

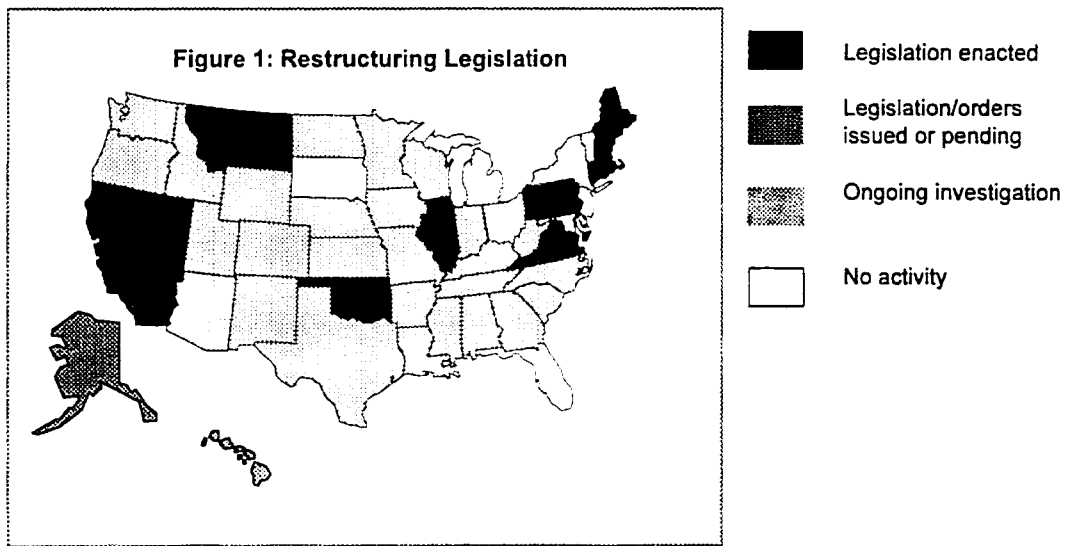
Electricity restructuring in the United States

Of IPPs, ISOs, UDCs & PUCs ...

Electricity restructuring is now a worldwide phenomena. Well over two dozen countries or regions have reconfigured their electricity industry in order to reduce regulation and introduce market competition. Market structures are, however, as varied as the host countries. In this regard the United States reflects the worldwide trend, for there are an amazing array of new institutions and procedures in the country's staid electricity industry. America's vast size, geographic demarcations, differences in infrastructure and resource diversity counters any notion that a single solution would be efficient. More important, however, is the history of the industry – its structure, ownership, and regulatory oversight.

History has dealt the Americans a bad hand when it comes to considering the possibility of a single, coherent approach to electricity restructuring. They must contend with overlapping and inconsistent regulatory jurisdictions, a fractured industry, and a high level of public expectation about the benefits of restructuring that may never be realized. There are nearly 400 electric utilities in 50 States, with a vast range in size and complexity. The smallest may serve a single city or village. Others, such as Pacific Power and Light and American Electric Power, operate a patchwork of generators, transmission, and distribution utilities in number of different states.

Of necessity, electricity restructuring must be a combination of federal state initiatives. This is because jurisdiction is split between local control of distribution and federal control of transmission and other activities related to interstate commerce. In 1986, Congress seemed poised to enact legislation aimed at clarifying jurisdictional issues and setting a national policy on electricity restructuring. But Bill Clinton's woes have driven serious issues from the agenda and it is unlikely that substantive federal legislation will be forthcoming anytime soon.

