CALIFORNIA ISO

California Independent
System Operator

California Power Crisis:

Viewpoint of the System Operator

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Overview of Presentation

Understanding California Power Market Experience

I. Review of Market Performance

II. Serious Market Power Concerns

III. Lessons Learned

What is the Role of the ISO?

PX &
Other
Schedulers

Cal-ISO Mission:

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

Generation

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

Distribution

Loads

What are the unique features of the California Market?

Features	Intended Purpose
1. Full Market Oriented Approach	All services procured through markets
2. Zonal Design	Simplify market transactions for commercial traders
3. Decentralized Unit Commitment of Generating Units	Improve efficiency in plant operations
4. Retail Rate Freeze	Insure savings to retail customers and provide revenues for stranded costs
5. Generation Divestiture	Reduce market concentration

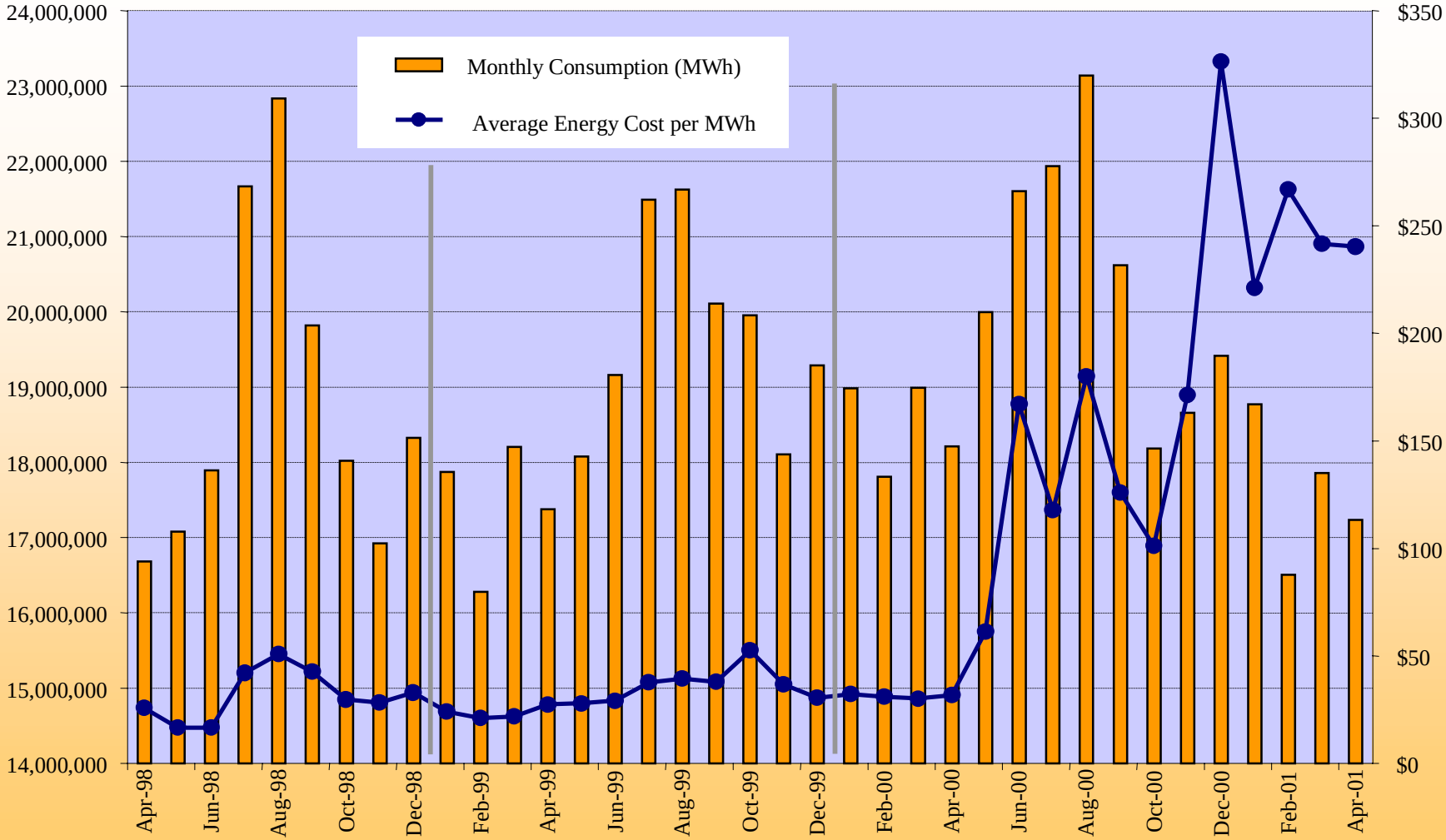
What Regulatory Framework Insures Competitive Markets?

