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- The lack of demand response in electricity markets is a major problem.
- It can prevent the most fundamental of interactions between demand and supply.
- It is a problem that contributes to the existence of market power in both aggregate and local markets for wholesale electricity.

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- Low demand elasticity is caused by a lack of a price signal to end users
- At its most fundamental level, demand elasticity requires real time prices and the ability to respond to prices in real time.
  - Instant market where Supply must equal Demand at every given moment.
  - It also requires end users benefit from a response

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- PJM has taken steps to facilitate the demand side of the market
- PJM Active Load Management Program (ALM)
- Pilot Program (started in 2000, for LSE's only)
- Pilot Program (2001-2002, third parties added):
  - Emergency Option (reliability)
  - Economic Option (price response)
  - Real Time Only

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- 2002 Load Response Program
  - Added Real Time and Day-Ahead options
- 2002 “Permanent Emergency Response Program”
- March 2003, multi-year Economic Program
- Recently extended through 2006
- Participation in the economic and emergency program requires an hourly interval meter

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- 2004 Economic Program Costs
  - Administrative Costs: $20,000 a year (Less than $1/MWh)
  - Payments for the generation portion of retail rates: $1,096,573 payments to loads by LSE
    - $854,816 = (LMP – (generation and transmission components of retail rates)) * MWh
    - $243,249 = generation and transmission components of retail rates
    - Presuming 50/50 split, the program cost $121,625 (lost revenues to cover transmission components)
    - $4/MWh in 2004

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- 2004 Economic Program Benefits
  - $1,096,573 to curtailing customers
  - Max LMP reduction of program: $50 per MWh on July 3, 2003
  - Max LMP reduction of program in 2004: $1/MWh
  - Avg. LMP Reduction of program in 2004: $.5/MWh
  - Avg. hourly load during reductions (48,000 MW) x $.5
  - $24,000 per hour, $54,000,000 for the 2,248 hours of load reduction in 2004
  - Adjusting for Spot Activity (40% of load): $22,000,000

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Table 2: 2002-2004 Price Impacts			
	ALM	**Economic Program**	**Emergency Program**
2002	$70/MWh	$50/MWh	$40/MWh
2003	N/A	$1/MWh	N/A
2004	N/A	$1/MWh	N/A

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Table 3: 2001 – 2004 Registered Participants in Load Response Programs				
	Economic Program		Emergency Program	
	Sites	MW	Sites	MW
2001		65		155
2002	116	337	61	548
2003	245	724	168	659
2004	350	1,109	4,315	1,783

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Table 4: 2001 – 2004 Performance of Economic Program Participants			
	Total MWh	**Total Payments**	**$/MWh**
2001	50	$13,994	$283
2002	6,462	$761,977	$118
2003	19,290	$827,179	$43
2004	31,719	$1,096,573	$35

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Table 5: 2004 Emergency Program and Economic Program Comparison			
	MWh	**Credits**	**Price/MWh**
Emergency	0	$0	$0
Economic	31,719	$1,096,573	$35

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Table 6: 2001 - 2004 Payments Comparison			
	Emergency ($)	Economic ($)	Total ($)
2001	$287,514	$13,994	$301,508
2002	$282,756	$761,997	$1,044,753
2003	$26,613	$827,179	$853,792
2004	$0	$1,096,573	$1,096,573

Table 7: Load Response Programs and ALM History						
	1999	2000	2001	2002	2003	2004
ALM Resources (MW)	2,005	1,693	1,962	1,292	1,207	1,228
2000-2001 Pilot Program Resources (MW)	NA	80	220	NA	NA	NA
Load Response Program (MW)	NA	NA	NA	891	1,383	2,892
Load Response MW also enrolled in ALM	NA	NA	164	298	445	449

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Figure 1: 2004 Daily Economic Reductions and Credits

