

Governance of Electricity Markets

Conclusions:

- Markets should strive to reach the goals of providing reliable and affordable energy to consumers and delivering a fair return on investment; therefore, the hybrid regulated/unregulated wholesale and retail electricity markets should be evaluated on their abilities to:
 - Provide an environment for long-term capital intensive investment - such as nuclear and renewable generation, transmission, and carbon capture and storage infrastructure; and
 - Offer a return on investments that produce greater energy efficiency as well as on those that increase energy supply.
- Unlike conventional commodities, electricity production and distribution involves a variety of additional social and political issues.
- The optimal model for wholesale electricity regulation remains in dispute. Organized wholesale markets serve three-fourths of the United States population and its economic commerce. This demonstrates that central market principles are accepted, but it is generally recognized that they can be improved.

- The Regional Transmission Organization (RTO) construct provides a forum for debates on how markets will continue to evolve.
- New grid technology continues to allow for more dynamic processes affecting markets and to influence how decisions are made to keep supply and demand in balance.
- Retail electricity systems will continue to differ across states. State regulators should harmonize retail regulation to capture the benefits of and avoid unintended consequences on competitive wholesale electricity markets.
- The U.S. will be adjusting a hybrid system of regulated and market systems for the foreseeable future. These changes will continue during a difficult period in which real electricity and commodity fuel prices are rising, new generation is needed, and the regulatory regime is uncertain.

Organized Wholesale Markets

The public debate about the optimal model for electricity regulation involves determining how best to achieve the public interest, including balancing the consumer's desire for reliability and reasonable prices with the supplier's need to attract investment. While reliability is not inconsistent with competition and increased economic efficiency, cooperation between consumers and suppliers is required to evaluate risks and to protect investors. U.S. electricity policy makers and market participants will therefore be fine-tuning a "hybrid" system of competition and regulation for the foreseeable future.

To determine the right market signals, there needs to be agreement on the primary functions of electricity service. Among regulators, producers, suppliers and consumers, negotiation takes place to stabilize the accepted standards for:

- Adequate capacity and supply,
- Affordability and economic development,
- Price volatility, and
- Consumer confidence.

Overlaid on these standards are societal mandates such as environmental regulations and fuel requirements.

Electricity deregulation began as an attempt to encourage competition in the generation and wholesale selling of power, with the Federal Energy Regulatory Commission (FERC) present to help balance competition with necessary regulation. The first step of deregulation began with many states breaking up vertically integrated monopolies and segregating companies' generation revenues from the revenues made serving customers and delivering power. Financial theorists and engineers have since enabled the market to be further subdivided so that transactions can take place based on more than simply the physical processes of making and delivering electrons. Now creative financial instruments allow buyers and sellers to trade in the volumes of electricity that can be made and distributed. Investors can buy electricity before it is made and sell it before it is needed. Space on transmission lines can be sold like real estate.

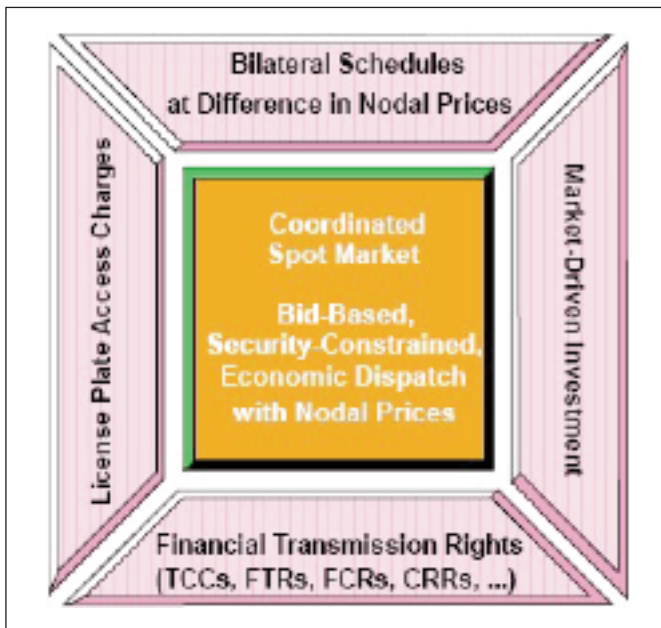
Market players today continue to negotiate what they want the power markets to achieve with respect to:

- Real-time and forward price transparency,
- Price risk mitigation,
- Credit risk mitigation, and
- Low barriers to entry.

