

ELECTRICITY STANDARD MARKET DESIGN: Proposal A, Analysis A-, Execution ?

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September 26, 2002

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

- **Enron memos.** 'Ricocheting' off the 'Death Star'. The smoking gun or collateral damage?

"...a University of California economist and energy expert said the focus on Enron and its apparent dancing around and over the ISO's rules could divert attention from larger problems. ... My concern is ... that FERC is going to use this to say the problem is with the ISO's rules and that's what caused the crisis and it's your own fault,...The larger problem ... was with the owners of California's power plants who he said created artificial shortages to drive up prices."¹

"The Enron memos reveal one an important fact about the behavior of electricity suppliers that was strongly disputed by many observers of competitive electricity markets but is a maintained assumption for economists studying these markets. That is, sellers intend to make as much money as possible and will use all available strategies to achieve this goal."²

Why do we need any market design, much less good market design? The three top reasons are:

1. Incentives
2. Incentives
3. Incentives

Once parties have choices, it is critical to get the incentives to reflect the effects of the choices.

¹ Severin Borenstein quoted in "Federal Regulators Orders California Electricity Sellers to Save Documents," Knight Ridder/Tribune Business News, May 8, 2002.

² Frank A. Wolak, Statement before the Senate Committee on Commerce, Science and Transportation, Washington D.C., May 15, 2002. p. 3.

The failures of electricity restructuring have ranged from the embarrassing to the negligent. Public officials and market participants are at a crossroads. But the road to take depends on the diagnosis of the failures and the identification of the needed corrections.

- **Go Back.** Can markets work well in the case of electricity? If not, then the old model of monopoly and regulation may be the best choice. But has too much happened since EPAAct of 1992? It would be both difficult and expensive to go back, and the delay would create even more crises.
- **Stand Still.** Can we simply stay where we are and fix a few leaks, letting the regulators go home early? The rules are in turmoil and market institutions are fragile. The ostrich strategy is an invitation to continued surprises, and this should be no surprise.
- **Go Forward.** Can we go forward, put good markets in place, and treat the costs of the mistakes as the sunk costs of an expensive education? This requires leadership by the regulators, in Washington and in the states. We know what we must do:
 - Regional Transmission Organizations.
 - Standard Market Design.
 - Significant Demand Participation.
 - Market Power Mitigation.

There is an underlying premise in many prior market design proposals that the functions of the independent system operator (ISO, aka ITP) can be largely separated from the operation of a wholesale spot market. This is a mistake.³

A False Goal

Minimize the role of the ISO: In an attempt to have a small footprint for the ISO, there is a common argument that the ISO functions should be restricted to reliability and separated from the operation of the spot market. In practice, the lack of an efficient spot market and efficient pricing drives the ISO to intervene ever more, but without the tools of the market. The ISO ends up large and intrusive, and the market works badly or not at all.

Better to

Recognize the minimum requirements of an ISO: There are certain functions that only the ISO can perform, and these should be done both efficiently and to support a competitive market. Done right, the result is healthy bilateral trading, liquidity, and ease of entry.

It is not good public policy to intentionally design the ISO functions to be inefficient. If we do so, we will succeed, and the ISO will not be able to provide the services that the market needs to handle the complexity of the electricity system. A well designed ISO, operating a spot market, providing price signals, and supporting transmission hedges, results in the smallest footprint possible.

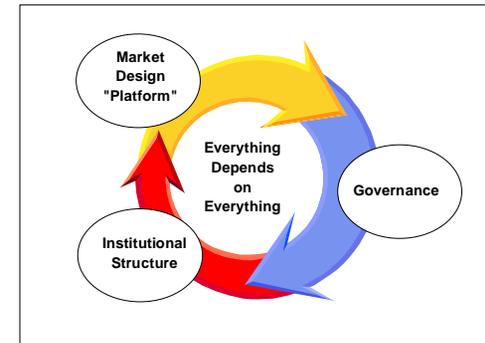
³ W. Hogan, "A Wholesale Pool Spot Market Must Be Administered by the Independent System Operator: Avoiding the Separation Fallacy," The Electricity Journal, December 1995, pp. 26-37.

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Some Lessons of Market Formation

Cycles around the loop take months to years when it is only talk. Once implemented, cycles take years or forever.

