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K. Seiferlein

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July 1994

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Annual Energy Review 1993

The *Annual Energy Review* (*AER*) presents the Energy Information Administration's historical energy statistics. For most series, statistics are given for every year from 1949 through 1993. The statistics, expressed in either physical units or British thermal units, cover all major energy activities, including consumption, production, trade, stocks, and prices, for all major energy commodities, including fossil fuels, electricity, and renewable energy sources.

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Preface

This twelfth edition of the *Annual Energy Review* (*AER*) presents the Energy Information Administration's historical energy statistics. For most series, statistics are given for every year from 1949 through 1993. Because coverage spans four and a half decades, the statistics in this report are well-suited to long-term trend analyses.

The *AER* is comprehensive. It covers all major energy activities, including consumption, production, trade, stocks, and prices, for all major energy commodities, including fossil fuels and electricity. The *AER* also presents Energy Information Administration (EIA) statistics on some renewable energy sources. EIA estimates that its consumption series include about half of the renewable energy used in the United States. For a more complete discussion of EIA's renewables data, see p. xix, "Introducing Expanded Coverage of Renewable Energy Data Into the Historical Consumption Series."

In this *AER*, Section 1 has been reorganized to enable analysts to relate energy use to factors such as population (Tables 1.5 and 1.6), economic growth (Table 1.7), and weather (new Tables 1.8 through 1.11).

Also new in this *AER* are end-use consumption data on conservation features in commercial buildings (Table 2.23), commercial buildings' participation in demand-side management programs (Table 2.24), and manufacturing sector inputs (Tables 2.6 through 2.8). The new tables are all part of a reorganized Section 2 that is entirely devoted to end-use energy consumption by sector.

This *AER* is also the first to include a section devoted to environmental data. Section 12 presents six tables on greenhouse gas emissions and the use of environmental equipment at electric utilities.

For the most part, fuel-specific data in the *AER* are expressed in physical units such as barrels, cubic feet, and short tons. The integrated summary data in Section 1 are expressed in Btu. The Btu values are calculated using the conversion factors in Appendix A. Statistics expressed in Btu are valuable in that they allow for comparisons among different fuels and for the calculation of integrated summary statistics such as U.S. consumption of energy.

The *AER* emphasizes *domestic* energy statistics. Accordingly, Sections 1 through 10 and 12 of this report are devoted to U.S. statistics, while Section 11 is reserved for most of the international statistics, such as world production of energy. The one exception is trade data. For example, Table 5.4, which presents statistics on petroleum imports by country of origin, is found in Section 5. Table 5.4 statistics cover petroleum imports into the United States from foreign countries. To keep table and figure titles in Sections 1 through 10 and 12 concise, "United States" is usually not specified. Readers interested in more detailed international data than are presented in the *AER* should consult the Energy Information Administration's *International Energy Annual.*

Publication of the *AER* each year is in keeping with responsibilities given EIA in Section 205(a)(2) of the Department of Energy Organization Act, Public Law 95-91. The report is intended for use by Members of Congress, Federal and State agencies, energy analysts, and the general public. The EIA welcomes suggestions from readers regarding its energy data series. To make a suggestion or to obtain specific information regarding the contents of the *AER*, readers may call any of the subject specialists listed as contacts on the preceding page.

Copies of the 1993 edition of the *Annual Energy Review* may be obtained by using the order form in the back of this publication. Most of the data in the 1993 edition also are available on personal computer diskette. For more information about the diskettes, see the back of this publication. In addition, the data are available as part of the National Economic, Social, and Environmental Data Bank on a CD-ROM. For more information about the data bank, contact the U.S. Department of Commerce, Economics and Statistics Administration, on 202–482–1986.

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Introducing Expanded Coverage of Renewable Energy Data Into the Historical Consumption Series

It is the objective of the Energy Information Administration (EIA) to report complete coverage of all components in its data series. Comprehensive reporting of renewable energy usage is difficult because of the dispersed nature of the various forms of renewable energy. For example, it is difficult to measure, or even to estimate, household usage of wood in a consistent fashion over time at a reasonable cost for the data collection.

EIA's integrated historical data, as represented in this report, include thorough coverage of the renewable energy that is consumed by electric utilities, but the usage by other consumers is generally not incorporated into EIA's integrated historical data series. EIA estimates that its integrated statistics include about half of the renewable energy used in the United States. That deficiency causes the overall total energy consumption to be undercounted by about 3 quadrillion Btu.[1]

[1]See Table 10.1. Most of the 3 quadrillion Btu is in the form of biomass use in the residential and manufacturing sectors. See *Estimates of U.S. Biofuels Consumption 1992*, DOE/EIA–0548(92), for more information.

Table 1 provides a summary of U.S. total energy consumption with the expanded coverage of renewable energy. With the additional coverage, total energy consumption in 1992, for example, is adjusted from 82.14 quadrillion Btu (as reported in Table 1.3) to 85.16 quadrillion Btu, an increase of nearly 4 percent. Using the adjusted total energy consumption, renewable energy is seen to be a valuable contributor to the Nation's energy supply. In 1992, renewable forms of energy totaled over 6 quadrillion Btu and accounted for 7 percent of the total.

A full accounting of renewable energy consumption estimates by source and sector for 1990 through 1992 is provided in Table 10.1. Also, see page xx for notes regarding the relationship of data on Table 1 with those on Tables 1.3 and 10.1. EIA is working on improving and extending the energy consumption time series. The expanded coverage of renewable energy data will be incorporated into the standard statistical series as soon as possible.

Table 1. Adjusted Total Energy Consumption, 1990-1992

(Quadrillion Btu)

Year	Fossil Fuels					Nuclear Electric Power	Hydroelectric Pumped Storage [3]	Renewable Energy						Total
	Coal	Coal Coke Net Imports	Natural Gas [1]	Petroleum [2]	Total Fossil Fuels			Conventional Hydroelectric Power [4]	Geothermal Energy	Biofuels [5]	Solar Energy	Wind Energy	Total Renewable Energy	
Energy Consumption by Source (see Table 1.3)														
1990	19.101	0.005	19.296	33.553	71.955	6.161	-0.036	2.982	0.181	0.021	([6])	([6])	3.184	81.265
1991	18.770	0.009	19.606	32.845	71.230	6.579	-0.047	3.163	0.170	0.021	([6])	([6])	3.354	81.116
1992	18.868	0.027	20.131	33.527	72.553	6.607	-0.043	2.836	0.170	0.022	([6])	([6])	3.028	82.144
Additional Renewable Energy Consumption (see Table 10.1)														
1990	—	—	—	—	—	—	—	0.050	0.071	2.611	0.067	0.023	2.822	—
1991	—	—	—	—	—	—	—	0.051	0.079	2.619	0.068	0.027	2.844	—
1992	—	—	—	—	—	—	—	0.064	0.088	2.763	0.068	0.030	3.013	—
Adjusted Total Energy Consumption														
1990	19.101	0.005	19.296	33.553	71.955	6.161	-0.036	3.032	0.252	2.632	0.067	0.023	6.006	84.086
1991	18.770	0.009	19.606	32.845	71.230	6.579	-0.047	3.214	0.249	2.640	0.068	0.027	6.198	83.960
1992	18.868	0.027	20.131	33.527	72.553	6.607	-0.043	2.900	0.258	2.785	0.068	0.030	6.041	85.158

[1] Includes supplemental gaseous fuel.
[2] Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.
[3] Represents total pumped storage facility production minus energy used for pumping.
[4] Includes net imports of electricity.
[5] Includes wood, wood waste, peat wood liquors, railroad ties, pitch, wood sludge, municipal solid waste, agricultural waste, straw, tires, landfill gases, fish oils, and/or other waste.
[6] Less than 0.0005 quadrillion Btu.
— = Not applicable.
Note: Totals may not equal sum of components due to independent rounding.
Sources: Tables 1.3 (cols. 1-4); 7.7 (cols. 2 and 3); A5 (col. 9); 8.2 (col. 6); A7 (col.1); and 10.1.

Crosswalk Between Table 1 and Tables 1.3 and 10.1

Energy Consumption by Source

Table 1		Table 1.3
Conventional Hydroelectric Power plus Hydroelectric Pumped Storage	=	Hydroelectric Power
Biofuels, Solar Energy, Wind Energy, plus Coal Coke Net Imports	=	Other

Additional Renewable Energy Consumption

Table 1		Table 10.1
Conventional Hydroelectric Power	=	Nonutility Hydroelectric Power less a small amount (0.033 quadrillion Btu) of other industrial hydroelectric power
Biofuels	=	Total Biofuels less Electric Utility Biofuels

Major Energy Developments in 1993

Energy Demand Reached a Record Level

A gradually reviving domestic economy, low energy prices, and a return to normal weather contributed to the second consecutive year of growth in U.S. total energy consumption, which rose to the record level of 84 quadrillion Btu in 1993 (1.3).[1] The increase came as a result of increases in the consumption of petroleum, natural gas, coal, and hydroelectric power. Consumption of nuclear electric power, however, declined for the first time in 13 years.

The improvement in the economy and continued low prices for crude oil in 1993 led to a modest increase in petroleum consumption (5.12). Petroleum consumption rose 0.2 million barrels per day from the 1992 level to 17 million barrels per day in 1993, primarily due to increased demand in the transportation sector. The transportation sector relies on petroleum so heavily that even the modest consumption increase (1.9 percent) affected the total. Electric utility consumption of petroleum rose 9.5 percent. Consumption of petroleum in the residential and commercial sector rose very little and the industrial sector consumed less petroleum in 1993 than in 1992.

Consumption of motor gasoline, which consistently accounts for the largest share of all petroleum products supplied, rose 2.9 percent to 7.5 million barrels per day in 1993 (5.11). The improved economy contributed to an increase in distillate fuel oil consumption of 1.7 percent to 3.0 million barrels per day. Consumption of jet fuel rose 1.4 percent to 1.5 million barrels per day. In contrast, residual fuel oil consumption fell 1.8 percent to 1.1 million barrels per day and consumption of liquefied petroleum gases fell 2.8 percent to 1.7 million barrels per day.

Consumption of natural gas in 1993 rose 3.3 percent to 20 trillion cubic feet (6.6). Increased demand in the residential, industrial, and transportation sectors was responsible for the growth. Natural gas consumption at electric utilities was 3.2 percent lower in 1993 than in 1992.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available and frequently are preliminary.

Consumption of coal in 1993 rose 4.0 percent to 928 million short tons (7.3). The increase occurred primarily at electric utilities, where 88 percent of the coal was consumed. Electric utilities used coal to replace some natural gas-fired generation and some nuclear electric power (8.2).

Electricity sales of 2.9 trillion kilowatthours were 3.7 percent above 1992 sales (8.5). The 1992-to-1993 increase was the biggest year-to-year increase since 1988. Sales to the residential sector rose 6.2 percent, and sales to the commercial sector rose 3.8 percent. Electricity sales to the industrial sector rose 1.0 percent.

The energy intensity of the economy, when measured in terms of energy consumption per dollar of gross domestic product (GDP), declined in 1993 for the second year in a row (1.7). About 16 thousand Btu of energy were consumed for each 1987 dollar of GDP in 1993, compared with 23 thousand Btu per 1987 dollar in the early 1970's. The energy intensity of the economy declined during the 1970's, 1980's, and 1990's due to increases in energy efficiency, conservation, the expansion of the service sector, and the shift toward less energy-intensive industries. The Energy Policy Act of 1992 mandates additional energy efficiency standards that may further lower the energy intensity of the economy.

Domestic Energy Production Continued To Fall

U.S. total energy production declined in 1993 for the third consecutive year, down 1.6 percent to 66 quadrillion Btu (1.2). Most of the decline was attributed to lower coal production, due to the strike by the United Mine Workers of America, and lower crude oil production. Coal production fell 1.1 quadrillion Btu from the 1992 level to 20 quadrillion Btu and crude oil production fell 0.7 quadrillion Btu to 14 quadrillion Btu. The decline in nuclear electric power production was modest in amount (0.1 quadrillion Btu), but it was notable as the first year-to-year decline in 13 years. In contrast, natural gas production rose 0.6 quadrillion Btu to 19 quadrillion Btu.

Coal and natural gas production each accounted for a greater share of the U.S. total than did crude oil. Coal production accounted for 31

percent of the U.S. total and dry natural gas production accounted for 29 percent, while crude oil production accounted for 22 percent.

Crude oil production dropped to 6.8 million barrels per day, down 4.6 percent from the level in 1992 (5.1). Average output from U.S. refineries in 1993 rose to 16 million barrels per day (5.8). Motor gasoline, at 7.2 million barrels per day, was by far the most prevalent product. The refinery utilization rate was 91 percent, the highest rate in 20 years, due in part to the shutdown of inefficient refineries (5.9).

At year end, the Strategic Petroleum Reserve held 587 million barrels of crude oil (5.16), enough to replace petroleum net imports for 78 days. Privately held stocks of crude oil totaled 335 million barrels (5.15 and 5.16).

Gross withdrawals of natural gas in 1993 totaled 23 trillion cubic feet, up 3.6 percent from the 1992 level, and dry gas production totaled 18 trillion cubic feet (6.2). U.S. total gross withdrawals include a small amount of methane produced from coalbeds. In 1992 (the most recent year for which data are available), gross withdrawals of coalbed methane totaled 535 billion cubic feet,[2] an amount equal to about 3 percent of U.S. total dry production. New drilling for coalbed methane was down, probably because easily developed prospects had already been drilled and because low prices for natural gas in 1992 made exploratory drilling less attractive. However, coalbed methane reserves increased 23 percent in 1992 and accounted for 6 percent of U.S. natural gas total reserves.

Exploration for crude oil and natural gas is closely tied to market conditions. In 1993, the continuing low price of crude oil restrained a modest upturn in domestic exploratory activity, which, in 1992, had fallen to the lowest levels in at least 44 years. The number of crews engaged in seismic exploration rose from 76 in 1992 to 79 in 1993, and rotary rigs in operation rose from 721 to 754. However, exploratory wells drilled fell from 3.4 thousand to 3.1 thousand (4.3 and 4.5).

Domestic coal production in 1993 totaled 947 million short tons, down from 998 million short tons in 1992 (7.1). Production of western coal rose to 420 million short tons, 44 percent of the total (7.2). The growth in western coal was due in part to environmental concerns that led to increased demand for low-sulfur coal, which is concentrated in the West. In addition, surface mining, with its higher productivity, is much more prevalent in the West.

Year-end coal stocks declined from 198 million short tons in 1992 to 147 million short tons in 1993 (7.5). The drawdown was necessary because the strike by the United Mine Workers of America against member companies of the Bituminous Coal Operators' Association led to lower coal production.

Conventional hydroelectric power production (which excludes hydroelectric pumped storage) rose from 244 billion kilowatthours in 1992, a year of persistent drought in western States, to 269 billion kilowatthours in 1993 (8.2). Hydroelectric pumped storage (total production at pumped storage facilities minus the energy used for pumping) was a negative 4 billion kilowatthours.

Environmental, safety, and economic concerns have restrained growth in the nuclear industry since the mid-1970's, and the effects of electric utilities' unwillingness to commission new nuclear plants became especially evident in 1992, when the year-end number of operable nuclear generating units declined for only the second time (9.2). However, because the capacity factor[3] increased, nuclear electric power production in 1992 rose 1.0 percent to an all-time high of 619 billion kilowatthours. In 1993, however, nuclear electric power production declined 1.4 percent to 610 billion kilowatthours and the nuclear portion of domestic electricity net generation fell from 22 percent to 21 percent.

Net Energy Imports Rose to Highest Level in 15 Years

U.S. net imports of energy rose to 17 quadrillion Btu in 1993, an increase of 15 percent from the 1992 level and the highest net import volume since 1978 (1.4). Changes in the trade volumes of the three major energy sources contributed to the increase. Petroleum net imports rose 8.2 percent to 16 quadrillion Btu, natural gas net imports rose 10 percent to 2.1 quadrillion Btu, and coal net exports declined 32 percent to 1.8 quadrillion Btu.

[2]Energy Information Administration, *Natural Gas Annual 1992*, DOE/EIA-0131(92) (Washington, DC, November 1993), p. 12.

[3]The actual generation in a given time period divided by the maximum possible generation in that time period.

Crude oil net imports in 1993 rose to an all-time high of 6.6 million barrels per day (5.3 and 5.5), but net imports of petroleum products declined 5.7 percent to 0.9 million barrels per day. The petroleum products registering the highest volumes of net imports in 1993 were unfinished oils, residual fuel oil, and motor gasoline. Petroleum coke and distillate fuel oil were the primary net exports.

U.S. net imports of petroleum totaled 7.5 million barrels per day in 1993 (5.7). Members of the Organization of Petroleum Exporting Countries (OPEC) supplied 4.3 million barrels per day, well over half of the total. Net imports from Saudi Arabia, Venezuela, and Nigeria were 1.4 million barrels per day, 1.3 million barrels per day, and 0.7 million barrels per day, respectively. Although OPEC continued to be a dominant influence on both domestic and world oil markets, there were signs of coming changes. For example, Ecuador's withdrawal from OPEC (effective on January 1, 1993) constituted the first change in OPEC's membership in several years.

The remaining 3.2 million barrels per day of U.S. petroleum net imports came primarily from Canada, which supplied 1.1 million barrels per day, and Mexico, which supplied 0.8 million barrels per day. The United Kingdom supplied 0.3 million barrels per day.

U.S. dependence on foreign suppliers of petroleum increased by 3.1 percentage points in 1993 (5.7). Net imports from all countries rose to a 44-percent share of petroleum consumption. Dependence on net imports from OPEC members alone rose 1.1 percentage points to a 25-percent share of petroleum consumption.

Natural gas net imports rose to 2.1 trillion cubic feet, primarily due to increased net imports from Canada (6.3). Trade with Canada was facilitated by the completion of the Iroquois transportation system, which was completed in January 1992. Canadian natural gas exports to the U.S. market rose 4.1 percent to 2.2 trillion cubic feet. U.S. exports to Canada, however, decreased 26 percent to 50 billion cubic feet.

Despite a sharp decline from the 1992 level, coal remained the primary U.S. energy export. Coal exports totaled 75 million short tons in 1993 (7.4). Lower coal exports to Canada and Japan, the largest markets for U.S. coal, coupled with across-the-board losses of export volume to European countries and to Brazil, brought coal exports to the lowest level since 1979.

Net imports of electricity totaled 29 billion kilowatthours in 1993 (8.1). Electricity net imports contributed only a small share of U.S electricity consumption.

Net imports of uranium[4] (U_3O_8) exceeded domestic production of uranium for the fourth consecutive year (9.3). In 1993, uranium net imports totaled an estimated 15 million pounds, compared with domestic production of 3.1 million pounds.

Energy Price Behavior Was Mixed

Despite political unrest in several oil-producing countries (notably Russia and Iraq), as well as attempts by OPEC to bolster crude oil prices, the U.S. refiners' composite acquisition cost of crude oil declined to $16.41 per barrel, down for the third consecutive year (5.20). The 1993 price was the lowest price (in real terms) in 20 years.

The end-use prices, excluding taxes, of most petroleum products also moved downward (5.21). Even the average price of all types of motor gasoline, which might have gone up as a result of sales of oxygenated motor gasoline, declined from $0.78 per gallon in 1992 to $0.76 per gallon in 1993. The prices of aviation gasoline, kerosene, kerosene-type jet fuel, and the distillate fuel oils all declined. The primary exception to the price declines was the price of residual fuel oil with a sulfur content of 1 percent or less, which was in demand for environmental reasons. Its price rose 3.6 percent to $0.40 per gallon.

The average wellhead price of all categories of natural gas rose 13 percent to $1.97 per thousand cubic feet (6.8). The price per thousand cubic feet of natural gas sold to industrial consumers (excluding lease and plant fuel) rose 2.1 percent, to $2.90 (6.9), while the price of natural gas sold to commercial consumers and residential consumers remained at the 1992 levels of $4.88 and $5.89, respectively.

The average real price[5] of bituminous coal and lignite at the minemouth fell to $16.55 per short ton, down for the eighteenth year in a row (7.8). The real price of coal at electric utilities, where most coal is consumed, was $23.06 per short ton, down from $24.24 per short ton in 1992.

[4]Imports of uranium are not included in U.S. total energy imports.
[5]Real prices are expressed in 1987 dollars.

Although the cost of coal at electric utilities declined, the weighted average real price of electricity to all sectors remained at the 1992 price of 5.6 cents per kilowatthour in 1993 (8.10). The average real price of electricity sold to the residential sector, where prices have usually been the highest, was 6.7 cents per kilowatthour, down 1.5 percent from the price in 1992. The commercial sector experienced a decrease, in real terms, of 3.1 percent, as the price declined to 6.2 cents per kilowatthour in 1993. Meanwhile, industrial customers continued to pay prices favorable compared with prices in other sectors. In 1993, the real price of electricity sold to industrial users was 3.9 cents per kilowatthour, down 2.5 percent from the price in 1992.

1. Energy Overview

Consumption

Energy consumption more than doubled during the 1949-through-1973 period, increasing from 30 quadrillion Btu in 1949 to 74 quadrillion Btu in 1973 (1.3),[1] and the U.S. economy grew at about the same rate. The domestic energy market was dominated by rapid growth in petroleum and natural gas consumption, which more than tripled during the period. After the 1973 oil price shock, energy consumption fluctuated, influenced by dramatic changes in oil prices, changes in the rate of growth of the domestic economy, and factors such as concerns about the effect of energy use on the environment. The post-1973 low point of energy consumption, 71 quadrillion Btu, occurred in 1983 during a period of very high oil prices. The highest level of energy consumption, 84 quadrillion Btu, occurred in 1993, when oil prices were low.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available and frequently are preliminary.

Indicators of Energy Intensity

The relationship between total energy consumption and real gross domestic product (GDP) is a traditional indicator of the energy intensity of the economy. In 1970, 23 thousand Btu of energy were consumed for each 1987 dollar of GDP (1.7). Higher energy prices in the early 1970's led to increases in energy efficiency and a significant restructuring of the energy-intensive activities of the manufacturing sector. The energy intensity of the economy as a whole fell in 1986 to 17 thousand Btu per 1987 dollar, where it remained through 1991. In 1992 and 1993, the energy intensity of the economy was 16 thousand Btu per 1987 dollar.

A second indicator of energy intensity is per capita consumption. Throughout the 1960's and early 1970's, the growth of end-use energy consumption was greater than the growth of the population (1.5). Per capita consumption rose from 212 million Btu in 1960 to a peak of 285 million Btu in 1973. Thereafter, per capita consumption trended downward to as low as 225 million Btu in 1983. In the 1990's, low petroleum prices encouraged energy use, and end-use energy consumption rose to 245 million Btu per capita in 1993.

The composition of demand after 1973 reflected a shift away from petroleum and, to a lesser extent, natural gas towards electricity generated by other fuels. In 1973, petroleum and natural gas accounted for 77 percent of total energy consumption; by 1993, their share had declined to 65 percent.

Production

Historically, three fossil fuels have accounted for the bulk of domestic energy production, which by 1993 totaled 66 quadrillion Btu (1.2). Coal accounted for the largest share of domestic energy production in 1949-1951 and, after a long hiatus, again in 1982 and in 1984 through 1993. In the interim, first crude oil and then natural gas dominated domestic production. In 1993, coal production totaled 20 quadrillion Btu. Dry natural gas production totaled 19 quadrillion Btu and crude oil production totaled 15 quadrillion Btu. Natural gas plant liquids accounted for another 2.4 quadrillion Btu.

Electricity net generation increased throughout the 1949-through-1993 period (8.1), registering only two year-to-year declines (during the 1982 recession and again in 1992). However, the rate of growth of electricity net generation slowed during the 45-year period. From 1949 through 1979, the annual growth rate averaged 7.1 percent, whereas from 1980 through 1993, the annual growth rate averaged 1.8 percent. After the mid-1970's, coal and nuclear fuels provided increasing shares of fuel input for electricity generation, displacing substantial quantities of both petroleum and natural gas (8.2). However, in 1993, nuclear power used for electricity generation declined from the record level of 6.6 quadrillion Btu in 1992 to 6.5 quadrillion Btu (1.2).

Hydroelectric generation accounted for over 1.4 quadrillion Btu of electricity in 1949 and from the 1970's through 1993 usually provided about 3 quadrillion Btu per year (1.2). However, in 1988, the second year of a drought, hydroelectric generation totaled only 2.3 quadrillion Btu and in 1992, a year of persistent drought in the West, the annual total fell to 2.5 quadrillion Btu.

Renewable energy sources (other than hydroelectric generation) also contributed to the domestic energy supply. In 1992 (the most recent year for which data on renewables in other sectors are available), electric utilities' generation of electricity from renewable sources, such as geothermal, biofuel, and solar energy, totaled 0.2 quadrillion Btu (1.2). Other sectors' use of renewable energy, which is not yet integrated into the total energy consumption series, is estimated to be 3.0 quadrillion Btu (10.1). That amount includes conventional hydroelectric power generation by the industrial sector.

Energy Prices in a Volatile Market

Since the mid-1970's, changes in fossil fuel prices have become more frequent and more pronounced (3.1). Prior to the Arab oil embargo of 1973-1974, the composite real price[2] per million Btu of crude oil, natural gas, and coal had declined to a post-World War II low of $0.90 in 1969. In 1974, however, the real price rose to $1.51 and eventually peaked at $3.48 in 1981 after a second round of crude oil price increases. Thereafter, overproduction of crude oil began to affect energy prices and, when crude oil prices plunged in 1986, the composite real price of the major fossil fuels fell to $1.71. In 1993, the composite price was $1.33, the lowest in 20 years.

Throughout the 1949-through-1993 period, changes in the real price of oil dominated movements in the composite index. The real price of oil trended downward between 1959 and 1970 and then rose sharply in 1974 and again in 1979 through 1981. Thereafter, in the face of shrinking demand and excess production, price trends reversed sharply. Precipitous declines in 1986 and 1988 brought the real price of crude oil in 1988 to $2.09 per million Btu, the lowest level since 1973. In 1989, the price rose to $2.52. In 1990, the Iraqi invasion of Kuwait contributed to an increase in crude oil prices to $3.05 per million Btu. In 1991, however, the ability of producers to supply replacement oil coupled with a worldwide economic recession that depressed petroleum demand led to a decrease in crude oil prices to $2.42 per million Btu. In 1993, the real price of oil declined to $1.98 per million Btu.

Prices of coal and natural gas were much less volatile than those of oil. Coal markets are generally less vulnerable to supply disruptions than are oil markets, where the output and pricing policies of the Organization of Petroleum Exporting Countries (OPEC) were a major influence during much of the 1973-through-1992 period. Natural gas prices were subject to substantial State and Federal regulation. Throughout the 1970's, regulation dampened the response of natural gas prices relative to oil price movement.

However, the weakening of crude oil prices after 1985 was severe enough to trigger declines in the prices of the other fossil fuels, particularly natural gas. The 1993 real price of crude oil per million Btu was $1.98, 55 percent below the 1985 price (3.1). The real price of natural gas was 40 percent lower and the real price of bituminous coal and lignite was 37 percent lower than their respective prices in 1985.

Changing Patterns of Trade

From 1958 forward, the United States consumed more energy than it produced, and the difference was met by energy imports (1.2, 1.3, and 1.4). Net imports of energy (primarily petroleum) grew rapidly through 1973, as demand for cheap foreign oil eroded quotas on petroleum imports. The Arab oil embargo of 1973-1974, coupled with the increase in the price of crude oil, interrupted growth in petroleum net imports, but nevertheless they climbed to a peak of 18 quadrillion Btu in 1977 (1.4). That year, U.S. dependence on foreign sources of crude oil reached an all-time high of 47 percent (5.7).

A second round of price increases, in 1979 through 1981, suppressed demand for foreign oil. In 1985, petroleum net imports totaled 9.0 quadrillion Btu, and U.S. dependence fell to 27 percent of consumption (1.4 and 5.7). Subsequently, petroleum net imports increased every year through 1989, when U.S. dependence on foreign sources of crude oil reached 42 percent of consumption. In 1993, the third consecutive year of low crude oil prices, petroleum net imports rose to 16 quadrillion Btu and U.S. dependence on them equaled 44 percent—the highest level in 16 years.

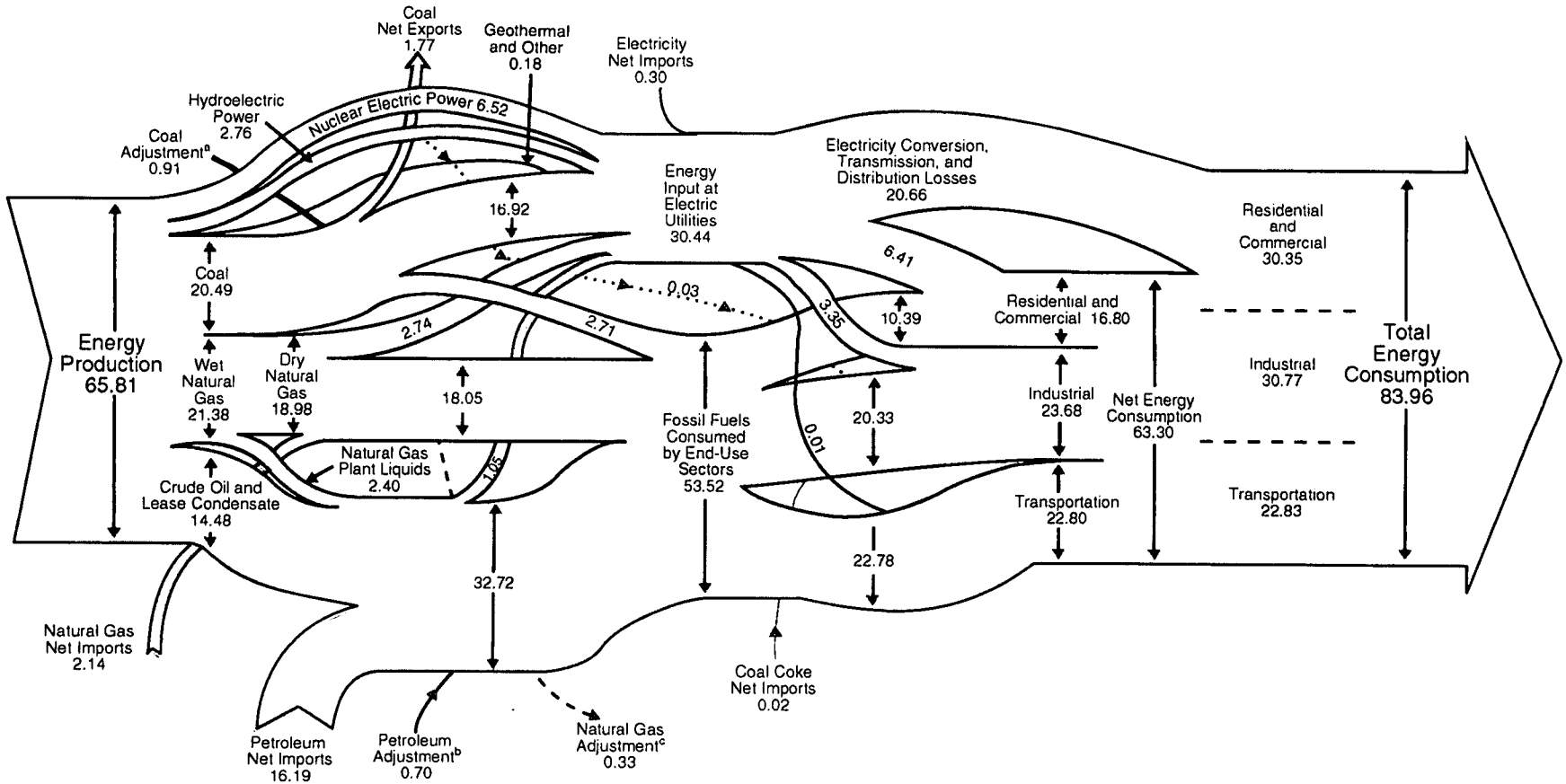
Natural gas trade was limited to border countries until the advent of shipping natural gas in liquefied form in the late 1960's. In 1993, natural gas net imports reached the record level of 2.1 quadrillion Btu.

Throughout the 1949-through-1993 period, the United States was a net exporter of coal (1.4). In 1993, coal net exports totaled 1.8 quadrillion Btu.

[2]Real prices are expressed in 1987 dollars.

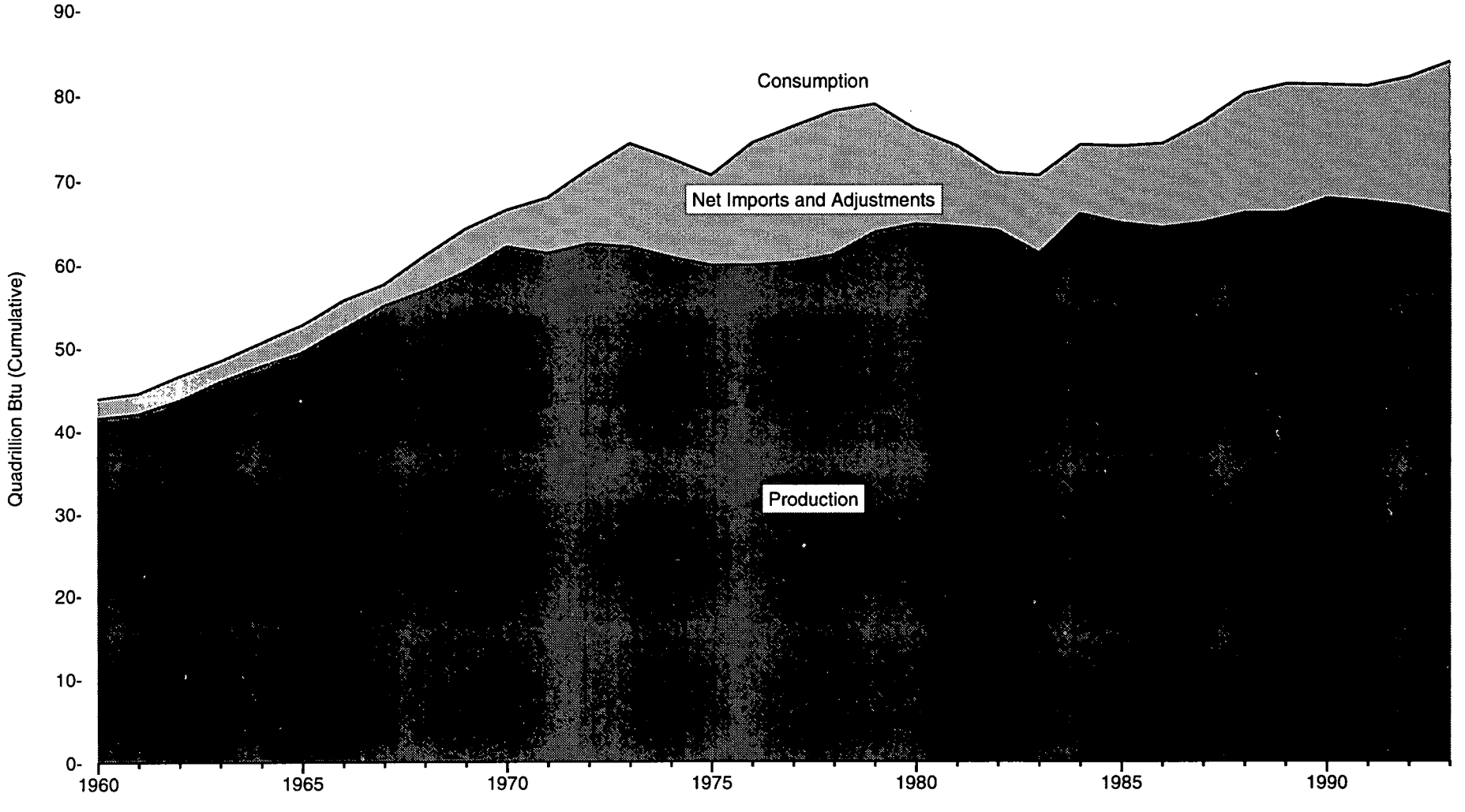
Diagram 1. Total Energy Flow, 1993

(Quadrillion Btu)



[a]Stock changes, losses, and unaccounted for.
[b]Other liquids, net stock change, refinery processing gain, and unaccounted for.
[c]Supplemental gaseous fuels, net storage withdrawals, and balancing item.
Notes: • Data are preliminary. • Totals may not equal sum of components due to independent rounding; the use of preliminary conversion factors; and unaccounted for quantities.
Sources: Tables 1.2 and *Monthly Energy Review*, March 1994, Tables 1.5 and 2.1.

Figure 1.1 Energy Overview, 1960-1993



Sources: Tables 1.2 and 1.3.

Table 1.1 Energy Overview, Selected Years, 1960-1993

(Quadrillion Btu)

Activity and Energy Source	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 [P]
Production	41.49	49.34	62.07	59.86	64.76	64.42	63.96	61.28	65.96	64.87	64.35	64.95	66.10	66.13	67.85	[R]67.48	[R]66.85	65.81
Coal	10.82	13.06	14.61	14.99	18.60	18.38	18.64	17.25	19.72	19.33	19.51	20.14	20.74	21.35	22.46	21.59	[R]21.59	20.49
Natural Gas (Dry)	12.66	15.78	21.67	19.64	19.91	19.70	18.32	16.59	18.01	16.98	16.54	17.14	17.60	17.85	18.36	[R]18.23	[R]18.38	18.98
Crude Oil [1]	14.93	16.52	20.40	17.73	18.25	18.15	18.31	18.39	18.85	18.99	18.38	17.67	17.28	16.12	15.57	15.70	[R]15.22	14.48
Natural Gas Plant Liquids	1.46	1.88	2.51	2.37	2.25	2.31	2.19	2.18	2.27	2.24	2.15	2.22	2.26	2.16	2.17	2.31	2.36	2.40
Nuclear Electric Power	0.01	0.04	0.24	1.90	2.74	3.01	3.13	3.20	3.55	4.15	4.47	4.91	5.66	5.68	6.16	6.58	[R]6.61	6.52
Hydroelectric Power [2]	1.61	2.06	2.63	3.15	2.90	2.76	3.27	3.53	3.39	2.97	3.07	2.63	2.33	2.77	2.93	2.88	[R]2.50	2.76
Other [3]	([4])	0.01	0.02	0.07	0.11	0.13	0.11	0.13	0.17	0.21	0.23	0.24	0.23	0.22	0.20	0.19	0.19	0.18
Imports	4.23	5.92	8.39	14.11	15.97	13.97	12.09	12.03	12.77	12.10	14.44	15.76	17.56	18.95	18.99	18.58	[R]19.65	21.19
Natural Gas	0.16	0.47	0.85	0.98	1.01	0.92	0.95	0.94	0.85	0.95	0.75	0.99	1.30	1.39	1.55	1.80	[R]2.16	2.29
Crude Oil [5]	2.20	2.65	2.81	8.72	11.19	9.34	7.42	7.08	7.30	6.81	9.00	10.07	11.03	12.60	12.77	12.55	[R]13.25	14.63
Petroleum Products[6]	1.80	2.75	4.66	4.23	3.46	3.30	3.36	3.57	4.13	3.80	4.20	4.10	4.72	4.57	4.35	3.79	[R]3.71	3.67
Other [7]	0.07	0.04	0.07	0.19	0.31	0.42	0.36	0.44	0.49	0.54	0.49	0.61	0.52	0.40	0.32	0.43	[R]0.52	0.60
Exports	1.48	1.85	2.66	2.36	3.72	4.33	4.63	3.72	3.80	4.23	4.06	3.85	4.42	4.77	4.91	5.22	[R]5.02	4.31
Coal	1.02	1.38	1.94	1.76	2.42	2.94	2.79	2.04	2.15	2.44	2.25	2.09	2.50	2.64	2.77	2.85	2.68	1.95
Crude Oil	0.43	0.39	0.55	0.44	1.16	1.26	1.73	1.57	1.54	1.66	1.67	1.63	1.74	1.84	1.82	2.13	2.01	2.11
Other [8]	0.03	0.09	0.18	0.16	0.14	0.12	0.11	0.11	0.11	0.14	0.14	0.13	0.18	0.29	0.31	0.24	[R]0.33	0.25
Adjustments [9]	-0.43	-0.72	-1.37	-1.07	-1.05	-0.08	-0.57	0.94	-0.78	1.24	-0.44	0.03	0.96	1.02	-0.67	[R]0.28	[R]0.66	1.27
Consumption	43.80	52.68	66.43	70.55	75.96	73.99	70.85	70.52	74.14	73.98	74.30	76.89	80.22	81.33	81.26	[R]81.12	[R]82.14	83.96
Coal	9.84	11.58	12.26	12.66	15.42	15.91	15.32	15.89	17.07	17.48	17.26	18.01	18.85	18.93	19.10	18.77	[R]18.87	19.63
Natural Gas [10]	12.39	15.77	21.79	19.95	20.39	19.93	18.51	17.36	18.51	17.83	16.71	17.74	18.55	19.38	19.30	[R]19.61	[R]20.13	20.79
Petroleum [11]	19.92	23.25	29.52	32.73	34.20	31.93	30.23	30.05	31.05	30.92	32.20	32.87	34.22	34.21	33.55	32.85	[R]33.53	33.77
Nuclear Electric Power	0.01	0.04	0.24	1.90	2.74	3.01	3.13	3.20	3.55	4.15	4.47	4.91	5.66	5.68	6.16	6.58	[R]6.61	6.52
Hydroelectric Power [12]	1.66	2.06	2.65	3.22	3.12	3.11	3.57	3.90	3.80	3.40	3.45	3.12	2.66	2.88	2.95	3.12	2.79	3.06
Other [13]	([4])	-0.01	-0.04	0.09	0.08	0.11	0.09	0.12	0.16	0.20	0.21	0.25	0.27	0.25	0.21	0.20	0.22	0.20

[1] Includes lease condensate.
[2] Electric utility and industrial generation.
[3] "Other" production is electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.
[4] Less than 0.005 quadrillion Btu.
[5] Includes imports of crude oil for the Strategic Petroleum Reserve, which began in 1977.
[6] Includes imports of unfinished oils and natural gas plant liquids.
[7] "Other" imports are coal, electricity, and coal coke.
[8] "Other" exports are natural gas, petroleum products, electricity, and coal coke.
[9] A balancing item. Includes stock changes, losses, gains, miscellaneous blending components, and unaccounted for supply.
[10] Includes supplemental gaseous fuels.
[11] Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.
[12] Electric utility and industrial generation, and net imports of electricity.
[13] "Other" consumption is net imports of coal coke and electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

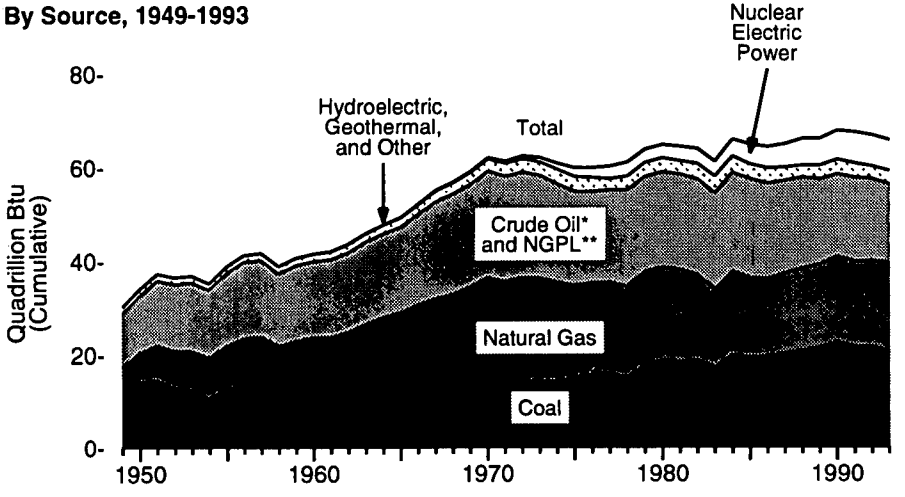
R=Revised data. P=Preliminary data.

Notes: • Due to a lack of consistent historical data, some renewable energy sources are not included. For 1992 consumption, 3.0 quadrillion Btu of renewable energy consumed by U.S. electric utilities to generate electricity for distribution is included, but an estimated 3.0 quadrillion Btu of renewable energy used by other sectors in the United States is not included. See Table 10.1. • Totals may not equal sum of components due to independent rounding.

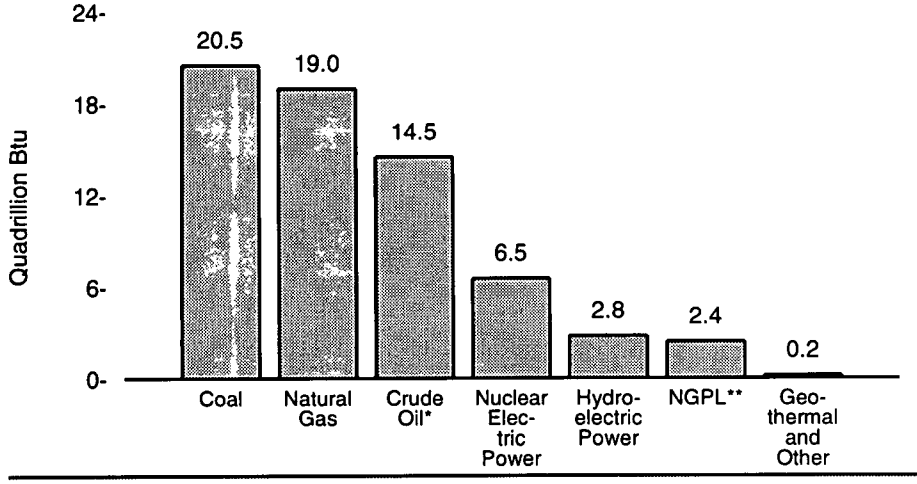
Sources: Tables 5.1, 6.1, 7.1, 7.7, 8.1, and 8.3, Energy Information Administration estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 1.2 Energy Production by Source

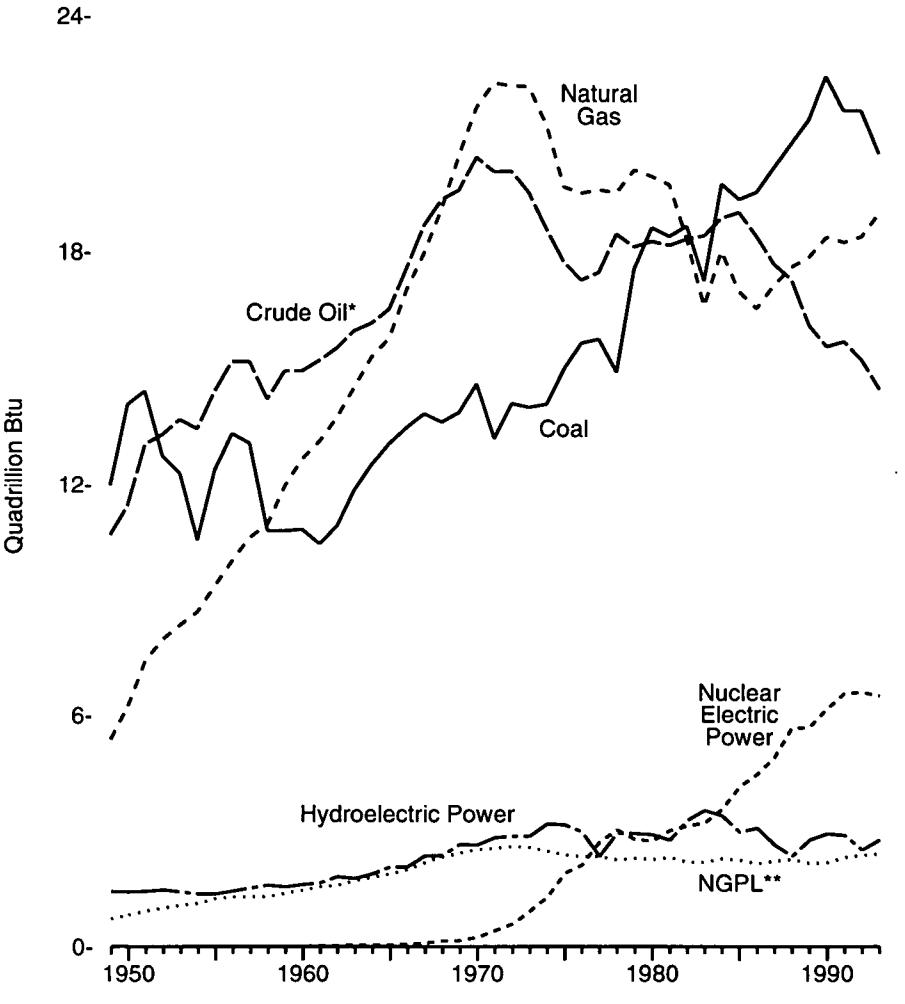
By Source, 1949-1993



By Source, 1993



By Major Source, 1949-1993



*Includes lease condensate. **Natural gas plant liquids.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 1.2.

Table 1.2 Energy Production by Source, 1949-1993

(Quadrillion Btu, Except as Noted)

Year	Coal	Natural Gas (Dry)	Crude Oil [1]	Natural Gas Plant Liquids	Nuclear Electric Power [2]	Hydroelectric Power [3]	Geothermal Energy	Other [4]	Total	Percent Change [5]
1949	11.97	5.38	10.68	0.71	0.00	1.42	0.00	0.01	30.18	—
1950	14.06	6.23	11.45	0.82	0.00	1.42	0.00	0.01	33.98	12.6
1951	14.42	7.42	13.04	0.92	0.00	1.42	0.00	0.01	37.22	9.5
1952	12.73	7.96	13.28	1.00	0.00	1.47	0.00	0.01	36.45	-2.1
1953	12.28	8.34	13.67	1.06	0.00	1.41	0.00	0.01	36.77	0.9
1954	10.54	8.68	13.43	1.11	0.00	1.36	0.00	(6)	35.13	-4.5
1955	12.37	9.34	14.41	1.24	0.00	1.36	0.00	(6)	38.73	10.2
1956	13.31	10.00	15.18	1.28	0.00	1.43	0.00	(6)	41.21	6.4
1957	13.06	10.61	15.18	1.29	(6)	1.52	0.00	(6)	41.65	1.1
1958	10.78	10.94	14.20	1.29	(6)	1.59	0.00	(6)	38.81	-6.8
1959	10.78	11.95	14.93	1.38	(6)	1.55	0.00	(6)	40.60	4.6
1960	10.82	12.66	14.93	1.46	0.01	1.61	(6)	(6)	41.49	2.2
1961	10.45	13.10	15.21	1.55	0.02	1.66	(6)	(6)	41.99	1.2
1962	10.90	13.72	15.52	1.59	0.03	1.82	(6)	(6)	43.58	3.8
1963	11.85	14.51	15.97	1.71	0.04	1.77	(6)	(6)	45.85	5.2
1964	12.52	15.30	16.16	1.80	0.04	1.89	(6)	(6)	47.72	4.1
1965	13.06	15.78	16.52	1.88	0.04	2.06	(6)	(6)	49.34	3.4
1966	13.47	17.01	17.56	2.00	0.06	2.06	(6)	(6)	52.17	5.7
1967	13.83	17.94	18.65	2.18	0.09	2.35	0.01	(6)	55.04	5.5
1968	13.61	19.07	19.31	2.32	0.14	2.35	0.01	(6)	56.81	3.2
1969	13.86	20.45	19.56	2.42	0.15	2.65	0.01	(6)	59.10	4.0
1970	14.61	21.67	20.40	2.51	0.24	2.63	0.01	(6)	62.07	5.0
1971	13.19	22.28	20.03	2.54	0.41	2.82	0.01	(6)	61.29	-1.3
1972	14.09	22.21	20.04	2.60	0.58	2.86	0.03	(6)	62.42	1.8
1973	13.99	22.19	19.49	2.57	0.91	2.86	0.04	(6)	62.06	-0.6
1974	14.07	21.21	18.57	2.47	1.27	3.18	0.05	(6)	60.84	-2.0
1975	14.99	19.64	17.73	2.37	1.90	3.15	0.07	(6)	59.86	-1.6
1976	15.65	19.48	17.26	2.33	2.11	2.98	0.08	(6)	59.89	0.1
1977	15.76	19.57	17.45	2.33	2.70	2.33	0.08	0.01	60.22	0.5
1978	14.91	19.49	18.43	2.25	3.02	2.94	0.06	(6)	61.10	1.5
1979	17.54	20.08	18.10	2.29	2.78	2.93	0.08	0.01	63.80	4.4
1980	18.60	19.91	18.25	2.25	2.74	2.90	0.11	(6)	64.76	1.5
1981	18.38	19.70	18.15	2.31	3.01	2.76	0.12	(6)	64.42	-0.5
1982	18.64	18.32	18.31	2.19	3.13	3.27	0.10	(6)	63.96	-0.7
1983	17.25	16.59	18.39	2.18	3.20	3.53	0.13	(6)	61.28	-4.2
1984	19.72	18.01	18.85	2.27	3.55	3.39	0.16	0.01	65.96	7.6
1985	19.33	16.98	18.99	2.24	4.15	2.97	0.20	0.01	64.87	-1.7
1986	19.51	16.54	18.38	2.15	4.47	3.07	0.22	0.01	64.35	-0.8
1987	20.14	17.14	17.67	2.22	4.91	2.63	0.23	0.02	64.95	0.9
1988	20.74	17.60	17.28	2.26	5.66	2.33	0.22	0.02	66.10	1.8
1989	21.35	17.85	16.12	2.16	5.68	2.77	0.20	0.02	66.13	(7)
1990	22.46	18.36	15.57	2.17	6.16	2.93	0.18	0.02	67.85	2.6
1991	21.59	R18.23	15.70	2.31	6.58	2.88	0.17	0.02	R67.48	-0.5
1992	R21.59	R18.38	R15.22	2.36	R6.61	R2.50	0.17	0.02	R66.85	R-0.9
1993P	20.49	18.98	14.48	2.40	6.52	2.76	0.16	0.02	65.81	-1.6

[1] Includes lease condensate.
[2] See Note 1 at end of section.
[3] Electric utility and industrial generation. See Note 1 at end of section.
[4] "Other" production is electricity generated from wood, waste, wind, photovoltaic, and solar thermal energy. Converted to Btu by applying national average heat rates for fossil-fueled steam-electric plants.
[5] Percent change from previous year calculated from data prior to rounding.
[6] Less than 0.005 quadrillion Btu.
[7] Less than 0.05 percent.

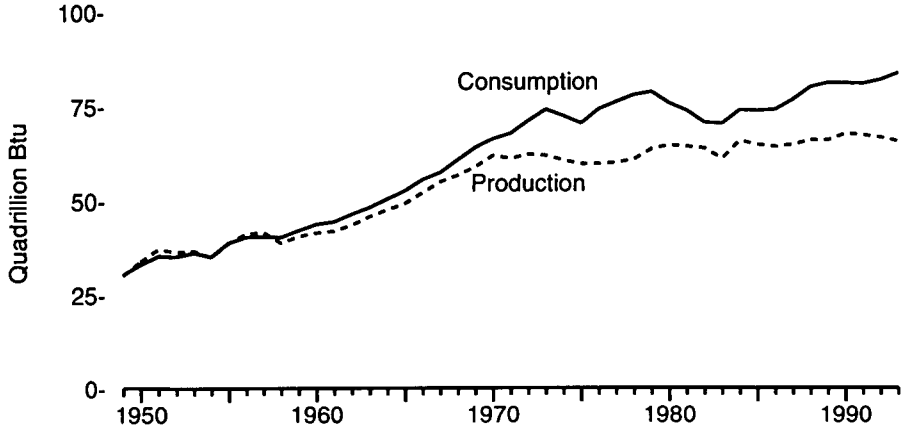
R=Revised data. P=Preliminary data. – = Not applicable.

Notes: • Due to a lack of consistent historical data, some renewable energy sources are not included. For 1992 consumption, 3.0 quadrillion Btu of renewable energy consumed by U.S. electric utilities to generate electricity for distribution is included, but an estimated 3.0 quadrillion Btu of renewable energy used by other sectors in the United States is not included. See Table 10.1. • Totals may not equal sum of components due to independent rounding.

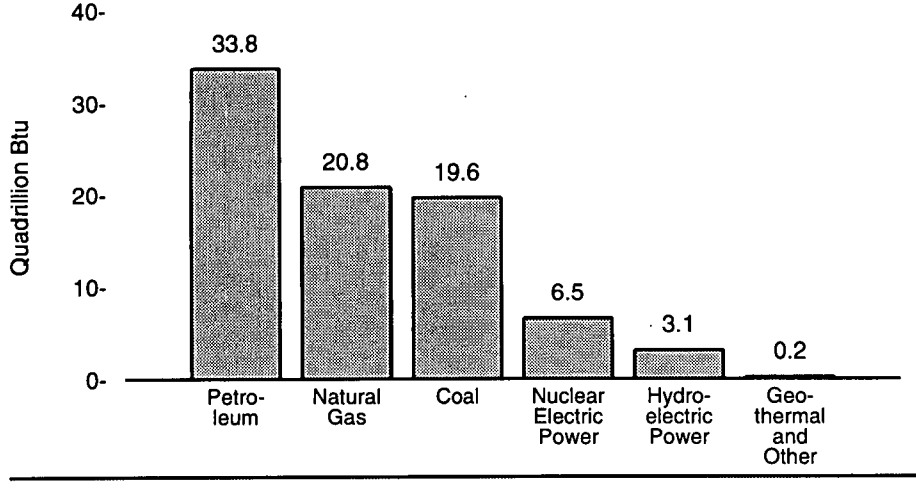
Sources: Tables 5.1, 6.1, 7.2, and 8.3, Energy Information Administration estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 1.3 Energy Consumption by Source

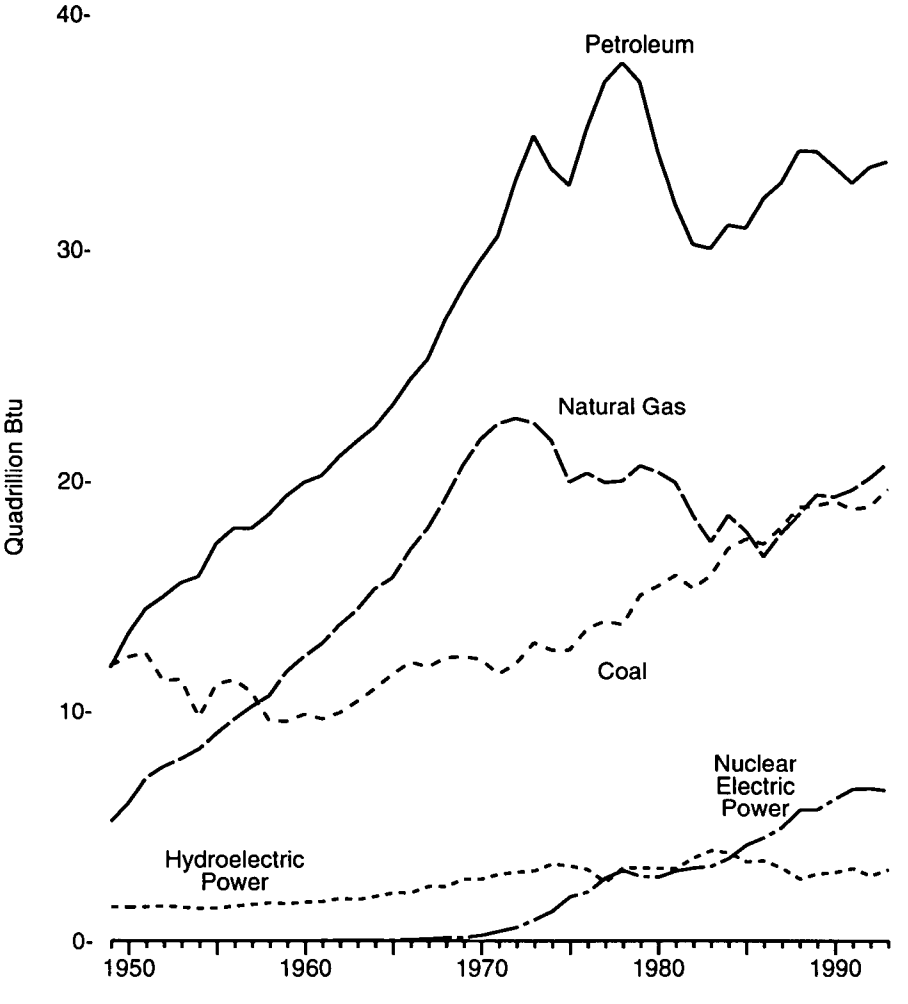
Consumption and Production, 1949-1993



By Source, 1993



By Major Source, 1949-1993



Note: Because vertical scales differ, graphs should not be compared.

Sources: Tables 1.2 and 1.3.

Table 1.3 Energy Consumption by Source, 1949-1993

(Quadrillion Btu, Except as Noted)

Year	Coal	Natural Gas [1]	Petroleum [2]	Nuclear Electric Power	Hydroelectric Power [3]	Geothermal Energy	Other [4]	Total	Percent Change [5]
1949	11.98	5.15	11.88	0.00	1.45	0.00	([6])	30.46	—
1950	12.35	5.97	13.32	0.00	1.44	0.00	0.01	33.08	8.6
1951	12.55	7.05	14.43	0.00	1.45	0.00	-0.02	35.47	7.2
1952	11.31	7.55	14.96	0.00	1.50	0.00	-0.01	35.30	-0.5
1953	11.37	7.91	15.56	0.00	1.44	0.00	([6])	36.27	2.7
1954	9.71	8.33	15.84	0.00	1.39	0.00	([6])	35.27	-2.8
1955	11.17	9.00	17.25	0.00	1.41	0.00	-0.01	38.82	10.1
1956	11.35	9.61	17.94	0.00	1.49	0.00	-0.01	40.38	4.0
1957	10.82	10.19	17.93	([6])	1.56	0.00	-0.02	40.48	0.3
1958	9.53	10.66	18.53	([6])	1.63	0.00	([6])	40.35	-0.3
1959	9.52	11.72	19.32	([6])	1.59	0.00	-0.01	42.14	4.4
1960	9.84	12.39	19.92	0.01	1.66	([6])	([6])	43.80	3.9
1961	9.62	12.93	20.22	0.02	1.68	([6])	-0.01	44.46	1.5
1962	9.91	13.73	21.05	0.03	1.82	([6])	([6])	46.53	4.7
1963	10.41	14.40	21.70	0.04	1.77	([6])	-0.01	48.32	3.9
1964	10.96	15.29	22.30	0.04	1.91	([6])	-0.01	50.50	4.5
1965	11.58	15.77	23.25	0.04	2.06	([6])	-0.02	52.68	4.3
1966	12.14	17.00	24.40	0.06	2.07	([6])	-0.02	55.66	5.6
1967	11.91	17.94	25.28	0.09	2.34	0.01	-0.01	57.57	3.4
1968	12.33	19.21	26.98	0.14	2.34	0.01	-0.01	61.00	6.0
1969	12.38	20.68	28.34	0.15	2.66	0.01	-0.03	64.19	5.2
1970	12.26	21.79	29.52	0.24	2.65	0.01	-0.05	66.43	3.5
1971	11.60	22.47	30.56	0.41	2.86	0.01	-0.03	67.89	2.2
1972	12.08	22.70	32.95	0.58	2.94	0.03	-0.02	71.26	5.0
1973	12.97	22.51	34.84	0.91	3.01	0.04	([6])	74.28	4.2
1974	12.66	21.73	33.45	1.27	3.31	0.05	0.06	72.54	-2.3
1975	12.66	19.95	32.73	1.90	3.22	0.07	0.02	70.55	-2.8
1976	13.58	20.35	35.17	2.11	3.07	0.08	([6])	74.36	5.4
1977	13.92	19.93	37.12	2.70	2.51	0.08	0.02	76.29	2.6
1978	13.77	20.00	37.97	3.02	3.14	0.06	0.13	78.09	2.4
1979	15.04	20.67	37.12	2.78	3.14	0.08	0.07	78.90	1.0
1980	15.42	20.39	34.20	2.74	3.12	0.11	-0.03	75.96	-3.7
1981	15.91	19.93	31.93	3.01	3.11	0.12	-0.01	73.99	-2.6
1982	15.32	18.51	30.23	3.13	3.57	0.10	-0.02	70.85	-4.2
1983	15.89	17.36	30.05	3.20	3.90	0.13	-0.01	70.52	-0.5
1984	17.07	18.51	31.05	3.55	3.80	0.16	([6])	74.14	5.1
1985	17.48	17.83	30.92	4.15	3.40	0.20	([6])	73.98	-0.2
1986	17.26	16.71	32.20	4.47	3.45	0.22	([6])	74.30	0.4
1987	18.01	17.74	32.87	4.91	3.12	0.23	0.02	76.89	3.5
1988	18.85	18.55	34.22	5.66	2.66	0.22	0.06	80.22	4.3
1989	18.93	19.38	34.21	5.68	2.88	0.20	0.05	81.33	1.4
1990	19.10	19.30	33.55	6.16	2.95	0.18	0.03	81.26	-0.1
1991	18.77	[R]19.61	32.85	6.58	3.12	0.17	0.03	[R]81.12	-0.2
1992	[R]18.87	[R]20.13	[R]33.53	[R]6.61	2.79	0.17	0.05	[R]82.14	1.3
1993[P]	19.63	20.79	33.77	6.52	3.06	0.16	0.04	83.96	2.2

[1] Includes supplemental gaseous fuels.

[2] Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.

[3] Electric utility and industrial generation, and net imports of electricity.

[4] "Other" consumption is net imports of coal coke and electricity generated for distribution from wood, waste, wind, photovoltaic, and solar thermal energy. Converted to Btu by applying national average heat rates for fossil-fueled steam-electric plants.

[5] Percent change from previous year calculated from data prior to rounding.

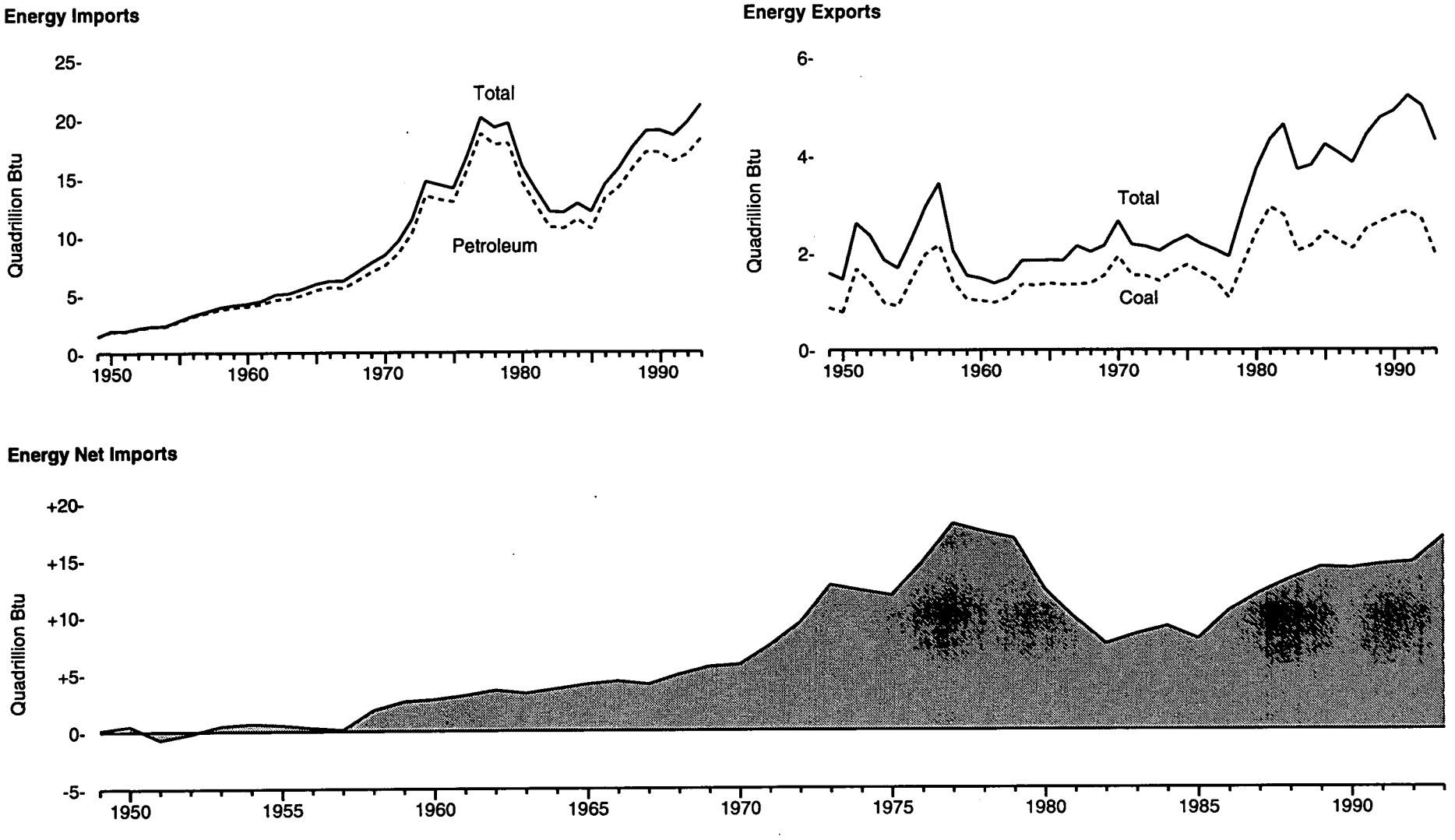
[6] Less than 0.005 quadrillion Btu.

R=Revised data. P=Preliminary data. — = Not applicable.

Notes: • Due to a lack of consistent historical data, some consumption of renewable energy sources is not included. In 1992, 3.0 quadrillion Btu of renewable energy consumed by U.S. electric utilities to generate electricity for distribution is included, but an estimated 3.0 quadrillion Btu of renewable energy used by other sectors in the United States is not included. See Table 10.1. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 5.1, 6.1, 7.1, 7.7, 8.1, and 8.2, Energy Information Administration estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 1.4 Energy Imports, Exports, and Net Imports, 1949-1993



Notes: • Negative net imports are net exports. • Because vertical scales differ, graphs should not be compared.

Source: Table 1.4.