The challenge for market participants results from the complex interplay among incentives, rules and networks. As organized markets have developed over the last decade, there have been many compromises and mistakes, but the framework has generally proved workable in such places as New England, New York, the Mid-

Atlantic Region, and the Midwest. Today, three-fourths of the population and economic commerce in the U.S. is served by organized wholesale markets. The Forum explored how this system allows private companies and public utility commissions around the country to evaluate options for a future characterized by capacity requirements, efficiency initiatives and carbon constraints.

Electricity Market: A Consistent Framework



Despite some mistakes, central coordination of wholesale markets provides a framework that is working in places like New York, PJM in the Mid-Atlantic region, New England, and the Midwest.

The RTO concept, developed by FERC in response to Congressional mandate, creates an environment for market negotiations. The leveled playing field has attracted new players to the utility market that deal with derivative products. However, many participants in organized markets miss forward price transparency and do not see market forces making that available. Without information to anticipate future costs, regulators fear consumers will face load imbalances, limited supply and high prices.

In some cases, state regulators use various mechanisms to define the composition of the native load of a traditionally regulated utility, determining the traditional resource requirements for retail and wholesale customers. The regulatory precedents attempt to satisfy a utility's obligation to serve at the least or best cost. But in those traditional cost-of-service states, capacity requirements often eclipse demand reduction goals, leaving prices subject to greater volatility.

Forum participants shared diverse opinions regarding the success of hybrid markets, and they built on experiences from both retail and wholesale structures to make recommendations for the future. The desire to mitigate price risk has suppliers looking for hedgable products they can use. Some industry participants expressed concern that with the introduction of financial transmission markets, competition and regulation may be at odds. While deregulation may have protected consumers by breaking up the formerly vertically integrated utilities, further developments in the market have, by some estimates, put consumers at risk. Others see these actions as efforts to undermine wholesale markets and standard market design.

One argument in favor of organized wholesale markets is that they have done a better job than bilateral markets in developing efficiency and renewables. The most telling example is wind: 75 percent of wind energy capacity is in organized markets although these regions have only 40 percent of the wind potential. These markets do a better job integrating wind technology because they have centralized dispatch and redispatch to accommodate the vagaries of an intermittent power source. In this case, competition drove adaptations to maximize results and promote service delivery. This led Forum participants into further discussion of whether markets or government could be more efficient in introducing new and improved technologies.

The Forum discussed the potential for transformational technologies and new service models while raising questions about the priorities that would result from choices driven solely by the market. Because climate and global energy vulnerabilities are national concerns, the taxpayers should bear some of the cost and risk of mitiga-

tion. To let the markets alone explore how to meet today's challenges would be too time-consuming and too uncertain. Most Forum participants believe rate makers and government should push research and development and deployment policies for technologies that are in the national interest and that markets should be organized to allow deployment to happen efficiently.

There remains no question that organized markets are controversial. One Forum participant summarized the arguments for and against: "If regulators knew what needed to be done, then there should not be as much regulatory uncertainty as exists. However, if markets performed as they should, getting the prices right should be simple."

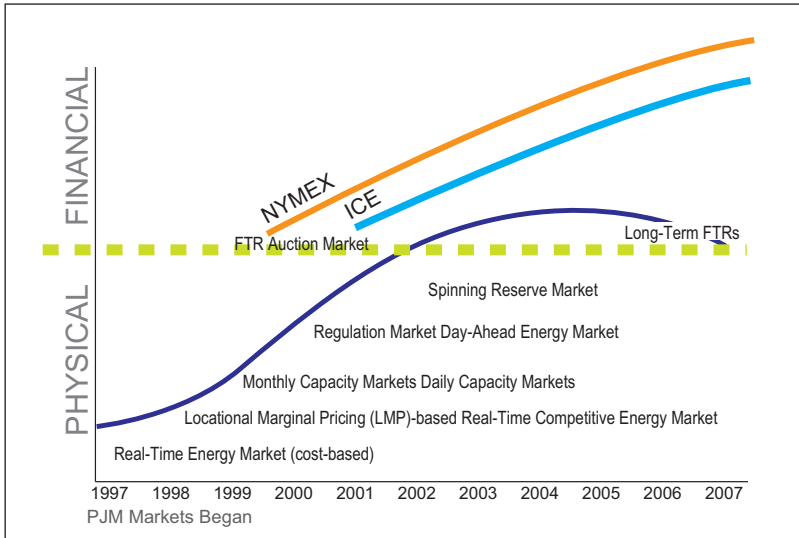
Improvements and Corrections

Many industry leaders accept the market design that has emerged over the last decade, but they recognize that improvements are needed. Some recommend the bid-based, security-constrained nodal model. These markets reflect what is actually happening in real time every minute of the day. Things can go wrong, plants can go off line, transmission can go down; but nodal models help prices reflect real time events so that customers can respond to such contingencies. Decision makers work to allow the benefit of the wholesale model to flow through to retail customers. While adaptations for residential customers are more difficult, large-scale commercial or industrial retail customers have already offered examples of how they can respond to externalities in real time.

