State of Market Report
California ISO

FERC Meeting
June 26, 2002

Anjali Sheffrin, Ph.D.
Director of Market Analysis
California ISO

Outline

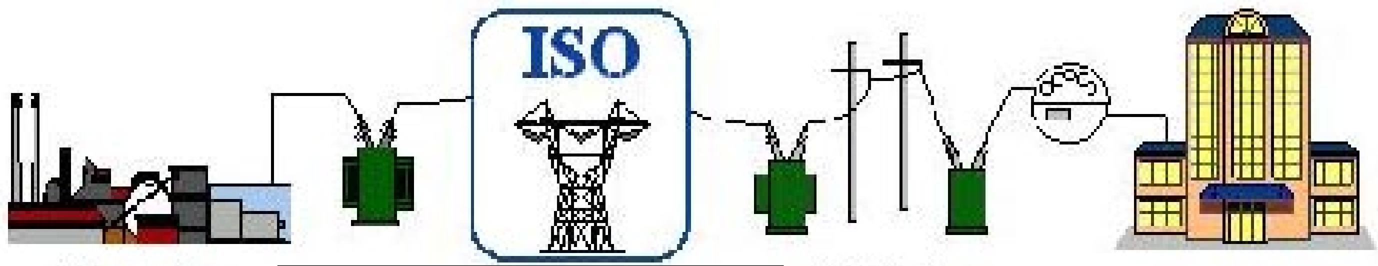
- Market Performance Overview
- Challenges and Solutions
  - Market Structure
  - Market Redesign
  - Market Monitoring

Markets Run By ISO

Cal-ISO Mission:

- Assure Grid Reliability
- Provide open and non-discriminatory access to grid
- Ensure efficient electricity market

Bilateral and Other
Day Ahead and Hour Ahead Schedules



Generation

- Ancillary service markets (Regulation, Spin,Non-spin, & Replacement)
- Transmission Congestion Management
- Real Time Imbalance Energy
- Reliability Must Run

Distribution

Loads

Market Highlights

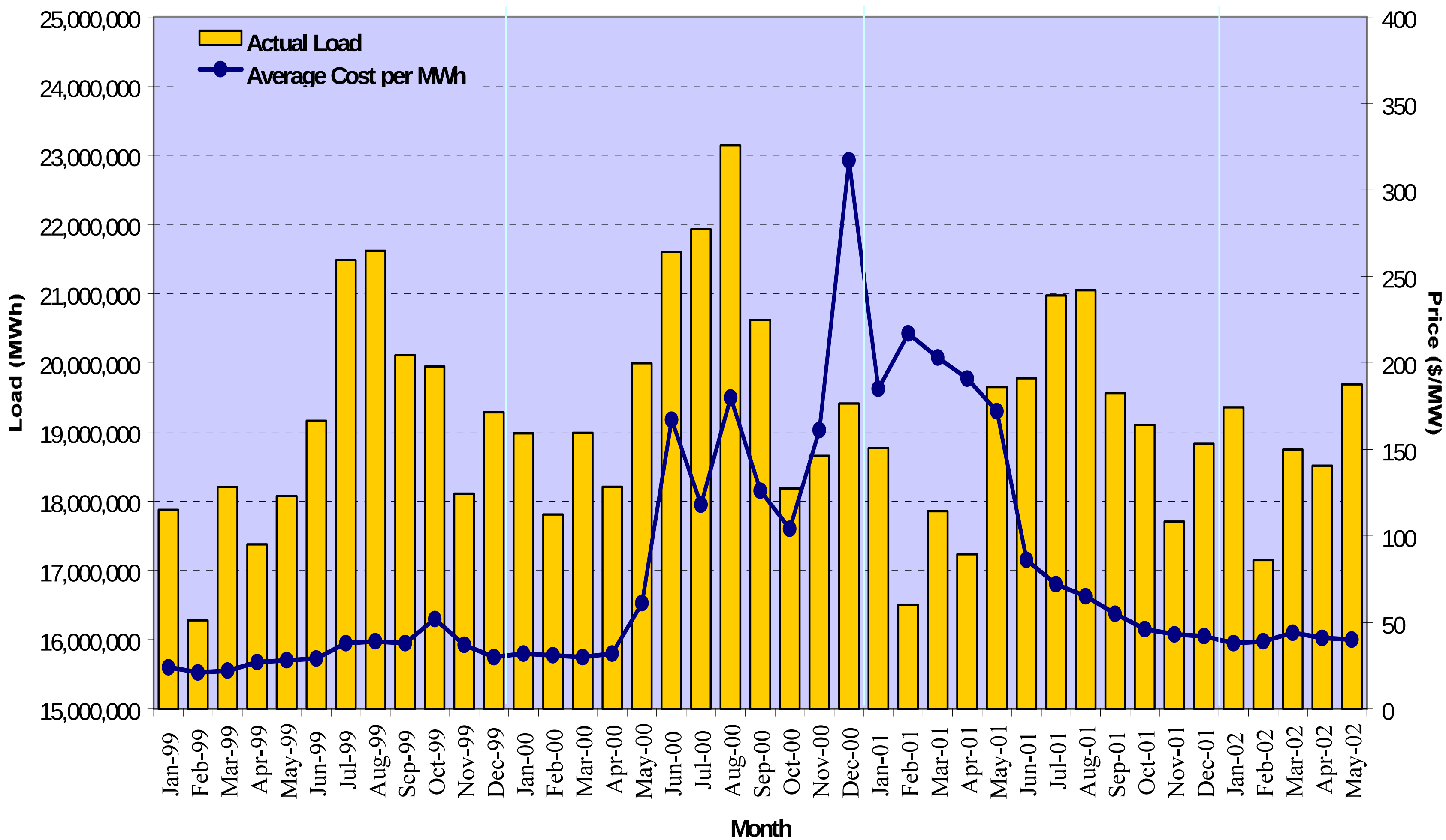
- Stable Market Prices and Adequate Supply
  - Average energy cost approximately $41/MWh since January
  - Total ancillary services costs remain at about 2% of energy cost
- Favorable factors
  - Normal hydro supply, stable gas price, healthy imports, low demand, and west-wide mitigation
- Risk factors
  - Reserve margin remains low while load starts to grow, new generation slows down, and imports levels may not be dependable
  - Utilities not credit-worthy to enter into long-term contracts to reduce pivotal position of sellers and exposure to spot markets
  - Continued bid mark-up in real-time market
  - Slow development of price responsive demand
- Reforms needed
  - Fundamental structural reform, market redesign with locational market power mitigation, and extension of West-wide mitigation

California ISO

California Independent
System Operator

Total Energy Costs Have Stabilized Since Jan 2002

Monthly Loads and Average Energy Cost to Serve Load



Summary of 2002 Energy Costs

	ISO Load (GWh)	Forward Energy (GWh)*	Est Forward Energy Costs (MM$)**	RT Energy Costs (MM$)***	A/S Costs (MM$)****	Total Energy Costs (MM$)	Total Costs of Energy and A/S (MM$)	Avg Cost of Energy ($/MWh)	A/S Cost ($/MWh Load)	A/S % of Energy Cost	Avg. Cost of Energy & A/S ($/MWh Load)
Jan-02	19,356	18,940	$ 737	$ 7	$ 19	$ 744	$ 763	$ 38	$ 0.97	2.5%	$ 39
Feb-02	17,153	16,654	$ 663	$ 7	$ 12	$ 670	$ 682	$ 39	$ 0.68	1.7%	$ 40
Mar-02	18,749	18,282	$ 811	$ 6	$ 9	$ 817	$ 826	$ 44	$ 0.50	1.2%	$ 44
Apr-02	18,511	17,937	$ 742	$ 8	$ 13	$ 750	$ 763	$ 41	$ 0.68	1.7%	$ 41
May-02	19,690	19,031	$ 774	$ 11	$ 15	$ 786	$ 801	$ 40	$ 0.78	2.0%	$ 41
Total 2002	93,460	90,844	$ 3,726	$ 40	$ 68	$ 3,766	$ 3,834				
Avg 2002	18,692	18,169	$ 745	$ 8	$ 14	$ 753	$ 767	$ 40	$ 0.72	1.8%	$ 41

* Sum of hour-ahead scheduled quantities

** Includes UDC (cost of production), estimated CDWR costs, and other bilaterals priced at hub prices

*** includes OOM, dispatched real-time paid MCP, and dispatched real-time paid as-bid

**** Including ISO purchase and self-provided A/S priced at corresponding A/S market price for each hour, less Replacement Reserve refund

March, April, and May forward costs (and resulting totals) are estimated. Values in July report will include true-up and may differ from values shown here.

California ISO

California Independent
System Operator

Summary of Energy Costs: 2001 and Earlier

	ISO Load (GWh)	Est Forward Energy Costs (MM$)*	RT Energy Costs (MM$)**	A/S Costs (MM$)***	Total Energy Costs (MM$)	Total Costs of Energy and A/S (MM$)	Avg Cost of Energy ($/MWh)	A/S Cost ($/MWh Load)	A/S % of Energy Cost	Avg. Cost of Energy & A/S ($/MWh Load)
Total 2001	227,024	$ 21,248	$ 4,162	$ 1,346.09	$ 25,409.97	$ 26,756				
Avg 2001	18,919	$ 1,771	$ 347	$ 112	$ 2,117	$ 2,230	$ 115	$ 6.07	5.3%	$ 118
Total 2000	237,543	$ 22,890	$ 2,877	$ 1,720	$ 25,373	$ 27,083				
Avg 2000	19,795	$ 1,907	$ 240	$ 143	$ 2,114	$ 2,257	$ 107	$ 7.24	6.8%	$ 114
Total 1999	227,533	$ 6,848	$ 180	$ 404	$ 7,028	$ 7,432				
Avg 1999	18,961	$ 571	$ 15	$ 34	$ 586	$ 619	$ 31	$ 1.78	5.7%	$ 33
1998 (9mo)	169,239	$ 4,704	$ 209	$ 638	$ 4,913	$ 5,551				
Avg 1998	18,804	$ 523	$ 23	$ 71	$ 546	$ 617	$ 29	$ 3.77	13.0%	$ 33

1998-2000:

* Forward costs include estimated PX and bilateral energy costs.

Estimated PX Energy Costs include UDC owned supply sold in the PX, valued at PX prices.

Estimated Bilateral Energy Cost based on the difference between hour ahead schedules and PX quantities, valued at PX prices.

** Beginning November 2000, ISO Real Time Energy Costs include OOM Costs.

2001 only:

***** Sum of hour-ahead scheduled costs. Includes UDC (cost of production), estimated CDWR costs, and other bilaterals priced at hub prices

****** includes OOM, dispatched real-time paid MCP, and dispatched real-time paid as-bid

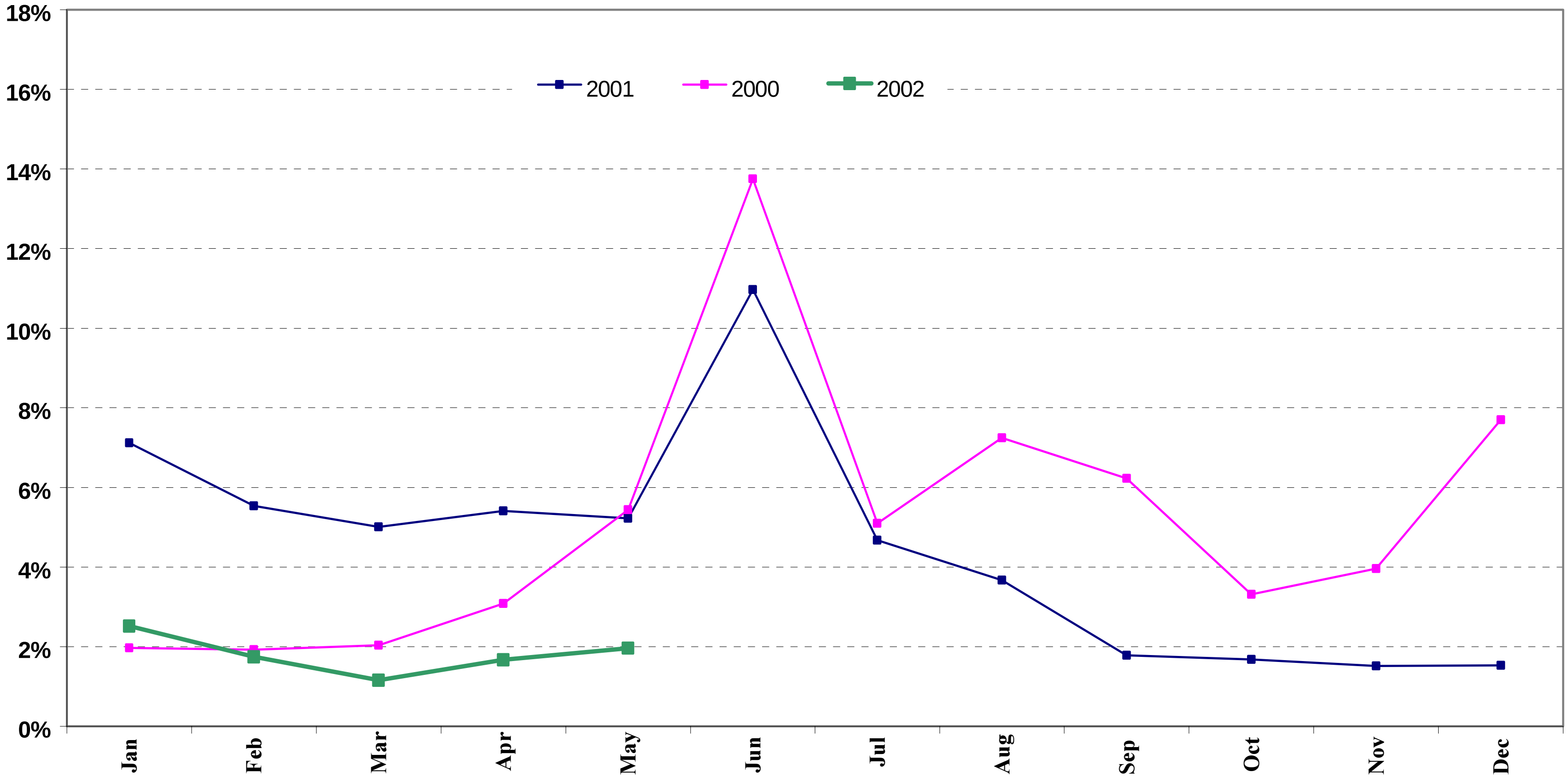
All years:

