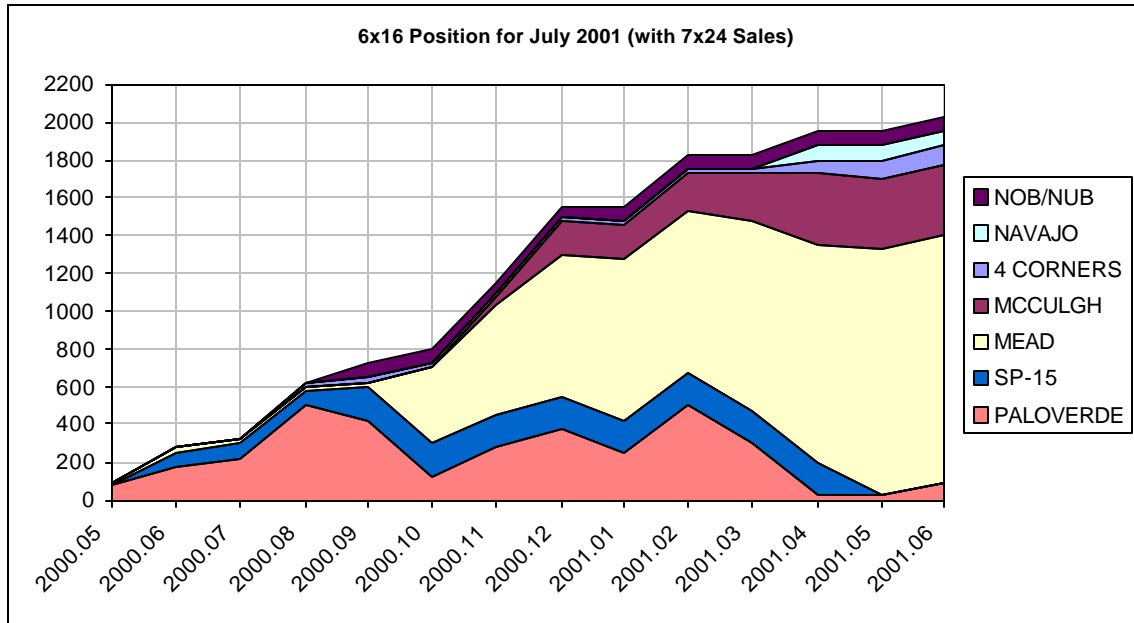


List of Attachments to Biewald Direct Testimony  
February 20, 2002

- Attachment BEB-1     Resume of Bruce Edward Biewald
- Attachment BEB-2     Table and Graph of NPC Purchases for July 2001 Peak Periods  
Over Time by Delivery Point
- Attachment BEB-3     Graph of Forward Prices for 6x16 Purchases at Palo Verde for Q3  
of 2001
- Attachment BEB-4     Graph of Actual Daily Prices for 6x16 Purchases at Palo Verde for  
Q3 of 2001
- Attachment BEB-5     Graph of NPC Forecast Load Duration Curves for Q3 of 2001
- Attachment BEB-6     Table of Effective Price of 6x16 Purchases at \$400 to Serve Peak  
Period Demand
- Attachment BEB-7     Graphs of NPC Q3 Average Hourly Firm Purchases and Economy  
Sales by Month
- Attachment BEB-8     Graphs of NPC Q3 Average Hourly System Load and Net System  
Load by Month
- Attachment BEB-9     Summary of Experience with Load Reduction Programs in the  
Northeast Markets in 2001

