

Natural Gas Supply and Demand Vary Throughout the Year

Natural gas is injected into pipelines every day and transported to millions of consumers all over the country. Virtually all the gas comes from either domestic gas well production, imports or withdrawals from storage facilities. During the summer, domestic gas well production and imported gas can more than satisfy customer demand, and excess supplies are placed into storage facilities. In the winter, demand for gas generally exceeds production and import capabilities, so withdrawals from storage are used to provide the extra gas needed to meet customer requirements.

Prices and Levels of Service Vary Among Customer Groups

Natural gas is consumed by residential, commercial, industrial and electric utility customers. Residential and small commercial customers use gas in relatively small quantities (primarily for space heating and cooking). They tend to pay the highest prices per unit of gas, but generally enjoy uninterrupted service. Industrial and electric utility users generally use gas in larger volumes (for uses such as process heating, crop drying and as fuel for powerplants). Although larger users usually pay lower prices per unit of gas, their purchase contracts tend to be shorter-term and interruptible, and many switch to other fuels if natural gas becomes scarce or too expensive.

Components of Natural Gas Prices

The price of natural gas paid by consumers is based primarily on the volume of gas delivered, and is made up of three parts

- transmission costs - for moving the gas by pipeline from its source to the customer's local area
- distribution costs - for bringing the gas from within the local area to the user's facility
- the cost of the gas itself

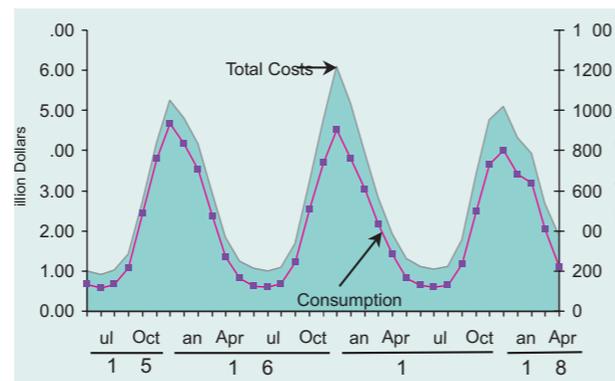
On average, the cost of the gas itself (the commodity price) is less than half the total cost for

low-volume users, such as residential and some commercial customers. Seasonal changes in the cost components can lead to unusual outcomes such as lower prices per unit in the winter than in the summer. The price of gas includes fixed cost components in transmission and distribution that are charged regardless of the level of consumption. As a result, the per unit cost of gas may increase as the amount of gas consumed declines. Lower wellhead prices of gas, generally seen in non-peak summer months, are often insufficient to offset an increase in per unit prices resulting from fixed costs being allocated over a smaller number of units consumed. Therefore, even though overall costs are lower for residential users during the summer months, their per unit costs are often higher.

Residential Consumers May Pay Higher Bills Even When They Use Less Gas

In assessing their natural gas bills, it is important for consumers to recognize the difference between price per unit of gas and total monthly cost (or expenditure). Total cost is determined basically by multiplying the volume consumed by the unit price. Residential bills can rise even when one

Figure 1. Residential Gas Costs and Consumption



Source: Energy Information Administration, Office of Oil and Gas, derived from *Natural Gas Monthly* (various issues).

factor (either unit price or volume) declines, if the rise in the other factor is greater.

The effect of offsetting changes in price and volumes consumed was seen in the winter of 1996/97 (November through March) when

residential consumers spent \$23.2 billion for natural gas (9% more than they spent the previous winter) despite a 6% reduction in consumption (Figure 1). A contributing factor was the relatively low storage levels going into that winter. These lower storage levels led to prices sufficiently high to increase total expenditures. The reverse can also happen. The following winter (1997/98) consumption fell 4% from the level of the prior winter, but expenditures were down even more (6%) because larger stocks going into the winter caused prices to decline 2%, resulting in lower gas bills overall.

Why Do Natural Gas Prices Fluctuate?

