ELECTRICITY MARKET RESTRUCTURING: SUCCESSFUL MARKET DESIGN

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Electricity Committee

NARUC Summer Meetings

Austin, Texas

July 26, 2005

Ultimate success is an open question for the international experiment in using electricity markets for public purposes.

From Down Under

"Plans for desperately needed new power generation are up in the air again. … [The New Zealand Labour Government's move] has the potential to up-end the electricity industry and turn back the clock to central planning. Electricity transmission is already centrally planned by state-owned Transpower.

"'The question is, should you centrally plan the alternatives,' Mr Hemmingway [Electricity Commission chairman] says. 'Do you give companies a leg-up in the form of a subsidy to undertake the alternatives? And, how would a package of centrally implemented alternatives distort the market?

"'How far we go down this slippery slope back toward central planning is a central question here. It's the key to our deliberations. We are aware of the slippery slope danger but we are also aware that if there are alternatives out there that are less expensive than the transmission line we ought not let them go to waste.'" (The Press, Christchurch, New Zealand, April 30, 2005.)

From Washington DC

"After holding its draft transmission pricing policy statement for more than two years, the federal Energy Regulatory Commission now says it will issue a final statement in two months…. The policy statement should address which customers pay for transmission expansion, [Commissioner Suedeen] Kelly said. The more expansively costs are spread, the more transmission will be built, she added, indicating that the approach called 'participant funding' should be reserved for projects with isolated benefits. 'I don't really want to use the word 'socialization,' because I think there is an argument to be made that all those people [on the grid] benefit.'" (Power Markets Week, May 2, 2005, p. 9.)

Using electricity markets for public purposes …

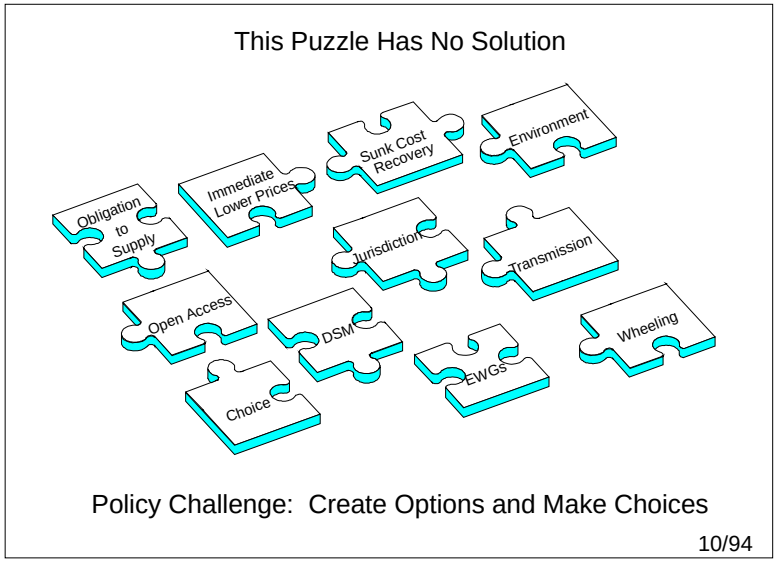
From Boston MA

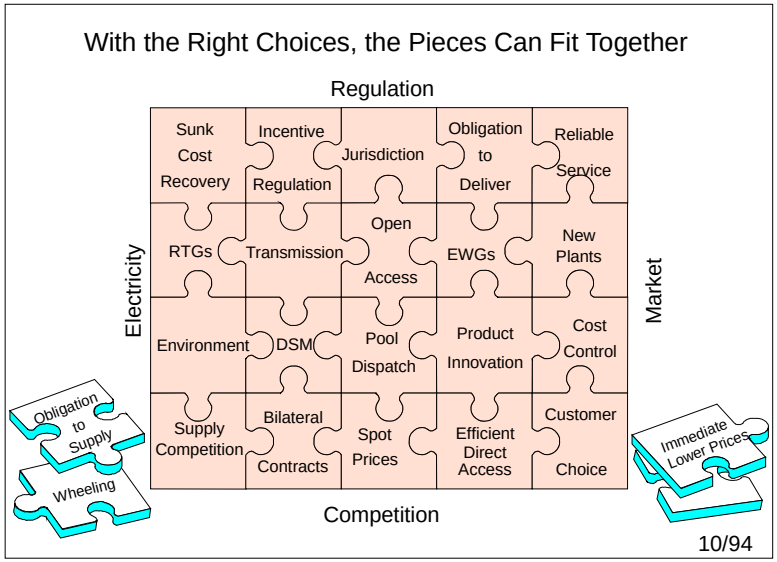
"With deregulation, the theory went, enterprising power producers would foresee a shortage and, on their own, build or expand plants to fill the market need. … The theory hasn't worked. … There has to be a better way, and there is. ISO New England should conduct an auction in which power generators are invited to bid for the right to supply the new capacity, with the award going to the firm willing to do it for the lowest increase in rates. If this looks like a partial return to the old days of the regulated market, so be it." (The Boston Globe, Boston, MA, editorial, July 19, 2005.)

From Washington DC

"Given the continuing development of voluntary RTOs and ISOs and the Commission's expressed intent to look into revisions to the Order No. 888 pro forma tariff in a separate proceeding, we have concluded that the SMD NOPR has been overtaken by events. Accordingly, we will exercise our discretion to terminate this proceeding." (Federal Energy Regulatory Commission, Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity Market Design, Docket No. RM01-12-000, Order Terminating Proceeding, April 19, 2005, p. 3.)

The public policy debate over reshaping the electricity industry confronts major challenges in balancing public interests and reliance on markets.





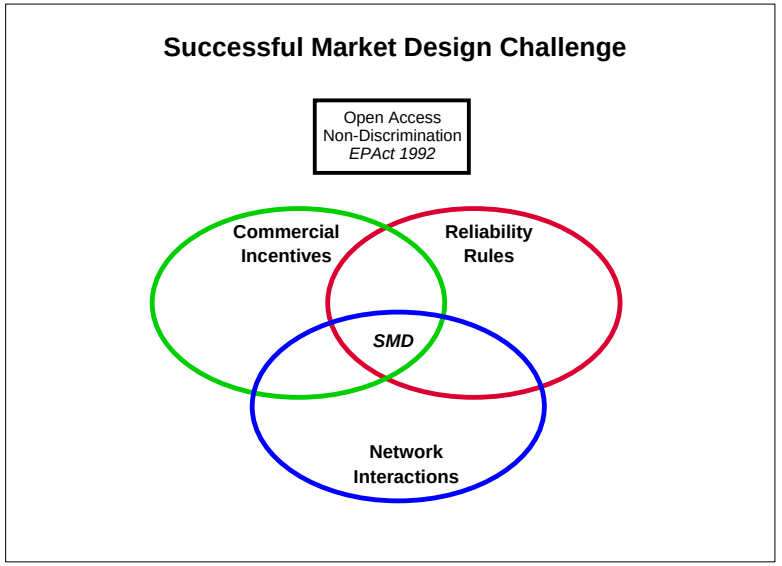
The debates are recycling, and often blur the distinction between retail electricity service (under state jurisdiction) and wholesale electricity markets (under federal jurisdiction).

