

***California's Energy:
Where do we go from here?***

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In 1998, RAND Created Two Scenarios, One Sunny and One Like This

Continued uncertainty

- Weak, if any federal legislation
- More states move toward competition
- More price fluctuations



Increasing chaos

- Market has troubles due to differences between states
- Large numbers of retail consumers cause problems
- Transmission constraints
- **Demand increases**
- Average price reductions



More chaos

- Consolidations and bankruptcies
- **Reliability problems**
- Higher than expected costs
- **Prices rise and spike due to severe weather conditions**



Chaos

- **Federal action**
- Price spikes and volatility
- **Blackouts**
- **Some states roll-back competition**
- Higher prices



Less chaos and less market

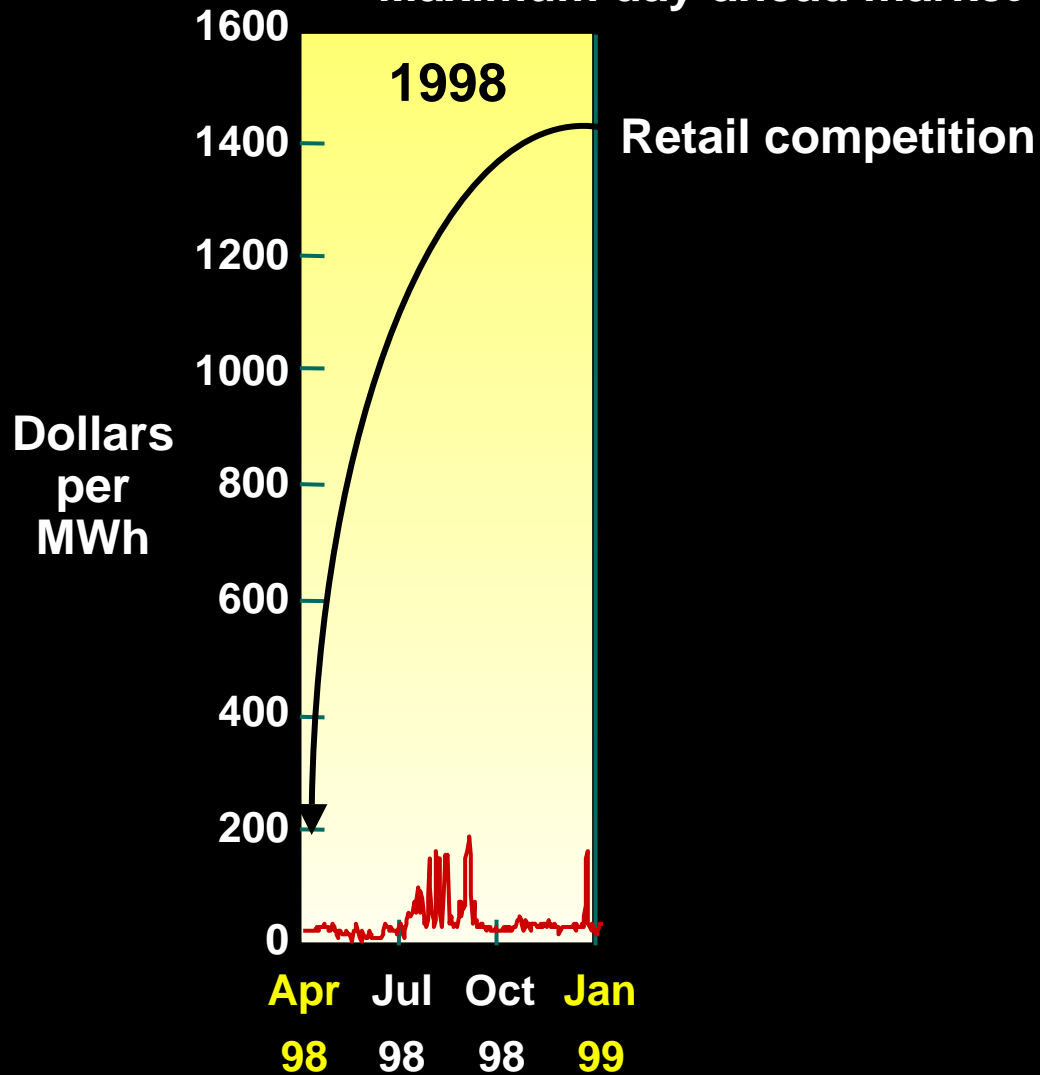
- Smaller number of generators
- Most states move towards consistency
- Some market restrictions
- Higher than expected costs and prices



Adapted from a presentation given at the Anderson School of Business, UCLA, September 1998