******* Including ISO purchase and self-provided A/S priced at corresponding A/S market price for each hour, less Replacement Reserve refund

California ISO

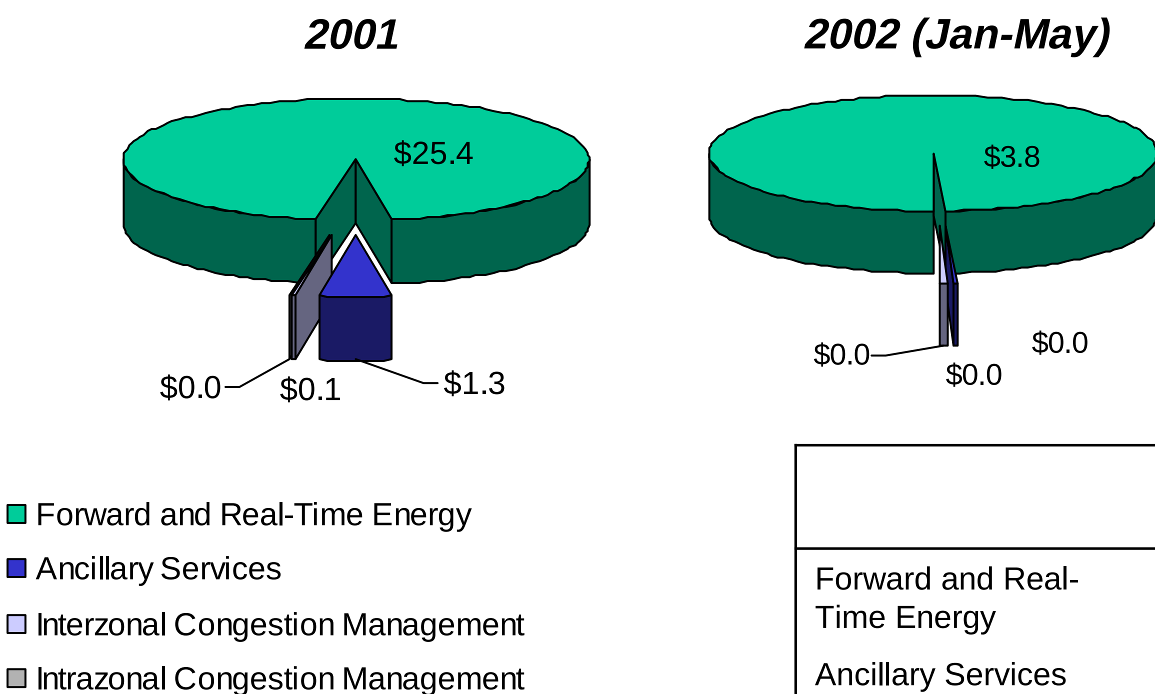
California Independent
System Operator

Ancillary Service Costs as a Percentage of Energy Costs Remains Below 2%



Congestion and Ancillary Services Have Played a Relatively Minor Role in Total Energy Costs

Wholesale Energy Costs in Billions of US Dollars



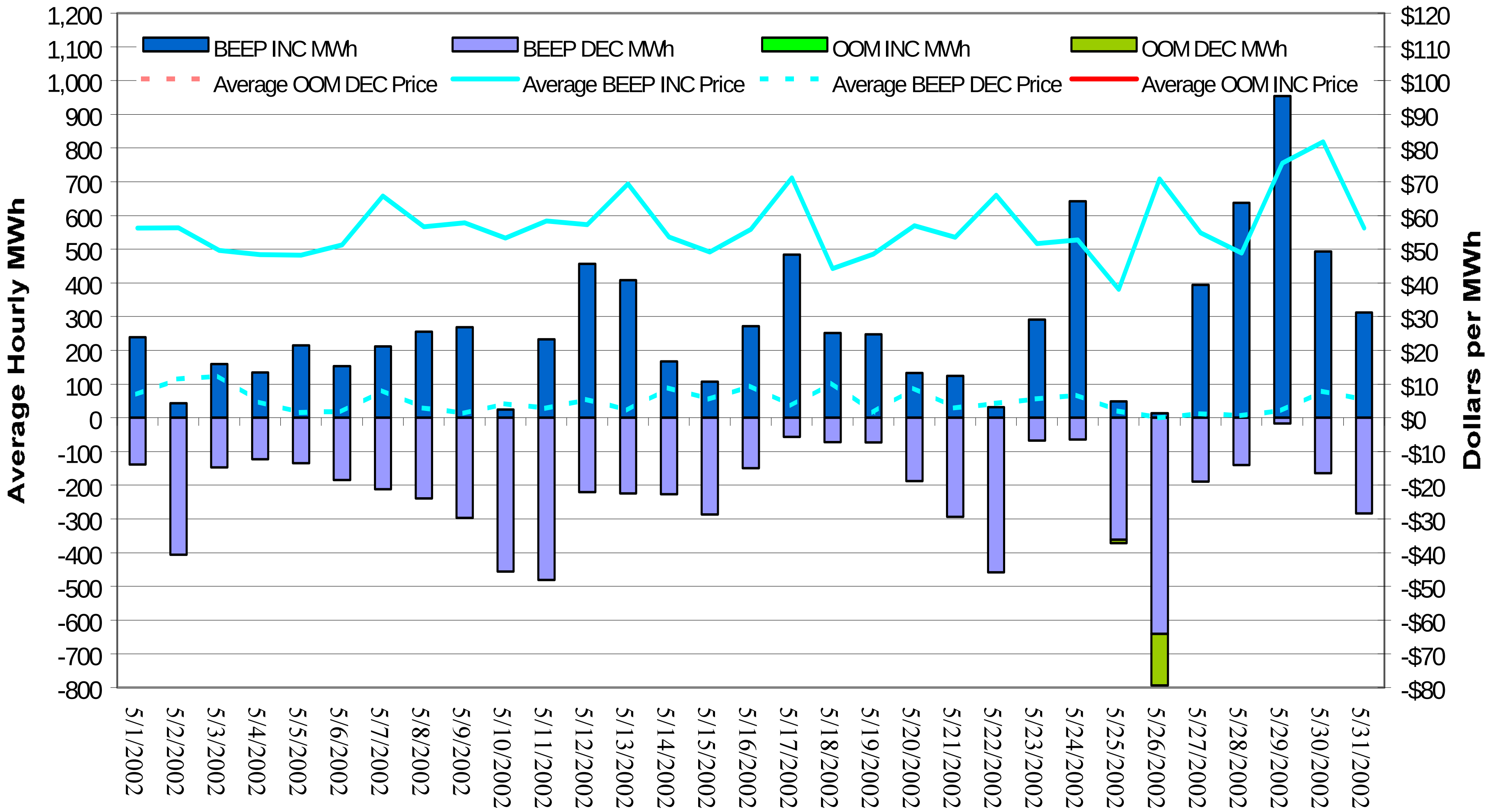
	2001	2002 YTD
Forward and Real-Time Energy	$25.4	$3.8
Ancillary Services	$1.3	$0.0
Interzonal Congestion	$0.1	$0.0
Intrazonal Congestion	$0.0	$0.0

California ISO

California Independent
System Operator

Prices and Volumes in Real-time Balancing Market

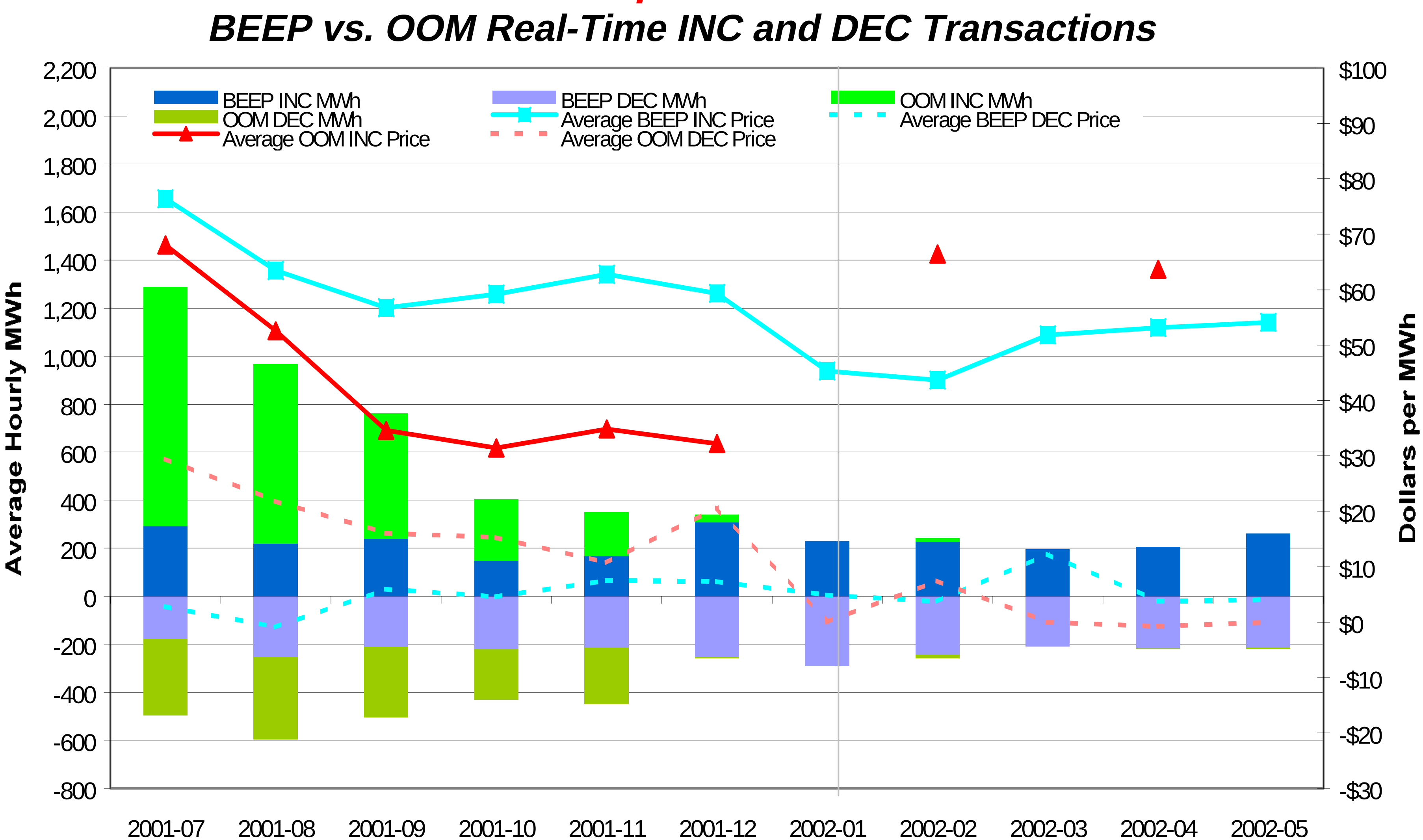
Volumes dispatched in BEEP, and Out of Market Real-Time transactions - Daily Averages



