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Standard Market Design in Wholesale Electricity Markets: Can FERC's Proposed Structure Adapt to the Unknown?

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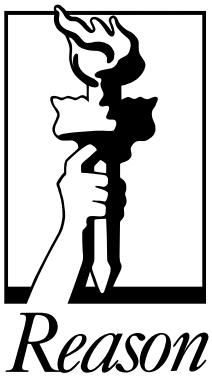
POLICY STUDY 301



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BY LYNNE KIESLING AND BRIAN MANNIX

Executive Summary

Fifteen years ago Vernon Smith wrote of electricity markets:

> *Replacing the entrenched regulatory regime, after eighty-odd years, with a competitive regime will require regulators to be forward looking, politically bold, and cognizant of the disciplinary value of competition.*[1]

Today the Federal Energy Regulatory Commission, and many of the state regulatory commissions, can look back with considerable pride at what they have accomplished. Deregulation of electric power generation has proceeded, perhaps not as quickly as in some other industries, and not without some missteps, but with a deliberate and sustained pace. Competition is now deeply entrenched in the nation's power generation system, and it has made that system more efficient, more adaptable, more resilient, and more reliable. Much of this progress has been driven by technological innovation and also by economic developments outside the industry, but to a considerable extent it is the product of hard work and innovative thinking within the regulatory commissions themselves, at both the federal and state levels.

FERC's current Standard Market Design (SMD) proposal is a bold—although not final—step in the evolution of electricity markets. It recognizes that, in power generation, competition is now the primary guarantor of "just and reasonable" rates. It seeks to protect and promote that competition by proscribing anticompetitive practices, especially those that take the form of "undue discrimination" by vertically integrated transmission operators. It seeks to expand the scope of competition by erasing the "seams" between different geographic jurisdictions, as well as smoothing some of the seams between wholesale and retail markets. And it seeks to unmask the price signals for transmission investment that will alleviate the troublesome bottlenecks in the existing infrastructure.

These goals are laudable, and some of the features of the proposed SMD are welcome. In our view, however, the current proposal also suffers from several serious flaws, that make us unable to support the current proposal.

1. The SMD is too prescriptive and too quick to impose uniformity for its own sake.

More uniform national, and even international, "ground rules" will provide a better foundation to facilitate exchange and competition, and to encourage investment in new capacity where it is needed. One the other hand, flexibility and variability in market design provide the raw material for evolution and experimentation, both by regulators and by market participants. By locking in a single, detailed, and inflexible market design, the SMD may inadvertently choke off further progress.

Regional variation in market design has created "seams," transaction costs, and other anomalies that seem desirable to eliminate. But regional variation in market design may also have accommodated legitimate differences in local conditions. And while variation allowed California to walk off a cliff, it has allowed other states, and the Commission, to draw important lessons from that experience.

The proposed rule identifies numerous problems—some theoretical, some anecdotal—in existing markets and asserts that the SMD will fix them. A search of the preamble for "eliminate(d)" and "(re)solve(d)" reveals dozens of problems that will be made, by rule, to vanish. The mixed record of recent experience with market design fails to dent the confidence with which the SMD is proffered:

> *"In the years since the ISO markets have been operating, dozens of market design flaws have been identified, . . . No region has been exempt from market design flaws of one type or another. . . . Only standardization of electricity market design will solve these problems. Our goal is . . . to raise the quality of all electricity markets simultaneously."*[2]

Unfortunately, standardization also means that *unintended* consequences of the SMD will affect all electricity markets simultaneously. Good intentions do not prevent errors, unanticipated abuses, or assumptions that turn out later to be misplaced. For this reason, the Commission should proceed with caution. The proposed SMD may appear to be superior to all the others only because it is, so far, untried.

Detailed rules run the risk of regulatory path dependence and lock-in. The new institutional structure in the SMD should be simple, flexible, and *reversible*, with clear and credible phase-out provisions as technology evolves and market-based retail pricing expands. Robust institutions that will stand the test of time and create value for consumers must be able to adapt to the unknown. Many unknowns exist in electricity, particularly in the regulatory, financial, and technological future. Market design that focuses too heavily on explicit details and not enough on flexible and adaptable rules will be useless at best, and counterproductive at worst.

2. The SMD classifies practices as "undue discrimination" without sufficient examination of economic efficiency.

In policing electricity markets, the Commission faces the same problem faced by antitrust agencies: How can it be sure that its power to intervene is used to protect competition rather than suppress it? In a complex

market it can be difficult to distinguish cost-based (and therefore economically efficient) discrimination from "undue" discrimination, and competitive practices from anti-competitive practices. Certainly it will not suffice to rely uncritically on complaints from market participants. Companies will file anticompetitive-discrimination complaints if it is rewarding to do so, regardless of whether the alleged discrimination has an economic basis. And aggressive competition elicits complaints from competitors just as surely as anti-competitive behavior does.

It is the duty of the Commission to ensure that its oversight of markets is not employed to favor one or another participant in the market, but to provide the greatest benefit to consumers as a whole. It should use as its guideposts the notions of economic efficiency and consumer harm that are used to guide antitrust interventions.

The SMD seeks to eliminate discrimination and, in particular, to ensure that a vertically integrated transmission provider will never have competitive advantage over independent generators. In its zeal to eliminate competitive advantage, however, the Commission needs to be careful not to throw the baby out with the bathwater: i.e., not to eliminate real economic efficiencies from the system.

For example, in its discussion of scheduling advantages (paragraphs 45-47) and in its discussion of imbalance resolutions (paragraphs 48-49), the SMD proposal appears to proceed directly from the observation that a practice confers competitive advantage to the conclusion that it should be banned. We do not have enough information to say whether these particular practices are anticompetitive, but surely there are some cases where competitive advantage flows from real economic efficiencies; the Commission needs to make more of an effort to examine this possibility before it bans a practice.