Federal role- Regulates ISO, PX, merchant suppliers, wholesale markets; legal obligation to ensure "just and reasonable" rates

State role- Regulate Investor-owned utilities, retail markets, distribution service

Municipal & Governmental utilities - Separate regulatory paradigm

Why Did Prices Jump After Two Years of Moderate Prices?



What Were the Key Factors Causing Price Spikes?

1 Limited Demand Response - Rate freeze meant no price signal to load to conserve

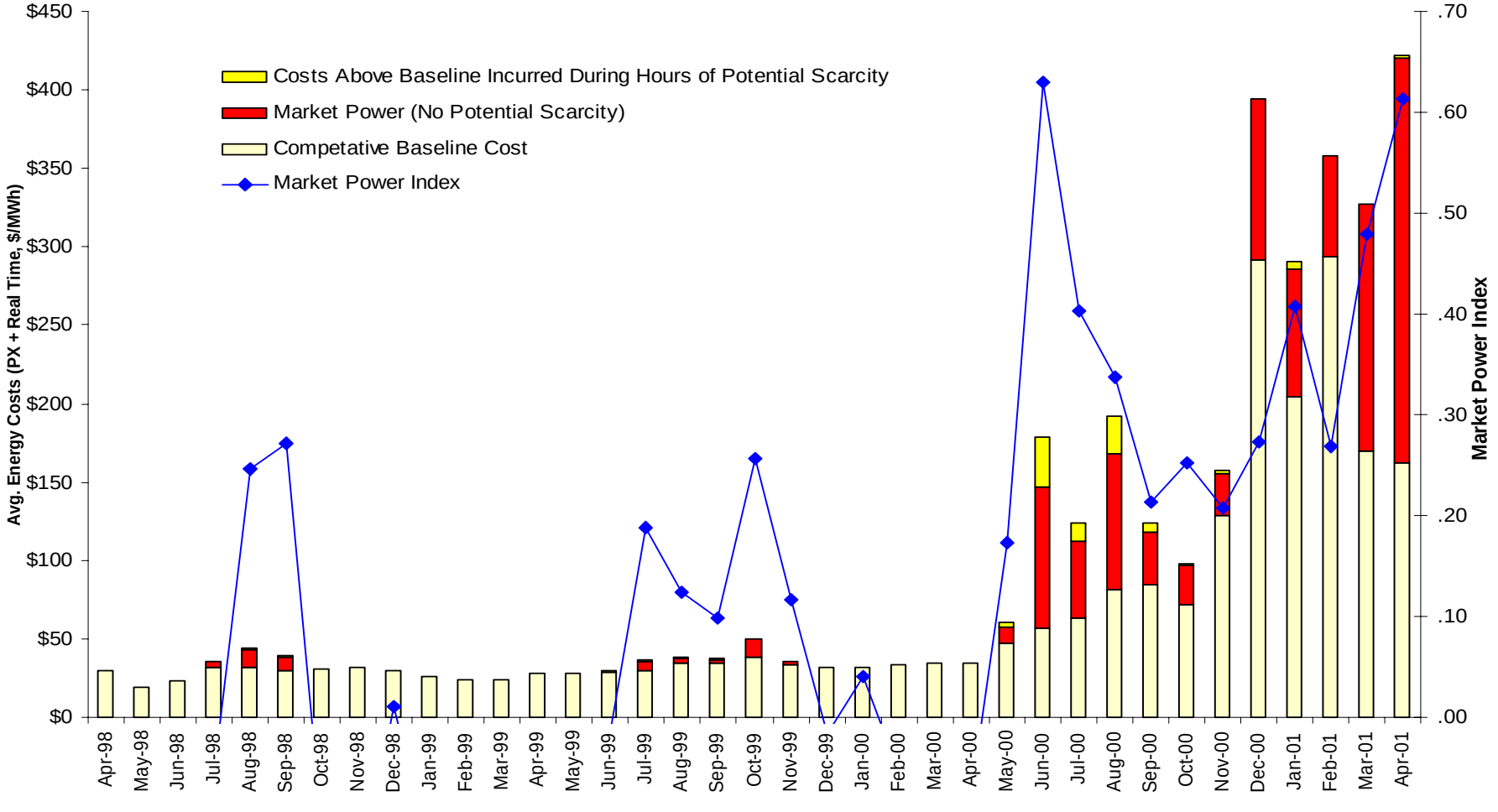
2 Lower Supplies Available and at Higher Cost

