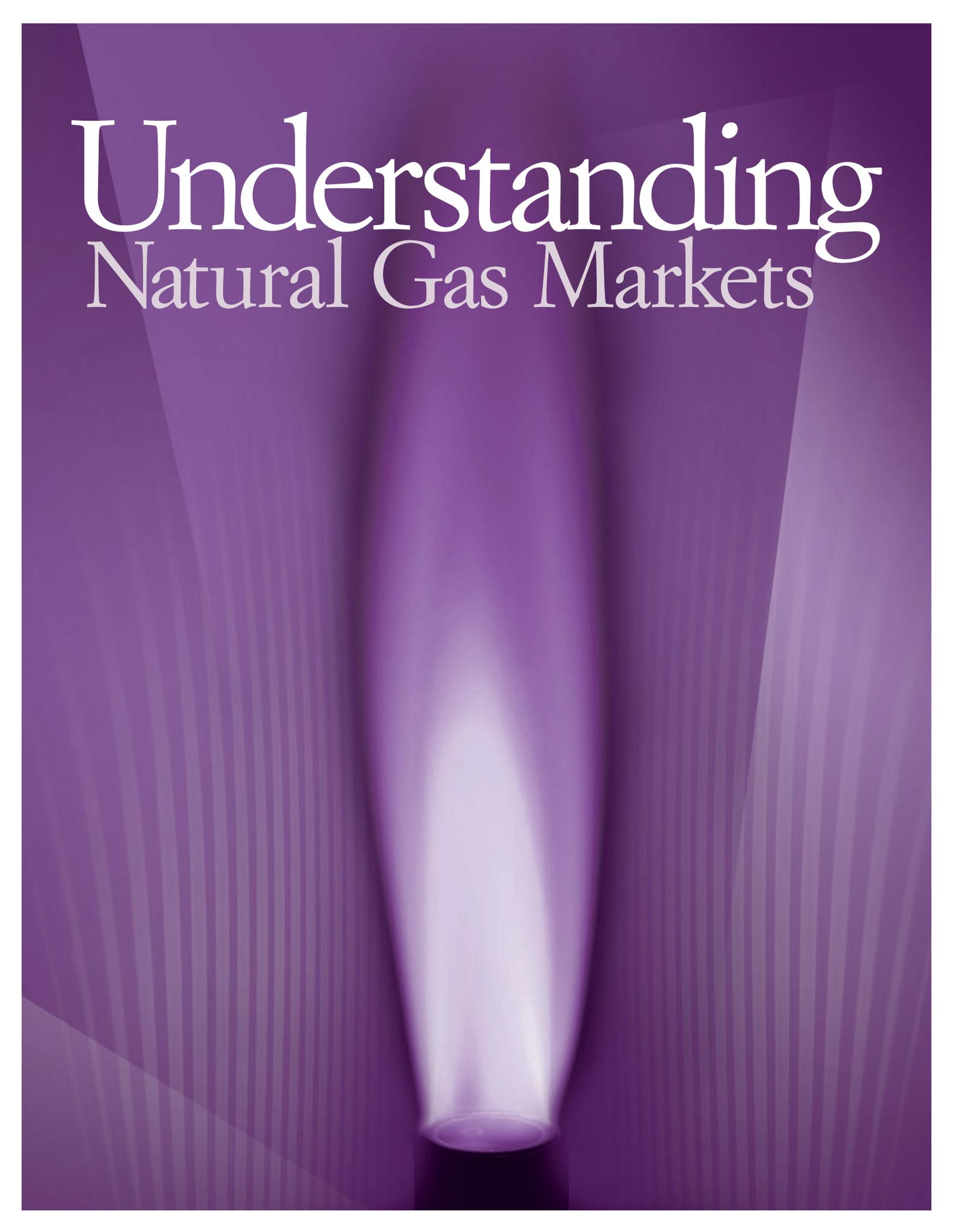


# Understanding Natural Gas Markets

The background is a deep purple color. In the center, there is a vertical, light purple plume that resembles a flame or a gas jet rising from a burner at the bottom. The plume is wider at the top and tapers towards the bottom. The overall effect is a clean, modern, and thematic design for a document about natural gas markets.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every sale, purchase, and payment must be properly documented to ensure the integrity of the financial statements. This includes keeping receipts, invoices, and bank statements in a secure and organized manner.

The second part of the document provides a detailed overview of the accounting cycle. It outlines the ten steps involved in the process, from identifying the accounting entity to preparing financial statements. Each step is explained in detail, with examples provided to illustrate the concepts. The cycle is presented as a continuous loop that repeats every year.

The third part of the document focuses on the classification of accounts. It explains the difference between assets, liabilities, and equity, and how they are recorded in the accounting system. It also discusses the importance of using the correct accounting method for each type of transaction, such as the accrual method for sales and the cash method for purchases.

The fourth part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every sale, purchase, and payment must be properly documented to ensure the integrity of the financial statements. This includes keeping receipts, invoices, and bank statements in a secure and organized manner.

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# Understanding Natural Gas Markets

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# Natural gas

is an important source of energy for the United States.

Its importance has grown since the mid-1990s. Natural gas is an attractive fuel because it is clean burning and efficient, and because ample supplies of natural gas have been available from domestic resources and from Canada. Throughout the 1990s, these factors and the low cost of natural gas helped lead to increased investment in facilities using natural gas.

For example, the vast majority of new electricity generation capacity built in the United States in the past decade has been natural gas-fired. However, for the last five to seven years, the price of natural gas has been trending upward (Figure 1). Of course, the result of increasing natural gas prices has been increased residential heating bills, increased fuel costs to electric generators using natural gas, and decreased competitiveness of U.S. industries that rely on natural gas. Given the effect of higher natural gas prices on consumers' budgets and on firms' competitiveness, consumers, business people, and policymakers are asking what has led to the increase in North American natural gas prices.

Addressing these questions requires an understanding of three important points:

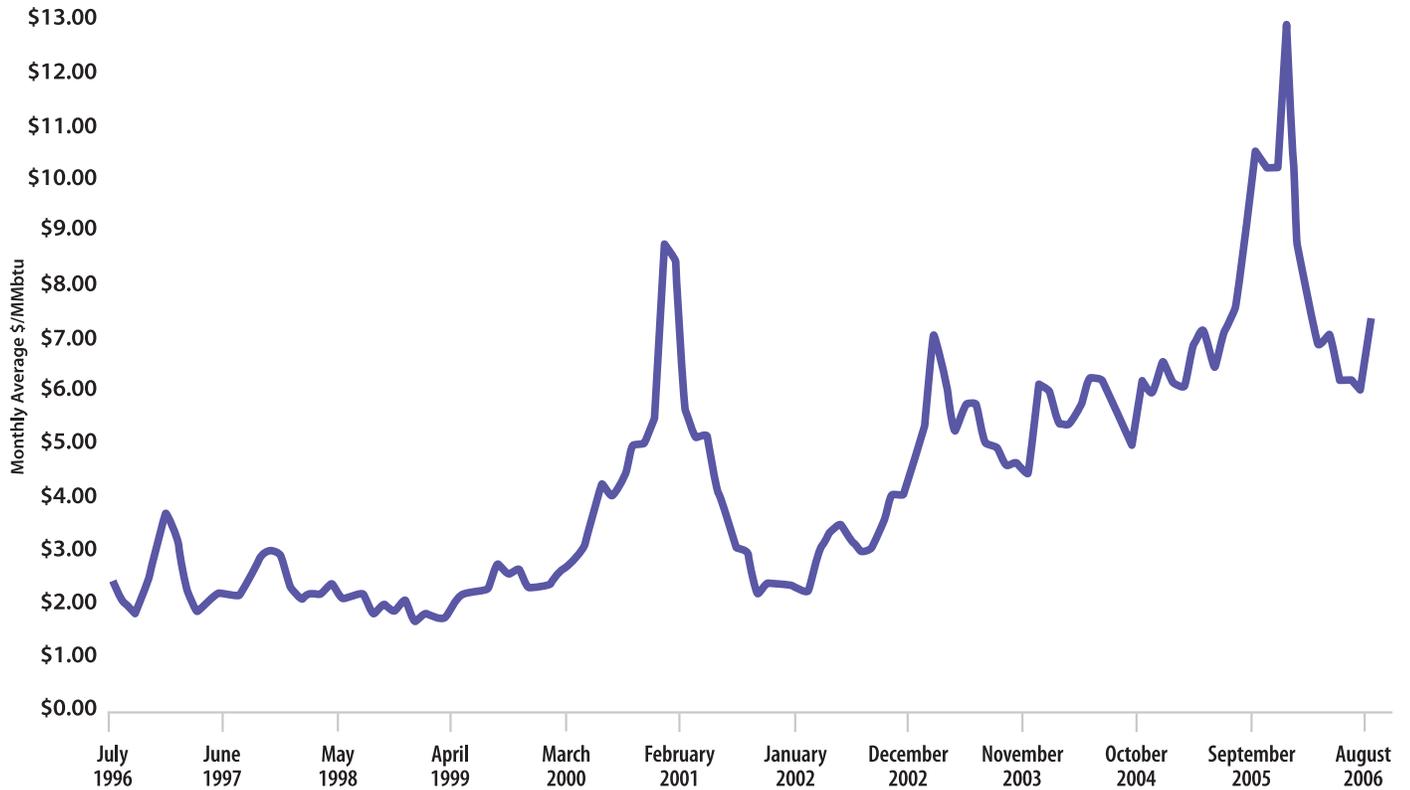
- ◆ North American prices for natural gas are driven by the interaction of natural gas supply available from North American natural gas and oil fields and demand. Demand depends, in large part, on the relative prices of other fuels, economic growth, and weather, which drives heating demand in the winter and demand for gas-fired generation for cooling in the summer.
- ◆ The U.S. natural gas market is highly competitive. Natural gas market prices are determined competitively on *spot* and *futures*\* markets reflecting current and expected supply and demand conditions. The market price is determined through the actions of thousands of well-informed buyers and sellers.
- ◆ Natural gas consumed in the United States is primarily produced domestically or imported from Canada. Planned increases in U.S. imports of *liquefied natural gas (LNG)* would, if realized, begin to integrate the United States into a growing world market for natural gas.

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\* Italicized words appear in the glossary.

## Average Natural Gas Spot Prices at Henry Hub, July 1996 - August 2006

Source: Platts



Note: There is no price data reported for July 1, 1996; August 30, 2005; September 27, 2005 - October 7, 2005. August 2006 is the average of daily prices from August 1, 2006 - August 21, 2006.

As described in this brochure, North America's demand for natural gas is strong as a result of continued economic growth and other factors. In addition, high oil prices have made natural gas a relatively more attractive fuel because fewer industrial natural gas users can profitably switch from natural gas to oil products for their energy needs. However, on the supply side, despite increased drilling activity, North American natural gas supply has leveled off due to the *mature*

age of existing natural gas fields. Furthermore, significant natural gas resources are currently off-limits to development. Political and market responses to high prices can include increased conservation of natural gas, increased access to currently restricted resources, improved extraction technology, expansion of infrastructure to bring Alaskan natural gas to the lower 48 states, and importation of natural gas, both via pipeline from Canada and LNG from overseas.

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# U.S. energy counts natural gas as an important part of its portfolio.

Natural gas provides 23 percent of the marketable energy consumed in the United States.<sup>1</sup> Oil products and coal are the other two major sources of energy. Natural gas is a valued source of energy because it is versatile and burns cleanly. As a result, natural gas use is commonplace in applications including cooking, residential and commercial heating, industrial process feed stocks, and electric generation.

## Physical Structure of the U.S. Natural Gas Industry

Figure 2 is a schematic illustration of the physical structure of the natural gas industry and illustrates the principal activities required to bring gas to consumers. The primary activities are:

### Exploration and Production

Exploration and production include finding and producing natural gas from natural gas fields or associated gas that is produced with crude oil.

### Processing

Natural gas processing removes impurities and the higher-valued products and prepares a *dry gas* stream that meets industry standards for transportation in high-pressure pipelines.

### Transportation

Natural gas is transported in high-pressure pipelines from producing areas to industrial end users, storage areas, and local distribution companies.

### Storage

The natural gas production and delivery system is not designed to produce and transport the full amount of natural gas consumers want during periods of peak demand. In order to meet peak demand, large customers and distribution companies put gas into underground storage, mostly near final consumers. The stored gas is withdrawn to meet consumers' needs during times of peak demand, such as a cold winter day.

### Local Distribution

Local distribution companies own and operate the network of pipes that carry natural gas from high-pressure trunk lines to final consumers. These consumers include residential, commercial, and industrial customers.

