

Fortnightly

# A Milestone Year: Power in the Commodity Markets

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Paper trading is here, introducing an element of speculation in wholesale electric markets.

The electric power industry joined the commodity markets on March 29, 1996, when power futures began to trade on the New York Mercantile Exchange (NYMEX). This first tentative step in the commoditization of electricity promises the emergence of a paper market for power, which, as in the case of other commodities, will likely prove substantially broader and more complex than electricity's physical market. From the interaction of the physical and paper markets will surface the long-term price structure for electric power, and the discovery of the full potential for interregional trade.

As was the case with other energy commodities, the paper and financial markets will tend to exert downward pressure on power prices because, among other reasons, free trade in electrons will make evident the classic market condition of commodities: that capability to supply chronically exceeds typical demand. Current electricity rates will come to be seen as a reflection of local regulatory inertia, while the market price of electrons will internalize the economics of state and regional excess capacity, a decade of deflation in the cost of the critical generation fuels, and the effects of the historic opening of the national transmission system by the Federal Energy Regulatory Commission.

Compare electricity with fossil fuels. Figure 1 illustrates how real fossil-fuel prices fell over the last two decades from 216.3 cents per million British thermal units (Btu) to 132.9 cents, while electricity rates rose inexorably over the same period. In combination, fuel price deflation, uneconomic rate structures, and excess capacity represent sources of "rents" that fall prey to attack by commodity markets.

On the first day of trading, electricity futures volume on the NYMEX reached a respectable but not significant 1,200 contracts, representing 900,000 megawatt-hours (Mwh) of electricity. The power futures market began in classical contango: For California/Oregon border (COB) delivery (see sidebar for contract definitions), a price of \$8.33/Mwh emerged for the prompt month, with a higher \$13.95/Mwh price for December 1996 contracts. For Palo Verde (PV) delivery, the price range showed \$11.45 for June and \$16.50 for September .

The COB and PV contracts may not prove viable, but the paper market for electrons is now virtually inevitable. Paper deals (swaps) for power - based on spot market prices - are already common. Moreover, a number of utilities have entered into long-term deals that, in practice, are creating a variety of future price curves. Nevertheless, NYMEX trading will surely provide a futures price curve that will gradually become the standard by which all other futures deals are judged.

A successful NYMEX futures market for electrons would give additional impetus to the development of a comprehensive commodity market for power - one that would eventually consist of futures, options, swaps, and derivatives. NYMEX should prove crucial to all these trading instruments because it will provide a transparent series of prompt and future prices on which to build other paper instruments.

Paper Markets:

[The Future Structure](#)

If the evolution of open interest and trading volume in natural gas and oil can be taken as a model, we can anticipate that a substantial "paper" power market will develop within two years of the NYMEX March 29 opening. In this context, the term "substantial" refers to the ratio of daily trading volume to physical market consumption. In oil, the combined crude oil and petroleum product futures market trading volumes amount to about 20 days of U.S. consumption. For natural gas, average daily futures trading volume represents about 5 days of physical consumption. With derivative transactions added, the trade volume approximately doubles that of exchange-traded markets. If the power futures market does grow as rapidly as anticipated, the key market segments - and the financial strategies likely to be affected by the use of paper transactions - will develop along new lines:

Hedging vs. Investment. The market will divide to absorb two sets of traders: 1) those companies seeking to use it primarily for hedging purposes - the so-called "commercials," in the terminology of the Commodity Futures Trading Commission (CFTC) - and 2) those seeking to use futures for investment - the so-called "noncommercials" in CFTC argot.

Speculator Entry. Paper power-market instruments - particularly the NYMEX contract - will evolve into a convenient vehicle for financial speculators to use to participate in power markets. As a result, speculators will routinely add significant paper volumes to physical power demand and supply.

Benchmark Pricing. With the introduction of power futures contracts, new relationships will develop among three sets of prices: futures, the physical market, and the panoply of regulated prices. In time, the daily volume of paper power trading in the United States will exceed that of physical power trading. As a consequence, paper power prices will come to be regarded as the benchmark prices for power sales.

New Production. The reduction of interregional transmission "tariffs" (in the trade theory sense of the term) will make it easier for hitherto suppressed low-cost power to find a market. This development will boost the effective power "producibility" in the United States and North America.

Spare Capacity. The production described above, when coupled with the introduction of power futures trading, will form the building blocks of a market structure capable of optimizing regional and national power capacity and overall use of the transmission grid.

#### Market Behavior:

Transaction Dynamics: The "transactional dynamics" of power markets will prove entirely different in the regulated and unregulated markets.

