

Review of CAISO Wholesale Electricity Market Performance



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California ISO
Your Link to Power

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Review of Electricity Wholesale Markets
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The California market is stable and competitive but it is not all that it should be.

- 🌐 Market prices within competitive ranges for the past 6 years.
- 🌐 Significant market improvements include:
 - Forward energy contracting – hedge spot market volatility.
 - Resource Adequacy Framework
 - New generation investment
 - Increased generation availability
 - Reduced real-time congestion costs
 - Reduced average wholesale costs –adjusting for changes in gas prices.
- 🌐 Current market design deficiencies
 - No centralized day-ahead energy market – no price transparency
 - No nodal pricing – real-time congestion cost socialized.
 - No meaningful participation by final demand – it is what it is.

Forward energy contracts and a resource adequacy framework have provided important benefits.

Forward Energy Contracting -

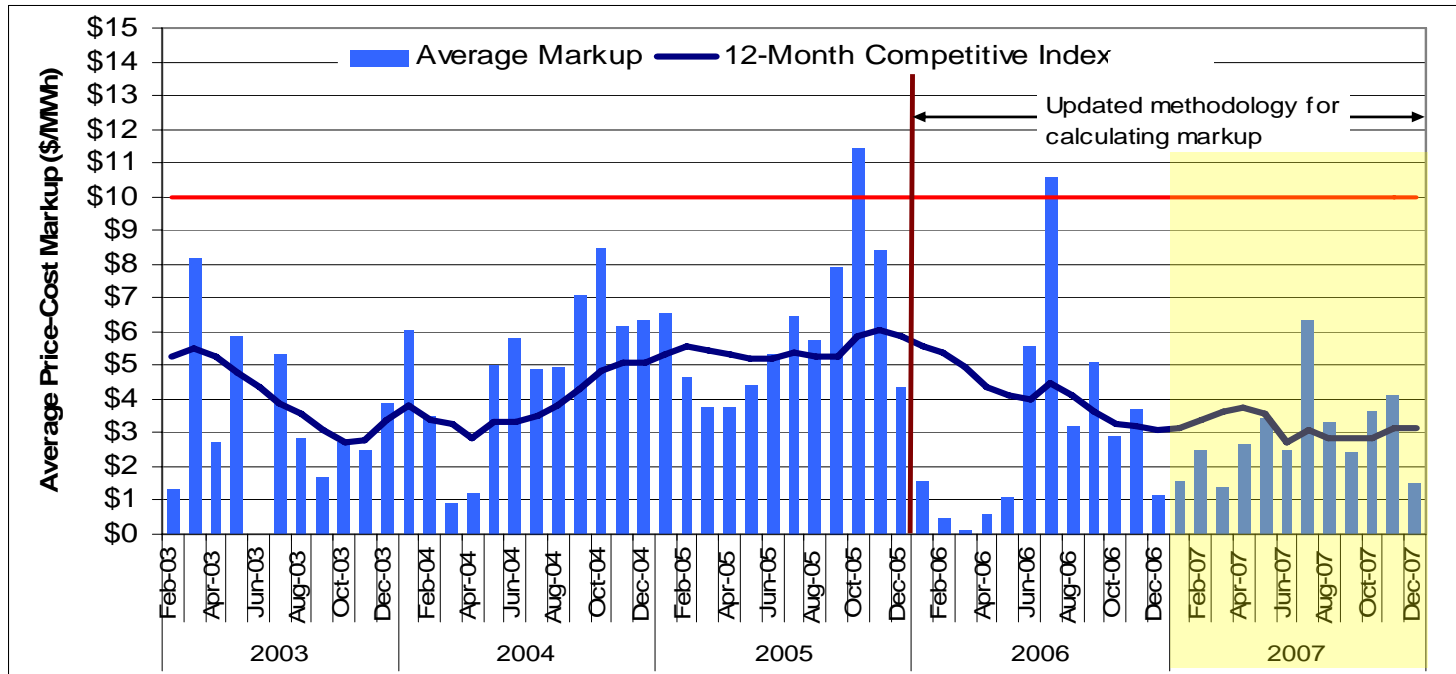
- Energy crisis primarily due to lack of hedging spot market exposure.
 - Created profitable opportunities for the exercise of market power.
 - Created significant financial risk for load serving entities.
- Since the crisis, fixed-priced forward energy contracting by load serving entities has reduced their spot market exposure.