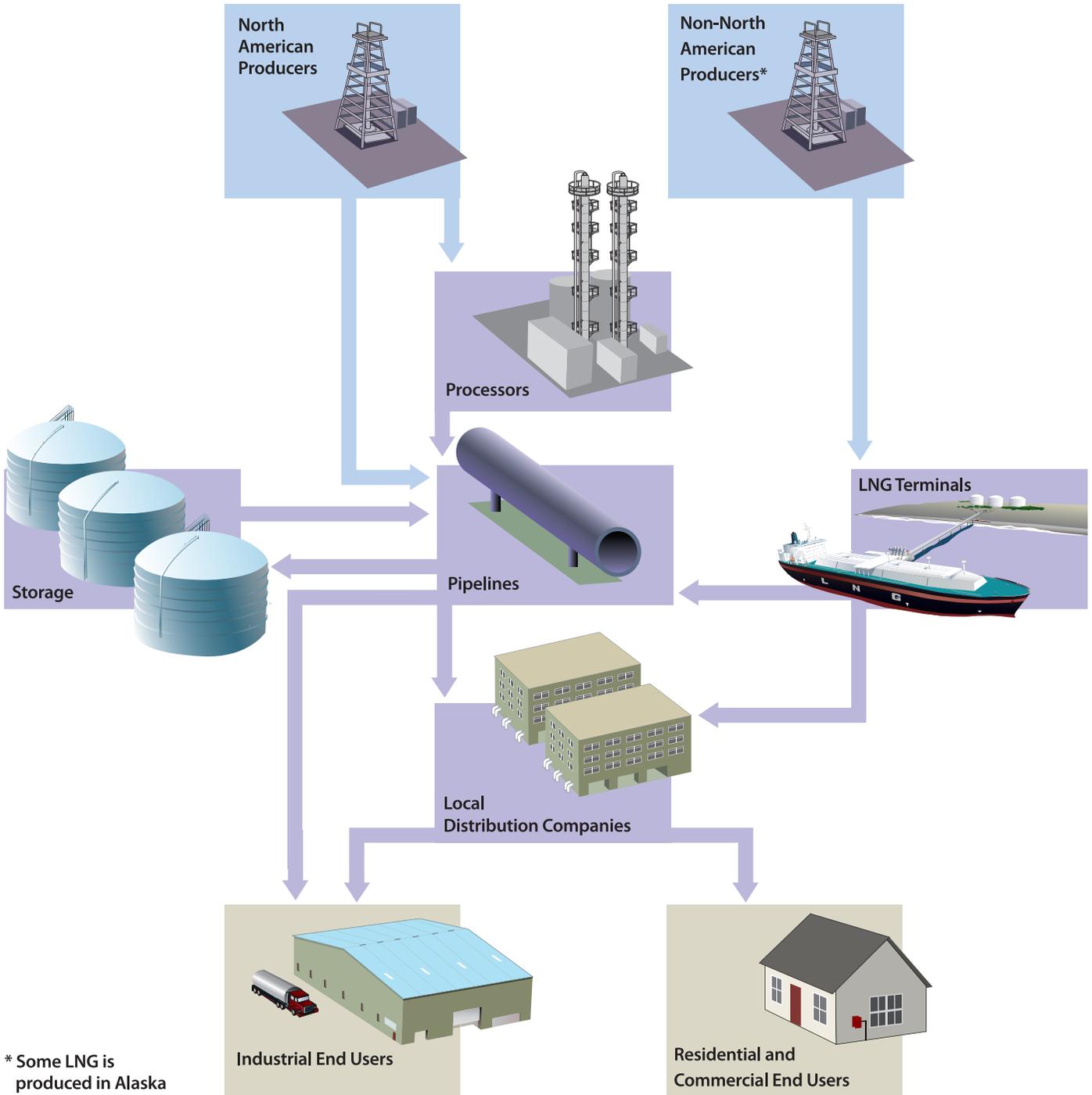
### Liquefied Natural Gas

The United States currently imports about three percent of its natural gas from overseas producers in the form of liquefied natural gas. LNG can also be stored and used to meet peak demand.

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<sup>1</sup> Energy Information Administration, "Energy Basics 101," [www.eia.doe.gov/basics/energybasics101.html](http://www.eia.doe.gov/basics/energybasics101.html).

## Physical Flow of Natural Gas



3

### Selected U.S. Natural Gas Producing Regions and Pipeline Flows

Source: EIA, Platts, State of Alaska Department of Natural Resources

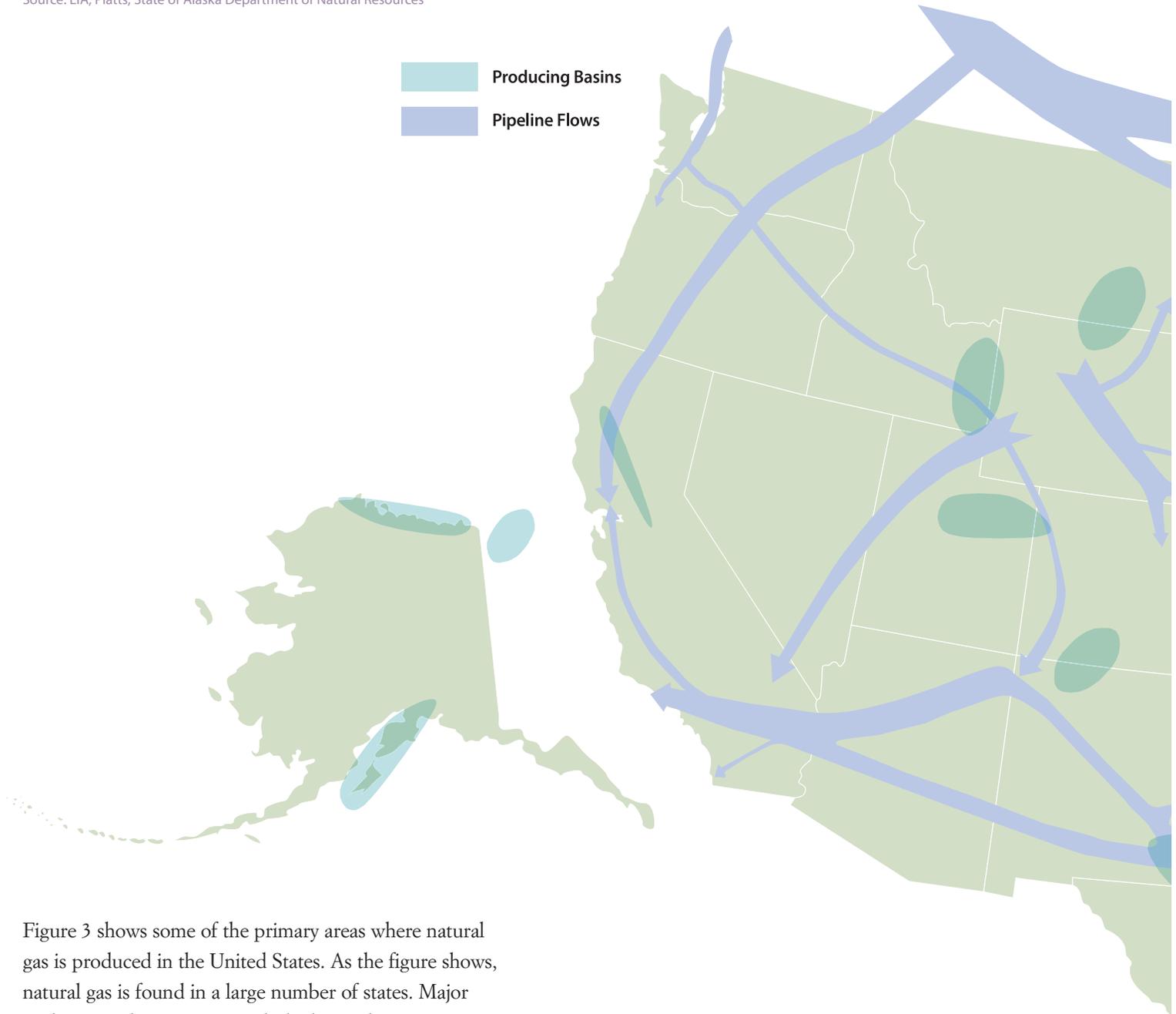
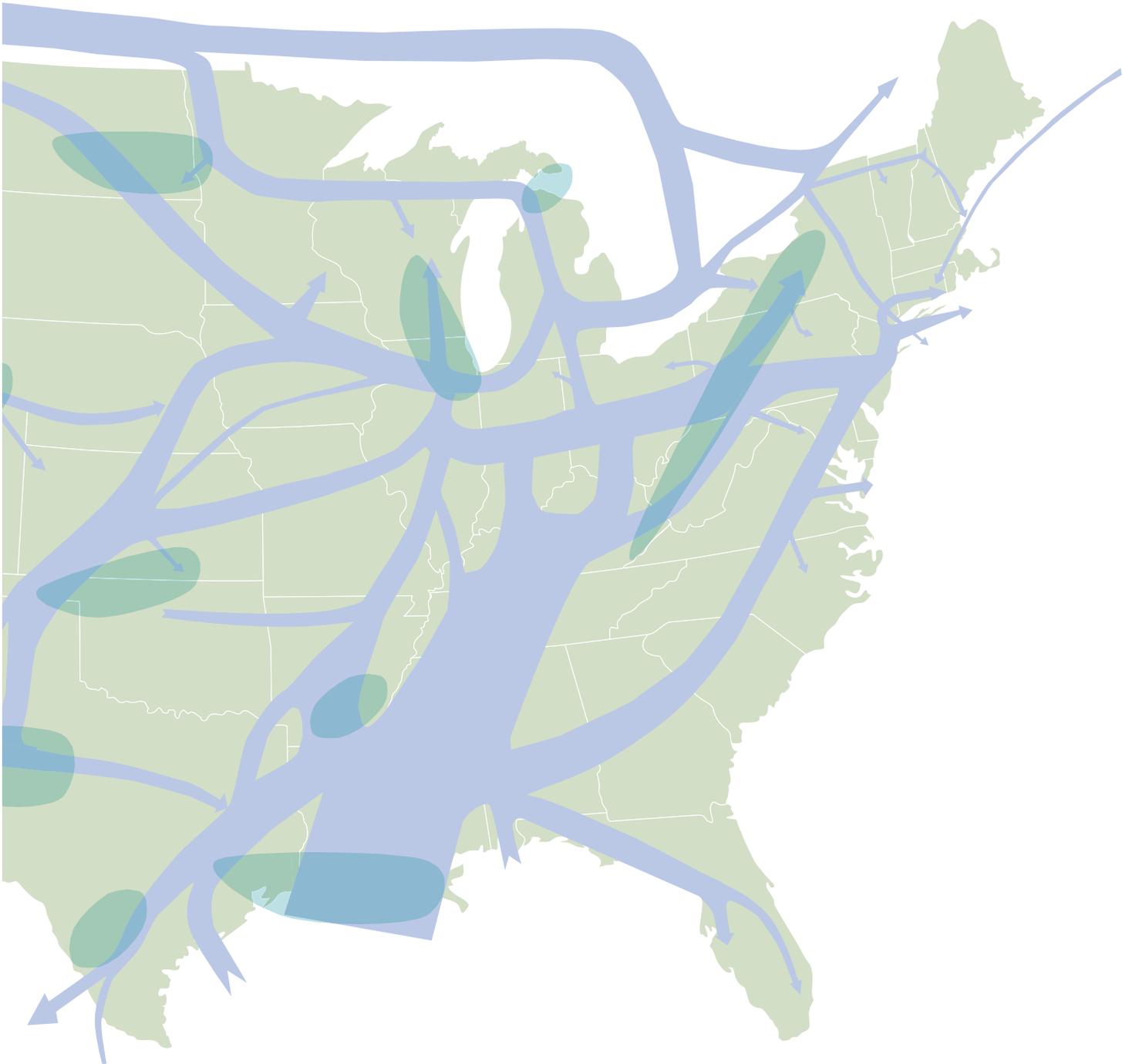


Figure 3 shows some of the primary areas where natural gas is produced in the United States. As the figure shows, natural gas is found in a large number of states. Major onshore production areas include the Rocky Mountains, Texas, and Louisiana. In addition, significant natural gas comes from offshore production in the Gulf of Mexico.

