

Trends in Electricity Deregulation

Presentation to DTN/Meteorlogix Energy Summit

Collin Cain, MSc

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Agenda

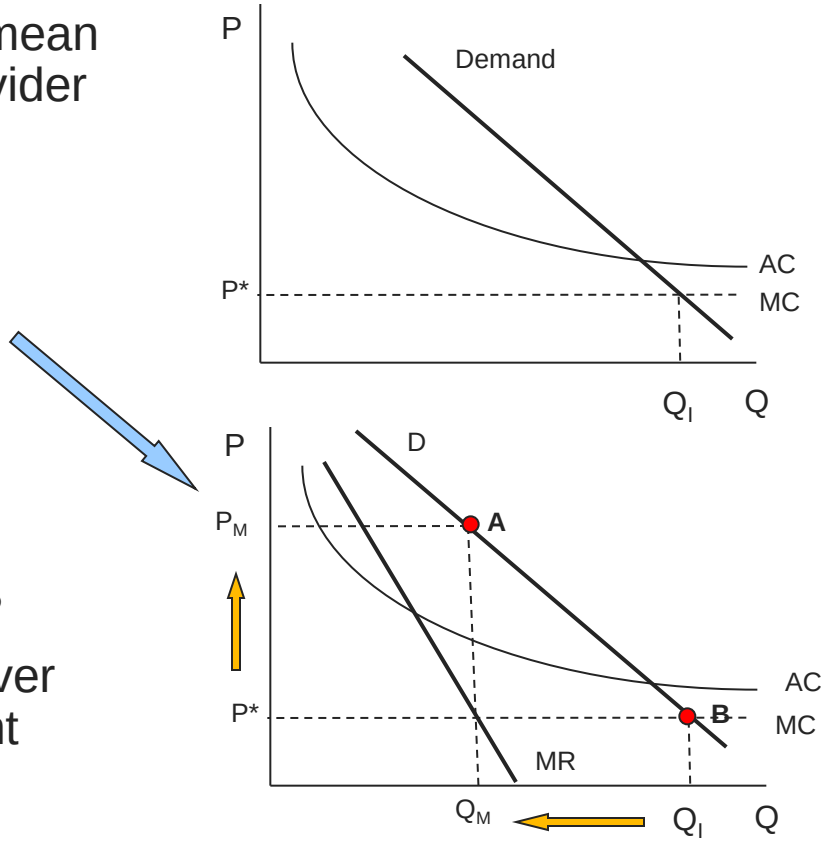
- Regulation and deregulation in electricity
- Backlash
  - “Reregulation”
- Current trends and challenges
  - FERC, ISO/RTOs, States
  - Need for consistent competition and environmental policies
  - Challenges ahead
- Decision making under uncertainty



Regulation and deregulation in electricity

Regulation of electricity service

- For most of the 20th century, electric service – generation, transmission, distribution – was assumed to be a natural monopoly
  - Constantly increasing returns to scale mean it is more cost effective for a single provider to deliver a product
  - However, for a monopolist, it is profit maximizing to reduce output such that incremental cost equals incremental revenue (MC=MR)
- Basic goals of traditional regulation:
  - Promote efficient pricing (P=MC) and output, i.e. move from point A to point B
  - Allow producer sufficient revenue to cover costs plus a rate of return on investment



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Roots of electricity “deregulation”

- Federal efforts to improve efficiency and decrease reliance on foreign oil
  - PURPA (1978) directed towards promoting cogeneration and renewables from independent power producers (IPPs)
  - NGPA (1978) gradual deregulation of natural gas pricing
- Growing recognition that generation is not a natural monopoly
  - Large increase in IPP activity (encouraged in part by excessive estimates of avoided costs)
  - States move to correct problems with competitive bidding
- Energy policy act of 1992
  - Created a new class of independent producers, called “exempt wholesale generators”
  - Required FERC to promote “open access” of independent generators to utilities’ transmission lines
  - Intended to allow large users to choose their electricity supplier
- By mid 1990s roughly half of new generating capacity in the US was being developed by IPPs