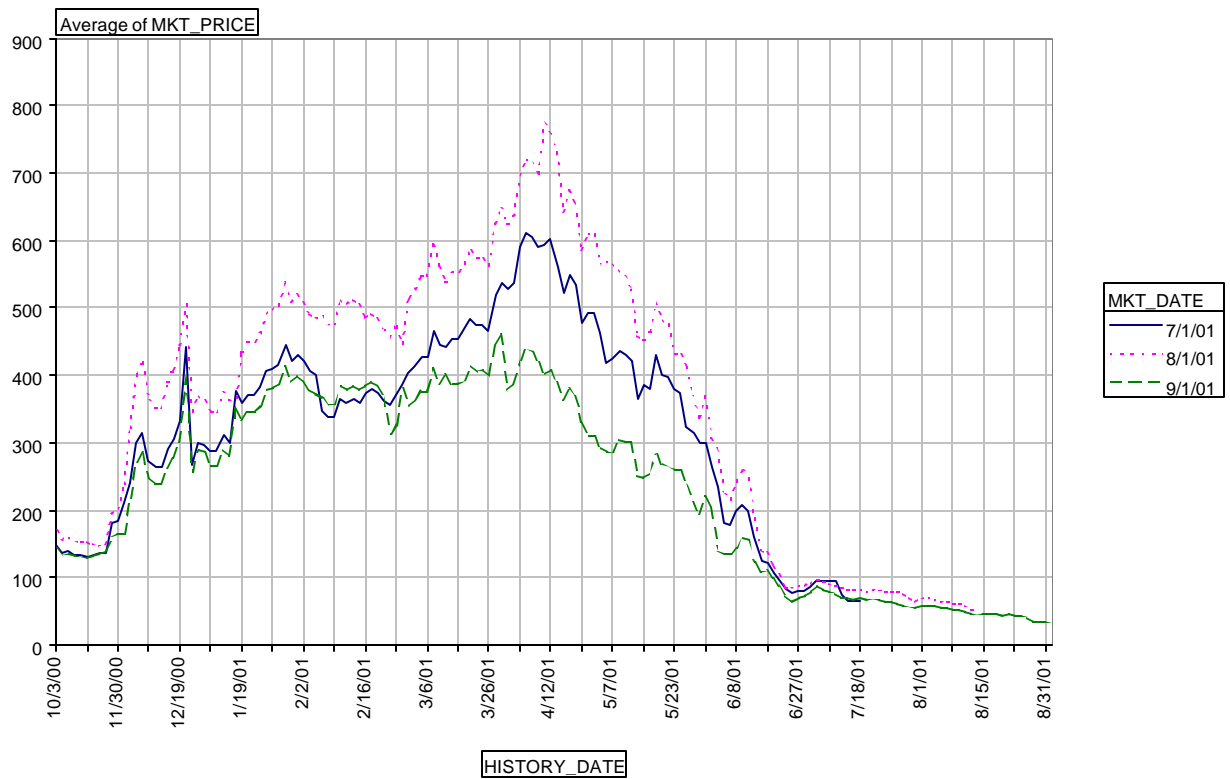
NPC Purchases for July 2001 Peak Periods Over Time by Delivery Point



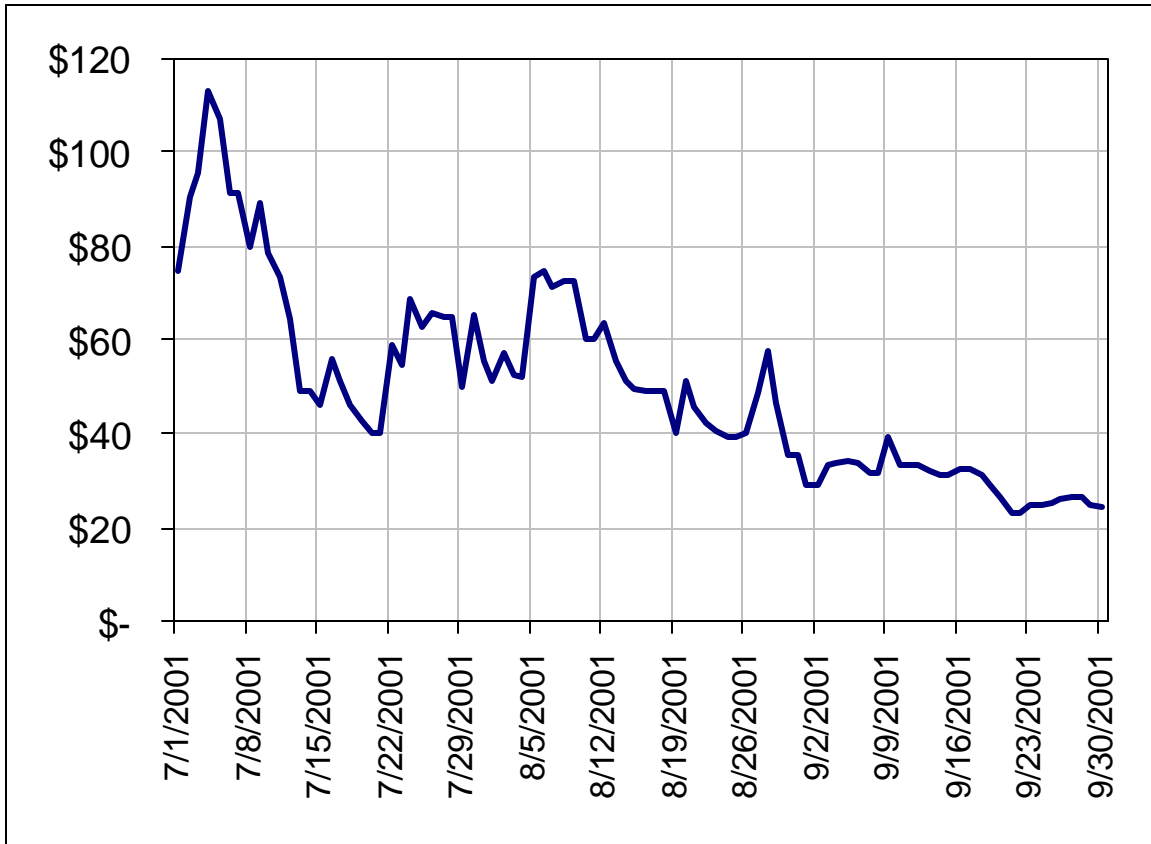
Cumulative Peak Period Position								
	6X16	Cumulative Position						
Month	4 CORNER	MCCULGH	MEAD	NAVAJO	NOB/NUB	PALOVERD	SP-15	Total
2000.05	0	0	25	0	0	75	0	100
2000.06	0	0	25	0	0	175	75	275
2000.07	0	0	25	0	0	225	75	325
2000.08	25	0	25	0	0	500	75	625
2000.09	25	0	25	0	75	425	175	725
2000.10	25	0	400	0	75	125	175	800
2000.11	25	50	575	0	50	275	175	1150
2000.12	25	175	750	0	50	375	175	1550
2001.01	25	175	850	0	75	250	175	1550
2001.02	25	200	850	0	75	500	175	1825
2001.03	25	250	1000	0	75	300	175	1825
2001.04	75	375	1150	75	75	25	175	1950
2001.05	100	375	1300	75	75	25	0	1950
2001.06	100	375	1300	75	75	100	0	2025