3. The SMD does not recognize the value of competition, or potential competition, in transmission services.

While the SMD recognizes the disciplinary value of competition in power generation, it appears to embrace—and to codify—the status of transmission as a "regulated natural monopoly." But FERC could accomplish many of the proposal's objectives regarding transmission investment and congestion pricing by reducing entry barriers in transmission. The standard market design structure as currently envisioned does not address the fundamental supply-side problem that makes transmission a bottleneck—the combination of fragmented ownership and the persistence of artificial barriers to entry facing the grid's potential competitors. The proposed SMD acknowledges that improved transmission coordination and investment can make wholesale generation markets more competitive, but does not incorporate the insight that the reverse is also true. Changes in generation regulation and technology can make transmission more competitive, so that transmission need no longer be treated as a natural monopoly.

The proposed SMD does not reduce the regulatory barriers to entry that prevent us from putting transmission to a market test. In the absence of these barriers, transmission faces potential competition, or is *contestable*. Reducing artificial barriers to entry in transmission, and observing the extent to which and the timeframe over which transmission really can be contestable, would create real benefits from dynamic efficiency and optimized investment. Furthermore, reduced entry barriers would enable investors to create redundancy and increased grid security when and where it makes economic sense. Such beneficial redundancy does not exist with transmission regulated as a natural monopoly, as natural monopoly theory is premised on removing redundant infrastructure.

4. The SMD does not recognize that market pricing for retail customers can exert considerable competitive discipline on transmission as well as generation.

Market-based retail pricing is another simple concept that would reduce the need for FERC and independent system operator (ISO) market monitoring functions and associated bureaucracies. Market-based retail pricing connects demand and supply, maximizing information transmission in markets and disciplining supplier exercise of market power better than any other known institution. Clearly, retail pricing is beyond the scope of this rulemaking and beyond the scope of the Commission's jurisdiction. However, states are slowly moving toward market-based retail pricing and retail choice. It is important for FERC to recognize that retail pricing reforms will make loads responsive to scarcity at peak times, and will thereby alleviate many of the transmission bottlenecks and rigidities that the SMD is designed to address.

Thus the proposed FERC and ISO market monitoring should have sunset provisions as the percentage of retail load on competitive contracts increases. Market-based retail pricing is more likely than market monitoring to create value for consumers, and one reason for that advantage is that market monitoring is almost certain to suppress dynamic investment incentives.

Part 1

The Standard Market Design Proposal

The electricity industry's growing pains have become familiar to most of us over the past several years. The first seeds of competitive, deregulated power generation were sown in 1978 by the Public Utilities Regulatory Policies Act, which created the boom in independent cogeneration. Ten years ago Congress passed the Energy Policy Act of 1992, which dramatically expanded competitive incentives and dynamics and created the potential for a wholesale electricity market. Over half of the states in the United States have embarked on so-called deregulation initiatives, which retain a substantial dose of regulation, but of a different form from the traditional regulatory treatment of the vertically integrated industry. Some states, like Texas and Pennsylvania, successfully used their restructuring to enable utilities and merchant generators to create value for consumers. Others, like California, encumbered their market design process with so many political constraints that needed investments in capacity were deterred and consumers suffered substantial harm. This patchwork of experiences, in combination with the discovery of abusive trading practices at Enron and other market participants, reduced the liquidity of wholesale markets and contributed to a debt crisis for energy companies. Now the confluence of these trends has led the Federal Energy Regulatory Commission to propose establishing a set of standard market rules for the wholesale electricity market.

A. Beneficial Features of the Proposal

The SMD proposal has an overarching objective of breaking down regional barriers to competitive wholesale electricity markets, creating a seamless national wholesale electricity market. The specific forms that this general objective takes revolve around transmission, particularly congestion pricing and creating dynamic transmission investment incentives. The SMD proposal correctly notes that the electricity industry, which has for much of its history been local and vertically integrated, lacks clear price signals for transmission investment, as well as for generation investment. In the patchwork of halfway efforts at deregulation at the state level, transmission investment incentives remain weak, and generators often build new plants in locations that create congestion because they do not bear their share of the congestion cost. Furthermore, the continued vertical ownership of generation and transmission by some utilities creates a discriminatory access issue when other generators would like to use the utility's transmission assets, but are concerned that they pay more or receive lower priority than related generators. FERC believes that through a set of standard wholesale market rules, these perverse incentives will disappear, to be replaced with a uniform set of rules that wholesale market participants will not be able to arbitrage across regional borders.

The abstract objectives of the SMD proposal are well-founded in both theoretical and empirical research in economics. Standard market rules reduce transaction costs and increase the extent of the market, which

increases exchange and creates value and growth in the process. Simplifying transactions and increasing the transparency of both transactions and the regulations governing them will increase the liquidity of wholesale markets, thereby making them more competitive. A uniform set of rules and business practices reduces opportunities for institutional arbitrage; rule differences create rents and arbitrage opportunities, causing resources to be wasted through unproductive rent-seeking.

The SMD proposal also recognizes the importance of transmission congestion property rights in reducing transaction costs and pricing congestion correctly, which is crucial for optimizing transmission investment. Finally, the proposal highlights the importance of unleashing market incentives for transmission infrastructure investment; these incentives are absent from the regulated rate of return to transmission assets, which has been well below average capital market returns over the past decade and has contributed substantially to the deficiency in transmission investment.

Several of the SMD proposal's specific recommendations are sensible and well-motivated. The treatment of congestion property rights as well-defined, alienable, and tradable is a crucial foundation for transmitting accurate price signals among market participants. Furthermore, having the congestion revenue rights "follow the load" when customers switch generators will maintain those incentives and not introduce distortionary transmission access incentives. In dealing with access issues, the SMD proposal includes a definition of Network Access Service that builds on the open access tariff foundation that FERC laid in 1995 with Order 888. Network Access Service is a consistent set of transmission rules for all consumers that are flexible and also incorporate tradability, which is a key, yet often-overlooked feature of property rights definitions that creates real value. The proposal also suggests assessing transmission access charges on generators according to a generator's share of the load ratio on that path. This pricing rule improves upon fixed rates, flat rates per unit of distance traveled, or other transmission pricing rules that do not in any way reflect the generator's actual use of the grid.