Resource Adequacy (RA) Framework

- Implemented in June 2006
- Provides formal mechanism for ensuring sufficient capacity is available (year ahead, month ahead) to meet monthly peaks.
- California Public Utilities Commission (CPUC) evaluating alternatives for a long-term RA framework.

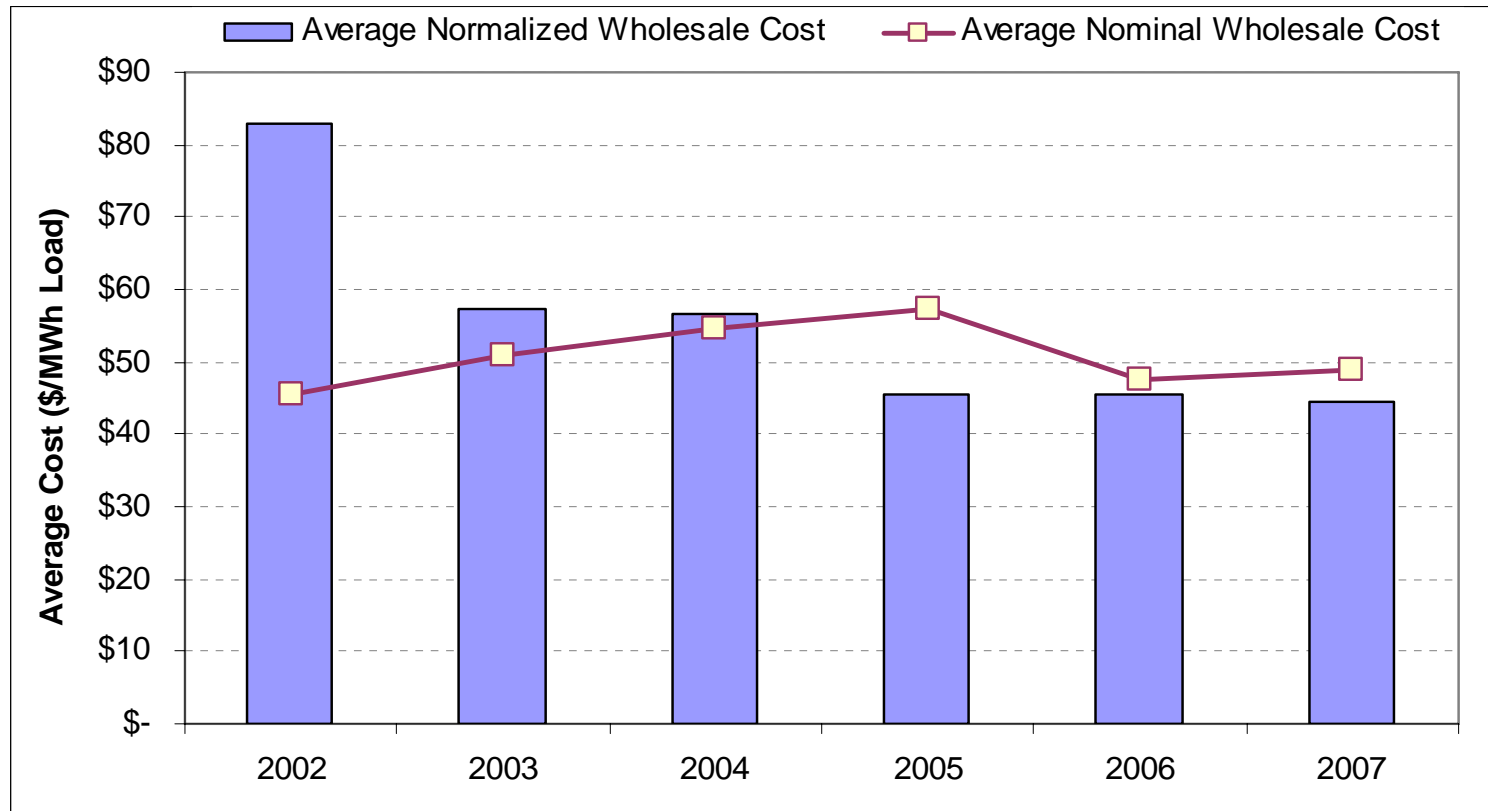
Wholesale markets are stable and competitive.