1996 – FERC Orders 888 and 889

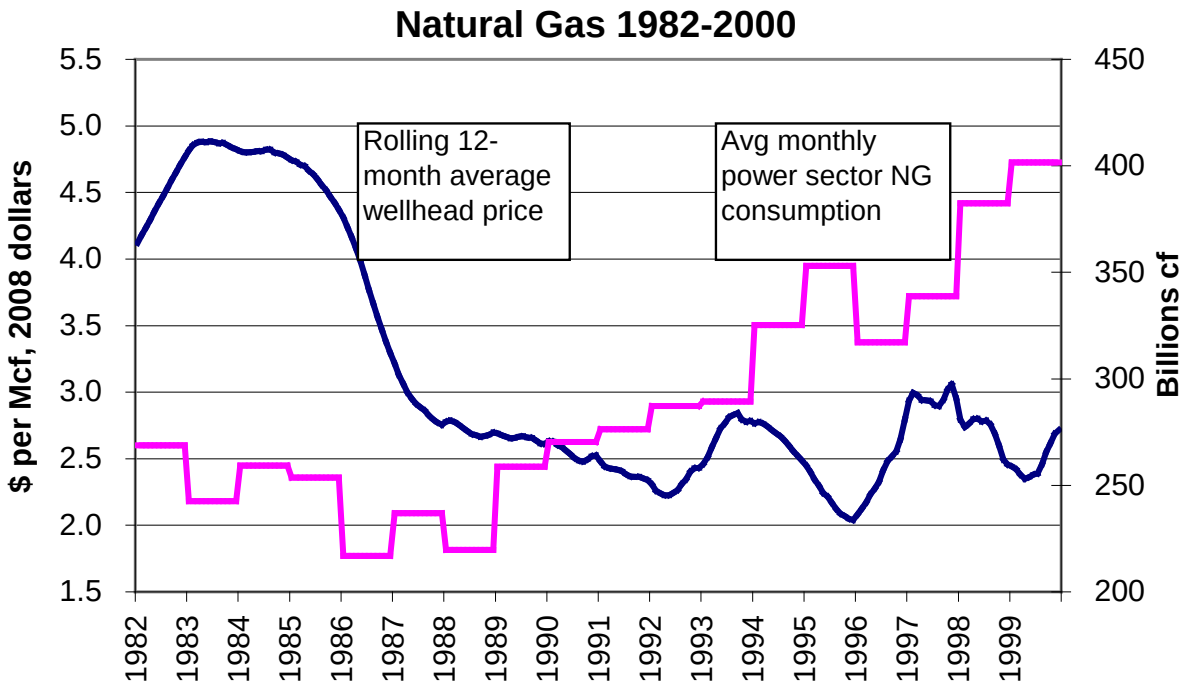
- Implementation of EPACT 1992, aiming to promote increased competition in wholesale power markets
- Order 888
  - Required utilities to have open access non-discriminatory transmission tariffs for wholesale transactions
  - Allowed utilities to seek stranded costs resulting from customers leaving the system
- Order 889
  - Required utilities to provide Open Access Sametime Information System (OASIS)
  - Required utilities to separate wholesale power marketing from transmission operation

State level restructuring

- Flurry of state legislation in the late 1990s initiated restructuring efforts
  - 1996: California, Pennsylvania, New York, Rhode Island, New Hamphshire
  - 1997: Illinois, Maine, Massachusetts, Montana, Nevada, Oklahoma
  - 1998: Connecticut, Arizona, West Virginia
  - 1999: Maryland, Delaware, New Jersey, New Mexico, Oregon, Texas, Virginia
- Restructuring separates or “unbundles” the electricity supply functions – generation, transmission and distribution
  - Utilities in restructured states no longer build, own, or operate generation
  - Restructuring settlements require utilities to divest generating assets through sales or through transfer to an “unregulated” affiliate
  - The cost of generation is no longer recovered under cost-of-service regulation, but must earn revenue through competitive bilateral transactions or through sales in centralized markets

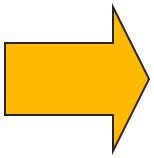
The impact of natural gas

- Deregulation in natural gas initially increased prices, boosting exploration and production, which drove prices toward historical lows by the late 1990s
- Restrictions on generating electricity with natural gas were lifted in the 1980s
- Substantial improvements in gas-fired turbine efficiency in 1980s and 1990s



The impact of natural gas (cont.)

