Natural Gas Industry

U.S. natural gas markets have undergone a remarkable transformation in recent years. After decades of rigid regulation, the natural gas industry is now free to compete on the wholesale level and, in a growing number of states, at the retail level. The result has been a substantial increase in the production of natural gas, far-reaching changes in the structure of the industry, and the growth of a large and fluid market in natural gas futures and options to cope with pricing uncertainties (NYME, 2003).

Natural gas is sold as a commodity, much like pork bellies, corn, copper, and oil. The basic characteristic of a commodity is that it is essentially the same product no matter where it is located. Natural gas, after processing, fits this description. Commodity markets are inherently volatile, meaning the price of commodities can change often, and at times drastically – indeed natural gas is one of the most volatile commodities currently on the market.

Natural gas is an attractive fuel: it burns cleanly, produces little pollution, and has abundant reserves. The Energy Department's study puts recoverable reserves and resources of natural gas in the lower 48 states at 1,310 trillion cubic feet, more than a 69-year supply at current production levels. Most of these reserves are recoverable at prices below $3.50 per 1,000 cubic feet.

The deregulation that began in 1978 has addressed two important factors that were inhibiting the growth of the industry: the lack of incentive to drill for new supplies, and the lack of reliable, readily accessible transportation. Additionally, the 1990 amendments to the Clean Air Act have led utilities and industries to use more natural gas in place of the high-sulfur boiler fuels that contribute to acid rain. The nation's rising demand for electricity has also increased the importance of natural gas. Utilities are responding by building or contracting for new combined-cycle and cogeneration facilities, most of which are fueled by natural gas.

Most U.S. gas demand is met by domestic production. About 15% of U.S. natural gas consumption was met by imports, virtually all arriving by pipeline from Canada. The low level of U.S. imports is typical of the natural gas markets worldwide. While nearly 50% of world oil production crosses a country's borders, only 16% of the world's gas production does so. Natural gas accounts for 25% of primary energy consumption in the United States. End-users are generally grouped as residential, commercial, industrial, and power generators; each has its own risk profile.
The residential and commercial groups have fairly stable baseload demands and large, variable heating demands. This heating demand is the main force that drives the natural gas market during the winter; approximately 43% of the natural gas consumed throughout the year is actually used in the four-month period of December through March. Over the short term, residential and commercial heating demand is weather-sensitive, varying primarily in response to the severity of the winter temperatures.

Many manufacturers consume natural gas, both as a feedstock and as a fuel for their manufacturing process. Generally, there is no other fuel that can be used for these purposes, or else the potential substitutes are costly, so this portion of industrial demand is not sensitive to residual fuel oil prices. However, both processing demand and boiler fuel demand are sensitive to changing levels of industrial activity — especially in the glass, food, paper, chemical, petroleum refining, primary metals, fabricated metals, and machinery industries.

For most electric utilities, air conditioning use is the major variable in market demand for electricity, and more and more power producers depend upon gas to meet peak demand. Since electricity demand peaks in the summer in most of the country, consumption of gas by electric power producers is counter-seasonal, helping to some extent to smooth out the highly seasonal demand pattern set by residential and commercial heating users.

La Plata County and Natural Gas

La Plata County sits on one of the largest natural gas reserves in the country. As such, the natural gas industry in La Plata County provides a substantial amount of tax revenue, providing the local community with many amenities that would not be possible otherwise (Walker and Sonora, 2005). Consider that:

- Direct spending by the natural gas industry in La Plata County for the year 2003 was approximately $215.7 million.
- Each dollar spent by the natural gas industry in La Plata County generates approximately $1.43 in additional sales (or output), or an additional $308.4 million dollars spent on productivity in La Plata County in 2003. This represents over 22% of the total personal income (or output) of La Plata County.
- Direct earnings spent in La Plata County increased by $42.6 million in 2003 because of natural gas operations. Total household earnings that can be attributed to the natural gas industry in La Plata County in 2003 equaled $78.5 million.
- Direct employment by the natural gas industry in 2003 was about 305 jobs which generates an additional 623 related jobs in La Plata County. This is approximately 4.2% of the total employment in the County.
- In 2003 the natural gas industry paid average salary was approximately $84,000, as compared with the average annual wage in La Plata County in 2003 of over $28,000.
- In 2003/2004 the natural gas industry accounted for about 48%/62% of all La Plata tax revenues, if natural gas prices continue, this share should grow.
- The natural gas industry generated an additional $6.2 million in sales tax revenue for La Plata County in 2003 or about 62% of the total sales tax revenue.
Hedging Natural Gas

Derivatives are financial instruments that 'derive' their value from an underlying asset; in this case the price of natural gas. Derivatives can range from being quite simple, to being exceedingly complex. Basic types of derivatives include futures, options, and financial swaps. Natural gas futures are traded on the New York Mercantile Exchange (NYMEX) in units of 10,000 million British thermal units (mmBtu) up to 36 months in advance. Consider the plot of natural gas prices since 1998 below. Prices have been as low as $2 and as high as $16 per mmBtu.