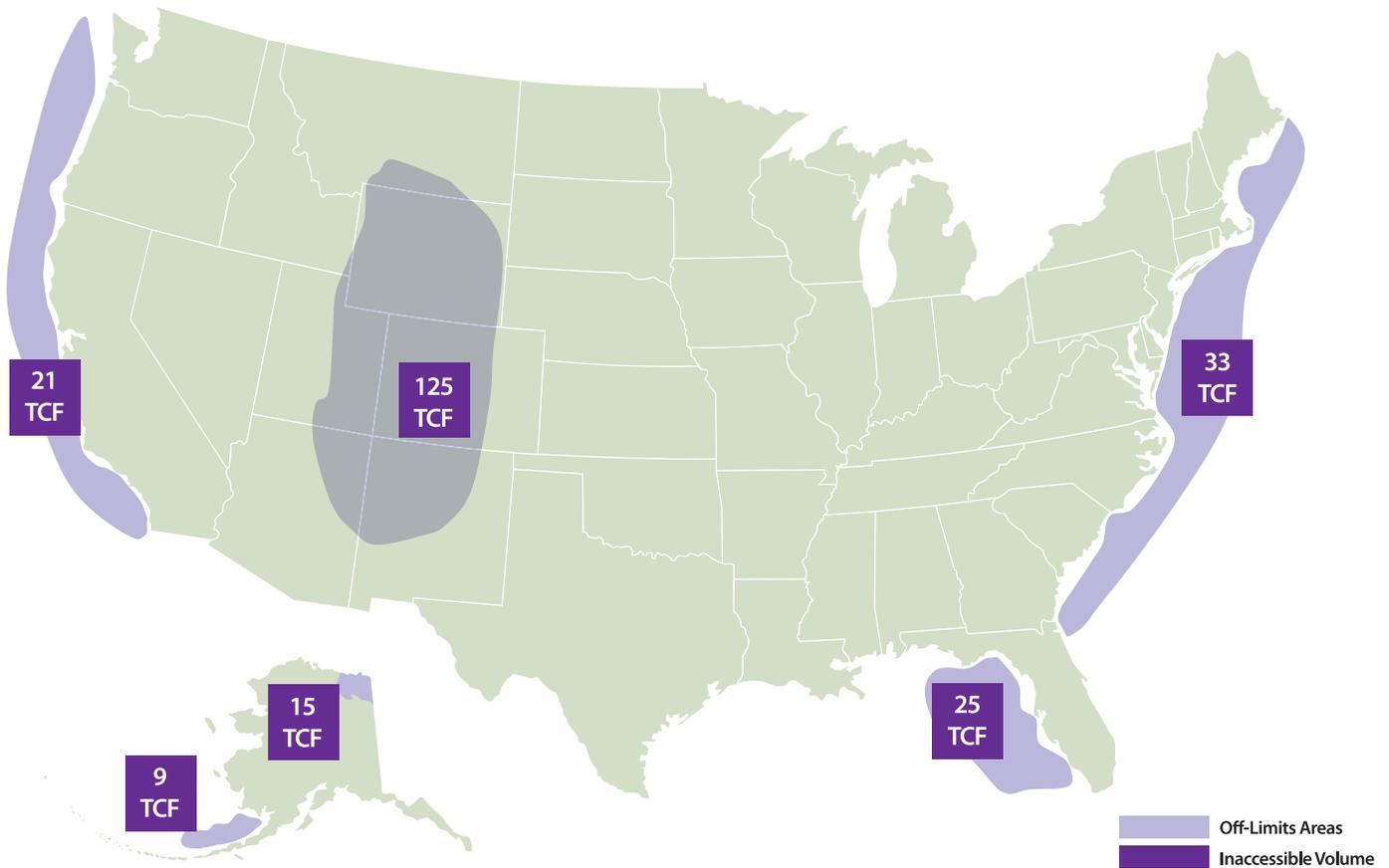
5



4

### U.S. Natural Gas Resources Subject to Access Restrictions (TCF)

Source: EIA, Platts, National Petroleum Council



As shown in Figure 4, offshore areas on both coasts and the Alaskan Peninsula are off-limits to exploration. In addition, approximately 125 trillion *cubic feet* (TCF) of the natural gas underlying federal lands in the Rocky Mountains is off-limits or under some type of restriction (such as species habitat restrictions or no surface occupancy) and approximately 25

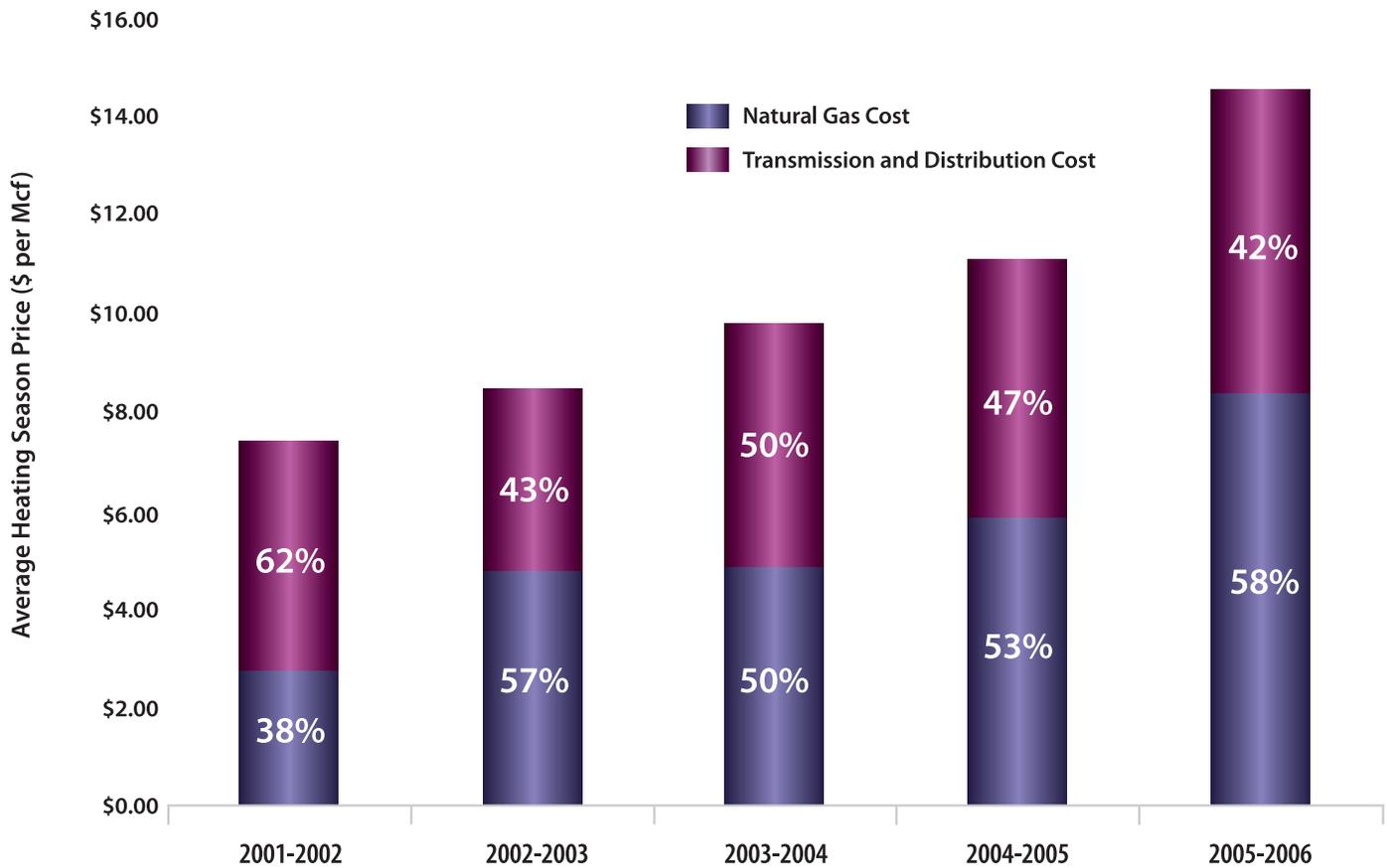
TCF of the natural gas off the western coast of Florida is unavailable for exploration and production.<sup>2</sup> As shown in the figure, it is estimated that approximately 225 TCF of U.S. natural gas *reserves* are off-limits to exploration, equal to approximately ten times the total amount of natural gas consumed in the U.S. in 2005 (22 TCF).<sup>3</sup>

<sup>2</sup> National Petroleum Council, *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy*, Vol. 2 at 127 (September 2003).

<sup>3</sup> [http://tonto.eia.doe.gov/dnav/ng/ng\\_cons\\_sum\\_dcu\\_nus\\_a.htm](http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm).

## Breakdown of Natural Gas Price Paid by Residential Consumers During the Heating Season, 2001-2006

Source: EIA



Once natural gas is produced and processed, it is injected into pipelines for transmission to customers and local distribution companies. Transportation and delivery costs are a significant portion of the cost of delivered natural gas. The rates charged by both the natural gas pipelines and the local distribution companies are regulated by federal or state regulators.

In recent years, transportation and delivery charges have declined from 62 percent to 42 percent of the final natural gas price paid by residential consumers during the heating season (November through March), while the cost of the natural gas itself has increased from 38 percent to 58 percent of the consumer's average heating season price (See Figure 5).

In the late 1980s and early 1990s, demand for natural gas grew rapidly in the United States, from around 17 TCF in 1983 to around 22 TCF in 1995, a 30 percent increase. During most of this period, natural gas was a less expensive source of energy than the oil products that it primarily competed against. As a result, the low natural gas prices

of generation and by the low cost of natural gas. In fact, the capacity of natural gas-fired generation has tripled since 1999, and the quantity of natural gas used by the electric power sector grew by more than 50 percent between 1996 and 2005. Commercial use of natural gas for heating office buildings and retail space has remained relatively constant.

# Demand for natural gas has grown rapidly.

of the 1990s and the expectation that prices would stay low contributed to large investments in facilities, particularly electric generation, that use natural gas. In addition, increasingly strict environmental regulations and the clean-burning qualities of natural gas have encouraged many energy consumers to choose natural gas.

Figure 6 shows the consumption of natural gas by sector of the economy. As the figure shows, the industrial sector is the largest user of natural gas, typically consuming more than 35 percent of total use. Historically, the residential sector has been the next largest user of natural gas, consuming approximately 22 percent of the total. However, the use of natural gas by electric generators has increased markedly since the late 1990s, driven in part by the ease of getting permits to build gas-fired generation relative to other types

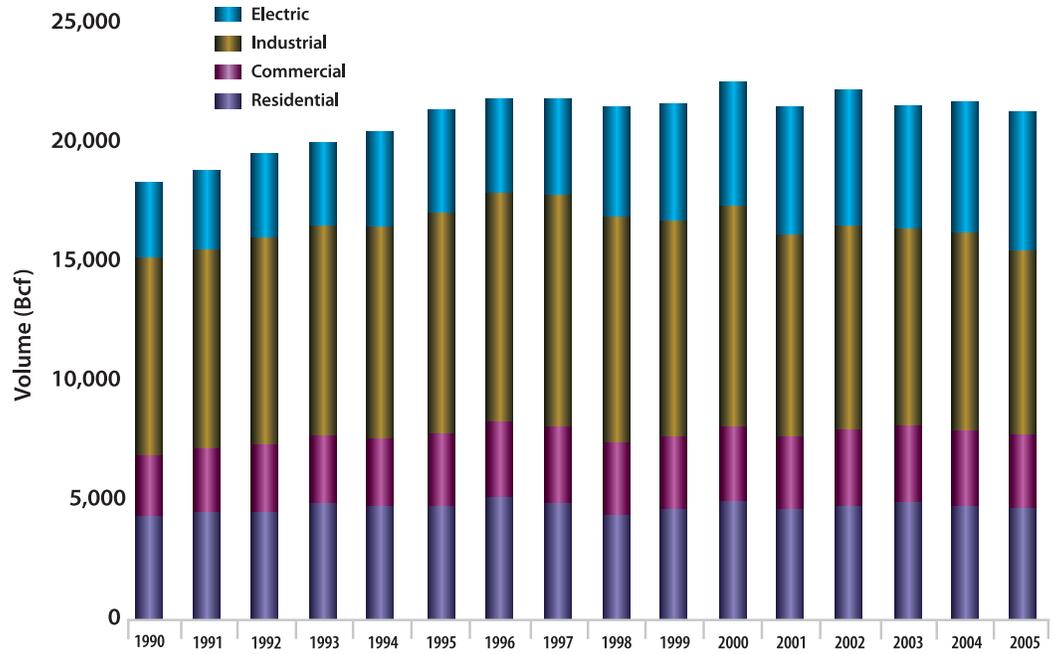
More than 60 million U.S. households use natural gas for water heating, space heating, or cooking. In total, natural gas accounts for more than 50 percent of the fuel used to heat U.S. homes.<sup>4</sup> Residential and commercial heating demand for natural gas is highly weather-sensitive, making weather the biggest driver of natural gas demand in the short term. As a result, natural gas demand is highly “seasonal” in nature, with significant “peaks” in the winter heating season, as illustrated in Figure 7. Natural gas pipelines and distribution companies must plan to meet customers’ needs during the peak demand periods. The seasonal nature of heating demand can cause the price of natural gas to vary widely at different times of the year.

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<sup>4</sup> [http://www.eia.doe.gov/kids/energyfacts/sources/non\\_renewable/naturalgas.html#WHAT%20IT%20IS%20USED%20FOR](http://www.eia.doe.gov/kids/energyfacts/sources/non_renewable/naturalgas.html#WHAT%20IT%20IS%20USED%20FOR).

