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Natural Gas: The Butterfly Effect on Electricity Prices

Several members of the Luthin Associates staff have been purchasing deregulated energy products since the early 1990's, and during this period we often noted a fairly strong correlation between natural gas and oil prices. It was also a common occurrence when meeting with a CFO for him or her to correlate the rising cost of electricity with the current price of oil. While this correlation may have once been valid, changes in the market and the evolution of the nation's energy production infrastructure have diminished the importance of oil in the electricity markets and simultaneously enhanced the significance of natural gas as a price indicator.

Oil used to be an integral power plant fuel, but it has become less important over time. Emissions requirements and other environmental and economic concerns have yielded an increasingly gas-fired energy production mix. According to the Energy Information Agency (EIA), the share of electricity produced from oil has fallen from a high of 22% in 1978 to less than 1% in 2011. For the last 30 years, coal and natural gas have been the major fossil fuels utilized in power plants. Critically, natural gas has continued to replace many coal plants. Coal fell from 78% of generation in the mid-1980's to 64% in 2010, while natural gas complemented this shift by rising from 15% to 35% during the same period (EIA). As a result, the direct influence of crude oil prices in the electricity market has abated and been superseded by the prominence of natural gas.

As such, in most U.S. power markets, natural gas has become the price driver for electricity. The EIA further projects electricity generation from coal to decline by 5% in 2012 as generation from natural gas increases by 9%. The dual advantage of lower fuel prices and better greenhouse emission performance signify the staying power of this trend.

(Continued on page 2).

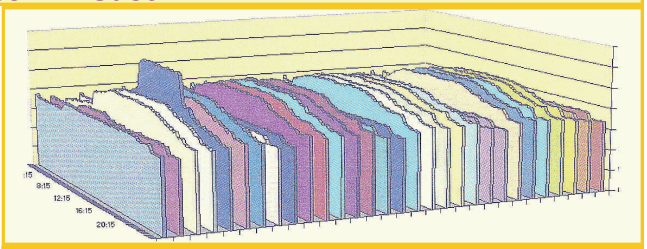
Inside this issue:

***Our new home**. Staff pictured left to right: Rakesh Parasuraman, John Dowling, Mark Hall, Catherine Luthin, John Luthin, Fran Rooney, Jim Ferris, Mary Rooney, Nat DiDonato. Left Steps: Priya Patel, Sandra Meola. Right Steps: Drue Zapoluch, Ellen Northrup.*

One Little Goof Can Turn Beauty Into A Beast

Electric rates are viewed by many as economic voodoo, like one of those math problems that gave you a headache back in high school. Ignoring the impact of those pricing mechanisms could turn your beautiful budget into an ugly duckling.

Even if you're buying power supply at a fixed rate, the delivery rate charged by your utility likely includes a peak demand charge based on your highest monthly power load. A high peak demand (kW) occurring only once in a month for half an hour (or less, depending on the tariff) could be responsible for 30-50% of your entire monthly electric bill. Where a delivery ratchet charge exists, that one big demand spike could also set the minimum peak demand charge you pay for each month that follows for a year. Let's say your usual monthly peak demand ranged from 600 kW in winter to 1400 kW in the summer. But, on one summer day, the staff in the central plant decided to test all your chillers (including the spare) at one time, briefly bumping peak demand up to 1800 kW. Not only would the peak demand for that month hit 1800 kW but, under a ratchet charge, the minimum billed demand for the following 11 months would be based on 1800 instead of 1400. But wait – there's more.



This 3D load profile of a month's power usage shows the Big Blue Blooper on a summer weekday.

In most power markets, and especially those that have retail choice, a capacity charge may be levied at the wholesale level, based on demand. The ESCo which purchases power from this wholesale market will look at your facility's peak demand at the time the system-wide peak occurs, and use it to calculate your capacity "tag." If our 1800 kW example occurred at that time, your capacity cost will increase the next time you enter into a supply contract. If your current supply contract has clauses that allow the ESCo to increase capacity charges, you will face a surcharge during the remainder of the contract term. If buying from a utility, a similar situation will arise. Regardless of how it is handled, you'll pay heavily for that mistake.