- Low natural gas prices and high-efficiency turbines meant new, independent generation was much cheaper than utility power
- Utility rates included large sunk costs, including huge cost overruns for nuclear plants built in the 1970s and 1980s



Large electricity users pushed for access to competitive, non-utility power

ISOs and centralized markets – enhancing the benefits of competition

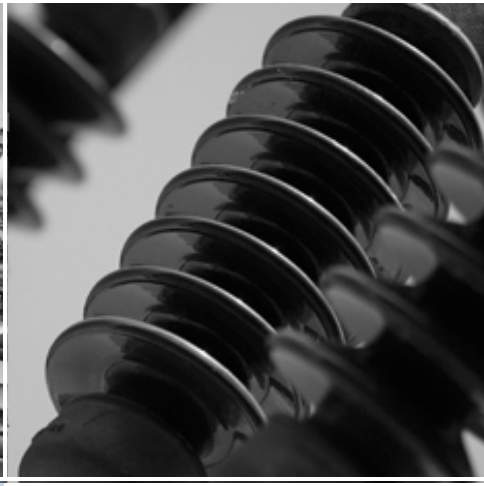
- Expansion of independent power increases the need for / value of an independent operator of the transmission system
- ISOs formed in California, Pennsylvania-New Jersey-Maryland (PJM), New England, New York, and Texas
- Centralized, bid-based markets for energy (and ancillary services) allow for:
  - Efficient price discovery
  - Optimal system dispatch
  - Congestion pricing to signal need for generation/transmission investment
- FERC Order 2000
  - Aimed at promoting broad-area Regional Transmission Organizations (RTOs) to administer the transmission system
  - Established characteristics and functions necessary for an entity to become an RTO

Retail access and competitive retail markets

- Transition period with capped rates, followed by full retail access
  - Offer up front benefits to consumers
  - Stranded cost recovery
  - Allow retail market to develop

    ⇨ **Expectation that electricity prices would fall**
- Rising fuel costs stifle development of competitive retail markets
  - Impossible to compete against capped utility rates
- Currently, competitive suppliers almost exclusively serving industrial and large commercial customers
- Competitive procurement
  - Restructured states with full retail access have relied on competitive procurement of default service supply by the utilities – New Jersey BGS Auctions, RFP mechanisms in Maryland, Massachusetts, Connecticut, etc.



