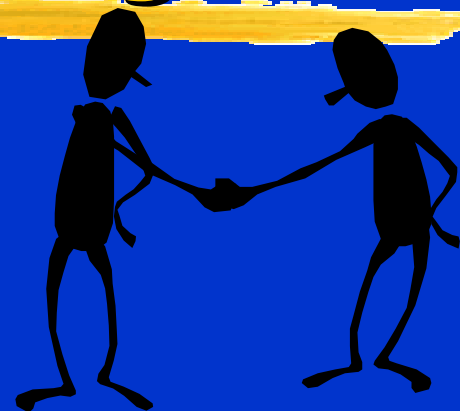


The Transition to Standard Market Design



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Getting from Here to There

AAI Workshop

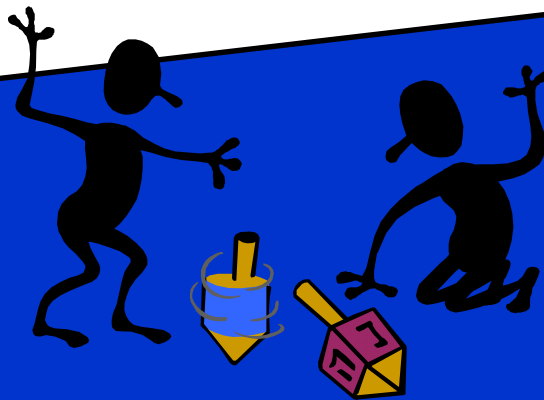
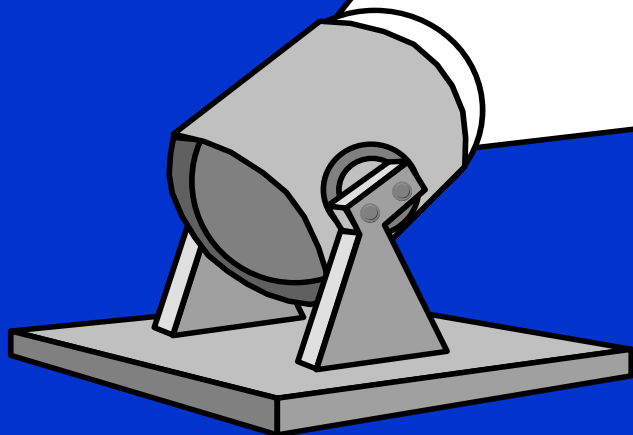
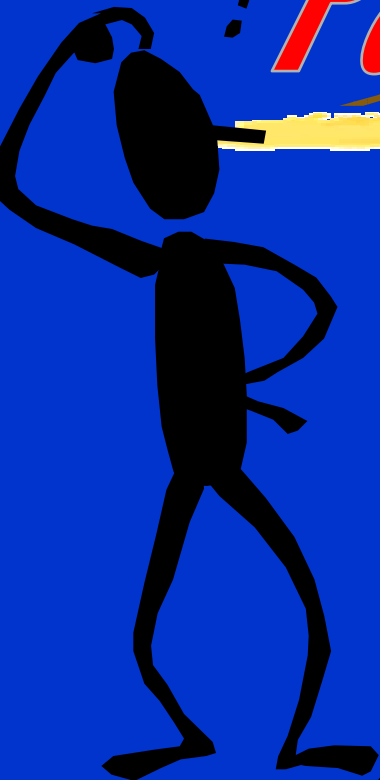
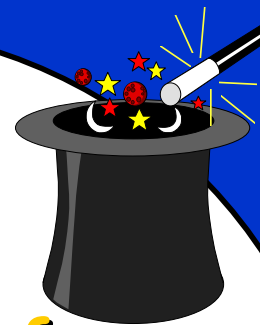
Arlington, VA

January 21, 2003



? *Paradigm Change*

Transitioning from
cost-of-service/
rate-of-return to
market/incentive
based regulation



The paradigm shift problem of Urban VIII



1543: Copernicus publishes a book claiming the earth revolves around the sun then dies.