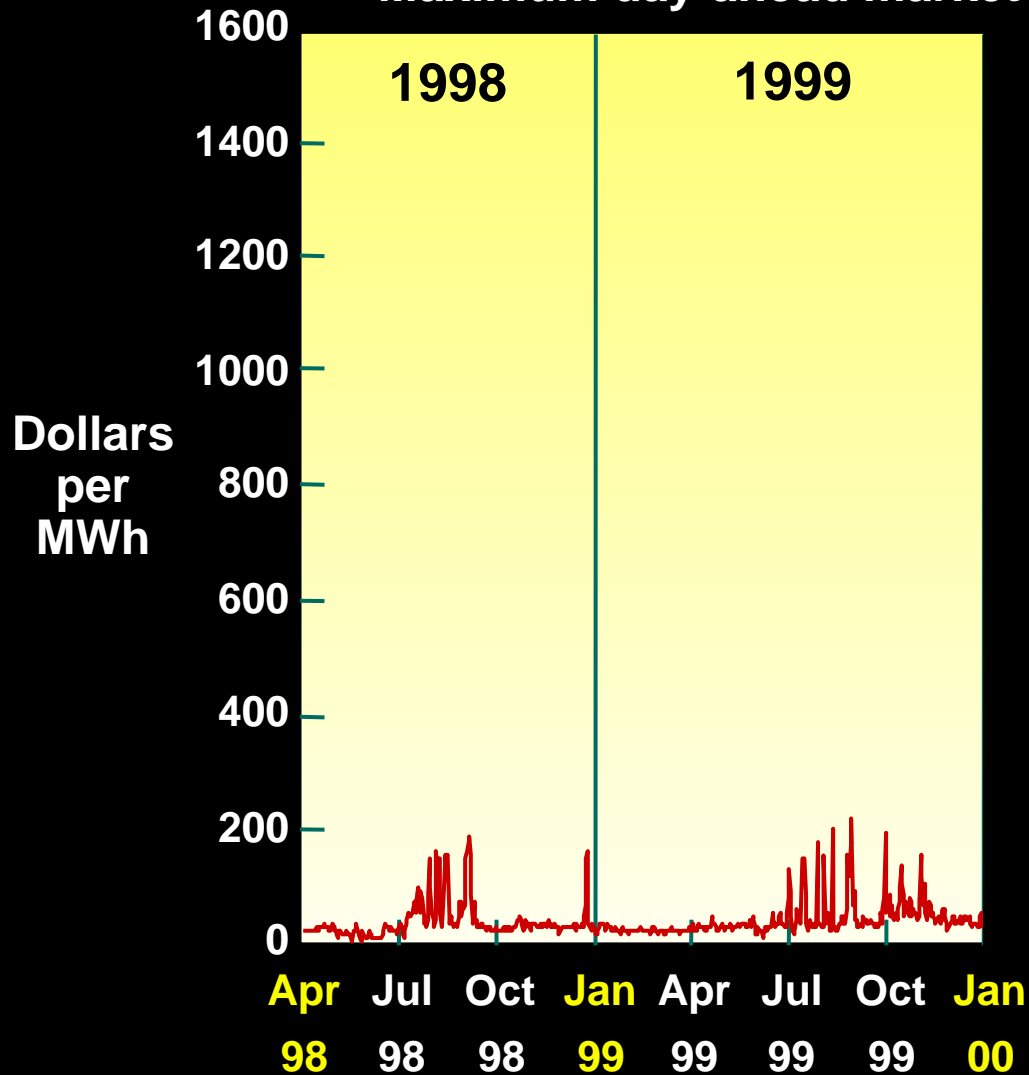
Prices Can Be An Indicator of Market Behavior