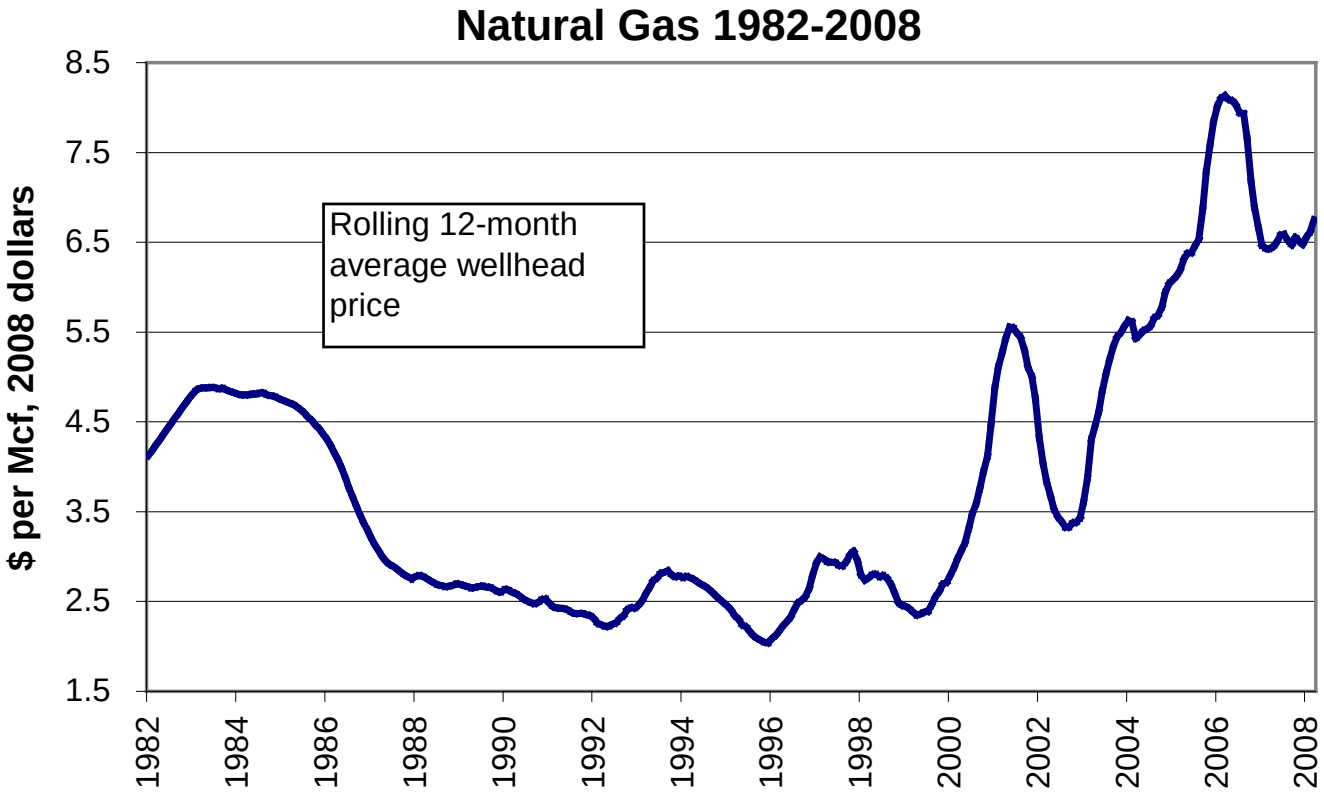


Backlash

Backlash

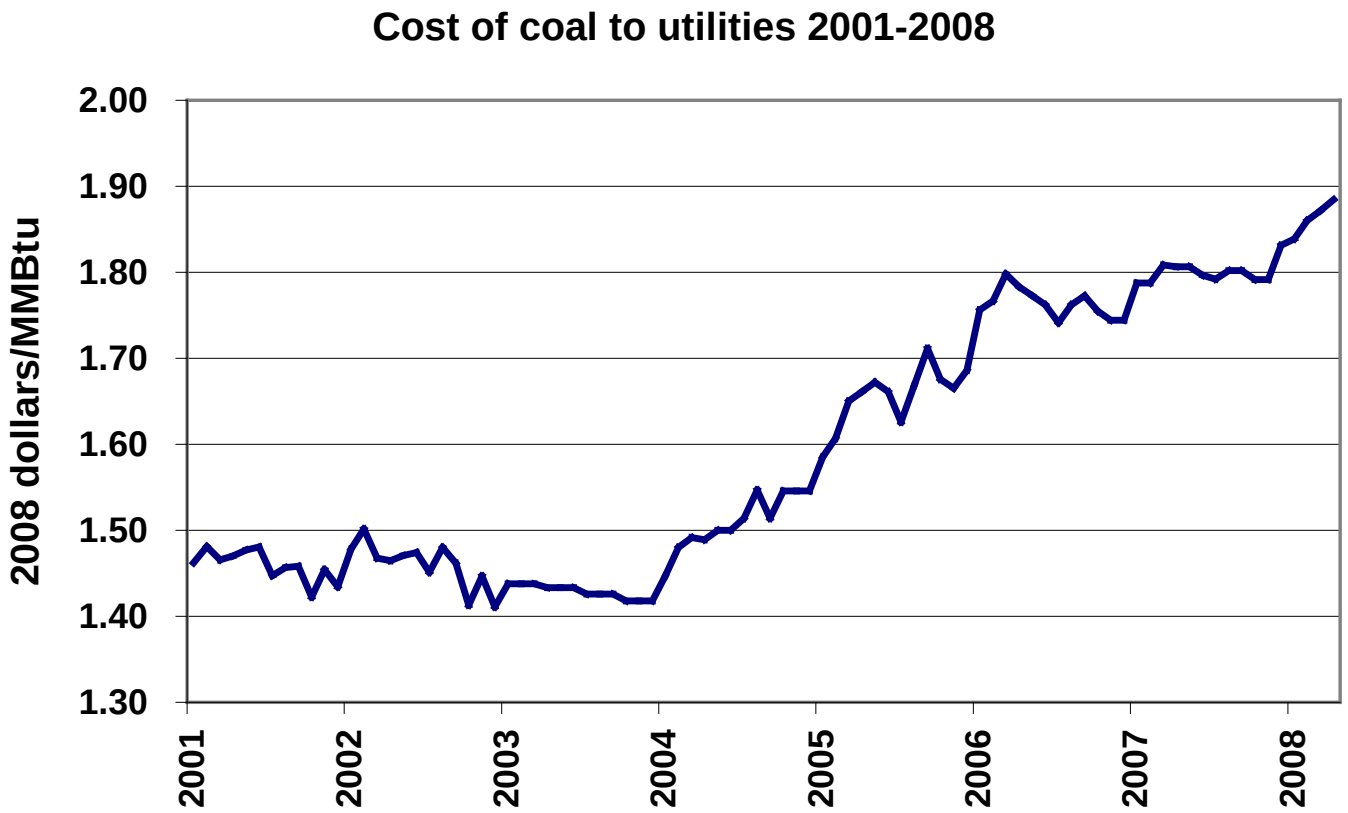
- California crisis 2000-2001
  - Largely driven by factors unrelated to restructuring *per se*
  - A number of states pull back from original restructuring plans
- 2005 –
  - Retail rates jump in restructured markets as price caps expire while fuel prices are rising sharply
  - Several states consider “reregulation”

