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Power Market Update: Knowledge Speaks But Wisdom Listens

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The power markets are dislocated. No doubt. A combination of factors--largest fuel switch in the industry's history, diminished demand growth, renewable proliferation, and the advent of disruptive technologies--have ensured that. One has only to look at the Electric Reliability Council of Texas (ERCOT) and northern Illinois hub (NiHub) markets to recognize that power prices have not been cooperating with widely-held beliefs for some time now. We have also noticed that some power companies have deviated from their hedging policies. Perhaps they think the dislocation will correct itself and they will hedge their positions in coming years as power prices become "more reflective of fundamentals". This approach intrigues us because we believe that waiting for pricing discovery in expectation of higher pricing is just a directional bet.

In this industry update, we discuss the different ways power generators think about hedging their economic production, how changing market conditions have introduced new risks, and how we subsume hedging practices into our credit rating assessments. We mainly discuss the power sector, but as hedging strategies are often similar across the energy platform, we've also included non-power examples.

Overview

- A ratable hedging strategy is an important aspect of our credit assessments for unregulated power companies.
- With a number of hedge counterparties exiting in the energy space, pricing discovery is weaker in the outer years.
- Dislocation in energy markets has widened the bid-ask spread, virtually eliminating the long-term hedge.
- New hedging products, often not as efficient, have replaced these longer-term hedges.
- Some companies have also lowered their hedged levels in expectation of higher prices.
- We have seen several companies underperform relative to expectations, due to continuing dislocation in power markets.

Of Trading And Hedging

Public futures markets were first established in the 19th century to give participants a transparent and standardized way to take positions (or hedge) in agricultural commodity prices. They have since expanded to include futures contracts for hedging the values of commodities (largely energy and metals), foreign currency, and interest rate fluctuations. Since 2000, when commodity prices broke upwards, companies have started noticing the effects of price volatility and have increasingly used financial derivatives and bilateral contracts to hedge commodity risks.

Commodity risk in power markets arises from potential movements in the prices of power, natural gas, coal, and other commodities/contracts. While users of commodities clearly bear this risk, economically, owners of generation assets take a directional bet too--they are betting that, in the long-run, generating power is better than purchasing it. By definition then, virtually every rated power corporation is bearing some commodity price risk–-whether it is as a purchaser or a generator. Apart from generating power, some companies also engage in both buying and selling of power, serving as a middleman (retailing) between generation and users. Finally, there are companies that intentionally take trading positions in commodities, seeking to profit from expected price movements.

We define trading activities as the deliberate risking of capital for the sake of benefiting from potential changes in commodities prices-–including changes in price differentials between different commodities–-or from arbitrage opportunities between different markets. Trading involves a physical position with none to some risks hedged through offsetting financial contracts or derivatives. It usually entails an investment in infrastructure, plus meeting market standards for credit quality. Trading usually involves the ownership, or leasing, of assets, but the focus is not on the ownership but rather on the use of these assets as physical options to maximize the value of the trade.

In contrast, a hedger is primarily an owner of assets and engages in financial or physical transactions in order to optimize the value of those assets. In fact, the word hedge is from old English "hecg", originally any fence or a defense. Hedging is thus the practice of taking a position in one market to offset and balance against the risk assumed in a contrary or opposing market or investment. Companies hedge their commodities price exposures to lock in a gross margin or, alternatively, to mitigate volatility in their cash flow. Hedging could also be driven by specific corporate requirements, such as to ensure that an acquisition is accretive. Assets are central to the business, with hedging employed to optimize their value ("trade around the assets"). We normally exclude from our definition of trading activities those that are undertaken purely to offset market risk exposures to which other business activities give rise, even where these offsetting positions are relatively "dirty" (that is, inexact) but factor the effect of these inefficient positions into our sensitivities.

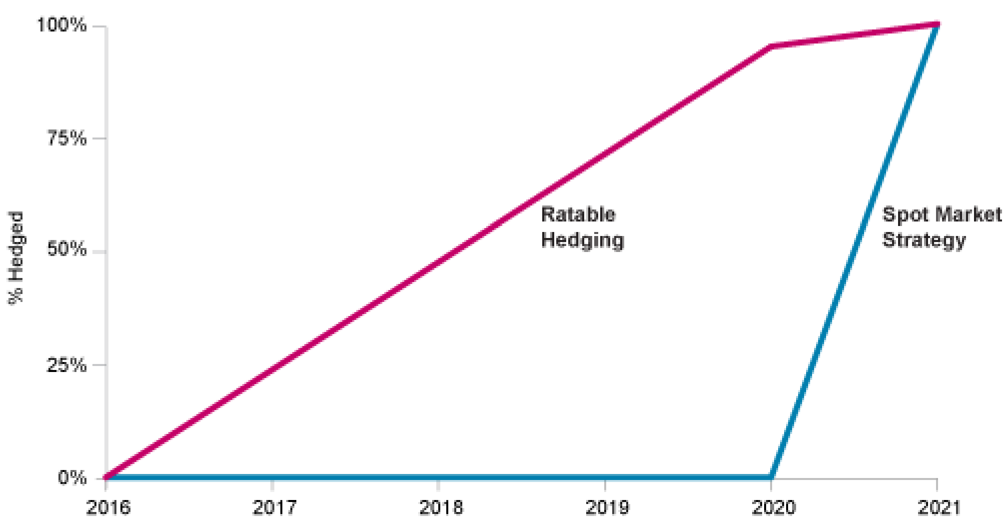
Eventually, hedging becomes a tradeoff between predictability of earnings (which generally benefits debtholders) and potentially higher profitability (which benefits equity holders). From a ratings perspective, we give credit for hedging that provides predictable floor revenues. If the hedging policy is driven by motives such as setting a floor for profit margin or covering fixed charges, including debt service (i.e hedging policies are determined by the leverage level in the capital structure) then it is likely that we will consider those revenue streams as higher quality cash flows in our analysis.

Why Hedge?