California ISO

California Independent System Operator

Dramatic Reduction in Out of Market Transactions As Market Improved



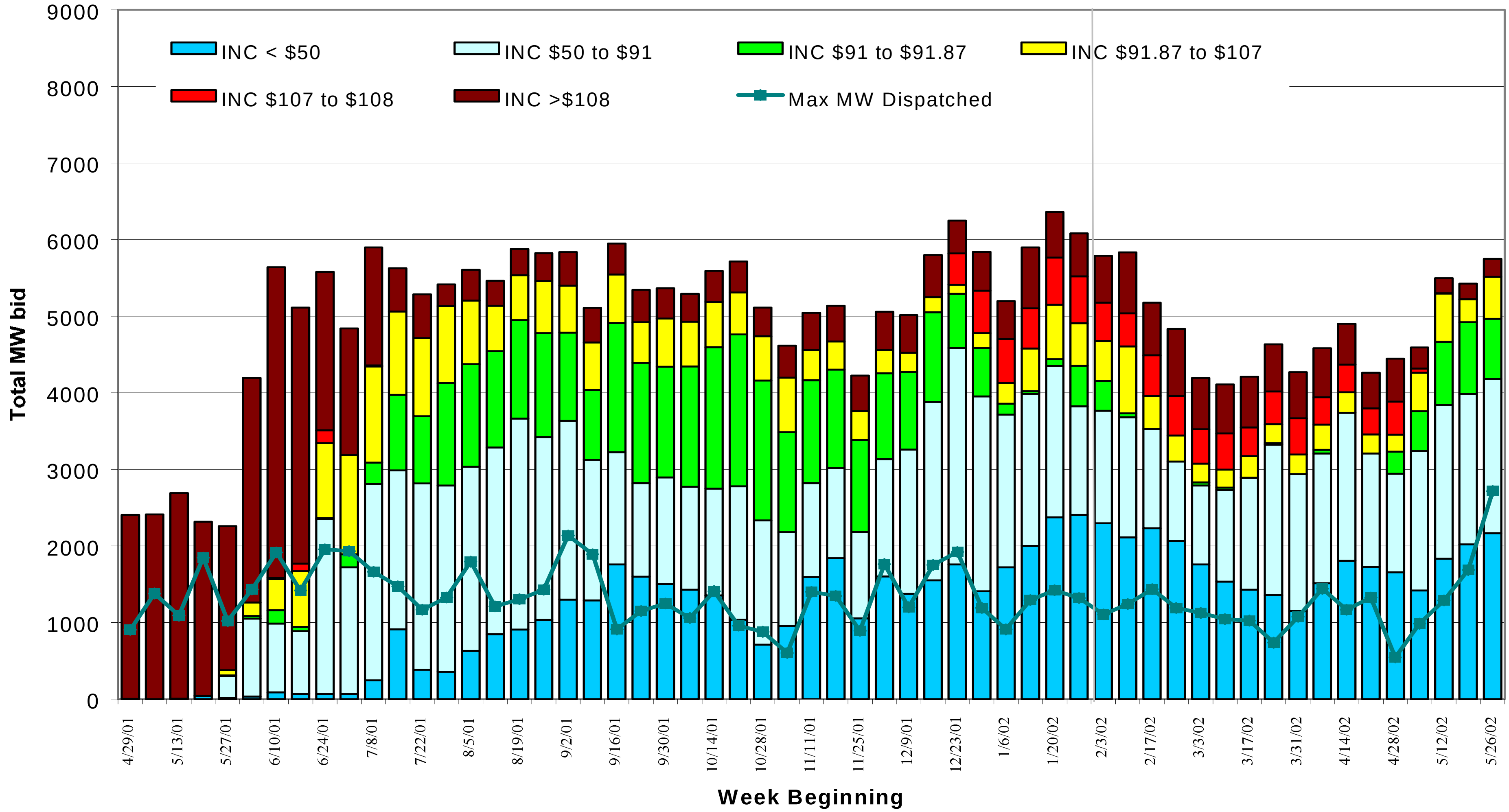
California ISO

California Independent System Operator

Demand and Supply Conditions in Real-time

Comparison of Bids Into Real-time Market By Price Bin

Weekly Inc Bids May 2001 to May 2002

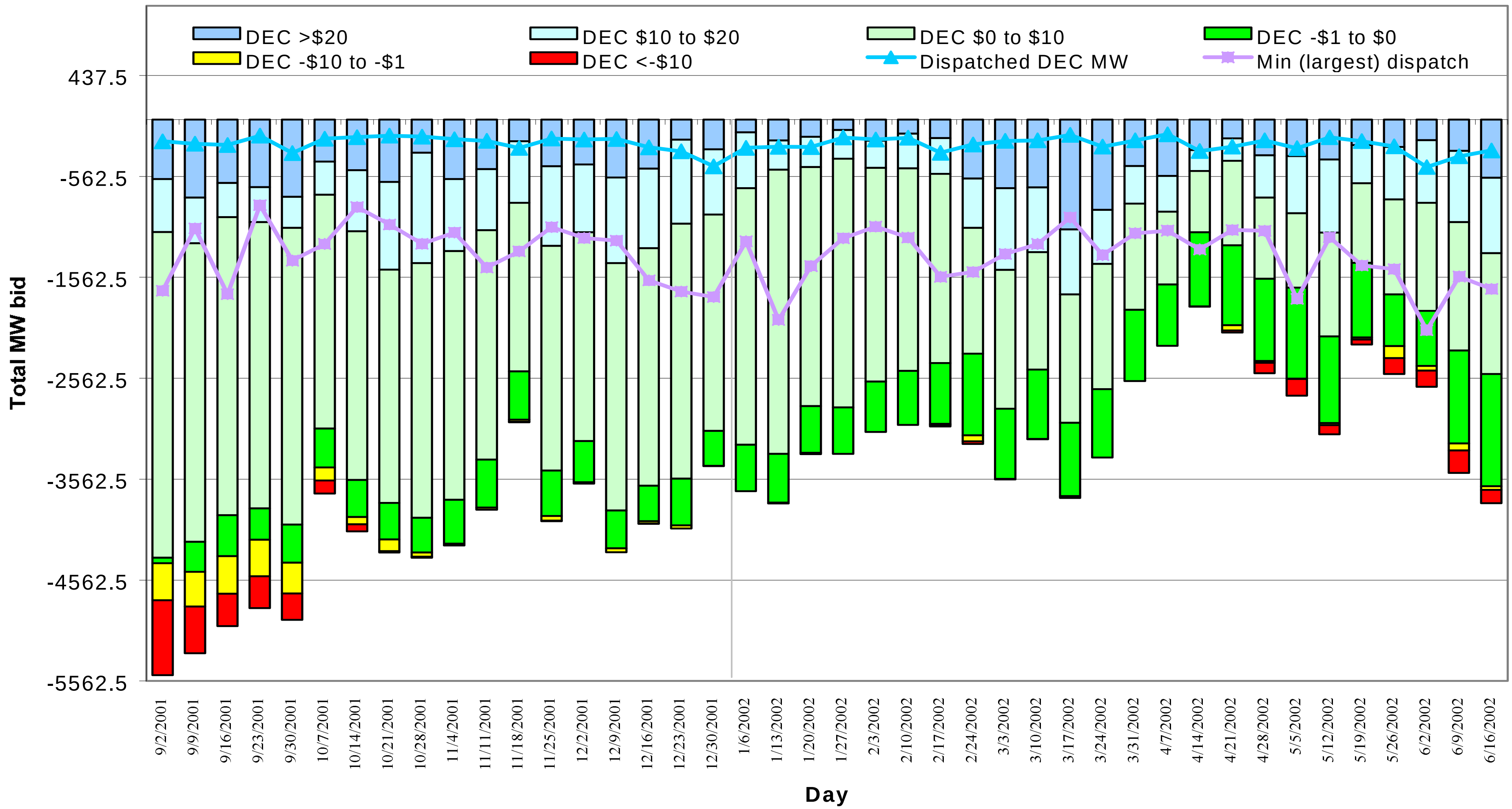


California ISO

California Independent System Operator

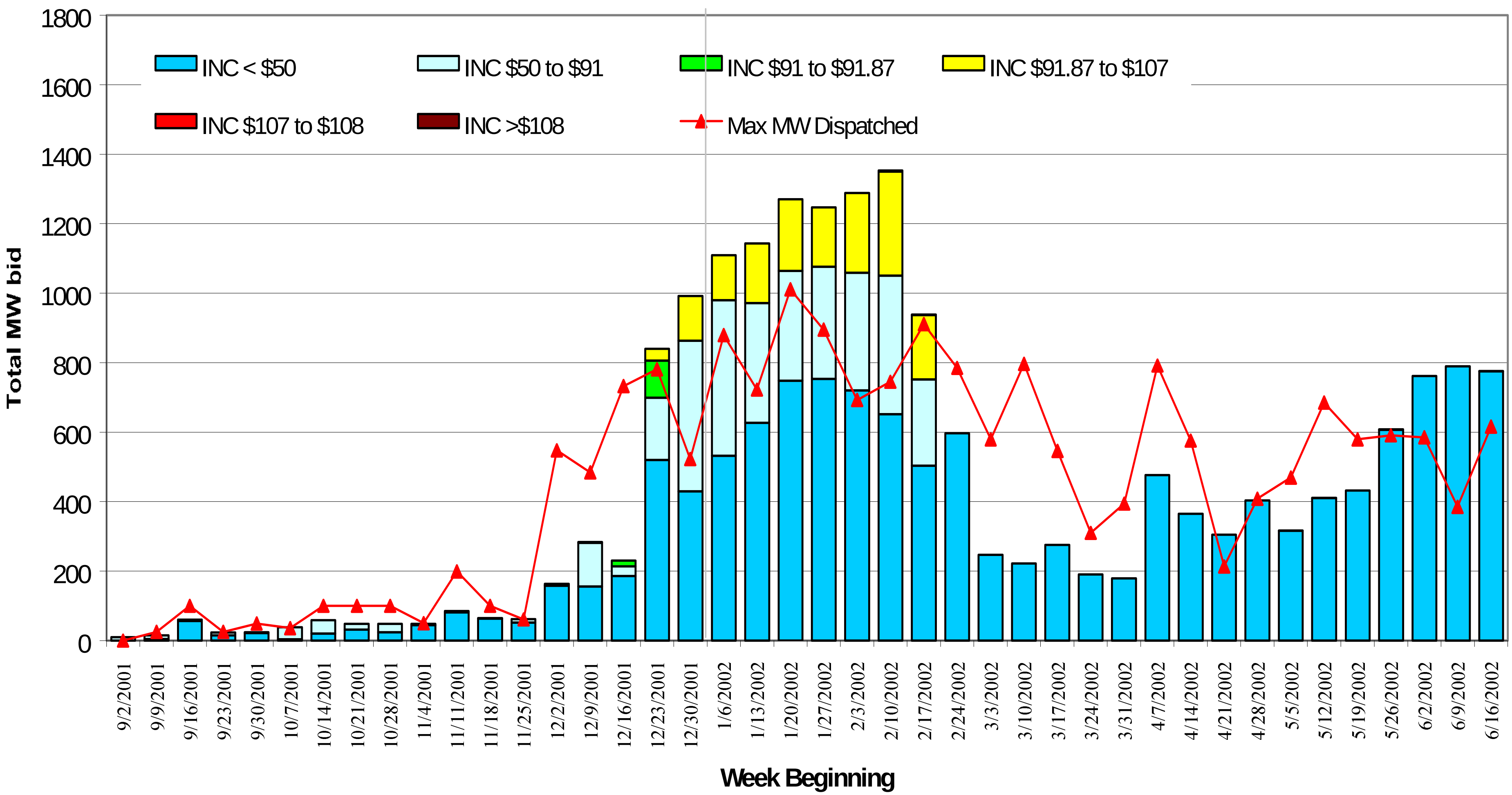
Comparison of Bids by Price Bin

DEC Bids by Price Bin - Weekly
Sep 2001 to Jun 2002



Bid Volume From Interties Declined with Zero-Bid Requirement

INC Tie Bids by Price Bin - Weekly Sept 2001 to June 2002

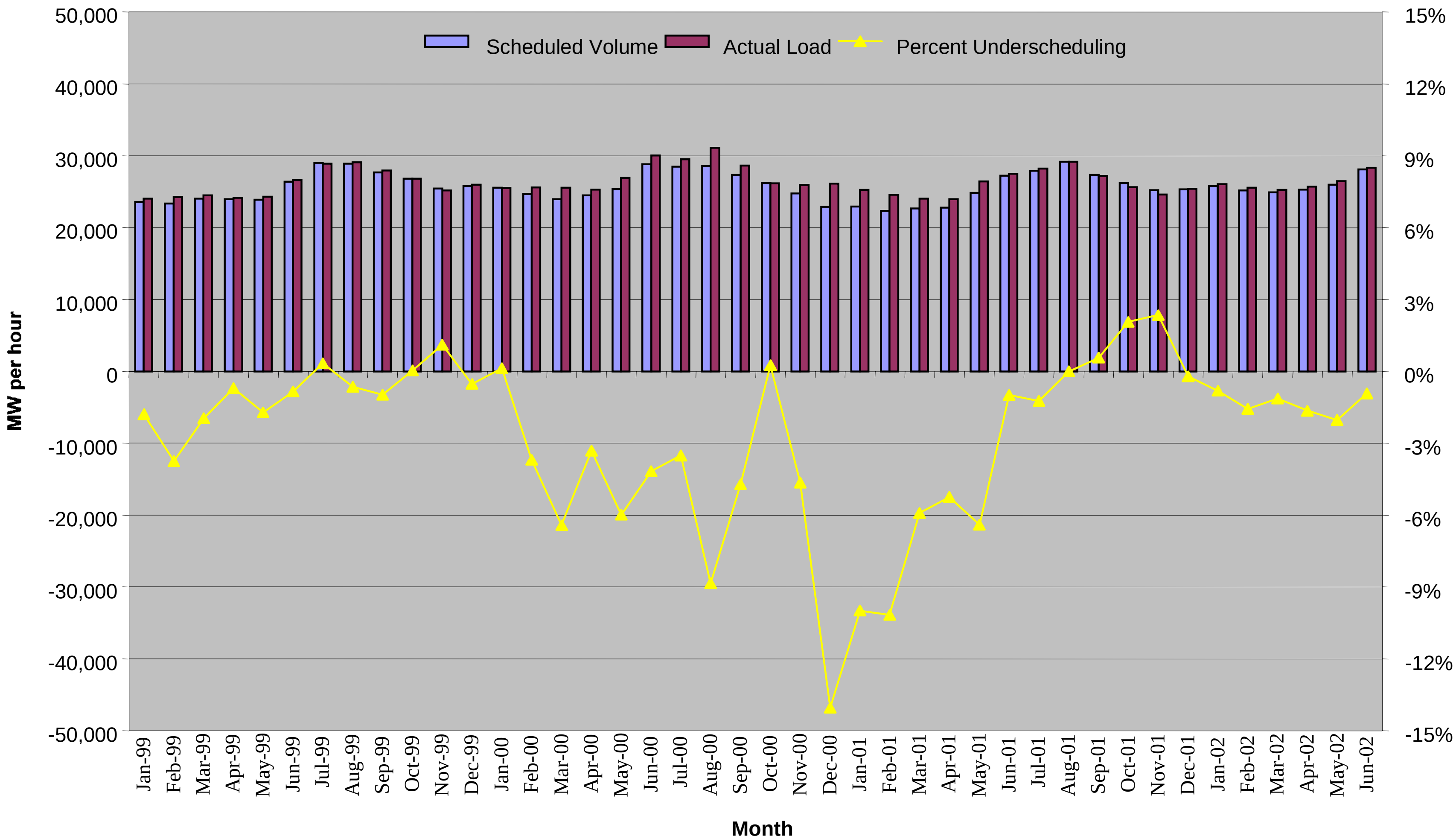


California ISO

California Independent
System Operator

Underscheduling Has Stabilized At 2-3%

Monthly Average Scheduled vs. Actual Load

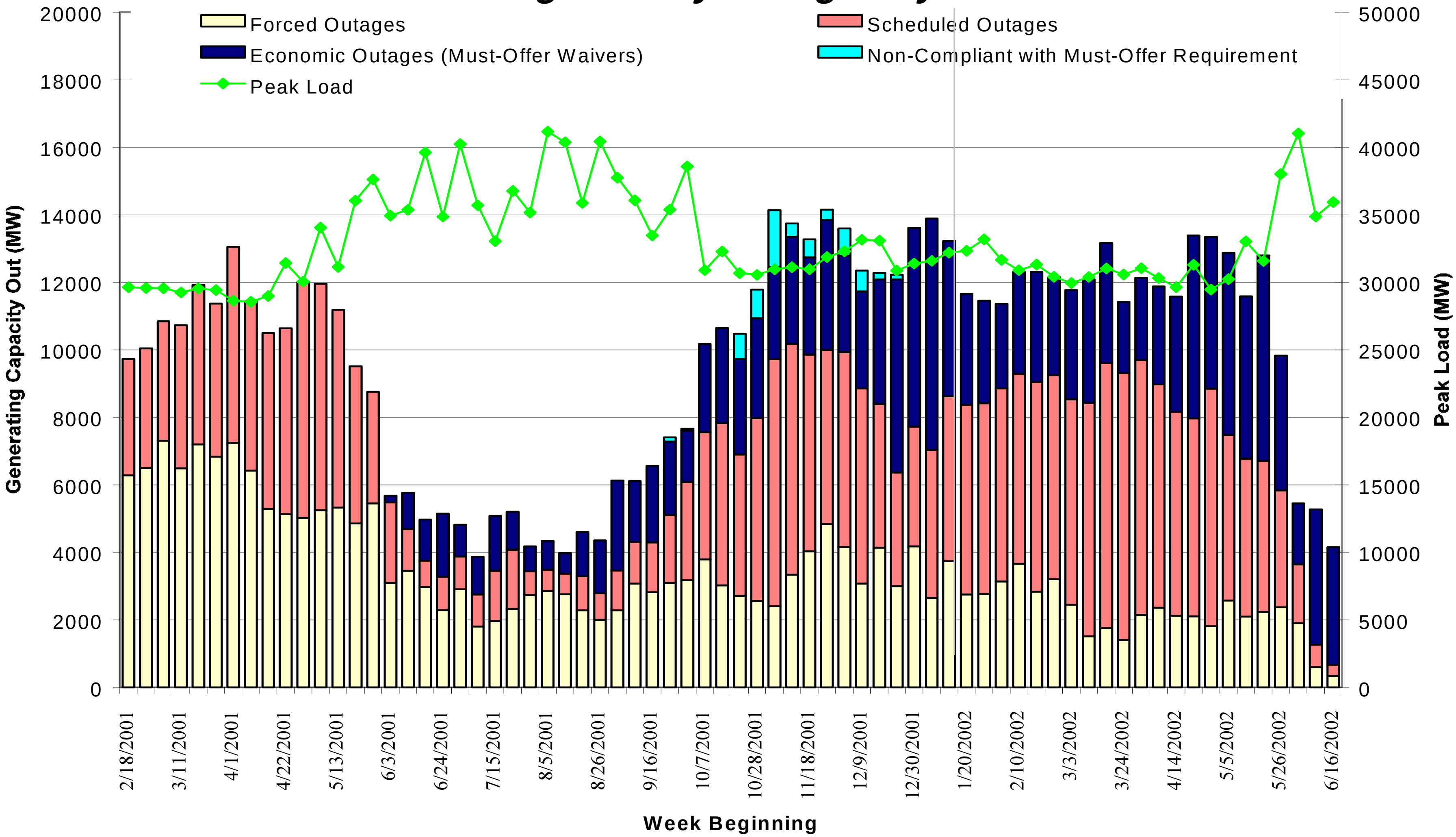


