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NATURAL GAS

Factors Affecting Prices and Potential Impacts on Consumers

Statement of Jim Wells, Director
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Highlights of [GAO-06-420T](#), a testimony before the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, United States Senate

Why GAO Did This Study

In early December 2005, wholesale natural gas prices topped \$15 per million BTUs, more than double the prices seen last summer and seven times the prices common during the 1990s. For the 2005-2006 heating season, the U.S. Energy Information Administration predicts that residences heating with gas will pay 35 percent more, on average, than they paid last winter.

This testimony addresses the following: (1) the factors causing natural gas price increases, (2) how consumers are affected by these higher prices, and (3) the roles federal government agencies play in ensuring that natural gas prices are determined in a competitive and informed marketplace.

This testimony is based on GAO's 2002 published work in this area, updated through interviews, examination of data, and review of relevant publications. GAO's new work was conducted from December 2005 through February 2006 in accordance with generally accepted government auditing standards.

www.gao.gov/cgi-bin/getrpt?GAO-06-420T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Jim Wells at (202) 512-3841 or wellsj@gao.gov.

NATURAL GAS

Factors Affecting Prices and Potential Impacts on Consumers

What GAO Found

Since 1999, wholesale prices for natural gas have trended upward because of expanding demand and supply that has not kept pace. The domestic natural gas industry has been producing at near capacity, and the nation's ability to increase imports has been limited. Tight supplies have also made the market susceptible to extreme price spikes when either demand or supply change unexpectedly. Prices spiked in August 2005 when hurricanes hit the Gulf Coast, disrupting a substantial portion of supply and again later when demand was pushed higher because of, among other reasons, colder-than-expected temperatures in early December. Although prices have dropped, they remain higher than last year. Other factors—such as market manipulation—may also have affected wholesale prices. We are currently examining futures trading in natural gas markets for signs of manipulation and expect to report on our results later this year.

While most consumers' gas bills are rising, the degree of the increase depends, in part, on how much of their supply is purchased from wholesale spot markets. Consumers who directly, or indirectly, buy their natural gas mainly from spot markets will see prices that reflect both recent price spikes and the longer-term trend toward higher prices. Our work shows that some of the largest natural gas utilities in a few states expect to buy at least 70 percent of their gas at spot market prices this winter. These companies generally pass these prices on to their customers. On the other hand, consumers and suppliers that have reduced exposure to spot market prices because some of their gas has been purchased through a process called hedging may be insulated from price spikes and may postpone their exposure to even gradual price hikes. In this regard, utilities in more than half the states have hedged at least 50 percent of their supply for this winter by entering into long-term fixed-price contracts and other techniques. This will help stabilize prices for their customers. Nonetheless, high gas prices will hit some consumers hard, including lower-income households and companies that depend heavily upon natural gas, such as fertilizer manufacturers.

The Federal Energy Regulatory Commission (FERC) and the Commodities Futures Trading Commission (CFTC) play key roles in ensuring that natural gas prices are determined in a competitive and informed marketplace. Both agencies monitor natural gas markets and investigate instances of possible market manipulation. Since 2002, FERC has settled a number of investigations involving natural gas market manipulation; for example, one company agreed to pay a settlement of \$1.6 billion after FERC found it had exercised market power over natural gas prices in California during the 2001-2002 heating season. From 2002 through May 2005, CFTC investigated over 40 energy companies and individuals, filed over 20 actions, and collected over \$300 million in penalties, most of which were natural gas related.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss natural gas prices. As you know, last fall two powerful and destructive hurricanes, Katrina and Rita, tore through the Gulf of Mexico and several states bordering it—an important area for the supply of natural gas. By early December 2005, wholesale natural gas prices topped \$15 per million BTUs, more than double the prices seen last summer and seven times the prices common throughout the 1990s. For the 2005-2006 winter heating season, the Energy Information Administration estimated in January 2006 that residential households heating with natural gas will pay \$257 (35 percent) more, on average, than last winter. Consumers in the Midwest are expected to witness even greater increases—paying 41 percent more than last winter.

This is not the first time that natural gas prices have sharply increased. In 2000-2001, prices rose steadily and remained high for nearly a year. We examined this phenomenon in 2002 and found that prices went up mainly because supplies could not keep pace with rising demand.¹ We also reported that federal agencies responsible for overseeing aspects of the natural gas market were actively investigating whether market participants had violated market rules or manipulated prices.

Concerned about the recent increases in natural gas prices and the implications of these increases on consumers in the United States, you asked us to address the following: (1) the factors causing natural gas price increases, (2) how consumers are affected by these higher prices, and (3) the roles federal government agencies play in ensuring that natural gas prices are determined in a competitive and informed marketplace.

Our testimony today is based on our prior reports, interviews, and a review of recent reports published by others. Prior related GAO products are listed at the end of this statement. To update our findings from those reports, we conducted interviews with federal agencies that included the Energy Information Administration, the Federal Energy Regulatory Commission, and the Commodities and Futures Trading Commission. We also interviewed the state commissions that oversee natural gas utilities, selected trade associations representing the natural gas industry, and other potentially affected industries. Further, we examined data on the

¹GAO, *Natural Gas: Analysis of Changes in Market Price*, [GAO-03-46](#) (Washington, D.C.: Dec. 18, 2002).

natural gas industry, including prices, consumption, and supplies. In addition, we reviewed relevant reports and other documents published by others. We conducted our work from December 2005 to February 2006 in accordance with generally accepted government auditing standards.

Summary

Since 1999, wholesale prices for natural gas purchased from the short-term, or spot, market have trended steadily upward because demand has expanded faster than supply. The domestic natural gas industry has been producing at near capacity, and, to date, the nation's ability to increase imports has reached its limits, given currently available infrastructure. Tight supplies have also made the market susceptible to extreme price spikes when either demand or supply change unexpectedly. Prices spiked in late 2005 when two hurricanes hit the Gulf Coast region, disrupting a substantial portion of our natural gas supply. This supply disruption was compounded by high demand due to, among other reasons, colder-than-expected temperatures in early December. As a result, December wholesale prices spiked further. Although prices have dropped from these highs, they remain higher than last year because some natural gas wells and pipelines damaged by the hurricanes remain inoperable and because the margin between demand and supply remains narrow. Other factors—such as market manipulation—may also have affected wholesale prices. We are examining futures trading in natural gas and other energy markets for signs of market manipulation and we plan to report on the results of that work later in 2006.

While the upward trend in natural gas prices is causing higher gas bills for most consumers, the degree to which they see their bills rise because of high wholesale prices depends on how much of their supply is purchased from wholesale spot markets. Consumers who buy most of their natural gas from spot markets, or consumers whose suppliers do so on their behalf, are likely to see price increases commensurate with both recent price spikes and the longer-term trend toward higher prices. According to our preliminary work with the state commissions that oversee natural gas utilities, some of the largest natural gas utilities in a few states expect to buy at least 70 percent of their gas this winter at spot market prices. The utilities generally pass these prices on to their customers. Gas utilities and consumers that do not obtain their gas through utilities can reduce their exposure to spot markets through a process called hedging, which includes such techniques as buying gas at fixed prices in long-term contracts or storing gas purchased when prices are relatively low to be used during times when prices are high. While hedging may not guarantee the lowest price, it allows consumers to have greater price stability. Our

preliminary work shows that the natural gas utilities in more than half of the states hedged at least 50 percent of their supplies for this winter. How consumers are affected by rising natural gas prices also depends on the consumer; some consumers are more sensitive to price changes than others. For example, lower-income residents may not be able to absorb the price increases and may have difficulty paying their bills. According to trade associations, industrial consumers that are heavily dependent upon natural gas, such as chemical and fertilizer manufacturers, may not be able to compete with foreign companies that have access to gas at lower prices and therefore may reduce operations or close U.S. plants.