Forward Prices for 6x16 Purchases at Palo Verde for Q3 of 2001

COMMODITY|ELON

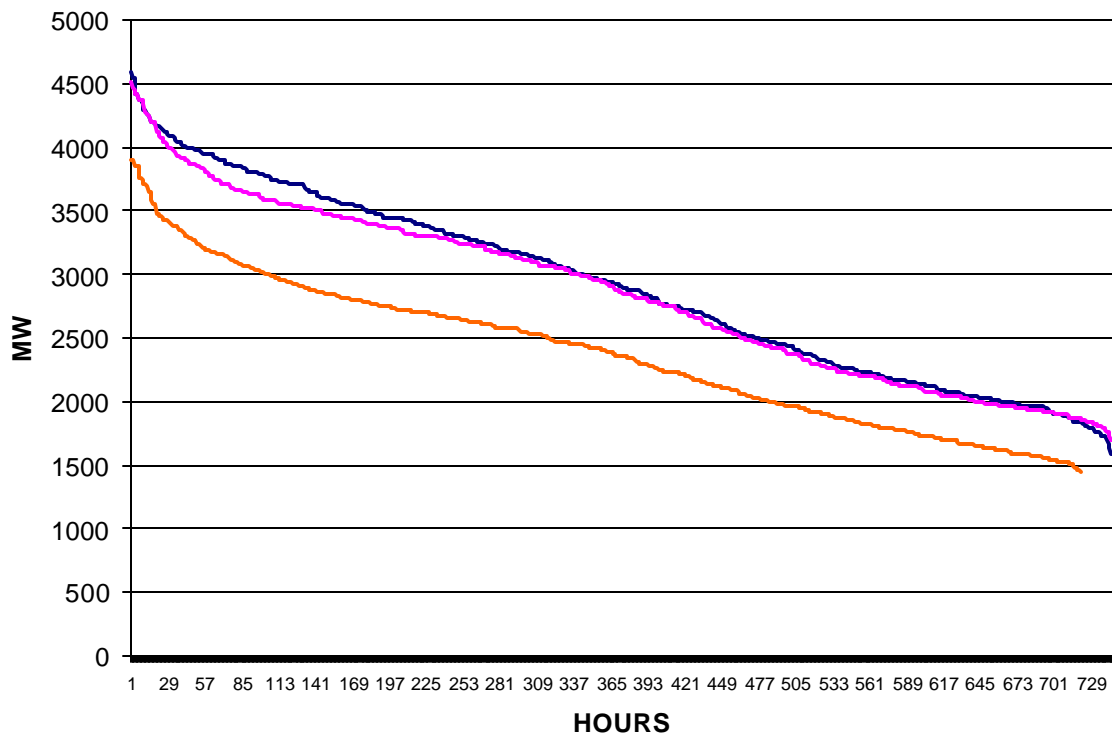


Actual Daily Prices for 6x16 Purchases at Palo Verde for Q3 of 2001



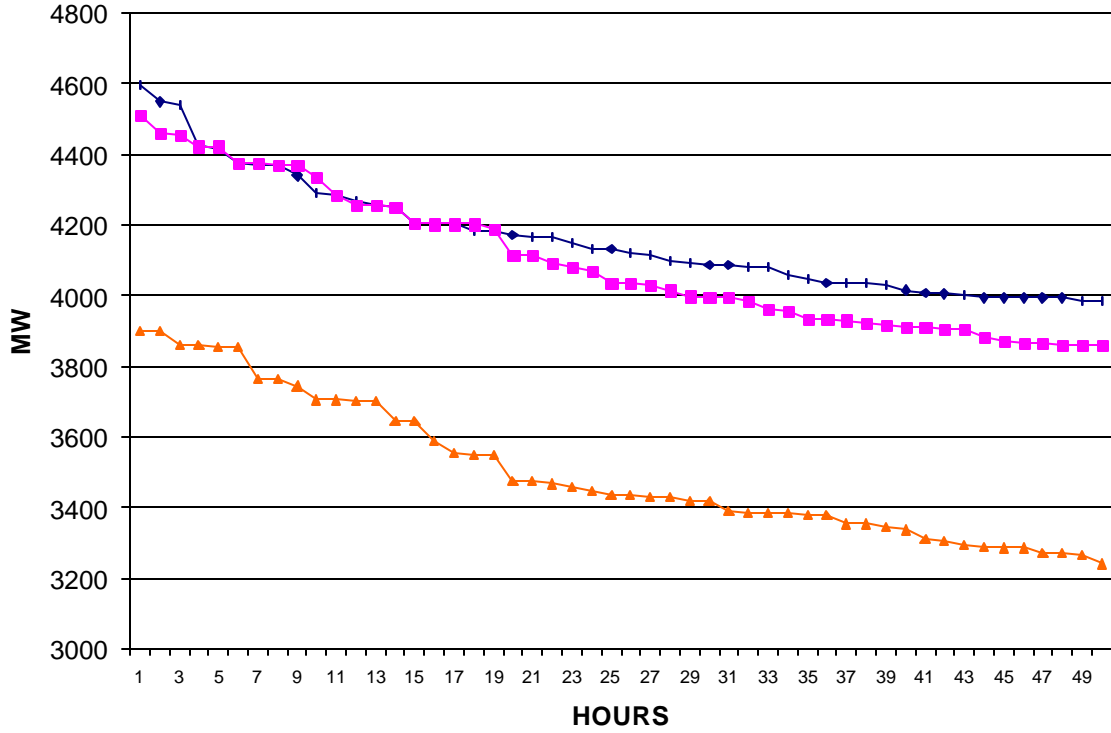
Graph of NPC Forecast Load Duration Curves for Q3 of 2001

All Hours Included



Graph of NPC Forecast Load Duration Curves for Q3 of 2001

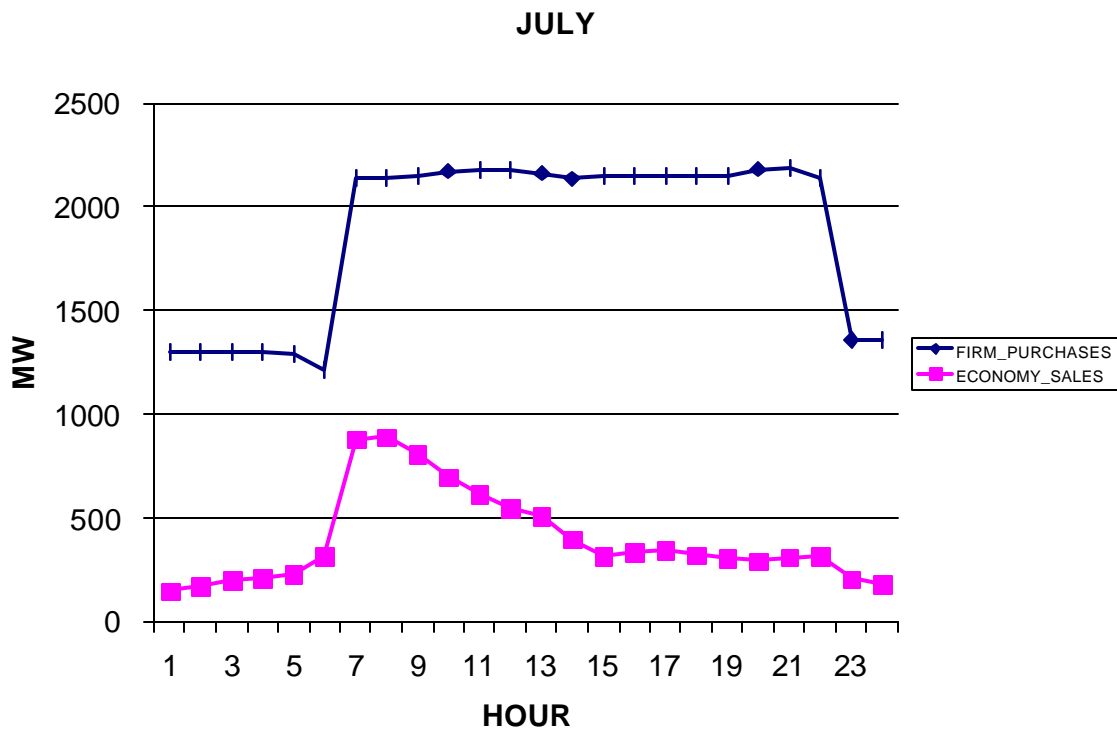
Top 50 Hours Only



Effective Price of 6x16 Purchases assuming \$400/MWh to Serve Peak Period Demand

For One Day		For One Month		For One Quarter	
Hours of Need	Price per Needed MWh	Hours of Need	Price per Needed MWh	Hours of Need	Price per Needed MWh
				1200	\$400
				800	\$600
		400	\$400	400	\$1,200
		300	\$533	300	\$1,600
		200	\$800	200	\$2,400
		100	\$1,600	100	\$4,800
		50	\$3,200	50	\$9,600
		40	\$4,000	40	\$12,000
		30	\$5,333	30	\$16,000
		20	\$8,000	20	\$24,000
16	\$400	16	\$10,000	16	\$30,000
10	\$640	10	\$16,000	10	\$48,000
5	\$1,280	5	\$32,000	5	\$96,000
4	\$1,600	4	\$40,000	4	\$120,000
3	\$2,133	3	\$53,333	3	\$160,000
2	\$3,200	2	\$80,000	2	\$240,000
1	\$6,400	1	\$160,000	1	\$480,000

