Power Asset Valuation: The Plot Thickens

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Valuing a power asset requires an understanding of the profit margin to be derived from converting fuel into electricity. Embedded in that profit margin is a view on fuel and electricity prices. Going forward, a majority of new plants are forecast to be gas-fired. Both gas and electric prices have become increasingly volatile in an evolving, quasi-regulated environment.

In the summer of 1999, we proposed that investment decisions in the domestic power market would be dramatically different going forward from what they had been in the past. In particular, we recommended that investors in power assets give increasing consideration to three factors:

- Structural changes in the power markets and how these changes impact asset valuation;
- The increased number of market players and how players' tactics will also influence asset values; and
- Transaction structuring and how it can and will be utilized to maximize value and protect investment.

In this article, we elaborate on the above to incorporate that:

- Structural market changes and methodology matter in deriving plant value;
- Player behavior, in the context of changing regulatory initiatives throughout the energy value chain, can alter plant economics; and
- Transaction structuring to fulfill corporate objectives needs to be considered.

VALUATION DEPENDENT UPON METHODOLOGY

Valuation of a power plant depends upon the methodology used. At least two power plant valuation methodologies are commonly used today: discounted cash flow (DCF) analyses and option approaches. While the approaches or modeling techniques are straightforward, the inputs or assumptions put into the model are not.

To illustrate: a key input into a DCF valuation is the price the plant charges for electricity, but today what the plant sells is not simply electricity. For example, some markets provide energy, capacity, and multiple supporting services (e.g., New England), whereas others provide energy but no capacity payments (e.g., California).

For option valuation models, a key input is the term structure of volatility, but that too is difficult to determine in today's market. At a recent conference, one of the presenters showed a slide suggesting that the volatility in California energy prices was almost two times the next most volatile "commodity" ever

traded (Dutch tulips in 1634-1637) and more than four times the third most (Viagra on the black market in 1998) (Giaier [2001]).

How should one derive value for a power project? The simple answer is to use Monte Carlo DCF methods—that is, to set up distributions for each input assumption and then have the computer (i.e., crystal ball) randomly simulate thousands of outcomes to generate anticipated equity returns. However, behind the simple answer lies a complex riddle: What are the distributions behind every input assumption in valuing a power plant? Furthermore, both company and marketplace actions may not be random.

We will now examine power plant valuation in the context of a regulated and then a gradually deregulated industry.

REGULATORY CHANGES: BROAD-RANGING AND LOCALIZED IMPACTS ON PLANT VALUATION

Today there is a wide spectrum of views about whether deregulation is working or will work. A recent restructuring report suggests that deregulation in states that have enacted a form of restructuring is working ("Restructuring" [2001]).

On the other end of the spectrum, a recent book by Paul MacAvoy [2001] chronicles 60 years of regulatory behavior in the natural gas market (see also "From the Faculty" [2001]). MacAvoy boldly asserts that after 40 years of price controls, followed by 20 years of phased-in deregulation, all approaches have been unsuccessful. MacAvoy's warning is fuel for thought when considering the deregulating electricity marketplace. It is the largest ever to deregulate (Awerbuch et al. [1999]) and fundamentally more complex than natural gas, primarily because electricity, unlike other commodities, cannot be stored.

Valuation of Power Assets in the Regulated Environment: Simple, but Inefficient

In the regulated environment, valuation was simpler. Historically, when investor-owned utilities (IOUs) developed generation projects, they were driven primarily by the need to maintain reliability and were able to pass their costs through to the end user. Hence, the value was merely the investor's cost plus a return. This approach was flawed and theories such as the Averch-Johnson bias have demonstrated that when the market-to-book ratio is greater than unity, utilities increase capital investment because it improves earnings per share. Similarly, when the market-to-book ratio is less than unity, utilities have an incentive to reduce capital investment (Stoll [1989]).

The extreme example of flawed valuation approaches in this era was the enormous cost and accessibility to capital associated with building nuclear plants. While financial players (namely, leasing entities) lightened up utility balance sheets and improved their income statements, they did not value the asset but underwrote the underlying credit.