Table 1.4 Energy Imports, Exports, and Net Imports, 1949-1993

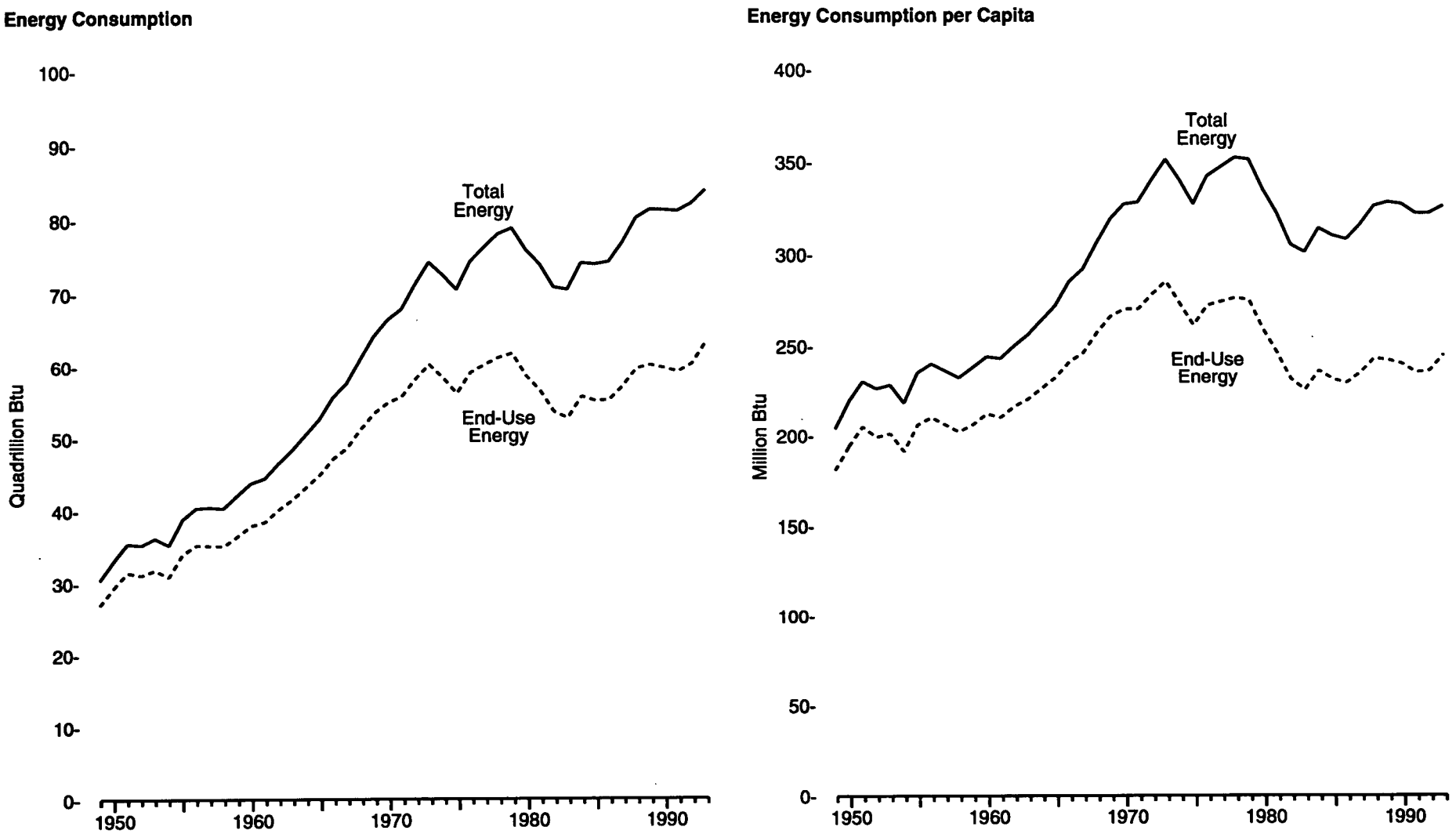
(Quadrillion Btu)

Year	Imports					Exports					Net Imports [1]				
	Coal	Natural Gas (Dry)	Petroleum [2]	Other [3]	Total	Coal	Natural Gas (Dry)	Petroleum	Other [3]	Total	Coal	Natural Gas (Dry)	Petroleum [2]	Other [3]	Total
1949	0.01	0.00	1.43	0.03	1.47	0.88	0.02	0.68	0.02	1.59	-0.87	-0.02	0.75	0.02	-0.13
1950	0.01	0.00	1.89	0.04	1.93	0.79	0.03	0.64	0.01	1.47	-0.78	-0.03	1.24	0.03	0.47
1951	0.01	0.00	1.87	0.04	1.92	1.68	0.03	0.89	0.03	2.62	-1.67	-0.03	0.98	0.01	-0.71
1952	0.01	0.01	2.11	0.04	2.17	1.40	0.03	0.91	0.02	2.37	-1.40	-0.02	1.20	0.02	-0.20
1953	0.01	0.01	2.28	0.04	2.34	0.98	0.03	0.84	0.02	1.87	-0.97	-0.02	1.44	0.02	0.47
1954	0.01	0.01	2.32	0.04	2.37	0.91	0.03	0.75	0.01	1.70	-0.91	-0.02	1.58	0.02	0.67
1955	0.01	0.01	2.75	0.06	2.83	1.46	0.03	0.77	0.02	2.29	-1.46	-0.02	1.98	0.04	0.54
1956	0.01	0.01	3.17	0.06	3.25	1.98	0.04	0.91	0.02	2.95	-1.98	-0.03	2.26	0.04	0.30
1957	0.01	0.04	3.46	0.06	3.57	2.17	0.04	1.20	0.03	3.45	-2.16	(4)	2.26	0.02	0.12
1958	0.01	0.14	3.72	0.05	3.92	1.42	0.04	0.58	0.02	2.06	-1.41	0.10	3.14	0.03	1.86
1959	0.01	0.14	3.91	0.05	4.11	1.05	0.02	0.45	0.02	1.54	-1.04	0.12	3.46	0.03	2.57
1960	0.01	0.16	4.00	0.06	4.23	1.02	0.01	0.43	0.02	1.48	-1.02	0.15	3.57	0.04	2.74
1961	(4)	0.23	4.19	0.04	4.46	0.98	0.01	0.37	0.02	1.38	-0.98	0.22	3.82	0.02	3.08
1962	0.01	0.42	4.56	0.03	5.01	1.08	0.02	0.36	0.03	1.48	-1.08	0.40	4.20	(4)	3.53
1963	0.01	0.42	4.65	0.03	5.10	1.36	0.02	0.44	0.03	1.85	-1.35	0.40	4.21	-0.01	3.25
1964	0.01	0.46	4.96	0.07	5.49	1.34	0.02	0.43	0.06	1.84	-1.33	0.44	4.53	0.01	3.65
1965	(4)	0.47	5.40	0.04	5.92	1.38	0.03	0.39	0.06	1.85	-1.37	0.44	5.01	-0.02	4.06
1966	(4)	0.50	5.63	0.05	6.18	1.35	0.03	0.41	0.06	1.85	-1.35	0.47	5.21	-0.01	4.32
1967	0.01	0.58	5.56	0.04	6.19	1.35	0.08	0.65	0.06	2.15	-1.35	0.50	4.91	-0.02	4.04
1968	0.01	0.67	6.21	0.04	6.93	1.38	0.10	0.49	0.06	2.03	-1.37	0.58	5.73	-0.02	4.90
1969	(4)	0.75	6.90	0.06	7.71	1.53	0.05	0.49	0.08	2.15	-1.53	0.70	6.42	-0.02	5.56
1970	(4)	0.85	7.47	0.07	8.39	1.94	0.07	0.55	0.11	2.66	-1.93	0.77	6.92	-0.04	5.72
1971	(4)	0.96	8.54	0.08	9.58	1.55	0.08	0.47	0.07	2.18	-1.54	0.88	8.07	(4)	7.41
1972	(4)	1.05	10.30	0.11	11.46	1.53	0.08	0.47	0.06	2.14	-1.53	0.97	9.83	0.05	9.32
1973	(4)	1.06	13.47	0.20	14.73	1.43	0.08	0.49	0.06	2.05	-1.42	0.98	12.98	0.14	12.68
1974	0.05	0.99	13.13	0.25	14.41	1.62	0.08	0.46	0.06	2.22	-1.57	0.91	12.66	0.19	12.19
1975	0.02	0.98	12.95	0.16	14.11	1.76	0.07	0.44	0.08	2.36	-1.74	0.90	12.51	0.08	11.75
1976	0.03	0.99	15.67	0.15	16.84	1.60	0.07	0.47	0.06	2.19	-1.57	0.92	15.20	0.09	14.65
1977	0.04	1.04	18.76	0.26	20.09	1.44	0.06	0.51	0.06	2.07	-1.40	0.98	18.24	0.20	18.02
1978	0.07	0.99	17.82	0.36	19.25	1.08	0.05	0.77	0.03	1.93	-1.00	0.94	17.06	0.33	17.32
1979	0.05	1.30	17.93	0.33	19.62	1.75	0.06	1.00	0.06	2.87	-1.70	1.24	16.93	0.27	16.75
1980	0.03	1.01	14.66	0.28	15.97	2.42	0.05	1.16	0.09	3.72	-2.39	0.96	13.50	0.18	12.25
1981	0.03	0.92	12.64	0.39	13.97	2.94	0.06	1.26	0.06	4.33	-2.92	0.86	11.38	0.33	9.65
1982	0.02	0.95	10.78	0.35	12.09	2.79	0.05	1.73	0.06	4.63	-2.77	0.90	9.05	0.28	7.46
1983	0.03	0.94	10.65	0.41	12.03	2.04	0.06	1.57	0.05	3.72	-2.01	0.89	9.08	0.36	8.31
1984	0.03	0.85	11.43	0.46	12.77	2.15	0.06	1.54	0.05	3.80	-2.12	0.79	9.89	0.40	8.96
1985	0.05	0.95	10.61	0.49	12.10	2.44	0.06	1.66	0.08	4.23	-2.39	0.90	8.95	0.41	7.87
1986	0.06	0.75	13.20	0.43	14.44	2.25	0.06	1.67	0.08	4.06	-2.19	0.69	11.53	0.36	10.38
1987	0.04	0.99	14.16	0.57	15.76	2.09	0.05	1.63	0.08	3.85	-2.05	0.94	12.53	0.49	11.91
1988	0.05	1.30	15.75	0.47	17.56	2.50	0.07	1.74	0.10	4.42	-2.45	1.22	14.01	0.37	13.15
1989	0.07	1.39	17.16	0.33	18.95	2.64	0.11	1.84	0.18	4.77	-2.57	1.28	15.33	0.14	14.18
1990	0.07	1.55	17.12	0.25	18.99	2.77	0.09	1.82	0.23	4.91	-2.70	1.46	15.29	0.03	14.08
1991	0.08	1.80	16.35	0.35	18.58	2.85	0.13	2.13	0.11	5.22	-2.77	1.67	14.22	0.24	13.36
1992	0.10	R2.16	R16.97	R0.43	R19.65	2.68	R0.22	2.01	R0.11	R5.02	-2.59	R1.94	R14.96	R0.32	R14.63
1993P	0.18	2.29	18.30	0.42	21.19	1.95	0.14	2.11	0.10	4.31	-1.77	2.14	16.19	0.31	16.88

[1] Net imports = imports minus exports.
[2] Includes imports into the Strategic Petroleum Reserve, which began in 1977.
[3] Coal coke and small amounts of electricity transmitted across U.S. borders with Canada and Mexico.
[4] Less than 0.005 quadrillion Btu.
R=Revised data. P=Preliminary data.

Notes: • Includes trade between the United States (50 States and the District of Columbia) and its territories and possessions. • Totals or net import items may not equal sum of components due to independent rounding.
Sources: Tables 5.1, 5.5, 6.1, 7.1, 7.7, and 8.1 and conversion factors in Appendix A.

Figure 1.5 Energy Consumption and Energy Consumption per Capita, 1949-1993



Source: Table 1.5.

Table 1.5 Energy Consumption and Energy Consumption per Capita, 1949-1993

Year	Total Energy Consumption (quadrillion Btu)	End-Use Energy Consumption [1] (quadrillion Btu)	Population [2] (million)	Consumption per Capita			
				Total Energy		End-Use Energy [1]	
				Quantity (million Btu)	Change from Previous Year (percent) [3]	Quantity (million Btu)	Change from Previous Year (percent) [3]
1949	30.46	26.97	149.3	204	—	181	—
1950	33.08	29.37	151.3	219	7.4	194	7.2
1951	35.47	31.50	154.0	230	5.0	205	5.7
1952	35.30	31.16	156.4	226	-1.7	199	-2.9
1953	36.27	31.87	159.0	228	0.9	201	1.0
1954	35.27	30.92	161.9	218	-4.4	191	-5.0
1955	38.82	34.02	165.1	235	7.8	206	7.9
1956	40.38	35.26	168.1	240	2.1	210	1.9
1957	40.48	35.19	171.2	236	-1.7	206	-1.9
1958	40.35	35.13	174.1	232	-1.7	202	-1.9
1959	42.14	36.53	177.1	238	2.6	206	2.0
1960	43.80	37.96	179.3	244	2.5	212	2.9
1961	44.46	38.46	183.0	243	-0.4	210	-0.9
1962	46.53	40.15	185.8	250	2.9	216	2.9
1963	48.32	41.54	188.5	256	2.4	220	1.9
1964	50.50	43.22	191.1	264	3.1	226	2.7
1965	52.68	44.93	193.5	272	3.0	232	2.7
1966	55.66	47.20	195.6	285	4.8	241	3.9
1967	57.57	48.62	197.5	292	2.5	246	2.1
1968	61.00	51.22	199.4	306	4.8	257	4.5
1969	64.19	53.49	201.4	319	4.2	266	3.5
1970	66.43	54.91	203.2	327	2.5	270	1.5
1971	67.89	55.75	206.8	328	0.3	270	0.0
1972	71.26	58.18	209.3	340	3.7	278	3.0
1973	74.28	60.27	211.4	351	3.2	285	2.5
1974	72.54	58.34	213.3	340	-3.1	273	-4.2
1975	70.55	56.16	215.5	327	-3.8	261	-4.4
1976	74.36	59.12	217.6	342	4.6	272	4.2
1977	76.29	60.22	219.8	347	1.5	274	0.7
1978	78.09	61.24	222.1	352	1.4	276	0.7
1979	78.90	61.83	224.6	351	-0.3	275	-0.4
1980	75.96	58.59	226.5	335	-4.6	259	-5.8
1981	73.99	56.55	229.6	322	-3.9	246	-5.0
1982	70.85	53.63	232.0	305	-5.3	231	-6.1
1983	70.52	52.78	234.3	301	-1.3	225	-2.6
1984	74.14	55.74	236.5	314	4.3	236	4.9
1985	73.98	55.12	238.7	310	-1.3	231	-2.1
1986	74.30	55.26	241.1	308	-0.6	229	-0.9
1987	76.89	57.16	243.4	316	2.6	235	2.6
1988	80.22	59.66	245.8	326	3.2	243	3.4
1989	81.33	60.14	248.2	328	0.6	242	-0.4
1990	81.26	59.72	248.7	327	-0.3	240	-0.8
1991	R81.12	R59.18	R252.1	322	-1.5	235	-2.1
1992	R82.14	R60.31	255.1	R322	0.0	R236	R0.4
1993P	83.96	63.30	257.9	326	1.2	245	3.8

[1] End-use energy consumption is total energy consumption less losses incurred in the generation, transmission, and distribution of electricity, less power plant electricity use and unaccounted for electrical system energy losses. (See Glossary.)

[2] Resident population of the 50 States and the District of Columbia estimated for July 1 of each year, except for the April 1 census count in 1950, 1960, 1970, 1980, and 1990.

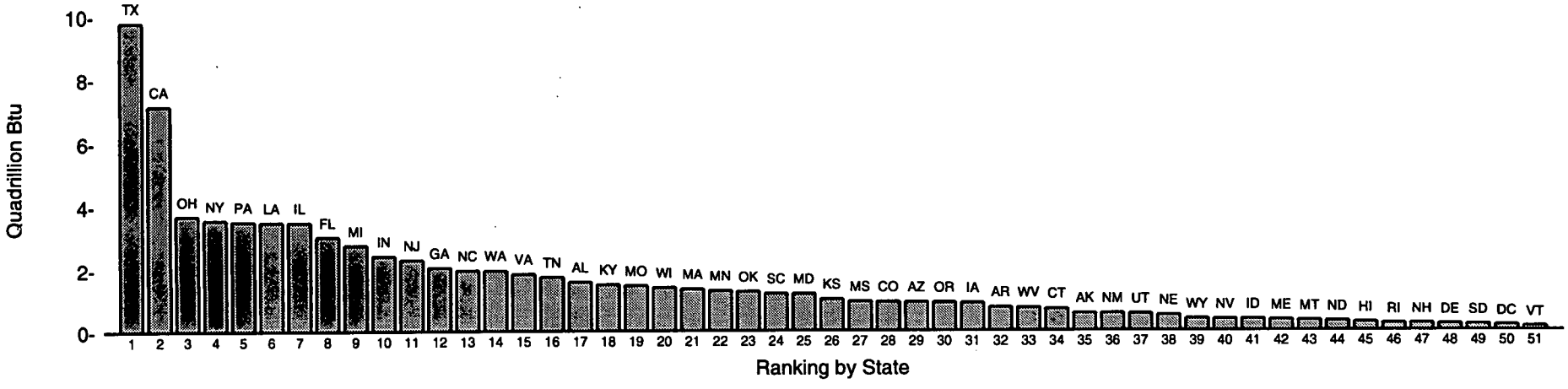
[3] Percent change calculated from data prior to rounding.

R=Revised data. P=Preliminary data. — = Not applicable.

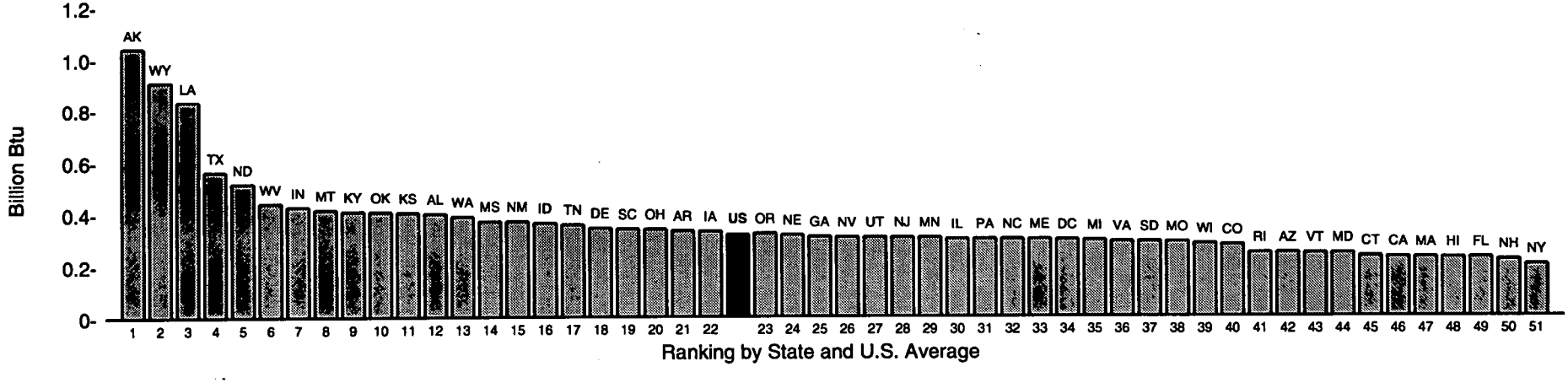
Sources: **Total Energy Consumption:** Table 1.3. **End-Use Energy Consumption:** Table 1.3. **Population:** • 1949—Bureau of the Census, *Current Population Reports*, "Population Estimates and Projections," Series P-25, No. 802, May 1979. • 1950-1980—Bureau of the Census, *Current Population Reports*, "Population Estimates and Projections," Series P-25, No. 990, July 1986. • 1981 forward—unpublished data consistent with the Bureau of the Census Press Release CB93-204, December 1993. **Consumption per Capita:** Calculated by Energy Information Administration.

Figure 1.6 Energy Consumption and Consumption per Capita by State, 1992

Consumption



Consumption per Capita



Source: Table 1.6.

Table 1.6 Energy Consumption and Consumption per Capita by State, 1992

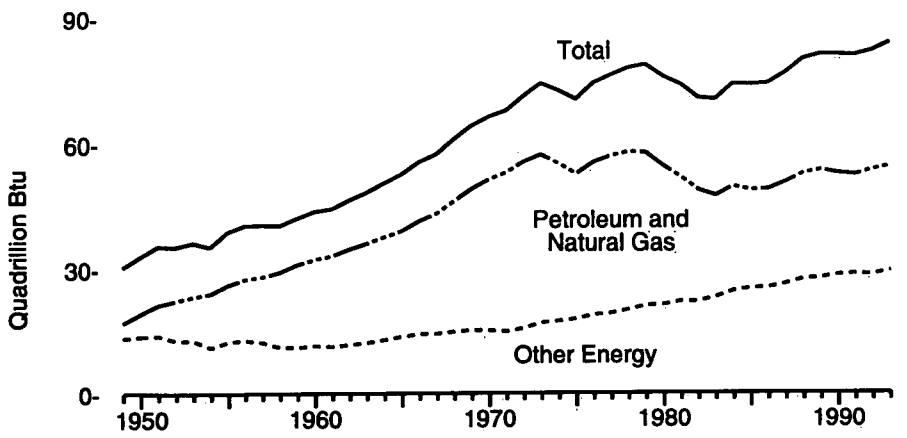
Rank	State	Consumption (Trillion Btu)	Rank	State	Consumption per Capita (Million Btu)
1	Texas	9,915.1	1	Alaska	1,040.0
2	California	7,092.3	2	Wyoming	908.1
3	Ohio	3,732.6	3	Louisiana	831.4
4	New York	3,616.0	4	Texas	560.7
5	Pennsylvania	3,597.0	5	North Dakota	516.1
6	Louisiana	3,557.5	6	West Virginia	439.0
7	Illinois	3,487.3	7	Indiana	425.6
8	Florida	3,066.4	8	Montana	414.3
9	Michigan	2,784.1	9	Kentucky	408.2
10	Indiana	2,407.8	10	Oklahoma	406.2
11	New Jersey	2,401.0	11	Kansas	403.0
12	Georgia	2,094.7	12	Alabama	399.5
13	North Carolina	2,018.9	13	Washington	387.2
14	Washington	1,991.2	14	Mississippi	370.0
15	Virginia	1,853.3	15	New Mexico	369.3
16	Tennessee	1,792.7	16	Idaho	362.6
17	Alabama	1,653.2	17	Tennessee	356.7
18	Kentucky	1,532.4	18	Delaware	343.7
19	Missouri	1,499.2	19	South Carolina	339.8
20	Wisconsin	1,404.3	20	Ohio	338.7
21	Massachusetts	1,369.5	21	Arkansas	332.5
22	Minnesota	1,369.1	22	Iowa	330.6
23	Oklahoma	1,302.0	23	Oregon	317.1
24	South Carolina	1,224.3	24	Nebraska	315.9
25	Maryland	1,203.7	25	Georgia	309.3
26	Kansas	1,013.5	26	Nevada	308.0
27	Mississippi	967.5	27	Utah	307.4
28	Colorado	958.9	28	New Jersey	307.0
29	Arizona	944.5	29	Minnesota	306.4
30	Oregon	942.4	30	Illinois	300.3
31	Iowa	926.7	31	Pennsylvania	299.9
32	Arkansas	796.0	32	North Carolina	299.7
33	West Virginia	794.2	33	Maine	299.6
34	Connecticut	761.7	34	District of Columbia	297.4
35	Alaska	611.5	35	Michigan	295.1
36	New Mexico	584.3	36	Virginia	289.8
37	Utah	556.8	37	South Dakota	289.4
38	Nebraska	505.8	38	Missouri	288.8
39	Wyoming	422.3	39	Wisconsin	281.2
40	Nevada	411.5	40	Colorado	276.8
41	Idaho	386.6	41	Rhode Island	246.6
42	Maine	370.3	42	Arizona	246.5
43	Montana	340.5	43	Vermont	244.9
44	North Dakota	327.2	44	Maryland	244.8
45	Hawaii	263.1	45	Connecticut	232.3
46	Rhode Island	246.8	46	California	229.6
47	New Hampshire	244.1	47	Massachusetts	228.5
48	Delaware	240.6	48	Hawaii	227.6
49	South Dakota	204.9	49	Florida	227.4
50	District of Columbia	174.0	50	New Hampshire	218.9
51	Vermont	139.9	51	New York	199.7
	United States	[1] **82,128.2**		**United States**	**322.0**

[1] The U.S. total differs from Table 1.3 due to the use of State-level conversion factors for coal and natural gas.

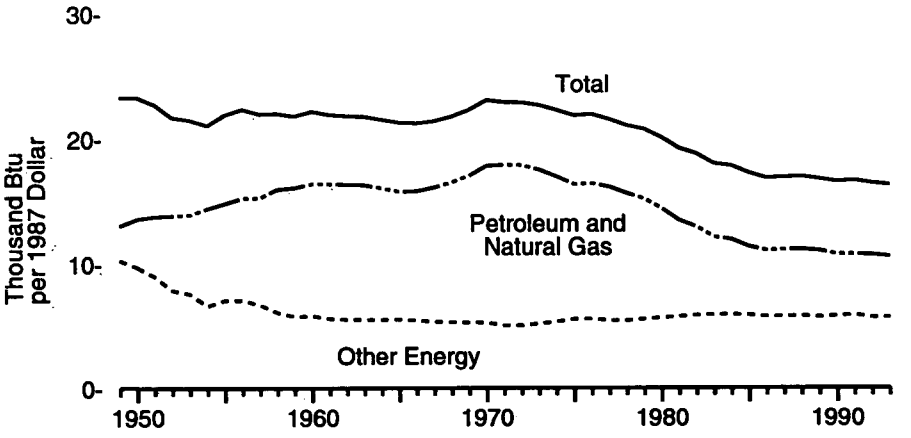
Source: Energy Information Administration, *State Energy Data Report 1992, Consumption Estimates* (May 1994).

Figure 1.7 Energy Consumption per Dollar of Gross Domestic Product

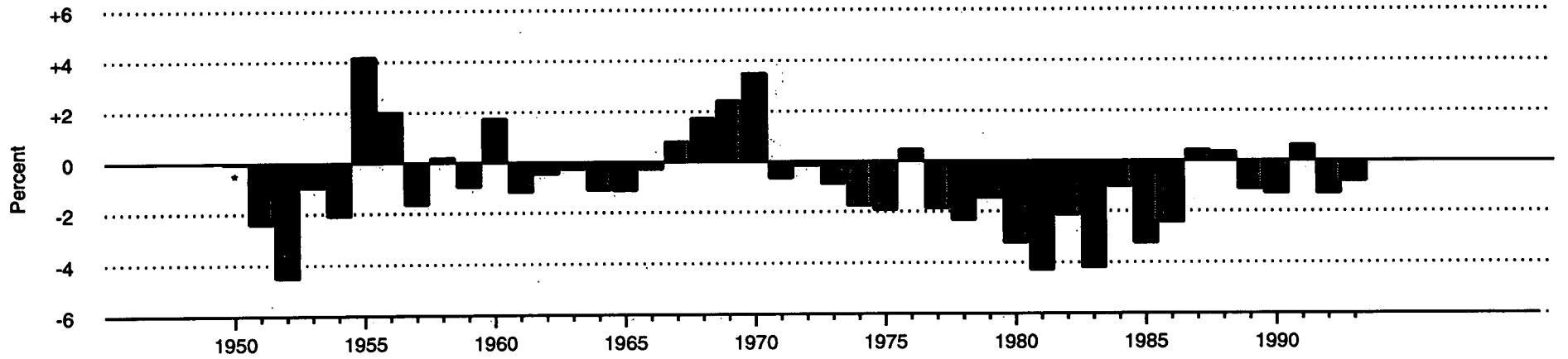
Energy Consumption, 1949-1993



Energy Consumption per Dollar of Gross Domestic Product, 1949-1993



Total Energy Consumption per Dollar of Gross Domestic Product, Change from Previous Year, 1950-1993



*Actual value is -0.04 percent.

Source: Table 1.7.

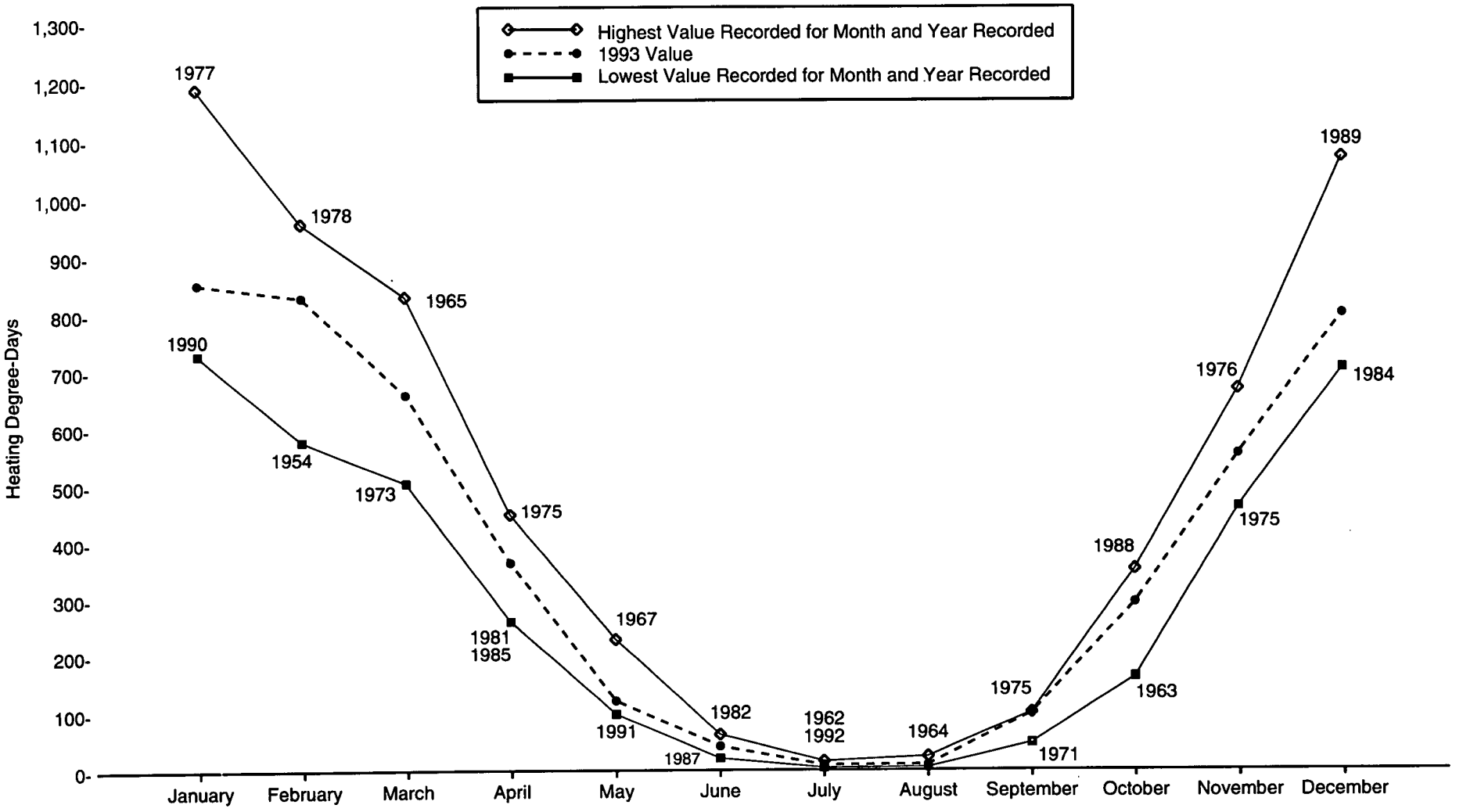
Table 1.7 Energy Consumption per Dollar of Gross Domestic Product, 1949-1993

Year	Energy Consumption			Gross Domestic Product (GDP)	Energy Consumption per Dollar of GDP			
	Petroleum and Natural Gas	Other Energy	Total		Petroleum and Natural Gas	Other Energy	Total	Change from Previous Year
	Quadrillion Btu			Billion 1987 Dollars	Thousand Btu per 1987 Dollar			Percent [1]
1949	17.03	13.43	30.46	1,305.5	13.04	10.29	23.33	—
1950	19.28	13.79	33.08	1,418.5	13.59	9.72	23.32	-0.0
1951	21.48	13.99	35.47	1,558.4	13.78	8.98	22.76	-2.4
1952	22.51	12.80	35.30	1,624.9	13.85	7.88	21.73	-4.5
1953	23.46	12.81	36.27	1,685.5	13.92	7.60	21.52	-1.0
1954	24.17	11.10	35.27	1,673.8	14.44	6.63	21.07	-2.1
1955	26.25	12.57	38.82	1,768.3	14.85	7.11	21.95	4.2
1956	27.55	12.83	40.38	1,803.6	15.28	7.11	22.39	2.0
1957	28.12	12.36	40.48	1,838.2	15.30	6.73	22.02	-1.7
1958	29.19	11.16	40.35	1,829.1	15.96	6.10	22.06	0.2
1959	31.04	11.10	42.14	1,928.8	16.09	5.76	21.85	-1.0
1960	32.30	11.50	43.80	1,970.8	16.39	5.83	22.23	1.7
1961	33.14	11.32	44.46	2,023.8	16.38	5.59	21.97	-1.2
1962	34.78	11.75	46.53	2,128.1	16.34	5.52	21.87	-0.5
1963	36.10	12.22	48.32	2,215.6	16.30	5.52	21.81	-0.3
1964	37.59	12.91	50.50	2,340.6	16.06	5.51	21.57	-1.1
1965	39.01	13.67	52.68	2,470.5	15.79	5.53	21.33	-1.1
1966	41.40	14.26	55.66	2,616.2	15.82	5.45	21.27	-0.3
1967	43.23	14.34	57.57	2,685.2	16.10	5.34	21.44	0.8
1968	46.19	14.81	61.00	2,796.9	16.51	5.30	21.81	1.7
1969	49.02	15.18	64.19	2,873.0	17.06	5.28	22.34	2.4
1970	51.32	15.12	66.43	2,873.9	17.86	5.26	23.12	3.5
1971	53.03	14.85	67.89	2,955.9	17.94	5.03	22.97	-0.6
1972	55.64	15.61	71.26	3,107.1	17.91	5.03	22.93	-0.2
1973	57.35	16.93	74.28	3,268.6	17.55	5.18	22.73	-0.9
1974	55.19	17.36	72.54	3,248.1	16.99	5.34	22.33	-1.8
1975	52.68	17.87	70.55	3,221.7	16.35	5.55	21.90	-1.9
1976	55.52	18.84	74.36	3,380.8	16.42	5.57	22.00	0.5
1977	57.05	19.24	76.29	3,533.3	16.15	5.44	21.59	-1.9
1978	57.97	20.12	78.09	3,703.5	15.65	5.43	21.09	-2.3
1979	57.79	21.11	78.90	3,796.8	15.22	5.56	20.78	-1.5
1980	54.60	21.36	75.96	3,776.3	14.46	5.66	20.11	-3.2
1981	51.86	22.13	73.99	3,843.1	13.49	5.76	19.25	-4.3
1982	48.74	22.11	70.85	3,760.3	12.96	5.88	18.84	-2.1
1983	47.41	23.11	70.52	3,906.6	12.14	5.92	18.05	-4.2
1984	49.56	24.59	74.14	4,148.5	11.95	5.93	17.87	-1.0
1985	48.76	25.22	73.98	4,279.8	11.39	5.89	17.29	-3.2
1986	48.90	25.39	74.30	4,404.5	11.10	5.77	16.87	-2.4
1987	50.61	26.28	76.89	4,539.9	11.15	5.79	16.94	0.4
1988	52.77	27.44	80.22	4,718.6	11.18	5.82	17.00	0.4
1989	53.59	27.73	81.33	4,838.0	11.08	5.73	16.81	-1.1
1990	52.85	28.42	81.26	R4,897.3	R10.79	R5.80	R16.59	R-1.3
1991	R52.45	28.66	R81.12	R4,861.4	R10.79	R5.90	R16.69	R0.6
1992	R53.66	R28.49	R82.14	R4,986.3	R10.76	R5.71	R16.47	R-1.3
1993P	54.55	29.40	83.96	5,137.7	10.62	5.72	16.34	-0.8

[1] Percent change calculated from data prior to rounding.
R=Revised data. P=Preliminary data. — = Not applicable.

Sources: Tables 1.3 and C1.

Figure 1.8 Heating Degree-Days by Month, 1949-1993



Source: Table 1.8.

Table 1.8 Heating Degree-Days by Month, 1949-1993

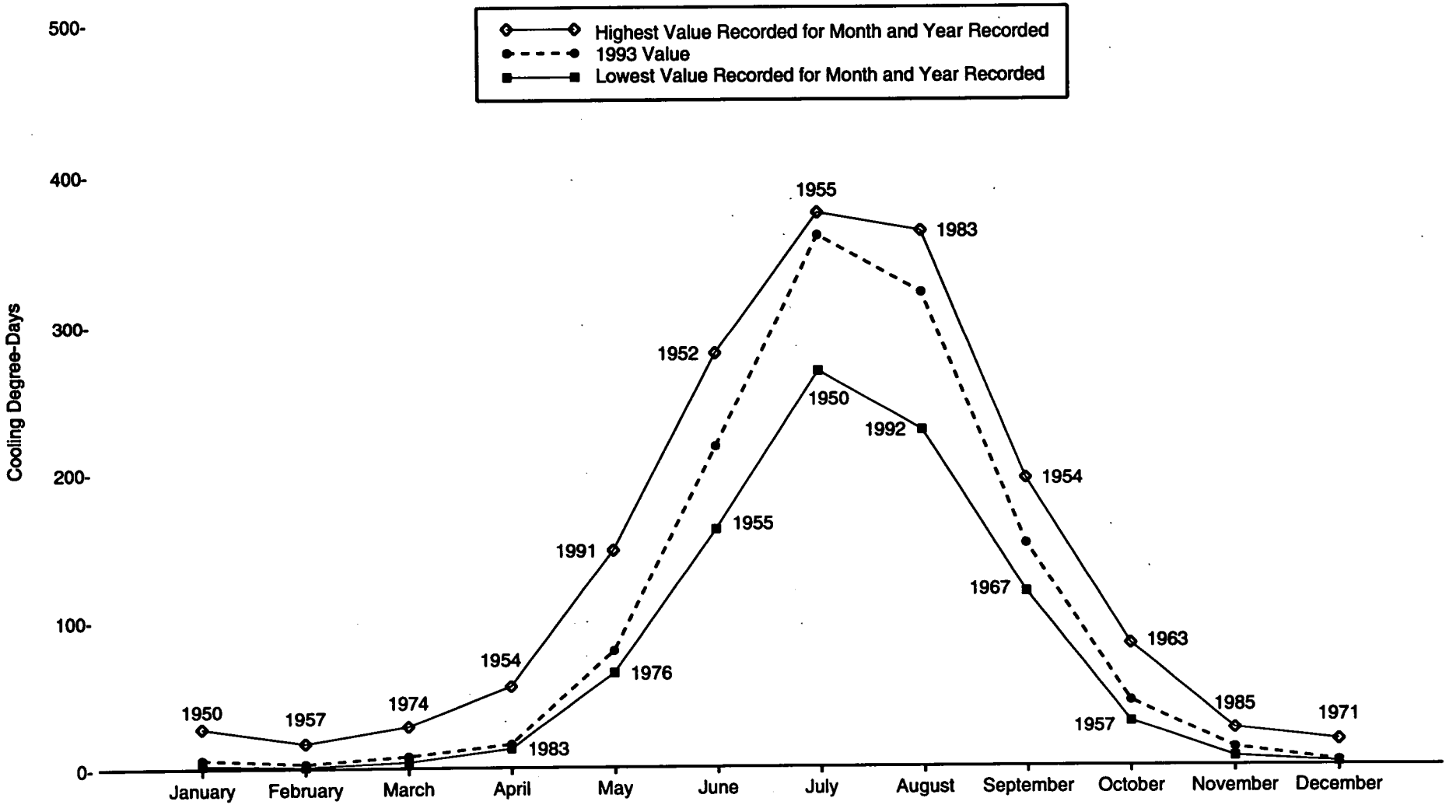
Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1949	858	701	611	330	128	21	7	9	94	209	503	763	4,234
1950	761	721	693	412	162	40	11	18	85	196	565	872	4,536
1951	863	724	632	359	135	45	8	17	74	231	645	814	4,547
1952	807	677	670	315	154	32	5	11	54	324	540	785	4,374
1953	754	667	557	378	142	33	5	11	51	208	492	765	4,063
1954	886	577	646	261	192	32	8	18	56	224	523	809	4,232
1955	927	759	600	272	121	48	9	6	56	237	600	886	4,521
1956	900	723	648	387	157	27	10	14	82	215	541	683	4,387
1957	977	628	610	308	148	23	6	16	61	315	536	711	4,339
1958	909	866	690	324	143	54	7	8	60	250	484	917	4,712
1959	944	762	619	305	112	26	4	6	48	249	594	734	4,403
1960	884	780	831	278	160	33	7	11	48	254	502	936	4,724
1961	982	670	565	413	199	29	5	7	48	238	532	852	4,540
1962	976	747	689	337	118	35	14	13	91	234	554	886	4,694
1963	1,061	841	562	325	163	35	8	18	76	162	471	1,012	4,734
1964	871	803	636	339	124	39	5	22	72	301	489	814	4,515
1965	907	780	738	355	114	48	11	14	78	271	494	739	4,549
1966	1,010	790	580	377	188	30	6	14	81	298	496	830	4,700
1967	816	820	600	352	229	34	8	17	82	270	588	793	4,609
1968	979	832	567	309	192	35	6	14	59	240	548	894	4,675
1969	939	778	735	307	134	47	7	9	60	296	564	860	4,736
1970	1,063	758	685	344	120	31	4	9	55	253	541	801	4,664
1971	976	760	681	375	194	29	10	12	47	187	553	723	4,547
1972	890	785	608	377	137	49	7	12	65	330	613	832	4,705
1973	893	772	504	356	182	22	6	9	61	212	497	799	4,313
1974	838	754	556	310	171	42	6	13	94	303	524	795	4,406
1975	821	742	686	449	117	37	5	13	100	235	462	805	4,472
1976	974	609	544	309	178	28	8	19	81	367	668	941	4,726
1977	1,188	751	529	270	119	38	6	13	59	295	493	844	4,605
1978	1,061	958	677	350	157	31	7	11	59	283	517	847	4,958
1979	1,079	950	575	364	148	37	6	15	58	271	528	750	4,781
1980	887	831	680	338	142	49	5	10	54	316	564	831	4,707
1981	984	689	620	260	165	25	6	11	76	327	504	845	4,512
1982	1,067	776	620	408	114	62	7	19	75	264	515	692	4,619
1983	874	706	588	421	189	35	6	5	53	251	509	990	4,627
1984	1,000	645	704	371	172	28	7	7	88	223	565	704	4,514
1985	1,057	807	557	260	123	47	5	17	69	243	506	951	4,642
1986	859	734	542	295	123	30	9	18	76	258	558	793	4,295
1987	920	714	573	309	107	20	8	13	61	345	491	773	4,334
1988	1,004	778	594	344	134	30	3	5	72	352	506	831	4,653
1989	789	832	603	344	163	32	5	14	73	259	542	1,070	4,726
1990	728	655	535	321	184	29	6	10	56	246	457	789	4,016
1991	921	639	564	287	98	30	6	7	69	242	586	751	4,200
1992	852	644	603	345	152	46	14	24	74	301	564	822	4,441
1993[P]	853	830	659	364	121	42	9	10	99	293	554	800	4,634

P=Preliminary data.

Notes: • Excludes Alaska and Hawaii. • Degree-days are relative measurements of outdoor air temperature. Heating degree-days are deviations of the mean daily temperature below 65° F. For example, a weather station recording a mean daily temperature of 40° F would report 25 heating degree-days. • Temperature information recorded by weather stations is used to calculate statewide degree-day averages based on resident State population estimated for 1990. The population-weighted State figures are aggregated into Census Divisions and the national average.

Sources: • 1949-1992—U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center, Asheville, North Carolina. Historical Climatology Series 5-1. • 1993—Energy Information Administration, *Monthly Energy Review*, August 1993-January 1994 issues, Table 1.11, which reports data from NOAA, National Weather Service Climate Analysis Center, Camp Springs, Maryland.

Figure 1.9 Cooling Degree-Days by Month, 1949-1993



Source: Table 1.9.

Table 1.9 Cooling Degree-Days by Month, 1949-1993

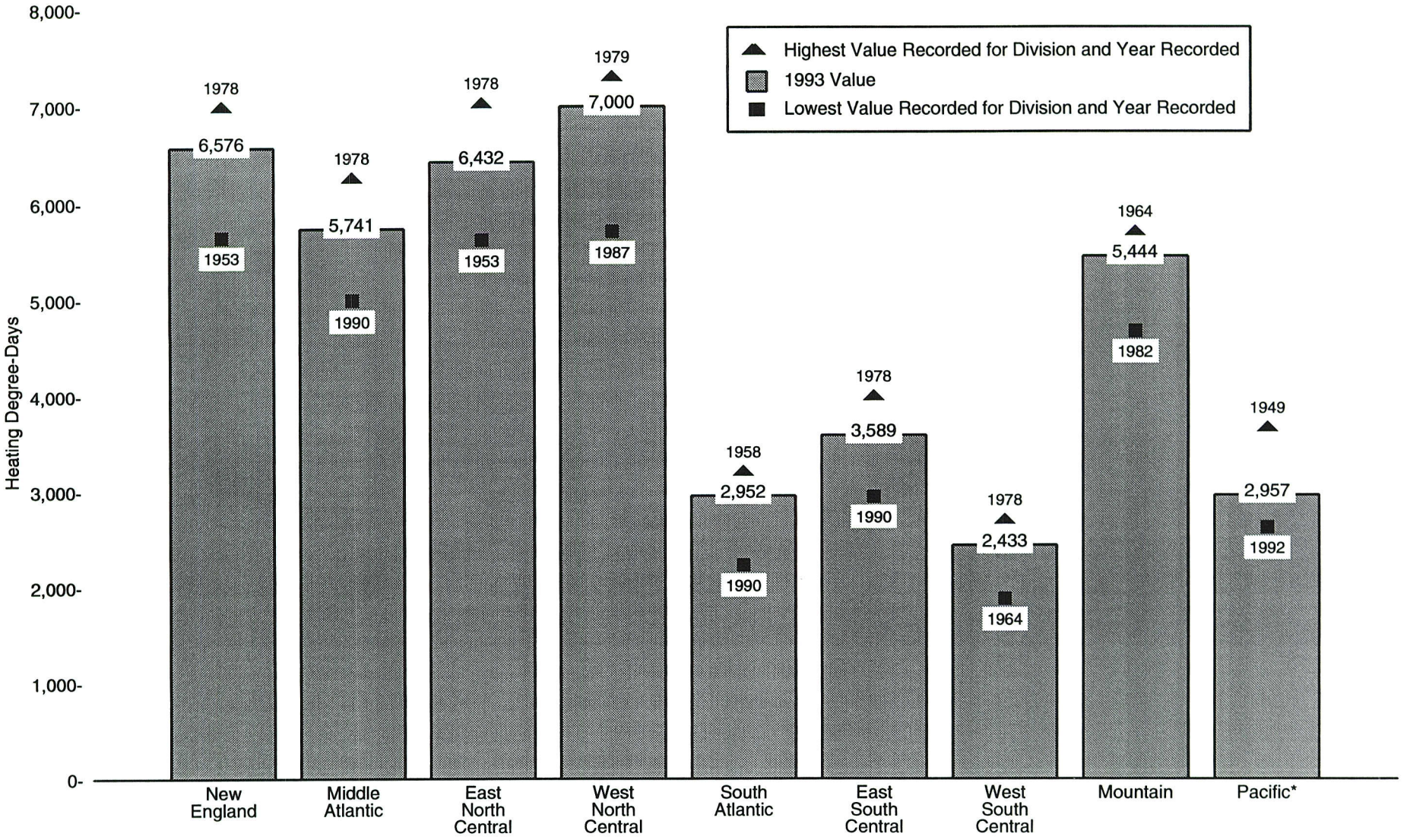
Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1949	16	14	14	27	110	253	367	294	131	70	12	10	1,318
1950	27	12	13	21	105	201	268	244	128	78	9	4	1,110
1951	8	5	15	22	95	198	318	293	158	65	7	11	1,195
1952	17	8	15	20	96	280	368	303	159	38	10	4	1,318
1953	12	8	26	25	118	263	338	292	168	58	11	7	1,326
1954	11	12	11	55	65	241	356	296	195	60	9	4	1,315
1955	6	7	20	45	121	161	381	355	182	50	10	6	1,344
1956	4	12	14	23	112	232	297	290	151	66	9	11	1,221
1957	12	17	13	33	96	243	337	275	155	30	13	6	1,230
1958	3	1	8	27	101	187	315	304	166	53	18	6	1,189
1959	6	12	13	31	129	228	325	344	179	64	12	5	1,348
1960	7	4	6	37	76	215	301	302	181	59	15	3	1,206
1961	5	9	23	20	71	195	306	287	186	47	12	7	1,168
1962	6	15	9	26	144	204	276	289	136	64	7	3	1,179
1963	5	5	22	42	94	213	308	266	153	83	11	2	1,204
1964	6	3	14	37	114	214	327	256	146	42	17	9	1,185
1965	9	7	10	42	125	179	280	273	155	48	19	6	1,153
1966	4	5	12	28	81	201	353	273	132	43	12	4	1,148
1967	9	5	24	48	70	206	278	253	118	45	12	9	1,077
1968	6	3	9	32	75	204	307	292	145	53	7	4	1,137
1969	7	4	4	33	94	200	331	304	153	48	8	4	1,190
1970	3	4	10	36	104	201	323	313	185	48	6	9	1,242
1971	8	7	10	22	68	244	288	269	182	77	12	17	1,204
1972	15	6	22	36	88	174	299	276	169	44	9	8	1,146
1973	7	3	24	18	75	236	318	303	166	66	21	4	1,241
1974	21	6	28	29	101	173	317	267	120	40	10	5	1,117
1975	14	11	14	24	117	203	301	296	120	55	12	5	1,172
1976	5	11	23	27	64	208	282	243	127	27	8	4	1,029
1977	2	5	21	35	121	212	351	293	180	44	15	6	1,285
1978	3	1	10	31	93	218	310	300	180	52	19	9	1,226
1979	4	4	13	32	82	187	295	266	160	53	11	6	1,113
1980	9	4	13	23	95	199	374	347	192	42	10	5	1,313
1981	3	6	10	52	75	257	333	275	138	43	12	5	1,209
1982	6	10	21	26	115	165	318	262	140	47	15	11	1,136
1983	6	5	9	13	72	193	353	362	172	58	12	5	1,260
1984	5	6	14	24	92	233	291	312	143	70	9	15	1,214
1985	3	5	22	39	108	193	313	269	145	68	25	4	1,194
1986	8	10	17	33	106	231	340	259	161	52	23	9	1,249
1987	5	7	13	23	127	244	334	298	156	40	14	8	1,269
1988	5	5	13	28	89	218	359	348	149	45	18	6	1,283
1989	15	7	19	36	88	208	312	266	138	49	16	2	1,156
1990	15	14	21	29	86	234	316	291	172	57	16	9	1,260
1991	10	9	19	42	147	235	336	305	149	62	8	9	1,331
1992	6	10	15	29	77	170	286	228	150	49	13	7	1,040
1993[P]	6	3	8	16	79	217	359	321	151	44	12	3	1,219

P=Preliminary data.

Notes: • Excludes Alaska and Hawaii. • Degree-days are relative measurements of outdoor air temperature. Cooling degree-days are deviations of the mean daily temperature above 65° F. For example, a weather station recording a mean daily temperature of 78° F would report 13 cooling degree-days. • Temperature information recorded by weather stations is used to calculate statewide degree-day averages based on resident State population estimated for 1990. The population-weighted State figures are aggregated into Census Divisions and the national average.

Sources: • 1949-1992—U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center, Asheville, North Carolina. Historical Climatology Series 5-2. • 1993—Energy Information Administration, *Monthly Energy Review*, February 1993-January 1994 issues, Table 1.11, which reports data from NOAA, National Weather Service Climate Analysis Center, Camp Springs, Maryland.

Figure 1.10 Heating Degree-Days by Census Division, 1949-1993



*Excludes Alaska and Hawaii.
Note: See Appendix E for Census division map.

Source: Table 1.10.

Table 1.10 Heating Degree-Days by Census Division, 1949-1993

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific [1]	United States [1]
1949	5,829	5,091	5,801	6,479	2,367	2,942	2,133	5,483	3,729	4,234
1950	6,470	5,765	6,619	7,136	2,713	3,315	1,974	4,930	3,355	4,536
1951	6,137	5,497	6,549	7,246	2,728	3,340	2,154	5,513	3,469	4,547
1952	6,180	5,443	5,977	6,386	2,684	3,276	2,074	5,404	3,586	4,374
1953	5,650	5,027	5,626	5,994	2,486	3,132	2,024	4,925	3,224	4,063
1954	6,291	5,473	5,841	6,063	2,713	3,211	1,876	4,679	3,296	4,232
1955	6,577	5,708	6,101	6,630	2,786	3,314	2,083	5,517	3,723	4,521
1956	6,702	5,731	6,019	6,408	2,642	3,113	2,032	5,146	3,382	4,387
1957	6,158	5,469	6,166	6,525	2,594	3,112	2,068	5,203	3,322	4,339
1958	6,907	6,237	6,585	6,585	3,271	4,004	2,590	4,929	2,819	4,712
1959	6,363	5,535	6,303	6,665	2,698	3,415	2,398	5,138	2,925	4,403
1960	6,561	5,901	6,544	6,884	3,147	3,958	2,551	5,328	3,309	4,724
1961	6,632	5,895	6,275	6,591	2,869	3,497	2,296	5,299	3,221	4,540
1962	6,981	6,089	6,545	6,691	3,022	3,627	2,264	5,165	3,400	4,694
1963	6,816	6,103	6,691	6,485	3,138	3,890	2,438	5,060	3,326	4,734
1964	6,594	5,694	6,030	6,303	2,828	3,462	2,272	5,769	3,583	4,515
1965	6,825	5,933	6,284	6,646	2,830	3,374	2,078	5,318	3,378	4,549
1966	6,662	6,012	6,606	6,872	3,118	3,758	2,416	5,275	3,170	4,700
1967	6,987	6,127	6,477	6,569	2,864	3,403	2,082	5,232	3,316	4,609
1968	6,800	5,981	6,331	6,556	3,160	3,927	2,522	5,415	3,198	4,675
1969	6,593	5,933	6,603	6,903	3,205	3,910	2,325	5,324	3,377	4,736
1970	6,839	5,943	6,455	6,835	2,997	3,685	2,396	5,436	3,257	4,664
1971	6,695	5,761	6,236	6,594	2,763	3,395	1,985	5,585	3,698	4,547
1972	7,001	6,064	6,772	7,094	2,759	3,438	2,259	5,352	3,376	4,705
1973	6,120	5,327	5,780	6,226	2,718	3,309	2,256	5,562	3,383	4,313
1974	6,621	5,670	6,259	6,478	2,551	3,171	2,080	5,281	3,294	4,406
1975	6,362	5,477	6,169	6,678	2,640	3,336	2,187	5,693	3,623	4,472
1976	6,839	6,097	6,768	6,670	3,040	3,881	2,446	5,303	3,115	4,726
1977	6,579	5,889	6,538	6,506	3,047	3,812	2,330	5,060	3,135	4,605
1978	7,061	6,330	7,095	7,324	3,187	4,062	2,764	5,370	3,168	4,958
1979	6,348	5,851	6,921	7,369	2,977	3,900	2,694	5,564	3,202	4,781
1980	6,900	6,143	6,792	6,652	3,099	3,855	2,378	5,052	2,986	4,707
1981	6,612	5,989	6,446	6,115	3,177	3,757	2,162	4,671	2,841	4,512
1982	6,697	5,866	6,542	7,000	2,721	3,357	2,227	5,544	3,449	4,619
1983	6,305	5,733	6,423	6,901	3,057	3,892	2,672	5,359	3,073	4,627
1984	6,442	5,777	6,418	6,582	2,791	3,451	2,194	5,592	3,149	4,514
1985	6,571	5,660	6,546	7,119	2,736	3,602	2,466	5,676	3,441	4,642
1986	6,517	5,665	6,150	6,231	2,686	3,294	2,058	4,870	2,807	4,295
1987	6,546	5,699	5,810	5,712	2,937	3,466	2,292	5,153	3,013	4,334
1988	6,715	6,088	6,590	6,634	3,122	3,800	2,346	5,148	2,975	4,653
1989	6,887	6,134	6,834	6,996	2,944	3,713	2,439	5,173	3,061	4,726
1990	5,848	4,998	5,681	6,011	2,230	2,929	1,944	5,146	3,148	4,016
1991	5,960	5,177	5,906	6,319	2,503	3,211	2,178	5,259	3,109	4,200
1992	6,844	5,964	6,297	6,262	2,852	3,498	2,145	5,054	2,763	4,441
1993[P]	6,576	5,741	6,432	7,000	2,952	3,589	2,433	5,444	2,957	4,634

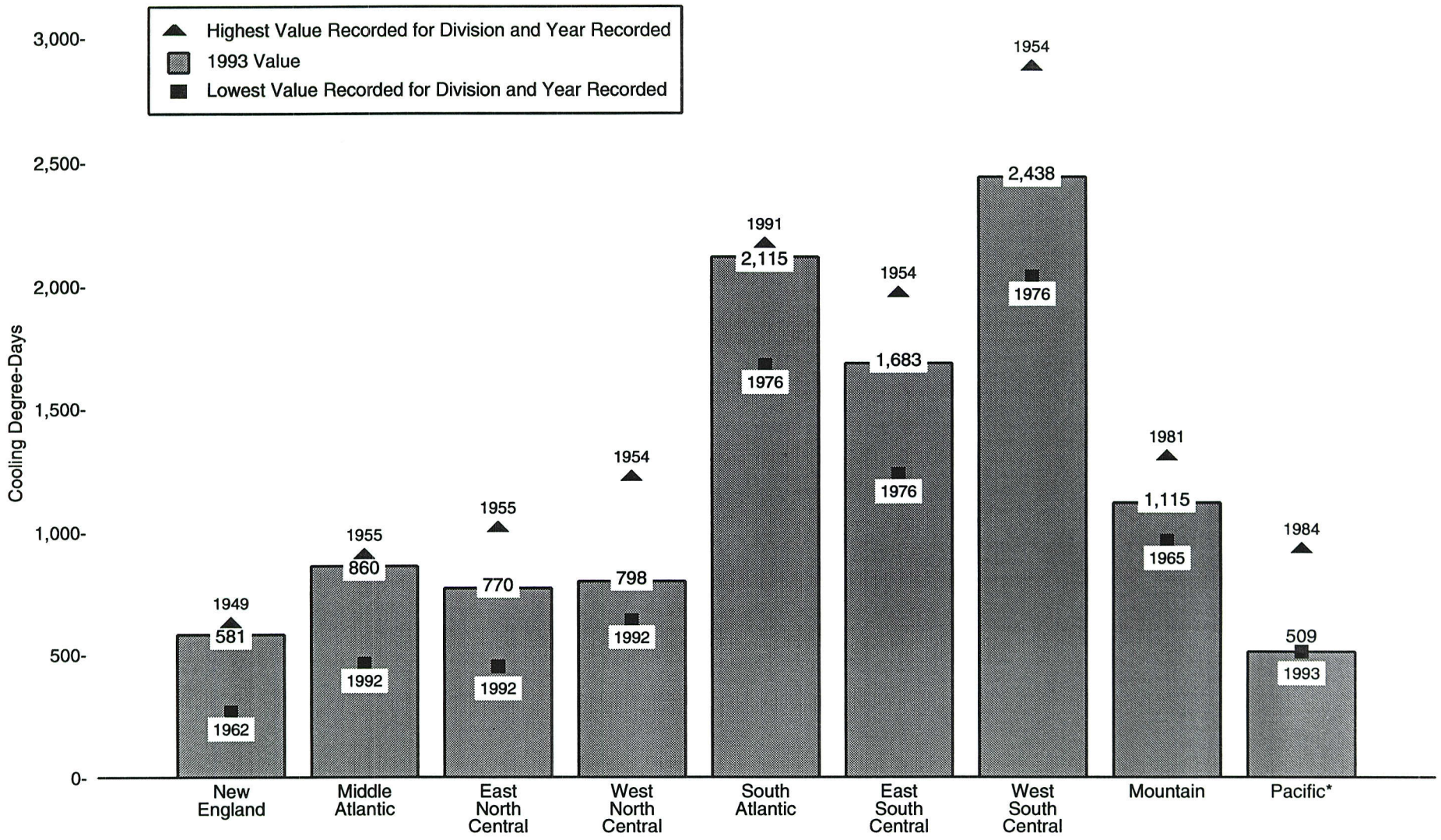
[1] Excludes Alaska and Hawaii.

P=Preliminary data.

Notes: • Degree-days are relative measurements of outdoor air temperature. Heating degree-days are deviations of the mean daily temperature below 65° F. For example, a weather station recording a mean daily temperature of 40° F would report 25 heating degree-days. • Temperature information recorded by weather stations is used to calculate statewide degree-day averages based on resident State population estimated for 1990. The population-weighted State figures are aggregated into Census Divisions and the national average.

Sources: • 1949-1992—U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center, Asheville, North Carolina. Historical Climatology Series 5-1. • 1993—Energy Information Administration, *Monthly Energy Review*, February 1993-January 1994 issues, Table 1.11, which reports data from NOAA, National Weather Service Climate Analysis Center, Camp Springs, Maryland.

Figure 1.11 Cooling Degree-Days by Census Division, 1949-1993



*Excludes Alaska and Hawaii.
Note: See Appendix E for Census division map.

Source: Table 1.11.

Table 1.11 Cooling Degree-Days by Census Division, 1949-1993

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific [1]	United States [1]
1949	654	901	949	1,038	2,128	1,776	2,510	1,198	593	1,318
1950	353	542	602	729	1,919	1,568	2,473	1,120	597	1,110
1951	400	653	644	777	2,028	1,781	2,684	1,137	593	1,195
1952	581	825	897	1,109	2,097	1,864	2,543	1,278	657	1,318
1953	441	768	945	1,183	2,137	1,893	2,727	1,193	571	1,326
1954	303	646	858	1,250	2,082	1,998	2,907	1,292	590	1,315
1955	602	934	1,043	1,238	2,045	1,791	2,643	1,124	560	1,344
1956	336	566	750	1,155	1,913	1,685	2,833	1,247	596	1,221
1957	428	738	754	1,004	2,050	1,692	2,465	1,155	660	1,230
1958	344	592	638	878	1,922	1,582	2,517	1,328	836	1,189
1959	532	903	997	1,083	2,128	1,745	2,456	1,258	776	1,348
1960	368	640	722	961	1,926	1,613	2,492	1,308	770	1,206
1961	482	787	745	867	1,888	1,370	2,230	1,223	709	1,168
1962	264	561	742	974	1,908	1,738	2,700	1,147	559	1,179
1963	373	571	712	1,196	1,812	1,580	2,899	1,235	605	1,204
1964	312	634	787	1,030	1,905	1,591	2,608	1,095	574	1,185
1965	352	638	688	914	1,931	1,634	2,579	961	542	1,153
1966	421	731	724	919	1,788	1,440	2,309	1,239	680	1,148
1967	420	602	548	713	1,697	1,257	2,385	1,120	817	1,077
1968	410	725	740	902	1,842	1,517	2,247	1,015	632	1,137
1969	447	706	701	940	1,887	1,572	2,505	1,228	680	1,190
1970	479	779	827	1,066	2,007	1,662	2,375	1,163	689	1,242
1971	465	730	783	960	1,932	1,577	2,448	1,074	685	1,204
1972	364	614	643	908	1,843	1,525	2,513	1,141	698	1,146
1973	551	830	864	1,009	2,000	1,665	2,359	1,123	624	1,241
1974	393	614	626	878	1,842	1,382	2,342	1,188	690	1,117
1975	467	708	788	1,003	2,011	1,520	2,261	1,031	547	1,172
1976	402	597	619	939	1,675	1,232	2,035	1,058	620	1,029
1977	407	689	823	1,122	2,020	1,808	2,720	1,256	715	1,285
1978	378	615	741	1,027	1,972	1,685	2,638	1,174	738	1,226
1979	434	588	618	871	1,833	1,412	2,242	1,164	770	1,113
1980	487	793	816	1,217	2,075	1,834	2,734	1,202	658	1,313
1981	436	657	658	924	1,889	1,576	2,498	1,331	876	1,209
1982	321	541	643	859	1,958	1,537	2,502	1,121	619	1,136
1983	538	799	934	1,178	1,925	1,579	2,288	1,174	776	1,260
1984	468	649	724	955	1,865	1,508	2,469	1,190	956	1,214
1985	372	627	643	830	2,004	1,596	2,599	1,210	737	1,194
1986	301	626	738	1,021	2,149	1,792	2,618	1,188	664	1,249
1987	406	729	918	1,115	2,067	1,718	2,368	1,196	706	1,269
1988	545	782	975	1,230	1,923	1,582	2,422	1,320	729	1,283
1989	426	658	652	864	1,977	1,417	2,295	1,330	685	1,156
1990	477	656	647	983	2,143	1,622	2,579	1,294	827	1,260
1991	511	854	959	1,125	2,197	1,758	2,499	1,182	672	1,331
1992	276	460	449	637	1,777	1,293	2,201	1,206	905	1,040
1993[P]	581	860	770	798	2,115	1,683	2,438	1,115	509	1,219

[1] Excludes Alaska and Hawaii.

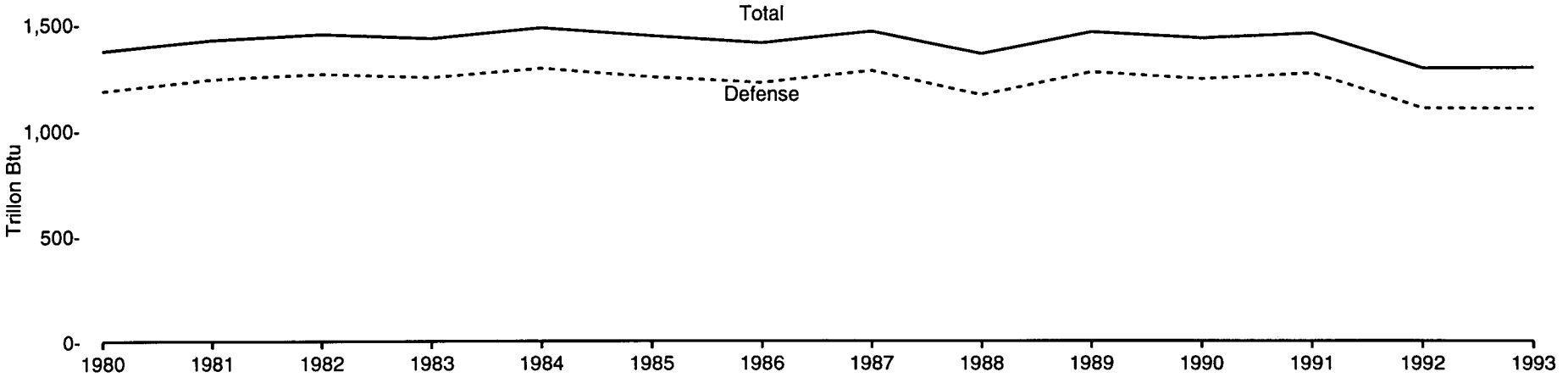
P=Preliminary data.

Notes: • Degree-days are relative measurements of outdoor air temperature. Cooling degree-days are deviations of the mean daily temperature above 65° F. For example, a weather station recording a mean daily temperature of 78° F would report 13 cooling degree-days. • Temperature information recorded by weather stations is used to calculate statewide degree-day averages based on resident State population estimated for 1990. The population-weighted State figures are aggregated into Census Divisions and the national average.

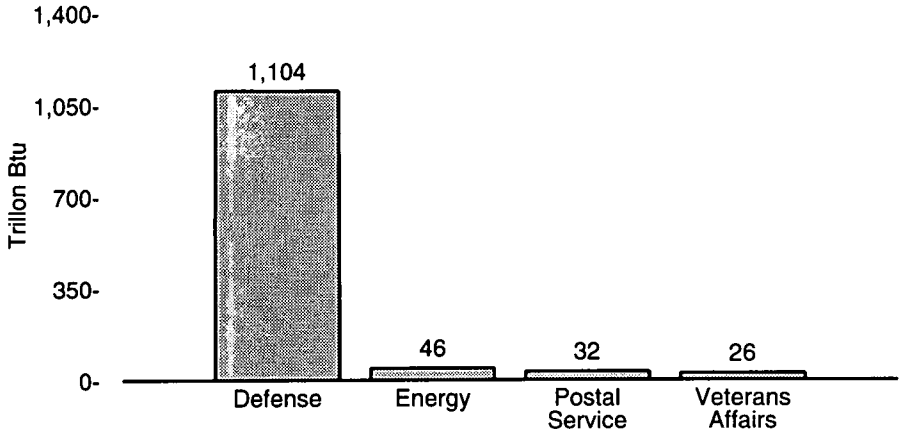
Sources: • 1949-1992—U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center, Asheville, North Carolina. Historical Climatology Series 5-2. • 1993—Energy Information Administration, *Monthly Energy Review*, February 1993-January 1994 issues, Table 1.11, which reports data from NOAA, National Weather Service Climate Analysis Center, Camp Springs, Maryland.

Figure 1.12 U.S. Government Energy Consumption, Fiscal Years

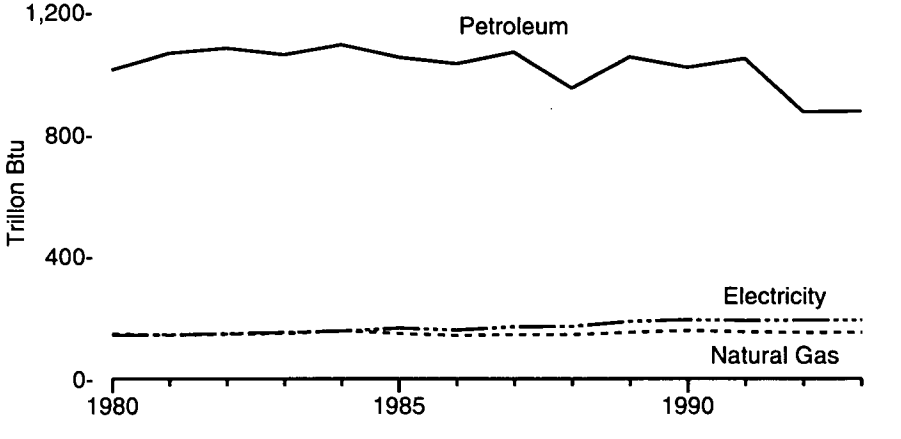
Total and U.S. Department of Defense, 1980-1993



Top Four Consuming Agencies, 1993



By Major Energy Source, 1980-1993



Notes: • The U.S. Government's fiscal year runs from October 1 through September 30.
• Because vertical scales differ, graphs should not be compared.

Source: Table 1.12.

Table 1.12 U.S. Government Energy Consumption, Fiscal Years 1980-1993

(Trillion Btu)

Category	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 E
Total, All Agencies	**1,371.2**	**1,424.2**	**1,451.4**	**1,431.8**	**1,482.5**	R1,444.0	**1,410.2**	R1,464.9	**1,359.8**	R1,462.7	R1,433.4	R1,456.8	R1,292.9	**1,296.7**
Defense	1,183.1	1,239.5	1,264.5	1,248.3	1,292.1	1,250.6	1,222.8	1,280.5	1,165.8	1,274.4	1,241.7	1,269.3	R1,104.0	1,104.0
Energy	47.4	47.3	49.0	49.5	51.6	R52.2	49.9	48.2	49.8	43.9	43.4	41.8	R44.4	45.5
Postal Service	27.2	27.9	27.5	26.5	27.7	27.8	28.0	28.5	29.6	30.3	30.6	30.8	R31.7	31.7
Veterans Affairs	24.8	24.0	24.2	24.1	24.6	25.1	25.0	24.9	26.3	26.2	24.9	25.3	25.3	25.6
Transportation	19.2	18.8	19.1	19.4	19.8	19.5	19.4	19.0	18.7	18.5	19.0	18.8	R15.8	16.6
General Services Administration	18.1	18.0	18.1	16.1	16.2	17.1	14.0	13.1	12.4	12.7	14.2	14.0	R13.8	14.0
NASA	10.4	10.0	10.1	10.3	10.6	10.9	11.2	11.1	11.2	12.1	12.3	R12.4	R12.5	12.1
Interior	8.5	7.6	7.4	7.7	8.4	R6.5	6.9	6.6	7.0	7.1	7.4	6.9	7.0	12.0
Health and Human Services	6.0	6.7	6.4	6.2	6.4	7.0	6.2	6.6	6.4	6.7	8.0	R7.1	R8.0	8.0
Justice	5.7	5.4	5.8	5.5	6.4	8.2	8.6	8.1	9.4	7.7	7.0	8.0	R7.5	7.5
Agriculture	8.6	7.9	7.6	7.4	7.9	8.4	6.8	R6.6	7.8	R7.6	R9.9	R9.2	R9.1	5.9
Other [1]	12.3	11.1	11.6	10.8	10.7	10.7	11.3	11.6	15.5	15.3	R15.1	R13.4	R13.8	13.8
Total, All Sources	**1,371.2**	**1,424.2**	**1,451.4**	**1,431.8**	**1,482.5**	R1,444.0	**1,410.2**	R1,464.9	**1,359.8**	R1,462.7	R1,433.4	R1,456.8	R1,292.9	**1,296.7**
Petroleum	1,011.8	1,066.1	1,082.7	1,061.1	1,093.8	R1,052.9	1,032.4	1,069.8	952.3	1,054.4	1,020.5	R1,049.4	R875.5	878.3
Jet Fuel	638.7	653.3	672.7	673.4	693.7	705.7	710.2	702.3	617.2	761.7	732.4	774.5	R627.0	627.6
Distillate and Residual Fuel Oil	307.7	351.3	349.4	329.5	342.9	R290.7	271.5	319.4	284.7	245.1	244.1	236.1	R203.8	203.5
Motor Gasoline	56.5	53.2	53.1	51.6	51.2	R50.5	45.3	43.1	41.2	41.1	37.2	R34.7	R35.6	31.6
Liquefied Petroleum Gases	4.0	3.7	3.9	4.0	4.1	R4.1	4.0	4.0	3.2	5.7	6.3	3.7	R8.1	14.6
Aviation Gasoline	4.9	4.6	3.6	2.6	1.9	1.9	1.4	1.0	6.0	0.8	0.5	0.4	R1.0	1.0
Electricity	141.9	144.5	147.5	151.5	155.9	165.4	159.1	169.7	171.1	R187.2	192.4	R190.0	R191.5	191.6
Natural Gas	147.3	142.2	146.2	147.8	157.4	R148.0	141.4	R144.7	144.3	151.9	R157.5	R153.3	R151.3	151.6
Coal	63.5	65.1	68.6	62.4	65.3	64.0	63.8	67.0	60.2	48.6	44.2	45.9	R51.8	52.3
Purchased Steam	6.8	6.2	6.2	9.0	10.1	R13.6	13.5	13.7	31.9	20.6	18.8	18.2	R22.8	22.9

[1] Includes National Archives and Records Administration, U.S. Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, U.S. Department of Labor, National Science Foundation (NSF), Federal Trade Commission, Federal Communications Commission, Environmental Protection Agency (EPA), U.S. Department of Housing and Urban Development, Railroad Retirement Board, Commodity Futures Trading Commission, Equal Employment Opportunity Commission, Nuclear Regulatory Commission, U.S. Department of State, U.S. Department of Treasury, Small Business Administration, Office of Personnel Management, Federal Emergency Management Agency, and U.S. Information Agency.

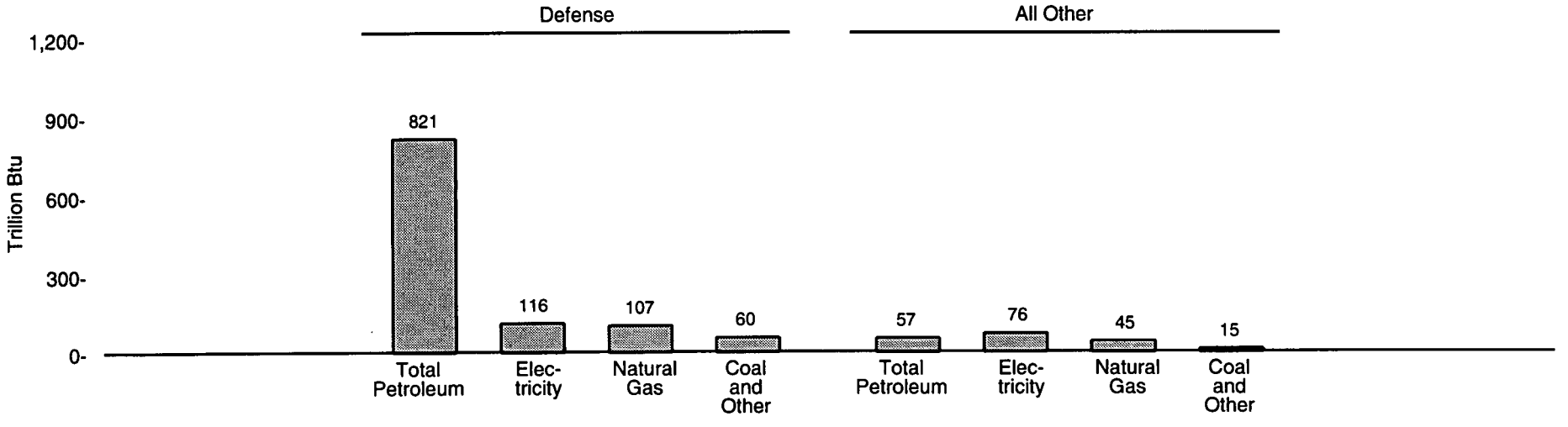
R = Revised data. E=Estimate. Other estimated data are EPA 1982 and 1988, U.S. Department of Treasury 1982 and 1983, and NSF 1988, 1989, and 1990.

Notes: • This table uses a conversion factor for electricity of 3,412 Btu per kilowatthour and a conversion factor for purchased steam of 1,000 Btu per pound. • These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the U.S. Department of Defense. U.S. Government energy use for electricity generation and uranium enrichment is excluded. However, other energy used by U.S. agencies that produce electricity or enrich uranium is included. • The U.S. Government's fiscal year runs from October 1 through September 30. • Totals may not equal sum of components due to independent rounding.

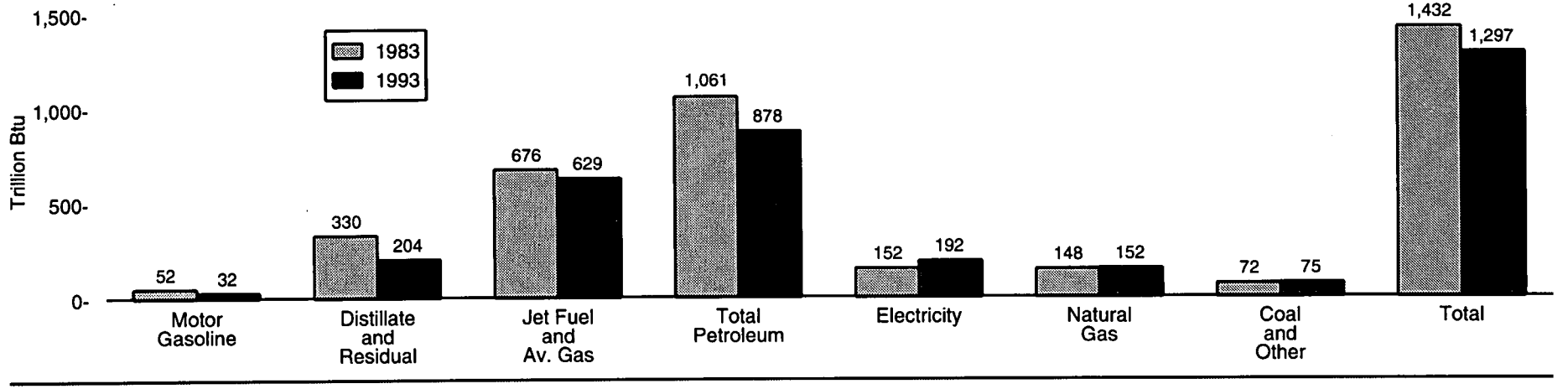
Source: U.S. Department of Energy, Form DOE F 6200.2, "Federal Energy Usage Report," quarterly.