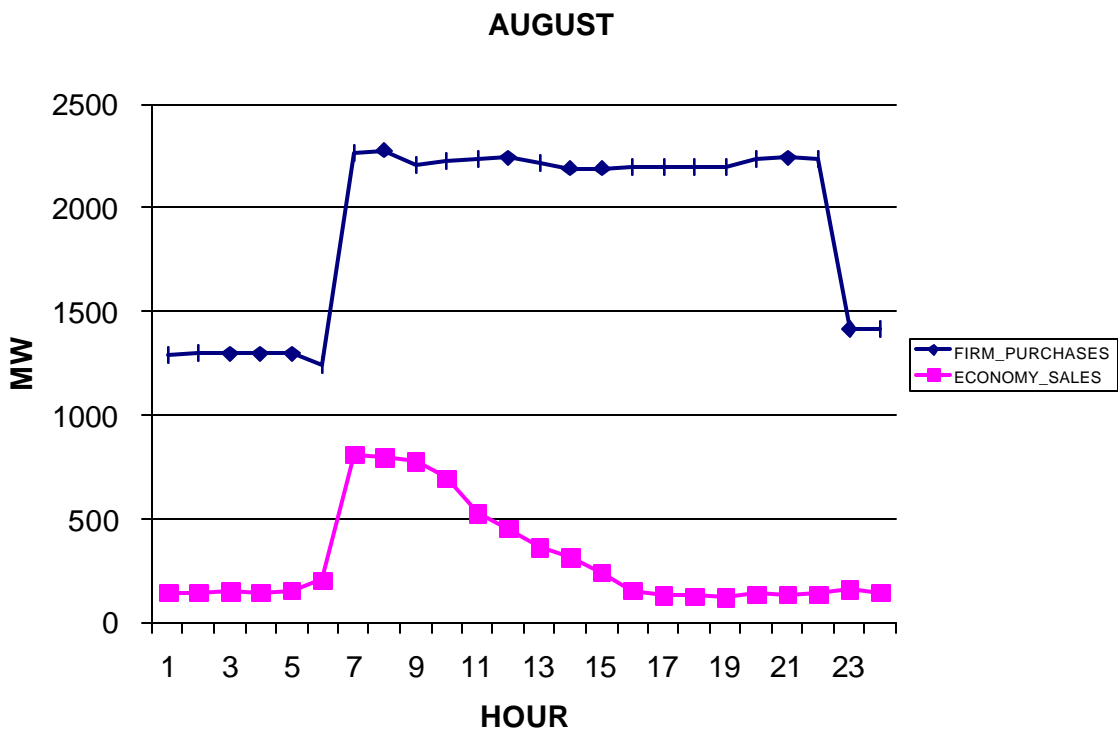
Graphs of NPC Q3 Average<sup>1</sup> Hourly Firm Purchases and Economy Sales by Month



<sup>1</sup> Sundays and holidays excluded.