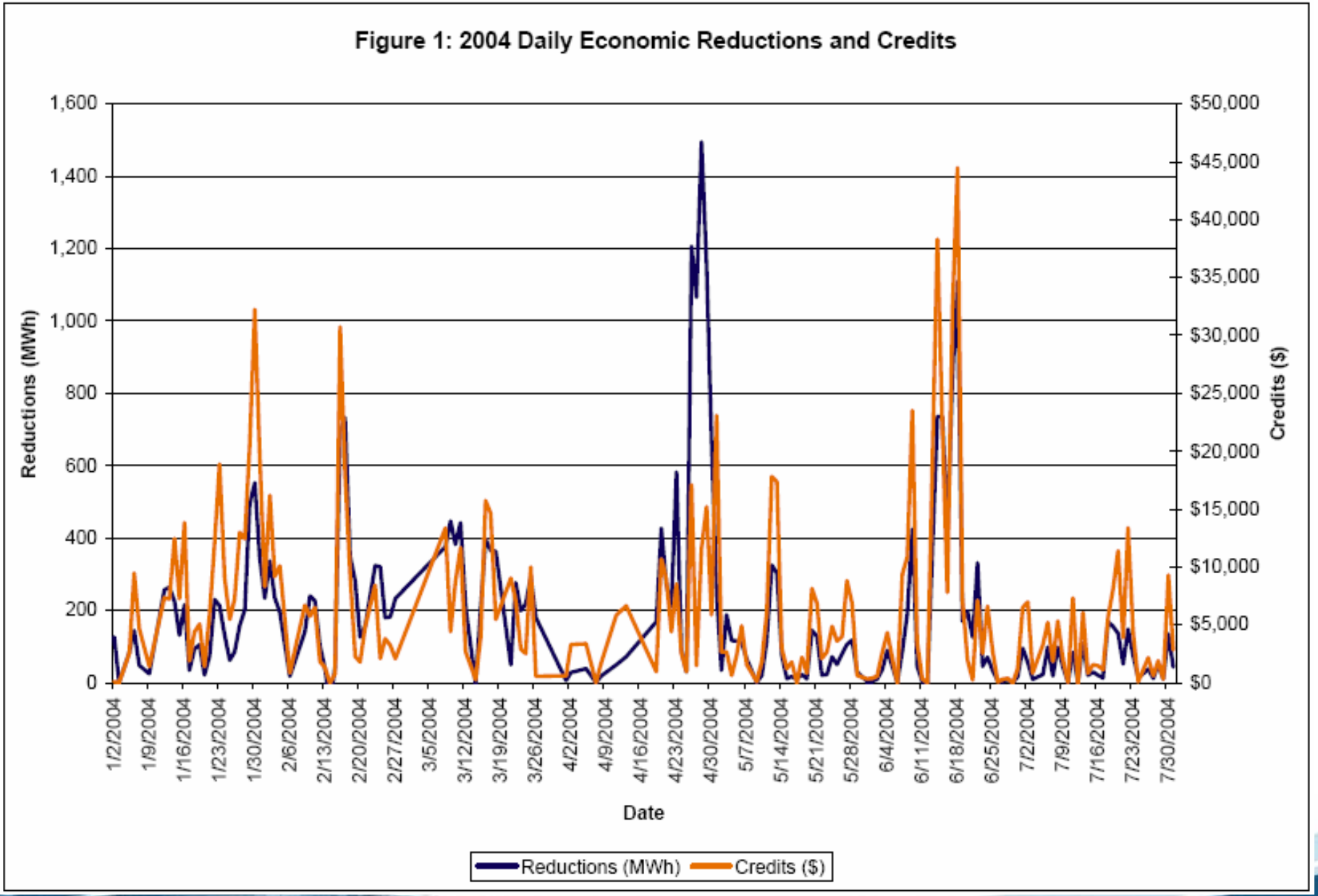

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Table 8: 2004 Total Daily Reductions								
	Real-Time		Day-Ahead		Pilot Program		Totals	
Date	RT MWh	RT Credits	DA MWh	DA Credits	MWh	Credits	MWh	Credits
Maximum								
	1,495	$39,826	179	$7,961	126	$11,499	1,495	$44,466
Hourly Average								
	13	$414	0	$3	1	$70	14	$488
Total								
	29,920	$931,577	179	$7,961	1,620	$157,034	31,719	$1,096,573

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Figure 2: 2004 Economic Program Reductions vs. LMP