Figure 1.13 U.S. Government Energy Consumption by Agency and Source, Fiscal Years

By Agency, 1993



By Source, 1983 and 1993



Notes: • The U.S. Government's fiscal year runs from October 1 through September 30.
• Because vertical scales differ, graphs should not be compared.

Source: Table 1.13.

Table 1.13 U.S. Government Energy Consumption by Agency and Source, Fiscal Years 1983 and 1993

(Trillion Btu)

Agencies	Petroleum					Electricity	Natural Gas	Coal and Other [2]	Total
	Motor Gasoline	Distillate and Residual Fuel Oils	Jet Fuel and Aviation Gas	Other [1]	Total				
Total, 1983	**51.6**	**329.5**	**675.9**	**4.0**	**1,061.1**	**151.5**	**147.8**	**71.5**	**1,431.8**
Defense	27.1	303.6	669.0	2.2	1,001.9	94.0	106.9	45.6	1,248.3
Energy	1.3	3.6	0.4	0.2	5.6	17.4	6.9	19.6	49.5
Postal Service	9.4	2.8	0.0	0.2	12.3	9.0	4.4	0.7	26.5
Veterans Affairs	0.5	2.3	0.0	0.0	2.8	5.9	14.4	0.9	24.1
Transportation	1.4	8.0	4.6	0.0	14.0	3.9	1.2	0.2	19.4
General Services Administration	0.1	1.1	0.0	0.0	1.2	8.6	3.2	3.1	16.1
NASA	0.3	0.8	1.5	0.0	2.5	5.0	2.3	0.4	10.3
Interior	2.1	1.7	0.1	0.8	4.7	1.3	1.6	0.2	7.7
Agriculture	4.0	0.6	0.1	0.3	5.0	1.2	1.1	0.0	7.4
Health and Human Services	0.4	2.5	0.0	0.1	3.1	1.7	1.4	0.0	6.2
Justice	1.7	0.4	0.1	0.0	2.2	0.9	2.1	0.4	5.5
Other [3]	3.1	~~0.7~~ 2.2	0.2	~~1.5~~ 0.1	5.6	2.6	2.2	0.4	10.8
Total, 1993 [E]	**31.6**	**203.5**	**628.5**	**14.6**	**878.2**	**191.6**	**151.6**	**75.2**	**1,296.7**
Defense	12.2	183.2	620.5	5.4	821.3	115.9	106.6	60.2	1,104.0
Energy	1.2	2.7	0.4	0.5	4.8	18.5	12.6	9.6	45.5
Postal Service	9.3	3.9	0.0	0.2	13.4	12.7	5.1	0.5	31.7
Veterans Affairs	0.6	1.6	0.0	0.0	2.2	8.2	13.9	1.3	25.6
Transportation	0.5	4.4	4.0	1.8	10.7	5.2	0.6	0.1	16.6
General Services Administration	0.0	0.4	0.0	0.0	0.4	9.3	2.9	1.4	14.0
NASA	0.2	1.0	1.4	0.0	2.6	6.8	2.4	0.3	12.1
Interior	1.8	1.1	0.2	6.3	9.4	1.8	0.7	0.1	12.0
Health and Human Services	0.0	2.0	0.0	0.1	2.1	3.2	2.3	0.3	8.0
Justice	2.9	0.4	0.7	0.0	4.1	2.2	0.9	0.4	7.5
Agriculture	1.3	0.4	0.0	0.2	2.0	2.1	1.7	0.1	5.9
Other [4]	1.7	~~0.8~~ 2.3	1.3	~~1.3~~ 0.0	5.3	5.5	2.1	0.9	13.8

[1] Includes liquefied petroleum gases, and other.

[2] Includes purchased steam, coal, and other.

[3] Includes U.S. Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, U.S. Department of Labor, National Science Foundation, U.S. Department of Housing and Urban Development, Federal Communications Commission, Office of Personnel Management, U.S. Department of State, U.S. Department of Treasury, Small Business Administration, and Environmental Protection Agency.

[4] Includes National Archives and Records Administration, U.S. Department of Commerce, U.S. Department of Labor, U.S. Department of State, Environmental Protection Agency, Federal Communications Commission, Federal Trade Commission, National Science Foundation, Panama Canal Commission, Commodity Futures Trading Commission, Equal Employment Opportunity Commission, Nuclear Regulatory Commission, Office of Personnel Management, U.S. Department of Housing and Urban Development, U.S. Department of Treasury, Railroad Retirement Board, Tennessee Valley Authority, Federal Emergency Management Agency, and U.S. Information Agency.

E=Estimate.

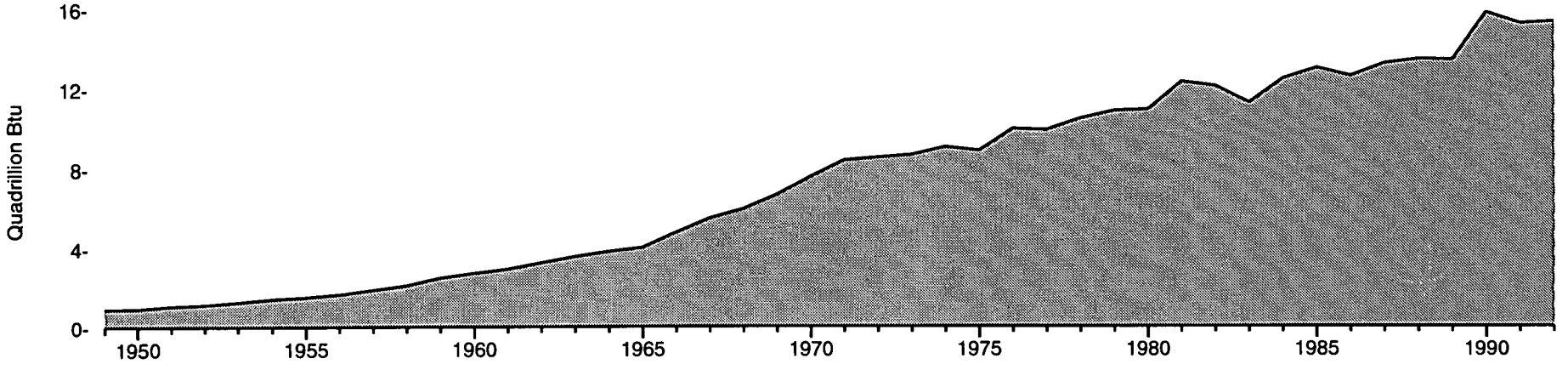
Notes: • This table uses a conversion factor for electricity of 3,412 Btu per kilowatthour and a conversion factor for purchased steam of 1,000 Btu per pound. • These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the U.S. Department of Defense. U.S. Government energy use for electricity generation and uranium enrichment is excluded. However, other energy used by U.S. agencies that produce electricity or enrich uranium is included. • The U.S. Government's fiscal year runs from October 1 through September 30. • Totals may not equal sum of components due to independent rounding.

Source: U.S. Department of Energy, Form DOE F 6200.2, "Federal Energy Usage Report," quarterly.

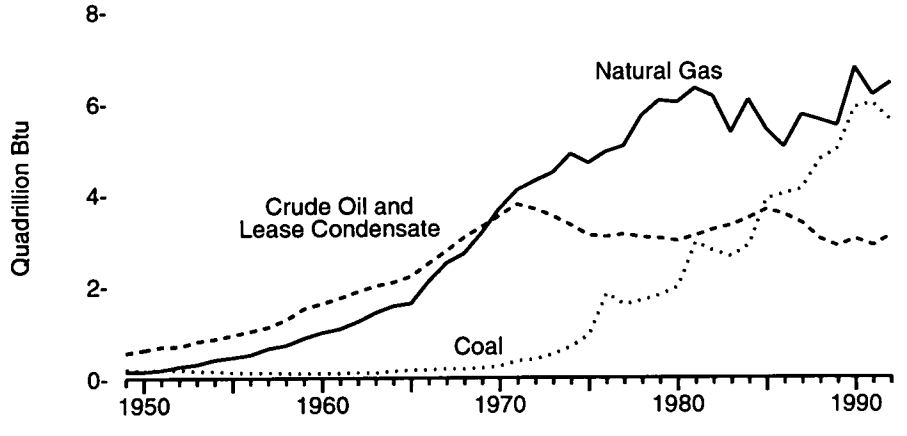
Chris Temper, ASI, to Judy Thompson 8/11/94.

Figure 1.14 Fossil Fuel Production on Federally Administered Lands

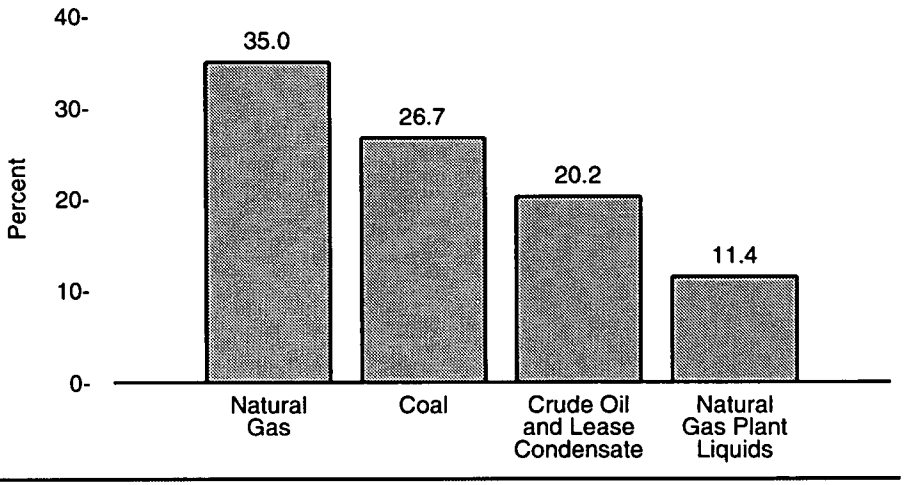
Total, 1949-1992



By Source, 1949-1992



Share of U.S. Total Production by Source, 1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 1.14.

Table 1.14 Fossil Fuel Production on Federally Administered Lands, 1949-1992

Year	Crude Oil and Lease Condensate [1]			Natural Gas Plant Liquids [2]			Natural Gas [3]			Coal [4]			Total	
	Million Barrels	Quadrillion Btu	Percent U.S. Total [5]	Million Barrels	Quadrillion Btu	Percent U.S. Total [5]	Trillion Cubic Feet	Quadrillion Btu	Percent U.S. Total [5]	Million Short Tons	Quadrillion Btu	Percent U.S. Total [5]	Quadrillion Btu	Percent U.S. Total
1949	95.2	0.55	5.2	4.4	0.02	2.8	0.15	0.15	2.8	9.5	0.20	2.0	0.92	3.2
1950	105.9	0.61	5.4	4.4	0.02	2.4	0.14	0.15	2.4	7.7	0.16	1.4	0.94	2.9
1951	117.3	0.68	5.2	5.3	0.02	2.6	0.17	0.18	2.4	9.3	0.20	1.6	1.08	3.0
1952	118.7	0.69	5.2	5.5	0.02	2.5	0.25	0.25	3.2	8.7	0.18	1.7	1.15	3.3
1953	136.9	0.79	5.8	5.7	0.03	2.4	0.29	0.30	3.6	7.5	0.16	1.5	1.28	3.6
1954	146.5	0.85	6.3	6.1	0.03	2.4	0.39	0.40	4.6	7.4	0.16	1.8	1.43	4.2
1955	159.5	0.92	6.4	6.0	0.03	2.1	0.43	0.45	4.8	5.9	0.12	1.2	1.53	4.1
1956	174.1	1.01	6.7	6.4	0.03	2.2	0.49	0.51	5.1	5.8	0.12	1.1	1.67	4.2
1957	189.4	1.10	7.2	6.6	0.03	2.2	0.62	0.64	6.1	5.7	0.12	1.1	1.89	4.7
1958	216.8	1.26	8.9	8.0	0.04	2.7	0.69	0.71	6.5	5.3	0.11	1.2	2.11	5.7
1959	258.2	1.50	10.0	9.5	0.04	3.0	0.83	0.86	7.2	4.9	0.10	1.1	2.50	6.4
1960	277.3	1.61	10.8	11.6	0.05	3.4	0.95	0.98	7.8	5.2	0.11	1.2	2.75	6.9
1961	297.3	1.72	11.3	13.5	0.06	3.7	1.03	1.06	8.1	5.2	0.11	1.2	2.95	7.3
1962	321.7	1.87	12.0	15.3	0.07	4.1	1.18	1.22	8.9	5.8	0.12	1.3	3.27	7.8
1963	342.8	1.99	12.5	16.0	0.07	4.0	1.37	1.41	9.7	5.4	0.11	1.1	3.58	8.1
1964	356.0	2.07	12.8	15.5	0.07	3.7	1.51	1.55	10.2	7.1	0.15	1.4	3.84	8.4
1965	378.6	2.20	13.3	14.3	0.06	3.2	1.56	1.61	10.2	8.2	0.17	1.6	4.04	8.5
1966	426.7	2.47	14.1	15.2	0.06	3.2	2.02	2.09	12.3	8.3	0.17	1.5	4.80	9.6
1967	472.6	2.74	14.7	20.1	0.09	3.9	2.41	2.48	13.8	9.5	0.20	1.7	5.51	10.5
1968	523.7	3.04	15.7	13.7	0.06	2.5	2.61	2.69	14.1	9.1	0.19	1.6	5.97	11.0
1969	563.8	3.27	16.7	19.9	0.08	3.4	3.05	3.14	15.4	10.1	0.21	1.8	6.70	11.9
1970	605.6	3.51	17.2	40.6	0.17	6.7	3.56	3.67	16.9	12.0	0.25	2.0	7.60	12.8
1971	648.9	3.76	18.8	54.0	0.22	8.7	3.95	4.08	18.3	17.3	0.36	3.1	8.42	14.5
1972	630.5	3.66	18.2	56.7	0.23	8.9	4.17	4.28	19.3	19.0	0.40	3.1	8.56	14.5
1973	604.3	3.51	18.0	54.9	0.22	8.7	4.37	4.46	20.1	24.2	0.51	4.1	8.70	14.9
1974	570.2	3.31	17.8	61.9	0.25	10.1	4.75	4.87	22.9	32.1	0.67	5.3	9.10	16.1
1975	531.5	3.08	17.4	59.7	0.24	10.0	4.57	4.67	23.8	43.6	0.92	6.7	8.90	16.3
1976	525.7	3.05	17.7	57.2	0.23	9.7	4.81	4.91	25.2	86.4	1.82	12.6	10.00	18.3
1977	535.0	3.10	17.8	57.4	0.23	9.7	4.94	5.04	25.8	74.8	1.57	10.7	9.94	18.0
1978	523.6	3.04	16.5	25.9	0.10	4.5	5.60	5.71	29.3	79.2	1.66	11.8	10.51	19.1
1979	519.8	3.01	16.7	11.9	0.05	2.1	5.93	6.05	30.1	84.9	1.78	10.9	10.89	18.8
1980	510.4	2.96	16.2	10.5	0.04	1.8	5.85	6.01	30.2	92.9	1.95	11.2	10.96	18.6
1981	529.3	3.07	16.9	12.3	0.05	2.1	6.15	6.31	32.1	138.8	2.91	16.8	12.35	21.1
1982	552.3	3.20	17.5	15.0	0.06	2.7	5.97	6.14	33.5	130.0	2.73	15.5	12.13	21.1
1983	568.8	3.30	17.9	14.0	0.05	2.5	5.17	5.33	32.1	124.3	2.61	15.9	11.30	20.8
1984	595.8	3.46	18.3	25.4	0.10	4.3	5.88	6.07	33.7	136.3	2.86	15.2	12.48	21.2
1985	628.3	3.64	19.2	26.6	0.10	4.5	5.24	5.41	31.8	184.6	3.88	20.9	13.03	22.6
1986	608.4	3.53	19.2	23.3	0.09	4.1	4.87	5.01	30.3	189.7	3.98	21.3	12.61	22.3
1987	577.3	3.35	18.9	23.7	0.09	4.1	5.56	5.73	33.4	195.2	4.10	21.2	13.27	23.2
1988	516.3	2.99	17.3	37.0	0.14	6.2	5.45	5.61	31.9	225.4	4.73	23.7	13.48	23.3
1989	488.9	2.84	17.6	45.1	0.17	8.0	5.32	5.49	30.7	236.3	4.96	24.1	13.46	23.4
1990	515.9	2.99	19.2	50.9	0.19	8.9	6.55	6.75	36.8	280.6	5.89	27.3	15.83	27.0
1991	491.0	2.85	18.1	72.7	0.28	12.0	5.99	6.17	(R)33.8	285.1	5.99	28.6	15.28	26.4
1992	529.1	3.07	20.2	70.7	0.27	11.4	6.25	6.43	35.0	266.7	5.60	26.7	15.37	26.7

[1] Production from Naval Petroleum Reserve No. 1 (NPR#1) for 1974 and earlier years is for fiscal years (July through June).

[2] Includes only those quantities for which the royalties were paid based on the value of the natural gas plant liquids produced. Additional quantities of natural gas plant liquids were produced; however, the royalties paid were based on the value of natural gas processed. These latter quantities are included with natural gas.

[3] Includes some quantities of natural gas processed into liquids at natural gas processing plants and fractionators.

[4] Converted to British thermal units (Btu) based on an estimated heat content of coal produced on federally administered lands of 21.0 million Btu per short ton.

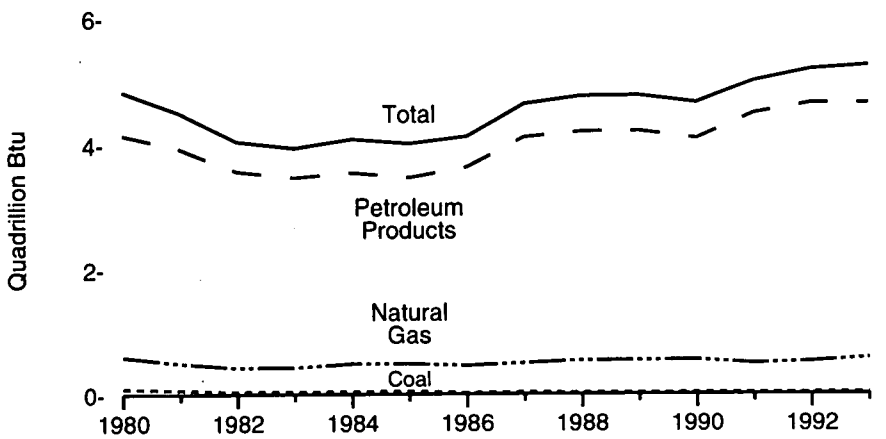
[5] Based on physical units.

Sources: See Note 2 at end of section.

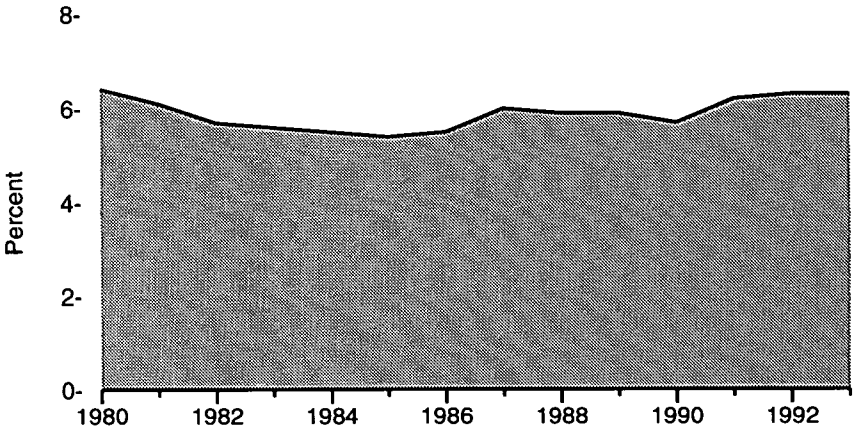
R = Revised.

Figure 1.15 Fossil Fuel Consumption for Nonfuel Use

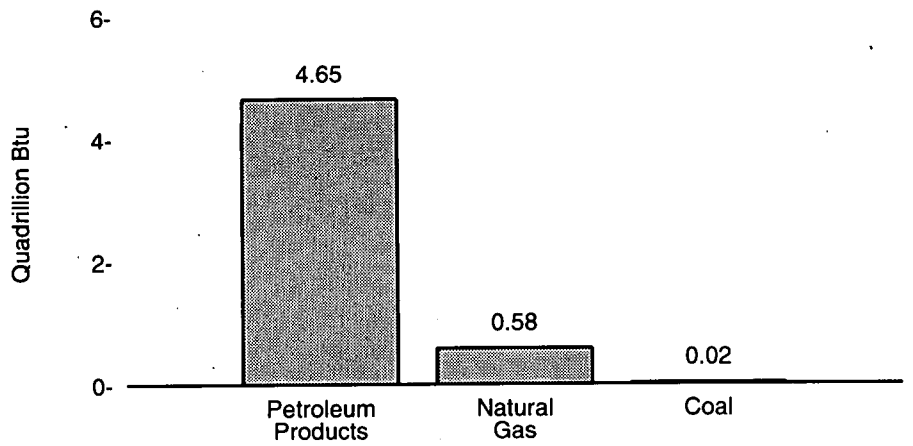
Total, 1980-1993



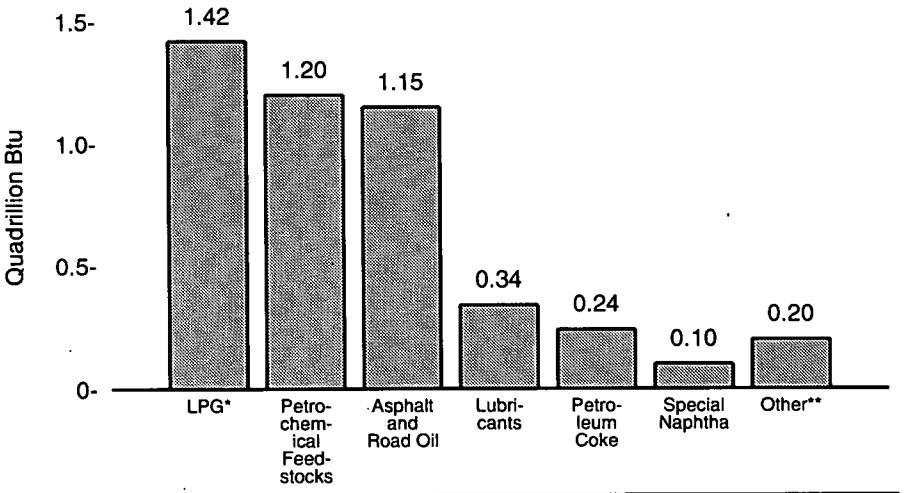
As Share of Total Energy Consumption, 1980-1993



By Fuel, 1993



By Petroleum Product, 1993



*Liquefied petroleum gases.
**"Other" is distillate fuel oil, residual fuel oil, waxes, and miscellaneous products.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 1.15.

Table 1.15 Fossil Fuel Consumption for Nonfuel Use, 1980-1993

Year	Petroleum Products								Natural Gas	Coal	Total	Percent of Total Energy Consumption
	Asphalt and Road Oil	Liquefied Petroleum Gases	Lubricants	Petro-chemical Feedstocks	Petroleum Coke	Special Naphtha	Other [1]	Total				
	Physical Units [2]											
1980	145	231	58	253	R8.2	37	R58	R790.2	589	R2.6	—	—
1981	125	230	56	236	R26.2	27	R54	R754.2	R482	R2.3	—	—
1982	125	259	51	169	R20.2	25	R48	R697.2	R415	R1.5	—	—
1983	136	267	53	153	R7.2	30	R45	R691.2	R418	R1.4	—	—
1984	149	260	57	144	R13.9	40	R38	R701.9	R471	R1.6	—	—
1985	153	255	53	143	R13.8	30	R38	R685.8	R475	1.8	—	—
1986	164	268	47	180	R12.8	24	R41	R736.8	R444	R0.8	—	—
1987	170	316	59	170	R23.5	28	R40	R806.5	R490	R0.9	—	—
1988	171	340	56	174	R24.7	22	R45	R832.7	R526	R0.8	—	—
1989	165	R349	58	172	R23.1	20	R44	R831.1	R528	R0.7	—	—
1990	164	362	60	153	R31.5	20	R40	R830.5	R533	R0.8	—	—
1991	162	R404	53	203	R27.0	17	R43	R909.0	R475	R0.7	—	—
1992	166	R411	54	R214	R42.3	R20	R35	R942.3	R507	R0.8	—	—
1993 P	174	404	56	212	39.4	20	34	939.4	566	[3]0.8	—	—
	Quadrillion Btu											
1980	0.96	0.82	0.35	1.43	R0.05	0.19	R0.34	R4.14	0.60	R0.09	R4.83	R6.4
1981	0.83	0.81	0.34	1.33	R0.16	0.14	R0.32	R3.93	R0.50	R0.07	R4.50	6.1
1982	0.83	0.90	0.31	0.95	R0.12	0.13	R0.28	R3.57	R0.43	R0.04	R4.04	5.7
1983	0.90	0.93	0.32	0.86	R0.04	0.16	R0.26	R3.47	R0.43	R0.04	R3.94	R5.6
1984	0.99	0.89	0.35	0.81	R0.08	0.21	R0.22	R3.55	R0.49	R0.04	R4.08	R5.5
1985	1.02	0.86	0.32	0.81	R0.08	0.16	R0.22	R3.47	R0.49	0.05	R4.01	5.4
1986	1.09	0.82	0.29	1.02	R0.08	0.13	R0.21	R3.64	R0.46	R0.02	R4.12	R5.5
1987	1.13	1.12	0.35	1.00	R0.14	0.14	R0.23	R4.11	R0.50	R0.03	4.64	6.0
1988	1.14	1.21	0.35	1.00	R0.15	0.11	R0.24	R4.20	R0.54	R0.02	4.76	5.9
1989	1.10	R1.26	0.35	1.00	R0.14	0.11	R0.25	R4.21	R0.54	R0.02	R4.77	R5.9
1990	1.09	R1.28	0.37	0.82	R0.19	0.11	R0.23	4.09	R0.55	R0.02	R4.66	R5.7
1991	1.08	R1.42	0.33	1.15	R0.16	0.09	R0.26	R4.49	R0.49	R0.02	R5.00	R6.2
1992	1.10	R1.45	0.33	R1.20	R0.26	0.10	R0.21	R4.65	R0.52	R0.02	R5.19	R6.3
1993 P	1.15	1.42	0.34	1.20	0.24	0.10	0.20	4.65	0.58	[3]0.02	5.25	6.3

[1] "Other" is distillate fuel oil, residual fuel oil, waxes, and miscellaneous products.
[2] Petroleum - million barrels; natural gas - billion cubic feet; and coal - million short tons.
[3] The 1993 value was not available in time for publication. This is the 1992 value.
R=Revised data. P=Preliminary data. — = Not applicable.

Sources: **Petroleum Products:** • 1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual* and *Sales of Liquefied Petroleum Gases and Ethane in 1980.* • 1981-1985—EIA, *Petroleum Supply Annual* and unpublished data. • 1986 forward—EIA, *Petroleum Supply Monthly* and EIA estimates. **Natural Gas:** • 1980—Bureau of the Census, 1980 Survey of Manufactures, *Hydrocarbon, Coal, and Coke Materials Consumed.* • 1981 forward—U.S. Department of Commerce estimates. **Coal:** U.S. International Trade Commission, *Synthetic Organic Chemicals, United States Production and Sales, 1992* (January 1994). **Percent of Total Energy Consumption:** Derived by dividing total by total consumption on Table 1.3.

Energy Overview Notes

1. Data on the generation of electricity in the United States represent net generation, which is gross output of electricity (measured at the generator terminals) minus power plant use. Nuclear electricity generation data identified by individual countries in Section 11 are gross output of electricity.

2. Table 1.14 Sources: **Coal:** • 1949-1980–U.S. Geological Survey, *Coal, Phosphate, Potash, Sodium, and Other Mineral Production, Royalty Income, and Related Statistics*, June 1981. • 1981 forward–U.S. Minerals Management Service, *Mineral Revenues–The 1992 Report on Receipts from Federal and Indian Leases*, and predecessor annual reports. **All Other Data:** • 1949-1980–U.S. Geological Survey, *Oil and Gas Production, Royalty Income, and Related Statistics*, June 1981; Department of Energy, Office of Naval Petroleum and Oil Shale Reserves, unpublished data; and U.S. Geological Survey, National Petroleum Reserve in Alaska, unpublished data. • 1981-1983–U.S. Minerals Management Service, *Mineral Revenues–The 1983 Report on Receipts from Federal and Indian Leases*, and predecessor annual reports; Department of Energy, Office of Naval Petroleum and Oil Shale Reserves, unpublished data; and U.S. Geological Survey, National Petroleum Reserve in Alaska, unpublished data. • 1984 forward–U.S. Minerals Management Service, *Mineral Revenues–The 1992 Report on Receipts from Federal and Indian Leases*, and predecessor annual reports, Department of Energy, Office of Naval Petroleum and Oil Shale Reserves, unpublished data.

2. End-Use Energy Consumption

The Energy Information Administration publishes two sets of statistics on end-use energy consumption. The first set, based on surveys directed to suppliers and marketers, provides continuous series for the years 1949 through 1993 and allocates U.S. total energy consumption to one of three end-use sectors: industrial, residential and commercial, and transportation. The second set, based on surveys directed to end-users of energy, provides detailed information on the types of energy consumed and the energy-related characteristics of manufacturing establishments, commercial buildings, households, and household vehicles.

End-Use Energy Overview, 1949-1993

Energy consumption by the industrial sector increased throughout the 1960's and in 1973 reached 32 quadrillion Btu. Of the three end-use sectors, the industrial sector proved to be the most responsive to the turmoil in energy markets after the 1973-1974 embargo (2.1).[1] In 1979, industrial consumption of energy peaked at 33 quadrillion Btu. In the early 1980's, a stagnant economy restrained industrial consumption, which declined to a 16-year low of 26 quadrillion Btu in 1983. In 1988 and 1989, economic growth spurred demand for energy in the industrial sector, and industrial energy consumption in 1989 rose to 29 quadrillion Btu. Despite slow economic growth in the 1990's, industrial energy consumption trended upward. In 1993, industrial consumption of energy reached 31 quadrillion Btu, the highest level in 14 years.

Much of the growth in energy consumption during the 1949-through-1993 period occurred in the residential and commercial sector (2.1). Residential and commercial consumption leveled off in response to higher energy prices in the late 1970's and early 1980's, but lower prices in the 1986-through-1993 period played a role in boosting residential and commercial energy consumption to the record level of 30 quadrillion Btu in 1993.

Energy consumption by the transportation sector was primarily petroleum consumption. Over the 45-year period, the transportation sector's consumption of petroleum more than tripled, but growth was slower during the 1980's than in previous decades. In 1993, consumption of petroleum in the transportation sector totaled 23 quadrillion Btu, up 1.6 percent from the 1992 level.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Consumption of Energy for Manufacturing

The U.S. manufacturing sector consumed an estimated 20 quadrillion Btu[2] of energy in 1991 (the most recent year for which data are available). Natural gas accounted for 6.1 quadrillion Btu, a 30-percent share of total energy consumption (2.2). Electricity[3] accounted for 2.4 quadrillion Btu, a 12-percent share, and coal consumption accounted for 2.0 quadrillion Btu, a 10-percent share. Fuel oil consumption of 0.6 quadrillion Btu accounted for a 3.0-percent share.

Of all the industries, the petroleum and coal products industry was the largest user of energy in 1991, consuming 6.0 quadrillion Btu. At 5.1 quadrillion Btu, the chemicals and allied products industry was the second largest user. Together, the two industries accounted for more than half of the energy consumption in the manufacturing sector.

Because the manufacturing sector accounts for a large share of total U.S. energy consumption, manufacturers' ability to cope with fluctuations in energy supplies and prices by switching to alternative sources of energy plays a significant role in the Nation's energy security. Fuel switching capability[4] in 1991 was determined for five major energy sources: natural gas, purchased electricity, coal, residual fuel oil, and distillate fuel oil (2.3).

Residual fuel oil registered the largest value (44 percent) for switchable consumption as a percentage of actual consumption, indicating substantial fuel-switching capabilities. In addition, almost 20 percent of

[2]The manufacturing sector is composed of establishments that use mechanical or chemical processes to transform raw materials into intermediate or final products. It does not include the remainder of the industrial sector (construction, mining, agricultural, fishing, and forestry establishments) or electric utilities. The 20 quadrillion Btu total is the *primary consumption of energy*; it includes energy consumed to produce heat and power and to generate electricity, as well as sources of energy consumed as petrochemical feedstocks and raw material inputs, but it excludes byproduct fuels produced from other energy sources.

[3]Net electricity, which is obtained by summing purchases, transfers in, and generation from noncombustible renewable resources, minus quantities sold and transferred out. It excludes electricity generated from combustible fuels.

[4]The capability of U.S. manufacturers to switch fuels within 30 days, using only existing equipment and keeping production output constant.

distillate fuel oil consumption could have been supplied by other sources. It is estimated that about 99 thousand barrels per day of consumption of fuel oil (residual and distillate combined) could have been switched to nonpetroleum sources.

Natural gas registered the largest absolute amount of total switchable consumption. Of the 5.5 quadrillion Btu total of natural gas consumption, 1.9 quadrillion Btu (35 percent) could have been switched to other sources. Of the 1.2 quadrillion Btu of coal consumed, 0.5 quadrillion Btu (45 percent) were switchable. Very little (less than 3 percent) of the 2.5 quadrillion Btu of purchased electricity consumed by manufacturers in 1991 could have been switched to other sources if manufacturing output were to be maintained.

Household Uses of Energy

In 1990 (the most recent year for which data are available), household energy consumption totaled 9.2 quadrillion Btu and energy consumption per household averaged 98 million Btu (2.9). Household energy consumption is strongly influenced by climate. Households in the West and South consumed the least amount of energy in 1990, an average of 78 million Btu per household in the West and 81 million Btu per household in the South. Consumption in the colder climates was higher in 1990; households in the Midwest averaged 122 million Btu per household and those in the Northeast 120 million Btu per household. Many other factors influence consumption, including the fact that houses in the Northeast and Midwest tend to be larger and older.

Energy consumed by households can be attributed to four primary applications: space heating, air conditioning, water heating, and appliance operation (2.10). In 1990, space heating was the most prevalent application of energy consumed by households and accounted for 4.8 quadrillion Btu. Natural gas was the primary source of energy for space heating and provided the main source of heat in 52 million households (2.11). Natural gas was also the primary source of energy for water heating (2.10).

More than 2 quadrillion Btu were used to operate appliances and, as would be expected, electricity was the major source of energy for that application. Refrigerators, color television sets, ovens (regular and microwave), and clothes washers were the most common household appliances (2.12).

Electricity was essentially the only source of energy used for air conditioning. Although air conditioning accounted for only 5.2 percent of household energy consumption, it accounted for 10 percent ($11.2 billion) of total household energy expenditures of $110 billion (2.10).

The cost of energy used to operate appliances totaled $49 billion in 1990, and the cost for space heating was $34 billion. Energy expenses for water heating came to about $15 billion.

Improvements in Passenger Car Efficiency

Because motor gasoline consistently accounts for the largest share of all petroleum products supplied (5.11), motor gasoline consumption has a significant effect on U.S. dependence on foreign sources of crude oil. Following the Arab oil embargo in the mid-1970's, concerns about U.S. dependence on foreign oil led to interest in improving motor vehicle efficiency.

In 1973, average annual mileage exceeded 10 thousand miles per passenger car (2.16). The average fuel rate of passenger cars, which make up a sizable proportion of the U.S. motor vehicle fleet, was 13 miles per gallon. That measure of fuel efficiency had declined for the previous several years.

In 1973 and 1974, however, crude oil supply interruptions and rising prices led to public concern over the continued availability of motor gasoline. The immediate effect of higher prices was a decline in mileage to an average of 9.6 thousand miles per passenger car in 1974 (2.16). At the same time, the average fuel rate of the passenger car fleet began to improve. It increased throughout the 1970's and 1980's, reaching an average of 22 miles per gallon in 1991 and 1992 (the most recent year for which data are available). The Federal Corporate Average Fuel Economy standards, which required automobile manufacturers to meet fleet fuel rate minimum averages, played a major role in the increase in fuel rates.

Energy Consumption by Household Vehicles

In spite of the recent rapid growth in the number of minivans and sport-utility vehicles owned by U.S. households, the average on-road fuel efficiency of the household vehicle fleet rose from 15 miles per gallon in 1983 to 19 miles per gallon in 1991 (2.15). In 1991, nearly 85 million households (out of a U.S. total of 95 million households)

owned or had access to at least one vehicle. The 151 million household vehicles traveled a total of 1.6 quadrillion miles, up from 1.2 quadrillion miles in 1983.

Household vehicles consumed 81 billion gallons of motor gasoline in 1991, of which 96 percent was unleaded. In 1983, by comparison, 59 percent of the 79 billion gallons consumed was unleaded. The average prices of both kinds of motor gasoline were slightly lower in 1991 than in 1983. According to household survey data, leaded motor gasoline averaged $1.10 per gallon and unleaded motor gasoline averaged $1.19 per gallon.

Energy-Related Characteristics of Commercial Buildings

Commercial buildings are those which house mercantile, service, office, education, and other activities. In 1992 (the most recent year for which data are available), there were approximately 68 billion square feet of commercial floorspace in the United States (2.18). The largest amount of commercial floorspace, 25 billion square feet, was found in the South and accounted for 36 percent of the U.S. total. On the basis of the amount of commercial floorspace in which a given energy source is consumed, electricity was the most prevalent. Electricity was an energy source for almost 67 billion square feet of commercial floorspace. Natural gas was also commonly used and supplied energy for 45 billion square feet. Fuel oil, district heat, and propane were consumed in smaller, but still significant, amounts in commercial buildings.

The most common energy-consuming activities in commercial buildings were space heating, air conditioning, water heating, cooking, and manufacturing (2.19). Most commercial floorspace (62 billion square feet) was heated and most (58 billion square feet) had hot water. Air conditioning was also common (57 billion square feet). Cooking and manufacturing were less prevalent, occurring in 23 billion square feet and 3 billion square feet, respectively.

On a Btu basis, electricity and natural gas were the most common sources of energy in commercial buildings (2.22). In 1989 (the most recent year for which energy consumption data are available), 2.8 quadrillion Btu of electricity and 2.1 quadrillion Btu of natural gas were consumed in commercial buildings. Consumption of district heat (steam and hot water from outside sources) totaled 0.6 quadrillion Btu and consumption of fuel oil totaled 0.4 quadrillion Btu. (Propane also supplied small amounts of energy in commercial buildings, but propane data were not collected in 1989.)

Of the $71 billion spent on energy for commercial buildings in 1989, by far the largest amount went for electricity (2.22). Electricity expenditures came to $56 billion, whereas expenditures for natural gas came to $9 billion. Expenditures for district heat were nearly $4 billion and expenditures for fuel oil were close to $2 billion.

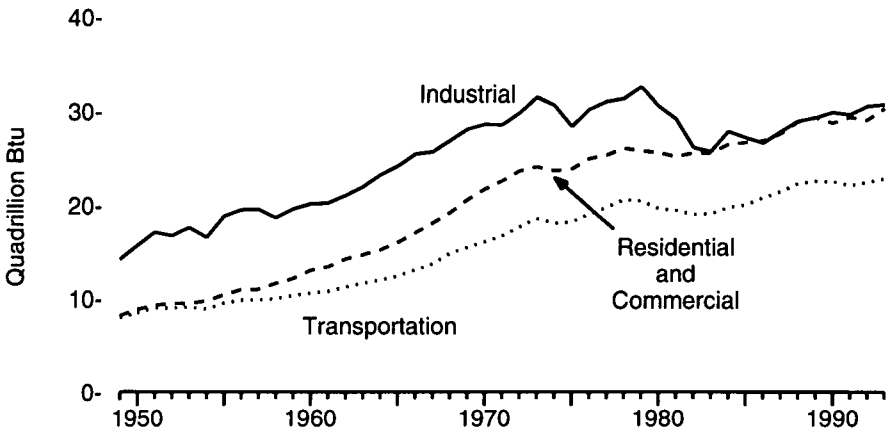
Conservation and DSM Program Participation in Commercial Buildings

Most commercial buildings contained energy conservation features in 1992 (2.23). Conservation features in building shells were pervasive. Conservation features in commercial heating, ventilation, and air conditioning systems occurred in 2.6 million of the 4.8 million commercial buildings. Conservation features associated with lighting occurred in 1.2 million buildings.

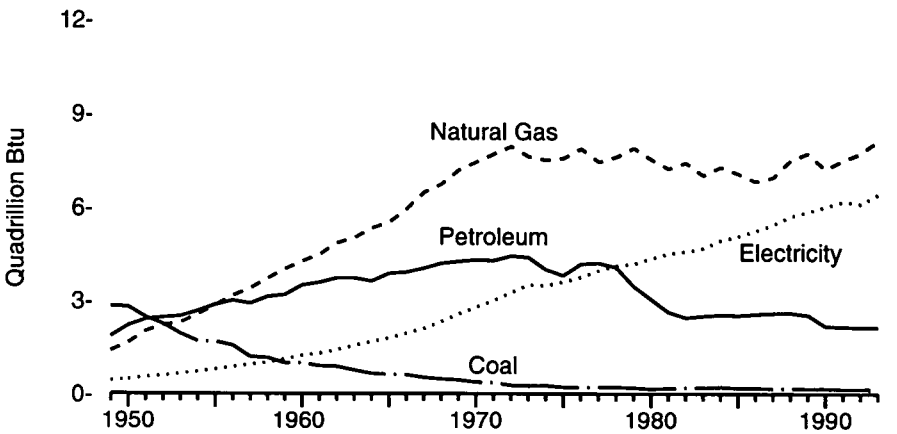
Many fewer buildings participated in the demand-side management (DSM) programs. (DSM is the planning, implementation, and monitoring of electric utility activities designed to encourage customers to reduce the amount of electricity they consume overall or at certain periods.) In 1992, only 315 thousand of the 4.8 million commercial buildings participated in at least one DSM program (2.24).

Figure 2.1 Energy Consumption by End-Use Sector, 1949-1993

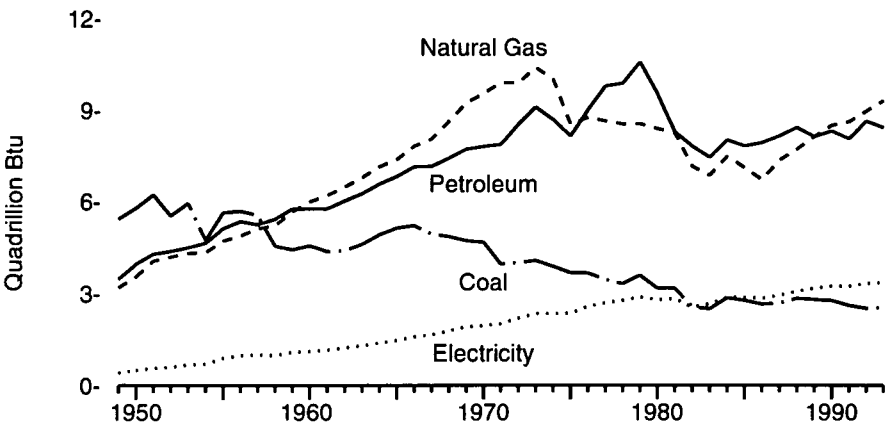
By End-Use Sector



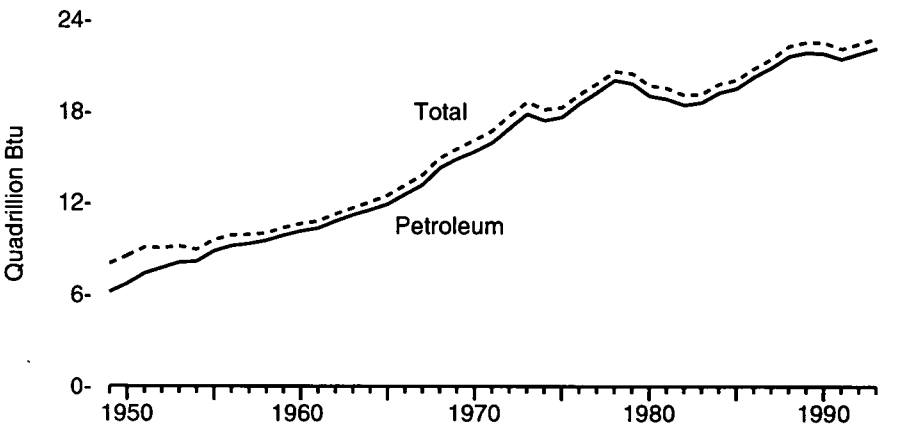
Residential and Commercial Sector



Industrial Sector



Transportation Sector



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 2.1.

Table 2.1 Energy Consumption by End-Use Sector, 1949-1993

(Quadrillion Btu)

	Residential and Commercial						Industrial						Transportation		
Year	Coal	Natural Gas [1]	Petroleum	Electricity	Losses [2]	Total	Coal	Natural Gas [1]	Petroleum	Electricity	Losses [2]	Total [3]	Petroleum	Total [4]	Total
1949	2.83	1.39	1.85	0.43	1.72	8.21	5.43	3.19	3.47	0.42	1.68	14.26	6.15	7.99	30.46
1950	2.80	1.64	2.20	0.47	1.76	8.87	5.78	3.55	3.95	0.50	1.86	15.71	6.69	8.49	33.08
1951	2.47	2.01	2.40	0.54	1.89	9.30	6.20	4.05	4.27	0.57	2.00	17.13	7.36	9.04	35.47
1952	2.25	2.21	2.46	0.59	2.02	9.54	5.52	4.18	4.36	0.60	2.05	16.76	7.71	9.00	35.30
1953	1.93	2.29	2.50	0.65	2.12	9.50	5.93	4.30	4.48	0.68	2.20	17.65	8.06	9.12	36.27
1954	1.68	2.57	2.67	0.72	2.15	9.78	4.73	4.32	4.63	0.71	2.14	16.58	8.12	8.90	35.27
1955	1.67	2.85	2.87	0.79	2.23	10.41	5.62	4.70	5.11	0.89	2.51	18.86	8.80	9.55	38.82
1956	1.55	3.15	3.00	0.87	2.39	10.96	5.67	4.87	5.34	0.98	2.68	19.55	9.15	9.86	40.38
1957	1.19	3.39	2.91	0.95	2.55	10.98	5.54	5.11	5.24	1.00	2.70	19.60	9.29	9.90	40.48
1958	1.16	3.71	3.12	1.01	2.64	11.65	4.53	5.21	5.41	0.98	2.54	18.70	9.51	10.00	40.35
1959	0.99	4.02	3.18	1.12	2.84	12.15	4.41	5.65	5.74	1.08	2.73	19.64	9.85	10.35	42.14
1960	0.99	4.27	3.49	1.23	3.06	13.04	4.54	5.97	5.75	1.11	2.76	20.16	10.13	10.60	43.80
1961	0.90	4.48	3.58	1.30	3.18	13.44	4.35	6.17	5.75	1.15	2.80	20.25	10.32	10.77	44.46
1962	0.88	4.85	3.72	1.41	3.40	14.27	4.38	6.45	6.00	1.23	2.95	21.04	10.77	11.23	46.53
1963	0.76	5.01	3.72	1.54	3.68	14.71	4.59	6.75	6.23	1.29	3.08	21.95	11.17	11.66	48.32
1964	0.65	5.33	3.62	1.67	3.96	15.23	4.91	7.11	6.55	1.38	3.29	23.27	11.50	12.00	50.50
1965	0.62	5.52	3.87	1.78	4.25	16.03	5.13	7.34	6.79	1.46	3.49	24.22	11.87	12.43	52.68
1966	0.61	5.95	3.91	1.94	4.65	17.06	5.21	7.80	7.11	1.58	3.79	25.50	12.50	13.10	55.66
1967	0.52	6.47	4.04	2.09	4.98	18.10	4.93	8.04	7.12	1.65	3.95	25.72	13.11	13.75	57.57
1968	0.47	6.73	4.20	2.32	5.52	19.23	4.85	8.63	7.39	1.78	4.24	26.90	14.21	14.86	61.00
1969	0.44	7.20	4.26	2.57	6.12	20.59	4.71	9.23	7.70	1.91	4.56	28.10	14.81	15.50	64.19
1970	0.37	7.46	4.31	2.79	6.78	21.71	4.66	9.54	7.79	1.95	4.72	28.63	15.31	16.09	66.43
1971	0.35	7.71	4.29	2.99	7.25	22.59	3.94	9.89	7.86	2.01	4.87	28.57	15.92	16.72	67.89
1972	0.27	7.94	4.43	3.25	7.80	23.69	3.99	9.88	8.53	2.19	5.25	29.86	16.89	17.71	71.26
1973	0.25	7.63	4.39	3.50	8.38	24.14	4.06	10.39	9.10	2.34	5.61	31.53	17.83	18.60	74.28
1974	0.26	7.52	4.00	3.47	8.48	23.72	3.87	10.00	8.69	2.34	5.70	30.70	17.40	18.12	72.54
1975	0.21	7.58	3.80	3.60	8.70	23.90	3.67	8.53	8.15	2.35	5.66	28.40	17.62	18.25	70.55
1976	0.20	7.87	4.18	3.75	9.02	25.02	3.66	8.76	9.01	2.57	6.20	30.24	18.51	19.10	74.36
1977	0.21	7.46	4.21	3.96	9.56	25.39	3.45	8.64	9.78	2.68	6.48	31.08	19.24	19.82	76.29
1978	0.21	7.62	4.07	4.12	10.07	26.09	3.31	8.54	9.87	2.76	6.75	31.39	20.04	20.61	78.09
1979	0.19	7.89	3.45	4.18	R10.10	25.81	3.59	8.55	10.57	2.87	6.94	32.61	19.82	20.47	78.90
1980	0.15	7.54	3.04	4.35	10.58	25.65	3.16	8.39	9.53	2.78	6.76	30.61	19.01	19.69	75.96
1981	0.17	7.24	2.63	4.50	R10.70	25.24	3.16	8.26	8.29	2.82	R6.70	29.24	18.81	19.51	73.99
1982	0.19	7.43	2.45	4.57	R11.00	25.63	2.55	7.12	7.80	2.54	R6.12	26.14	18.42	19.07	70.85
1983	0.19	7.02	2.50	4.68	R11.24	25.63	2.49	6.83	7.42	2.65	R6.36	25.75	18.59	19.13	70.52
1984	0.21	7.29	2.54	4.93	R11.51	26.48	2.84	7.45	8.01	2.86	R6.68	27.86	19.22	19.80	74.14
1985	0.18	7.08	2.52	5.06	R11.87	26.70	2.76	7.08	7.81	2.86	R6.69	27.22	19.50	20.07	73.98
1986	0.18	6.82	2.56	5.24	R12.06	26.85	2.64	6.69	7.92	2.83	R6.53	26.63	20.27	20.81	74.30
1987	0.16	6.95	2.59	5.44	R12.48	27.62	2.67	7.32	8.15	2.93	R6.71	27.83	20.87	21.45	76.89
1988	0.17	7.51	2.60	5.72	R12.92	28.92	2.83	7.70	8.43	3.06	R6.90	28.99	21.63	22.30	80.22
1989	0.15	7.73	2.53	5.86	R13.14	29.40	2.79	8.13	8.13	3.16	R7.08	29.35	21.87	22.56	81.33
1990	0.16	7.22	2.17	6.02	R13.22	28.79	2.76	8.50	8.32	3.23	R7.09	29.93	21.81	22.54	81.26
1991	0.14	7.51	2.15	6.18	R13.44	29.42	2.60	R8.62	8.06	3.23	R7.02	R29.57	21.46	22.12	R81.12
1992	0.14	R7.73	R2.13	6.10	R13.01	R29.10	R2.51	R8.97	R8.64	R3.32	R7.08	R30.58	R21.81	R22.46	R82.14
1993P	0.15	8.11	2.13	6.41	13.54	30.34	2.54	9.31	8.43	3.35	7.09	30.77	22.16	22.83	83.96

[1] Includes supplemental natural gas.

[2] Electrical system energy losses. See Glossary and Diagram 5. Total losses are calculated as the sum of energy consumed at electric utilities to generate electricity, utility purchases of electricity from nonutility power producers, and imported electricity, minus exported electricity and electricity consumed by end users. Total losses are allocated to the end-use sectors in proportion to each sector's share of total electricity use.

[3] Also includes hydroelectric power and net imports of coal coke.

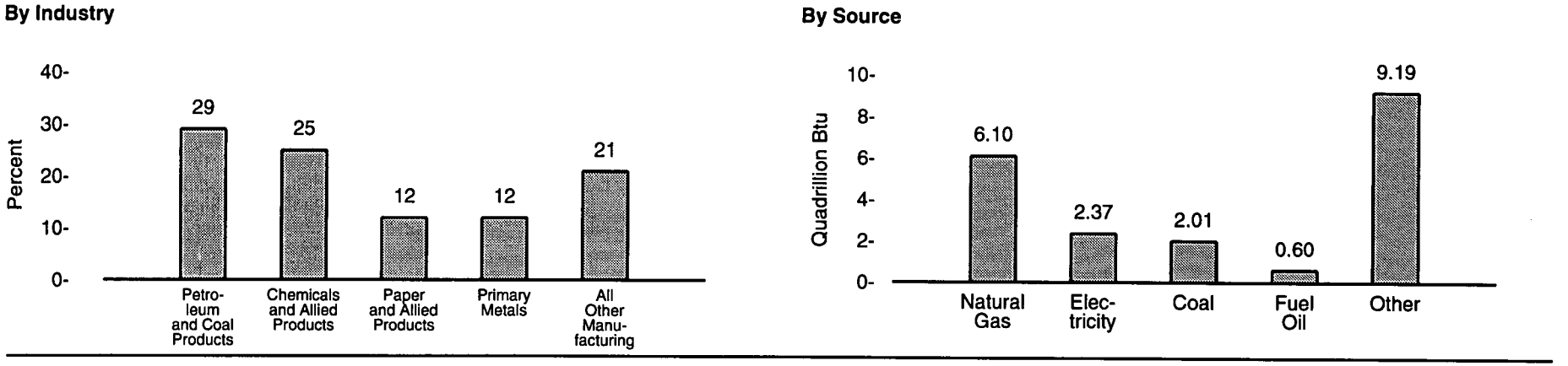
[4] Also includes coal, natural gas, electricity, and electrical system energy losses.

R=Revised data. P=Preliminary data.

Notes: • Due to a lack of consistent historical data, some consumption of renewable energy sources is not included. In 1992, 3.0 quadrillion Btu of renewable energy consumed by U.S. electric utilities to generate electricity for distribution is included, but an estimated 3.0 quadrillion Btu of renewable energy used by other sectors in the United States is not included. See Table 10.1. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 5.12, 6.6, 7.3, 7.7, 8.1, 8.3, 8.5, 10.8, A3-A7, and Energy Information Administration estimates for industrial hydroelectric power. "Other" from Table 8.5 is allocated to the Residential and Commercial Sector, except for approximately 4 percent used by railroads and railways and attributed to the Transportation Sector.

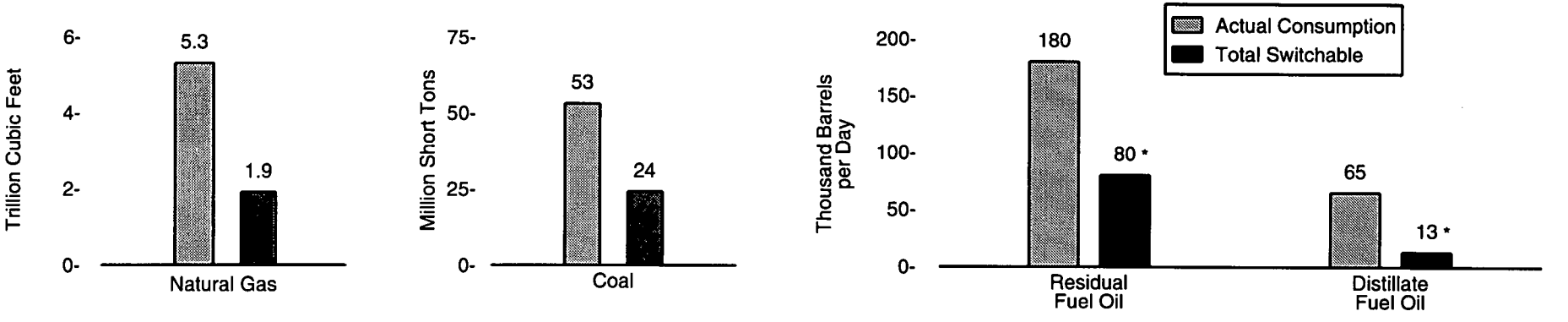
Figure 2.2 Manufacturing Primary Energy Consumption, 1991



Note: "Other" includes all other types of energy that respondents indicated were consumed; included are feedstocks and raw materials for the production of nonenergy products, such as asphalt.

Source: Table 2.2.

Figure 2.3 Manufacturing Fuel-Switching Capability Within 30 Days, 1991



*The total estimated quantity of residual fuel oil and distillate fuel oil combined that is switchable to nonpetroleum alternative fuels is 99 thousand barrels per day.

Source: Table 2.3.

Table 2.2 Manufacturing Energy Consumption Measures, 1991

(Quadrillion Btu, Except as Noted)

Type of Consumption and Selected Industries	Electricity	Fuel Oil	Natural Gas	Coal	Other [1]	Total	Percent
Primary Consumption [2] of Energy	**2.370**	**0.600**	**6.095**	**2.006**	**9.186**	**20.257**	**100**
Paper and Allied Products	0.201	0.165	W	0.296	W	2.506	12
Chemicals and Allied Products	0.440	W	2.227	W	W	5.051	25
Petroleum and Coal Products [3]	0.105	0.086	0.838	W	W	5.967	29
Primary Metal Industries	0.499	W	0.708	0.853	W	2.467	12
All Other Manufacturing Industries	1.125	W	W	W	W	4.266	21
Total Energy Consumed to Produce Heat, Power, and Electricity [4]	**2.370**	**0.553**	**5.506**	**1.184**	**5.414**	**15.027**	**100**
Paper and Allied Products	0.201	0.165	0.548	0.296	1.262	2.472	16
Chemicals and Allied Products	0.440	0.060	1.669	0.253	0.618	3.040	20
Petroleum and Coal Products	0.105	0.108	0.838	W	W	2.987	20
Primary Metal Industries	0.499	0.044	0.686	0.046	1.017	2.292	15
All Other Manufacturing Industries	1.125	0.176	1.765	W	W	4.236	28
Offsite-Produced Energy Consumed to Produce Heat, Power, and Electricity	**2.451**	**0.485**	**5.492**	**1.175**	**1.234**	**10.837**	**100**
Paper and Allied Products	0.222	0.165	0.548	0.292	0.313	1.540	14
Chemicals and Allied Products	0.474	0.059	1.665	0.249	0.227	2.674	25
Petroleum and Coal Products	0.114	0.041	0.830	W	W	1.138	11
Primary Metal Industries	0.502	0.044	0.686	0.046	0.285	1.563	14
All Other Manufacturing Industries	1.139	0.176	1.763	W	W	3.922	36

[1] Includes all other types of energy that respondents indicated were consumed.
[2] Includes feedstocks; does not include by-product fuels.
[3] Includes feedstocks and raw materials for the production of nonenergy products, regardless of the type of energy.
[4] Includes by-product energy.

W=Withheld to avoid disclosing data for individual establishments. Data are included in higher level totals.

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *Manufacturing Energy Consumption Survey: Consumption of Energy 1991* (July 1994).

Table 2.3 Manufacturing Fuel-Switching Capability Within 30 Days, 1991

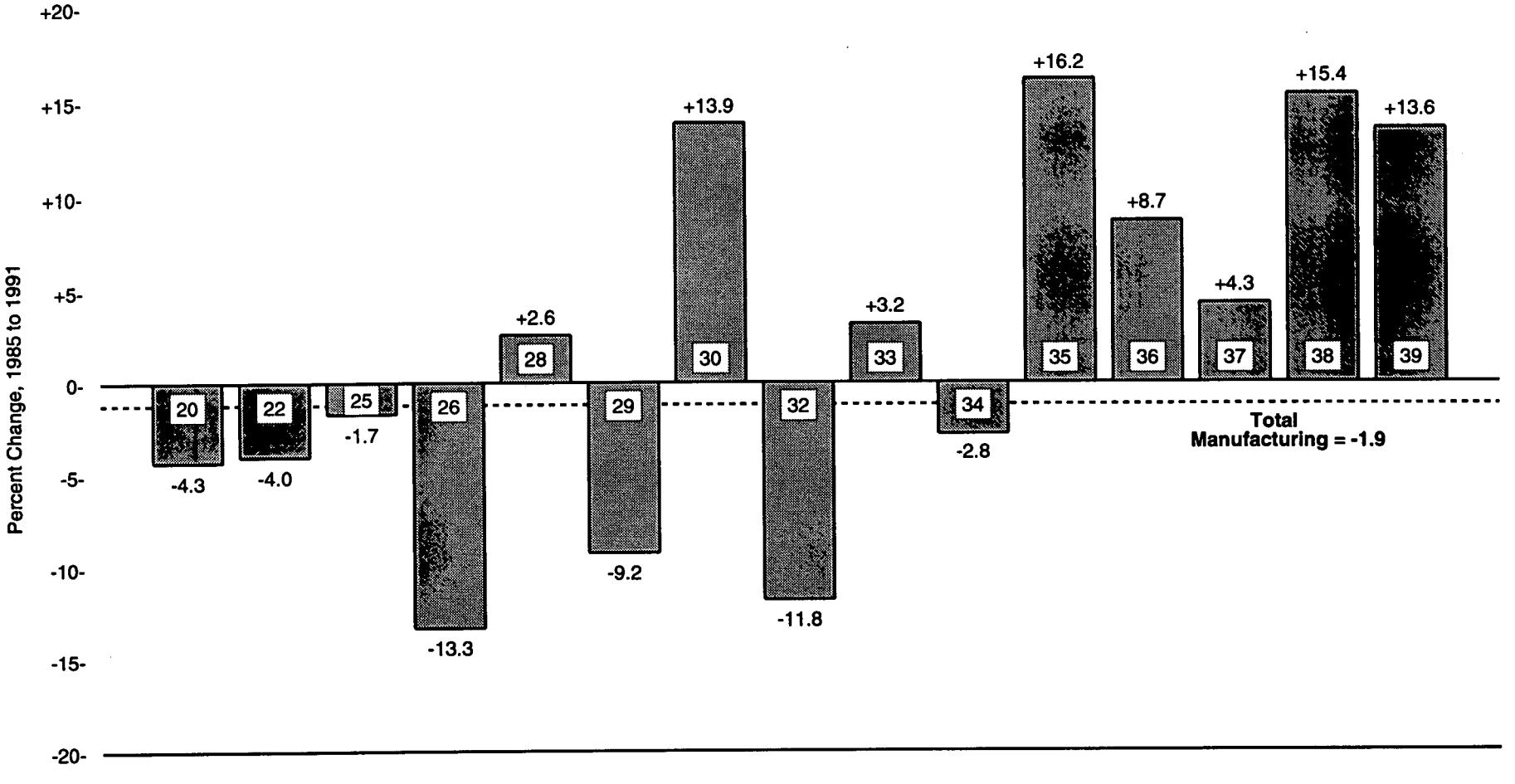
Measure of Consumption	Natural Gas		Purchased Electricity [1]		Coal		Residual Fuel Oil		Distillate Fuel Oil	
	Billion Cubic Feet per Year	Quadrillion Btu per Year	Million Kilowatt-hours per Year	Quadrillion Btu per Year	Thousand Short Tons per Year	Quadrillion Btu per Year	Thousand Barrels per Day	Quadrillion Btu per Year	Thousand Barrels per Day	Quadrillion Btu per Year
Actual	5,345	5.505	718,480	2.451	53,035	1.181	180	0.414	65	0.139
Minimum [2]	3,485	3.590	701,478	2.393	29,425	0.655	100	0.229	52	0.111
Maximum [3]	5,887	6.064	766,887	2.617	58,996	1.314	553	1.269	551	1.171
Total Switchable [4]	1,860	1.916	17,003	0.058	23,610	0.526	[5] 80	0.185	[5] 13	0.028

[1] Those quantities for which payment was made and that were available onsite for consumption.
[2] The amount of fuel actually consumed, minus the amount of actual consumption that could have been replaced by other fuels.
[3] The amount of fuel actually consumed, plus the amount of additional consumption that could have occurred if all possible switching from other fuels took place.
[4] The amount of actual consumption that could have been replaced by other fuels.
[5] The total estimated quantity of residual and distillate fuel oil combined that is switchable to nonpetroleum alternative fuels is 99 thousand barrels per day.

Note: Consumption includes energy consumed for heat, power, and onsite electricity generation. It excludes energy consumed as petrochemical feedstocks and raw material inputs.

Source: Energy Information Administration, *Manufacturing Energy Consumption Survey: Consumption of Energy 1991* (July 1994).

Figure 2.4 Manufacturing Offsite Energy Intensity Change by Industry Group, 1985 to 1991



Note: Numbers that appear within each bar are the Standard Industrial Classification (SIC) codes for industry groups.

Source: Table 2.4.

Table 2.4 Manufacturing Energy Intensity by Industry Group, 1985, 1988, and 1991

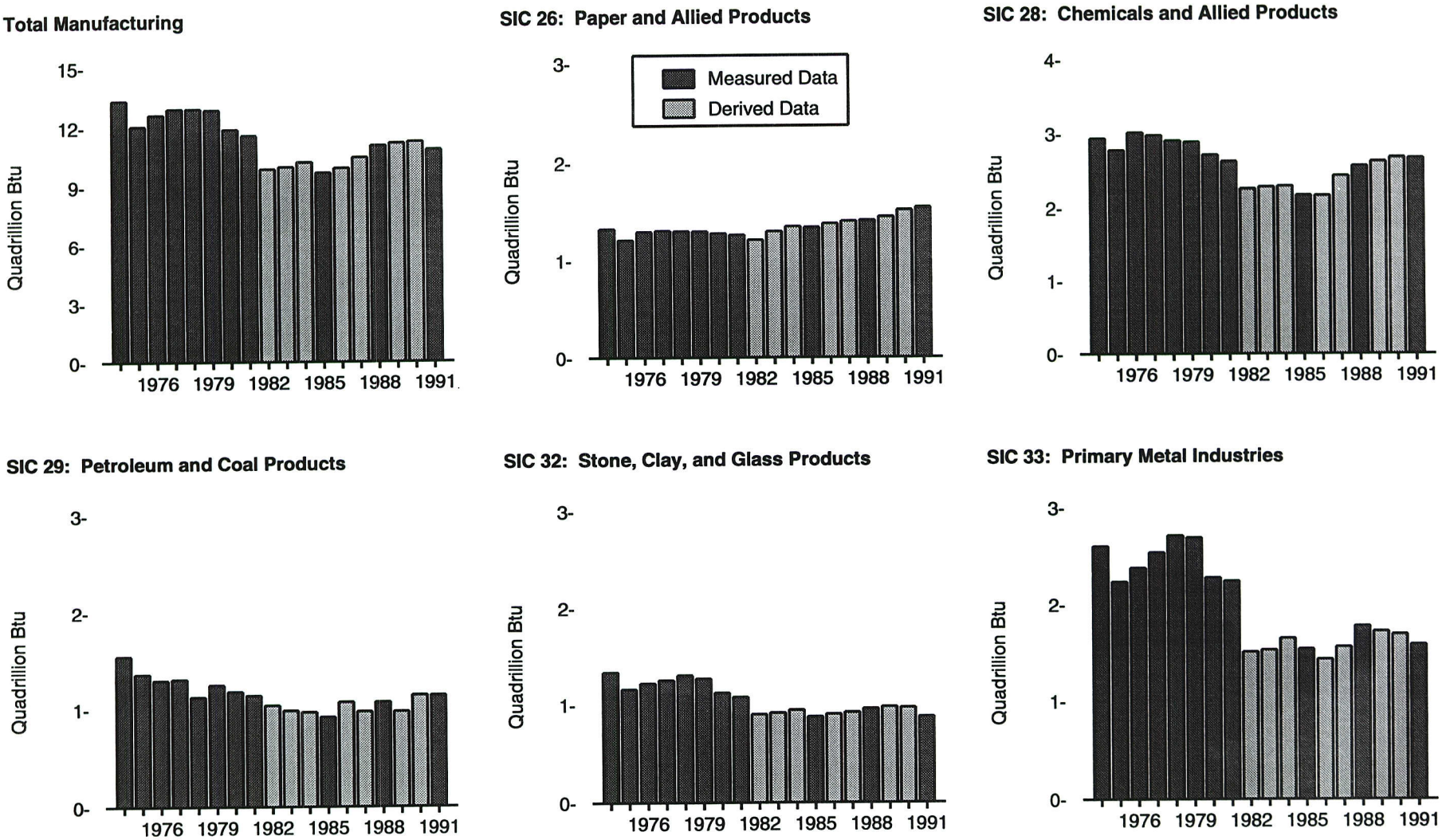
SIC [2] Code	Industry Group	Offsite Energy Intensity Ratios [3]			Offsite Energy Intensity Change [1] (percent)		
		1985	1988	1991	1985 to 1988	1985 to 1991	1988 to 1991
20	Food and Kindred Products	2.53	2.79	2.64	-10.1	-4.3	5.3
21	Tobacco Products	NA	NA	NA	NA	NA	NA
22	Textile Mill Products	4.49	4.54	4.67	-1.1	-4.0	-2.9
23	Apparel and Other Textile Products	NA	NA	NA	NA	NA	NA
24	Lumber and Wood Products	NA	NA	NA	NA	NA	NA
25	Furniture and Fixtures	1.37	1.48	1.39	-8.2	-1.7	6.1
26	Paper and Allied Products	12.27	11.29	13.90	8.0	-13.3	-23.1
27	Printing and Publishing	NA	NA	NA	NA	NA	NA
28	Chemicals and Allied Products	11.85	11.28	11.55	4.8	2.6	-2.3
29	Petroleum and Coal Products	7.63	7.83	8.33	-2.6	-9.2	-6.4
30	Rubber and Misc. Plastics Products	3.04	3.05	2.62	-0.5	13.9	14.3
31	Leather and Leather Products	NA	NA	NA	NA	NA	NA
32	Stone, Clay, and Glass Products	15.52	16.39	17.35	-5.6	-11.8	-5.8
33	Primary Metal Industries	13.84	13.66	13.40	1.3	3.2	1.9
34	Fabricated Metal Products	2.18	2.33	2.24	-6.8	-2.8	3.8
35	Industrial Machinery and Equipment	1.20	1.10	1.00	7.8	16.2	9.0
36	Electronic and Other Electric Equipment	1.15	1.21	1.05	-4.8	8.7	12.9
37	Transportation Equipment	1.04	0.97	1.00	6.8	4.3	-2.7
38	Instruments and Related Products	1.05	0.91	0.89	13.2	15.4	2.5
39	Miscellaneous Manufacturing Industries	1.25	1.27	1.08	-1.4	13.6	14.9
—	Total Manufacturing	4.35	4.26	4.44	2.1	-1.9	-4.1

[1] A decrease in the energy intensity ratio results in an increase in energy efficiency represented by a positive value.
[2] Standard Industrial Classification based on 1987 system.
[3] Thousand Btu per constant (1987) dollar of value of shipments and receipts.
NA=Not available.

Note: Data for 1985 and 1988 are different from previously published data due to deflator and SIC adjustments.

Sources: • 1985—Energy Information Administration (EIA), Form EIA-846, "1985 Manufacturing Energy Consumption Survey." • 1988—EIA, Form EIA-846, "1988 Manufacturing Energy Consumption Survey." • 1991—EIA, Form EIA-846, "1991 Manufacturing Energy Consumption Survey."

Figure 2.5 Offsite-Produced Energy Consumed for Heat and Power by Selected Industry Group, 1974-1991



Note: Because scales differ, graphs should not be compared.

Source: Table 2.5.

Table 2.5 Offsite-Produced Energy Consumed for Heat and Power by Selected Industry Group, 1974-1991

(Trillion Btu)

Year	Data Source [2]	Industry Group by SIC Code [1]													
		SIC 20	SIC 22	SIC 26	SIC 28	SIC 29	SIC 30	SIC 32	SIC 33	SIC 34	SIC 35	SIC 36	SIC 37	Others [3]	Total
1974	ASM	959	323	1,327	2,937	1,545	247	1,332	2,604	408	367	251	375	661	13,337
1975	ASM	916	307	1,210	2,780	1,357	227	1,159	2,235	367	330	227	348	575	12,037
1976	ASM	938	329	1,295	3,017	1,292	237	1,220	2,380	381	330	233	380	594	12,625
1977	CM	952	339	1,308	2,979	1,303	272	1,252	2,539	395	340	249	390	610	12,929
1978	ASM	980	327	1,301	2,905	1,123	261	1,300	2,711	400	351	255	398	617	12,929
1979	ASM	949	315	1,300	2,889	1,245	249	1,266	2,689	386	353	250	385	592	12,867
1980	ASM	948	295	1,278	2,717	1,178	223	1,122	2,277	359	334	240	344	558	11,874
1981	ASM	913	292	1,262	2,630	1,137	223	1,077	2,241	352	325	235	329	546	11,563
1982	Derived	*900*	*256*	*1,210*	*2,258*	*1,035*	*231*	*901*	*1,507*	*298*	*278*	*218*	*293*	*496*	*9,881*
1983	Derived	*889*	*274*	*1,299*	*2,285*	*982*	*238*	*916*	*1,528*	*288*	*257*	*229*	*307*	*499*	*9,990*
1984	Derived	*898*	*266*	*1,349*	*2,295*	*966*	*236*	*945*	*1,650*	*319*	*268*	*235*	*325*	*510*	*10,221*
1985	MECS	876	247	1,340	2,170	917	211	878	1,537	297	241	209	322	452	9,698
1986	Derived	*894*	*258*	*1,379*	*2,167*	*1,068*	*232*	*903*	*1,431*	*302*	*243*	*219*	*339*	*502*	*9,935*
1987	Derived	*921*	*278*	*1,402*	*2,436*	*972*	*250*	*921*	*1,560*	*323*	*261*	*207*	*348*	*583*	*10,461*
1988	MECS	946	276	1,409	2,568	1,070	251	959	1,773	343	278	215	350	616	11,052
1989	Derived	*946*	*280*	*1,446*	*2,630*	*1,105*	*259*	*978*	*1,720*	*345*	*284*	*217*	*356*	*617*	*11,183*
1990	Derived	*942*	*273*	*1,514*	*2,683*	*1,140*	*255*	*970*	*1,690*	*335*	*277*	*215*	*352*	*612*	*11,256*
1991	MECS	922	272	1,540	2,674	1,138	235	877	1,563	305	236	196	318	561	10,837

[1] Standard Industrial Classification (SIC) code industry groups displayed are:
SIC 20 Food and Kindred Products
SIC 22 Textile Mill Products
SIC 26 Paper and Allied Products
SIC 28 Chemicals and Allied Products
SIC 29 Petroleum and Coal Products
SIC 30 Rubber and Misc. Plastics Products
SIC 32 Stone, Clay, and Glass Products
SIC 33 Primary Metal Industries
SIC 34 Fabricated Metal Products
SIC 35 Industrial Machinery and Equipment
SIC 36 Electronic and Other Electric Equipment
SIC 37 Transportation Equipment.