- Many different models of retail service can coexist.
- A successful wholesale market on an interconnected grid requires greater consistency

The public policy debate over reshaping the electricity industry confronts major challenges in balancing public interests and reliance on markets.

> "The need for additional attention to reliability is not necessarily at odds with increasing competition and the improved economic efficiency it brings to bulk power markets. Reliability and economic efficiency can be compatible, but this outcome requires more than reliance on the laws of physics and the principles of economics. It requires sustained, focused efforts by regulators, policy makers, and industry leaders to strengthen and maintain the institutions and rules needed to protect both of these important goals. Regulators must ensure that competition does not erode incentives to comply with reliability requirements, and that reliability requirements do not serve as a smokescreen for noncompetitive practices." (Blackout Task Force Report, April 2004, p. 140.)

- The emphasis should be on investment incentives and innovation, not short-run operational efficiency.
- With workable markets, market participants spending their own money would be better overall in balancing risks and rewards than would central planners spending other people's money.
- If not, electricity restructuring itself would fail the cost-benefit test.



ELECTRICITY MARKET Electricity Restructuring Reconsidered

Frustration with electricity restructuring raises calls for reform of open access and efforts to develop competitive markets.

At its core, the debate identifies persistent disagreement about what open access means, and what models are available to achieve the purported benefits.

Under the conceptual umbrella of revisiting the ideas of open access and Order 888, one appeal is to consider alternatives to the recent FERC policies regarding Regional Transmission Organizations (RTOs):

> **"… it should not be assumed that RTOs are the only, or even the preferred, mechanism available to ensure competitive wholesale power markets."**[1]

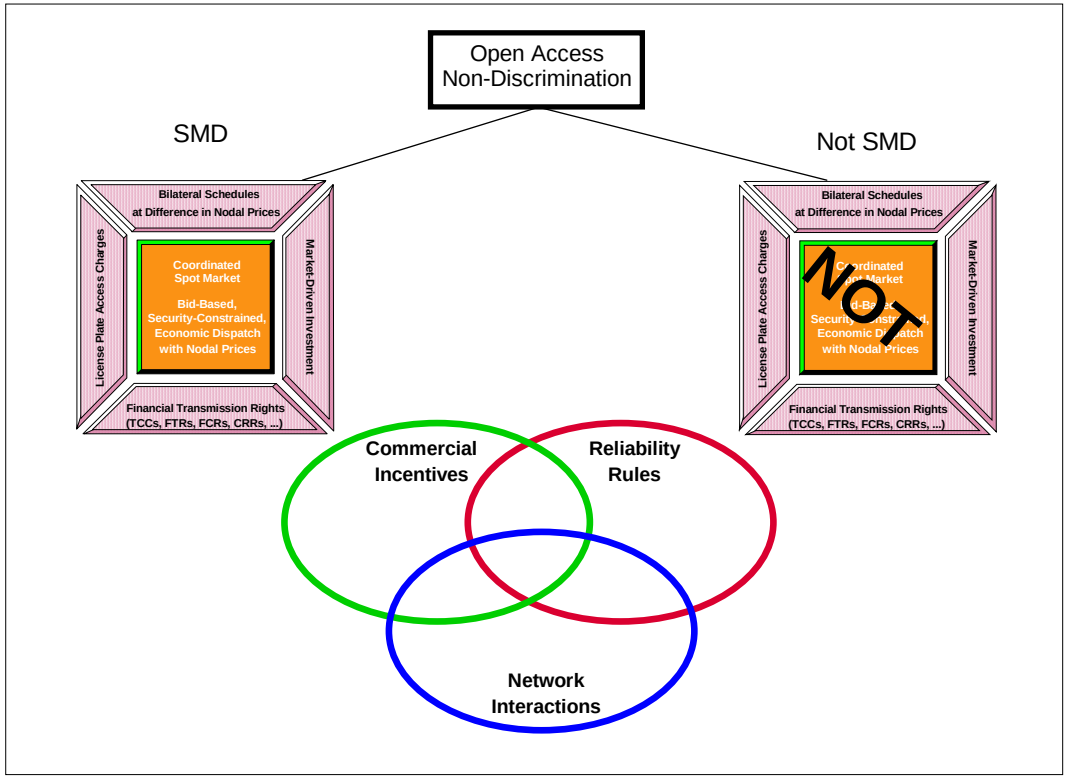
A competing formulation might be put as:

> **"… it should not be assumed that RTOs are *not* the only, or even the preferred, mechanism available to ensure competitive wholesale power markets."**

[1] American Public Power Association, Restructuring at the Crossroads: FERC Electricity Policy Reconsidered, Washington DC, December 2004, p. 14.

ELECTRICITY MARKET — Electricity Restructuring

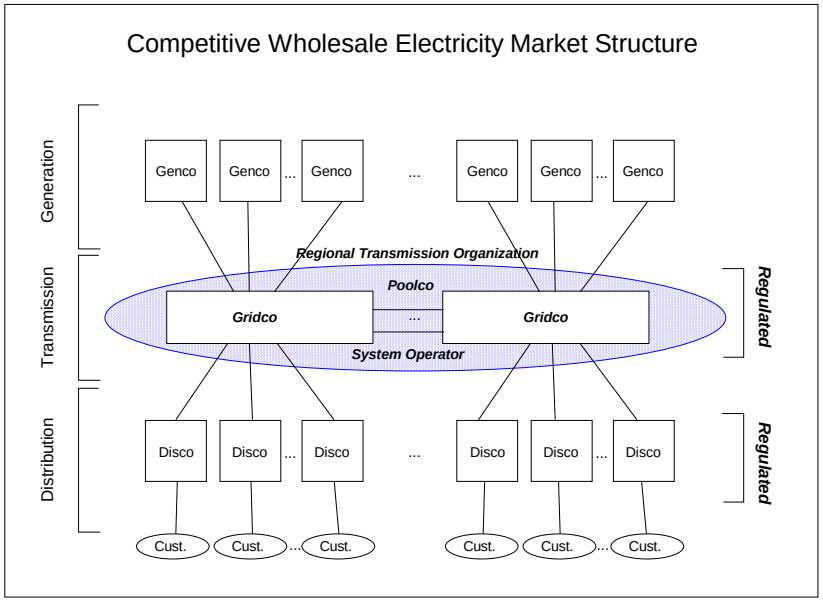
The public policy debate over reshaping the electricity industry confronts major challenges in balancing public interests and reliance on markets.



