

NATURAL GAS AND CONSUMERS

Natural Gas Primer

A Guide to Understanding Natural Gas Prices



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Interstate Oil and Gas Compact Commission

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September 2000

The Big Picture

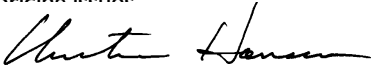
When natural gas was first piped to residential neighborhoods in the Midwest decades ago, consumers didn't wonder where it was produced. They marveled that it came straight into their homes and that they would never again have to shovel coal into the furnace to stay warm in the winter.

The wonder of this convenience also distances consumers from the product. They don't care that the natural gas was produced in abundance in the western United States or that they were fortunate enough to be served by pipelines headed to the lucrative Chicago and Milwaukee markets.

As consumers of natural gas now face the most rapid increase in price since the early 1980s, it makes sense to reflect on this precious commodity and examine its pricing in the broader context.

Long gone are memories of any other heating fuel for many in the Midwest. Natural gas is expected to be supplied at the push of a thermostat lever. Consumers still don't care about where it comes from — or wonder about how it is priced.

For that reason, the Interstate Oil and Gas Compact Commission (IOGCC) asked David Garlick, author and petroleum analyst who is a retired chief of oil and gas for the Texas Railroad Commission, to take a "big picture" look at these pricing issues.



Christine Hansen, Executive Director
Interstate Oil and Gas Compact Commission

Natural Gas Facts

1 The Energy Information Administration (EIA), part of the U.S. Department of Energy predicts that natural gas prices will continue to rise and average above \$3 per thousand cubic feet (Mcf) in 2000. EIA projects higher natural gas prices for the foreseeable future, keeping the price of natural gas between the cost of a good coffee latte (\$2.75) and a large sized movie popcorn (\$4.25). This \$3.00 price will represent the highest nominal price (not adjusted for inflation) in the last 20 years.

2 After adjusting for inflation, the price for natural gas in 2000 is actually much lower than it was in the early 1980s. In real terms, meaning adjusted for inflation, the price per Mcf is about 70 cents lower than it was throughout 1982 –1984. While natural gas prices may seem high, they are 30 percent lower than they were in 1983.

3 Even at today's higher prices, consumers receive 30 percent more energy with natural gas than with oil if they spend \$30 for oil and \$30 for natural gas. This makes natural gas an energy value.

4 The natural gas industry has made extensive use of cavern storage facilities in order to meet peak demands. Over 2 billion Mcf a year moves in and out of storage, ensuring that natural gas is more reliable for today's consumers than in previous years. The volume of natural gas stored to meet peak demands is twice as large today as it was 20 years ago.

5 Consumption of natural gas has declined by approximately 25 percent per residential consumer over the last 30 years. Consumers have played a significant role in their own deliverance from high gas prices. A typical home will use between 80 and 90 Mcf of natural gas in a year.

- 6 The total cost for gas for a typical residence will be about \$380 in the year 2000. This is over \$200 per home less than in 1983 and 1984. While prices in 2000 may seem high, they will actually be lower per residence than they have been in fifteen of the last twenty years. Consumers, through improved energy conservation, have played a key role in achieving these substantial savings.
- 7 Experts in the field of natural gas resource base size indicate that the United States, at current levels of consumption, has a 60-year supply of natural gas remaining in the ground.
- 8 More natural gas wells have to be drilled in the future to get this natural gas out of the ground. That takes money. Higher prices mean more wells drilled while lower prices mean fewer wells drilled.
- 9 Producing states have taken the lead in ensuring the future supply of natural gas by reducing the state tax burden on the oil and natural gas industry to encourage drilling investment within the states.
- 10 One of these programs, which eliminated or reduced severance taxes on gas wells drilled in high cost formations in Texas, had thousands of new wells drilled under the incentive. Today, these wells produce 7 percent of the natural gas supply used in the United States each year.
- 11 By paying reasonable prices for natural gas, consumers ensure money is available to drill more wells, guarantee their natural gas supply into the foreseeable future, and ensure that their future prices are as low as possible.

Natural gas will be the center of attention if prices remain at current levels. **These prices are not high in inflation-adjusted terms.** This fact will not stop calls from consumer groups and politicians for action to correct the situation and fix the “price-gouging.” If the result of these efforts impacts the drilling of new natural gas wells, then these well-meaning groups will have done the ultimate disservice to the consumers. The only result can be reduced supplies and ultimately higher prices.

The Blame Game

So, you just opened up your home heating bill, and found that it cost twice as much to heat your part of the American dream as it did last winter. You are angry, and your dog, Blue, is too good at pheasants to kick. What do you do?