Average Monthly Spot Markups and 12-Month Competitiveness Index, 2003-07



- 🌐 Average monthly price-to-cost markup for spot bilateral purchases has stayed below \$10/MWh for most of the last two years
- 🌐 12-Month Competitiveness Index for spot bilateral purchases was below \$4/MWh in each month of 2007

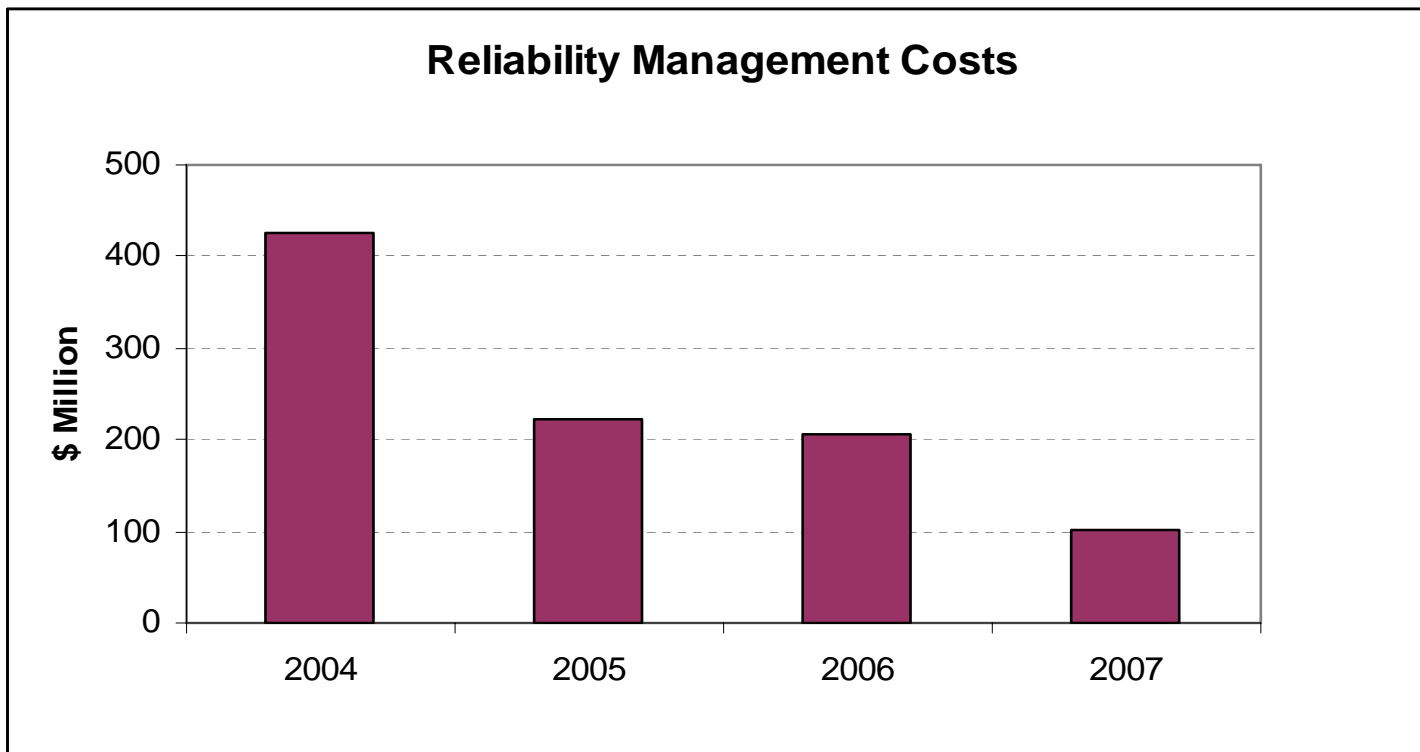
Significant decline in average wholesale costs when adjusted for changes in fuel cost.



- 🌐 **Wholesale cost** – Production cost of utility generation + energy contracts + plus spot market purchases + other costs.
- 🌐 **“Normalized” Wholesale Costs** – Adjusted for changes in natural gas prices.

Grid improvements have significantly reduced reliability management costs.