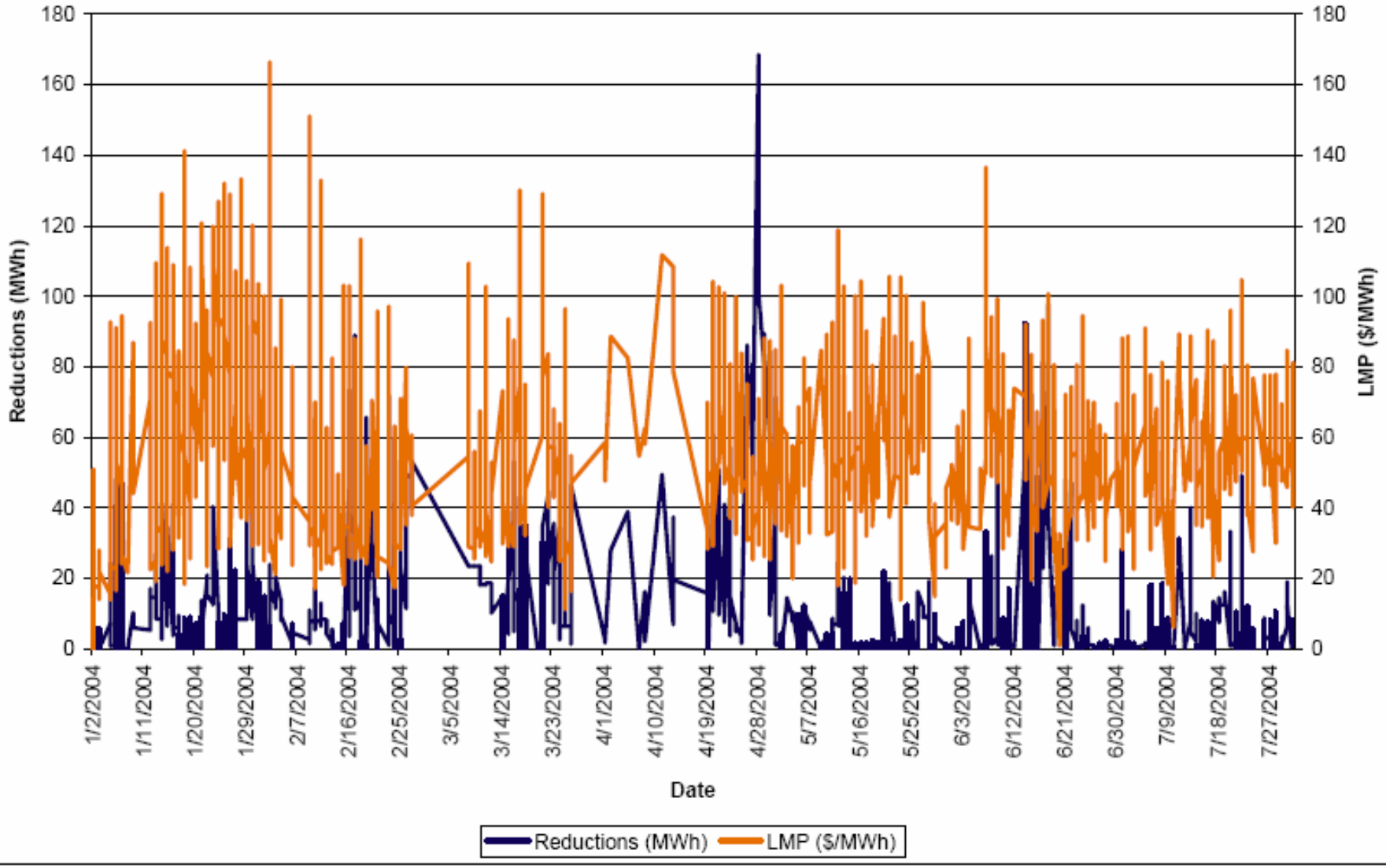

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Figure 3: 2004 Economic Program Reductions vs. Load

