Overview

The natural gas industry and markets experienced a number of key changes during 2001. After two years of increase, consumption declined in 2001 in all sectors except electric power. Production and net imports increased by 716 Bcf, but much of this supply was added to storage. Prices were generally higher in 2001 compared with previous years. The average wellhead price was $4.02 per thousand cubic feet (Mcf), which is 9 percent above the 2000 level and 84 percent above the 1999 level. However, wellhead prices declined throughout the year.

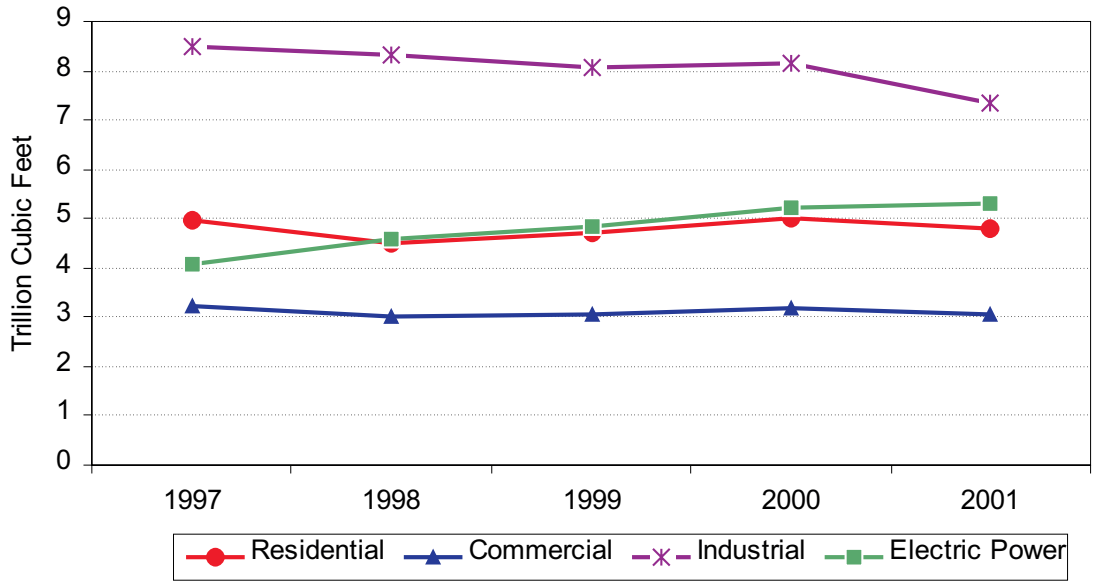
Beyond the changes in market activities, the 2001 data reflect recent changes in the industry accounting employed by the Energy Information Administration (EIA). EIA has reclassified gas use in the electricity sector to reflect today's less regulated energy market. Regulatory reform in both natural gas and electricity markets during the 1990s introduced a number of changes that the old data system did not address well. Key among these changes was the shift in electric power generation from a strictly regulated industry to one in which nonregulated companies hold a major and expanding share of the market.

The previous data system reported consumption data by major consuming sector, which was based on customer type: residential, commercial, industrial consumers, and electric utilities. Over time, electric generation from nonutility power producers, or non-utility generators (NUGs), became the source of large amounts of electricity. Natural gas use for power generation by nonutility power producers was included mainly in the industrial sector in previous editions of the *Natural Gas Annual*.

In the new data system, EIA has combined gas use by nonutility power producers with that of electric utilities to represent gas use for all electric power generation, where the primary intent of that power is for sale in the market. Gas use by commercial or industrial plants in combined heat and power (CHP) applications is included with the commercial and industrial sectors. The reallocation of a significant volume of gas from the industrial to the electric power sector and the use of a new data source for nonutility gas consumption alters the face of the industry and markets suggested by the data. Industrial sector consumption appears less than it would be in the previous accounting, and natural gas for electric power generation exceeds the levels used by electric utilities alone.

The new accounting system yields estimated total natural gas consumption that is approximately 5 percent greater than previously estimated for 2001. This results primarily from the much larger estimate for natural gas delivered to

Figure 1. Natural Gas Consumption by Sector, 1997-2001



independent power producers based on the electric power data forms, EIA-860B and EIA-906, which are the source of this information beginning this year.[1] In addition to the revisions to the data accounting system, EIA also has conducted significant data quality work to capture more companies in its natural gas surveys. This results in higher consumption than previously would have been the case.

Natural Gas Consumption

Natural Gas Consumption Decreased in All Sectors Except Electric Power

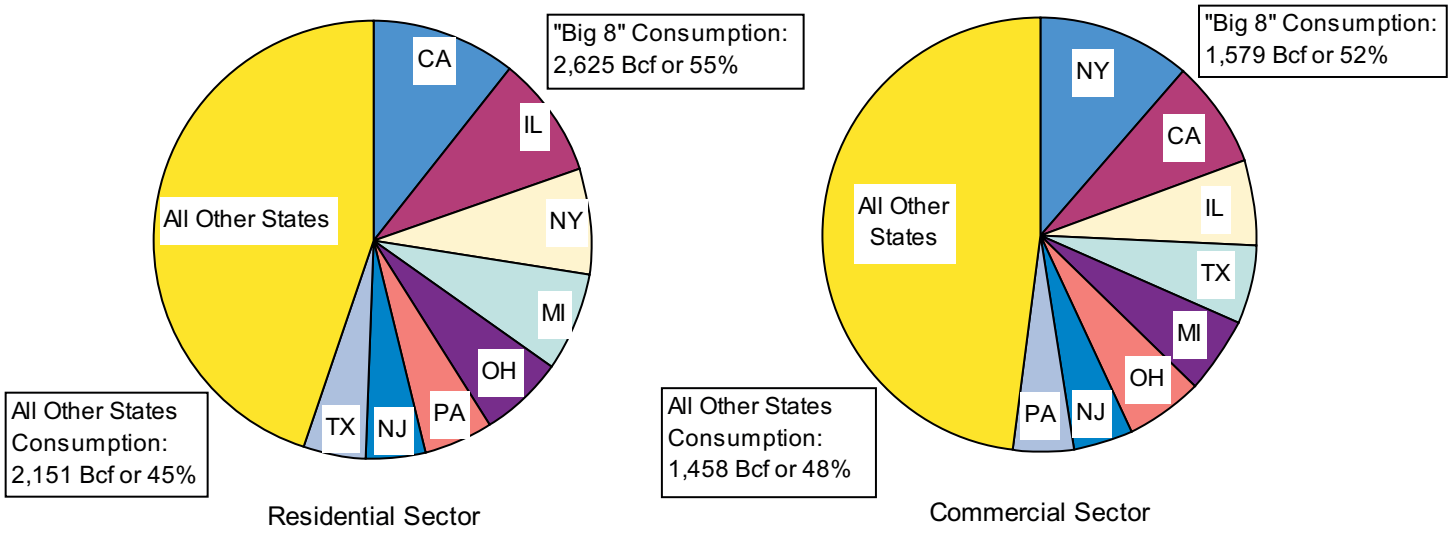
Total natural gas consumption fell to 22.2 trillion cubic feet (Tcf) from the record high of 23.3 Tcf in 2000, with a corresponding decline in the volume delivered to end users from 21.5 to 20.5 Tcf. In general, higher prices likely discouraged consumption. Residential and commercial consumption declined for the year, reflecting the influence of weather on these sectors (Figure 1). Temperatures were warmer than normal during the first and last quarters of the year. The weak economy contributed to a reduction of 779 billion cubic feet (Bcf) in industrial sector consumption. Electric power was the only major consuming sector that showed increased consumption. A primary factor contributing to this increase is a larger stock of gas-fired generation capacity. Vehicle use of natural gas increased. However, vehicular use of natural gas remains an extremely small percentage of total consumption.