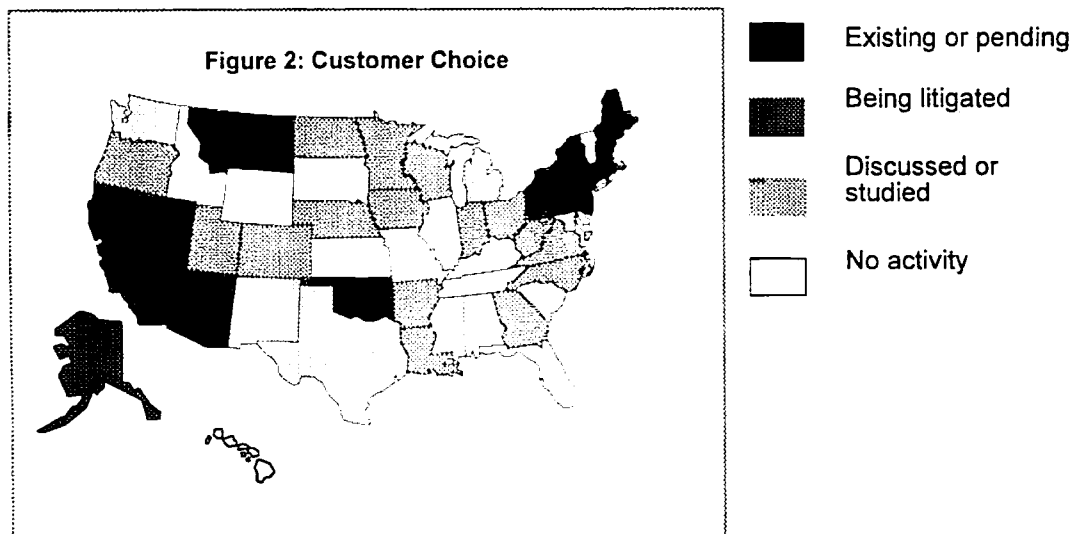


Despite the Congressional stall, various states have moved ahead with legislation. *Figure 1* provides an overview of the situation. Far and away the most dramatic of the restructuring efforts has been in California and this is discussed in some length later in the report. One aspect that is of particular interest is customer choice. Not all restructuring plans include customer choice and, as the Californians have discovered, ensuring choice to everyone, including individual residential customers, is complex and expensive. The status of the various states is illustrated in *Figure 2*.

A Brief History

Traditionally in the United States investor owned electric utilities (IOUs) – unlike gas utilities – have been integrated corporations. That is, the same corporate entity owns power generation, transmission and distribution. Further, the Public Utility Holding Company Act (PUCHA) of 1935 effectively restricted the regional integration of these corporations. As a consequence there are 141 investor-owned utilities serving individual cities or regions. Each utility was given a monopoly franchise by state and local governments. In return for the exclusive right to market power in a specified region, the corporation agreed to serve all customers at prices or electricity rates regulated by state Public Utility Commissions (PUCs). This arrangement is referred to as the “regulatory compact,” where the benefits of an exclusive market were wedded to the “obligation to serve.”

In the period after World War II, electric utilities believed that vast economies of scale were possible in the generation of power, particularly for coal and nuclear generation. As a consequence, large generating plants were usually placed far from population centres where they could take advantage of the close-by coal mines, transportation facilities or



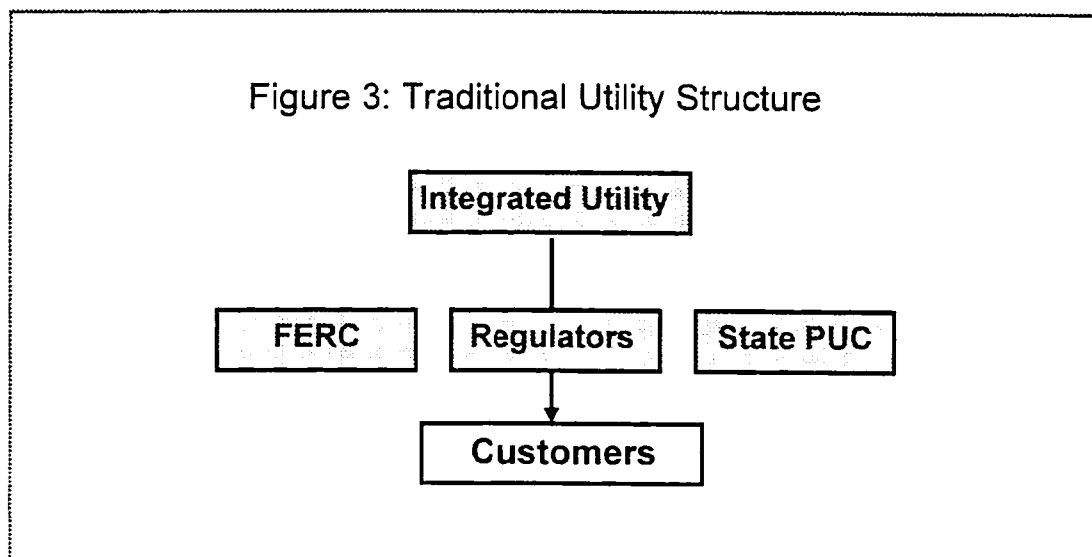
other natural advantages that reduced the cost of generating power. This necessitated the development of high voltage transmission lines that frequently crossed state borders, prompting regulation and oversight by the Federal Power Commission (FPC). During the oil market turmoil of the 1970s, the FPC was combined with other federal energy regulatory functions into the Federal Energy Regulatory Commission (FERC.)

