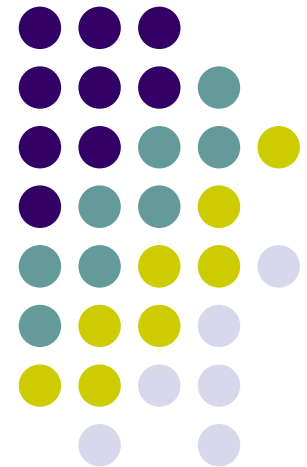
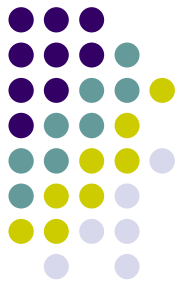


Restructuring Wholesale and Retail Electricity Markets in the U.S.*

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XIII Seminario Repsol YPF ~ Harvard
Salamanca, Spain, May 10, 2003



*Lessons from the bleeding edge of electricity restructuring



Outline of Presentation*

- Why did we begin restructuring electricity markets in the U.S.?
- What happened and why?
- What lessons can be learned?
- Appendix: A few fundamentals about electricity

*The views expressed here are my own and do not represent the views of the Tennessee Valley Authority.



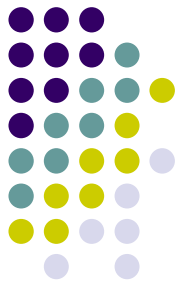
Why deregulate?

- **The problem:**

- Electricity prices were high (2-3 times market) in high-cost states
- Management and/or regulatory mistakes were perceived to be the problem

- **The hope** – that competition in generation would:

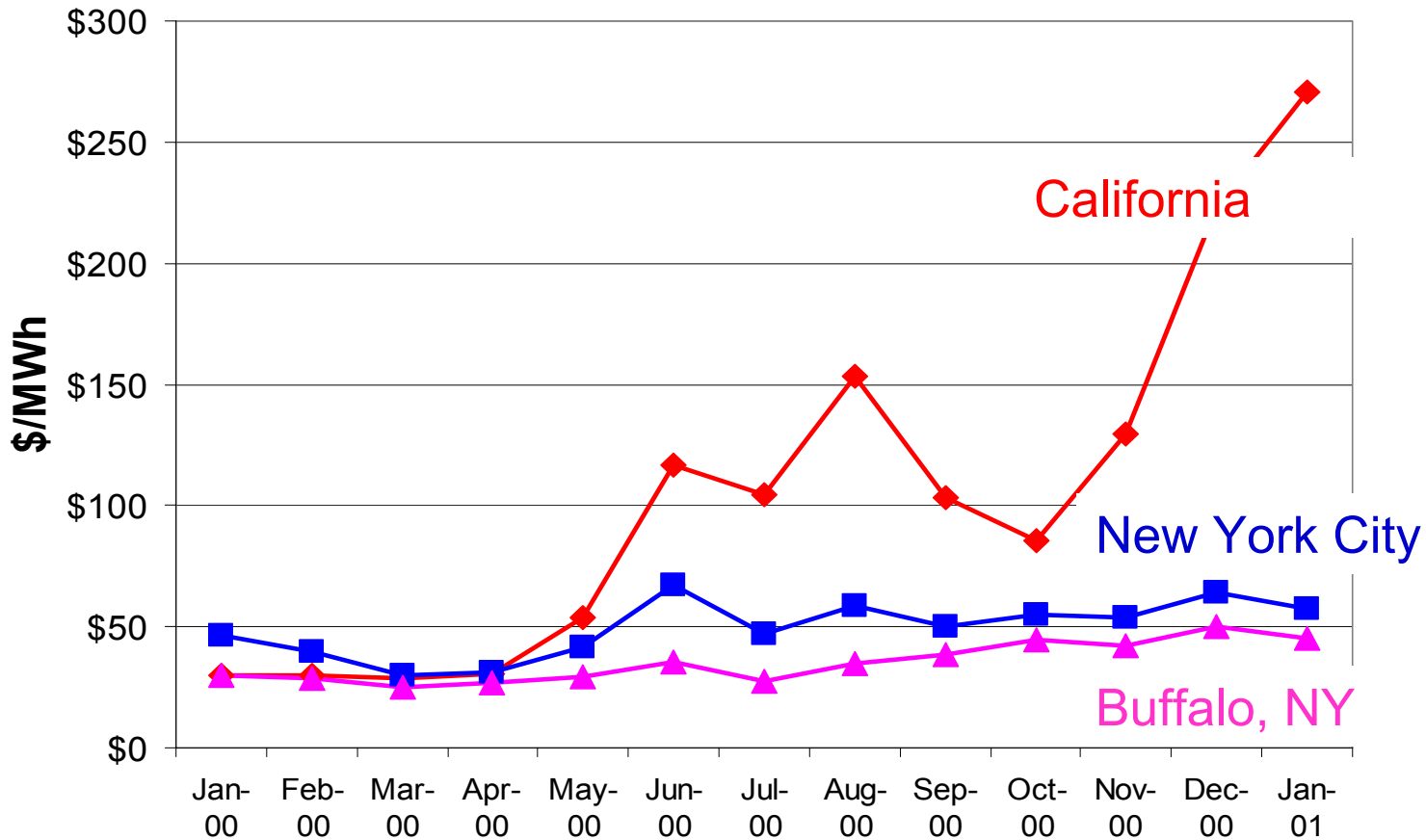
- Shift the cost of management mistakes and forecast risk from customers to suppliers
- Reduce the role of regulation
- Lead to greater innovation
- Result in lower overall costs over the long run