- Reliability Management Costs – Variable cost of CAISO out-of-market generation dispatches to manage local reliability constraints.



Cumulative new generation investment is significant, but little net-gain in Southern California.

	Cumulative (2001-2007)
SP15	
New Generation	7,404
Retirements	(4,280)
Forecasted Load Growth*	3,648
Net Change	513
NP26	
New Generation	7,544
Retirements	(1,235)
Forecasted Load Growth*	2,895
Net Change	4,996
ISO System	
New Generation	14,949
Retirements	(5,515)
Forecasted Load Growth*	6,542
Net Change	5,509

New generation in Southern California largely offset by retirements and load growth.

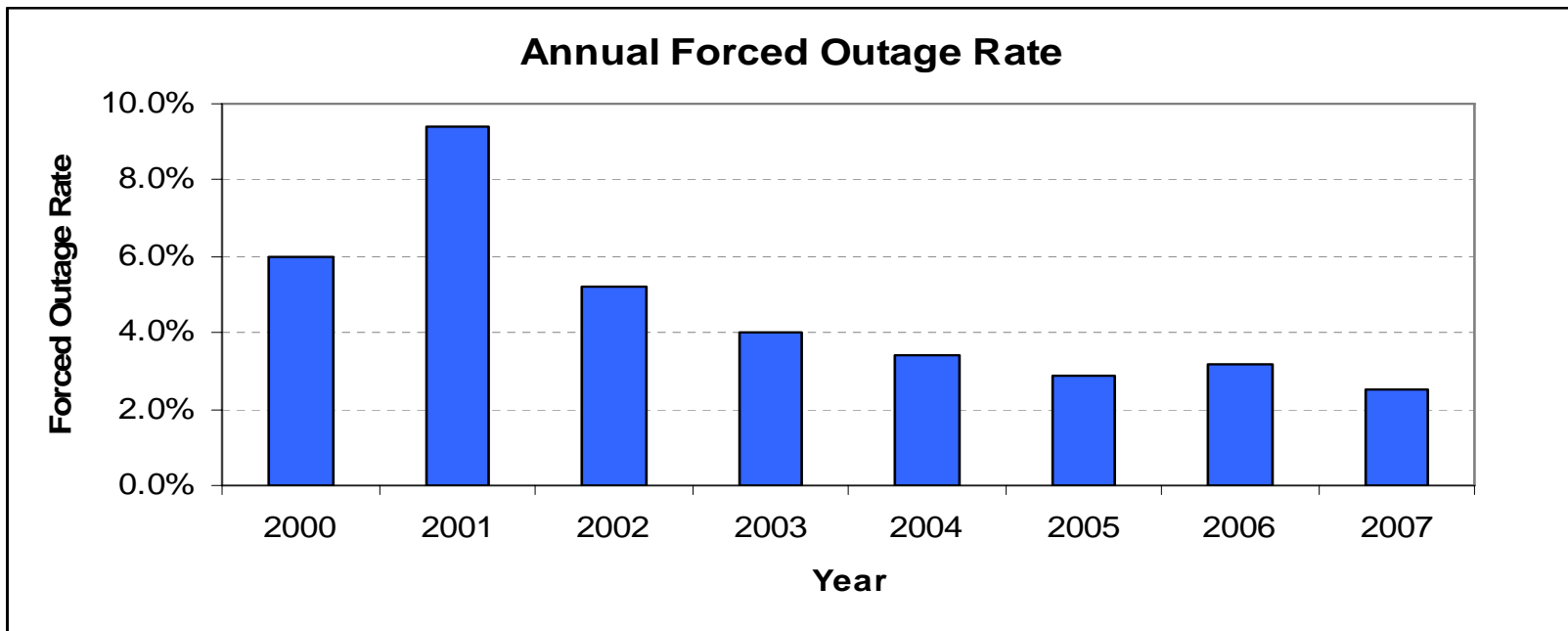
Major gains in Central & Northern California.