Prices might go up temporarily because

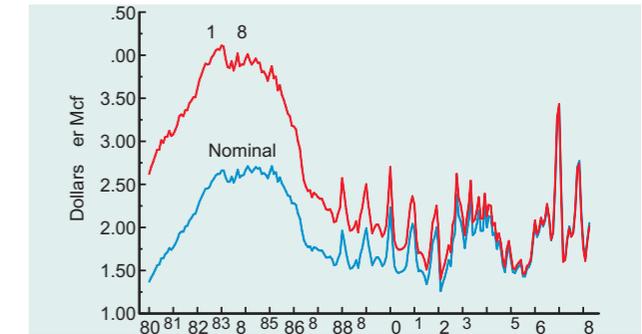
- Prolonged or severe winter weather increases demand in the high-consumption winter months.
- Diminished volumes of natural gas in storage reduce volumes that can be withdrawn and, especially in the early months of the heating season, make operators cautious about removing gas from their diminishing inventory.
- Constraints may occur along the pipeline delivery system.
- Operational difficulties restrict supplies to customers (e.g., production valves freeze, equipment breaks down).

What is Price Volatility?

The term price volatility is used to describe rapid price fluctuations of a commodity. Volatility is measured by the day-to-day percentage difference in the price of the commodity. The degree of variation defines a volatile market, not the level of prices.

Prices of basic energy (natural gas, electricity, heating oil) are generally more volatile than prices of other commodities. One reason that energy prices are so volatile is that many consumers are extremely limited in their ability to substitute

Figure 2. Average Monthly Wellhead Price



Source: Energy Information Administration, Office of Oil and Gas, derived from *Natural Gas Monthly* (various issues).

between fuels when the price of natural gas, for example, fluctuates. Residential users often cannot replace their heating system quickly and in the long run, it may not be economical to do so. So, while consumers can substitute readily between food products when relative prices shift, most do not have that option in heating their homes.

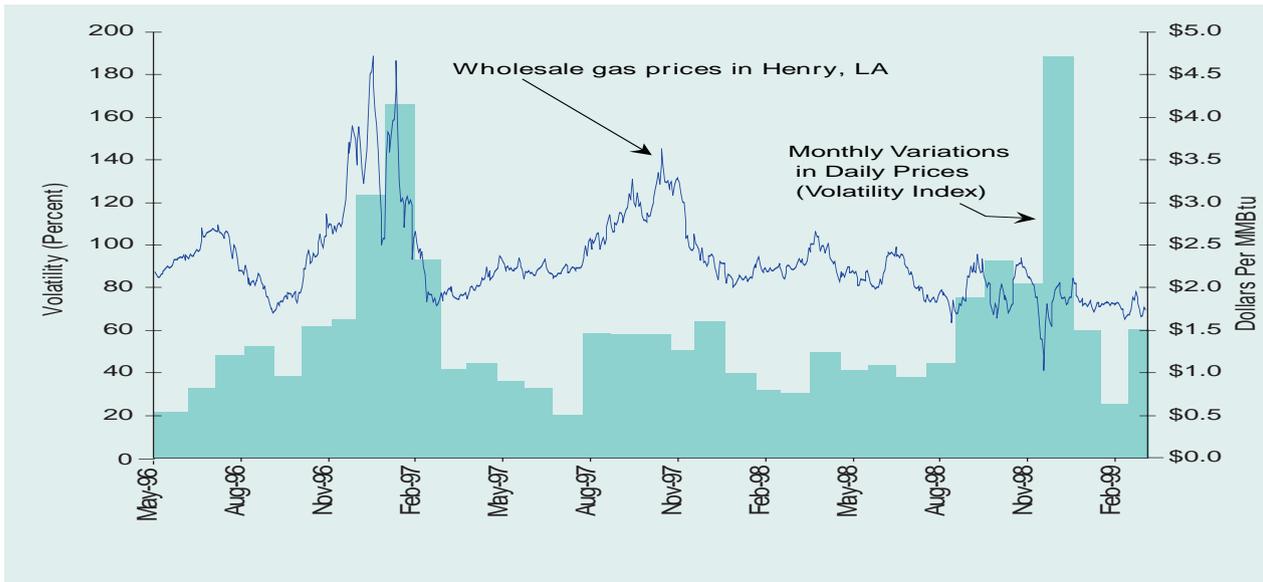
Price Volatility Has Grown With More Competition

The wellhead price, or the price of natural gas produced from domestic wells, has moved from a relatively stable but high price environment during the early 1980's to one with a great deal of price volatility but at lower price levels (Figure 2). Since price ceilings on natural gas were removed (beginning in 1979 and fully deregulated on January 1, 1993), there has been more competition in the supply market. This competition has created a more dynamic system that responds quickly to changes in the amount of natural gas consumed or supplied. Adjusted for inflation, the annual wellhead price declined by more than 50% between 1983 and 1998.