A Forum participant offered an example of such an adaptation. In a particular pulp and paper plant, the plant's grinders can be shut down on short notice while paper making machines have to run continuously. Price volatility caused a reaction from this customer, and they adopted a sophisticated hedging behavior. Calculating the price of pulp versus electricity, they devised a pulp storage system to feed paper machines while grinders are shut off when electricity prices shoot up. Subsequent price increases yielded no complaints to the utility because

the customer had hedged against the price. While Forum participants appreciated the effectiveness of this solution and the demonstration of successful nodal markets, one industry observer noted such markets are complicated and therefore politically vulnerable.

Markets Lifecycle



Source: PJM

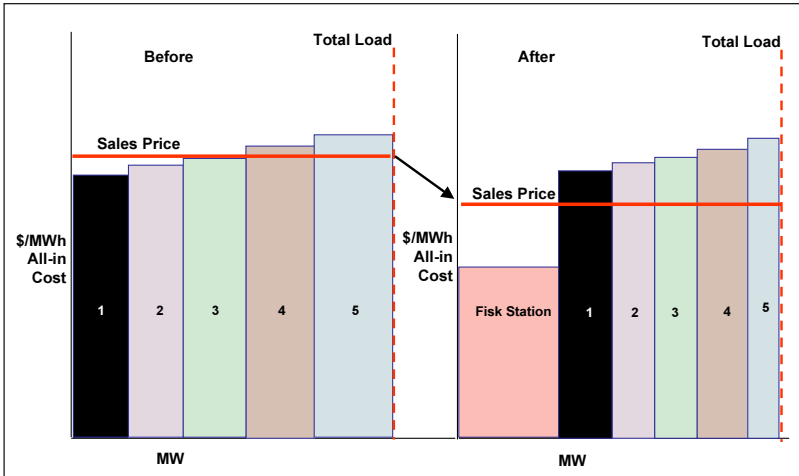
Transactions in the electricity markets have evolved to take place in both the physical and financial realms, accounting for not only electricity exchanges, but also transmission capacity and volumes, financial flows, and load balancing.

The majority of U.S. electricity markets now settle on physical network locations (nodes) as a result of the efforts of RTOs. Some suppliers believe electricity is best served by an exchange, as are other commodities which have many suppliers, high volatility, and low differentiation. Because of the lack of a proper exchange, however, electricity trading lags behind other commodities in the trading multiple over physical delivery. Financial transmission rights move in this direction to expand the tradable products based on the commodity, but currently the available goods for power transactions do not adequately cover customer needs and risks.

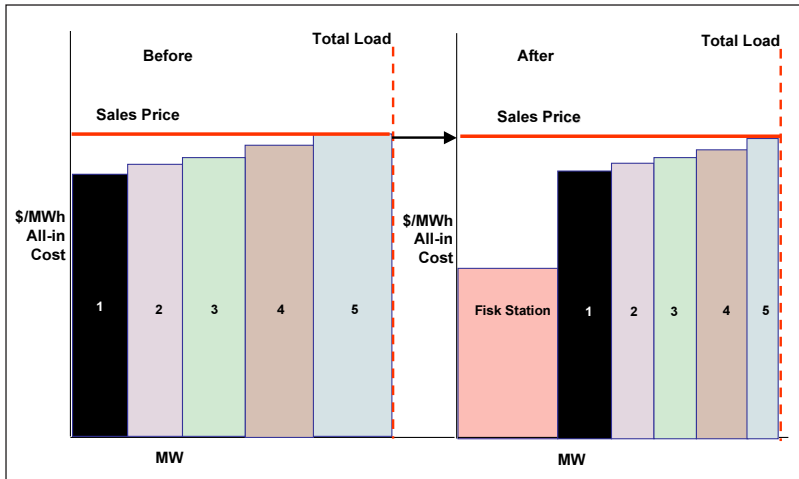
Some industry leaders are greatly concerned by the way in which regulators respond to the problems with market design. One participant made a distinction between “Big R” and “little r” regulation. “Big R” regulation involves ad hoc fixes to each separate problem, sometimes creating other problems that must then be fixed by additional regulation. “Little r” regulation involves the design of general rules and policies to support competitive wholesale markets, relating any necessary fixes to the overall framework. Today’s operating reserve requirements are an example of “Big R” standards, disconnected from pricing and the implied value of lost load. A “little r” solution would incorporate the cost and probability of lost load into the price of electricity and not require separate reserve requirements.