Auction and trading rules in the SMD proposal also improve upon those used in earlier markets in the United States and in other countries. The SMD proposal relies on voluntary bilateral trading among participants instead of a mandated central pool structure. The California experience revealed the fatal flaws in mandated central pools, and the New Electricity Trading Arrangements (NETA) in the United Kingdom successfully moved their wholesale markets away from a pool and toward bilateral trading in 2001. Texas is also using a voluntary bilateral market design and has experienced very few trading anomalies. Voluntary bilateral trading avoids the manipulation opportunities that were inherent in, for example, California's bifurcated Power Exchange/Independent System Operator pool with a price cap.

The SMD proposal also recommends using a uniform price auction for power sales, in which all suppliers submit their offers, and all suppliers receive the market-clearing price. A uniform-price auction also means that lower-cost suppliers will earn some producer surplus, the difference between their bid and the market-clearing price. That producer surplus repays producers for the fixed costs they have had to incur to bring electricity to market. Building generation capacity is neither cheap nor quick. Thus producer surplus sends a very important signal, and provides very important incentives, to producers *and potential producers* about what kind of investment needs there are to satisfy demand in this industry. As scarcity becomes more binding, existing producers earn more money from it and potential producers see profit opportunities in alleviating it, which they would do by investing and entering the market. A uniform-price auction allows that dynamic investment incentive to pervade the market, and leads to optimal investment.

Transmission investment incentive optimization is one of the main objectives of the SMD proposal. The well-defined congestion revenue rights, flexible and tradable Network Access Service, and a uniform-price auction design for the wholesale generation market all contribute to creating the right investment incentives. Another aspect of the proposal, participant funding of transmission investment, also contributes to those incentives. Simply put, participant funding stipulates that the party who benefits from the transmission investment pays for it.

One final set of financial characteristics of the SMD proposal is noteworthy. The proposal recommends that the bids that market participants place in day-ahead markets be financially binding; in other words, participants can be held responsible for the bids and offers that they make in the day-ahead market. This provision would reduce strategic incentives that arise in these intertemporal markets, and while the intertemporal markets are crucial for system balance and reliability, they can create incentives to misrepresent preferences. For example, in California the split between the Power Exchange day-ahead market and the real-time ISO market created incentives both for utilities to understate their bids to buy in the day-ahead market and for suppliers to withhold offers from the day-ahead market, in an attempt to influence prices. Financially binding day-ahead bids mitigate that strategic incentive. Another financial aspect is allowing purely financial bids in wholesale markets, or allowing for market participants who do not and cannot deliver or take receipt of generated electricity. Allowing such traders to participate will increase liquidity and depth, reduce the existence and duration of arbitrage opportunities in wholesale markets, and thus will encourage price convergence across time and place.

B. Detail and Specificity in the Proposal: Examples

Although full of important and well-crafted recommendations, the SMD proposal is prescriptive and awash in excessively detailed rules. In many of the dimensions of the SMD proposal, the objective is sound, but then the question arises: how necessary are such detailed specifications to competitive wholesale markets? Excessive details can make the SMD proposal unable to adapt to changing technology and market conditions. Furthermore, such detailed specifications would make changing these new institutions very costly and time-consuming. This is particularly true when a subset of market participants has a stake in preserving the status quo: anticompetitive or discriminatory practices in a contestable marketplace tend to be eroded, but anticompetitive or discriminatory regulations tend to get locked in place.

One example of overly-detailed rules in the SMD proposal is elaborately specified redispatch tariffs. Redispatch occurs when congestion requires that a generator resend a delivery through an additional injection of current into the grid. Redispatch is an important function in maintaining the reliability of the transmission network, and the rules establishing prices paid for redispatch vary by region. Such importance does not require, though, extensive specifications of multiple tariffs for redispatch in different situations under different conditions.[3] More parsimonious ways to bring about reliability-based redispatch exist, but they rely on reduced artificial entry barriers to transmission, improved demand response to transmit better price signals, and other regulatory features of the current institutions.

The SMD proposal also recommends several different types of congestion revenue property rights, including point-to-point obligation rights, point-to-point option rights, and flowgate rights.[4] While "offering several different types of Congestion Revenue Rights would make the system more flexible and better able to adapt to the needs of specific customers,"[5] what is the value in having the rules specify particular types of congestion revenue rights? If the objective is for the congestion property rights system to be flexible and

adaptable for the market participants, those participants are the ones best situated to devise the mutually beneficial implementation of those rights. In other words, the uniform rule that would best serve the largest variety of diverse market participants, each with his own skills, preferences, locations and costs, would be to stipulate that there will be well-defined, alienable and tradable congestion property rights, and that if those rights are not transparent and clearly defined to the mutual satisfaction of the participants, then the dissatisfied party would have legal recourse. Going into detail beyond that ties the hands of the market participants, and prevents them from using their local knowledge to figure out the most mutually beneficial details. Note that this simple rule does not necessarily imply that congestion revenue rights would be negotiated on every transaction, just as property rights over milk sold and bought in the supermarket do not imply that consumers must haggle over the price. It is entirely likely that posted prices and other schemes for valuing different congestion revenue rights would evolve out of the superior local knowledge of the market participants. It is unlikely, though, that congestion revenue rights as dictated in the SMD proposal would evolve as robustly and beneficially as those that the participants derive, based on sound, uniform property rights definitions.

Detailed rules run the risk of regulatory path dependence and lock-in. The SMD proposal could implement a detailed set of congestion revenue rights for all market participants, and then a technological or contracting innovation is likely to occur that would make the detailed rights definition obsolete. In that situation, which given our experience with technological change is highly likely, the rules would have to change to revise the stipulation of the rights. Such an institutional change would involve a process similar to that for the current SMD proposal, and would be costly and time-consuming, and possibly contentious. Regulatory lag could result in substantial lost profits due to delays in the process of shifting from old institutions to new ones.