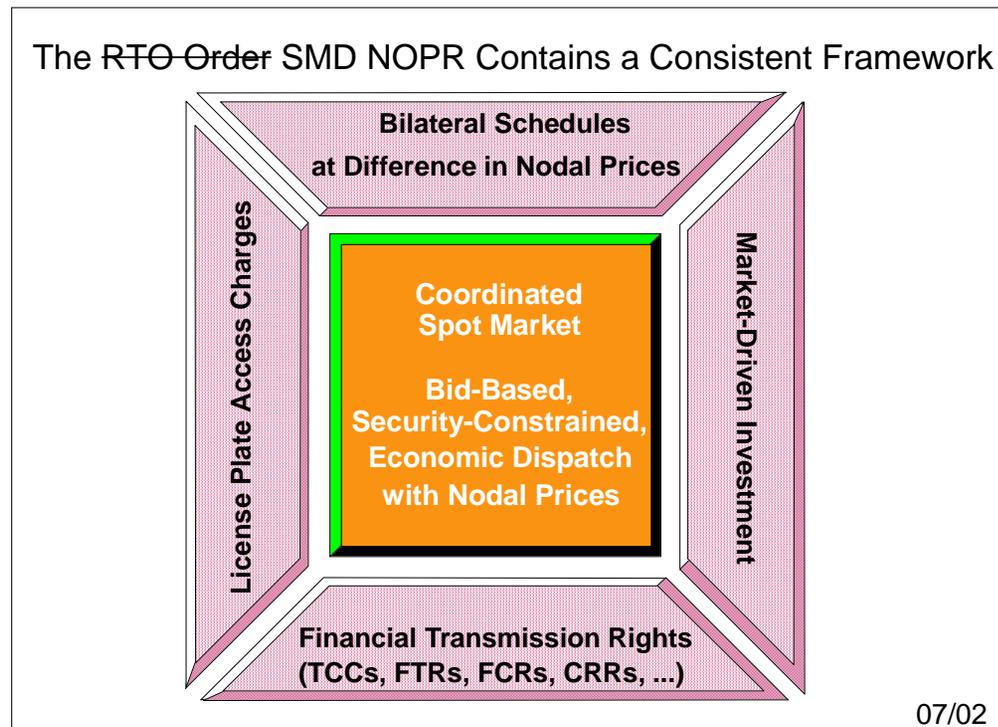
- **Don't Assume It is Easy to Muddle Through.** Errors are costly. Bad market design leads to serious disruption itself (PJM-1997, NE-1999) or helps make bad problems worse (California-2000). Bad governance structures make all problems more difficult.
- **Get the Prices Right.** When a monopoly that makes all the decisions, the details matter less. But whenever market participants are given a choice, it is critical that they see the right prices. Market participants will respond to incentives. That after all, is the foundation for restructuring. Opportunity cost pricing supports efficient behavior. Otherwise, the system operator and regulators will be forced to intervene with non-market mechanisms that negate the broader purpose.
- **Recognize that the Market Can't Solve the Problem of Market Design.** There are too many moving parts that must move together. Absent strong public oversight, the complex interactions and the competing interests provide a textbook case for sacrificing the public interest and sinking to the least common denominator.
- **Face Squarely the Mandates of Order 2000.** If FERC means what it says, the Order goes a long way in defining how a wholesale electricity market must be organized. But it is too timid and indirect. "If it looks like a duck and walks like a duck, it must be a duck." In the SMD NOPR, FERC makes clear what it means. If it follows through, there can be a workable market.



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A Market Framework

The ~~Regional Transmission Organization (RTO) Millennium Order (Order 2000)~~ Standard Market Design (SMD) NOPR contains a workable market framework that is working in places like New York and the PJM Interconnection in the Mid-Atlantic Region.



Poolco...ISO...IMO...GO/SO...Transco...RTO... ITP...: "A rose by any other name ..."

In the SMD NOPR of 2002, the FERC covers a great deal of ground beyond the basics of coordinated spot markets and financial transmission rights. At a high level, it gets an A for the basic proposal.