Maximum day-ahead market clearing price

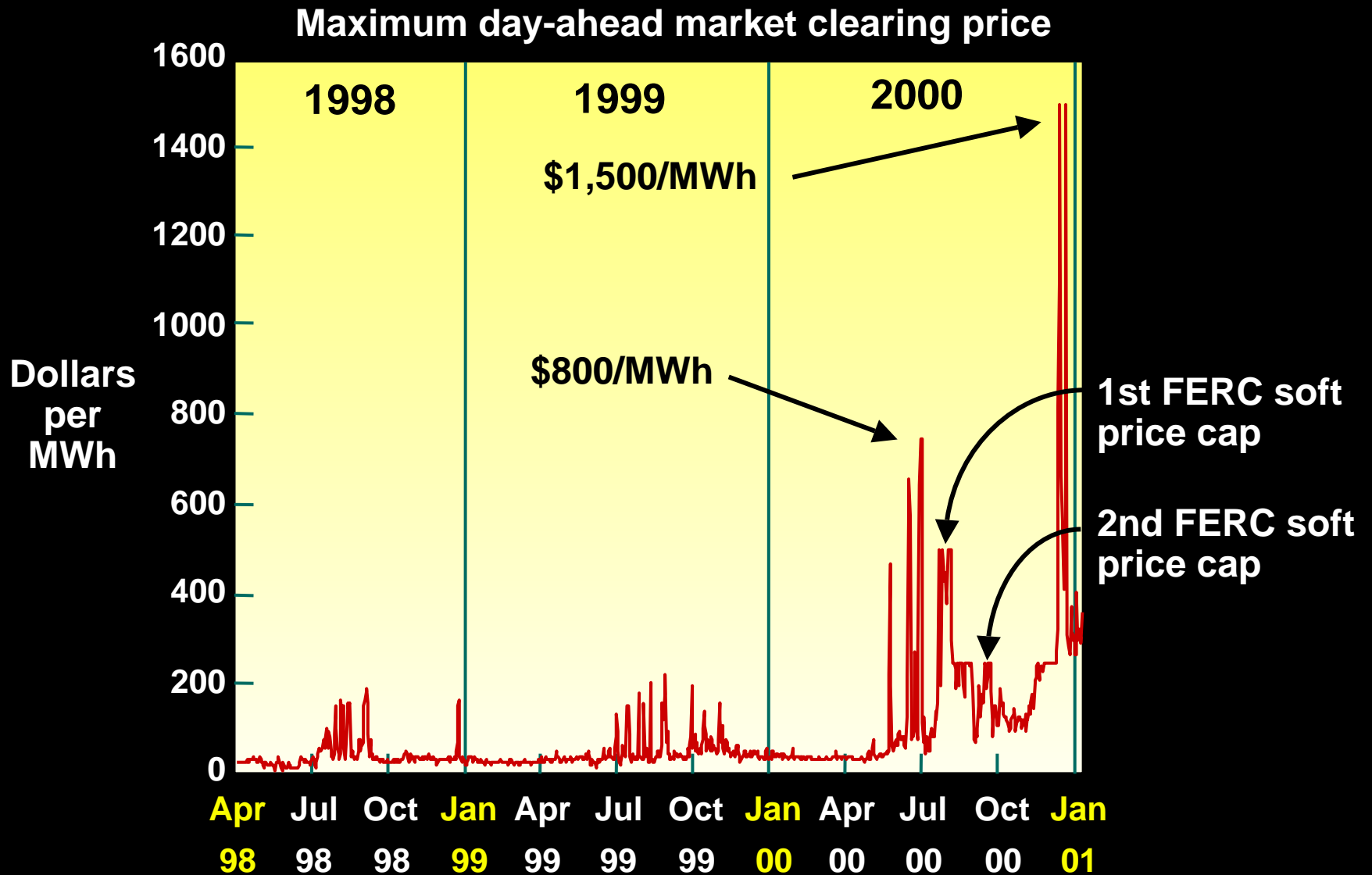


The Effects of Restructuring Were Not Yet Felt in 1999

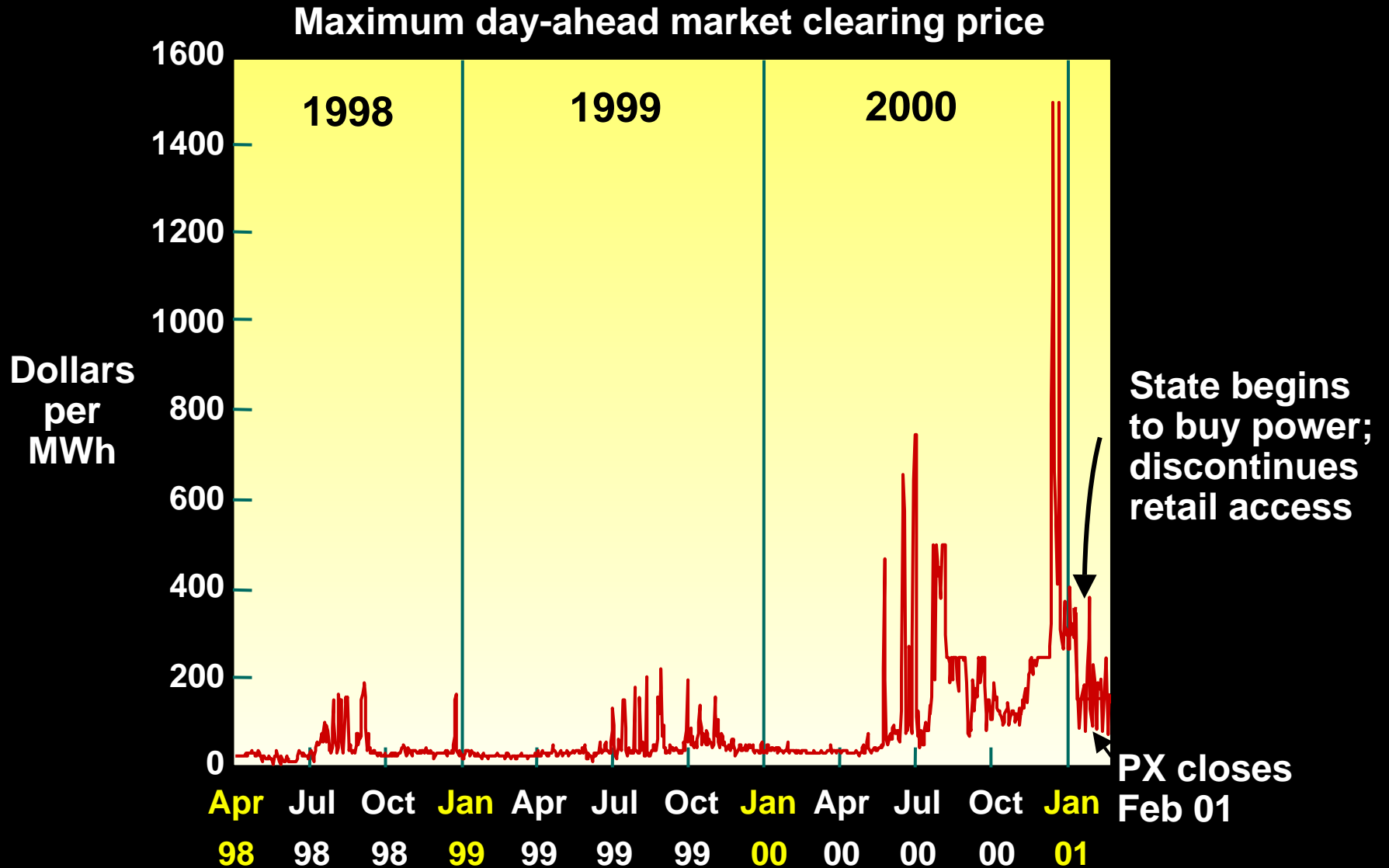
Maximum day-ahead market clearing price



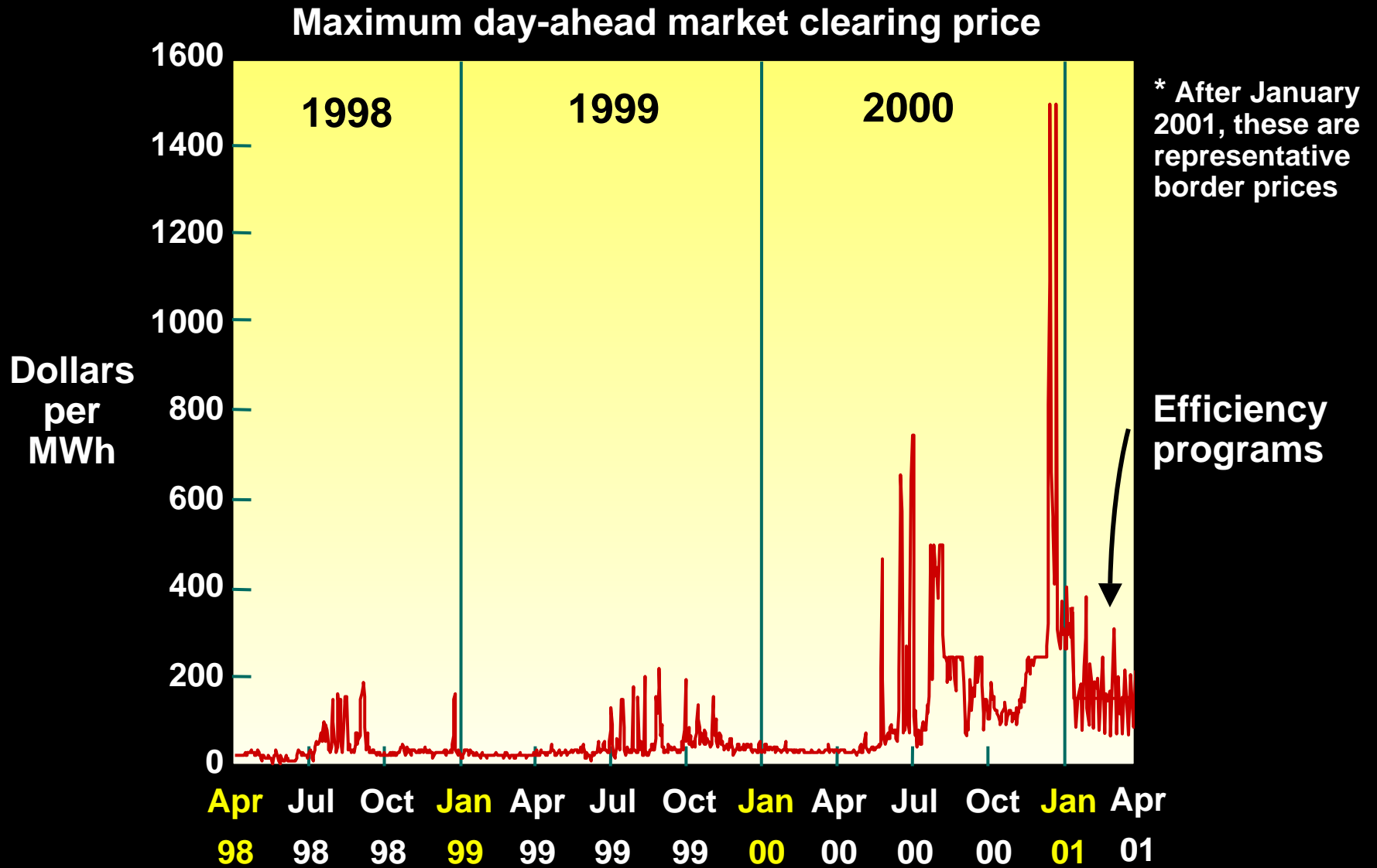
Prices Drove the Perception of a "Crisis"