Controlling your peak demand, both in real-time and month-to-month, should be part of any effort to control costs. A system that monitors demand in real time that can send an alarm or automatically actuate a demand shedding sequence helps to reduce the incidence of costly mistakes. A well-trained operations staff is also a great asset. NYSERDA offers Monitoring-Based Commission, a program to help underwrite the cost of implementing such a system, which provides incentives to support the realization of measurable operational based energy savings. Details are available at www.nyserda.ny.gov/Page-Sections/Commercial-and-Industrial/Programs/Existing-Facilities-Program/Performance-Based-Incentives.aspx.

Natural Gas: The Butterfly Effect on Electricity Prices (Cont'd)

The continuing decline in natural gas prices is a direct result of expanding gas production from thousands of new wells in the U.S., driven by the use of hydraulic fracturing and horizontal drilling technologies in shale formations (a combination colloquially known as "fracking"). Lawmakers have routinely introduced new emissions requirements to assist in sustaining the progression towards natural gas power. As trends in the supply and regulatory areas continue in this fashion, the expanding influence of natural gas is solidified.

Further contributing to the overall situation, it was discovered that many of the new shale wells are "wet", meaning they also produce natural gas liquids (NGL) that include propane, ethane, butane, and natural gasoline. As oil prices rise, NGL recovered from shale may become worth more than its gas. In addition, the aforementioned gas drilling technologies are also being used to extract oil in places previously considered inaccessible. Hydraulically fractured oil wells, in turn, produce large quantities of natural gas as a byproduct, which further increases supply and lowers gas costs.

New gas production and lower prices resulting from abundance of shale gas and the impact of the recession have placed the weak correlation between oil and power pricing in sharp relief. As the world's demand for oil continues to rise, and speculators thrive on geopolitical tensions, crude oil prices continue to rise while natural gas prices ease. The August 2012 crude oil contract traded above $98 per barrel from January through April. The same contract for natural gas decreased from $3.28 per mmBTU to $2.46, a drop of 25%. Market analysis demonstrates that as natural gas prices drop, so do electricity prices. Since 2008, electric commodity pricing (the bill portion without utility delivery charges) has dropped by more than 50%, largely due to the ~65% nosedive in natural gas supply pricing during that period.

The net effect is that higher oil prices have stimulated the NGL market, bringing prices up. As a result, hydraulic fracturing of oil and gas wells have increased, both of which increase the supply of gas and depress natural gas prices. Because gas is the price leader for electricity, these various phenomena drive down the price of power – and this directly contradicts the old oil/electricity price correlation.

Ultimately, such low gas pricing is great for consumers, but not sustainable. As prices drop, wells become too costly to drill relative to the value of the gas and halt production accordingly. Indicative of this, Baker Hughes (an oilfield service company) has reported that natural gas rig counts are at the lowest level in ten years. As such, the reduction in drilling may tip the supply-demand curve and result in an upward trend in natural gas prices. This shift may be exacerbated by increasing gas demand if the economy recovers, and if new EPA rules force coal-fired utilities to switch to gas. These developments would ultimately impact electricity prices in the future, as markets adjust to the new reality.

Until such things occur, enjoy the ride.

Demand Response: Floats Like A Butterfly But Volatile as a Bee

Many businesses are earning revenue in New York's deregulated power markets by using less electricity through demand response programs. Recent price volatility has added challenges to structuring such programs and finding more creative ways to increase participation. Volatility in capacity prices can potentially leave customers at a disadvantage when determining what type of offer to make with a Curtailment Service Provider (CSP). The following article will review recent pricing changes and provide insight into structuring demand response programs, with subsequent discussion about improving load curtailment.

