Evolving Nature of Electricity Market Design in the U.S.

G.Gross

University of Illinois at Urbana-Champaign

Introduction

The introduction of the blueprint for open access transmission operations laid out in the FERC Orders No. 888 and 889 in 1996 was followed by the Order No. 2000 which directed FERC-jurisdictional entities to establish new transmission structures called regional transmission organizations or RTO's. FERC subsequently invested considerable time and effort to develop a robust wholesale market via the so-called standard design (SMD) proposed rule making. The SMD was a bold, overly prescriptive and overly ambitious undertaking that failed due to various political, regional and stakeholder pressures, including the opposition of those entities who have yet to accept the notion of markets in the electricity sector. FERC withdrew the proposed rulemaking and replaced it with the less ambitious White Paper on the Wholesale Power Market Platform (WPM). While many of the underlying SMD aspects were kept, the overall effect was to move away from the cookie-cutter approach and to encourage regional differences in the market design arena. This paper assesses the thrusts of the SMD proposal and those of its redrafted version as presented in the WPM White Paper. The objective is to examine the FERC's vision for achieving smoothly functioning electricity wholesale markets in the U.S. and the path taken toward the implementation of that vision.

What is SMD?

After laying the foundation for the manner in which transmission-owning utilities are to provide nondiscriminatory and comparable open access transmission services and creating the responsible organizations known as independent system operators or ISOs and RTOs, FERC focused its energies to effectively harness the benefits of competitive markets. The driving force behind the restructuring of wholesale electricity markets is the desire to capture the benefits provided by competitive markets through improved efficiency and innovation for electricity customers. FERC, in the belief that the development of short-

term wholesale markets with transparent prices and market structures that can produce *just and reasonable* prices require its intervention, issued the SMD Notice of Proposed Rulemaking (NOPR) in July 2002. The NOPR incorporated the experiences of electricity market design in the U.S. and other countries. The objective of the proposal is to harmonize wholesale power markets nationwide in order for FERC to meet its mandate of ensuring "just and reasonable prices" as set out in the Federal Power Act of 1935.

The SMD proposal is a single set of rules for all wholesale electric markets. This fundamental industry restructuring proposal is a highly prescriptive document for virtually all aspects of the wholesale electricity industry including

the structure of wholesale energy markets;
transmission ownership and operations issues;
transmission pricing;
generation and transmission planning and expansion;
market power monitoring and mitigation; and,
the corporate governance structure.

FERC's motivation in the drafting of this wide-reaching proposal is to prevent discriminatory practices in the provision of transmission services in order to ensure the smooth functioning of vibrant competitive electricity markets. FERC aimed to set up rules to facilitate economically efficient electricity trade by standardizing the design and operation of markets in wide geographic regions to facilitate the timely addition of new transmission transfer capability and to establish a regulatory backstop to protect customers against the exercise of market power.

The Scope of SMD

The SMD proposal was aimed to be a *one size fits all* rule. In light of the slowness of the industry's response to implementing the FERC Order No. 2000 required RTO structures, FERC embarked on a new undertaking in which the key player would be the so-

called independent transmission provider or ITP. The ITP would assume all the functions previously assigned to the ISO/RTO as specified in the earlier Orders. The ITP would be the *only* transmission provider in the region and would also be running all the wholesale markets – commodity, ancillary services and financial. In addition, the ITP would assume broad roles in two new areas:

regional resource adequacy, and

regional transmission planning

The proposal strengthened the role of the transmission provider in the market monitoring and mitigation areas to be assumed by the ITP, particularly, when compared to that of either the ISO or the RTO.

The participation in the ITP would no longer be voluntary and all FERC-jurisdictional shareholder-owned utilities would be required to turn over control and operations of transmission to the ITP. The NOPR contains very specific ITP corporate governance rules, which, in effect preclude the ITP from being *for profit* because the setting up of a shareholder elected board is not allowed. The ITP Board would be selected by a stakeholder committee and be composed from representatives of the following six classes:

generators and marketers

transmission owners

transmission dependent utilities

public interest groups

alternative energy suppliers

end users and retail providers that do not own transmission or distribution assets.