California ISO

California Independent System Operator

Must Offer Order and Improved Outage Management Has Reduced Outages

Average Hourly Outages by Week



Although Loads Are Higher Than 2001, Remain Lower Than 2000

Load Growth Rates Compared with Same Month Prior Year

	Avg. Hrly. Load	Avg. Daily Peak	Monthly Peak
June-01	-8.5%	-11.3%	-8.8%
July-01	-4.4%	-7.9%	-7.1%
August-01	-6.3%	-7.4%	-5.4%
September-01	-5.1%	-6.3%	-12.3%
October-01	-1.8%	-1.3%	8.5%
November-01	-5.1%	-4.4%	-4.0%
December-01	-2.7%	-1.8%	-1.5%
January-02	3.1%	2.8%	2.3%
February-02	3.9%	3.8%	4.1%
March-02	5.0%	3.8%	4.9%
April-02	7.2%	6.3%	-0.4%
May-02	0.2%	-1.9%	1.0%

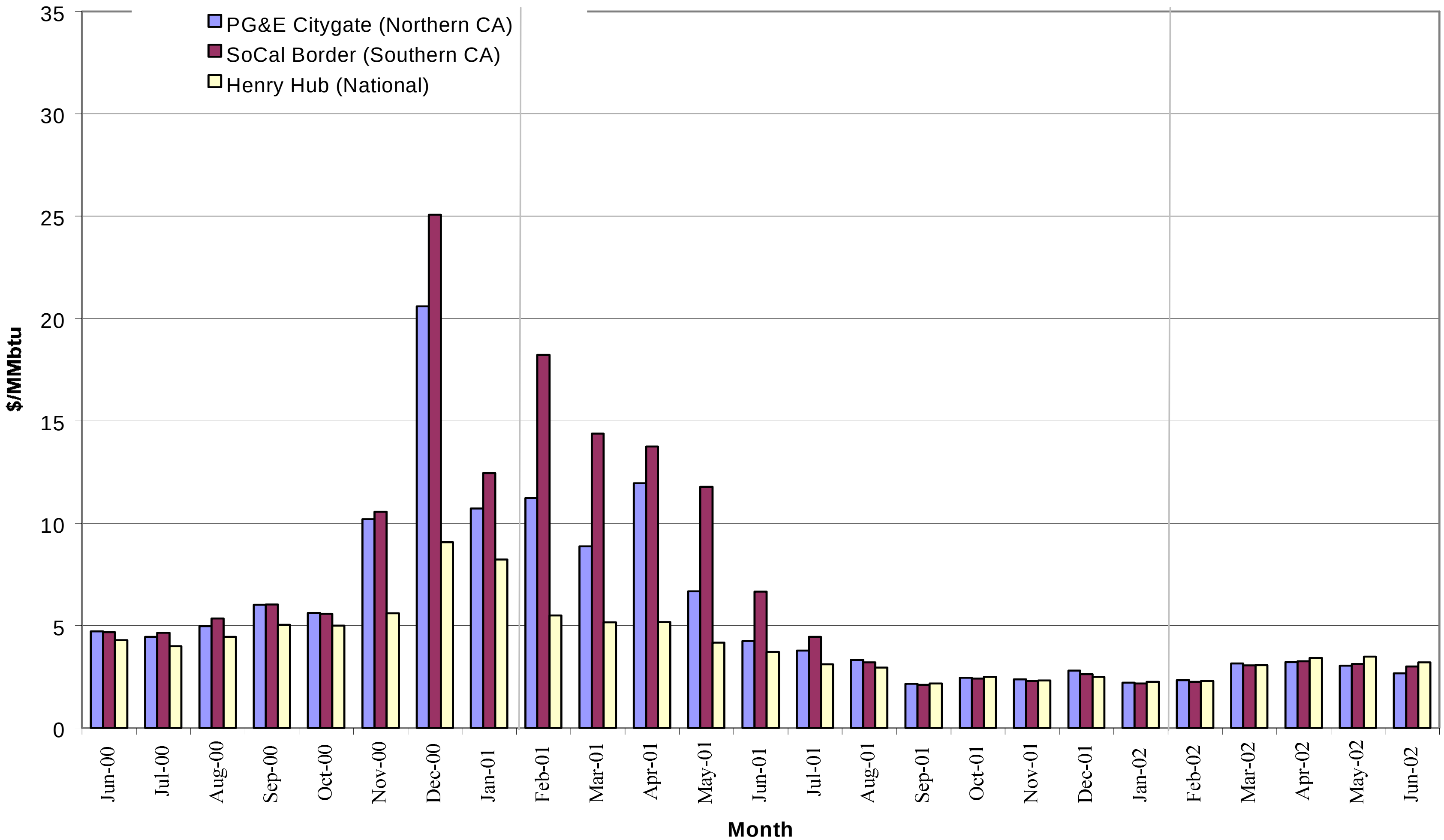
Note: Load figures are based on unadjusted ISO control area loads.

California ISO

California Independent
System Operator

Gas Price Have Stabilized

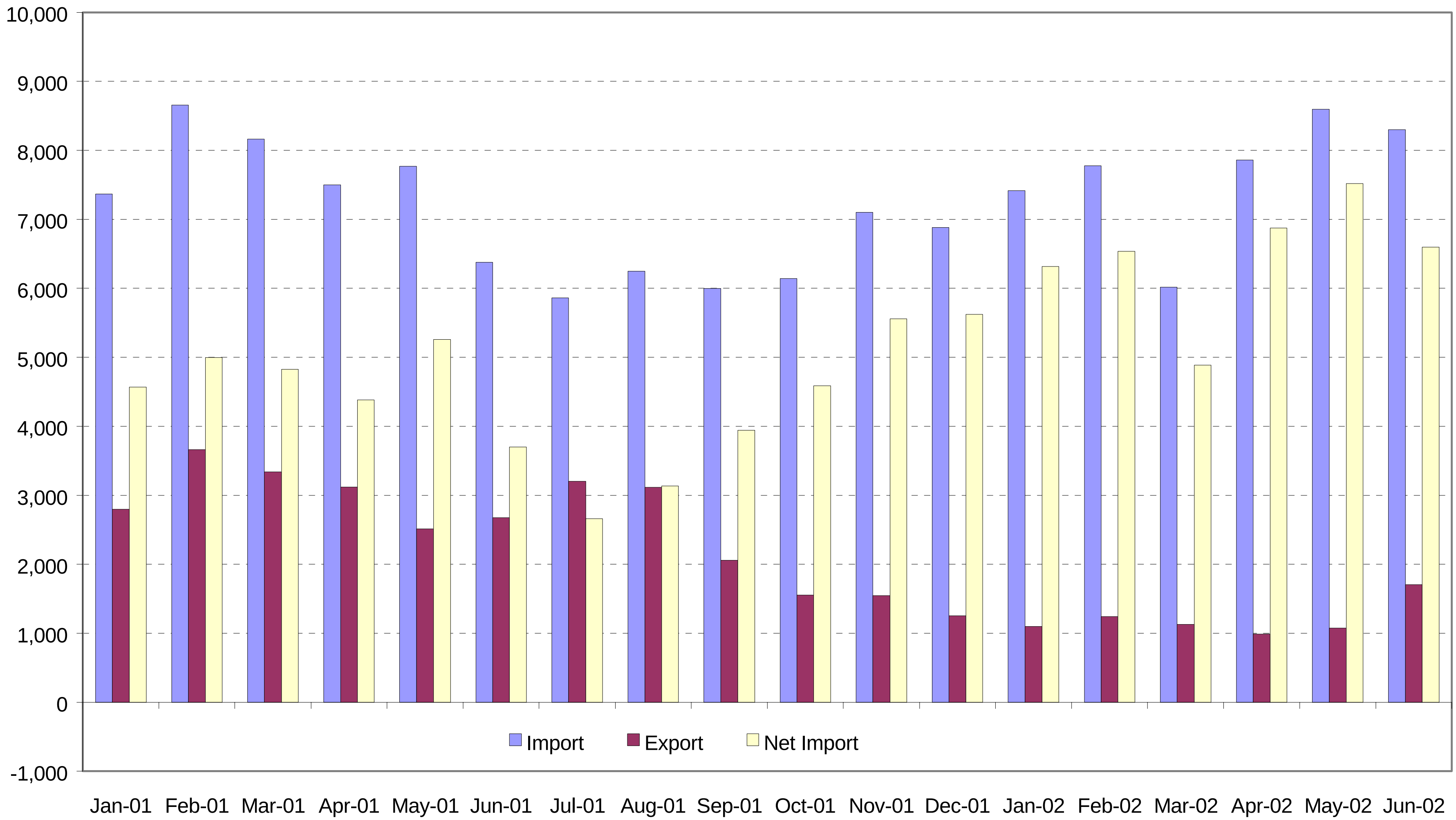
Average Monthly Gas Prices: Jun-00 through Jun-02