The evolution of electricity restructuring contains a thread of issues related to counterintuitive market design requirements requiring coordination for competition.

Markets for Power, 1983. Joskow and Schmalensee.

"The practice of ignoring the critical functions played by the transmission system in many discussions of deregulation almost certainly leads to incorrect conclusions about the optimal structure of an electric power system."[2]



2 Paul L. Joskow and Richard Schmalensee, Markets for Power: An Analysis of Electric Utility Deregulation, MIT Press, 1983, p. 63.

ELECTRICITY MARKET — Order 888 and Open Access

The Open Access Rule of Order 888 followed from a lengthy debate about the many details of electricity markets.

> "Today the Commission issues three final, interrelated rules designed to remove impediments to competition in the wholesale bulk power marketplace … . The legal and policy cornerstone of these rules is to remedy undue discrimination in access to the monopoly owned transmission wires that control whether and to whom electricity can be transported in interstate commerce." (FERC, Order 888, April 24, 1996, p. 1.)

- **What did Order 888 anticipate for the development of electricity market design?**
- **Did FERC jump too soon to an RTO model with a "standard market design" that forecloses other options?**
- **What other electricity market design options are available to achieve the objectives of open access and Order 888?**
- **Is it necessary to revisit Order 888 to develop a new approach to achieve the open access objective to remove impediments to competition?**

ELECTRICITY MARKET Order 888 and the Contract Path

Under Order 888 the FERC made a crucial choice regarding a central complication of the electricity system.

> "A contract path is simply a path that can be designated to form a single continuous electrical path between the parties to an agreement. Because of the laws of physics, it is unlikely that the actual power flow will follow that contract path. … Flow-based pricing or contracting would be designed to account for the actual power flows on a transmission system. It would take into account the "unscheduled flows" that occur under a contract path regime." (FERC, Order 888, April 24, 1996, footnotes 184-185, p. 93.)

> "We will not, at this time, require that flow-based pricing and contracting be used in the electric industry. In reaching this conclusion, we recognize that there may be difficulties in using a traditional contract path approach in a non-discriminatory open access transmission environment, as described by Hogan and others. At the same time, however, contract path pricing and contracting is the longstanding approach used in the electric industry and it is the approach familiar to all participants in the industry. To require now a dramatic overhaul of the traditional approach such as a shift to some form of flow-based pricing and contracting could severely slow, if not derail for some time, the move to open access and more competitive wholesale bulk power markets. In addition, we believe it is premature for the Commission to impose generically a new pricing regime without the benefit of any experience with such pricing. We welcome new and innovative proposals, but we will not impose them in this Rule." (FERC, Order 888, April 24, 1996, p. 96.)

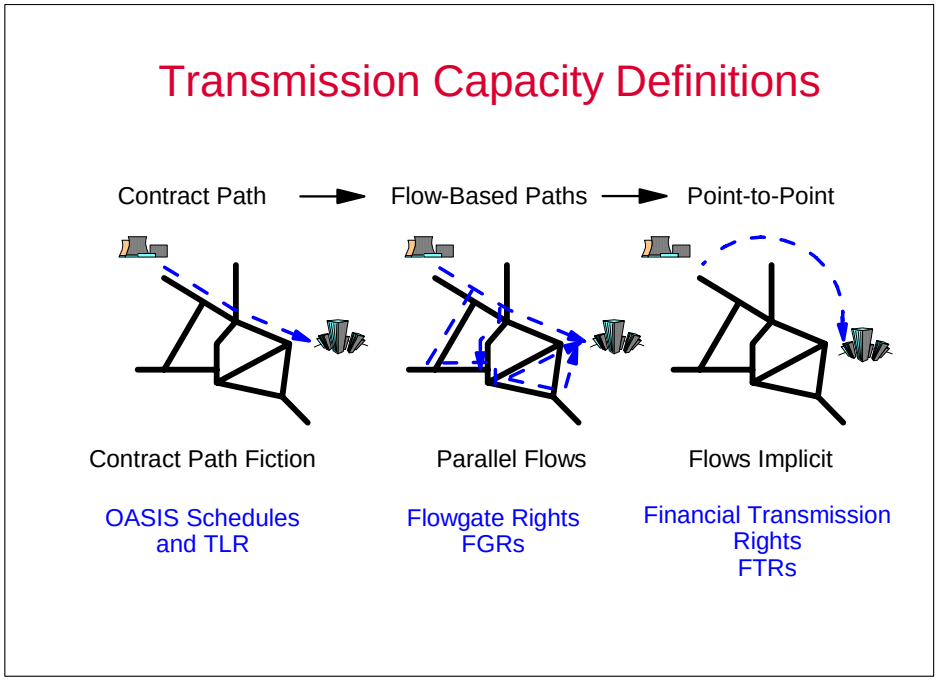
Hence, although the fictional contract path approach won't work in theory, maintaining the fiction would be less disruptive in moving quickly to open access and an expanded competitive market!

Order 888 would not work in theory, but might it work in practice? The CRT provided striking evidence that FERC knew there was a serious problem.

Capacity Reservation Tariff (CRT), 1996. A new model, on the same day as Order 888 (April 24, 1996).

> "The proposed capacity reservation open access transmission tariff, if adopted, would replace the open access transmission tariff required by the Commission ..."[3]

The new model outlined in the CRT moved away from the contract path to embrace point-to-point rights. The CRT was roundly rejected by industry, and received little support. But it was to reappear, again and again.



NERC Transmission Loading Relief (TLR), 1997. The reliability watchdogs saw the impending problem and soon created the unscheduling system to complement the contract path scheduling required under Order 888.

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3 Federal Energy Regulatory Commission, "Capacity Reservation Open Access Transmission Tariffs," Notice of Proposed Rulemaking, RM96-11-000, Washington DC, April 24, 1996, p. 1.

ELECTRICITY MARKET Coordination for Competition

The Successful Market Design challenge dictates the need for some central institutions to support markets through the seeming oxymoron of "coordination for competition."