- Lack of New Generation for Last 10 Years
- Numerous Outages of Generation and Transmission
- Reduced Hydro Generation and Imports, Increased Gas Prices, High Cost of Emissions

3 Unrestrained Exercise of Market Power by Suppliers

What Explains the High Prices?

Prices above competitive levels were due to both higher production cost and higher mark-up from market power



Why Weren't High Prices Mitigated?

Extensive Regulatory Constraints

- CPUC - Requirement to Buy/Sell in spot market and Prohibition Forward Contracting and Hedging by Load

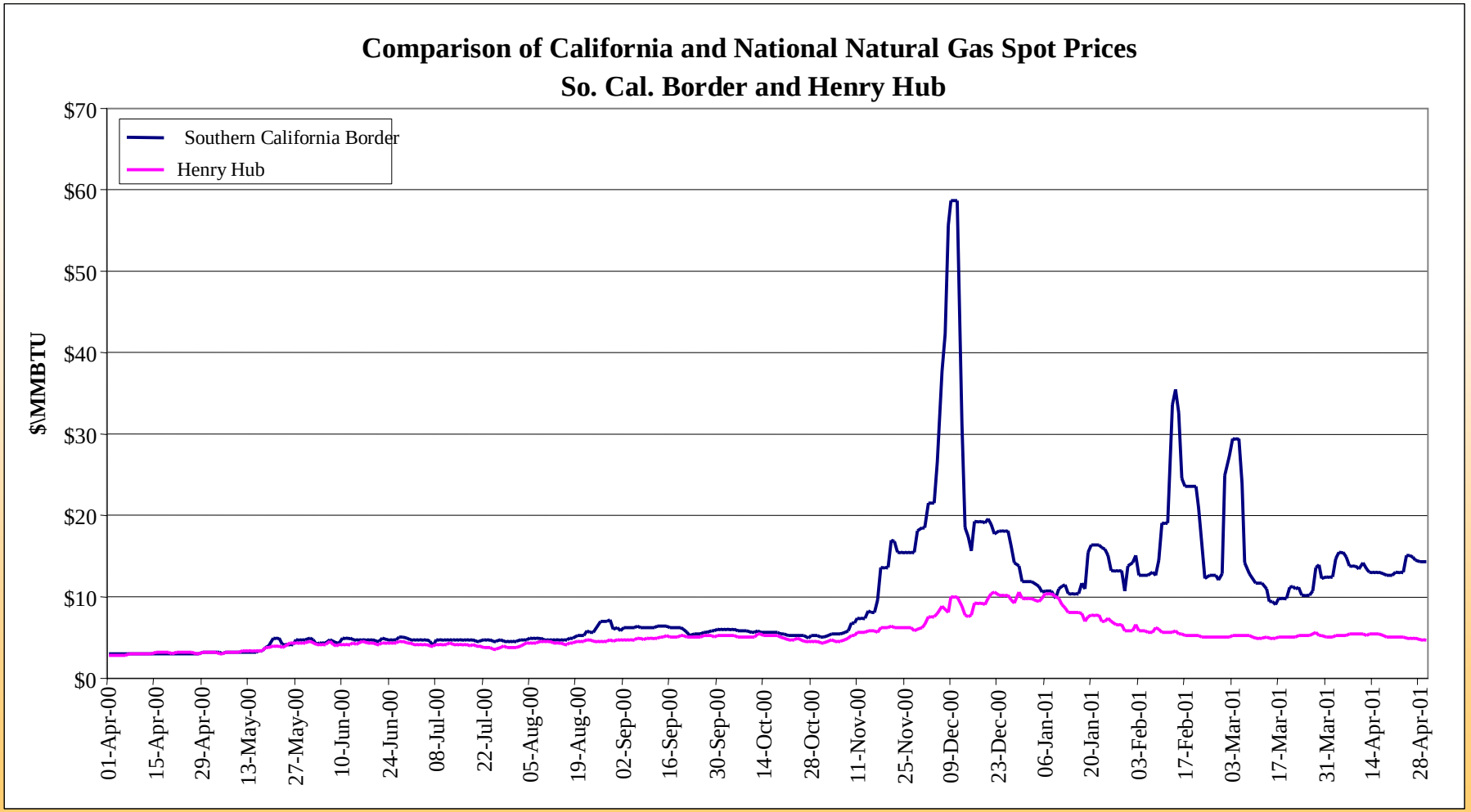
- Federal Granted Market - Based Rate Authority Without Sufficient Review of Conditions Allowing Exercise of Market Power; Concern About Vertical Market Power Without Adequate Protection Against Horizontal Market Power