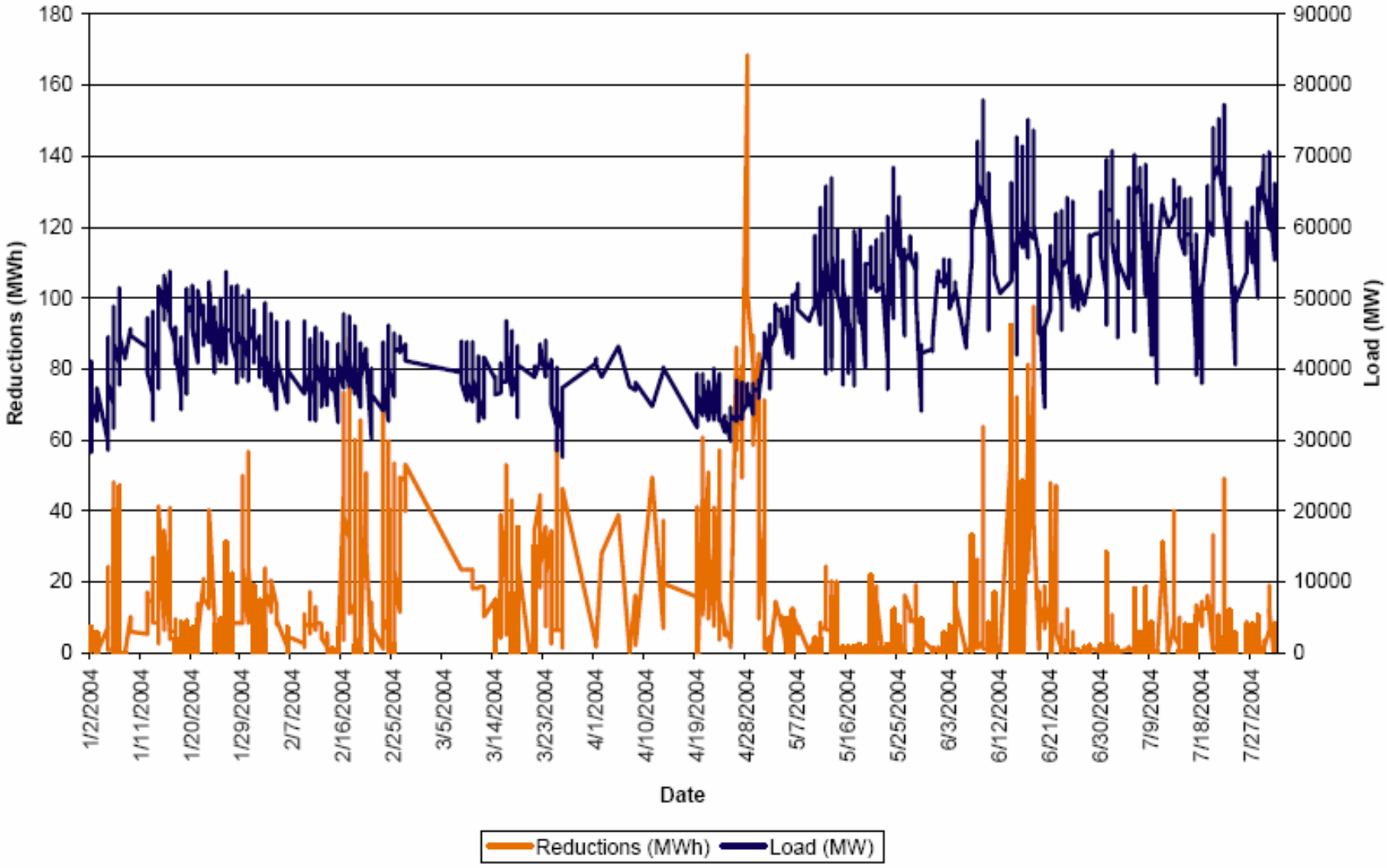

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Figure 4: June-July Average PJM RTO System Aggregate Supply Curve