Three federal agencies—the Federal Energy Regulatory Commission (FERC), the Commodities Futures Trading Commission (CFTC), and the Energy Information Administration (EIA)—play key roles in ensuring that natural gas prices are determined in a competitive and informed marketplace. FERC is responsible for ensuring that wholesale prices for natural gas sold and transported in interstate commerce are determined competitively. It carries out this responsibility by, among other actions, monitoring the markets in which natural gas is traded and investigating instances of possible market manipulation. Since 2002, FERC has settled a number of investigations involving natural gas market manipulation; for example, one company agreed to pay a settlement of \$1.6 billion after FERC found it had exercised market power over natural gas prices in California during the 2001-2002 heating season. Since prices spiked in the fall of 2005, FERC has received complaints and identified areas of concern regarding high prices. Agency officials told us they investigate such matters where appropriate and that regulations governing FERC's activities prevent them from disclosing whether any investigations are under way. Similarly, CFTC is responsible for ensuring that fraud, manipulation and abusive practices do not occur in federally regulated financial markets such as the New York Mercantile Exchange (NYMEX), where some natural gas contracts are traded. CFTC monitors the markets for attempted market manipulation and takes enforcement actions, when it deems appropriate, such as initiating legal proceedings and imposing financial penalties. From 2002 through mid-2005, CFTC investigated more than 40 energy companies or individuals and assessed penalties totaling over \$300 million, most of which concerned natural gas-related settlements. FERC and CFTC recently signed a memorandum of understanding in an effort to work together more effectively. EIA publishes information about natural gas markets, including aggregate estimates of supply and demand and average prices.

Background

Natural gas is a colorless, odorless fossil fuel found underground that is generated through the slow decomposition of ancient organic matter. In some cases, the gas, composed mainly of methane, is trapped in pockets of porous rock held in place by impermeable rock. In other cases, natural gas may occur within oil reservoirs or in coal deposits.² Natural gas is extracted via wells drilled into the porous rock. The natural gas is then moved through pipelines and processing plants to consumers.

Historically, domestic natural gas production has occurred largely in Texas, Oklahoma, and Louisiana. In more recent years, as older fields have been depleted, the Rocky Mountain region, Alaska, and areas beneath the deeper waters of the Gulf of Mexico are becoming increasingly important in supplying natural gas; however, in many cases these supplies are not near pipelines and other infrastructure needed for getting the gas to markets, which increases the costs of gas obtained from the newer fields.

Natural gas consumers include

- residential users living in houses, apartments, and mobile homes;
- commercial users such as stores, offices, schools, places of worship, and hospitals;
- industrial users covering a wide range of facilities for producing, processing, or assembling goods, including manufacturing, agricultural, and mining operations;
- entities that use natural gas to generate electricity and provide that electricity to others, such as regulated electric utilities and competitive suppliers of electricity; and
- the transportation sector, including pipeline companies, which use natural gas to operate the pipeline networks, as well as those using natural gas to power cars and buses.

Most residential and commercial consumers rely on natural gas utilities to supply their gas. Industrial consumers and electricity generators obtain their gas through a variety of means, including buying it directly from spot markets and natural gas utilities.

²Natural gas occurring within oil deposits is referred to as “associated natural gas.” Natural gas found in coal deposits is referred to as “coal-bed methane.”

The demand for natural gas in the United States has generally been seasonal, with peak demand during the winter heating months. From April through October, companies typically purchase natural gas and place it into underground storage facilities located around the country. Later, as the seasonal demand increases, these stored supplies of natural gas are used to augment the supplies provided via pipelines. According to EIA, natural gas demand during winter months is usually 1.5 times greater than monthly natural gas production in other months.

Over the past 25 years, the wholesale natural gas supply market has evolved from a highly regulated market to a largely deregulated market, where prices are mainly driven by supply and demand. While the regulated market ensured stable prices, it also caused severe gas supply shortages because, with artificially low prices, producers had no incentive to increase production and consumers had no reason to curtail their demand. Before implementation of the Natural Gas Policy Act of 1978, which began deregulation of wholesale natural gas prices, the federal government controlled the prices that natural gas producers could charge for the gas they sold through interstate commerce. Under this regulatory approach, producers located natural gas reserves, drilled wells, gathered the gas, and sold it at federally controlled prices to interstate pipeline companies. After purchasing the natural gas, pipeline companies generally transported and sold the gas to local distribution or gas utility companies. These companies, under the oversight of state or local regulatory agencies, then sold and delivered the gas to their consumers, such as homeowners.

In today's restructured market, the retail prices that consumers pay are still regulated in many states and reflect the prices paid by their suppliers to acquire the natural gas. However, the federal government does not control the wholesale price of natural gas. Since the removal of federal price controls, the wholesale price of natural gas decreased initially and has become more volatile. Producers still locate and gather natural gas, but they now sell the gas at market-driven prices to a variety of companies, including marketers, broker/trader intermediaries, and a variety of consumers. New market centers have emerged, including a market center referred to as the Henry Hub, located in Henry, Louisiana. Henry Hub

prices are reported on a daily basis, and trades made at that market are often used as benchmarks for other natural gas trades.³

The various players in the market may sell gas back and forth several times before it is actually delivered to the ultimate consumers. In some cases—in spot markets, for example—natural gas is sold for immediate delivery.⁴ In other cases, it may be sold for delivery in the future, through a variety of what are called futures markets. In addition, several types of financial derivatives related to natural gas—contracts whose market value is derived from the price of the gas itself—can be bought and sold through numerous sources by entities that are interested in protecting themselves against increases in the price of natural gas. Derivatives include natural gas futures and options, and derivative prices typically move in parallel with the spot market.⁵ Derivatives markets include exchanges such as the New York Mercantile Exchange, which is regulated by the CFTC; and the Intercontinental Exchange, which operates as an exempt commercial market without CFTC oversight but over which CFTC has anti-manipulation and anti-fraud authority; and off-exchange and over-the-counter (OTC) markets, which are not subject to general federal regulatory oversight.

³The Henry Hub is the largest centralized point for natural gas spot and futures trading in the United States. The New York Mercantile Exchange (NYMEX) uses the Henry Hub as the point of delivery for its natural gas futures contract. NYMEX deliveries at the Henry Hub are treated in the same way as cash-market transactions. Many natural gas marketers also use the Henry Hub as their physical contract delivery point or their price benchmark for spot trades of natural gas.

⁴According to the American Gas Association, the term spot market refers to a market in which natural gas is bought and sold for immediate or very near-term delivery, usually for a period of 30 or fewer days.

⁵A futures contract is an agreement to buy or sell a commodity for delivery in the future at a price, or according to a pricing formula, that is determined at initiation of the contract. An obligation under a futures contract may be fulfilled without actual delivery of the commodity by, for example, an offsetting transaction or cash settlement. An option gives the buyer the right, but not the obligation, to buy or sell a commodity at a specific price on or before a specific date.