Fuel prices – natural gas



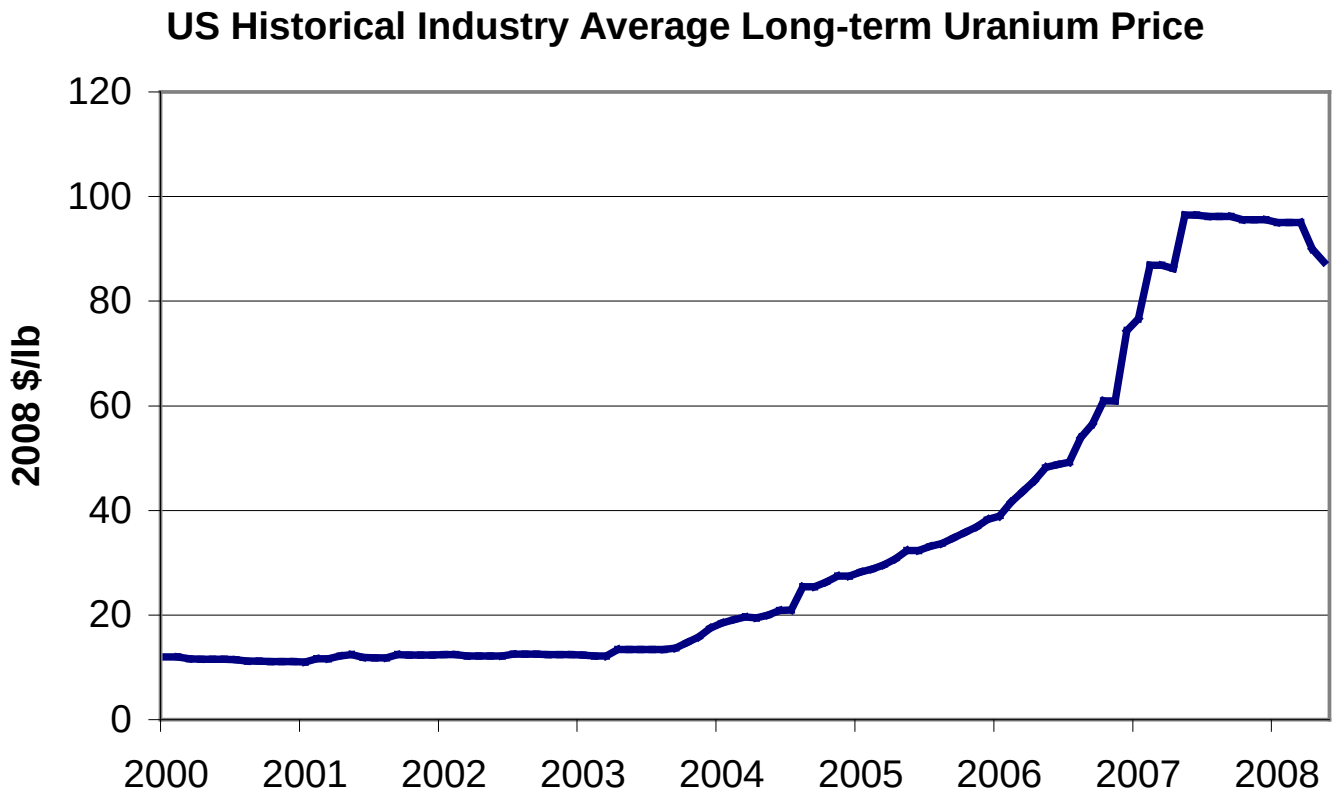
Source: Energy Information Administration