Net Result: **Tight supply conditions and inelastic demand allowed most significant suppliers to exercise market power to inflate prices even in low-load hours**

FERC Criteria for Market Based Rates Was Flawed

- Market share safe harbor of 20% and HHI criterion were used as predictions when market experience was not available
- These market share criteria were never proven in the electricity markets where demand and supply conditions change hourly
- The only definitive criterion is actual system price-cost mark-up for a given period
- FERC has traditionally used a 10-15% guideline on price mark-up, but did not institute it in California

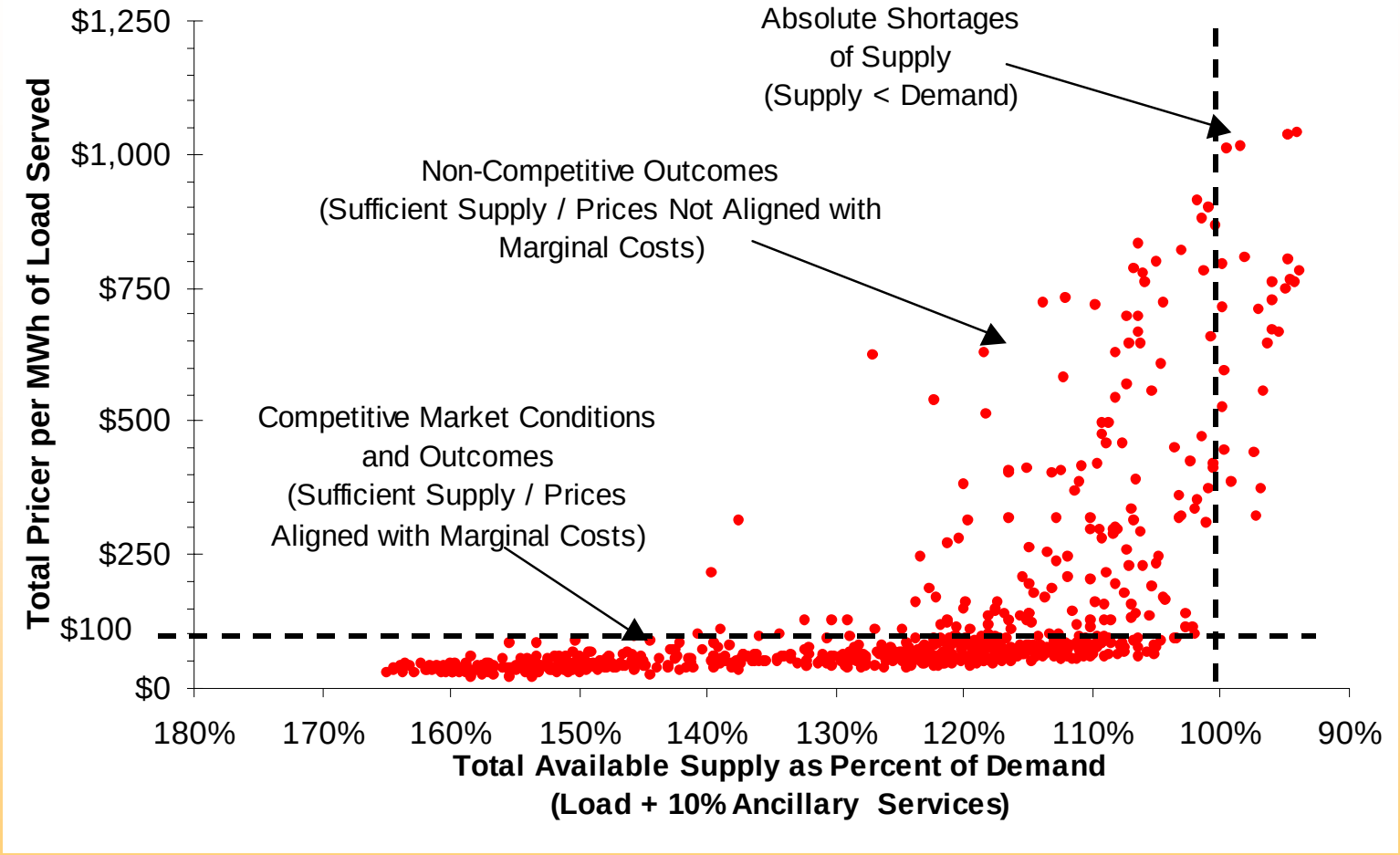
What Happened to Gas Prices?



How Do We Evaluate Market Power?

- Market power is generally defined as a firm's capability to profitably raise the price above competitive levels for a significant period of time.
- Practical monitoring index: Price-cost mark-up — market clearing price above system marginal cost.
- Two ways to exercise market power: economic withholding and physical withholding. All market power bidding strategies will be carried out in one of these forms.
- Economic withholding
  - Submit bids at prices above producer's marginal cost
  - Most often observed in CA ISO real time market
- Physical withholding
  - Restrict output or withhold capacity from bidding into market
  - Most serious problem in period of tight supply

Scarcity or Market Power?



* Source: *Report on California Energy Market Issues and Performance: May-June, 2000,*
Prepared by the Department of Market Analysis, August 10, 2000

Why market share criteria failed to warn market power?

- Market share criteria are static and does not reflect the dynamics in power market, where supply and demand condition fluctuate from hour to hour. While some hours may be competitive, others are not.
- Market share criteria fail completely when there is shortage in the market. E.g. when supply margin is less than 5%, a supplier with 5% market share can demand extremely high prices.
- With a few large supplier who can implicitly coordinate bidding strategy with each other, even smaller individual market share can give the large suppliers joint market power.
- ISO monitoring data shows that a supply margin of about 20% is needed to ensure zero price mark-up given the current largest market share of about 10%.
- With demand growth, low hydro availability and dramatically reduced imports, supply margins fell below 20% and often down to zero. This allows suppliers to be pivotal in setting prices. Therefore market power becomes excessive and sustained in most hours.