California ISO

California Independent
System Operator

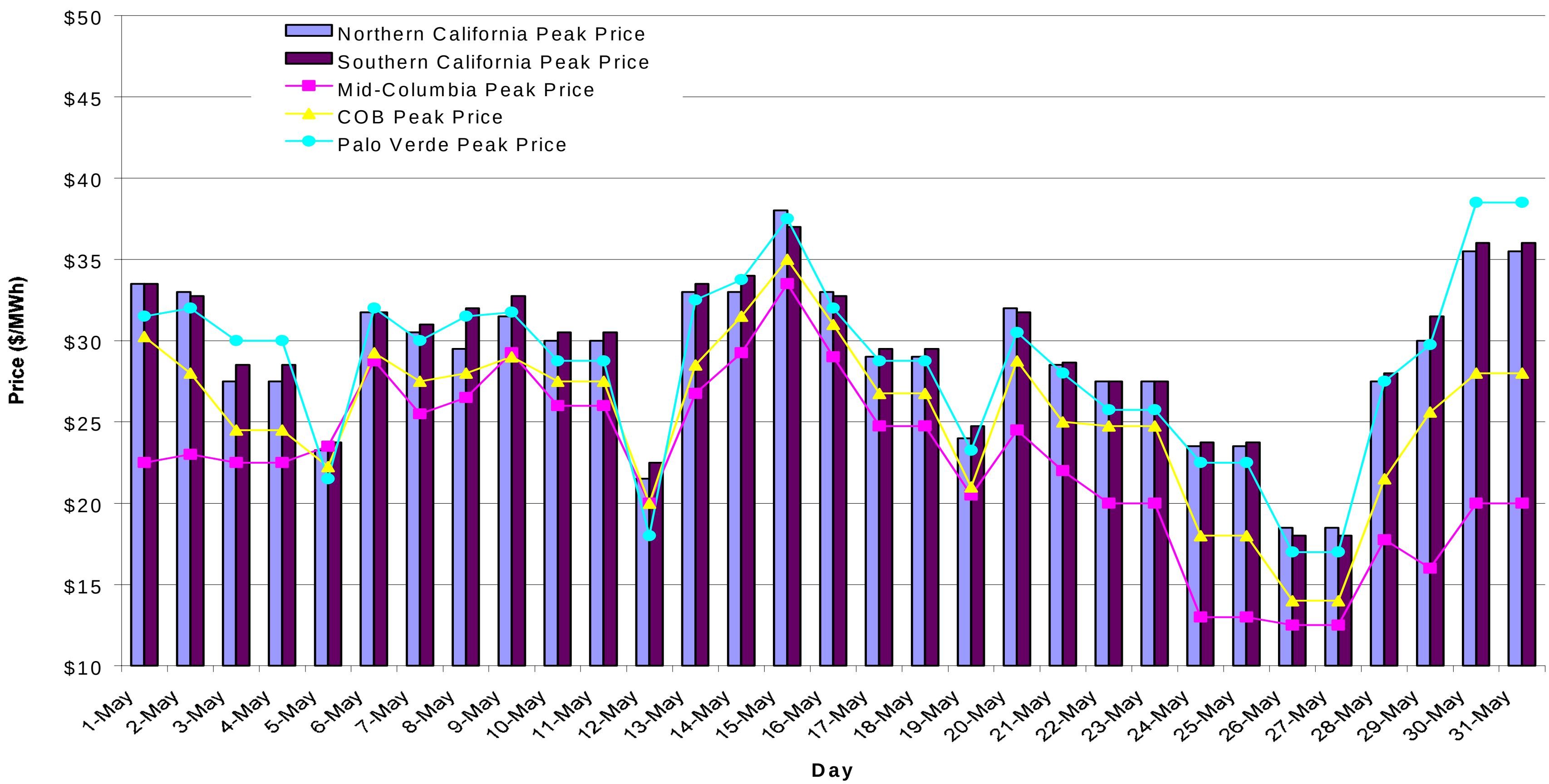
Imports and Exports (January 01, 2001 To June 20, 2002)



California ISO

California Independent
System Operator

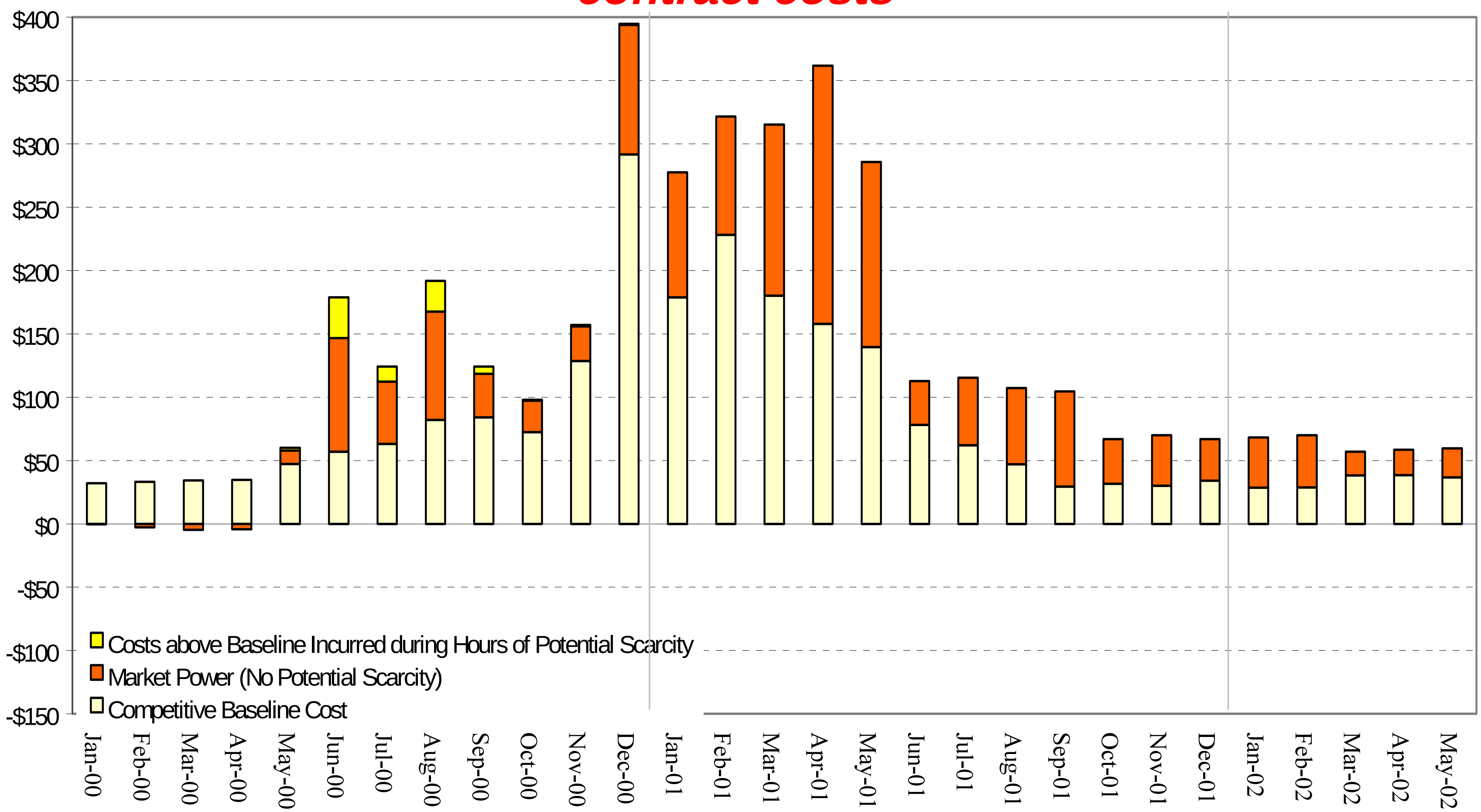
Regional Day-Ahead Bilateral Electric Prices
May 2002



California ISO

California Independent
System Operator

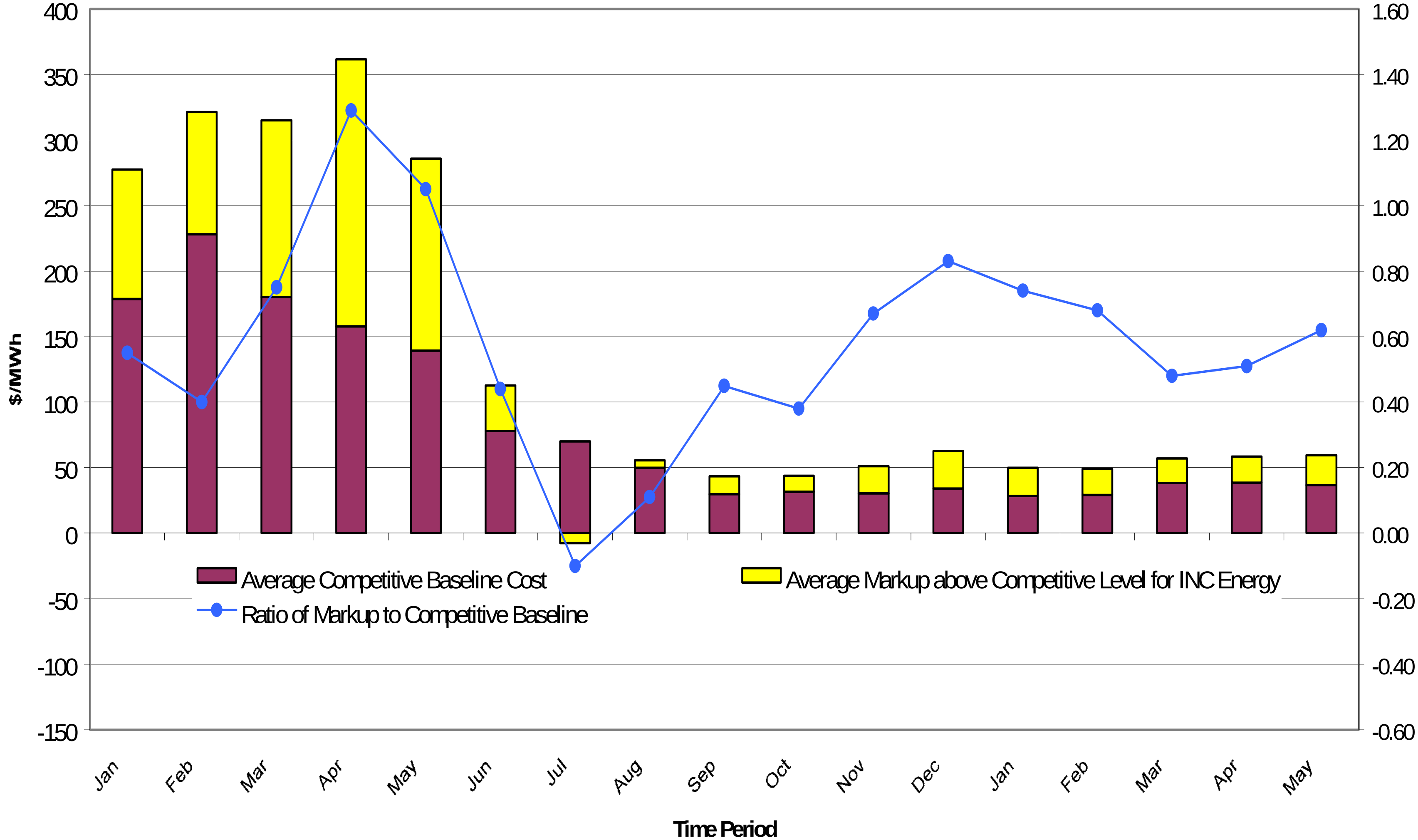
Three Views of Price/Cost Markup: Long-term View
Mark-up above competitive benchmark remains high due to forward contract costs