Natural gas markets have undergone a number of fundamental changes during the past five years. Consumption of natural gas for electric power not only increased in 2001, but it also expanded in each year of the five years, 1997-2001, included in this report. The sustained growth in electric power use of gas has resulted in this sector becoming the second largest consuming sector, moving ahead of the residential sector. Industrial use of natural gas during the same period has declined from 41 percent of the market to 36 percent. Consequently, the share of the market driven by seasonal factors–residential, commercial, and electric power–is growing, which likely will alter seasonal patterns in aggregate demand.

Some additional highlights related to the consumption data follow.

[1]A more detailed discussion of the changes to the data accounting system is available in Appendix H of the *Annual Energy Review 2002,* which is available at: http://www.eia.doe.gov/emeu/aer/pdf/pages/Sec_h_l.pdf. Additional information on the data quality and data development work incorporated into the current *Natural Gas Annual* is available in Appendix A of this report.

Figure 2. Proportion of Natural Gas Consumption in Residential and Commercial Sectors by State, 2001



The Same 8 States Accounted for Over 50 Percent of Natural Gas Consumption in Both Residential and Commercial Sectors in 2001

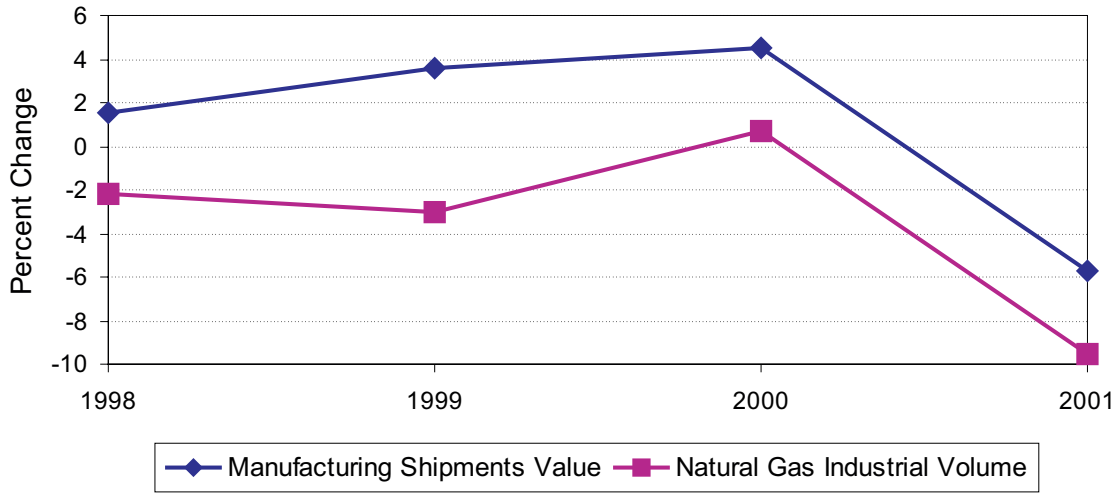
- **Residential and commercial consumption each declined by more than 4 percent in 2001.** One factor–key for residential consumption, and important for commercial–was that temperatures during the year's heating season months (January-March, November-December) were warmer than normal. Nearly 70 percent of annual residential consumption occurs in these months. Commercial consumption was also affected by the near 28-percent price increase from the previous year, as well as by the general economic downturn. The decline in residential consumption may also have been influenced in part by a 24 percent price increase from 2000.

- **Eight States accounted for over 50 percent of natural gas consumption in both the residential and commercial sectors in 2001 (Figure 2).** These "big 8" States taken together had 2,625 Bcf of consumption in the residential sector, or about 55 percent of the total. These same 8 States (although in a different order by volume) accounted for commercial consumption of 1,579 Bcf, or about 52 percent.

- **Five States accounted for over 83 percent of the decline in commercial consumption in the Lower 48 States.** New York experienced the largest drop in commercial deliveries in the nation in both volume terms (62 Bcf) and as a percent of 2000 deliveries (15 percent). New Jersey, with a drop of nearly 22 Bcf, or 14 percent, experienced the next largest drop. The midwestern States of Illinois, Indiana, and Michigan round out the top 5, each losing around 12 Bcf or more in commercial deliveries.

- **The total number of residential customers grew by over one million (1.7 percent), while total commercial customers grew by 19,305 (less than 1 percent).** In only three States did the number of residential customers decline (Arkansas, Connecticut, and Louisiana); all others including the District of Columbia added residential customers. The net increase in commercial customers was spread over 34 States. For the United States as a whole, on-system sales customers declined in total, with two States (Ohio and Maryland) having relatively large losses of on-system sales customers (almost 25,000 and 18,000, respectively).

Figure 3. Percent Change in Industrial Use of Natural Gas and Value of All Manufacturing Shipments



Source for Value of Shipments: U.S. Census Bureau, Monthly Manufacturers Shipments, Inventories, and Orders (M3) survey, Table 3 (www.census.gov/indicator/www/m3/hist/naicsvsp.xls).

- **Twelve of the 23 States and the District of Columbia with residential "customer choice" programs added transportation-only customers.** The increase in transportation customers exceeded the increase in traditional sales customers by more than 40 percent, with some States' programs (e.g., Georgia, Indiana, Kentucky, New York, and Ohio) recording remarkable gains. Georgia had the largest number of transportation-only residential customers, at 1,430,673, and the highest participation rate at 82 percent.