When crafting a set of uniform market rules, FERC should pay attention to the future likelihood of having to change the rules, and the costliness thereof. The institutional change that gets implemented should be flexible and *reversible*, with phase-out and sunset provisions as anticipated markets (such as the expansion of demand response at the state level) and technology changes.

Part 2

Simple Market Design Rules: Transmission Entry And Demand Response

A. A Benchmark Set of Simple Rules

Perform the following thought experiment: what would be the minimum set of rules necessary to support a competitive wholesale market?[6] How different is the standard market design proposal from that minimum set of rules, and what are the costs and benefits associated with the differences?

A crucial component of the minimum set of rules involves transmission entry barrier reduction, and distributed generation interconnection rules. Technological change has also helped create the environment and the incentives for the deregulation and restructuring efforts that we have seen thus far. Electricity generation has become more efficient and cost-effective at smaller scales, undercutting the historical tendency of large central generating plants to exploit economies of scale. As the technology of generation has changed, the economics of generation have also changed, and large power plants are no longer the only way to lower the long-run average cost of producing electricity. Technological change has made distributed generation possible and more cost-effective over time. It has also improved transmission's ability to carry electricity over longer distances with less line loss. More importantly, though, technological change in generation has changed the economics of transmission, making it more contestable, and making the existing regulatory barriers to entry in transmission increasingly obsolete.

A simple approach to creating competitive wholesale markets also involves integrating the price signals between supply and demand, by integrating wholesale and retail market price signals. Enabling consumer demand response at the retail level is the easiest way to achieve that objective. Demand response and market-based pricing for retail consumers provides the discipline of supplier attempts to raise prices that we typically associate with competitive markets. Market-based retail pricing would mitigate much of the need for market monitoring in wholesale markets.

Retail demand elasticity, and the potential for electricity distributors to provide very different value to their customers, is an important information flow to integrate into the parsimonious market rules for wholesale electricity markets. Put another way, you cannot expect to get the best economic results by doing wholesale

and then retail sequentially; they are simultaneous and feed into each other, and by disabling that information flow that takes the form of prices, inefficient investment is the result. Think about the states and nations that have done electricity restructuring well. They almost unanimously approach wholesale and retail as integrated, simultaneous markets.

B. Transmission Entry Barriers Send Faulty Investment Signals

Electricity industry regulation is slowly evolving away from its traditional "command and control" treatment toward more use of choice and markets. It does, though, retain the government-granted monopoly franchise in the transmission (and distribution) portion of the value chain. In so doing we overlook the potential contestability of those segments of the industry, and stifle potential beneficial technical and institutional change and innovation. Transmission policy decisions at the federal level, including the SMD proposal, continue to be influenced by this natural monopoly theory of transmission. Those decisions have implications for the adoption of technological and contractual innovations that would take advantage of transmission's contestability.

FERC's effort at institutional and regulatory change to promote competitive electricity markets is a welcome departure from the historical forms of utility regulation that are changing at both the federal and state levels. However, the retention of the premise that natural monopoly conditions characterize transmission, and that such conditions imply the need for ongoing economic regulation, means that this institutional change is only an incremental step, and may have some unintended costs as a result of institutional path dependence and lock-in. Mandating a particular institutional structure, especially one based on natural monopoly theory, will forestall the discovery of possibly superior alternatives, and as technological change and other changes occur, revising the SMD structure could be quite costly and time-consuming.

Many mechanisms exist by which a regulatory system based on such a strong assumption about industry and market characteristics can raise substantial barriers to the emergence of superior alternatives. One is that it locks in the transaction costs of a regulated monopoly transmission grid with no mechanism for the evolution of contracts to seek institutional arrangements with lower transaction costs. Another is the elimination of mechanisms by which refined use of local knowledge can lead to discovery of beneficial institutional arrangements that cannot be discovered by even the most thoughtful regulatory bodies. The contention that regional independent transmission providers form the best institutional structure falls prey to this criticism, if this structure is implemented as a static and inflexible institution. The combined federal and state regulation of the industry complicates the entry barrier story even further, as does the disincentive to transmission ownership consolidation posed by the combination of capital gains taxes and antitrust legislation.

1. Technological Change and Contestable Transmission

Institutional change in the electricity industry should also incorporate the effects of technological change in one segment on the competitive dynamics of the whole industry. A regulatory approach that treats the segments of the industry (generation, transmission, distribution) separately undermines the potential benefits that changes in one segment can create in another. Such a "silo" regulatory system overlooks and fails to either incorporate or encourage possible competition from other parts of the value chain in the industry, and locks in inefficient investment choices.

Technological change has also helped create the environment and the incentives for the deregulation and restructuring efforts that we have seen thus far. As the technology of generation has changed, the economics of generation have also changed, and large power plants are no longer the only way to lower the long-run average cost of producing electricity. Technological change has made distributed generation possible and more cost-effective over time. It has also improved transmission's ability to carry electricity over longer distances with less line loss. More importantly, though, technological change in generation has changed the economics of transmission, making it more contestable.

> *Transmission policy, though, is still based on the premise that transmission is a natural monopoly, and therefore should continue to be regulated.* [7]

The idea that redundant electricity transmission would be unnecessarily costly continues to permeate public policy regarding transmission, including the SMD proposal. This perspective does not incorporate due consideration of other alternatives to the existing transmission grid, such as distributed generation, nor does it acknowledge the security benefits of redundant systems.

Technical change and contestability hold the keys to a dynamic electricity industry. Contestability is an important feature of competitive markets because it promotes dynamic efficiency. Often the threat of potential competition can deter a company from raising its prices, because it knows that by doing so it may attract competitors. Electricity transmission faces some possible competition from entrepreneurs who may be willing to lay parallel lines (as with natural gas and telecommunications, redundant systems could be profitable and cost-effective), but the more pressing competition could come from transmission of fuel to distributed generation sites instead of transmission of electricity.[8]

Technological change holds a lot of promise, as it has throughout history, for promoting contestability in transmission. Distributed generation and fuel shipment could serve as a competitive alternative to transmission; superconductors, new drilling and digging methods, and other technological changes could change the relative costs of laying redundant transmission lines. Obstacles to technological change include the ongoing monopoly franchise and the ensuing rent-seeking.