In most cases, ratable hedging reduces risk relative to spot market sales because it reduces the time to sale (see chart 1) and because movements in forward prices, while significant, tend to be less extreme than movements in spot prices. This is particularly true for a backwardated market (i.e. future pricing curve is declining [convex]). In the illustration below, a company that ratably hedges its production for up to three years in advance of the sale of its economic generation reduces its average time to sales by half. In the example, nearly 95% of the 2017 production is already hedged by the time the year begins and the company is primarily hedging the operational length that it left open to accommodate potential outages in its operating fleet. For relatively large companies in an industry, hedging becomes a necessity because the entry of large supply into a market would otherwise meaningfully depress spot prices.

Chart 1

Illustrative Sale Of 2020 Production

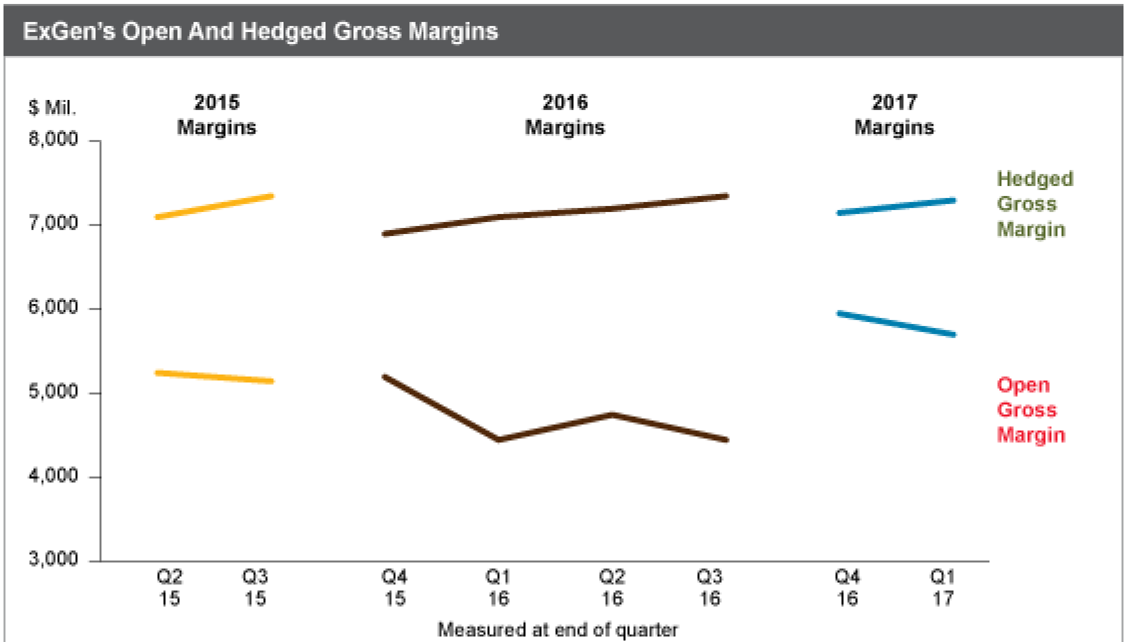


Source: S&P Global Inc.

Exelon Generation Co. LLC (ExGen) is a good example of the impact of falling natural gas prices on unregulated generation companies, as it has relatively better hedging disclosures than those of its peers. Falling natural gas prices harm ExGen more than its peers because a large proportion of its generation is from base-load nuclear generation, all of which declining natural gas prices affect.

The company undertakes ratable hedging largely to bring predictability to future cash flows, which otherwise would be extremely volatile (see chart 2). The chart below ignores all power and non-power new business that ExGen contracts (or expects to contract) in the year and shows only the impact of mark-to-market value of hedges on its open gross margin for the year.

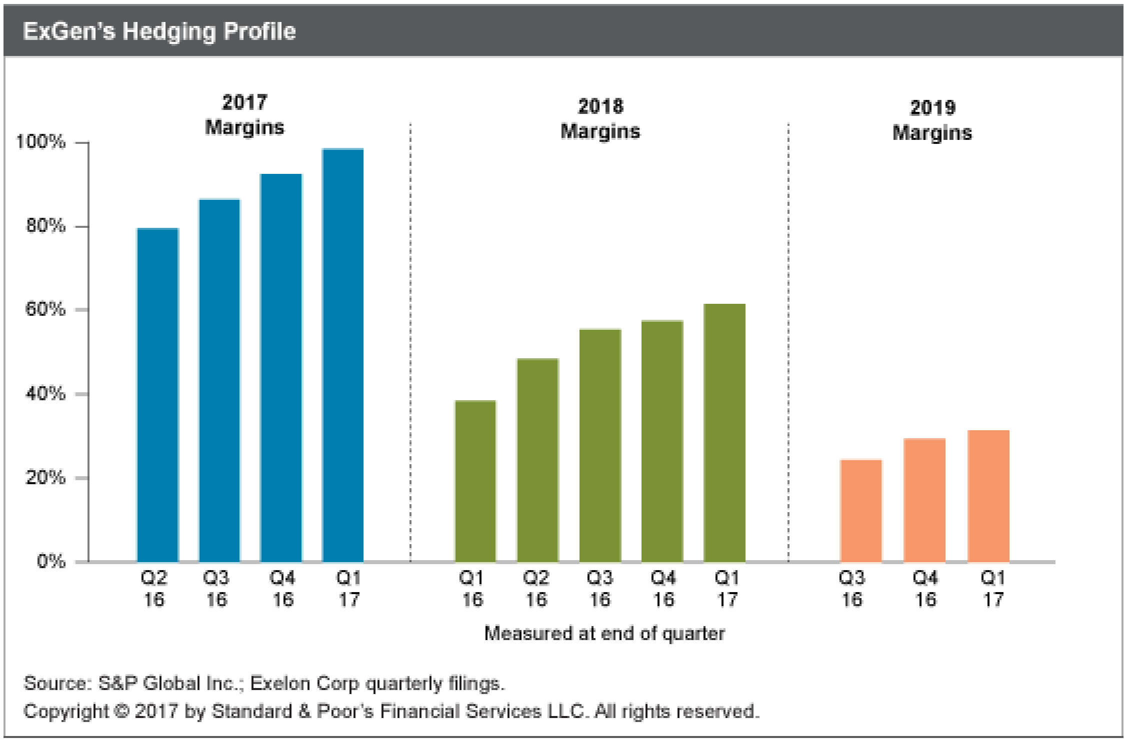
Chart 2



Source: S&P Global Inc.; Exelon Corp quarterly filings.