By February 2001, State Was in Crisis Mode

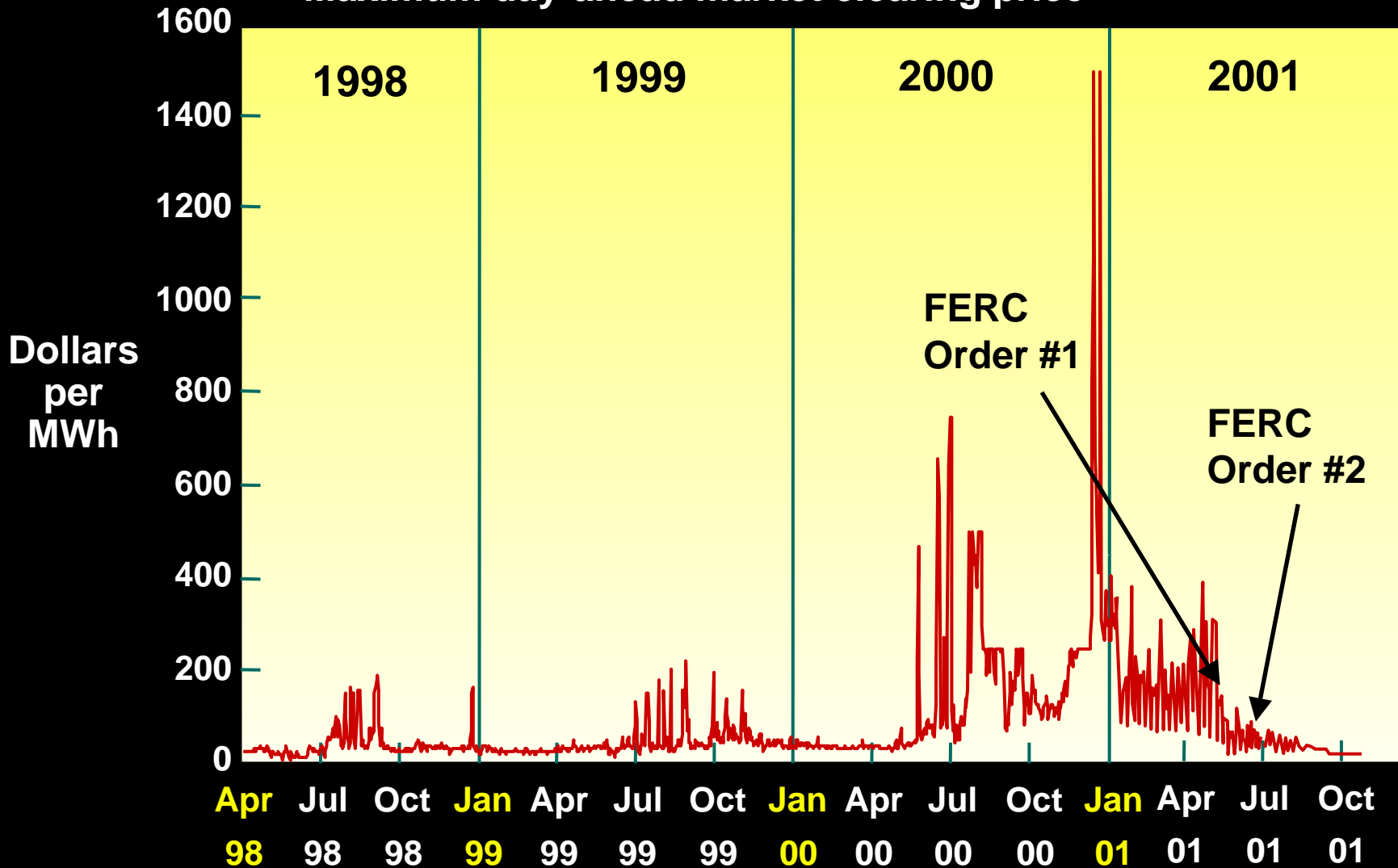


Was the Situation Stabilizing by March 2001?