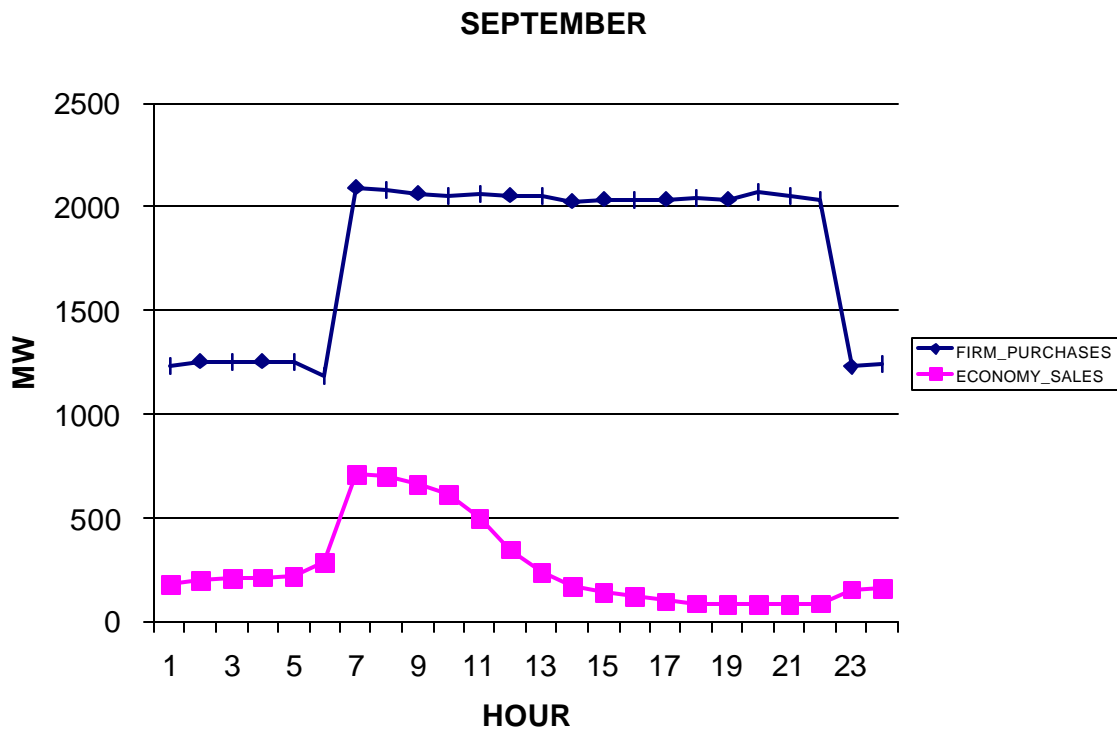


Graphs of NPC Q3 Average<sup>1</sup> Hourly Firm Purchases and Economy Sales by Month



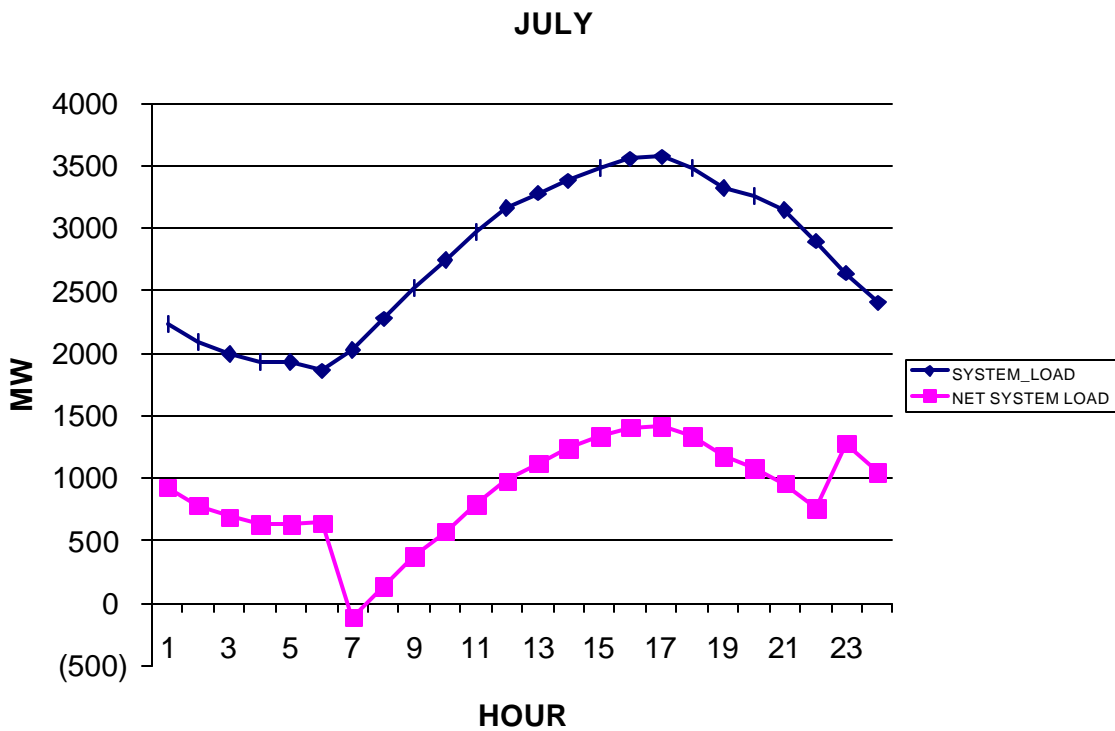
<sup>1</sup> Sundays and holidays excluded.

Graphs of NPC Q3 Average<sup>1</sup> Hourly Firm Purchases and Economy Sales by Month



<sup>1</sup> Sundays and holidays excluded.

