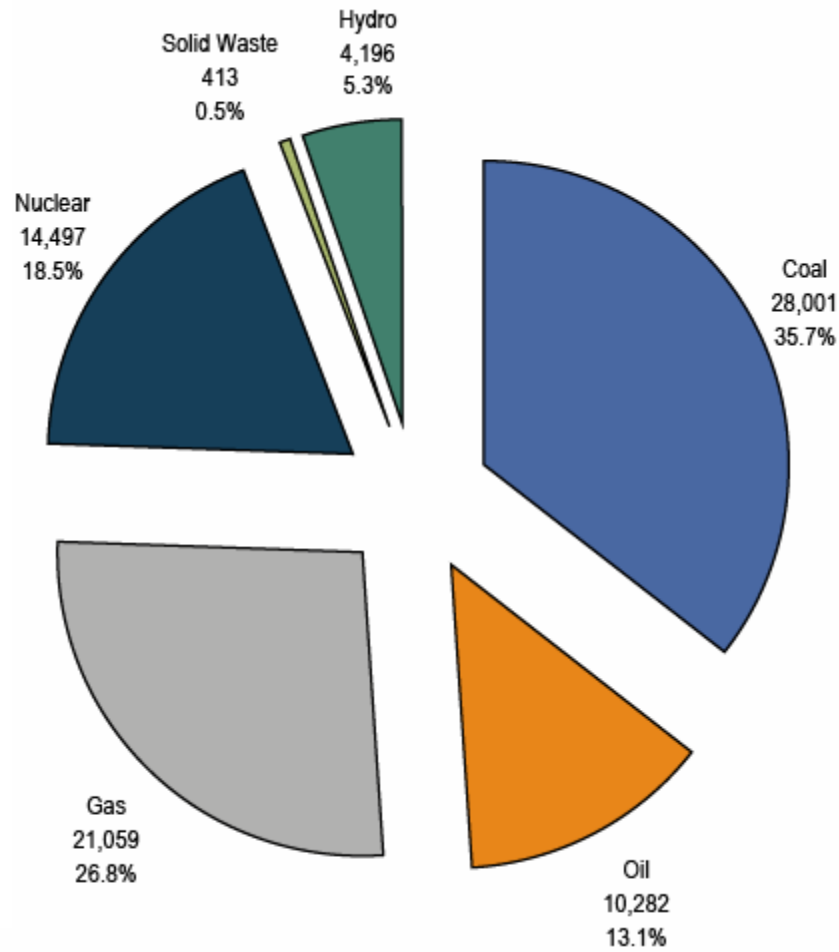
- Develop/modify market rules to **facilitate competition**
- **Limit returns to market power**
- Provide **incentives to competitive behavior**
- Make **exercise of market power more difficult**

- **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

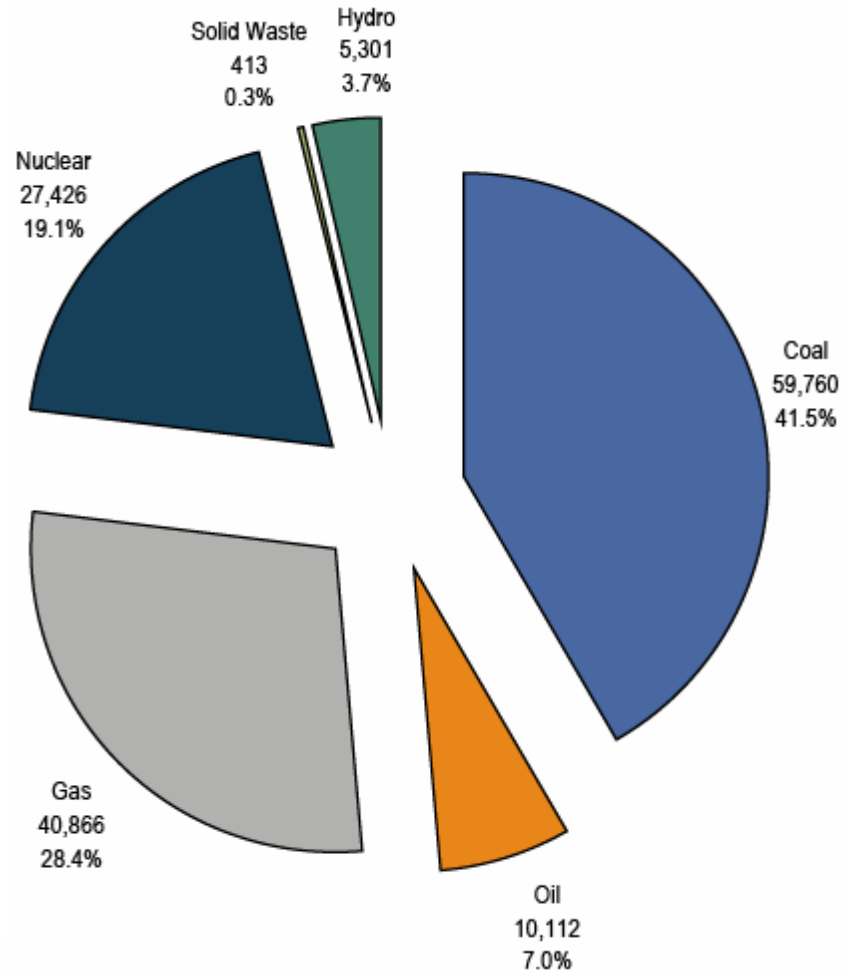


# PJM capacity by fuel source: At January 1, 2004

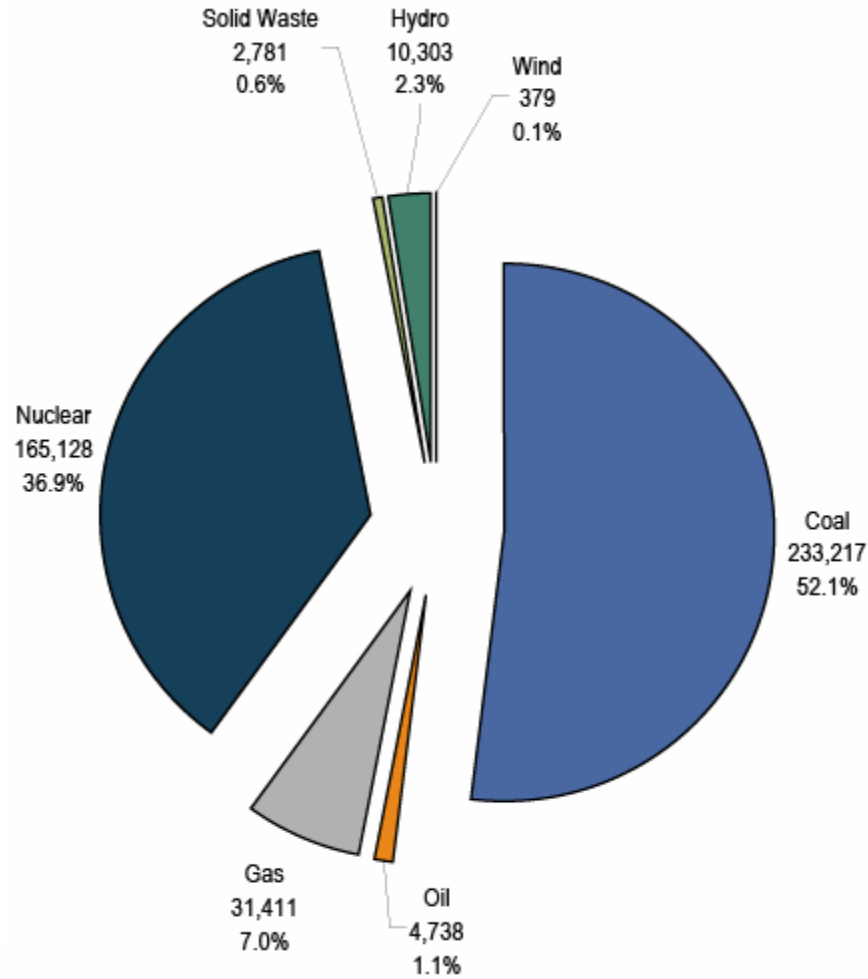




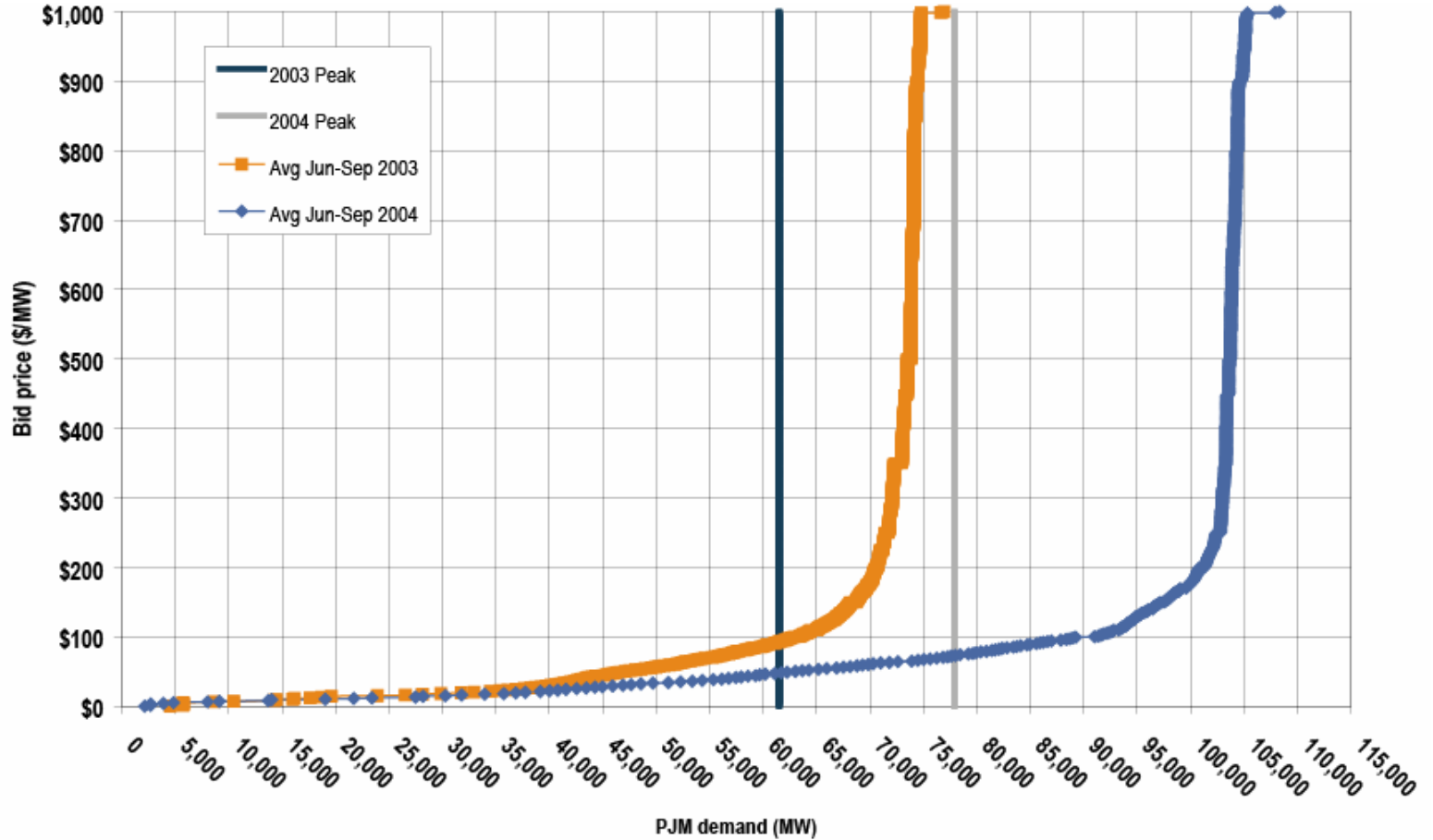
# PJM capacity by fuel source: At December 31, 2004



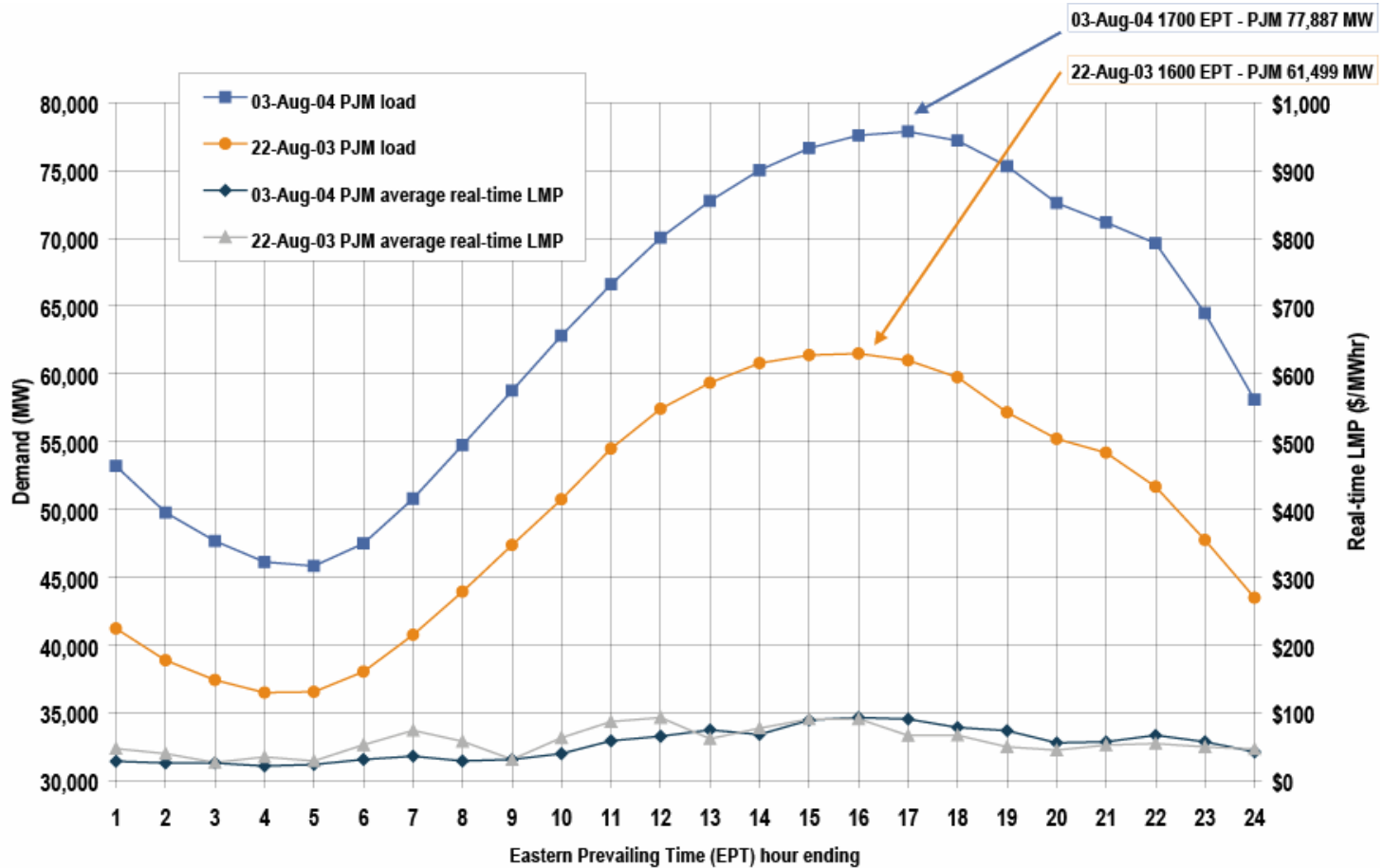
# PJM generation by fuel source (GWh): Calendar year 2004