- **The number of transportation-only commercial customers actually increased, by 50,720**, even though natural gas deliveries for these customers declined by almost 10 percent in 2001.

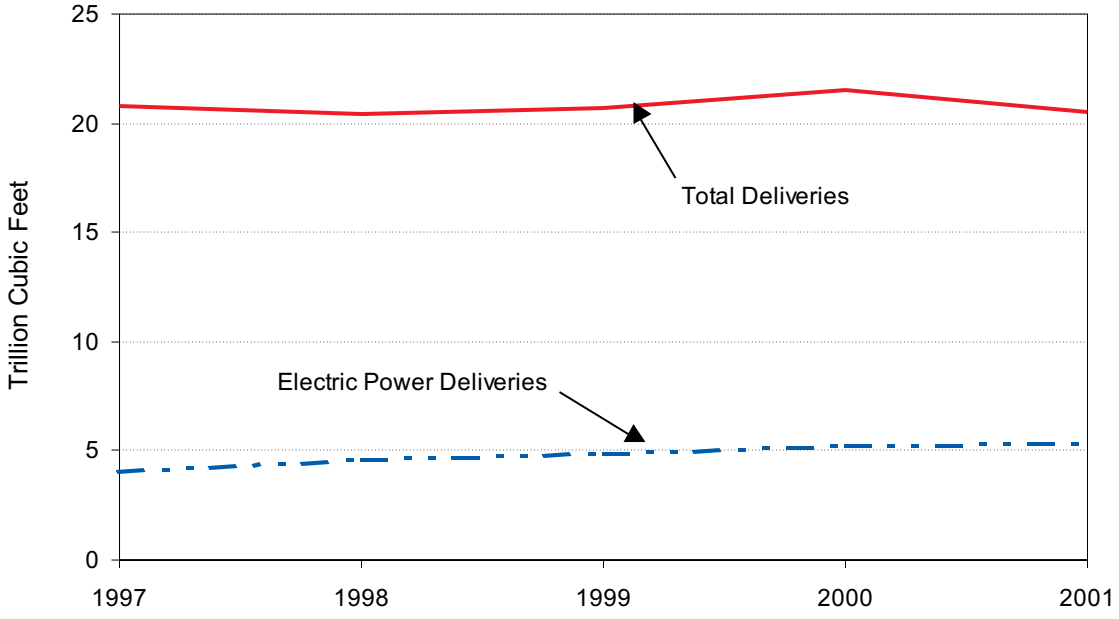
The Largest Sector for Natural Gas Usage, Industrial, Fell More Than 9 Percent in Volume Used

- **Industrial use of natural gas declined by 779 Bcf (9.6 percent) from 2000 to 2001, reflecting a weak national economy and high natural gas prices (Figure 3).** Illustrative of the weak economy, the value of all shipments from the manufacturing sector dropped by 5.7 percent in 2001 after a decade of steady growth. At the same time, natural gas consumption in the industrial sector dropped by a greater relative amount, 9.6 percent. Higher prices for natural gas have been cited as the reason for the decline in industrial usage of natural gas. Some gas suppliers reported that paper mills, glass plants, steel mills and other manufacturing establishments that utilize natural gas shut down in 2001 because of high gas prices. Industries that use natural gas as a feedstock, rather than for process heat, cannot switch to other fuels but instead must reduce activity or shut down altogether. The second largest single component of the manufacturing sector usage of natural gas is the fertilizer industry (http://www.eia.doe.gov/emeu/mecs/mecs98/databables/d98n1_1.pdf), which makes nitrogen fertilizer from natural gas. Thus the price of fertilizer is very sensitive to natural gas price changes. Owing to high costs of natural gas, 40 percent of fertilizer production capacity in the country was shut down at the start of the year 2001.

Natural Gas Consumption for Electric Power Generation Continued to Increase

- **In 2001, natural gas consumed in the electric power sector grew 82 Bcf to 5.29 trillion cubic feet (Tcf), or 1.6 percent over 2000 (Figure 4).** Natural gas consumption for electric power generation in 2001 grew despite a slight decrease in net generation of electricity, demand for which was lower owing to an economic slowdown as well as generally mild weather throughout the year. Increased natural gas consumption despite lower power generation overall reflects the relative cost and environmental advantages of gas-fired generation. Since 1997, the volume of natural gas consumed in this sector has grown approximately 30 percent. The sustained growth makes the electric power sector the fastest-growing sector of natural gas consumption.

Figure 4. Electric Power Sector and Total Consumption of Natural Gas



- **The increase in natural gas consumption in the electric power sector over the past few years has** resulted from building new gas-fired electric generators across the country. In 2001 alone, more than 40,000 megawatts of efficient, gas-fired electric power generation was placed into service**.** Gas-fired turbines have become the favored new source of electricity for their capability to start up quickly during peak demand periods.

- **Total natural gas consumed in the electric power sector is now roughly 26 percent of total deliveries to consumers in the country, compared to approximately 20 percent in 1997.** In terms of volumes consumed by sector, natural gas consumption for electric power generation is second only to industrial consumption.

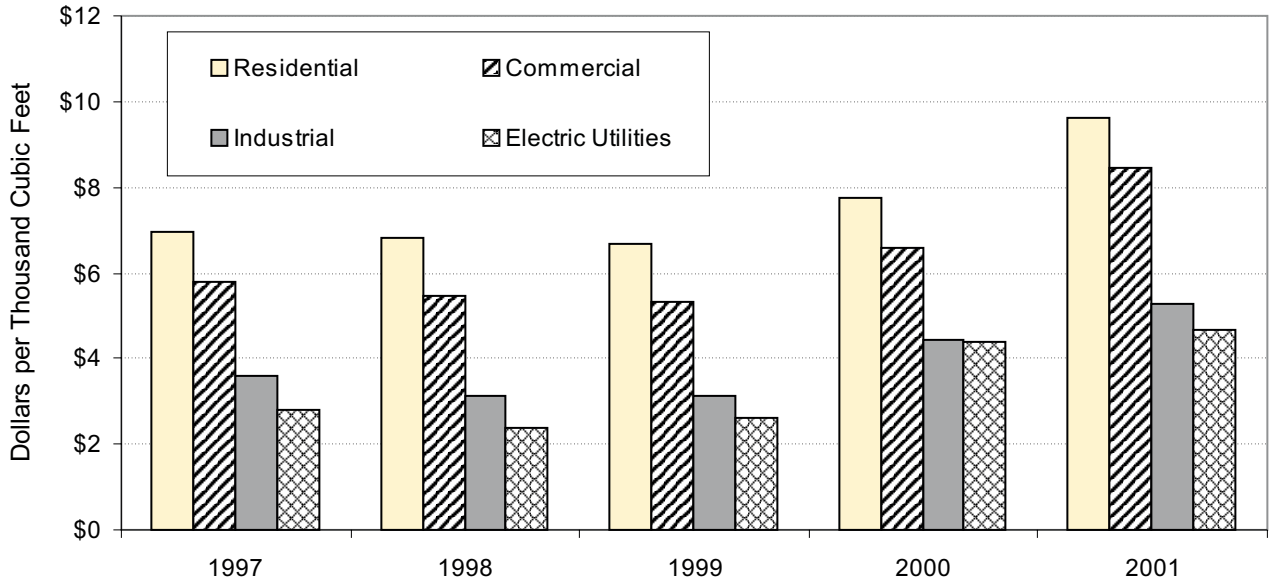
Natural Gas End Use Prices Were Near Record Levels