Open gross margins are under continual onslaught from a weak power market environment (note that 2017's open gross margins are higher only because they now include zero emission credits [ZEC] revenues). In contrast, since 2015, hedged margins have been fairly resilient. Because the company needs to hedge its large generation, it needs to bring volumes ratably into the market, which it does in a measured fashion (see chart 3).

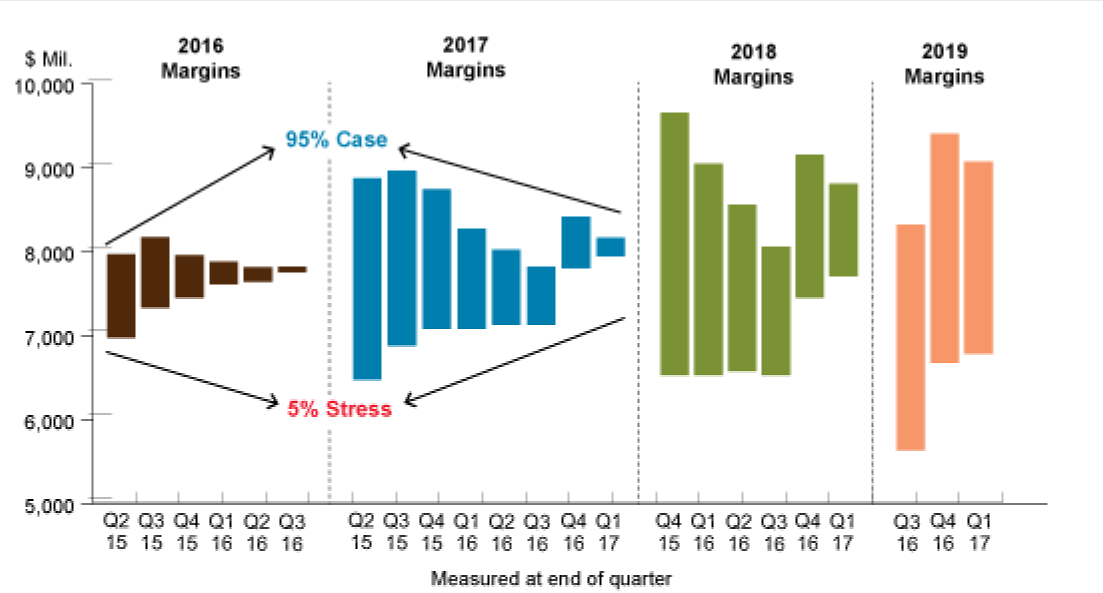
Chart 3



Also, ExGen's hedged gross margin range expectation (unlike chart 2, the margins presented in chart 4 include power and non-power new business expectations) is fairly narrow for 2017, but expands in future years. The broader gross margin range in 2018 and 2019 is a result of higher future unhedged exposure, and uncertainty over power prices, due to volatile natural gas prices.

Chart 4

ExGen's Hedged Gross Margin – Upside And Risk



Source: S&P Global Inc.; Exelon Corp quarterly filings.

From a ratings perspective, a 5% stress to expected gross hedged margin indicates a floor level for gross margins (see chart 4). This represents the gross margin expectation at a 95% confidence interval, meaning expected gross margins will be lower than this value only if power prices decline more than two standard deviations from current levels. The 50% case would be the expected gross margin (statistically, the "mean"). Similarly, a 95% case represents gross margin expectations if power prices moved up by two standard deviations. From a ratings perspective, we focus on the 5% stress as it indicates a floor under a falling price scenario.

We note the following:

- Outer years have larger bands as hedged levels are lower.
- Under a backwardated (i.e., future expected earnings are lower than the current year) pricing environment, the 95% case has fallen each quarter as progressive volumes were hedged at lower levels.
- The company did well in protecting its floor gross margins (5% case) even under a backwardated pricing environment because power pricing did not move down by more than two standard deviations during the year.
- However, gross margins floors have continually declined in the outer years due to the continuing onslaught of distributed generation, renewable proliferation and lower gas prices.

Hedging also has limitations. Merchant power producers have historically shrugged away volatility over the next two to three years by hedging their expected generation in the forward physical or financial markets. In the past, commodity prices (largely driven by natural gas) did show dips, but eventually settled back at higher levels, exhibiting the mean reversion that one typically sees in commodities markets. Because we now expect natural gas prices to remain subdued longer term, this strategy has limitations. As a "price taking" business, baseload merchant generators neither control the prompt price of power nor the shape of the forward price curve. All generators currently face backwardated gross margins as old hedges come off and they can only roll generation into lower priced hedges. Still, a ratable hedging strategy does provide insulation from near-term market forces. In a market that is seeing volatile swings, hedging future production potentially allows time to revise capital structures that are compatible with the evolving commodity dynamics.

As a separate point, the company's gross margin floor expectations had fallen meaningfully for 2019. The uplift in margins across the board from the fourth quarter of 2016 represent the ZEC revenues. From past performance, it appears that ExGen will protect its 2019 floor margins at, or marginally above, 2018 levels.

Typical Strategies And Hedging Instruments

So how does an issuer think about hedging its market risk? The hedge employed is usually predicated on whether the hedger is a producer or a user. A producer, such as a power generator, is "long product". Producers typically hedge this long position through forward sales, which represents the offsetting short hedge position. These forward sales could be on an exchange if the product has a liquid market, or through bilateral contracts. Producers willing to bear some downside risk also use options--such as a revenue put option--to mitigate their market exposure.