# Average PJM aggregate supply curves: Summers 2003 and 2004



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



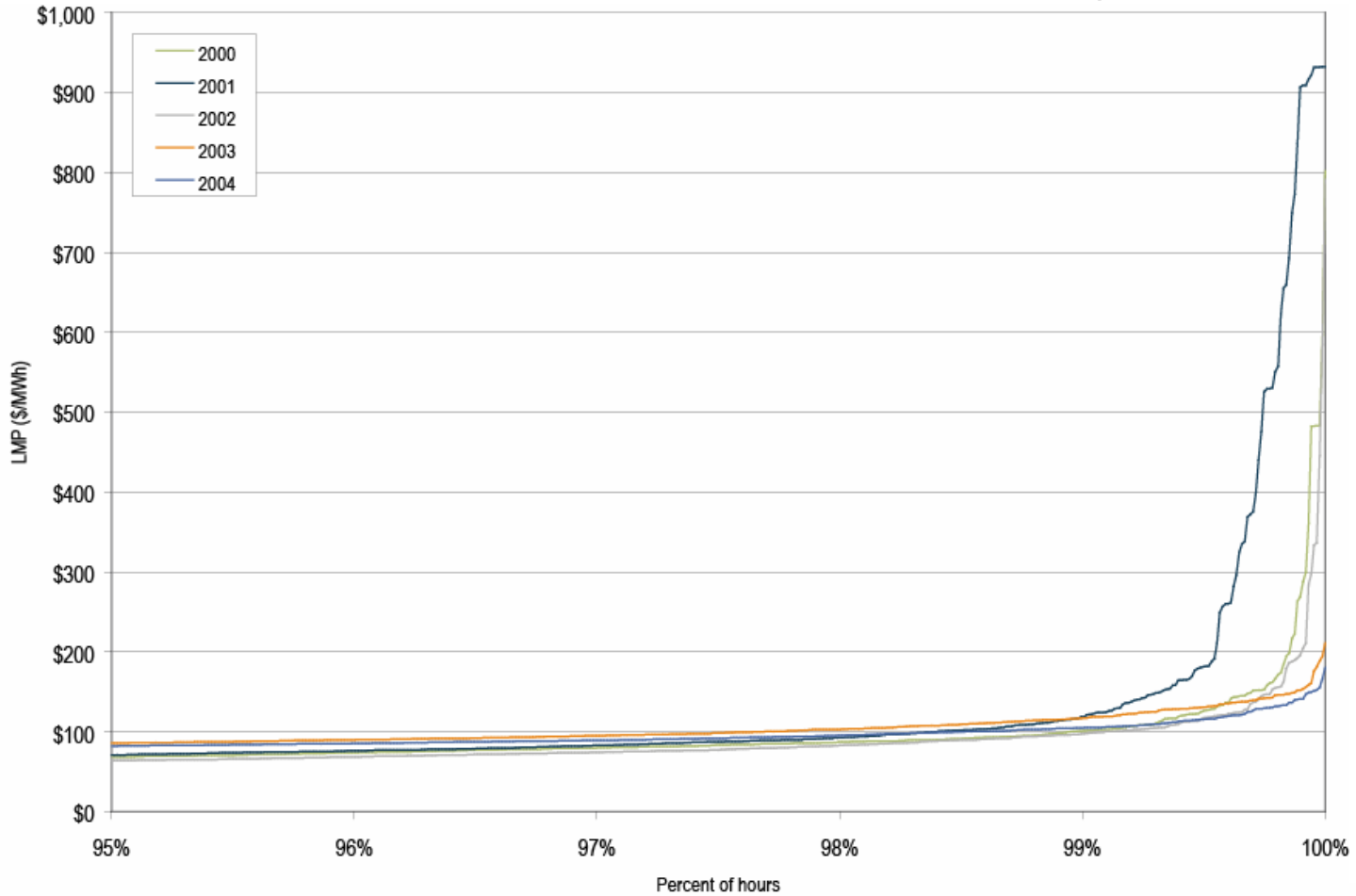


# PJM average hourly LMP (Dollars per MWh): Calendar years 1998 to 2004

|      | 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

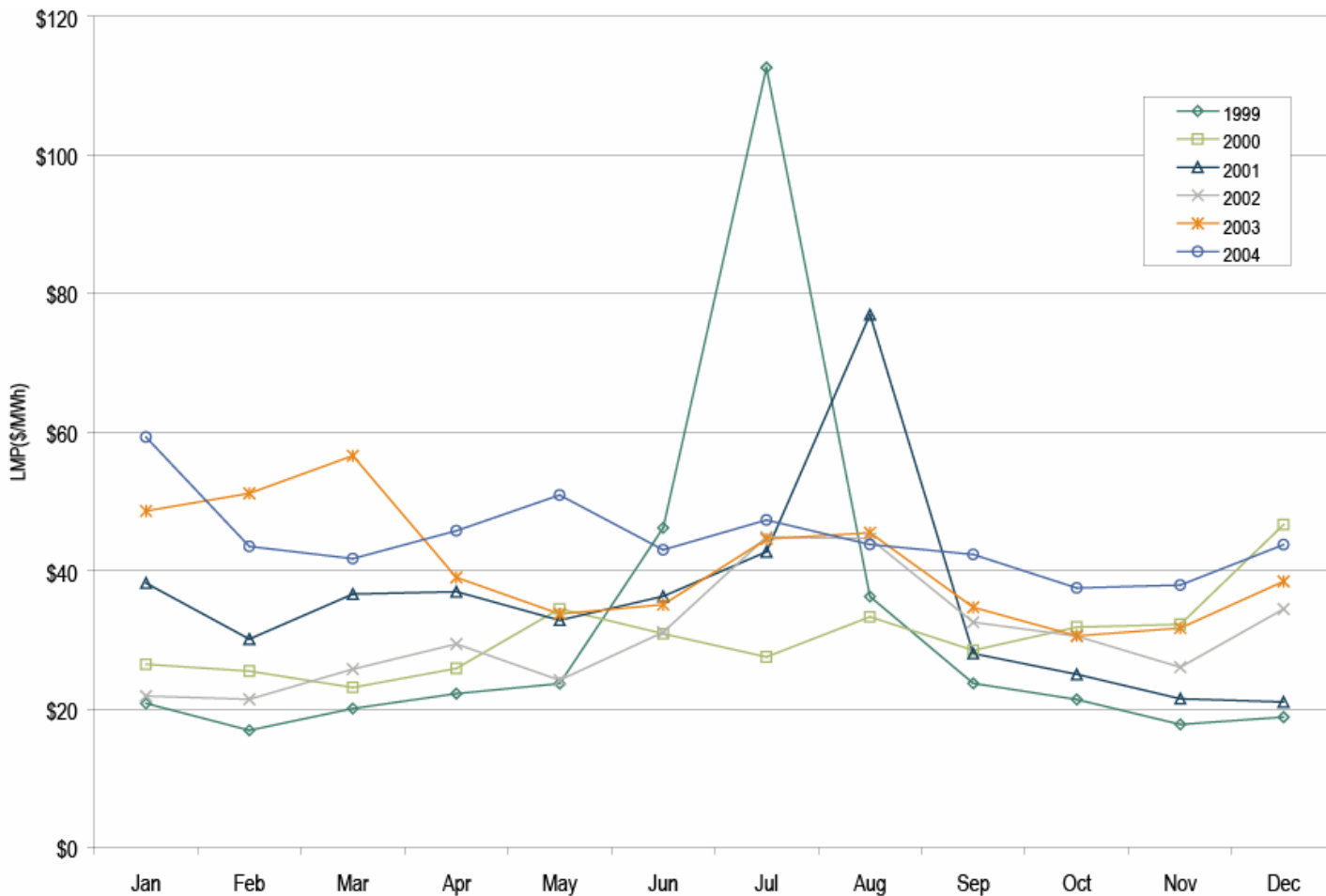




PJM load-weighted, average LMP (Dollars per MWh):  
Calendar years 1998 to 2004

|      | 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







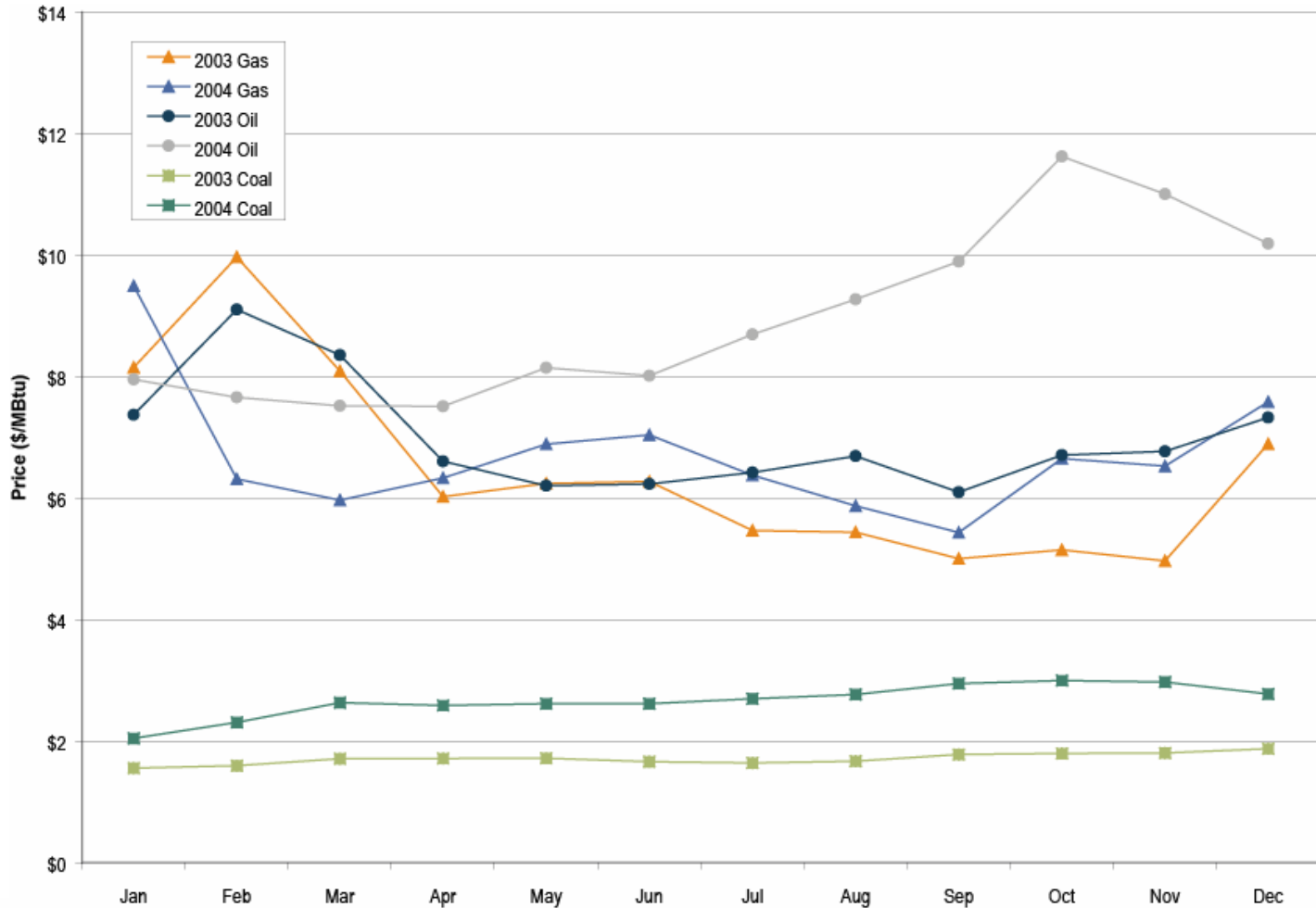
# PJM fuel-cost-adjusted, load-weighted LMP (Dollars per MWh): Calendar years 2003 to 2004

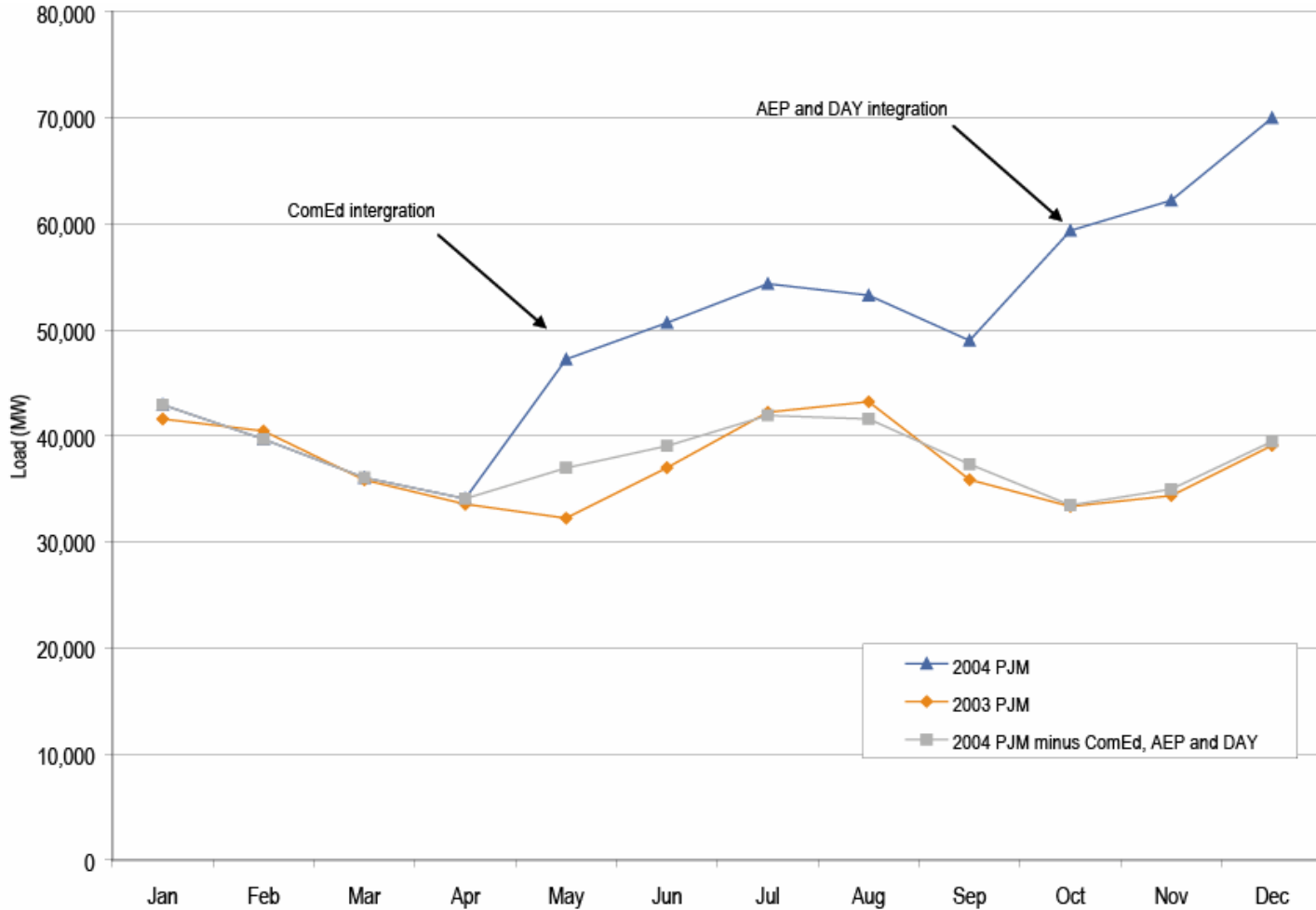
|                           | 2003    | 2004    | Change |
|---------------------------|---------|---------|--------|
| <b>Average LMP</b>        | \$41.23 | \$39.49 | -4.2%  |
| <b>Median LMP</b>         | \$34.95 | \$34.47 | -1.4%  |
| <b>Standard Deviation</b> | \$25.40 | \$20.81 | -18.1% |