In regulated markets, transactions will move forward with bundled command-and-control rates. Thus, utilities will continue to deploy considerable management resources to obtain the favor of regulators. In the unregulated markets, however, intense competition will develop in power production and in gaining access to transmission. This competition will create two sets of market prices - one set of prices at the "power producer gate," including a very influential set of futures prices at the NYMEX settlement area(s), and a second set of prices at the "distribution gate." Both sets of prices will fluctuate constantly, leaving producers, consumers, transmission companies, and investor/speculators with shifting opportunities for financial gains and losses. These gains and losses will track the difference between the actual power cum transmission price at any given time and the futures contracts into which the companies will have entered.

As commercial power companies get accustomed to paper markets, they will gain confidence to trade power further into the future. In this way, supply and demand balances will emerge on the NYMEX for as many as five years into the future, providing an "offer curve" similar in scope - if not in shape - to the ones now available for oil and gas. Here is a key question for the first cohort of market makers: Will the power "offer curve" appear in contango or in backwardation? (See Figure 2.)

In contango, the direction of prices in a futures market slopes upward, indicating that prompt (or immediate) prices stand lower than futures prices. In backwardation, the price line slopes downward as contract delivery is postponed, meaning that prompt prices stand higher than futures prices. The crude oil market is typically in contango, except in times of crisis, such as the initial months of the Iraqi invasion of Kuwait. The power market could be typically in backwardation, given the uncertain consequences of deregulation.<sup>4</sup>

Another important dynamic will bear watching: the structures of supply and demand. True, supply and demand should always be in balance. But in order to better understand the pricing dynamics of the futures market, one must appreciate the degree to which the capacity of the power sector to supply product will chronically exceed typical demand. This understanding has proven especially critical for markets like oil, where low-cost producers deliberately and voluntarily underproduce for the sake of pursuing monopoly rents. In the power sector - where low-cost producers have been kept from natural markets by regulation - the issue of capability to supply will determine the weight of downward pressure on prices.

Taken together, these ideas underlie the theory that commodity paper markets operate as "rent-destroyers." As mentioned earlier, the margin between the cost of electric power and the principal generating fuels has been rising steadily since 1980. In other words, electric power prices have failed to reflect the price deflation seen since 1980 for oil, coal, and natural gas. This growing "crack" between power prices and prices for power's "raw material" looms as a rent that the commoditization of electricity will attack and, in all likelihood, destroy.

### Market Effects:

#### Price Dynamics

When examined under a basic economic framework - with typical supply-and-demand curves intersecting at an equilibrium price - paper power markets will exhibit the same characteristics as do other, more traditional markets, but with a different terminology: The willingness to supply being called "short"; the willingness to buy termed "long." Paper traders affect the market by adding either to supply (i.e., they go short) or demand (going long). As in physical markets, one can track structural changes in paper markets (such as how much product a buyer or seller will offer to trade at a given price) by charting movements along the supply (short) or demand (long) curves in the traditional supply-and-demand curve.

Considered in this traditional way, power prices in paper markets should react predictably to changes in demand and supply for paper kilowatts. Sudden shifts may occur, brought about by professional speculators. Speculators, such as managers of commodity funds, will doubtless follow the tradition of moving in and out of commodity market segments for reasons that will have little or nothing to do with the supply and demand of particular fuels. For example, they might move on the fact that a computerized trading program will have noted a historic propensity for a commodity to rise in value when another commodity has moved in the opposite direction. Large players might suddenly decide to abandon power as a financial investment, thus triggering a sudden decline in demand and price for paper kilowatts, and consequently, a decline in the value of physical power. How will the players in physical markets anticipate such moves? Not easily. Nor will financial market forecasters anticipate them with any greater acumen.

The challenge will be to know how and to what extent paper markets diverge from their physical counterparts. One way in which they diverge is in the type of data that explains transactions for the paper market. Important data include: 1) the volume of NYMEX transactions, 2) the open interest at the end of each trading day, and 3) the "Commitment of Traders" (COT) reports released twice a week by the CFTC.

At first glance, futures data tell a simple story: A short exits from every long. As trading volume and open interest change, the long and short positions taken by the commercials (hedgers), noncommercials (speculators), and small traders will also vary from day to day and week to week. As Figure 3 shows, in the NYMEX crude oil futures market the commercials claim the largest share of open interest. But the impetus for a price change in any paper market at any given time will likely come from the speculators. As with data in the physical market, the COT data are imperfect at best. Thus, COT data will provide clues, but not much more. Their exact meaning will stand revealed only through continuous market analysis.

In any case, given any particular market condition, a large and sudden increase in demand for long positions will tend to move prices up; a rise in demand for short positions will tend to move prices down. Let us assume, for example, that on a given day a speculator decides to go short with the purchase of 5,000 contracts. Initially, news of such a large increase in the number of demanded shorts drives down the price. The order for 5,000 short contracts amounts to a search for 5,000 long contracts; in the open outcry process that follows on the NYMEX floor, the bid price will fall until the necessary number of longs are attracted to take offsetting positions.