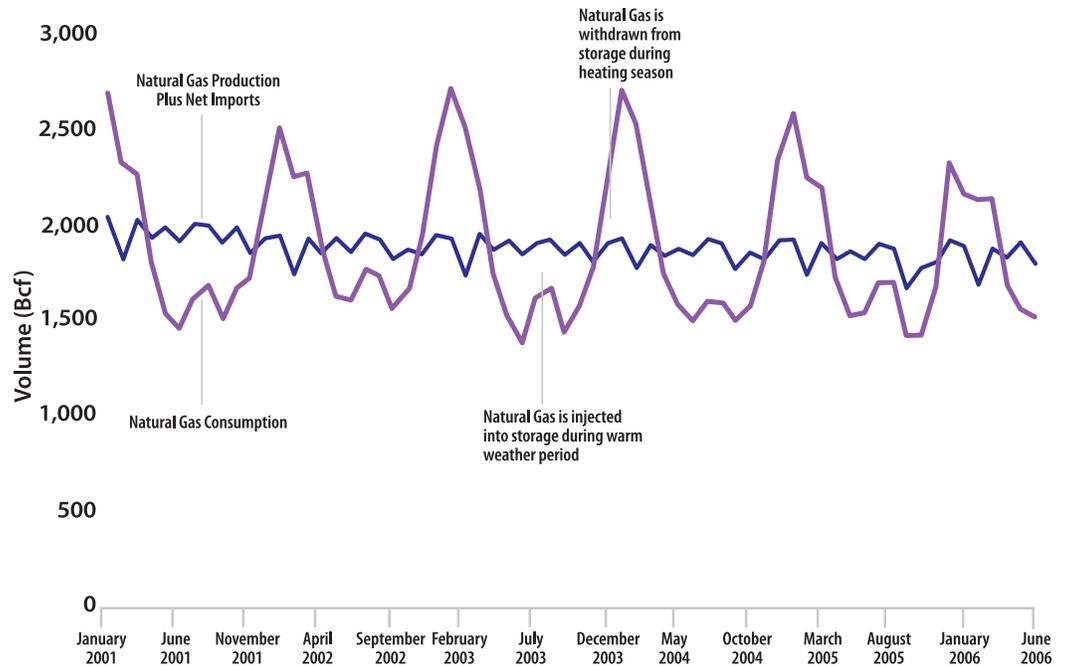
6  
**U.S. Natural Gas  
 Consumption by Sector,  
 January 1990 -  
 December 2005**

Source: EIA



7  
**Natural Gas  
 Consumption,  
 Production and  
 Storage Activity,  
 January 2001 -  
 June 2006**

Source: EIA



## Natural Gas Demand

As described on the previous page, the natural gas production and transmission system is not designed to move the full amount of peak demand from producing areas to consumers. In order to meet high seasonal winter demand for natural gas, a significant amount (ten percent or more of our annual consumption) is put into storage during periods of warm weather and lower demand. Figure 7 shows the pattern of natural gas production and storage. The relatively flat purple line shows natural gas production and imports into the United States. The figure shows production remains essentially flat throughout the year, but, as the lighter purple line shows, consumption rises dramatically in the winter and falls in the spring through the early fall.

Heating demand for natural gas puts upward pressure on natural gas prices during winter, contributing to the tighter market that exists for natural gas in the winter months, and serving to compensate those who place gas in storage during lower-price, off-peak periods. Regulated local distribution companies, however, will place gas in storage for peak demand independent of prices because of their regulator mandate to be able to serve their customers' peak demands. Thus, natural gas inventory levels are driven, in part, by regulatory factors in addition to market factors.

Despite the storage of natural gas and the industry's recognition that demand will rise in the winter months, winter natural gas prices can fluctuate quite dramatically

with changes in weather and the amount of natural gas in storage. The reasons for this price volatility are straightforward. For example, if storage levels appear to be low in autumn, there will be concern that it will be difficult to meet peak demands throughout the winter, and traders may be willing to pay more to secure natural gas volumes for winter month deliveries. This results in upward pressure on market prices. In contrast, warmer than expected weather during the winter of 2005-2006 led to storage being quite full as the winter progressed and natural gas prices

dropped in response to these ample supplies.

Available supply and demand are tightly balanced today. This means, for example, that an interruption of supply, such as what happened when hurricane damage shut down substantial gas production in the Gulf of Mexico in 2005, can lead to rapid and dramatic spikes in prices. Investments are intended to bring on new

supply, but new supplies require months or years to bring online. And the short-term demand response to high prices is constrained by the fact that many natural gas consumers (especially residential and commercial consumers) do not have the ability to switch to alternate fuels or to significantly reduce their energy use in the short-term. In the longer run, high prices do reduce demand. For example, some U.S. industrial gas users like chemical and fertilizer plants have shut down permanently.<sup>5</sup> Weather and storage levels also continue to influence natural gas markets on a seasonal basis.



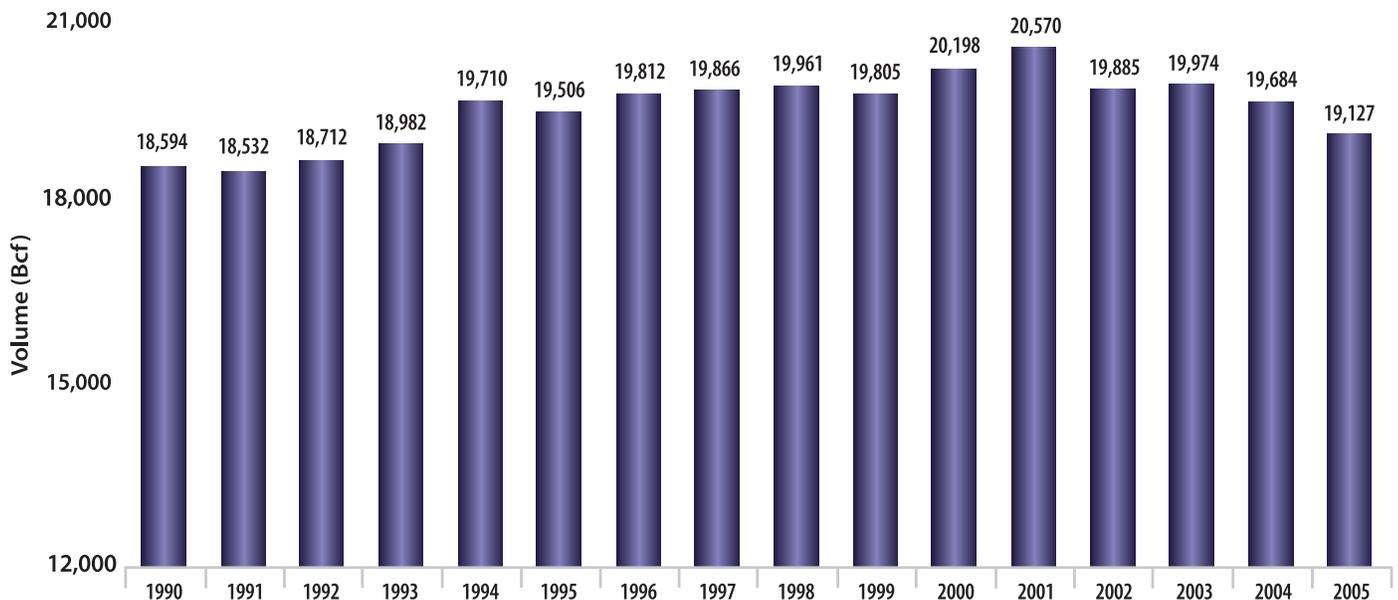
<sup>5</sup> National Petroleum Council, *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy*, Vol. 2 at 292 (September 2003).

97%  
of the U.S. gas  
supply comes from  
domestic sources  
and Canada.

Figure 8 shows the total domestic production of natural gas in the United States. As the figure shows, domestic production of natural gas peaked in 2001 and has declined slowly since that time. In 2005, production was seven percent lower than in the peak year 2001. This decline is, in part, the result of the fact that some of the key natural gas fields have matured and are less productive than earlier in their lives, whereas new developments of unconventional resources often have lower productivity. In addition, significant undeveloped natural gas resources remain off-limits to exploration. Moreover, the reduced level of U.S. production in 2005 is partly attributable to interruptions to offshore production as a result of hurricanes.

8  
U.S. Natural Gas Marketed Production, 1990 -2005

Source: EIA



9  
**Historical and Projected Natural Gas Supply by Source, 1990-2025**

Source: EIA

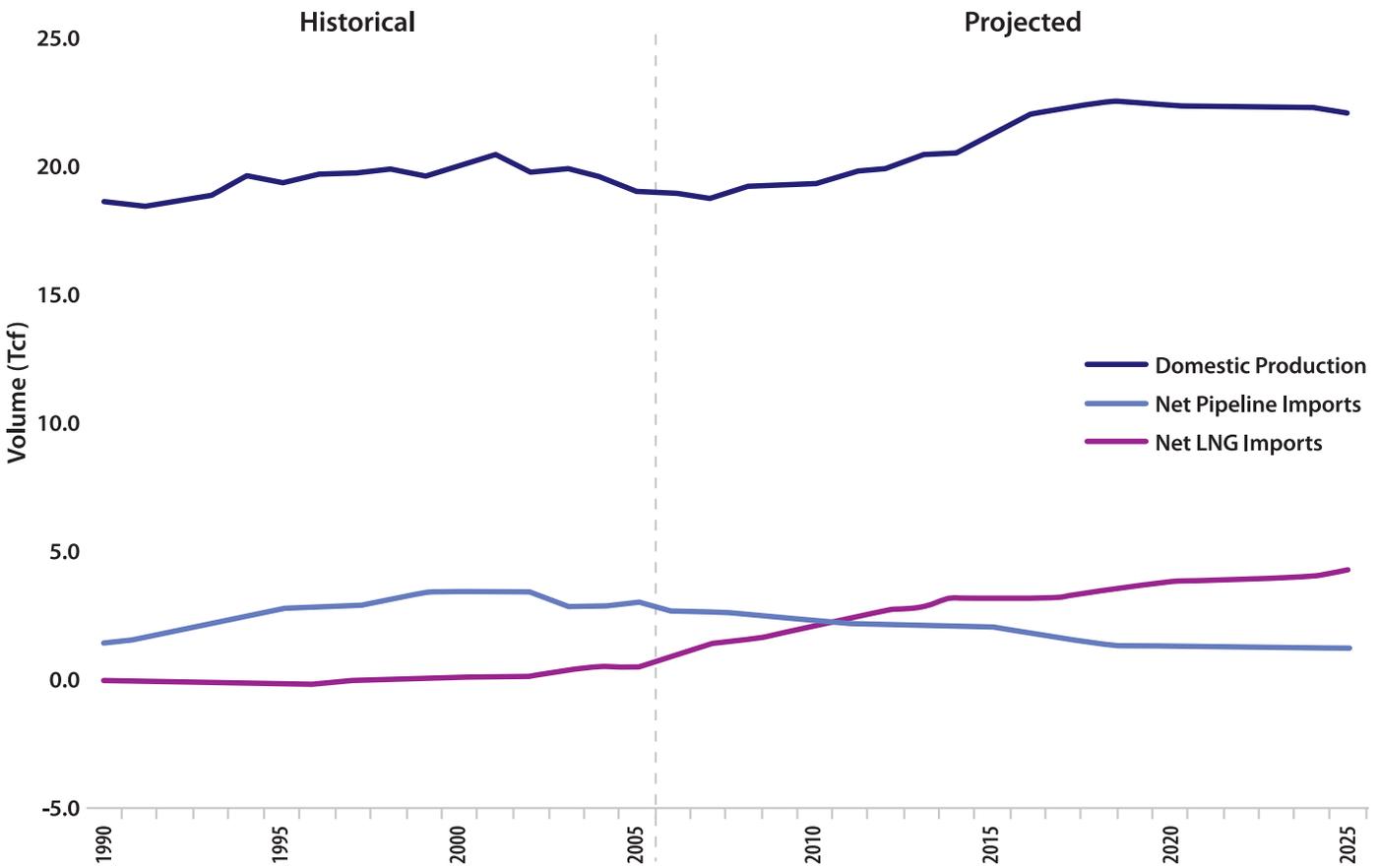
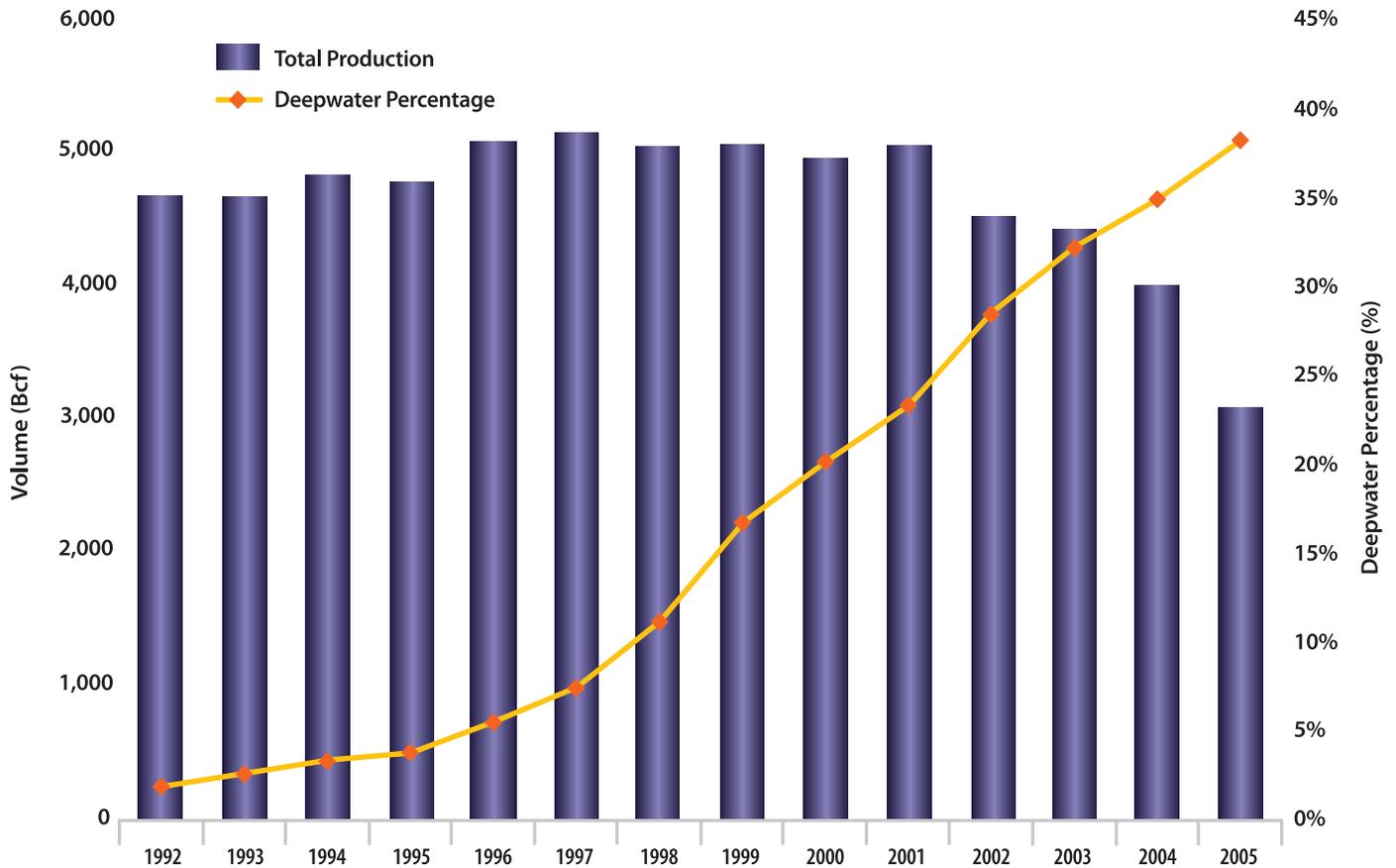