Fuel prices – coal



Source: Energy Information Administration

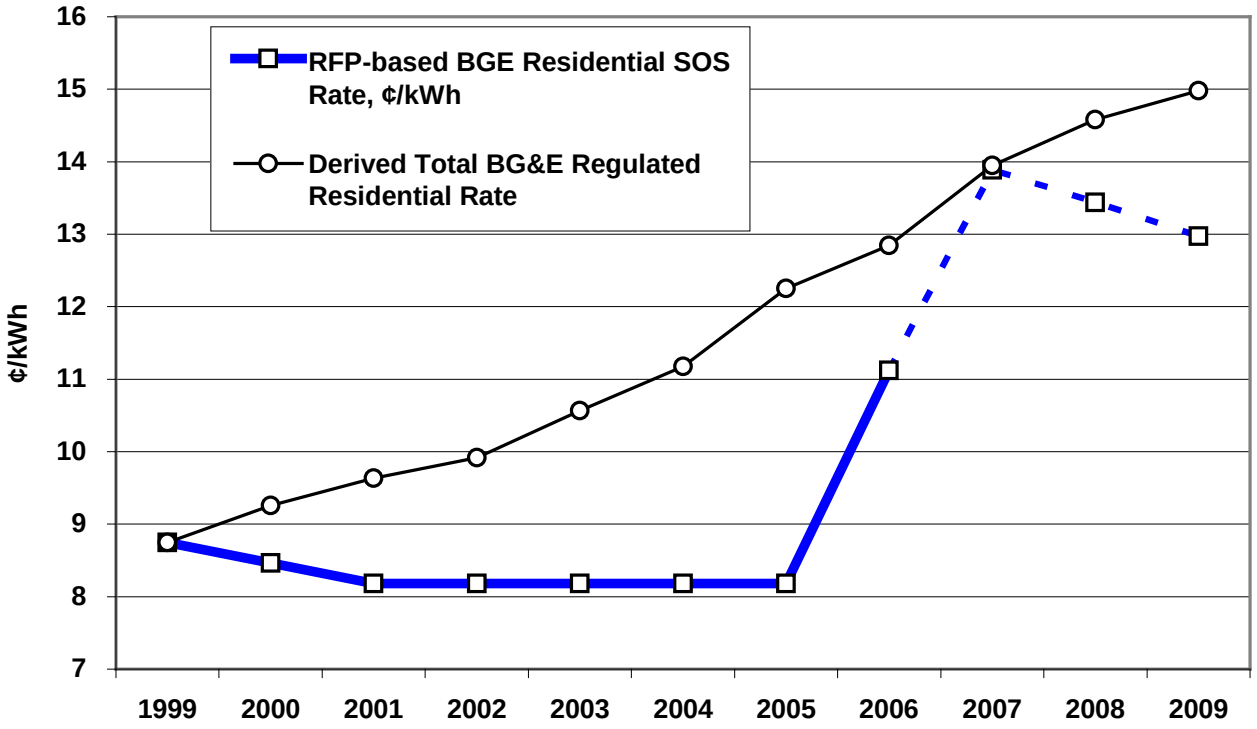
Fuel prices – uranium



Source: Cameco. Calculated from month-end prices published by Ux Consulting and TradeTech. Long-term prices prior to May 2004 are not industry-averages, but from TradeTech only.

The Maryland example

- As a result of BG&E's restructuring settlement, residential rates were reduced 6.5% from the level of the company's 1993 rate case and fixed for 6 years
- The estimated impact of moving to competitive market rates following the expiration of rate caps in 2006 was a 72% rate increase
- However, a "but for" analysis suggests that rates under continued regulation could have been at least as high as the competitive market rates



1999-2006

NG ↑ 192%

Coal* ↑ 67%

U_3O_8 ↑ 428%

*Estimated increase in delivered coal price

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Maryland response

- Deferred rate increases
- Investigation of 1999 restructuring deals, stranded cost payments, nuclear decommissioning
  - Negotiated settlement with BGE
- Consideration of “reregulation” alternatives
  - Require utilities to repurchase Maryland generating fleet (not recommended)
  - Direct utilities to enter into long-term contracts for new generation (recommended)
  - State power authority to initiate power projects (pending)
  - Integrated resource planning (recommended)
  - Aggressive effort to shape PJM and FERC policies (in progress – RPM complaint)
- Assess potential changes to default supply procurement, Maryland RFP

“Reregulation” in other states

- Connecticut
  - Require long-term contracting by utilities
  - RFP for new generation capacity, demand response, with revenue support mechanism
  - Allow cost-of-service treatment for new utility peaking generation
  - Aggressive intervention to change ISO-NE capacity market plan
  - Energy Advisory Board
- Illinois
  - Elimination of Illinois Auction process
  - Require utility financial swaps to hedge medium term energy costs
  - $1 billion in rate relief from Ameren and ComEd
  - Illinois Power Agency
    - Agency will procure power for utility default service
    - Possibly develop new generation
    - "Power can be supplied by governments at a lower cost than by private investor companies,” House Speaker Michael Madigan

“Reregulation” in other states (cont.)