Futures markets allow investors to participate in the determination of commodity prices. Funds flow from stocks to bonds to real estate to currencies and commodities. From day to day and week to week, billions of dollars flow into and out of each of these investment groupings. In addition, as Figure 4 indicates, evidence suggests that speculator money flows under the care of professional management, rather than haphazardly among asset classes. By some estimates, the amount of money invested in "Managed Futures Accounts" and in "Hedge Funds" has increased from zero to about \$30 billion in the United States alone over the past decade.

Speculators typically take a rather large position in the crude oil and gasoline futures markets - by certain estimates, some 25 percent of the total open interest positions in crude oil, and 18 percent of natural gas, at the end of the third quarter of 1995.<sup>7</sup> One can expect that speculators will assume the same role in the emergent paper markets for electric power. And the depth of commercial versus investor/speculator participation in the futures markets will likely exert a significant effect on electricity price volatility, as well as on the ability of large investors to dominate short-term pricing.

#### Market Makers:

##### Patterns and Similarities

The commodity market for electric power should demonstrate similarities to that of other fuels and forms of energy. For reference, one of the peculiarities of the oil futures market comes from the relatively small number of large institutional end users of finished products. The bulk of U.S. oil consumption lies in transportation, where consumers exhibit an exceptionally small per-unit exposure to the price of fuel. Of course, consumers do not remain indifferent to gasoline prices - efforts to boost gasoline taxes often run headlong into strong public opposition - but they don't generally hedge the market. By contrast, while the proportion of petroleum product consumption by large institutions is relatively small, their financial statements indicate a general awareness of fuel-hedging possibilities and a widespread propensity to use the futures market to hedge part of the fuel-cost exposure.

This example suggests that, in the power sector, large industrial customers will exploit their purchasing power to maximum effect both in the physical and paper markets. Other organized bulk buyers, such as municipals and cooperatives, will learn to do the same. Utilities themselves, one must assume, will also enter the commodity markets to hedge fuels, purchased-power contracts, or contracts for differences. And, residential and commercial customers will remain least likely to seek hedging vehicles unless, as some analysts predict, municipalization or other aggregations take place in response to the perception of an uneven distribution of benefits from utility restructuring.

In sum, the prognosis points to a far more complex market for electricity than that which has governed supply and demand during the last near-century of regulation. Power prices will become more volatile, but also more reflective of actual market conditions, and will, on average, be lower than they are today. As the pace of deregulation accelerates, both the physical and the paper power markets will grow, perhaps to dominate the commodity market itself.

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#### Electric Power Futures Geographic Loci:

. COB & Palo Verde. Two contracts, each providing for the delivery of 736 Mwh over a one-month period. One contract (COB) sets delivery at the California/Oregon border; the other (PV) is based at the Palo Verde switchyard in Arizona.

. PJM. NYMEX is actively consider in another contract with delivery on the East coast, most probably within the territory of the PJM (Pennsylvania-New Jersey-Maryland) Interconnection. Whether three distinct delivery contracts can remain viable in the long-term remains unknown. The market will likely dictate which of the contracts, if any, will emerge dominant.

### Terms and Conditions of Futures Contracts:

Quantity. Power is delivered at a rate 2 Mw throughout every hour of the delivery period, defined as the 16 on-peak hours between 0600 and 2200.

Price. Prices are quoted in dollars and cents per Mwh, with a minimum price fluctuation of one cent, and a maximum daily price movement of \$3/Mwh. However, these limits can expand when the contract settles at its limit, meaning that, during period of extremely large price movements, the NYMEX can authorize an increase in the maximum price fluctuation beyond the nominal \$3 limit.

### Notes & References

1 Energy Information Administration: 1994 Annual Energy Review. Composite prices include those for oil, coal, anthracite, and gas, in real 1987 cents.

2 The Wall Street Journal, April 1, 1996.

3 ESAI has studied oil and gas derivative volumes from information presented in annual reports from oil producers, refiners, and consumers. These studies indicate that the derivatives market may run approximately five to 10 times larger than the Exchange-traded futures market.

4 Various schools of thought vie on what is the "normal" price structure of a commodity. John Maynard Keynes thought that contango should dominate, because speculators require a large risk premium to take the long positions in the prompt months of the futures markets. Another view states that backwardation should rule because the "convenience yield" of oil is so great. For a good general discussion of the oil offer curve, see Jacques Gabillon, "Analyzing the Forward Curve," Managing Energy Price Risk (Risk Publications, London, 1995).

5 In the oil market, the CFTC defines noncommercials as nonhedgers holding more than 300 contracts.

6 A great deal of uncertainty persists about the total amount of investment money managed by hedge funds. By their very nature, these hedge funds do not fall subject to close regulatory scrutiny, nor do they publish their returns.

7 Author's estimates, based on CFTC Commitment of Traders Data.