Church doctrine: earth is the center of the universe

Early 1600s: Bruno burned at the stake

Galileo develops telescope, observes the universe and irritates the Jesuits

Cardinal Barberini supports Galileo

1632: *Dialogue* is published; bubonic plague

1633 Urban orders Inquisition of Galileo

Urban probably agrees with Galileo, but will be seen as weak if he supports him. Guilty!



Post Galileo: the quantum mechanics

Cardinal Barberini was Urban: where you stand depends on where you sit.

1642: Galileo dies; Newton is born

Newton discovers gravity and the calculus
continuity and certainty rule

1835: *Dialogue* removed from the Index

1905: Albert E introduces relativity
quantum mechanics

discontinuity and uncertainty rule

1992: John Paul II accepts to Galileo's empirical
approach to science



The law is Not optional



⇒ The 'anything goes' era ended in 2001

⇒ No deregulation; liberalization and restructuring

⇒ the core mission

⇒ prevent undue discrimination

⇒ establish just and reasonable rates

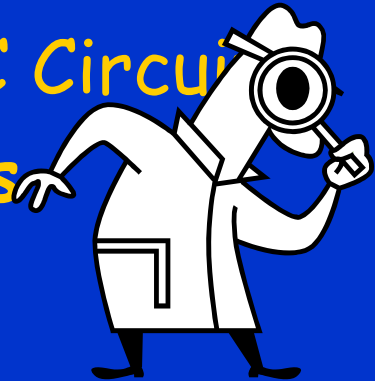
⇒ in both tx and wholesales



⇒ Do we know it when you see it? when to intervene?

⇒ Price set in a well-functioning market. DC Circuit

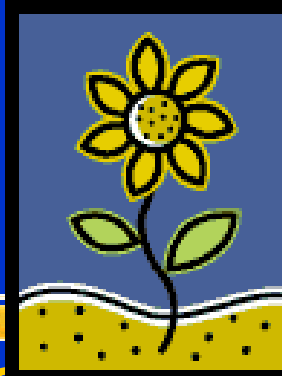
⇒ SMD is FERC's proposal to carry out its responsibility



Failed market designs



- Zonal markets (Cal, PJM, NE, UK)
- Sequential markets for energy and anc services
- One settlement systems
- Infeasible markets (Cal PX and UK)
- Ignore non-convexities (start-up and no-load)
- Ignore market power
- As-bid/first-price auctions
- all ended in administrative intervention
- No property rights to market power or poor market design



Myths, Shibboleths and Truth

- ☯ All electric systems have central dispatch.
The question is how to do it.
- ☯ We are acting from failed (weeds) and successful (flowers) real experience
- ☯ SMD does not cure cancer, but there are no known technical impediments to SMD
- ☯ Market power and free riders issues must be addressed
- ☯ Significant State and Regional variations

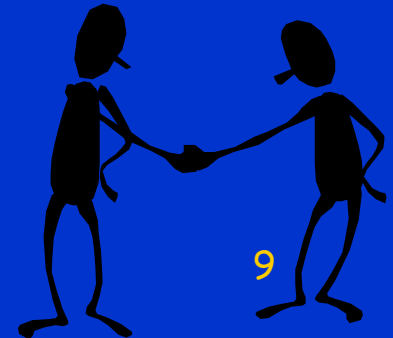
Cost-of-service Nostalgia

- ☹️ Sam Insull's legacy
- ☹️ Stranded Costs: \$200 billion
- ☹️ Nuclear value: < 15% of book
- ☹️ Fossil value: 200% of book; over-depreciated
- ☹️ Affiliate abuse is rampant
- ☹️ Cost-of-capital is lower, but it is wasted
- ☹️ Consumer assumes all the risks