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

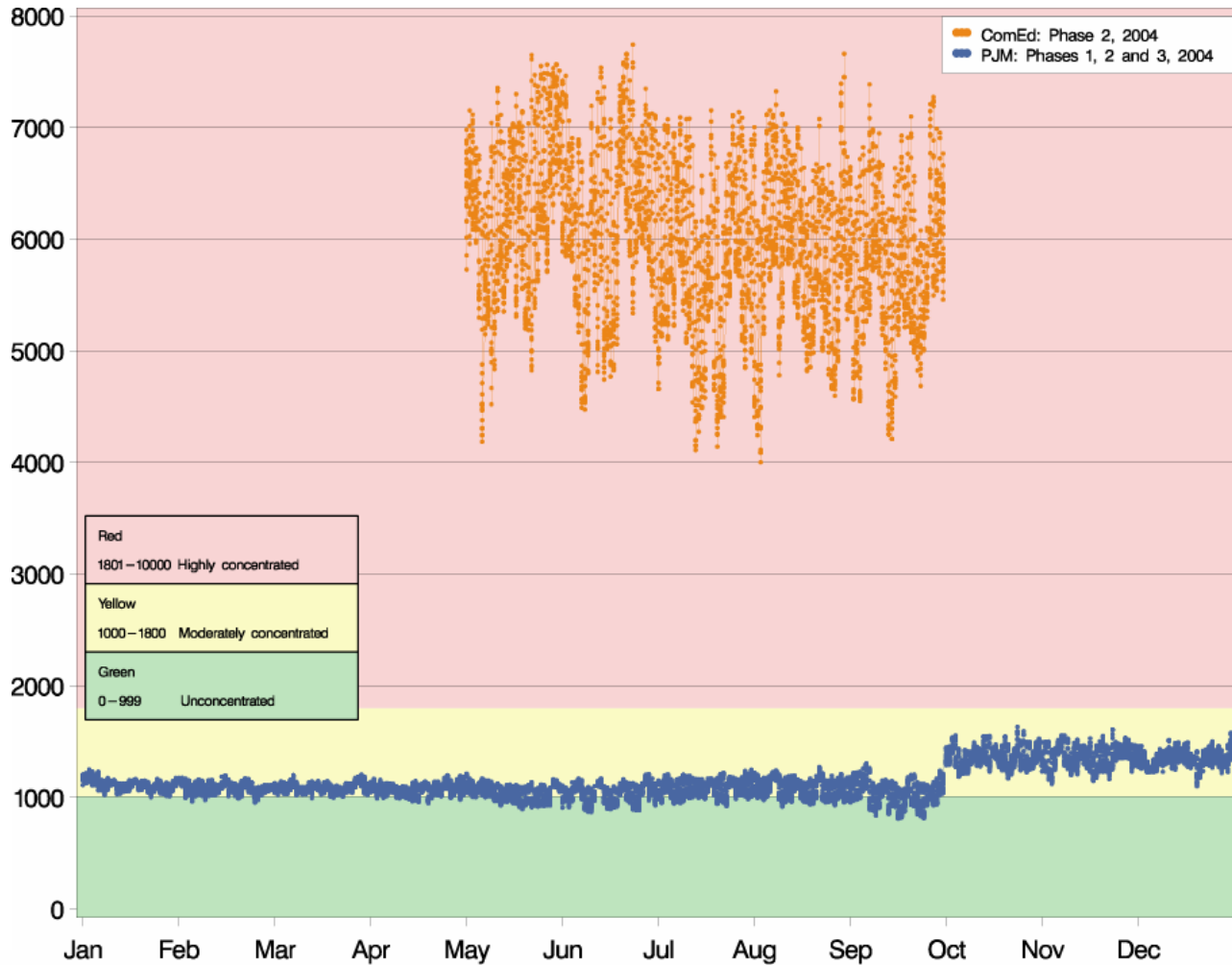
| Fuel Type   | 2000 | 2001 | 2002 | 2003 | 2004 | Phase 2 |     |
|-------------|------|------|------|------|------|---------|-----|
|             |      |      |      |      |      | ComEd   | PJM |
| Coal        | 48%  | 49%  | 55%  | 52%  | 56%  | 86%     | 41% |
| Misc        | 0%   | 0%   | 0%   | 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% |

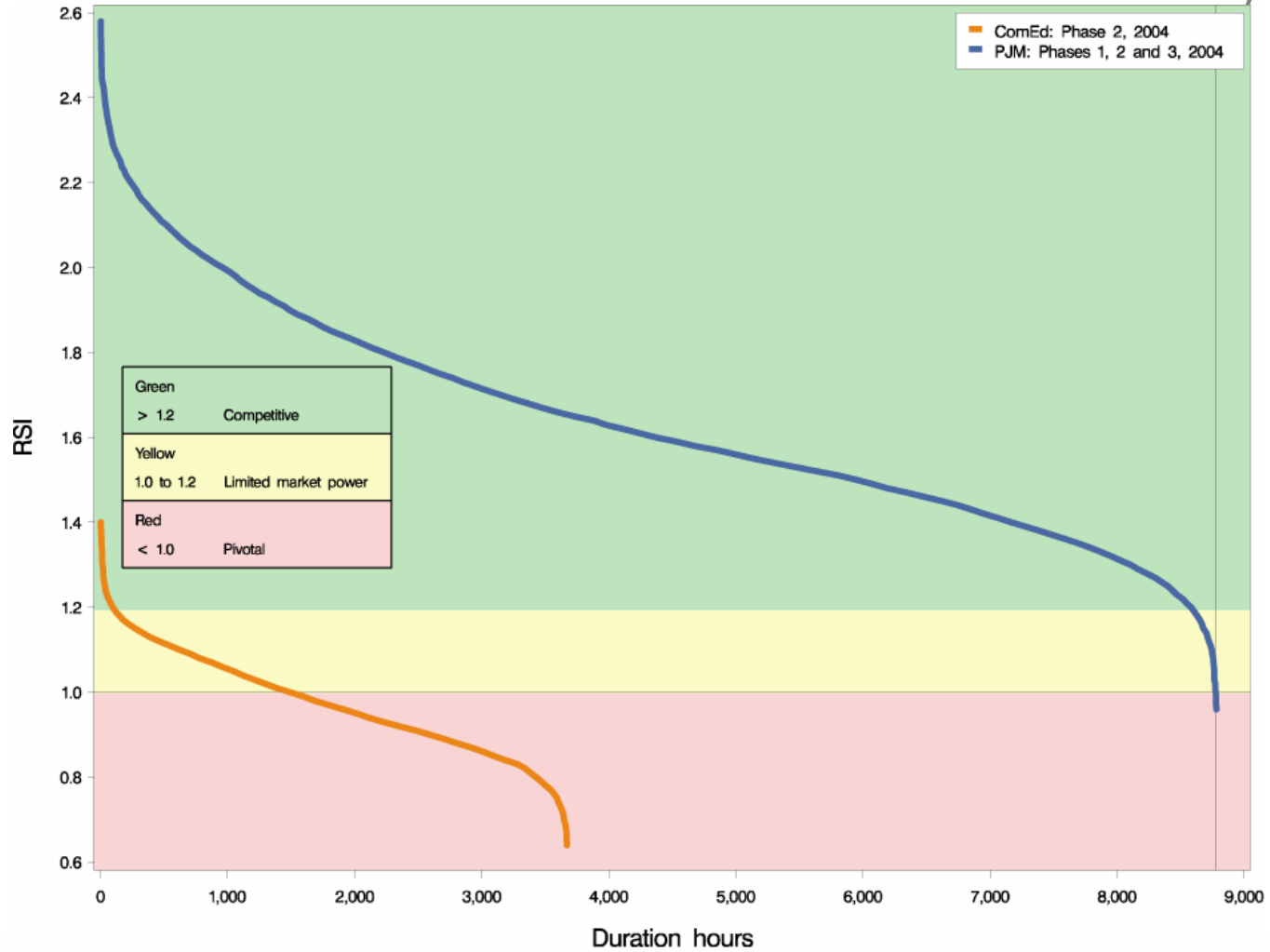
# Spot fuel price comparison: Calendar years 2003 to 2004