Demand Response (DR) programs provide financial rewards to the customer that can change operations or bring their own generation resources on line. The most popular method of participation, the NYISO's Special Case Resource Program (SCR), has seen a regular increase in participation. Statistics available from 2005 through 2011 show continuous growth in customer participation from 1,800 in 2005 to 5,600 in 2011. During this period, load growth increased from 1,100 MW to 2,025 MW. In addition to revenue generation, the popularity of the programs may be somewhat attributed to the infrequency of required load reductions. Between 2005 and 2011, there have only been 13 load reductions for a total of 76 hours, and none at all between 2007 and 2009.

The value of demand response varies depending on the price of capacity and the location of the facility. For this discussion, we will refer to NYISO's Zone J which covers NYC. The current strip price of capacity for the period from May to October 2012 is $11.70 per KW per month, down from last summer's $13.54. This means the CSP will pay you about $70,000 (less a 10 to 20% fee) over the six month summer period for a commitment to reduce load by 1,000 KW. About half this amount may be earned in the winter where capacity prices have historically been less than half the value of the summer capacity, due to the lower reliability risks. These programs may also be administered by the local utility, whose rates may be different because they may be based on different reliability issues (such as local distribution).

So what can you expect to earn this year? This is not an easy question, as capacity price volatility is rampant. The NYISO sets capacity prices based on the amount of available capacity and the estimated cost of new generation. This has resulted in large swings as new generators have driven prices down and retirements have driven prices up in turn (see our Belts and Suspenders article for further details). Prices fell during the summer of 2011 as additional generation resources were commissioned. Shortly thereafter, a number of retirements were made known and the 2011 six-month summer strip auction closed at $13.54 (the highest price ever). However, the more volatile spot auction, which enables the market to purchase capacity monthly rather than via a seasonal strip, weakened immediately afterwards as monthly prices ranged from $11.76 in June to $5.76 in July.

When shopping for a CSP, you will probably be offered some discount of the "market price." Behind the scenes, your CSP will pledge some combination of strip and spot capacity to meet their requirements. This mix of products enables them to hedge their portfolios and maximize their revenue. They do not typically offer you the option of participating in this added risk / reward. For those customers where price certainty is more important, the option of sharing in market changes will not be compelling. If you are willing to take on some risk, however, you may want to pursue a different strategy.

Predicting capacity prices is neither an art nor a science. It is more of a dart throwing process. Lower capacity prices for 2012 were historically predicted to decrease based on a three year low in the winter strip of $2.70. This trend was further supported by an estimated 2012 load growth of less than 1% in NYC and a net increase in generation to keep supply and demand impacts neutral. Like other markets, past performance is NOT an indicator of future performance.

So what is the take away? You have options. If a CSP offered you a deal for the summer based on the 2012 strip price, it would have been worth $11.70 per KW for each of the six months. Historically speaking, that may be an acceptable amount of revenue. However, if you had decided to go month-to-month or to share in the monthly pricing changes, you would have been ahead as the May strip was $17.16 followed by $11.54 in June. The rest of the summer prices will become available over time. So - which was a better deal? Time will tell, but you should be aware of your options. Today there are multiple approaches to the demand response market and you should understand how your CSP will approach the market so as to achieve maximum benefit from the volatility.

Factoid

Beware: Don't Let Them Take Your Data Away

The electric profile data which demonstrates how you participate in historical demand response events is your property and customers should ensure their contracts with CSPs explicitly state this. There have been cases where CSPs, after contracts were cancelled, left the customers without a historical record of their participation. This makes it more difficult to maximize your participation in the future. If this happens to you, see if you can obtain profile data from your utility.