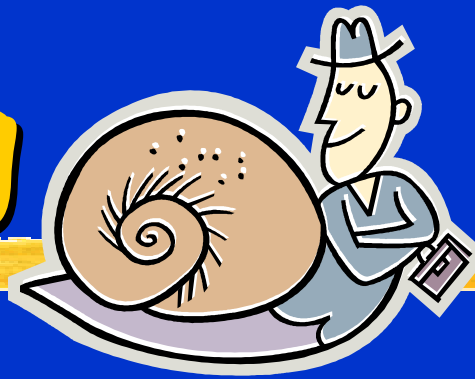


Electric Restructuring requires Institutional change on all levels

- ❑ Culture: religion, customs, and traditions
 - ❑ change interval: decade to century or more
 - ❑ Market theology v. regulation
 - ❑ develop ethical practices: Honor among thieves
- ❑ Formal rules: laws (FPA '35; EPAct '92)
 - ❑ change interval: decade +
 - ❑ Hope standard: What is legal under the FPA?
- ❑ Play of the game: regulations (888, 2000, SMD)
 - ❑ change interval: one to ten years
 - ❑ Market-based rates; hub and spoke
- ❑ Resource allocation: markets
 - ❑ change interval: real time
 - ❑ ISOs, Enron OnLine, bucket shops



restructuring



- ☯ All markets have rules
- ☯ Not all are written. Insurance/extortion
- ☯ Where are the economies of scale and scope
- ☯ Aligning efficiencies and incentives
- ☯ How many firms for efficient markets?
 - ☯ Nuclear power: 2, 5, 10, 20, 50, 150
 - ☯ Control areas: 2, 5, 10, 20, 50, 150
 - ☯ Generators: 2, 5, 10, 20, 50, 150
 - ☯ Distcos: 2, 5, 10, 20, 50, 1500
- ☯ SMD allows us to proceed at pace

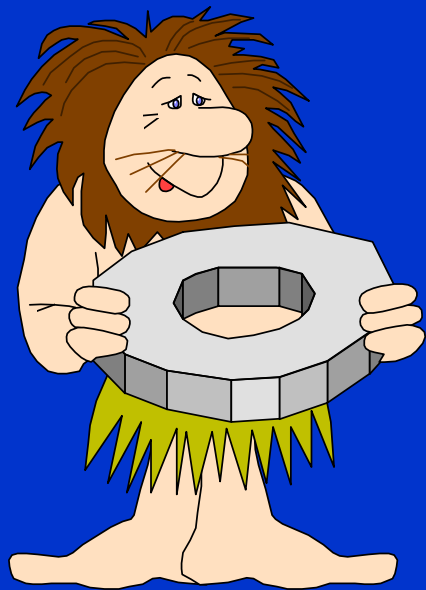
Changing incentives

- ❌ From fiduciary responsibility to illegal activity, eg, declared outage, high bids
- ❌ Mitigation is error prone
- ❌ Catch 22
 - ❌ Eliminate 205/206
 - ❌ After short time, the market will sort it out
 - ❌ Not politically feasible, Congress will intervene
- ❌ Bearing false witness over the wires
- ❌ Should it be illegal to lie about marginal cost

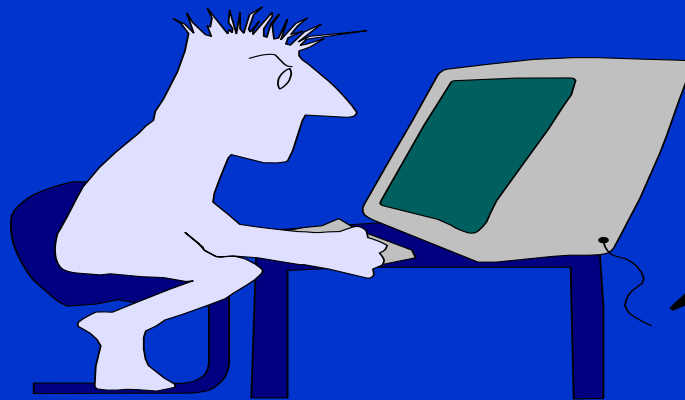
Market theology v. reality

- ✗ Because Nash got a Noble and a movie for describing a game theoretic equilibrium does not make it legal or efficient. Is it J&R?
- ✗ What about cooperation? Wash trades, ...
- ✗ What if the skills of the traders were put to productive activities?
 - ✗ 'DESPITE HEAT, CREDIT CONCERNS, LACK OF LIQUIDITY ARE KEEPING PRICES IN CHECK'
PMW Aug. 19, 02
- ✗ Compounding political issues and market power: exercising market power when there is a resulting event that can be easily politicized
 - ✗ High prices
 - ✗ Need information to counter this charge