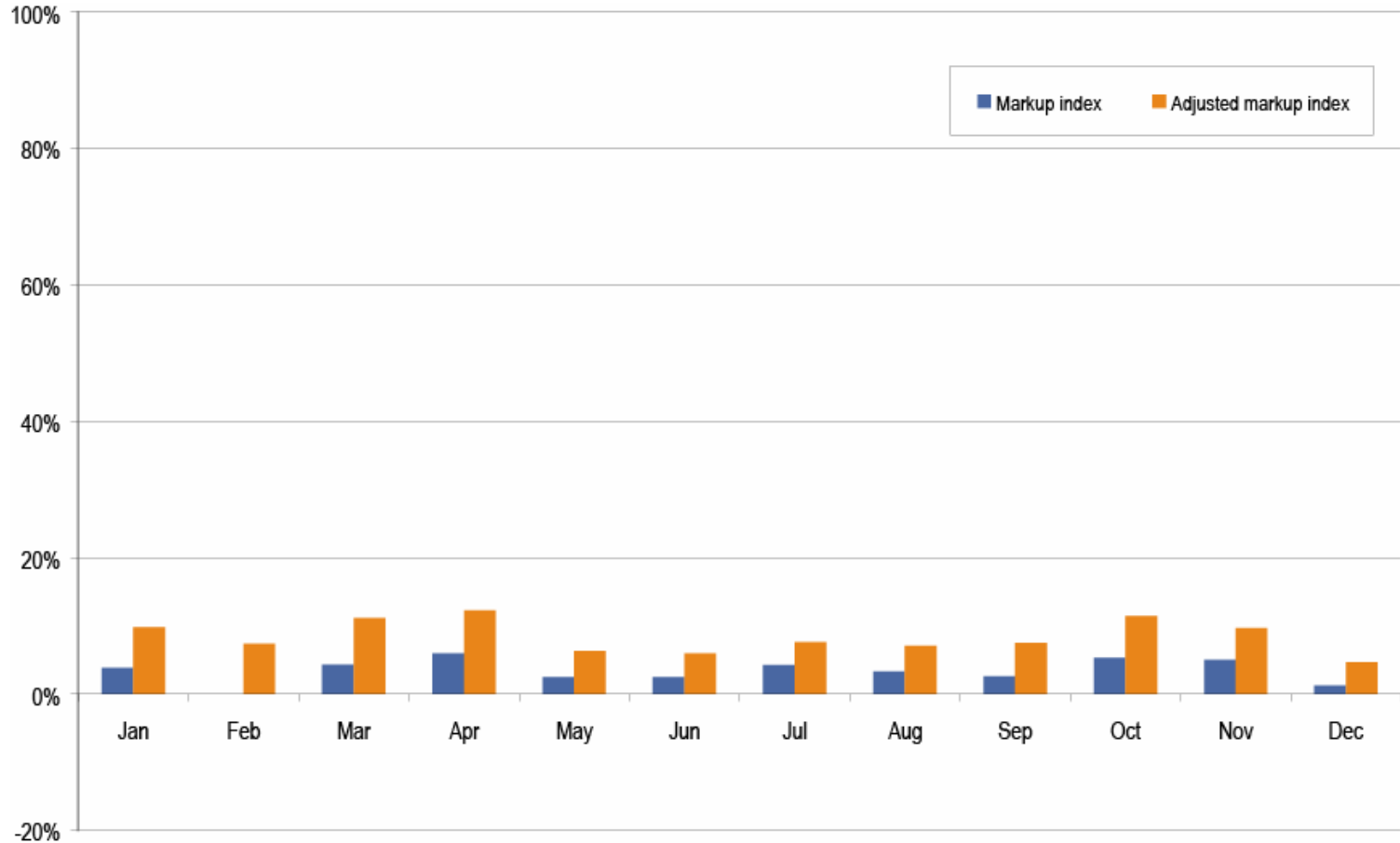


# PJM and ComEd hourly Energy Market HHI: Phases 1, 2 and 3, 2004





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

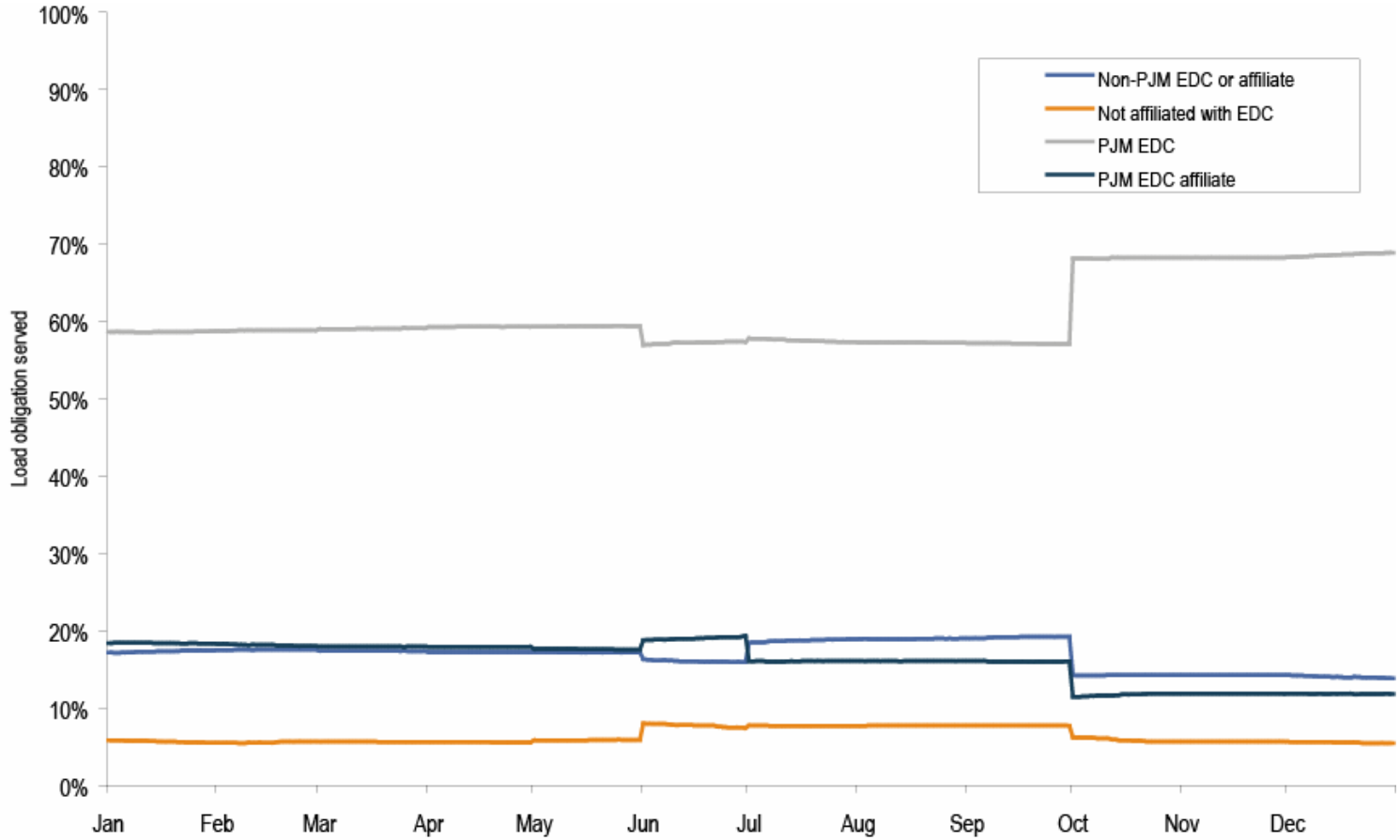


# Average real-time, offer-capped MW: Calendar years 2001 to 2004

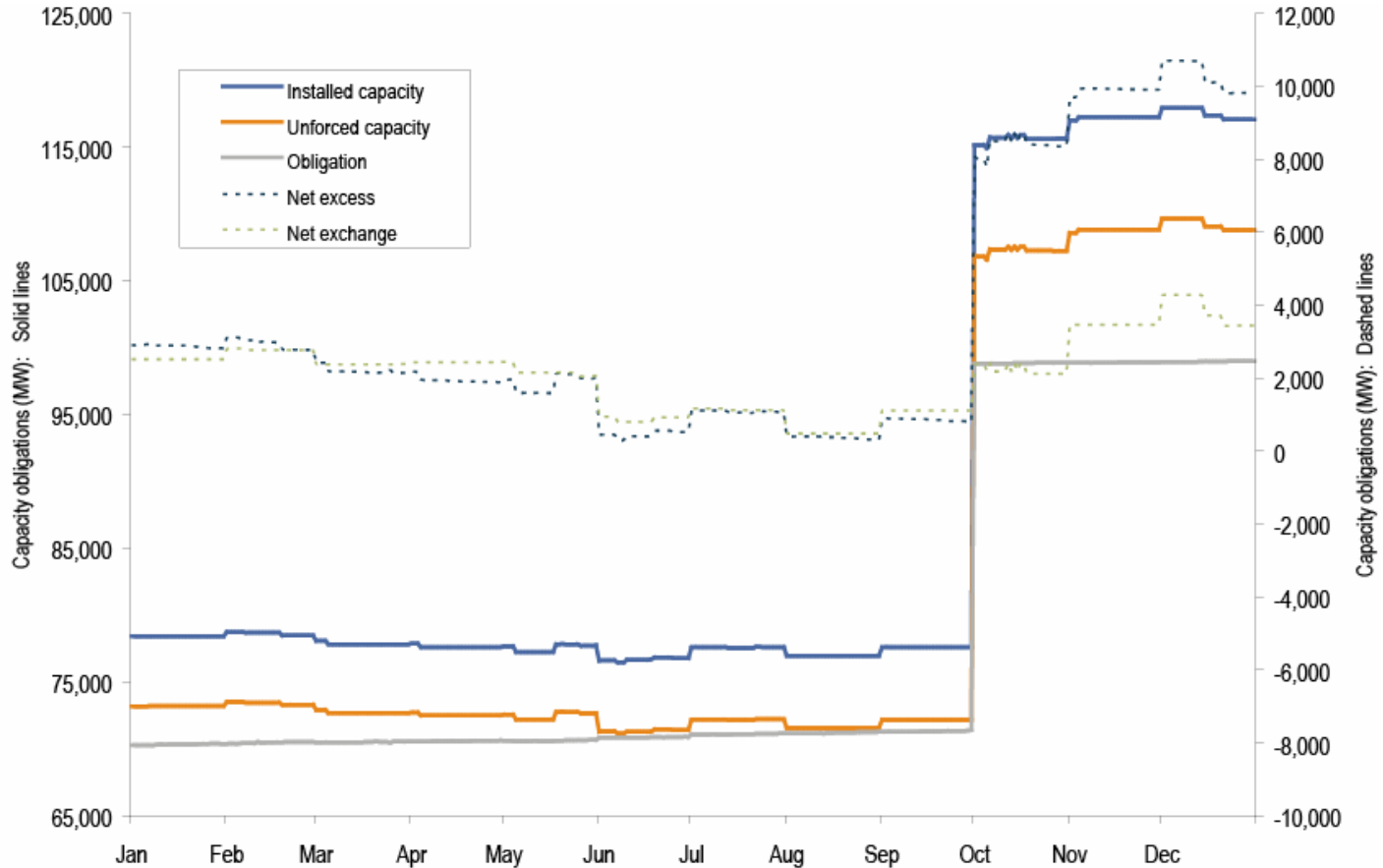
|     | 2001              |         | 2002              |         | 2003              |         | 2004              |         |
|-----|-------------------|---------|-------------------|---------|-------------------|---------|-------------------|---------|
|     | Average MW Capped | Percent | Average 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%    |



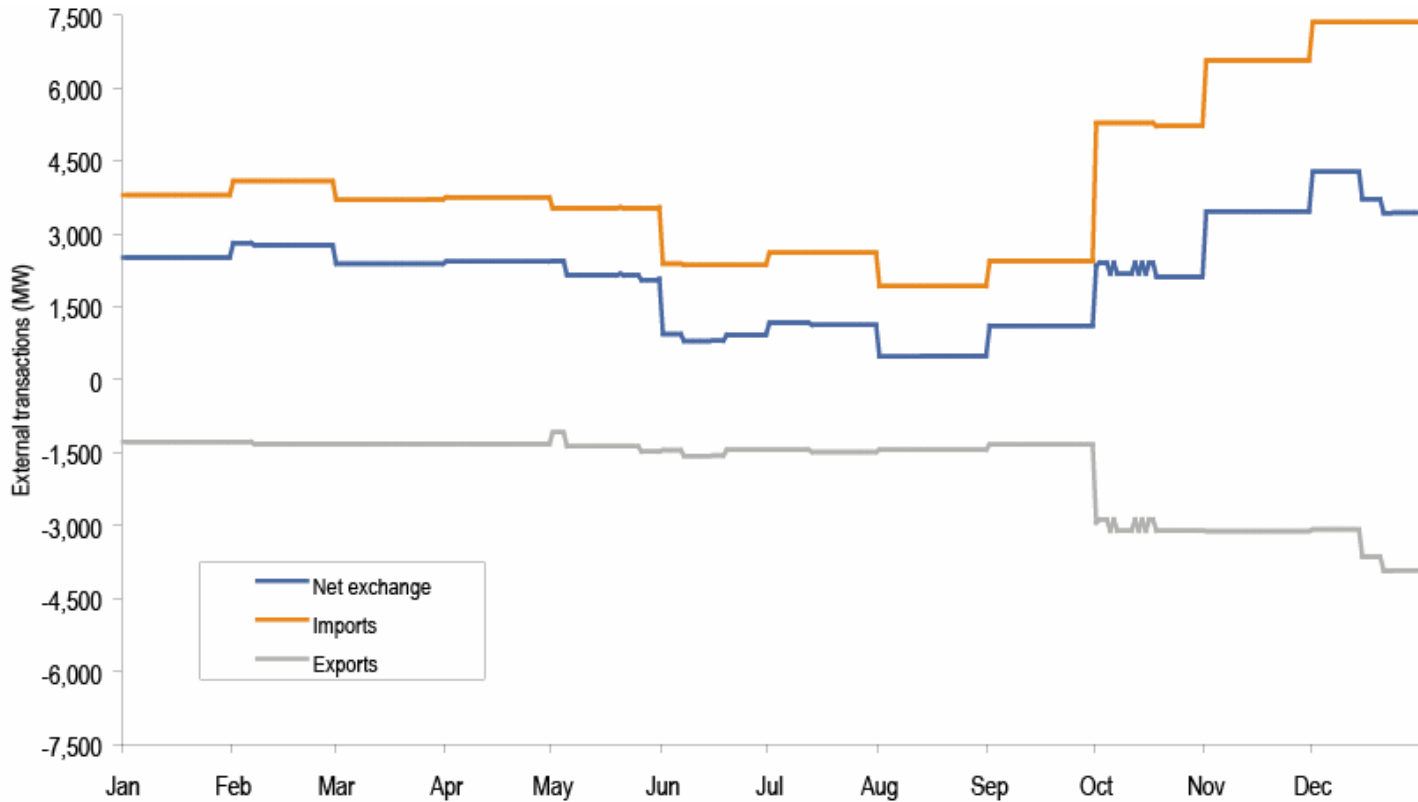
# PJM Capacity Market load obligation served (Percent): Calendar year 2004



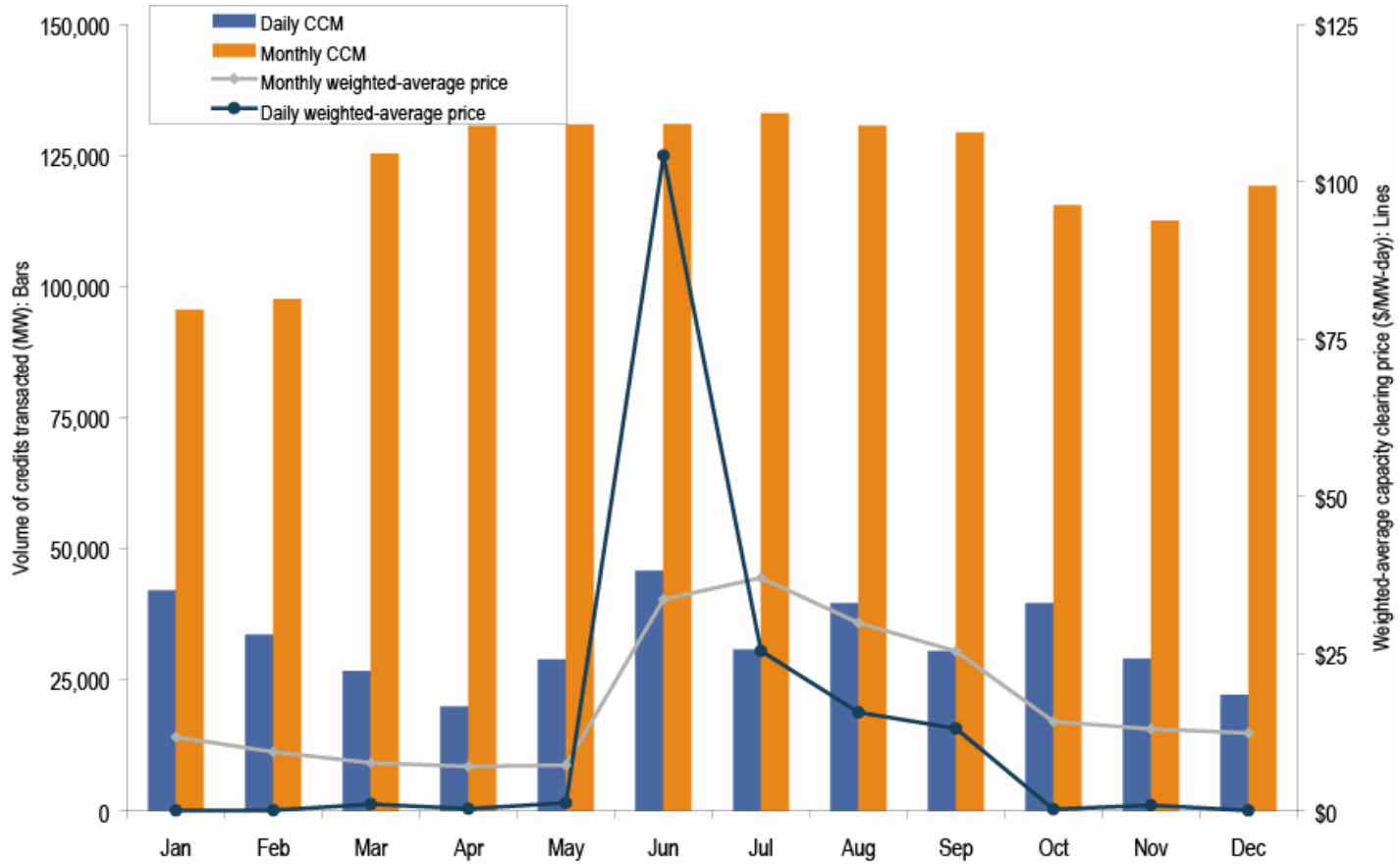
# Capacity obligations to the PJM Capacity Market: Calendar year 2004



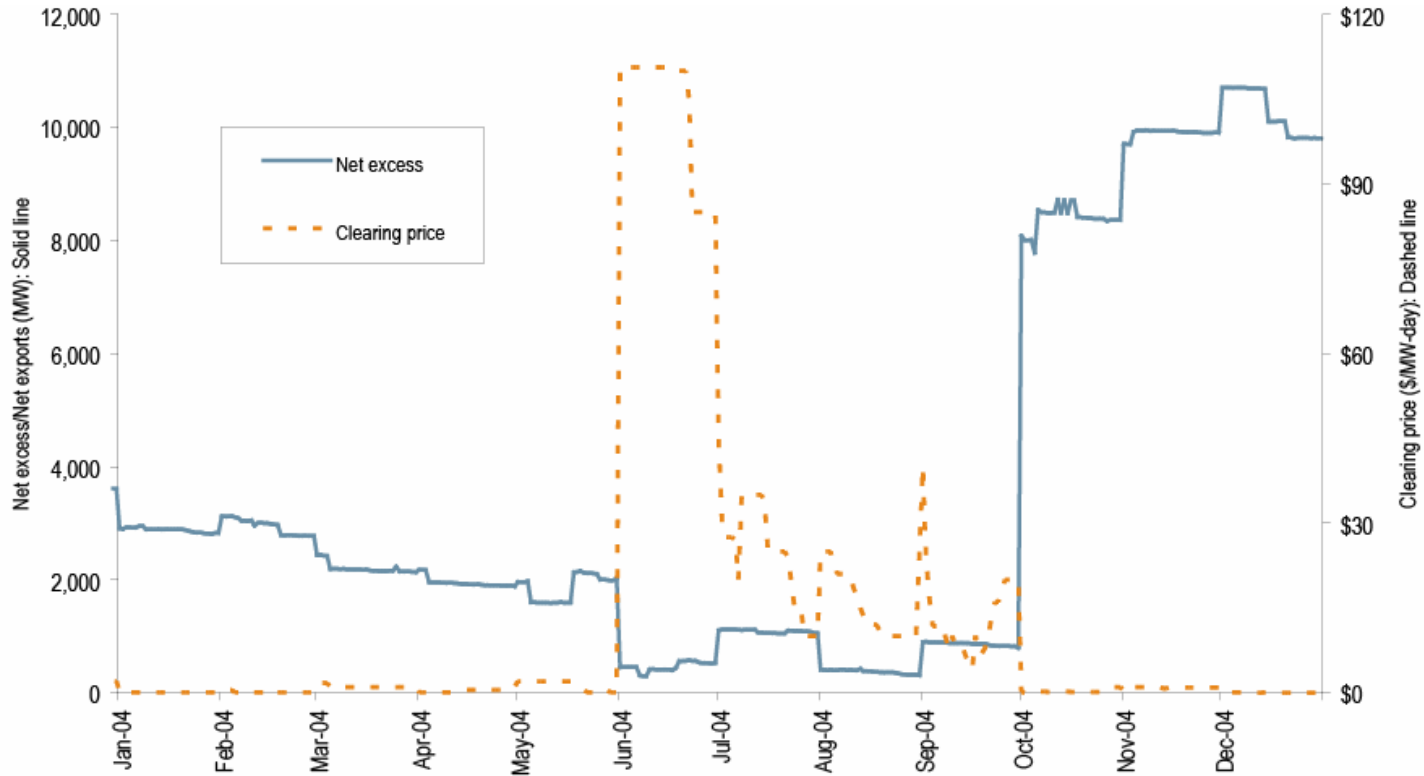
# External PJM Capacity Market transactions: Calendar year 2004