You will probably do what generations of Americans have done—blame the oil and natural gas industry for this misfortune. Next the federal politicians, sensing an angry electorate, will seize the opportunity for free publicity and further denounce the people who keep you warm. They will demand congressional investigations to expose profiteering, price-fixing, collusion, and money-grubbing on the part of the industry. After all, they also used to watch “Dallas” on TV so they have firsthand knowledge of the mechanics of the oil and natural gas industry. The industry will be accused of almost everything except teen-age acne at this stage.

Militant activists, using environmentally friendly materials like sticks and stones as potential weapons, will chatter saying they told us so. If the United States didn’t burn fossil fuels, then its citizens wouldn’t be subject to this profiteering industry and the air quality would be much improved. They may re-launch the idea of a big tax on burning fossil fuels so that you won’t consume as much, forgetting that high prices tend to naturally encourage conservation. If we can just get the price so high that people can’t afford it, then the air will be much better. (Remember the failed carbon tax?) Never mind that you might live through the winter at a brisk 42 degrees inside your home, while spending more than you thought possible to bring your home to a temperature at which your Thanksgiving turkey will thaw in the recommended three days—if left in the living room. Now, aren’t you sorry that you opened your bill for home heating?

Later, prices for natural gas and heating oil will fall once more, and all the sensa

tionalism, investigations, and muckraking will vanish. If completed, the investigations will find no collusion or price-fixing, but rather the vagaries of a free market at work.

Clearly, the above scenario has been exaggerated. The essence of truth remains, however, as this witch-hunt cycle has been repeated several times in the past when prices for gasoline, natural gas, and heating oil have risen. Currently natural gas prices have risen dramatically, and if these higher prices remain in place through the winter, consumers will see their bills increase substantially.

In this time of 15-second sound bites, let us take our plowshares, break through the crust, and examine what lies beneath the surface on these matters.

Beneath the Surface

Natural gas may be produced from gas wells or from oil wells. When it is produced from oil wells, it represents a small part of the oil and gas mix that is produced from the well.

The standard measure of natural gas is called an Mcf. This stands for 1,000 cubic feet and represents the equivalent of a room ten feet tall by ten feet square full of natural gas. One cubic foot of natural gas contains approximately 1,000 BTU's or British Thermal Units. A BTU is the amount of energy required to raise the temperature of 1 pound of water by 1 degree.

A barrel of oil containing 42 gallons is the energy equivalent of 5.6 Mcf of natural gas. Therefore, it is natural to assume that a barrel of oil generally costs about seven times as much as an Mcf of natural gas, but that is not the case.. Natural gas, a cleaner-burning fuel, traditionally sells for much less than oil. Even with today's

higher prices for natural gas, the energy in a barrel of oil sells at a premium to natural gas. In other words, if a consumer spent \$30 for oil and \$30 for natural gas, the consumer gets 30 percent more energy with the natural gas than with the oil.

Surprisingly, the current higher price run has occurred during the late spring and summer months. Historically, demand for natural gas was greatest in the winter, while spring and fall were considered off-peak times. This meant prices were highest in the winter, when many people used natural gas for heating, but prices fell as temperatures warmed and demand decreased. As air conditioning became a fixture in many homes, powered by natural gas or electricity, a secondary, but lower, peak in demand would occur in the summer.

The winter demand peak was sometimes difficult to meet. Some areas of the country might be bitterly cold and the pipeline capacity needed to get the natural gas there might be insufficient to meet the sudden demand. To meet these emergencies, the natural gas industry began maintaining gas storage facilities, frequently near consuming areas. These were frequently natural gas reservoirs in the earth used to store natural gas produced in the spring and fall (the off-peaks), then sent to the consumer during the winter demand peaks. Natural gas storage facilities have reduced winter crisis periods while simultaneously lowering winter prices.

At the same time, these facilities have downsides, both for consumers and industry. First, maintaining storage facilities increases the cost of natural gas. Natural gas is purchased frequently during the lower price periods, and a storage fee is paid. If demand for the natural gas at prices higher than the original price, plus the storage fee, does not materialize, then the company storing the natural gas loses money. A warm winter can cost companies utilizing storage facilities millions of dollars. If a problem with supplies materializes this winter, it may be caused by the higher prices during the periods in which natural gas is stored. The higher prices may prevent an adequate fill to meet winter demand. If the winter is as warm as the previous three winters, then this may not be a problem.

Approximately 2 billion Mcf a year (or 10 percent of all the natural gas consumed) moves in and out of storage to meet consumer demand in peak periods. The volume stored each year is now twice as large as it was 20 years ago. While these facilities have solved many supply problems, it would be incorrect to assume that everything is perfect. Spot shortages can still occur in places without the ability to develop storage near consuming areas or in places where bitter cold strains the delivery system capability. The bottom line, however, is that natural gas is more reliable for today's consumers than it has ever been.