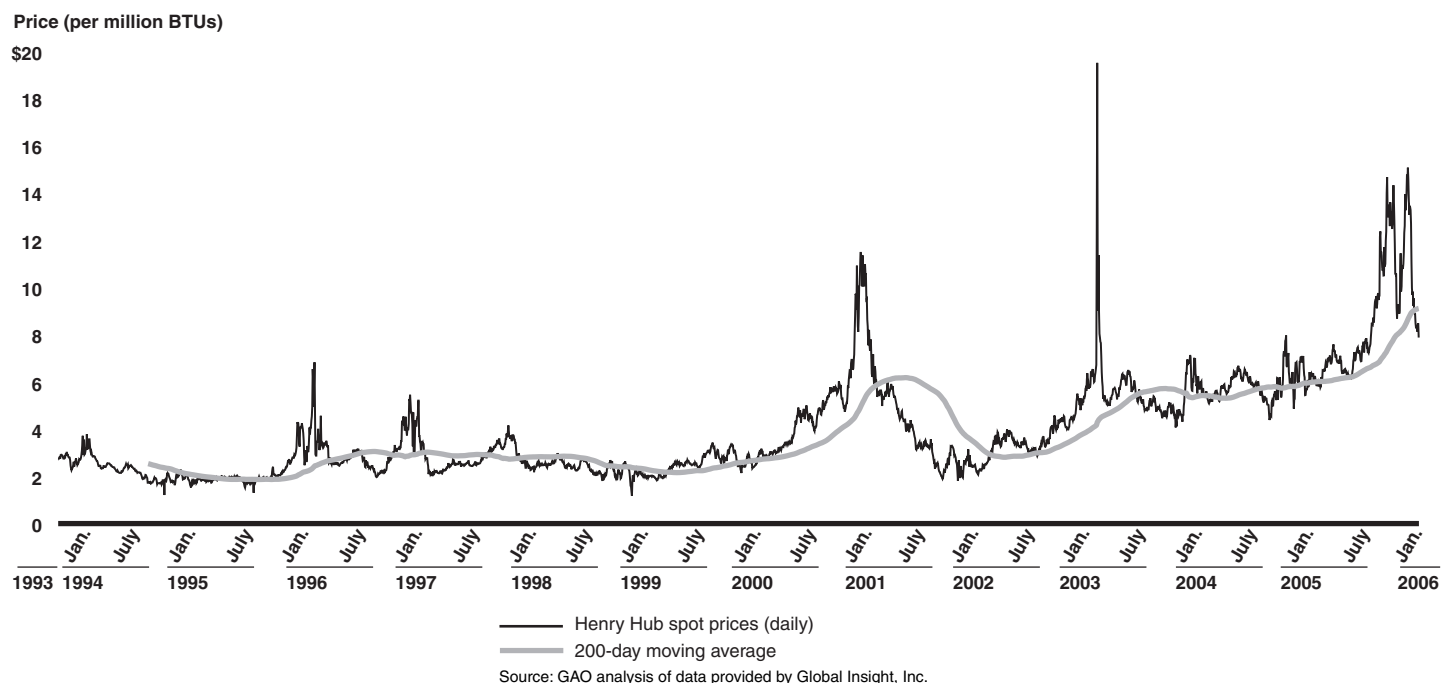
Increasing Demand and Tight Supply Have Driven Up Prices and Made Extreme Price Spikes Possible

Since 1999, wholesale prices for natural gas have trended steadily upward due to expanding demand—largely for electricity production—and supply that could not expand as quickly because the industry is already operating at near capacity. This tightness in the demand and supply balance has also made the market susceptible to extreme price changes in times when either demand or supply change unexpectedly. One such period of extreme price changes occurred in late 2005, when two hurricanes hit the Gulf Coast region, disrupting a substantial portion of the domestic supply of natural gas. Prices spiked to high levels and, although they have since dropped, they remain unusually high today.

Trend toward Higher Prices in Recent Years Is Due Largely to Market Forces

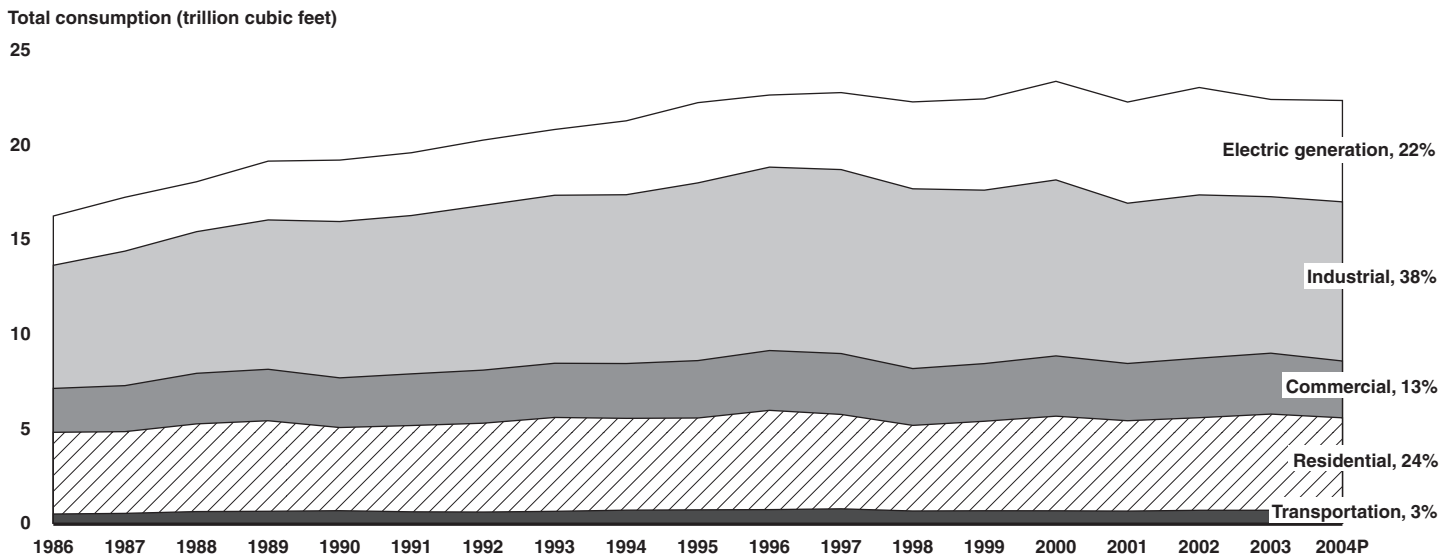
Since 1999, wholesale natural gas prices have risen steadily, as demonstrated by the moving average in figure 1. Previously, in the early and mid-1990s, prices were generally low, usually ranging from \$2 to \$3 per million BTUs, adjusted for inflation. From January 1999 through July 2005, however, average wholesale prices increased by over 200 percent, rising from about \$2 to \$6.75 per million BTUs. Most recently, in the last half of 2005, prices rose to over \$15 per million BTUs, sevenfold higher than prices seen in the early 1990s.

Figure 1: Wholesale Natural Gas Prices at Henry Hub, in 2004 dollars



A combination of market forces has caused the upward trend in wholesale natural gas prices since 1999. Demand for natural gas has been growing rapidly since the mid-1980s, with total consumption increasing by about 38 percent from 1986 through 2004. Figure 2 illustrates the extent to which consumption of natural gas has risen in the United States over the past 2 decades and the relative amounts used by each of the five types of consumers: residential, commercial, industrial, electricity generators, and transportation.

Figure 2: Consumption of Natural Gas by Sector, 1986-2004 (with 2004 Percentage of Total)



Source: GAO analysis of Energy Information Administration data.