Another expert argued that the pendulum may have swung too far in the direction of competition. With essentially all generation in organized markets now being priced at marginal cost, there is no “ballast” of average cost power in the system. Using Samuel Insull’s transformational 1903 Fisk Street Station as an illustration, he showed how Insull brought prices down. By adding the largest, most technically advanced, lowest-cost generator of its time to Chicago Edison’s fleet, Insull reduced average costs and therefore the average sales price. Today, with marginal cost pricing, adding additional low cost capacity could leave the sales price unchanged, with all the economic rent going to the generator.

Fisk Street Station in 1903



Fisk Street Station Transported to 2007



Source: Cogentrix

With average cost pricing, Samuel Insull's large Fisk Street Station allowed Chicago Edison to lower their average sales price in 1903. With pure marginal cost pricing, the price to customers would not decline.

State Regulation

In light of rising fuel prices and other factors, many state regulators and others are most comfortable with the cost-of-service regulatory model. Advocates of an integrated resource planning (IRP) approach, they do not intend to sacrifice technological advances and expect to get the best generation mix on a state or regional basis. Through a public advisory process, utility companies will provide information to the public, and receive and consider input, regarding the development of their IRP. Topics to be discussed within the process will include load forecasts, evaluation of existing supply- and demand-side resources, assessment of the need for additional resources, identification of resource options, modeling and risk assumptions and the cost and general attributes of potential additional resources, and development of the most cost-effective portfolio of resources. A passionate statement of concern about the impact of high electricity prices on low and middle income consumers was offered by one Forum participant as a counterpoint to the “little r” argument for getting the prices right.

The California market meltdown and more recent retail rate shocks in Illinois, Maryland and other states have inspired movements for re-regulation. Forum discussion of re-regulation displayed fears that, although most efforts are focused on retail regulation, the benefits of developing wholesale markets could be diminished. Some industry leaders believe the rush to re-regulate is due to the reactions to rising prices and argue that rate shock is an insufficient reason to re-regulate. Almost all Forum participants agreed that multi-year rate caps in a time of rising prices guarantee rate shocks and should be avoided.

Some experts believe that the remaining unregulated states will modify their frameworks to reflect a hybrid version of what they used to have, including some version of the least-cost, utility obligation-to-serve model. These modifications will include conditions for:

- Reliable service,
- Reinstitution of cost-of-service rates for a substantial amount of baseload capacity,
- Life of unit and plant life extensions, and
- Least cost IRP process.

By law, FERC focuses on wholesale markets, and demand response and energy efficiency are becoming part of organized wholesale markets. Although they have traditionally been a focus of retail regulation, they are being incorporated into RTO and ISO tariffs authorized by FERC. From this perspective, integrating retail regulation into market design is critical.

The hybrid system demonstrates a blend of retail and wholesale, but not everyone in the industry believes they can remain segregated. Finding collaborative ways to look at retail and wholesale together will increase understanding of the overall market and will help set price signals that reflect real cost. But some opinion leaders contend that addressing retail issues through the structure of wholesale markets is not the solution. They see a need for stability and seek regulatory standards that will pass through signals to customers.

Encouraging Investment

Rising fuel prices, the need for generation and transmission capacity, and uncertain regulatory regimes all work against any moderation in pricing. These factors bring together public and private interests in both organized and bilateral markets. In all markets, participants are seeking long term predictability for massive capital investments. High asset values are being translated into the marketplace with aggressive buyers who are willing to pay for the opportunity to generate electricity in competitive markets. Locational pricing signals will serve to place generation where it will be most valuable.

Decision makers throughout the system agree that supply options will have to be robust, sustainable, and competitively priced. Consumers and investors need to recognize the value they receive from infrastructure investment in terms of both enhanced reliability and mitigation of environmental impacts. Capital investment takes place along a complex series of points in each energy chain. As improvements occur from the pipelines to the plugs, those costs will have to be paid by suppliers, producers or consumers. The issues are: Who pays for what, who owns what, how are revenues allocated, and who decides?