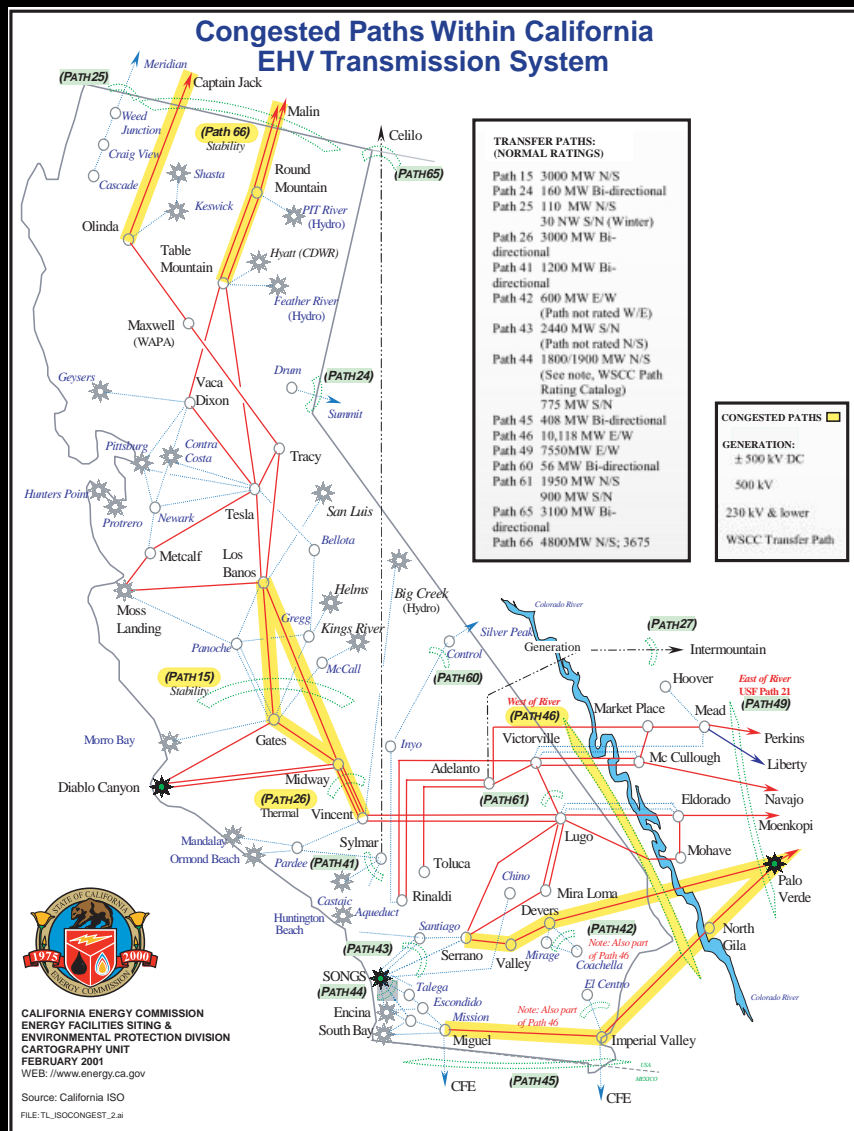


If Prices Drove the Crisis, Then Is the Crisis Over?

Maximum day-ahead market clearing price



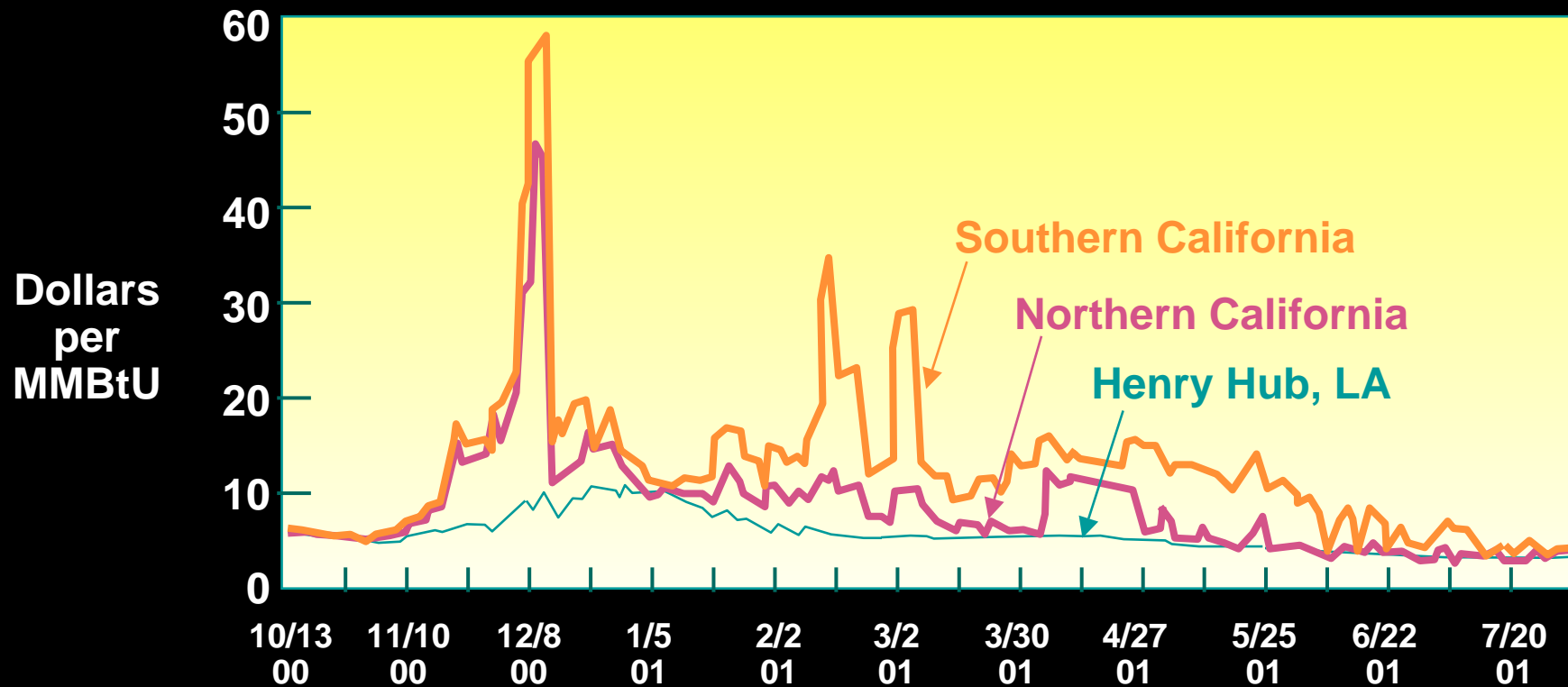
There Are Significant Transmission Constraints in California



- Geographic location of new plants
- Moving power to where it is needed
- Cost of transmission losses
- Role of new technologies
- Not only a California problem