A user, on the other hand, may have commodity risks at both input costs and revenues. These companies secure physical volume delivery via forward agreements/contracts to insure sufficient throughput at plants. Revenues positions are generally hedged with forward bilateral contracts or exchange trades. Synthetic margins may also be "locked" on exchanges. For example, an agriculture company can lock a crush margin on an exchange by buying a corn or soybean futures contract and selling ethanol or soybean meal futures (a processed soybean product). These companies typically rely more on options, which can be structured via collars to lock in a target ceiling and target floor for the input costs. Writing a call option is frequently employed in conjunction with the put option (a collar) to reduce the cost of the hedge.

The use of options has also increased because of greater flexibility in the types of hedging products. Still, given the thin margins on commodities, profitable options on paper are often not economically viable once premium costs are accounted for. Therefore, over-reliance on options to manage margins may result in a company consistently underperforming industry profit levels.

All Hedges Are Not Created Equal

Not all hedging is of the same quality, which is especially important to note from a credit perspective. We present examples, mostly from the power sector (in decreasing order of quality) to underscore this, but the point is applicable to other energy markets as well. All of the strategies below qualify as hedges but present the power generator (short fuel; long power) with varying degrees of risk.

Tolling Arrangement

A toll is the cleanest form of hedging. In this arrangement, the power offtaker supplies the fuel and takes the power.

The risk the generator is usually left with is long term operating performance guarantees, which are often easily met. While the toll minimizes risks and allocates them to the entity most capable of bearing them, there is no meaningful upside; the generator merely gets a tolling fee. Outperformance is usually limited to the ability of the generation unit to perform at levels better than contractual reimbursements, although some may have bonus components linked to spark spreads (in the power sector). An example of this arrangement that we have rated in the Liquefied Natural Gas (LNG) sector is the agreement that FLNG Liquefaction 2 LLC, (Freeport LNG train 2; FLIQ2) has entered with BP Energy Co., its primary offtake counterparty. Once the project is complete and operational, the key risk that FLIQ2 needs to manage is plant performance--mainly availability--and controlling non-power-related costs. In our credit assessment, FLIQ2 is not exposed to market risk, meaning that we expect cash available for debt service to decline less than 5% from our base case to our downside case, which includes adverse changes to market conditions alone (and not adverse performance change). Our assessment focuses on contractual terms to see if the tolling contract fully shields FLIQ2 from market risk (for instance, even power usage costs are passed through to BP Energy).

Power Purchase Agreement (PPA)

In a PPA, or alternatively, long-term offtake agreement arrangement, the generator is short fuel but has hedged its long power position. A PPA is riskier because it introduces the concept that the generator is managing the market risk on the fuel side. Risks also pertain to escalators in the long-term purchase agreement and whether change-in-law risks are passed through to the offtaker. For instance, a number of legacy PPAs in California were silent on carbon cost pass-through and some had to absorb those costs when California initiated a carbon cost regime.

For another example, Sabine Pass Liquefaction has entered into 20-year sales purchase agreements with its offtakers. Sabine has chosen to take natural gas procurement risks because (i) the contract allows them to pass through the cost of gas at 15% over the contractually-agreed index (offering an opportunity to make some upside), and (ii) because they feel that a number of their customers, especially foreign utilities, do not have the desire nor expertise to go into the market and procure the gas themselves. They are taking the gas procurement and gas price risk, but as is the case with other downstream facilities operating on the Gulf Coast, they are comfortable with the gas supply infrastructure, performance history, and price based on analysis of likely supply. We note that risk of gas pipeline service interruption is borne by the project unless it is a specified force majeure event.

As a result of rapidly-declining marginal costs of production, due to lower gas prices and increased efficiency, bid-ask spreads for long-term contracts have widened to such an extent that we have not seen many, if any, long-term tolls or PPAs in the power space (or in the LNG markets) in recent years. Long-term contracting markets are also dying out because of the exit of large financial institutions. They have been replaced by medium term (four to five years) swap and hedge contracts, such as the ones listed below. And, while PPAs may largely mitigate market risk, they introduce a new one: counterparty risk, specifically, under our criteria, the credit quality of the offtaker.

Revenue Put Option

This is essentially merchant power operations but with minimum (floor) revenues for a predefined number of years (generally shorter than a PPA or toll length). In this arrangement, it is the power generator who pays the hedge provider an option premium for having the right to exercise the option when revenues fall below a predetermined level (setting a revenue floor) and retains all of the upside in power prices. The generator lives with the risk of declining power prices up to the floor level. Fuel risk remains entirely on the generator.

We are seeing this market as one that is also getting constrained in terms of the number of counterparties willing to be hedge providers, and consequently terms for generators have become less favorable. On the other hand, banks and sponsors are also getting overexposed to certain hedge providers. The limited number of counterparties willing to participate as hedge providers is currently an issue in power project financings. It is the hedge providers that regulate the market to ensure there is no overbuild as they are the ones that take the risk on spark spreads.

From a credit perspective, we assess whether the revenue put is set high enough to protect the assets' cash flow at levels that provide it headroom over its fixed costs (including debt service), or if the floor covers only a portion of the fixed costs, and the asset must earn energy margins to cover the shortfall. Moreover, timing and frequency of heat rate call option (HRCO) settlements can have cash flow impacts, and eventually affect credit quality. For example, Panda Temple I's revenue put covered only a portion of its fixed costs and timing differentials in settlement resulted in additional stress on its first quarter cash flows; this project recently defaulted.