In a feeble attempt to involve state regulators and other interested stakeholders, FERC made a provision for the ITP to receive non-binding advice from the

Stakeholder Advisory Committee; and the

Regional State Advisory Committee (RSAC).

The functions of the committees were not specified in detail.

The basic market design framework in SMD is modeled heavily on the functioning and design in the PJM ISO, NY ISO and the ISO – New England. The design encompasses the various day-ahead and real-time spot energy markets and ancillary service markets. The ITP would file the open access transmission tariff under which it would provide network access service for all eligible wholesale market players and, also, for bundled transmission retail services. The congestion management is prescribed to be locational marginal price based and is accompanied by the requirement for the provision of protection of transmission customers by means of the so-called firm transmission rights or FTR. The extension of FERC's jurisdiction into the areas of resource adequacy and transmission planning, the domain heretofore of state regulators, was particularly poorly received. In the remainder of this section, we discuss in some additional detail the key aspects of the SMD proposal.

FERC was intent on providing a very wide geographic scope to each ITP's region. This intent is a clear continuation of the RTO formation initiative laid out in its Order No. 2000. The transmission services provided by the ITP consist of region-wide – over the footprint of the ITP – network transmission services for all users without the rate "pancaking" of the different ownership transmission networks that constitute the region's grid. The transmission pricing consists of two separate charges – an access charge to the grid and a congestion charge for its usage. The provision of hedging of congestion charges through the use of firm transmission rights (called congestion revenue rights in the SMD NOPR) narrowly specified the terms and conditions for the issuance and usage of these financial instruments. The overall thrust placed much of the risk on the shoulders of the transmission owning entities.

The SMD proposal focuses in on an increasingly pronounced role for the ITP in the provision of market monitoring services. The basic requirement was the establishment of a market monitoring unit independent of all market participants and reporting directly to both

the ITP Board and FERC. The key areas of responsibility for the market monitoring unit encompass

identification of market power,
design of mitigation plans,
investigation of market manipulations/abuses, and
enforcement of penalties.

The notion of including market monitoring and mitigation is highly appropriate; however, the state of the art in the development of effective metrics and tools and the formulation of appropriate penalties is too limited to permit the unit to effectively discharge this newly enlarged function.

The added new areas of resource adequacy and regional transmission planning and expansion became major topics of criticism. These areas are traditionally regarded as being within the jurisdiction of state regulators and FERC's proposed scope of activities for the ITPs was seen as encroaching on the jurisdiction of the state agencies. In the past, the states made decisions on planning, reliability and adequacy of service. The resource adequacy requirements prescribed that each ITP forecast the demand, help determine adequate levels of resources and assign to each load serving entity (LSE) a share of the resource requirement. The LSE obligation would be enforced via the ITP tariff and curtailment penalties in case the LSEs fail to meet their resource requirements. The proposal went so far as to specify minimum reserve margin levels of 12% in every region. An additional issue was the fact that these provisions would not be imposed on FERC non-jurisdictional entities since FERC has no authority over them. A key area, that the proposal failed to address, is the need to carefully design a resource adequacy scheme so as to not result in boom-bust cycles in generation capacity.

In the planning area, SMD prescribed the establishment of a market-driven regional planning process allowing competition among generation, transmission and demand response. The idea is that the ITP acts as the ultimate resource decision maker and the role

of the states is limited to providing non-binding input into the ITP planning process. FERC recognized, however, that the states' role in siting and retail and recovery would continue. The options for pricing new transmission were limited to direct assignment of costs through participant funding and rolled-in embedded costs. The proposal lacked any incentives for encouraging investment in transmission. The transmission owner was deemed the "builder of last resort" should the market fail to respond.

The proposal was coupled with such an unrealistic schedule as to doom its possible implementation. The requirement was that by September 2004 there would be full nation-wide ITP/SMD implementation.

Some Major Issues with the SMD Proposal

Given the wide scope of the proposal, the industry and stakeholders reacted quickly and broadly. FERC received approximately 1,000 sets of formal comments on the proposed rulemaking. The widespread criticism reached all the way up to the legislative branch and, in effect, resulted in blocking SMD by proposing legislation that has yet to be enacted. Senate leaders warned FERC not to implement SMD while legislation is pending.