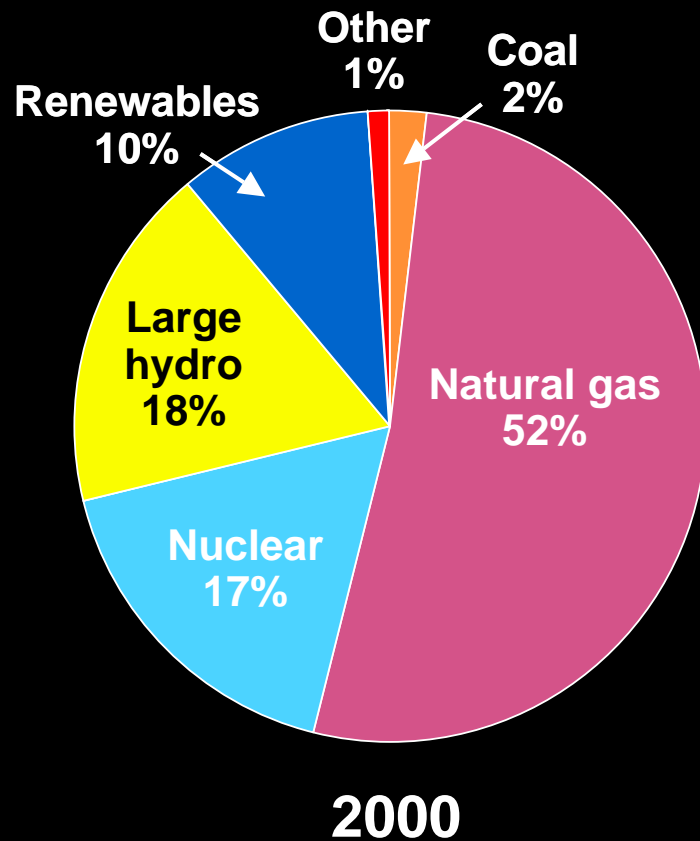
Natural Gas Plays A Role

Natural Gas Spot Contract Market Prices
Dollars per million British thermal units



Source: enerfax.com

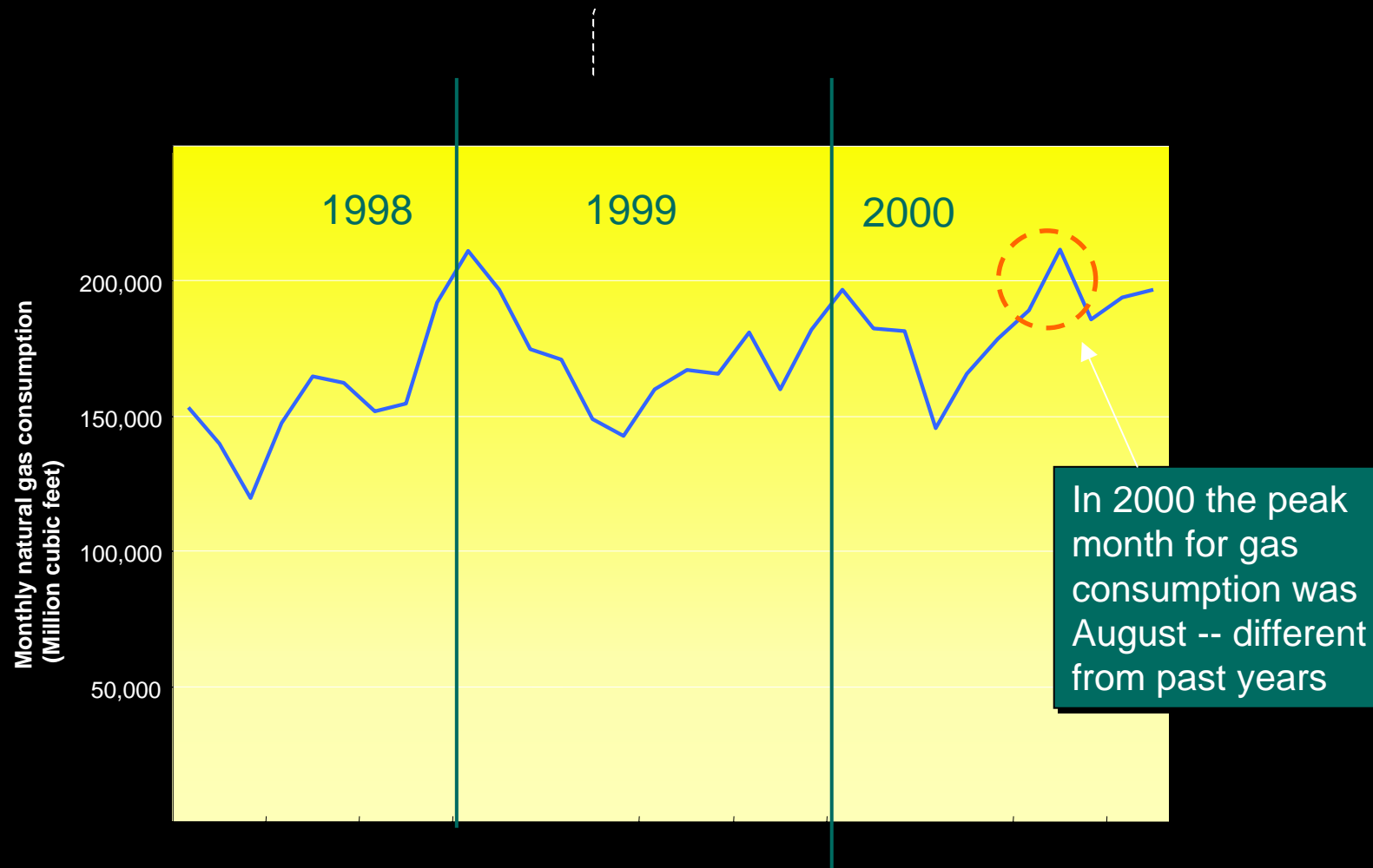
Where Will Gas For New Generation Come From and What Will It Cost?