Over time, new-entrant independent power producers (IPPs) were encouraged to develop new generation facilities and compete with perceived to be overspending incumbents. The IPPs were paid through power purchase agreements (PPAs), which included capacity payments designed to cover their fixed costs and energy charges to reimburse variable costs associated with running the plants. The value of the facility, however, was trickier to calculate as now it was frequently tied to an IOU's avoided cost of energy. Over time, the avoided cost of energy that was projected (and put into the PPAs) led to imbalances and differing views about the contract versus market value.

How did financial players value the IPP projects? Once again, having a strong power off-taker may have led financiers to rely on the sponsor's credit rather than on their assessment of the plant's stand-alone value. In many cases, the financiers provided the undercapitalized developers with more than 100% of the project costs.

As a result of the nuclear and IPP eras, energy-intensive industrial users in high-cost areas such as California and New England began to lobby for deregulation in an attempt to lower their electricity bills. However, proponents of deregulation were faced with the dilemma of overcoming "stranded costs," the costs attributed to leveling the playing field when a utility had an asset on its books at more than market value.

The stranded cost "plug" was to be trued up at some future period subject to certain specific conditions. For example, if nonstranded assets were sold, the premium above book value would offset the stranded cost, leaving the remainder to be collected from the end users. Stranded costs suggested that past valuations on assets were inconsistent with the ways a new competitive marketplace would determine value. In some instances, there has been a rethinking that the stranded assets may actually be stranded value—that is, they may be undervalued in a pricing environment characteristic of supply shortages.

Power Asset Valuation in a Quasi-Deregulated Market: Novel, but Imperfect

From 1997 to 2000, generation values appreciated roughly 25%, from a 1.5 to a 1.9 market-to-book ratio (*EEI Newsletter* [2001]). But some analysts believe generation assets still have significant embedded value. Recently, Morgan Stanley Dean Witter noted, "The roughly 480,000 still-regulated megawatts are valued at roughly $100 billion when they should be valued over $350 billion in our view" (Konolige [2001]).

Why is premium value being associated with assets that only a few years ago were valued at less than book? Our new energy policy ("National Energy Policy" [2001]) suggests that we have shortages on the supply side: not enough generating stations, too few transmission and distribution upgrades, scarce gas transportation, lack of access to reserves, and lack of workers. The one place where shortage is not mentioned as an issue is in our ability to deregulate network industries.

Shortages have had many effects:

- *Signaled new generation and brought forth new players*—Formerly-small IPP players have bought big players, small players have become big, and big players have taken steps to keep up;
- *Stimulated risk management services;*
- *Highlighted the need for energy management strategies*;
- *Motivated diversification*;
- *Financially impaired distribution companies;*
- *Created unintended consequences* such as paying aluminum companies to shut down for prolonged periods because their electricity is worth more than the aluminum;
- *Caused many states to slow down and reconsider* whether, or how fast, they want to move toward retail consumer choice;
- *Driven up consulting and legal fees*;
- *Spurred economists to articulate pricing behavior strategies*, such as oligopolistic pricing and game theory; and
- *Catapulted energy to the front pages of our newspapers.*

Despite multiple blue-ribbon panels of leading economists, no simple going-forward solution has emerged; in some eyes, however, the solution appears as straightforward as simply replicating the Pennsylvania-New Jersey-Maryland (PJM) power market—a market that works.

Power plant valuation factors extend beyond market structure. For example, the fuel and environmental markets are becoming increasingly intertwined. Meanwhile, functional unbundling and rebundling has continued. Some players have vertically integrated to buy gas reserves to control fuel costs or by acquiring engineering construction firms. Some players have horizontally integrated by buying power development companies and assets at auction.

Power project finance now requires financiers to understand not just individual plant values but also incremental values—for example, site development potential or portfolio value.

The Value Chain: Converged, but Connected

Fuel: No Longer Just a Pass-Through, but a Key Determinant in Margins. Despite the recent spike in gas prices, power plant development continues in the face of potential margin compression and looming industrial growth in various regions. There are concerns that constraints during the summer peaks will impede the ability to run power plants as well as to pass through potentially higher prices.

Structural details in regional gas markets, such as price caps for generating stations, have been identified as leading to unforeseen consequences (Wolak [2001]). Thus, valuation will depend upon future views of gas flows and structural details.