A significant share of the increased demand in recent years has resulted from increased use of natural gas to generate electricity. Out of concern regarding the supply of natural gas and other factors, construction of power plants using oil or natural gas as a primary fuel was restricted from 1978, when the Powerplant and Industrial Fuel Use Act (Fuel Use Act) took effect, through 1987, when it was repealed. After the Fuel Use Act's repeal, use of natural gas by the electric generation sector increased by 79 percent from 1987 through 2004. Newer gas-powered plants produce low levels of pollutants, compared with many existing plants. This characteristic, as well as the long period of low prices in the 1990s and other factors, has made natural gas the primary fuel in new power plants.

The supply of natural gas, however, has not kept pace with the increased demand. Historically, most of the natural gas used in the United States—85 percent in 2003—has been produced here. However, as older natural gas fields have been depleted, additional drilling for natural gas has been required in order to maintain domestic production. This additional drilling has not necessarily resulted in immediate additional supplies in part because development of new wells and supporting pipeline infrastructure can take time. Overall, from 1994 through 2003, domestic annual production held steady at about 19 trillion cubic feet. In 2003, EIA reported that the domestic natural gas industry had produced nearly all of the natural gas that could be produced on a monthly basis from 1996 through 2001—the most recent data then available. Furthermore, EIA reported that at times there was virtually no spare capacity in some parts of the country and forecasted that these tight supply conditions would continue, despite EIA’s projection for a significant increase in drilling activity.

In recent years, imports of natural gas have become increasingly important. Net imports of natural gas have increased steadily, rising by over 250 percent from 1987 through 2004. In 2004, the United States imported about 15 percent of the total natural gas consumed here. Nearly all of the imported gas comes from Canada via pipeline, and those imports constitute virtually all of Canada’s production not used in that country. In addition, a small share—about 3 percent of total U.S. supply—has been shipped on special ocean tankers as liquefied natural gas (LNG) from countries such as Trinidad and Tobago, Nigeria, and others. These imports have increased significantly in recent years; however, it is not clear if we have the capacity to handle further increased shipments, in part because only five facilities in the United States are able to receive and process LNG imports. Moreover, because of limited international supplies and high prices in other markets, it also is not clear how much additional supply is available to the United States.

Extreme Price Spikes Resulted from Tight Demand and Supply Conditions

The tight demand and supply balance has made the market for natural gas more susceptible to extreme price changes when demand or supply changed unexpectedly. As we previously reported, prices spikes occur periodically in natural gas markets because neither the demand side nor the supply side can quickly adjust to changes in the marketplace. On the demand side, some customers are able to react to changes in prices. For example, some industrial entities may be able to switch fuels or reduce their production. However, many other customers, such as residential customers, may have few fuel-switching options and little firsthand

High Prices in Late 2005
Resulted from Supply
Disruptions Caused by
Hurricanes Katrina and Rita

knowledge of spot natural gas prices—and understand the costs of their natural gas consumption only when they receive their bill. On the supply side, suppliers are slow to respond to price changes. For example, they may be delayed in responding to high prices because, as noted earlier, existing domestic sources of natural gas are already operating at near full capacity—often above 90 percent in the United States in recent years, according to EIA. In these circumstances, because little excess supply is readily available, it must be added, generally by drilling new wells and connecting those wells to existing pipelines, which can take time. For example, receiving regulatory approval can take a year or more, and the time to drill the well and connect it to the pipeline network can take another 6 to 18 months. Because neither the suppliers nor many consumers can react quickly to price changes, even small unexpected increases in demand or disruptions in supplies can cause sudden and significant price increases.

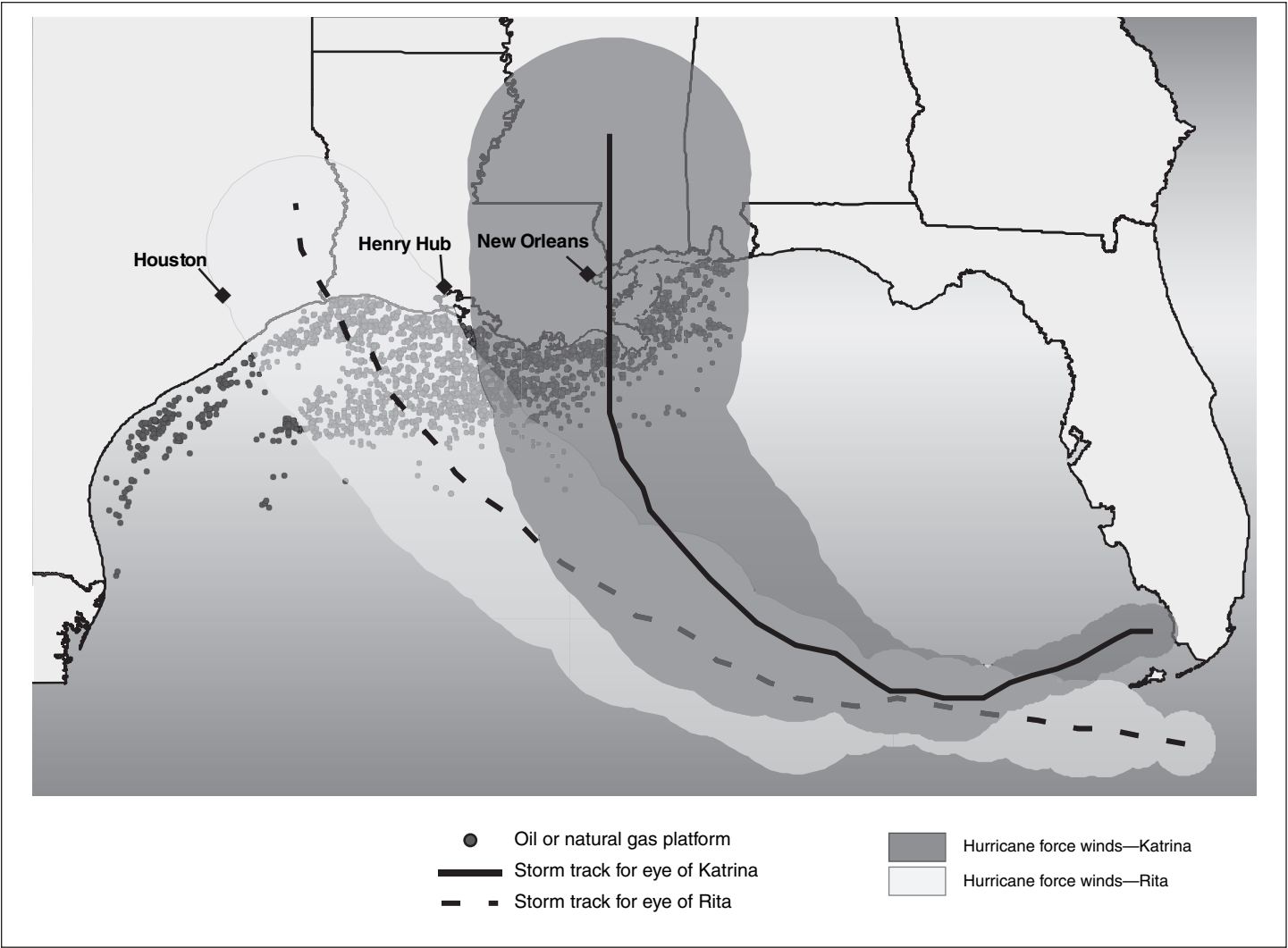
Most recently, prices rose sharply following the landfall of two hurricanes in the Gulf region. It appears that the price spike was caused by the unexpected decrease in the supply of natural gas in late 2005 following Hurricanes Katrina and Rita, exacerbated by factors that raised demand. Because of the damage caused to production, processing, importing, and transporting infrastructure in the Gulf region, wholesale prices climbed to a high of \$15 per million BTUs by December 2005. Other factors—such as market manipulation—may also have affected wholesale prices. Our ongoing work examining futures trading in natural gas markets will address this issue later this year.