Deregulation -- What happened?

- By the late 1990's, roughly half the states had opened retail markets to competition, or were planning to do so
- On the eve of deregulation in the Northeast and California:
 - wholesale market prices were roughly 2¢/kWh compared to embedded generation costs of 6-7¢/kWh
- After deregulation:
 - Market prices stayed low for the first few years
 - Beginning in June 2000, California began feeling the effects of a severe capacity shortage, which coupled with the worst market design in the country, drove prices up -- **waaaaay** up!

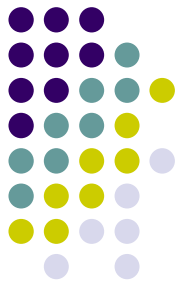
Day-ahead electricity prices (CA and New York) Jan 00 - Jan 01



Source: NYISO MIS 3/1/01; UCEI Berkeley web site

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What happened and why?



Three categories of issues have challenged restructuring efforts in the U.S.:

1. **The Money Issues** – Who pays and who benefits?
2. **The Technical Issues** – What does it take to design wholesale and retail markets that work?
3. **The Institutional Issues** – Who's in charge?
 - Regulatory jurisdiction
 - Ownership – public vs. private

The Money Issues



Circa 1996

- Major Issues:
 - Who would pay for stranded costs -- the above market costs of sunk utility investments?
- Rarely Mentioned:
 - Market infrastructure costs
 - Who will pay for new investment in transmission?

Today (2003)

- Largely resolved:
 - Stranded costs
- Major Issues:
 - In high-cost regions:
 - How can we protect small customers from high market prices?
 - How can we get larger, regional markets?
 - In low-cost regions:
 - How can low rates be retained?
 - Will benefits of competition exceed the costs?
 - Will native load be forced to pay for transmission investments needed to benefit high-cost regions?

The Technical Issues – wholesale markets



Circa 1996

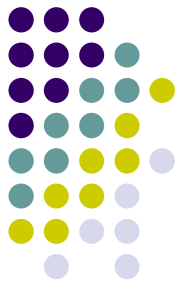
- Major Issue:
 - Should transmission operations be integrated with a short-term market?
 - Advocates limited to New York and PJM* (and Bill Hogan)
 - Opponents argued for separation under the slogan “No PoolCo” and prevailed in California
 - Faced with little consensus, FERC** let different regions experiment
- Rarely Discussed:
 - How to get meaningful demand response
 - How to mitigate market power

Today (2003)

- Largely Resolved:
 - When rules don’t reflect underlying reality, gaming can cause catastrophic results when systems are under stress
 - Core features of workable wholesale markets
 - Independent operation of transmission, integrated with
 - Voluntary energy spot markets
 - Location marginal pricing
 - Financial congestion revenue rights
- Major Focus of Attention:
 - How to get meaningful demand response
 - How to mitigate market power

*PJM = the Pennsylvania, New Jersey, Maryland system. **FERC = the U.S. Federal Energy Regulatory Commission.

The Technical Issues – retail markets



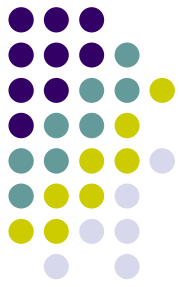
Circa 1996

- Major issues
 - All customers had to have access at once
 - Rules focused on
 - Mechanics of retail access
 - How to “jump start” the market
 - Handicapping the incumbent
 - Subsidies to switch
 - Small customers needed price protection and choice at the same time
- Poorly understood
 - Economics of commodity retailing for small customers
 - Small loads
 - Thin margins
 - High transactions costs
 - No value-added services to offset higher costs

Today (2003)

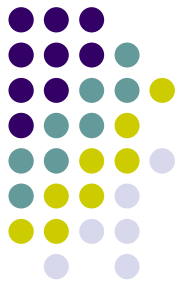
- Largely acknowledged
 - Poor economics for small customers
 - Retail market issues pushed too fast
 - Wholesale market issues should have been resolved first
- Major issues
 - Regulators reluctant to remove price protections for small customers
 - A mixed system makes more sense
 - Keep small customers on regulated service
 - Move large customers to market
 - How do we get there?
 - Politically embarrassing to roll back reforms
 - New legislation required in most states to implement changes

Institutional Issues – who's in charge?