Generation: Value a Function of Wall Street Growth Expectations and the Ability to Capitalize on Market Imbalances. Consolidation has continued in the generation business with companies aiming for significant national market shares but employing different strategies. Some have sought to acquire or build integrated positions along the value chain while others have pursued specialization, such as pure-play generation.

Interestingly, the pure-play companies' growth strategies outpace earnings, but apparently they are being credited for positioning themselves to capture near-term supply/demand imbalances.

Pure-play companies have unlocked significant value for shareholders but raise questions as to whether similar power plant projects are being valued appropriately. That is, a bundle of development projects owned by a pure-play appears to attract a higher multiple than a similar group of projects embedded within an integrated utility.

Valuing power assets is also a function of unique structures such as price caps. For example, a subtle structural flaw identified by the California Market Surveillance Committee has been so-called "underscheduling" by utilities ("Report" [2000]). The exhibit illustrates the average underscheduling of loads and generation by system load level in June 2000. It suggests that at high load levels, when the market can least afford uncertainty, demand apparently understates its need. This issue arose when utilities sought to defend against high day-ahead prices and to pay no more than the real-time price cap. Thus, utilities capped their bids in the PX day-ahead market at the price cap in the real-time market. However, the strategy had unplanned consequences as generators and power marketers responded with relatively (to historical) high real-time prices in a market with no storage and an obligation to serve on demand. The underscheduling problem persists today and can influence plant value.

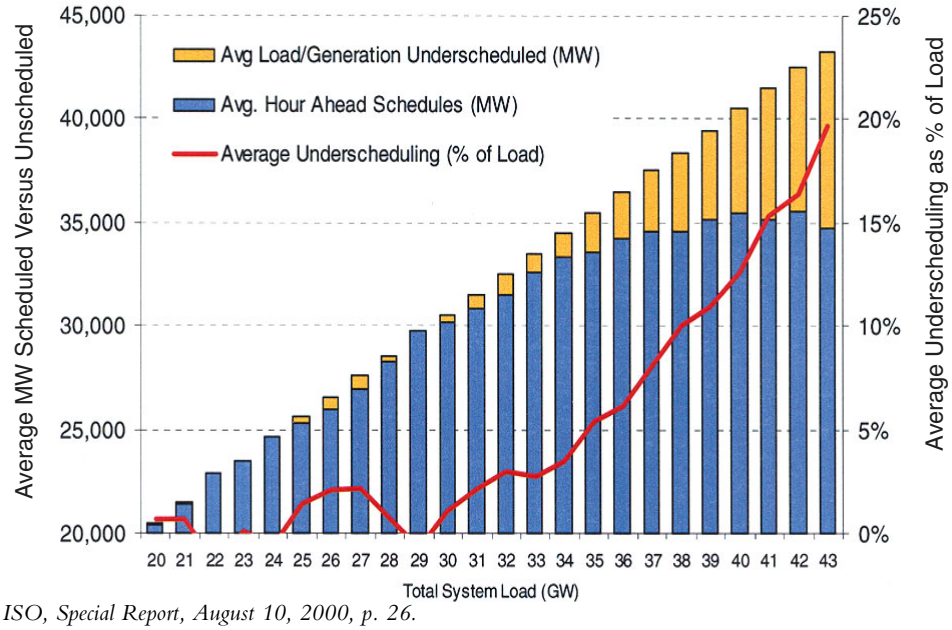
This underscheduling phenomenon is a *real* showstopper. Universal Studios recently lodged a complaint with the FERC ("News Digest Transmission" [2001]; see also FERC Docket No. EL01-42-00, filed March 2, 2001). The movie studio said that the utility's underscheduling directly caused the ISO to handle a constant crisis in both reliability and supply by imposing curtailments on the movie studio under an interruptible retail tariff when no curtailment was really necessary.

Energy Marketers: Controlling, Tolling, and, Lately, Seeing Profits Rolling. While it is still unclear whether marketers need to be asset backed or asset light, their presence has become increasingly noticeable. They are actively buying, building, and controlling energy. Marketers continue to create different ways to buy fuel and sell power, mostly through variations on long-term contracts and options. Marketers may help in providing price discovery as they seek to enable liquid markets. Volatility appears to be the friend of marketers, and their ability to be agnostic regarding the sources of MMBtu's is helping drive convergence. As the fuel and power markets converge, valuation uncertainty should narrow. Power and gas marketing activity can be a signal for not only how liquid a market is, but also for how certain the value of a plant's output may be in the future. In this situation, a strategic value may complicate the understanding of a plant's selling price.