The development of high voltage transmission lines to move power from generating plants or 'source' to load centers or 'sink' also created the opportunity for inter-utility trade through power pools. Over several decades, two types of power pools were developed. The first type, known as 'tight power pools' were typified by the Pennsylvania-Jersey-Maryland (PJM) Power Pool and the New England Power Pool (NEPOOL.) The second type, known as 'loose power pools' typified trading in the West and were known as the Western System Power Pool (WSPP.) As the name implies, tight power pools are under tight centralized control and dispatch, while loose power pools are much more flexible and allow market-based trading for both energy (the electrons) and transmission.

In the decades in which power pool trade was between utilities, it was aimed at taking advantage of difference in generating costs and peak load demand, often with the notion that benefits should be shared equally. The success of gas industry deregulation, however, spurred a similar interest for electricity on the part of politicians, regulators and utility executives. In 1993 FERC began certifying power marketers so that they could trade wholesale power with utilities. By 1995 the trickle became a torrent and there are now 451 certified power marketers. These firms are from three primary sources, the financial industry, the gas industry and spin-offs from electrical utilities.

Figure 3 illustrates the traditional utility structure. FERC regulates transmission and inter-utility trade. State PUC's regulate power distribution and retail rates to residential, commercial and industrial customers.

Before reviewing the new structures proposed (and in some cases implemented) for private utilities, it is important to provide a brief overview of 'public' power in the U.S. Many communities have not-for-profit power companies; there are 239 separate companies of 3 major classifications: Municipalities (Munies), Cooperatives (COOPs), and Public Utility Districts (PUDs.) In addition, there are several federal agencies – notably the Bonneville Power Administration and the Tennessee Valley Authority – which market and trade wholesale power, mostly to public utilities. Most of these organizations were formed during the great depression, when Roosevelt's New Deal aimed at electrifying rural America and wresting control of an essential commodity from the hands of 'greedy' monopolists. Since public utilities are not-for-profit and are effectively owned by the public sector, their distribution systems are not regulated. Like British 'public schools' there is a sense of irony in the fact that public utility commissions regulate private power not public power.



Restructuring

It is essential to understand at least a portion of the tortured history of the electrical industry in America in order to make sense of the restructuring effort. Most countries, including England and Wales, have or have had a nationally owned electric company that provided generation, transmission and distribution. When a decision was made to privatize the industry it was a simple step to break it into its three main sectors. This minimizes the need for regulation, freeing up generators to compete and allowing customers to have a choice of suppliers. The alternative would have been to break up the national company into a series of regional integrated monopolies, very much like the present system in the U.S.

Restructuring private utilities in the U.S. to something like the U.K. model is very difficult. Here the problem is twofold: first, it would mean divestiture of integrated firms' assets (which to some is akin to nationalization) and second, it would include the integration of separately owned transmission systems into a few commonly owned regional grids. All of this has to be done by multiple regulatory and legislative bodies and has to secure the tacit acceptance of hundreds of private and public corporations, which face a highly uncertain future.