Let's talk Prices

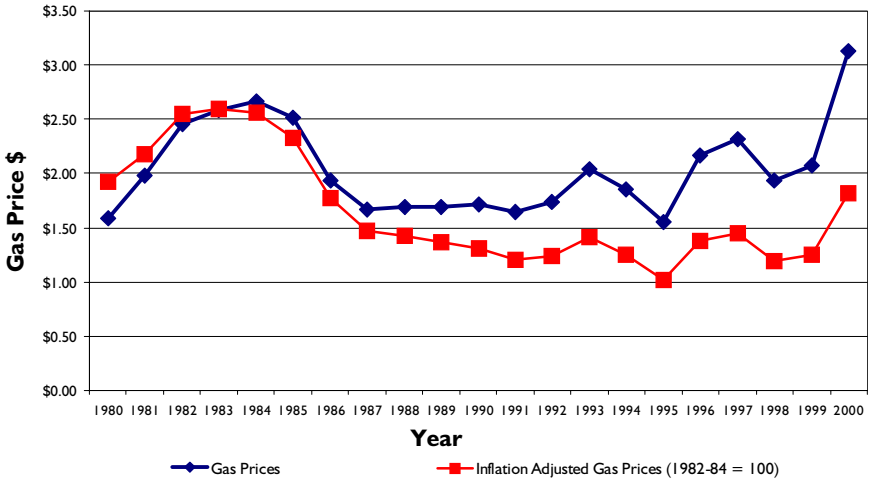
The Energy Information Administration (EIA), part of the Department of Energy, predicts that natural gas prices will rise above \$3 per Mcf in the year 2000. While EIA projects prices falling in the fall and the spring, the net effect of their projection is for higher prices in the foreseeable future. This higher price for an Mcf of natural gas is predicted to remain in a range that is between the cost of a good coffee latte (\$2.75) and a large sized movie popcorn (\$4.25).

Figure 1 shows that this \$3 average price will represent the highest nominal price in the last twenty years. Nominal prices are the price at the time—not adjusted for inflation. After adjusting for inflation, a much different picture emerges. The price for natural gas in 2000 is actually much lower than it was in the early 1980s. In real terms, that is adjusted for inflation, the price per Mcf is about 70 cents lower than it was throughout 1982–1984. While natural gas prices may seem high, they are 30 percent lower than they were in 1983.

Figure 2 shows the average residential consumption of natural gas during the last 30 years. Consumption has decreased by approximately 25 percent per residential consumer over the period. This shows the effects of energy conservation, increased insulation, and superior new building methods. In terms of consumption of natural gas, and the ultimate bill for the energy, the consumer has played

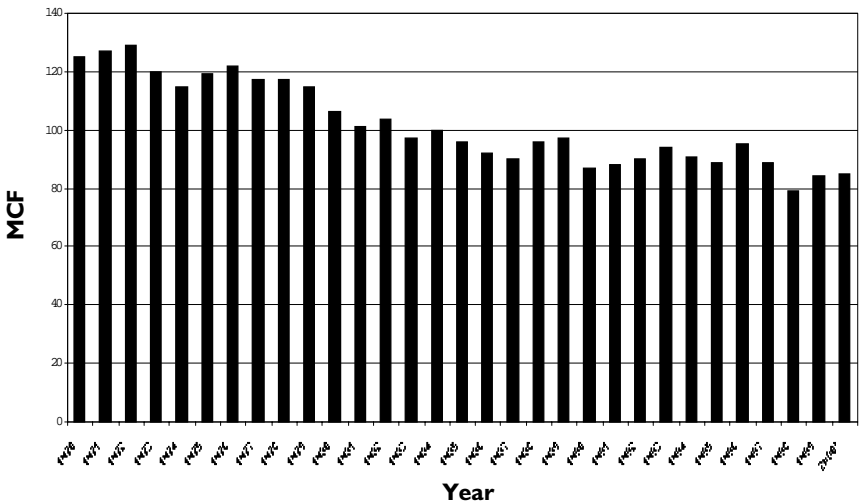
a role in his own deliverance. A typical home will use between 80 and 90 Mcf of natural gas in a year.

Figure 1— Comparison of Real and Inflation-Adjusted Natural Gas Prices



Sources: Prices from Energy Information Administration. Prices for 2000 are EIA estimates. CPI data is from the Bureau of Labor Statistics.