For example, distributed generation (DG) technology could provide substantial contestability for electricity transmission. Technological change has made DG sources such as gas turbines, microturbines, and other small-scale generation systems more economically viable. Capacity constraints and institutional volatility, as seen in the recent California crisis, have also contributed to the growing appeal of DG alternatives. Distributed generation equipment manufacturers also tout redundancy as a security benefit that customers would enjoy from implementing DG systems (a selling point that was particularly effective when customers had Y2K concerns about off-site power).

DG creates contestability in transmission by enabling customers to substitute DG for electricity transmitted across the grid. This alternative could be particularly attractive to large industrial customers, who could build in as much reliability and redundancy as they believe they need for their operations without the need to construct (or get someone else to construct) elaborate, expensive grid capital. Some institutional and regulatory characteristics of the industry do hinder the adoption of DG, though.[9] The public utility's obligation to serve customers, and the customer's commensurate obligation to be served by the public utility, is changing very slowly in the face of such technological change.

Industry participants have already created and implemented many sophisticated approaches to competition and innovative contracting, and FERC incorporated recognition of these benefits into Order 2000. The current SMD proposal, though, appears to be an attempt to impose a single top-down institutional structure in the industry. Such an imposition is unlikely to generate the benefits of a more dynamically competitive institutional structure with fewer artificial barriers to entry.

Critics of the relevance of contestability in electricity transmission point out that to achieve the efficient outcome seen in perfectly competitive markets, the industry must have zero sunk costs. In an industry with sunk costs, the contestability model predicts that the actual outcome will not be the efficient outcome.[10] Sunk costs are a substantial factor in electricity transmission. That fact does not imply, however, that contestability is irrelevant in electricity transmission; rather, contestability in reality will occur to varying degrees in different industries and under different conditions, depending on the institutional environment, the regulatory environment, the demand characteristics in the industry, and technological change. For example, "even in the presence of sunk costs, however, the natural monopolist may have difficulties in sustaining its position if technology is advancing quickly, or if firms in other industries are making similar advances."[11] Critics who dismiss the potential for contestability to deliver real benefits to consumers and innovative producers commit Demsetz's "Nirvana Fallacy" by comparing a situation in reality to an idealized situation that is not likely to exist. Instead, policymakers should compare a regulatory environment that is sufficiently flexible to allow market participants to exploit what contestability there is to the real policy environment of the government-granted monopoly franchise. The existing regulatory and policy environment places a downward bias on incentives to discover and implement alternatives to electricity transmission, from redundant wires to distributed generation.

2. Transmission Policy Must Be Flexible to Evolve

An institutional structure that removes barriers to entry would also be more flexible than traditional regulatory institutions. Efficiency over time depends on institutions that are economically and politically flexible enough to adapt to opportunities and encourage innovation and risk taking.[12] Institutions that do not adapt to discovery will wind up increasing transaction costs as the wedge grows between efficient practices and behavior accommodated by the static institutions. Increasing transaction costs in turn obscure or even eliminate opportunities for beneficial discovery and for direct market evolution. Contestability, for example, can be stifled by high transaction costs caused by static regulatory schemes that limit contract flexibility.

Thus the point of flexible transmission policy should be to allow institutional arrangements that lower transaction costs (along with regular costs) according to unique, local, and dynamic conditions. Even with institutional change to decrease transaction costs, such as the proposed SMD, transaction costs in electricity transmission are bounded away from zero. The physical constraints of Kirchoff's Law, according to which electrons follow the path of least resistance in an alternating current grid, imply that power buyers and sellers will not be able to write a complete contract guaranteeing electron delivery from one to the other given current technology. But that does not mean current costs are closer to zero than the competitive alternative.

The relevant question is: can we better decrease transaction costs through dynamic competition or regulation? There is a long-standing argument that regulation does so, that the transactions are too complex and transaction costs too high in a competitive market. However, consider the California state regulators at the Department of Water Resources, whom Governor Davis pulled into the electricity buying business only to learn just how inexperienced and handicapped they are relative to private-sector traders. Professional energy

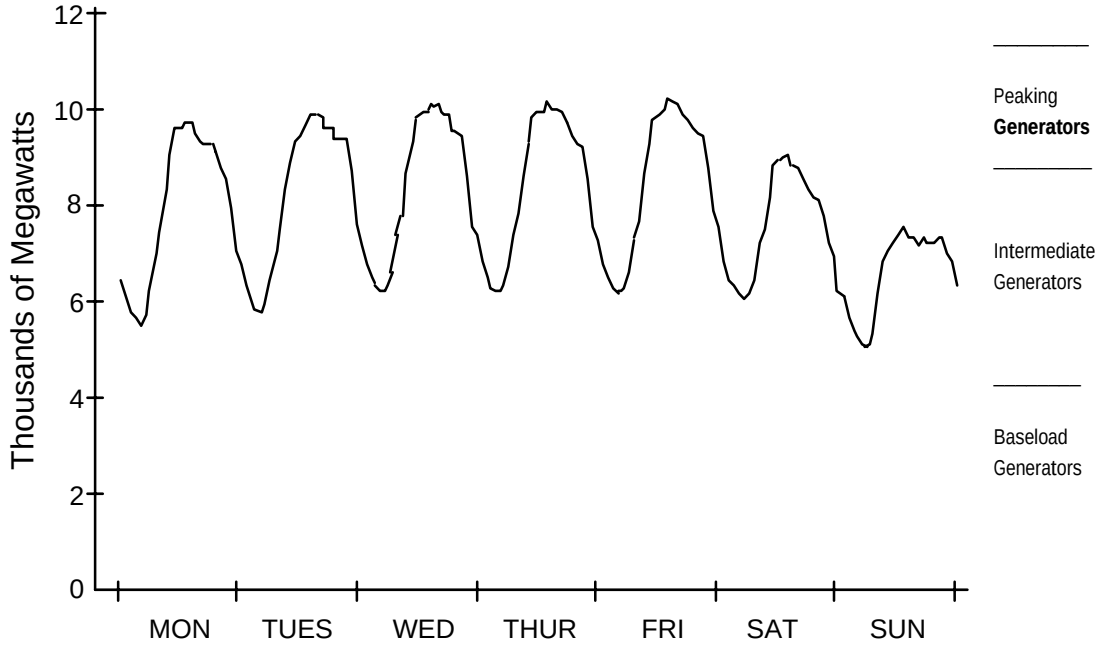
traders had built up substantial transaction-cost-reducing human capital and developed contract paths that reduce transaction costs in ways that the regulators had not envisioned.