[2] ASM = U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufactures: Fuels and Electric Energy Consumed, 1974-1976* and *1978-1981*.
CM = U.S. Department of Commerce, Bureau of the Census, *Census of Manufactures: Fuels and Electric Energy Consumed, 1977*.
MECS = Energy Information Administration, Office of Energy Markets and End Use, *Manufacturing Energy Consumption Survey: Consumption of Energy, 1985* and *1988*.
Derived = Estimates derived by using consumption data from MECS and ASM and Federal Reserve Board production indices from the *Statistical Abstract of the United States, 1984, 1990,* and *1993*.

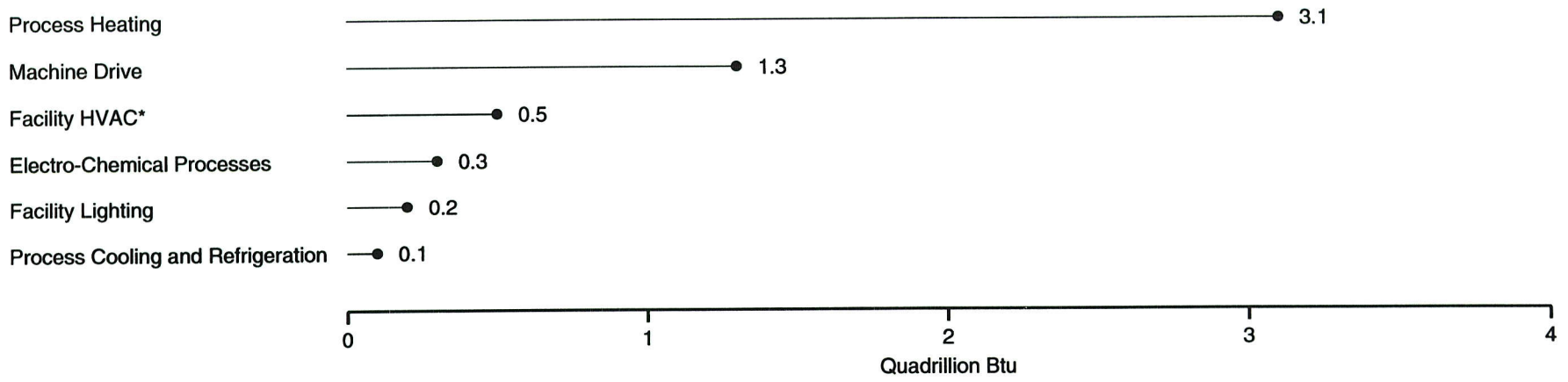
[3] Others are SIC 21 Tobacco Products; SIC 23 Apparel and Other Textile Products; SIC 24 Lumber and Wood Products; SIC 25 Furniture and Fixtures; SIC 27 Printing and Publishing; SIC 31 Leather and Leather Products; SIC 38 Instruments and Related Products; and SIC 39 Miscellaneous Manufacturing Industries.

Note: • Totals may not equal sum of components due to independent rounding. • Data represent the purchased consumption, defined as consumption of energy that was originally produced offsite and acquired as a result of a purchase or transfer and consumed onsite for the production of heat and power.

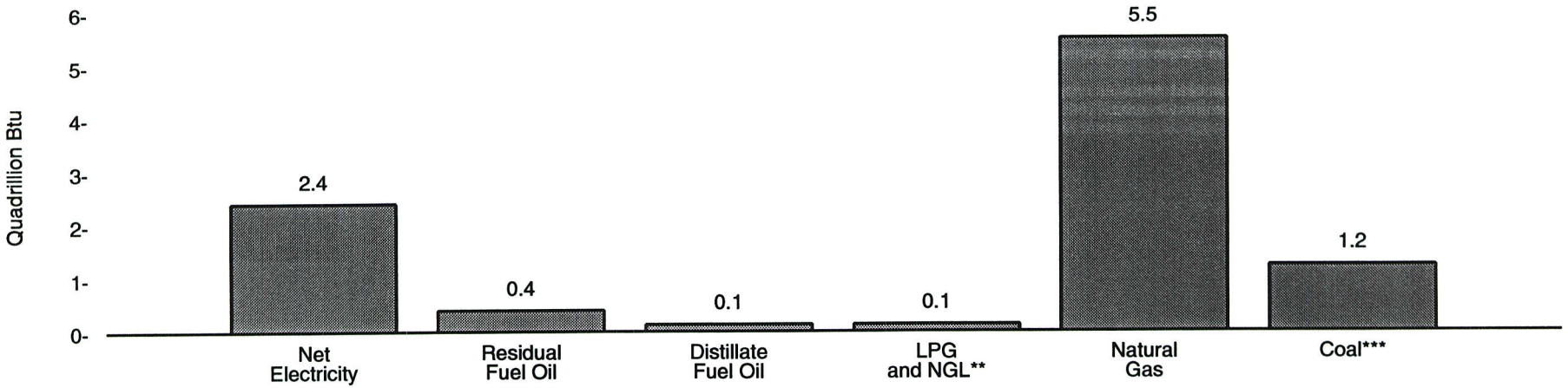
Sources: • 1974-1988—Energy Information Administration (EIA), *Derived Annual Estimates of Manufacturing Energy Consumption, 1974-1988* (August 1992), Table 1. • 1989-forward—EIA, Form EIA-846, "1991 Manufacturing Energy Consumption Survey."

Figure 2.6 Manufacturing Sector Inputs for Heat, Power, and Electricity Generation, 1991

By Selected End Uses



By Energy Source



* Heating, ventilation, and air conditioning.
** Liquefied petroleum gases and natural gas liquids.
*** Excluding coal coke and breeze.
Source: Table 2.6.

Table 2.6 Manufacturing Sector Inputs for Heat, Power, and Electricity Generation by Energy Source, 1991

End-Use Category	Net Electricity [1]	Residual Fuel Oil	Distillate Fuel Oil [2]	LPG and NGL [3]	Natural Gas [4]	Coal (Excluding Coal Coke and Breeze)	Total [5]
	Million Kilowatthours	Thousand Barrels			Billion Cubic Feet	Thousand Short Tons	
Indirect End Use (Boiler Fuel)	W	47,009	6,850	4,928	2,037	38,473	
Direct End Use							
All Process Uses	546,382	17,342	5,800	16,908	2,503	14,075	
Process Heating [6]	68,853	16,959	3,177	12,704	2,312	14,075	
Process Cooling and Refrigeration	36,330	6	30	18	13	0	
Machine Drive	347,899	353	2,398	4,093	123	0	
Electro-Chemical Processes	89,005	—	—	—	—	—	
Other Process Uses	4,295	24	196	93	55	([7])	
All Non-Process Uses	116,156	1,148	9,134	5,105	682	W	
Facility Heating, Ventilation, and Air Conditioning [6]	56,165	673	1,372	731	275	15	
Facility Lighting	47,309	—	—	—	—	—	
Other Facility Support	10,537	W	81	62	22	0	
Onsite Transportation	1,114	—	6,533	4,242	([7])	—	
Conventional Electricity Generation	—	325	734	41	337	W	
Other Non-Process Use	1,031	W	413	30	48	0	
End Use Not Reported	W	339	2,101	1,028	124	W	
Total	694,702	65,837	23,885	27,970	5,345	53,035	
				Trillion Btu			
Indirect End Use (Boiler Fuel)	W	296	40	18	2,098	859	W
Direct End Use							
All Process Uses	1,864	109	34	64	2,578	314	4,963
Process Heating [6]	235	107	19	49	2,382	314	3,106
Process Cooling and Refrigeration	124	([7])	([7])	([7])	13	0	137
Machine Drive	1,187	2	14	15	127	0	1,345
Electro-Chemical Processes	304	—	—	—	—	—	304
Other Process Uses	15	([7])	1	([7])	56	([7])	72
All Non-Process Uses	396	7	53	19	702	W	W
Facility Heating, Ventilation, and Air Conditioning [6]	192	4	8	3	283	([7])	490
Facility Lighting	161	—	—	—	—	—	161
Other Facility Support	36	W	([7])	([7])	23	0	W
Onsite Transportation	4	—	38	16	([7])	—	58
Conventional Electricity Generation	—	2	4	([7])	347	W	W
Other Non-Process Use	4	W	2	([7])	49	0	W
End Use Not Reported	W	2	12	4	128	W	W
Total	2,370	414	139	105	5,506	1,184	9,718

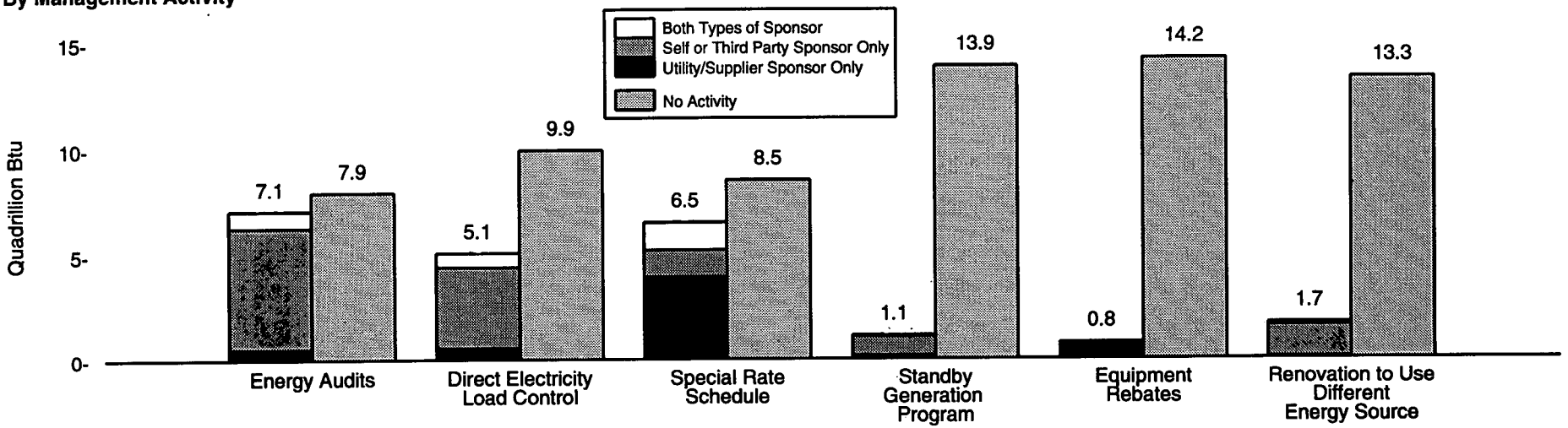
[1] "Net Electricity" is obtained by summing purchases, transfers in, and generation from noncombustible renewable resources, minus quantities sold and transferred out.
[2] Includes fuel oil nos. 1, 2, and 4 and diesel fuel nos. 1, 2, and 4.
[3] Liquefied petroleum gases and natural gas liquids.
[4] Includes natural gas obtained from utilities, transmission pipelines, any other supplier(s) such as brokers, and producers.
[5] Total of major energy sources. The top half of the "Total" column is blank because different physical units cannot be added.
[6] Exclude steam and hot water.
[7] Less than 0.5 rounded to zero.
— = Estimation of energy input quantity is not applicable. W=Withheld to avoid disclosing data for individual establishments. Data are included in higher level totals.

Notes: • Totals may not equal sum of components due to independent rounding. • The estimates of combustible energy presented in this table are for the total consumption of energy for the production of heat and power, regardless of where the energy was produced. Specifically, the estimates include the quantities of energy that were originally produced offsite and purchased by or transferred to the establishment, plus those that were produced onsite from other energy or input materials not classified as energy, or were extracted from captive (onsite) mines or wells. • Allocations to end uses are made on the basis of reasonable approximations by respondents.

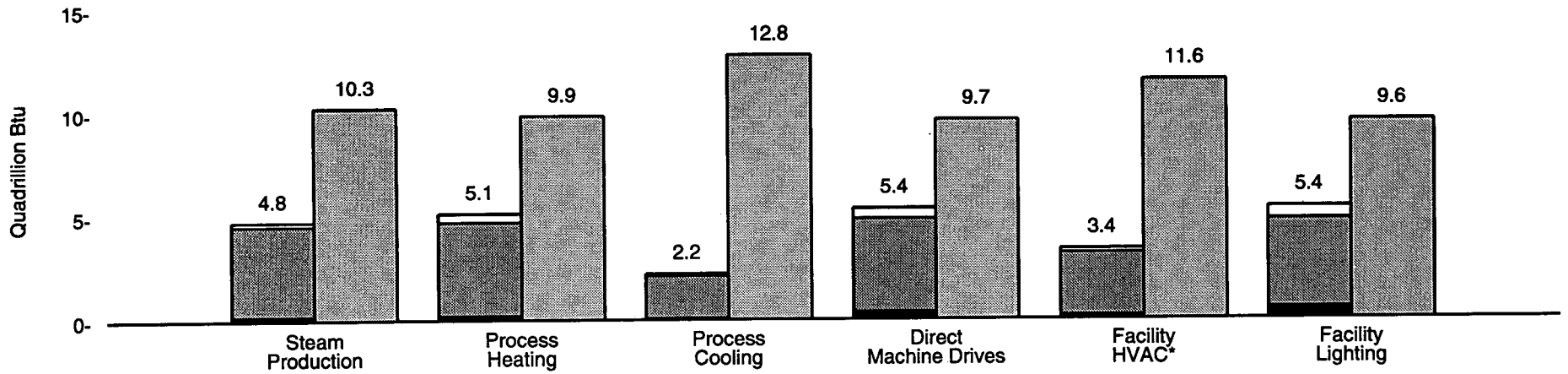
Source: Energy Information Administration, Form EIA-846, "1991 Manufacturing Energy Consumption Survey."

Figure 2.7 Manufacturing Sector Inputs for Heat, Power and Electricity Generation in 1991 by Energy Management Activity Present from 1989-1991

By Management Activity



Equipment Installation or Retrofit for the Primary Purpose of Improving Energy Efficiency Affecting:



*Heating, ventilation, and air conditioning.
Note: These energy management activities are commonly called demand-side management programs when conducted by utility or supplier.

Source: Table 2.7.

Table 2.7 Manufacturing Sector Inputs for Heat, Power, and Electricity Generation in 1991 by Energy Management Activity Present from 1989-1991

Sponsorship [1]	Energy Audits	Direct Electricity Load Control	Special Rate Schedule [2]	Standby Generation Program	Equipment Rebates	Equipment Installation or Retrofit for the Primary Purpose of Improving Energy Efficiency Affecting: Steam Production [3]	Process Heating	Process Cooling	Direct Machine Drives [4]	Facility HVAC [5]	Facility Lighting	Renovation to Use Different Energy Source [6]	Other [7]
	Quadrillion Btu												
Any Type of Sponsor	7.083	5.086	6.517	1.133	0.783	4.757	5.146	2.212	5.354	3.424	5.405	1.693	0.376
Utility/Supplier Sponsor Only [8]	0.532	0.565	3.939	0.176	0.582	0.200	0.209	0.069	0.351	0.175	0.518	0.049	0.056
Self or Third Party Sponsor Only	5.757	3.853	1.269	0.918	0.095	4.360	4.517	2.059	4.511	3.061	4.285	1.525	0.271
Both	0.793	0.668	1.310	0.038	0.106	0.197	0.419	0.084	0.493	0.187	0.602	0.120	0.049
No Activity	7.944	9.941	8.509	13.894	14.244	10.269	9.881	12.815	9.672	11.603	9.622	13.333	14.651
Total	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027	15.027
	Percent												
Any Type of Sponsor	47.1	33.8	43.4	7.5	5.2	31.7	34.2	14.7	35.6	22.8	36.0	11.3	2.5
Utility/Supplier Sponsor Only [8]	3.5	3.8	26.2	1.2	3.9	1.3	1.4	0.5	2.3	1.2	3.4	0.3	0.4
Self or Third Party Sponsor Only	38.3	25.6	8.4	6.1	0.6	29.0	30.1	13.7	30.0	20.4	28.5	10.1	1.8
Both	5.3	4.4	8.7	0.3	0.7	1.3	2.8	0.6	3.3	1.2	4.0	0.8	0.3
No Activity	52.9	66.2	56.6	92.5	94.8	63.3	65.8	85.3	64.4	77.2	64.0	88.7	97.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

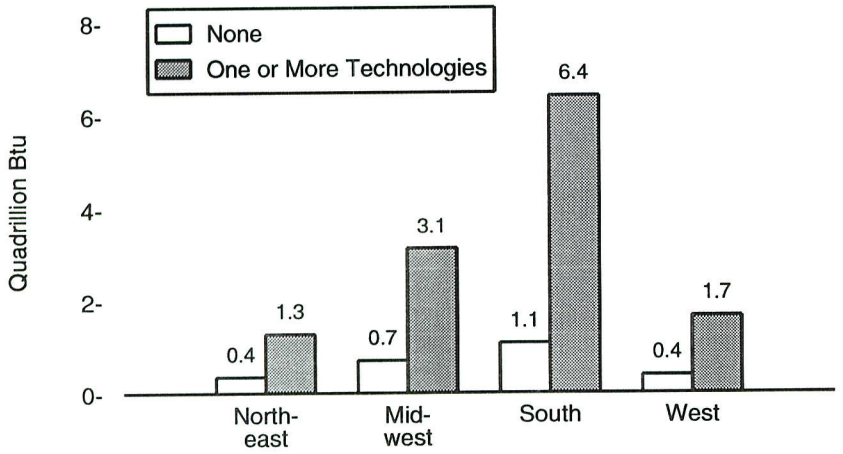
[1] Sponsorship of an energy management activity was determined by the manufacturing establishment.
[2] For example, interruptible or time-of-use rates.
[3] For example, boilers or nozzles.
[4] For example, adjustable-speed drives, motors, and pumps.
[5] Heating, ventilation, and air conditioning.
[6] Equipment retrofit or installation for the primary purpose of using different energy source (e.g., electrification).
[7] Included are power factor corrections, improvements in operating procedures, and other energy management activities reported by survey respondents.
[8] These energy management activities are commonly called demand-side management programs when conducted by utility or supplier.

Note: Totals may not equal sum of components due to independent rounding.

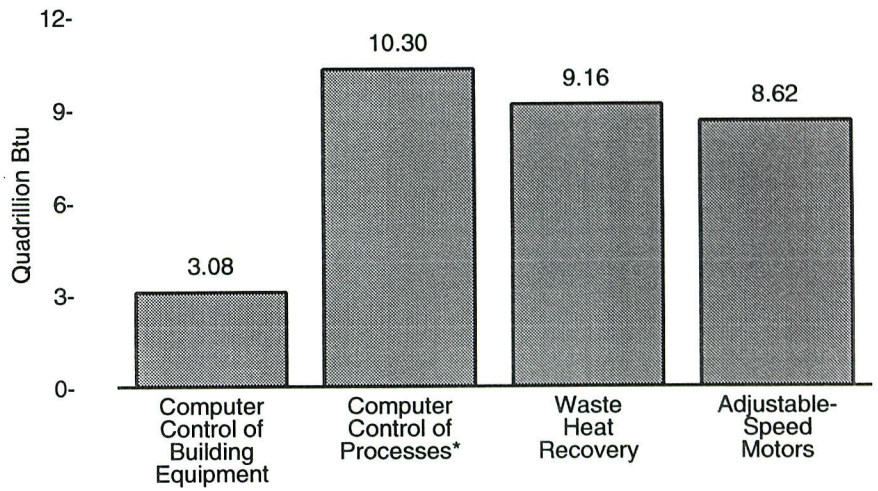
Source: Energy Information Administration, Form EIA-846, "1991 Manufacturing Energy Consumption Survey."

Figure 2.8 Manufacturing Sector Inputs for Heat, Power, and Electricity Generation by Technology, 1991

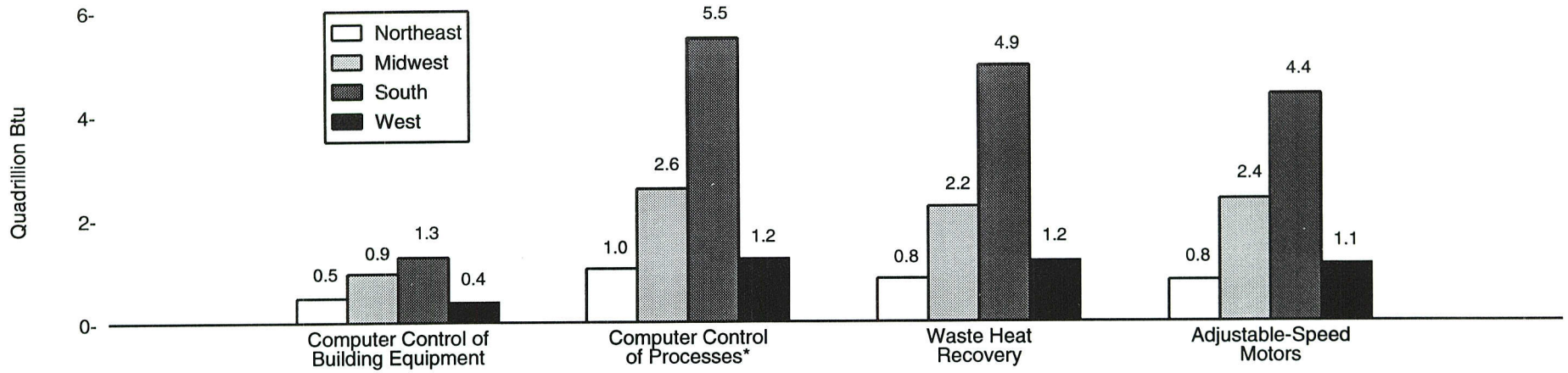
No Presence or Presence of Energy-Related Technologies, by Region



Energy-Related Technologies by Technology Type



Energy-Related Technologies by Technology Type by Region



*Or major energy-using equipment.
Notes: • See Appendix E for Census regions. • Because vertical scales differ, graphs should not be compared.
Source: Table 2.8.

Table 2.8 Manufacturing Sector Inputs for Heat, Power, and Electricity Generation by Technology, 1991

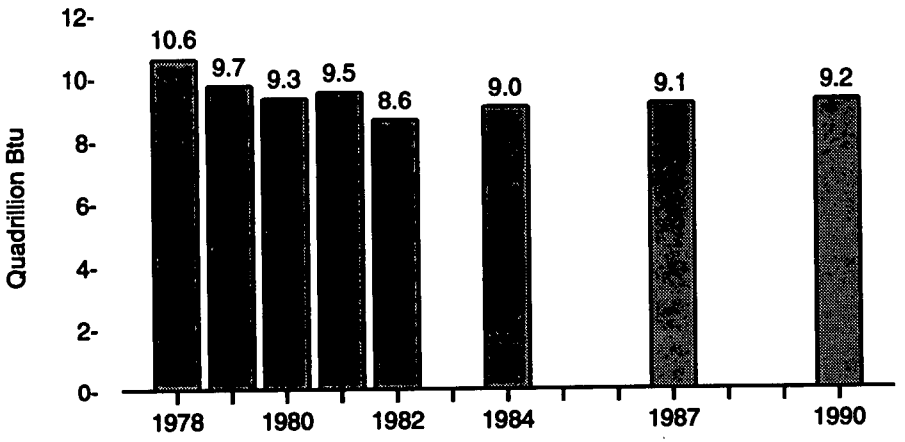
Census Region [1]	Total	No Presence of Selected Technologies [2]	Presence of One or More Selected Technologies [2]	Types of General Energy-Related Technologies			
				Computer Control of Building Environment [3]	Computer Control of Processes or Major Energy-Using Equipment [4]	Waste Heat Recovery	Adjustable-Speed Motors
	Quadrillion Btu						
Northeast	1.635	0.352	1.282	0.473	1.033	0.828	0.791
Midwest	3.833	0.703	3.130	0.942	2.570	2.219	2.356
South	7.507	1.078	6.429	1.260	5.463	4.931	4.365
West	2.052	0.383	1.669	0.406	1.235	1.180	1.112
United States	**15.027**	**2.516**	**12.510**	**3.081**	**10.300**	**9.158**	**8.623**
	Percent						
Northeast	10.9	14.0	10.2	15.4	10.0	9.0	9.2
Midwest	25.5	27.9	25.0	30.6	25.0	24.2	27.3
South	50.0	42.8	51.4	40.9	53.0	53.8	50.6
West	13.7	15.2	13.3	13.2	12.0	12.9	12.9
United States	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

[1] See Appendix E for Census regions.
[2] "Selected Technologies" include both general and industry-specific technologies.
[3] For example, space heating or cooling and lighting.
[4] For example, boilers, furnaces, and conveyers.

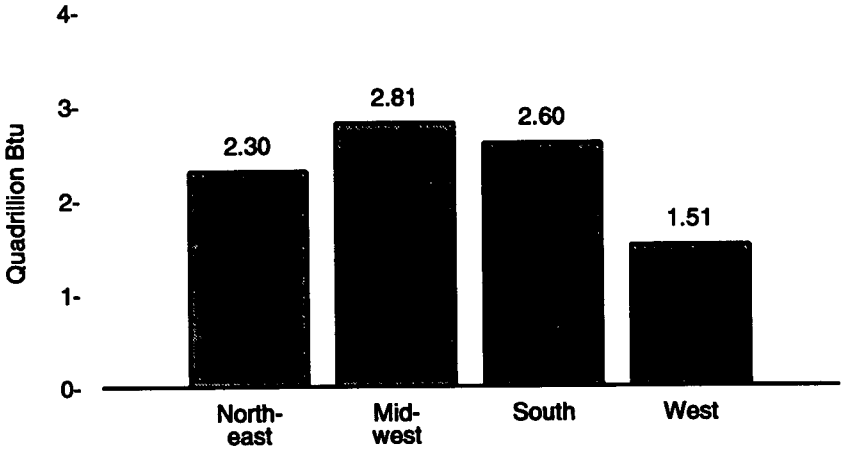
Note: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, Form EIA-846, "1991 Manufacturing Energy Consumption Survey."

Figure 2.9 Household Energy Consumption

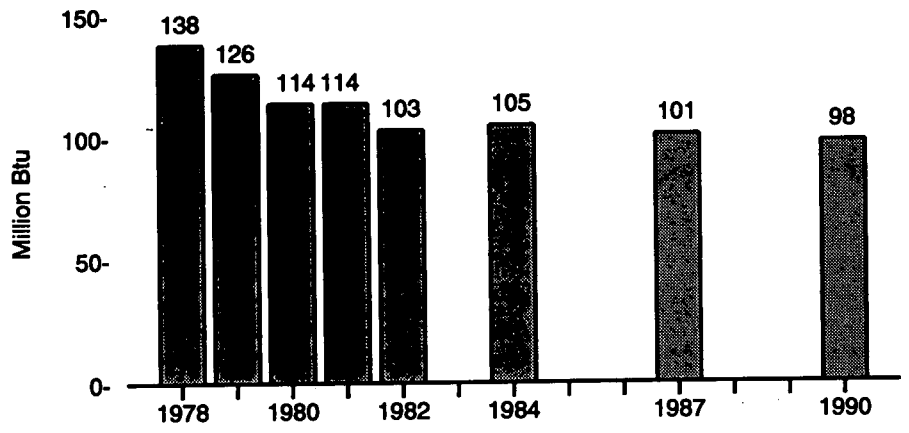
Consumption by All Households, Selected Years, 1978-1990



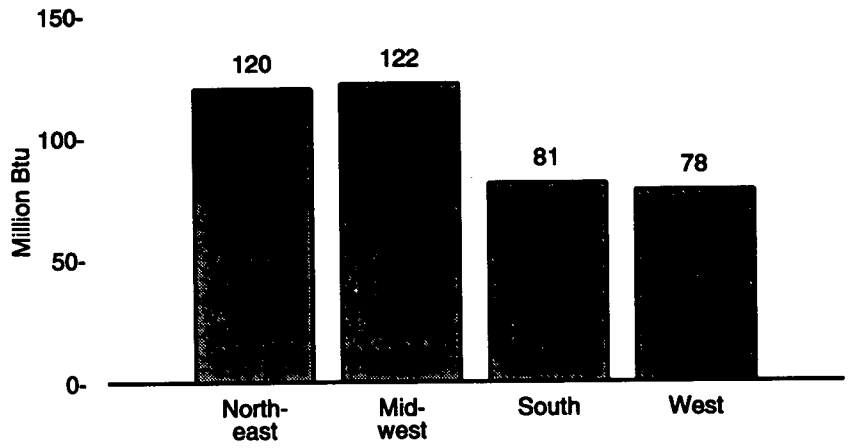
Consumption by All Households, by Census Region, 1990



Consumption per Household, Selected Years, 1978-1990



Consumption per Household, by Census Region, 1990



Notes: • No data are available for years not shown. Data for 1978 through 1984 are for April of the year shown through March of the following year; data for 1987 and 1990 are for the calendar year. • Because vertical scales differ, graphs should not be compared.
Source: Table 2.9. See Appendix E for Census regions.

Table 2.9 Household Energy Consumption by Census Region, Selected Years, 1978-1990

(Quadrillion Btu, Except as Noted)

Census Region [1]	1978	1979	1980	1981	1982	1984	1987	1990
Northeast	**2.89**	**2.50**	**2.43**	**2.47**	**2.18**	**2.29**	**2.37**	**2.30**
Natural Gas	1.14	1.05	0.92	1.06	0.99	0.93	1.03	1.03
Electricity [2]	0.39	0.39	0.39	0.42	0.38	0.41	0.44	0.47
Distillate Fuel Oil and Kerosene	1.32	1.03	1.09	0.96	0.79	0.93	0.87	0.78
Liquefied Petroleum Gases	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02
Consumption per Household (million Btu)	166	145	138	138	122	125	124	120
Midwest	**3.70**	**3.48**	**2.92**	**3.12**	**2.60**	**2.80**	**2.73**	**2.81**
Natural Gas	2.53	2.48	2.02	2.24	1.76	1.99	1.83	1.88
Electricity [2]	0.60	0.59	0.60	0.57	0.57	0.55	0.61	0.66
Distillate Fuel Oil and Kerosene	0.46	0.31	0.16	0.17	0.15	0.13	0.16	0.12
Liquefied Petroleum Gases	0.12	0.10	0.15	0.13	0.11	0.13	0.13	0.13
Consumption per Household (million Btu)	180	168	139	147	122	129	123	122
South	**2.43**	**2.30**	**2.59**	**2.46**	**2.46**	**2.50**	**2.61**	**2.60**
Natural Gas	0.96	0.91	1.11	1.16	1.13	1.15	1.09	1.03
Electricity [2]	1.00	0.97	1.06	1.03	1.05	1.06	1.22	1.36
Distillate Fuel Oil and Kerosene	0.32	0.28	0.27	0.16	0.17	0.16	0.17	0.11
Liquefied Petroleum Gases	0.15	0.14	0.15	0.12	0.12	0.12	0.12	0.10
Consumption per Household (million Btu)	99	92	96	89	88	85	84	81
West	**1.54**	**1.47**	**1.38**	**1.47**	**1.38**	**1.45**	**1.42**	**1.51**
Natural Gas	0.95	0.88	0.89	0.93	0.89	0.91	0.88	0.92
Electricity [2]	0.48	0.47	0.41	0.46	0.42	0.47	0.48	0.54
Distillate Fuel Oil and Kerosene	0.09	0.09	0.04	0.03	0.03	0.04	0.02	0.00
Liquefied Petroleum Gases	0.03	0.04	0.04	0.04	0.04	0.03	0.05	0.03
Consumption per Household (million Btu)	110	100	86	90	84	85	78	78
United States	**10.56**	**9.74**	**9.32**	**9.51**	**8.62**	**9.04**	**9.13**	**9.22**
Natural Gas	5.58	5.31	4.94	5.39	4.77	4.98	4.83	4.86
Electricity [2]	2.47	2.42	2.46	2.48	2.42	2.48	2.76	3.03
Distillate Fuel Oil and Kerosene	2.19	1.71	1.55	1.33	1.14	1.26	1.22	1.04
Liquefied Petroleum Gases	0.33	0.31	0.36	0.31	0.29	0.31	0.32	0.28
Consumption per Household (million Btu) [3]	138	126	114	114	103	105	101	98

[1] See Appendix E for Census regions.

[2] Includes electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

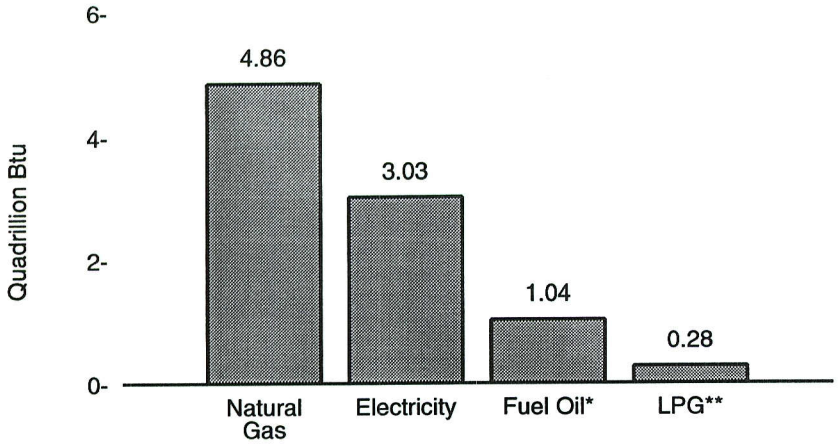
[3] Data not adjusted to account for more severe winter weather in earlier years when the survey was fielded.

Notes: • This table shows major energy items only. • No data are available for years not shown. • One Btu of electricity = 0.000293 (1 ÷ 3,412) kWh. • Data for 1978-1984 are for April of year shown through March of following year; data for 1987 and 1990 are for the calendar year. • Totals may not equal sum of components due to independent rounding.

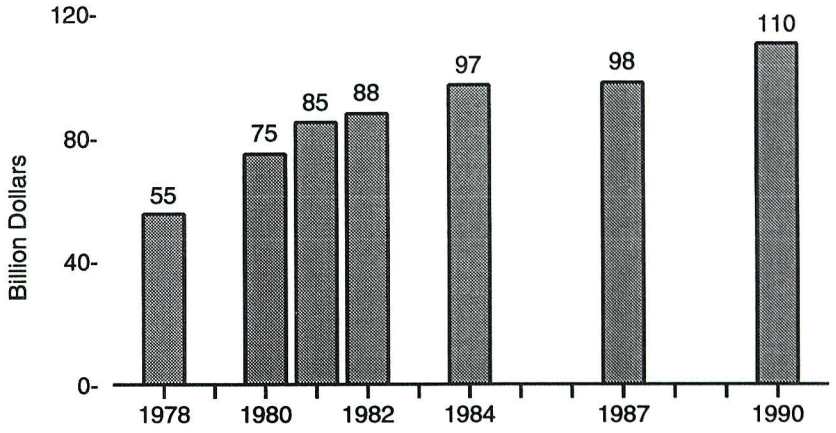
Sources: • 1978 and 1979—Energy Information Administration (EIA), Form EIA-84, "Residential Energy Consumption Survey." • 1980 forward—EIA, Form EIA-457, "Residential Energy Consumption Survey."

Figure 2.10 Household Energy Consumption and Expenditures

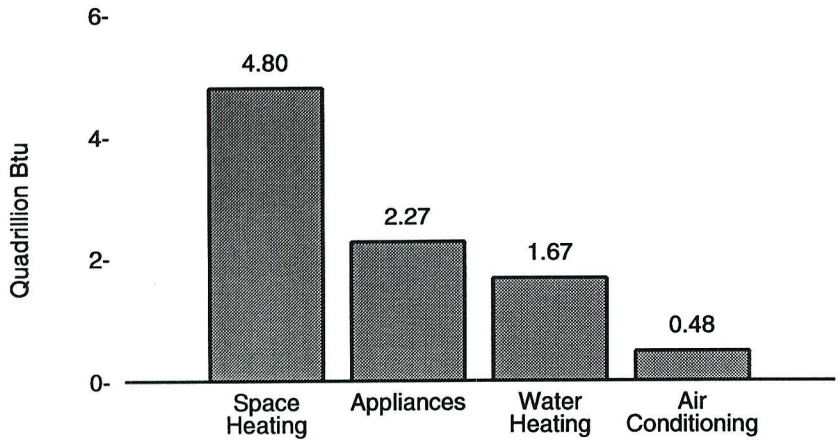
Consumption by Energy Source, 1990



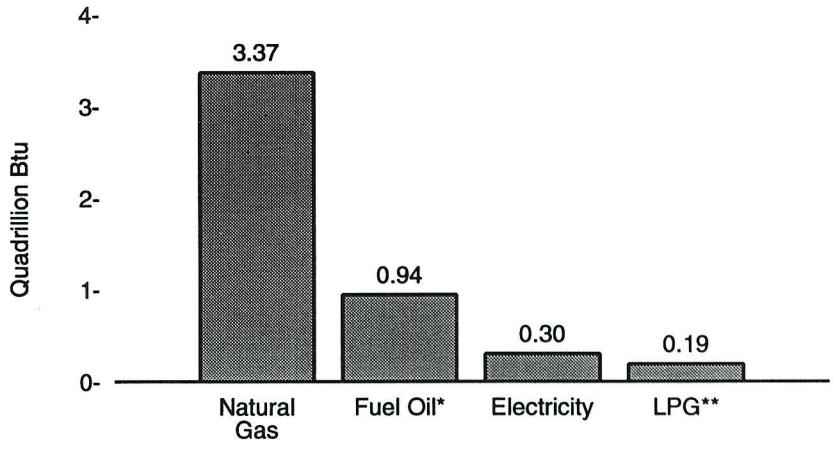
Expenditures, Selected Years, 1978-1990



Consumption by End Use, 1990



Consumption for Space Heating, 1990



*Fuel oil is distillate fuel oil and kerosene.
**Liquefied petroleum gases.
Notes: • No data are available for years not shown. • Because vertical scales differ, graphs should not be compared.
Source: Table 2.10.

Table 2.10 Household Energy Consumption and Expenditures by End Use and Energy Source, Selected Years, 1978-1990

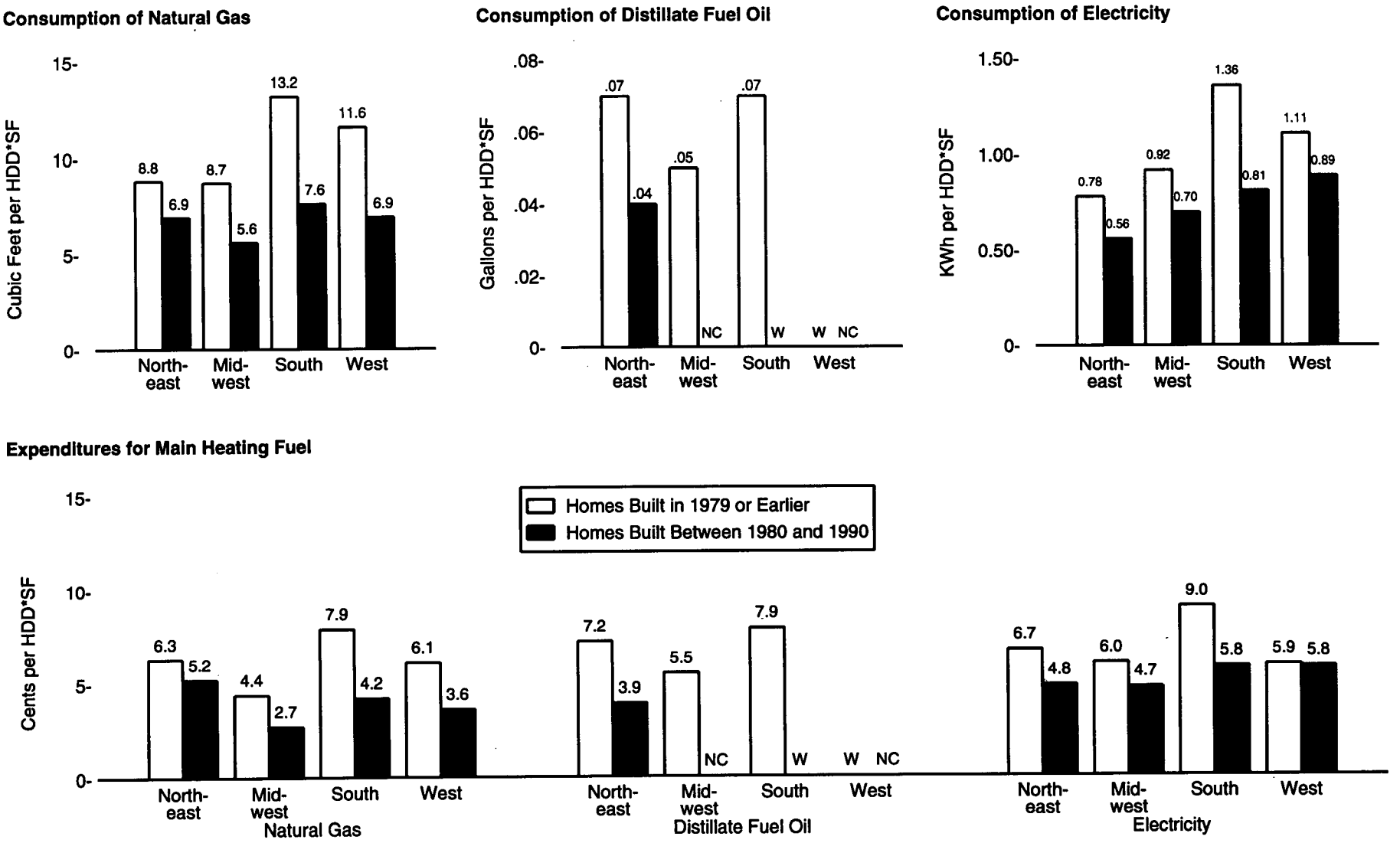
Year	Space Heating				A/C [1,2]	Water Heating				Appliances			Total [2]			
	Natural Gas	Electricity [3]	Fuel Oil [4]	LPG [5]	Electricity [3]	Natural Gas	Electricity [3]	Fuel Oil [4]	LPG [5]	Natural Gas	Electricity [3]	LPG [5]	Natural Gas	Electricity [3]	Fuel Oil [4]	LPG [5]
	Consumption (quadrillion Btu)															
1978	4.26	0.41	2.05	0.23	0.31	1.04	0.29	0.14	0.06	0.28	1.46	0.03	5.58	2.47	2.19	0.33
1980	3.32	0.28	1.32	0.25	0.32	1.24	0.31	0.24	0.07	0.38	1.55	0.04	4.94	2.46	1.55	0.36
1981	3.81	0.30	1.13	0.22	0.33	1.10	0.33	0.21	0.06	0.49	1.53	0.03	5.39	2.48	1.33	0.31
1982	3.31	0.27	1.05	0.19	0.30	1.08	0.33	0.09	0.06	0.39	1.52	0.04	4.77	2.42	1.14	0.29
1984	3.51	0.30	1.10	0.21	0.36	1.10	0.32	0.15	0.06	0.35	1.53	0.04	4.98	2.48	1.26	0.31
1987	3.38	0.28	1.05	0.22	0.44	1.10	0.31	0.17	0.06	0.34	1.72	0.04	4.83	2.76	1.22	0.32
1990	3.37	0.30	0.94	0.19	0.48	1.16	0.34	0.11	0.06	0.33	1.91	0.03	4.86	3.03	1.04	0.28
	Expenditures (billion dollars)															
1978	11.49	3.53	8.06	1.05	3.97	2.88	3.15	0.56	0.36	0.93	19.24	0.25	15.30	29.89	8.62	1.66
1980	12.80	3.71	10.59	1.90	5.07	4.79	4.54	1.89	0.59	1.71	26.82	0.41	19.30	40.14	12.48	2.89
1981	17.07	4.60	9.99	1.84	5.96	4.93	5.32	1.83	0.53	2.50	30.02	0.37	24.50	45.90	11.82	2.74
1982	18.55	4.45	8.84	1.68	6.05	6.08	5.90	0.75	0.57	2.42	32.02	0.47	27.06	48.42	9.59	2.72
1984	20.66	5.71	8.51	2.00	7.51	6.63	6.44	1.09	0.58	2.31	34.95	0.54	29.80	54.50	9.60	3.10
1987	18.05	5.53	6.25	1.85	9.77	6.02	6.45	0.94	0.50	2.02	39.83	0.46	26.15	61.58	7.21	2.81
1990	18.59	6.16	7.42	2.01	11.19	6.59	7.21	0.83	0.64	2.03	46.95	0.48	27.26	71.54	8.25	3.14

[1] A/C = Air conditioning.
[2] A small amount of natural gas used for air conditioning is included in "Natural Gas" under "Total."
[3] Includes electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal electricity.
[4] Fuel oil is distillate fuel oil and kerosene.
[5] Liquefied petroleum gases.

Notes: • No data are available for years not shown. Consumption totals for 1979 are available on Table 2.9. • One Btu of electricity = 0.000293 (1 ÷ 3,412) kWh. • Totals may not equal sum of components due to independent rounding.

Sources: • 1978—Energy Information Administration (EIA), Form EIA-84, "Residential Energy Consumption Survey." • 1980 forward—EIA, Form EIA-457, "Residential Energy Consumption Survey."

Figure 2.11 Household Energy Consumption and Expenditure Indicators by Census Region and Vintage of Housing Unit, 1990



W=Data withheld because fewer than 10 housing units were sampled. NC=No cases in sample.

Note: HDD*SF=heating degree-days times square footage.
Source: Table 2.11. See Appendix E for Census regions.

Table 2.11 Household Energy Consumption and Expenditure Indicators by Census Region and Vintage of Housing Unit, 1990

Source and Indicator (Units)	Census Regions [1]								United States	
	Northeast		Midwest		South		West			
	Built in 1979 or Earlier	Built Between 1980-1990	Built in 1979 or Earlier	Built Between 1980-1990	Built in 1979 or Earlier	Built Between 1980-1990	Built in 1979 or Earlier	Built Between 1980-1990	Built in 1979 or Earlier	Built Between 1980-1990
Natural Gas										
Households Using Natural Gas as Main Space Heating Source (million)	8.4	0.3	14.7	1.8	12.8	1.3	10.2	2.2	46.1	5.7
Annual Consumption per Household for Main Space Heating (1,000 cubic feet)	78.8	66.6	86.4	74.8	48.1	42.6	44.7	40.6	62.8	58.4
Annual Expenditures per Household for Main Space Heating (dollars)	558	501	433	367	288	234	233	215	358	306
Annual Heating Degree-Days (degree-days)	4,888	5,325	5,651	5,807	2,490	2,720	2,946	3,341	3,971	4,209
Average Heated Floor Space (square feet)	1,836	1,806	1,762	2,299	1,474	2,072	1,307	1,770	1,594	2,183
Consumption per 1,000 Square Foot * HDD (cubic feet)	8.8	6.9	8.7	5.6	13.2	7.6	11.6	6.9	9.8	6.4
Expenditures per 1,000 Square Foot * HDD (cents)	6.3	5.2	4.4	2.7	7.9	4.2	6.1	3.6	5.6	3.4
Electricity [2]										
Households Using Electricity as Main Space Heating Source (million)	1.2	.8	2.1	.5	7.2	5.1	3.3	1.2	13.9	7.6
Annual Consumption per Household for Main Space Heating (kWh)	4,984	4,496	7,116	5,096	3,163	2,188	6,385	3,024	4,808	2,782
Annual Expenditures per Household for Main Space Heating (dollars)	473	386	461	341	211	155	337	197	306	197
Annual Heating Degree-Days (degree-days)	5,248	4,905	5,581	5,255	1,811	1,937	4,597	2,878	3,331	2,721
Average Heated Floor Space (square feet)	1,222	1,628	1,364	1,385	1,295	1,391	1,210	1,178	1,279	1,380
Consumption per 1,000 Square Foot * HDD (kWh)	.78	.56	.92	.70	1.36	.81	1.11	.89	1.13	.74
Expenditures per 1,000 Square Foot * HDD (cents)	6.7	4.8	6.0	4.7	9.0	5.8	5.9	5.8	7.2	5.3
Distillate Fuel Oil										
Households Using Oil as Main Space Heating Source (million)	7.2	.3	1.2	NC	1.5	W	W	NC	10.1	W
Annual Consumption per Household for Main Space Heating (gallons)	620	480	652	NC	377	W	W	NC	560	W
Annual Expenditures per Household for Main Space Heating (dollars)	676	521	690	NC	417	W	W	NC	609	W
Annual Heating Degree-Days (degree-days)	5,075	5,937	6,357	NC	3,166	W	W	NC	4,903	W
Average Heated Floor Space (square feet)	1,870	2,273	2,091	NC	1,646	W	W	NC	1,849	W
Consumption per 1,000 Square Foot * HDD (gallons)	.07	.04	.05	NC	.07	W	W	NC	.06	W
Expenditures per 1,000 Square Foot * HDD (cents)	7.2	3.9	5.5	NC	7.9	W	W	NC	6.9	W
Liquefied Petroleum Gases (LPG)										
Households Using LPG as Main Space Heating Source (million)	W	W	1.2	.4	1.5	.7	.2	W	3.1	1.2
Annual Consumption per Household for Main Space Heating (gallons)	W	W	681	546	359	273	440	W	470	382
Annual Expenditures per Household for Main Space Heating (dollars)	W	W	594	474	408	270	450	W	464	364
Annual Heating Degree-Days (degree-days)	W	W	5,872	6,025	2,115	2,658	3,750	W	3,833	4,071
Average Heated Floor Space (square feet)	W	W	1,549	2,081	1,170	1,292	1,076	W	1,281	1,580
Consumption per 1,000 Square Foot * HDD (gallons)	W	W	.08	.04	.15	.08	.11	W	.09	.06
Expenditures per 1,000 Square Foot * HDD (cents)	W	W	6.6	3.8	16.6	7.9	11.2	W	9.6	5.7

[1] See Appendix E for Census regions.

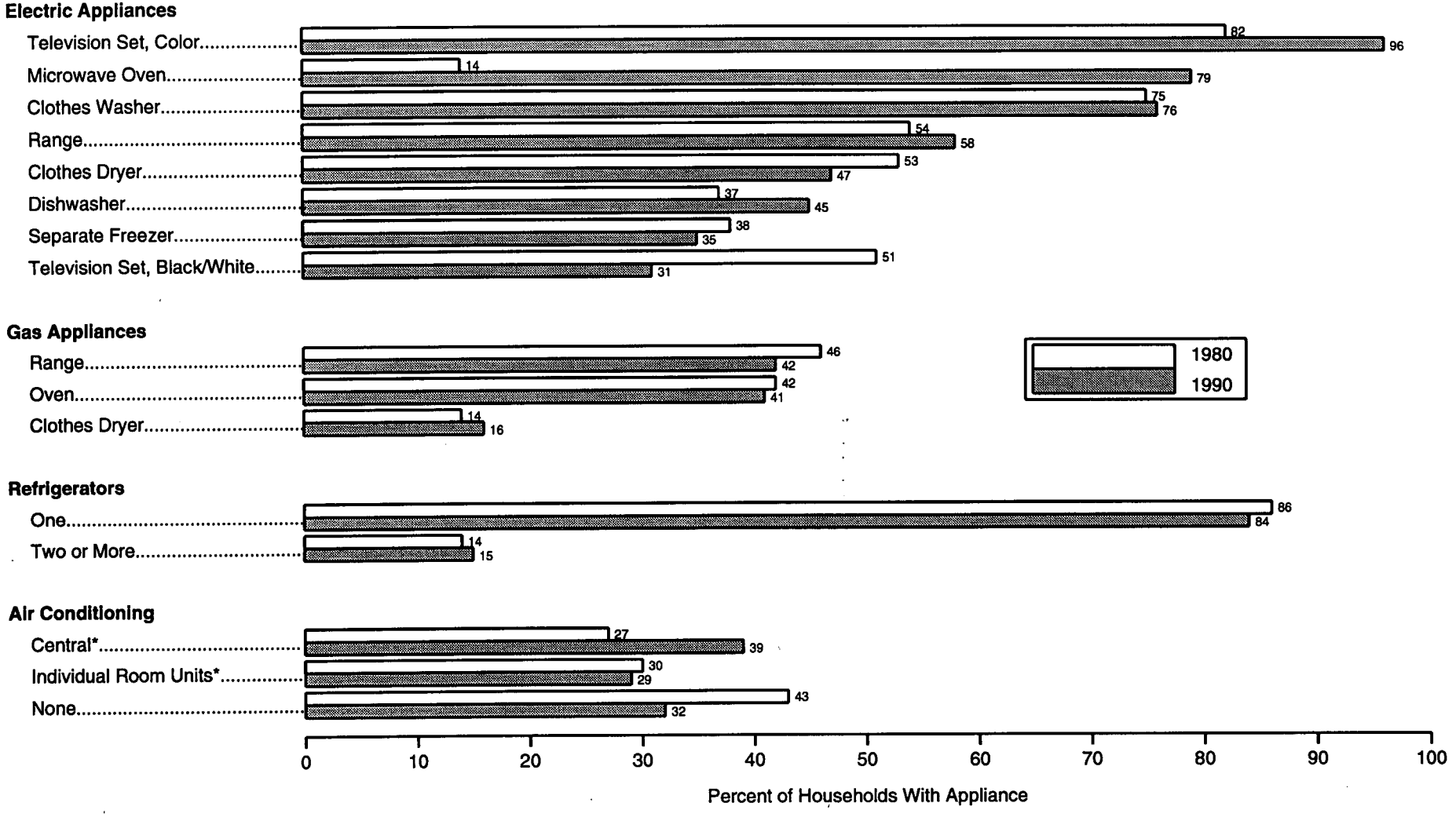
[2] Includes electricity generated for distribution from geothermal, wood, waste, wind, photovoltaic, and solar thermal energy sources.

W=Data withheld because fewer than 10 housing units were sampled. NC=No cases in sample.

Notes: • HDD = heating degree-days to base 65 °F. • One Btu of electricity = 0.000293 (1 ÷ 3,412) kWh. • Averages are for households using the fuel as the main space heating fuel. Space heating consumption and expenditures in this table do not show the small amounts of fuel used by households that use the fuel only as a secondary space heating fuel. • Space heating does not include electricity used by the fan that circulates warm air through the ducts. • HDD are for 1990.

Source: Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 2.12 Households With Selected Appliances, 1980 and 1990



*Households with both central and individual room units are counted only under "central."

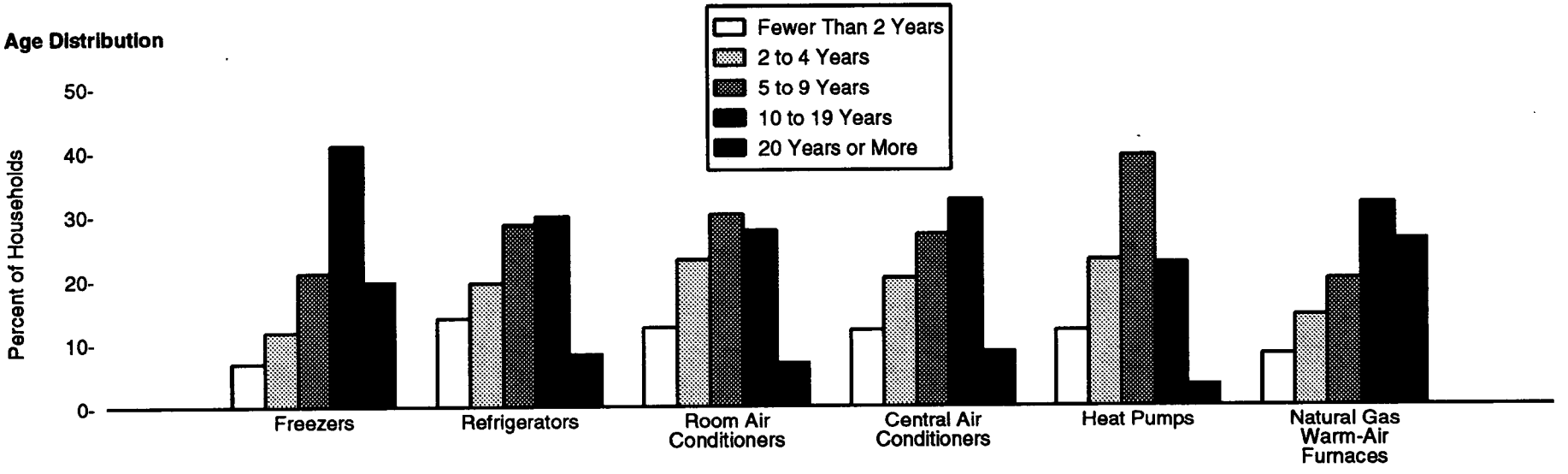
Source: Table 2.12.

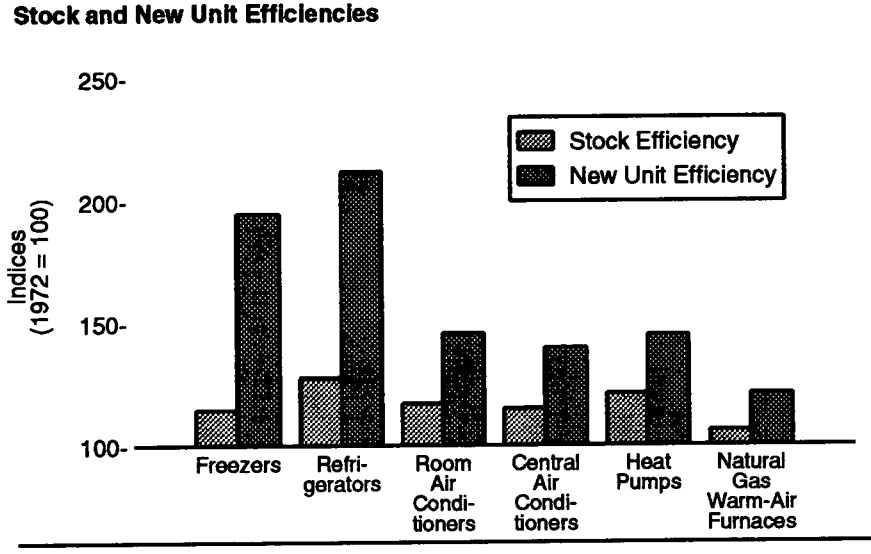
Table 2.12 Households With Selected Appliances, Selected Years, 1978-1990

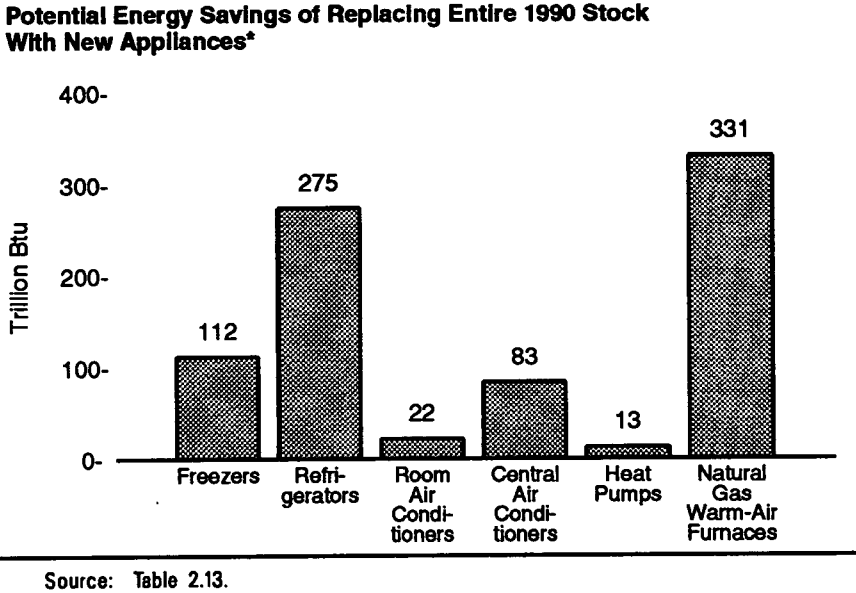
Appliance	Percent of Households								Change
	1978	1979	1980	1981	1982	1984	1987	1990	1980 to 1990
Total Households	100	100	100	100	100	100	100	100	—
Type of Appliances									
Electric Appliances									
Television Set (Color)	NA	NA	82	82	85	88	93	96	14
Television Set (B/W)	NA	NA	51	48	47	43	36	31	-20
Clothes Washer	75	NA	75	74	72	74	76	76	1
Range (Stove-Top Burner)	53	NA	54	54	53	54	57	58	4
Oven, Regular or Microwave	54	NA	59	58	59	63	79	88	29
Oven, Microwave	8	NA	14	17	21	34	61	79	65
Clothes Dryer	45	NA	47	45	45	46	51	53	6
Separate Freezer	35	NA	38	38	37	37	34	35	-3
Dishwasher	35	NA	37	37	36	38	43	45	8
Dehumidifier	NA	NA	9	9	9	9	10	12	3
Waterbed Heaters	NA	NA	NA	NA	NA	10	14	15	NA
Window or Ceiling Fan	NA	NA	NA	NA	28	35	46	51	NA
Whole House Fan	NA	NA	NA	NA	8	8	9	10	NA
Evaporative Cooler	NA	NA	4	4	4	4	3	4	([1])
Personal Computer	NA	NA	NA	NA	NA	NA	NA	16	NA
Pump for Well Water	NA	NA	NA	NA	NA	NA	NA	15	NA
Swimming-Pool Pump [2]	NA	NA	4	4	3	NA	NA	5	1
Gas Appliances [3]									
Range (Stove-Top or Burner)	48	NA	46	46	47	45	43	42	-4
Oven	47	NA	42	40	42	42	41	41	-1
Clothes Dryer	14	NA	14	16	15	16	15	16	2
Outdoor Gas Grill	NA	NA	9	9	11	13	20	26	17
Outdoor Gas Light	2	NA	2	2	2	1	1	1	-1
Swimming Pool Heater [4]	NA	NA	NA	NA	NA	1	1	2	NA
Refrigerators [5]									
One	86	NA	86	87	86	88	86	84	-2
Two or More	14	NA	14	13	13	12	14	15	1
Air Conditioning (A/C)									
Central [6]	23	24	27	27	28	30	36	39	12
Individual Room Units [6]	33	31	30	31	30	30	30	29	-1
None	44	45	43	42	42	40	36	32	-11
Portable Kerosene Heaters	([1])	NA	([1])	1	3	6	6	5	5

[1] Less than 0.5 percent.
[2] All reported swimming pools were assumed to have an electric pump for filtering and circulating the water.
[3] Includes natural gas or liquefied petroleum gases.
[4] In 1984, 1987, and 1990, also includes heaters for jacuzzis and hot tubs.
[5] Fewer than 0.5 percent of the households do not have a refrigerator.
[6] Households with both central and individual room units are counted only under "Central."
NA=Not available. — = Not applicable.
Note: No data are available for years not shown.
Sources: • 1978 and 1979—Energy Information Administration (EIA), Form EIA-84, "Residential Energy Consumption Survey." • 1980 forward—EIA, Form EIA-457, "Residential Energy Consumption Survey."

Figure 2.13 Age Distribution of Stock and Potential Annual Energy Savings of Selected Appliances, 1990







*The energy savings that would have occurred if all existing appliances had been replaced with new 1990 appliances.

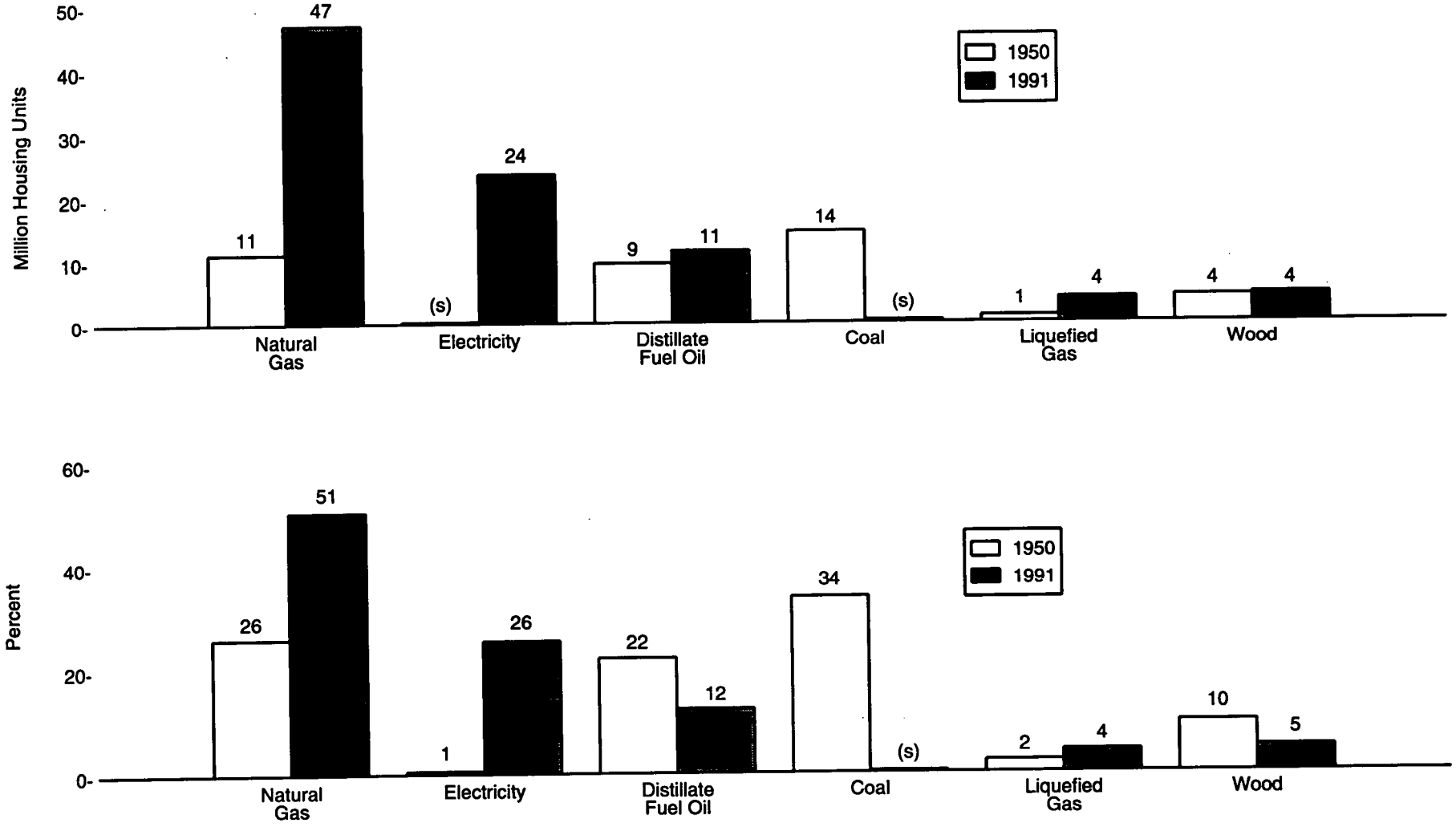
Source: Table 2.13.

Table 2.13 Age Distribution of Stock and Potential Annual Energy Savings of Selected Appliances, 1990

Category/Measurement	Freezers	Refrigerators [1]	Room Air Conditioners [1]	Central Air Conditioners	Heat Pumps	Natural Gas Warm-Air Furnaces
Age Distribution (Percent of Households) [2]						
Fewer Than 2 Years	6.9	13.9	12.4	12.0	11.9	8.1
2 to 4 Years	11.7	19.4	23.0	20.1	22.9	14.2
5 to 9 Years	20.9	28.5	30.1	26.9	39.3	19.9
10 to 19 Years	40.9	29.8	27.5	32.3	22.4	31.7
20 Years or More	19.7	8.4	7.0	8.7	3.5	26.2
Stock Efficiency [3] (1972 = 100)	114.5	127.6	117.2	115.0	121.2	106.1
New Unit Efficiency [4] (1972 = 100)	194.7	212.2	146.0	139.8	145.1	121.1
Potential Efficiency Gain (Percent)	70.0	66.3	24.6	21.6	19.7	14.1
Energy Consumption						
Trillion Btu	160.0	414.1	90.4	386.1	65.3	2,345.3
Billion Kilowatthours	46.9	121.4	26.5	113.2	19.1	—
Billion Cubic Feet	—	—	—	—	—	[5] 2,283.6
Potential Energy Savings of Replacing Entire 1990 Stock With New Appliances [6]						
Trillion Btu	112.0	274.5	22.2	83.4	12.9	330.7
Billion Kilowatthours	32.8	80.5	6.5	24.4	3.8	—
Billion Cubic Feet	—	—	—	—	—	[5] 322.0
Potential Energy Savings of Replacing 10-Years-and-Older Stock With New Appliances [7]						
Trillion Btu	94.7	208.3	13.9	66.4	7.1	281.4
Billion Kilowatthours	27.8	61.0	4.1	19.5	2.1	—
Billion Cubic Feet	—	—		—	—	[5] 274.0

[1] Household refrigerator and room air conditioner with the most use.
[2] Sum of components may not equal 100 percent due to independent rounding.
[3] Model efficiency rates of appliances in each age group, weighted by the number of appliances.
[4] Manufacturers new model efficiency rates, weighted by the number of appliances.
[5] Converted at 1,027 Btu per cubic feet.
[6] The energy savings that would have occurred if all existing appliances had been replaced with new 1990 appliances.
[7] The energy savings that would have occurred if all appliances that were at least 10 years old had been replaced with new 1990 appliances.
— = Not applicable.
Source: Energy Information Administration, *Household Energy Consumption and Expenditures 1990* (February 1993), Tables 13 and B13.

Figure 2.14 Type of Heating in Occupied Housing Units, 1950 and 1991



(s)=Less than 0.5.

Source: Table 2.14.

Table 2.14 Type of Heating in Occupied Housing Units, Selected Years, 1950-1991

Year	Coal [1]	Natural Gas	Liquefied Gas	Distillate Fuel Oil	Kerosene	Electricity	Wood	Solar	Other	None [2]	Total
					Million						
1950	14.48	11.12	0.98	9.46	([3])	0.28	4.17	NA	0.77	1.57	42.83
1960	6.46	22.85	2.69	17.16	([3])	0.93	2.24	NA	0.22	0.48	53.02
1970	1.82	35.01	3.81	16.47	([3])	4.88	0.79	NA	0.27	0.40	63.45
1973	0.80	38.46	4.42	17.24	([3])	7.21	0.60	NA	0.15	0.45	69.34
1974	0.74	39.47	4.14	16.84	([3])	8.41	0.66	NA	0.09	0.48	70.83
1975	0.57	40.93	4.15	16.30	([3])	9.17	0.85	NA	0.08	0.47	72.52
1976	0.48	41.22	4.24	16.45	([3])	10.15	0.91	NA	0.09	0.46	74.01
1977	0.45	41.54	4.18	15.62	0.44	11.15	1.24	NA	0.15	0.51	75.28
1978	0.40	42.52	4.13	15.65	0.42	12.26	1.07	NA	0.12	0.60	77.17
1979	0.36	43.32	4.13	15.30	0.41	13.24	1.14	NA	0.10	0.57	78.57
1980	0.33	44.40	4.17	14.50	0.37	14.21	1.38	NA	0.11	0.61	80.07
1981	0.36	46.08	4.17	14.13	0.37	15.49	1.89	NA	0.10	0.59	83.18
1983 [4]	0.43	46.70	3.87	12.59	0.45	15.68	4.09	NA	0.16	0.68	84.64
1985	0.45	45.33	3.58	12.44	1.06	18.36	6.25	0.05	0.37	0.53	88.43
1987	0.41	45.96	3.66	12.74	1.08	20.61	5.45	0.05	0.28	0.66	90.89
1989	0.34	47.40	3.66	12.47	1.07	23.06	4.59	([5])	0.40	0.66	93.68
1991	0.32	47.02	3.88	11.47	0.99	23.71	4.44	([5])	0.41	0.86	93.15
					Percent						
1950	33.8	26.0	2.3	22.1	([3])	0.6	9.7	NA	1.8	3.7	100.0
1960	12.2	43.1	5.1	32.4	([3])	1.8	4.2	NA	0.4	0.9	100.0
1970	2.9	55.2	6.0	26.0	([3])	7.7	1.3	NA	0.4	0.6	100.0
1973	1.2	55.5	6.4	24.9	([3])	10.4	0.9	NA	0.2	0.7	100.0
1974	1.0	55.7	5.8	23.8	([3])	11.9	0.9	NA	0.1	0.7	100.0
1975	0.8	56.4	5.7	22.5	([3])	12.6	1.2	NA	0.1	0.6	100.0
1976	0.7	55.7	5.7	22.2	([3])	13.7	1.2	NA	0.1	0.6	100.0
1977	0.6	55.2	5.6	20.7	0.6	14.8	1.6	NA	0.2	0.7	100.0
1978	0.5	55.1	5.4	20.3	0.5	15.9	1.4	NA	0.2	0.8	100.0
1979	0.5	55.1	5.3	19.5	0.5	16.9	1.4	NA	0.1	0.7	100.0
1980	0.4	55.4	5.2	18.1	0.5	17.7	1.7	NA	0.1	0.8	100.0
1981	0.4	55.4	5.0	17.0	0.4	18.6	2.3	NA	0.1	0.7	100.0
1983 [4]	0.5	55.2	4.6	14.9	0.5	18.5	4.8	NA	0.2	0.8	100.0
1985	0.5	51.3	4.1	14.1	1.2	20.8	7.1	0.1	0.4	0.6	100.0
1987	0.4	50.6	4.0	14.0	1.2	22.7	6.0	0.1	0.3	0.7	100.0
1989	0.4	50.6	3.9	13.3	1.1	24.6	4.9	([6])	0.4	0.7	100.0
1991	0.3	50.5	4.2	12.3	1.1	25.5	4.8	([6])	0.4	0.9	100.0

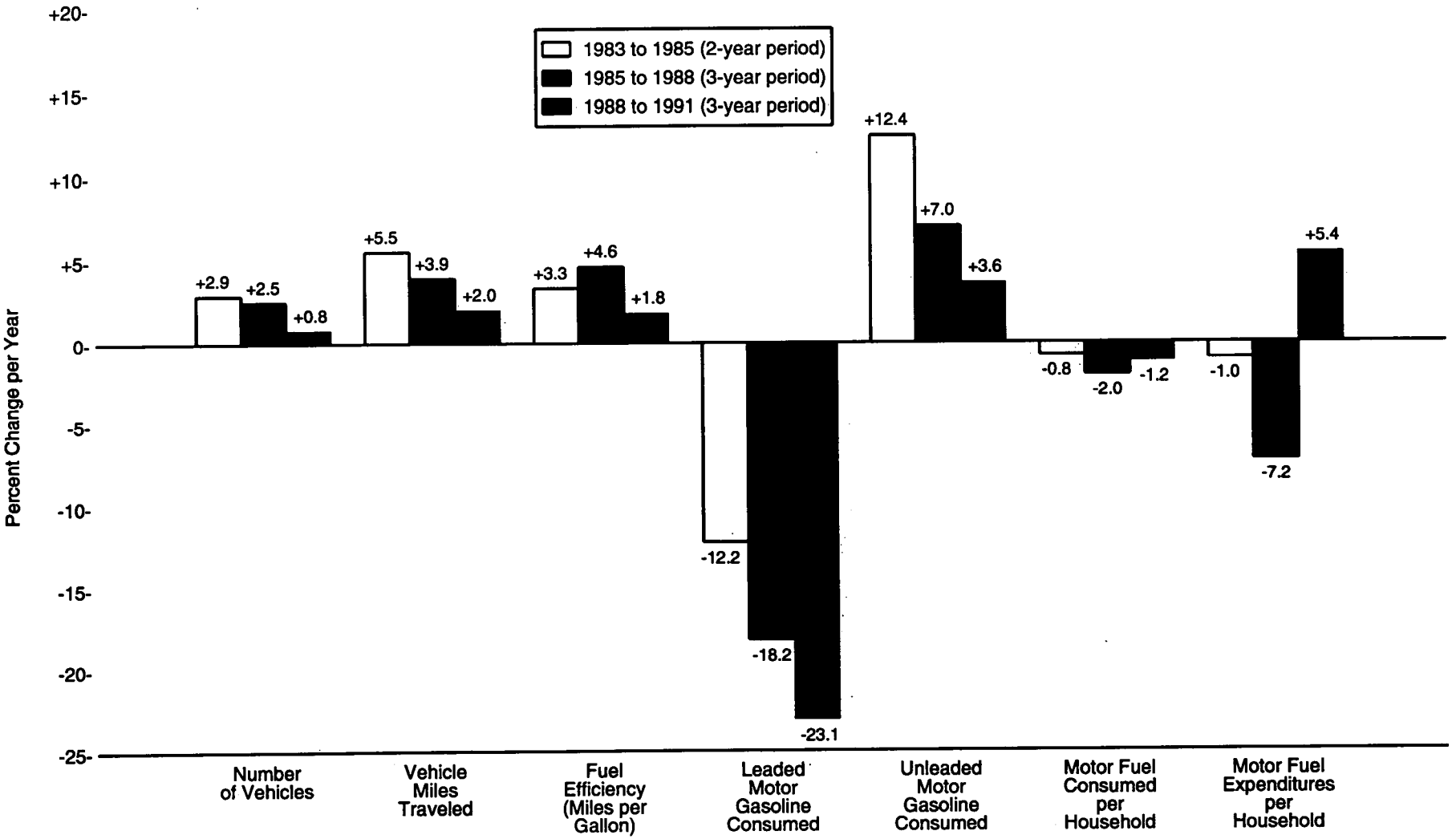
[1] Includes coal coke.
[2] Includes nonreporting units in 1950 and 1960, which totaled 997 and 2,000 units, respectively.
[3] Included in distillate fuel oil.
[4] Since 1983, the *American Housing Survey for the United States* has been a biennial survey.
[5] Less than 0.05 million.
[6] Less than 0.1 percent.