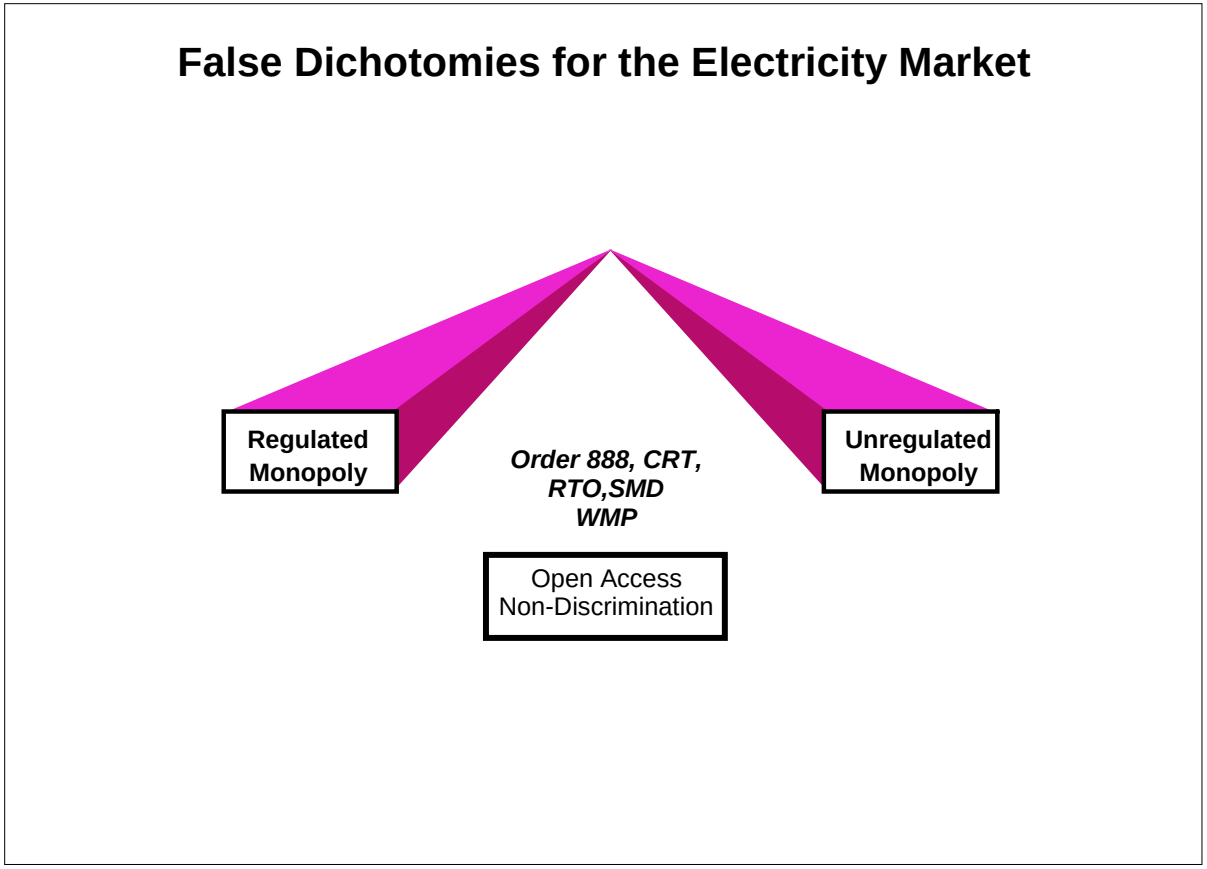
Central institutions differ in the degree of involvement and impact on the market.

- **Central Coordination.** Organized markets required to facilitate exchange between willing buyers and willing sellers in voluntary transactions. (E.g., energy purchase and sales in spot markets.)
  - Design can be compatible with largely decentralized decisions.
  - Emphasis is on consistent incentives.
  - Evaluation remains neutral on market choices.

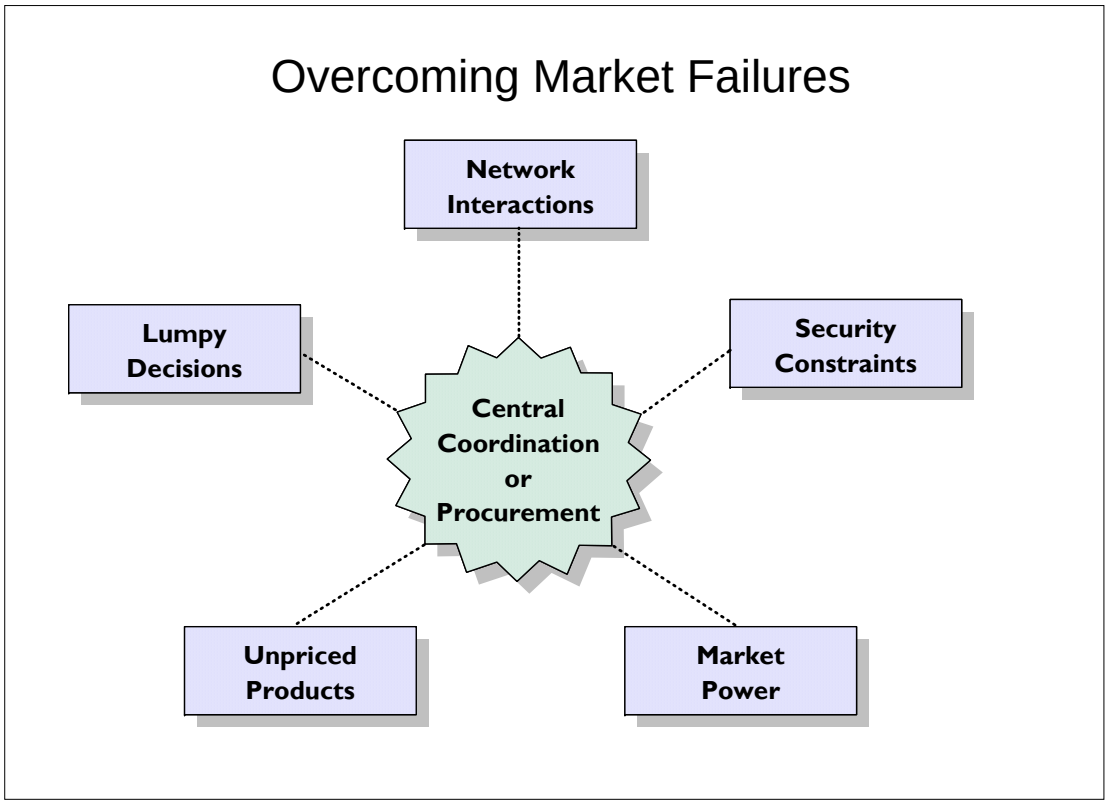
- **Central Procurement.** Administrative determination of required products and services with imposition of mandatory payments as a condition of participation in the system. (E.g., operating reserves with charges collected through uplift payments.)
  - Emphasis is on assured outcomes.
  - Central judgment and mandatory payment replace market forces.
  - Slippery slope could undermine broad purpose of electricity restructuring.

ELECTRICITY MARKET — Finding a Middle Ground

There is a middle ground for open access without going all the way to unregulated monopoly. But the middle ground requires careful attention to designing the rules to provide the oxymoron of "coordination for competition." The electricity market cannot solve the problem of market design.