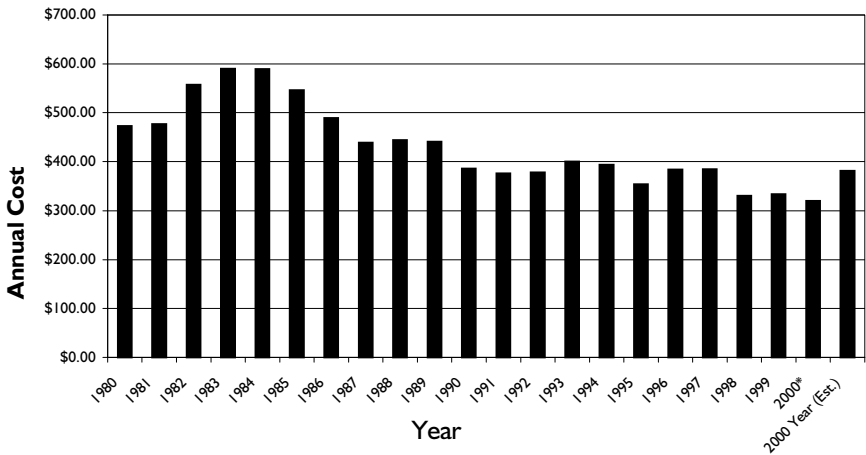
Figure 2— Average Natural Gas Consumption per Residence



Sources: Energy Information Administration. 2000 consumption is estimated.

Figure 3 uses Energy Information Administration data showing the average residential price per Mcf (adjusted for inflation) multiplied times the average residential consumption. The total cost of gas for a typical residence in 2000 is estimated at \$380. This is over \$200 per home less than in 1983 and 1984. **While prices may seem high, prices for 2000 will actually be lower per residence than they have been in 15 of the last 20 years.** Consumers, through improved energy conservation, have played a key role in achieving these substantial savings.

Figure 3 — Average Annual Natural Gas Cost per Residence (Inflation Adjusted)



* Based on EIA first quarter data. The second 2000 year entry represents the calculation for the entire year based on EIA cost projections.

A 60-Year Supply

Natural gas continues to be a clean-burning and excellent value for consumers. Experts in the field of the natural gas resource base size indicate that the United States, at current levels of consumption (approximately 21 billion Mcf a year), has a 60-year supply of natural gas remaining in the ground.

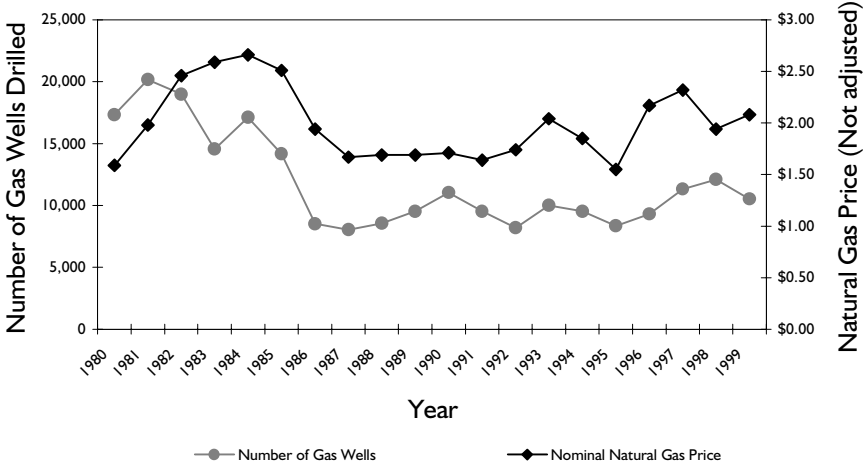
That is the problem. In order to get the natural gas out of the ground, more natural gas wells have to be drilled in the future. That takes money. Generally, natural gas is found in reservoirs that are deeper than those in which oil is found — increasing drilling costs. Today, the typical natural gas well costs more than \$700,000 and wells costing more than \$1 million dollars each are common. Wells drilled in dense formations may require an advanced technique called fracturing where the rock containing the natural gas, which may be two miles below the surface, is split for hundreds of feet away from the well bore. The natural gas can then flow to the well through the artificial fractures. The use of these techniques can add hundreds of thousands of dollars to the cost of a well.

Further, the investments required to develop a pipeline infrastructure often exceed a million dollars per mile. As use of natural gas increases, the expansion of pipelines moving the natural gas from where it is produced to consumers will be necessary. For example, the cost of a pipeline to deliver natural gas from Alaska to consumers in the Midwest and Northeast would be several billion dollars. Alaska has known resources of 35 trillion cubic feet of natural gas and it is estimated up to three times as much in potential reserves. The cost of getting permission to build this pipeline also is very high, despite the fact that this would bring substantial new supplies to consumers and thereby lower their prices.