NA=Not available.

Notes: • Includes mobile homes and individual housing units in apartment buildings. Housing units with more than one type of heating system are classified according to the principal type of heating system. • Totals may not equal sum of components due to independent rounding.

Sources: • 1950, 1960, and 1970—Bureau of the Census, *Census of Population and Housing*. • 1973 forward—Bureau of the Census, *American Housing Survey for the United States in 1991*, Table 2-5.

Figure 2.15 Household Motor Vehicle Data



Note: The percent changes are of all income categories; they are simple average annual percent changes (computed as the 3-year percent change divided by 3) and will differ slightly from compound average annual percent changes.
Source: Table 2.15.

Table 2.15 Household Motor Vehicle Data, 1983, 1985, 1988, and 1991

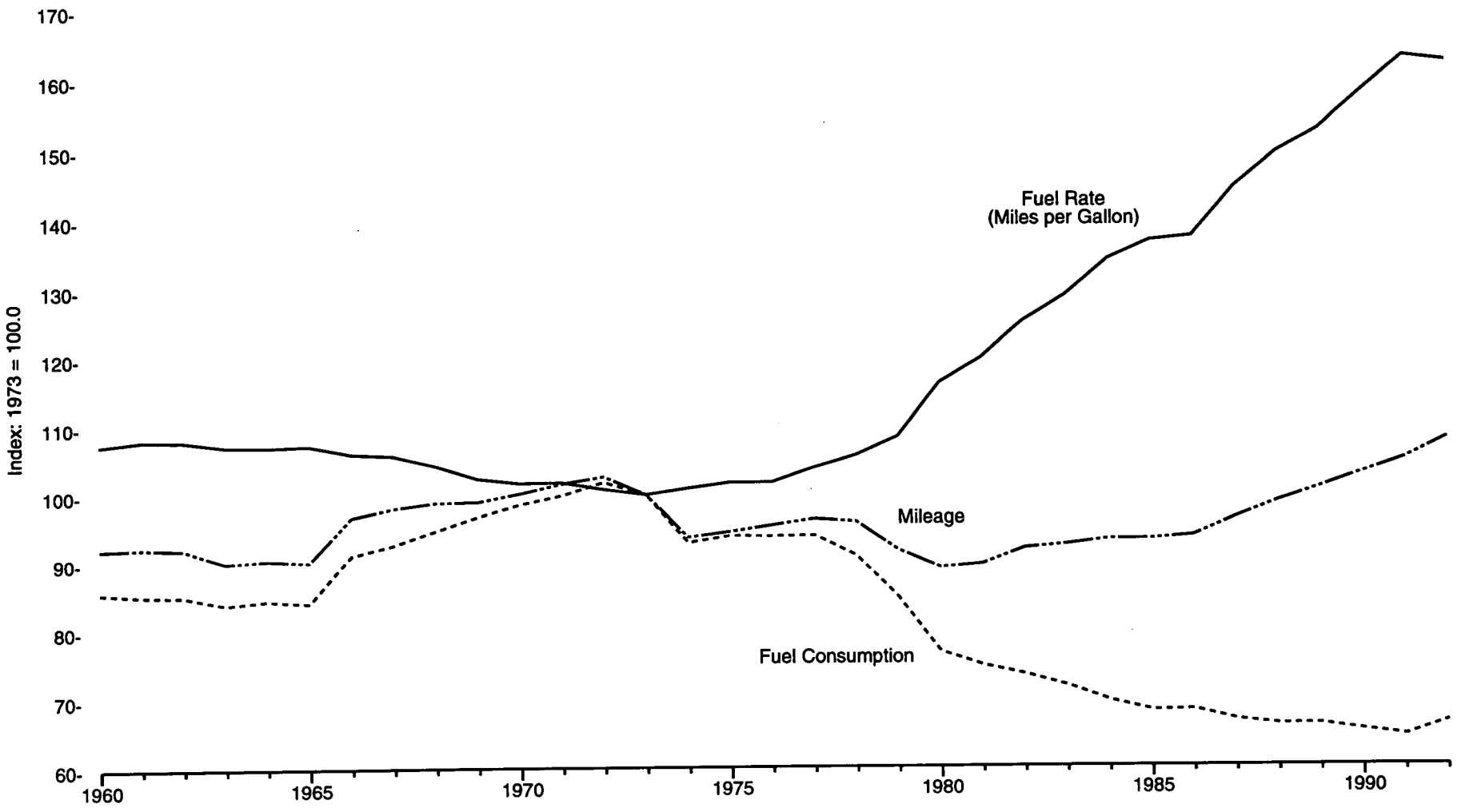
Unit of Measure	Family Income											
	Less than $25,000				$25,000 or More				All Income Categories			
	1983	1985	1988	1991	1983	1985	1988	1991	1983	1985	1988	1991
Households with Vehicles (millions)	42.9	43.3	38.9	36.5	30.5	34.5	42.2	48.2	73.4	77.7	81.3	84.6
Vehicles (millions)	66.7	65.4	58.7	52.7	63.0	71.9	88.8	98.5	129.7	137.3	147.5	151.2
Vehicle Miles Traveled (billions)	589	587	550	488	630	766	960	1,114	1,219	1,353	1,511	1,602
Motor Fuel Consumed (billion gallons)	40.8	38.2	31.4	26.9	39.8	45.7	51.0	55.9	80.5	83.9	82.4	82.8
Motor Gasoline Consumed (billion gallons)												
Leaded	19.2	13.5	5.4	1.8	13.2	11.0	5.8	1.6	32.4	24.5	11.1	3.4
Unleaded	20.9	24.2	25.7	24.7	25.3	33.7	44.3	52.9	46.3	57.8	69.9	77.5
Motor Fuel Expenditures (billion dollars)	48.1	44.8	30.7	31.7	47.3	54.3	50.3	66.6	95.4	99.1	81.1	98.2
Averages per Household with Vehicles												
Vehicles	1.6	1.5	1.5	1.4	2.1	2.1	2.1	2.0	1.8	1.8	1.8	1.8
Vehicle Miles Traveled (thousands)	13.7	13.6	14.1	13.4	20.7	22.2	22.7	23.1	16.6	17.4	18.6	18.9
Motor Fuel Consumed (gallons)	950	883	807	737	1,305	1,326	1,205	1,160	1,097	1,079	1,014	979
Motor Fuel Expenditures (dollars)	1,121	1,035	789	869	1,552	1,575	1,191	1,382	1,300	1,274	998	1,161
Averages per Vehicle												
Vehicle Miles Traveled (thousands)	8.8	9.0	9.4	9.3	10.0	10.7	10.8	11.3	9.4	9.9	10.3	10.6
Motor Fuel Consumed (gallons)	612	585	536	510	631	636	574	568	621	611	559	548
Motor Fuel Expenditures (dollars)	722	685	524	602	751	755	567	676	736	722	550	650
Fuel Efficiency (miles per gallon)	14.4	15.3	17.5	18.1	15.8	16.8	18.8	19.9	15.1	16.1	18.3	19.3
Price of Motor Gasoline (dollars per gallon)												
Leaded	1.14	1.11	0.90	1.10	1.14	1.11	0.90	1.10	1.14	1.11	0.90	R 1.10
Unleaded	1.22	1.20	0.99	1.18	1.22	1.21	1.00	1.19	1.22	1.21	1.00	1.19

R=Revised data.

Notes: • Included are automobiles, station wagons, passenger vans, cargo vans, motor homes, pickup trucks, and sport utilities or similar vehicles. Excluded are motorcycles, mopeds, large trucks, and buses. • Motor fuel includes motor gasoline and a small amount of other fuels, such as diesel, gasohol, and propane. These data for 1983 differ from previously published 1983 data in that the basis for estimating the number of vehicle-owning households was changed to conform with that being used for 1985. • Totals may not equal sum of components due to independent rounding.

Sources: **Fuel Efficiency:** • 1983 and 1985—Energy Information Administration (EIA), "Residential Transportation Energy Consumption Survey" purchase diaries. • 1988 and 1991—Environmental Protection Agency Certification Files, adjusted for on-road driving. **Price of Motor Gasoline:** • 1983 and 1985—EIA, "Residential Transportation Energy Consumption Survey" purchase diaries. • 1988 and 1991—Bureau of Labor Statistics Gasoline Pump Price Series and Lundberg Inc. price series. **All Other Data:** EIA, Form EIA-876A/C, "Residential Transportation Energy Consumption Survey."

Figure 2.16 Passenger Car Efficiency, 1960-1992



Source: Table 2.16.

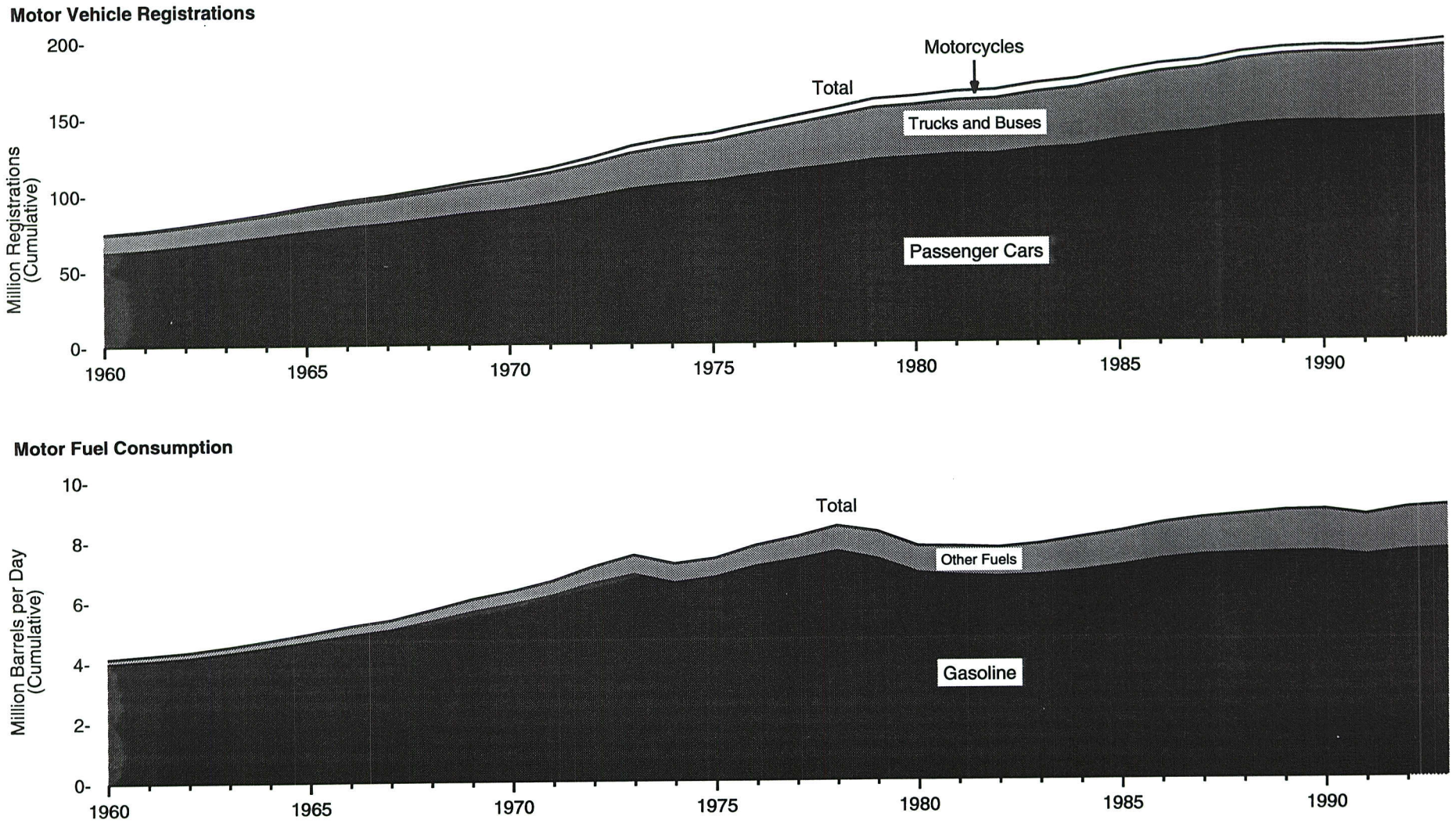
Table 2.16 Motor Vehicle Efficiency, 1960-1992

Year	Passenger Cars [1]						All Motor Vehicles [2]					
	Mileage		Fuel Consumption		Fuel Rate		Mileage		Fuel Consumption		Fuel Rate	
	Miles per Car	Index 1973 = 100.0	Gallons per Car	Index 1973 = 100.0	Miles per Gallon	Index 1973 = 100.0	Miles per Vehicle	Index 1973 = 100.0	Gallons per Vehicle	Index 1973 = 100.0	Miles per Gallon	Index 1973 = 100.0
1960	9,446	92.1	661	85.7	14.28	107.4	9,652	95.6	777	91.4	12.42	104.4
1961	9,465	92.3	658	85.3	14.38	108.1	9,648	95.5	776	91.3	12.44	104.6
1962	9,441	92.1	657	85.2	14.37	108.0	9,618	95.2	774	91.1	12.43	104.5
1963	9,240	90.1	648	84.0	14.26	107.2	9,646	95.5	773	90.9	12.48	105.0
1964	9,286	90.5	652	84.6	14.25	107.1	9,698	96.0	778	91.5	12.47	104.9
1965	9,255	90.2	649	84.2	14.27	107.3	9,674	95.8	775	91.2	12.48	105.0
1966	9,923	96.8	703	91.2	14.11	106.1	9,675	95.8	780	91.8	12.40	104.2
1967	10,060	98.1	715	92.7	14.07	105.8	9,751	96.6	786	92.5	12.40	104.2
1968	10,144	98.9	731	94.8	13.87	104.3	9,864	97.7	805	94.7	12.25	103.0
1969	10,158	99.0	746	96.8	13.62	102.4	9,885	97.9	821	96.6	12.05	101.3
1970	10,272	100.2	760	98.6	13.52	101.7	9,976	98.8	830	97.7	12.02	101.1
1971	10,422	101.6	770	99.9	13.54	101.8	10,133	100.3	839	98.7	12.08	101.6
1972	10,521	102.6	785	101.8	13.40	100.8	10,279	101.8	857	100.1	11.99	100.8
1973	10,256	100.0	771	100.0	13.30	100.0	10,099	100.0	850	100.0	11.89	100.0
1974	9,606	93.7	716	92.9	13.42	100.9	9,493	94.0	788	92.7	12.05	101.3
1975	9,690	94.5	716	93.9	13.52	101.7	9,627	95.3	790	92.9	12.18	102.4
1976	9,785	95.4	723	93.8	13.53	101.7	9,774	96.8	806	94.8	12.12	101.9
1977	9,879	96.3	716	93.9	13.80	103.8	9,978	98.8	814	95.8	12.26	103.1
1978	9,835	95.9	701	90.9	14.04	105.6	10,077	99.8	816	96.0	12.35	103.9
1979	9,403	91.7	653	84.7	14.41	108.3	9,722	96.3	776	91.3	12.52	105.3
1980	9,141	89.1	591	76.7	15.46	116.2	9,458	93.7	712	83.8	13.29	111.8
1981	9,186	89.6	576	74.7	15.94	119.8	9,462	93.7	697	82.0	13.57	114.1
1982	9,428	91.9	566	73.4	16.65	125.2	9,644	95.5	686	80.7	14.07	118.3
1983	9,475	92.4	553	71.7	17.14	128.9	9,761	96.7	686	80.7	14.24	119.8
1984	9,558	93.2	536	69.5	17.83	134.1	10,017	99.2	691	81.3	14.49	121.9
1985	9,560	93.2	525	68.1	18.20	136.8	10,018	99.2	685	80.6	14.62	123.0
1986	9,608	93.7	526	68.2	18.27	137.4	10,117	100.2	690	81.2	14.66	123.3
1987	9,878	96.3	514	66.7	19.20	144.4	10,449	103.5	694	81.6	15.07	126.7
1988	10,121	98.7	509	66.0	19.87	149.4	10,720	106.1	688	80.9	15.58	131.0
1989	10,332	100.7	509	66.0	20.31	152.7	10,936	108.3	688	80.9	15.90	133.7
1990	10,548	102.8	502	65.1	21.02	158.0	11,107	110.0	677	79.8	16.40	137.9
1991	R10,757	R104.9	R496	R64.3	R21.69	R163.1	R11,294	R111.8	668	78.6	R16.90	142.1
1992P	11,063	107.9	512	66.4	21.60	162.4	11,520	114.1	684	80.5	16.85	141.7

[1] From 1960 to 1965, passenger cars also include motorcycles.
[2] Passenger cars, motorcycles, buses, and trucks.
R=Revised data. P=Preliminary data.

Sources: • 1960-1985—Federal Highway Administration, *Highway Statistics Summary to 1985*, Table VM-201A. • 1986 forward—Federal Highway Administration, *Highway Statistics*, annual, Table VM-1.

Figure 2.17 Motor Vehicle Registrations and Motor Fuel Consumption, 1960-1993



Source: Table 2.17.

Table 2.17 Motor Vehicle Registrations and Motor Fuel Consumption, 1960-1993

Year	Motor Vehicle Registrations (millions)					Motor Fuel Consumption [1] (thousand barrels per day)		
	Passenger Cars	Motorcycles	Buses	Trucks	Total	Gasoline [2]	Other Fuels [3]	Total [4]
1960	61.7	0.6	0.3	11.9	74.4	3,953	159	4,112
1961	63.4	0.6	0.3	12.3	76.6	4,034	176	4,210
1962	66.1	0.7	0.3	12.8	79.8	4,120	192	4,312
1963	69.0	0.8	0.3	13.4	83.5	4,274	211	4,485
1964	72.0	1.0	0.3	14.0	87.3	4,454	236	4,690
1965	75.3	1.4	0.3	14.8	91.7	4,644	269	4,913
1966	78.1	1.8	0.3	15.5	95.7	4,846	306	5,152
1967	80.4	2.0	0.3	16.2	98.9	5,014	329	5,343
1968	83.6	2.1	0.4	16.9	103.0	5,300	370	5,670
1969	86.9	2.3	0.4	17.9	107.4	5,604	413	6,017
1970	89.2	2.8	0.4	18.8	111.2	5,845	439	6,284
1971	92.7	3.3	0.4	19.9	116.3	6,125	494	6,619
1972	97.1	3.8	0.4	21.3	122.6	6,529	554	7,083
1973	102.0	4.4	0.4	23.2	130.0	6,819	642	7,460
1974	104.9	5.0	0.4	24.6	134.9	6,531	639	7,170
1975	106.7	5.0	0.5	25.8	137.9	6,719	628	7,347
1976	110.4	5.0	0.5	27.7	143.5	7,075	697	7,772
1977	113.7	5.0	0.5	29.6	148.8	7,287	760	8,046
1978	116.6	5.1	0.5	31.7	153.9	7,555	837	8,392
1979	120.2	5.5	0.5	33.3	159.6	7,291	913	8,204
1980	121.7	5.7	0.5	33.6	161.6	6,820	896	7,716
1981	123.5	5.8	0.5	34.5	164.3	6,726	969	7,695
1982	123.7	5.7	0.6	35.3	165.3	6,679	972	7,651
1983	126.7	5.6	0.6	36.5	169.4	6,731	1,043	7,774
1984	127.9	5.5	0.6	38.0	172.0	6,850	1,127	7,977
1985	132.1	5.4	([5])	39.6	177.1	7,020	1,158	8,178
1986	135.4	5.3	([5])	40.8	181.5	7,229	1,202	8,431
1987	137.3	4.9	([5])	41.7	183.9	7,359	1,242	8,601
1988	141.3	4.6	([5])	43.1	189.0	7,405	1,306	8,711
1989	143.1	4.4	([5])	44.2	191.7	7,437	1,385	8,822
1990	143.5	4.3	([5])	45.1	192.9	7,454	1,396	8,849
1991	143.0	4.2	([5])	45.4	192.5	7,323	1,349	8,672
1992	[R]144.2	4.1	([5])	[R]46.1	[R]194.4	[R]7,472	[R]1,430	[R]8,902
1993[E]	145.7	4.0	([5])	47.1	196.9	7,533	1,449	8,981

[1] Includes only motor fuel taxed at the prevailing tax rates in each State. Excludes motor fuel exempt from tax payment, subject to tax refund, or taxed at rates other than the prevailing tax rate. Experience has shown that the total motor fuel consumption quantity cited here equals more than 99.0 percent of gross reported motor fuel consumption.

[2] Motor gasoline, aviation gasoline, and gasohol.

[3] Distillate fuel oil (diesel oil), liquefied gases, and kerosene when they are used to operate vehicles on highways. Excludes jet fuel beginning in 1962.

[4] Excludes losses allowed for evaporation, handling, etc.

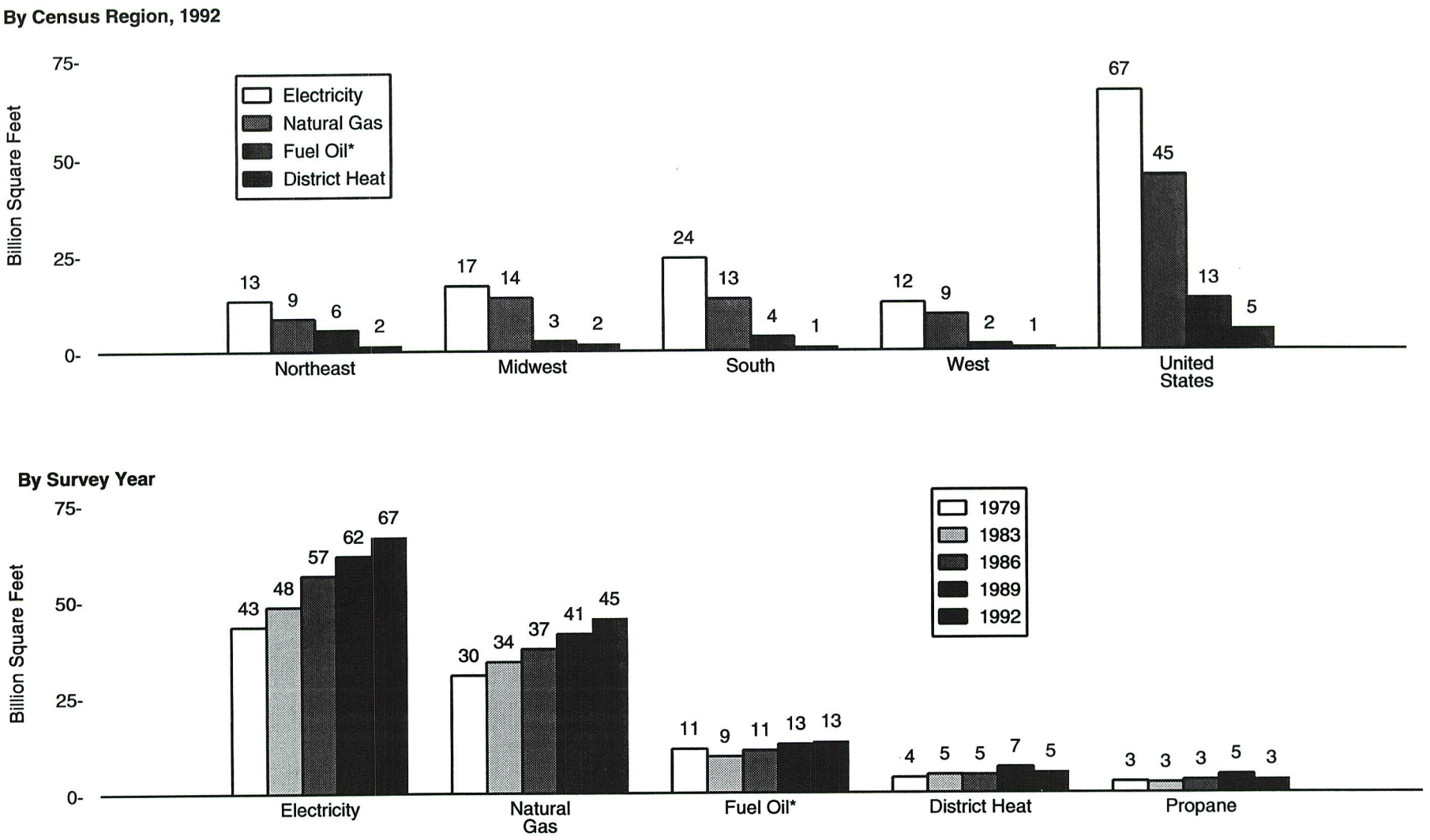
[5] Included in trucks.

R=Revised data. E=Estimate.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1960-1975—Federal Highway Administration, *Highway Statistics Summary to 1975*, Tables MV-201 and MF-221. • 1976-1986—Federal Highway Administration, *Highway Statistics Annual*, Tables MV-1, MF-21, and MF-25. • 1987 forward—Federal Highway Administration, *Selected Highway Statistics and Charts 1992*.

Figure 2.18 Commercial Buildings Characteristics by Energy Source



*Distillate fuel oil, residual fuel oil, and kerosene.

Source: Table 2.18. See Appendix E for Census regions.

Table 2.18 Commercial Buildings Characteristics by Energy Source, Selected Years, 1979-1992

(Billion Square Feet)

Energy Source and Year	Square Footage Category			Principal Building Activity				Census Region [1]				All Buildings
	1,001 to 10,000	10,001 to 100,000	Over 100,000	Mercantile and Service	Office	Education	All Other	Northeast	Midwest	South	West	
All Buildings												
1979	9.21	20.89	13.44	9.96	6.99	5.97	20.63	9.53	14.20	13.66	6.16	43.55
1983	9.26	22.35	17.86	10.32	8.31	6.04	24.80	10.25	15.25	16.61	7.36	49.47
1986	13.07	26.34	18.79	12.81	9.55	7.29	28.56	11.83	16.03	19.40	10.94	58.20
1989	13.32	28.32	21.54	12.37	11.80	8.08	30.94	13.57	15.96	22.04	11.62	63.18
1992	14.53	28.51	24.84	12.40	12.32	8.47	34.69	13.40	17.28	24.58	12.62	67.88
Electricity												
1979	8.99	20.76	13.41	9.92	6.98	5.97	20.29	9.46	14.16	13.42	6.11	43.15
1983	8.86	21.79	17.68	10.24	8.27	6.03	23.78	9.98	14.88	16.22	7.24	48.33
1986	12.49	25.52	18.50	12.71	9.50	7.20	27.10	11.43	15.68	18.75	10.65	56.51
1989	12.71	27.58	21.28	12.36	11.80	8.07	29.34	13.33	15.70	21.22	11.32	61.56
1992	14.05	27.89	24.61	12.39	12.32	8.47	33.37	13.24	16.91	23.99	12.41	66.55
Natural Gas												
1979	5.58	14.41	10.50	7.56	4.61	4.17	14.13	6.75	11.81	7.77	4.15	30.48
1983	5.53	14.82	13.58	7.90	5.50	4.45	16.09	6.95	12.79	9.17	5.02	33.94
1986	7.03	16.15	14.09	8.74	5.73	5.52	17.28	6.89	12.42	10.43	7.53	37.26
1989	7.38	17.41	16.36	8.79	7.22	6.64	18.49	8.52	12.81	11.66	8.15	41.14
1992	8.03	19.11	17.96	9.38	7.86	6.85	21.01	8.56	13.84	13.41	9.29	45.10
Fuel Oil [2]												
1979	1.92	4.73	4.75	2.09	1.75	2.28	5.28	4.41	2.97	2.97	1.04	11.40
1983	1.21	3.36	4.83	1.50	1.59	1.43	4.89	4.21	1.77	2.84	0.60	9.41
1986	1.71	3.97	5.33	2.42	1.76	1.68	5.14	5.09	2.04	2.52	1.36	11.01
1989	1.52	4.49	6.59	1.62	2.91	2.21	5.87	5.13	3.20	2.84	1.43	12.60
1992	1.75	3.89	7.57	2.11	3.60	1.84	5.67	5.53	2.54	3.58	1.56	13.22
District Heat [3]												
1979	Q	1.17	2.64	Q	1.19	0.40	1.98	1.26	1.58	0.65	0.39	3.88
1983	Q	1.39	3.16	Q	1.25	0.45	2.46	1.37	1.93	0.80	0.53	4.64
1986	0.10	1.49	3.04	0.16	1.45	0.83	2.18	1.38	1.80	0.71	0.74	4.63
1989	0.15	1.88	4.55	Q	2.32	1.13	3.02	2.24	1.51	1.58	1.25	6.58
1992	0.13	1.65	3.56	0.15	1.71	0.69	2.79	1.56	1.88	0.98	0.91	5.34
Propane												
1979	0.66	1.21	0.93	0.63	0.14	0.47	1.56	0.44	0.73	1.40	0.23	2.80
1983	0.59	0.89	1.07	Q	Q	0.35	1.54	0.47	0.44	1.59	Q	2.56
1986	1.08	1.61	0.52	0.64	Q	0.37	2.10	0.78	0.66	1.35	0.42	3.21
1989	1.04	1.95	1.71	0.91	Q	1.14	2.52	1.07	1.06	1.74	Q	4.69
1992	1.04	1.37	0.99	0.74	0.21	0.47	1.97	1.04	0.58	1.51	0.26	3.39

[1] See Appendix E for Census regions.

[2] Distillate fuel oil, residual fuel oil, and kerosene.

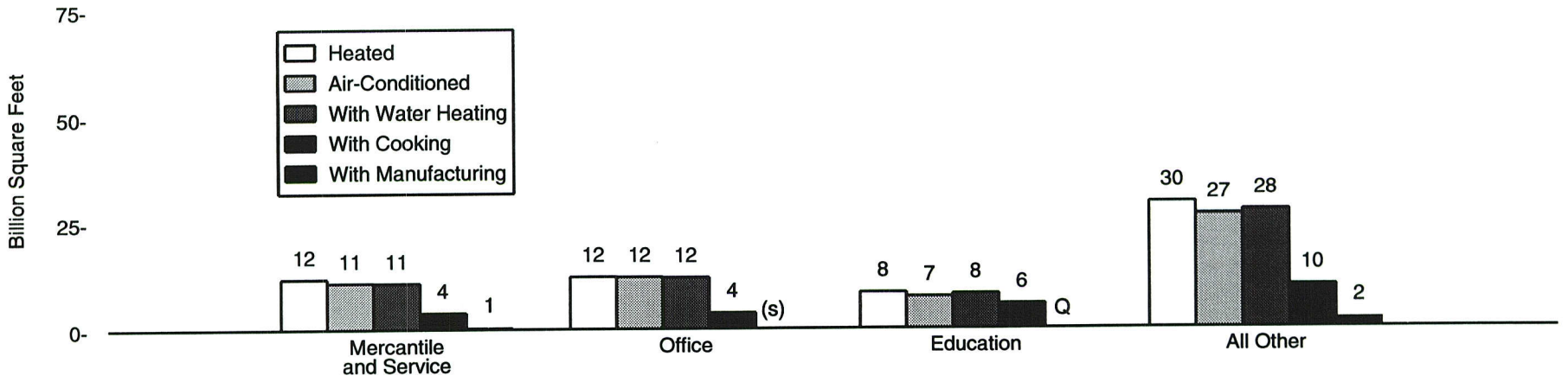
[3] For 1979 and 1983, includes only purchased steam. For 1986, 1989, and 1992, includes purchased and nonpurchased steam and purchased and nonpurchased hot water.

Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

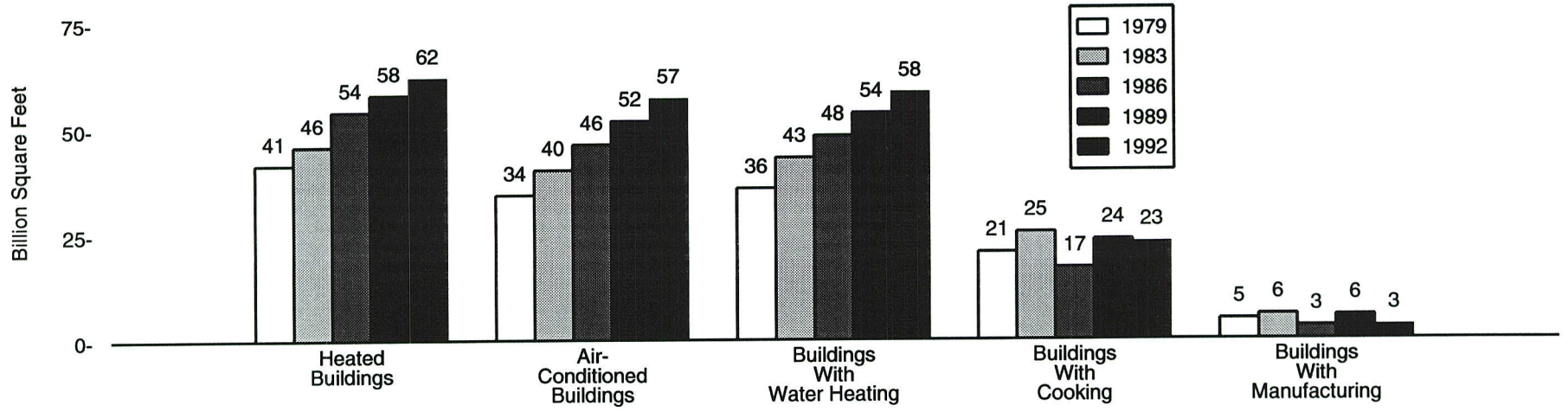
Sources: • 1979—Energy Information Administration (EIA), Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." • 1983—EIA, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." • 1986—EIA, Form EIA-871, "Nonresidential Buildings Energy Consumption Survey." • 1989 and 1992—EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey."

Figure 2.19 Commercial Buildings Characteristics by End Use

By Principal Building Activity, 1992



By Survey Year



(s)=Less than 500 million square feet. Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

Source: Table 2.19.

Table 2.19 Commercial Buildings Characteristics by End Use, Selected Years, 1979-1992

(Billion Square Feet)

Building Characteristic and Year	Square Footage Category			Principal Building Activity				Census Region [1]				All Buildings
	1,001 to 10,000	10,001 to 100,000	Over 100,000	Mercantile and Service	Office	Education	All Other	Northeast	Midwest	South	West	
All Buildings												
1979	9.21	20.89	13.44	9.96	6.99	5.97	20.63	9.53	14.20	13.66	6.16	43.55
1983	9.26	22.35	17.86	10.32	8.31	6.04	24.80	10.25	15.25	16.61	7.36	49.47
1986	13.07	26.34	18.79	12.81	9.55	7.29	28.56	11.83	16.03	19.40	10.94	58.20
1989	13.32	28.32	21.54	12.37	11.80	8.08	30.94	13.57	15.96	22.04	11.62	63.18
1992	14.53	28.51	24.84	12.40	12.32	8.47	34.69	13.40	17.28	24.58	12.62	67.88
Heated Buildings												
1979	8.53	19.85	13.04	9.63	6.98	5.97	18.84	9.35	13.85	12.50	5.72	41.42
1983	8.14	20.57	16.97	9.75	8.19	5.82	21.92	9.54	14.50	15.00	6.64	45.68
1986	11.47	24.26	18.19	12.39	9.46	7.24	24.83	11.24	15.20	17.53	9.95	53.92
1989	11.38	25.85	20.64	12.04	11.68	8.02	26.13	12.97	15.07	19.17	10.66	57.87
1992	12.74	26.18	23.08	11.83	12.26	8.38	29.53	12.86	16.30	21.66	11.18	62.00
Air-Conditioned Buildings												
1979	5.99	16.29	11.96	7.84	6.73	4.21	15.46	7.61	11.28	11.82	3.53	34.24
1983	6.18	18.05	15.96	8.58	7.99	4.58	19.04	8.09	12.43	14.73	4.94	40.18
1986	8.95	20.63	16.56	10.38	9.33	5.77	20.64	8.54	12.49	16.73	8.36	46.13
1989	9.37	23.05	19.35	10.80	11.63	6.50	22.83	10.33	13.16	18.96	9.32	51.77
1992	10.60	23.98	22.46	10.87	12.20	7.39	26.58	11.16	14.38	21.21	10.30	57.04
Buildings With Water Heating												
1979	6.42	17.33	12.07	7.58	6.34	5.59	16.31	8.44	12.34	10.05	4.99	35.82
1983	6.89	19.34	16.85	8.62	7.90	5.78	20.78	9.15	13.79	13.78	6.36	43.08
1986	9.04	21.99	17.16	9.91	8.83	6.86	22.59	9.97	14.00	14.71	9.51	48.19
1989	9.28	24.10	20.21	10.16	11.20	7.62	24.60	12.45	14.21	16.92	10.00	53.58
1992	10.76	24.85	22.87	10.81	12.03	8.04	27.60	12.41	15.46	19.59	11.02	58.48
Buildings With Cooking												
1979	2.82	9.12	8.76	3.27	2.84	4.38	10.21	5.27	6.83	6.12	2.48	20.71
1983	3.25	10.30	11.89	4.17	4.14	4.63	12.50	5.69	7.69	8.48	3.59	25.44
1986	1.54	5.82	9.69	2.72	2.28	3.98	8.08	4.02	4.64	5.33	3.06	17.05
1989	2.31	8.26	13.10	4.04	3.92	5.29	10.43	5.87	6.49	7.19	4.11	23.67
1992	1.90	7.59	13.58	3.81	3.67	5.68	9.91	5.74	5.80	7.77	3.76	23.07
Buildings With Manufacturing												
1979	0.71	2.24	1.82	1.21	0.36	0.52	2.68	1.17	1.42	1.44	0.73	4.77
1983	0.87	2.85	2.11	1.25	0.71	0.40	3.47	1.39	1.93	1.61	0.90	5.83
1986	0.31	1.35	1.40	0.49	0.53	Q	1.88	0.55	0.97	0.97	0.56	3.06
1989	0.49	2.59	2.52	0.85	0.97	Q	2.99	1.03	1.54	1.73	1.30	5.60
1992	0.34	1.50	1.34	0.53	0.36	Q	2.13	0.76	0.89	1.04	0.48	3.17

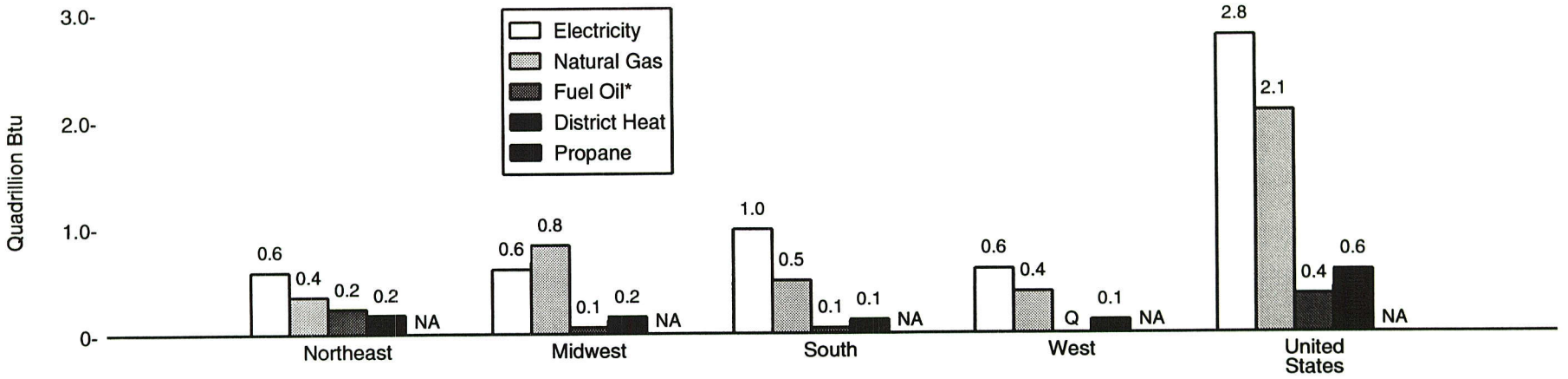
[1] See Appendix E for Census regions.

Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

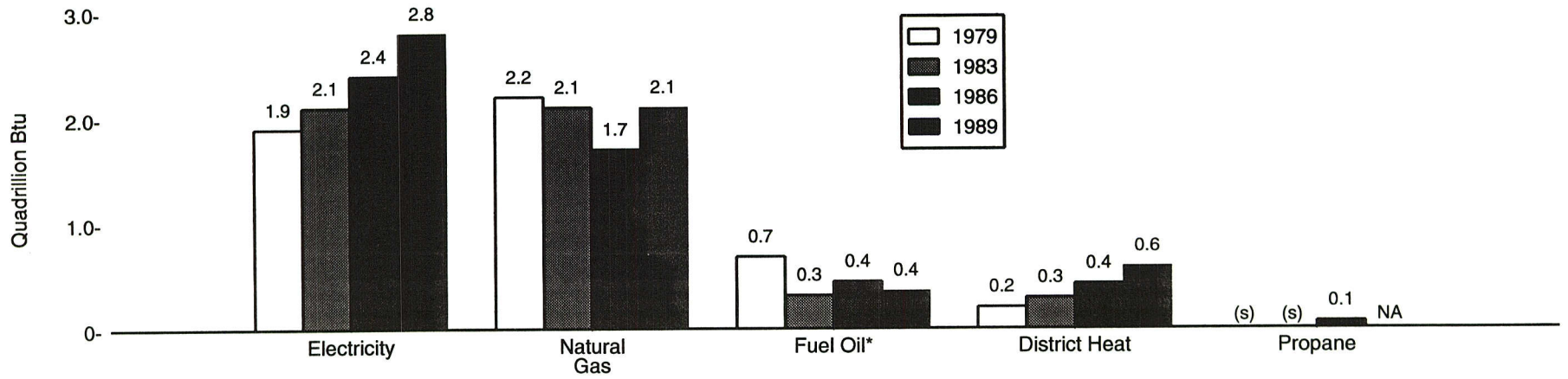
Sources: • 1979—Energy Information Administration (EIA), Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." • 1983—EIA, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." • 1986—EIA, Form EIA-871, "Nonresidential Buildings Energy Consumption Survey." • 1989 and 1992—EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey."

Figure 2.20 Commercial Buildings Consumption by Energy Source

By Census Region, 1989



By Survey Year



*Distillate fuel oil, residual fuel oil, and kerosene.
NA=Not available. Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled. (s)=Less than 50 trillion Btu.
Source: Table 2.20. See Appendix E for Census regions.

Table 2.20 Commercial Buildings Consumption by Energy Source, Selected Years, 1979-1989

(Trillion Btu)

Energy Source and Year	Square Footage Category			Principal Building Activity				Census Region [1]				All Buildings
	1,001 to 10,000	10,001 to 100,000	Over 100,000	Mercantile and Service	Office	Education	All Other	Northeast	Midwest	South	West	
Major Sources [2]												
1979	1,254.87	2,202.11	1,507.75	893.53	860.79	511.16	2,699.24	1,216.88	1,826.47	1,395.20	526.17	4,964.73
1983	1,241.81	1,934.59	1,646.28	811.84	1,017.68	480.23	2,512.93	858.31	1,820.50	1,461.69	682.18	4,822.68
1986	1,273.19	2,007.53	1,696.22	985.45	1,008.28	632.50	2,350.71	1,037.29	1,584.59	1,459.28	895.77	4,976.94
1989	1,258.94	2,402.15	2,127.04	1,048.25	1,229.56	704.04	2,806.28	1,354.47	1,659.46	1,648.41	1,125.79	5,788.13
Electricity												
1979	428.52	872.29	607.67	360.61	423.66	162.78	961.43	425.35	593.38	662.32	227.43	1,908.48
1983	468.59	902.63	757.78	425.83	509.43	152.36	1,041.38	324.49	672.66	800.58	331.27	2,129.01
1986	653.77	927.31	809.30	535.95	640.76	178.93	1,034.74	429.52	583.72	866.88	510.26	2,390.38
1989	571.75	1,145.23	1,056.09	549.67	781.48	216.76	1,225.16	585.62	608.95	974.78	603.72	2,773.06
Natural Gas												
1979	645.58	996.40	532.42	422.38	272.28	213.89	1,265.85	442.76	1,006.52	469.81	255.31	2,174.40
1983	684.01	809.44	597.16	327.32	365.21	245.63	1,152.45	278.27	978.41	522.97	310.96	2,090.61
1986	484.73	715.33	522.77	331.91	258.26	253.64	879.03	243.78	741.89	425.76	311.40	1,722.84
1989	567.66	835.57	669.82	416.67	238.00	323.46	1,094.92	353.10	830.93	497.67	391.35	2,073.05
Fuel Oil [3]												
1979	176.90	272.35	231.47	103.07	106.69	107.16	363.81	284.83	133.42	236.70	25.76	680.72
1983	84.92	139.79	89.78	43.13	75.30	61.30	134.76	171.70	28.23	104.31	Q	314.49
1986	114.40	206.12	121.19	105.42	38.74	103.23	194.31	269.64	63.16	86.10	22.80	441.70
1989	100.50	169.85	86.48	75.50	43.16	70.96	167.21	236.57	60.72	50.20	Q	356.83
District Heat [4]												
1979	Q	61.08	136.18	Q	58.17	27.33	108.15	63.94	93.15	Q	Q	201.12
1983	Q	82.73	201.56	Q	67.74	20.94	184.34	83.85	141.18	33.83	29.71	288.58
1986	Q	158.76	242.96	12.17	70.52	96.71	242.64	94.35	195.82	80.53	51.32	422.01
1989	19.02	251.50	314.66	Q	166.92	Q	318.99	179.19	158.86	125.76	121.38	585.18
Propane												
1979	23.21	15.20	4.89	10.01	Q	2.24	29.19	Q	15.72	14.55	9.71	43.30
1983	20.05	11.99	1.64	5.91	Q	1.56	23.86	Q	7.04	20.93	Q	33.68
1986	43.83	18.27	1.13	16.93	Q	2.53	42.11	8.84	18.83	25.78	Q	63.23
1989 [5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

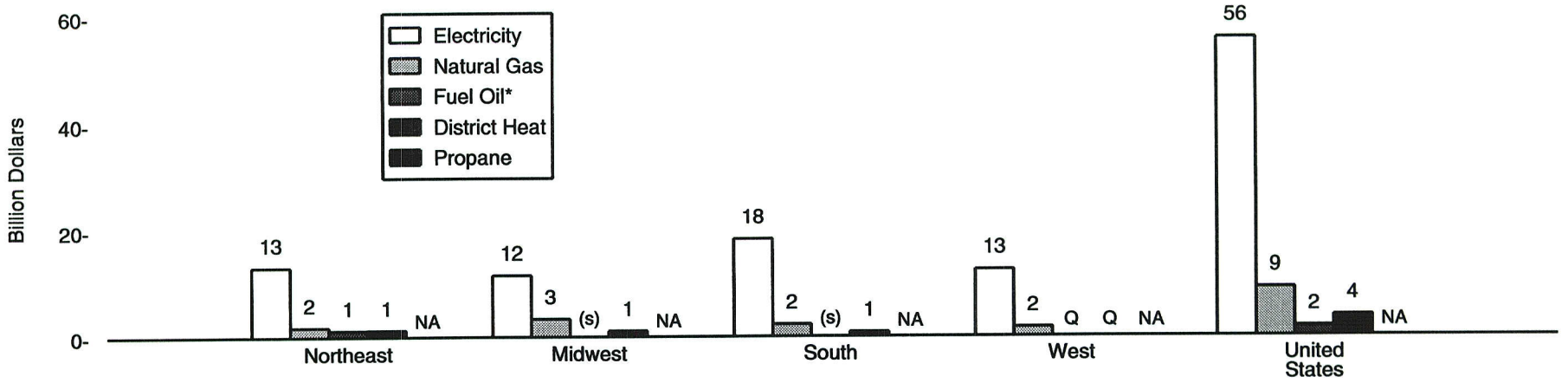
[1] See Appendix E for Census regions.
[2] Includes electricity, natural gas, fuel oil, and district heat.
[3] Distillate fuel oil, residual fuel oil, and kerosene.
[4] For 1979 and 1983, includes only purchased steam. For 1986 and 1989, includes purchased and nonpurchased steam and purchased and nonpurchased hot water.
[5] Not collected.
NA=Not available. Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

Note: Statistics for individual fuels are for all buildings using each fuel. Statistics for major sources are for the sum of electricity, natural gas, fuel oil, and district heat, across all buildings using any of those fuels.

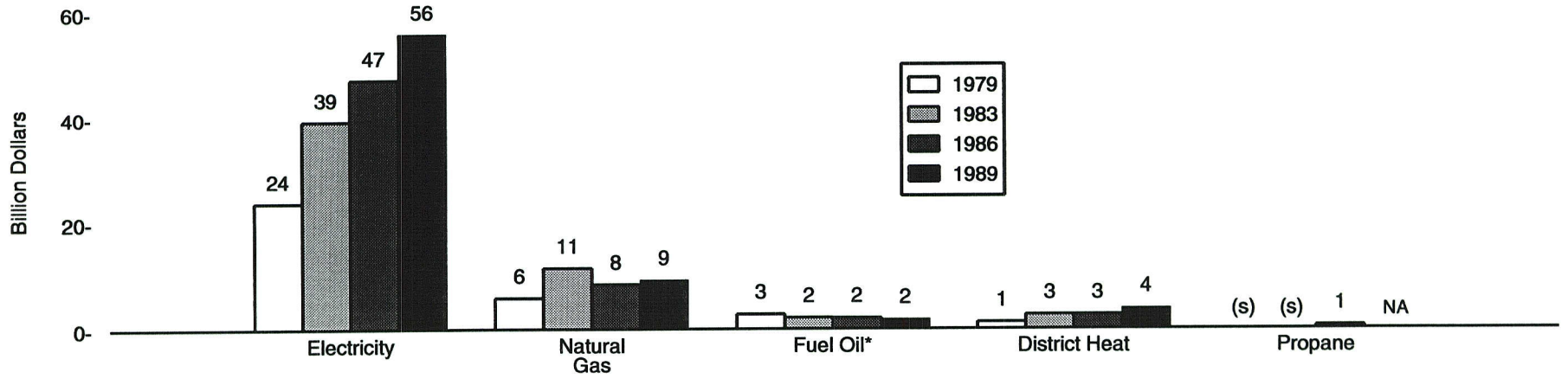
Sources: • 1979—Energy Information Administration (EIA), Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." • 1983—EIA, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." • 1986—EIA, Form EIA-871, "Nonresidential Buildings Energy Consumption Survey." • 1989—EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey."

Figure 2.21 Commercial Buildings Expenditures by Energy Source

By Census Region, 1989



By Survey Year



*Distillate fuel oil, residual fuel oil, and kerosene.
NA=Not available. (s)=Less than 500 million dollars. Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.
Source: Table 2.21. See Appendix E for Census regions.

Table 2.21 Commercial Buildings Expenditures by Energy Source, Selected Years, 1979-1989

(Million Dollars)

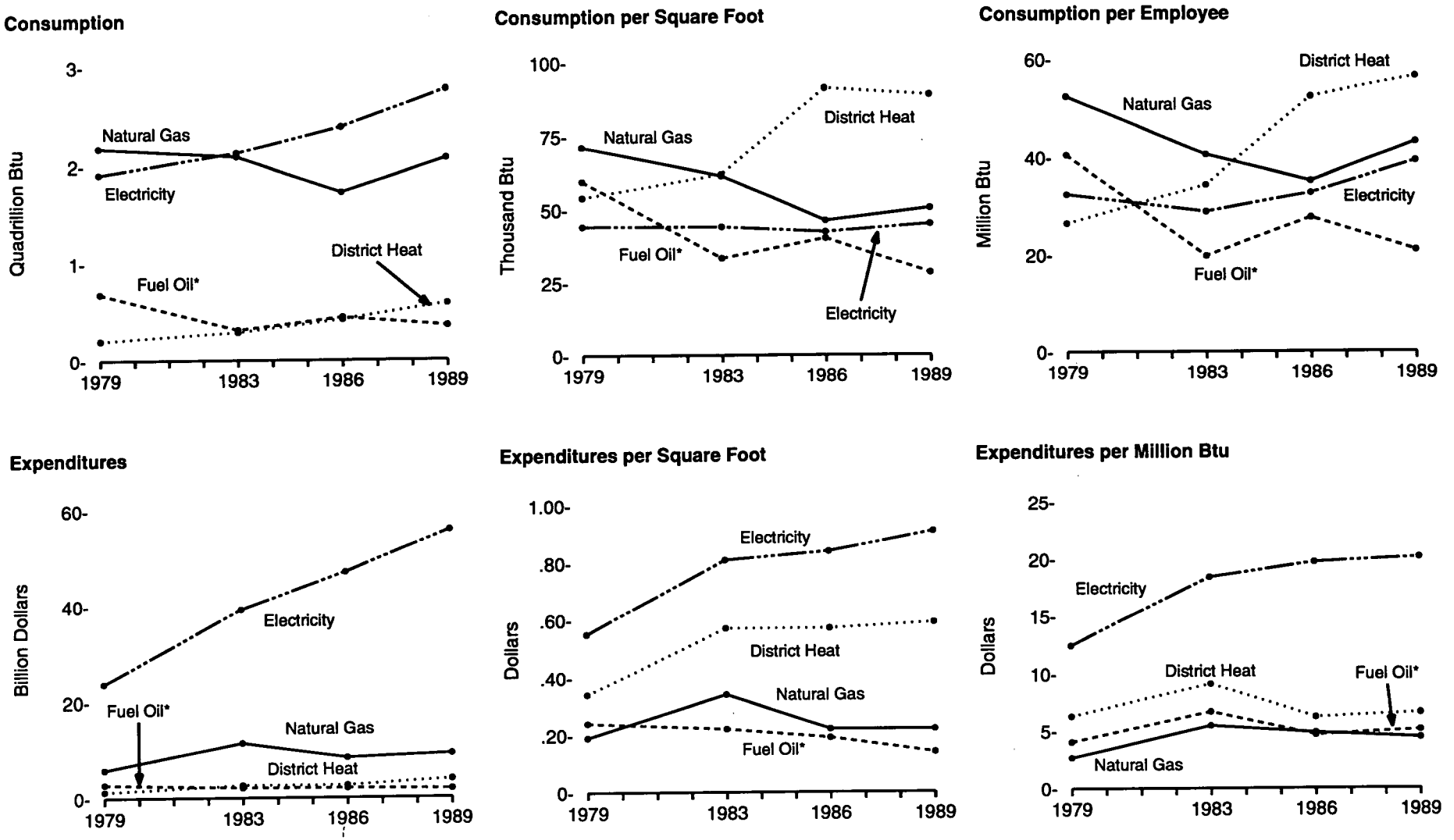
Energy Source and Year	Square Footage Category			Principal Building Activity				Census Region [1]				All Buildings
	1,001 to 10,000	10,001 to 100,000	Over 100,000	Mercantile and Service	Office	Education	All Other	Northeast	Midwest	South	West	
Major Sources [2]												
1979	8,587	15,120	9,889	6,384	7,438	3,051	16,723	9,405	10,661	10,106	3,424	33,596
1983	13,891	22,978	18,582	9,958	12,814	4,786	27,892	12,399	18,009	17,868	7,174	55,451
1986	17,411	23,512	19,296	13,091	14,763	5,762	26,604	14,269	15,718	17,725	12,508	60,219
1989	17,472	28,943	24,411	13,527	18,323	6,589	32,386	17,505	16,468	21,759	15,093	70,826
Electricity												
1979	5,958	10,994	6,799	4,655	5,862	1,936	11,298	6,493	7,009	7,756	2,493	23,751
1983	9,338	16,779	13,162	7,602	9,651	2,925	19,101	8,406	11,594	14,176	5,103	39,279
1986	14,137	18,046	15,003	10,781	12,884	3,606	19,915	10,886	10,869	14,856	10,575	47,186
1989	13,824	22,770	19,349	11,116	15,757	4,391	24,679	13,188	11,697	18,409	12,649	55,943
Natural Gas												
1979	1,804	2,654	1,356	1,231	728	551	3,304	1,320	2,547	1,255	692	5,814
1983	3,886	4,485	3,071	1,904	1,999	1,317	6,223	1,874	5,172	2,675	1,721	11,443
1986	2,522	3,543	2,289	1,706	1,178	1,189	4,282	1,472	3,400	1,958	1,524	8,355
1989	2,924	3,760	2,520	1,931	1,128	1,309	4,836	1,807	3,381	2,293	1,724	9,204
Fuel Oil [3]												
1979	798	1,117	850	457	443	396	1,469	1,149	569	932	116	2,765
1983	630	947	525	319	501	387	896	1,141	198	688	75	2,102
1986	616	970	473	516	194	448	901	1,272	278	394	115	2,059
1989	582	862	378	430	232	331	829	1,225	310	241	Q	1,822
District Heat [4]												
1979	Q	355	885	Q	405	169	652	444	535	163	124	1,267
1983	Q	767	1,823	Q	664	157	1,673	977	1,045	329	275	2,627
1986	Q	953	1,530	88	507	519	1,506	639	1,170	516	294	2,620
1989	141	1,551	2,165	Q	1,207	Q	2,042	1,286	1,081	816	Q	3,857
Propane												
1979	123	80	22	52	Q	10	153	Q	76	81	47	225
1983	190	109	14	56	Q	12	222	Q	62	201	Q	313
1986	370	163	10	140	Q	20	368	93	131	221	Q	543
1989 [5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1] See Appendix E for Census regions.
[2] Includes electricity, natural gas, fuel oil, and district heat.
[3] Distillate fuel oil, residual fuel oil, and kerosene.
[4] For 1979 and 1983, includes only purchased steam. For 1986 and 1989, includes purchased and nonpurchased steam and purchased and nonpurchased hot water.
[5] Not collected.
NA=Not available. Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

Note: Statistics for individual fuels are for all buildings using each fuel. Statistics for major sources are for the sum of electricity, natural gas, fuel oil, and district heat, across all buildings using any of those fuels.

Sources: • 1979—Energy Information Administration (EIA), Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." • 1983—EIA, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." • 1986—EIA, Form EIA-871, "Nonresidential Buildings Energy Consumption Survey." • 1989—EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey."

Figure 2.22 Commercial Buildings Energy Consumption and Expenditure Indicators, Selected Years, 1979-1989



*Distillate fuel oil, residual fuel oil, and kerosene.
Notes: • No data are available for 1980-1982, 1984-1985, and 1987-1988. • Because vertical scales differ, graphs should not be compared.
Source: Table 2.22.

Table 2.22 Commercial Buildings Energy Consumption and Expenditure Indicators, Selected Years, 1979-1989

Energy Source and Year	Building Characteristics			Energy Consumption				Energy Expenditures			
	Number of Buildings (thousand)	Total Square Feet (million)	Square Feet per Building (thousand)	Total (trillion Btu)	Per Building (million Btu)	Per Square Foot (thousand Btu)	Per Employee (million Btu)	Total (million dollars)	Per Building (thousand dollars)	Per Square Foot (dollars)	Per Million Btu (dollars)
Major Sources [1]											
1979	3,073	43,546	14.2	5,008	1,630	115.0	85.0	33,821	11.0	0.78	6.75
1983	3,185	49,471	15.5	4,856	1,525	98.2	65.7	55,764	17.5	1.13	11.48
1986	4,154	58,199	14.0	5,040	1,213	86.6	68.6	60,762	14.6	1.04	12.06
1989	4,528	63,184	14.0	5,788	1,278	91.6	81.9	70,826	15.6	1.12	12.24
Electricity											
1979	3,001	43,153	14.4	1,908	636	44.2	32.4	23,751	7.9	0.55	12.45
1983	3,052	48,327	15.8	2,129	697	44.1	28.9	39,279	12.9	0.81	18.45
1986	3,965	56,508	14.3	2,390	603	42.3	32.7	47,186	11.9	0.84	19.74
1989	4,294	61,563	14.3	2,773	646	45.0	39.3	55,943	13.0	0.91	20.17
Natural Gas											
1979	1,864	30,477	16.4	2,174	1,167	71.3	52.5	5,814	3.1	0.19	2.67
1983	1,904	33,935	17.8	2,091	1,098	61.6	40.6	11,443	6.0	0.34	5.47
1986	2,214	37,263	16.8	1,723	778	46.2	35.2	8,355	3.8	0.22	4.85
1989	2,420	41,143	17.0	2,073	857	50.4	43.2	9,204	3.8	0.22	4.44
Fuel Oil [2]											
1979	641	11,397	17.8	681	1,063	59.7	40.5	2,765	4.3	0.24	4.06
1983	441	9,409	21.3	314	714	33.4	19.8	2,102	4.8	0.22	6.68
1986	534	11,005	20.6	442	827	40.1	27.7	2,059	3.9	0.19	4.66
1989	581	12,600	21.7	357	614	28.3	21.0	1,822	3.1	0.14	5.11
District Heat [3]											
1979	47	3,722	79.0	201	4,267	54.0	26.5	1,267	26.9	0.34	6.30
1983	64	4,643	72.9	289	4,530	62.1	34.4	2,627	41.2	0.57	9.10
1986	77	4,625	59.7	422	5,446	91.2	52.4	2,620	33.8	0.57	6.21
1989	98	6,578	67.0	585	5,964	89.0	56.5	3,857	39.3	0.59	6.59
Propane											
1979	214	2,797	13.1	43	202	15.5	12.9	225	1.1	0.08	5.19
1983	191	2,562	13.4	34	176	13.1	8.5	313	1.6	0.12	9.29
1986	344	3,213	9.3	63	184	19.7	17.6	543	1.6	0.17	8.59
1989	348	4,695	13.5	NA	NA	NA	NA	NA	NA	NA	NA

[1] For 1979, 1983 and 1986, includes electricity, natural gas, fuel oil, district heat, and propane. For 1989, includes electricity, natural gas, fuel oil, and district heat. Propane consumption statistics were not collected in 1989.

[2] Distillate fuel oil, residual fuel oil, and kerosene.

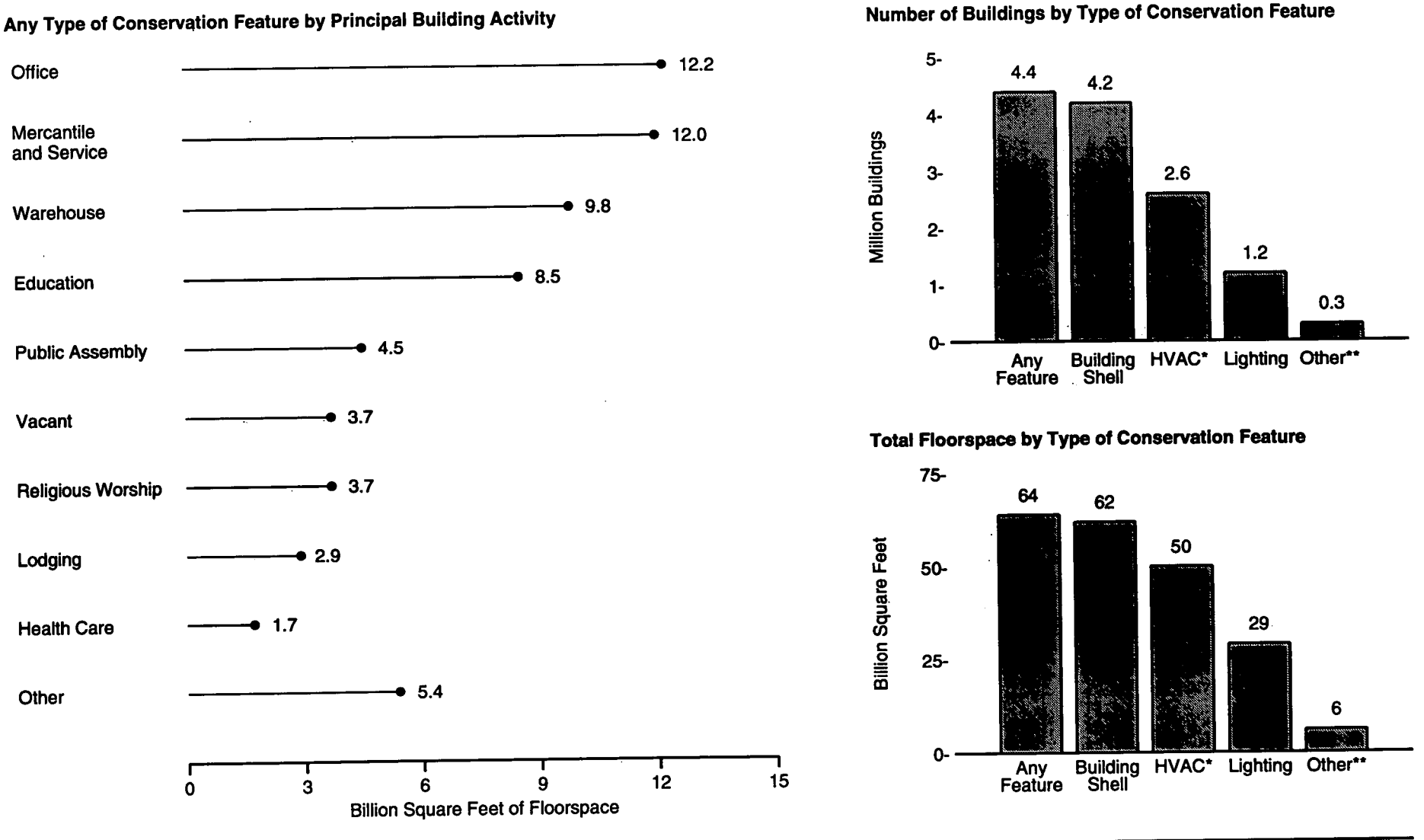
[3] For 1979 and 1983, includes only purchased steam. For 1986 and 1989, includes purchased and nonpurchased steam and purchased and nonpurchased hot water.

NA=Not available.

Note: Statistics for individual fuels are for all buildings using each fuel. Statistics for major sources are for all buildings, even buildings using no major fuel.

Sources: • 1979—Energy Information Administration (EIA), Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." • 1983—EIA, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." • 1986—EIA, Form EIA-871, "Nonresidential Buildings Energy Consumption Survey." • 1989—EIA, Form EIA-871, "Commercial Buildings Energy Consumption Survey."

Figure 2.23 Commercial Buildings With Energy Conservation Features, 1992



*Heating, ventilation, and air conditioning.
**Examples of "Other" include timers on thermostats, zoned heating, reclaimed heat, and architectural design of the building.

Note: More than one conservation feature may apply to a building.
Source: Table 2.23.

Table 2.23 Commercial Buildings With Energy Conservation Features, 1992

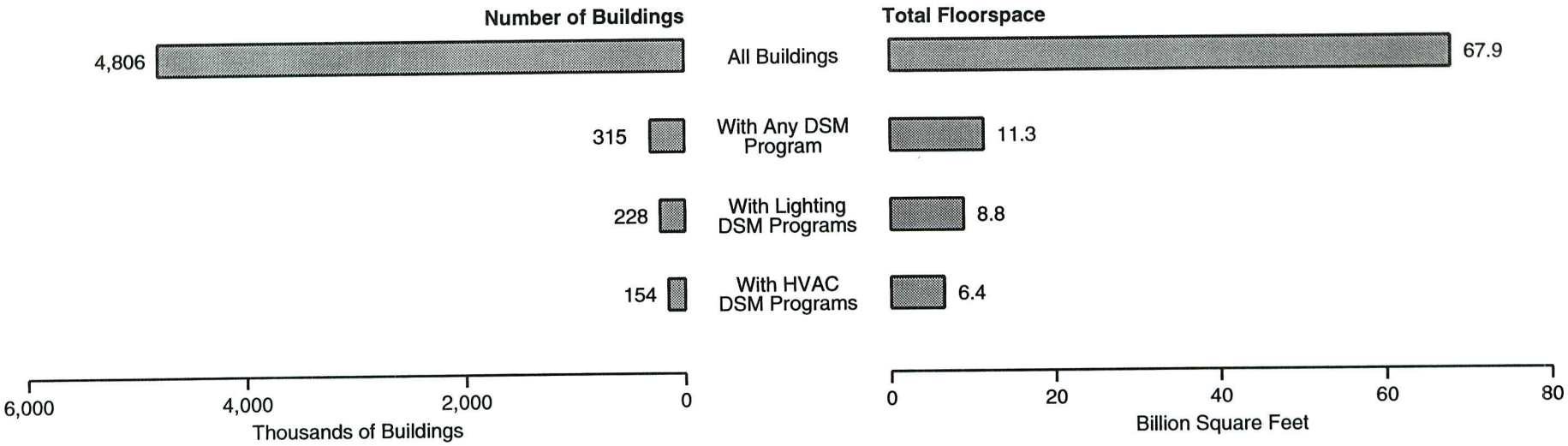
Building Characteristic	Number of Buildings (thousands)						Total Floorspace (million square feet)					
		Conservation Features [1]						Conservation Features [1]				
	Total	Any	Building Shell	HVAC [2]	Lighting	Other [3]	Total	Any	Building Shell	HVAC [2]	Lighting	Other [3]
All Buildings	4,806	4,357	4,223	2,604	1,178	264	67,876	64,403	62,056	50,281	29,453	5,952
Building Floorspace (square feet)												
1,001 to 5,000	2,681	2,376	2,305	1,194	452	102	7,327	6,575	6,375	3,370	1,302	291
5,001 to 10,000	975	887	864	569	275	62	7,199	6,566	6,405	4,221	2,066	467
10,001 to 25,000	647	610	587	447	241	50	10,375	9,788	9,403	7,257	3,952	821
25,001 to 50,000	280	268	259	208	106	25	10,069	9,597	9,270	7,503	3,884	896
50,001 to 100,000	116	113	111	98	47	14	8,062	7,874	7,683	6,797	3,420	917
100,001 to 200,000	71	68	66	57	36	8	9,678	9,271	8,935	7,699	4,821	1,020
200,001 to 500,000	26	25	23	23	14	2	7,889	7,479	7,098	6,946	4,557	740
Over 500,000	9	9	9	9	7	1	7,278	7,254	6,887	6,488	5,452	799
Principal Building Activity												
Education	301	300	296	245	74	27	8,470	8,457	8,379	7,719	3,297	922
Food Sales	130	119	114	70	20	Q	757	695	656	510	197	Q
Food Service	260	251	245	166	92	Q	1,491	1,465	1,451	1,073	546	Q
Health Care	63	63	63	47	26	6	1,763	1,735	1,735	1,664	1,304	368
Lodging	154	152	150	120	51	12	2,891	2,868	2,825	2,585	1,340	379
Mercantile and Service	1,272	1,186	1,141	643	293	56	12,402	12,038	11,667	8,905	5,339	1,003
Office	749	727	722	534	220	41	12,319	12,239	12,185	11,004	7,042	904
Parking	24	20	16	10	5	Q	1,652	1,303	678	753	748	Q
Public Assembly	278	269	262	175	96	21	4,556	4,501	4,341	3,959	2,969	410
Public Order and Safety	60	59	59	46	19	Q	820	818	818	762	205	Q
Religious Worship	366	355	347	199	101	31	3,747	3,707	3,657	2,759	1,652	526
Warehouse	761	555	511	256	135	30	11,484	9,764	9,082	5,812	3,323	711
Other	69	58	56	34	22	Q	1,130	1,099	1,032	968	589	Q
Vacant	319	242	240	60	25	Q	4,396	3,716	3,550	1,808	901	Q
Year Constructed												
1899 or Before	169	159	155	95	65	Q	1,721	1,662	1,620	1,229	659	Q
1900 to 1919	255	235	230	137	65	20	3,608	3,325	3,269	2,662	1,368	406
1920 to 1945	724	641	615	328	173	31	8,712	7,841	7,532	5,313	2,943	604
1946 to 1959	880	782	761	445	169	41	10,421	9,752	9,484	6,726	3,384	677
1960 to 1969	783	716	697	442	180	38	12,612	12,053	11,695	9,812	5,219	1,247
1970 to 1979	982	889	850	556	235	59	14,014	13,464	12,754	10,636	6,680	1,430
1980 to 1989	884	812	797	526	243	55	14,287	13,886	13,365	11,800	7,572	1,185
1990 to 1992	128	121	117	76	48	9	2,502	2,419	2,338	2,103	1,627	275
Census Region [4]												
Northeast	771	711	693	504	241	57	13,400	12,891	12,612	10,840	6,727	1,626
Midwest	1,202	1,097	1,076	626	295	67	17,280	16,619	16,031	13,100	7,790	1,575
South	1,963	1,737	1,667	980	375	85	24,577	22,659	21,758	16,864	8,307	1,757
West	870	812	787	494	268	55	12,619	12,234	11,655	9,477	6,628	993

[1] More than one conservation feature may apply to a building.
[2] Heating, ventilation, and air conditioning.
[3] Examples of other include timers on thermostats, zoned heating, reclaimed heat, and architectural design of the building.
[4] See Appendix E for Census regions.