The Gulf region produces about 20 percent of the U.S. natural gas supply. The region's extensive natural gas-related infrastructure includes about 4,000 platforms that extract natural gas from beneath the ocean floor; two of the five terminals that import LNG into the United States; plants that remove impurities from natural gas to prepare it for sale and use; and an extensive network of pipelines, linked by hubs such as the Henry Hub, that transport natural gas to other parts of the United States.

The paths of Hurricanes Katrina and Rita, in relation to Gulf region natural gas infrastructure, are shown in figure 3. The hurricanes forced operators to evacuate about 90 percent of the oil and gas platforms in the Gulf for safety reasons, rendering them unable to produce natural gas; shut down one of the two LNG importing terminals for about two weeks; damaged processing plants; and damaged several pipelines and their connecting hubs, delaying transmission of natural gas from supply facilities that were

still operational. For example, the Henry Hub, a major gas market center, was closed by flooding for a total of 11 days following Katrina and Rita.

Figure 3: Path of Hurricanes Katrina and Rita Relative to Oil and Natural Gas Production Platforms

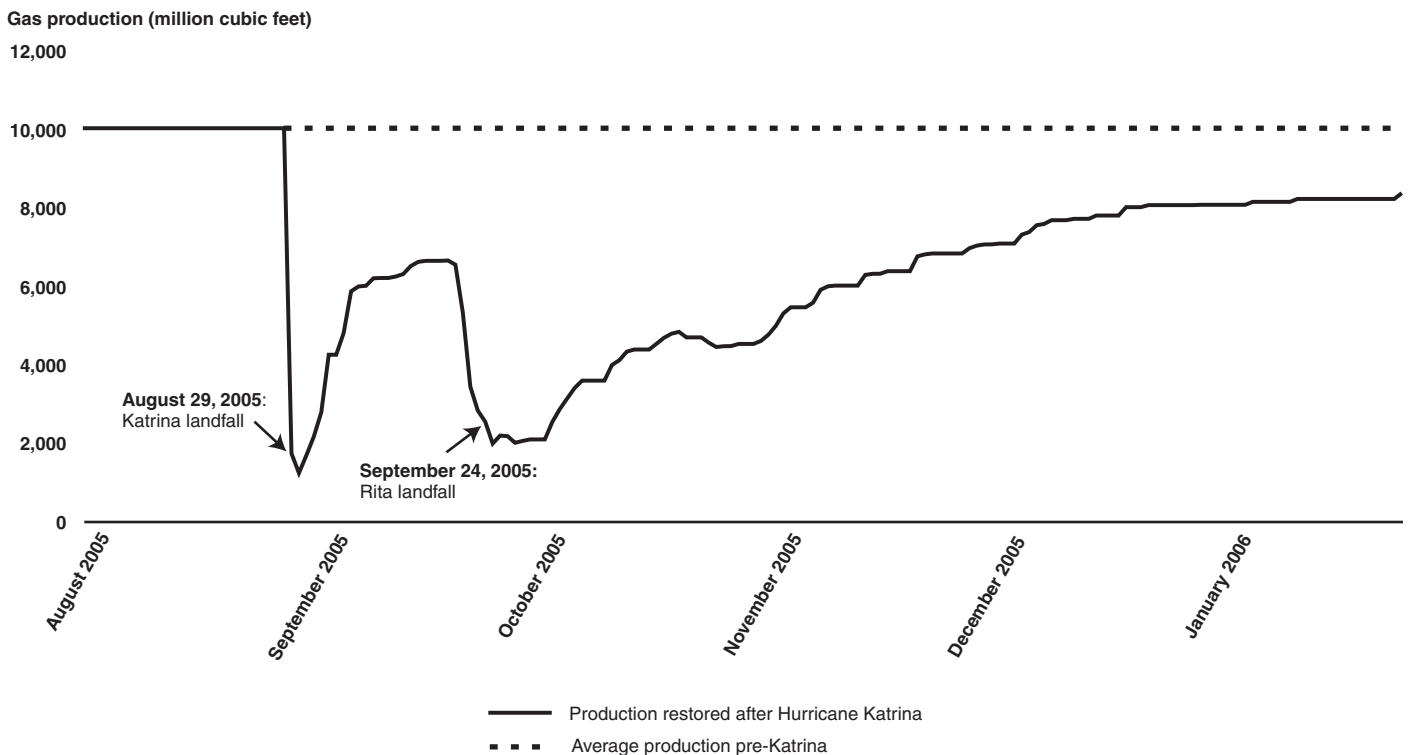


Source: GAO analysis of data provided by the National Weather Service and the Minerals Management Service.

As a result of all of these factors, the hurricanes had a significant impact on the supply of natural gas. Figure 4 shows the impact of Hurricanes Katrina and Rita on the production of natural gas from the Gulf region. Hurricane Katrina disrupted about 8 billion cubic feet of natural gas

production per day immediately following its landfall—amounting to about 80 percent of daily production from the Gulf and about 16 percent of total daily U.S. production of natural gas. Lost production from Katrina was in the process of being restored when Hurricane Rita struck—again reducing production of natural gas from the Gulf region to levels similar to those immediately following Katrina. As a result of the severity and timing of these two hurricanes, the Gulf region produced less than half its usual amount of natural gas for about 9 weeks after Hurricane Katrina struck. By comparison, nearly all of the lost production that resulted from Hurricane Ivan in 2004 was restored within 9 weeks and amounted to about 20 percent of that caused by Katrina and Rita. By the end of January, only about 80 percent of the natural gas supplies that had been disrupted by Katrina and Rita had been restored, leaving the overall market tighter than it was prior to the hurricanes and leaving the U.S. vulnerable to future unexpected interruptions in supply or increases in demand—either of which could result in higher prices.

Figure 4: Daily Natural Gas Production from the Gulf of Mexico Following Landfalls of Hurricanes Katrina and Rita