California's in-state fuel mix

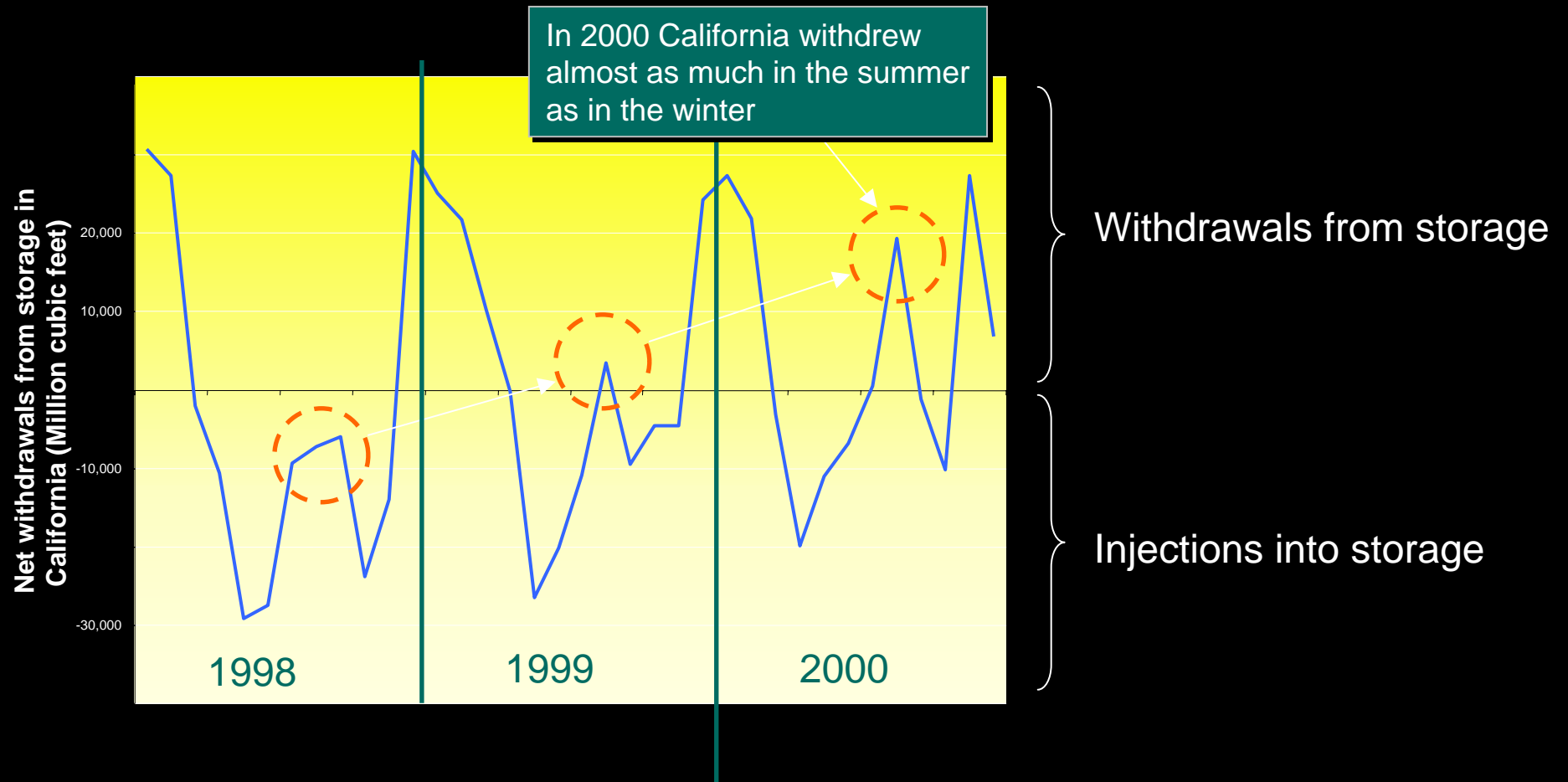
- California is adding 5,000 MW of natural gas
- In the West, 8,600 MW of new gas generation is coming on line
- 10,000 MW has been approved and 15,000 MW is under review

Have Seasonal Consumption Patterns Changed?