The process is generally broken into six basic steps:

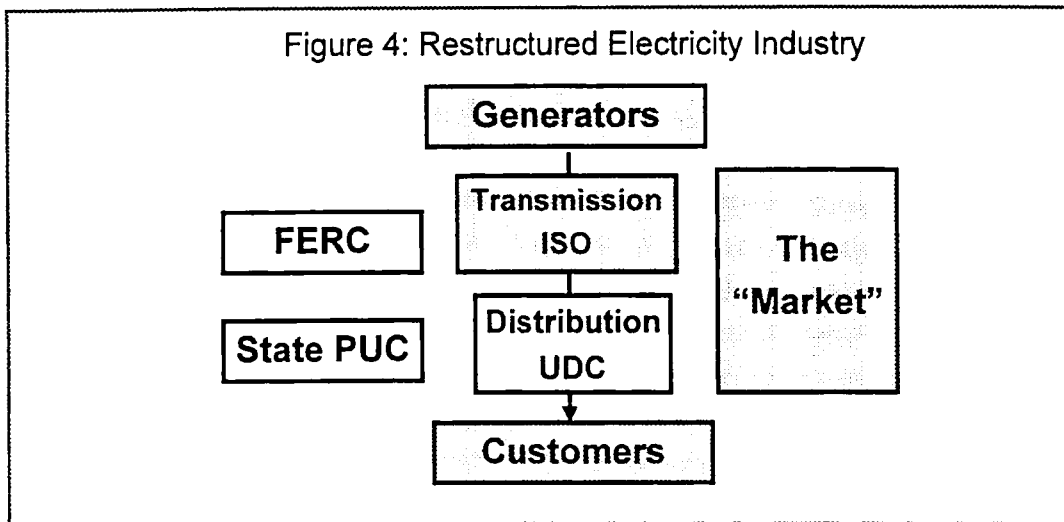
- Encourage the development of 'Independent Power Producers,' (IPPs). This was the consequence (perhaps unintended) of the Public Utility Regulatory Policies Act (PURPA) of 1978.
- Experiment with market based pricing, which began in 1983 with FERC's approval of the WSPP.
- Ensure non-discriminatory access to transmission facilities, requiring standardized rates and published information on transmission availability. The Energy Policy Act (EPA) of 1992 granted FERC the power to order utilities to mandate transmission access. This was followed in 1996 by FERC order 888.
- Open up the wholesale market by allowing non-utilities (power marketers) to buy and sell power, which began in 1993.
- Facilitate the integration of the power grid by combining the operating areas of individual utilities into a broader area, with control passing to an Independent System Operator (ISO) while at the same time ensuring that ownership remains undisturbed. Such new arrangements began in 1996.
- On a state-by-state basis, reconfigure regulatory procedures to allow power marketers and IPPs access to retail customers in what had been the exclusive service territory of a franchised monopoly. In other words, grant customer choice.

The 'stranded cost' problem

Broadly both the utility customers and their political representatives have supported these actions. The industry has been dragged, perhaps reluctantly, into the process because of the problem of 'stranded cost.' During the era of energy shortage in the 1970s many utilities invested in high-cost generation facilities that have since proven to be grossly uneconomic. They were also required by regulators to enter into long-term contracts to purchase power from IPPs at their 'avoided cost.' The combination of lower oil prices and technical improvements in combined cycle combustion turbines have caused avoided costs to drop three-fold for many utilities. Thus, state regulators have offered these companies a deal: they will allow stranded costs to be recovered in a transition period if the utility will open its service territory to competition. California was the first state to craft such a deal and its experience is discussed later.

Defining the Market

Broadly the proposals for restructuring the U.S. power industry look something like *Figure 4*. The integrated industry has been broken into three parts – generation,



transmission or grid management (ISO), and the utility distribution company (UDC). FERC will regulate ISOs and state PUCs will regulate the UDCs. What is still undefined is the nature of the 'market.' In this regard, there are widely disparate views as to what is the best way to proceed.