From a conceptual point of view, the proposal is deficient since the comprehensiveness/completeness of the market structure is necessary. While SMD has provisions for short-term energy markets, there are no provisions for capacity markets and there is a clear lack of appropriate economic signals for transmission investment. The proposal lacked specificity for the side-by-side operation of the ITP markets with the bilateral contracts. It failed to provide transparent rules and procedures that can effectively integrate and coordinate system operations with market administrative functions. The proposed rule would result in a considerable increase in uncertainty at a time when the

industry has been severely hampered by huge market capitalization declines and the industry-wide derating of the credit worthiness of virtually all market players.

In the area of regional transmission planning the envisioned process was deemed to be unfair since it would not give the current transmission owner the first right of refusal but would obligate the owner should the market fail to respond. The failure to include in the proposal the need for the development of long-term economic signals to serve as effective incentives for new transmission incentives is a key shortcoming. The lack of incentives in the adding of new transmission has resulted in a staedy decrease of annual investment in transmission. As the Mega Blackout of August 14, 2003 clearly showed the situation of the infrastructural transmission has reached critically low margin levels and the addition of transmission resources and facilities is required for the continued reliable operation of the North American electricity system.

The shift from the current state/local planning process to the envisioned ITP regional planning represents a significant move. Such a transition needs to be clearly specified since it breaks the long existing regulatory compact between the state and the utility on generation and transmission and the state-based cost recovery is jeopardized. In addition, the continuing state involvement and support needs to be clearly specified.

For many industry players, the lack of flexibility in the specified corporate structure that failed to allow *for-profit* models for the ITP was heavily troubling. In particular, the lack of incentives in the efficient and effective operation of ITPs was seen to be a key flaw. Such a restriction was seen as being counter-productive in furthering the goal of vibrant competitive markets.

The jurisdiction of FERC is basically limited to investor-owned electricity companies. The lack of uniformity in the application of SMD with the exemption of the non-jurisdictional utilities (municipal, federal, state and coop entities) opens the door to

leaning on the grid since the existing reciprocity provision of FERC Order No. 888 is inadequate to enforce consistency over all interconnected networks. In particular, in the resource adequacy area, such a lack of consistency cannot ensure overall system reliability. Furthermore, the FERC requirements lack the necessary linkage between reliability and economics. The proposal failed to include the formulation of incentives to provide new capacity or of appropriate penalties in case of failure to meet required levels of reliability.

The creation of the geographically extensive ITPs creates *seams* problems between interconnected ITPs. Such problems encompass all aspects of market and system operations and planning. These problems create major new challenges that the industry and regulators need to face.

The majority of the comments in the SMD NOPR was rather political in tone and focused on the federal-state jurisdictional issues and the overly prescriptive nature of the proposal with the major failing to accommodate regional differences. The opposition effectively marshaled its forces and that were to deflect FERC from its intended course. FERC issued its "White Paper: Wholesale Power Market Platform" on April 28, 2003 in which it indicated its abandonment of the SMD rule and its replacement by a more flexible approach. We next discuss the key aspects of the Platform and the major differences with the original SMD proposal.

The White Paper

The White Paper sharply alters the course set forth by FERC in the SMD NOPR. The major thrust is to revert to the regional approach of the Order No. 2000 and away from the nation-wide approach of the SMD proposal. The ITP concept is abandoned completely and FERC uses the ISO/RTO structure that was introduced in its earlier Orders. The Paper identifies the revisions to the SMD proposal and compares the RTO requirements set out in the Order No. 2000 to those proposed in it. Basically, the White Paper clearly establishes

the reduced scope and configuration of existing ISOs/RTOs. The voluntary approach to RTO formation, delineated in Order No. 2000, is replaced by the mandatory RTO participation specified in the White Paper. The Paper goes to great lengths to provide flexibility for, and accommodation of, regional differences in practically every aspect of market design. In addition, in light of the loud criticisms voiced, the Paper is full of deference to, and larger roles for, state authorities in the development of RTOs. One may view the White Paper as the statement of the FERC revised version of what may be politically acceptable in the market design arena.