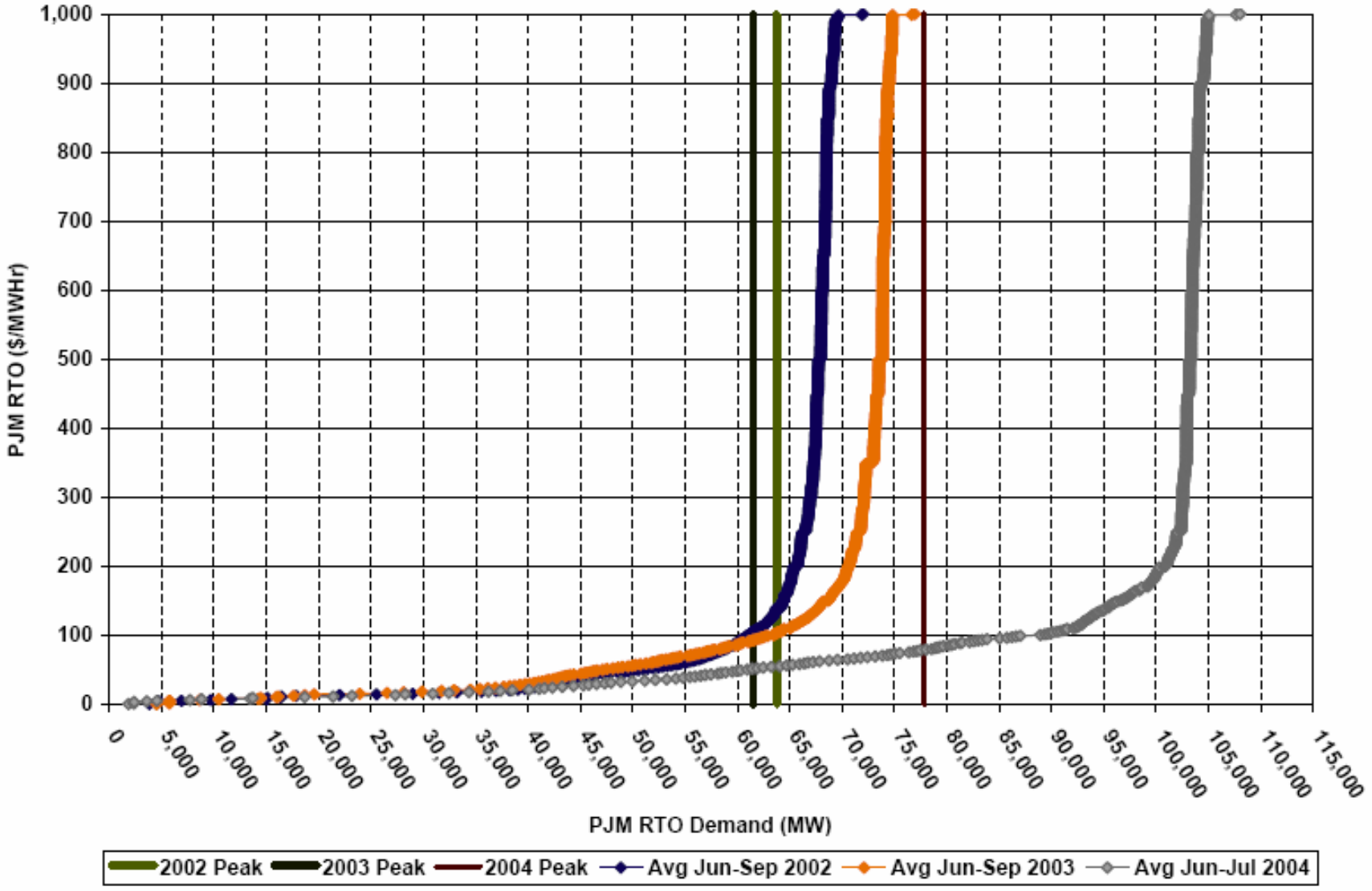

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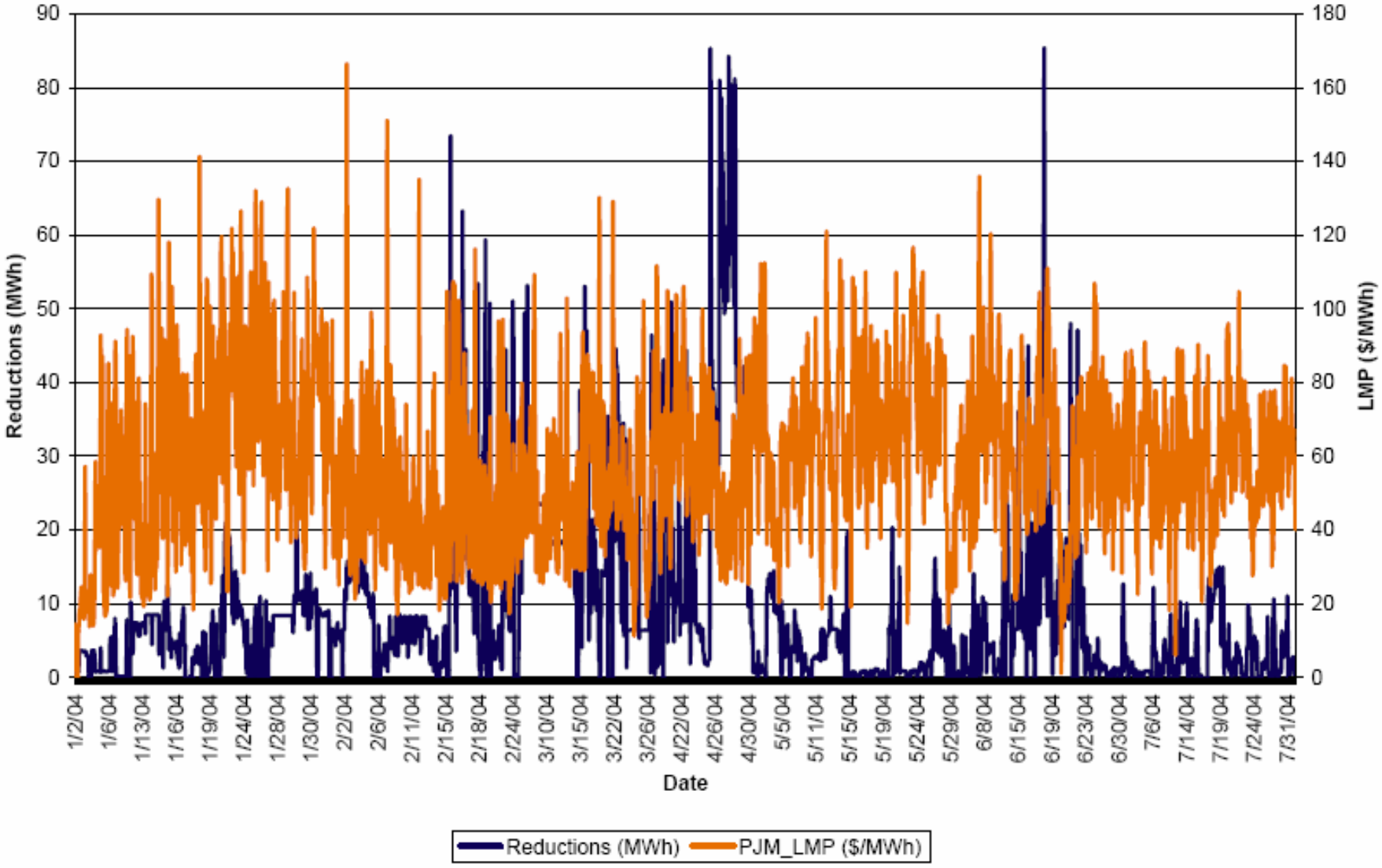
Figure 5: 2004 Average Hourly Reductions vs. PJM's Real-Time Hourly LMPs



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Participation by Zone

Table 10: 2004 Economic Program Zonal Reductions												
	Real- Time			Day- Ahead			Pilot			Totals		
	MWh	Credits	Hours	MWh	Credits	Hours	MWh	Credits	Hours	MWh	Credits	Hours
AECO	0	$0	0	0	$0	0	0	$0	0	0	$0	0
APS	26,019	$766,790	2,034	0	$0	0	106	$10,142	52	26,125	$776,932	2,086
BGE	141	$6,746	75	0	$0	0	0	$0	0	141	$6,746	75
COMED	0	$0	0	0	$0	0	0	$0	0	0	$0	0
DPL	13	$817	19	179	$7,961	50	0	$0	0	192	$8,779	69
JCPL	12	$1,420	10	0	$0	0	187	$21,595	97	199	$23,015	107
METED	57	$480	96	0	$0	0	375	$36,682	83	432	$37,162	179
PECO	15	$1,389	16	0	$0	0	0	$0	0	15	$1,389	16
PENELEC	0	$0	0	0	$0	0	938	$87,353	45	938	$87,353	45
PEPCO	0	$0	0	0	$0	0	0	$0	0	0	$0	0
PPL	2,861	$77,227	296	0	$0	0	14	$1,263	47	2,874	$78,491	343
PSEG	803	$76,707	1,203	0	$0	0	0	$0	0	803	$76,707	1,203
RECO	0	$0	0	0	$0	0	0	$0	0	0	$0	0
Total												
	29,920	$931,577	3,749	179	$7,961	50	1,620	$157,034	324	31,719	$1,096,573	4,123
Max												
	26,019	$766,790	2,034	179	$7,961	50	938	$87,353	97	26,125	$776,932	2,086
Avg												
	2,302	$71,660	288	14	$612	4	125	$12,080	25	2,440	$84,352	317

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- PJM's programs so far represent transition mechanisms
- Further development is obviously needed
  - Success will be dependent on retail market and rate structure changes
  - Market penetration of interval meters and the means to take advantage of the information
- The potential benefits exceed the costs

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- Provide the tools that will allow customers to have price signals
- Need to ensure that customers have the ability to react
- Incentives to react should be based on market fundamentals
- Going forward, market design needs to incorporate demand side participation
  - Retail rate structure changes

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