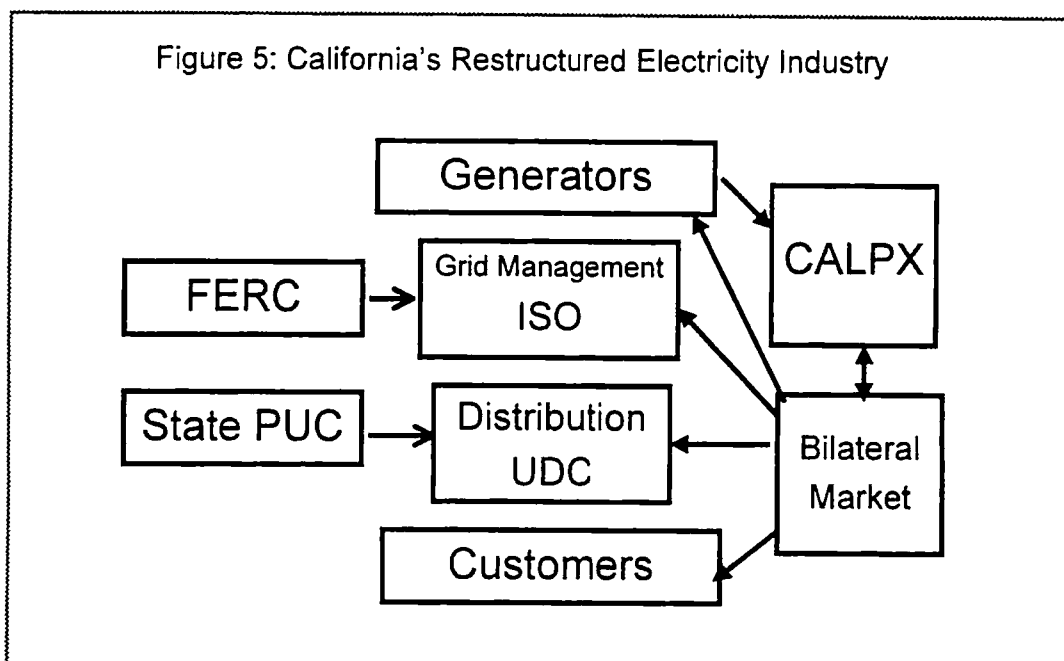
California

The debate over market structure reached its zenith (some would say nadir) in the debate over restructuring the California power industry. Southern California Edison advocated the development of a 'Poolco'. This organization would manage the grid for all participating utilities and conduct a mandatory auction for all power sales; a structure very similar to the present England and Wales power pool. Poolco would have barred all other types of power trading.

In contrast, Enron advocated that the pool (or ISO) simply manage grid reliability and leave the market to the marketers. According to Enron it was only necessary to extend the market-based trading mechanisms that already existed in the WSPP. That market structure has become known as 'bilateral' trading. As the name implies it is a series of one-on-one contracts for the purchase and sale of power. Most commodity markets are dominated by bilateral trading for the purchase and sale of physical products, mainly because this type of trading can accommodate a wide variety of contractual terms and variations in product quality and delivery points. Bilateral trading in electricity markets results in a set of generation and load schedules. In the view of Enron and other advocates of bilateral trading, it is not necessary for the ISO to know contract prices, all it needs to know is scheduled volumes in order for it to manage the grid.

From the perspective of California's regulators, bilateral trading had several drawbacks. First, there was concern that the market would be dominated by a few big players or that it would be inefficient in other respects. Second, it was unclear how such a structure would ensure that all classes of utility customers would be allowed retail choice. And, third, there was no assurance that bilateral trading would produce price transparency, which was necessary in order to calculate the 'competitive transition charge' or CTC. The CTC is a monthly payback to the California utilities for their stranded costs. Just as earlier, politicians had decided that "war is too important to be left to the generals," California became convinced that the power market was too important to be left to marketers. On the other hand, Enron witnesses and their cronies had made their point. The original Poolco design was too restrictive; the power market should be left flexible and allowed to evolve as circumstances warrant.

California's solution was to create an ISO separate from a power exchange. The three utilities allowed to recover stranded costs would be required to bid all of their loads and generation into the exchange during a four-year period of transition. Other utilities and marketers could choose to use the exchange or trade bilaterally. The volume of all trade



(whether through the exchange or bilateral negotiations) would be scheduled through the California ISO by 'scheduling coordinators.' The new structure was put in place over a period of fifteen months and began operations on April 1, 1998. The system has functioned reliably since, including a hot spell in late summer during record peak load deliveries. Unlike the Midwest, California did not experience extreme price spikes and accompanying economic dislocations.