- Jurisdictional issues are still a problem
 - FERC
 - regulates “interstate” and “wholesale” sales
 - Can order utilities to build new transmission
 - States regulate
 - “intrastate” and “retail” sales
 - siting of transmission lines
 - recovery of 90+% of transmission costs
 - The legal distinctions (wholesale/retail and inter/intrastate) bear no relationship to power markets or the physics of the grid
- In most states, public power entities are self-regulated (munis, coops, federally owned)
- Given the lack of consensus on what should be done, jurisdictional and institutional conflicts create barriers to restructuring

General Lessons Learned from U.S. Restructuring



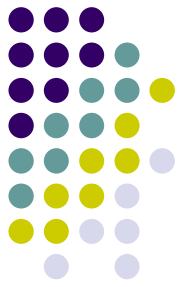
- We've made real progress – but it's hard to tell from all the shouting
- Wholesale markets can work, but whether it's worth the effort depends on where you're starting from
- It's harder than many of us thought it would be at the outset
- Four specific recommendations follow

Lesson No. 1: Manage Expectations



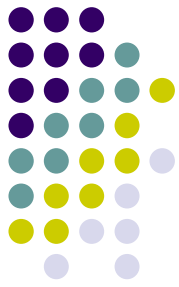
- Do not exaggerate the benefits of restructuring
- Recognize that everybody cannot be made better off relative to the status quo
 - Markets create winners and losers
 - Some customers are subsidized today – expect their costs to go up
 - Prices go down and up
- Do not understate the costs: free markets aren't free
 - Costs to set up markets are substantial
 - Benefits occur over the long run
 - There are no windfall gains to be had – unless someone experiences a windfall loss

Lesson No. 2 – Get the technical details right



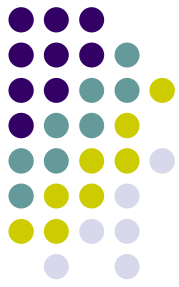
- Don't try to proceed with a “fire-ready-aim” approach
 - Small details can kill you
 - Learn from the mistakes and successes in other markets
- Getting the wholesale market design right should be the highest priority. If the wholesale market is working well:
 - Access for large customers is relatively easy
 - Benefits accrue to small customers, even if they don't have choice

Lesson No. 3: The role of retail markets



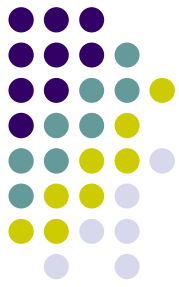
- You need **some**, but not all retail load participating in wholesale markets to help markets clear and mitigate price spikes
- **Do** put large (>1 MW) customers into the market
- **Don't** put small customers into the market, at least not at first
 - Economics are ugly
 - Political pressure is too great when market prices are high
- **Do** recognize you can't have it both ways
 - You can't have a well functioning market and price protection at the same time
 - If customers need "protection" from high market prices, they shouldn't be in the market in the first place

Lesson No. 4: Develop a realistic plan for dealing with institutional issues

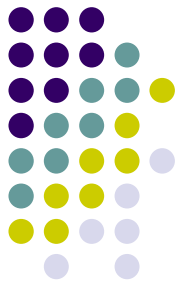


- Do an assessment of the issues
 - Will some regions benefit more than others?
 - What stakeholder groups will win and which will lose?
 - Who gets to decide whether, when and how to move forward?
- Develop a plan
 - If interests conflict, who will drive the process toward resolution?
 - How will winners be able to educate/persuade/bribe losers to participate?