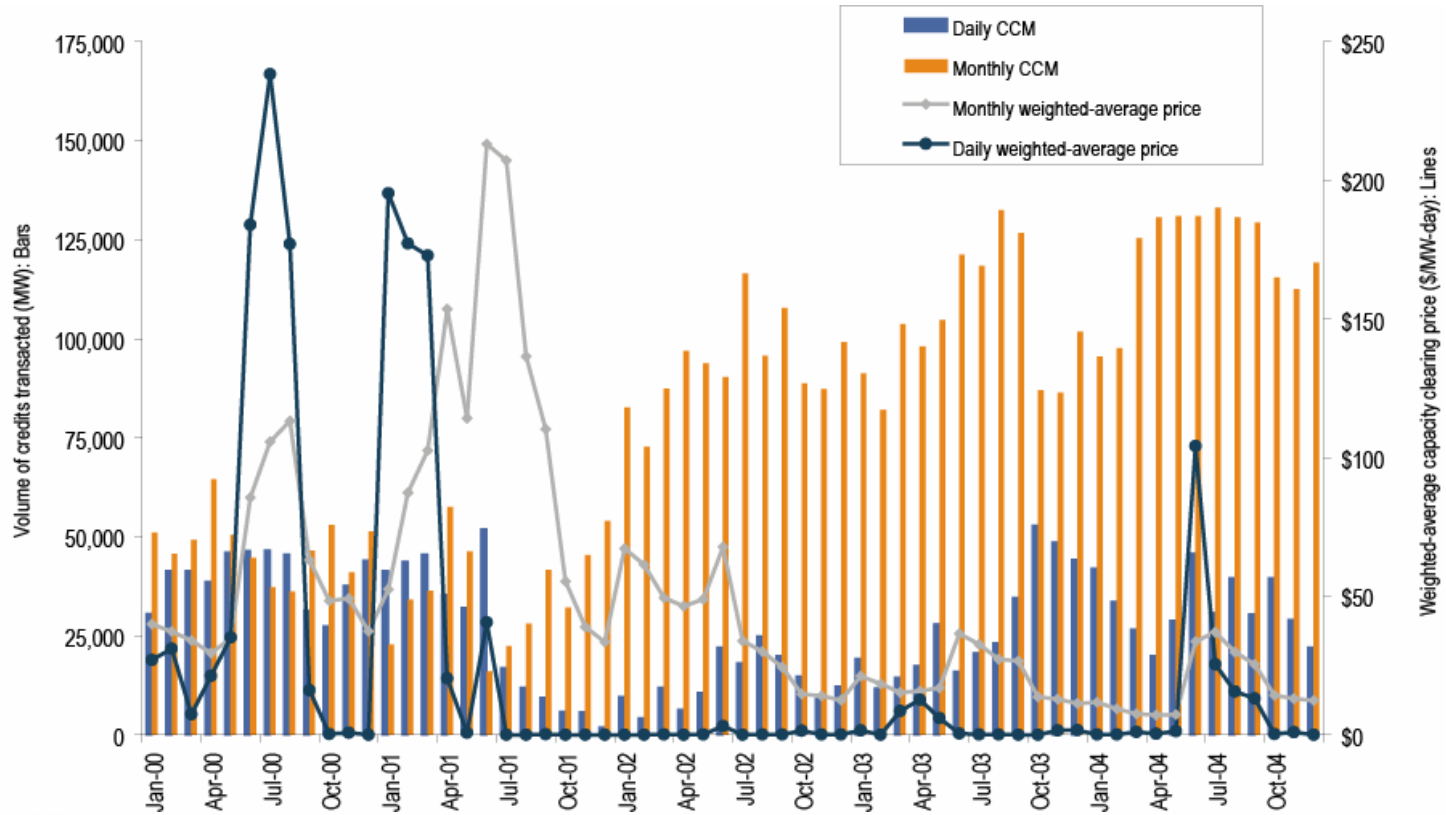
# PJM Daily and Monthly Capacity Credit Market (CCM) performance: Calendar year 2004



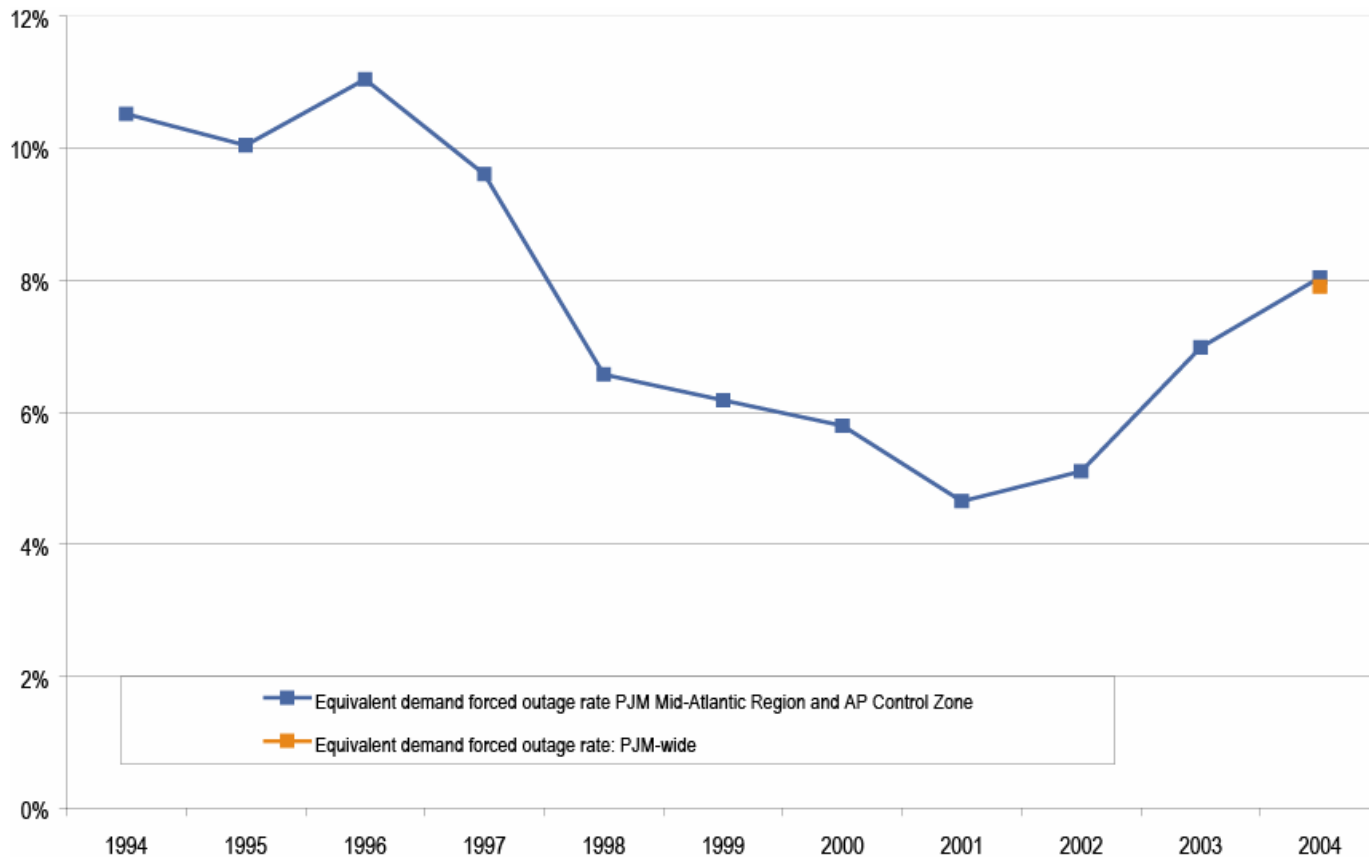
# The PJM Capacity Market's net excess vs. capacity credit market-clearing prices: Calendar year 2004



# 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

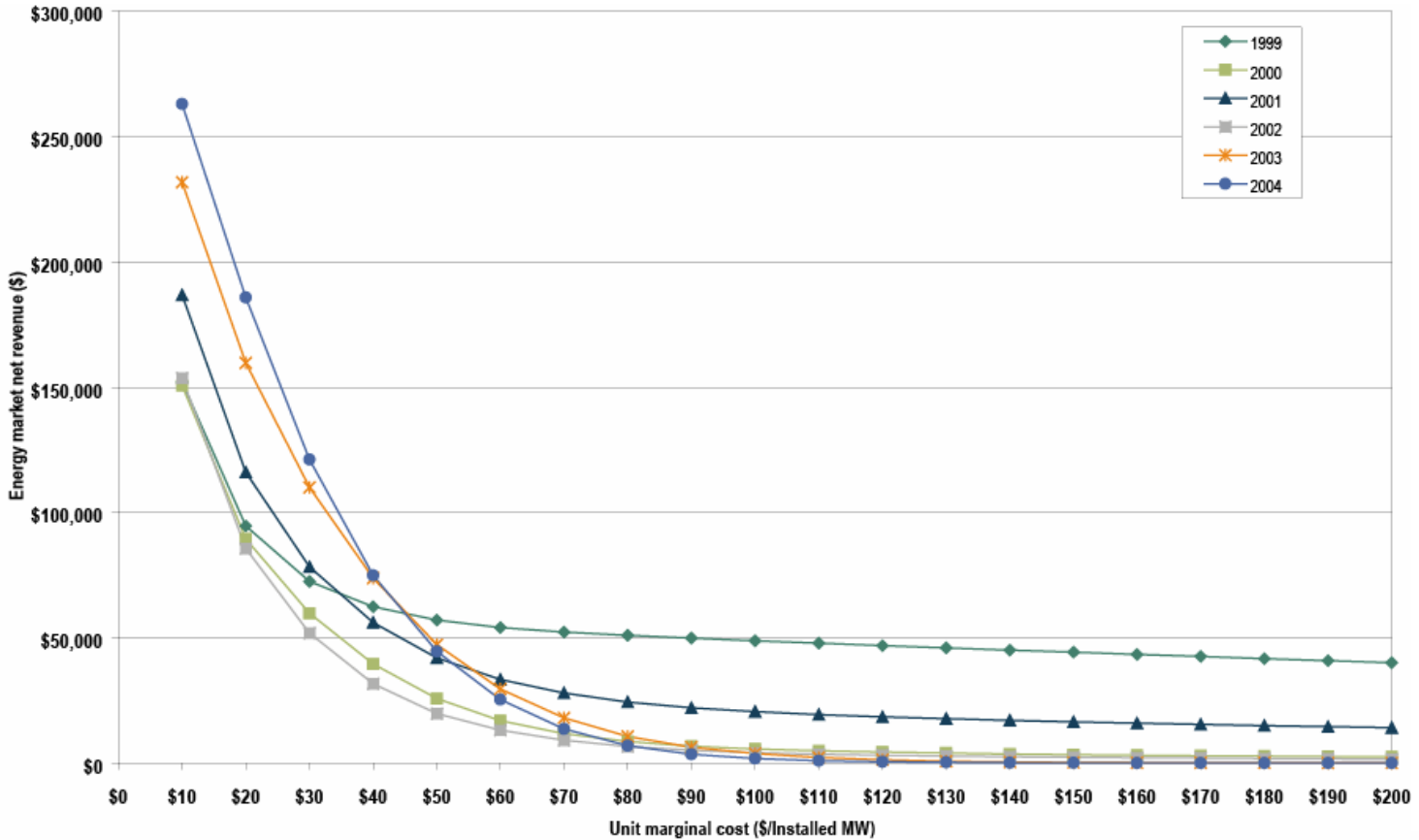




Table 1.

| 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   |

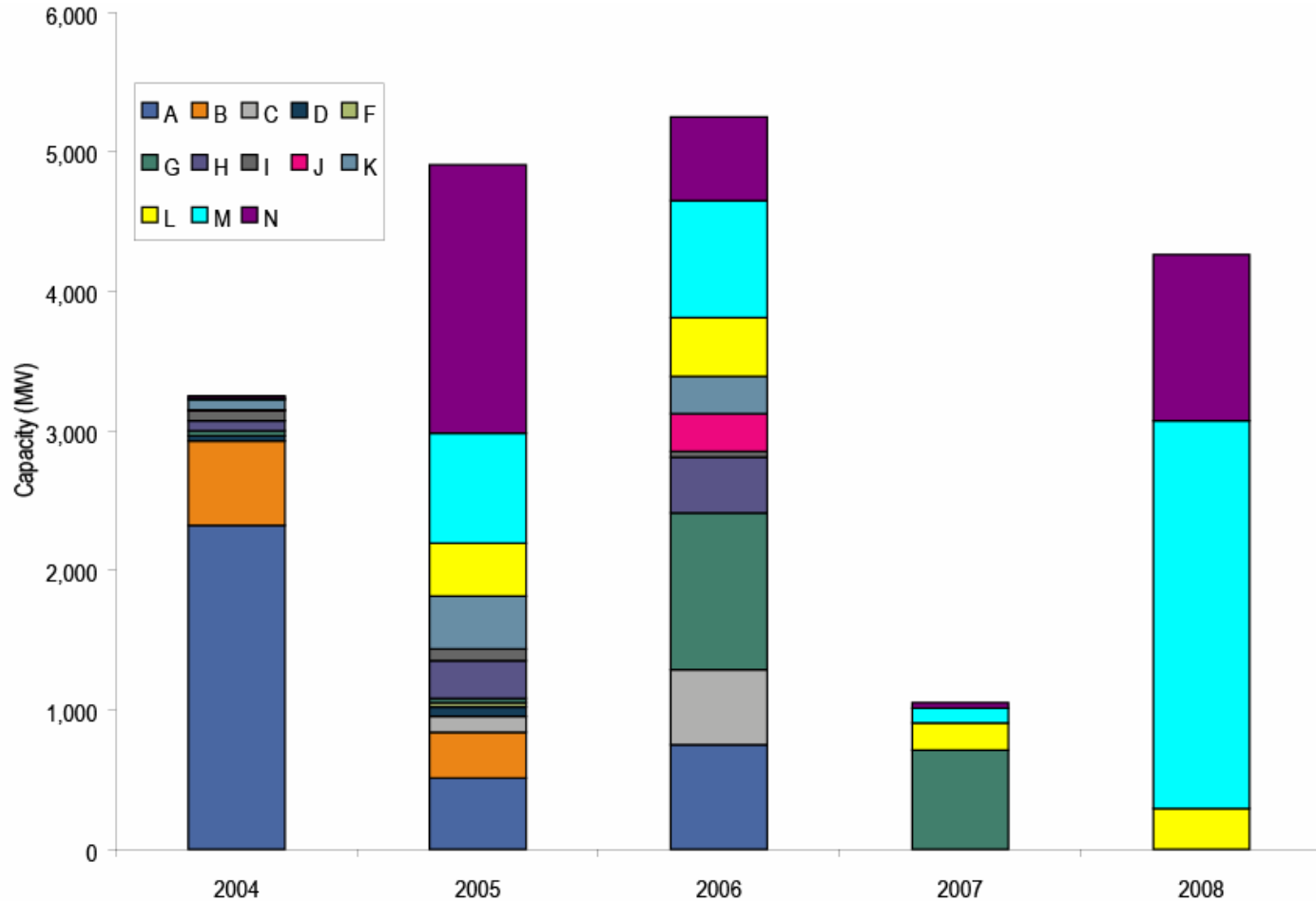
Table 2.