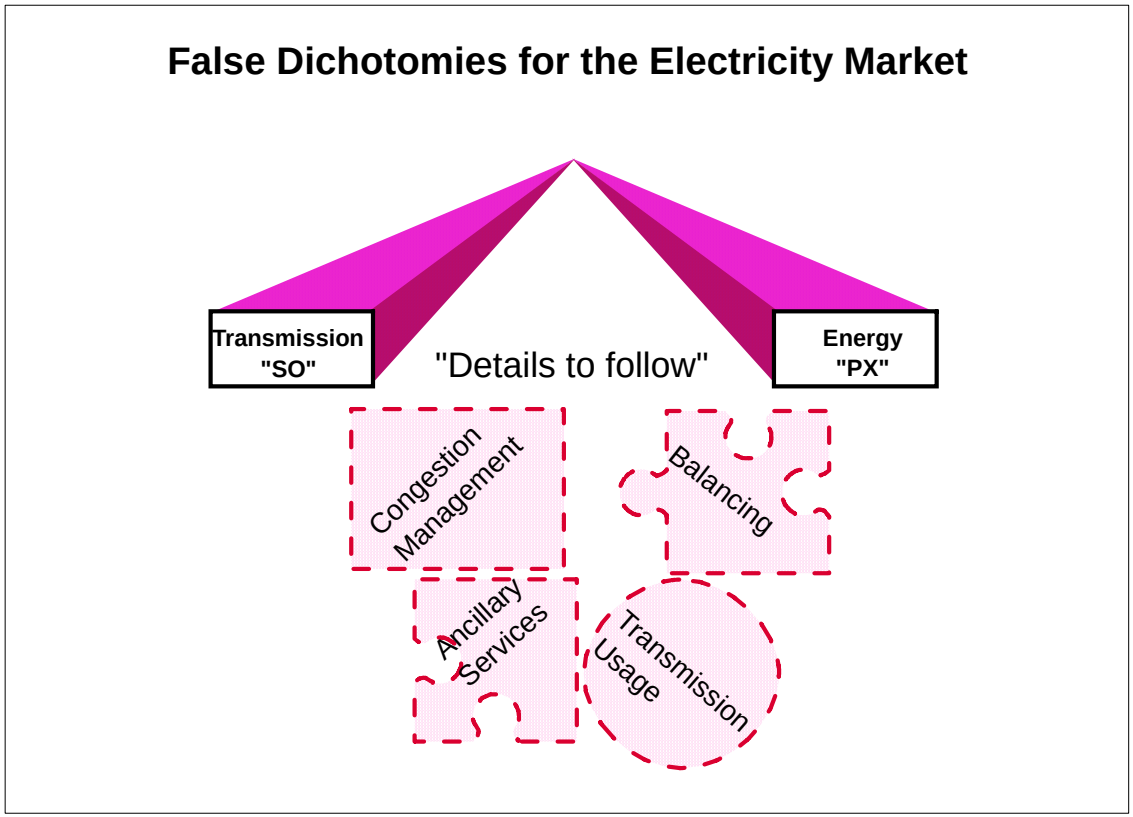
The need for central institutions arises from the existence of prominent forms of market failure.



A Dangerous Definition of Market Failure. "The market fails to do what the central planner wants."

ELECTRICITY MARKET — Separation Fallacy

The market for transmission and the market for energy are inherently intertwined. Separation into a transmission operator and a power exchange is based on a fallacy. The details reveal that the pieces cannot be constructed separately and still fit together. [4]

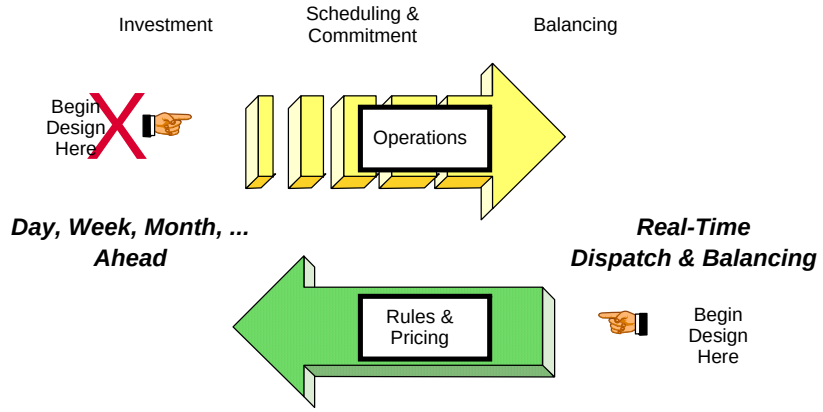


[4] W. Hogan, "A Wholesale Pool Spot Market Must Be Administered by the Independent System Operator: Avoiding the Separation Fallacy," The Electricity Journal, December 1995, pp. 26-37.

ELECTRICITY MARKET — Focus on Balancing Markets First

Good design begins with the real-time market, and works backward. A common failure mode starts with the forward market, without specifying the rules and prices that would apply in real time.

False Starts for the Electricity Market



Market expectations determine incentives. Start at the end. Work backward, not forward, in setting market design.

The independent system operator provides a dispatch function. Three questions remain. Just say yes, and the market can decide on the split between bilateral and coordinated exchange.

- **Should the system operator be allowed to offer an economic dispatch service for some plants?**

The alternative would be to define a set of administrative procedures and rules for system balancing that purposely ignore the information about the costs of running particular plants. It seems more natural that the operator consider customer bids and provide economic dispatch for some plants.

- **Should the system operator apply marginal cost prices for power provided through the dispatch?**

Under an economic dispatch for the flexible plants and loads, it is a straightforward matter to determine the locational marginal costs of additional power. These marginal costs are also the prices that would apply in the case of a perfect competitive market at equilibrium. In addition, these locational marginal cost prices provide the consistent foundation for the design of a comparable transmission tariff.

- **Should generators and customers be allowed to participate in the economic dispatch offered by the system operator?**

The natural extension of open access and the principles of choice would suggest that participation should be voluntary. Market participants can evaluate their own economic situation and make their own choice about participating in the operator's economic dispatch or finding similar services elsewhere.

ELECTRICITY MARKET Focus on Balancing Markets First

Good design of the real-time market simplifies everything else. The basic principles stand at the center of successful market design ("SMD"), including the core elements of the FERC standard market design and subsequent wholesale market platform.

- Efficient real-time operations conform to economic dispatch, and the prices or opportunity costs at the margin equal the much discussed locational marginal prices (LMP). This fact dictates the core elements of SMD. Any other outcome will create problematic incentives requiring intrusive mandates and rules to maintain reliability and achieve efficiency.

