

**Electricity Market Design and Structure:  
Avoiding the Separation Fallacy  
Comments  
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These comments are submitted on my own behalf in connection with the Commission's deliberations on the allocation of functions within Regional Transmission Organizations. The Commission has conducted extensive inquiries into the respective roles of Regional Transmission Organizations, grid owners (including Independent Transmission Companies), Independent System Operators, Market Monitors and other institutions needed to support competitive electricity markets. I have attached a longer paper written with John Chandley that addresses many of these issues.<sup>2</sup> Here I would emphasize the most important point.

The critical element in allocation of functions flows from the market design and its associated requirements for success. As described before, in Order 2000 the Commission provided the basis for a sensible market design.<sup>3</sup> There are many details of the required standard market design. However, the centerpiece is the organization of system operations including energy balancing, short-term reliability and transmission congestion management through a coordinated spot market using a bid-based, security-constrained economic dispatch with locational prices. This centerpiece is what Larry Ruff called "the integrated dispatch/spot market functions" in his testimony at the February 19<sup>th</sup> technical panel. The open dispatch/spot market allows parties to buy and sell spot energy (and transmission). It provides congestion management and the

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<sup>2</sup> John D. Chandley and William W. Hogan, "Independent Transmission Companies in a Regional Transmission Organization," Center for Business and Government, Harvard University, January 8, 2002. For access to paper please use the following internet url:

<[http://www.ksg.harvard.edu/hepg/Papers/Chandley%20Hogan%20ITC%20in%20RTO%20rev\\_Jan\\_8\\_02.pdf](http://www.ksg.harvard.edu/hepg/Papers/Chandley%20Hogan%20ITC%20in%20RTO%20rev_Jan_8_02.pdf)>

<sup>3</sup> For a further discussion, see William W. Hogan, "Regional Transmission Organizations: Millennium Order on Designing Market Institutions for Electric Network Systems," Center for Business and Government, Harvard University, May 2000.

balancing market to support bilateral transactions, for which grid usage charges are defined by the difference in locational prices. The design also provides point-to-point financial transmission rights (FTRs) that hedge these congestion-related charges. The locational prices and award of FTRs for grid expansions then support market driven investment. Using the same framework, the RTO can then offer a day-ahead market to augment price certainty and allow FTR exchanges, and it can include a unit commitment service to reduce risks and support real-time reliability. This successful approach is the core of the market design in the Northeast markets and is the model that the Commission should expect and support.

In the flood of information and recommendations the Commission receives, there is always a risk that the critical components of this design might be lost or blurred. In particular, there is the possibility that some might recommend that elements of this centerpiece of successful competitive electricity markets be separated and assigned to different entities. One version of this would be to assign some of the components of the integrated dispatch functions to one or more grid owners, on the assumption that “grid operations” can be separated from “market operations.” Another version of this that has been suggested by NERC would be to assign reliability-related components of the same integrated dispatch functions to different entities, such as a “reliability authority” and an “interchange authority,” while having a separate “balancing authority” and perhaps a separate “Transmission Service Provider.” Again, the erroneous assumption is that transmission operations and reliability functions can be meaningfully separated from short-run market functions. They cannot. *All of these versions for separating inherently integrated functions would be a mistake.*

In the successful Northeastern markets, system operations, short-run reliability functions and market operations all flow from the same dispatch functions. They are coordinated by the RTO/ISO in an integrated and internally consistent manner. All the pieces must work together. Hence, although I believe the Commission knows all this, I submit these comments to ensure that the record is unambiguous.

This is not a new issue. As we now know from painful and expensive experience, the decision to separate system operations from short-term markets in California was a failure. In 1995, parties proposed creation of a separate California independent system operator (CAISO) to manage transmission operations and maintain reliability and a separate power exchange (PX) to coordinate a spot market. I wrote then at length about the “separation fallacy.”<sup>4</sup> “Short-term dispatch and short-term transmission are two sides of the same coin. They cannot be separated, but should be designed to support an efficient, non-discriminatory spot market administered by an independent system operator. To do otherwise would unnecessarily increase costs, create hidden subsidies and require more regulation.” (p. 26) That argument was opposed by the proponents of

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<sup>4</sup> William W. Hogan, “A Wholesale Pool Spot Market Must Be Administered by the Independent System Operator: Avoiding the Separation Fallacy,” Electricity Journal, December 1995, pp.26-37.

the fallacy.<sup>5</sup> The Commission's later orders addressed the unhappy results of the market separation experiment in the original California market design.<sup>6</sup>

The discussion from that time long ago is still relevant today as the Commission allocates the functions among the various institutions. A regret from my earlier critique is that I understated the seriousness of the problems that would unfold from a market design built on the separation fallacy, but the analysis still holds. To make clear the central importance of this issue, I repeat several parts of that article to reiterate the points and make them more accessible as part of the current record. The terminology of 1995 was slightly different than that in use today, but the "pool" model is close to the Northeast market model in PJM and New York (and soon New England) and the independent system operator can be viewed as the RTO.