California ISO

California Independent System Operator

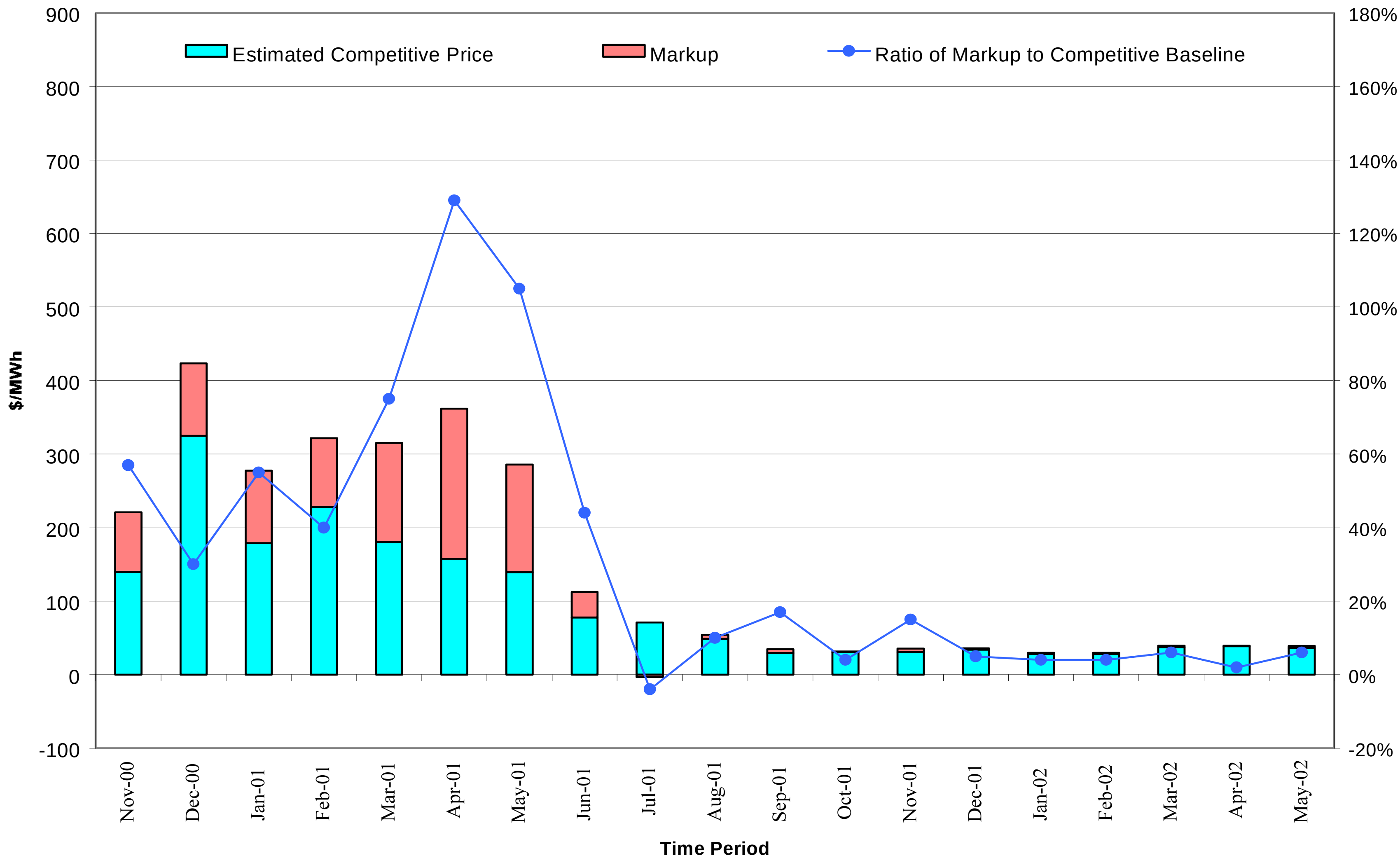
View 2: Price/Cost Markup in Real-Time Energy Market



California ISO

California Independent System Operator

*View 3: Markup above Competitive Prices in Short-Term Energy**

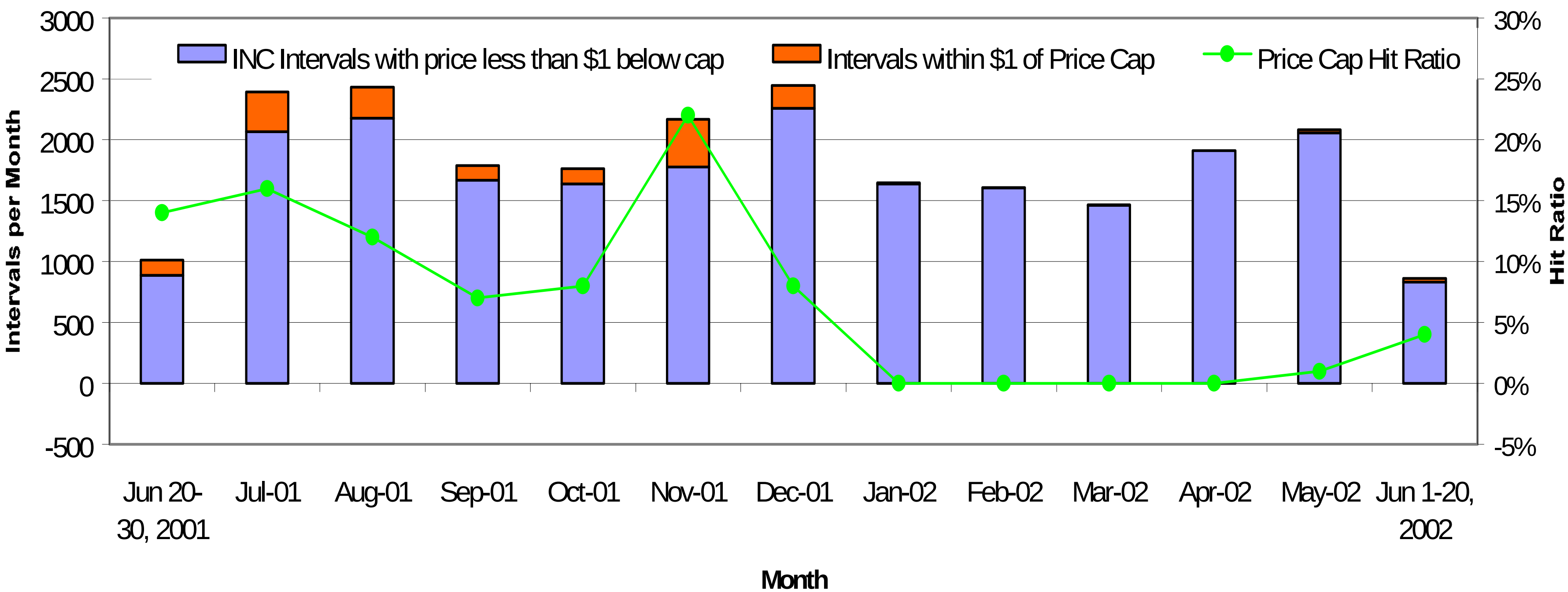


*Short-term energy includes ISO real time and CDWR Day Ahead and Hour Ahead purchases

California ISO

California Independent
System Operator

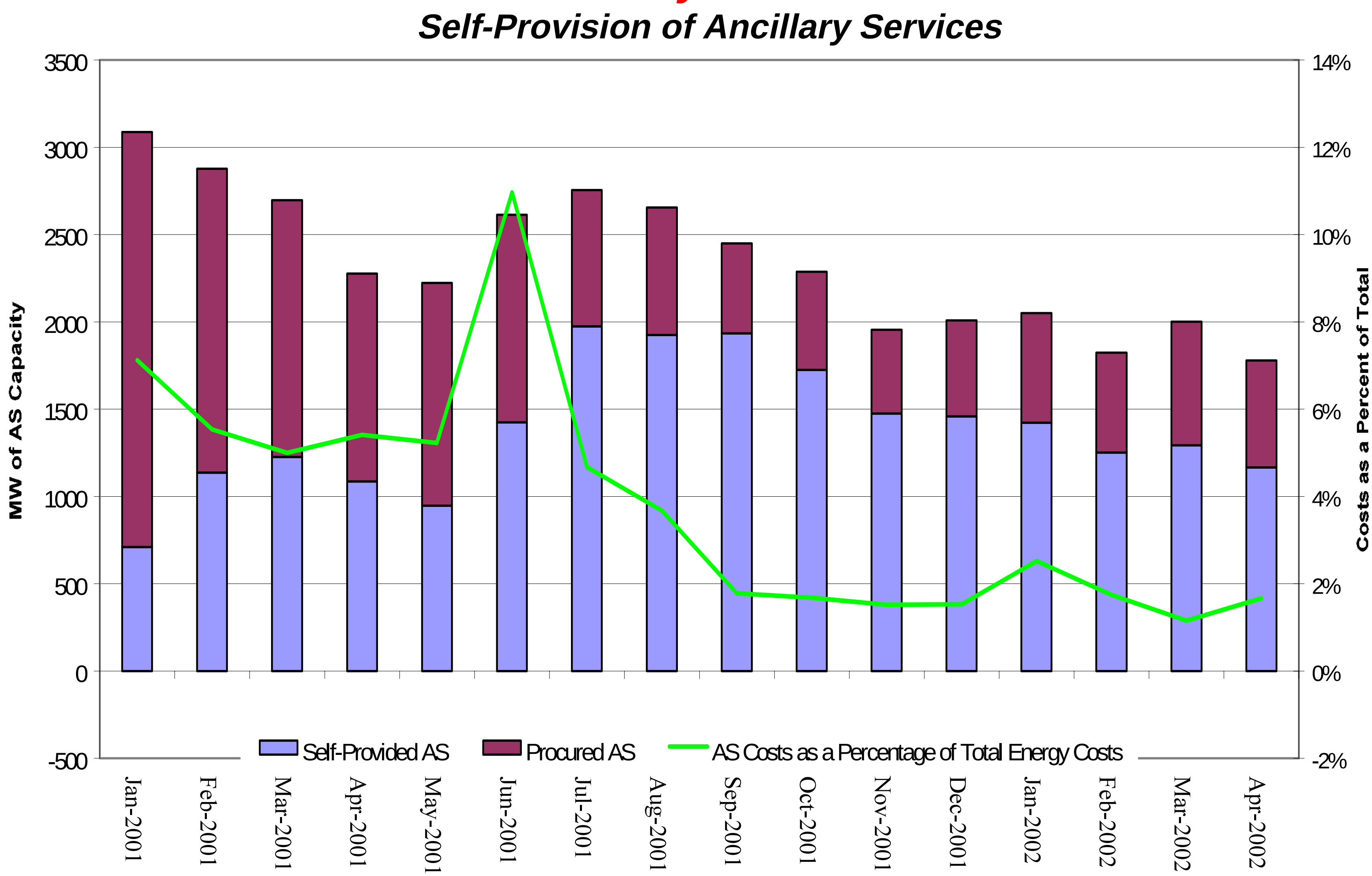
NP15 Price Cap Hits in 10-Minute Intervals by Month



California ISO

California Independent
System Operator

Stable Ancillary Service Markets



California ISO

California Independent System Operator

Ancillary Services Prices and Volumes

	NP15		SP15		Pct. of Hours with Zonal Procurement
	Peak	Off-Peak	Peak	Off-Peak	
Regulation Up	$ 13.29	$ 15.56	$ 13.58	$ 15.30	0%
Regulation Down	$ 14.34	$ 20.40	$ 15.45	$ 21.20	0%
Spin	$ 5.90	$ 1.11	$ 6.06	$ 1.03	0%
Non-Spin	$ 1.57	$ 0.08	$ 2.56	$ 0.09	0%
Replacement	$ 0.09	$ 0.07	$ 0.05	$ 0.21	0%

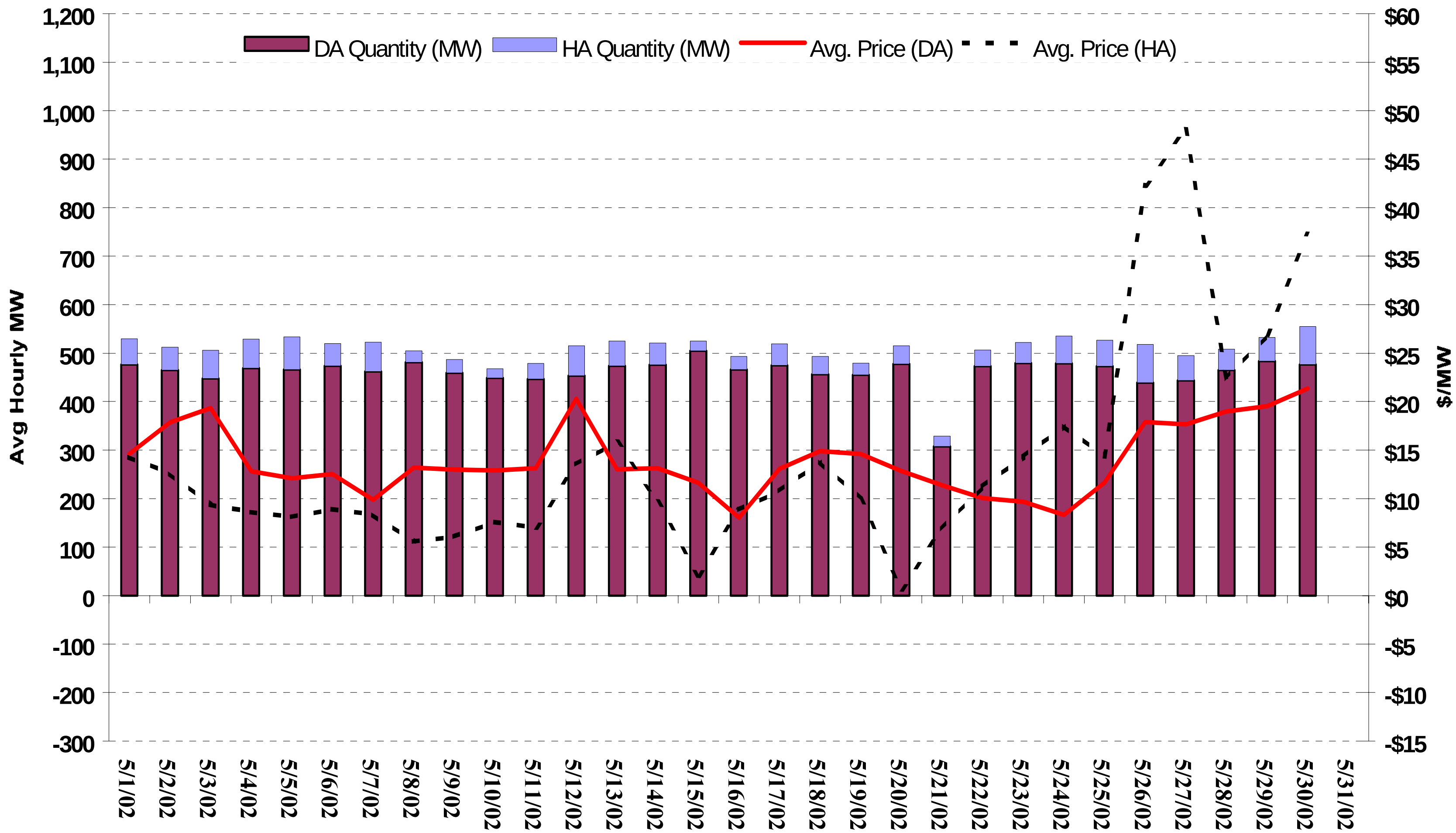
	Day-Ahead Market	Hour-Ahead Market	Quantity Weighted Price	Average Hourly MW Day Ahead	Average Hourly MW Hour Ahead	Percent Purchased in Day Ahead
Regulation Up	$ 14.08	$ 16.68	$ 14.31	468	46	91%
Regulation Down	$ 16.51	$ 7.62	$ 15.58	457	54	89%
Spin	$ 4.43	$ 9.83	$ 4.67	714	33	95%
Non-Spin	$ 1.30	$ 2.12	$ 1.35	663	42	94%
Replacement	$ 0.08	$ 0.62	$ 0.12	62	5	92%