FERC-imposed institutional change via the SMD proposal may lead to more costly and inefficient electricity provision compared to institutional change that could evolve out of the flexibility to opt out of RTOs and build distributed generation, develop new contract paths, or some other unknowable future change that path dependence could forestall. That path dependence could also lead to the construction of more transmission grid assets than under a more flexible transmission policy, leading to excess and inefficient investment. Only through removing regulatory obstacles will we be able to discover and achieve optimal transmission investment.

C. Market-based Retail Pricing Is Necessary For Efficient Investment

Since state regulation of the electricity industry commenced in 1907, retail customers have faced average rates that change infrequently. Retail electric service is provided on a guaranteed-price basis, under the regulatory "obligation to serve" remit. In terms of consumer expression of their demand, these regulated rates have meant that consumer demand signals are metered, aggregated, and transmitted to suppliers on a *monthly* basis. With such unchanging rates, the demand or typical aggregate load profile fluctuates greatly across the day, as shown in Figure 1.

Figure 1: **Actual Weekly Load Curve:**
An example of the demand for electricity over one week



Source: Vernon Smith, personal correspondence

Because of the "obligation to serve" requirement facing utilities as part of traditional retail regulation, utilities must be able to generate or buy enough power to satisfy peaks throughout the day. Put another way, the responsibility for satisfying all consumers, whenever they want power, rests with the suppliers. Fixed, regulated rates mean that consumers have no incentive to take on any of that responsibility. The result of this supply-focused approach is excess of generation capacity, because suppliers are required to serve all demand, whenever it occurs, without changing prices to reflect the different costs of serving that demand at different times. Retail prices cannot change even though costs do change, as captured in the three different types of plants used by the industry and in these electricity experiments.

Retail customers still overwhelmingly face guaranteed average prices in the form of rate caps, even in states that have implemented some measure of deregulation. The states that have retained their regulated, vertically integrated industry structure still have guaranteed average wholesale prices, in addition to fixed retail rates for customers. In states that have implemented restructuring, the political compromises that have been required to move restructuring forward have led to a regulatory environment in which wholesale electricity markets and retail rates are still largely disconnected. Such price caps reduce the incentives of customers to participate in demand response programs that send informative price signals into the wholesale market. Many studies have shown that the demand for electricity is definitely downward-sloping, indicating that consumers do have some price responsiveness, and that responsiveness can change as frequently as hourly. Fixed retail prices remove the price signals that would enable consumers to respond and act on those price sensitivities, and ignore the diversity among customers in their demand. Taking advantage of that diversity would lead to improved investment incentives, lower costs, and well-served customers. It would also be likely to reduce the required investment in transmission assets that a purely wholesale market focus would produce. This possible overinvestment in transmission is one of the main problems in the SMD proposal.

The benefits from implementing market-based pricing are varied and extensive. Market-based pricing emphasizes the information content of prices, an aspect of prices that frequently gets overlooked in political debates like the ones that occurred in California in 2000 and 2001. The most important features of market-based pricing and demand response arise when consumers can choose how much of the real cost of power they see over which time period, and when they have the corresponding choice of prices to face. An important policy distinction arises between customers being *required* to see hourly prices, and customers having the *opportunity* to see hourly prices. We recommend eliminating regulatory barriers to customers having the opportunity to see hourly prices. Eliminating this barrier would allow retail consumer information to flow into wholesale markets, improving the efficiency of wholesale markets and optimizing the required investment in infrastructure such as transmission.

Market-based pricing increases competitiveness of electricity markets and reduces the severity of price spikes. Customers who adjust their use in the face of price volatility help reduce the magnitude of price spikes. Shifting demand from an expensive hour to a cheaper hour lowers equilibrium price in the expensive hour and may increase it in the cheaper hour.[13]

Market-based pricing also gives consumers an explicit way to hold generators accountable for their wholesale pricing decisions. Market-based pricing integrates wholesale and retail markets; that integration means that customers may face wholesale electricity prices more directly, and therefore will be able to shift their demand away from hours with high wholesale prices. Thus removing the artificial regulatory barriers from the demand side disciplines firms that could otherwise exercise market power in a one-sided, supply-driven market.

In markets that have only supply-side bidding (a one-sided market), suppliers can manipulate prices more effectively than in double-sided markets where consumers can act on their preferences and the prices they see in the market. Market-based pricing reduces the exercise of market power by changing the shape and size of the peak/shoulder/off-peak demand curves, known as load shaping. Furthermore, the benefits of lower prices accrue to all consumers, not just those who actually do shift their demand, because others will also see lower overall and peak prices. These peak-period reductions also increase reliability of the network.

The recent electricity experiments of Vernon Smith, Bart Wilson, and Steve Rassenti illustrate the power of experimental methodology to create information about what is likely, and what we cannot predict, from different features of electricity deregulation, particularly demand responsiveness and two-sided markets. The experiment's participants are electricity generators, participating in a wholesale generation market. They are the supply side of the market, and they can own different types of generation capacity – baseload (low cost), intermediate cost "load followers", and high-cost peaking units. These levels realistically reflect a typical supply curve, in which generators run their least expensive units until they hit capacity, then move to the intermediate-cost plants, and only run the expensive peaking plants during periods of peak load. Generators bid by submitting schedules of asking prices for their capacity in a given period, and all generators receive the market-clearing price. These rules mirror those found in many wholesale electricity markets. Generators can also have market power, depending on what kind of capacity they own and how concentrated that ownership is.