The basic separation fallacy supposes that in a restructured market environment it is possible and desirable to view system operations as distinct engineering activities that should not recognize or interact with the market:

#### "The Separation Fallacy

This call for a system operator that is independent of the participants in the market has been recast of late into the dangerous notion that the ISO must also be independent of the spot market itself. There have been some recent assertions by some of the supporters of the Memorandum of Understanding in California, most notably a number of power marketers, that any pool-based spot market in electricity should be organized in a power exchange (PE) that is strictly separated from the activities of the independent system operator. The argument is that the system operator should provide transmission services to everyone without any involvement in operating the PE dispatch and the associated spot market. Most significantly, these parties urge that the independent system operator should not receive any bidding information, perform any economic dispatch, or determine any spot market prices.

This is a seriously flawed idea. No commercial or technical case can be made for separating operation of a spot market into distinct PE and

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<sup>5</sup> "Professor Hogan can also be read to suggest that the ISO should become the 'pool' by taking schedules which include not just quantity information, but also include price information so that the ISO can select 'the most economically efficient' requests from among the schedules, as if the schedules were bids into the pool. This proposal would essentially re-create the pool in the guise of the ISO. Again, there can be no doubt that the parties intended to foreclose this situation. Indeed, the parties went to great lengths in the MOU to allow buyers and sellers to purchase unbundled transmission rights, to make quantity-only schedules, and not to disclose pricing information to the ISO or subject their transactions to 'economic dispatch.'" Enron et al., "Comments of Enron Capital & Trade Resources, Wickland Power Services, Destec Power Services, inc., Illinova Power Marketing, Inc., Coastal Electric Services, and Electric Clearinghouse, Inc., on the Memorandum of Understanding filed September 11, 1995," dated October 2, 1995, and filed with the CPUC, p. 13.

<sup>6</sup> The early problems in market design and congestion management resulted in the Commission's order finding the system "fundamentally flawed." See Federal Energy Regulatory Commission, "Order Accepting for Filing in Part and Rejecting in Part Proposed Tariff Amendment and Directing Reevaluation of Approach to Addressing Intrazonal Congestion," Docket ER00-555-000, 90 FERC 61, 000, Washington DC, January 7, 2000, p. 9. See also Federal Energy Regulatory Commission, "Order Denying Requests for Clarifications and Rehearing," 91 FERC 61, 026, Docket ER00-555-001, Washington DC, April 12, 2000, p. 4.

ISO functions. There are, by contrast, very compelling reasons for keeping these functions together.” (p. 27)

The flaw in the logic of separation arises from a misunderstanding of the nature of electric systems, the role and tools of dispatch, and the connections with efficient pricing:

“Economic Dispatch. The short-term complexity of the interactions in the transmission grid requires the ISO to adjust the dispatch to meet transmission constraints and maintain balance in the system. The criterion for adjusting the dispatch should be to provide the most highly valued use of the grid based on the preferences of those in the market. In other words, users should provide bids, at least incremental and decremental bids around quantity schedules, and the ISO should use this information to determine the most economically rational use of the transmission system for the current dispatch. ... Efficient Pricing. The most significant attributable costs are the direct cost of power and the short-term cost of congestion in the transmission grid. The congestion cost arises when transmission constraints force some more expensive plants to operate. This cost of congestion would differ by location. Those causing the congestion at the margin should pay for it, and these prices should apply to everyone.” (p. 28)

A persistent source of frustration then and now was the repeated attempt by many to imply that this coordinated spot market would somehow be incompatible with a wide range of bilateral schedules and transaction:

“As has been explained many times – and about as many times ignored or misrepresented – this approach is fully compatible with any kind of bilateral transactions that could be made, without cost-shifting and without discrimination in favor of certain market participants. In fact, this approach expands the options of everyone in the market by making a virtue out of the necessity of central coordination.” (p. 28)

By now the experience of the Northeast market model where, for example, the PJM western hub has become the most liquid trading market in the country should have killed this argument and shown how the coordinated spot market facilitates rather than inhibits bilateral trading.