Heat Rate Call Option

The heat rate is the efficiency with which a power plant converts the calorific content of the fuel into electricity. Broadly simplifying, the variable cost of producing power is the unit's heat rate multiplied by the cost of fuel. In a HRCO, the power offtaker makes a periodic fixed payment to the power generator (the option premium) for the right to "call" the plant at a specified heat rate. The heat rate in the contract is typically matched with the plant's heat rate. Apart from outage risk, the generator is also taking on balancing market risks in electricity and fuel; i.e. the generator has to operate within contracted parameters for which it is reimbursed (actual heat rate versus contract heat rate; actual fuel cost versus fuel index; and actual variable operations and maintenance [O&M], versus contract variable operations and maintenance [VO&M]). The upside is operational efficiency; the generator gets to keep the difference between actual performance and the parameters it is reimbursed on. We may not give much hedging benefit (by stressing cash flows substantially) if we believe that the HRCO could have significant basis risks.

Hedging 101: The Heat Rate Call Option

An HRCO is essentially a contractual exchange of cash flows. It can be either financially settled or physically settled, i.e., it gives the counterparty the right to call the asset above a specified market heat rate.

In most financially settled transactions, the counterparty gives the project a fixed payment in exchange for one or several structured payments based on market prices. The option can be without basis risk (for instance, if the asset is at the same power hub where the option is written) or can have basis risk (as in the example below). We illustrate below an example of a HRCO between an offtaker and a generator in New York Zone J.

On a specified monthly settlement date, the offtaker makes certain payments to the generator. In turn, the generator contracts to make certain payments to the offtaker. In our illustrative case, on the 20th of every month, the following payments are made/received (all financial).

Offtaker pays a fixed payment of, say, $6.33 per kW/month, and generator pays the offtaker (or receives from offtaker) the following:

- Generator pays Zone J location-based marginal pricing (LBMP) power price less contract heat rate times the Fuel Index, less the contract VO&M fee (let's say $3.25 per megawatt-hour [MWh]), less contract start charge. This payment is essentially the gross margins based on HRCO contract terms.
- If generator is online, generator receives Hub LBMP, out of merit payments, and ancillary service revenues; less production costs (i.e. generator's "production costs" will include actual heat rate times fuel, actual VO&M, actual start charge. These may be intentionally, or unintentionally, different from those in the contract).

Note that generators are paid at the generation node, but hedge at a trading hub. So there is always some basis risk unless generator sells at the generation node. Hub is a market construct--an aggregation of buses. The power price reference zone index (Zone J) used in the HRCO contract is an average of nodes and is used because it is a liquid and actively traded index.

Also, the generator may choose not to run or may be unable to run. Suppose the generator's node LBMP is under its generation cost, it would prefer not to run and pay offtaker either the node LBMP or the Zone J LBMP, whichever it has agreed to.

Generator's Rationale

If the contact is properly constructed, it mimics a toll and results in a predictable revenue stream. If the basis between Zone J and the generator's hub holds, the generator will get gross margins in its hub which cancel payments it makes (gross margins in Zone J). The generator is left with a demand charge that services its debt and also provides an internal rate of return.

Offtaker's Rationale

The offtaker may have a financial or physical obligation in Zone J with another counterparty. It calls the plant when it needs to supply energy. Alternatively, the offtaker may or may not buy the call to hedge a current or future obligation, i.e., the offtaker may just like the trade in the bullish Zone J.

There are many areas where the potential for mismatches exists:

- Generator Hub LBMP versus Zone J LBMP (the zone index, which is the average of nodes). This basis could be either gas or power. Basis risk is undoubtedly the biggest risk. It can be minimized but can never be eliminated.
- Contractual capacity compared with actual capacity.
- Unit forces out or derates when unit is economic. This is a potentially big one unless there are some outages allowance.
- Actual heat rate versus contract heat rate.

- Actual fuel cost versus fuel index.
- Actual variable VO&M, versus contract VO&M--a relatively lesser risk.
- Frequency and/or timing of the HRCO settlement.

Source: S&P Global; Reference: NRG Energy Inc.

Block Power Sales

Block power sales have all the risks of a PPA but shorter term forward sale contracts with no price escalators embedded in the contract. We give credit for the contracted period but then apply our merchant deck to the outer years. While eventual realized prices in the outer years could be higher than our merchant pricing assumption due to the company's ratable hedging, we give credit only when those volumes are contracted and pricing is known. Forward capacity revenue sales can be a version of this phenomenon.

Full Requirements Contracts

Full requirements contracts have all the risks of a PPA and introduce volumetric risks. The main risk is modeling errors because the generator has to manage load shaping risks of the offtaker that may change substantially seasonally (or even daily). There is some hourly shaping risk that remains when generators sell block energy against an expected generation shape. While we can have the total delta MWh hedged, we could still have some exposure in the wings (i.e., are long low price hours) and in the super peak (i.e., short high price hours). For peaking assets in markets that tend to spike, this can be a problem—-in a falling market, we could lose more being short the super peak than we gain being long the wings. This also shows why matching with an affiliated retail load is usually the best hedge. The generator also has to manage other risks, like transmission congestion and the risk that the offtaker's load may switch (leave), or conversely, increase. There is no way to hedge this shaping risk except by factoring expected losses into prices (buying insurance or buying options at various strike prices). Our sensitivities stress the hedges to see how they perform under price swings. We typically request gross margin performance under a 95% downside stress to inform our base-case cash flow adjustments.

Constructing Margins By Hedging Components

Hedges can also be constructed if some commodities have a more liquid or tradable market. For example, in the ERCOT market, Vistra Energy Corp, Calpine Corp., and NRG Energy Inc. hedge power by hedging market heat rates and natural gas volumes. This is because in ERCOT, power is traded as a heat rate index versus NYMEX last day settle, i.e., we can buy or sell a market heat rate directly. This is generally due to the fact that natural gas is almost always on the margin in ERCOT, thus it trades rate rather than fixed price. Also, the power trade can be physical or financial, the gas trade is usually financial (typically though the use of NYMEX look-alike on ICE). Also, power sales can have several platforms. It can be retail, over-the-counter (OTC), or through origination (bilateral). Gas trades are almost always OTC. While this can create more tailored solutions, it can also introduce basis risk.