In presenting the economics underlying the power of consumer demand in electricity markets, Rassenti, Smith and Wilson analogize between the electricity industry and other industries, particularly the airline and hotel industries. All three are service industries, facing peak demand that fluctuates and that determines capacity, with substantial capital investment requirements to satisfy demand. In competitive markets for airline travel and hotel rooms, where both consumers and producers can provide and respond to price signals, rates typically go up in peak demand periods and plummet in off-peak periods. The high rates in peak demand periods, rates that certainly exceed marginal cost, pay for the capital that is necessary to satisfy the peak, and the interaction of these price signals lead to optimal capacity investment.

Facing uncertain, peaking demand does not mean, though, that all customers who want a seat or a room at peak will get it at a price they are willing to pay. Hotels and airlines do not operate under a regulatory obligation to serve, yet consumers deal with the fact that they might not be able to consume the flight or the hotel room they want when they want at the price they want. They shift their demand to different times, trading off convenience for cost depending on their individual preferences. Thus the comparison with the airline and hotel industries reveals exactly the extent to which the "electricity cannot be stored" rationale for regulation is a canard – airline travel and hotel service cannot be stored either, yet no one is arguing that these industries should operate under "must serve" obligations like those in the electricity industry.

Rassenti, Smith and Wilson[14] compared two bidding systems in a wholesale electricity market – one with only supply-side bidding, and one with both supply-side and demand-side bidding. The demand side of the experiment proceeds as follows: take a very simple rule by which consumers can choose whether or not to let the retail electricity supplier interrupt their service at a couple of different points, and see what effect that rule could have on the outcomes in the wholesale market. They then divided the demand into four types: must-serve demand, off-peak demand, shoulder demand, and peak demand. Under fixed retail rates, all demand is essentially must-serve demand, including the high peaks. One of the important things to learn in this experiment is whether allowing consumers to choose to have their demand interrupted at two different prices

would lead to increased consumer benefit, increased supplier profits, and any change in the ability of suppliers to exercise market power in the experiments when they have it.

The generators then have to choose prices at which they bid into the wholesale market; in some experiments the generators face perfectly inelastic must-serve demand, and in some experiments they face consumers who can choose to have their service interrupted. In their experiments the timeframe is several days (compressed into a few hours), so the generators experience bidding over the fluctuating demand cycle. And, at the end of the day, the participants get to keep their profits, so the incentives are real.

With no demand-side responsiveness, suppliers with market power were more able and more likely to exercise it by withholding capacity. In the experiments with both demand-side and supply-side bidding, suppliers with market power were not as able to exercise it, and price fluctuations were smaller. Not only were average prices lower, but the variance of prices was also lower; demand responsiveness reduced price levels and price volatility, even in the face of supplier market power. When suppliers did not have market power, demand responsiveness still led to lower and less volatile electricity prices.

Market-based retail pricing is a crucial component of the ability to deliver choice and value to customers. Fixed, regulated average rates are an obsolete relic of a regulatory approach that, if it persists, will stifle the application of creativity in this industry. If utilities, regulators, and politicians consider the possibility that utilities can offer different value propositions to their customers than just “juice coming through the wall”, utilities can benefit from using market-based pricing as a tool for offering an attractive portfolio of service options to their customers. Creating value from this change, though, requires vision, and getting the transitions and the institutions right can be extremely tricky. Consumers will change how they think about buying electric service, and what that service is, exactly. For that change to occur, politicians and regulators will have to act on the leadership and vision that would allow consumers to take responsibility for their individual purchasing choices.

The mismatch between real-time wholesale supply signals and fixed, average demand signals will continue to send the wrong transmission investment message to capital markets. Nonexistent price signals lead to poor investment choices, and thus run counter to the primary objective of the SMD proposal.

Part 3

Political and Jurisdictional Barriers to Simple Rules

Achieving integrated, competitive wholesale and retail electricity markets is made more difficult by the bifurcated regulatory jurisdiction between federal and state that keeps wholesale supply and retail demand from sharing information through market exchange. The most parsimonious, simple, unmanipulable approach to institutional change in electricity involves bridging state and federal jurisdictions to enact beneficial institutional change. The SMD proposal focuses on wholesale markets and transmission in isolation, not on ways to encourage a more market-based retail approach. As long as the SMD proposal and electricity policy in general remain so supply focused, electricity policy will be like one hand clapping, leading to potential overinvestment in transmission and costly future revisions of institutions.

Absent the ability to implement the simplest set of rules because of jurisdictional constraints, the SMD proposal runs the risk of compounding regulatory intervention with further regulatory intervention. Market monitoring and market power mitigation are potentially the most costly of these band-aids; "… because market power mitigation may tend to suppress scarcity prices that signal the need for investment, a companion mechanism besides spot prices is needed."[15] In other words, FERC argues that the inability to unleash the disciplining power of retail demand response requires market power mitigation, which reduces investment incentives by not producing scarcity rents. They, therefore, must build in some other investment incentives. In the case of market power mitigation, the jurisdictional constraint away from retail demand response leads to the layering of regulation upon regulation, all in the name of competition.

Another example of the cost of a supply-focused approach arises in the recommendation for a west-wide regional transmission organization: "a west wide RTO, … is the best vehicle for designing and implementing a long-term regional solution."[16] While a west-wide RTO may be the best supply-focused vehicle, it is still inferior to an approach to reliability and system balancing that integrates supply-side and demand-side participants to manage regional investment decisions and mitigate supplier market power.

Even if these jurisdictional constraints mean not achieving that integrated wholesale-retail simultaneous deregulation in this SMD proposal, what gets implemented in the SMD should be flexible and *reversible*, with phase-out provisions as demand response and market-based pricing expands.