Shifting Emphasis

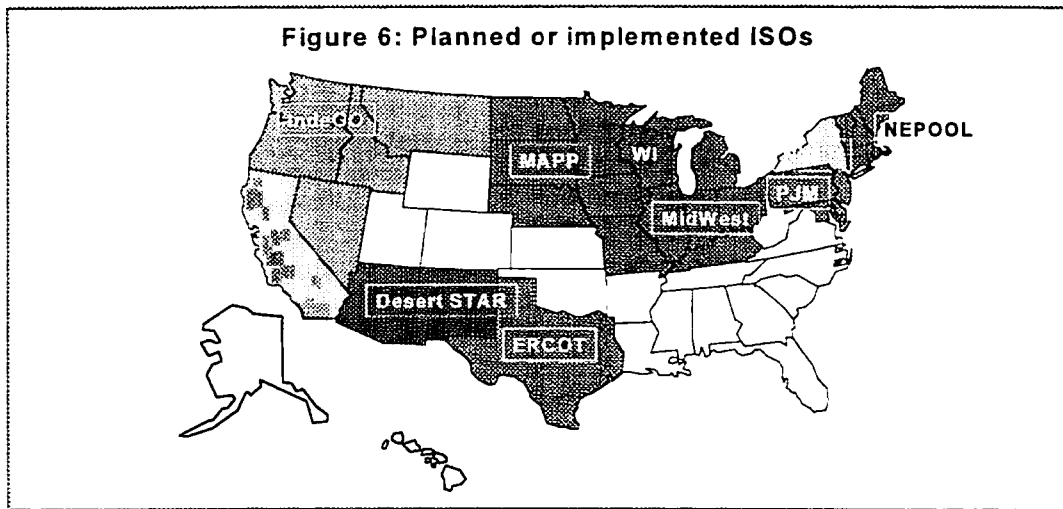
The debate in California and the new industry structure that followed has had a major impact on restructuring throughout the United States. In the first place, the debate underscored the general complexity of the electricity industry and the difficulties of separating generation, transmission, and distribution decisions in an integrated industry. While the debate did not really resolve the crucial issues, it did result in a flexible industry configuration that over time may do so. The genius of the California solution is its adaptability. Mandatory participation in the California Power Exchange (CALPX) is only required of utilities wishing to recover stranded costs and then only for a short transition period. By 2002 the marketplace itself will determine which institutions are best suited to play the role of Adam Smith's invisible hand (see Figure 5).

The downside of the California solution has been its cost and restricted size. Start up costs, software, communications, etc. for the ISO and CALPX have totaled over one-quarter of a billion dollars. Volumetric fees for trading in the exchange or scheduling power in the ISO grid are high compared to other jurisdictions. The ISO's wheeling out charges for power that leaves its grid are excessive and this has driven a wedge through the middle of the Western power market. California's retail power sales are about one-half of the WSCC total, but this may not be large enough to ensure a robust market.

Due to the expected high cost, an ISO planned for the Pacific Northwest, IndeGO, has been cancelled. Instead, proposals have been made for an Independent System Administrator (ISA.) An ISA would coordinate the activities of dispatchers in multiple control areas, but would not attempt to manage every aspect of the grid. ISOs are still a popular concept, however. There are now nine ISOs implemented or planned in the United States and they are illustrated in Figure 6.

Implications for trading

The impact of California's restructuring on trading volume is more serious. This is best illustrated by trading in NYMEX electricity futures. NYMEX introduced two electricity contracts for Western trading in May 1996. Trading volume increased smartly then paused in April 1998, when the new California market opened. Since August volume has fallen back to the level achieved in the first year (see Figure 7). Very little industry



interest has been shown in fledgling Midwest electricity futures contracts introduced by the Chicago Board of Trade and the Minneapolis Grain Exchange. Volumes for both September and October have been disappointing and the contracts are unlikely to survive.