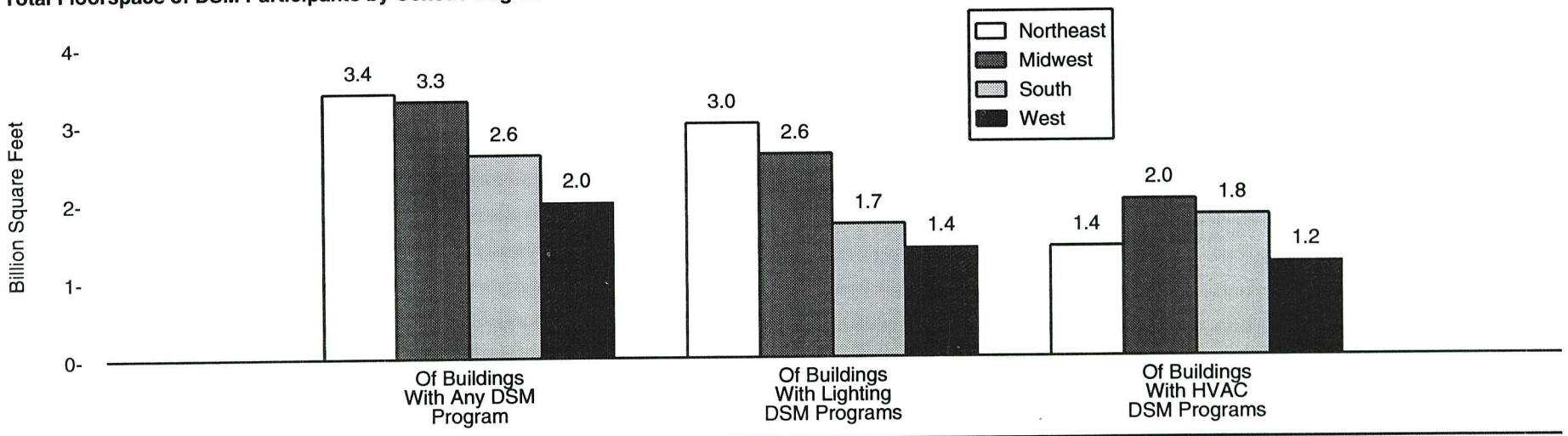
Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.

Source: Energy Information Administration, Form EIA-871A, "Commercial Buildings Energy Consumption Survey for 1992."

Figure 2.24 Commercial Buildings' Participation in Demand-Side Management Programs, 1992



Total Floorspace of DSM Participants by Census Region



Notes: • See Appendix E for Census regions. • DSM=Demand-Side Management. • HVAC=Heating, ventilation, and air conditioning. • More than one type of DSM program may apply to a building.

Source: Table 2.24.

Table 2.24 Commercial Buildings' Participation in Demand-Side Management Programs, 1992

Building Characteristic	Number of Buildings (thousands)				Total Floorspace (million square feet)			
	Total	With Any DSM [2] Program	With Lighting DSM [2] Programs	With HVAC [1] DSM [2] Programs	Of All Buildings	Of Buildings With Any DSM [2] Program	Of Buildings With Lighting DSM [2] Programs	Of Buildings With HVAC [1] DSM [2] Programs
All Buildings	4,806	315	228	154	67,876	11,310	8,805	6,370
Building Floorspace (square feet)								
1,001 to 5,000	2,681	103	75	46	7,327	321	225	152
5,001 to 10,000	975	66	47	30	7,199	485	345	222
10,001 to 25,000	647	68	46	36	10,375	1,075	704	595
25,001 to 50,000	280	30	25	14	10,069	1,105	951	541
50,001 to 100,000	116	23	16	12	8,062	1,581	1,128	843
100,001 to 200,000	71	14	9	9	9,678	1,960	1,235	1,236
200,001 to 500,000	26	9	8	5	7,889	2,548	2,247	1,490
Over 500,000	9	2	2	2	7,278	2,235	1,970	1,291
Principal Building Activity								
Education	301	54	37	32	8,470	2,560	1,933	1,434
Food Sales	130	Q	Q	Q	757	Q	Q	Q
Food Service	260	24	18	Q	1,491	159	112	Q
Health Care	63	11	10	4	1,763	911	715	663
Lodging	154	21	18	8	2,891	707	515	510
Mercantile and Service	1,272	50	40	21	12,402	1,728	1,482	690
Office	749	62	47	27	12,319	2,707	2,062	1,696
Parking	24	Q	Q	Q	1,652	Q	Q	Q
Public Assembly	278	24	14	15	4,556	700	432	461
Public Order and Safety	60	Q	Q	Q	820	Q	Q	Q
Religious Worship	366	15	Q	Q	3,747	402	Q	Q
Warehouse	761	24	17	13	11,484	648	537	320
Other	69	Q	Q	Q	1,130	221	194	Q
Vacant	319	7	Q	Q	4,396	126	Q	Q
Year Constructed								
1899 or Before	169	12	9	Q	1,721	161	144	Q
1900 to 1919	255	18	14	7	3,608	476	374	189
1920 to 1945	724	45	36	14	8,712	1,244	871	741
1946 to 1959	880	55	42	24	10,421	1,331	1,105	629
1960 to 1969	783	53	39	29	12,612	2,793	2,236	1,497
1970 to 1979	982	74	53	43	14,014	2,741	2,314	1,637
1980 to 1989	884	51	31	27	14,287	2,060	1,359	1,289
1990 to 1992	128	7	4	Q	2,502	504	402	330
Census Region [3]								
Northeast	771	99	85	30	13,400	3,436	3,014	1,386
Midwest	1,202	68	49	33	17,280	3,279	2,620	1,988
South	1,963	72	44	49	24,577	2,600	1,740	1,777
West	870	75	50	41	12,619	1,994	1,431	1,220

[1] Heating, ventilation, and air conditioning.
[2] Demand-Side Management.
[3] See Appendix E for Census regions.
Q=Data withheld because either the relative standard error was greater than 50 percent or fewer than 20 buildings were sampled.
Note: More than one type of DSM program may apply to a building.
Source: Energy Information Administration, Form EIA-871A, "Commercial Buildings Energy Consumption Survey for 1992."

3. Financial Indicators

Fossil Fuel Prices Down From Record Levels

From the 1949 level of $1.32 per million Btu, real prices[1] of fossil fuels[2] trended downward to a low of $0.90 in 1969 (3.1).[3] Thereafter, prices began to escalate, sometimes abruptly. In 1974, the composite price of fossil fuels jumped from the 1973 level of $0.96 to $1.51, surpassing the 1949 level for the first time and registering the largest year-to-year increase (56 percent) of the 1949-to-1993 period. The peak of $3.48 was reached in 1981. Thereafter, the price declined each year through 1988, plunging 36 percent in 1986 alone. Although prices recovered somewhat in 1989 and 1990, they then declined to a 20-year low of $1.33 in 1993.

Crude oil was the most expensive of the fossil fuels over the entire period, with the exception of anthracite in 1975 through 1977. At its peak in 1981, the real price of crude oil reached $6.94, more than triple the price of natural gas and more than quadruple the price of nonanthracitic coal.

Energy Expenditures Level in 1991

The energy expenditure measure is the product of energy consumption and energy prices. In 1991 (the most recent year for which price data are available), end-use energy consumption decreased 0.9 percent (1.5) and energy prices fell. Expenditures fell 0.5 percent to $467 billion (3.6).

End-use expenditures of $222 billion for petroleum products accounted for 48 percent of total energy expenditures in 1991 (3.8). The year-to-year decrease in petroleum expenditures was close to $13 billion. Sales of electricity (net of expenditures by electric utilities for most fuels used to generate electricity) totaled $148 billion. Nuclear fuel and biomass fuels used at electric utilities accounted for $4.2 billion. Expenditures for natural gas and coal were $65 billion and $28 billion, respectively.

[1]Real prices are expressed in 1987 dollars.

[2]Crude oil, natural gas, and coal.

[3]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Energy Industry Financial Performance

In 1992 (the most recent year for which data are available), the 25 major energy companies included in the Financial Reporting System (FRS)[4] accounted for 54 percent of U.S. crude oil and natural gas liquids production, 44 percent of dry natural gas production, and 25 percent of coal production (3.9). They also accounted for 70 percent of refinery capacity. The FRS companies continued to play a significant role in the U.S. economy. In 1992, their sales were equal to 20 percent of the sales of the *Fortune* 500 largest U.S. industrial corporations.[5]

A weak domestic economy and low crude oil prices led to impaired financial performance by FRS companies in 1992. The composite refiner acquisition cost of crude oil fell from $19.06 per barrel in 1991 to $18.43 per barrel in 1992, the lowest price since 1989 (5.20). The low price resulted in reduced earnings and the FRS companies' net income declined 4.1 percent to $15.1 billion.[6] Net income from petroleum and natural gas production (domestic and foreign) fell from $17.7 billion in 1991 to $14.4 billion in 1992. Net income from domestic refining and marketing fell from $0.9 billion to a negative $0.2 billion (the first negative return since 1977, when collection of complete FRS data began). The poor performance was due to the fact that although raw materials costs declined, refined product prices declined even more. In addition, capital, processing, and distribution costs also rose, in part due to requirements for the marketing and distribution of oxygenated motor gasoline.

Most of the FRS companies' $42.0 billion in new investments in 1992 was directed toward petroleum activities, particularly the development of oil and gas reserves and production both at home and abroad (3.12). For the first time in the 19 years for which FRS data have been collected,[7] more than half of the FRS companies' petroleum and natural gas exploration and development expenditures were directed abroad.

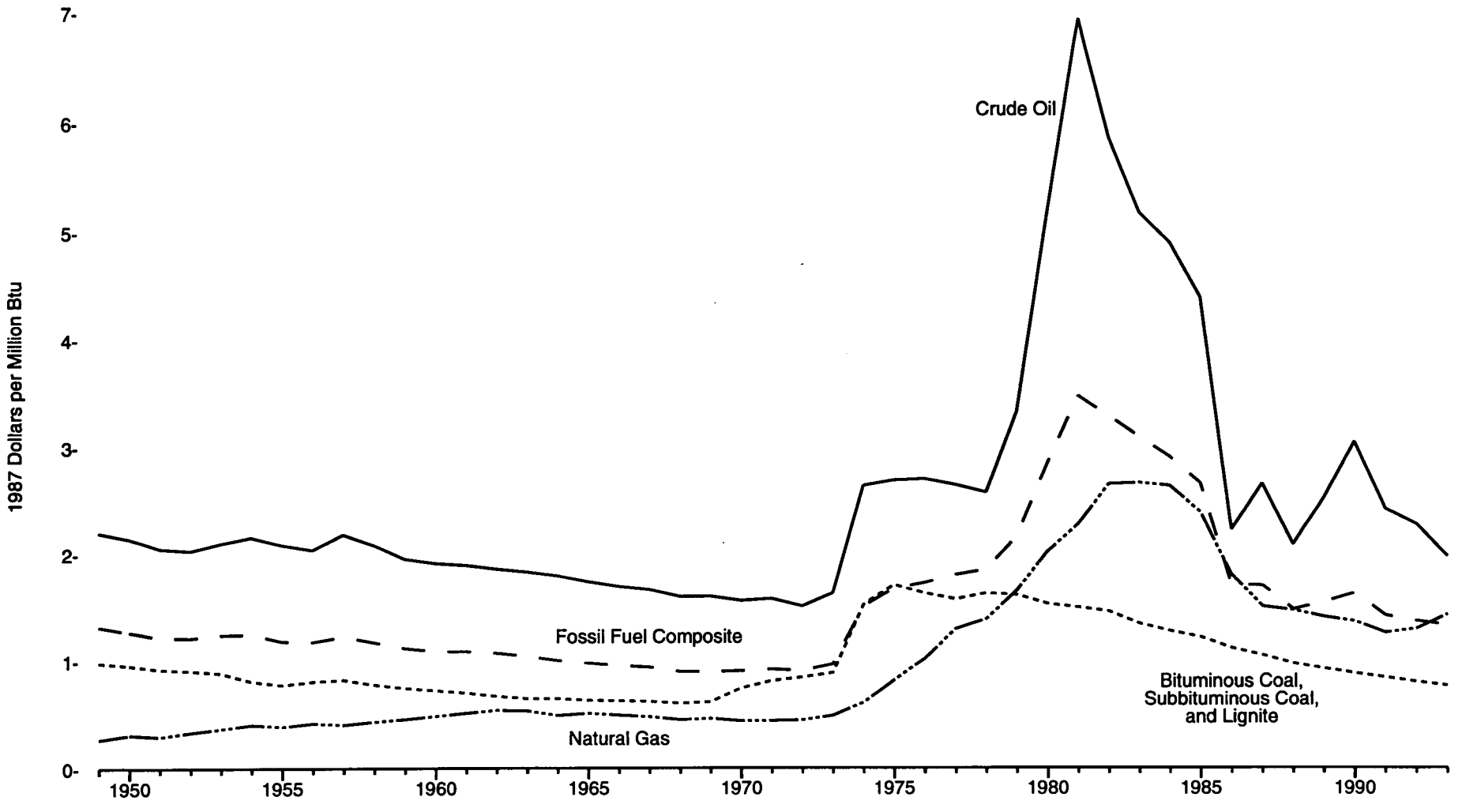
[4]The FRS collects financial data from the major energy-producing companies. See Note at end of section.

[5]Energy Information Administration, *Performance Profiles of Major Energy Producers 1992*, DOE/EIA-0206(92) (Washington DC, January 1994), p. 2.

[6]*Performance Profiles*, p. 5. Net income of $15.1 billion excludes $13.3 billion in unusual items, such as provisions for reserves for future liabilities.

[7]Collection of complete FRS data began in 1977; partial data were collected for 1974 through 1976.

Figure 3.1 Fossil Fuel Production Prices, 1949-1993



Note: Prices are in 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Source: Table 3.1.

Table 3.1 Fossil Fuel Production Prices, 1949-1993

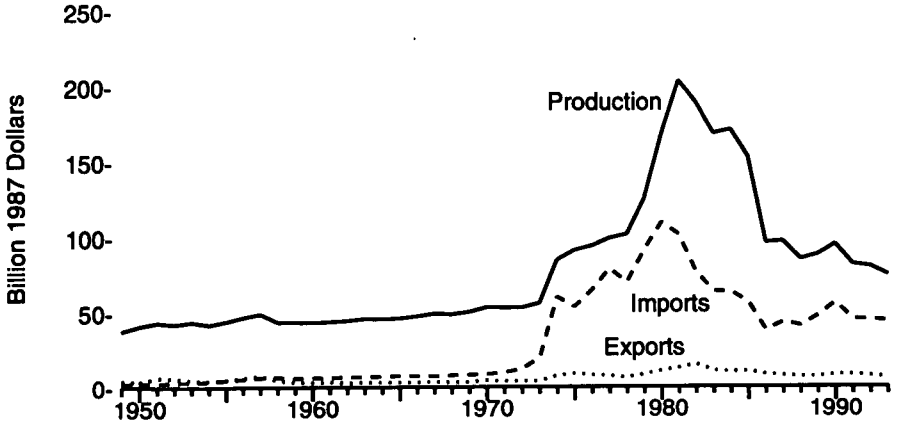
(Cents per Million Btu)

Year	Crude Oil [1]		Natural Gas [2]		Bituminous Coal, Subbituminous Coal, and Lignite [3]		Anthracite [4]		Fossil Fuel Composite [5]		
	Nominal	Real [6]	Nominal	Real [6]	Nominal	Real [6]	Nominal	Real [6]	Nominal	Real [6]	Percent Change
1949	43.8	220.1	5.4	27.1	19.5	98.0	36.4	182.9	26.2	131.7	–
1950	43.3	214.4	6.3	31.2	19.3	95.5	37.9	187.6	25.6	126.7	-3.8
1951	43.6	204.7	6.3	29.6	19.6	92.0	40.7	191.1	25.9	121.6	-4.0
1952	43.6	202.8	7.2	33.5	19.5	90.7	39.3	182.8	26.1	121.4	-0.2
1953	46.2	210.0	8.1	36.8	19.5	88.6	40.7	185.0	27.3	124.1	2.2
1954	47.9	215.8	9.0	40.5	18.0	81.1	36.1	162.6	27.7	124.8	0.6
1955	47.8	208.7	8.9	38.9	17.8	77.7	33.1	144.5	27.1	118.3	-5.2
1956	48.1	203.8	9.9	41.9	19.1	80.9	34.9	147.9	27.8	117.8	-0.4
1957	53.3	218.4	9.9	40.6	20.1	82.4	38.3	157.0	29.9	122.5	4.0
1958	51.9	208.4	10.8	43.4	19.4	77.9	38.0	152.6	29.2	117.3	-4.2
1959	50.0	195.3	11.7	45.7	19.1	74.6	35.9	140.2	28.6	111.7	-4.8
1960	49.7	191.2	12.6	48.5	18.8	72.3	33.8	130.0	28.3	108.8	-2.6
1961	49.8	189.4	13.5	51.3	18.4	70.0	34.6	131.6	28.6	108.7	-0.1
1962	50.0	185.9	14.5	53.9	18.0	66.9	33.6	124.9	28.8	107.1	-1.5
1963	49.8	183.1	14.5	53.3	17.6	64.7	36.6	134.6	28.3	104.0	-2.9
1964	49.7	179.4	13.6	49.1	17.9	64.6	38.0	137.2	27.7	100.0	-3.8
1965	49.3	173.6	14.5	51.1	17.9	63.0	36.3	127.8	27.7	97.5	-2.5
1966	49.7	169.0	14.5	49.3	18.4	62.6	34.8	118.4	28.0	95.2	-2.4
1967	50.3	166.0	14.5	47.9	18.8	62.0	36.0	118.8	28.4	93.7	-1.6
1968	50.7	159.4	14.3	45.0	19.1	60.1	39.2	123.3	28.5	89.6	-4.4
1969	53.3	159.6	15.4	46.1	20.5	61.4	44.0	131.7	29.9	89.5	-0.1
1970	54.8	155.7	15.4	43.8	26.2	74.4	48.8	138.6	31.7	90.1	0.7
1971	58.4	157.4	16.3	43.9	30.1	81.1	53.2	143.4	34.0	91.6	1.7
1972	58.4	150.5	17.3	44.6	32.7	84.3	55.3	142.5	35.0	90.2	-1.5
1973	67.1	162.5	20.1	48.7	36.5	88.4	61.7	149.4	39.8	96.4	6.9
1974	118.4	263.7	27.3	60.8	68.2	151.9	102.2	227.6	67.6	150.6	56.2
1975	132.2	268.7	40.2	81.7	83.9	170.5	149.5	303.9	82.1	166.9	10.8
1976	141.2	270.0	53.1	101.5	85.0	162.5	153.9	294.3	90.2	172.5	3.4
1977	147.8	264.4	72.3	129.3	87.7	156.9	153.8	275.1	100.8	180.3	4.5
1978	155.2	257.4	83.6	138.6	97.9	162.4	152.7	253.2	111.6	185.1	2.7
1979	217.9	332.7	108.1	165.0	105.3	160.8	177.2	270.5	141.7	216.3	16.9
1980	372.2	519.1	144.8	202.0	109.4	152.6	185.9	259.3	204.2	284.8	31.7
1981	547.8	694.3	179.5	227.5	117.9	149.4	190.1	240.9	274.5	347.9	22.2
1982	491.7	586.8	222.2	265.2	122.1	145.7	214.0	255.4	275.7	329.0	-5.4
1983	451.6	517.9	232.3	266.4	117.2	134.4	230.0	263.8	270.1	309.7	-5.9
1984	446.2	490.3	239.9	263.6	115.9	127.4	208.7	229.3	264.6	290.8	-6.1
1985	415.3	439.9	225.7	239.1	114.8	121.6	204.2	216.3	251.2	266.1	-8.5
1986	215.7	222.6	174.8	180.4	108.2	111.7	191.1	197.2	165.3	170.6	-35.9
1987	265.5	265.5	150.2	150.2	104.9	104.9	188.9	188.9	170.0	170.0	-0.4
1988	216.9	208.8	152.4	146.7	100.8	97.0	189.8	182.7	153.3	147.5	-13.2
1989	273.4	252.0	152.7	140.7	100.0	92.2	183.6	169.2	167.1	154.0	4.4
1990	345.3	R304.8	154.6	R136.5	99.5	R87.8	174.5	R154.0	184.3	R162.7	R5.6
1991	285.2	R242.3	148.0	R125.7	98.9	84.0	161.0	R136.8	167.0	R141.9	R-12.8
1992	R275.7	R227.7	R156.8	R129.5	R96.9	R80.0	R151.7	R125.3	R165.8	R136.9	R-3.5
1993P	245.5	197.7	177.5	142.9	95.0	76.5	167.5	134.9	165.1	132.9	-2.9

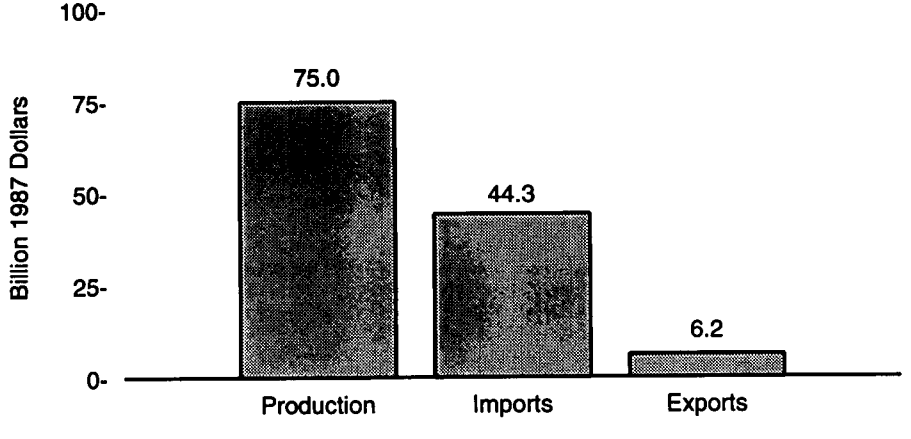
[1] Domestic first purchase prices.
[2] Wellhead prices.
[3] Price are free-on-board (f.o.b.) mines.
[4] Through 1978, prices are f.o.b. preparation plants; for 1979 forward, prices are f.o.b. mines.
[5] Derived by multiplying the price per Btu of each fossil fuel by the total Btu content of the production of each fossil fuel and dividing this accumulated value of total fossil fuel production by the accumulated Btu content of total fossil fuel production.
[6] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
R=Revised data. P=Preliminary data. — = Not applicable.
Sources: Tables 5.17, 6.8, and 7.8 and Appendices A and D.

Figure 3.2 Value of Fossil Fuel Production

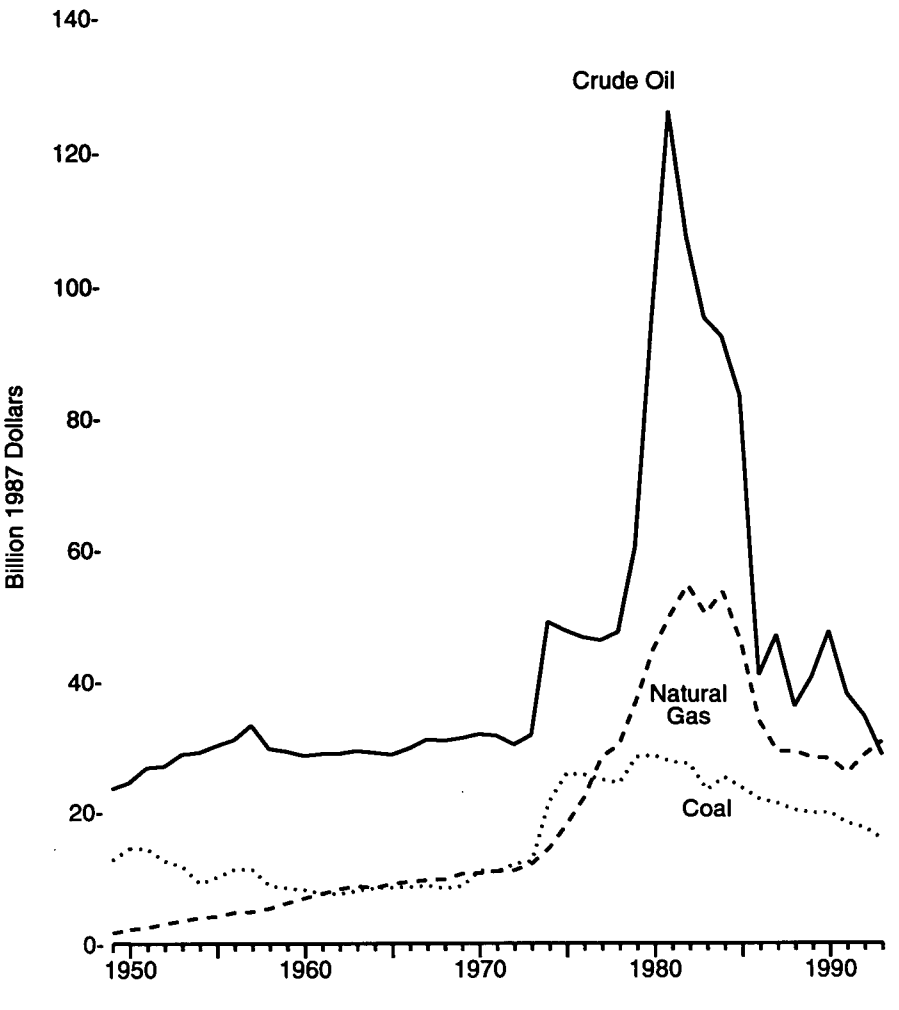
Overview, 1949-1993



Overview, 1993



Production by Fuel, 1949-1993



Notes: • Prices are in 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D. • Because vertical scales differ, graphs should not be compared.

Sources: Tables 3.2, 3.3, and 3.4.

Table 3.2 Value of Fossil Fuel Production, 1949-1993

(Billion Dollars)

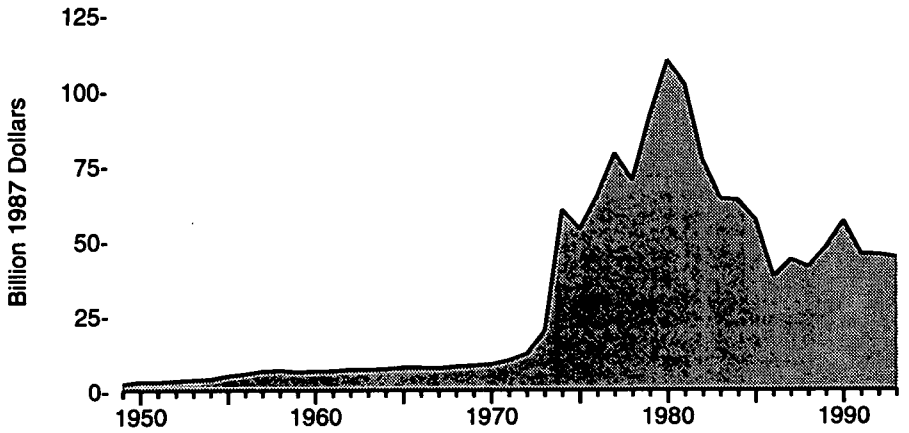
Year	Crude Oil [1]		Natural Gas (Marketed Production)		Coal						Total	
					Bituminous Coal, Subbituminous Coal, and Lignite		Anthracite		Total			
	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]
1949	4.68	23.52	0.33	1.66	2.14	10.75	0.38	1.91	2.52	12.66	7.53	37.84
1950	4.95	24.50	0.44	2.18	2.50	12.38	0.41	2.03	2.91	14.41	8.30	41.09
1951	5.69	26.71	0.52	2.44	2.63	12.35	0.42	1.97	3.05	14.32	9.26	43.47
1952	5.79	26.93	0.64	2.98	2.29	10.65	0.39	1.81	2.68	12.46	9.11	42.37
1953	6.32	28.73	0.76	3.45	2.25	10.23	0.31	1.41	2.56	11.64	9.64	43.82
1954	6.44	29.01	0.87	3.92	1.77	7.97	0.25	1.13	2.02	9.10	9.33	42.03
1955	6.88	30.04	0.94	4.10	2.09	9.13	0.21	0.92	2.30	10.05	10.12	44.19
1956	7.30	30.93	1.11	4.70	2.41	10.21	0.24	1.02	2.65	11.23	11.06	46.86
1957	8.09	33.16	1.17	4.80	2.50	10.25	0.23	0.94	2.73	11.19	11.99	49.15
1958	7.37	29.60	1.32	5.30	1.99	7.99	0.19	0.76	2.18	8.75	10.87	43.65
1959	7.47	29.18	1.57	6.13	1.97	7.70	0.18	0.70	2.15	8.40	11.19	43.71
1960	7.42	28.54	1.79	6.88	1.95	7.50	0.15	0.58	2.10	8.08	11.31	43.50
1961	7.58	28.82	1.99	7.57	1.85	7.03	0.14	0.53	1.99	7.56	11.56	43.95
1962	7.76	28.85	2.22	8.25	1.89	7.03	0.13	0.48	2.02	7.51	12.00	44.61
1963	7.96	29.26	2.36	8.68	2.01	7.39	0.16	0.59	2.17	7.98	12.49	45.92
1964	8.03	28.99	2.33	8.41	2.17	7.83	0.15	0.54	2.32	8.37	12.68	45.77
1965	8.15	28.70	2.57	9.05	2.27	7.99	0.13	0.46	2.40	8.45	13.12	46.20
1966	8.72	29.66	2.75	9.35	2.42	8.23	0.10	0.34	2.52	8.57	13.99	47.58
1967	9.39	30.99	2.91	9.60	2.55	8.42	0.10	0.33	2.65	8.75	14.95	49.34
1968	9.79	30.79	3.09	9.72	2.55	8.02	0.10	0.31	2.65	8.33	15.53	48.84
1969	10.42	31.20	3.52	10.54	2.80	8.38	0.10	0.30	2.90	8.68	16.84	50.42
1970	11.19	31.79	3.73	10.60	3.77	10.71	0.11	0.31	3.88	11.02	18.80	53.41
1971	11.71	31.56	4.05	10.92	3.90	10.51	0.11	0.30	4.01	10.81	19.77	53.29
1972	11.71	30.18	4.28	11.03	4.56	11.75	0.09	0.23	4.65	11.98	20.64	53.19
1973	13.07	31.65	4.98	12.06	5.05	12.23	0.09	0.22	5.14	12.45	23.19	56.16
1974	22.00	49.00	6.48	14.43	9.50	21.16	0.15	0.33	9.65	21.49	38.13	84.92
1975	23.45	47.66	8.85	17.99	12.47	25.35	0.20	0.41	12.67	25.76	44.97	91.41
1976	24.37	46.60	11.57	22.12	13.19	25.22	0.21	0.40	13.40	25.62	49.34	94.34
1977	25.79	46.14	15.82	28.30	13.70	24.51	0.20	0.36	13.90	24.87	55.51	99.31
1978	28.60	47.43	18.18	30.15	14.49	24.03	0.18	0.30	14.67	24.33	61.45	101.91
1979	39.45	60.23	24.16	36.89	18.36	28.03	0.20	0.31	18.56	28.34	82.17	125.46
1980	67.93	94.74	32.09	44.76	20.20	28.17	0.26	0.36	20.46	28.53	120.48	168.03
1981	99.40	125.98	39.51	50.08	21.51	27.26	0.24	0.30	21.75	27.56	160.66	203.62
1982	90.03	107.43	45.71	54.55	22.62	26.99	0.23	0.27	22.85	27.26	158.59	189.24
1983	83.05	95.24	43.73	50.15	20.11	23.06	0.21	0.24	20.32	23.30	147.10	168.69
1984	84.10	92.42	48.69	53.51	22.75	25.00	0.20	0.22	22.95	25.22	155.74	171.15
1985	78.88	83.56	43.35	45.92	22.06	23.37	0.22	0.23	22.28	23.60	144.51	153.08
1986	39.63	40.90	32.71	33.76	21.00	21.67	0.19	0.20	21.19	21.87	93.53	96.53
1987	46.93	46.93	29.11	29.11	21.05	21.05	0.16	0.16	21.21	21.21	97.25	97.25
1988	37.48	36.07	30.28	29.14	20.83	20.05	0.16	0.15	20.99	20.20	88.75	85.41
1989	44.07	40.62	30.58	28.18	21.27	19.60	0.14	0.13	21.41	19.73	96.06	88.53
1990	53.77	R47.46	31.80	R28.07	22.27	R19.66	0.14	0.12	22.41	R19.78	107.98	R95.31
1991	44.77	R38.04	R30.39	R25.82	21.29	R18.09	0.13	0.11	21.42	R18.20	R96.58	82.06
1992	R41.97	R34.66	R32.56	R26.89	R20.86	R17.23	0.12	0.10	R20.98	R17.33	R95.51	R78.88
1993P	35.54	28.62	38.08	30.66	19.39	15.61	0.14	0.11	19.53	15.72	93.15	75.00

[1] Includes lease condensate.
[2] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
R=Revised data. P=Preliminary data.

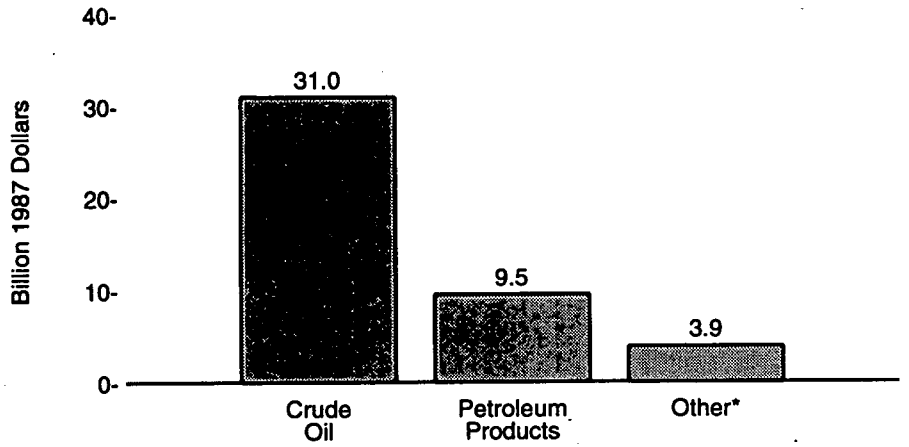
Note: Value is based on fuel prices taken as closely as possible to the point of production.
Sources: Tables 5.1, 5.17, 6.2, 6.8, 7.2, and 7.8 and Appendix D.

Figure 3.3 Value of Fossil Fuel Imports

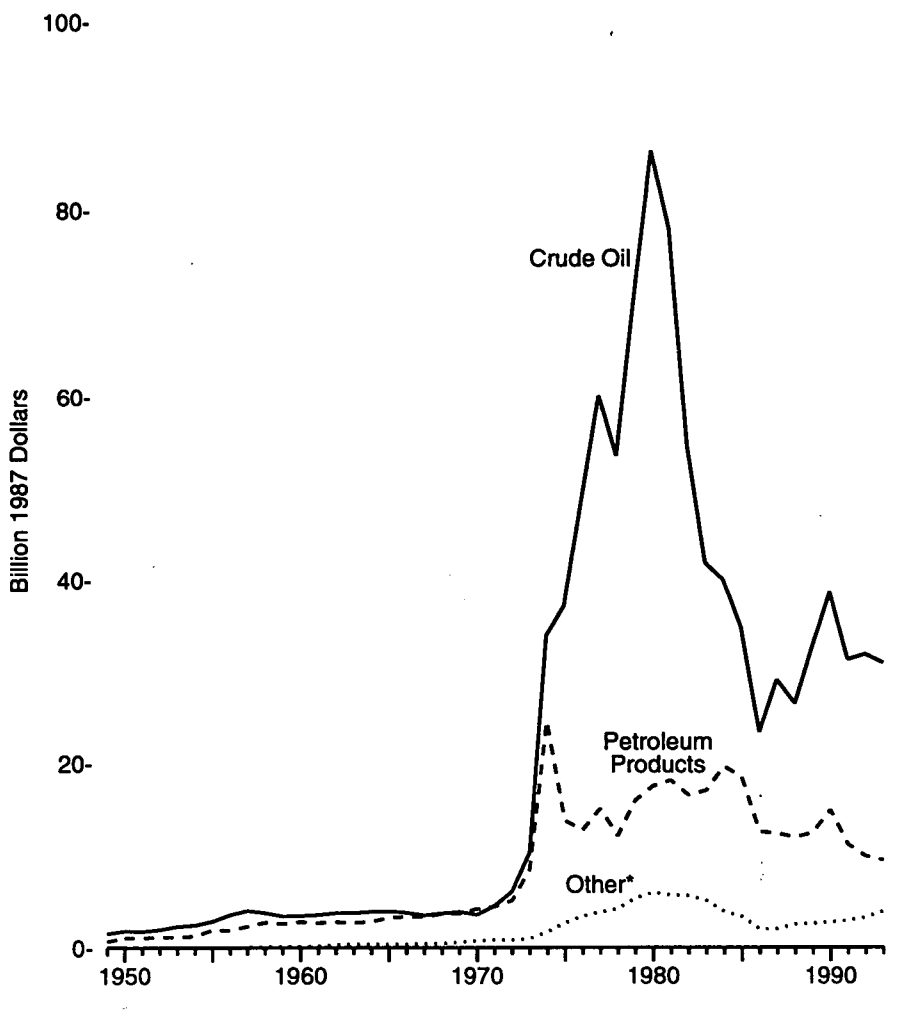
Total, 1949-1993



By Fuel, 1993



By Fuel, 1949-1993



*"Other" is coal, coal coke, and natural gas.

Notes: • Prices are in 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D. • Because vertical scales differ, graphs should not be compared.

Source: Table 3.3.

Table 3.3 Value of Fossil Fuel Imports, 1949-1993

(Billion Dollars)

Year	Coal		Coal Coke		Natural Gas		Crude Oil [1]		Petroleum Products		Total	
	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]
1949	(3)	0.01	(3)	0.02	0.00	0.00	0.30	1.53	0.14	0.69	0.45	2.25
1950	(3)	0.01	0.01	0.03	0.00	0.00	0.37	1.83	0.21	1.06	0.59	2.93
1951	(3)	0.01	(3)	0.01	0.00	0.00	0.37	1.76	0.23	1.06	0.61	2.84
1952	(3)	0.01	(3)	0.02	(3)	(3)	0.42	1.97	0.25	1.17	0.68	3.18
1953	(3)	0.01	(3)	0.01	(3)	0.01	0.51	2.32	0.25	1.14	0.77	3.48
1954	(3)	0.01	(3)	0.01	(3)	(3)	0.54	2.45	0.28	1.28	0.83	3.75
1955	(3)	0.01	(3)	0.01	(3)	0.01	0.65	2.86	0.44	1.93	1.10	4.81
1956	(3)	0.01	(3)	0.01	(3)	(3)	0.84	3.55	0.45	1.90	1.29	5.47
1957	(3)	0.01	(3)	0.01	(3)	0.01	0.98	4.02	0.57	2.33	1.56	6.38
1958	(3)	0.01	(3)	0.01	0.02	0.09	0.94	3.77	0.68	2.75	1.65	6.63
1959	(3)	0.01	(3)	0.01	0.03	0.10	0.87	3.41	0.66	2.59	1.57	6.12
1960	(3)	0.01	(3)	0.01	0.03	0.11	0.90	3.44	0.73	2.81	1.66	6.38
1961	(3)	0.01	(3)	0.01	0.04	0.17	0.93	3.55	0.71	2.70	1.69	6.43
1962	(3)	0.01	(3)	0.01	0.09	0.32	1.01	3.76	0.75	2.80	1.86	6.90
1963	(3)	0.01	(3)	0.01	0.10	0.36	1.03	3.77	0.74	2.71	1.87	6.86
1964	(3)	0.01	(3)	0.01	0.10	0.36	1.08	3.90	0.78	2.83	1.97	7.10
1965	(3)	0.01	(3)	(3)	0.11	0.37	1.12	3.94	0.92	3.25	2.15	7.58
1966	(3)	0.01	(3)	0.01	0.11	0.36	1.12	3.79	0.99	3.36	2.21	7.52
1967	(3)	0.01	(3)	0.01	0.13	0.43	1.06	3.51	1.02	3.35	2.21	7.30
1968	(3)	0.01	(3)	0.01	0.15	0.46	1.18	3.72	1.16	3.66	2.50	7.86
1969	(3)	(3)	(3)	0.01	0.20	0.58	1.30	3.89	1.24	3.71	2.74	8.19
1970	(3)	(3)	(3)	0.01	0.26	0.73	1.26	3.58	1.48	4.21	3.00	8.53
1971	(3)	(3)	0.01	0.01	0.31	0.84	1.69	4.55	1.66	4.46	3.66	9.87
1972	(3)	(3)	(3)	0.01	0.31	0.81	2.37	6.11	1.99	5.13	4.68	12.06
1973	(3)	(3)	0.04	0.10	0.36	0.88	4.24	10.27	3.50	8.47	8.14	19.71
1974	0.06	0.13	0.19	0.43	0.53	1.18	15.25	33.97	11.01	24.53	27.05	60.24
1975	0.02	0.04	0.16	0.32	1.15	2.34	18.29	37.18	6.77	13.76	26.39	53.63
1976	0.02	0.03	0.11	0.21	1.66	3.17	25.46	48.67	6.65	12.72	33.90	64.81
1977	0.04	0.07	0.13	0.23	2.00	3.58	33.59	60.09	8.42	15.06	44.18	79.03
1978	0.07	0.12	0.41	0.68	2.06	3.42	32.30	53.56	7.30	12.11	42.15	69.89
1979	0.05	0.08	0.34	0.52	3.13	4.77	46.06	70.32	10.45	15.95	60.03	91.64
1980	0.03	0.04	0.05	0.07	4.21	5.88	61.90	86.33	12.54	17.49	78.74	109.81
1981	0.03	0.04	0.04	0.05	4.41	5.59	61.46	77.89	14.30	18.12	80.24	101.70
1982	0.02	0.03	0.01	0.01	4.69	5.60	45.72	54.56	13.86	16.54	64.31	76.74
1983	0.04	0.05	(3)	(3)	4.39	5.03	36.49	41.85	14.84	17.02	55.77	63.95
1984	0.05	0.05	0.05	0.05	3.44	3.78	36.44	40.05	17.87	19.63	57.84	63.56
1985	0.07	0.07	0.04	0.05	3.05	3.23	32.90	34.85	17.47	18.50	53.53	56.71
1986	0.08	0.08	0.03	0.03	1.82	1.88	22.61	23.33	12.18	12.57	36.72	37.89
1987	0.06	0.06	0.05	0.05	1.93	1.93	29.13	29.13	12.37	12.37	43.54	43.54
1988	0.06	0.06	0.19	0.19	2.38	2.29	27.55	26.51	12.43	11.97	42.62	41.02
1989	0.10	0.09	0.22	0.20	2.51	2.31	35.53	32.75	13.50	12.44	51.85	47.79
1990	0.09	0.08	0.07	0.06	2.97	R2.62	43.78	R38.65	16.90	R14.92	63.83	R56.33
1991	0.11	0.10	0.09	0.08	3.24	2.75	36.90	R31.35	13.17	R11.19	53.51	R45.47
1992	0.13	0.11	0.14	0.12	R3.96	R3.27	R38.55	R31.84	R11.98	R9.90	R54.77	R45.22
1993P	0.22	0.18	0.12	0.09	4.48	3.61	38.44	30.95	11.75	9.46	55.00	44.28

[1] Includes imports into the Strategic Petroleum Reserve, which began in 1977.

[2] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

[3] Less than $5 million.

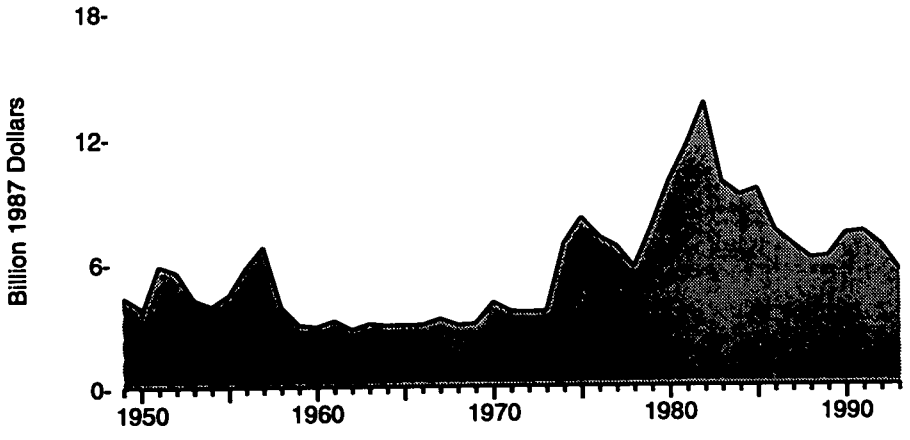
R=Revised data. P=Preliminary data.

Notes: • Includes value of imports into Puerto Rico from foreign countries; excludes receipts into the 50 States and the District of Columbia from the Virgin Islands and Puerto Rico. • Totals may not equal sum of components due to independent rounding.

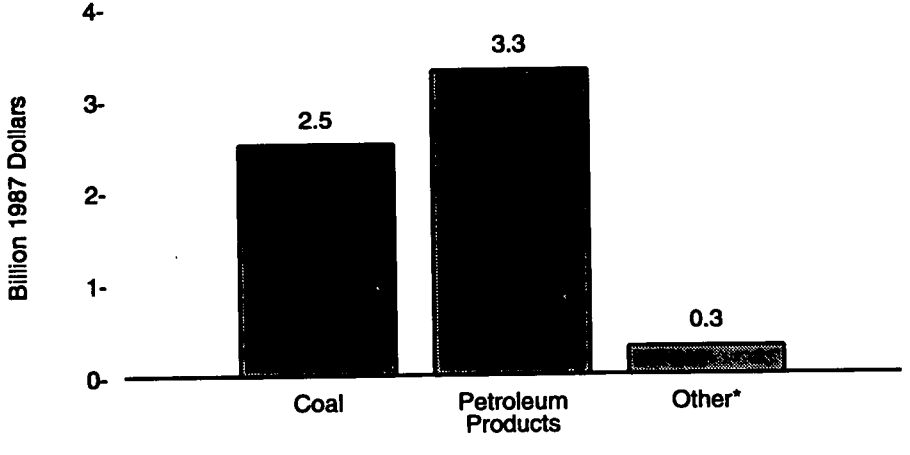
Sources: **Natural Gas:** • 1949-1962—Bureau of the Census, *U.S. Imports of Merchandise for Consumption*, FT110. • 1963—Bureau of the Census, *U.S. Imports of Merchandise for Consumption*, FT125. • 1964-1971—Bureau of the Census, *U.S. Imports for Consumption and General Imports*, FT246. • 1972 and 1973—Federal Power Commission, *Pipeline Imports and Exports of Natural Gas - Imports and Exports of LNG*. • 1974-1977—Federal Power Commission, *United States Imports and Exports of Natural Gas*, annual. • 1978-1981—Energy Information Administration (EIA), *U.S. Imports and Exports of Natural Gas*, annual. • 1982-1992—EIA, *Natural Gas Monthly*. • 1993—EIA estimates. **All Other Data:** • 1949-1962—Bureau of the Census, *U.S. Imports of Merchandise for Consumption*, FT110. • 1963—Bureau of the Census, *U.S. Imports of Merchandise for Consumption*, FT125. • 1964-1988—Bureau of the Census, *U.S. Imports for Consumption*, FT135. • 1989 forward—Bureau of the Census, *Advanced Report on U.S. Merchandise Trade*, FT900 Adv. (93-12).

Figure 3.4 Value of Fossil Fuel Exports

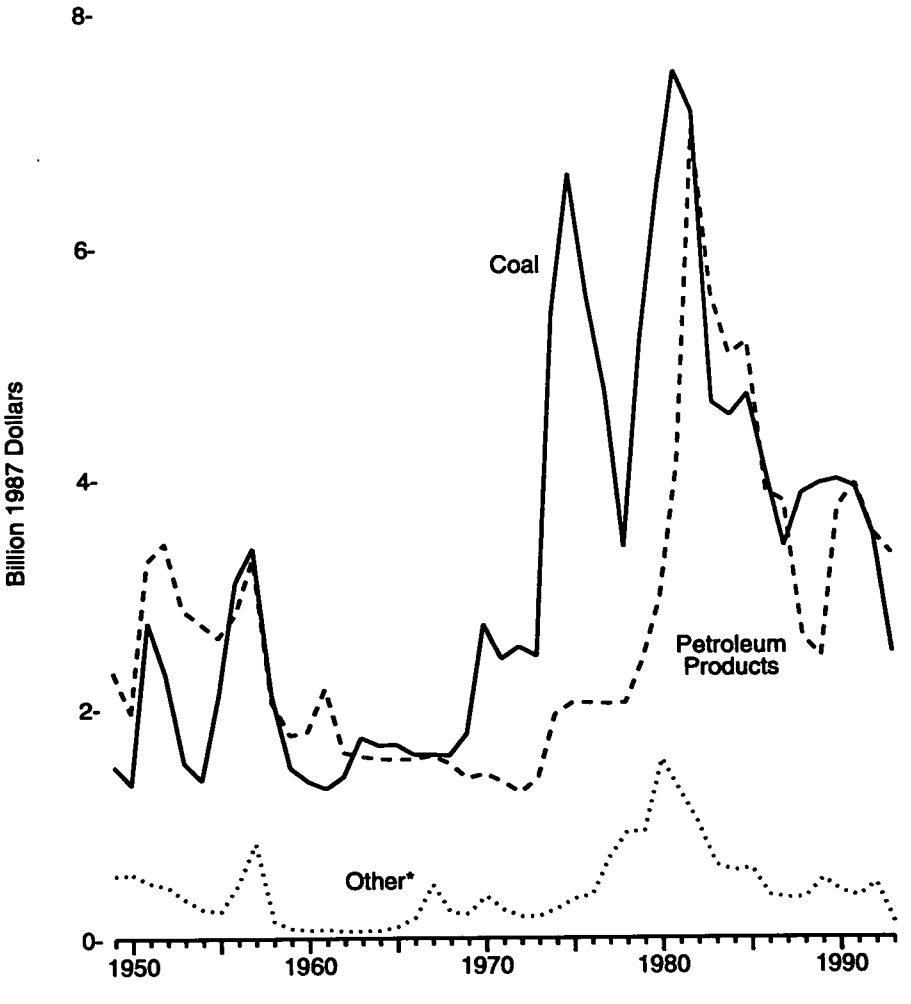
Total, 1949-1993



By Fuel, 1993



By Fuel, 1949-1993



*"Other" is coal coke, natural gas, and crude oil.
Notes: • Prices are in 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D. • Because vertical scales differ, graphs should not be compared.
Source: Table 3.4.

Table 3.4 Value of Fossil Fuel Exports, 1949-1993

(Billion Dollars)

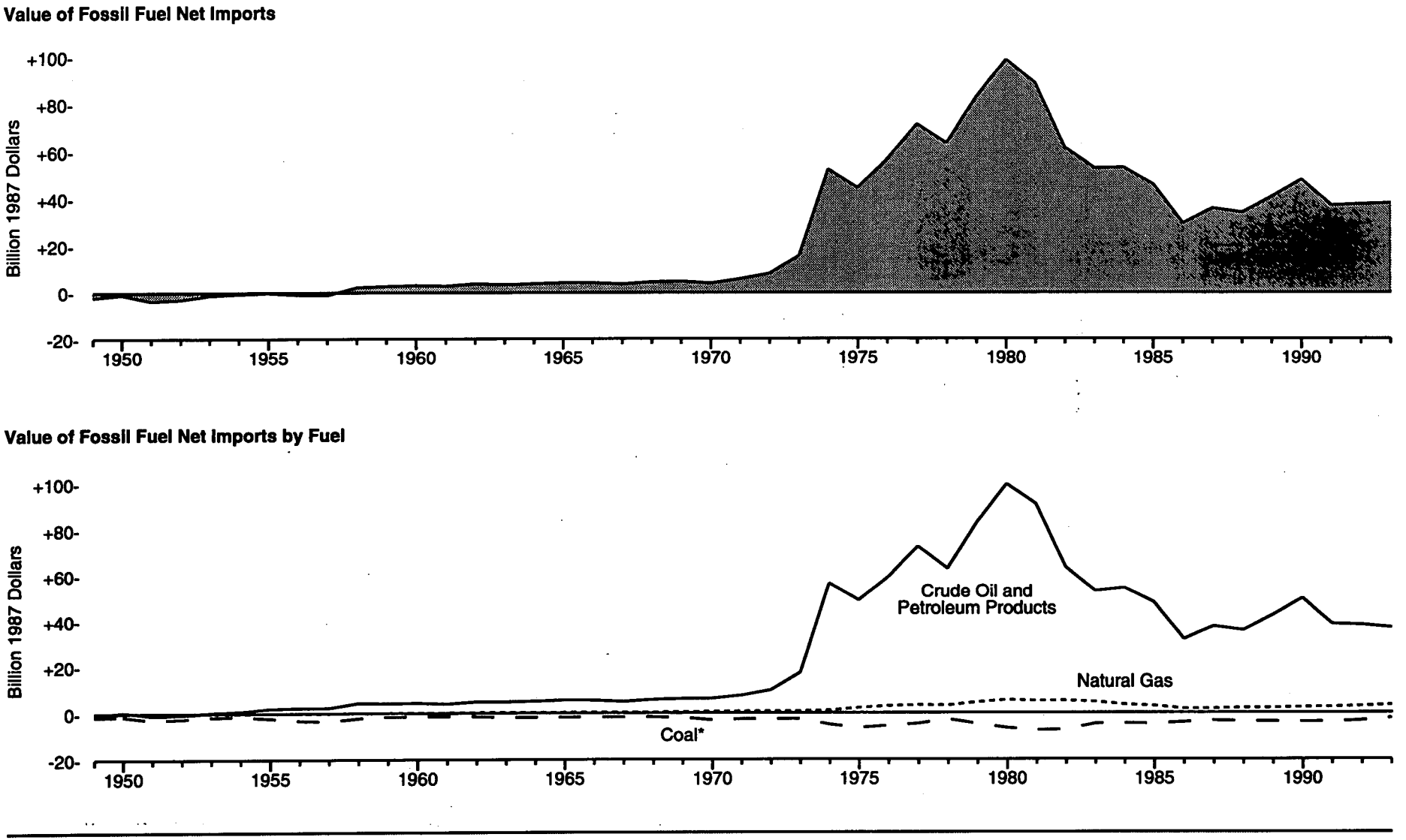
Year	Coal		Coal Coke		Natural Gas		Crude Oil		Petroleum Products		Total	
	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]
1949	0.30	1.49	0.01	0.04	([2])	0.01	0.10	0.49	0.46	2.32	0.87	4.36
1950	0.27	1.33	0.01	0.03	([2])	0.02	0.10	0.51	0.39	1.95	0.78	3.84
1951	0.59	2.75	0.02	0.08	([2])	0.02	0.08	0.38	0.70	3.28	1.39	6.52
1952	0.49	2.30	0.01	0.06	([2])	0.02	0.08	0.36	0.74	3.44	1.33	6.18
1953	0.34	1.52	0.01	0.04	([2])	0.02	0.06	0.27	0.63	2.86	1.04	4.72
1954	0.30	1.37	0.01	0.03	([2])	0.02	0.05	0.20	0.61	2.74	0.97	4.36
1955	0.48	2.12	0.01	0.04	0.01	0.03	0.04	0.17	0.60	2.62	1.14	4.97
1956	0.73	3.10	0.01	0.05	0.01	0.04	0.09	0.38	0.67	2.82	1.51	6.40
1957	0.83	3.40	0.01	0.06	0.01	0.05	0.17	0.71	0.81	3.31	1.84	7.53
1958	0.53	2.11	0.01	0.03	0.01	0.06	0.01	0.06	0.51	2.05	1.07	4.31
1959	0.38	1.48	0.01	0.03	0.01	0.02	0.01	0.03	0.45	1.76	0.85	3.33
1960	0.35	1.36	0.01	0.03	([2])	0.01	0.01	0.03	0.47	1.80	0.84	3.23
1961	0.34	1.30	0.01	0.03	([2])	0.01	0.01	0.03	0.57	2.18	0.93	3.55
1962	0.38	1.40	0.01	0.03	([2])	0.01	0.01	0.02	0.43	1.61	0.83	3.07
1963	0.47	1.74	0.01	0.03	([2])	0.02	([2])	0.02	0.43	1.58	0.92	3.38
1964	0.46	1.67	0.01	0.04	([2])	0.02	([2])	0.01	0.43	1.55	0.91	3.29
1965	0.48	1.68	0.02	0.06	0.01	0.03	([2])	0.02	0.44	1.55	0.95	3.33
1966	0.47	1.59	0.02	0.08	0.02	0.06	0.01	0.03	0.46	1.55	0.97	3.32
1967	0.48	1.59	0.02	0.05	0.03	0.11	0.09	0.30	0.48	1.58	1.10	3.64
1968	0.50	1.58	0.02	0.06	0.04	0.12	0.01	0.04	0.48	1.51	1.05	3.31
1969	0.59	1.78	0.04	0.12	0.03	0.08	0.01	0.02	0.46	1.38	1.13	3.37
1970	0.96	2.73	0.08	0.22	0.03	0.09	0.02	0.05	0.50	1.42	1.59	4.52
1971	0.90	2.43	0.04	0.12	0.04	0.10	0.01	0.02	0.50	1.35	1.49	4.02
1972	0.98	2.54	0.03	0.08	0.04	0.10	([2])	([2])	0.49	1.26	1.55	3.98
1973	1.01	2.45	0.03	0.08	0.04	0.10	([2])	0.01	0.57	1.39	1.66	4.03
1974	2.44	5.43	0.04	0.10	0.05	0.12	0.01	0.03	0.87	1.94	3.42	7.62
1975	3.26	6.62	0.07	0.15	0.09	0.18	([2])	([2])	1.01	2.05	4.43	9.01
1976	2.91	5.56	0.07	0.13	0.10	0.19	0.03	0.05	1.07	2.05	4.17	7.98
1977	2.66	4.75	0.07	0.13	0.11	0.19	0.21	0.37	1.14	2.04	4.18	7.48
1978	2.05	3.40	0.05	0.08	0.11	0.19	0.39	0.65	1.23	2.04	3.83	6.36
1979	3.40	5.19	0.08	0.12	0.13	0.19	0.39	0.60	1.58	2.42	5.58	8.53
1980	4.63	6.45	0.13	0.18	0.23	0.32	0.75	1.05	2.12	2.96	7.86	10.96
1981	5.92	7.50	0.07	0.09	0.35	0.44	0.58	0.73	3.24	4.10	10.16	12.87
1982	5.99	7.15	0.06	0.07	0.30	0.36	0.47	0.56	5.86	6.99	12.68	15.14
1983	4.06	4.65	0.05	0.05	0.28	0.32	0.22	0.26	4.88	5.59	9.48	10.87
1984	4.13	4.54	0.07	0.08	0.27	0.30	0.19	0.20	4.62	5.07	9.27	10.19
1985	4.47	4.73	0.08	0.08	0.26	0.28	0.23	0.24	4.90	5.19	9.93	10.52
1986	3.93	4.06	0.07	0.07	0.17	0.18	0.12	0.12	3.77	3.89	8.05	8.31
1987	3.40	3.40	0.05	0.05	0.17	0.17	0.13	0.13	3.80	3.80	7.54	7.54
1988	4.01	3.86	0.08	0.07	0.20	0.19	0.08	0.07	2.72	2.62	7.09	6.83
1989	4.29	3.95	0.08	0.07	0.27	0.25	0.21	0.19	2.65	2.45	7.49	6.91
1990	4.51	3.98	0.05	0.04	0.27	0.23	0.14	0.12	4.23	3.74	9.20	8.12
1991	4.62	3.92	0.05	0.04	0.33	0.28	0.03	0.03	4.65	3.95	9.69	8.23
1992	4.24	R3.50	0.04	0.04	R0.49	R0.40	0.03	R0.03	R4.27	R3.52	R9.07	R7.49
1993P	3.09	2.48	0.06	0.05	0.32	0.26	0.02	0.02	4.15	3.34	7.64	6.15

[1] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
[2] Less than $5 million.
R=Revised data. P=Preliminary data.

Notes: • Includes value of exports from Puerto Rico to foreign countries; excludes shipments from the 50 States and the District of Columbia to the Virgin Islands and Puerto Rico. • Totals may not equal sum of components due to independent rounding.

Sources: **Natural Gas:** • 1949-1971—Bureau of the Census, *U.S. Exports*, FT410. • 1972 and 1973—Federal Power Commission, *Pipeline Imports and Exports of Natural Gas - Imports and Exports of LNG*. • 1974-1977—Federal Power Commission, *United States Imports and Exports of Natural Gas*, annual. • 1978-1981—Energy Information Administration (EIA), *U.S. Imports and Exports of Natural Gas*, annual. • 1982-1992—EIA, *Natural Gas Monthly*. • 1993—EIA estimates. **All Other Data:** • 1949-1988—Bureau of the Census, *U.S. Exports*, FT410. • 1989 forward—Bureau of the Census, *Advanced Report on U.S. Merchandise Trade*, FT900 Adv. (93-12).

Figure 3.5 Value of Fossil Fuel Net Imports, 1949-1993



*Includes small amounts of coal coke.
Notes: • Negative net imports are net exports. • Prices are in 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
Source: Table 3.5.

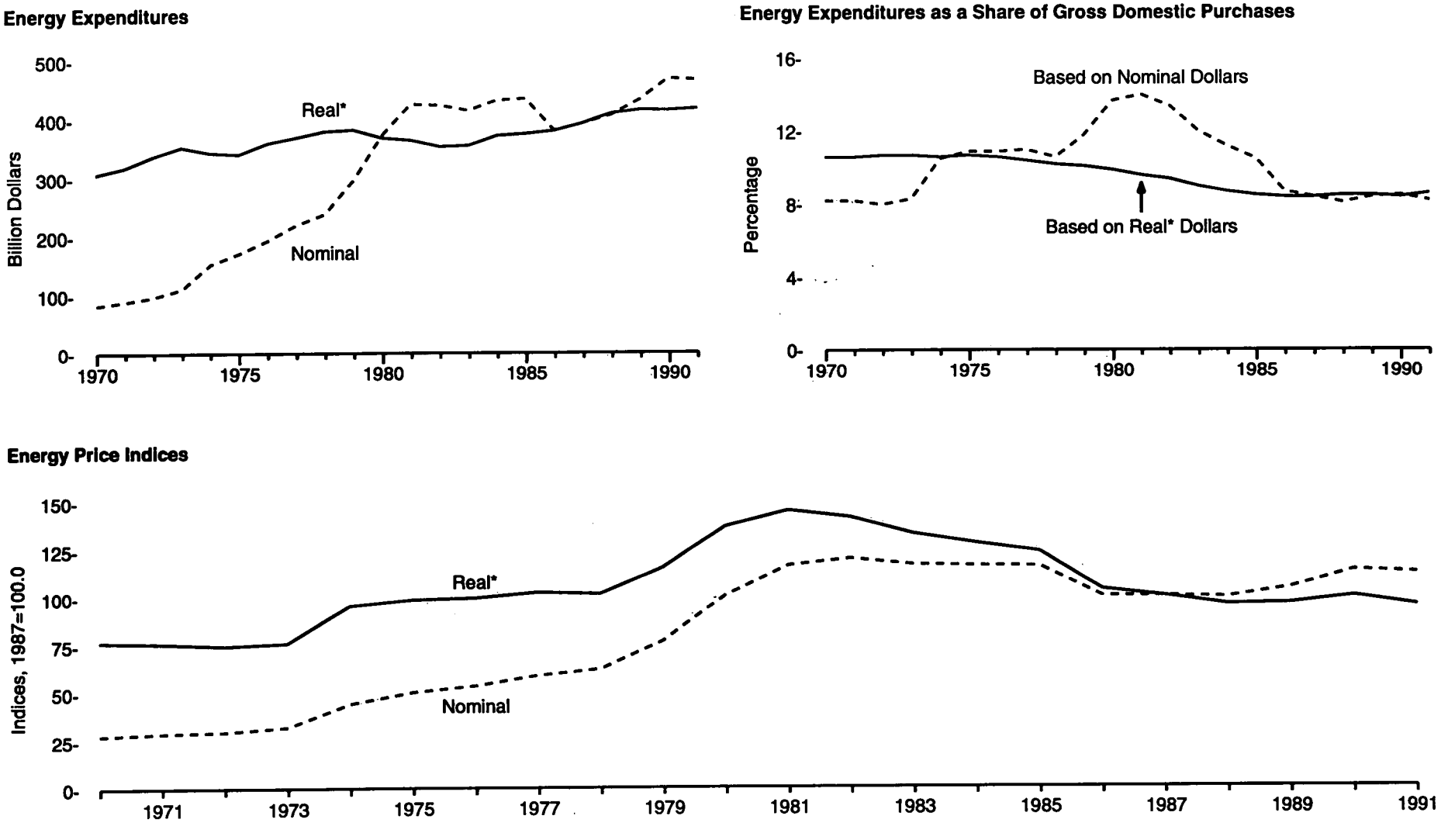
Table 3.5 Value of Fossil Fuel Net Imports, 1949-1993

(Billion Dollars)

Year	Coal		Coal Coke		Natural Gas		Crude Oil		Petroleum Products		Total	
	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]
1949	-0.29	-1.48	(2)	-0.02	(2)	-0.01	0.21	1.04	-0.32	-1.63	-0.42	-2.11
1950	-0.27	-1.32	(2)	(2)	(2)	-0.02	0.27	1.32	-0.18	-0.89	-0.18	-0.91
1951	-0.58	-2.74	-0.02	-0.07	(2)	-0.02	0.29	1.38	-0.47	-2.22	-0.78	-3.67
1952	-0.49	-2.29	-0.01	-0.04	(2)	-0.02	0.34	1.60	-0.49	-2.27	-0.65	-3.01
1953	-0.33	-1.51	-0.01	-0.03	(2)	-0.01	0.45	2.04	-0.38	-1.72	-0.27	-1.23
1954	-0.30	-1.36	(2)	-0.02	(2)	-0.01	0.50	2.25	-0.32	-1.46	-0.14	-0.61
1955	-0.48	-2.10	-0.01	-0.03	-0.01	-0.02	0.62	2.69	-0.16	-0.69	-0.04	-0.16
1956	-0.73	-3.09	-0.01	-0.04	-0.01	-0.03	0.75	3.17	-0.22	-0.93	-0.22	-0.93
1957	-0.83	-3.38	-0.01	-0.05	-0.01	-0.04	0.81	3.31	-0.24	-0.99	-0.28	-1.15
1958	-0.52	-2.10	-0.01	-0.02	0.01	0.03	0.92	3.71	0.17	0.70	0.58	2.32
1959	-0.38	-1.47	-0.01	-0.03	0.02	0.08	0.87	3.38	0.21	0.83	0.71	2.79
1960	-0.35	-1.35	-0.01	-0.02	0.02	0.10	0.89	3.41	0.26	1.02	0.82	3.15
1961	-0.34	-1.29	-0.01	-0.03	0.04	0.16	0.92	3.52	0.14	0.52	0.76	2.88
1962	-0.38	-1.39	-0.01	-0.02	0.08	0.31	1.01	3.74	0.32	1.19	1.03	3.82
1963	-0.47	-1.73	-0.01	-0.02	0.09	0.34	1.02	3.75	0.31	1.14	0.95	3.48
1964	-0.46	-1.66	-0.01	-0.03	0.10	0.34	1.08	3.89	0.35	1.27	1.06	3.81
1965	-0.48	-1.67	-0.01	-0.05	0.10	0.35	1.11	3.93	0.48	1.70	1.21	4.25
1966	-0.47	-1.59	-0.02	-0.07	0.09	0.30	1.11	3.76	0.53	1.81	1.24	4.21
1967	-0.48	-1.59	-0.01	-0.05	0.10	0.32	0.97	3.21	0.54	1.77	1.11	3.67
1968	-0.50	-1.57	-0.02	-0.05	0.11	0.34	1.17	3.69	0.68	2.15	1.45	4.55
1969	-0.59	-1.77	-0.04	-0.11	0.17	0.51	1.29	3.87	0.78	2.33	1.61	4.82
1970	-0.96	-2.73	-0.08	-0.21	0.23	0.65	1.24	3.53	0.98	2.79	1.41	4.02
1971	-0.90	-2.43	-0.04	-0.11	0.27	0.74	1.68	4.53	1.15	3.11	2.17	5.85
1972	-0.98	-2.53	-0.03	-0.07	0.28	0.71	2.37	6.10	1.50	3.87	3.13	8.08
1973	-1.01	-2.45	0.01	0.01	0.32	0.78	4.24	10.26	2.93	7.08	6.48	15.68
1974	-2.38	-5.30	0.15	0.33	0.48	1.06	15.24	33.94	10.14	22.58	23.63	52.62
1975	-3.24	-6.58	0.08	0.17	1.06	2.15	18.29	37.18	5.76	11.71	21.96	44.63
1976	-2.89	-5.53	0.04	0.08	1.56	2.98	25.43	48.62	5.58	10.67	29.72	56.83
1977	-2.62	-4.68	0.06	0.11	1.89	3.39	33.38	59.72	7.28	13.02	40.00	71.55
1978	-1.98	-3.28	0.36	0.60	1.95	3.23	31.91	52.92	6.07	10.07	38.31	63.54
1979	-3.35	-5.11	0.26	0.40	3.00	4.58	45.66	69.72	8.87	13.54	54.44	83.12
1980	-4.60	-6.41	-0.08	-0.11	3.98	5.56	61.15	85.28	10.42	14.53	70.88	98.85
1981	-5.89	-7.46	-0.03	-0.04	4.06	5.15	60.88	77.16	11.06	14.02	70.09	88.83
1982	-5.97	-7.12	-0.05	-0.06	4.39	5.24	45.25	54.00	8.00	9.55	51.63	61.61
1983	-4.01	-4.60	-0.04	-0.05	4.11	4.71	36.27	41.59	9.96	11.43	46.28	53.08
1984	-4.09	-4.49	-0.02	-0.02	3.17	3.48	36.26	39.85	13.25	14.56	48.57	53.37
1985	-4.39	-4.66	-0.03	-0.04	2.79	2.95	32.68	34.62	12.57	13.32	43.60	46.19
1986	-3.85	-3.97	-0.04	-0.04	1.65	1.70	22.49	23.21	8.42	8.68	28.67	29.58
1987	-3.35	-3.35	0.01	0.01	1.76	1.76	29.00	29.00	8.57	8.57	36.00	36.00
1988	-3.95	-3.80	0.12	0.11	2.18	2.10	27.47	26.44	9.71	9.35	35.53	34.19
1989	-4.19	-3.86	0.14	0.13	2.24	2.06	35.32	32.56	10.85	10.00	44.35	40.88
1990	-4.42	-3.90	0.02	0.02	2.71	2.39	43.65	R38.52	12.67	R11.18	54.63	R48.22
1991	-4.51	-3.83	0.04	0.04	2.90	2.46	36.87	R31.32	8.52	R7.24	43.82	R37.23
1992	-4.11	R-3.39	0.10	0.08	R3.47	R2.87	38.52	R31.81	R7.72	R6.37	R45.70	R37.73
1993P	-2.87	-2.31	0.06	0.05	4.16	3.35	38.42	30.93	7.60	6.12	47.36	38.13

[1] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
[2] Less than $5 million.
R=Revised data. P=Preliminary data.
Notes: • Net imports = imports minus exports. • Totals may not equal sum of components due to independent rounding. Data on this table may not equal data on Table 3.3 minus data on Table 3.4 due to independent rounding.
Sources: Tables 3.3 and 3.4.

Figure 3.6 Energy Expenditures and Price Indices, 1970-1991



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Source: Table 3.6.

Table 3.6 Energy Expenditures and Price Indices, 1970-1991

Year	Energy Expenditures [1]		Gross Domestic Purchases [2]		Energy Expenditures as a Share of Gross Domestic Purchases [3]		Energy Expenditure Price Index [4]	
	Billion Dollars	Billion 1987 Dollars	Billion Dollars	Billion 1987 Dollars	Percentage Based on Billion Dollars	Percentage Based on Billion 1987 Dollars	Nominal (1987 = 100.0)	Real (1987 = 100.0)
1970	82.6	R307.5	1,009.5	2,909.1	8.2	10.6	R27.8	R76.7
1971	89.8	R318.5	1,100.2	3,001.8	8.2	10.6	R29.0	76.0
1972	97.8	R337.7	1,215.0	3,163.6	8.0	10.7	29.7	R74.7
1973	111.6	R353.5	1,349.0	3,302.7	8.3	10.7	32.1	R76.1
1974	153.1	R344.0	1,461.8	3,252.2	10.5	10.6	44.4	R95.7
1975	171.8	R341.3	1,572.3	3,198.6	10.9	10.7	R50.2	98.9
1976	193.7	R360.4	1,770.7	3,387.1	10.9	10.6	53.5	99.8
1977	220.2	R370.3	1,997.8	3,561.1	11.0	10.4	R59.0	R102.7
1978	238.9	R380.5	2,258.8	3,733.3	10.6	10.2	R62.4	101.9
1979	297.0	R382.9	2,512.5	3,807.4	11.8	10.1	76.9	R115.5
1980	373.9	R369.4	2,722.8	3,745.7	13.7	9.9	R100.7	R136.8
1981	426.4	R365.4	3,045.3	3,821.2	14.0	9.6	R116.3	R145.0
1982	424.8	R354.4	3,170.2	3,767.7	13.4	9.4	R119.8	R141.3
1983	R415.8	R356.2	3,456.5	3,962.8	12.0	9.0	R116.6	R132.8
1984	433.5	R373.1	3,879.9	4,270.5	11.2	8.7	R116.0	R127.7
1985	435.4	R376.1	4,154.3	4,425.1	10.5	8.5	R115.8	R123.3
1986	381.3	R381.2	4,401.2	4,559.6	8.7	8.4	R100.1	103.6
1987	R393.5	R393.5	4,683.0	4,683.0	8.4	8.4	100.0	100.0
1988	407.6	R410.6	5,008.4	4,822.6	8.1	8.5	R99.3	95.5
1989	R434.3	R416.6	5,330.5	4,911.7	R8.1	8.5	R104.3	R96.1
1990	R469.5	R415.8	5,591.1	4,929.3	R8.4	8.4	R113.4	R99.8
1991	467.1	418.6	5,699.3	4,842.8	8.2	8.6	112.1	95.1

[1] Based on end-user prices and net energy consumption estimates.