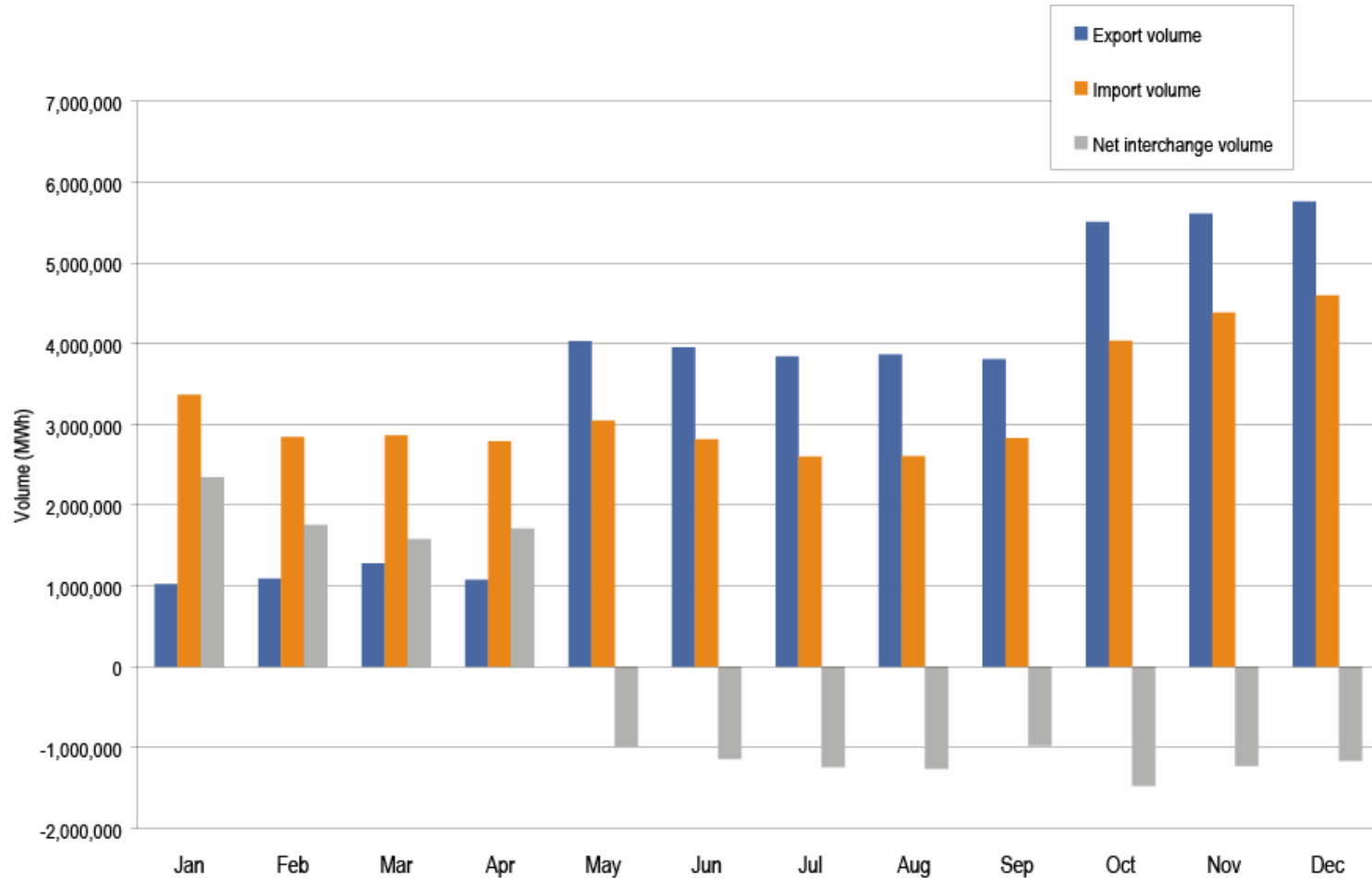
| Unit Type               | First Year Operating Fixed Cost | 20 Year Levelized Fixed Cost | Perfect Dispatch Net Revenue 2004 | Realistic Dispatch Net Revenue 2004 |
|-------------------------|---------------------------------|------------------------------|-----------------------------------|-------------------------------------|
| 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                           |

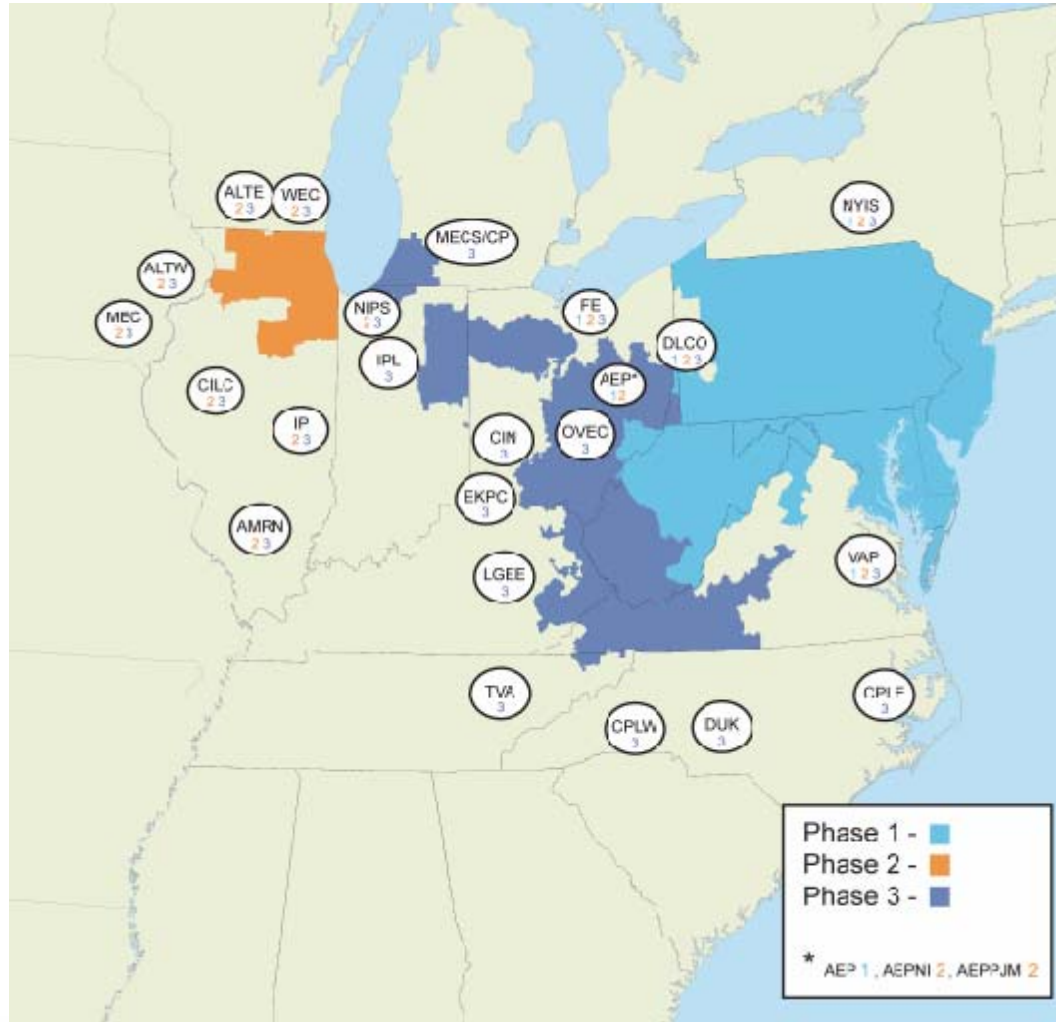
# New entrant first year and 20-year levelized fixed costs by plant type (Dollars per installed MW-year)

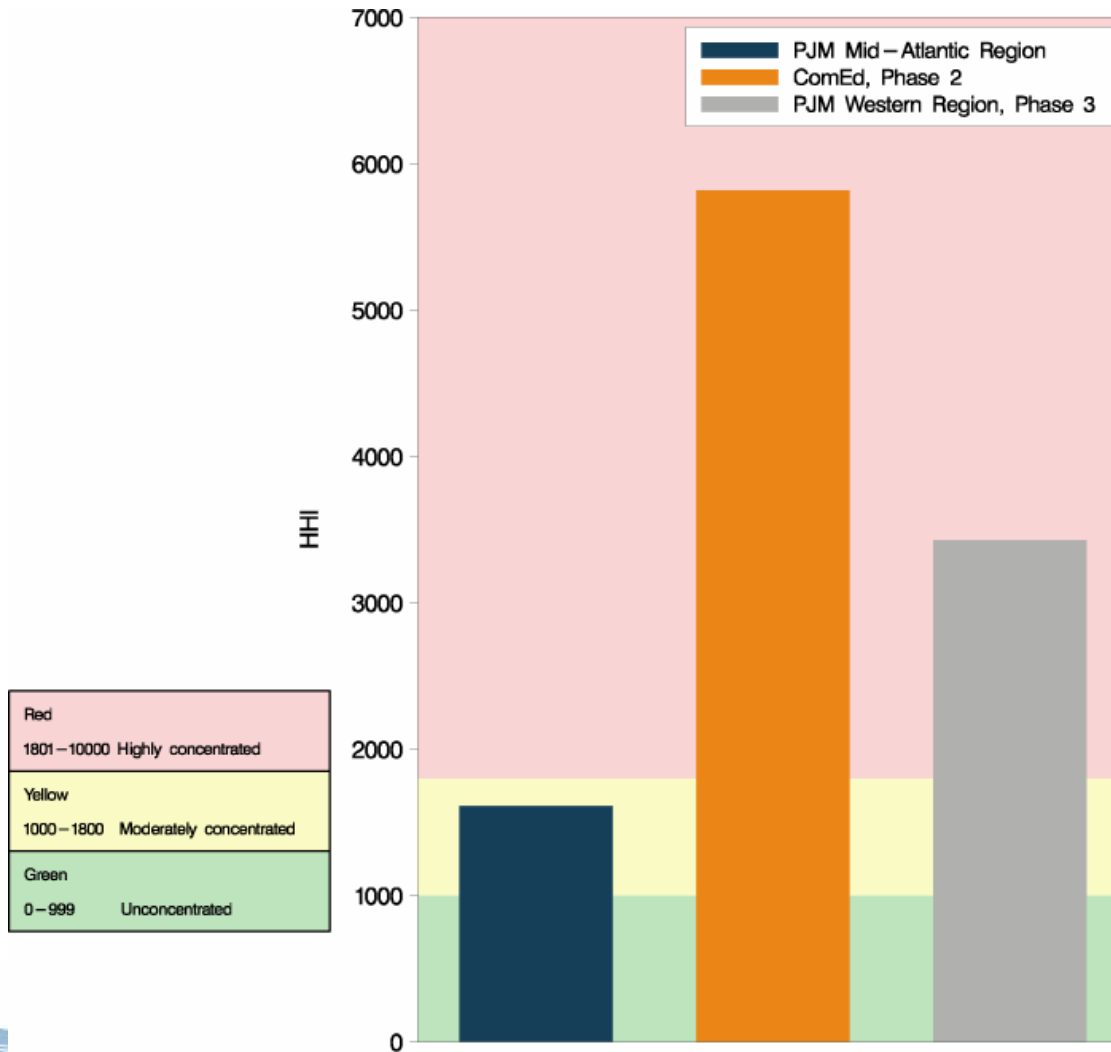
|           | <b>First Year<br/>Fixed Cost</b> | <b>20-Year Levelized<br/>Fixed Cost</b> |
|-----------|----------------------------------|---|
| <b>CP</b> | <b>\$178,019</b>                 | <b>\$208,247</b>                        |
| <b>CC</b> | <b>\$79,969</b>                  | <b>\$93,549</b> 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

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



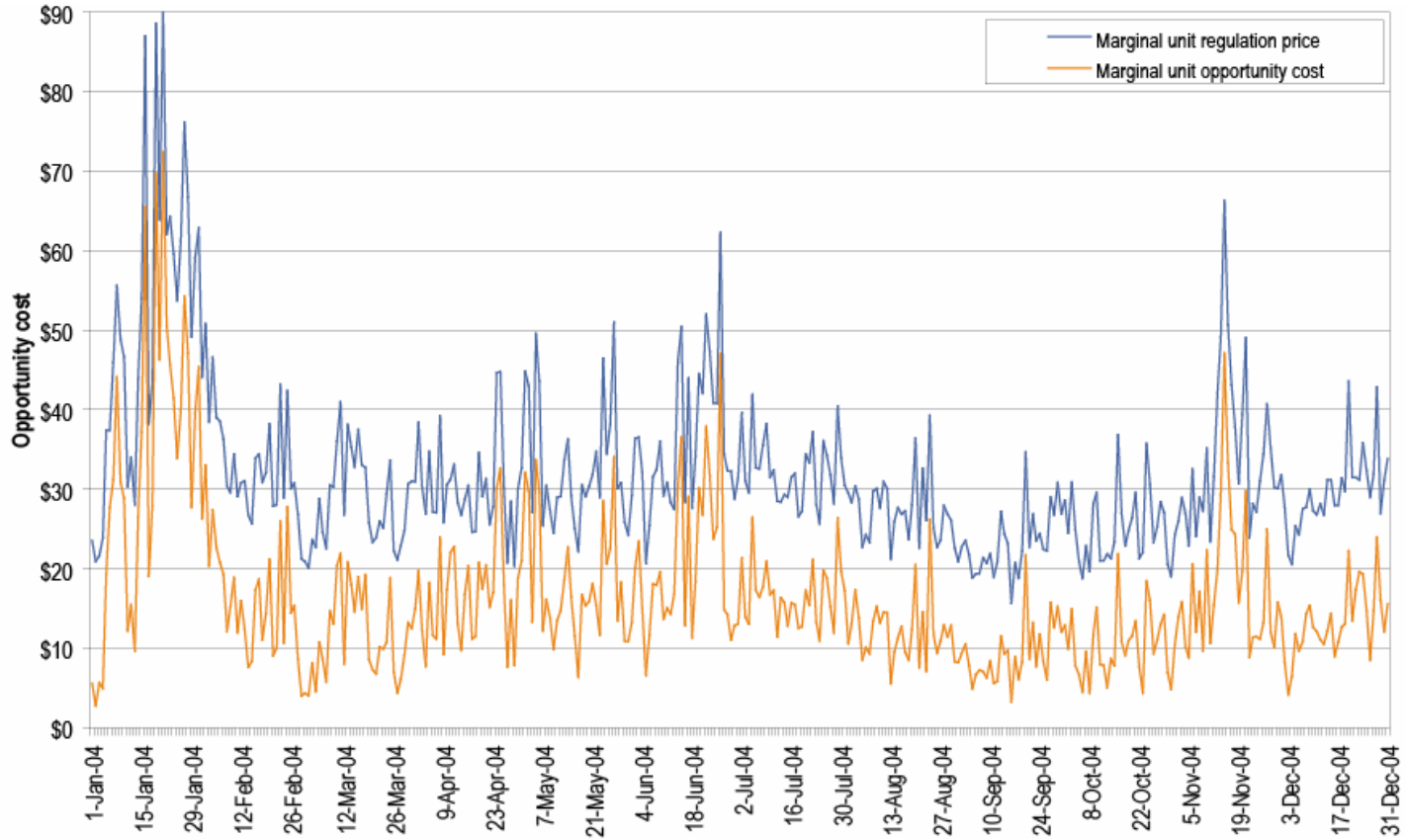




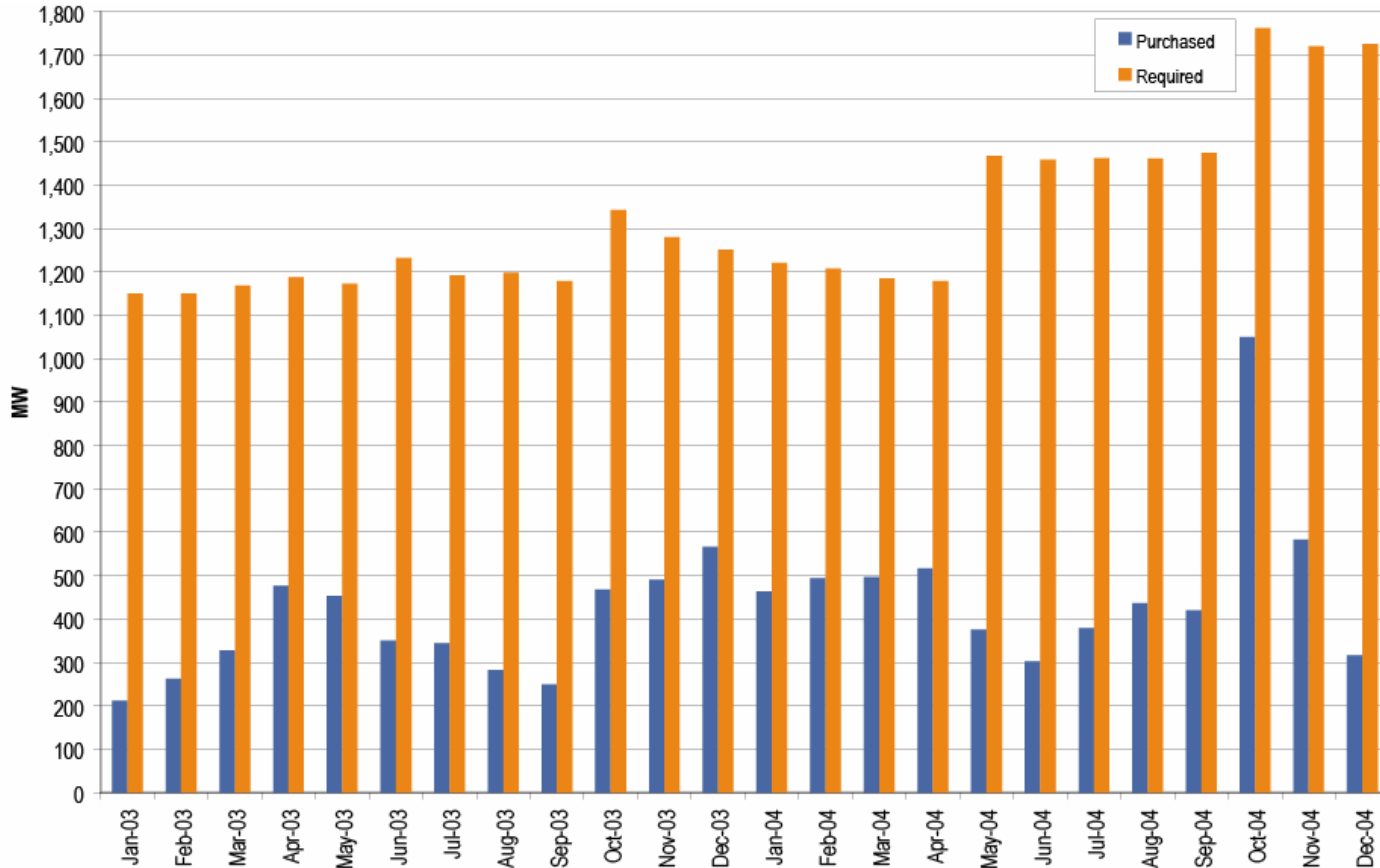


|        |            |                         |
|--------|------------|-------------------------|
| Red    | 1801-10000 | Highly concentrated     |
| Yellow | 1000-1800  | Moderately concentrated |
| Green  | 0-999      | Unconcentrated          |