“The use of an economic dispatch with locational prices is precisely a means to ensure that both the spot-market bids and bilateral transactions are treated in the same way. Basing the payments for transmission opportunity costs on the locational price differences eliminates any bias in favor of *or against* the spot market.” (p. 30, emphasis in original)

The dangers of the separation fallacy, both in increasing costs and creating opportunities for exploitation of the market flaws, were anticipated.

“Both the inefficient dispatch and the inconsistent transmission prices would raise total costs. They would also create substantial arbitrage opportunities for brokers and other unregulated middlemen who could exploit the inefficiencies that the dichotomy created. Prices would be out of balance with reality, creating profits out of cost-shifting opportunities. The details would vary, but the incentives would be similar to those created by the familiar problem of inconsistent pool pricing under "split savings." Even when the pool dispatch is least cost, pricing in conflict with market opportunity costs can create artificial arbitrage opportunities that will be exploited by competitive market participants. In the further absence of a least-cost dispatch, the difficulties would be compounded. Only the few who stand to benefit from these intentional complications and restrictions of the market could view this as good public policy.” (p. 32)

Today we know that this prediction underestimated the scope of the opportunities to exploit the rules in ways that worked against effective market operation.

Nonetheless, the persistence of the separation fallacy is surprising. One device to avoid efficient market design is to try for compromise where the substance of good design is claimed but the overt design seems to support market separation. This common political practice of using obfuscation to cover disagreements is especially dangerous in the context of the spot market where it is required that the pieces fit together. This is not a good place to mumble. The ideas are complicated enough and clarity is needed:

“There have been attempts to circumvent these difficulties by redefining the roles of the ISO and the PE so that the PE does nothing more than agree on the rules that have to be implemented by the ISO, hence the PE transforms into the ISO's governance mechanism. However, the operating responsibilities of the PE would be reduced to the dictum "don't just do something, stand there." All the operating responsibility would be vested in the ISO.

While this outcome presents no problem in theory, in practice it is laden with danger. Supporters of the separation fallacy do not want this outcome, and could at every opportunity use any paper differences between a PE and the ISO to create real differences. With any vagueness in the language, the door to mischief would be open. It would require too much diligence on the part of regulators and others to simultaneously maintain and eviscerate the cosmetic separation.” (p. 36)

The implication of the analysis and subsequent experience is clear enough. The bottom line then and now is to avoid the separation fallacy:

Summary -

Economic dispatch arose as a solution to a real problem, special to electric networks. That problem does not go away with the introduction of competition, and should not be swept under the rug. Furthermore, efficient

pricing of transmission usage is an essential support of the competitive electricity market and widespread customer choice. To ensure non-discrimination, the system operator must be truly independent of individual market participants. To ensure efficiency, the ISO must have information about the relative value of alternative uses of the transmission grid. Transmission access, operation and pricing in a competitive electricity market with customer choice require a network-based approach that goes beyond traditional concepts of transmission management. In the face of transmission constraints, use of the system would include pricing to reflect congestion or redispatch costs. These short-term transmission prices would differ by location and would apply to all users of the system. The congestion prices would be obtained as a byproduct of the determination by the ISO of the constrained dispatch to reflect the least-cost method of meeting the constraints while balancing supply and demand. Efficiency and non-discrimination can co-exist with both bilateral transactions and a pool, but only if the ISO is given the appropriate tools to harness rather than handcuff the management of transmission constraints. The Poolco model of an ISO providing a bid-based economic dispatch, charging locational spot prices, and administering a system of transmission congestion contracts is the *only* internally consistent and workable approach that has been described for operating an efficient, non-discriminatory competitive electricity market in the presence of complex network interactions. The separation fallacy, innocuous on the surface, strikes at the heart of the matter by preventing the ISO from getting or using the information essential to accomplish this worthy objective.

The separation fallacy is seriously wrong.” (p. 36-37)

The Commission is on the right track with Order 2000. The need is for a standard market design built on the Northeast model. The key feature is that the independent system operator must administer the spot market using a bid-based, security-constrained economic dispatch with locational prices. This design can support bilateral transactions charged at the difference in locational prices, provide point-to-point financial transmission rights, and support market driven investment.

I submit these comments in support of the record and to further the policy direction that the Commission appears to be following. The sooner we get this issue behind us, the sooner we can turn to other important matters like transmission investment, market power mitigation, and so on.

**Attachment:** John D. Chandley and William W. Hogan, “Independent Transmission Companies in a Regional Transmission Organization,” Center for Business and Government, Harvard University, January 8, 2002.

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