Regulatory Factors Causing Current Problems at Federal Level

- FERC regulates wholesale electricity rates – Federal Power Act requires FERC to ensure the wholesale rates are just and reasonable. If prices are not, FERC must action to make them just and reasonable:

  "Whenever the Commission, after a hearing had up its own motion or upon complaint, shall find that any rate, charge, or classification, demand, observed, charged or collected by any public utility for transmission or sale subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affected such rate, charge, or classification is unjust, unreasonable, unduly discriminatory or preferential, the Commission shall determine the just and reasonable rate, charge, classification rule, rule, regulation, practice or contract to be thereafter observed and in force, and shall fix the same by order."

  (Federal Power Act)

- FERC's approach of maintaining market based rate while searching for long term solutions brought about market melt down.

Why are the rates unjust and unreasonable?

- Astronomical mark-up : Approximately $8 billion for 12 months from May 2000 to May 2001 in PX/ISO markets
- Estimated mark-up is enough money to pay for 13,000 MW of new power plants
- Variable profits are multiples of fixed revenue requirement for power plants

RSI is a Better Measure of Potential Market Power

- Residual Supply Index (RSI) measures the supply sufficiency relative to demand assuming the largest supplier withhold its entire capacity.
  - RSI < 100% is definite market power condition
  - RSI between 100% and 150% pose market power risk.
  - RSI > 150% lead to low market power risk
- Monitoring data shows clear correlation between RSI and system price-cost mark-up

Lessons Learned

- Avoid Partial Deregulation Among Utilities and Other Suppliers
- Identify Specific Responsibility for Adequate Supply
- Insure Compatibility of Retail Rate Design and Wholesale Market
- Allow Significant Forward Contracting & Hedging
- Encourage Price Responsive Demand
- Effective Market Power Mitigation for Electricity and Gas
- Effective State and Federal Regulatory Coordination

Moving Forward

- Stabilize current financial condition
- Speed development of generation and transmission upgrades
- Reduce reliance on spot markets (day-ahead to real-time)--
- Enhance demand price responsiveness and conservation
- Establish market power mitigation measures
  - Condition continued market based rates authority for generators on their signing long-term contracts
  - Adopt additional market power mitigation
    - Capacity payments and availability standard
    - Bid price mitigation in real time and A/S markets
    - Gas market power mitigation
  - Apply mitigation for Summer 2001 and Summer 2002 until adequate supplies can assure workably competitive markets

Can California Problem Occur in Other States?..YES

(1) On East Coast- Hot weather from Maine to western PA will cause $1000 price spikes many hours for the same reason occurring in CA. Occurred in East Coast in summer of 1999. Summer 2000 very mild in East.

(2) California is alone in not allowing forward contracts. High prices in other states will affect less than 10% of their purchases rather than more than 60%. However, vesting contracts are expiring in the East Coast markets. Most of the load-serving entities are not signing up, so the amount spot market exposure is growing. This creates a greater incentive to exercise market power. So the potential gain is greater for generators and the potential damage to consumers higher.

(3) Lack of real-time pricing at the retail level in any East Coast ISO. Allows suppliers to charge what the market will bear. This problem exists in all states.

(4) Lack of Supply and Lack of New Investment is Western States problem.

Conclusions

- The *market* works reasonably well with sufficient supply margins and price responsive demand. But market was severely constrained by regulatory restrictions and incomplete deregulation
- Checklist of issues to address to avoid the California experience in deregulation
  - Avoid Partial Deregulation Among Suppliers
  - Assign Specific Responsibility for Adequate Supply to Load
  - Insure Compatibility of Retail Rates and Wholesale Market
  - Allow Significant Forward Contracting & Hedging
  - Encourage Price Responsive Demand
  - Provide Effective Market Power Mitigation for Electricity and Gas
  - Insure Effective State and Federal Regulatory Coordination