California ISO

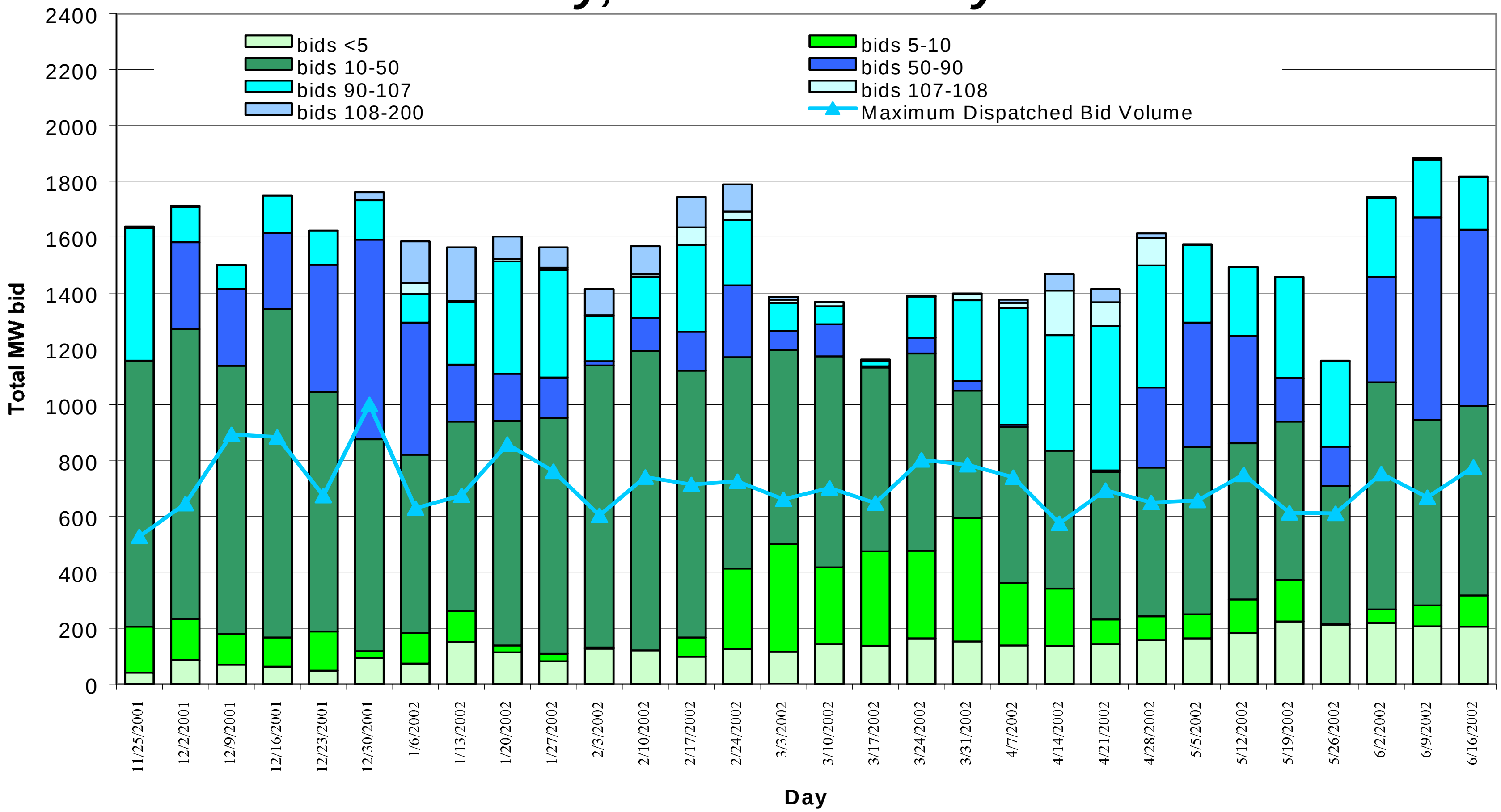
California Independent System Operator

Average Daily Regulation Up Prices and Quantities

May 2002



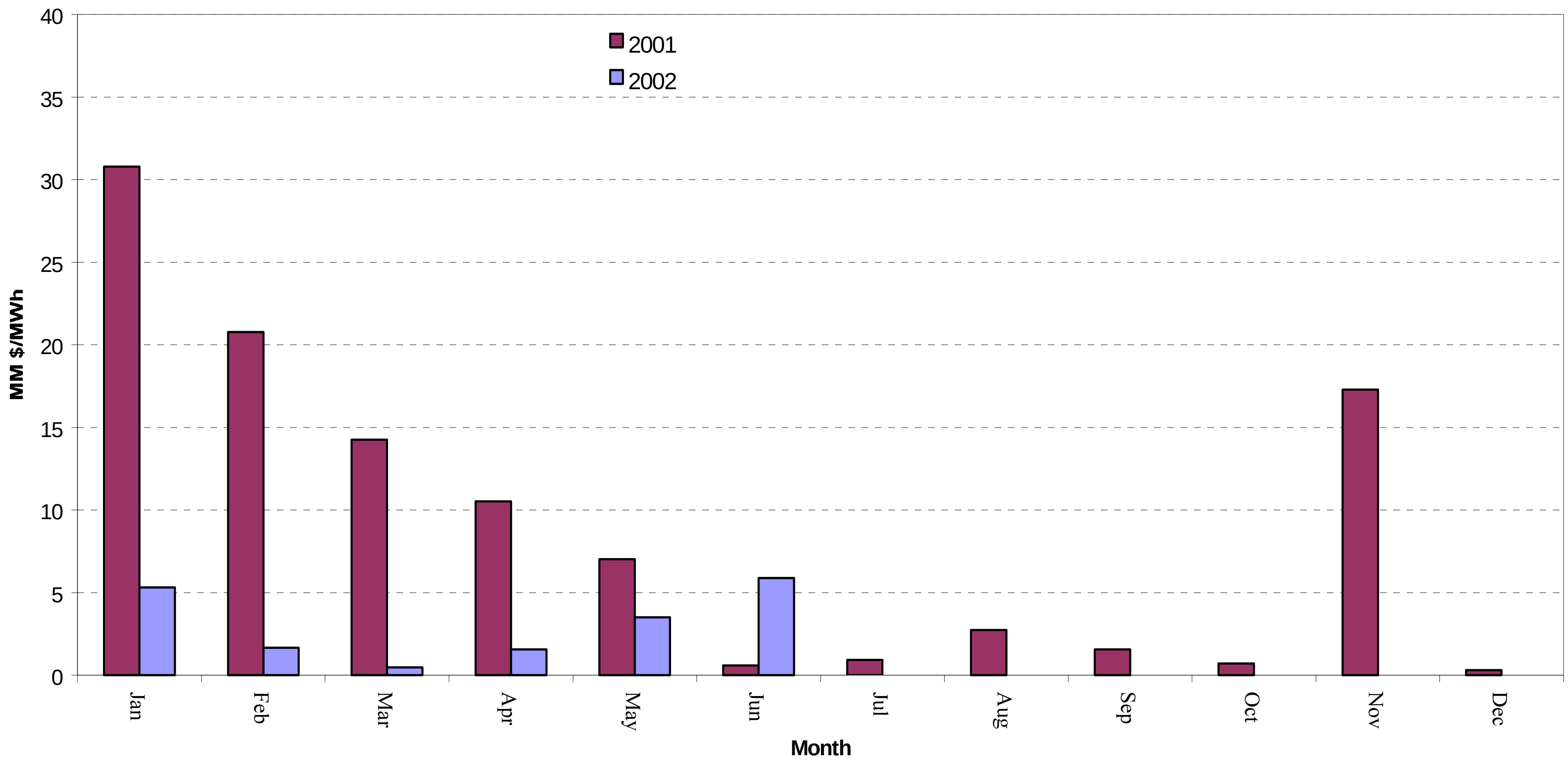
Supply and Demand Conditions in Regulation Up Market
Upward Regulation Bids by Price Bin
- Weekly, Dec 2001 to May 2002