- **End use consumer prices increased in each sector of the natural gas market in 2001 (Figure 5).** Prices climbed 24 percent in the residential sector, 28 percent in commercial sector, 19 percent in the industrial sector, 19 percent in the vehicle fuel use sector, and nearly 7 percent in the electric utilities sector. This is the second straight year in which prices increased in each of the sectors, and the third straight year of price hikes in the electric utilities sector. The smaller relative increases in the prices paid by the electric utilities and industrial sectors relative to the prices paid in the commercial and residential sectors can likely be attributed to more flexibility in fuel consumption, and the economic slowdown during 2001, which would have weakened demand for natural gas in these sectors, ameliorating any potential price increase.

- **Residential and commercial consumers continued to pay the highest prices for natural gas, $9.64 and $8.43 per Mcf, respectively.** This reflects the limited options in service and the service reliability required during peak demand periods.

- **Industrial companies and electric utilities are large-volume customers with relatively high load factors, which enable them to take advantage of economies of scale in natural gas purchases.** Additionally, they are typically in a better position to elect

Figure 5. Natural Gas Prices by Major Consuming Sectors



whether to stay with their local distribution company (LDC), seek supplies from alternative sources, or switch to other fuels. The average prices paid by the industrial and electric utility sectors were $5.28 and $4.67 per Mcf, respectively.

- **The average price for natural gas at the city gate increased by nearly 24 percent from 2000 to 2001, climbing to $5.72 per thousand cubic feet**. City gate prices represent the total cost paid by gas distribution companies for gas received at the point where gas is physically transferred from a pipeline company or transmission system to the local distribution company (LDC). This price reflects all charges for the commodity, storage, and transportation associated with the LDC obtaining natural gas for sale to consumers.

- **Residential prices in 2001 matched their previous record high, while prices to the other sectors were** at their highest since the mid 1980s. The average residential price was $9.64 per Mcf for the year, virtually equal to the $9.63 per Mcf observed in 1983 (all prices measured in constant 2001 dollars). At $8.43 per Mcf, the average price to the commercial sector was its highest since 1984. The industrial and electric utility sectors paid more per unit in 2001 than at any time since 1985.

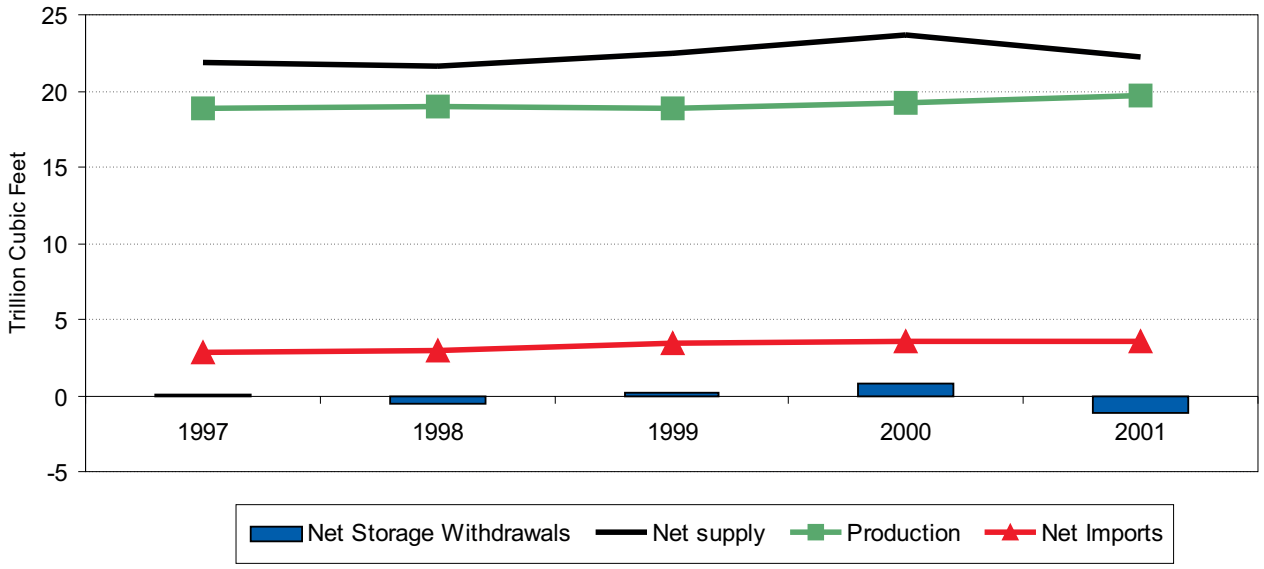
Natural Gas Supply

Natural Gas Production and Net Imports Increased in 2001

Domestic production and net imports increased by 716 Bcf in 2001, which was sufficient to satisfy demand and accommodate a large addition to storage volumes. Domestic production increased by more than 500 Bcf in 2001 compared with 2000 levels, and by almost 900 Bcf in the two years since 1999 (Figure 6). The increased domestic production reflects the record level of drilling for gas prospects, which in turn resulted in a net increase in proved reserves as well as more production. Net storage injections in 2001 were 1,165 Bcf, compared with net withdrawals of 829 Bcf in 2000. Net imports increased slightly, by about 66 Bcf, while gross imports were up 195 Bcf as new transmission projects started in late 2000 operated for the full year. New projects also added to gas exports, which increased by 130 Bcf, mostly to Canada.