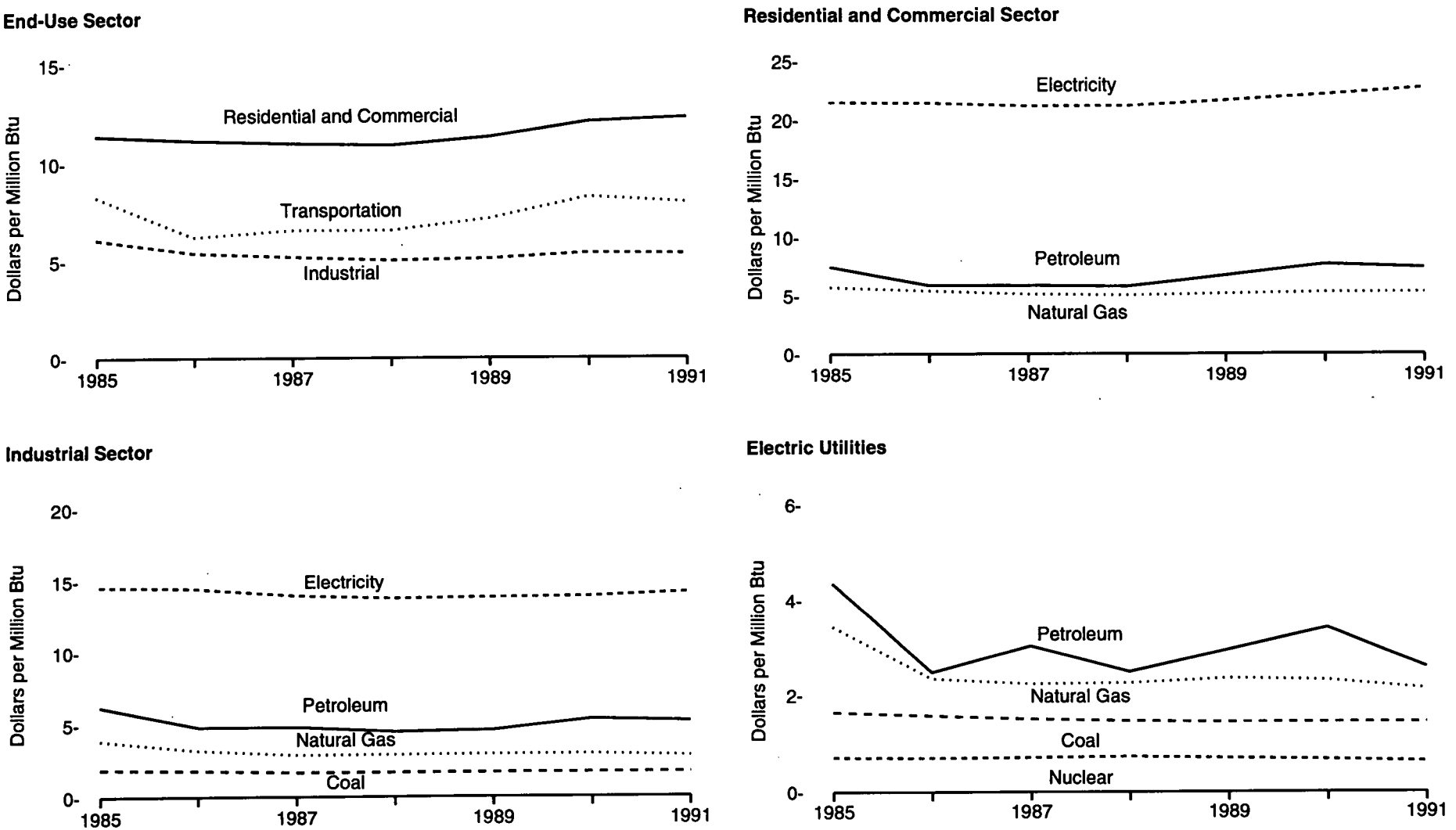
[2] Represents all purchases of goods and services in the U.S. domestic economy. The data are not the same as the gross domestic product implicit price deflators (GDP) due to differences in coverage of imports and exports. The GDP represents the value of all goods and services produced in the United States, including exports and excluding imports. Gross domestic purchases represents the value of all goods and services consumed in the United States, including imports and excluding exports. Thus, the value of goods and services produced in the United States and consumed abroad is reflected in the GDP but not in gross domestic purchases, and the value of goods and services produced abroad and consumed in the United States is reflected in gross domestic purchases but not in the GDP.

[3] Calculations based on unrounded data.

[4] The nominal energy expenditure price index is a weighted measure of the change in end-use prices of energy products with the product mix of energy expenditures in the base year 1987 held constant. The real energy expenditure price index is calculated by deflating the nominal energy expenditure price index by the gross domestic purchases benchmark-years-weighted price index developed by the Department of Commerce. The weights for the latter price index are based on average gross domestic purchases for successive pairs of benchmark years.

Source: Energy Information Administration, *State Energy Price and Expenditure Report 1991*, Appendix C, "Additional Measures of Energy Consumption, Expenditures, and Prices" (September 1993), Tables C2, C3, C5, and C6.

Figure 3.7 Energy Price Estimates by Sector, 1985-1991



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 3.7.

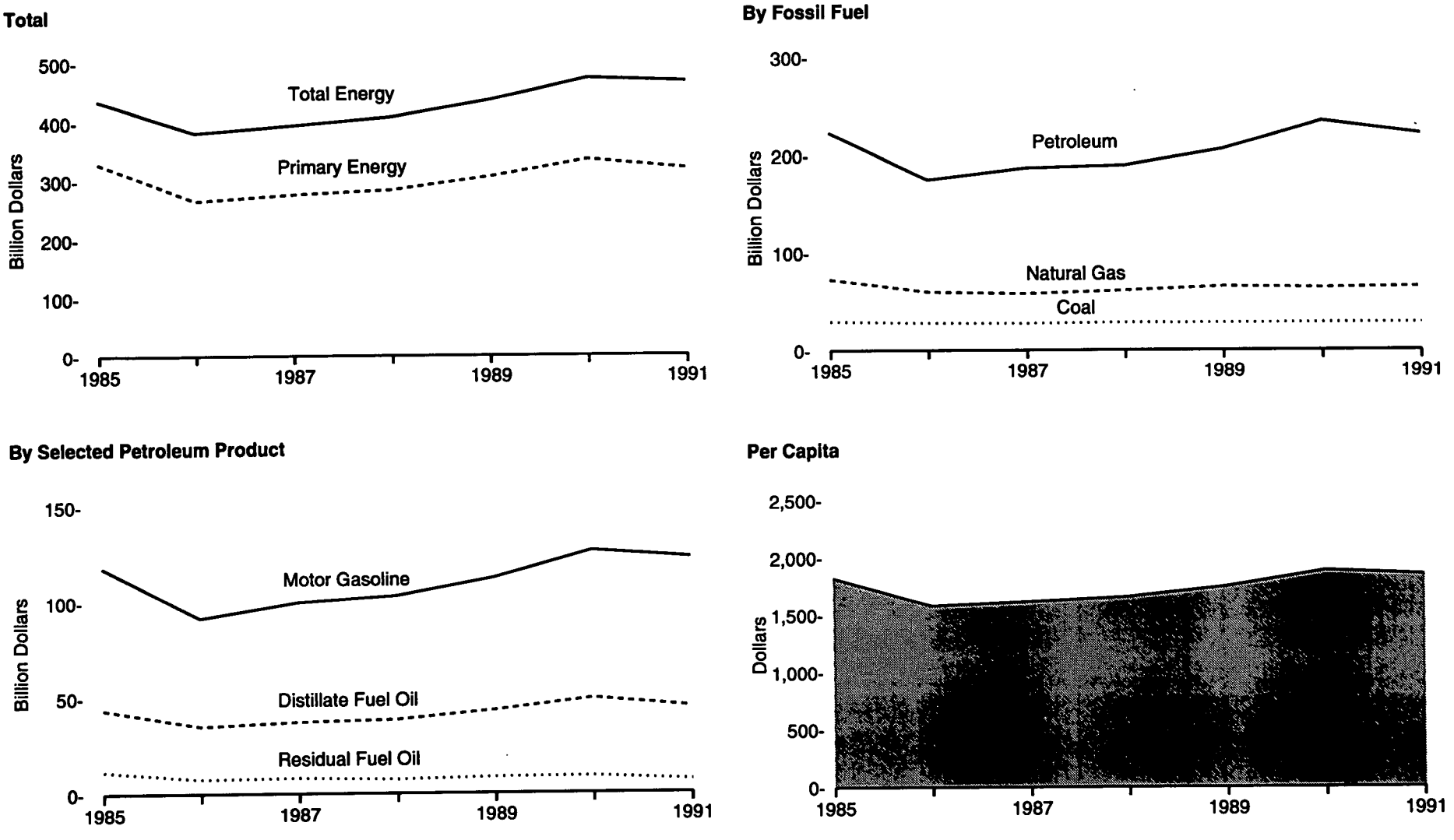
Table 3.7 Energy Price Estimates by Sector, 1970, 1975, 1980, and 1985-1991

(Dollars per Million Btu)

Sector	1970	1975	1980	1985	1986	1987	1988	1989	1990	1991
Residential and Commercial Sector	2.07	3.93	7.68	11.37	11.14	10.99	10.90	11.31	R12.09	12.29
Primary Energy	1.08	1.97	4.36	6.12	5.49	5.27	5.17	5.49	R5.78	5.71
Coal	0.73	1.78	2.10	2.37	2.23	2.03	1.97	1.99	R2.17	2.17
Natural Gas	0.96	1.56	3.50	5.73	5.42	5.12	5.03	5.16	R5.28	5.30
Petroleum Products [1]	1.32	2.82	6.58	7.47	5.89	R5.87	R5.79	R6.72	R7.67	7.40
Distillate Fuel Oil	1.32	2.66	6.86	7.32	5.70	5.49	5.49	6.20	7.30	6.90
Liquefied Petroleum Gases	1.98	3.81	7.50	9.02	8.51	8.49	8.35	9.92	10.59	10.65
Motor Gasoline	2.86	4.66	9.77	9.01	6.77	7.22	7.33	8.03	9.15	8.98
Residual Fuel Oil	0.45	1.91	4.12	4.50	2.70	R3.10	R2.52	R2.92	R3.41	2.61
Electricity	6.33	10.21	15.86	21.50	21.45	21.18	21.19	21.64	22.12	22.70
Industrial Sector	0.83	2.20	4.71	6.09	5.40	R5.19	5.03	R5.11	R5.40	5.34
Primary Energy [2]	0.60	1.66	3.77	4.49	3.65	R3.50	3.34	R3.37	R3.70	3.57
Coal	0.45	1.50	1.87	1.89	1.80	1.68	1.68	1.68	1.69	1.69
Coking Coal	0.45	1.65	2.10	2.03	1.90	1.74	1.79	1.78	1.79	1.83
Steam Coal	0.44	1.28	1.56	1.81	1.75	1.64	1.61	1.61	1.63	1.62
Natural Gas	0.38	0.95	2.52	3.87	3.20	2.88	2.90	2.93	R2.95	2.80
Petroleum Products [3]	0.96	2.41	5.59	6.20	4.80	R4.80	4.48	R4.58	R5.35	5.19
Asphalt and Road Oil	0.68	1.89	3.68	4.77	4.34	3.56	3.39	2.95	3.02	3.14
Distillate Fuel Oil	0.72	2.23	5.54	6.10	3.76	4.16	3.83	4.78	5.68	5.14
Liquefied Petroleum Gases	1.10	2.51	5.18	5.66	5.63	5.16	4.97	4.05	5.40	5.47
Lubricants	5.08	R7.48	14.36	17.61	15.59	R12.70	14.61	R13.30	R13.40	15.42
Residual Fuel Oil	0.46	1.91	3.69	4.24	2.51	2.87	2.34	2.75	3.10	2.44
Electricity	2.99	6.07	10.81	14.57	14.45	13.98	13.78	13.85	13.92	14.18
Transportation Sector	2.31	4.02	8.61	8.26	6.22	R6.57	6.56	R7.16	R8.26	7.97
Primary Energy	2.31	4.02	8.60	8.25	6.21	R6.56	6.55	R7.15	R8.25	7.96
Coal	0.41	1.26	([4])	([4])	([4])	([4])	([4])	([4])	([4])	([4])
Petroleum Products [5]	2.31	4.02	8.60	8.25	6.21	R6.56	6.55	R7.15	R8.25	7.96
Distillate Fuel Oil	1.31	2.80	7.19	7.50	6.36	6.75	6.59	7.16	8.46	8.11
Jet Fuel	0.73	2.05	6.36	5.91	3.92	4.03	3.80	4.39	5.68	4.83
Motor Gasoline	2.85	4.64	9.84	9.01	6.79	7.22	7.32	8.01	9.12	8.93
Residual Fuel Oil	0.38	1.72	3.31	4.36	2.11	2.64	2.22	2.47	2.98	2.83
Electricity	4.65	11.72	14.71	19.74	19.63	23.03	22.05	22.99	R23.49	23.80
Electric Utilities	0.32	0.96	1.75	1.85	1.55	1.51	1.45	1.48	1.46	1.37
Coal	0.31	0.82	1.35	1.65	1.58	1.51	1.47	1.45	1.45	1.45
Natural Gas	0.28	0.75	2.20	3.43	2.35	2.24	2.26	2.36	2.32	2.14
Petroleum Products [6]	0.42	2.00	4.34	4.35	2.48	3.03	2.49	2.95	3.41	2.59
Heavy Oil [7]	0.41	1.99	4.25	4.24	2.42	2.97	2.41	2.85	3.30	2.46
Nuclear Fuel	0.18	0.24	0.43	0.71	0.70	0.71	0.73	0.70	0.67	0.63
Biomass Fuels	0.65	0.92	1.74	0.79	0.32	0.95	0.87	R0.69	R0.52	0.55

[1] In addition to listed products, includes kerosene.
[2] In addition to listed energy sources, includes imports and exports of coal coke.
[3] In addition to listed products, includes jet fuel, kerosene, motor gasoline, still gas, special naphthas, petrochemical feedstocks, petroleum coke, wax, pentanes plus, and miscellaneous products.
[4] Not applicable.
[5] In addition to listed products, includes aviation gasoline, liquefied petroleum gases, and lubricants.
[6] In addition to listed products, includes fuel oil nos. 1 and 2, kerosene, jet fuel, and petroleum coke.
[7] Heavy oil includes fuel oil nos. 4, 5, and 6, and residual fuel oils.
R=Revised data.
Sources: **Residential and Commercial Sector:** Energy Information Administration (EIA), "State Energy Price and Expenditure Data System 1991." **All Other Data:** EIA, *State Energy Price and Expenditure Report 1991* (September 1993), p.20.

Figure 3.8 Energy Expenditure Estimates, 1985-1991



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 3.8.

Table 3.8 Energy Expenditure Estimates, 1970, 1975, 1980, and 1985-1991

(Billion Dollars, Except as Noted)

Energy Source	1970	1975	1980	1985	1986	1987	1988	1989	1990	1991
Coal	4.6	13.0	22.6	29.7	27.9	27.6	28.4	R28.1	28.4	27.9
Coking Coal	1.2	3.7	3.8	2.2	1.8	1.7	2.0	R1.9	1.9	1.7
Steam Coal	3.4	9.4	18.9	27.5	26.1	25.9	26.4	26.2	26.5	26.2
Natural Gas	10.9	20.1	51.1	72.9	59.7	58.0	61.1	65.4	64.1	64.7
Petroleum Products	48.1	103.9	238.4	223.2	174.5	R186.4	189.3	R206.3	R234.5	222.0
Asphalt and Road Oil	0.7	1.9	3.5	4.9	4.7	4.0	3.8	3.2	3.5	3.4
Aviation Gasoline	0.2	0.2	0.6	0.5	0.5	0.3	0.4	0.4	0.4	0.4
Distillate Fuel Oil	6.3	15.7	40.8	43.6	35.0	37.2	38.4	43.3	49.3	45.1
Jet Fuel	1.4	4.2	13.9	14.7	10.5	11.4	11.3	13.4	17.8	14.6
Kerosene	0.6	0.9	2.3	1.9	1.3	1.2	1.2	1.2	0.7	0.8
Liquefied Petroleum Gases	2.4	5.2	10.9	13.1	12.3	12.4	12.3	11.8	13.2	14.5
Lubricants	1.5	2.3	5.1	5.7	4.9	R4.5	5.0	R4.7	R4.9	5.0
Motor Gasoline	31.6	59.4	124.4	118.0	91.5	99.8	103.2	112.6	126.5	123.1
Residual Fuel Oil	2.0	10.4	21.6	11.5	7.5	8.1	7.3	8.4	8.7	6.8
Other Petroleum Products [1]	1.2	3.6	15.3	9.2	6.3	7.3	6.4	7.3	9.5	8.5
Nuclear Fuel	(2)	0.4	1.2	2.9	3.1	3.5	4.1	4.0	4.1	4.2
Biomass Fuels at Utilities	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Imports of Coal Coke	(2)	0.2	0.1	(2)	(2)	0.1	0.2	0.2	0.1	0.1
Exports of Coal Coke [3]	-0.1	-0.1	-0.1	-0.1	-0.1	(2)	-0.1	-0.1	-0.1	-0.1
Total Primary Energy [4]	63.5	137.5	313.2	328.8	265.2	R275.5	283.0	R303.9	R331.2	318.8
Electric Utility Fuel [3,5]	-4.3	-16.4	-37.4	-42.6	-35.8	-36.7	-37.4	-38.9	-38.4	-36.5
Electricity Purchased by End Users [6]	23.4	50.7	98.1	149.2	151.8	154.7	162.1	169.3	176.7	184.8
Total Energy	82.6	171.8	373.9	435.4	381.3	R393.5	407.6	R434.3	R469.5	467.1
Total Energy per Capita (Dollars)	406	797	1,650	1,824	1,581	R1,617	1,658	R1,750	R1,888	1,853

[1] Pentanes plus, petrochemical feedstocks, special naphthas, petroleum coke, still gas, wax, and miscellaneous products.

[2] Less than $0.05 billion.

[3] In determining total energy expenditures, this is a negative quantity.

[4] Biomass fuels are not included, except those consumed at the electric utilities and those added to motor gasoline.

[5] There are no direct fuel costs for hydroelectric, geothermal, centralized solar, or wind energy.

[6] These are sales. In determining total energy expenditures, this is a positive quantity.

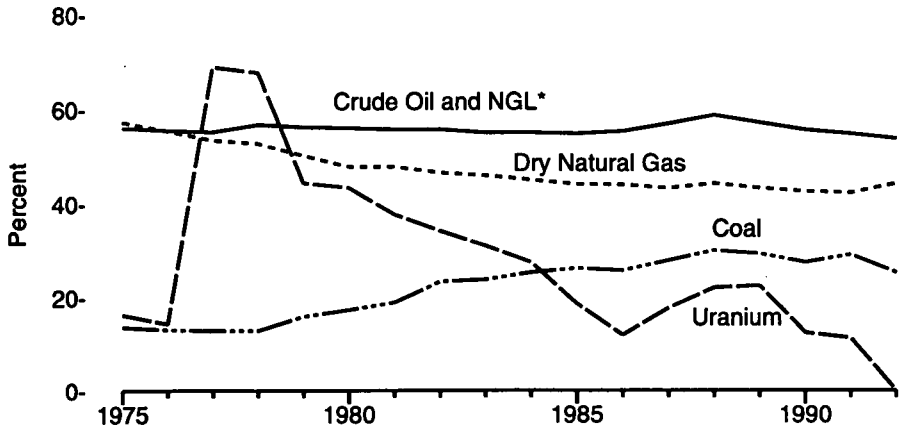
R=Revised data.

Note: Totals may not equal sum of components due to independent rounding.

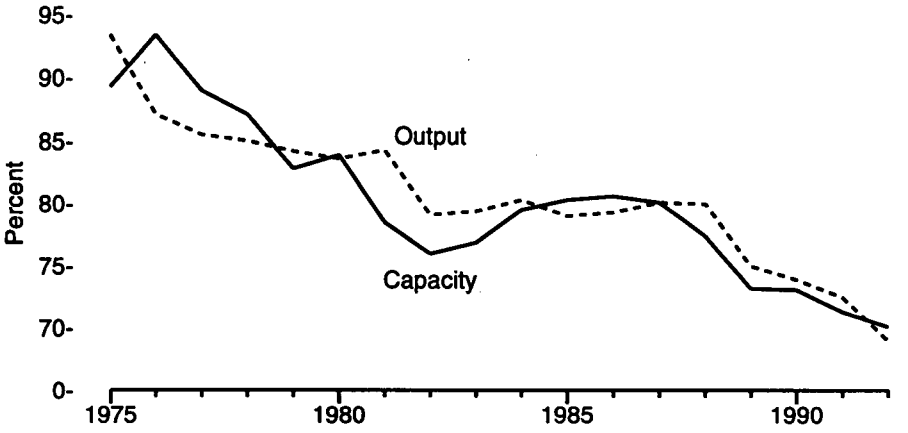
Sources: **Expenditures:** Energy Information Administration (EIA), *State Energy Price and Expenditure Report (SEPER) 1991* (September 1993), p. 19. **Total Energy per Capita:** EIA, *SEPER 1991* (September 1993), p. 5.

Figure 3.9 FRS Companies' Operations, Selected Statistics, 1975-1992

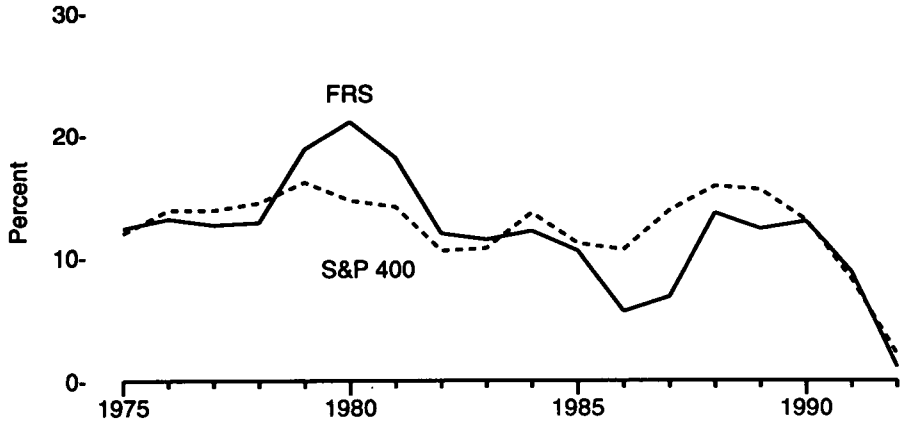
FRS Shares of U.S. Total Production



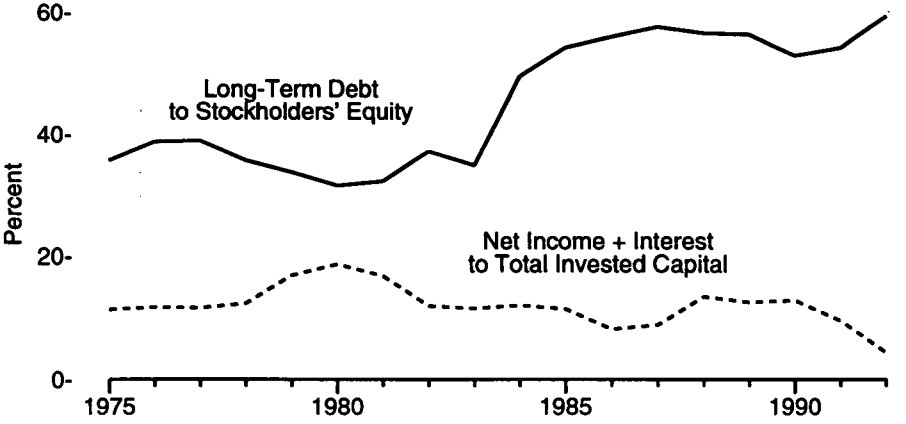
FRS Shares of U.S. Refining Capacity and Output



FRS Companies' Net Income to Stockholders' Equity



FRS Companies' Indicators



*Natural gas liquids.
Notes: • FRS is the Financial Reporting System (see Note at end of section). • Because vertical scales differ, graphs should not be compared.

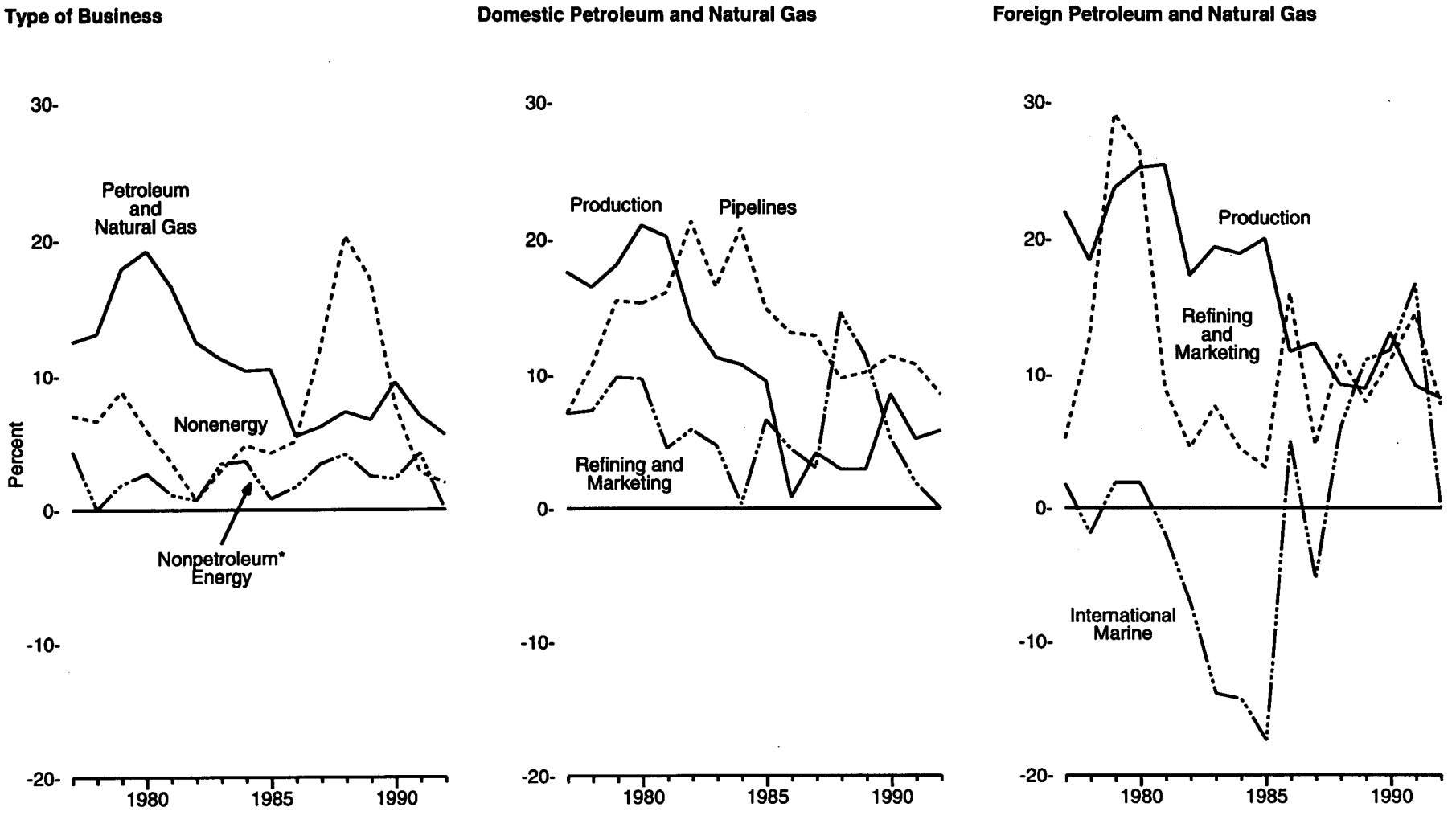
Source: Table 3.9.

Table 3.9 FRS Companies' Operations, Selected Statistics, 1975-1992

Year	Production				Refining		Financial Indicators				
	Crude Oil and Natural Gas Liquids	Dry Natural Gas	Coal [1]	Uranium	Capacity [2]	Output	Net Income	Net Income to Stockholders' Equity	Net Income to Stockholders' Equity for S & P 400 [3]	Net Income Plus Interest to Total Invested Capital	Long-Term Debt to Stockholders' Equity
	Million Barrels	Trillion Cubic Feet	Million Short Tons	Million Pounds U_3O_8	Million Barrels per Day		Billion Dollars	Percent			
1975	2,049.9	11.0	88.1	4.3	13.4	12.8	10.3	12.3	11.9	11.3	35.6
1976	1,983.4	10.6	89.0	3.3	14.2	12.8	12.0	13.1	13.8	11.7	38.7
1977	1,991.2	10.3	89.1	16.0	14.6	13.6	12.7	12.6	13.8	11.6	38.9
1978	2,131.4	10.1	85.5	17.3	14.8	13.6	13.9	12.8	14.4	12.3	35.6
1979	2,081.7	9.9	123.3	16.7	14.4	13.3	23.5	18.8	16.1	16.9	33.7
1980	2,087.5	9.3	142.3	19.0	15.1	12.2	31.0	21.1	14.6	18.7	31.5
1981	2,072.4	9.2	154.8	14.5	14.6	R11.8	30.0	18.1	14.1	16.8	32.2
1982	2,079.1	8.3	195.2	9.2	13.6	10.6	21.8	11.9	10.5	11.9	37.1
1983	2,059.3	7.4	185.2	6.6	13.0	10.4	21.9	11.4	10.7	11.5	34.8
1984	2,088.8	7.9	226.0	4.1	12.8	11.0	21.3	12.1	13.6	12.0	49.5
1985	2,120.5	7.3	230.4	2.1	12.6	10.9	17.4	10.5	11.1	11.4	54.3
1986	2,089.6	7.1	227.6	1.6	12.5	11.5	9.2	5.6	10.6	8.1	56.0
1987	2,069.5	7.2	255.3	2.3	12.5	11.7	11.3	6.8	13.8	8.8	57.6
1988	2,102.1	7.6	285.3	2.9	12.3	12.0	22.3	13.6	15.8	13.4	56.6
1989	1,911.1	7.5	286.9	3.1	11.5	11.4	19.8	12.3	15.5	12.5	56.4
1990	1,814.0	7.6	282.0	1.1	11.4	11.3	21.6	12.9	13.0	12.8	53.0
1991	R1,818.1	7.5	289.6	0.9	R11.2	11.1	14.7	8.8	R 8.2	9.5	54.3
1992	1,750.2	7.9	251.9	0.0	11.0	11.0	1.8	1.1	2.1	4.3	59.4
	Percent of U.S. Total										
1975	R56.1	R57.3	13.6	R16.2	R89.3	R93.4					
1976	R55.6	R55.5	13.1	R14.3	R93.4	R87.1					
1977	R55.3	53.6	12.9	R69.0	R89.0	R85.5					
1978	R56.8	R52.9	12.9	R67.8	R87.1	R85.0					
1979	R56.3	50.3	15.9	R44.5	R82.8	R84.2					
1980	R56.1	R47.9	17.3	R43.5	R83.9	R83.6					
1981	R55.8	R47.9	18.9	R37.7	R78.5	R84.3					
1982	R55.8	R46.6	23.4	R34.2	R76.0	R79.1					
1983	R55.1	R46.0	23.8	R31.1	R76.9	R79.4					
1984	R55.1	R45.1	25.3	R27.5	R79.5	R80.3					
1985	R54.9	R44.2	26.2	R18.6	R80.3	R79.0					
1986	R55.4	R44.1	25.7	R11.9	R80.6	R79.3					
1987	R57.0	R43.4	27.9	R17.7	R80.1	R80.1					
1988	R58.8	R44.4	R30.1	R22.1	R77.4	R80.0					
1989	R57.2	R43.4	R29.4	R22.5	R73.2	R75.0					
1990	R55.7	R42.7	R27.5	12.4	R73.1	R73.9					
1991	R54.9	R42.4	R29.2	R11.3	R71.3	R72.5					
1992	53.9	44.4	25.3	0.0	70.1	69.0					

[1] Bituminous coal, subbituminous coal, and lignite.
[2] Operable capacity as of January 1 of the following year.
[3] Standard and Poors' 400.
R=Revised data.
Notes: • FRS is the Financial Reporting System (see Note at end of section). • FRS Crude Oil and NGL and Natural Gas (Dry Marketed) production are on a net ownership interest basis (see Glossary).
Sources: **FRS Company Statistics:** Energy Information Administration, *Performance Profiles of Major Energy Producers* report series. **U.S. Production Data for Calculation of Shares:** Tables 5.1, 5.8, 5.9, 6.1, 7.2, and 9.3.

Figure 3.10 FRS Companies' Return on Investment by Type of Business, 1977-1992



*Coal, nuclear, and other energy.
Notes: • FRS is the Financial Reporting System (see Note at end of section). • Return on investment=Net income as a percent of net investment in place.
Sources: Tables 3.10 and 3.11.

Table 3.10 FRS Companies' Net Income, 1975-1992

(Billion Dollars)

Year	Type of Business					Domestic Petroleum and Natural Gas				Foreign Petroleum and Natural Gas			
	Petroleum and Natural Gas	Coal	Nuclear and Other Energy	Non-energy	Total [1]	Production	Refining and Marketing	Rate Regulated Pipelines	Total [1]	Production	Refining and Marketing	International Marine	Total [1]
1975	NA	NA	NA	NA	10.3	NA	NA	NA	NA	NA	NA	NA	NA
1976	NA	NA	NA	NA	12.0	NA	NA	NA	NA	NA	NA	NA	NA
1977	13.0	0.2	(2)	1.7	12.7	6.4	1.5	0.8	8.6	3.6	0.7	0.1	4.4
1978	14.7	0.1	-0.1	1.8	13.9	6.7	1.6	1.2	9.5	3.5	1.8	-0.1	5.2
1979	23.0	0.3	-0.1	2.8	23.5	9.4	2.3	1.7	13.4	5.2	4.3	0.1	9.7
1980	29.1	0.3	(2)	2.3	31.0	13.8	2.5	1.7	17.9	6.9	4.3	0.1	11.2
1981	29.5	0.4	-0.3	1.6	30.0	16.8	1.3	1.8	19.9	8.0	1.6	-0.1	9.6
1982	25.0	0.4	-0.3	0.4	21.8	14.1	1.9	2.3	18.3	6.1	0.8	-0.3	6.7
1983	24.0	0.5	(2)	1.8	21.9	12.2	1.6	2.0	15.9	7.2	1.3	-0.5	8.2
1984	23.6	0.6	-0.1	2.9	21.3	13.3	0.1	2.5	15.8	7.5	0.7	-0.4	7.8
1985	24.8	0.4	-0.3	2.5	17.4	12.1	2.3	2.3	16.7	8.0	0.5	-0.4	8.1
1986	12.9	0.2	(2)	2.8	9.2	0.9	1.6	2.6	5.2	4.7	2.9	0.1	7.7
1987	14.8	0.4	(2)	7.1	11.3	4.7	1.1	2.6	8.4	5.4	1.0	-0.1	6.4
1988	17.5	0.6	-0.1	10.8	22.3	3.2	5.4	2.0	10.6	4.3	2.4	0.1	6.9
1989	16.2	0.4	-0.1	8.7	19.8	3.1	4.5	1.9	9.5	4.7	1.8	0.2	6.7
1990	23.4	0.3	0.1	4.3	21.6	8.7	2.2	2.1	12.9	7.4	2.8	0.2	10.5
1991	17.7	0.6	0.1	1.6	14.7	5.1	0.9	2.0	7.9	5.4	4.1	0.3	9.8
1992	14.4	-0.5	0.1	1.2	1.8	5.6	-0.2	2.1	7.5	4.7	2.2	(2)	6.9

[1] Total is sum of components shown plus eliminations and nontraceables, which are defined in the glossary.

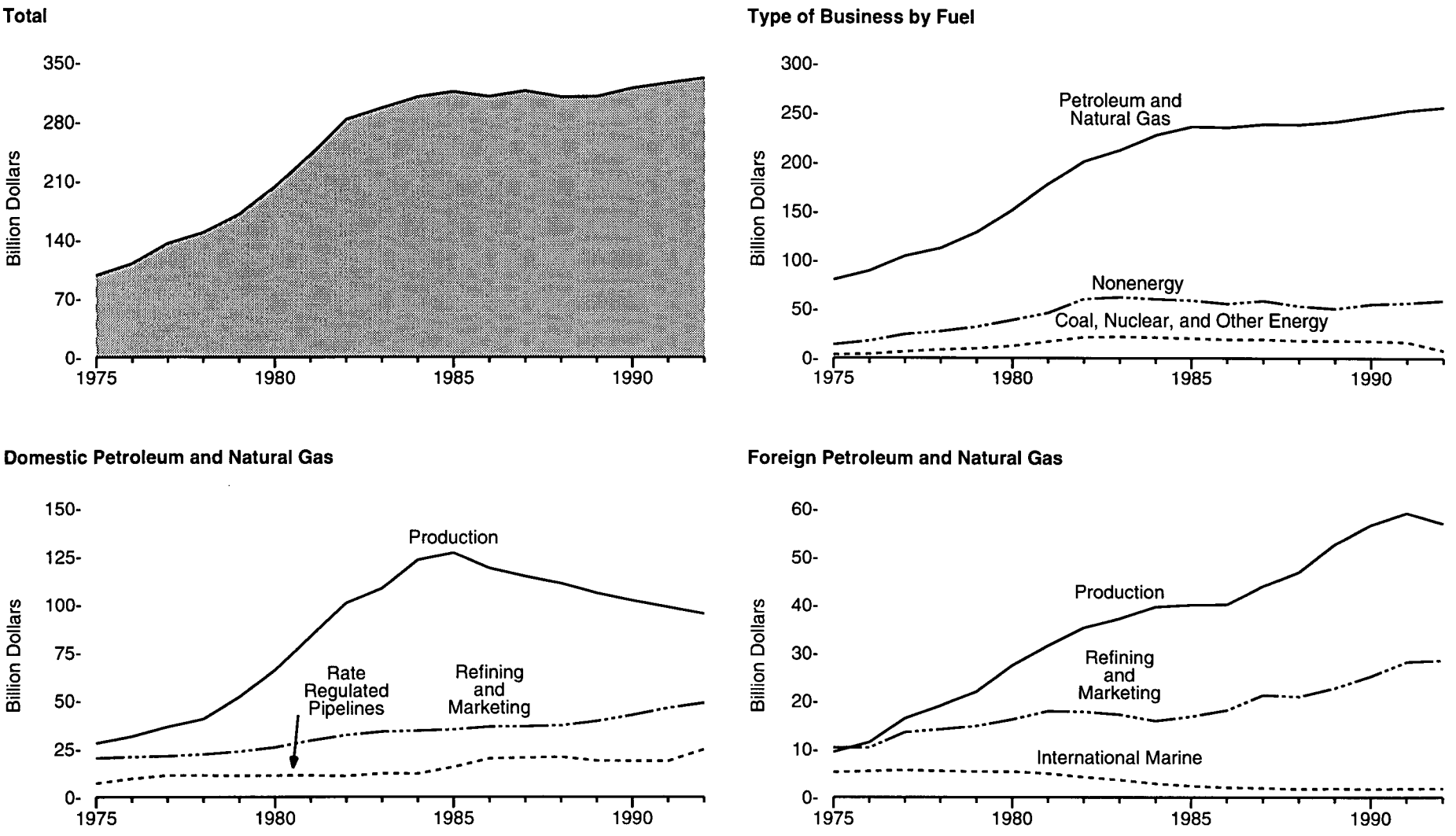
[2] Less than $50 million in absolute value.

NA=Not available.

Note: FRS is the Financial Reporting System (see Note at end of section).

Source: Energy Information Administration, *Performance Profiles of Major Energy Producers*, various issues.

Figure 3.11 FRS Companies' Net Investment in Place, 1975-1992



Notes: • FRS is the Financial Reporting System (see Note at end of section). • Because vertical scales differ, graphs should not be compared.

Source: Table 3.11.

Table 3.11 FRS Companies' Net Investment in Place, 1975-1992

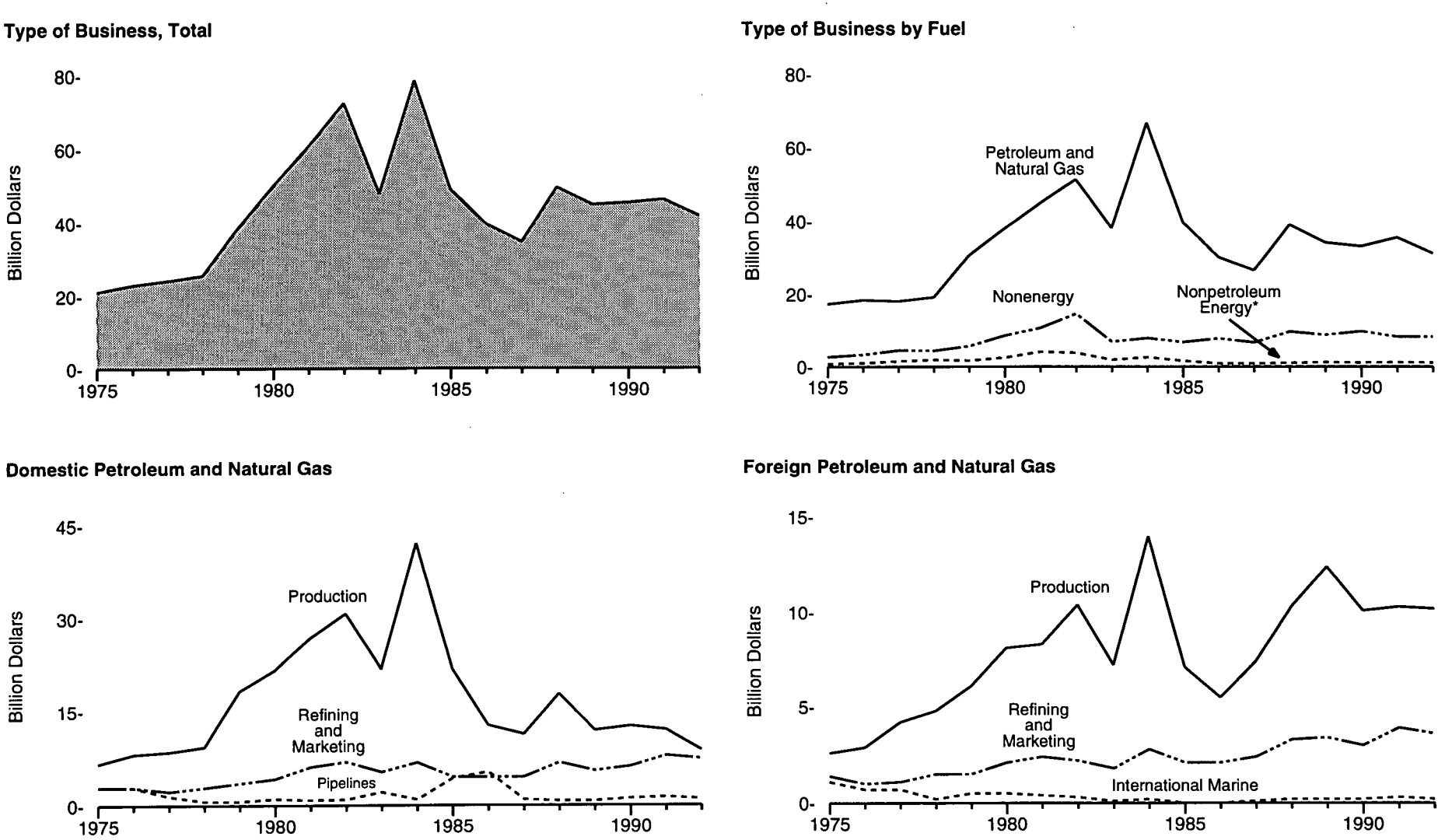
(Billion Dollars)

Year	Type of Business						Domestic Petroleum and Natural Gas				Foreign Petroleum and Natural Gas			
	Petroleum and Natural Gas	Coal	Nuclear and Other Energy	Non-energy	Non-traceables	Total	Production	Refining and Marketing	Rate Regulated Pipelines	Total	Production	Refining and Marketing	International Marine	Total
1975	79.8	1.6	0.8	13.7	1.0	97.3	27.8	20.0	7.0	54.8	9.4	10.3	5.2	24.9
1976	88.9	2.0	1.0	17.6	1.1	111.1	31.4	20.7	9.5	61.7	11.4	10.3	5.4	27.1
1977	104.2	2.8	1.9	24.3	1.9	135.2	36.4	21.1	11.2	68.7	16.4	13.5	5.6	35.5
1978	112.2	3.3	3.1	27.3	2.1	148.1	40.5	22.0	11.2	73.7	19.0	14.1	5.4	38.5
1979	128.3	4.1	3.3	31.9	2.4	169.9	51.8	23.5	11.0	86.3	21.9	14.8	5.3	42.0
1980	151.4	5.0	4.0	38.7	3.4	202.6	65.8	25.7	11.1	102.5	27.4	16.2	5.3	48.9
1981	178.0	7.2	4.5	45.9	5.2	240.8	83.2	29.2	11.2	123.6	31.5	17.9	4.9	54.3
1982	200.7	9.3	5.3	60.3	6.9	282.5	100.7	32.1	10.8	143.6	35.2	17.8	4.2	57.2
1983	212.2	9.4	5.1	62.2	7.4	296.3	108.4	33.8	12.1	154.4	37.1	17.2	3.6	57.9
1984	227.8	9.2	4.7	60.3	7.4	309.4	123.1	34.3	12.0	169.4	39.6	15.9	2.8	58.4
1985	236.2	9.1	3.7	58.9	7.5	315.4	126.8	34.9	15.4	177.1	40.0	16.8	2.3	59.0
1986	235.4	8.4	3.3	55.4	7.4	309.9	118.9	36.4	19.8	175.1	40.1	18.1	2.0	60.3
1987	238.7	8.6	3.3	58.5	7.3	316.4	114.7	36.6	20.2	171.6	44.0	21.2	1.9	67.1
1988	238.4	8.7	3.4	53.1	6.0	309.6	111.1	37.1	20.6	168.8	46.9	20.9	1.7	69.6
1989	241.3	8.7	3.1	50.5	6.2	309.9	106.0	39.4	18.7	164.1	52.7	22.7	1.8	77.2
1990	246.7	8.2	3.0	55.1	6.5	319.6	102.1	42.5	18.5	163.1	56.7	25.2	1.7	83.6
1991	252.6	6.7	2.9	56.4	7.0	325.6	98.6	46.2	18.5	163.4	59.2	28.2	1.8	89.2
1992	256.0	5.2	2.8	58.7	8.7	331.5	95.1	48.8	24.7	168.6	57.0	28.5	1.8	87.4

Notes: • FRS is the Financial Reporting System (see Note at end of section). • Net investment in place is net property, plant, and equipment plus investments and advances. • Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *Performance Profiles of Major Energy Producers*, various issues.

Figure 3.12 FRS Companies' Additions to Investment in Place, 1975-1992



*Coal, nuclear, and other energy.
Notes: • FRS is the Financial Reporting System (see Note at end of section). • Because vertical scales differ, graphs should not be compared.
Source: Table 3.12.

Table 3.12 FRS Companies' Additions to Investment in Place, 1975-1992

(Billion Dollars)

Year	Type of Business					Domestic Petroleum and Natural Gas				Foreign Petroleum and Natural Gas			
	Petroleum and Natural Gas	Coal	Nuclear and Other Energy	Non-energy	Total [1]	Production	Refining and Marketing	Rate Regulated Pipelines	Total	Production	Refining and Marketing	International Marine	Total
1975	17.3	0.5	0.3	2.7	21.1	6.6	2.8	2.8	12.2	2.6	1.4	1.1	5.1
1976	18.4	0.5	0.5	3.3	23.1	8.1	2.8	2.8	13.8	2.9	1.0	0.7	4.6
1977	18.1	0.9	0.6	4.5	24.3	8.5	2.2	1.4	12.1	4.2	1.1	0.7	6.0
1978	19.2	1.0	0.9	4.4	25.6	9.3	2.8	0.6	12.7	4.8	1.5	0.2	6.5
1979	30.7	0.8	0.9	5.7	38.5	18.2	3.5	0.6	22.5	6.1	1.5	0.5	8.2
1980	38.0	1.3	1.2	8.6	50.1	21.6	4.2	1.0	26.9	8.1	2.1	0.5	11.1
1981	44.9	2.9	1.2	10.7	60.8	26.8	6.1	0.8	33.8	8.3	2.4	0.4	11.1
1982	51.5	2.1	1.7	14.6	72.6	30.8	6.9	0.9	38.6	10.4	2.2	0.3	12.8
1983	38.2	1.1	0.8	6.9	48.0	21.8	5.3	2.1	29.2	7.2	1.8	0.1	9.1
1984	66.8	1.6	1.0	7.9	78.7	42.1	6.8	0.9	49.7	14.0	2.8	0.2	17.1
1985	39.8	1.5	0.1	6.8	49.2	21.8	4.5	4.3	30.6	7.1	2.1	([2])	9.3
1986	30.2	0.7	0.2	7.8	39.7	12.7	4.5	5.3	22.5	5.5	2.1	([2])	7.7
1987	26.6	0.6	0.3	6.7	34.8	11.3	4.5	0.9	16.7	7.4	2.4	0.1	9.9
1988	39.1	0.6	0.4	9.7	49.7	17.8	6.8	0.7	25.3	10.3	3.3	0.2	13.7
1989	34.2	1.0	0.2	8.8	45.0	11.9	5.5	0.7	18.2	12.4	3.4	0.2	16.0
1990	33.2	0.9	0.2	9.8	45.5	12.6	6.2	1.1	20.0	10.1	3.0	0.2	13.2
1991	35.6	1.0	0.2	8.3	46.4	12.0	7.9	1.3	21.2	10.3	3.9	0.3	14.4
1992	31.3	0.9	0.2	8.3	42.0	8.8	7.4	1.0	17.3	10.2	3.6	0.2	14.0

[1] Total is sum of components shown plus nontraceables, which are defined in the glossary. Totals may not equal sum of components due to independent rounding.

[2] Less than $50 million.

Notes: • FRS is the Financial Reporting System (see Note at end of section). • Additions to investment in place is property, plant, and equipment plus investments and advances.

Source: Energy Information Administration, *Performance Profiles of Major Energy Producers*, various issues.

Financial Indicators Note

The Financial Reporting System (FRS) data system is designed to permit review of the financial performance of energy companies. Data are disaggregated both by line of business and by geographic area of operation. Domestic operations include Puerto Rico and the Virgin Islands; foreign operations exclude those areas.

The 25 companies included in the FRS for the 1992 reporting year are the following:

Amerada Hess Corporation
Amoco Corporation
Anadarko Petroleum, Inc.
Ashland Oil Inc.
Atlantic Richfield Company
BP America Inc.
Burlington Resources Inc.
Chevron Corporation
Coastal Corporation
E.I. du Pont de Nemours and Company (Du Pont)
Enron Corporation
Exxon Corporation
Fina Inc.
Kerr-McGee Corporation
Mobil Corporation
Nerco Inc.
Occidental Petroleum Corporation
Oryx Energy Company
Phillips Petroleum Company
Shell Oil Company
Sun Company, Inc.
Texaco Inc.
Union Pacific Corporation
Unocal Corporation
USX Corporation

4. Energy Resources

Crude Oil and Natural Gas Resources

The most recent U.S. Geological Survey assessment of U.S. undiscovered recoverable resources provides a mean estimate for 1987 of 49 billion barrels of crude oil (4.1).[1] Alaska, including its Federal offshore region, accounted for one-third of all U.S. crude oil resources. The Survey's mean estimate of natural gas resources was 399 trillion cubic feet. The Gulf Coast and the Federal offshore region in the Gulf of Mexico accounted for nearly one-half and Alaska's onshore and offshore regions accounted for nearly one-fifth of the U.S. total.

Crude Oil and Natural Gas Proved Reserves

The combined oil-equivalent proved reserves of crude oil, natural gas, and natural gas liquids increased every year from 1949 until 1968 (4.9), when, for the first time, production exceeded net additions to proved reserves. Except for the addition of Alaska's North Slope reserves in 1970, proved reserves trended downward, falling to 58 billion barrels oil equivalent in 1992. At the end of 1992, proved reserves were 25 billion barrels of crude oil (including lease condensate) and 173 trillion cubic feet of natural gas (4.2). Through 1992, crude oil cumulative production of 167 billion barrels from 39,335 fields equaled about 87 percent of estimated ultimate recovery, while natural gas cumulative production of 838 trillion cubic feet from 34,909 fields equaled about 83 percent of ultimate recovery.

Coal Reserves: An Abundant Supply

The Energy Information Administration has estimated that the demonstrated reserve base of coal contained 474 billion short tons at the beginning of 1993 (4.10). Although recoverability rates differ from site to site, about 56 percent of the demonstrated reserve base is estimated to be recoverable.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Uranium Resources

At the end of 1992, uranium reserves with forward costs (those yet to be incurred in production) of up to $30 per pound totaled 295 million pounds of uranium oxide (U_3O_8), about 40 percent of which was in Wyoming (4.12). Estimated additional resources and speculative resources in the $30-per-pound category in 1992 totaled 2.2 billion pounds and 1.3 billion pounds, respectively.

Exploring for Energy Resources

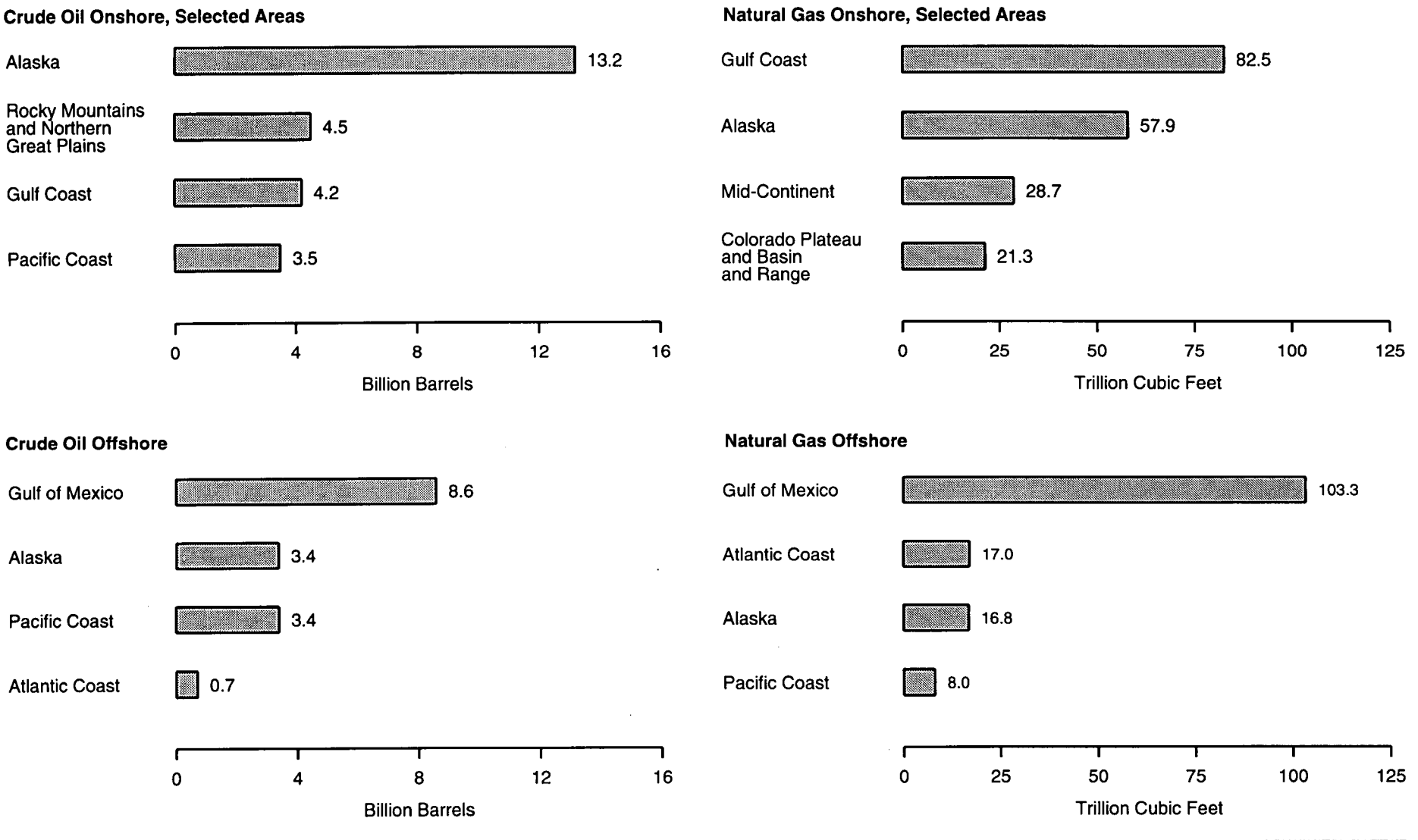
Exploration for oil and gas is closely tied to market conditions, particularly to the price of crude oil. When the price rose in 1981, three indicators of exploratory activity all rose to record levels: crews engaged in seismic exploration rose to 681, rotary rigs in operation rose to 3,970, and exploratory wells drilled rose to 17.5 thousand (4.3 and 4.5). Subsequently, prices declined and then collapsed, leading to drastic cutbacks in exploration. By 1992, crews engaged in seismic exploration had declined to 76, rotary rigs in operation had declined to 721, and exploratory wells drilled had declined to 3.4 thousand, the lowest levels in at least 44 years. However, the low 1992 annual average for rotary rigs in operation masked a year-end surge that may be explained by the existence of tax incentives for natural gas production from nonconventional sources. The incentives apply to wells completed by the end of 1992. Those wells will remain eligible for the tax credits through 2002.[2]

In 1993, despite a further decline in oil prices, two indicators of exploratory activity rose slightly: crews engaged in seismic exploration rose from 76 to 79 and rotary rigs in operation rose from 721 to 754. However, exploratory wells drilled declined from 3.4 thousand to 3.1 thousand.

Exploration for uranium also reflects changes in energy markets. The number of exploratory and development holes drilled peaked in 1978 at 104 thousand (4.11). As uranium market conditions deteriorated after 1978, the number plunged to fewer than 4 thousand in 1985. In 1992, the number of holes drilled fell to 1.8 thousand.

[2]Energy Information Administration, *Short-Term Energy Outlook* First Quarter 1993, DOE/EIA-0202 (93/1Q) (Washington, DC, February 1993), pp. 1, 6, and 15.

Figure 4.1 Crude Oil and Natural Gas Estimated Undiscovered Recoverable Resources, January 1, 1987



Note: Values plotted are the calculated means.

Source: Table 4.1.

Table 4.1 Crude Oil and Natural Gas Estimated Undiscovered Recoverable Resources, January 1, 1987

Region	Crude Oil (billion barrels)			Natural Gas [1] (trillion cubic feet)		
		Estimated Range [2]			Estimated Range [2]	
	Mean [3]	Low	High	Mean [3]	Low	High
Onshore and State Waters	**33.3**	**19.6**	**51.9**	**254.0**	**178.7**	**346.7**
Alaska	13.2	3.6	31.3	57.9	15.6	138.6
Pacific Coast	3.5	1.5	6.6	11.0	5.5	19.1
Colorado Plateau and Basin and Range	1.5	0.5	3.4	21.3	9.6	39.3
Rocky Mountains and Northern Great Plains	4.5	2.7	6.9	15.2	7.0	27.8
West Texas and Eastern New Mexico	2.6	1.5	4.0	20.1	11.9	31.3
Gulf Coast	4.2	2.4	6.7	82.5	51.2	123.6
Mid-Continent	1.9	1.2	2.7	28.7	16.2	46.0
Eastern Interior [4]	1.8	1.3	2.4	17.2	10.8	25.7
Atlantic Coast	0.2	0.1	0.5	([5])	([5])	([5])
Federal Offshore [6]	**16.1**	**9.2**	**25.6**	**145.1**	**97.8**	**204.8**
Alaska [7]	3.4	0.6	9.4	16.8	4.7	39.4
Pacific Coast	3.4	0.9	8.3	8.0	3.5	15.1
Gulf of Mexico	8.6	4.9	13.6	103.3	63.0	156.9
Atlantic Coast	0.7	0.1	2.3	17.0	6.8	33.7
United States Total	**49.4**	**33.2**	**69.9**	**399.1**	**306.8**	**507.2**

[1] There are a number of more recent, nongovernment-generated natural gas resource estimates that are larger, in part because (a) they include natural gas from sources, such as coalbeds and tight sands, beyond the conventionally producible reservoirs that were included in the 1987 Department of the Interior estimate, and (b) they reflect larger estimates of ultimate recovery appreciation. For example, the Potential Gas Committee's latest mean estimate published in "Potential Supply of Natural Gas in the United States, December 31, 1992," is 1,001 trillion cubic feet. The National Petroleum Council's one-time, 1992 mean estimate, published in "The Potential for Natural Gas in the United States: Source and Supply," was 1,065 trillion cubic feet. The Department of the Interior will publish a new Government-generated estimate in 1995.

[2] The low value of the range is the quantity associated with a 95 percent probability (19 in 20 chance) that there is at least this amount. The high value is the quantity with a 5 percent probability (1 in 20 chance) that there is at least this amount. Totals for the low and high values are not obtained by arithmetic summation; they are derived by statistical methods.

[3] The arithmetic average of all possible outcomes.

[4] Includes the Michigan Basin and Appalachians.

[5] Less than 0.1 trillion cubic feet.

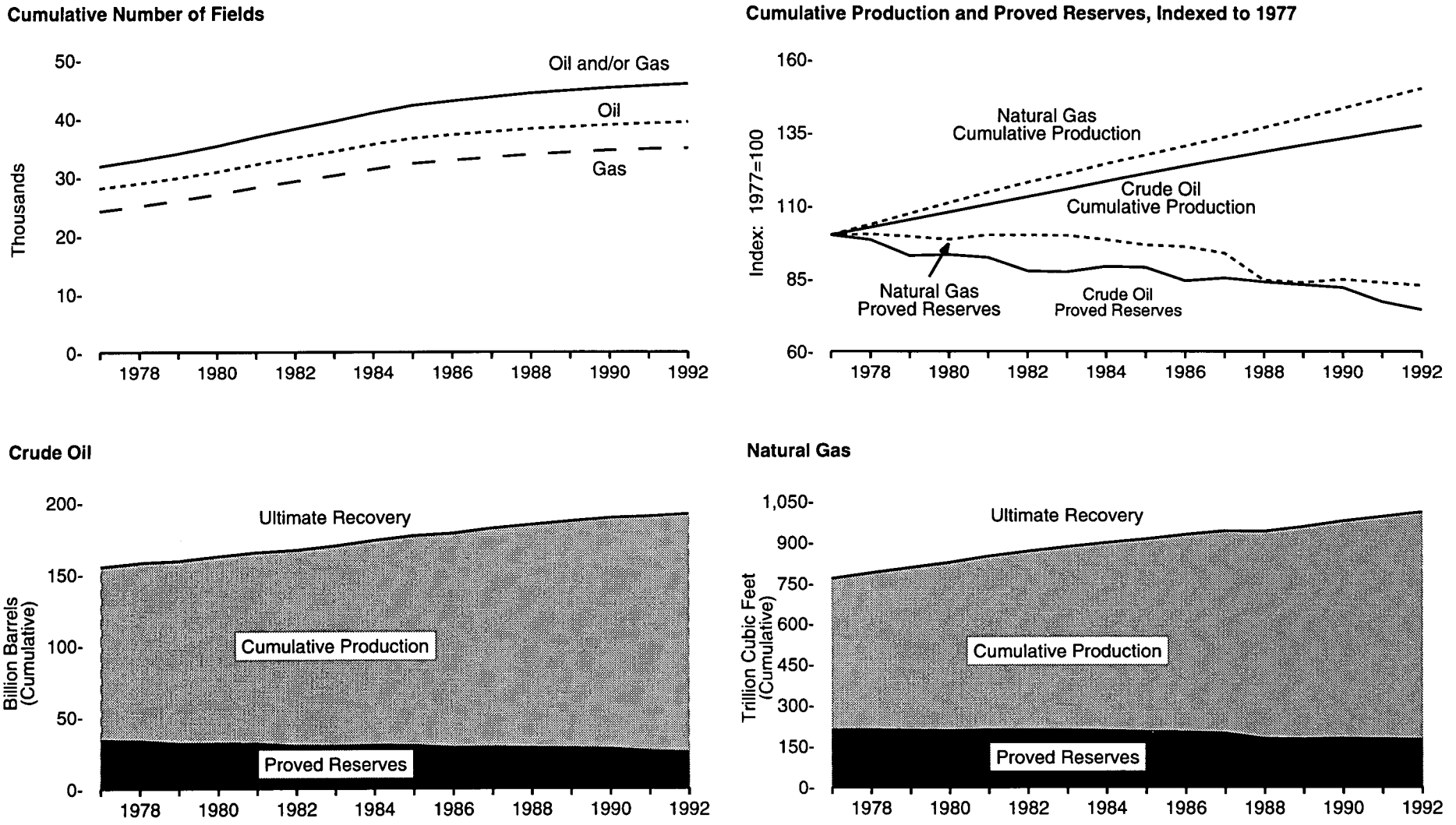
[6] Includes only the area encompassed by the Federally Controlled Outer Continental Shelf.

[7] Includes quantities considered recoverable only if technology permits their exploitation beneath Arctic ice — a condition not yet met.

Note: The estimates are risked. The methodology computes the marginal probability that economically recoverable hydrocarbons exist in the area. When applied to the mean volume, the methodology adjusts the figure to reflect the probability that the area be nonproductive.

Source: U.S. Department of the Interior, U.S. Geological Survey and Minerals Management Service, *Estimates of Undiscovered Recoverable Conventional Oil and Gas Resources in the United States - A Part of the Nation's Energy Endowment, 1989.*

Figure 4.2 Crude Oil and Natural Gas Field Counts, Cumulative Production, Proved Reserves, and Ultimate Recovery, 1977-1992



Notes: • Crude oil includes lease condensate. • Natural gas is wet, after lease separation.

Source: Table 4.2.

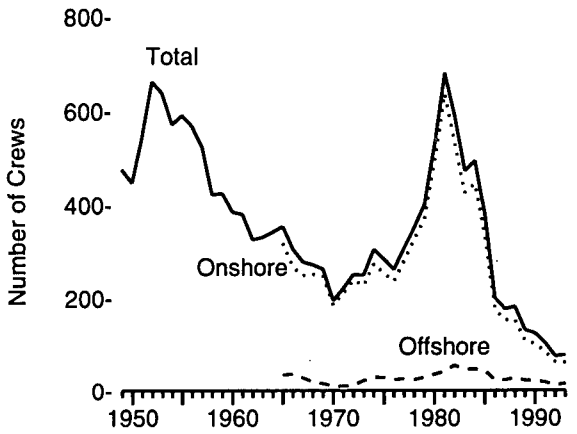
Table 4.2 Crude Oil and Natural Gas Field Counts, Cumulative Production, Proved Reserves, and Ultimate Recovery, 1977-1992

Year	Cumulative Number of Fields with Oil and/or Gas [3]	Cumulative Number of Fields with Oil [3]	Crude Oil [1] (billion barrels)			Cumulative Number of Fields with Gas [3]	Natural Gas [2] (trillion cubic feet)		
			Cumulative Production	Proved Reserves	Ultimate Recovery		Cumulative Production	Proved Reserves	Ultimate Recovery
1977	R31,811	R28,078	121.4	33.6	155.0	R24,164	558.3	209.5	767.8
1978	R32,836	R28,892	124.6	33.1	157.6	R25,012	578.4	210.1	788.5
1979	R33,982	R29,820	127.7	31.2	158.9	R25,980	599.1	208.3	807.4
1980	R35,276	R30,864	130.8	31.3	162.2	R27,007	619.4	206.3	825.6
1981	R36,800	R32,121	133.9	31.0	165.0	R28,198	639.4	209.4	848.9
1982	R38,185	R33,279	137.1	29.5	166.6	R29,234	658.1	209.3	867.4
1983	R39,487	R34,344	140.3	29.3	169.6	R30,210	675.1	209.0	884.1
1984	R40,945	R35,553	143.5	30.0	173.5	R31,301	693.5	206.0	899.5
1985	R42,199	R36,581	146.8	29.9	176.7	R32,270	710.9	202.2	913.1
1986	R42,947	R37,173	150.0	28.3	178.3	R32,803	727.8	201.1	928.9
1987	R43,616	R37,681	153.0	28.7	181.7	R33,304	745.4	196.4	941.8
1988	R44,275	R38,185	156.0	28.2	184.2	R33,823	763.4	177.0	940.4
1989	R44,730	R38,519	158.8	27.9	186.7	R34,188	781.7	175.4	957.1
1990	R45,208	R38,868	161.5	27.6	189.0	R34,550	800.4	177.6	978.0
1991	R45,531	R39,113	164.2	25.9	190.1	R34,755	819.1	175.3	994.4
1992	45,867	39,335	166.8	25.0	191.8	34,909	838.0	173.3	1,011.3

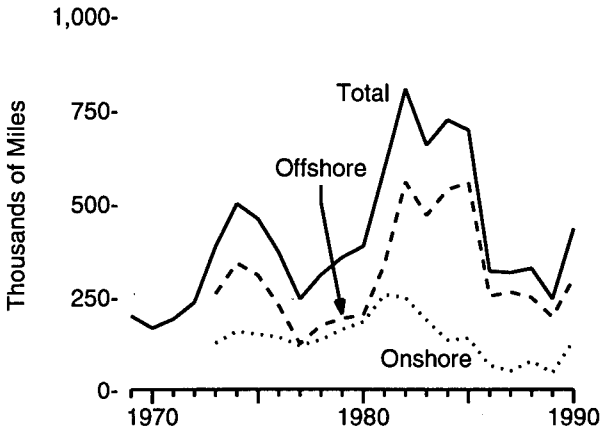
[1] Includes lease condensate.
[2] Wet, after lease separation.
[3] Re-determinations of the limits of distinct oil and gas fields and improved information concerning their discovery dates cause frequent revisions in the field-count historical series.
R=Revised data.
Sources: **1991:** Energy Information Administration (EIA), Office of Oil and Gas, Oil and Gas Integrated Field File (OGIFF), (March 1993). **1977-1990 and 1992:** • Crude Oil Cumulative Production—EIA, *Petroleum Supply Annual 1992 Volume 1* (May 1993). • Natural Gas Cumulative Production—EIA, *Natural Gas Annual 1992* (November 1993). • Proved Reserves—EIA, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1992 Annual Report* (October 1993). • Field Counts—EIA, *Oil and Gas Field Code Master List 1993* (December 1993) and OGIFF.

Figure 4.3 Oil and Gas Drilling Activity Measurements

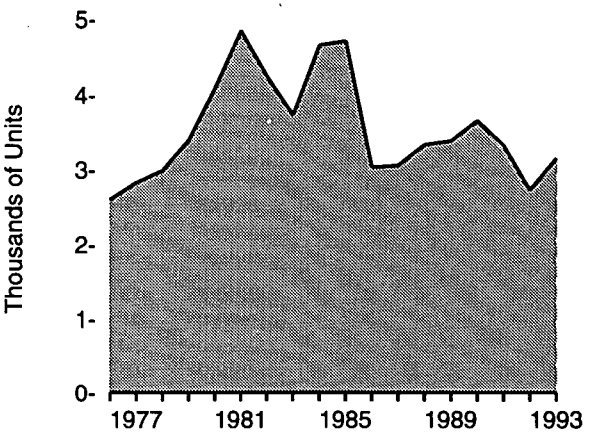
Crews Engaged in Seismic Exploration, 1949-1993



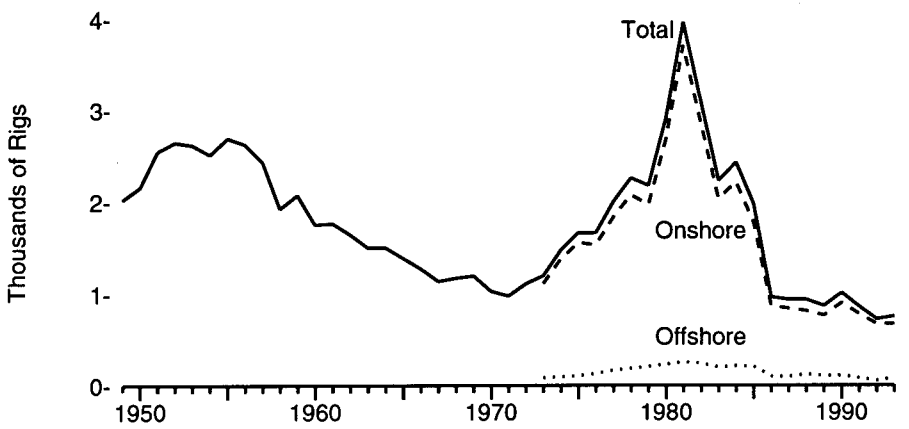
Line Miles of Seismic Surveys, 1969-1990



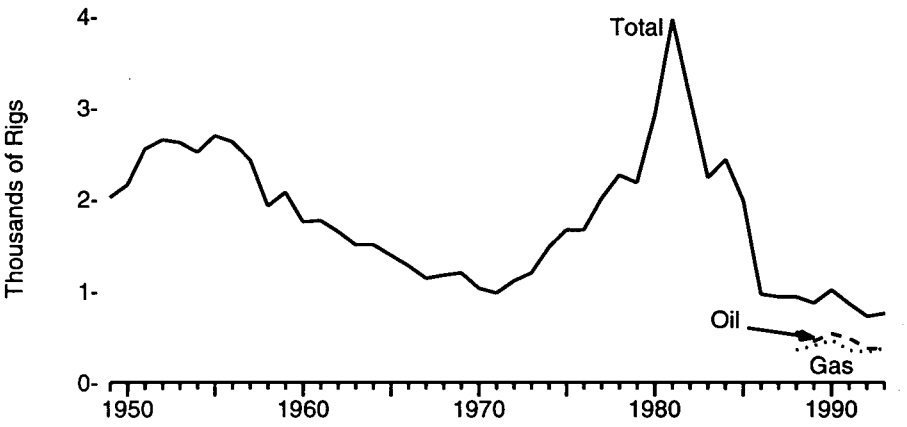
Active Well Servicing Units, 1976-1993



Rotary Rigs in Operation, By Site, 1949-1993



Rotary Rigs in Operation By Type, 1949-1993



Source: Table 4.3.