Figure 4 shows an historical overview of the natural gas wells drilled by year, along with the nominal (not adjusted for inflation) prices of natural gas. The two lines have similar shapes—generally, higher prices mean more wells drilled and lower prices means fewer wells drilled.

Paying a little more means that more wells are drilled, ensuring future supplies, and thereby lowering prices in the future.

Figure 4 — Comparison of Number of Gas Wells Drilled and Natural Gas Prices



Source: Energy Information Administration

Ensuring Energy Security

Many of the oil and natural gas producing states, looking to the future, have taken the lead in ensuring the future supply of natural gas. Recognizing that the United States must now compete with an open world for oil and natural gas investment dollars, these states have reduced the state tax burden on the oil and natural gas industry to encourage drilling investment within the states. Generally, these tax incentives reduce or eliminate severance taxes, which are levied as a percentage of the wellhead value. For these states, the additional value received from the increased investment in drilling, exceeds the value of the state taxes invested. These additional values are frequently property taxes earmarked for schools, or additional income tax revenues from newly created high-paying oil and natural gas jobs.

One of these programs, which eliminated or reduced severance taxes on natural gas wells drilled in high cost formations in Texas, caused thousands of new wells to be drilled. Today, these wells produce 7 percent of the natural gas supply used in the United States each year. By paying reasonable prices for natural gas, consumers help ensure that the money is available to drill additional wells, help guarantee their natural gas supply into the foreseeable future, and help ensure that their future prices are as low as possible.

The Real Story

It is important that the real story of natural gas be presented. Natural gas will be the center of substantial attention if prices remain at September 2000 levels. Although these prices are not record high in inflation-adjusted terms, there will still be calls from politicians for action to correct the situation and fix the “price-gouging.” If these efforts negatively impact the drilling of new natural gas wells, then these well-meaning politicians will have done the ultimate disservice to the consumers because the only result can be reduced natural gas supplies and ultimately higher prices.

The tale of the winter of 2000 may well be this story of supply and demand. The supply is tight and the demand is high. Understanding why natural gas prices are higher than in previous years is critical for consumers and policy makers. The damage to the natural gas industry and the nation’s energy supply has been devastating in the past when they failed to understand higher prices are the result of market forces shaping supply and demand.

Producing states must effectively communicate sensible solutions which encourage additional production of natural gas. Increased supply will lower consumer price and create long-term stability in the natural gas market. That result will serve consumers while building the nation’s economy through more job creation.

ABOUT THE INTERSTATE OIL AND GAS COMPACT COMMISSION

The Interstate Oil and Gas Compact Commission (IOGCC) represents the governors of 37 states — 30 member and seven associate states — that produce virtually all the domestic oil and natural gas in the United States. Five international affiliates have been accepted into the IOGCC in recent years.

The organization's mission is to promote the conservation and efficient recovery of domestic oil and natural gas resources, while protecting health, safety and the environment.

Since its creation in 1935, the IOGCC has assisted states in balancing a multitude of interests — maximizing domestic oil and natural gas production, minimizing the waste of irreplaceable natural resources, and protecting human and environmental health — through sound regulatory practices. The IOGCC plays an active role in Washington, D.C., serving as the voice of the states on oil and natural gas issues and advocating states' rights to govern the resources found within their borders.

For more information about the IOGCC, please call 405/525-3556, visit its World Wide Web site at www.iogcc.state.ok.us, or send electronic mail to iogcc@iogcc.state.ok.us.

Member States

Alabama (1945)
Alaska (1957)
Arizona (1955)
Arkansas (1941)
California (1974)
Colorado (1935)
Florida (1945)
Illinois (1935)
Indiana (1947)
Kansas (1935)
Kentucky (1942)
Louisiana (1941)
Maryland (1959)
Michigan (1939)
Mississippi (1948)
Montana (1945)
Nebraska (1953)
Nevada (1955)
New Mexico (1935)
New York (1941)
North Dakota (1953)
Ohio (1943)
Oklahoma (1935)
Pennsylvania (1941)
South Dakota (1955)
Texas (1935)
Utah (1957)
Virginia (1982)
West Virginia (1945)
Wyoming (1955)

Associate States

Georgia (1946)
Idaho (1960)
Missouri (1995)
North Carolina (1971)
Oregon (1954)
South Carolina (1972)
Washington (1967)

International Affiliates

Alberta (1996)
Egypt (1999)
Newfoundland and
Labrador (1997)
Nova Scotia (1997)
Venezuela (1997)



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