Average prices for the year were higher in 2001 compared with 2000. The average wellhead price was $4.02 per Mcf, although prices fell during the year from more than $8 to just above $2. Prices for imported gas were correspondingly higher. The average price for all gas

Figure 6. Natural Gas Supply, 1997-2001



imports was $4.43 per Mcf. However, for the second straight year, the price of liquefied natural gas (LNG) imports was less than that of natural gas imports via pipeline from Canada. The higher prices for gas supplies led to corresponding increases in prices of gas delivered to all consuming sectors.

Some additional highlights related to the supply data follow.

Natural Gas Production Was at Its Highest Level in Almost 30 Years

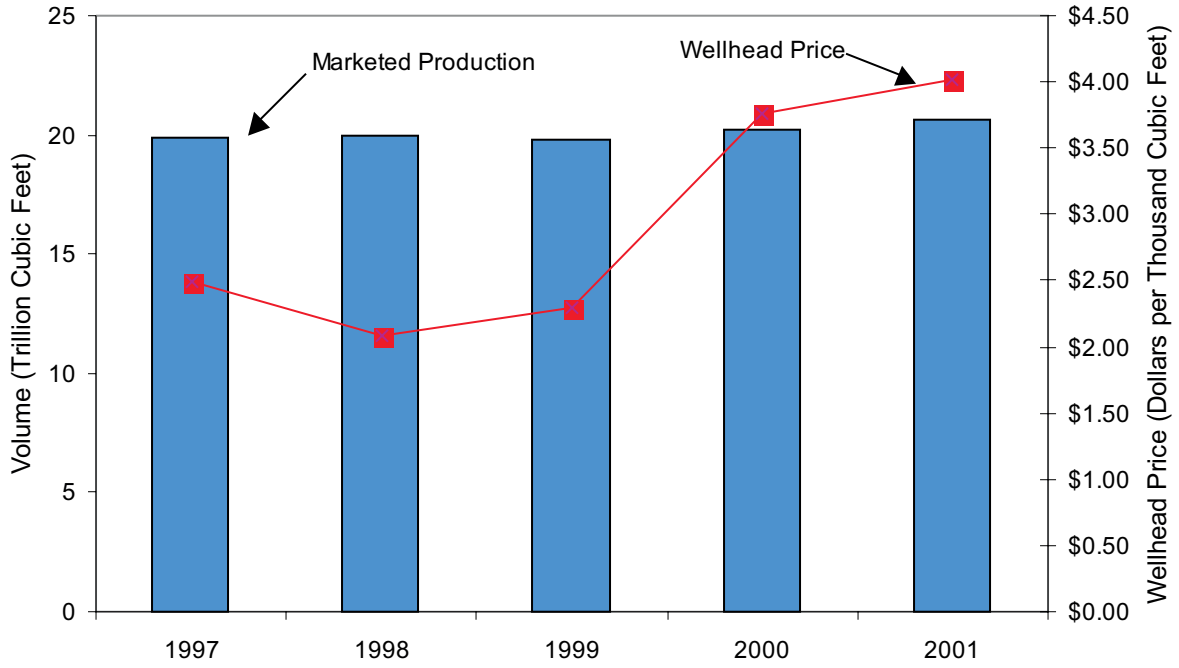
- **The United States had 20.7 trillion cubic feet of marketed natural gas production in 2001 (Figure 7), which is the highest it has been since 1974 when marketed production reached 21.6 trillion cubic feet.** This 2 percent increase from 2000 is the largest year-to-year increase in marketed production in the last 5 years. Moreover, marketed production was almost 1 trillion cubic feet or over 4 percent greater than the level reported in 1999.

- **Marketed natural gas production from State and Federal waters was nearly 5.7 trillion cubic feet in 2001, almost 4 percent greater than in 2000.** Offshore fields accounted for over 27 percent of total marketed production in the United States in 2001.[2]

- **The United States had 183 trillion cubic feet of dry natural gas reserves as of December 31, 2001, a 3 percent increase over the 2000 level.** Additions to dry gas reserves in 2001 were nearly 26 trillion cubic feet, which was the equivalent of over 125 percent of marketed gas production.

[2] As noted in the Preface, the Minerals Management Service (MMS) has not provided monthly production data for the Gulf of Mexico region since July 2001. As a result, EIA estimated volume and revenues for the remainder of the year for the Federal offshore production, which is included in the production estimates and prices for the States of Alabama, Louisiana and Texas.

Figure 7. Average Wellhead Prices and Marketed Production in the United States, 1997-2001



Note: Prices in 2001 dollars.
Source: Constant dollars derived using chain-weighted Gross Domestic Product (GDP), Bureau of Labor Statistics

- **Texas and Louisiana (including Federal offshore production) continued to account for the majority of natural gas produced in the United States with 5 States accounting for nearly 80 percent of marketed production.** The remaining 20 percent of production flows from 27 States.

- **The national average natural gas wellhead price was $4.02 per thousand cubic feet in 2001, which was 7 percent higher than in 2000.** In 2001, California had the highest price in the Lower 48 States at $6.93 per thousand cubic feet, while Nebraska had the lowest average wellhead price at $2.16 per thousand cubic feet.

- **After adjustment for inflation, prices in 2001 were the highest since 1984 when they reached $4.07 per thousand cubic feet in 2001 dollars.** The highest wellhead price occurred in 1983 when it was $4.11 per thousand cubic feet.[3]