Source: Natural Gas Monthly

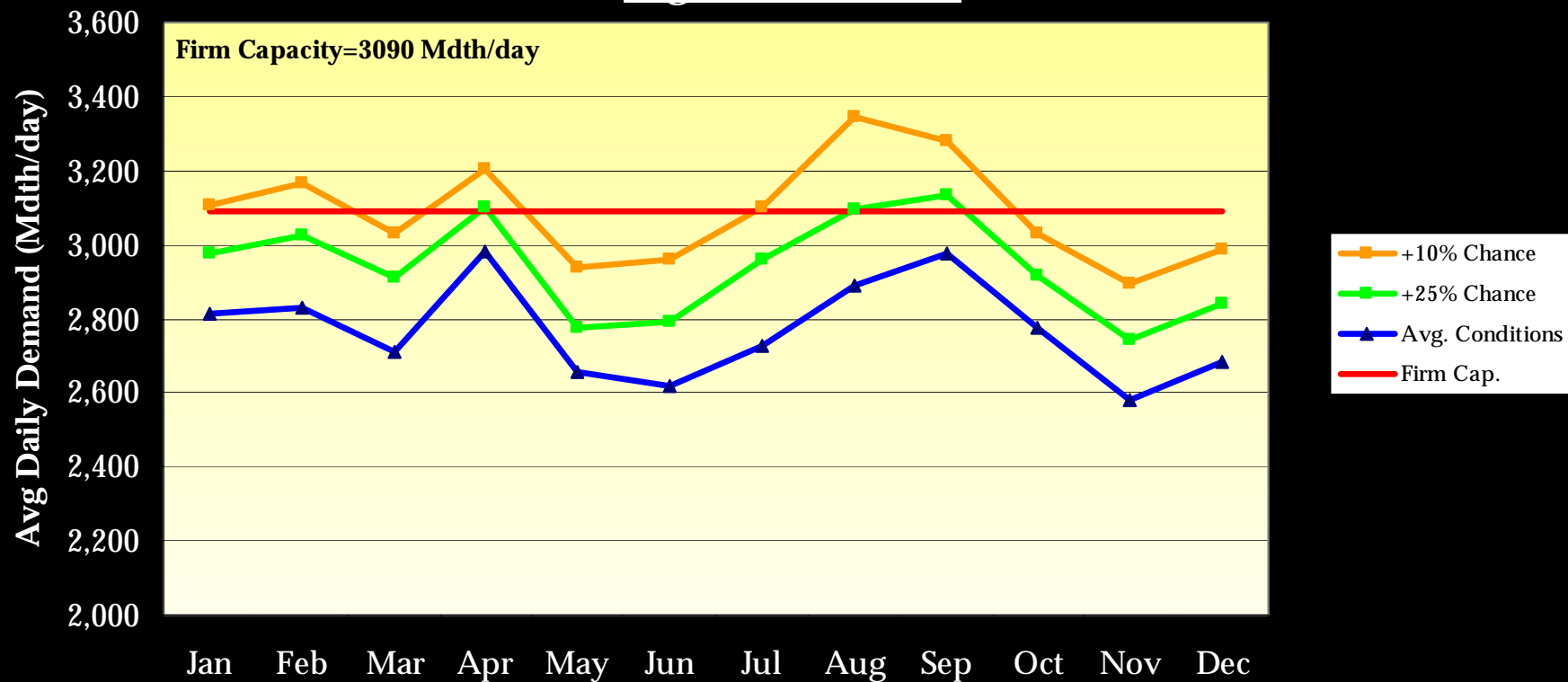
It Impacts Storage



Source: Natural Gas Monthly

PG&E Expects a 25% Chance of High Demand Risking Price Spikes

2005 Demand for Flowing Supply
Based on Higher EG Growth Forecast

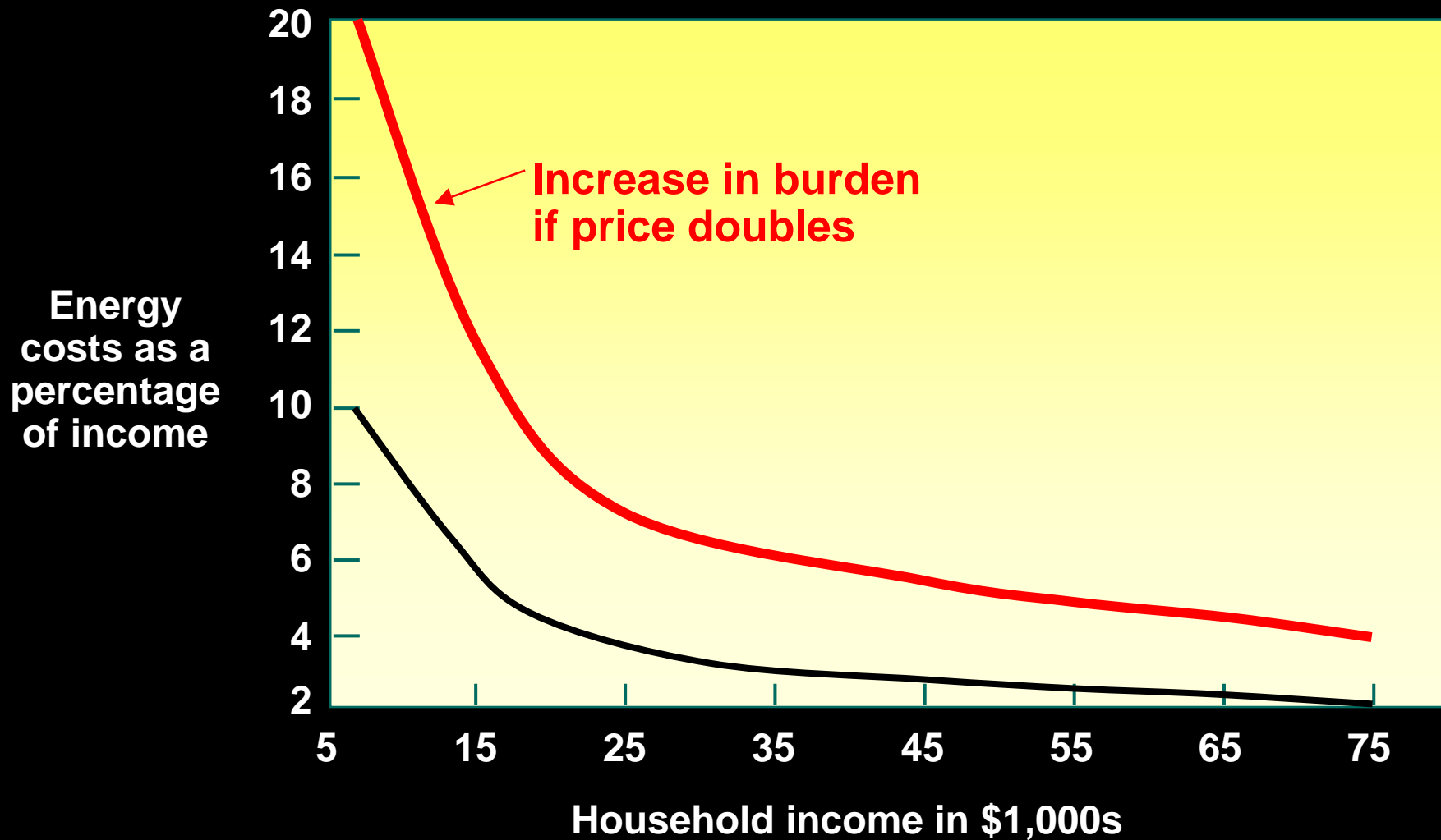


Environmental Issues Will Continue to Play a Role



- Pollution is still a problem
- Natural gas plants don't necessarily help

Consumers Tend To Be Overlooked



Here's What We Still Need to Know

- **Market stability:** What are the mechanisms and conditions for creating competition and controlling volatility?
- **Restructuring:** How will restructured markets work under stress?
- **Pricing:** What impact will time of use rates and real time pricing have?
- **State power authority:** What should its role be?
- **Demand:** How much was efficiency and how much was conservation?

Here's What We Still Need to Know

- **Consumers:** Should there be lifeline rates and how much?
- **Natural gas supply and price:** What do we really know about the gas supply?
- **Diversity of supply:** What roles do efficiency, renewables, and distributed generation play in balancing the portfolio?
- **Environmental outcomes:** What effect will regulatory changes and new capacity have on air and water quality?