- Delaware
  - Deferred rate increases
  - Integrated resource planning
  - RFPs for new generation capacity, long-term PPAs
    - Numerous regulator imposed requirements

Problems with “reregulation”

- No escape from higher fuel costs
- Integrated resource plans are no better now than they were in the past
- Long-term contracting, cost-of-service generation shift risks back onto consumers
- Rate deferrals, average cost pricing contradict goals of conservation, investment in renewables, demand response
- Government intervention may reduce competitive participation
- Increased regulatory risk drives up supply costs
- Litigation – e.g. NRG suit and appeal in Connecticut



Current trends and challenges

The current regulatory landscape

- FERC
  - Making organized competitive markets work better – *ANOPR on Wholesale Competition in Regions with Organized Electric Markets*
  - Ensuring non-discriminatory access in non-centralized markets
- ISO/RTOs
  - Creating appropriate incentives for new investment in generation and transmission
  - Scarcity pricing v. market power mitigation
  - Integration of demand response into price-setting mechanism
  - Market mechanisms – demand curves, price caps
- States
  - Aggressive goals for conservation, renewables development, greenhouse gas emission control
  - Requiring long-term contracting / portfolio approach
  - Integrated resource planning
  - Allowing utility self-build generation
  - Hybrid market mechanisms – revenue support for new generation
- Intervenors
  - Attack on current market mechanisms
  - Now that it appears MC>AC, large users are pushing to undo restructuring

What was the point of deregulation?

- Expand competition in electricity supply
- Provide incentives and transparent information to encourage efficient behavior
  - Improved operational efficiency
  - Improved investment efficiency
- Shift investment risk away from consumers
  - Allow the market to allocate risk to those best able to manage it
- Promote innovation
  - Technology – generation, metering, distributed generation, demand response, etc.
  - Products/services – green power, variable or fixed pricing
  - Risk management – fuel price, demand hedging

Challenges ahead

- What price reliability?
  - Value of reliability
    - Efficient markets can help reveal the value consumers place on reliability
  - How to price it
    - Energy only markets
    - Capacity markets (locational or otherwise)
    - Operating reserve demand curve
  - Peak prices - scarcity pricing or market power?
- Allocation of transmission system costs of maintaining/enhancing reliability
- Increasing responsiveness of demand
  - How to incorporate DR in price setting process; compensation, incentives
  - Real time retail pricing
- “Protect” consumers from price volatility, or have them pay the true incremental cost of consumption?

Regulatory policy should seek to harness market forces to achieve energy market and environmental goals

- Appropriately structured competitive markets can:
  - Improve system-wide economic dispatch within a given control area
  - Expand economic dispatch across a wider range of resources by increasing geographic scope of wholesale markets
  - Improve operating efficiencies and reduce outages at lower-emission baseload plants, e.g., nuclear facilities
  - Provide appropriate price signals to guide consumption
    - consumers know when the impact of their usage is greatest and have and incentive to cut back
  - Provide appropriate price signals to guide investment in:
    - new generation, transmission, renewables, efficiency measures, demand response capability
  - Promote retail competition to offer consumers enhanced products: e.g., time of use rates facilitated by smart meters, “green energy” options

Focusing on economic incentives can help ensure consistent environmental and competition policies

There is no “magic bullet” for electricity’s challenges

- Solutions will come from varied sources:
  - Improved market structure/rules
  - Improved competitive access in unrestructured markets
  - Investments:
    - Transmission
    - Generation
    - Efficiency
    - Demand reduction
    - Distributed generation
    - Renewables
    - “Smart grid” technology
    - Research and development
- Regulatory strategy should be to ensure that policy and market incentives are consistent with overall goals