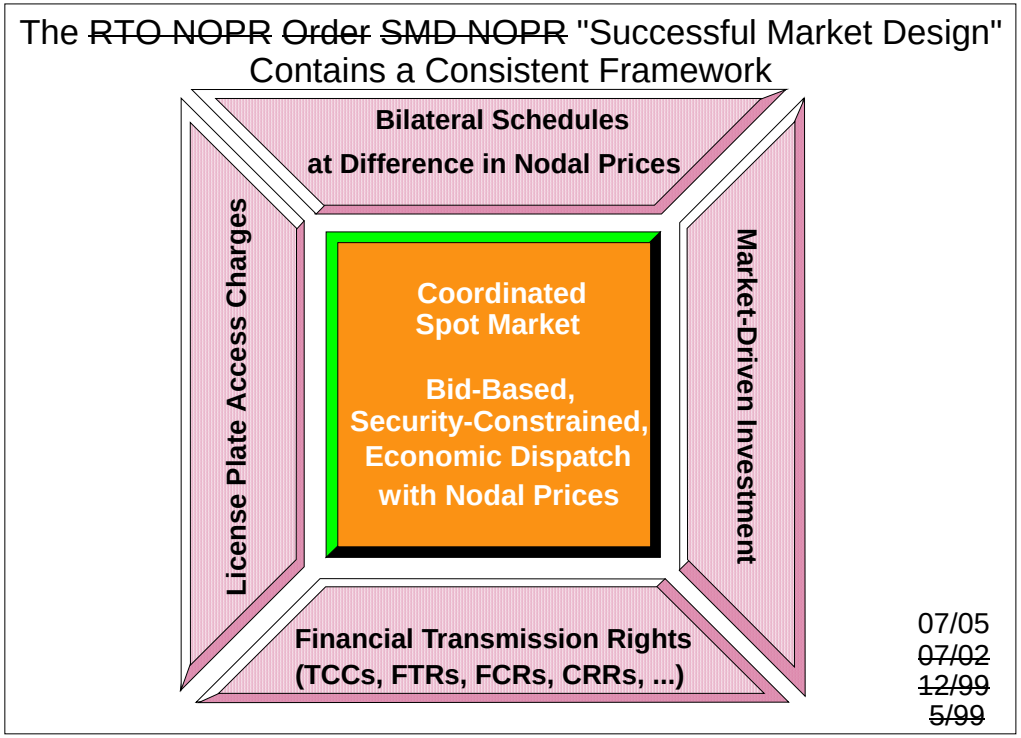
- Available Transmission Capacity (ATC) calculations required for the contract path model are not well defined. The problem is conceptual and not just a requirement for better information. Hence, ATC estimates are arbitrary and controversial. By contrast, the point-to-point financial transmission rights found in SMD provide an alternative, well-defined and workable set of rights to support forward markets.

- Security limits dictated by reliability standards are implemented as contingency constraints which inherently require coordinated and simultaneous evaluation. Evaluation of the (many) constraints requires calculation and not just observation.

- Bid-based dispatch or balancing systems can incorporate the elements needed for efficient operations to support coordination and competition.

ELECTRICITY MARKET — A Market Framework

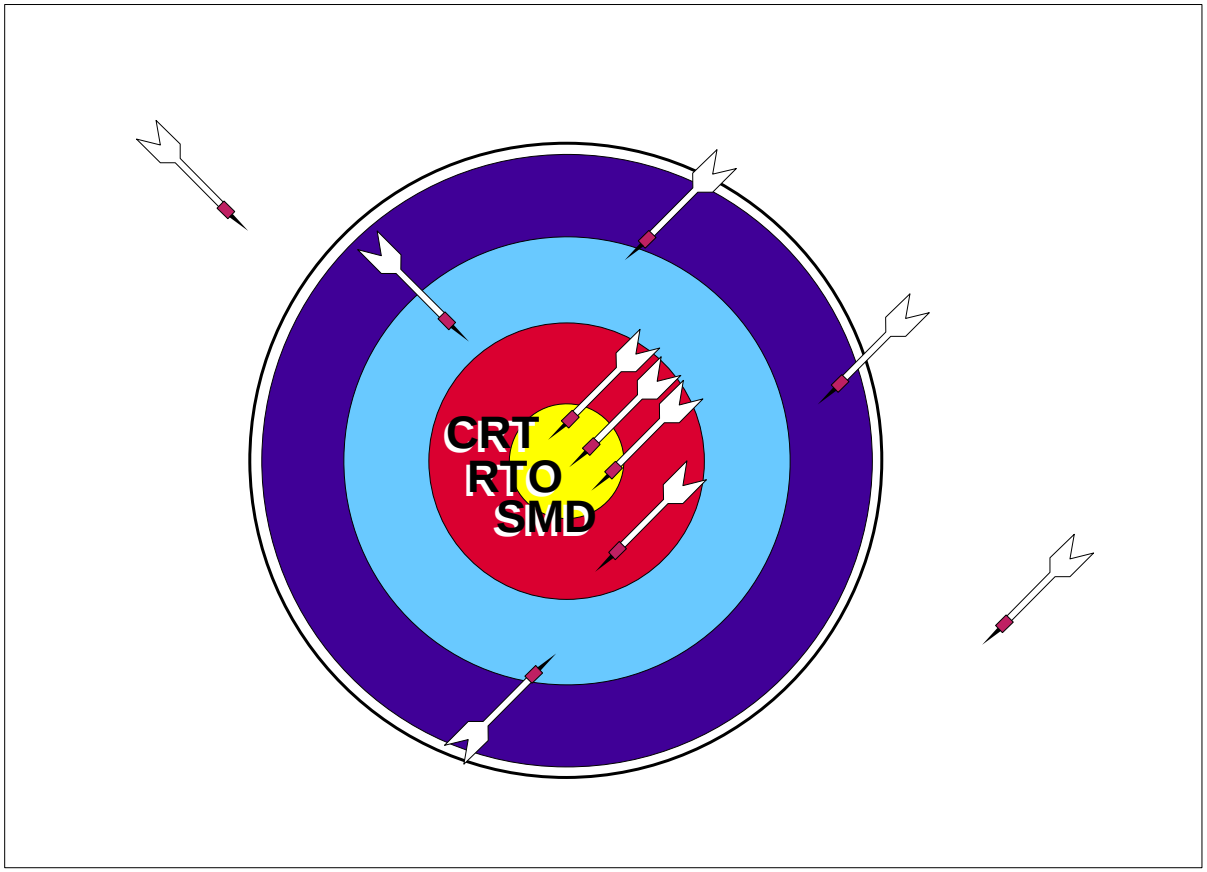
The example of successful central coordination, ~~CRT, Regional Transmission Organization (RTO) Millennium Order (Order 2000) Standard Market Design (SMD) Notice of Proposed Rulemaking (NOPR),~~ "Successful Market Design" provides a workable market framework that is working in places like New York, PJM in the Mid-Atlantic Region, New England, and the Midwest.