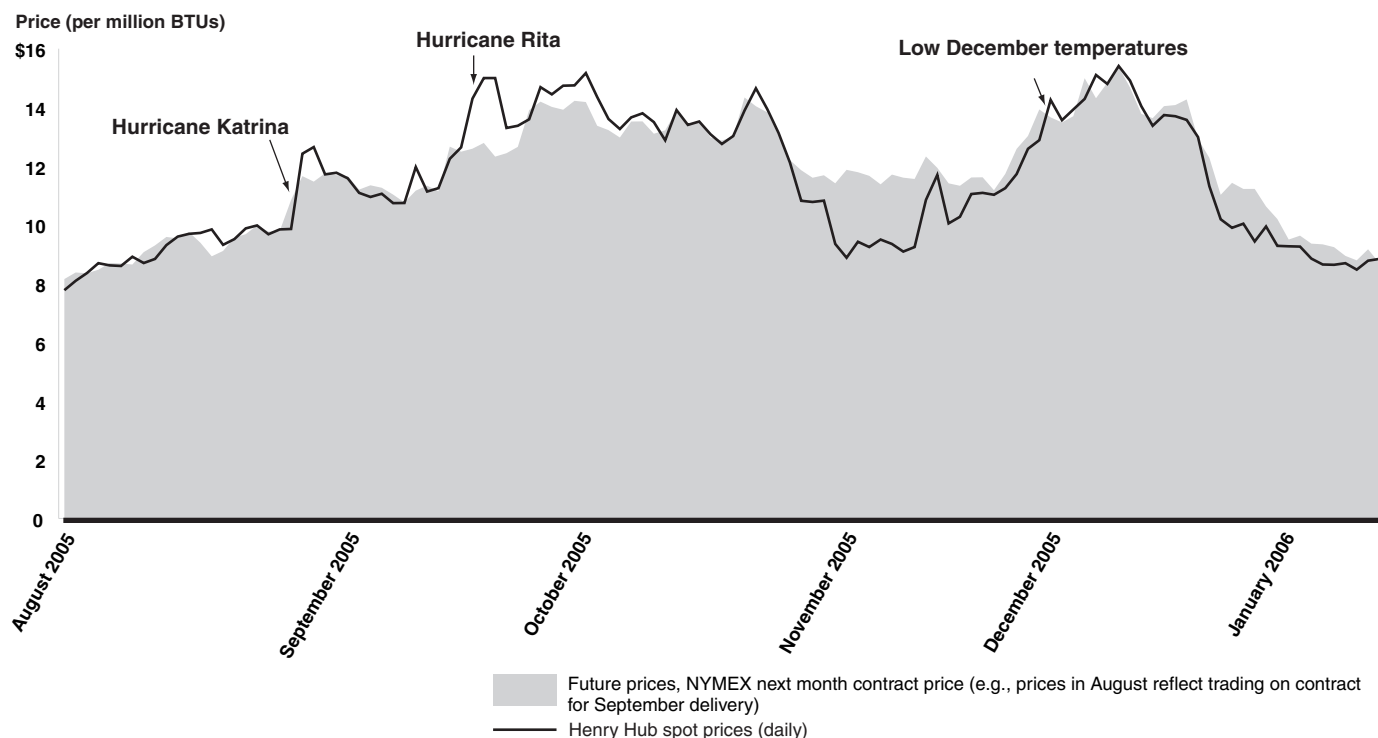


Source: GAO analysis of data provided by Energy Information Administration and the Minerals Management Service.

The high natural gas prices that followed the Katrina and Rita supply disruptions came at a time when demand for natural gas was already high. Higher-than-average late-summer temperatures in August had led to increased demand for natural gas to generate electricity, particularly in the South. As a result of this high level of demand, existing supplies were stretched thin and overall price levels were high. In addition, the hurricanes struck as companies were filling their storage of natural gas in preparation for the winter heating season.

Prices for natural gas in both the spot and the futures market spiked dramatically immediately following the supply disruptions caused by the 2005 hurricanes. In September 2005, after the second hurricane, natural gas spot prices increased to over \$15 per million BTUs—roughly twice as high as the average price in July 2005 of about \$7.60 per million BTUs. Futures prices to deliver gas in October also doubled to \$14.20 per million BTUs, reflecting traders' expectations that high spot prices could continue into the future. Futures prices closely followed spot prices until early November 2005, when spot prices fell to about \$9 per million BTUs, but prices for December gas futures remained at about \$12 per million BTUs, reflecting the belief by futures market traders that natural gas prices would be high in December. A brief cold spell during the beginning of December increased demand for natural gas for heating purposes, driving prices up. The arrival of warmer than normal temperatures just before the end of the year reduced demand and has contributed to the recent reduction in prices. Figure 5 shows the spikes in natural gas prices during the months of, and following, the 2005 hurricanes.

Figure 5: Prices for Natural Gas in the Spot and Futures Markets, August 2005 to January 2006



Source: GAO analysis of data provided by Energy Information Administration and Global Insight, Inc., and Platts.

Note: Because the Henry Hub was closed for one day on August 29, 2005, and for 10 days from September 23 through October 6, 2005, prices for these dates were based on estimates taken either from a nearby natural gas hub or from the previous day's price.

Price Spikes in 2001 and 2003 Were Caused by Unexpected Increases in Demand

Two other instances of price spikes—caused by unexpected increases in demand—have occurred since 1999. First, coincident with the western electricity crisis, from mid-2000 through early 2001, wholesale prices for natural gas rose substantially and remained relatively high for nearly a year. This period witnessed significant increased demand for natural gas by the electric generation sector in order to meet electricity demand across the West during a year of diminished availability of hydroelectricity, a situation compounded by high demand through the winter and lower-than-normal storage levels. In a second instance, wholesale prices rose sharply in February 2003 during a period of high demand because of unusually cold winter temperatures; however, prices returned to normal relatively quickly.

Impact on Consumers of Higher Wholesale Natural Gas Prices Depends on the Extent to Which They Buy from Spot Markets and on Other Factors

How higher wholesale natural gas prices are affecting consumers depends largely on the degree to which the consumers or their suppliers may have purchased gas on the spot market—which reflects current wholesale prices—or may have taken steps to reduce their exposure to these prices.⁶ The effect of higher prices also depends on the consumer’s sensitivity to price changes. Some consumers, such as low-income residents and certain industries, are more sensitive to price changes than others.

Higher Wholesale Prices May Lead to Significant Increases in Energy Expenditures for Consumers Exposed to Spot Markets

The impact of recent increases in natural gas wholesale prices on consumers depends on how much of the natural gas they use is purchased in spot markets. Those with the greatest reliance on spot markets are hit the hardest when prices rise or spike. For example, some natural gas utilities that relied on spot markets are spending significantly more on energy this winter, which may translate into higher gas bills for residential and commercial consumers. According to our preliminary work with the state commissions that regulate natural gas utilities,⁷ 10 states reported that at least some of the natural gas utilities they regulate were highly exposed to spot market prices. Furthermore, in a few states, some of the largest natural gas utilities projected they would purchase 70 percent or more of their natural gas supplies for this winter from the spot market.

Participants in the market, such as industrial consumers who purchase gas directly from the market or natural gas utilities that purchase gas on behalf of their customers, can hedge against high spot market prices for natural gas in three main ways: (1) by purchasing and storing gas for use during times when prices are high; (2) by signing fixed-price contracts for delivery of the gas in the future; and (3) by purchasing financial instruments, such as options or derivatives, that increase in value as natural gas prices rise. Since the winter of 2000-2001, some state public utility commissions (PUCs) have encouraged the natural gas utilities they regulate to hedge some part of their gas purchases in order to help stabilize prices, according to the American Gas Association. According to

⁶Other costs reflected in consumers’ retail bills, such as transportation and pipeline maintenance, compose a substantial part of the final retail bill but are relatively stable.

⁷The preliminary work is part of a larger effort that we will complete later this year.

the state commissions, 27 states reported that the utilities they regulate will acquire at least half of their expected winter natural gas needs at a known price, generally ranging from \$7 to \$10 per million BTUs. In that regard, last November, Commissioner Donald Mason of Ohio told Congress that customers around Dayton, Ohio, have saved about \$3 per million BTUs as a result of hedging, including use of long-term, fixed-price contracts. Gas utilities are also taking other approaches to keep down or stabilize their customers' costs. For example, in some states, utilities offer "level" payment programs and show customers how to use energy wisely through energy-efficient appliances. In Minnesota, in 2005, all state-jurisdictional gas utilities are required to spend at least 0.5 percent of their gross operating revenues on conservation improvement efforts such as weather audits, weatherization, and rebates for purchases of energy-efficient appliances. While some gas utilities have made efforts to reduce their exposure to spot prices by increasing their use of hedging, as some did after the price spike in 2000-2001, some states and municipalities still discourage the use of hedging, according to the association that represents the public utility commissioners.