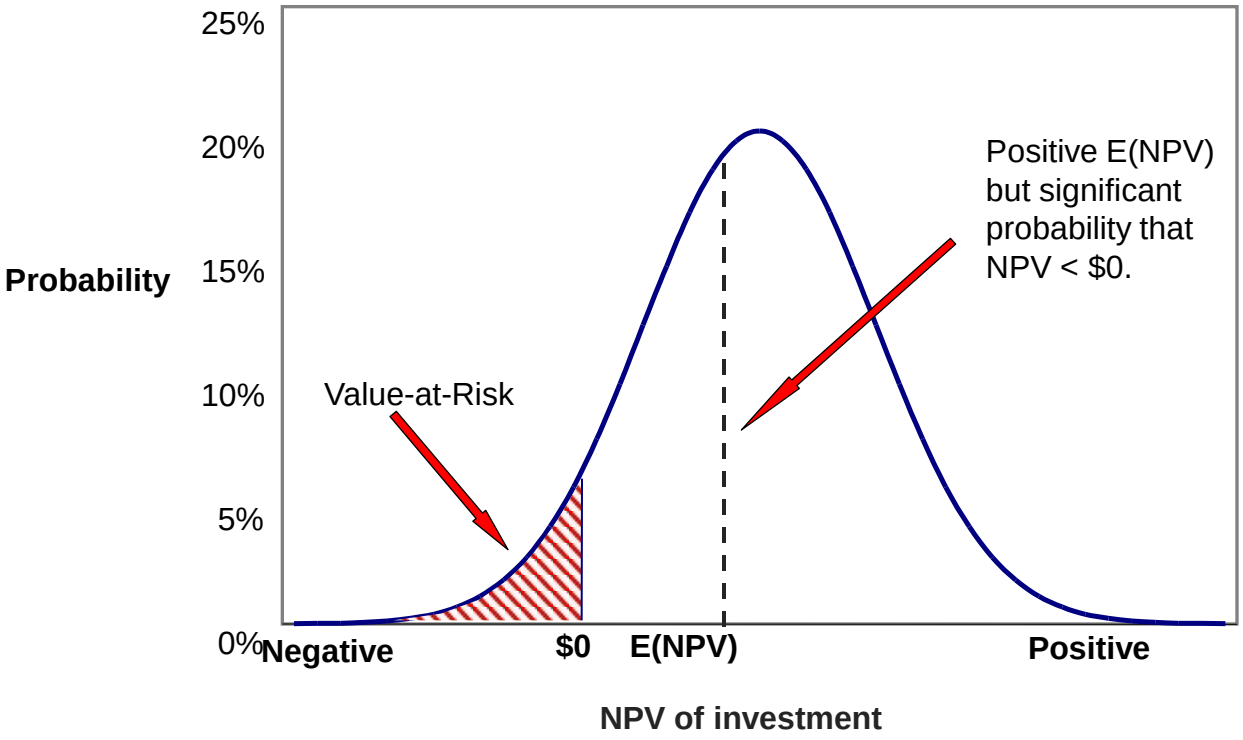
Decision making under uncertainty

Numerous sources of uncertainty for suppliers, utilities, regulators

- Uncertainties are great:
  - Fuel commodity prices
  - Carbon rules/tax
  - New nuclear
  - Regulatory uncertainty
  - Disruptive technologies
  - Extreme events

Economic valuation under uncertainty

- Use economic modeling process to estimate probability distributions of net present value for different investments
  - Sole focus on expected values ignores crucial information about investment risk
  - Consider likelihood that investment will have negative NPV, even though expected NPV is positive



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Economic valuation under uncertainty (cont.)

- Uncertainties can reveal benefits, as well as costs
  - Focus is usually on downside risk – but upside is critical, too
  - Fossil fuel price volatility
    - Benefits renewable, nuclear technologies
  - Greenhouse gas legislation
    - Downside risk for coal-plant owners
    - Upside risk for renewable, nuclear
- Evaluating lead times can demonstrate positive value
  - Market volatility often raises a question: abandon or stay the course?
  - NPV analysis typically cannot address this issue
- Real options analysis
  - Can evaluate “option value” associated with “off-ramps”, key milestones where investment can be re-evaluated
  - Long-lead times and volatility increase real option value

Economic valuation under uncertainty (cont.)

- Risk analysis tools
  - Montecarlo modeling
  - Portfolio optimization
  - Extreme event analysis – non-linear dynamics
  - Decision analysis
  - Dynamic programming – optimizing multiple interdependent decisions

Conclusions

- The intention of deregulation was to shift risk away from consumers and promote efficient investment
- “Reregulation” has the potential to undercut the benefits of competitive markets
- Trend may be toward greater intervention in markets
- Trend should be toward consistent policy to harness competition to promote efficiency, conservation and other environmental objectives
- Uncertainties are great – suppliers, utilities and regulators need to address sources of risk systematically in evaluating decisions

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Collin Cain, MSc, is a Manager with Bates White, LLC. Mr. Cain has more than 10 years experience in electricity and environmental economics. He assists clients in developing investment, divestiture and risk management strategies. Mr. Cain's expertise includes power plant valuation, forensic analysis in litigation support, and prudence evaluation. Mr. Cain also assists clients in developing regulatory strategies, and has provided expert testimony in both regulatory and private legal proceedings.