System-wide

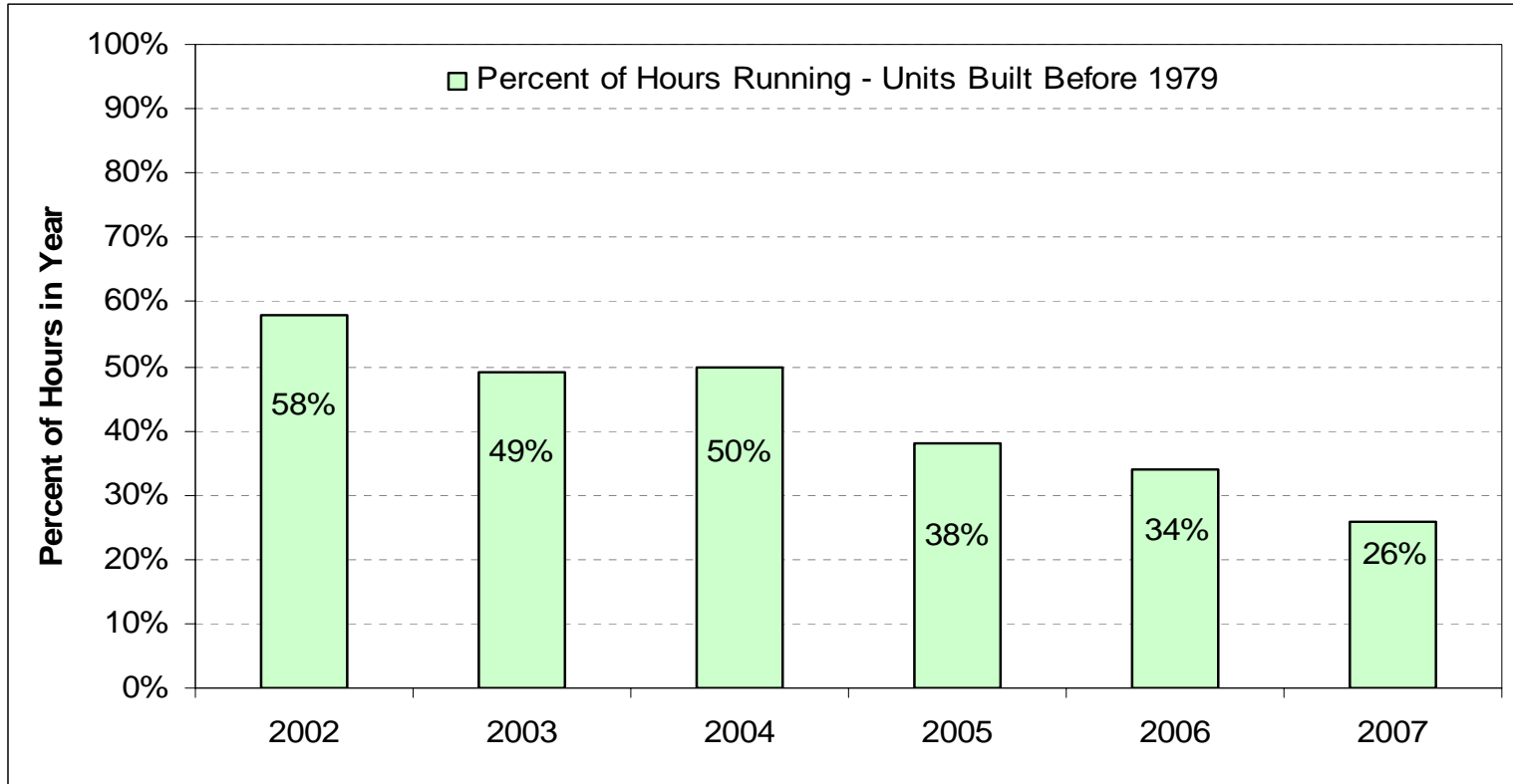
* Based on 2% annual load growth.

Significant decline in forced outage rates for generation fleet.

- Generation forced outage rate in 2007 was the lowest in seven years.
- Contributing factors for decline include:
 - Availability incentives of serving energy contracts.
 - 15,000 MW of new generation and retirement of older plants.
 - Greater coordination and planning of generation maintenance plans.