While hedging allows consumers to obtain greater price stability, it has costs and risks, and utilities may lack incentives to undertake it. Storing gas for later use, for example, entails up-front costs such as the cost of placing it into and keeping it in storage. Market participants face risks if, for example, they purchase gas in advance under a fixed-price long-term contract and prices drop. For that reason, some natural gas utilities may be reluctant to enter into long-term contracts when prices are relatively high, according to a trade association that represents municipal gas utilities. Furthermore, absent specific PUC guidance to hedge purchases, gas utilities may have few incentives to hedge since they are generally able to pass along increased costs associated with purchases of natural gas. Moreover, some state regulators may not allow gas utilities to financially benefit from using hedging but hold them financially responsible if the hedge proves unnecessary. Furthermore, while under some circumstances hedging can reduce or eliminate the impact of a price spike, it may offer little benefit during prolonged periods of price changes. For example, a utility that signed a 5-year commitment to purchase natural gas at a predetermined price may witness no change in the cost of acquiring the natural gas during the period of the contract but would again face market prices (either higher or lower) when it came time to replace this gas supply at the end of the contract. In this sense, hedging may serve to delay until the contract term ends, but not prevent, the effect of higher or lower prices on consumers.

Some Consumers Are More Sensitive to Price Changes

Because energy costs account for a relatively large share of overall costs for some consumers or because they are heavily dependent on natural gas, any price increases can present significant difficulties. In particular, low-income residential consumers and some highly energy intensive industries appear likely to encounter the greatest impact.

The effect of high natural gas prices has already been especially severe on low-income individuals. According to representatives from a trade association representing publicly owned natural gas utilities, a utility in Philadelphia, Philadelphia Gas Works, has billed \$42 million more than they have collected so far this winter, representing an increase of 2 percent in uncollectible heating bills this winter compared with last winter. In Kentucky, utilities this winter have witnessed the highest number of complaints and the greatest number of problems faced by customers. Furthermore, federal assistance to low-income households in meeting heating expenditures provides only limited assistance. According to the National Association of State Energy Officials, the Low Income Home Energy Assistance Program (LIHEAP)⁸ currently serves only 20 percent of the eligible population, with average payments of \$311 per family designed to help families pay projected natural gas heating expenditures of \$1,568 this winter. Additionally, despite several years of increases, LIHEAP funding in fiscal year 2005 is only 67 percent of what it was in fiscal year 1982, adjusted for inflation.⁹ However, some states have increased funding for low-income individuals recently. For example, in December, Minnesota began distribution of an additional \$13.4 million in funding designed to assist an additional 26,000 households in paying for heating.

Electricity generators are also sensitive to higher prices because of their dependence on natural gas. This is true especially in the eastern United States, where, according to FERC, electricity generators rely heavily on natural gas. Furthermore, the region has many of the newer gas-fired electric power plants that have less flexibility to switch to other fuels,

⁸LIHEAP is a federally funded program that helps low-income households with their home energy bills. The federal government does not provide energy assistance directly to the public, generally providing funding to state-run programs. State-run LIHEAP programs may offer bill payment assistance, weatherization, and energy-related home repairs or other types of assistance.

⁹Data reflect LIHEAP and weatherization appropriations, supplemental or emergency appropriations, and REACH funding.

such as oil-based fuels, according to the National Petroleum Council and others. As a result, some consumers may see higher electricity bills.

High natural gas prices are also adversely affecting industrial consumers. As we reported in 2003, some industrial consumers shut down production facilities¹⁰ because of higher energy costs in 2000 and 2001. Industry representatives expect recent high prices to have a similar effect. A recent survey by a trade association representing large energy consumers showed that more than half of 31 member companies surveyed are decreasing their demand for natural gas an average of 8 percent to 9 percent this winter compared with last winter, leading the association to conclude that higher prices have forced industries to curtail production in the United States. The association expects that further cutbacks will occur if prices remain high this year.

According to an association that represents industrial consumers, high natural gas spot prices have been particularly detrimental to specific industries in the United States that rely on natural gas, such as fertilizer and chemical manufacturers, that compete in international markets. As we reported in 2003,¹¹ natural gas expenses can account for 90 percent of the total cost of manufacturing nitrogen fertilizer. The high cost of domestic natural gas has made it difficult for U.S. producers of nitrogen fertilizer to compete with foreign nitrogen fertilizer producers, who can buy natural gas at lower prices and export their products to the United States. For example, in 2004, Trinidad and Tobago was the largest supplier of anhydrous ammonia,¹² a type of nitrogen fertilizer, to the United States. Prices of natural gas are sharply lower in Trinidad and Tobago, where, according to the Fertilizer Institute, prices were about \$1.60 per million BTUs in 2005. The U.S. fertilizer industry, which typically supplied 85 percent of its domestic needs from U.S.-based production during the 1990s, now relies on imports for nearly 45 percent of nitrogen supplies, according to a trade association representing fertilizer companies.

¹⁰GAO, *Natural Gas: Domestic Nitrogen Fertilizer Production Depends on Natural Gas Availability and Prices*, [GAO-03-1148](#) (Washington, D.C.: Sept. 30, 2003).

¹¹[GAO-03-1148](#).

¹²Anhydrous ammonia is the source of nearly all nitrogen fertilizer produced in the world. Nitrogen fertilizer is composed of three basic components—nitrogen, potassium, and phosphorus—and of these components, nitrogen is the most important component of fertilizer. Natural gas is a key component in the production of nitrogen, and the cost of natural gas can account for up to 90 percent of nitrogen fertilizer production costs.

Furthermore, other industries can be affected. In the fertilizer industry, according to a trade association representing fertilizer companies, costs are passed on to U.S. farmers, which have witnessed a dramatic increase in the cost of nitrogen fertilizers. The prices paid by farmers for the major fertilizer materials reached a record during the spring of 2005—on average, 8 percent higher compared with the same period in 2004, according to a trade association representing fertilizer companies.

The Federal Government Has a Limited, but Important, Role in Overseeing Natural Gas Markets

In today's restructured market, the federal government does not control the price of natural gas or directly regulate most wholesale prices. However, three federal agencies—FERC, CFTC, and EIA—play key roles in overseeing and supporting a competitive and informed natural gas marketplace.

FERC's Oversight Activities

Under federal law, FERC is responsible for regulating the terms, conditions, and rates for interstate transportation by natural gas pipelines and public gas utilities to ensure that wholesale prices for natural gas, sold and transported in interstate commerce, are "just and reasonable." FERC's jurisdiction over retail natural gas sales is limited to domestic gas sold by pipelines, local distribution companies, and their affiliates. The commission does not prescribe prices for these commodity sales. FERC's regulatory authority applies to the physical markets for energy commodities, such as natural gas, and not to futures markets.

In December 2002, we reported that as energy markets were restructured, FERC had not adequately revised its regulatory and oversight approach to respond to the transition to competitive energy markets. FERC agreed that its approach to ensuring just and reasonable prices needed to change: from one of reviewing individual companies' rate requests and supporting cost data to one of proactively monitoring energy markets to ensure that they are working well to produce competitive prices. That year, the commission established the Office of Market Oversight and Investigations to actively monitor energy markets and, when necessary, undertake investigations into whether any entity had or was attempting to manipulate energy prices. As we previously reported, in 2002, FERC staff undertook several studies and investigations to determine whether there had been

attempts to manipulate upward prices for natural gas delivered to California during 2000-2001.