Hedging 101: Breaking Power Into Components

A wholesale generator in a market like ERCOT would use a dispatch model to produce what its generation length would be (long position). This length is broken out into separate heat rate and natural gas equivalent components. Then all sales (whether to external counterparties or to a retail affiliate) would be short positions netted against that length whether it is heat rate, natural gas, or both. Generally, sales to a retail affiliate are power sales and would hedge both heat rate and natural gas equivalent positions. The generator then calculates the percentage hedged separately for natural gas and heat rate components.

Here's how this may work:

Assume natural gas is $3/million Btu (mmBtu) and forward market for power is $30/MWh. Then the market-implied heat rate is 10 mmBtu/MWh ($30/MWh divided by $3/mmBtu). So, to sell 15,000 MWh, we would buy 150,000 mmBtu of gas to sell the equivalent of a 10 heat rate.

Things are a little different if we are specifically hedging generation. If we're hedging a combined-cycle gas unit with a 7 mmBtu/MWh heat rate (its production efficiency) and following the above example, we sell forward power for $30/MWh. We probably wouldn't buy 10 mmBtu/MWh times 15,000 MWh worth of gas because the plant burns only 7 mmBtu/MWh. If we're "sparking out" the unit, we'd buy 105,000 mmBtu (7 times 15,000). Now, if we are an ERCOT hedger and sell the heat rate directly at 10, we would want to sell the extra gas ([10–7] times 15,000 MWh) to lock in the unit spark.

Because the power is sold versus day ahead or real time settlement and gas is versus last day settle (third business day before end of preceding month), there are additional transactions to run the hedges inside the month (i.e. gas basis [sell LD1, buy Inside FERC] and gas index [sell IFERC, buy Gas Daily Average]).

This is usually a clean hedge for the wholesale side. As a generation owner, if we've 1) Hedged by selling power forward at a hub, 2) Bought a financial transmission right (FTR) that moves the position from our generation node to that hub, 3) Locked in the volume of gas our CCGT will use to generate that power and 4) Rolled it inside the delivery month by trading gas basis and index, that margin is basically locked in. In other words, that hedge margin is invariant to changes in gas price or power price.

The hedge can still become ineffective, i.e., the derivative may move more than 20% up, or 25% down, relative to the underlying asset it's hedging. The problem that may cause this is if the hedge is serving a load shape, which varies hourly and monthly. In all hedge calculations, selling MWhs for the spring nights is the same as selling that volume for the summer peak. Of course, those two products have much different generation spreads. As a result, for monthly hedging, even at 100% hedged level, we may be over-hedged weak weather months and under-hedged strong ones. When we sum these up, even though we have hedged a high percentage of expected generation, we may still not have captured as much of the expected margin. Usually, in such situations, the hedger/trader will attempt dynamic hedging--a technique that is widely used by traders to continually hedge exposures because it involves adjusting a hedge as the underlying moves. But this may not be successful and result in inefficient hedging.

Source: S&P Global; NRG Energy Inc.

Hedging Could Give Rise To A Different Kind Of Risk

Hedging too much, too far out, or using the wrong instrument can be a risk. Forward contracts are dependent on the existence of liquid forward and futures markets and competitive access to storage and financing. Often, hedging goes wrong because of relative depth of the fuels and products markets. All too often large losses result from mismatches between fuel and products. For instance, in the oil and gas sector, there have been cases of over-hedging (gulf producers or refiners getting caught short by hurricane interruptions) or mishedging (refinery locking in fuels prices and then seeing them spike while prices for their unhedged asphalt/fuel oil crashed).

In particular, for any agricultural product the relative depth of the markets is exacerbated by a financial crisis. This is because at the core of a financial crisis is the "credit crunch". Credit plays a key role in agriculture, financing the time lag between purchasing inputs--seeds, fertilizers, other agricultural chemicals--and the realization of revenues from crops harvested and sold months later. Credit is also important for financing the physical trade of product from seed and fertilizer producers through the supply chain to retailers. The financial crisis usually creates great uncertainty with input and output prices in the agriculture sector and crop prices quickly collapse from record levels.

For instance, corn markets are fairly liquid two years out, while ethanol markets can be hedged up to only about six months. In the period leading up to the financial crisis, as corn prices rose, many ethanol producers hedged corn out 12 to 18 months even as ethanol was sold forward for a shorter term. In the wake of the credit crisis, these producers were stuck with a negative crush spread as ethanol prices tumbled. Similarly, meat processors hedged a vast majority of projected feed volumes with futures, locking in the majority of their feed cost for a year when corn prices first shot up. Once corn prices pulled back, the industry was stuck with high feed costs, while product prices (i.e. poultry) fell because of unpredictability of supplies and market prices. This led to huge losses. Using options would have significantly reduced, but not eliminated, the problem.

….And Even A Good Hedge Has Risks

Liquidity Risk/Margin Calls

Depending on the type of hedge instrument used, there may be the potential for margin/collateral calls, given adverse power price movements. Large commodity price swings can lead to significant margin calls on hedges. Depending on the level of perceived exposure, we may conduct a liquidity analysis to evaluate the level of committed availabilities for the company to meet stress-case projected liquidity requirements, including low probability tail events that could lead to significant liquidity calls. These liquidity needs may arise from 1) Negative mark-to-market (MTM) positions in contracts with defined credit thresholds, also known as hard triggers, 2) Negative MTM positions in contracts with only adequate assurance clauses, also called soft triggers, 3). Requirements for static margin at exchanges and regional transmission organizations (RTO)s, 4) 60-day net payables exposure, or 5) Triggers in loans and contracts, etc. We typically stress a company's out-of-money positions assuming a combined credit event (where the company loses its investment grade rating) and a market event (a 30% adverse price movement over the prompt 12-months and a 20% price movement further out.