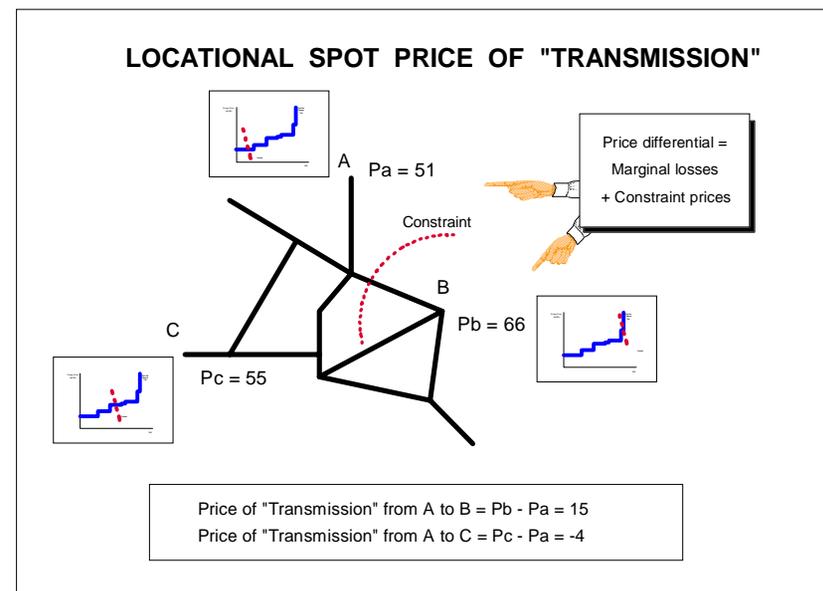
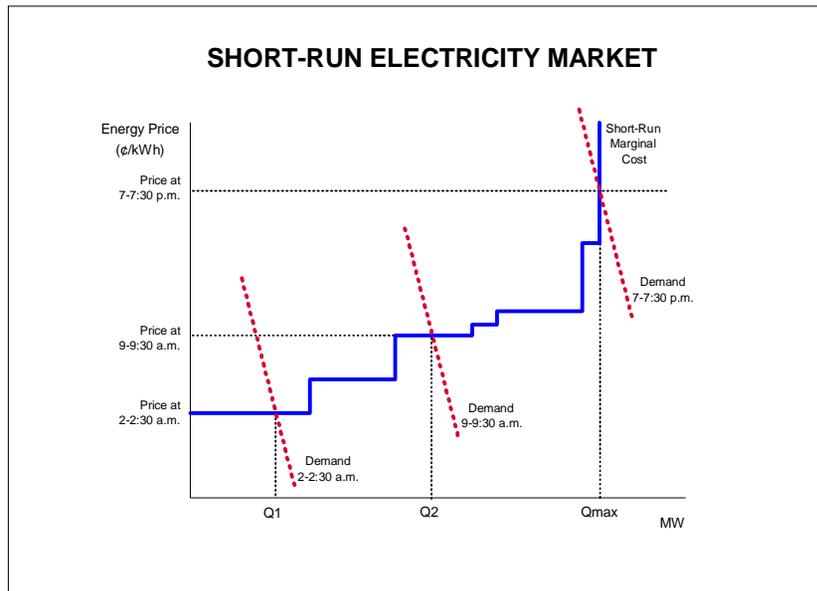
- **Spot Markets:** The greatest strength is in the clear instructions for real-time balancing markets, and integrated day-ahead markets with financial transmission rights. Here the design has many gears that have to mesh, and the FERC SMD builds on the best experience. The details matter, but we are close.
- **Market Power Mitigation:** There is no perfect answer. The FERC SMD offers a compendium of tools for market power mitigation that may be the best of a bad lot.
- **Resource Adequacy:** The prize for the newest idea goes to the attempt to design a short-term system for long-term resource adequacy. This replacement for installed capacity requirements will produce many comments with struggles to understand what is proposed and how it might work.
- **Governance:** The Achilles heel of the SMD NOPR may be in the huge political fight over governance, now underway. The rhetoric of states' rights and the reality of the detailed rules both threaten collateral damage to the progress on market design.

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Design Centerpiece

The coordinated spot market is the design centerpiece.

One criterion would be the consistency of any feature with operation of the real-time market. There is little room for flexibility here.



The case of PJM is instructive. The market performed badly in 1997 with a poorly designed real-time market. Fixing the real-time market in 1998 corrected the most egregious problems, without requiring a day-ahead market. Later the day-ahead market began but with great care to maintain consistency with the real-time pricing, operations, grid model, and so on.

Consider the case of the NOPR day-ahead market design. There is a recognized value of day-ahead scheduling and hedging.

- **Consistent Models:** The SMD NOPR rejects the sometimes argument that the ITP can operate a day-ahead commercial market under simplified models of the grid and assumptions about pricing.
- **Coordinated Operations and Markets:** The SMD NOPR rejects the fallacy that reliable system operations and market operations can be separated. There is no separate exchange and transmission market, as failed in California. The walls between ancillary services markets are broken down to work towards coordinated optimization and clearing by the ITP. There may be differences in the timing of various implementations, but the broad outline of the design is based on sound theory and good use of the experience.
- **Unit Commitment:** The SMD NOPR contains a sophisticated discussion of economic and reliability unit commitment ideas and the choices in allocation of uplift charges to when market-clearing prices are incomplete in supporting the efficient solution. There analysis includes recognition of the necessity that the rules reinforce the incentives needed both day-ahead and in the real-time market. Since we know that there is no first-best solution to the problem, the rule might allow for some regional flexibility

Keep your eye in this ball. The basic design of the real-time market should be replicated everywhere. The day-ahead market should be consistent with the real-time market. Be wary of any suggestions to fix the real-time to support the day-ahead, or to impose inconsistent models. (RTO West ?)