Appendix -- A few electricity fundamentals



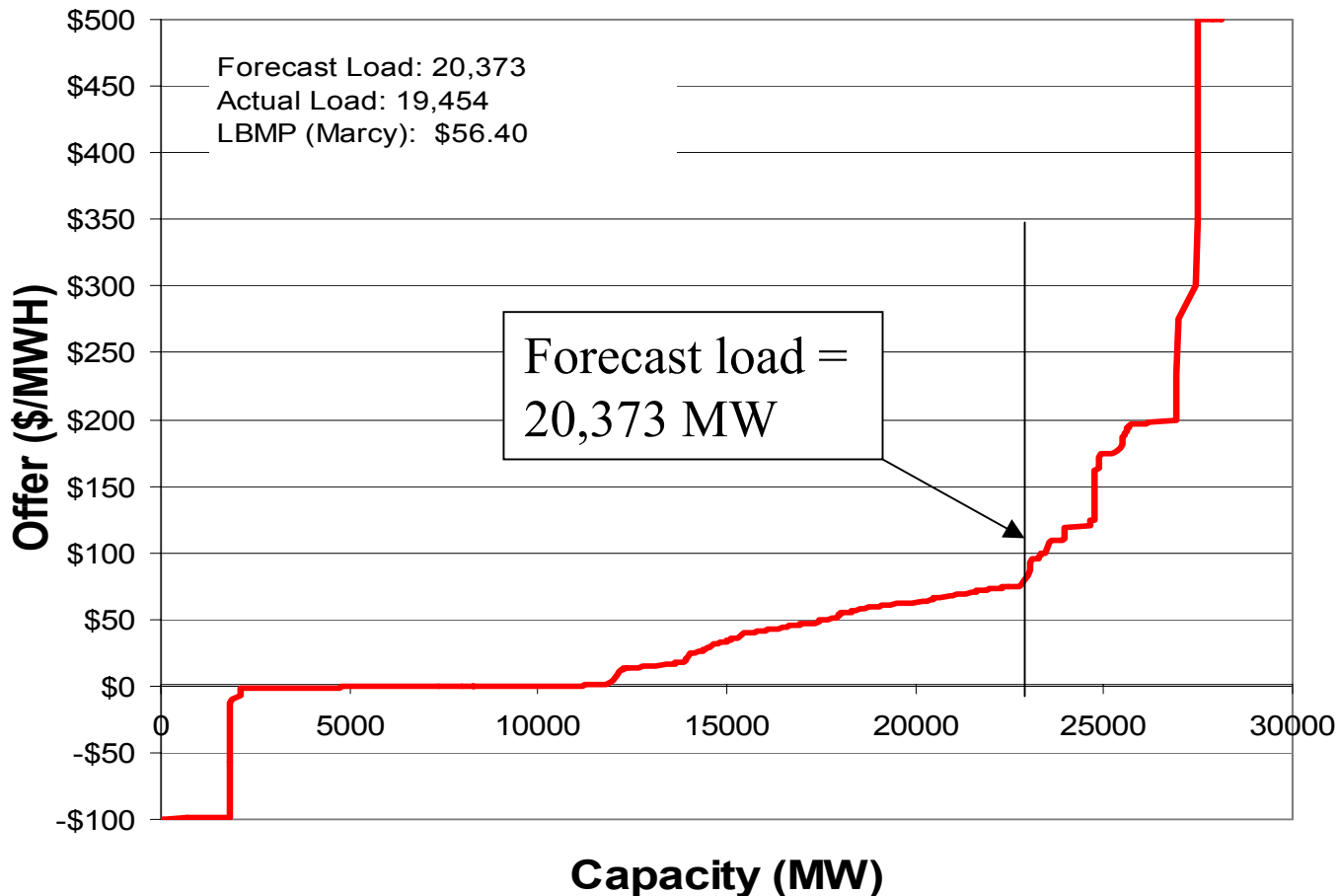
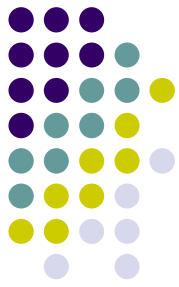
- **Electricity cannot be stored economically**
 - Reliability is achieved through an integrated network of generation and transmission assets (the “bulk power system”)
- **Customer demand is relatively unresponsive to price in the short-term**
 - **Wholesale**: little demand response in the wholesale spot market (timeframes are too short)
 - **Retail**: Most customers are protected from market prices through a regulated service options (so customers can't benefit by responding, even if they wanted to)



A few electricity fundamentals . . .

- **New supplies cannot be added overnight**
 - It can take 3-5 years to site and build a new gas plant; even longer for coal or nuclear
- **The results are that:**
 - Electricity spot markets are many times more volatile than any other commodity
 - Short term markets conditions can create market power
 - Electricity is inherently subject to
 - Enormous forecasting errors, and
 - “boom and bust” price cycles

When supplies are tight, both the supply and demand curve can be vertical, leading to price spikes when supplies are short



Source: NYISO web site

Data are price bids in the NY ISO Day-Ahead Market for Feb. 7, 2000, Hour 8.