SMD: Market Design, Monitoring and Mitigation



market design



monitoring



mitigation

good market design



- ☯ Critical when market is tight
- ☯ Need SMD market to be compatible with off-SMD markets
- ☯ efficient and competitive with truthful bidding
- ☯ incentives and rules for truthful bidding
 - ☯ avoid excessive mitigation
 - ☯ demand curve for reserves
- ☯ Settlements: revenue adequacy/Payments cover bid costs
- ☯ Don't design the market to favor large players
- ☯ Deal with free riders: reservation bids
- ☯ good information (monitoring) systems
 - ☯ ex-ante
 - ☯ real-time for mitigation
 - ☯ ex-post for future decisions

Market power: can it be discussed in polite company?

"The researches of many commentators have already thrown much darkness on the subject and it is probable that, if they continue, we shall soon know nothing at all about it."

Mark Twain

- ☹️ Conditions for market power abuse
- ☹️ Entry and/or exit barriers
- ☹️ Demand response: 'low' demand elasticity
- ☹️ high market concentration
- ☹️ market segmentation: congestion
- ☹️ profitable withholding or discrimination



market power potential is a function of the weather and topology

Nash/Cournot(1838) equilibrium:

$$(p - amc) / p = HHI / e$$



What is illegal
under
antitrust law
without
collusion?

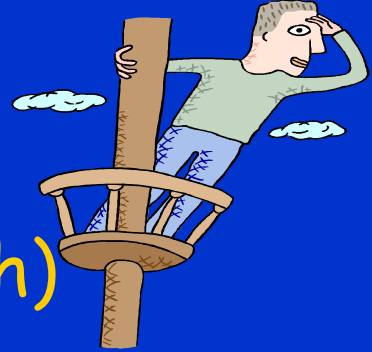
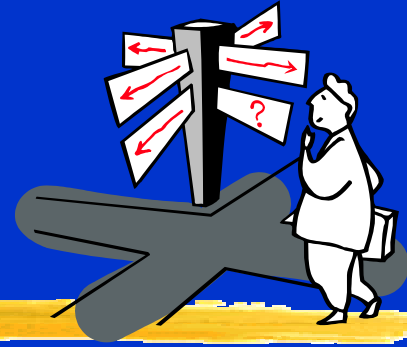
amc = wgt'd. avg marginal costs

e is the market elasticity it is a
function of weather

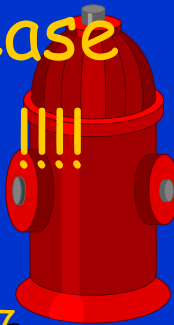
As q gets larger, e gets smaller,
 $(p - amc) / p$ gets larger



Market Power Mitigation Options



- Hear No Evil, See No Evil, Speak No Evil
- let antitrust folks take care of it
- Punitive Ex-post (The Antitrust Approach)
- Watch (Chauncy Gardner), Report and ?
- Return to Cost-of-Service (Regression Therapy)
 - Price Caps and curtailments
 - price caped long-term contracts: number please
- Divestiture (the Big Stick): $(p - amc) / p = HHI / e$!!!!
- Dynamic must offer with bid caps
- hydrants must be checked one hour before all fires