Consider the NOPR proposal for market power mitigation. There is a need for mitigation policies. There are no perfect solutions here, but the SMD NOPR packages the best we have with a constant eye towards consistency with the rest of the design.

- **Ex ante Rather than Ex-Post:** It is difficult to impose ex post recovery and it would greatly complicate efficient operation of the markets if the results were always subject to change much later.
- **Targeted Rather than Diffuse:** The most obvious problems arise because of local constraints where it is relatively easy to identify those with market power.
- **Bid Caps Not Price Caps:** Bid caps are inputs to operations that have a form and function much like the normal bids a market is designed to evaluate. Paying market-clearing prices greatly simplifies the implementation, especially when there are constraints and locational prices differ. By contrast, uniform price caps create perverse incentives and complicate the evaluation of market power effects.
- **Safety Net:** The SMD NOPR calls for the safety net of \$1000 and recognizes that it is like a substitute for demand side bidding. The argument is consistent with the price level being relatively high and with the need to stimulate demand participation.
- **Automated Mitigation Process:** Comments sought on further proposals that are more complicated, but based on implementation experience in New York. In all cases, there is a careful consideration of the distinctions between scarcity conditions and the exercise of market power, and the need for mitigation rules to be consistent with the rest of the market design.

In the case of resource adequacy, there is frustration with the existing installed capacity markets. The SMD NOPR proposal moves the real incentives to the real-time market.

- **Resource Adequacy:** Forecasts of requirements and public identification of those who have adequate resources and those who may be short. But no measurement or penalties until real-time.
- **Real-Time Penalties:** To the extent possible there would be targeted curtailment of participants who were resource deficient. In addition, purchases from the real-time spot market would be charged at a penalty rate above the default price cap. There are real questions as to the ability to implement targeted curtailment. If the penalties are set high enough to induce voluntary curtailment (para. 531), the resource adequacy program becomes much like an energy-only market.
- **Balanced Schedules:** The incentives of the resources adequacy enforcement would drive the participants to seek balanced schedules from the forward market. If deviations from the balanced schedules are penalized in a way greater than the market-clearing price, there will be strong incentives not to deviate from the schedules. But we know from hard experience that imposing a balanced scheduling requirement greatly complicates operation of the system, especially when the system is stressed. Would the effect of the enforcement rules be the opposite of the intent, to make quick adjustments in times of stress more difficult?