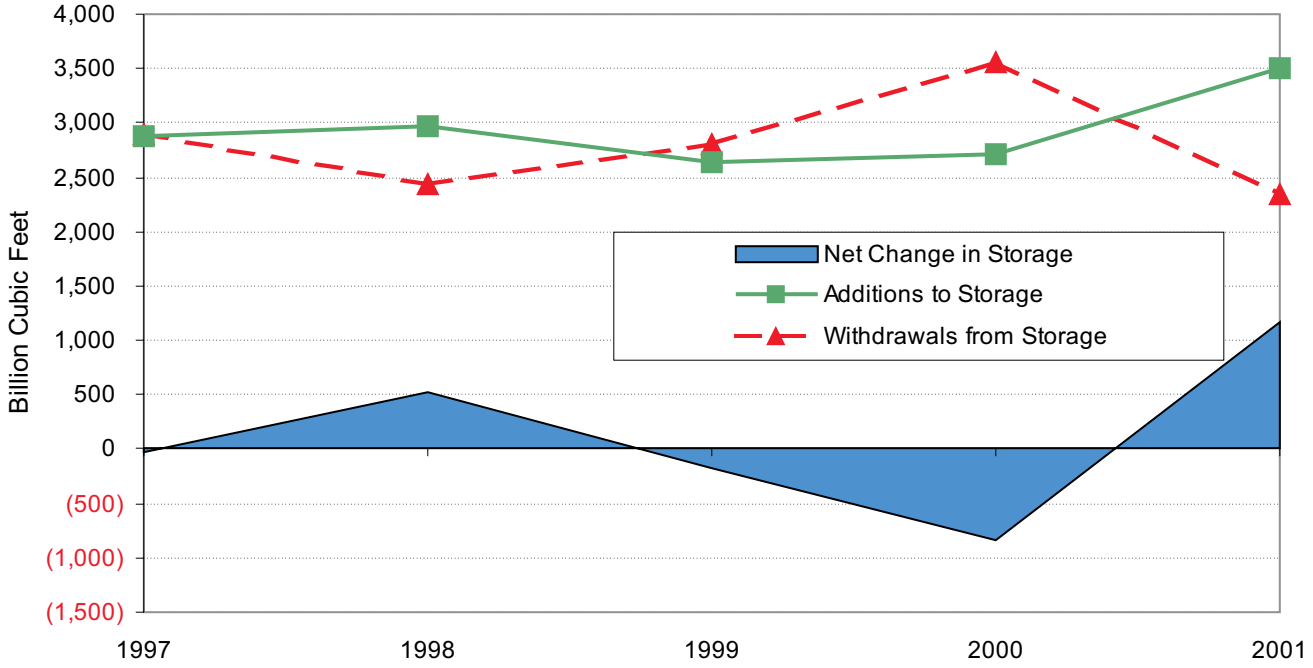
[3] Prices were converted to constant dollars based on the GDP deflators published by the Bureau of Economic Analysis in the "*National Income and Product Accounts Tables,*" tables 1.1 and 1.2.

Natural Gas Storage Inventories Experienced Record Net Additions

- **Net storage additions for the year were an all-time high of 1,165 Bcf.** The stage for unusually large storage additions was set in the previous year, when underground storage inventories at the beginning of the 2000-2001 heating season were at their third lowest level (2,732 Bcf) in the 26-year span of EIA storage data.[4] After record-setting cold weather in November and December of 2000, stocks ended that year at 1,719 Bcf. Storage levels at the end of March 2001 reached an all-time low of 742 Bcf. Relatively mild weather at the beginning and end of 2001 contributed to reduced consumption, ·which helped support large storage additions. For the U.S. as a whole, total gas-customer weighted heating degree days during 2001 were about 9 percent less than normal; more than 4 percent below normal during January and February, and nearly 25 and 16 percent below normal, respectively, during November and December.

[4] Stock-level information for LNG storage is not available. However, net LNG storage injections and withdrawals are relatively small. For example, less than 1 percent of the 1,165 Bcf in net storage additions in 2001 was due to LNG activity.

Figure 8. Additions, Withdrawals, and Net Change to Storage Inventories, 1997-2001



- **The year-to-year shift in net stock change reduced supply flow from storage by almost 2 Tcf from 2000 levels (Figure 8).** Storage activity shifted from a net source of supply to the end use markets in 2000 to a net reduction of supplies available to end use markets in 2001. The record net addition of 1,165 Bcf followed the record net drawdown of 829 Bcf in 2000. The resulting near-2 Tcf swing in gas from storage was more than double the next highest year-to-year swing in storage flows. This is highly significant for end use markets because it absorbed net supplies that would have been available in those markets.

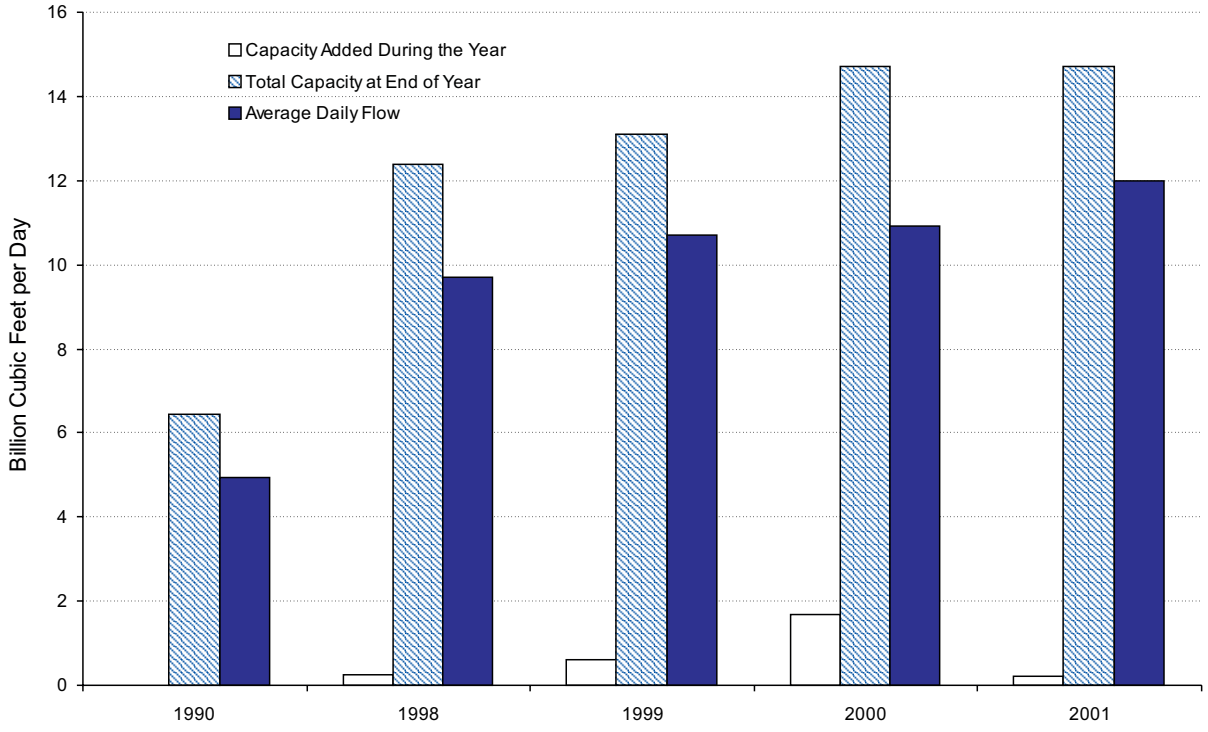
Natural Gas Trade Between the United States and Foreign Countries Expanded to Record Levels in 2001

- **The United States recorded gross imports of 3,977** Bcf and gross exports of 373 Bcf in 2001. Canada continues to be the largest foreign source of natural gas supplies to U.S. markets, while Mexico continues as an increasingly important and growing market for U.S. natural gas exports. LNG imports increased 5.3 percent to 238 Bcf, the largest volume of LNG imports since 1979.