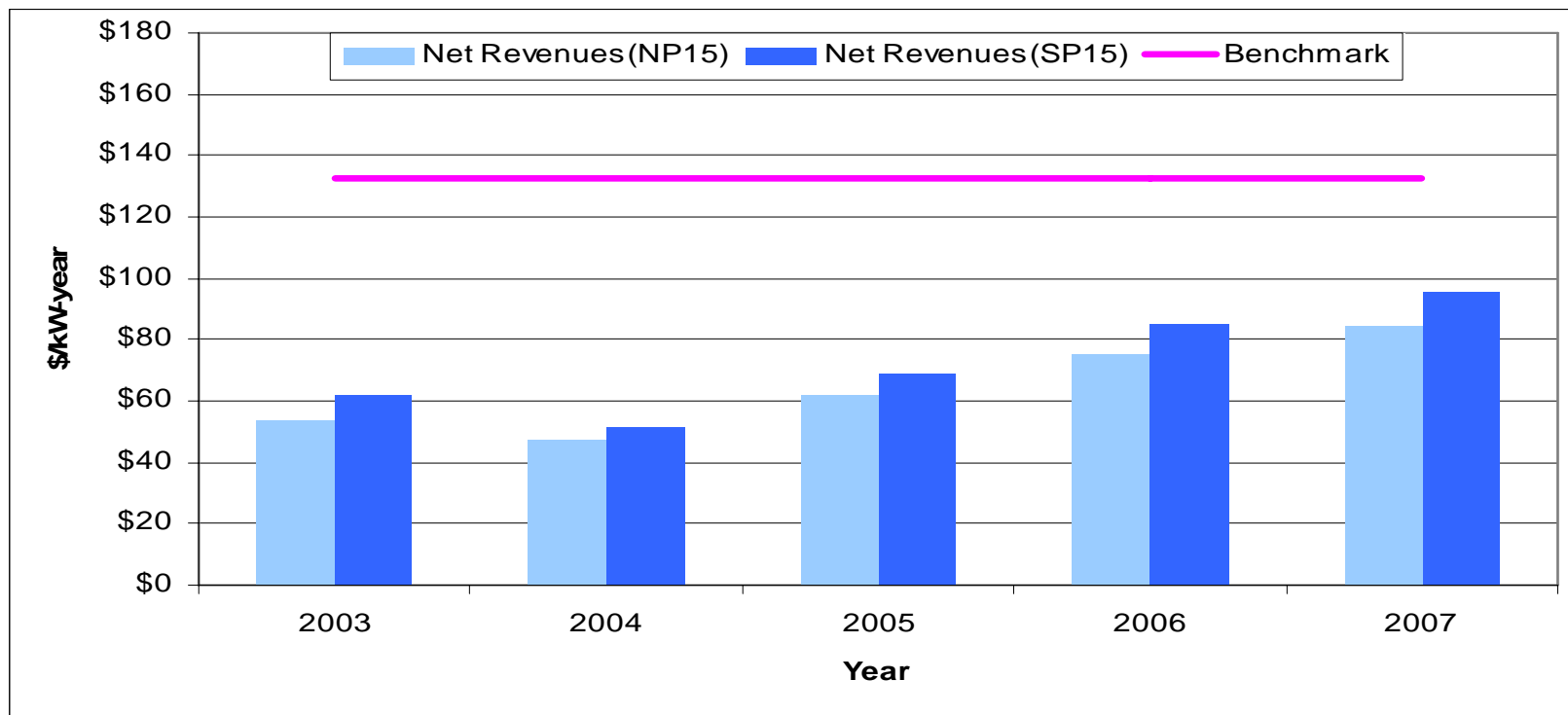
Reliance on older and inefficient generation has been steadily declining.



- Units built before 1979 ran on average 26% of the time in 2007.
- California environmental policies and the age of these facilities will require a long-term plan for phasing them out.

Spot market revenues continue to be below the cost of new generation investment.

Financial Analysis of New Combined Cycle Unit (2003-2007)



- Findings underscore the critical importance of long term contracting for facilitating new generation investment.
- MRTU and future market enhancements may increase spot market revenue opportunities.

Summary & Conclusions

- 🌐 California market has been stable and competitive.
- 🌐 Significant market improvements have occurred.
- 🌐 Some deficiencies remain -
 - No centralized day-ahead market
 - No nodal pricing
 - Limited demand participation
- 🌐 MRTU will address the first two deficiencies and provide a better market framework for demand participation.
- 🌐 Developing greater demand participation in CAISO markets will require close collaboration with state agencies.
- 🌐 Other critical areas for future market development will be discussed by Mr. Mansour.