Figure 9 shows the sources of natural gas supply to U.S. consumers. In recent years about 82 percent has come from domestic sources.

Approximately 15 percent of U.S. natural gas consumption is imported from Canada. The remaining three percent comes from LNG imports.

## Natural Gas Production of the Gulf of Mexico Federal Offshore, 1992-2005

Source: Minerals Management Service



The production of natural gas from the Gulf of Mexico shows the impact of the maturation of the gas fields in a producing area on total production. Figure 10 depicts natural gas production from the Gulf of Mexico and the share of that production that comes from *deepwater* wells drilled in more than 200 meters of water.

Total Gulf production peaked in 1997, but the decline in Gulf production was slowed by the increased drilling of deepwater wells. Today, approximately 38 percent of Gulf production comes from deepwater wells. Thus, the industry has had to move to more expensive resources and improved technology to stem the decline of production.

11  
**Natural Gas Production by Source, 1990-2025**

Source: EIA

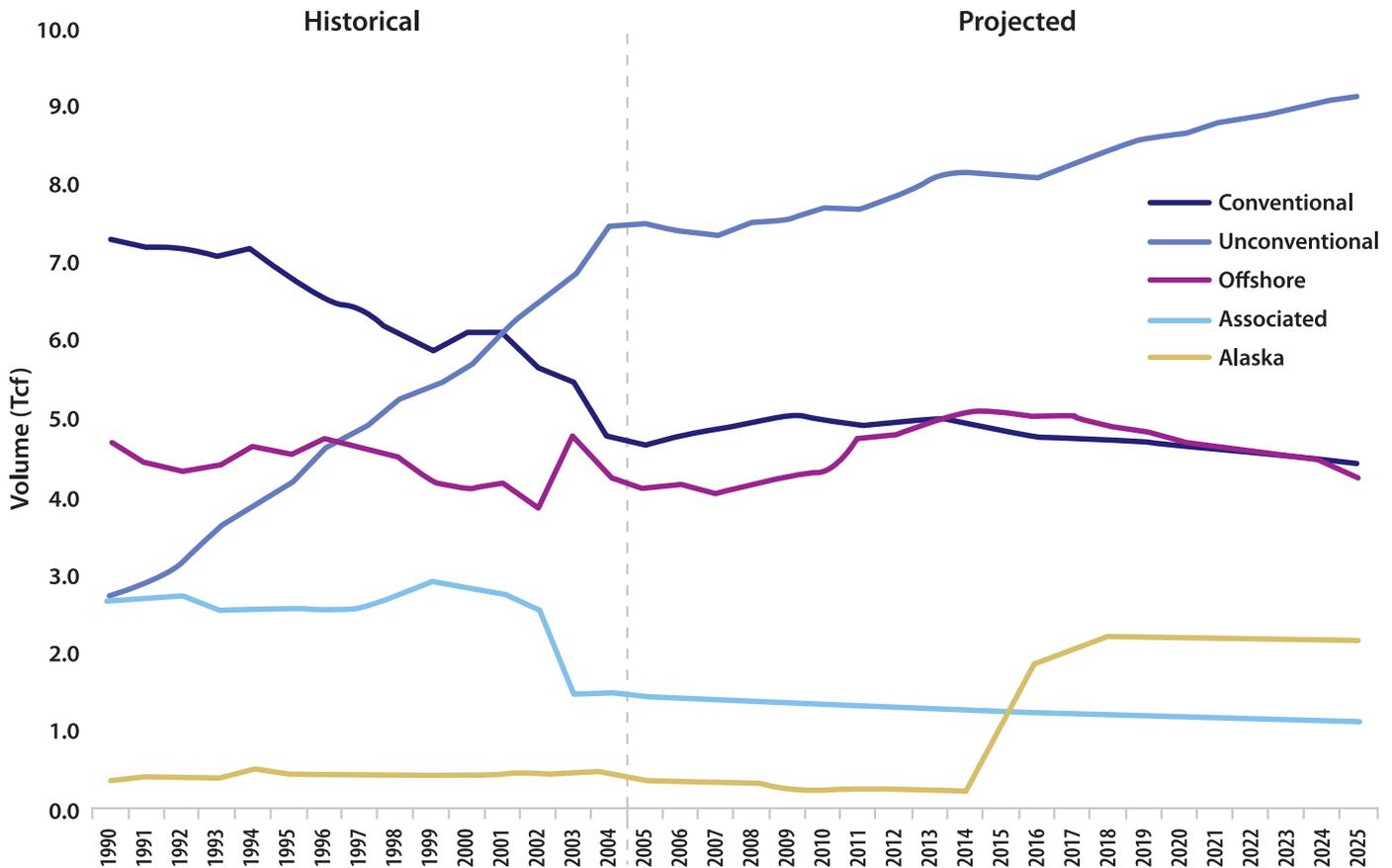
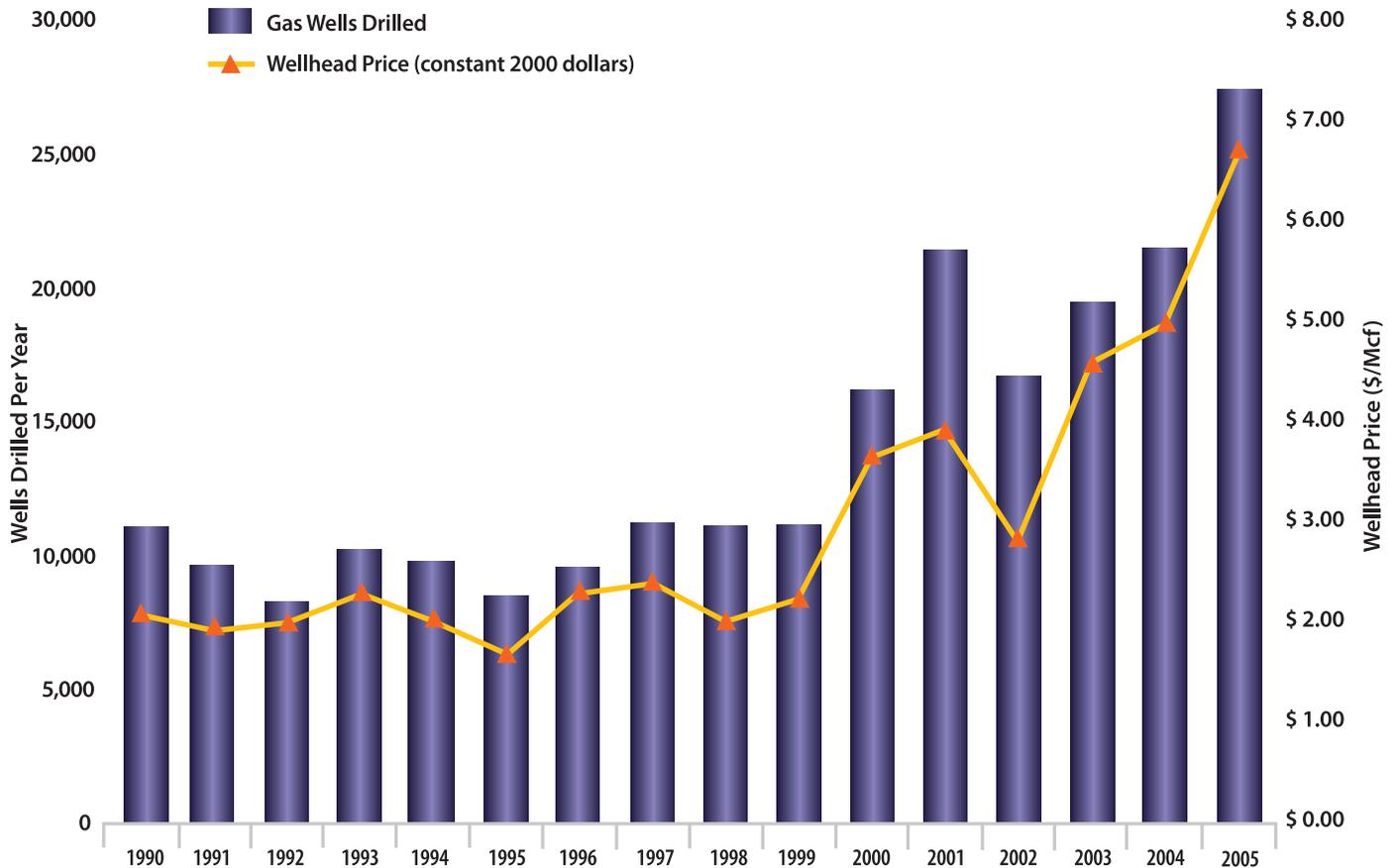


Figure 11 shows the U.S. production of conventional natural gas, offshore natural gas (primarily from the Gulf of Mexico), and *unconventional* natural gas, which includes natural gas from *deep wells*, *coalbed methane*, *tight sands*, and other sources that are more difficult and costly to develop than conventional resources. The amount of natural gas produced from unconventional resources is increasing while production from conventional and offshore resources is declining. Developing these unconventional resources would be further facilitated by advances in drilling and other technology and by increased access to resource areas that are off-limits.

Clearly, the tightening supply and demand balance in North America helps explain the upward trend in natural gas prices over the last five to seven years. Conventional resources that are currently accessible to natural gas producers are beginning to mature. As a result, producers have had to shift their efforts to resources that are more difficult and more expensive to develop.