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

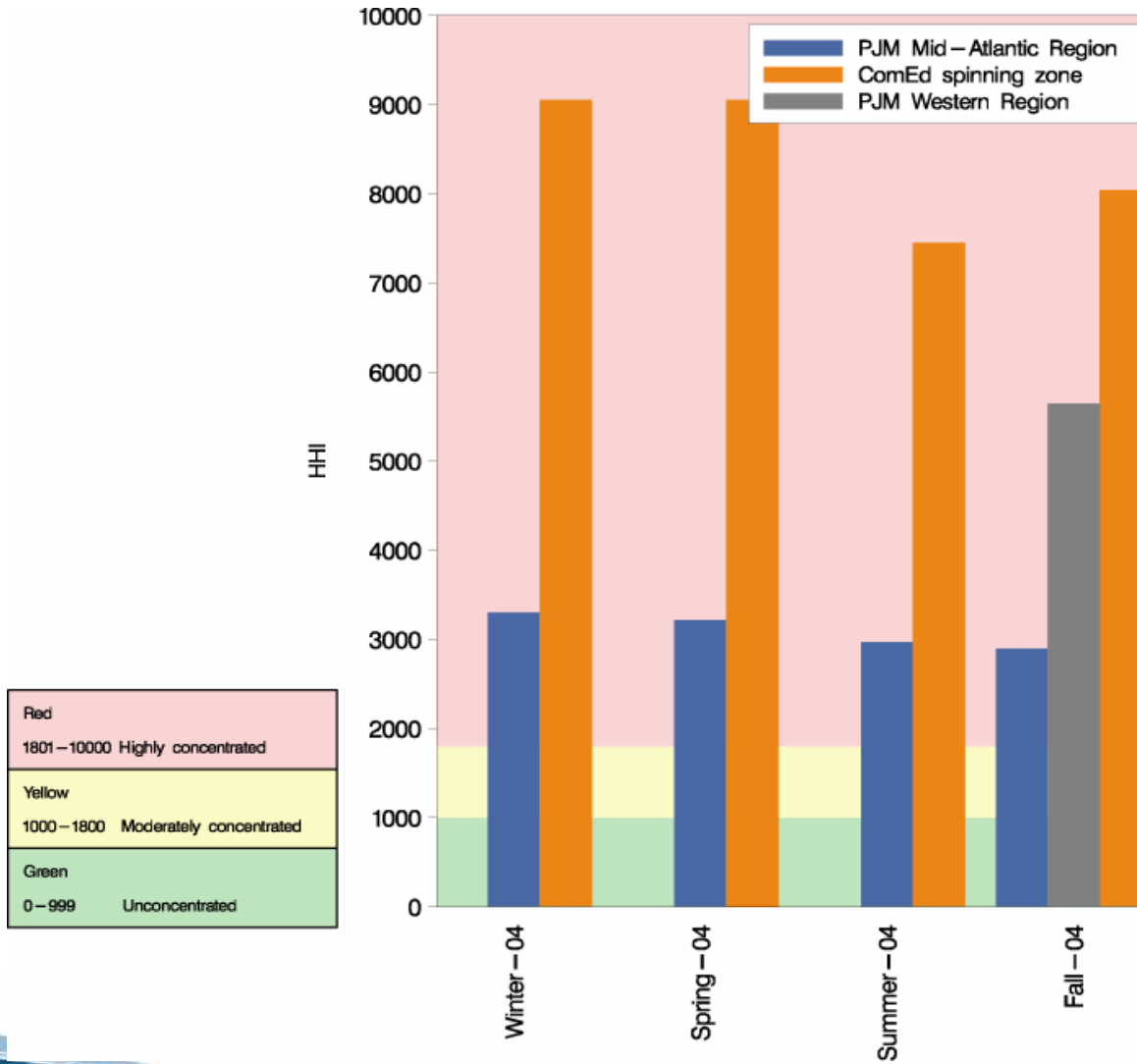


# PJM Control Area average hourly required spinning vs. Tier 2 spinning purchased: Calendar years 2003 to 2004



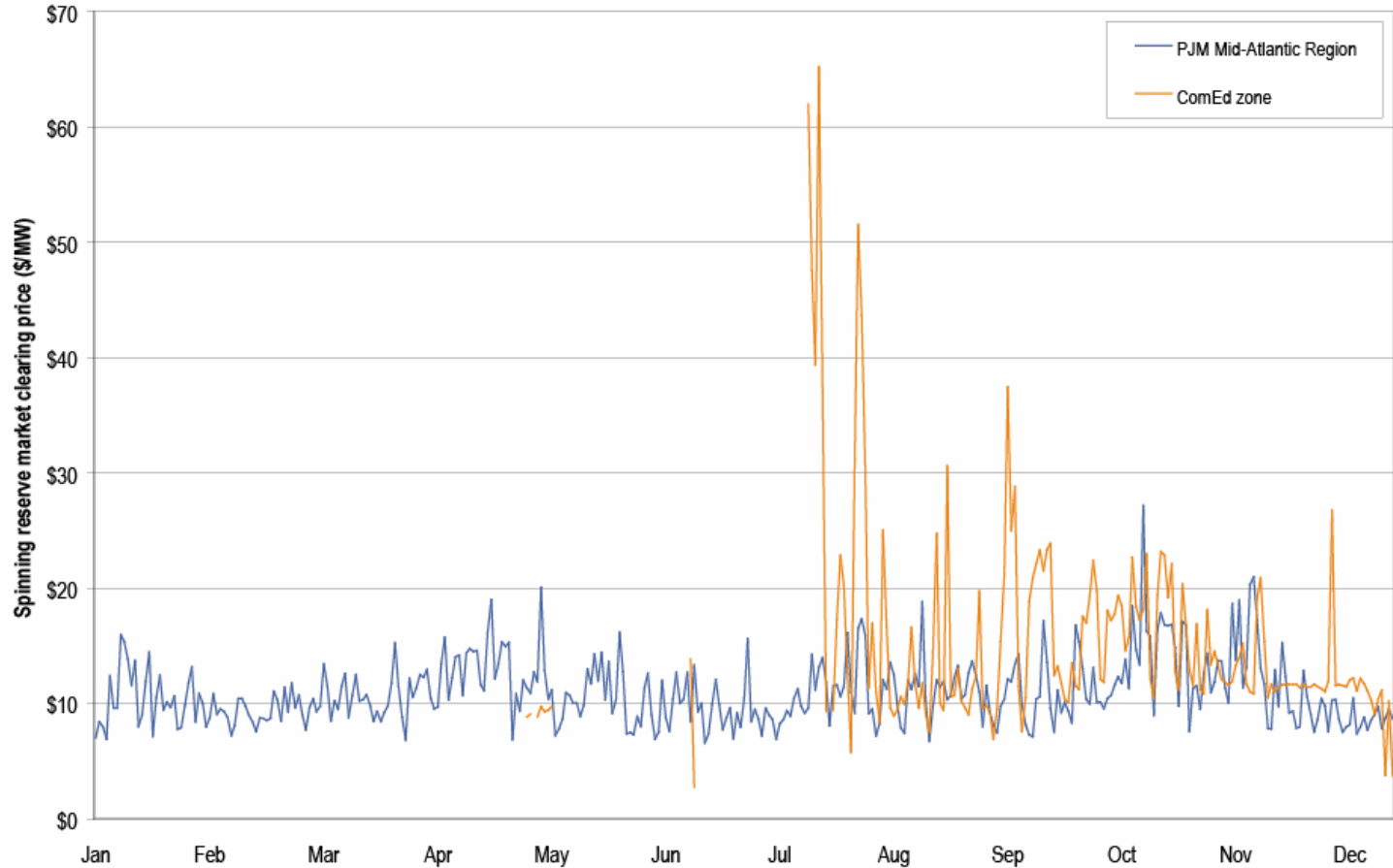


# PJM system Spinning Reserve Market HHI: Calendar year 2004



|        |                                   |
|--------|-----------------------------------|
| Red    | 1801-10000 Highly concentrated    |
| Yellow | 1000-1800 Moderately concentrated |
| Green  | 0-999 Unconcentrated              |

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





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

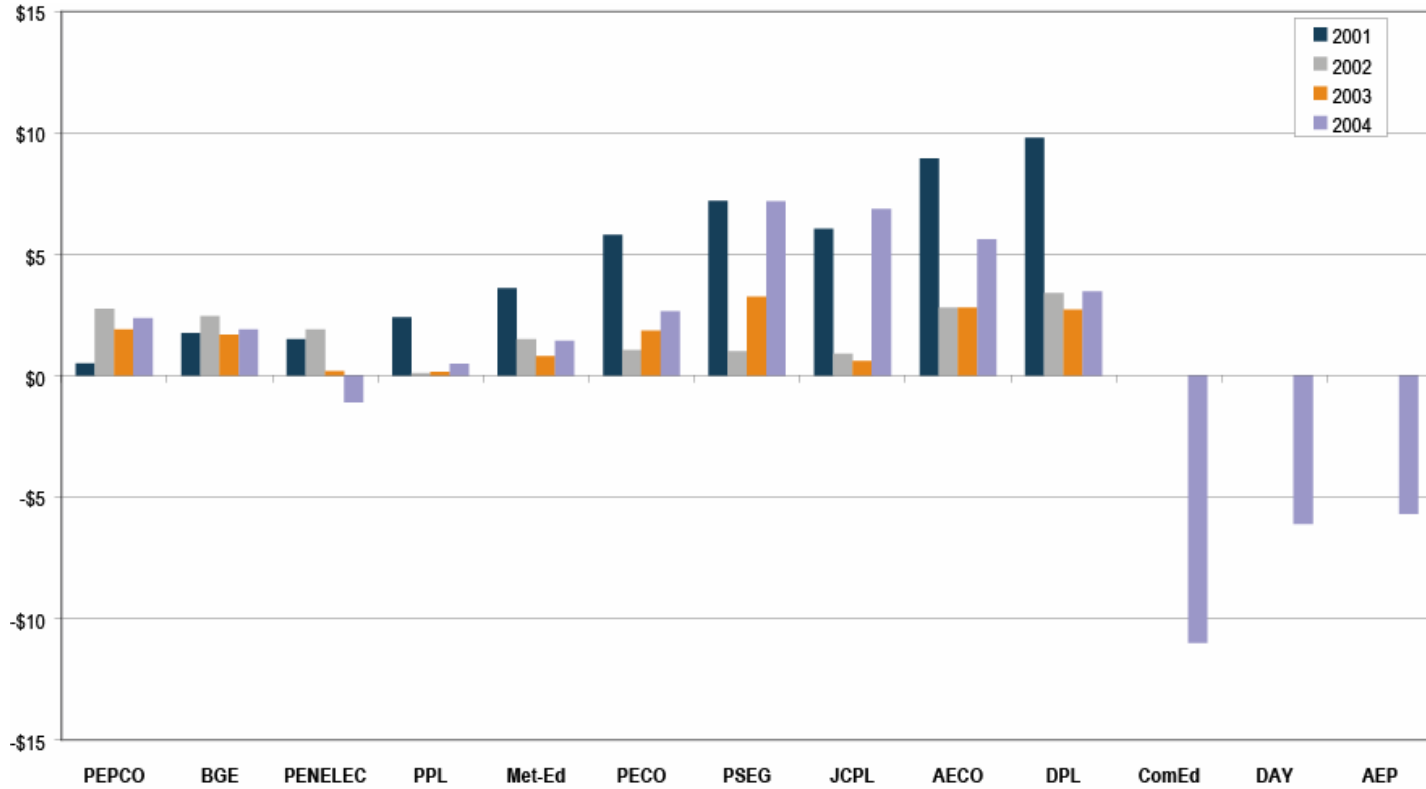
|              | <b>Congestion Charges</b> | <b>Percent Increase</b> | <b>Total PJM Billing</b> | <b>Percent of PJM Billing</b> |
|--------------|---------------------------|-------------------------|--------------------------|-------------------------------|
| <b>1999</b>  | \$53                   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