One participant argued that the energy industry requires “cathedral thinking”—an overarching vision, a desire to build for the future, and a coherent plan that will guide everyone who helps build the system. Such thinking can be consistent with the hybrid regulatory system that is developing if government and industry leaders set out the vision.

Some companies and investors believe the government should create markets that allow and encourage investment of private capital. They contend that confidence in markets will attract capital from a blend of investors and promote reliability. If markets are directed, they will not be successful in determining what is needed, and the flow of trade and investment will be limited.

Other industry and financial leaders would like to see regulators support contract structures for project finance of all new technologies, not just public subsidies for some. They argue that markets can deploy new generation faster than government, and that subsidies can be far less effective than contracts in attracting both debt and equity.

One Forum participant noted that businesses in general have learned how to deal with investment decisions despite uncertainty. With a probability curve of outcomes, existing management techniques can guide decision makers. For large capital investment in regulated industries, however, one major challenge comes from risks related to future regulation. He noted the example of low-carbon baseload generation. On the basis of only the expectation that a cost

will be assigned to carbon emissions, coal plants have become risky investments and therefore less attractive to utilities. In the short term, utilities use the stopgap measure of natural gas, despite its volatile price. This near-term solution defers efforts to advance significant long-term solutions like baseload nuclear power or cleaner coal technologies. The key to developing strong markets, according to this participant, is unlocking possible contract structures that allow new combinations of services and products. If suppliers and producers can package electricity and associated services, they can create new products based on the financial and physical aspects of electricity distribution.

The flexible LNG market offers a possible model to help electricity markets develop financial transmission rights (FTR) and other market solutions to mitigate risk. As the LNG market has become more robust, market evolution along the value chain offered storage as a buying option to control upstream flow. This type of innovation in the gas market demonstrated that some commodities can become asset classes. Some companies accumulate assets by constructing a number of gas storage facilities.

For example, the Henry Hub, the largest centralized point for natural gas spot and futures trading in the U.S., is structuring its own market on hub pricing. Traded 72 months into the future, NYMEX deliveries are treated as cash-market transactions. Many natural gas marketers also use the hub for their price benchmark for spot trades of natural gas or their physical contract delivery point. In states that maintain competitive retail choice regulation, electricity retailers are likely to look for similar innovations as markets evolve. As an asset class, electricity will move as products that offer customers alternative energy packages, carbon offset purchases and energy efficiency services.

One participant noted that more expensive supply options in electricity markets will need to be integrated into utilities' supply plans without requiring them to be financed on the back end with the sale of power produced. Long term hedges are acceptable and can function with FTRs, but industry observers note that utilities need to avoid huge capital investments sunk in projects that never produce electric-

ity, like the Shoreham nuclear plant. FTRs help to avoid congestion costs and inform where new generation can be most efficient by allowing utilities to guarantee their access to transmission lines once those plants are built.

Mandates for renewables, at the state or federal level, constitute another opportunity or risk factor for utilities. Most utility leaders believe a regulatory mandate will not work well as long as the U.S. maintains a balkanized regulatory system. Pricing drivers are very different across regions, and the ability of utilities to pass through higher costs varies by state. Nonetheless, California and the Northeast have demonstrated more willingness to pay for renewables and carbon controls, leading to new market entrants. Advocates will continue to push for renewable standards nationwide, but as long as the Southeast lacks a solid platform for these technologies, there will be resistance.

Efficiency – Consumer Control

As noted previously, smart grid technology offers new opportunities for consumers to control their bills by adjusting their demand. The growth of new physical and financial products has increased the number of players in the market. With increased competition, businesses believe increased consumer participation will be required to balance loads and maintain prices. As one industry observer noted, “There will have to be more demand instruction. Little things [in energy efficiency] that people are doing will catch up, so it’s hard to imagine that prices will go way up and stay there.”

The penetration of new technologies will open the potential to sell power back to the grid and commoditize load balancing. These changes will start with education and information on prices. Yet market and regulatory response will be essential. If the market successfully drives competition down to the consumer level, utilities will cannibalize their existing markets. This can already been seen in five states where a mandatory switch to compact fluorescent light bulbs will result in revenues lost.

A few Forum participants suggested that active demand and supply participation by consumers can help balance supply and demand and help overcome retail and wholesale divisions. If not on a residential level, they seek policy reforms that engage commercial retail consumers differently. Traditional utilities and their historic competition will change and the service model could evolve. Changes could be accelerated if industry invests heavily in smart grids and new signals enter the market. Advocates of this future see people choosing not their energy provider but what they are going to buy.