## New Producing Natural Gas Wells and Wellhead Price, 1990-2005

Source: EIA

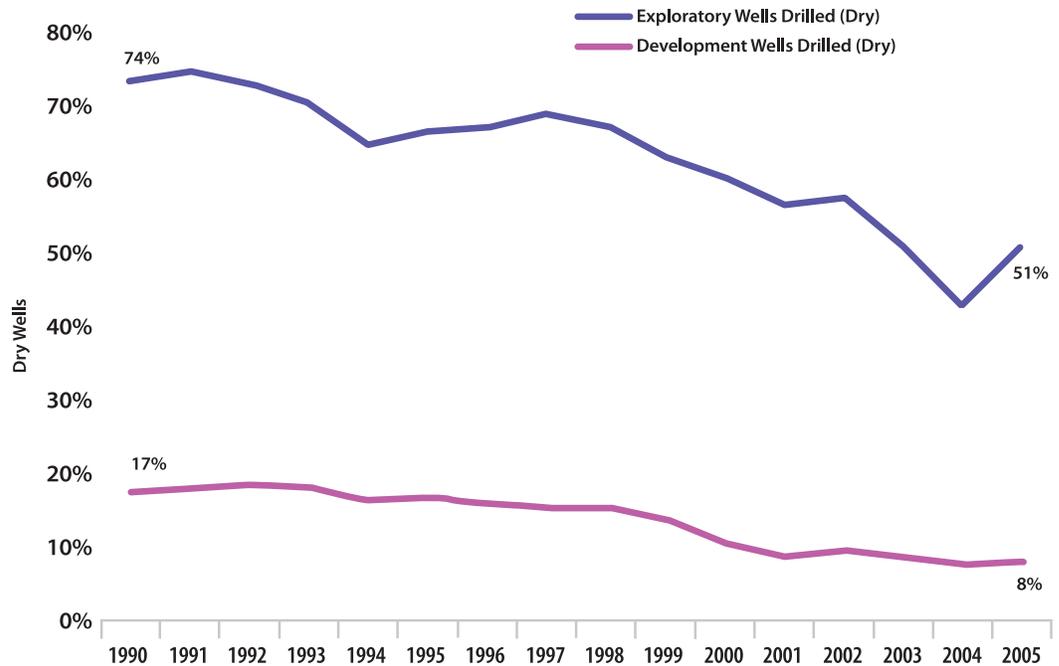


The natural gas industry has responded to higher natural gas prices by increasing its efforts to find and develop natural gas resources. Producers have sought out and developed unconventional resources such as coalbed methane, tight sands, and deepwater resources.

In addition, as shown in Figure 12, natural gas producers have increased the number of wells drilled in the United States from approximately 11,000 in 1999 to approximately 27,000 in 2005. Improvements in technology have also led to increased success in drilling exploration and development wells. As shown in Figure 13 (next page), the percentage of *dry wells* fell steadily over the last decade.

13  
**Dry Rate for  
 Exploratory and  
 Development  
 Wells Drilled,  
 1990-2005**

Source: EIA



As production from traditional U.S. supply basins including the shallow portions of the Gulf of Mexico is flat or declining, the United States will have to look to new sources and new technologies in order to maintain its natural gas supply.

**Increased Domestic Supply**

In the continental United States there is potential for increased supplies from the Rocky Mountain region, deepwater sections of the Gulf of Mexico, and new areas. Increases in natural gas supply in both the Rocky Mountains and the eastern Gulf of Mexico are limited by drilling restrictions, however.<sup>6</sup>

**Canadian Imports**

As in the United States, the Canadian supply situation is characterized by declining production from mature supply resources and increasing production from unconventional resources as well as increased supplies from the Arctic region. Thus, overall Canadian production is projected to remain relatively flat and exports to the United States, after factoring

in expanding Canadian use, are expected to decline. Canada is expected to use more natural gas to heat buildings and to produce unconventional oil from tar sands, which uses heat from natural gas. According to the Energy Information Administration's (EIA) most recent forecast, pipeline imports from Canada to the United States reached their peak between 2000 and 2005, and will decline slowly but steadily for the next two decades (see Figure 9). Expanded production in developed areas in Canada and in the lower 48 states is attractive because there is an extensive pipeline network available in most areas that makes it possible to bring this gas to market quickly. There are other potentially large sources of natural gas available to U.S. consumers, but some will require substantial investments for these supplies to be brought to market.

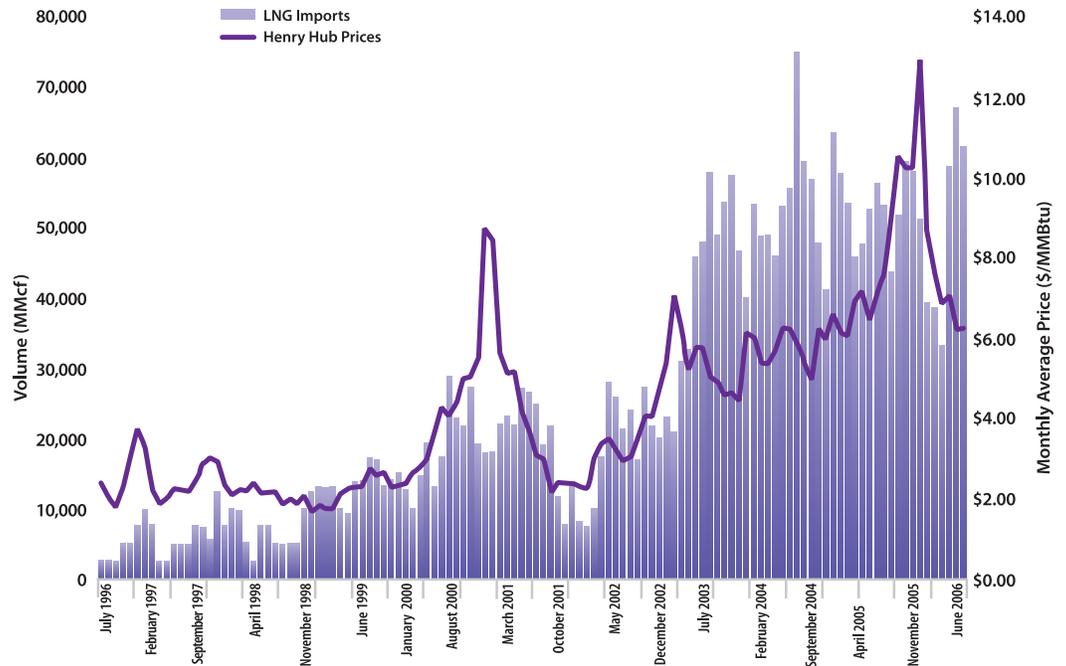
**U.S. Arctic Gas Supplies**

Currently, the United States has large natural gas resources in the Arctic regions of Alaska (e.g., Prudhoe Bay). Proved gas

<sup>6</sup> National Petroleum Council, *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy*, Vol. 2 at 127 (September 2003).

## U.S. LNG Imports by Month and Monthly Average Natural Gas Spot Prices, July 1996-June 2006

Source: EIA, Platts



reserves on the North Slope of Alaska total approximately 45 TCF and potential reserves have been estimated to be more than 250 TCF.<sup>7</sup> These natural gas resources are currently not connected to pipelines that can bring this gas to markets in the lower 48 states, though there are plans to build such a pipeline. This pipeline could carry as much as 4 billion cubic feet (BCF) per day,<sup>8</sup> or approximately seven percent of average daily U.S. consumption in 2005.

### LNG Imports

The United States currently imports a small amount of natural gas from overseas in the form of LNG. In response to high natural gas prices in the United States, LNG imports rose rapidly beginning in 2002, as shown in Figure 14. In recent years, the United States has increased its capacity for importing LNG by reopening old LNG terminals that were built during the natural gas shortages of the 1970s and 1980s but were then mothballed when natural gas prices were low, and by constructing new LNG import capacity. Moreover,

developers have announced plans to build more than 40 additional LNG import terminals.<sup>9</sup> However, LNG terminals can be difficult to permit and build, and it is uncertain how many of these planned terminals will eventually be constructed.

While most analysts agree with the forecast of the EIA that the contribution of LNG to overall North American natural gas supply will grow, the ultimate contribution of LNG to supply remains somewhat uncertain. Even accounting for the increases in natural gas prices in the United States in recent years, natural gas prices at times have been still higher in other parts of the world, such as Japan and parts of Europe, that depend on LNG for a significant share of their natural gas supply.<sup>10</sup> The growing role of LNG in North America will increasingly connect what has been a regional market to the global market for LNG. As a result, U.S. natural gas prices will, over time (should this trend continue), increasingly follow global demand and supply trends, as do U.S. oil prices.

7 National Petroleum Council, *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy*, Vol. 2 at 110 (September 2003).

8 National Petroleum Council, *Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy*, Vol. 2 at 202 (September 2003).

9 <http://www.ferc.gov/industries/lng.asp#skipnavsub>.

10 *Natural Gas Week*, "U.S. LNG Import Activity Picks Up with Softening of Global Market," May 15, 2006, at 7.

## How Natural Gas Is Traded

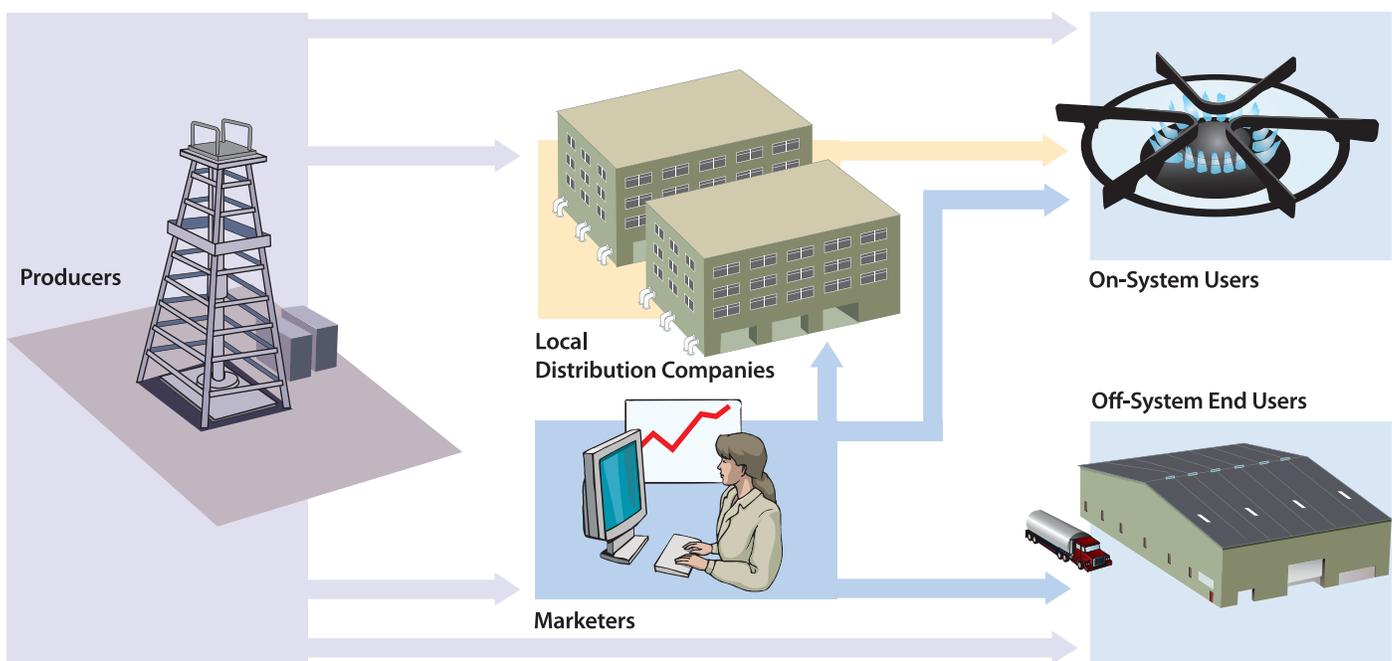
Figure 15 shows schematically some of the types of natural gas transactions that take place as gas makes its way from the fields where it is produced to end users' burner tips. The natural gas industry in the United States is highly competitive, with literally thousands of producers.<sup>11</sup> Some producers have the ability to market their natural gas and may sell it directly to local distribution companies or to large industrial buyers of natural gas. (Some of these large industrial buyers are "on-system" end users, meaning that they receive physical natural gas deliveries from a local distribution company. Others are "off-system end users," meaning they are directly connected to an interstate pipeline.) Other producers sell their gas to marketers who have the ability to aggregate natural gas into quantities that fit the needs of different types of buyers and to transport gas to their buyers. Marketers may be large or small and sell to local distribution companies or to commercial or industrial customers connected directly to pipelines or served by local distribution companies.

Most residential and commercial customers purchase natural gas from a local distribution company. In contrast, many industrial customers have the option to purchase natural gas from a marketer or producer instead of from the distribution company.

There are many different types of buyers and sellers who are motivated to buy and sell gas under different types of commercial arrangements. As a result, gas is sold on a spot market basis, under longer-term contracts with fixed pricing or terms that track market prices, and under contracts with other types of pricing provisions. Marketers are able to meet customers' differing needs by bringing together a large number of buyers and sellers. In addition, marketers and other buyers and sellers of natural gas are able to use financial instruments traded on exchanges to hedge the risks associated with price volatility.