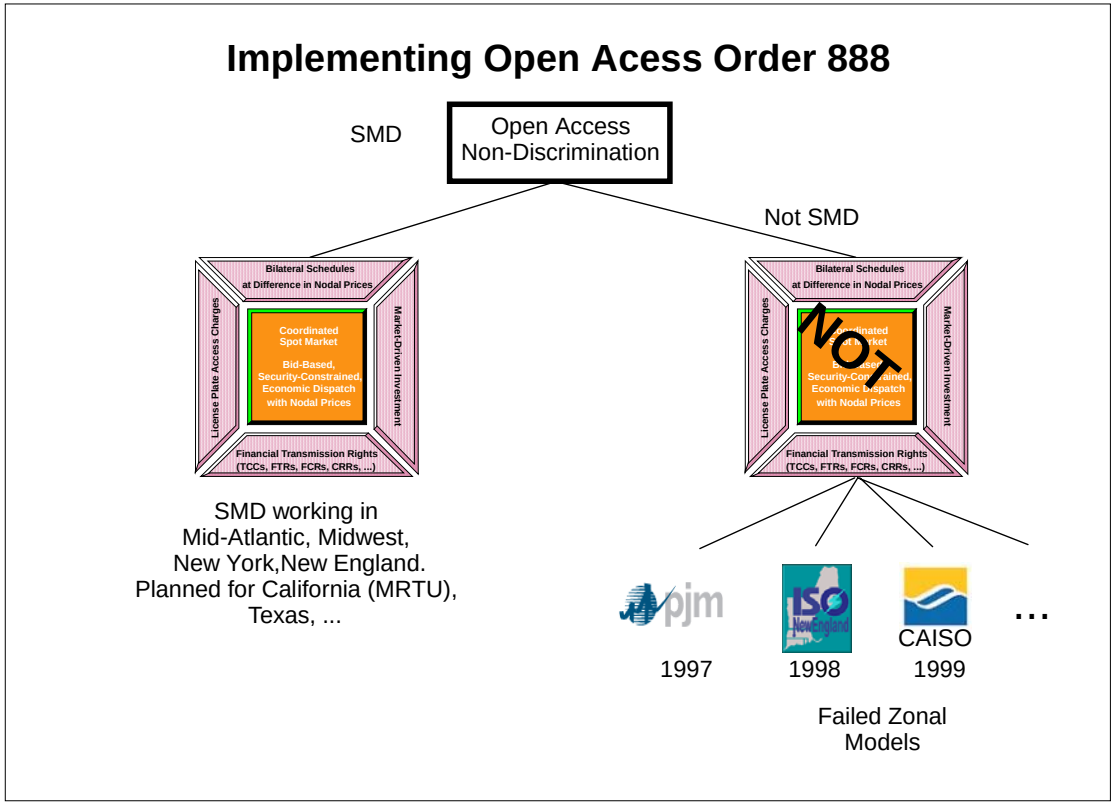
Poolco…OPCO…ISO…IMO…Transco…RTO… ITP…WMP…: "A rose by any other name …"

ELECTRICITY MARKET — Successful Market Design

The CRT-RTO-SMD approach is the only consistent model yet proposed for wholesale electricity markets under open access and non-discrimination. There have been many alternatives that have been tried and missed the target.

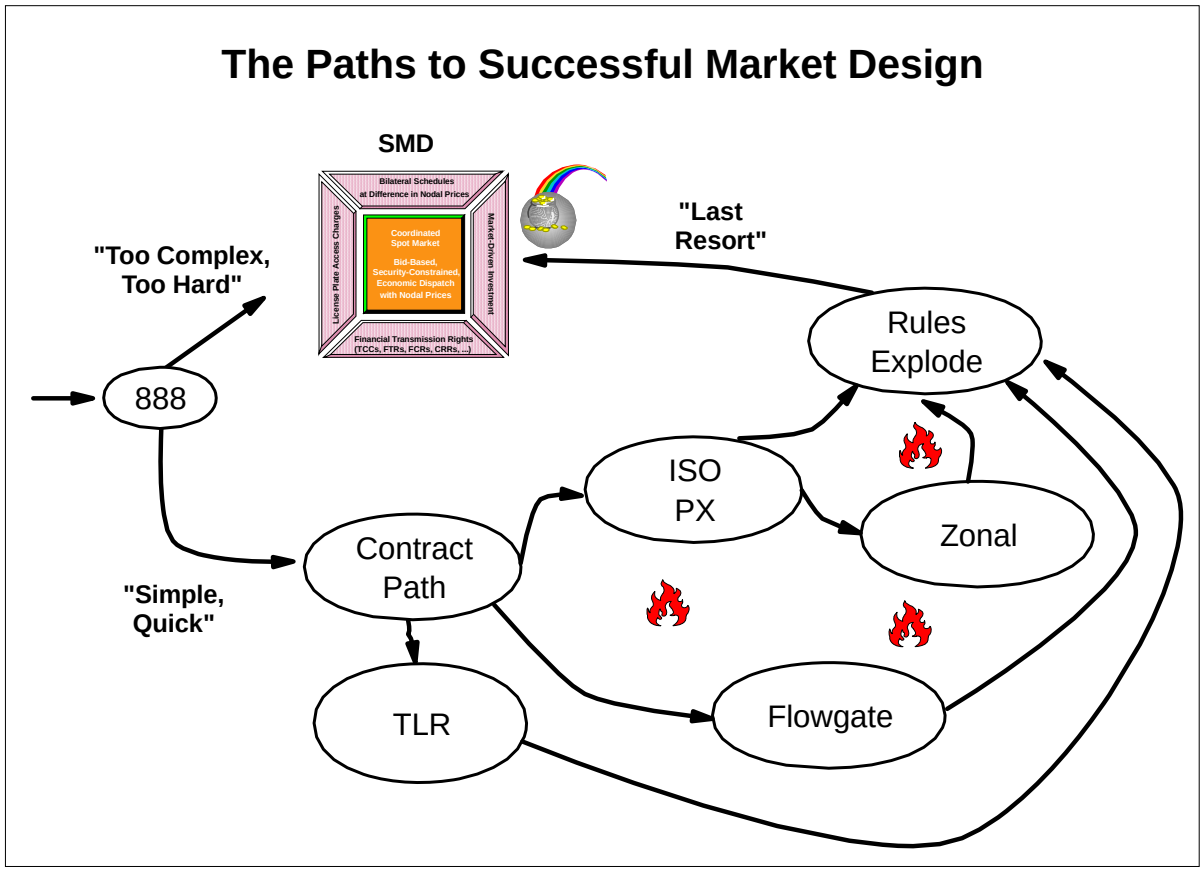


The LMP model appears complex with many locations and many different prices. A common mistake is to argue that aggregation to a few zones would make the market simpler.