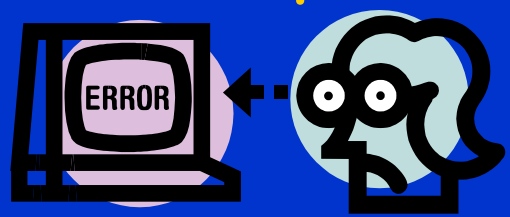
resource adequacy

Warning Label for Spot Markets
Failure to forward contract or submit demand schedules is risky and may be hazardous to your financial health

- ↪ bilateral market disciplined by spot market
- ↪ Long-term monitored for entry barriers
- ↪ Start the process when entry is possible
- ↪ Demand bidding counts; trust but verify
- ↪ May need to install curtailment equipment
- ↪ If you are short, you may have to pay a high price in the spot market
- ↪ If you are long, you may receive a high price in the spot market

Mitigation

- ⇒ Ex-ante is highly error prone and unilateral
 - ⇒ Hub and spoke
 - ⇒ SMA
- ⇒ Contract cover is important, but complex
- ⇒ Ex-post mitigation is too messy
- ⇒ western markets are poster child
- ⇒ Mitigation must be politically tuned
 - ⇒ High prices, scarcity rents and market power
- ⇒ bilateral market disciplined by spot market mitigation and monitored for entry barriers



Dynamic Mitigation

- ⇒ free of behavioral assumptions
- ⇒ Less error prone
- ⇒ Allows competitive markets to function
- ⇒ Fewest assumptions and guesses
- ⇒ Demand curve for reserves
- ⇒ Guard rails: implemented infrequently
- ⇒ **Must Offer with Bid Caps**
- ⇒ Only available under SMD

Must Offer with Bid Caps (Efficient Competition)



- ☺ Require creditworthiness
- ☺ Demand bidding or contract cover: no vertical demand curves
- ☺ Develop triggers for mitigation: no withholding
- ☺ Non-punitive: Bid at marginal costs get market clearing price
- ☺ Requires
 - ☺ Rough calculation of marginal costs
 - ☺ day-ahead market for ex-ante correction
- ☺ Does not require
 - ☺ Capital costs
 - ☺ Regulation of marketers or forward trades

Hydro and Energy Limited Resources

- Requires forward planning of generation
- Complicated opportunity costs
- Special bidding rules
 - Bid daily max energy
 - DAM will get maximum revenues
- Monitoring
 - Announce rules for non-economic activities
 - E.g. Fish protection, irrigation, other
 - Observe bidding pattern over time
 - E.g. running off-peak and not on-peak
 - Compare to announced program

Portable Entitlement Program

- POLR/SOLR makes and maintains entitlements under state regulation and resource adequacy requirements
- Portable entitlement program (fixed p and q)
 - Long-term entitlements includes CRRs
 - Attached to the customer
 - Auto buy/sell for under/over entitlement in SMD spot market
 - entitlement moves when the customer moves .
 - Terminates when the customer leaves the SOLR
- **NO SOLR PRICE CAPS**

Can the expansion market become more competitive under an independent RTO?

- ☯ Yes, if we have the will.
- ☯ Back to the 1970s.
- ☯ Can generation be competitive?
- ☯ ITCs like being franchised monopolies
- ☯ Do we need franchised monopolies
- ☯ RFPs (Demsetz markets)
- ☯ Williamson's caution in Oakland cable TV
- ☯ free riders issues

What is needed for competition?



- ☺ good market design and information
- ☺ organizing principle: compatible incentives
- ☺ recognition and mitigation of market power
- ☺ Interaction of markets and physics
- ☺ Market approaches to replace planning
- ☺ understand the choices
 - ↓ free market (Coasian dream). NOT
 - ↑ markets with market rules (SMD)
 - ↓ administrative rules (TLRs and OFOs)
 - ↓ State socialism



Wholesale Market Design AGORAPHOBIA

You don't always
get it right the
first time.

Now you have
experience

Try SMD

NO, WE DIDN'T NUKE OUR-
SELVES BACK INTO THE STONE-
AGE. WE DEREGULATED OUR
ELECTRIC UTILITIES...

Are you a
Copernican or
a Ptolemain?

All power corrupts, but we need the electricity