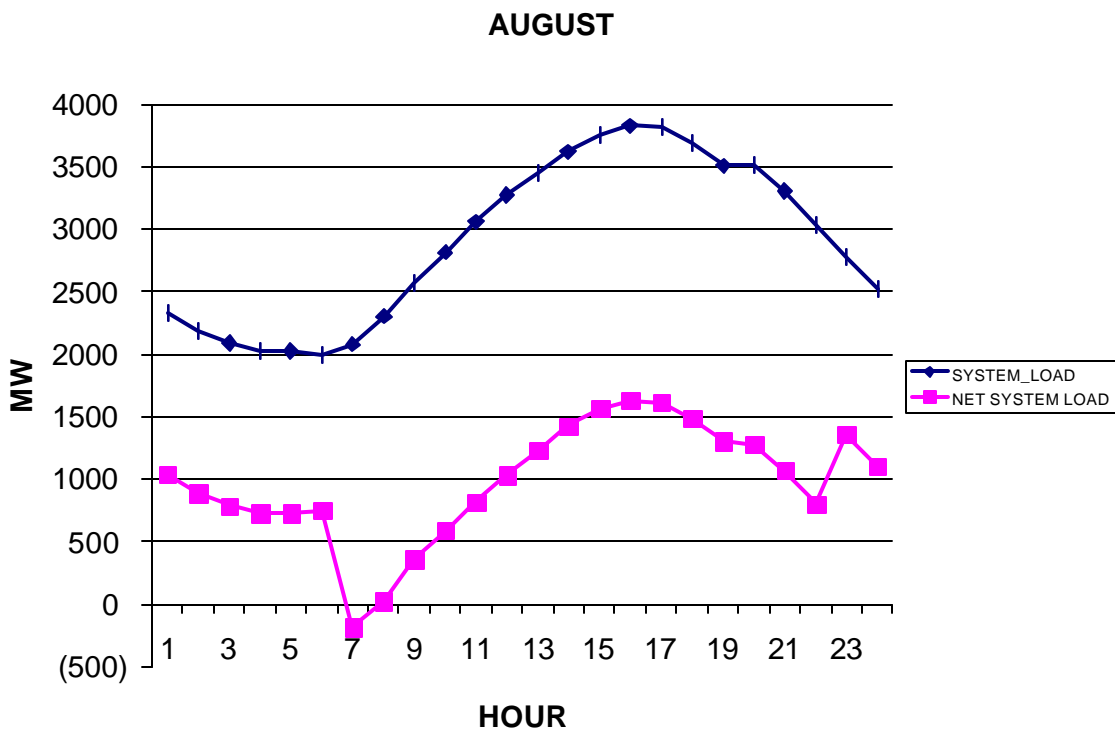
Graphs of NPC Q3 Average<sup>1</sup> Hourly System Load and Net System Load<sup>2</sup> by Month



<sup>1</sup> Sundays and holidays excluded.

<sup>2</sup> "Net system load" is the system load minus firm purchases.

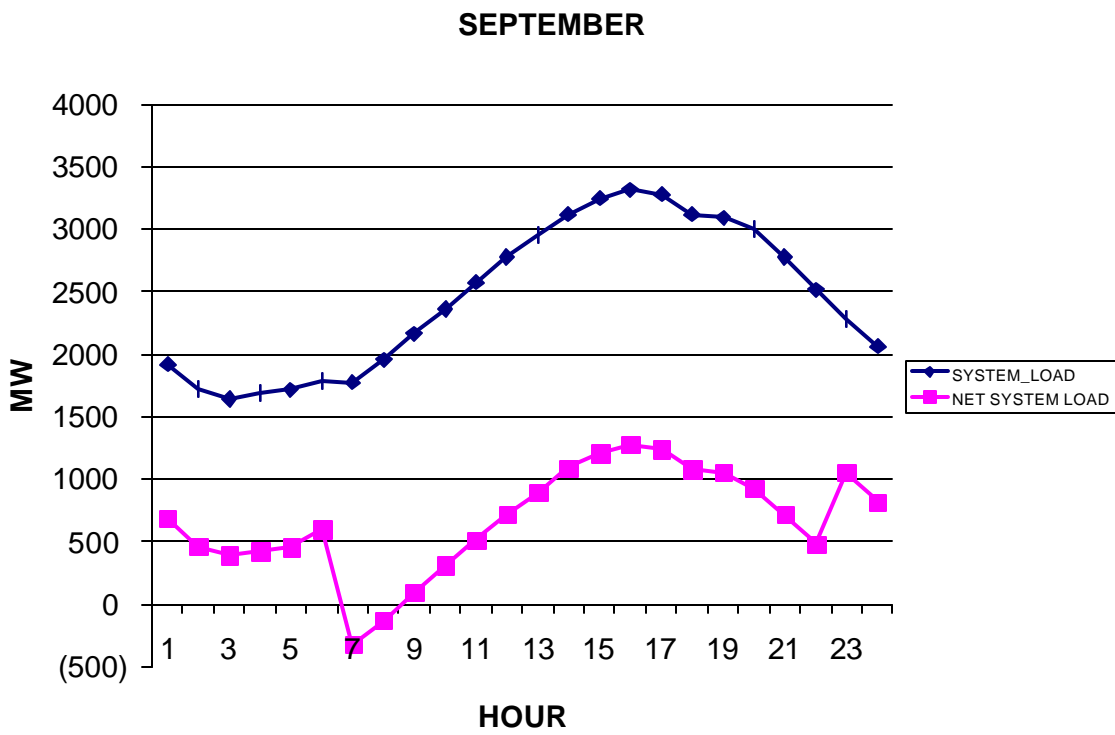
Graphs of NPC Q3 Average<sup>1</sup> Hourly System Load and Net System Load<sup>2</sup> by Month



<sup>1</sup> Sundays and holidays excluded.