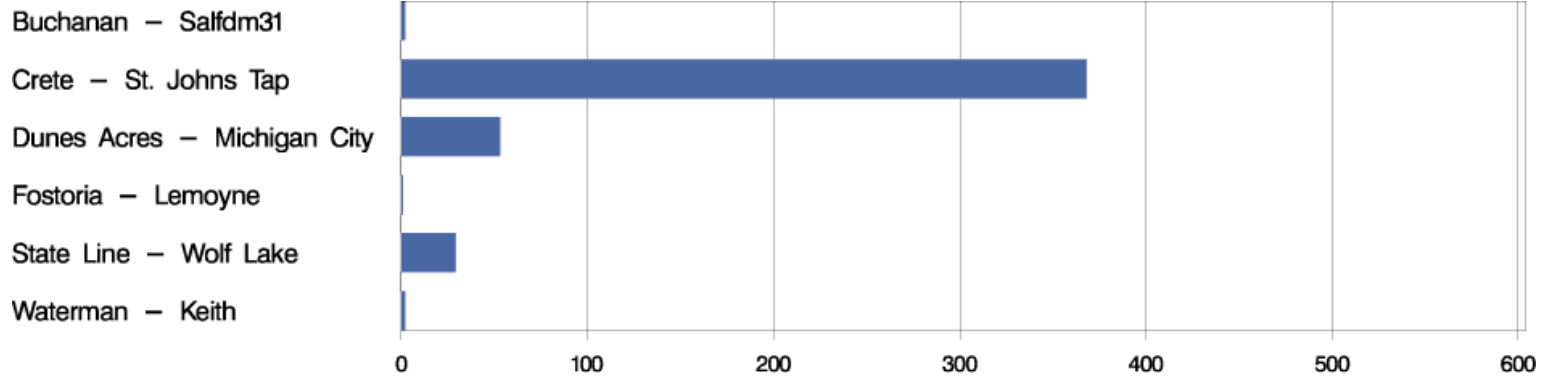


# Monthly PJM congestion accounting summary [Dollars (millions)]:By planning period

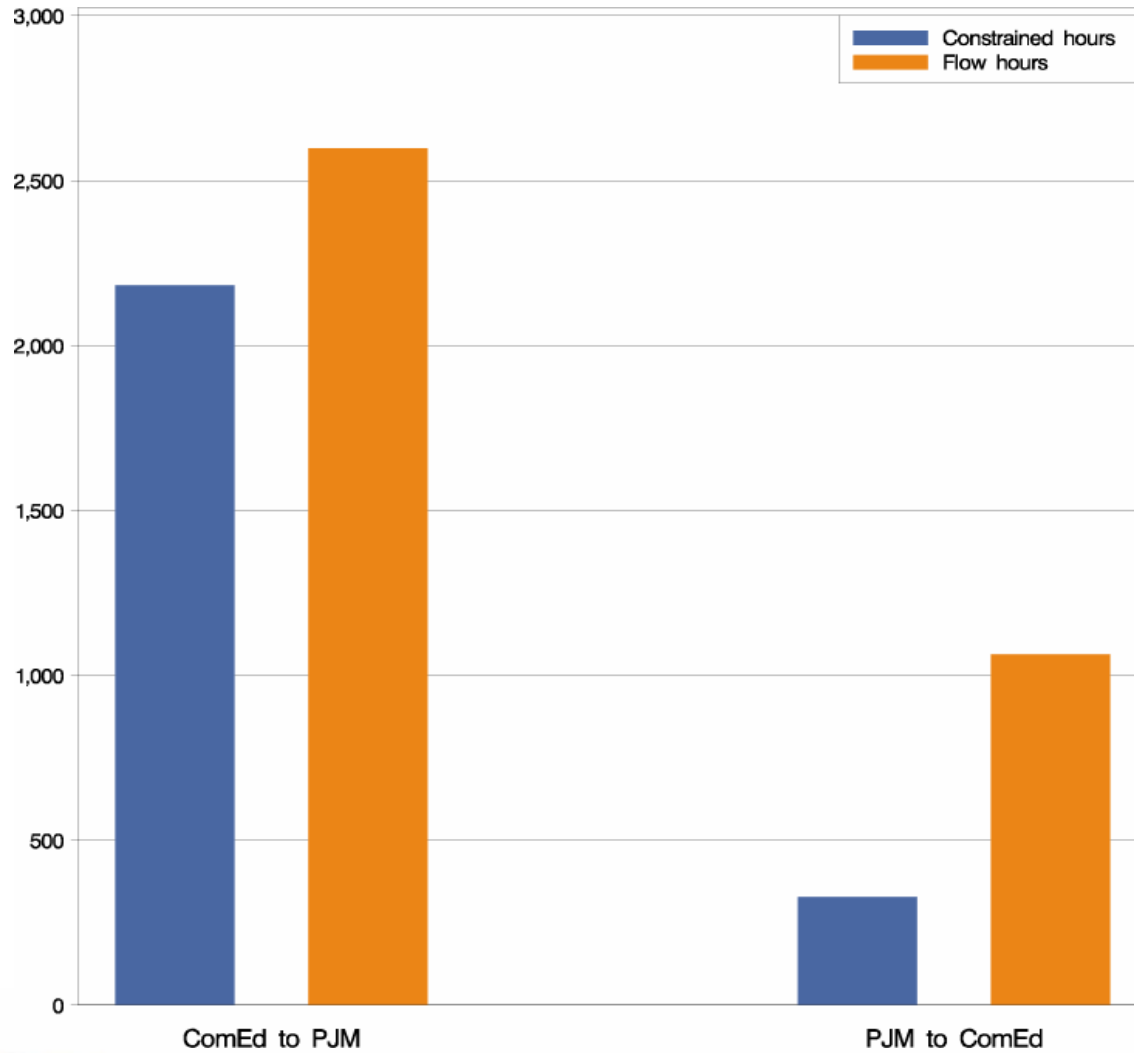
|   |              | Congestion Charges  | FTR Target Allocations | Congestion Credits | FTR Payout Ratio | Credits Deficiency | Credits Excess |
|---|--------------|---|------------------------|--------------------|------------------|--------------------|----------------|
| Planning Period 2003 to 2004                              | 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            |
| <b>Total</b>  | <b>\$680</b> | <b>\$696</b>  | <b>\$635</b>           | <b>91%</b>         | <b>\$60</b>      | <b>\$45</b>        |                |
|   |              | <b>Values After Excess Congestion Charges Distributed</b> |                        |                    |                  |                    |                |
|   |              | \$680   | \$696                  | \$680              | 98%              | \$16               | \$0            |
| Planning Year 2004 to 2005<br>(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            |
|   | <b>Total</b> | <b>\$627</b>  | <b>\$627</b>           | <b>\$609</b>       | <b>97%</b>       | <b>\$18</b>        | <b>\$18</b>    |

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

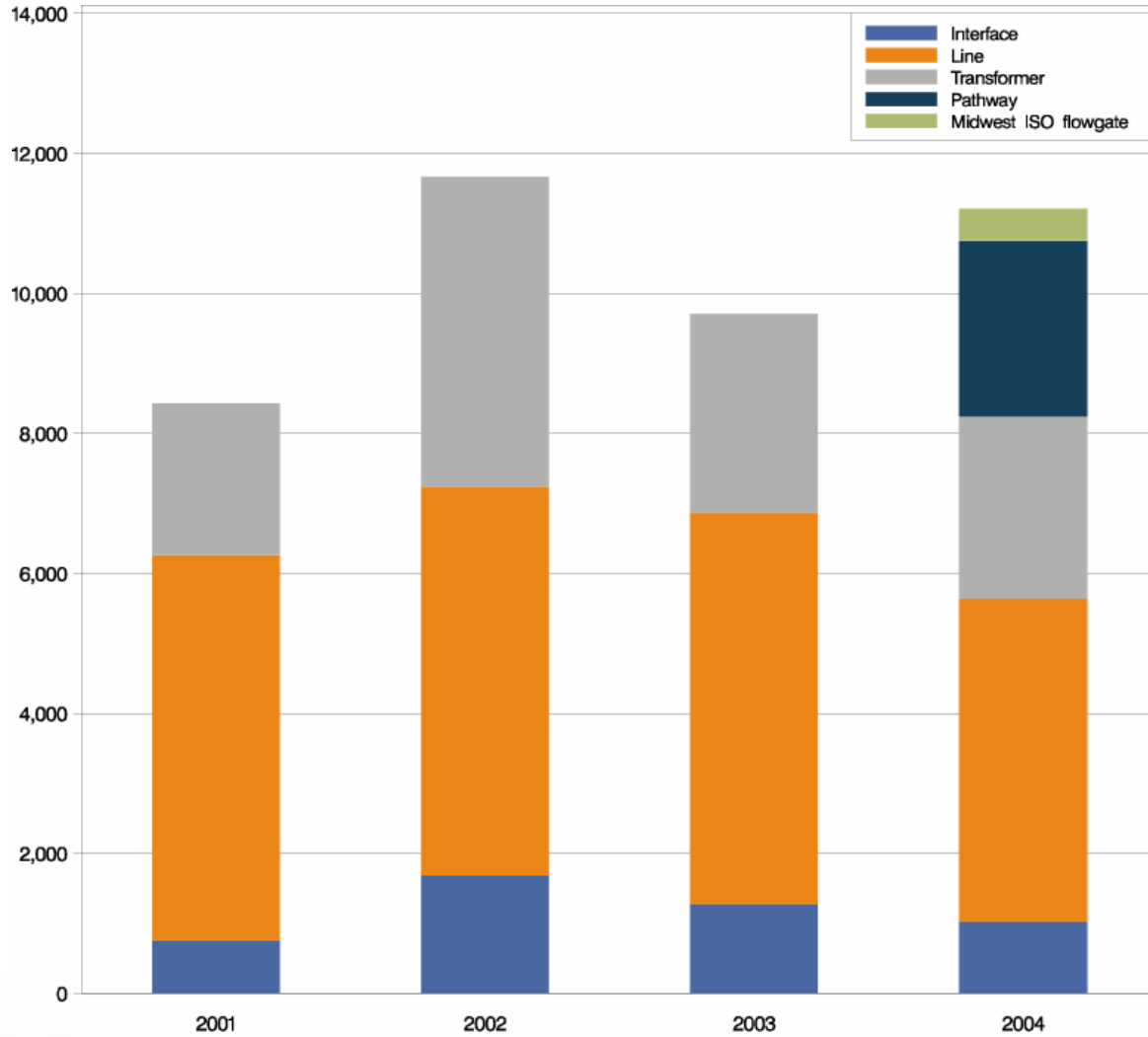




# Pathway directional flows and hours of congestion: Phase 2, 2004

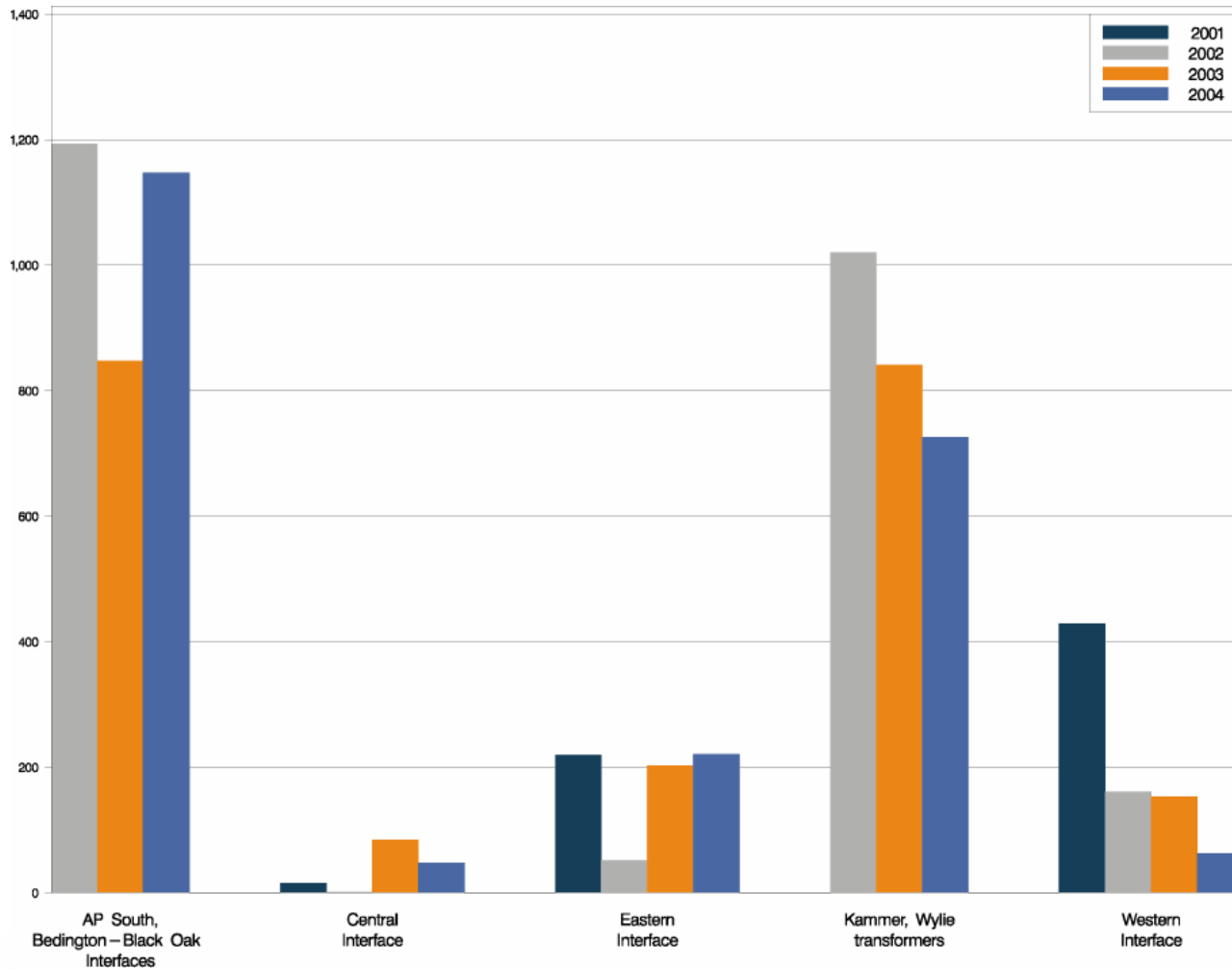


# Congestion-event hours by facility type: Calendar years 2001 to 2004

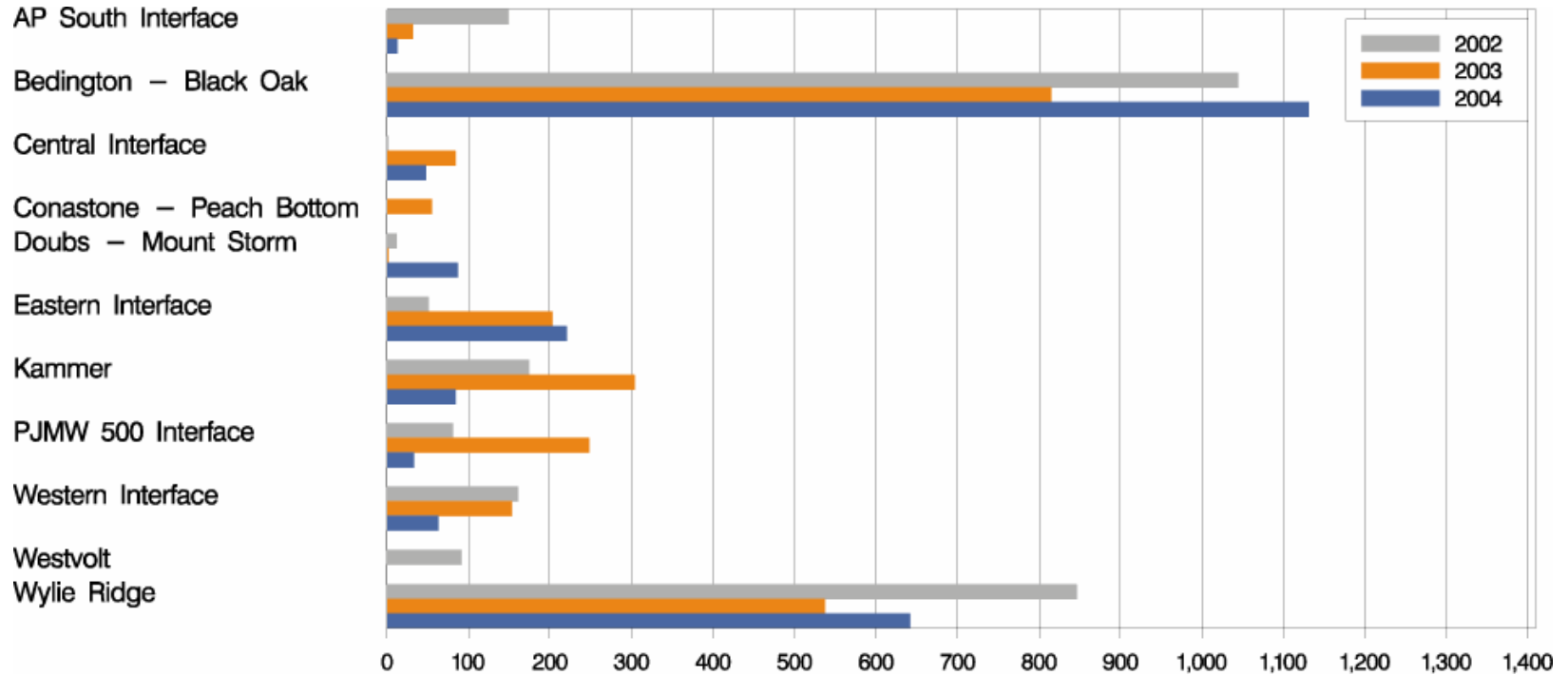




# Regional constraints and congestion-event hours by facility: Calendar years 2001 to 2004



# 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