Both Belts and Suspenders Are Needed to Foster Reliability

In the spaghetti western, *Once Upon A Time in the West,* the main bad guy, Frank, played by Henry Fonda, asks one of his less trustworthy henchmen, "How can you trust a man who wears both a belt and suspenders. A man can't even trust his own pants." After two bullets from Frank, trust was not an issue anymore. While Frank may have been right about the value of the belts and suspenders approach to personal relationships, there are times when having a multi-faceted set of contingencies is wise and even necessary. Ensuring a reliable supply of electricity for New York State meets that qualification.

While there are State initiatives addressing energy efficiency and renewable power development, and the utilities have programs to improve local distribution constraints, more has to be done to ensure that all of that power is generated efficiently and it gets to the places where it is needed. The answer, as proposed in the Governor's State of the State address, is the Energy Super Highway, a public-private initiative to upgrade and modernize New York State's energy system. The plan, according to state officials, will spur private investment as well as public funding of about $2 billion. In April, a gathering of 500 people met at Columbia University to kick-off this effort.

Why does this issue need both belts and suspenders? As of the close of 2010, 84 percent of the high-voltage transmission facilities in New York State were more than 30 years old and 59 percent of New York State's power plant capacity is pre-1980 vintage. The Indian Point Energy Center includes two nuclear powered generating units capable of producing 2,060 megawatts whose licenses may expire by 2013 and 2015 due to concerns about the role of nuclear generation.

While the State has enough generation and transmission to meet its needs through 2020, the level of transmission available to the NYC load pocket appears to be the main issue in the short term. *Power Trends 2012: The State of the Grid*, the NY-ISO's summary of the State's energy assets (and the source of much of this data), refers to the NYC load pocket as a "constraint" that "narrows the excess of supply for downstate regions." The loss of the Indian Point generation inside the load pocket could have an impact on reliability without alternative transmission or local generation solutions.

The Energy Super Highway is in the process of evaluating a series of requests for information from groups that are exploring projects that would coincide with the goals of the Highway. 85 private developers, utilities, financial firms and other entities responded and came up with 130 ideas to upgrade and revitalize the state's aging infrastructure. The next step is to evaluate all of the proposals and develop a plan to modernize the grid. The projects include 51 proposals for new generation, 29 for transmission, four gas pipelines and 46 submissions including various ideas in the energy industry.

Hopefully, upon completion of the plan, we can loosen the belt but we won't discard it until everything is built.

On A Personal Note...

This summer I have spent a good amount of my time in my backyard gossiping with neighbors over the fence, reading a book or just taking a quick nap. The backyard is full of flowers and herbs my husband planted as well as wind chimes, birdhouses and a hummingbird feeder. The feeder attracts lots of attention; there are always bees, dragonflies and butterflies buzzing about. The butterflies led me to think about the chaos theory, specifically the butterfly effect.

So what is the butterfly effect? It is a really bad Sci-Fi movie starring Ashton Kutcher or a concept which originated in chaos theory where a small change within a system can have significant, unanticipated impacts. When predicting weather patterns, the theory dictates that the slightest disturbance in one part of a system can trigger a chain of events that creates a hurricane in another part of the world. This newsletter illustrates how one small change (the butterfly effect) can have a big effect on energy markets.

Clients often ask us to predict with certainty where energy prices will be in the future. This is something neither we nor anyone else can do with any degree of accuracy. The patterns and trends within energy markets are always changing and they do so in highly unpredictable ways. Our lead article illustrates how a long held relationship in energy prices changed almost overnight as new technology overturned a decades old supply – demand relationship. We also discuss the unpredictability of capacity charges and how an unplanned operational decision in a building can change its energy budget.

Based on the above, one might decide not to look for order and just accept chaos. Unfortunately, those who have adopted that strategy are no longer in the business. What we are trying to communicate here is that despite chaos, we must look for those patterns that have proven to correlate the past with the future and then use a careful rationale to apply them. We use this philosophy when answering the client's question. We provide advice on the trends that exist at the point of time that the question is asked and apply our experience in providing several likely outcomes including that which is most probable.

Enjoy the Summer!
Catherine Luthin
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