FERC's ability to monitor the natural gas markets has been enhanced in several regards recently. First, the Energy Policy Act of 2005, passed last September, contains several enforcement provisions that increase the commission's ability to punish wrongdoers that harm the public. In particular, the act provides FERC with the authority to impose greater civil penalties on firms that commit fraud. In addition, FERC has taken steps to strengthen its efforts to protect energy consumers. These actions include establishing a telephone hotline that individuals can call to report market abuse or other problems. FERC also has begun actively monitoring natural gas markets to determine whether price movements are the result of market manipulation or market fundamentals. The staff reviews market activity for any possible manipulation that might also affect prices and performs a detailed review of natural gas prices and market activity on a daily basis with the intent of identifying areas of possible manipulation. If the staff identifies price anomalies that are not explained by market fundamentals, they investigate.

Since 2002, FERC has settled a number of investigations involving natural gas market manipulation. For example, 10 companies agreed to pay settlements totaling approximately \$84 million. In addition, a FERC administrative law judge found that another company exercised market power over natural gas prices in California during the 2001-2002 heating season, and the company subsequently agreed to pay a settlement of \$1.6 billion. FERC officials told us that, since early fall of last year, it has received complaints, expressions of concern, and requests to investigate with respect to high natural gas prices through its enforcement hotline and from public officials and the general public. Additionally, FERC has identified areas of concern through its daily market oversight process. FERC officials told us that all complaints and concerns are taken seriously and actively investigated, where appropriate. However, since ongoing investigations are considered nonpublic under FERC's regulations, officials said they could not comment further on any ongoing investigations of the natural gas market.

CFTC Oversight of Related Financial Markets

A large part of CFTC's mission is to protect market users and the public from fraud, manipulation, and abusive practices related to the sale of commodity futures and options, including natural gas. CFTC does this for federally regulated exchanges such as NYMEX, and it has limited authority over certain other futures markets. It does not have general regulatory

authority for other over-the-counter markets, including some used for trading natural gas futures or options.¹³ In fulfilling its regulatory role, CFTC conducts market surveillance to identify situations that could amount to attempted or actual futures market manipulation and to initiate appropriate preventive actions. For instance, to protect the futures market from excessive speculation that could cause unwarranted price fluctuations, CFTC or an exchange impose limits on the size of the transactions that may be held in futures or options of a commodity. In the natural gas futures market, these transaction limits are placed on trading that occurs during the spot month.¹⁴ To monitor these transaction limits, the commission has about 45 market surveillance staff and economists to do policy and economic analysis of energy trading issues.

As part of its regulatory role, CFTC also enforces various laws prohibiting fraud, manipulation, and abusive trading practices. CFTC's enforcement group investigates and prosecutes alleged violations of the Commodity Exchange Act. From 2002 through May 2005, CFTC investigated over 40 energy companies and individuals, filed over 20 actions, and collected over \$300 million in penalties. Most of these actions were related to natural gas. For example, in July 2004, Coral Energy Resources, L.P. (Coral), a Houston-based firm that marketed gas to consumers across the United States, was ordered to pay a civil monetary penalty of \$30 million. The penalty was imposed because the CFTC found that Coral knowingly provided false, misleading, or inaccurate information concerning its natural gas transactions from January 2000 to September 2002. During that time, CFTC found that Coral employees also attempted to manipulate the price of natural gas in interstate commerce or for future delivery. Natural gas traders report their market information to firms like Natural Gas Intelligence, who in turn compile pricing and volume indexes, for instance,

¹³Under the Commodity Exchange Act, transactions in exempt commodities, which include over-the-counter energy derivatives, are exempt from most provisions of the act, although the antimanipulation and certain antifraud provisions are applicable and can be enforced by CFTC. To qualify for the exemption, the markets must be limited to institutional participants, and if a market should function like an electronic exchange, the exemption requires that the exchange limit transactions to participants trading for their own accounts, notify the commission of their activities, keep records, submit to CFTC's subpoena authority and information requests, and publicly report trade data when the products begin to serve a significant price discovery function.

¹⁴The "spot month" is defined in many different ways, but generally refers to the nearest futures month beginning on a date near the first business day of the month in which the futures expires or on a date near the first day that delivery notices can be tendered. Some spot-month limits apply to both hedge and speculative positions.

that are used by market participants to settle their transactions. Submitting incorrect information could affect the price of natural gas in interstate commerce and could affect the futures or options prices of gas.

FERC and CFTC Taking Action to Better Coordinate Oversight Efforts

FERC and CFTC have recently signed a memorandum of understanding to create a more effective and efficient working relationship between the two agencies. The agreement covers the sharing of information and the confidential treatment of proprietary energy-trading data. FERC officials told us that if either agency needs information about trading within the other agency's jurisdiction, then the other agency must provide it. The understanding is to contribute to better coordination of enforcement cases.

EIA Collects, Disseminates, and Analyzes Information about the Market

The Energy Information Administration (EIA) is charged with collecting information about energy markets, including natural gas. The information reported by this agency is important in promoting efficient natural gas markets and public awareness of these markets. In our 2002 analysis of natural gas markets, we identified that most elements of EIA's natural gas data collection program inadequately reflected some of the changes in the market. For example, with some exceptions, EIA's current natural gas data collection program remains primarily an annual effort to obtain comprehensive information on natural gas volumes and prices, while markets have evolved to require more timely and detailed data. However, beginning in the spring of 2002, EIA began to provide more real time market information that traders and other gas industry analysts use as an indicator of both supply and demand. For example, on May 9, 2002, EIA began releasing weekly estimates of natural gas in underground storage for the United States and three regions of the United States. According to EIA, these data are valued by market participants and are a key predictor of future natural gas price movements. EIA has also undertaken efforts to better understand derivatives markets and the effectiveness of energy derivatives to manage price risk. In addition, EIA's weekly natural gas data releases are published each Thursday, and according to EIA officials, these releases have been well received by natural gas market participants.

Concluding Observations

Natural gas has become an essential element in our national energy picture. Ironically, however, natural gas markets may be suffering from the growing popularity of this versatile fuel. Rising demand and tightening supply appear to have contributed to both the general rise in prices over the past several years as well as the price spikes, such as that following

the hurricanes in 2005. Moreover, the stage seems set for future price spikes if either demand is higher than expected or supplies are unexpectedly interrupted.

To the extent that the higher prices persist and price spikes are possible, natural gas markets could pose significant challenges for our country. Many people may have to pay a larger percentage of their income for home heating and other uses of natural gas, such as electricity—not just this year, but every year. Some may not be able to afford it. Further, because some key industries have historically relied on low natural gas prices to be competitive, we may lose some of these industries along with the jobs that they provide.

These are weighty issues that require concerted actions reaching across not just the natural gas industry but also across the energy sector and related financial markets. The American consumer wants secure, affordable, reliable, and environmentally sound energy. Meeting this demand will be a challenge. This hearing offers another important step in the process of overseeing the regulators—FERC and CFTC—charged with ensuring these markets operate as intended.

Mr. Chairman, this concludes my prepared statement. I would be pleased to respond to any questions that you or other Members of the Subcommittee may have at this time.

Contact and Staff Acknowledgments

If you have any questions about this testimony, please contact me at (202) 512-3841 or wellsj@gao.gov. Other major contributors to this testimony include Karla Springer (Assistant Director), Lee Carroll, Michael Derr, Patrick Dynes, Elizabeth Erdmann, Philip Farah, John Forrester, Mark Gaffigan, Mike Hix, Chester Joy, Jon Ludwigson, Kristen Sullivan Massey, Cynthia Norris, Frank Rusco, Jena Sinkfield, Rebecca Spithill, John Wanska, and Kim Wheeler-Raheb.

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