Part 4

Conclusion

FERC's standard market design proposal addresses supply-side issues, particularly transmission ownership, investment, and congestion pricing. The spirit is right and the effort is thorough and admirable. But a supply-side-focused institutional change is still only one hand clapping. The standard market design should be couched more in the long-run benefits and objectives of creating a collaborative regulatory environment that enables demand-side and supply-side incentives and knowledge to interact, which is the best way to perform market monitoring, discipline suppliers, and provide optimal dynamic investment incentives. Furthermore, the unwillingness to encourage competitive transmission by removing regulatory barriers to entry in the transmission sector of the value chain creates a market design proposal that compounds market interventions with further market interventions, instead of unleashing the benefits of integrated supply and demand in markets.

Retaining transmission entry barriers and retail average cost pricing ensures that transmission investment arising from the SMD proposal will be inefficient (except by chance). Entry barriers and the lack of demand response silence the most powerful information transmission mechanisms available – price signals that tell investors how much to build, and that also discipline supplier market power.

While they intend for this institutional change to encourage competition and healthy markets in the industry, the proposed standard market design does not capture the benefits of contestability of transmission, particularly from technological change in other aspects of the industry. As such, this structure risks decreasing the possible benefits that could arise from true competitive order in electricity transmission, and risks locking the industry into a relatively static institutional structure that resembles the traditional industry more than it does a dynamic, flexible one.

Transmission's degree of contestability depends heavily on barriers to entry into ventures that could compete with transmission. The higher the entry barriers, the lower the contestability and the more able a transmission owner is to exercise market power and raise prices. FERC's current effort to coordinate DG interconnection standards across states will reduce technical entry barriers, in keeping with the technological change that has made DG scale small enough to provide a real threat of competition to transmission. DG is but an example of the technological possibilities for competition with the grid.

The largest remaining barriers are regulatory. The traditional, service-territory-defined government monopoly franchise and the ongoing natural monopoly regulation of transmission are the greatest barriers to potential competition against transmission. They are also the worst impediments to the application of technological change in ways that will create choice and benefits for consumers. Until artificial entry barriers

facing transmission's competitors change, transmission's contestability, and the delivery of efficiency gains and choice to consumers, remain off limits by legal construct.

FERC is coming at the problem from the wrong side – the supply side – because that is where it has jurisdiction. Addressing the demand side, making it more responsive and enabling customers to convey price signals into the market, would result in more efficient wholesale infrastructure investment than the detailed set of rules laid out in the standard market design proposal. While FERC does not have demand-side jurisdiction, it should ensure that the supply-side standard market rules it implements do not interfere with (or perhaps even encourage) the development of demand responsiveness at the state level. Only by implementing rules that will adapt to the unknown can FERC create a forward-looking, enabling institutional foundation for integrated, competitive wholesale and retail electricity markets.

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Endnotes

[1] Vernon L. Smith, "Currents of Competition in Electricity Markets," *Regulation*, Summer 1987, p. 29.

[2] Federal Energy Regulatory Commission, *Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity Market Design, Notice of Proposed Rulemaking*, Docket Number RM01-12-000, July 2002, web version (pdf), paragraphs 88–89.

[3] Ibid., p. 44.

[4] Ibid., p. 128.

[5] Ibid., p. 139.

[6] We are grateful to Tom Lenard of the Progress & Freedom Foundation for posing this thought experiment.

[7] While somewhat outdated by now, this statement captures the fundamental idea underlying the ongoing regulatory treatment of transmission:

And even though economies of scale have disappeared in the generation segment of the industry and competition is considered workable there, there are still tremendous economies of scale in transmission that make competition in this segment of the industry unworkable. Consequently, transmission providers will likely continue providing services as franchised monopolies subject to cost-of-service regulation at the local, state, and/or federal level.

Martin Baughman, "Investing in Transmission Facilities," in Hung-po Chao and Hilliard Huntington, eds., *Designing Competitive Electricity Markets* (Boston: Kluwer Academic Publishing, 1998). This statement is outdated because subsequent proposals in Order 2000 would implement performance-based ratemaking instead of cost-of-service or rate-of-return regulation. However, the monopoly franchise persists, as does the belief that transmission should continue to be regulated as a natural monopoly and redundant entry should be blocked by law.

[8] Liles provides a compelling argument for why transmission is contestable, and why, therefore, for-profit transmission companies are viable, in James Liles, "Merchant Transmission: Building a Grid That Wall Street Can Understand." *Public Utilities Fortnightly* September 15, 2001, pp. 24–36.

[9] The uniform generation interconnection standards across the states that FERC is currently pursuing would reduce transaction costs and entry barriers to such new technologies as distributed generation and help reduce the demand for transmission services. Such standards would therefore reduce the amount of additional necessary grid construction and would move toward increasing contestability of transmission.

[10] William Baumol, John Panzar, and Robert Willig, *Contestable Markets and the Theory of Industry Structure* (New York: Harcourt Brace Jovanovich, 1982).

[11] Peter Hall, *Innovation, Economics and Evolution* (New York: Harvester, 1994), p. 204.

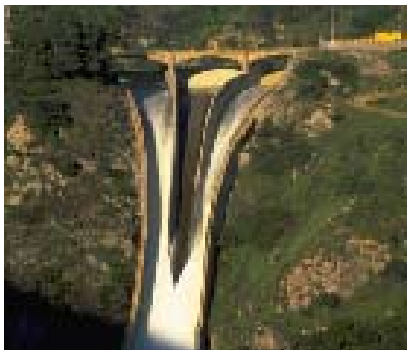
[12] Douglass C. North, "Transaction Costs, Institutions, and Economic Performance," International Center for Economic Growth Occasional Paper No. 30 (San Francisco: International Center for Economic Growth, 1992).

[13] Price might not rise in the less expensive hour because generators are often willing to accept lower prices to avoid having to shut off generators in that hour.

[14] Stephen J. Rassenti, Vernon L. Smith, and Bart J. Wilson. (2001) "Turning Off the Lights," *Regulation*, Fall, 2001.

[15] Federal Energy Regulatory Commission, pp. 8–9.

[16] Federal Energy Regulatory Commission, p. 21.



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