Transmission: Creating Substantial Basis Differentials, but Will the Congestion Last? The growth of generation assets has greatly outpaced investment in new transmission facilities. The current and future regulatory environment of the transmission sector is uncertain. Today, no two regional transmission organizations (RTOs) are alike. Inadequate transmission capacity is causing increasing bottlenecks, necessitating the use of sophisticated transmission pricing models in more congested power markets such as New York City to allocate transmission rights. The location of generating facilities therefore has

EXHIBIT

Average Underscheduling of Loads and Generation by System Load Level (June 2000)



Source: California ISO, Special Report, August 10, 2000, p. 26.

become a strategic advantage. Recent regulatory initiatives to establish eminent domain for new transmission facilities, as seen with gas pipelines, may start to relieve the bottlenecking. Transmission access can be key to prices and plant utilization in assessing a plant's value.

Distribution: The Last Bottleneck? Although the ultimate structure of the distribution sector is still playing out, some pure-plays are emerging—largely utilities that have decided to divest their generation assets to focus on being primarily wires companies. In addition, some companies are realizing hidden value from telecom rights of way.

The development of the distribution sector will have important implications for power plant valuation. For example, congestion on low-voltage lines may be more complicated to fix than high-voltage transmission as it encounters state and local obstacles, such as with New York City. The value of generation assets could be considerably higher if local distribution cannot be fixed and virtually no new generation sites exist.

Retail: Does Customer Switching Matter? Limited customer switching has disappointed players expecting vigorous competition. Elastic demand may directly affect pricing and, ultimately, plant value.

CORPORATE/TRANSACTION STRUCTURING AND HOW IT CAN INFLUENCE INVESTMENT

A question arises as to whether valuations are based on plant-by-plant analyses, corporate earnings growth, or both. This question is highlighted by transactions involving synthetic or leveraged leases. Synthetic leases, in the form of master turbine trusts, allow greenfield developers to house assets off their balance sheets while retaining the associated benefits and improving their core earnings. These structures help reduce transaction costs by enabling generating companies to finance multiple projects rather than finance project-by-project. On a related tack, some brownfield asset owners are utilizing leveraged leases to provide a powerful earnings kick over a long term—as much as 48 years.

GUIDING PRINCIPLES FOR DERIVING PLANT WORTH

In summary, deriving a plant's worth has become dependent upon:

- *National policy intent*: Maintain plant fuel diversity.
- *Regulatory behavior*: Deregulated market-based versus cost-based structures.
- *Local supply/demand imbalance*: Some markets appear short (e.g., New York City), while some appear overbuilt (e.g., Texas).
- *Technology*: How much electricity demand arises from the "new economy"? Could heat rates dramatically improve? Will distributed generation matter? Does flexibility matter?
- *Price sensitivity*: Will retail price elasticity influence plant value?
- *Gas/electric infrastructure*: Is our transmission and distribution infrastructure for gas and electricity adequate?
- *Environmental compliance costs*: How much would compliance with the Kyoto Protocol add to a coal plant's cost structure?
- *Role*: Single plant or part of a portfolio, and whether the plant operates as a baseload, mid-merit, or peaker.
- *Transaction structure*: Is the plant part of a stand-alone project, portfolio, or a corporate initiative?

Ironically, unbundling generation has not simplified valuing power assets. While the market appears more uncertain, our current research suggests three key determinants behind a successful investment strategy:

- Invest in understanding current and alternative market structures for the fuel, electric, and environmental markets.
- Develop powerful predictive modeling tools for integrated fuel, electric, and environmental markets. Rigor can help reveal, define parameters for, and align views about the profit margin derived from converting fuel into electricity.
- Transaction structures can maximize company or plant value.

Our national energy policy reinforces the need to rebuild our energy infrastructure and establish competitive markets. While competition brings forth innovation to drive out inefficiency, investors need to respond and adapt to prosper. Successful investment can benefit all interested parties.

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