Figure 7: Electricity Futures Contract Volumes, 1996-1998

Month	COB	NYMEX Futures			CBOT Futures		
		PV	Cinergy	Entergy	TVA	ComEd	MGE
Mar-96	923	292	-	-	-	-	-
Apr-96	6,924	1,186	-	-	-	-	-
May-96	6,394	1,158	-	-	-	-	-
Jun-96	6,590	1,279	-	-	-	-	-
Jul-96	4,746	1,038	-	-	-	-	-
Aug-96	4,548	1,649	-	-	-	-	-
Sep-96	4,683	2,026	-	-	-	-	-
Oct-96	6,373	3,454	-	-	-	-	-
Nov-96	4,575	2,238	-	-	-	-	-
Dec-96	6,584	3,228	-	-	-	-	-
Jan-97	5,966	4,166	-	-	-	-	-
Feb-97	4,217	4,424	-	-	-	-	-
Mar-97	4,883	6,327	-	-	-	-	-
Apr-97	10,487	10,659	-	-	-	-	-
May-97	10,638	15,447	-	-	-	-	-
Jun-97	15,757	17,508	-	-	-	-	-
Jul-97	11,544	18,104	-	-	-	-	-
Aug-97	7,266	14,035	-	-	-	-	-
Sep-97	12,860	20,188	-	-	-	-	-
Oct-97	15,599	23,023	-	-	-	-	-
Nov-97	8,192	10,322	-	-	-	-	-
Dec-97	13,487	11,774	-	-	-	-	-
Jan-98	17,190	17,913	-	-	-	-	-
Feb-98	14,950	21,150	-	-	-	-	-
Mar-98	13,807	15,483	-	-	-	-	-
Apr-98	12,631	15,617	-	-	-	-	-
May-98	12,200	16,884	-	-	-	-	-
Jun-98	13,373	16,898	-	-	-	-	-
Jul-98	11,129	13,317	8,470	7,834	-	-	-
Aug-98	7,340	7,188	7,565	9,480	-	-	-
Sep-98	5,563	5,243	8,588	6,214	119	44	29
Oct-98	7,704	4,156	9,359	5,960	27	31	7

Sources: COB, Palo Verde, Cinergy, and Entergy futures data from NYMEX. TVA and Com Ed futures data from Chicago Board Of Trade. MGE futures data from the Minnesota Grain Exchange. The Cinergy and Entergy futures began trading in July 1998. The TVA, Com Ed and MGE futures began trading in September 1998.

Target on the Midwest

Despite (or perhaps because of) the Midwest's market disruption in June the focus of electricity restructuring has shifted to this region. Twelve utilities from an eight-state region that ranges from Virginia to Minnesota have created the Midwest ISO.

FERC approved the Midwest ISO in September 1998 and operations are expected to begin in 2000. In parallel with the integration of the region's transmission systems, NYMEX opened trading in two Midwest contracts, Into Cinergy and Entergy, in July 1998. These contracts are off to a good start with volume well ahead of the start up of NYMEX's Western contracts. There are two significant issues facing the Midwest: Should a power exchange accompany the ISO and should neighboring transmission owners be forced to join?

At this time, the largest utility in the region, American Electric Power (AEP), has not joined the Midwest ISO. AEP, in fact, sponsored an alternative. These circumstances led William Massey, a FERC Commissioner, to comment that the Midwest ISO was like Swiss cheese, full of holes. The California ISO has the same problem on a smaller scale; it represents only 80% of the California retail market and half of the Western interchange. If ISO's are going to be worth their cost, they are going to have to integrate, not divide, markets. There is a similar divisive issue concerning a Midwest power exchange. Many utilities in the Midwest have stranded cost problems, but the multi-state range of the ISO and the number and diversity of buyers makes it difficult to adopt the California model. There are alternatives. PJM and NEPOOL (the two Eastern tight power pools that have been recast as ISOs) have chosen to integrate power exchanges into the ISO activities. Both ISOs allow bilateral trading and the main purpose of the power exchange is for load balancing. If the Midwest chooses a power exchange this is a more likely model than California.

East Coast

Tight power pools have been the dominant mechanism for trading on the eastern seaboard. Now they are making a transition to ISO. The three principal pools are PJM, NEPOOL and the New York Power Pool (NYPP.)

Perhaps the most interesting approach is in New York. There the pool operators decided that they were unwilling to fund a power exchange. Instead, they left it to private enterprise, by inviting bids. To date, only one company, the Automated Power Exchange, has agreed to establish a power exchange.

In conclusion, the United States is large and diverse and electricity restructuring reflects that diversity. It is to a large extent a living laboratory. Although it is too early to determine what institutional arrangements are best suited to power industry the odds are good that many of the solutions will be found in North America. Sam Van Vactor

Acting Editor - John Roberts

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