Price Volatility is Not Always Associated with High Prices

Consumers may tend to equate higher prices with volatility, but prices and volatility do not necessarily peak or trough at the same time. The daily wholesale price, and the associated monthly

Figure 3. Comparison of Price Levels and Price Volatility



Source: Energy Information Administration, Office of Oil and Gas, derived from *Natural Gas Monthly* (various issues).

volatility, for spot trades of natural gas at the market center in Henry, Louisiana (called the Henry Hub) demonstrates the difference between patterns in each. Both gas prices and volatility surged in the winter of 1996/97 (Figure 3). Although prices in the following winter also attained rather high peak levels, the volatility measure was less than half the prior year's value due to the lack of severe daily variation. In contrast, the month with the highest degree of volatility was December 1998, during which prices plummeted. In fact, on December 4, 1998, the spot price at the Henry Hub hit the very low level of \$1.01 per million British thermal units (MMBtu). Yet on the next trading day, prices rebounded to \$1.55. Such erratic action contributed to the high degree of volatility in that month.

How Do These Fluctuations Impact Consumers?

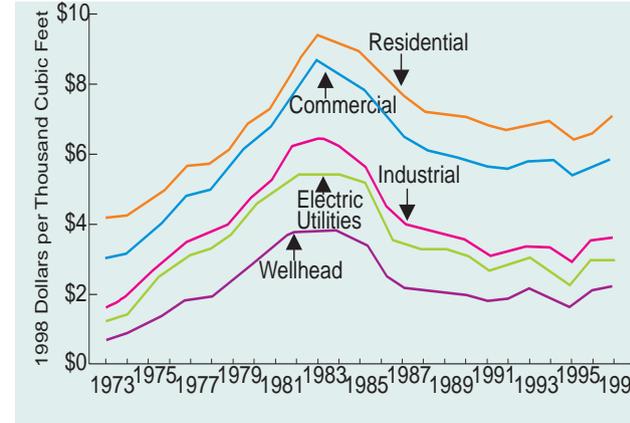
The impact of price volatility varies among consumers based on their overall service needs. Prices to residential customers tend to be much more stable than for commercial and industrial users. Residential customers see less variation because their bills reflect monthly average prices, which do not fluctuate as much as daily prices. Also, many residential customers stabilize their monthly bills by participating in yearly budget plans provided by their local gas distribution companies. Residential prices are within the jurisdiction of State agencies, and regulatory provisions

generally tend to inhibit the impact of market conditions. As regulatory reform proceeds at the State level, residential customers may experience more price variations. On the other hand, electric utilities and other large consumers, who often rely on short-term market purchases or arrangements without fixed price terms, have been dealing with fluctuating natural gas prices for years. These consumers often contract in this way because it offers the possibility of cost savings and they can switch to other fuels if necessary.

Customer Gas Prices Have Declined Substantially from 1980's Peak Prices

During the 1990's when natural gas prices have been very volatile, average monthly natural gas price levels have been substantially below the highs of the 1980's (Figure 4). Actual price decreases have been rather similar for consumers in

Figure 4. Annual Consumer Gas Prices



Source: Energy Information Administration, Office of Oil and Gas, derived from *Natural Gas Annual*.

each customer class, although the high-volume industrial and electric utility customers experienced the greatest percentage reductions. More than half the price reduction for all customers is attributable to a decline in the wellhead price of natural gas.

Consumer price reductions between 1986 and 1997 are particularly striking as they occurred while annual demand levels grew from 16.2 trillion cubic feet (Tcf) to 22.0 Tcf. The factors behind the decline in prices are varied, and include increased competition and efficiency resulting from regulatory restructuring of the gas industry, and competitive pressure from lower petroleum product prices since 1986. Improved technology and innovation in gas production and pipeline systems also increased productivity and helped to manage costs.

For a more detailed discussion of the natural gas industry, see EIA's *Natural Gas 1998 Issues and Trends*, on our World Wide Web Site at: www.eia.doe.gov and then select "Natural Gas", then select "Analysis".

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