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Graphs of NPC Q3 Average<sup>1</sup> Hourly System Load and Net System Load<sup>2</sup> by Month



<sup>1</sup> Sundays and holidays excluded.

<sup>2</sup> "Net system load" is the system load minus firm purchases.

Summary of Experience with Load Reduction Programs  
in the Northeast Markets in 2001

**Pennsylvania/New Jersey/Maryland (PJM)**

PJM's 2001-2002 Load Reduction Pilot Program included both reliability and economic programs. (PJM's 2000-2001 Load Reduction Pilot Program included only a reliability-based or "emergency" program.) For the 2001-2002 program, PJM signed up 220 MW of curtailable load. Customers could curtail load either by operating an on-site generator or by reducing energy usage. Of the 220 MW enrolled, 13 MW came from on-site generators, and the balance, from customers willing to reduce usage. PJM's program was approved by FERC on May 30, 2001, and the program went into effect on June 1, 2001.

Payments for curtailments in the reliability program were the higher of \$500 per MWh or the locational marginal price at the time of the curtailment. In the economic program, customers simply identified a price at which they would curtail and began curtailing at that price. These customers received the LMP at the time of curtailment.

PJM called on the reliability program on three days during the summer of 2001 for a total of 17 hours. (The first time was on July 25, less than two months after FERC approved the program.) The average payment made in the reliability program was roughly \$700 per MWh.

Customers in the economic program curtailed on five different days during a total of 34 hours. The average payment made in this program was approximately \$380 per MWh. The blended average for the reliability and economic programs, as shown in the table below, was roughly 500 per MWh.<sup>1</sup>

**ISO New England**

ISO New England's Load Response Program was established on June 1, 2001 and will continue through May 31, 2002. Like PJM, ISO New England enrolled customers into two programs, one based on system reliability and one based on price. One hundred one customers were enrolled in these programs, representing a total of 63 MW. (Of this number, 6.3 MW participated in the reliability program and 56.8 MW in the economic program.) Customers with both curtailable load and on-site generators were involved.

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<sup>1</sup> All information about the PJM program is from: PJM Interconnection, L.L.C., *Report on the 2000-2001 PJM Customer Load Reduction Pilot Program*, available at: [www.pjm.com](http://www.pjm.com).

ISO New England received load reductions under the program on seven different days during the summer of 2001. The ISO called for reliability-based reductions on only one of these days (August 9); the other load reductions were provided in response to high prices. The ISO paid \$513 per MWh for the reductions it received on August 9. Less than one MWh was ultimately needed on this day, so the payment was less than \$513. The average of the payments made for economic reductions was \$476 per MWh. The range of payments was \$94.39 to \$963.83 per MWh. Because less than one MWh was provided in the reliability program, the blended average of the payments made in the two programs was virtually the same as the average payment made in the economic program – \$476 per MWh.<sup>1</sup>

**New York ISO**

The New York ISO established two load response programs for the summer of 2001. In the Emergency Demand Response Program (EDRP) customers were paid to reduce load during system emergency conditions. In the Day Ahead Demand Response Program (DADRP) customers could bid load reductions in the ISO’s day ahead bidding process.

In the EDRP, 679 MW enrolled, 521 MW of interruptible load, 121 MW of on-site generation and 38 MW of mixed response. The ISO called for EDRP load reductions on four days in August 2001 during a total of 23 hours. The largest load reductions were approximately 450 MW during two hours on August 9. The ISO reports that total payments for load reductions were roughly \$4.5 million. They do not provide data on average payment per MWh.

The DADRP, which did not become operational until mid-July, included 24 participants, mostly large industrial loads. The ISO received bids for demand reductions on 31 days. Bids ranged from approximately \$10 per MWh to \$375 per MWh.<sup>2</sup>

**Summary of Northeastern Load Response Programs, 2001**

Region	MW Enrolled	Hours Called	MWhs Curtailed	Average Price (\$/MWh)
PJM	220	54	442	500
ISO New England	63	NA	951	476
New York ISO	679	23	8,178	NA

NA = information not available. For PJM and ISO New England, data from both the reliability and economic programs are shown. For the New York ISO, only data for the reliability program is shown.

<sup>1</sup> Information on ISO New England’s programs is from: ISO New England, *Compliance Report to FERC*, December 3, 2001, Docket No. ER01-3086-000, available at: [www.iso-ne.com](http://www.iso-ne.com).

<sup>2</sup> Information on the New York ISO’s programs is from: New York ISO, *Compliance Report to FERC*, December 4, 2001, Docket No. ER01-3001-000, available at: [www.nyiso.com](http://www.nyiso.com).