- **Annual natural gas imports from Canada grew to 3.7 trillion cubic feet in 2001.** During the year, Canadian natural gas accounted for 18 percent of all natural gas consumed domestically. Imports from Canada increased 5.2 percent over 2000 levels (Figure 9), marking the fifteenth consecutive yearly increase in imports. A significant portion of the increase in natural gas deliveries from Canada in 2001 resulted fromthe first full year of operations of the Alliance Pipeline, which crosses the U.S. border at Sherwood, North Dakota.

- **In recent years, a growing portion of the natural gas that flows from western Canada to the United States is not consumed in the United States,**

Figure 9. Canadian Natural Gas Import Capacity and Flow, 1990 and 1998-2001



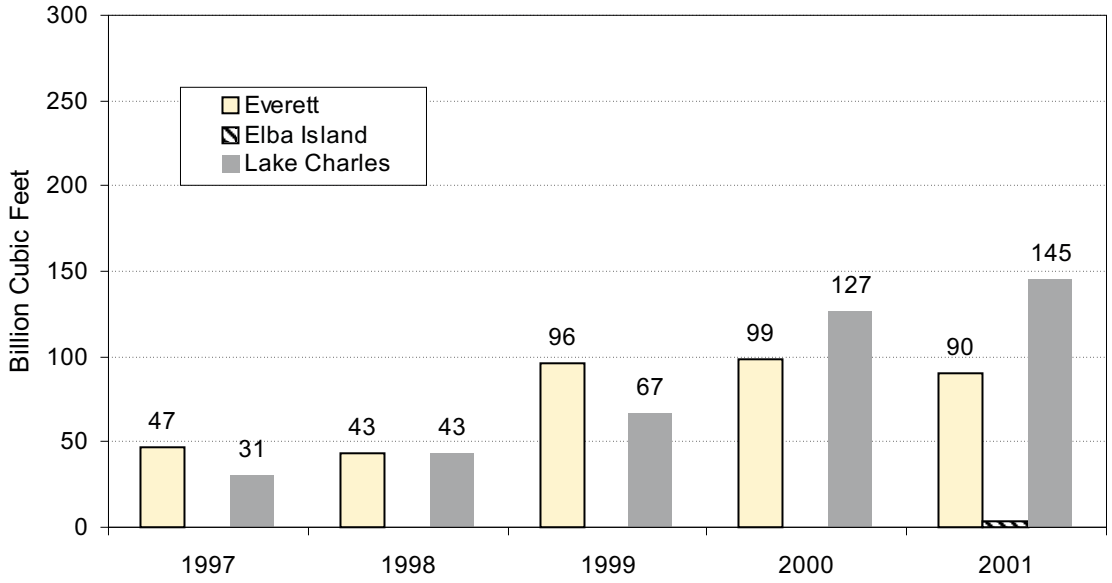
Note: Average Daily Imports includes gas flows that are re-exported to Canada (referred to as Intransit imports).
Sources:Energy Information Administration (EIA). **Capacity:** GasTran Gas Transportation System, Natural Gas Pipeline Capacity Database. **Flow:** Form EIA176 "Annual Report of Natural and Supplemental Gas Supply and Disposition."

rather, it is redirected back to Canadian markets. Referred to as "intransit receipts" in the applicable State summary tables, these volumes totaled 575 Bcf in 2001 compared with 517 Bcf in 2000. Total gas deliveries from Canada grew to 4.3 trillion cubic feet annually in 2001, 87 percent of which was consumed in the United States while the remainder flowed-through on U.S. pipelines for final delivery to eastern Canadian markets.

- **Imports of liquefied natural gas (LNG) rose to 238 Bcf, or about 12 Bcf higher than LNG imports in 2000.** The increase lifted LNG import activity near its historic high in 1979. U.S. terminals received a total of 101 shipments of LNG from six countries. CMS Trunkline LNG received a record 61 shipments for a total of 145 Bcf, an increase of nearly 18 Bcf over last year, at its terminal located in Lake Charles, Louisiana. LNG imports fell 8.4 Bcf at the Distrigas facility in Everett, Massachusetts, where 39 shipments representing a total of 90 Bcf arrived from two different countries. One LNG shipment arrived at the newly reopened Elba Island, Georgia, terminal. For the second consecutive year, Trinidad and Tobago, which began producing and supplying LNG to the Distrigas facility in May 1999, led all suppliers with imports of 98 Bcf, or 41 percent of LNG supplies. Algeria, formerly the sole supplier of LNG to the United States, provided 65 Bcf, or 27 percent, of LNG supplies.

- **Natural gas exports (excluding LNG) grew by 73 percent in 2001.** Most of this growth occurred between the United States and Canada (95 Bcf out of 130 Bcf total increase), as the newly inaugurated Vector Pipeline completed its first full year of service, transporting increasing amounts of gas between the Chicago Hub and Ontario, Canada, markets. Pipeline exports to Mexico, which have grown rapidly in recent years with the construction of new export (pipeline) capacity in Texas and California, reached a record 140 Bcf in 2001, or 34 percent above 2000. Opportunities to supply growing Mexican demand, particularly in the electric generation sector, continue to provide the impetus for infrastructure growth at the border.