The revised version whittles down many of the provisions of the SMD NOPR. The softening of the lines on FERC's jurisdiction over areas traditionally viewed as those under state jurisdiction is significant. The Paper provides a far more significant role for the state regulators. The move away from the single nation-wide standard system to different regionally specific designs is a substantial shift in the FERC vision. FERC no longer asserts its jurisdiction over bundled transmission rates for retail service. The White Paper also alters the heavily prescriptive tone of the NOPR and replaces it with far less specificity on many of the topics under the market design rubric.

The Wholesale Power Market Platform described in the White Paper is a conceptual framework for "fair, competitive bulk electricity markets." In FERC's view, the platform embodies all the components necessary to provide the most expeditious way to bring about reliable, reasonably priced electric services for all customers by through the creation of transparent markets with fair rules. Moreover, there is the provision of the required regulatory certainty and stability to ensure that the electricity infrastructure is constructed. The platform embodies a primary reliance on bilateral contracts and the RTO operated markets serve to supplement these contracts. The platform allows the regional differences to be explicitly incorporated and provides for a considerably expanded role for state regulatory authorities.

The White Paper reaffirms the importance of the independence of the RTO from all market participants so as to be free of any potential conflicts of interest and have the required objectivity in providing nondiscriminatory comparable transmission services to all transmission customers. Such independence is equally important in the assessment of the transmission facilities needed by the footprint region to meet reliably and economically the forecasted load.

The White Paper addresses the importance of the spot electricity markets for the day-ahead and real-time purposes. The specification of the rules of each market is left to the discretion of the regional ISO/RTO. In addition, FERC explicitly requires the incorporation of security constraints in the day-ahead markets. The design of the day-ahead markets must allow the markets to work reliably in concert with the region's congestion management scheme.

The White Paper emphasizes the critical role of market power mitigation while ensuring the prices are adequately high to attract eh needed investments in new infrastructure additions in the region. The regional scope of such measures is emphasized together with the need to pay close attention for addressing compatibility issues with interconnected RTOs/ISOs, the so-called seams issues.

The Paper moves away from strictly LMP-based congestion management by allowing other unspecified market-based schemes. In addition, FERC provides flexibility in the areas of FTR. Specifically, the scope of FTR is widened to include options in addition to the forwards and rights over specific flow gates. Such broadening extends the functionality of these important hedging tools for transmission customers. The added flexibility can result in improving the utilization of the limited grid capability and thereby lower the costs of the end users. The regional allocation of the FTR is left to the discretion of each region.

The White Paper also abandons a uniform approach to resource adequacy and allows the incorporation of each region's specific characteristics and implementation approach. A similar approach is also adopted for the regional transmission planning process. FERC emphasizes that the fact that each RTO/ISO administers the regional tariff provides the critical link in establishing an appropriate regional cost recovery mechanism for the new transmission investments.

Concluding Remarks

The FERC vision of how to achieve vibrant competitive electricity markets has shifted considerably over the recent months. The FERC has recognized the need to explicitly account for regional differences and to have a more prominent role for state regulatory agencies.

The FERC vision gives rise to a broad range of major challenges and exciting opportunities for power engineers and economists in the area of market design. The solution of the problems that arise will require the effective marriage of economics and power system engineering. The daunting challenges in the collection of data and deployment of effective data management tools impose major demands on information technology specialists so as to ensure adequate and timely information in competitive markets. The implementation of different regional RTOs brings to the fore the need to address the issues that arise in light of possible lack of compatibility of interconnected neighboring regions' organizations. The SMD proposal and White Paper are silent on several aspects of markets such as implementational issues and the critically important need to develop market design validation methodologies. The entire area of market monitoring presents a broad range of problems that need to be addressed including the issues of development of appropriate metrics for effectively monitoring market performance, sanity checks for identification and detection of fraud or manipulation and measures for assessment of market power and the robustness of demand response. In addition, both

long- and short-term competitive benchmarks are needed to establish reference levels in the assessment of market performance. The mitigation area also presents a very challenging topic that requires considerable amount of work to develop effective practical schemes. In the realm of application of economics, the area is replete with the challenges of developing incentives in all relevant aspects of electricity market operations and planning. The market design area truly constitutes an unparalleled opportunity for power system engineers and economists to contribute to the effective design of the future electricity industry.