California ISO

California Independent
System Operator

Comparison of Monthly Interzonal Congestion Costs:
2002 vs. 2001

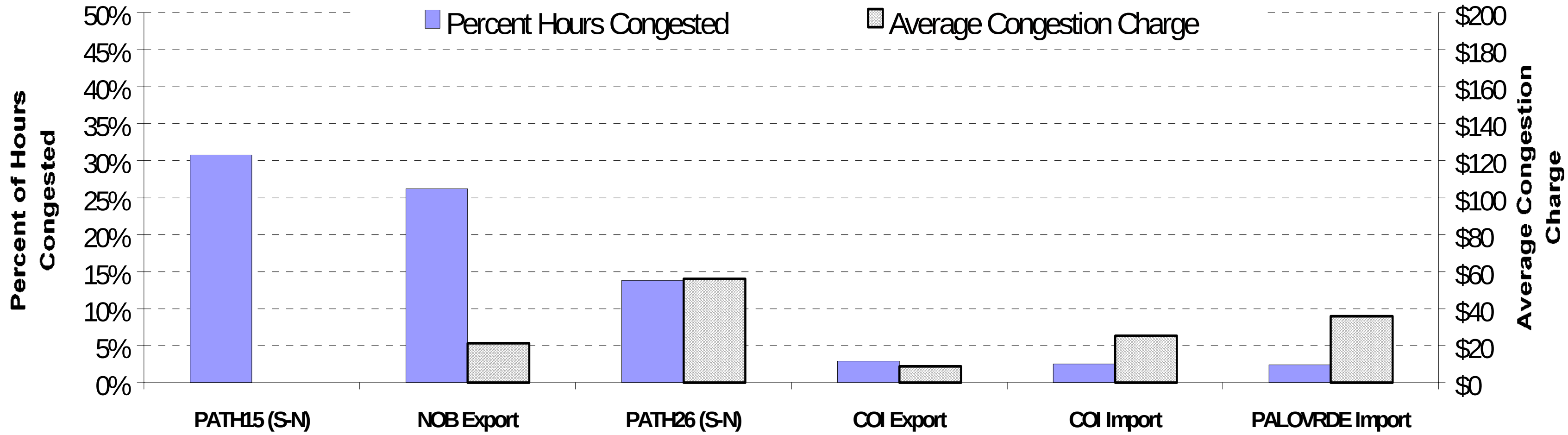


California ISO

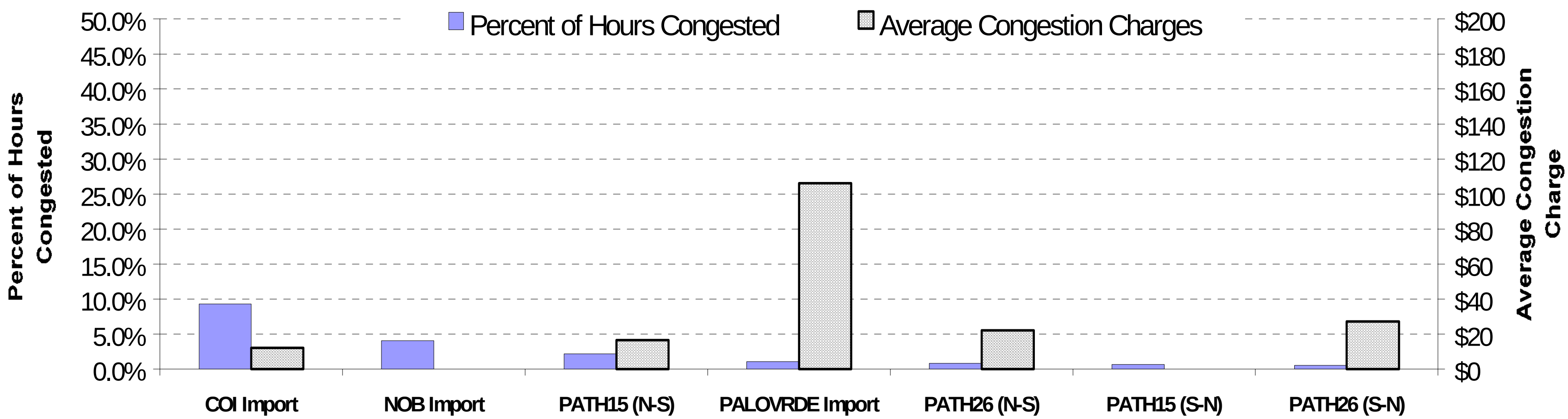
California Independent
System Operator

Comparison of Congestion Costs By Path

Day Ahead Congestion - May 2001



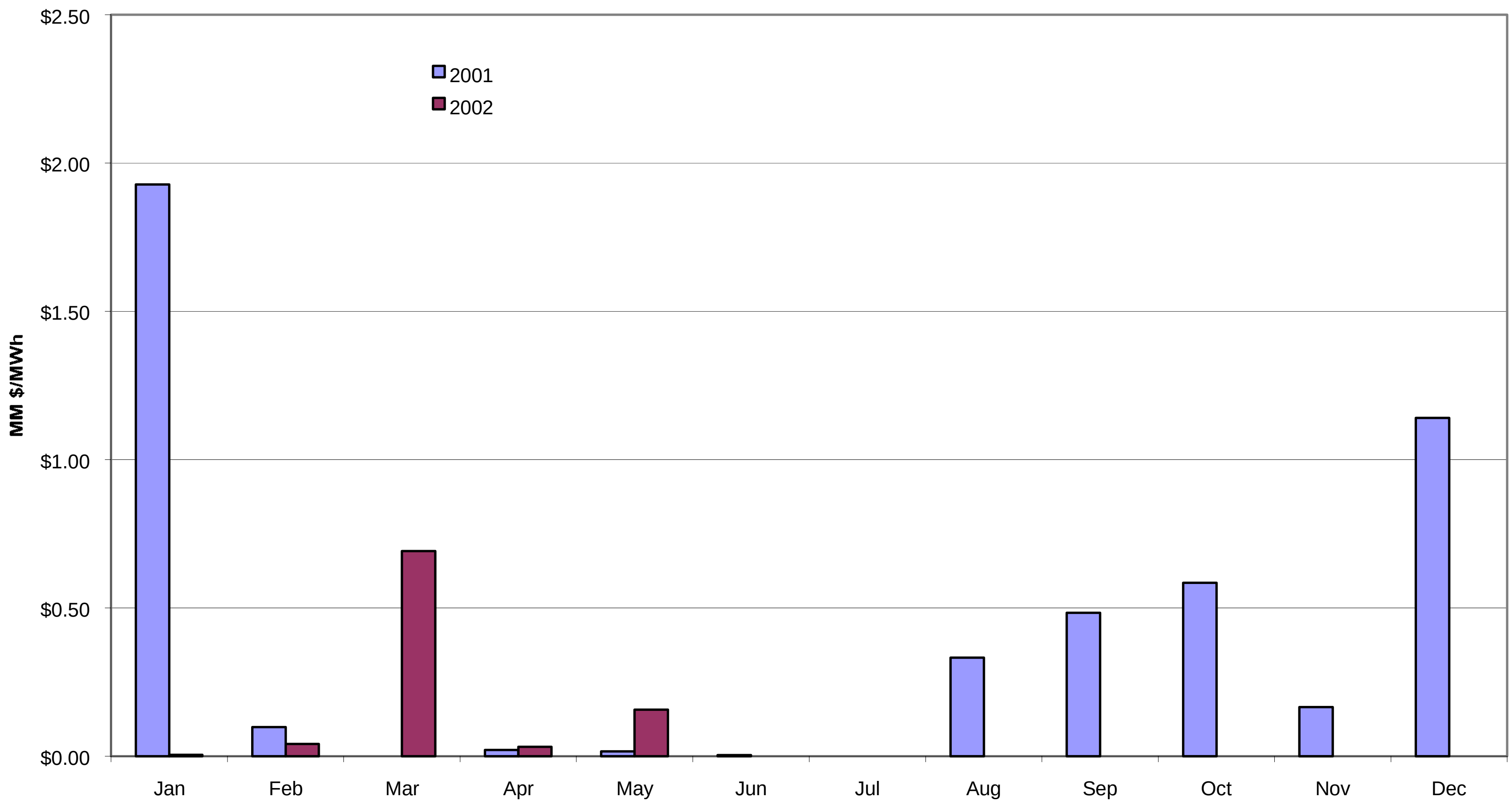
Day Ahead Congestion - May 2002



California ISO

California Independent
System Operator

Monthly Intrazonal (Within Zone) Congestion Costs:
2002 vs. 2001



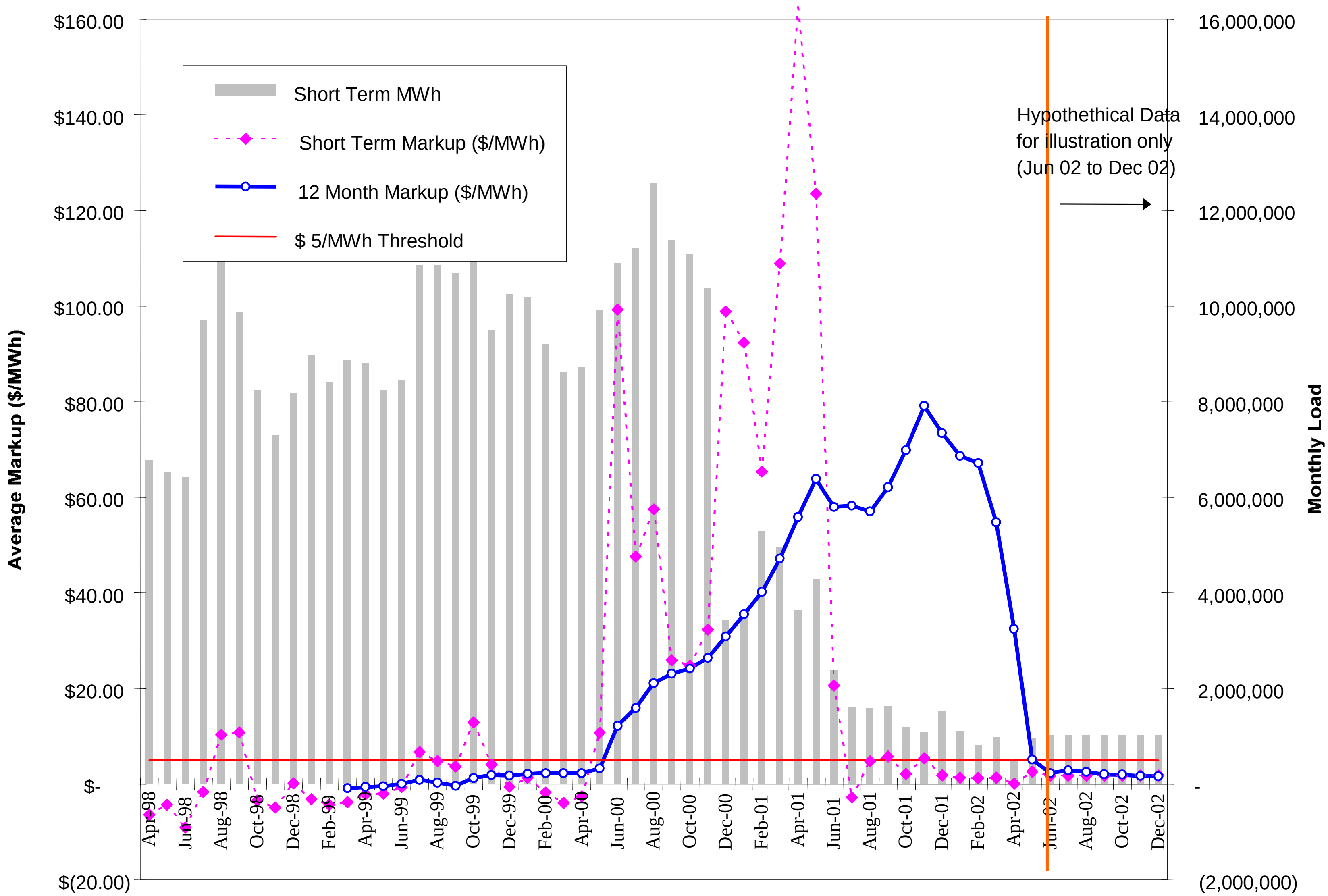
Overall Measure of Market Performance: 12-Month Competitiveness Index

- Useful as a market monitoring tool, and to identify the need for mitigation
- Recognizes that price signals, including spikes, are integral to a dynamic competitive market, and are necessary for recovery of investment costs
- Rule: If weighted-average short-term price over last 12 months is at least $5 above estimate of competitive equilibrium price, then temporarily impose west-wide mitigation automatically

California ISO

California Independent System Operator

12-Month Index Since the Start of the Market



Remaining Challenges

- Market Structure Issues
  - Adequate Supply (Reserve Margin)
  - Utilities Ability to Contract Long Term
  - Demand Response
  - Transmission Expansion and Upgrade
  - Adequate tools for West-wide Market Power Mitigation and Resolution of RTO Seams Issues
- Market Redesign
- Market Power Monitoring and Mitigation

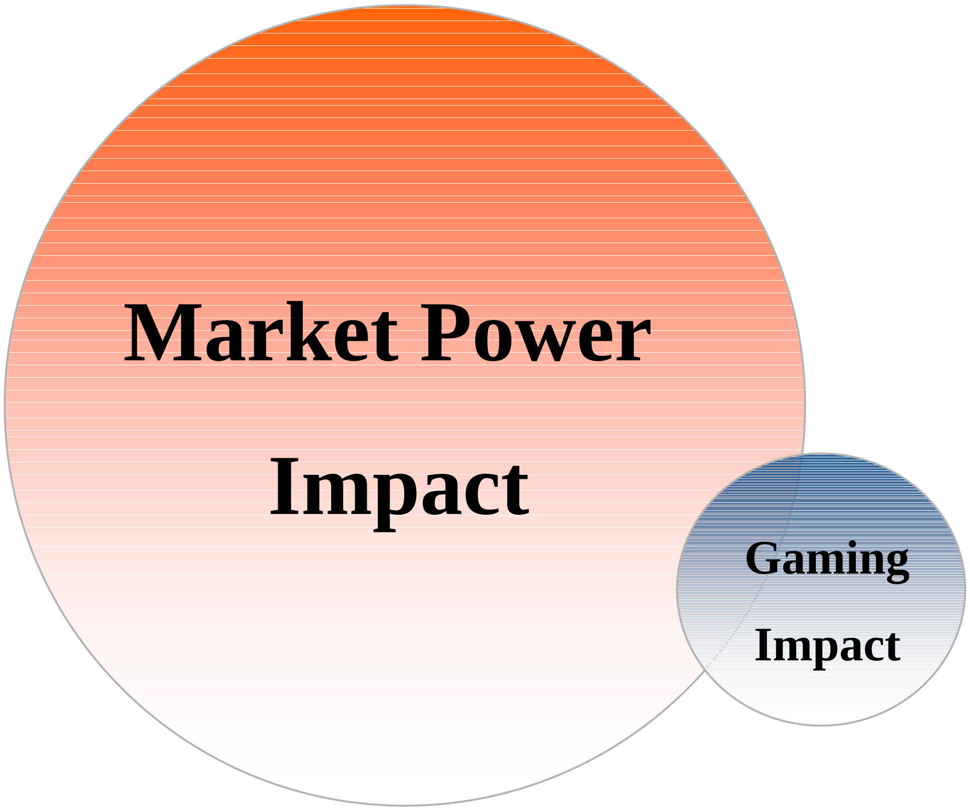
Market Structure Issues

- Adequate Supply (Reserve Margin)
  - Dependent on imports; new generation addition behind schedule
  - Reserve margin improves but remains low (10% for 2002, up from 5% in 2000)
- IOUs must become creditworthy, and must also obtain CPUC approval for long-term purchase protocols
  - Several CDWR Long Term Contracts renegotiated for increased capacity and flexibility
- Demand Response remains minimal despite multiple programs by ISO, CPUC/IOU and Power Authority
- Transmission Expansion and Upgrade
  - Path 15 upgrade approved by the Commission
  - Comprehensive evaluation and planning method to capture market benefits of transmission expansion being developed
- Tools for West-wide Market Power Mitigation and Resolution of RTO Seams Issues

Market Design Issues

- Market Redesign (MD02)
  - Energy Market: LMP, Residual Unit Commitment
  - Redesigned Firm Transmission Rights
  - Redesigned Ancillary Service Markets
  - New Available Capacity Requirement
  - Market Monitoring and Mitigation
    - Locational market power
- Market Redesign is important. However, it is not a substitute for addressing structural problems

Market Power vs. Gaming



Market power in energy market has been and remains the dominant threat.

Recent investigation of Enron gaming strategy should not alter our priority.

Examination of Enron-type Trading Tactics

- All incidents are being examined; refunds ordered if verified
- Mostly in congestion management and ancillary services
- Measures taken to prevent these activities
  - Many are banned under current rules as they constitute “gaming” of market rules
  - Some are addressed in market redesign
  - Some were dealt with by west-wide mitigation
  - Need region-wide monitoring to identify some strategies
- Enhanced penalties and sanctions authority will be proposed in August 2002