Figure 10. U.S. LNG Imports by Terminal



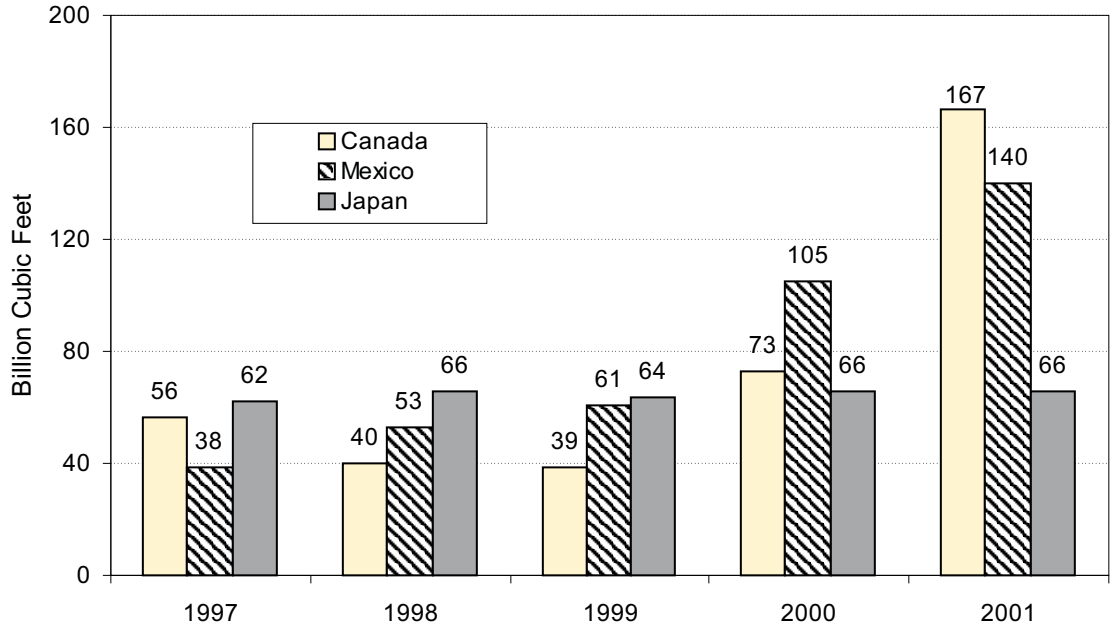
- **LNG exports to Japan from the Kenai, Alaska,** facility, which amounted to 66 Bcf for a second consecutive year, generally have remained constant over the last decade. Small volumes of LNG are also exported by truck to Mexico.

Interstate Movements of Natural Gas Increased in 2001

- **Gas flow volumes on the interstate natural gas pipeline network increased by 4 percent in 2001, although volumes decreased on several major transportation corridors.** Gas movements on the major pipelines extending from the Southwest region to the Southeast and Northeast fell by as much as 10 percent owing to warmer than average weather in the first and last quarters of the year. In addition, increased natural gas flowing into the Northeast from eastern offshore Canada in 2001 contributed to the reduced demand for Southwest supply. Similarly, transportation volumes decreased between the Southwest production areas and the Midwest, as flows on transportation corridors between Canada and the Midwest grew 19 percent over 2000 levels, in large part owing to the Alliance Pipeline system and an expansion of the Northern Border Pipeline system.

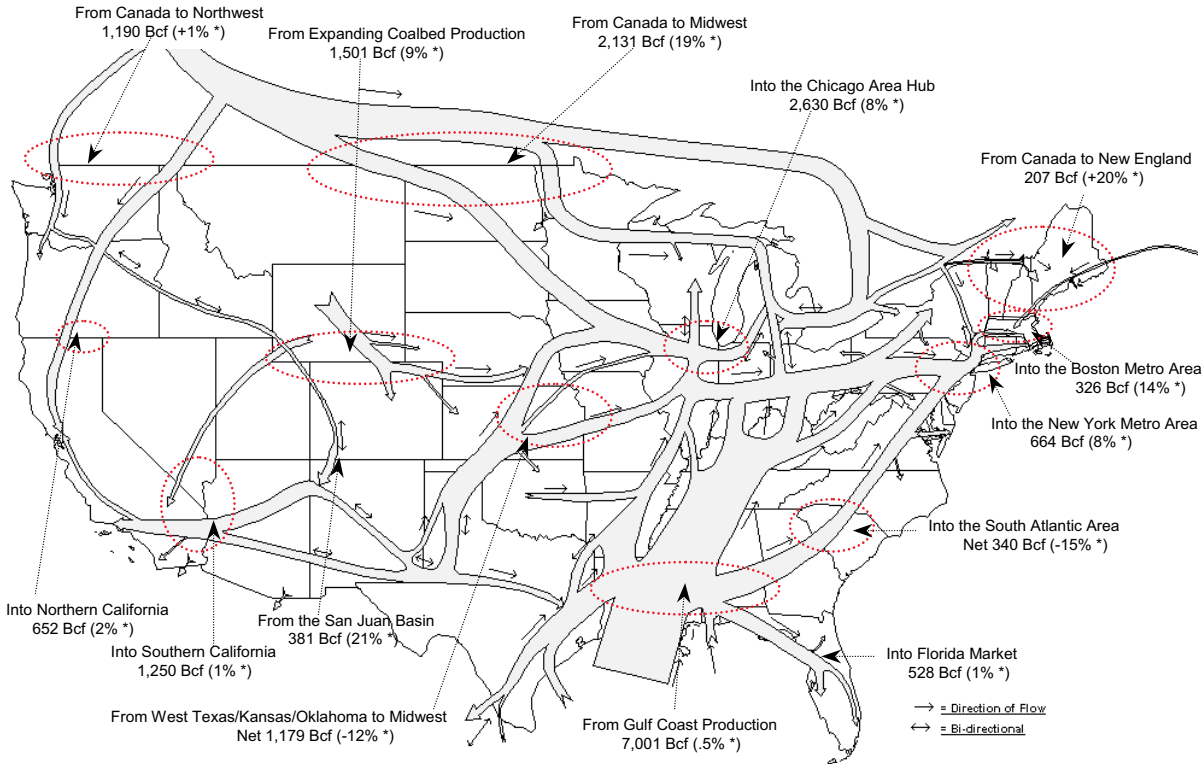
- **The continuing expansion of coalbed methane production in the Rocky Mountains area,** especially in the Powder River Basin of Wyoming/Montana, resulted in a 12 percent increase in gas movements out of Wyoming, most of it directed toward the Midwestern United States. By the end of 2003, interstate natural gas pipeline capacity in the area is expected almost to double.

Figure 11. U. S. Exports by Country of Destination



- **Pipeline capacity into the California market increased by 35 percent, but flows into the State increased by 1 to 2 percent.** The installation of new capacity was a reflection of the quick market response to the 2000-2001 energy crisis in the West and a spike in natural gas demand and prices between September 2000 and March 2001. The need was perceived owing to a rapid growth in gas-fired power plant needs during a period when regional water levels (and hydro-power resources) were down significantly. However, subsequent changing market conditions within the State reduced the need for the additional supplies, at least temporarily.

Figure 12. Major Natural Gas Pipeline Transportation Routes and 2001 Interstate Flow Levels at Selected Key Locations



Percent change in flow from 2000. Bcf = billion cubic feet.

Sources:Energy Information Administration (EIA). **Corridors:** GasTran Gas Transportation System, Natural Gas Pipeline State Border Capacity Database. **Flow:** Form EIA176 "Annual Report of Natural Gas and Supplemental Gas Supply and Disposition."