The price of natural gas is set by market forces; the buying and selling of the commodity by market players, based on supply and demand. There are two distinct markets for natural gas: the spot market and the futures market. Essentially, the spot market is the daily market, where natural gas is bought and sold 'right now'. To get the price of natural gas on a specific day, it is the spot market price that is most informative. The futures market consists of buying and selling natural gas under contract at least one month, and up to 36 months, in advance. For example, under a simplified futures contract, one could enter into an agreement today, for delivery of the physical gas in two months. There is a significant market for natural gas derivatives and financial instruments in the United States. It has been estimated that the value of trading that occurs on the financial market is 10 to 12 times greater than the value of physical natural gas trading.

Trading financial derivatives can help to mitigate, or 'hedge' risk. A hedging strategy is created to reduce the risk of losing money. For example, purchasing homeowner's insurance is a common hedging activity. Similarly, a marketer who plans
on selling natural gas in the spot market for the next month may be worried about falling prices, and can use a variety of financial instruments to hedge against the possibility of natural gas being worth less in the future. Futures and options markets provide a forum for commercial interests in a commodity to hedge against price risk by transferring that risk to those more willing and able to bear it, or to those commercial interests with inverse risk profiles.

Thus, the futures market allows industry marketers to lock in a purchase price for gas they have committed to deliver, or to lock in a selling price, including a profit margin, for gas they have committed to buy. Pricing in a volatile market makes it difficult to maintain flexibility when planning. Without futures, market participants must accept fixed-price contracts, which can prove disadvantageous. The futures market provides flexibility in forward planning. This flexibility is further enhanced by the options market which provides participants with, among other things, the ability to set price floors or ceilings, hedging against adverse price movements while retaining the ability to participate in favorable ones.

Financial natural gas markets may also be used by market participants who wish to speculate about price movements or related events that may come about in the future. The main difference between speculation and hedging is that the objective of hedging is to reduce risk, whereas the objective of speculation is to take on risk in the hope of earning a financial return. Speculators hope to forecast future events or price movements correctly, and profit through these forecasts using financial derivatives.

Consider the following examples where futures and options could be used to hedge risk (i.e. lessen the probability of losing money):

- Fixing short-term fuel costs: End users may sometimes look for extra protection against seasonal price spikes or may want to lock in their near-term fuel costs for some other reason.
- Locking in an attractive spot price: The end-user who finds the current natural gas spot price attractive can use the futures market to lock in that price for at least 36 months. Or the end-user can purchase call options to set a ceiling purchase price for gas.
- Hedging storage gas: End-users who have put gas into storage can hedge against falling prices by selling futures, buying puts, or even selling calls against their stored gas.
- Protecting against sharp price spikes caused by occasional pipeline congestion which results in shortages or delivery slowdowns.
- When abnormal weather, concerns about storage levels, or other factors cause natural gas spot prices to strengthen, that strength will frequently be reflected in prices paid for futures contracts deliverable some months ahead. This presents opportunities to lock in attractive forward selling prices.
- Producers can earn additional revenue in flat markets by selling call options on their reserves.
- Protecting against increasing or decreasing electricity prices.
- In general, financial institutions are more willing to lend against hedged reserves than unhedged reserves and, in some cases, hedging is a prerequisite for borrowing. Either the sale of futures or a put options purchase is considered a suitable instrument for hedging gas still in the ground.
In general, the natural gas futures market provides investors with many attractive opportunities. Demand for gas is highly seasonal, but the seasonal impact on pricing is unpredictable. Variables include the severity of the winter weather, inventory levels, producers' needs to generate cash to cover their expenses, unexpected changes in demand for gas-generated electricity, transportation prices and constraints, and the cost of natural gas versus the cost of other fuels.

Futures Example

Assume you are in the business of selling natural gas or in the case of La Plata County your tax income is dependent upon the price of natural gas. Assume it is year 2005 and future prices of natural gas are $12 per mmBtu. You could short future contracts at $12 in 2005 for up to 36 months. Consider the price of natural gas today of $7 per mmBtu. What does this all really mean?

You have a contract to sell your natural gas for $12, no matter the price today. This future contract allows you to either physically deliver your natural gas at $12 or you could simply cash-in on your financial contract. Your short future position has a current value of $5 per mmBtu today ($12 - $7). You could close out your futures contract and pocket $5 per mmBtu and then sell your natural gas at $7 per mmBtu; for an effective selling price of $12 per mmBtu. In other words, if you correctly hedged your natural gas exposure in 2005 your gross profit today would be 71% higher versus selling only at the spot price.

Let’s consider the opposite scenario today where the spot price of natural gas is $16 per mmBtu. Your future contract would be worth negative $4 ($12 - $16), however, you could sell your natural gas at $16 per mmBtu, for an effective selling price of $12 per mmBtu. In other words, the spot price is $16 and you effectively sold the natural gas for $12.

Thus, hedging is a practice to lock in a particular selling price or profit margin. If you are happy with the currently quoted “profit margin” for your business, then futures are an instrument to guarantee it. To put things in perspective, La Plata County produces approximately 525 million mmBtu each year. At an average selling price of $12 per mmBtu this equates to $6.3 billion in gross sales versus $3.7 billion in gross sales at $7 per mmBtu.

References