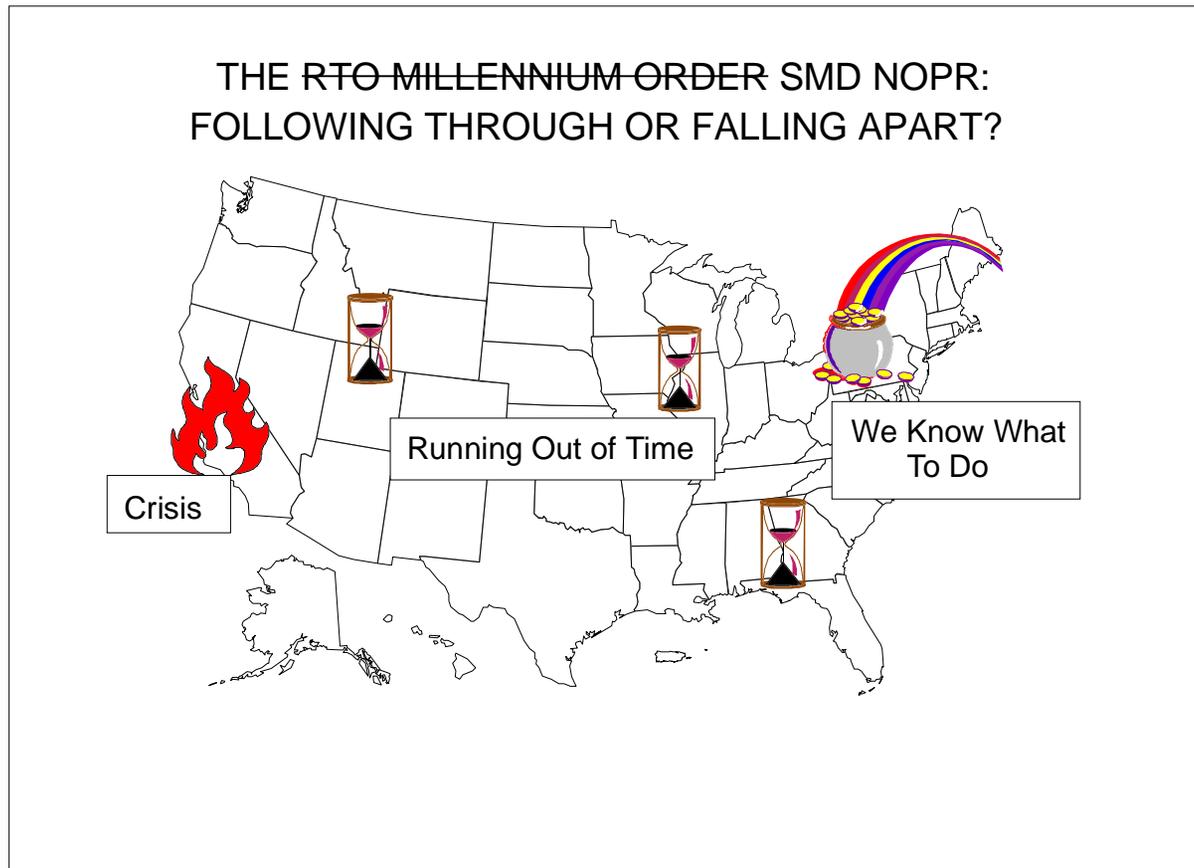
Details, details, details. The details matter, and can matter a lot. The SMD NOPR is a work in process.

- **Seams:** The SMD NOPR is almost completely silent on how to deal with seams problems that require coordination among ITPS. This is an area for future work.
- **Transmission Investment:** The NOPR presents a challenge to delineate the bright or fuzzy line between merchant transmission investment and regulated transmission investment. The key principle that both can be accommodated is a strong point. But the complexity of how to make the distinctions and provide good incentives for both is still a challenge.
- **Priorities:** The SMD NOPR is a big step for the existing ISOs who are to be the ITPs. It is an even bigger step where the ITPs have not yet begun operation. Not everything needs to be done first, and not everything can be done first. The final rule will need a sense of priorities, and here there might be some regional differences.
 1. Real Time Energy and Ancillary Services, coordinated spot market and pricing.
 2. Market Power Mitigation and Demand Participation.
 3. Financial Transmission Rights.
 4. Day-Ahead Market for Scheduling and Pricing.
 5. Investment Rules for Transmission and Generation.
 6. Seams Rules for Improved Coordination of ITPs.
 7. ...

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Reforms of Reforms

National progress in implementing the advance of regional transmission organizations under the Millennium Order (Order 2000) still hangs in the balance. Time is running out. If the SMD effort succeeds, workable electricity markets can be obtained. If it fails, ...?



Supporting papers and additional detail can be obtained from the author. William W. Hogan is the Lucius N. Littauer Professor of Public Policy and Administration, John F. Kennedy School of Government, Harvard University and a Director of LECG, LLC. This paper draws on work for the Harvard Electricity Policy Group and the Harvard-Japan Project on Energy and the Environment. The author is or has been a consultant on electric market reform and transmission issues for Allegheny Electric Global Market, American Electric Power, American National Power, Avista Energy, Brazil Power Exchange Administrator (ASMAE), British National Grid Company, California Independent Energy Producers Association, Calpine Corporation, Comision Reguladora De Energia (CRE, Mexico), Commonwealth Edison Company, Conectiv, Detroit Edison Company, Duquesne Light Company, Dynegy, Edison Electric Institute, Electricity Corporation of New Zealand, Electric Power Supply Association, GPU Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd., ISO New England, Mirant Corporation, Morgan Stanley Capital Group, National Independent Energy Producers, New England Power Company, New York Independent System Operator, New York Power Pool, New York Utilities Collaborative, Niagara Mohawk Corporation, Pepco, PJM Office of Interconnection, Public Service Electric & Gas Company, Reliant Energy, San Diego Gas & Electric Corporation, Sempra Energy, TransÉnergie, Transpower of New Zealand, Westbrook Power, Williams Energy Group, and Wisconsin Electric Power Company. The views presented here are not necessarily attributable to any of those mentioned, and any remaining errors are solely the responsibility of the author. (Related papers can be found on the web at <http://www.ksg.harvard.edu/whogan>).