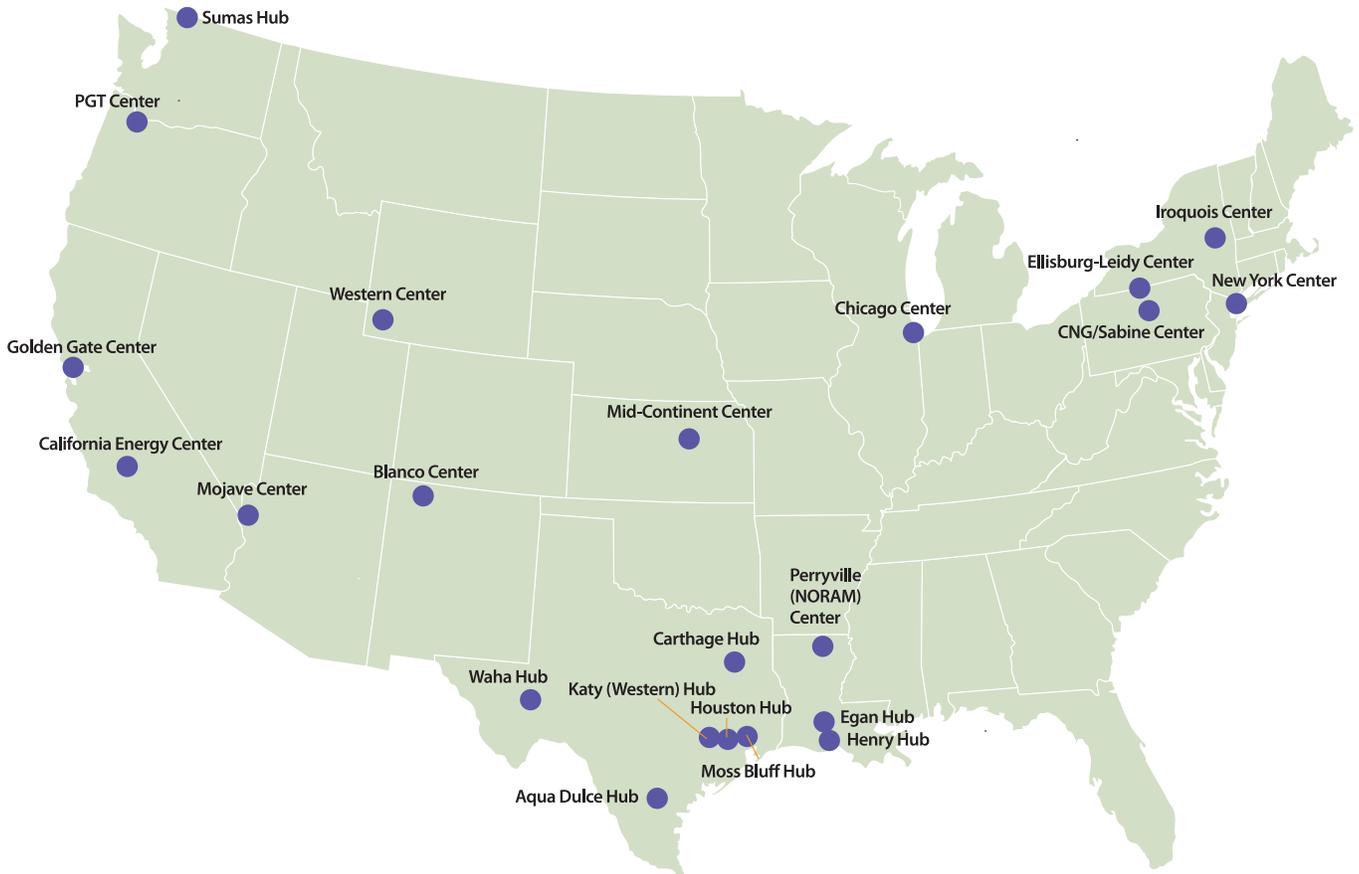
<sup>11</sup> As noted previously, federal and state regulators regulate the prices charged by most natural gas pipelines and local distribution companies for the transportation and distribution services they provide. Natural gas prices themselves are not regulated today.

## 15 Commercial and Financial Arrangements



## Natural Gas Market Centers Serving as Major Trading and Transshipment Points

Source: EIA



Note that pipelines do not buy and sell natural gas. Most of the major natural gas pipelines are federally regulated interstate pipelines. These pipelines are limited to providing transportation services, including storage.<sup>12</sup> Thus, pipelines move gas at government-regulated rates on behalf of buyers and sellers, but do not participate in the buying and selling of natural gas.

The domestic natural gas marketplace has a highly competitive spot market where brokers and others buy and sell natural gas. Figure 16 shows some of the points where natural gas for physical delivery is actively traded in the continental United States. These points are market centers where brokers actively trade and prices are established. In addition to these market centers, natural gas is actively traded at many other locations, including segments of individual pipelines and locations where pipelines interconnect with local distribution companies.

<sup>12</sup> Prior to the federal restructuring of regulation of the interstate natural gas pipeline system, natural gas pipelines purchased gas from producers and sold it to the customers connected to the pipeline. This system was inefficient because it severely limited the number of buyers for natural gas and kept the market from operating competitively. These regulations were part of the overall regulation of the natural gas industry that was dramatically altered beginning in the late 1970s through the mid 1980s.

The most important market center in the United States is the Henry Hub, located in southern Louisiana, because it is the most active and highest-volume trading point. The Henry Hub is interconnected with 16 different intra- and interstate pipelines and, thus, effectively interconnects to all producing and consuming regions throughout North America. Because of its central location and its high degree of interconnectedness, the Henry Hub is used as the delivery point for the New York Mercantile Exchange's (NYMEX) natural gas futures contract and a pricing reference point for virtually the entire North American natural gas market.

Market participants buy and sell natural gas on a “spot” basis every day at the trading points shown in Figure 16, as well as at dozens of other points. Spot market transactions are normally conducted over the internet or by telephone, with the buyer agreeing to pay a negotiated price for the natural gas to be delivered by the seller at a specified delivery point. Natural gas spot prices reflect daily supply and demand balances and can be volatile.

In addition to daily spot transactions, monthly spot transactions are often entered during “bid week,” the last five business days of a month. During bid week, buyers and sellers arrange for the purchase and sale of physical natural gas to be delivered throughout the coming month, including making delivery arrangements with pipelines.

Many customers purchase natural gas under longer-term contracts that provide for delivery of gas for a specified period of time. The length of time can vary. Frequently the prices in longer-term contracts are not fixed, but are instead indexed to prices that are regularly published in the trade press. A number of trade publications publish index prices based on their surveys of natural gas buyers and sellers to determine the prices they pay (or receive) for natural gas (at market locations such as those shown in Figure 16) in daily or monthly transactions.

### Futures and Other Financial Contracts

In addition to the contracts for physical supply described previously, natural gas derivatives are traded on the New York Mercantile Exchange. A NYMEX natural gas futures contract requires the seller to deliver (and the buyer to take delivery of) natural gas at the contractually agreed price, in a specified future month, at the Henry Hub.<sup>13</sup> The price to be paid for delivery in the future month when the futures contract matures is determined at the time the contract is sold. As expectations about the value of natural gas at the time of delivery change, the value of the futures contract will change as well.<sup>14</sup>

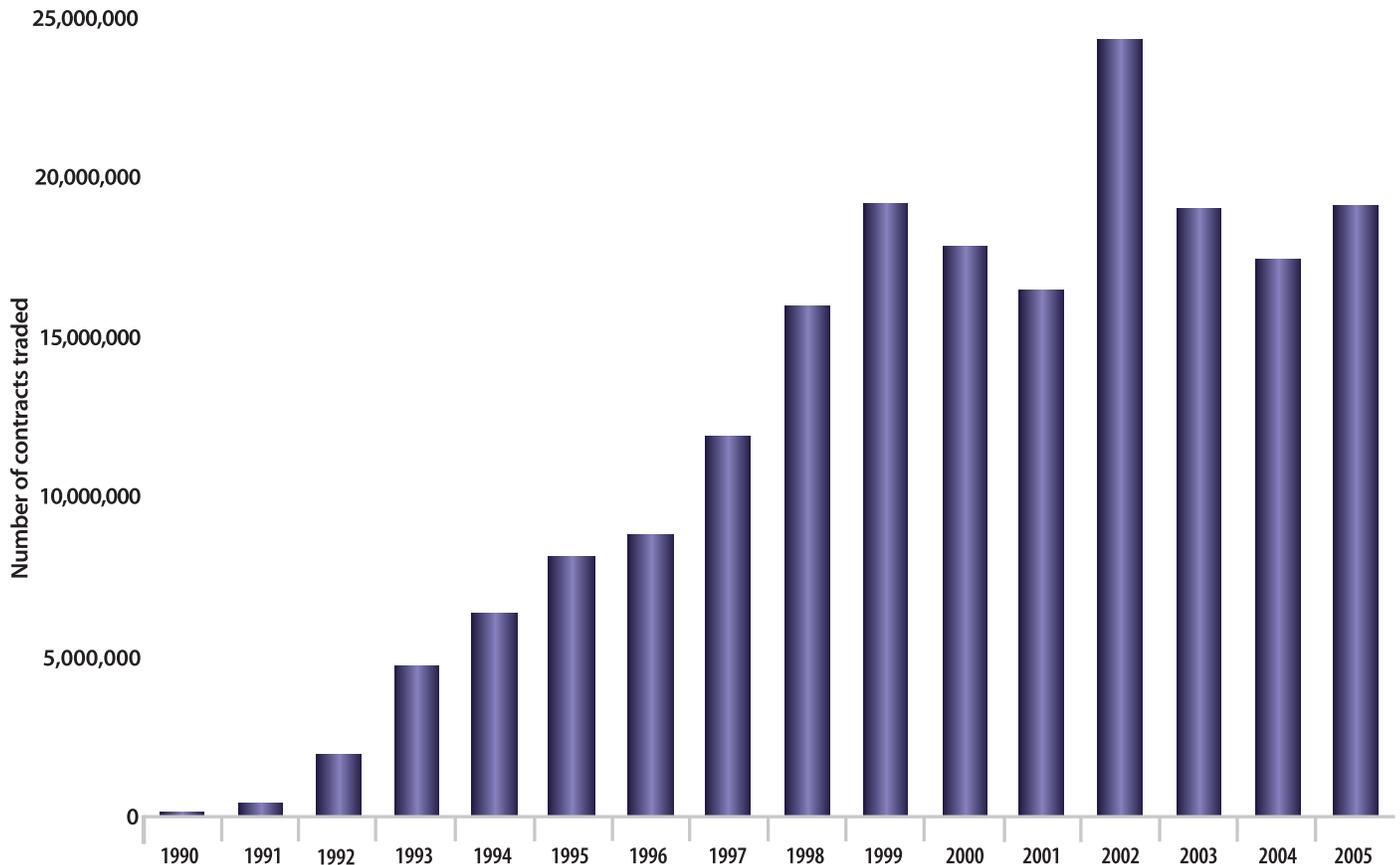
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<sup>13</sup> The NYMEX natural gas futures contract stipulates the purchase and sale of 10,000 MMBtu of natural gas at the Henry Hub trading point in Louisiana in the delivery month. As noted, the Henry Hub is the nexus of 16 intra- and interstate natural gas pipeline systems that draw supplies from the region's gas supplies and serve markets throughout the United States.

<sup>14</sup> Other NYMEX-traded natural gas derivatives include options contracts, calendar spread options, and basis swap futures contracts. In addition to the derivatives available on NYMEX, market participants trade other derivatives in over-the-counter (OTC) markets.