Metallgesellschaft AG (MG)

In 1991, the U.S. subsidiary of MG (trading, engineering, and chemicals conglomerate) implemented a marketing strategy intended to insulate customers from heating oil and gasoline price volatility.

Customers were offered contracts to buy products at fixed amounts and at fixed price—-set at a premium above average futures price of contracts expiring over next 12 months-—over a 5-year or 10-year period.

These contracts effectively gave MG a short position in long-term forward contracts. MG hedged this exposure using long positions in near-term futures contracts, intending to roll these over in advance of expiration. Alternative hedges in forward market were unavailable and long-term futures were highly illiquid.

The problem for MG, however, was that gains and losses on forward contracts are realized at expiration: in MG's case, they were realized if and when customers took delivery. On the other hand, futures contracts were marked to market daily.

During 1993, prices fell precipitously, resulting in losses on MG's long positions, which were realized immediately. Offsetting gains on customer contracts would only be realized over time. The net cash outflow, exacerbated by margin calls, resulted in a cash squeeze. Adding to MG's problems was the fact that the oil market shifted from backwardation to contango, increasing the cost of the futures. Moreover, under German accounting rules that were in effect at that time, MG was required to report losses associated with futures hedges, but could not book gains on customer contracts—-with the resulting reported losses roiling various constituents. In December 1993, MG cashed out its positions and reported losses of $1.5 billion.

A similar situation confronted Constellation Energy in Sept. 2008 when increasing margin calls prompted it to pursue additional credit lines. As an aside, that was also the time we learned that traders do have schadenfreude moments--the credit default swap spreads on the company were broken by intense short selling action, effectively making it impossible for the company to secure those lines.

Counterparty Risk

Conversely, in the case of in-the-money hedge positions, the company may bear counterparty credit risk. Under our criteria, we would need to form an opinion on the credit quality of the counterparty, and determine the materiality of the hedge benefit to determine if the hedge provider indeed limits the generator's credit quality.

Counterparty Risk On In-The-Money Hedges

"The market for cotton, one of the world's oldest commodities, has been roiled by rampant breaking of contracts by farmers and textile mills.

"Over the past two years, cotton prices nearly tripled before they fell by almost two-thirds, triggering the broken deals. Both cotton growers and the overseas mills that spin cotton into yarn have walked away from previously signed agreements after prices turned against them.

"As much as 20% of the hundreds of thousands of contracts written since 2010--valued at as much as $12 billion--have been reneged on or rewritten…"

-Wall Street Journal, Aug. 31, 2012

Knowledge Speaks But Wisdom Listens

In his book, "The Wisdom Of Crowds", James Surowiecki narrates an anecdote. In fall 1906, Francis Galton, a half cousin of Charles Darwin, visited the West of England Fat Stock and Poultry fair near his hometown in Plymouth and happened upon an intriguing contest. An ox was on display and members of the gathering crowd were lining up to place wagers on the weight of the ox after it was slaughtered and dressed. The best guesses would receive prizes. The crowd reflected a diverse lot. Many were butchers and farmers, and considered experts, while others had no practical knowledge of cattle. Almost 800 submitted guesses and no one nailed the exact answer of 1,198 pounds. But the average of the guesses, at 1,197 pounds, got pretty close. This mean number, representing the collective wisdom of that crowd, was closer than the estimates of any individual villager and closer than any of the estimates made by the experts. The thesis proffered is that under certain set of conditions (such as decentralization--ability to draw from local expertise; and aggregation--ability to transfer private judgements into collective opinion), a diverse set of independently deciding individuals may make better predictions than experts.

The forward power markets are just such a diverse and independent opinion. We know that markets do tend to overreact ("madness of mobs") as is their wont. We also know that forward prices set by regional power markets will invariably be wrong, but they are still the best indicator of future pricing. We certainly understand if a company is relatively less hedged in the prompt year in anticipation of a preseason (summer or winter) rally. However, we think that in a market that is experiencing the onslaught of disruptive technologies, assuming that one has superior knowledge to consistently outperform the vagaries of the commodity markets is a strategy that is not credit supportive. The forward pricing may just be indicative of changing market conditions. For example, for the latest New England capacity auction, the RTO reduced its load forecast by 390 megawatt (MW) for "behind-the-meter" solar PV resources. Moreover, nearly 640 MW of incremental energy efficiency products cleared in the auction. That's the equivalent of a 3% move in reserve margins. Perhaps the markets are suggesting that net demand growth will be slower than anticipated and spark spreads could languish. Similarly, ERCOT's implied forward market heat rates have remained subdued (even when conventional wisdom in 2012 indicated a tightening reserve margin). Perhaps the market was anticipating that proliferating renewable generation would impact scarcity price formations in an energy-only market like ERCOT significantly. Nihub has similarly shown dislocation from power pricing based on natural gas prices since 2007 when wind started impacting marginal hours. We, therefore, think that wisdom is in listening to the markets and knowing that hedging entails giving up prospective upside to underpin the downside.

We do not profess to know forward power markets or the different ways energy companies can hedge their future production and gross margins. In fact, we routinely educate ourselves on the emerging products used for hedging away risk. However, we understand credit, and from a credit perspective, we see the ability to engage in effective hedging as merely a function of the availability of appropriate hedging instruments and markets. The willingness to do so in a disciplined manner is a totally different matter. That has more to do with the risk culture of a firm and the perceived costs/benefits of entering such hedges. We do not expect diversified investment grade companies and independent power producers to think about hedging their future production in the same way. Diversified companies like Exelon Corp., Public Service Electric & Gas Co., Dominion Energy, or NextEra Corp. will think of it in terms of the costs and benefits of maintaining an investment grade rating, whereas independent power producers like NRG Energy or Dynegy Inc. will base their hedging decisions factoring in minimum debt servicing levels that bondholders will tolerate, before leaving production unhedged for equity upside.