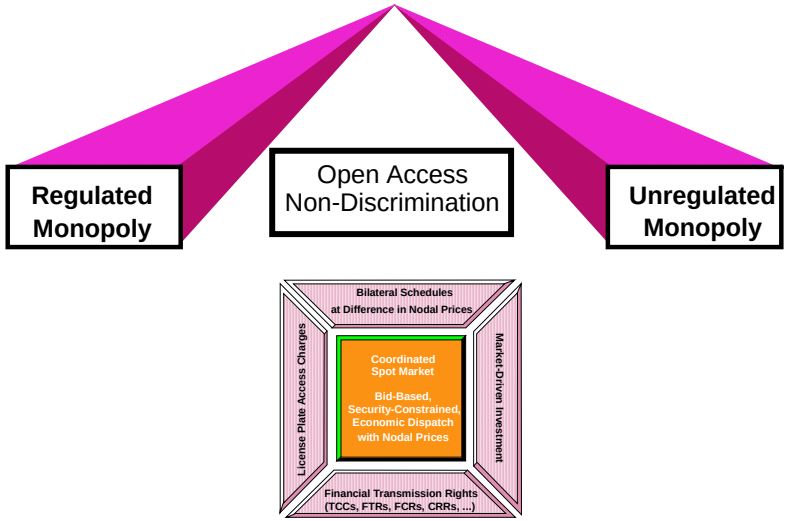
If there are many different LMPs, pretending there are a few zones is more self-deception than simplification. Many attempts to create workable, highly aggregated zonal models have failed.

Turning away from SMD is either turning away from open access, or embarking on a painful and circuitous route. With its core elements, SMD is the only design that works both in theory and in practice.



There is no dichotomy for an open access model. There is no theory and no experience that identifies any viable alternative. There is no need to *assume* that SMD is the only model that works, the evidence makes the case. There is no evidence available to support the assumption that there is a viable alternative. The burden of proof should be born by the alternatives.

No Dichotomy for Open Access



SMD working in
Mid-Atlantic, New York,
New England, Midwest.
Planned for California (MRTU),
Texas, ...

ELECTRICITY MARKET SMD is Not Yet Sufficient

The core SMD elements provide the necessary foundation for open access and wholesale electricity markets. However, the core elements by themselves are not yet sufficient. The challenge is to build on the foundation. There remain many challenges:

- Better demand response.
- Scarcity pricing in practice as well as in theory.
- Energy limited facilities.
- Seams across the integrated grid.
- Long-term financial transmission rights.
- Transmission investment.
- Market power mitigation.
- Resource adequacy.
- Long-term incentives for RTOs.
- **...**

ELECTRICITY MARKET Too Hard?

Will Congress and the states support the Successful Market Design?

Pressure on the FERC has been building

- Opposition from states in the Southeast and Northwest.
- FERC "White Paper" on the Wholesale Market Platform on April 28, 2003.
- Two days after the White Paper, Senate Energy Committee votes 13-10 to impose a two year moratorium on the Standard Market Design.
- Department of Energy simultaneously produces a cost-benefit study generally supportive of the SMD. The House energy bill contains no SMD prohibition.
- FERC then announces it will wait until it sees the outcome of the energy bill, but continues with regional hearings on the wholesale market platform.
- To obtain unanimous consent and go to conference with the energy bill, Senator Shelby received a commitment to delay SMD for years. This would "cripple" FERC. (FERC Chair Pat Wood, September 15, 2003)
- "These recent FERC actions signal a clear attempt by FERC to utilize creative mechanisms to force electric utilities to join RTOs regardless of the economic merit or benefits to ultimate ratepayers in the affected states." (Letter to the President, nine southern governors, February 3, 2004)
- FERC terminates the SMD NOPR on July 19, 2005.

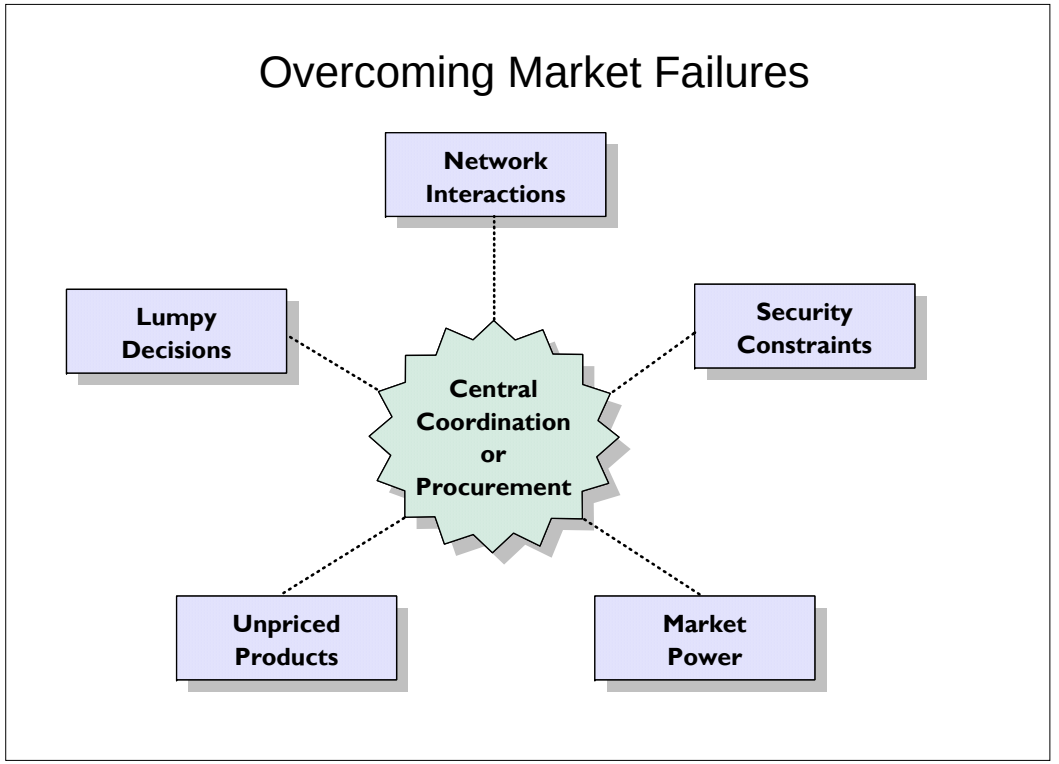
Will Congress avoid the "separation fallacy"? Will FERC be able to follow through? Or will the country endure a further long period of expensive experimentation with accidents waiting to happen?

The need for central institutions arises from the existence of prominent forms of market failure. The challenge is to address market failures while preserving the market as the default.

A dangerous definition of market failure. "The market fails to do what the central planner wants."

Focus on market design and market failures. Better to fix a bad design than to micromanage bad decisions.

Be afraid of the reflexive market intervention that sows the seeds of intervention.



Intervene where needed, and know how to stop. There are examples of interventions that overcome market failure without overturning the market.

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