## Natural Gas Futures Contracts Traded by Year, 1990\*-2005

\*Annual volume for 1990 begins in April | Source: NYMEX



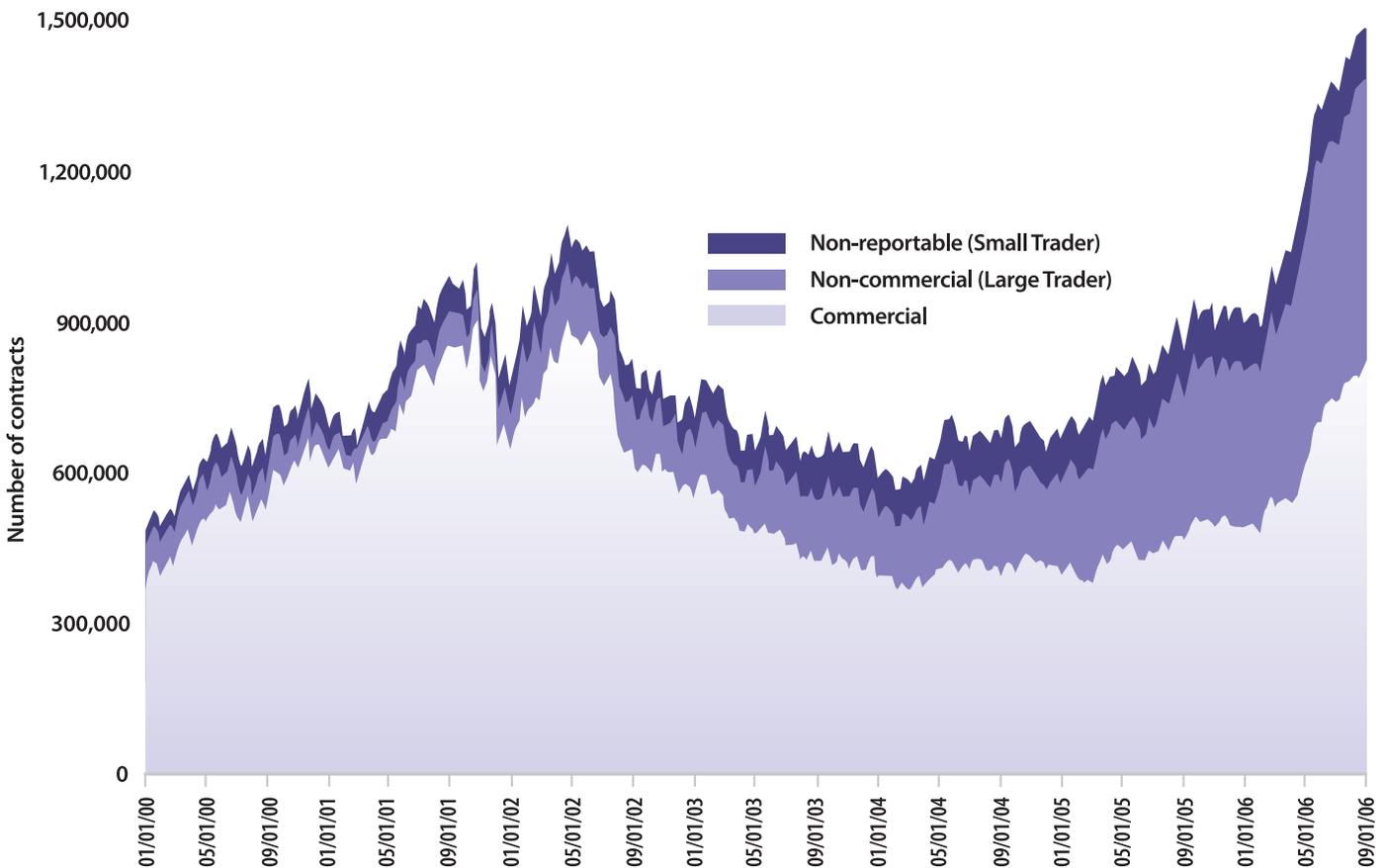
Derivatives such as the NYMEX futures contract make it possible for market participants to avoid the risk that results from highly volatile natural gas prices in the physical market. For example, a manufacturing facility that uses natural gas may face highly volatile cash flows as a result of dramatic fluctuations in natural gas prices from month to month and day to day. To reduce these risks, the facility can purchase physical natural gas using contracts with indexed prices and, in addition, purchase financial derivatives that rise in value when gas prices rise and fall in value when gas prices fall. The result is that when prices are high, the value of the derivatives will rise to offset the additional cost of gas, and vice versa.

The futures market for natural gas has grown rapidly from its inception in 1990. Figure 17 shows the number of natural gas contracts traded on the NYMEX each year between 1990 and 2005. This market is made up of a large number of buyers and sellers, as well as different types of buyers and sellers. Parties with commercial interests frequently use futures contracts to reduce their exposure to price risk by locking in the price they will pay (or receive) for natural gas to be delivered in some future month. For example, a natural gas producer who expects to produce and sell natural gas each month for the next several years can use the NYMEX futures contract to lock in the price that the producer will receive for that gas.

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**Weekly Open Contracts by Trader Type, January 2000 - September 2006**

Source: The Commodity Futures Trading Commission (CFTC)

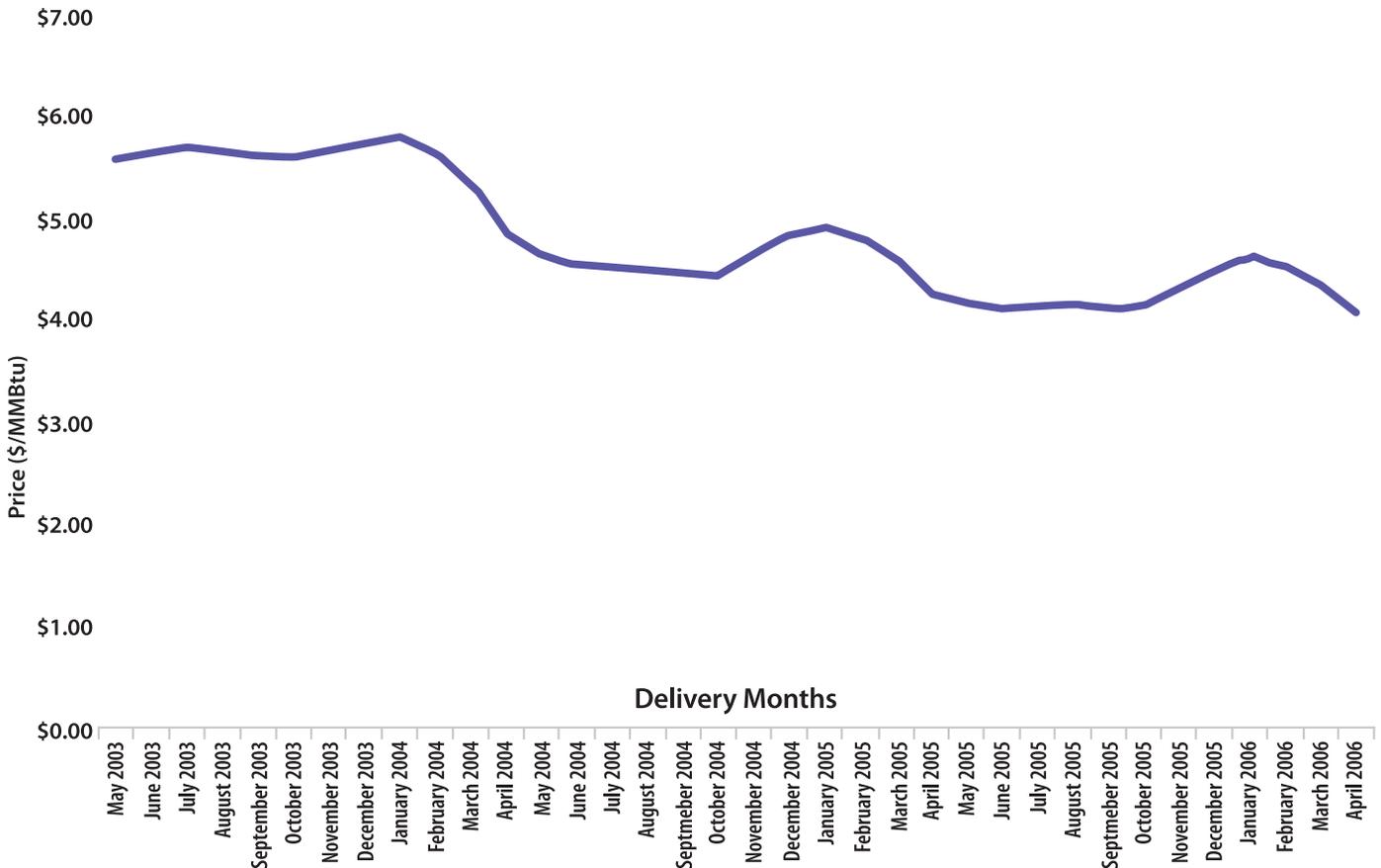


In addition, the market includes a growing number of parties who do not have a commercial interest in the natural gas industry. Non-commercial parties buy and sell futures contracts in response to contract prices (rather than to hedge natural market positions) and in doing so they provide insurance to commercial parties and liquidity to the futures market. As shown in Figure 18, open contracts held by these

non-commercial traders have increased dramatically since early 2002. The market benefits from the trading activity of all types of traders because to trade effectively over a sustained period, these parties must be well-informed, and their participation in the market ensures that market prices reflect all of the information available about current and future supply and demand conditions.

## Natural Gas Futures Settlement Price as of April 14, 2003

Source: Platts



Futures markets also provide valuable information about expectations for supply and demand conditions in the physical market that will determine the price for gas scheduled for delivery on a specified future date. For example, if in 2005 the price of a futures contract for the delivery of gas in April 2006 is \$8 per MMBtu, this represents thousands of buyers' and sellers' best estimate of what the price (in this case, increase) of gas will be for physical delivery in April 2006.<sup>15</sup> This price discovery function is beneficial because it provides market information to those who can best respond by, for example, putting additional gas in storage or taking steps to switch to a different fuel.

Figure 19 provides a snapshot of futures contract prices on a day in April 2003. The figure shows prices for natural gas to be delivered in each of the next 36 months. The futures contract prices reflect buyers' and sellers' expectations as of April 2003 that spot natural gas prices would be higher in future heating seasons (October through March) and lower in non-heating seasons (April through September).

<sup>15</sup> Markets rely in part on the number of buyers and sellers involved for credibility of pricing. The result – a reported price that reflects what multiple parties are willing to pay or receive – provides efficiency and reduces costs.

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# Market Driven

The U.S. natural gas market is highly competitive.

Thousands of U.S. companies produce natural gas and thousands of consumers purchase it, every hour of every day. The steep rise in natural gas prices in recent years reflects a natural market response to the tight supply and demand balance. Demand for natural gas has been strong, especially from the power sector where gas-using capacity tripled after 1999. On the supply side, most natural gas consumed in the United States is produced from relatively mature fields in the United States or Canada, where more intensive (and costly) effort is now required to maintain production levels. Continued improvements in technology will be required to maintain production from existing fields. Other supplies from new sources, such as Alaska's North Slope, and some increase in LNG imports are anticipated to offset declines in domestic production. Moreover, allowing access to additional resources that are currently off-limits would enhance the domestic supply of natural gas.



### **British Thermal Unit (Btu)**

A British Thermal Unit (Btu) is the amount of energy required to raise the temperature of one pound of water by one degree Fahrenheit. This is the most common unit used for buying and selling natural gas. A typical home in the U.S. Midwest using natural gas for heating will use approximately 14 MMBtu during a typical month in the heating season.

### **Coalbed Methane**

Coalbed methane is natural gas contained in coal deposits. Typical recovery entails pumping water out of the coal to allow the gas to escape.

### **Cubic Foot (cf)**

A cubic foot (cf) is a standard measure of natural gas, equal to the amount of natural gas contained at standard temperature and pressure (60 degrees Fahrenheit and 14.73 pounds standard per square inch) in a cube whose edges are one foot long. There are 1,031 Btu in a cubic foot of natural gas. BCF (billion cubic feet) and TCF (trillion cubic feet) are common abbreviations used in the natural gas industry.

### **Deep Gas**

Deep gas is natural gas found at depths greater than the average for a particular area; for FERC purposes, it is gas found at depths of more than 15,000 feet.

### **Deepwater**

Deepwater natural gas is natural gas located in the Gulf of Mexico in waters at least 200 meters (656 feet) deep.

### **Dry Gas**

Dry gas is natural gas which remains after: 1) the liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, field, and/or plant separation); and 2) any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable. Note: Dry natural gas is

also known as consumer-grade natural gas. The parameters for measurement are cubic feet at 60 degrees Fahrenheit and 14.73 pounds per square inch absolute.

### **Dry Wells**

Dry wells are exploratory or development wells found to be incapable of producing either oil or gas in sufficient quantities to justify completion as an oil or gas well.

### **Futures Contract**

A futures contract is a binding, legal agreement between a buyer and a seller for delivery of a particular quantity of a commodity at a specified time, place, and price. These contracts are traded on regulated exchanges and are settled daily based on their current value in the marketplace. Most natural gas futures contracts traded on the New York Mercantile Exchange (NYMEX) end without actual physical delivery of the commodity. Futures contracts most often are liquidated or cancelled out by purchasing a covering position prior to the delivery date and are generally used as a financial risk management and investment tool rather than for supply purposes.

### **Liquefied Natural Gas (LNG)**

Liquefied natural gas (LNG) is natural gas that has been liquefied by reducing its temperature to -260 degrees Fahrenheit at atmospheric pressure. This liquefaction process reduces the volume of the gas by approximately 600 times from its original size.

### **Maturity**

Maturity refers to the relative state of development of natural gas resources in a field, reserve, basin, or other area. In common usage, a “mature field” is one whose natural gas production has begun to decline. A “mature basin” is one that has undergone extensive exploration and production activity such that it is assumed relatively few large fields remain undiscovered.

Continued on next page

### **Over-the-Counter (OTC)**

Over-the-counter (OTC) transactions are not done on an organized exchange.

### **Reserves**

Reserves are estimated quantities of natural gas that analysis of geologic and engineering data demonstrates with some probability are recoverable under existing economic and operating conditions.

### **Spot Market**

The natural gas spot market is a market in which natural gas is bought and sold for immediate or very near-term delivery, usually for a period of 30 days or less. The transaction does not imply a continuing arrangement between the buyer and the seller. A spot market is more likely to develop at a location with numerous pipeline interconnections, thus allowing for a large number of buyers and sellers. The Henry Hub in southern Louisiana is the best-known spot market for natural gas.

### **Tight Sands Gas**

Tight sands gas is a form of unconventional gas located in low-permeability sandstone.

### **Unconventional Gas**

Unconventional gas refers to natural gas extracted from coalbeds (coalbed methane) and from low-permeability sandstone and shale formations (respectively, tight sands and gas shales). Unconventional gas has become an increasingly important component of total U.S. domestic production over the past decade. Although unconventional gas resources are abundant, they are generally more costly to produce.

Source:  
Energy Information Administration (<http://www.eia.doe.gov/>).



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