Appendix: Basis Risk

To the extent the price index referenced in the hedge contract is not correlated with the company's exposure, so-called "basis risk" arises. Basis is the difference between the total costs to source a commodity (including interregional price differences and storage/transportation costs) and the on-exchange quoted price. This difference is difficult to hedge and is borne by the company. As various historical examples attest, poorly structured hedges can unintentionally leave the company with elevated exposure to extreme price movements–-becoming, in effect, trading positions rather than hedge positions.

These basis inefficiencies arise from two factors:

Locational Or Geographic Basis

The commodity that is hedged is in a less liquid market and is hedged with an offsetting trade in a relatively liquid market. Basis risk is introduced when historic correlations, on which the hedge is predicated, break down. The most noticeable example is the significant upstream investment that has led to the U.S. shale gas and oil production to diminished supply constraints and natural gas prices, and volatility decline in in recent years. However, the volatility that used to exist in natural gas prices has not been done away, it has merely moved downstream into natural gas basis as regional demand-supply dynamics have changed, prompting pipeline capacity additions in recent years. For instance, pipeline constraints, coupled with declining natural gas production at Sable Island and limited LNG deliveries are resulting in much higher natural gas prices at certain trading points. New England gas trades at a premium to Henry Hub and Tetco M3 due to increased power sector reliance and limited infrastructure. A hedge based on historic New England and Henry Hub correlations has the likelihood of performing poorly.

Product Basis

This basis arises because of relatively shallow markets in one product relative to another, or when products are substituted in a hedge either because an end product can be produced from a variety of commodities to meet contract requirements at an overall lower cost (e.g. animal feed etc.) or when the correlation between products has been very stable (crude oil and NGLs). Historically, natural gas liquids (NGLs) were hedged against West Texas Intermediate (WTI) crude. Companies that sold WTI crude to hedge ethane and propane positions lost significant amount of money when those correlations broke down.

Case Study: Essential Power, LLC

In 2012, Essential Power LLC, a 1,720 MW generation portfolio of gas-fired assets in Pennsylvania-Jersey-Maryland and New England, entered into a HRCO for its three units at Newington, Ocean Peaking, and Rock Springs. Ocean Peaking and Rock Springs had commodity hedges which were structured based on the actual gas delivery point of the plants. However, the Newington facility was anticipated to demonstrate higher basis beginning in mid-2013 based on the fact that there was a modest historic separation between Algonquin, the delivery point, and Tetco M3/Transco, the hedging hub.

Table 1

Contract Versus Actual

Comparison of terms

	HRCO	Facility
Delivery period	7/1/2013-8/31/2016	
Power index	Mass Hub Day ahead	Newington
Gas index	Tetco-M; Transco Z-6 NY	Algonquin

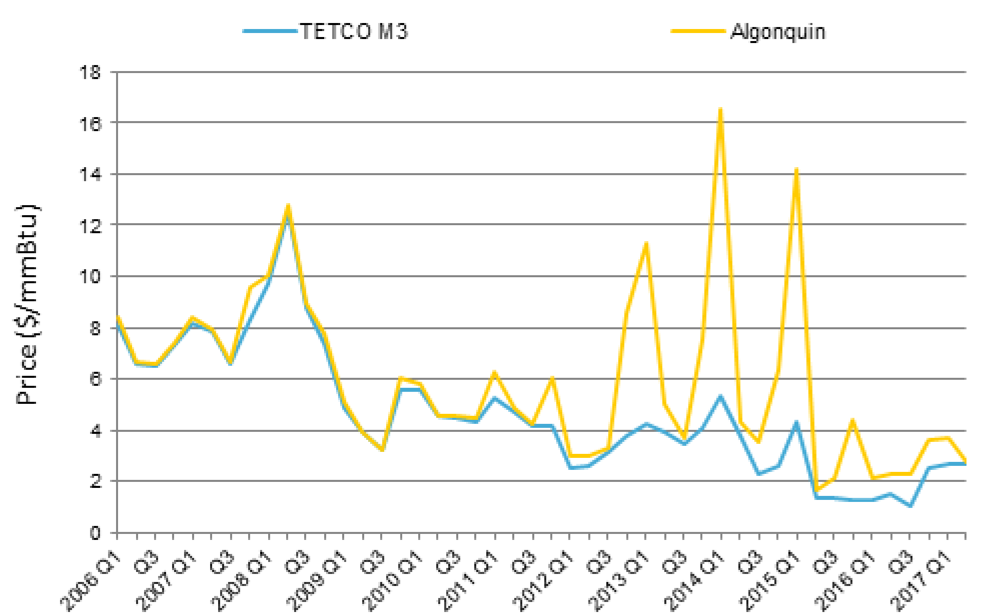
The Newington commodity hedge was struck at a liquid pricing hub to achieve a higher premium (the option premium that the facility received), which the project expected would offset any anticipated basis based on historical correlations. The hedge also provided adequate cushion between the facility's capacity and the contractual generation quantity, unit heat rate and contracted heat rate, start charges, and VO&M. It also had provisions that defined minimum run time, minimum down time, and maximum starts per day. It would appear that the hedge was well conceived.

However, a combination of factors, including severe weather, resulted in a basis blow out in winter 2012/2013. On the Algonquin end, pipeline infrastructure constraints and higher natural gas demand caused a significant increase in realized prices at the plant's delivery point while on the Tetco M3 end gas prices stayed low, and even declined marginally, due to continuing strong production in the Marcellus.

The charts below present the breakdown of historical correlation and the ensuing basis blow out. We note that these are current gas price charts that show prices subsiding in 2016 after New England witnessed a couple of milder winters. What the project was confronted with in the winter of 2013/2014 was an even spikier forward winter blow out through its contract term.

Chart 5

TETCO M3 vs. Algonquin, Quarterly Average Price, 2006-2017



Source: S&P Global Inc.; Bloomberg. Note: The basis blow out of the HRCO took place under a different shareholder and management team than current. The new refinancing is clear from any remaining overhang from the HRCO.

Chart 6

TETCO M3 vs. TGP Z6, Quarterly Average Price, 2006-2017