Table 4.3 Oil and Gas Drilling Activity Measurements, 1949-1993

Year	Crews Engaged in Seismic Exploration			Line Miles of Seismic Surveys (thousand)			Rotary Rigs in Operation [1]					Active Well Servicing Units
							By Site		By Type			
	Offshore	Onshore	Total	Offshore	Onshore	Total	Offshore	Onshore	Oil	Gas	Total [2]	
1949	NA	NA	476	NA	NA	NA	NA	NA	NA	NA	2,017	NA
1950	NA	NA	448	NA	NA	NA	NA	NA	NA	NA	2,154	NA
1951	NA	NA	545	NA	NA	NA	NA	NA	NA	NA	2,543	NA
1952	NA	NA	663	NA	NA	NA	NA	NA	NA	NA	2,641	NA
1953	NA	NA	639	NA	NA	NA	NA	NA	NA	NA	2,613	NA
1954	NA	NA	572	NA	NA	NA	NA	NA	NA	NA	2,508	NA
1955	NA	NA	591	NA	NA	NA	NA	NA	NA	NA	2,686	NA
1956	NA	NA	568	NA	NA	NA	NA	NA	NA	NA	2,620	NA
1957	NA	NA	524	NA	NA	NA	NA	NA	NA	NA	2,426	NA
1958	NA	NA	422	NA	NA	NA	NA	NA	NA	NA	1,922	NA
1959	NA	NA	425	NA	NA	NA	NA	NA	NA	NA	2,071	NA
1960	NA	NA	385	NA	NA	NA	NA	NA	NA	NA	1,748	NA
1961	NA	NA	380	NA	NA	NA	NA	NA	NA	NA	1,761	NA
1962	NA	NA	326	NA	NA	NA	NA	NA	NA	NA	1,641	NA
1963	NA	NA	331	NA	NA	NA	NA	NA	NA	NA	1,499	NA
1964	NA	NA	342	NA	NA	NA	NA	NA	NA	NA	1,501	NA
1965	36	318	354	NA	NA	NA	NA	NA	NA	NA	1,388	NA
1966	38	268	306	NA	NA	NA	NA	NA	NA	NA	1,272	NA
1967	29	249	278	NA	NA	NA	NA	NA	NA	NA	1,135	NA
1968	20	252	272	NA	NA	NA	NA	NA	NA	NA	1,169	NA
1969	16	247	263	NA	NA	199.9	NA	NA	NA	NA	1,194	NA
1970	10	185	195	NA	NA	167.3	NA	NA	NA	NA	1,028	NA
1971	10	211	221	NA	NA	191.7	NA	NA	NA	NA	976	NA
1972	12	239	251	NA	NA	235.7	NA	NA	NA	NA	1,107	NA
1973	23	227	250	258.9	127.2	386.1	84	1,110	NA	NA	1,194	NA
1974	31	274	305	341.8	158.6	500.4	94	1,378	NA	NA	1,472	NA
1975	30	254	284	309.3	150.7	460.0	106	1,554	NA	NA	1,660	NA
1976	25	237	262	226.3	142.9	369.2	129	1,529	NA	NA	1,658	2,601
1977	27	281	308	124.7	120.1	244.7	167	1,834	NA	NA	2,001	2,828
1978	25	327	352	174.6	135.9	310.5	185	2,074	NA	NA	2,259	2,988
1979	30	370	400	193.2	163.9	357.1	207	1,970	NA	NA	2,177	3,399
1980	37	493	530	202.7	184.1	386.8	231	2,678	NA	NA	2,909	4,089
1981	44	637	681	338.2	256.2	594.4	256	3,714	NA	NA	3,970	4,850
1982	57	531	588	558.5	248.5	806.9	243	2,862	NA	NA	3,105	4,248
1983	47	426	473	469.2	188.5	657.7	199	2,033	NA	NA	2,232	3,732
1984	49	445	494	538.5	185.9	724.4	213	2,215	NA	NA	2,428	4,663
1985	45	333	378	557.7	140.0	697.7	206	1,774	NA	NA	1,980	4,716
1986	24	176	200	252.6	67.6	320.2	99	865	NA	NA	964	3,036
1987	24	153	177	263.7	52.7	316.5	95	841	NA	NA	936	3,060
1988	29	153	182	248.6	79.5	328.1	123	813	554	354	936	3,341
1989	23	109	132	197.4	48.0	245.5	105	764	453	401	869	3,391
1990	23	102	125	300.2	134.2	434.5	108	902	532	464	1,010	3,658
1991	19	85	104	NA	NA	NA	81	779	482	351	860	3,331
1992	12	64	76	NA	NA	NA	52	669	373	331	721	2,732
1993	16	63	79	NA	NA	NA	82	672	373	364	754	3,158

[1] Data are not for the exact calendar year but for the 52 or 53 consecutive whole weeks that most nearly coincide with the calendar year.

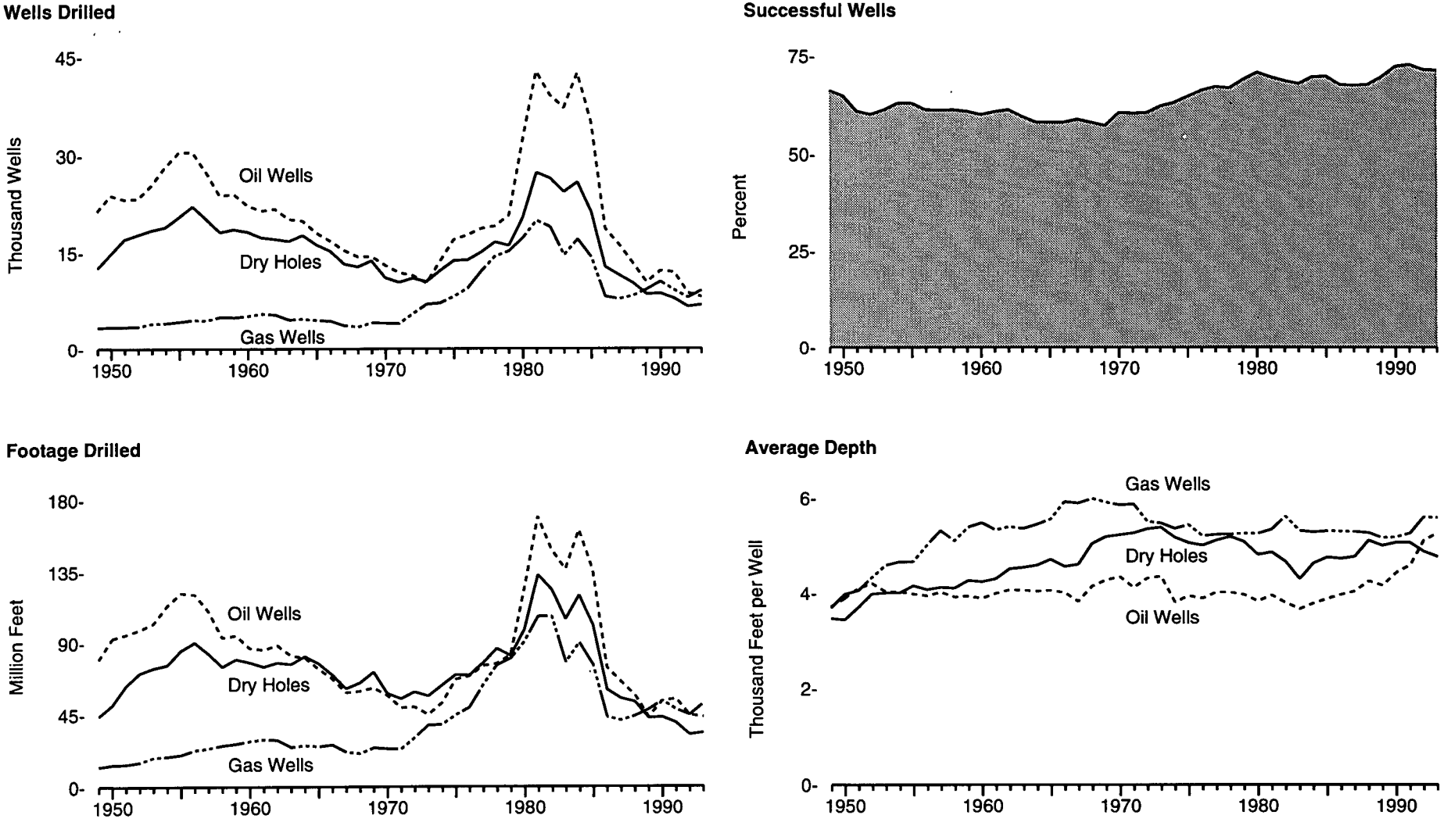
[2] Sum of oil, gas, and miscellaneous other rigs, which is not shown.

NA=Not available.

Notes: • Geographic coverage is the 50 States and the District of Columbia. • Totals may not equal sum of components due to independent rounding.

Sources: **Crews Engaged in Seismic Exploration** and **Line Miles of Seismic Surveys:** Society of Exploration Geophysicists, Tulsa, Oklahoma, *SEG News Release*, and *Geophysics: The Leading Edge of Exploration*, monthly. **Rotary Rigs in Operation:** Baker Hughes, Inc., Houston, Texas, *Rotary Rigs Running—By State*. **Active Well Servicing Units:** American Association of Oilwell Servicing Contractors, Dallas, Texas, "Well Servicing."

Figure 4.4 Oil and Gas Exploratory and Development Wells, 1949-1993



Source: Table 4.4.

Table 4.4 Oil and Gas Exploratory and Development Wells, 1949-1993

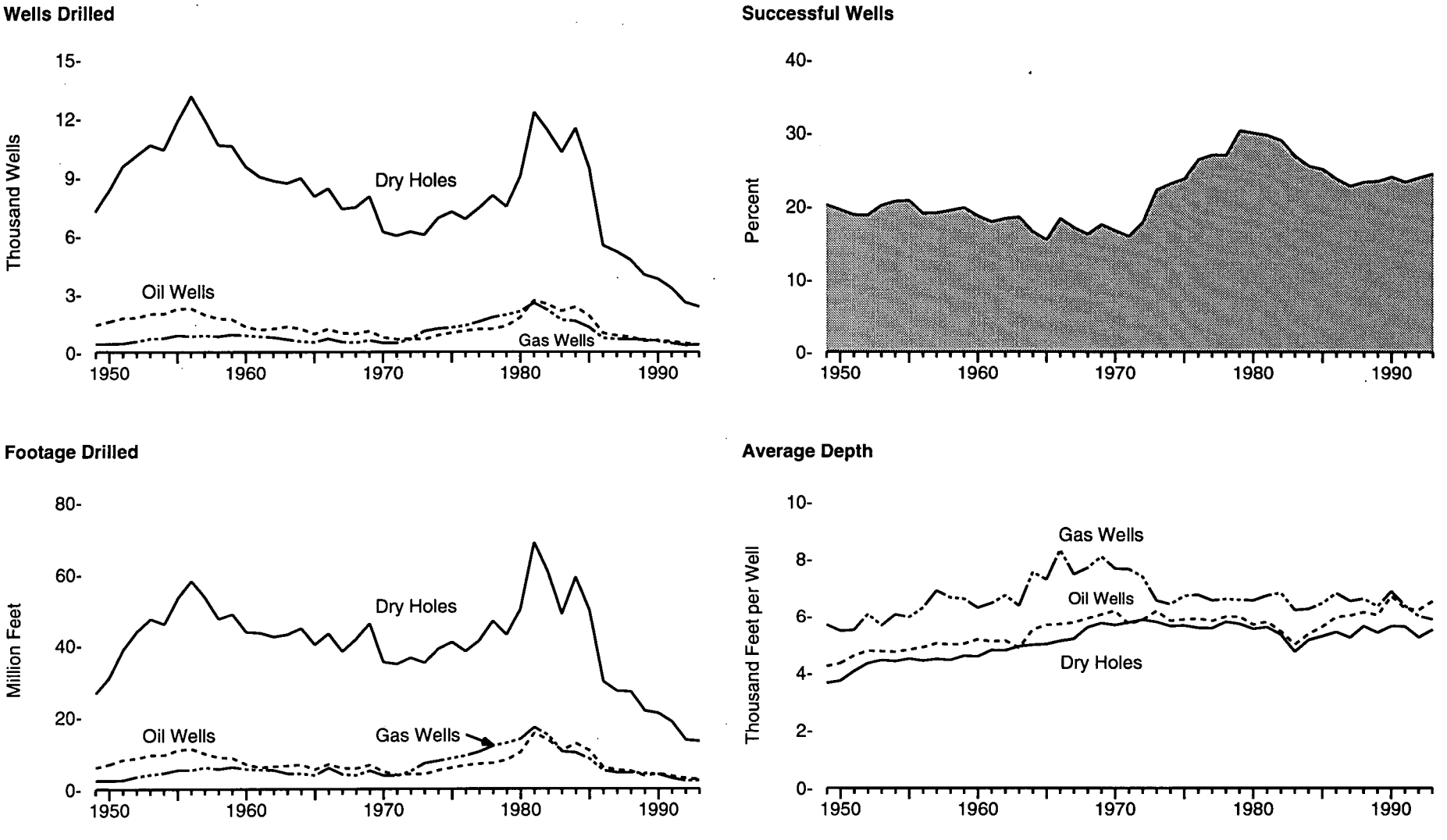
Year	Wells Drilled (thousands)				Successful Wells (percent)	Footage Drilled (million feet)				Average Depth (feet per well)			
	Oil	Gas	Dry Holes	Total		Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total
1949	21.35	3.36	12.60	37.31	66.2	79.4	12.4	43.8	135.6	3,720	3,698	3,473	3,635
1950	23.81	3.44	14.80	42.05	64.8	92.7	13.7	51.0	157.4	3,893	3,979	3,445	3,742
1951	23.18	3.44	17.03	43.64	61.0	95.1	13.9	63.1	172.1	4,103	4,056	3,706	3,944
1952	23.29	3.51	17.76	44.56	60.1	98.1	15.3	70.7	184.1	4,214	4,342	3,983	4,132
1953	25.32	3.97	18.45	47.74	61.4	102.1	18.2	73.9	194.2	4,033	4,599	4,004	4,069
1954	28.14	4.04	18.93	51.11	63.0	113.4	18.9	75.8	208.0	4,028	4,670	4,004	4,070
1955	30.43	4.27	20.45	55.15	62.9	121.1	19.9	85.1	226.2	3,981	4,672	4,161	4,101
1956	30.53	4.53	22.11	57.17	61.3	120.4	22.7	90.2	233.3	3,942	5,018	4,079	4,080
1957	27.36	4.48	20.16	52.00	61.2	110.0	23.8	83.2	217.0	4,021	5,326	4,126	4,174
1958	23.77	5.01	18.16	46.94	61.3	93.1	25.6	74.6	193.3	3,916	5,106	4,110	4,118
1959	24.04	4.93	18.59	47.56	60.9	94.6	26.6	79.5	200.7	3,935	5,396	4,275	4,220
1960	22.26	5.15	18.21	45.62	60.1	86.6	28.2	77.4	192.2	3,889	5,486	4,248	4,213
1961	21.44	5.49	17.33	44.25	60.8	85.6	29.3	74.7	189.6	3,994	5,339	4,311	4,285
1962	21.73	5.35	17.08	44.16	61.3	88.4	28.9	77.3	194.6	4,070	5,408	4,524	4,408
1963	20.14	4.57	16.76	41.47	59.6	81.8	24.5	76.3	182.6	4,063	5,368	4,552	4,405
1964	19.91	4.69	17.69	42.29	58.2	80.5	25.6	81.4	187.4	4,042	5,453	4,598	4,431
1965	18.07	4.48	16.23	38.77	58.2	73.3	24.9	76.6	174.9	4,059	5,562	4,723	4,510
1966	16.78	4.38	15.23	36.38	58.1	67.3	25.9	69.6	162.9	4,013	5,928	4,573	4,478
1967	15.33	3.66	13.25	32.23	58.9	58.6	21.6	61.1	141.4	3,825	5,898	4,616	4,385
1968	14.33	3.46	12.81	30.60	58.1	59.5	20.7	64.7	145.0	4,153	5,994	5,053	4,738
1969	14.37	4.08	13.74	32.19	57.3	61.6	24.2	71.4	157.1	4,286	5,918	5,195	4,881
1970	13.04	4.03	11.10	28.17	60.6	56.8	23.6	58.1	138.6	4,357	5,859	5,236	4,918
1971	11.90	3.98	10.38	26.27	60.5	49.1	23.4	54.8	127.3	R4,122	5,880	5,276	4,845
1972	11.44	5.48	11.01	27.93	60.6	49.5	30.3	59.1	138.8	4,327	5,517	5,362	4,969
1973	10.25	6.98	10.47	27.69	62.2	44.8	38.2	56.5	139.4	4,366	5,478	5,394	5,035
1974	13.66	7.17	12.21	33.04	63.1	52.1	38.5	63.2	153.8	3,811	5,369	5,180	4,655
1975	16.98	8.17	13.74	38.89	64.7	66.9	44.5	69.6	181.0	3,942	5,445	5,069	4,656
1976	17.70	9.44	13.81	40.94	66.3	68.8	49.2	69.3	187.3	3,889	5,213	5,017	4,575
1977	18.70	12.12	15.04	45.86	67.2	75.2	63.5	77.0	215.7	4,021	5,240	5,121	4,704
1978	19.07	14.41	16.59	50.06	66.9	76.6	75.6	86.2	238.4	4,019	R5,248	5,194	4,762
1979	20.70	15.17	16.04	51.91	69.1	82.1	79.9	81.7	243.7	3,967	5,266	R5,093	4,694
1980	32.28	17.22	20.34	69.84	70.9	123.6	90.7	98.1	312.3	3,829	5,264	4,821	4,472
1981	42.84	19.91	27.28	90.03	69.7	169.4	106.5	132.9	408.8	3,955	5,350	4,871	4,541
1982	39.14	18.94	26.38	84.47	68.8	148.6	106.5	123.3	378.4	3,797	5,621	R4,675	4,480
1983	37.20	14.56	24.34	76.09	68.0	136.4	R77.4	104.8	318.6	R3,671	R5,324	R4,310	R4,192
1984	42.59	17.01	25.80	85.39	69.8	R161.1	R90.0	119.6	370.7	R3,787	R5,295	R4,642	R4,345
1985	35.02	14.25	21.21	70.48	69.9	135.9	75.7	101.0	312.6	R3,883	R5,317	R4,768	R4,439
1986	18.70	8.14	12.77	39.60	67.8	R74.0	43.1	R60.4	177.5	R3,969	R5,313	R4,742	R4,494
1987	16.19	7.76	11.48	35.42	67.6	R65.3	R41.1	54.8	161.2	R4,043	R5,304	R4,780	R4,558
1988	13.32	8.24	10.24	31.80	67.8	57.0	R43.7	52.6	153.3	R4,266	R5,282	R5,121	R4,804
1989E	10.34	9.23	8.49	28.06	69.7	R43.1	47.7	42.6	133.4	R4,169	R5,173	R5,015	R4,755
1990E	12.15	R10.44	R8.61	R31.20	R72.4	R53.1	R53.3	R43.0	149.4	R4,450	R5,190	R5,078	R4,871
1991E	11.91	R9.13	R7.83	R28.87	R72.9	R54.5	R47.8	R39.5	R141.8	R4,604	R5,271	R5,077	R4,943
1992E	R8.68	R7.95	R6.58	R23.20	R71.6	R44.2	R44.4	R32.0	R120.7	R5,121	R5,609	R4,887	R5,222
1993E	8.08	9.04	6.84	23.96	71.5	43.2	51.4	33.2	127.7	5,272	5,598	4,781	5,255

R=Revised data. E=Estimate. See Note at end of section.

Notes: • Service wells, stratigraphic tests, and core tests are excluded. • For 1949-1959, data represent wells completed in a given year. For 1960-1969, data are for well completion reports received by the American Petroleum Institute during the reporting year. For 1970 forward, the data represent wells completed in a given year. See Note at end of section. • Totals may not equal sum of components due to independent rounding. Average depth may not equal average of components due to independent rounding.

Sources: • 1949-1965—Gulf Publishing Company, *World Oil*, "Forecast-Review" issue. • 1966-1969—American Petroleum Institute, *Quarterly Review of Drilling Statistics for the United States*, annual summaries and monthly reports. • 1970 forward—Energy Information Administration computations based on well reports submitted to the American Petroleum Institute.

Figure 4.5 Oil and Gas Exploratory Wells, 1949-1993



Source: Table 4.5.

Table 4.5 Oil and Gas Exploratory Wells, 1949-1993

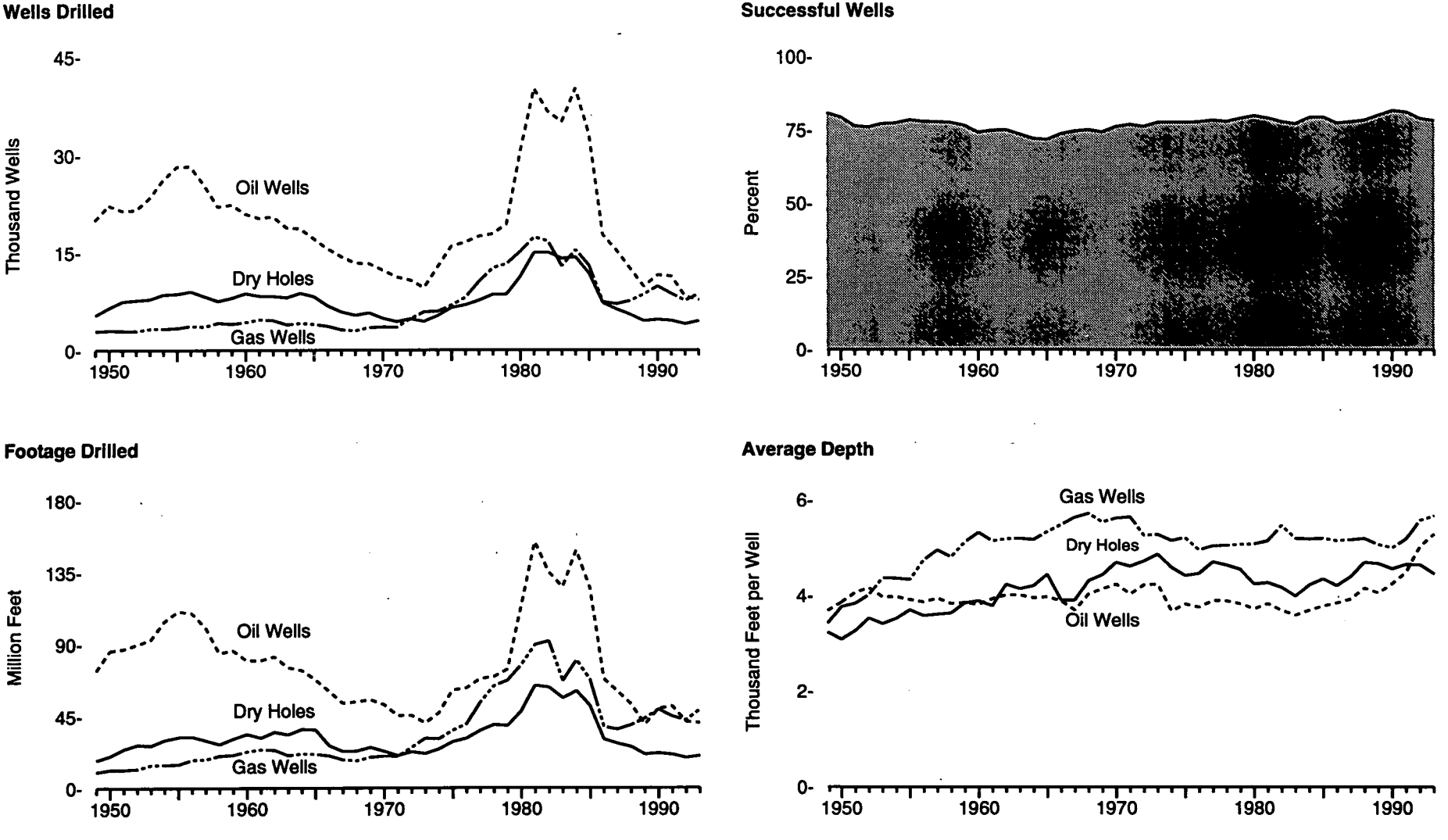
Year	Wells Drilled (thousands)				Successful Wells (percent)	Footage Drilled (million feet)				Average Depth (feet per well)			
	Oil	Gas	Dry Holes	Total		Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total
1949	1.41	0.42	7.23	9.06	20.2	6.0	2.4	26.4	34.8	4,232	5,682	3,658	3,842
1950	1.58	0.43	8.29	10.31	19.5	6.9	2.4	31.0	40.2	4,335	5,466	3,733	3,898
1951	1.76	0.45	9.54	11.76	18.9	8.1	2.5	38.7	49.3	4,609	5,497	4,059	4,197
1952	1.78	0.56	10.09	12.43	18.8	8.5	3.4	43.7	55.6	4,781	6,071	4,334	4,476
1953	1.98	0.70	10.63	13.31	20.1	9.4	4.0	47.3	60.7	4,761	5,654	4,447	4,557
1954	1.99	0.73	10.39	13.10	20.7	9.4	4.4	45.8	59.6	4,740	6,059	4,408	4,550
1955	2.24	0.87	11.83	14.94	20.8	10.8	5.2	53.2	69.2	4,819	5,964	4,498	4,632
1956	2.27	0.82	13.12	16.21	19.1	11.1	5.2	58.0	74.3	4,901	6,301	4,425	4,587
1957	1.95	0.87	11.90	14.71	19.1	9.8	6.0	53.4	69.2	5,036	6,898	4,488	4,702
1958	1.75	0.82	10.63	13.20	19.4	8.7	5.5	47.3	61.5	4,993	6,657	4,449	4,658
1959	1.70	0.91	10.58	13.19	19.8	8.5	6.0	48.7	63.3	5,021	6,613	4,602	4,795
1960	1.32	0.87	9.52	11.70	18.7	6.8	5.5	43.5	55.8	5,170	6,298	4,575	4,770
1961	1.16	0.81	9.02	10.99	17.9	5.9	5.2	43.3	54.4	5,099	6,457	4,799	4,953
1962	1.21	0.77	8.82	10.80	18.4	6.2	5.2	42.2	53.6	5,124	6,728	4,790	4,966
1963	1.31	0.66	8.69	10.66	18.5	6.4	4.2	42.8	53.5	4,878	6,370	4,933	5,016
1964	1.22	0.56	8.95	10.73	16.6	6.7	4.2	44.6	55.5	5,509	7,547	4,980	5,174
1965	0.95	0.52	8.01	9.47	15.4	5.4	3.8	40.1	49.2	5,672	7,295	5,007	5,198
1966	1.20	0.70	8.42	10.31	18.4	6.8	5.8	43.1	55.7	5,700	8,321	5,117	5,402
1967	0.99	0.53	7.36	8.88	17.1	5.7	4.0	38.2	47.8	5,758	7,478	5,188	5,388
1968	0.95	0.49	7.44	8.88	16.2	5.6	3.7	41.6	51.0	5,914	7,697	5,589	5,739
1969	1.08	0.62	8.00	9.70	17.5	6.6	5.0	45.9	57.5	6,054	8,092	5,739	5,924
1970	0.76	0.48	6.19	7.43	16.7	4.7	3.7	35.1	43.5	6,198	R7,672	5,671	5,854
1971	0.66	0.47	6.00	7.13	15.9	3.8	3.6	34.6	42.0	R5,703	R7,657	5,765	5,885
1972	0.69	0.66	6.20	7.55	17.9	4.0	4.9	36.4	45.3	R5,859	R7,390	5,863	5,996
1973	0.65	1.08	6.04	7.77	22.3	4.0	7.1	34.9	46.0	R6,188	R6,555	5,785	5,926
1974	0.87	1.21	6.89	8.97	23.1	5.1	7.7	38.9	51.7	5,826	6,425	5,637	5,761
1975	0.99	1.26	7.21	9.46	23.8	5.8	8.5	40.8	55.1	5,875	R6,715	5,655	5,819
1976	1.10	1.36	6.85	9.32	26.4	6.5	9.2	38.2	53.9	R5,905	R6,749	R5,574	5,785
1977	1.18	1.56	7.40	10.15	27.1	6.9	10.2	41.1	58.3	5,821	R6,561	R5,558	5,743
1978	1.19	1.79	8.05	11.04	27.0	7.1	11.8	46.6	65.6	R5,975	6,604	5,787	5,940
1979	1.34	1.92	7.48	10.73	30.3	8.0	12.6	42.7	63.4	R5,984	6,579	5,715	5,903
1980	1.78	2.09	9.04	12.91	30.0	10.1	13.7	50.1	73.9	5,684	R6,557	5,540	5,725
1981	2.67	2.53	12.30	17.50	29.7	15.4	17.0	68.8	101.3	5,789	6,724	5,598	5,790
1982	2.47	2.17	11.35	15.98	29.0	13.5	14.8	60.5	88.8	5,446	6,819	R5,335	5,553
1983	2.11	1.66	10.27	14.04	26.9	R10.5	10.3	48.7	69.6	4,996	R6,221	R4,747	R4,958
1984	2.34	1.60	11.48	15.42	25.5	12.5	10.0	R59.1	R81.6	5,354	R6,258	R5,154	R5,299
1985	1.88	1.28	9.45	12.61	25.1	10.5	8.3	49.8	68.6	R5,613	R6,461	R5,280	R5,450
1986	0.99	0.73	5.51	7.23	23.8	5.9	5.0	29.8	40.7	R5,962	R6,810	R5,425	R5,638
1987	0.88	0.67	5.18	6.71	22.8	5.2	4.4	27.1	R36.6	R6,021	R6,541	R5,233	R5,465
1988	0.79	0.66	4.77	6.22	23.4	4.9	4.4	R27.0	R36.2	R6,145	R6,618	R5,635	5,805
1989P	0.58	0.65	4.00	5.23	23.5	3.5	4.1	21.6	R29.3	R6,041	R6,353	R5,405	R5,594
1990P	0.62	0.58	R3.78	R4.98	R24.0	4.1	3.9	R21.0	R28.9	R6,715	R6,876	R5,639	R5,916
1991P	0.54	R0.46	3.30	R4.31	R23.4	3.4	2.9	R18.5	R24.8	R6,278	R6,371	R5,623	R5,786
1992P	R0.46	R0.36	R2.57	R3.38	R24.0	2.8	R2.1	R13.4	R18.4	R6,232	R6,003	R5,243	R5,456
1993P	0.38	0.39	2.35	3.11	24.5	2.5	2.3	13.1	17.9	6,531	5,884	5,512	5,681

R=Revised data. P=Preliminary data. See Note at end of section.

Notes: • For 1949-1959, data represent wells completed in a given year. For 1960-1969, data are for well completion reports received by the American Petroleum Institute during the reporting year. For 1970 forward, the data represent wells completed in a given year. See Note at end of section. • Totals may not equal sum of components due to independent rounding. Average depth may not equal average of components due to independent rounding.

Sources: • 1949-1960—American Association of Petroleum Geologists, *Statistics on Exploratory Drilling in the United States, 1940 through 1960* (1962), pp. 4-19. • 1961-1965—*Bulletin of the American Association of Petroleum Geologists*, "North American Developments" issue. • 1966-1969—American Petroleum Institute, *Quarterly Review of Drilling Statistics for the United States*, annual summaries and monthly reports. • 1970 forward—Energy Information Administration computations based on well reports submitted to the American Petroleum Institute.

Figure 4.6 Oil and Gas Development Wells, 1949-1993



Source: Table 4.6.

Table 4.6 Oil and Gas Development Wells, 1949-1993

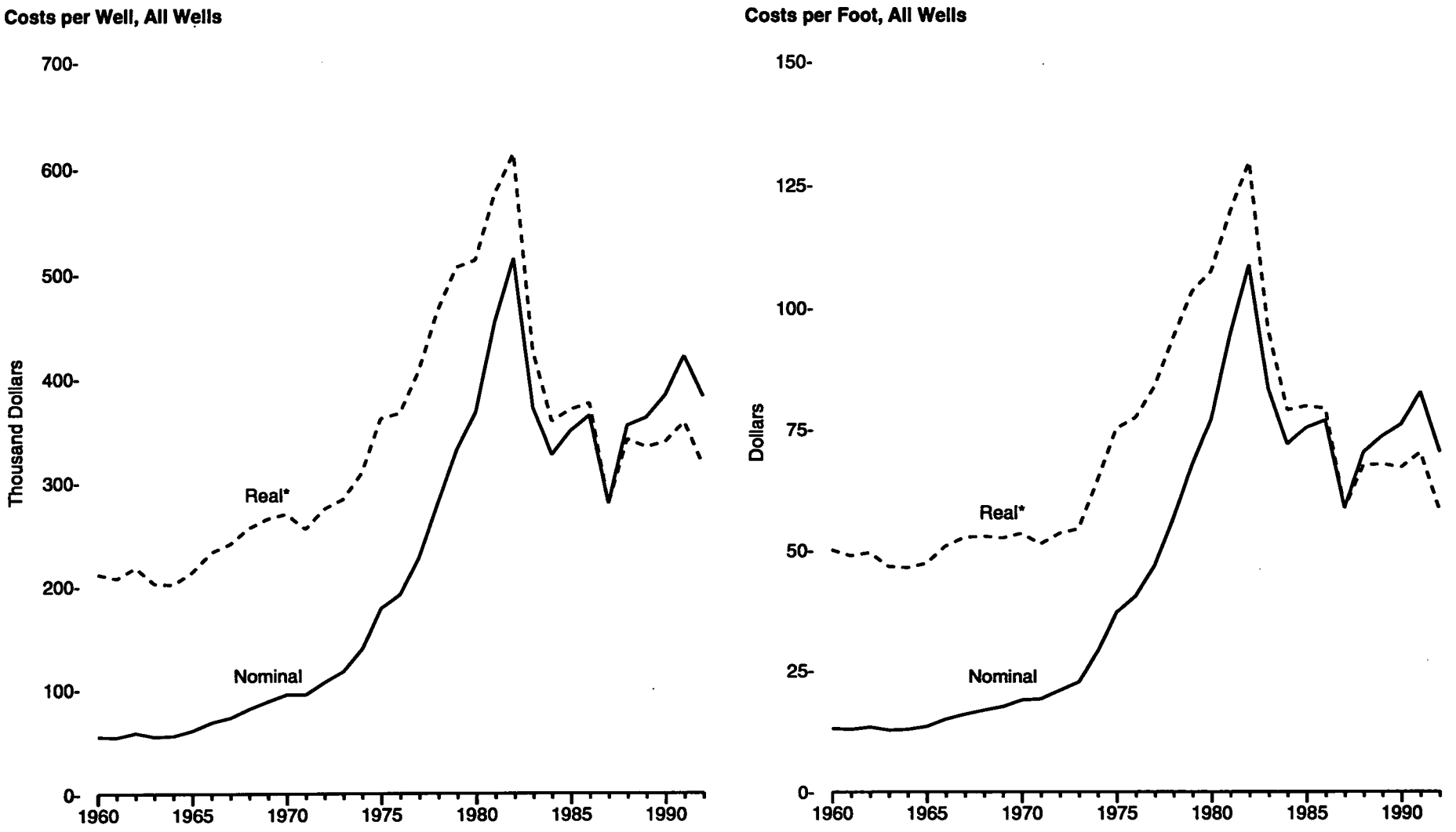
Year	Wells Drilled (thousands)				Successful Wells (percent)	Footage Drilled (million feet)				Average Depth (feet per well)			
	Oil	Gas	Dry Holes	Total		Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total
1949	19.95	2.94	5.37	28.25	81.0	73.5	10.0	17.3	100.8	3,684	3,412	3,225	3,568
1950	22.23	3.01	6.51	31.74	79.5	85.8	11.3	20.0	117.2	3,861	3,766	3,077	3,691
1951	21.42	2.98	7.49	31.89	76.5	87.0	11.5	24.4	122.8	4,061	3,837	3,255	3,851
1952	21.51	2.96	7.67	32.14	76.1	89.7	11.9	27.0	128.5	4,167	4,015	3,520	3,999
1953	23.34	3.27	7.82	34.43	77.3	92.7	14.3	26.6	133.6	3,972	4,373	3,401	3,880
1954	26.16	3.31	8.54	38.01	77.5	104.0	14.5	30.0	148.4	3,974	4,365	3,512	3,905
1955	28.20	3.39	8.62	40.21	78.6	110.4	14.7	31.9	157.0	3,915	4,339	3,699	3,904
1956	28.26	3.71	8.99	40.96	78.0	109.2	17.6	32.1	158.9	3,865	4,734	3,574	3,880
1957	25.42	3.61	8.25	37.28	77.9	100.2	17.9	29.7	147.9	3,944	4,950	3,605	3,966
1958	22.03	4.18	7.53	33.74	77.7	84.4	20.1	27.3	131.8	3,831	4,801	3,631	3,907
1959	22.34	4.02	8.01	34.37	76.7	86.1	20.6	30.8	137.4	3,852	5,120	3,844	3,999
1960	20.94	4.28	8.70	33.92	74.4	79.7	22.8	33.8	136.3	3,809	5,321	3,889	4,020
1961	20.28	4.67	8.31	33.26	75.0	79.7	24.0	31.4	135.2	3,931	5,145	3,782	4,064
1962	20.52	4.58	8.26	33.36	75.2	82.2	23.8	35.0	141.0	4,008	5,186	4,239	4,227
1963	18.82	3.91	8.08	30.80	73.8	75.4	20.3	33.5	129.2	4,006	5,198	4,143	4,193
1964	18.69	4.14	8.74	31.57	72.3	73.7	21.4	36.8	131.9	3,947	5,171	4,207	4,179
1965	17.12	3.97	8.22	29.31	71.9	68.0	21.2	36.5	125.7	3,970	5,337	4,446	4,288
1966	15.58	3.68	6.81	26.07	73.9	60.5	20.1	26.6	107.2	3,884	5,474	3,900	4,112
1967	14.34	3.13	5.89	23.36	74.8	53.0	17.6	23.0	93.5	3,692	5,629	3,901	4,004
1968	13.38	2.97	5.37	21.72	75.3	53.9	17.0	23.2	94.0	4,027	5,716	4,311	4,328
1969	13.28	3.47	5.74	22.49	74.5	55.0	19.2	25.4	99.6	4,142	5,531	4,437	4,431
1970	12.28	3.55	4.91	20.74	76.3	52.1	20.0	23.0	95.0	4,243	5,615	4,686	4,583
1971	11.24	3.51	4.39	19.14	77.1	45.3	19.8	20.2	85.3	4,028	5,641	4,608	4,457
1972	10.75	4.83	4.81	20.38	76.4	45.4	25.4	22.7	93.5	4,228	5,261	4,716	4,588
1973	9.60	5.90	4.43	19.92	77.8	40.7	31.1	21.5	93.4	4,242	5,281	4,861	4,687
1974	12.79	5.97	5.31	24.07	77.9	47.0	30.8	24.4	102.1	3,674	5,156	4,587	4,243
1975	15.99	6.91	6.53	29.42	77.8	61.1	36.0	28.9	126.0	3,822	5,213	4,423	4,282
1976	16.60	8.08	6.95	31.62	78.0	62.3	40.0	31.1	133.4	3,756	4,954	4,468	4,218
1977	17.52	10.56	7.63	35.71	78.6	68.3	53.3	35.9	157.4	3,899	5,044	4,699	4,409
1978	17.87	12.61	8.54	39.02	78.1	69.5	63.8	39.6	172.8	3,889	5,055	4,634	4,429
1979	19.37	13.25	8.56	41.18	79.2	74.1	67.3	38.9	180.3	3,828	5,076	4,549	4,379
1980	30.50	15.13	11.30	56.93	80.1	113.5	76.9	48.0	238.4	3,721	5,085	4,246	4,188
1981	40.18	17.37	14.99	72.54	79.3	154.0	89.5	64.1	307.5	3,833	5,149	4,275	4,240
1982	36.67	16.78	15.04	68.48	78.0	135.2	91.7	62.8	289.7	3,686	5,466	4,176	4,230
1983	35.09	12.90	14.07	62.05	77.3	125.9	67.1	56.1	249.0	3,588	5,202	3,986	4,014
1984	40.25	15.41	14.32	69.98	79.5	148.6	80.0	60.5	289.1	3,692	5,190	4,227	4,132
1985	33.14	12.97	11.76	57.88	79.7	125.3	67.4	51.2	243.9	3,781	5,199	4,352	4,215
1986	17.71	7.40	7.26	32.37	77.6	68.1	38.1	30.6	136.8	3,847	5,150	4,212	4,227
1987	15.33	7.08	6.30	28.71	78.1	60.2	36.7	27.7	124.6	3,927	5,178	4,402	4,340
1988	12.53	7.58	5.48	25.58	78.6	52.1	39.3	25.7	117.1	4,162	5,183	4,691	4,578
1989[E]	9.76	8.57	4.49	22.82	80.3	39.6	43.6	21.0	104.1	4,057	5,083	4,666	4,562
1990[E]	11.53	9.86	4.83	26.23	81.6	49.1	49.3	22.0	120.4	4,255	5,003	4,559	4,592
1991[E]	11.36	8.67	4.53	24.56	81.6	51.1	44.9	21.0	117.1	4,497	5,181	4,650	4,767
1992[E]	8.22	7.59	4.01	19.82	79.8	41.4	42.3	18.6	102.3	5,039	5,568	4,640	5,161
1993[E]	7.70	8.65	4.49	20.85	78.5	40.7	49.0	20.0	109.8	5,287	5,667	4,462	5,267

E=Estimate. See Note at end of section.

Notes: • Service wells, stratigraphic tests, and core tests are excluded. • For 1949-1959, data represent wells completed in a given year. For 1960-1969, data are for well completion reports received by the American Petroleum Institute during the reporting year. For 1970 forward, the data represent wells completed in a given year. See Note at end of section. • Totals may not equal sum of components due to independent rounding. Average depth may not equal average of components due to independent rounding.

Sources: • 1949-1965—Gulf Publishing Company, *World Oil*, "Forecast-Review" issue. • 1966-1969—American Petroleum Institute, *Quarterly Review of Drilling Statistics for the United States*, annual summaries and monthly reports. • 1970 forward—Energy Information Administration computations based on well reports submitted to the American Petroleum Institute.

Figure 4.7 Costs of Wells Drilled, 1960-1992



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Source: Table 4.7.

Table 4.7 Costs of Oil and Gas Wells Drilled, 1960-1992

Year	Costs per Well (thousand dollars)					Costs per Foot (dollars)				
	Oil (nominal)	Gas (nominal)	Dry Holes (nominal)	All (nominal)	All (real) [1]	Oil (nominal)	Gas (nominal)	Dry Holes (nominal)	All (nominal)	All (real) [1]
1960	52.2	102.7	44.0	54.9	211.3	13.22	18.57	10.56	13.01	50.04
1961	51.3	94.7	45.2	54.5	207.3	13.11	17.65	10.56	12.85	48.86
1962	54.2	97.1	50.8	58.6	218.0	13.41	18.10	11.20	13.31	49.48
1963	51.8	92.4	48.2	55.0	202.3	13.20	17.19	10.58	12.69	46.65
1964	50.6	104.8	48.5	55.8	201.5	13.12	18.57	10.64	12.86	46.43
1965	56.6	101.9	53.1	60.6	213.5	13.94	18.35	11.21	13.44	47.32
1966	62.2	133.8	56.9	68.4	232.6	15.04	21.75	12.34	14.95	50.85
1967	66.6	141.0	61.5	72.9	240.6	16.61	23.05	12.87	15.97	52.71
1968	79.1	148.5	66.2	81.5	256.2	18.63	24.05	12.88	16.83	52.92
1969	86.5	154.3	70.2	88.6	265.1	19.28	25.58	13.23	17.56	52.57
1970	86.7	160.7	80.9	94.9	269.6	19.29	26.75	15.21	18.84	53.52
1971	78.4	166.6	86.8	94.7	255.3	18.41	27.70	16.02	19.03	51.29
1972	93.5	157.8	94.9	106.4	274.3	20.77	27.78	17.28	20.76	53.51
1973	103.8	155.3	105.8	117.2	283.7	22.54	27.46	19.22	22.50	54.48
1974	110.2	189.2	141.7	138.7	308.9	27.82	34.11	26.76	28.93	64.43
1975	138.6	262.0	177.2	177.8	361.4	34.17	46.23	33.86	36.99	75.18
1976	151.1	270.4	190.3	191.6	366.4	37.35	49.78	36.94	40.46	77.36
1977	170.0	313.5	230.2	227.2	406.4	41.16	57.57	43.49	46.81	83.74
1978	208.0	374.2	281.7	280.0	464.3	49.72	68.37	52.55	56.63	93.91
1979	243.1	443.1	339.6	331.4	505.9	58.29	80.66	64.60	67.70	103.36
1980	272.1	536.4	376.5	367.7	512.8	66.36	95.16	73.70	77.02	107.42
1981	336.3	698.6	464.0	453.7	575.0	80.40	122.17	90.03	94.30	119.52
1982	347.4	864.3	515.4	514.4	613.8	86.34	146.20	104.09	108.73	129.75
1983	283.8	608.1	366.5	371.7	426.3	72.65	108.37	79.10	83.34	95.57
1984	262.1	489.8	329.2	326.5	358.8	66.32	88.80	67.18	71.90	79.01
1985	270.4	508.7	372.3	349.4	370.1	66.78	93.09	73.69	75.35	79.82
1986	284.9	522.9	389.2	364.6	376.2	68.35	93.02	76.53	76.88	79.34
1987	246.0	380.4	259.1	279.6	279.6	58.35	69.55	51.05	58.71	58.71
1988	279.4	460.3	366.4	354.7	341.4	62.28	84.65	66.96	70.23	67.59
1989	282.3	457.8	355.4	362.2	333.9	64.92	86.86	67.61	73.55	67.79
1990	321.8	471.3	367.5	383.6	R338.6	69.17	90.73	67.49	76.07	R67.14
1991	346.9	506.6	441.2	421.5	R358.1	73.75	93.10	83.05	82.64	R70.21
1992	362.3	426.1	357.6	382.6	315.9	69.50	72.83	67.82	70.27	58.03

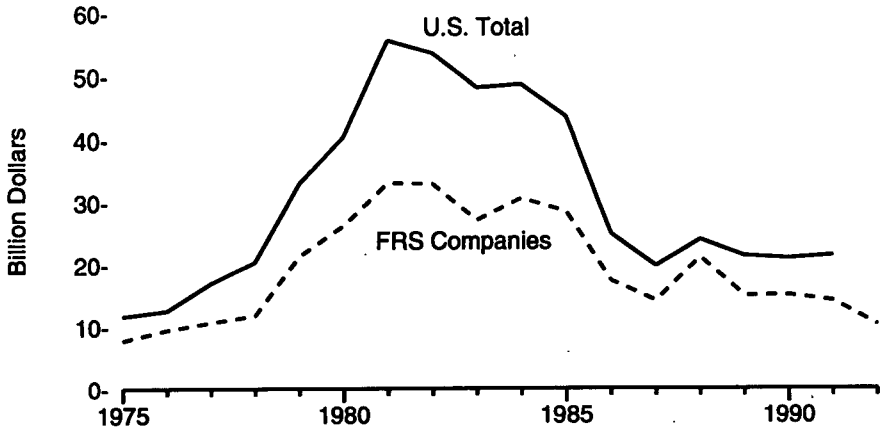
[1] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
R=Revised data.

Notes: • The information reported for 1965 and prior years is not strictly comparable with the more recent surveys. • Average cost is the arithmetic mean and includes all costs for drilling and equipping wells and for surface producing facilities. Wells drilled include exploratory and development wells; excludes service wells, stratigraphic tests, and core tests.

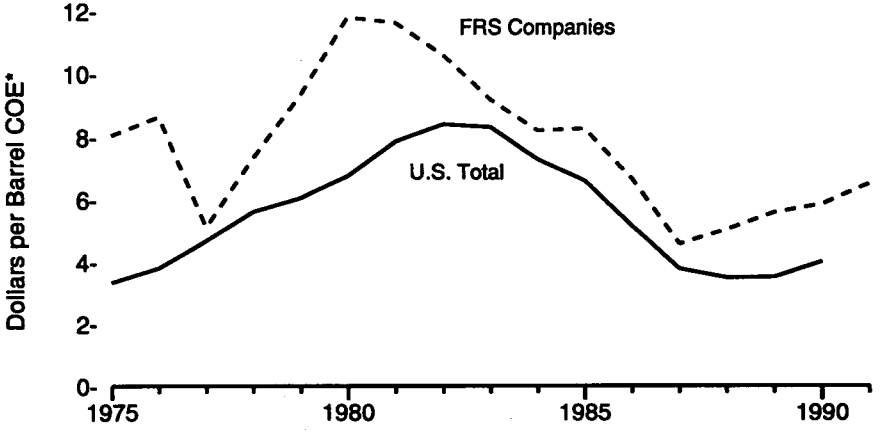
Source: American Petroleum Institute, Independent Petroleum Association of America, Mid-Continent Oil and Gas Association, *1992 Joint Association Survey on Drilling Costs.*

Figure 4.8 U.S. Exploration and Development Expenditures, Gross Additions to Proved Reserves, and Production of Liquid and Gaseous Hydrocarbons by FRS Companies and U.S. Industry

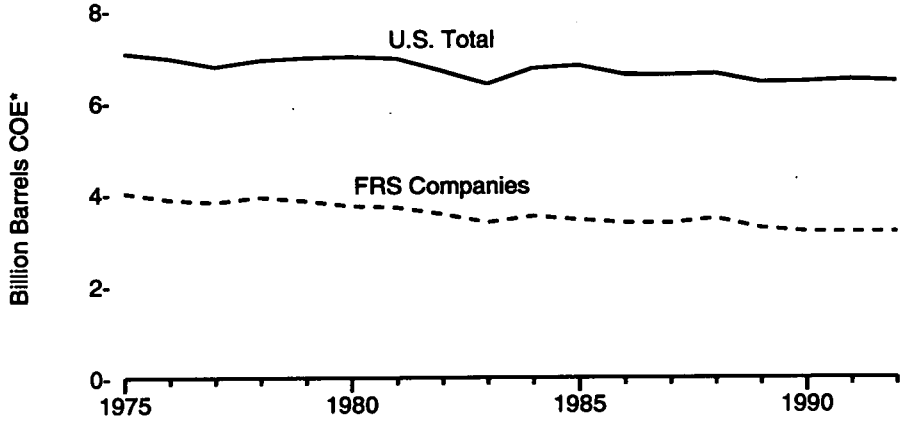
Exploration and Development Expenditures, 1975-1992



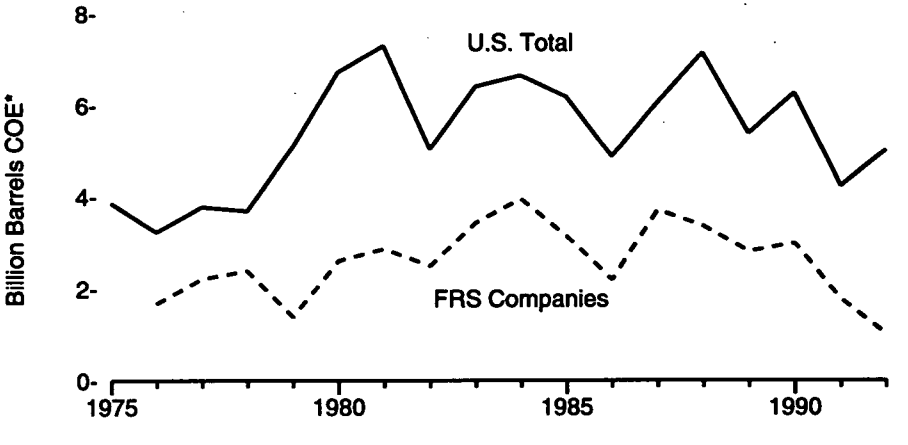
Expenditures per Barrel of Gross Reserve Additions, 1975-1991 (3-year weighted average)



Production, 1975-1992



Gross Additions to Proved Reserves, 1975-1992



*COE is the Crude Oil Equivalent.
Note: FRS is the Financial Reporting System (see Note at end of Section 3).

Source: Table 4.8.

Table 4.8 U.S. Exploration and Development Expenditures, Gross Additions to Proved Reserves, and Production of Liquid and Gaseous Hydrocarbons by FRS Companies and U.S. Industry, 1975-1992

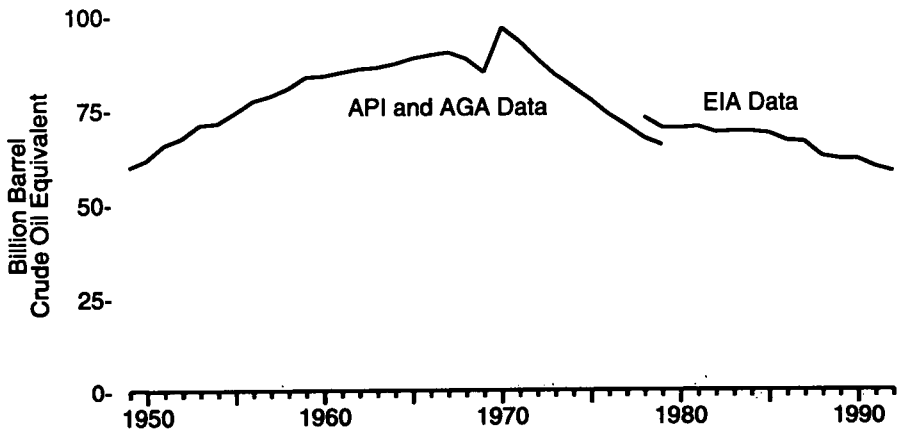
Year	Exploration and Development Expenditures (billion dollars)		Gross Additions to Proved Reserves [1] of Liquid and Gaseous Hydrocarbons [2] (million barrels COE [3])		Expenditures per Barrel of Reserve Additions, Three-Year Weighted Average (dollars per barrel COE [3])		Production of Liquid and Gaseous Hydrocarbons [2] (million barrels COE [3])	
	FRS Companies [4]	U.S. Total	FRS Companies [5,6]	U.S. Total [6]	FRS Companies [4,5]	U.S. Total	FRS Companies [5]	U.S. Total
1975	7.8	11.7	NA	3,846	8.05	3.34	4,006	7,071
1976	9.5	12.6	1,663	3,224	8.64	3.81	3,863	6,958
1977	10.7	17.0	2,210	3,765	5.12	4.68	3,809	6,777
1978	11.8	20.4	2,383	3,679	7.34	5.62	3,916	6,918
1979	21.3	32.9	1,378	5,071	9.34	6.06	3,834	6,970
1980	26.2	40.4	2,590	6,723	11.80	6.76	3,727	6,995
1981	33.0	55.7	2,848	7,304	11.63	7.86	3,694	6,954
1982	32.9	53.7	2,482	5,030	10.62	8.41	3,551	6,682
1983	27.1	48.2	3,427	6,412	9.20	8.32	3,370	6,399
1984	30.6	48.7	3,941	6,653	8.21	7.30	3,503	6,736
1985	28.5	43.6	3,129	6,190	8.27	6.61	3,427	6,798
1986	17.4	24.9	2,187	4,866	6.67	5.16	3,361	6,602
1987	14.2	19.8	3,698	6,059	4.58	3.79	3,354	6,596
1988	21.2	24.0	3,359	7,156	5.05	3.50	3,460	6,624
1989	15.0	21.4	2,798	5,385	5.60	3.52	3,243	6,437
1990	15.1	21.0	2,979	R6,271	5.87	4.02	3,163	6,453
1991	14.2	21.5	1,772	4,227	R6.52	NA	3,155	R6,497
1992	10.3	NA	1,331	5,006	NA	NA	3,152	6,459

[1] Gross additions to proved reserves equal annual change in proved reserves plus annual production.
[2] Liquid and gaseous hydrocarbons include crude oil, natural gas liquids, and natural gas.
[3] Crude oil equivalent: converted to Btu on the basis of annual average conversion factors. See Appendix A.
[4] FRS data for 1982 and 1984 are adjusted to exclude purchases of proved reserves associated with mergers among the FRS Companies.
[5] Based on net ownership interest (see Glossary).
[6] Downward revisions of Alaska North Slope natural gas reserves are excluded.
R=Revised data. NA=Not available.
Notes: • FRS is the Financial Reporting System (see Note at end of Section 3). • Data in this table are for U.S. domestic operations only.

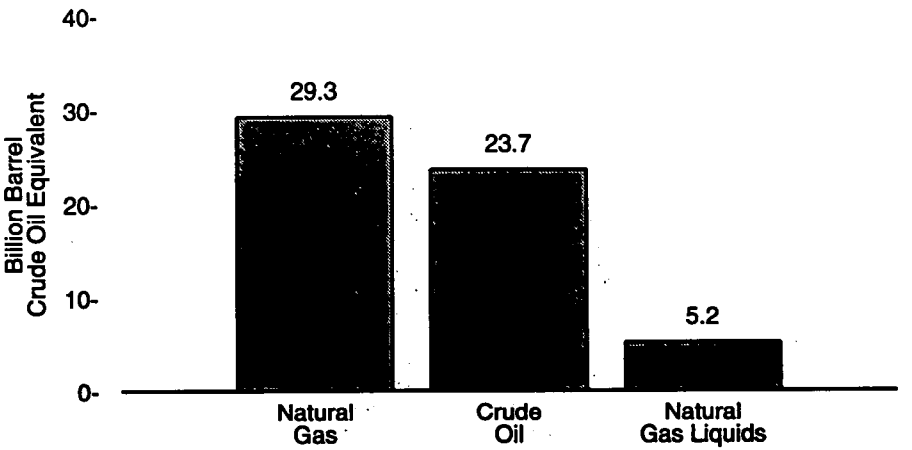
Sources: **FRS Companies:** Energy Information Administration (EIA), Form EIA-28, "Financial Reporting System." **U.S. Total, Exploration and Development Expenditures:** • 1975-1982—Bureau of the Census, *Annual Survey of Oil and Gas.* • 1983-1991—American Petroleum Institute, *Survey on Oil and Gas Expenditures 1992.* **U.S. Total, Gross Additions to Proved Reserves of Liquid and Gaseous Hydrocarbons:** • 1975-1979—American Gas Association, American Petroleum Institute, and Canadian Petroleum Association (published jointly), *Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada as of December 31, 1979,* Volume 34, June 1980. • 1980 forward—EIA, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992 Annual Report (November 1993).* **U.S. Total, Production of Liquid and Gaseous Hydrocarbons:** • 1975-1991—Tables 5.1 and 6.1. • 1992—EIA, *Monthly Energy Review* (February 1994).

Figure 4.9 Liquid and Gaseous Hydrocarbon Proved Reserves, End of Year

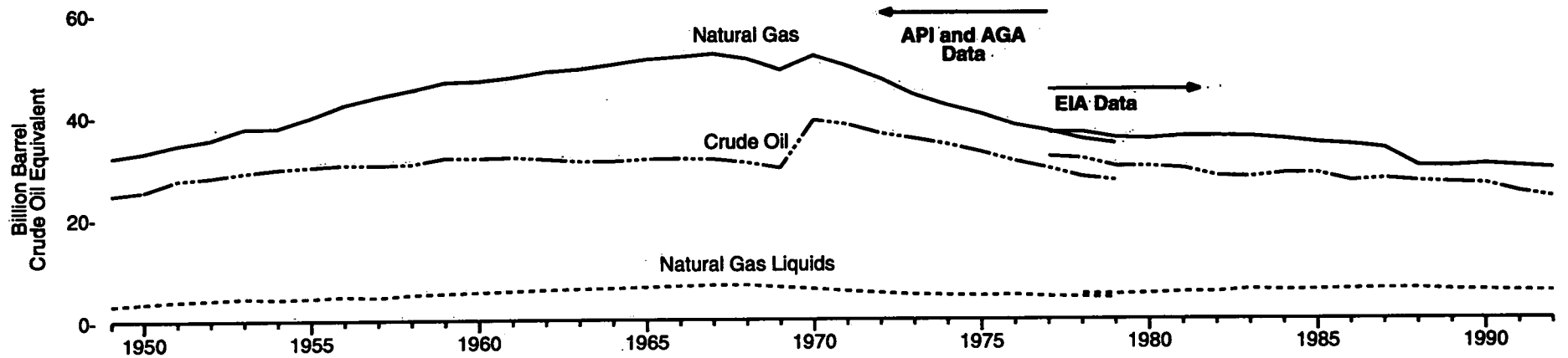
Total, 1949-1992



By Type, 1992



By Type, 1949-1992



Notes: • API=American Petroleum Institute. AGA=American Gas Association. EIA=Energy Information Administration. • Because vertical scales differ, graphs should not be compared.
Source: Table 4.9.

Table 4.9 Liquid and Gaseous Hydrocarbon Proved Reserves, End of Year 1949-1992

Year	Crude Oil	Natural Gas		Natural Gas Liquids		Total
	Billion Barrels	Trillion Cubic Feet [1]	Billion Barrels COE [2]	Billion Barrels	Billion Barrels COE [2]	Billion Barrels COE [2]
	American Petroleum Institute and American Gas Association Data					
1949	24.6	179.4	32.0	3.7	3.1	59.7
1950	25.3	184.6	32.9	4.3	3.5	61.7
1951	27.5	192.8	34.4	4.7	3.9	65.7
1952	28.0	198.6	35.4	5.0	4.1	67.5
1953	28.9	210.3	37.5	5.4	4.4	70.9
1954	29.6	210.6	37.6	5.2	4.2	71.3
1955	30.0	222.5	39.7	5.4	4.4	74.1
1956	30.4	236.5	42.2	5.9	4.7	77.3
1957	30.3	245.2	43.8	5.7	4.5	78.6
1958	30.5	252.8	45.1	6.2	5.0	80.6
1959	31.7	261.2	46.6	6.5	5.2	83.5
1960	31.6	262.3	46.8	6.8	5.4	83.8
1961	31.8	266.3	47.5	7.0	5.6	84.8
1962	31.4	272.3	48.6	7.3	5.8	85.7
1963	31.0	276.2	49.1	7.7	6.0	86.1
1964	31.0	281.3	50.0	7.7	6.1	87.1
1965	31.4	286.5	51.0	8.0	6.3	88.6
1966	31.5	289.3	51.5	8.3	6.5	89.5
1967	31.4	292.9	52.1	8.6	6.7	90.2
1968	30.7	287.3	51.1	8.6	6.7	88.5
1969	29.6	275.1	48.9	8.1	6.3	84.8
1970	39.0	290.7	51.7	7.7	5.9	96.6
1971	38.1	278.8	49.6	7.3	5.5	93.2
1972	36.3	266.1	47.1	6.8	5.1	88.5
1973	35.3	250.0	44.0	6.5	4.8	84.1
1974	34.2	237.1	41.9	6.4	4.7	80.8
1975	32.7	228.2	40.2	6.3	4.6	77.5
1976	30.9	216.0	38.0	6.4	4.7	73.6
1977	29.5	208.9	36.8	6.0	4.4	70.6
1978	27.8	200.3	35.2	5.9	4.3	67.3
1979	27.1	194.9	34.3	5.7	4.1	65.5
	Energy Information Administration Data					
1977	31.8	207.4	36.5	NA	NA	NA
1978	31.4	208.0	36.5	6.8	4.9	72.8
1979	29.8	201.0	35.4	6.6	4.8	70.0
1980	29.8	199.0	35.2	6.7	4.9	69.9
1981	29.4	201.7	35.7	7.1	5.2	70.3
1982	27.9	201.5	35.7	7.2	5.2	68.8
1983	27.7	200.2	35.6	7.9	5.7	69.0
1984	28.4	197.5	35.1	7.6	5.5	69.0
1985	28.4	193.4	34.4	7.9	5.6	68.5
1986	26.9	191.6	34.0	8.2	5.7	66.6
1987	27.3	187.2	33.3	8.1	5.8	66.3
1988	26.8	168.0	29.8	8.2	5.8	62.5
1989	26.5	167.1	29.7	7.8	5.5	61.7
1990	26.3	169.3	30.1	7.6	5.4	61.7
1991	24.7	167.1	29.7	7.5	5.3	59.6
1992	23.7	165.0	29.3	7.5	5.2	58.3

[1] The American Gas Association estimates of natural gas proved reserves include volumes of gas held in underground storage. In 1979, this volume amounted to 4.9 trillion cubic feet. Energy Information Administration (EIA) data do not include gas in underground storage.

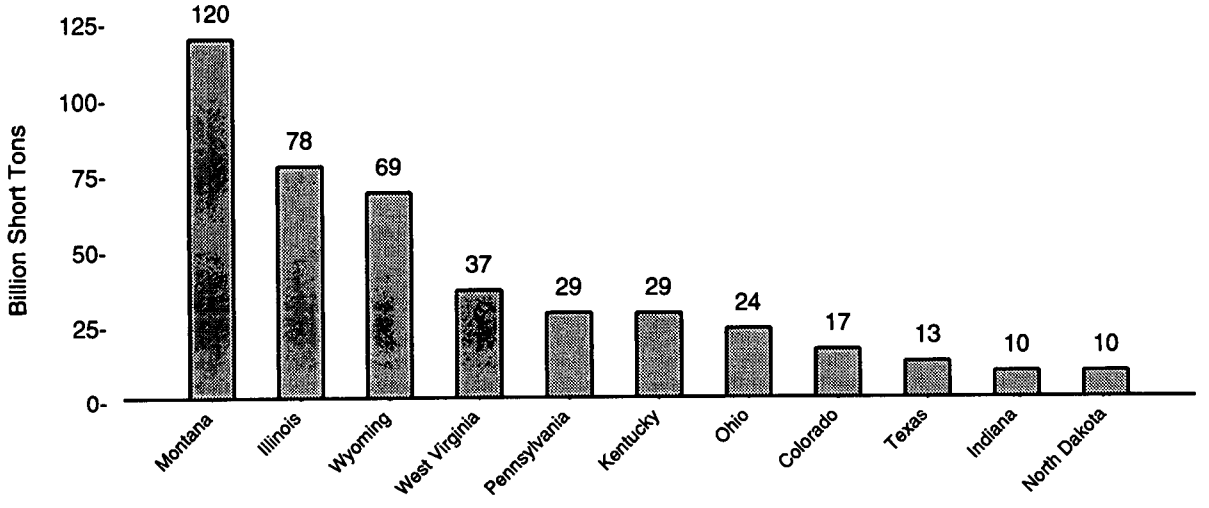
[2] Crude oil equivalent. Natural Gas and Natural Gas Liquids are converted to Btu on the basis of annual average conversion factors. See Appendix A.

NA=Not available.

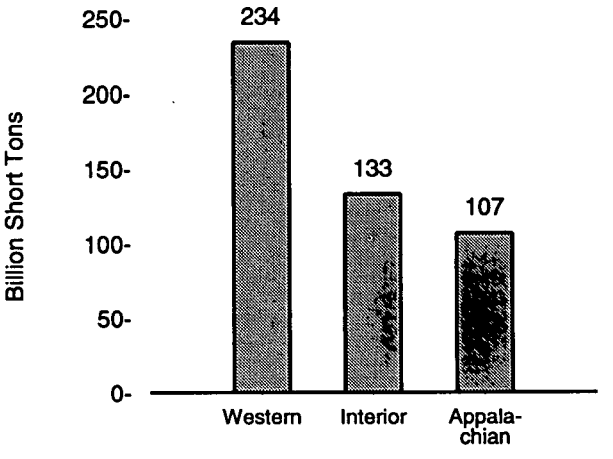
Sources: • **API/AGA Data**—American Gas Association, American Petroleum Institute, and Canadian Petroleum Association (published jointly). *Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the United States and Canada as of December 31, 1979.* Volume 34, June 1980. • **EIA Data**—EIA, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992 Annual Report* (October 1993), Table 1.

Figure 4.10 Coal Demonstrated Reserve Base, January 1, 1993

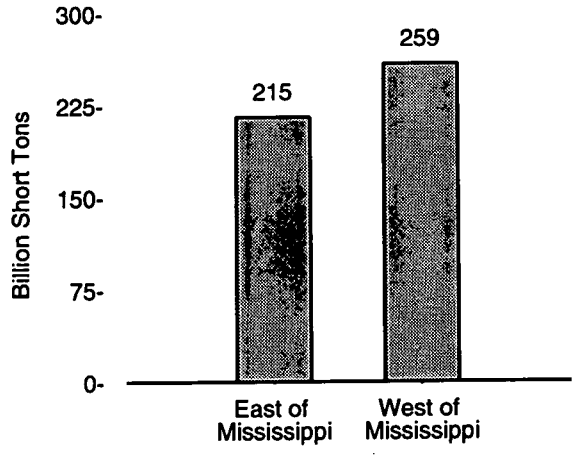
By Key States



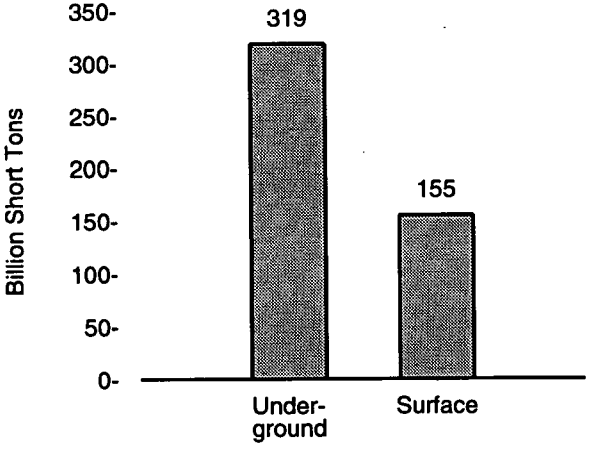
By Region



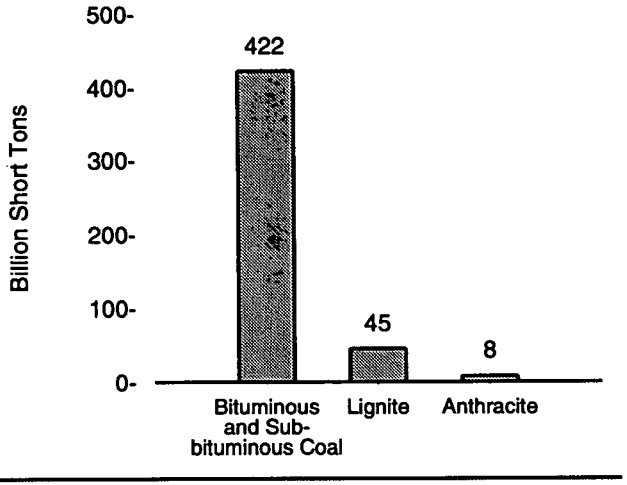
East and West of Mississippi



By Mining Method



By Rank



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 4.10.

Table 4.10 Coal Demonstrated Reserve Base, January 1, 1993

(Billion Short Tons)

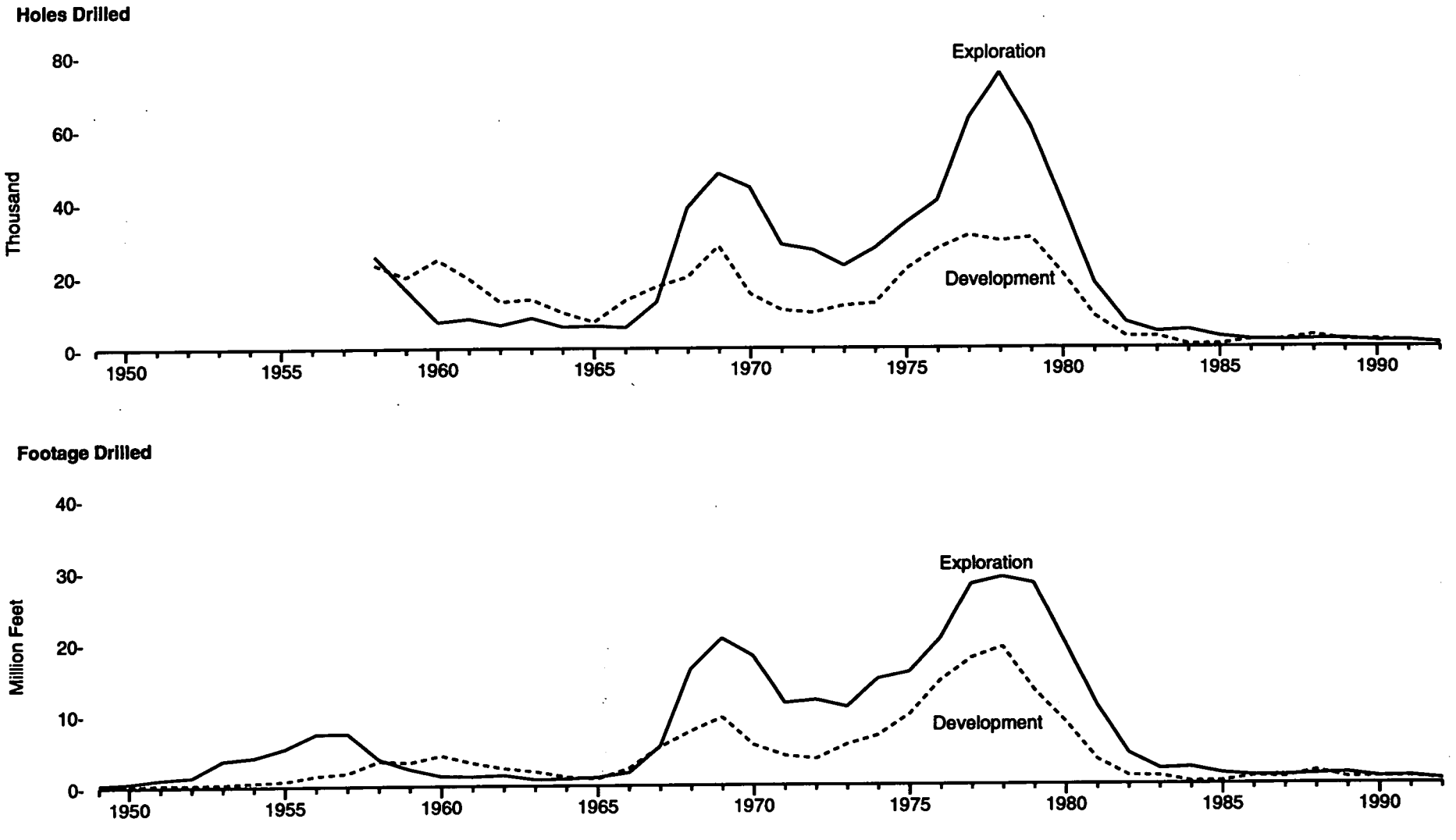
Region and State	Anthracite	Bituminous Coal [1]		Lignite	Total		
	Underground and Surface [2]	Underground	Surface	Surface [3]	Underground	Surface	Total
Appalachian	**7.4**	**81.8**	**16.6**	**1.1**	**85.7**	**21.1**	**106.8**
Alabama	0	1.4	2.2	1.1	1.4	3.3	4.7
Kentucky, Eastern	0	7.1	1.5	0	7.1	1.5	8.6
Ohio	0	17.9	6.0	0	17.9	6.0	23.8
Pennsylvania	7.2	20.7	1.1	0	24.6	4.5	29.1
Virginia	0.1	1.6	0.7	0	1.7	0.7	2.5
West Virginia	0	31.8	4.7	0	31.8	4.7	36.5
Other [4]	0	1.2	0.4	0	1.2	0.4	1.6
Interior	**0.1**	**92.7**	**26.7**	**13.7**	**92.8**	**40.4**	**133.3**
Illinois	0	62.6	15.4	0	62.6	15.4	78.0
Indiana	0	8.9	1.2	0	8.9	1.2	10.1
Iowa	0	1.7	0.5	0	1.7	0.5	2.2
Kentucky, Western	0	16.4	3.8	0	16.4	3.8	20.2
Missouri	0	1.5	4.5	0	1.5	4.5	6.0
Oklahoma	0	1.2	0.3	0	1.2	0.3	1.6
Texas	0	0	0	13.2	0	13.2	13.2
Other [5]	0.1	0.3	1.1	0.5	0.4	1.6	2.0
Western	**(6)**	**140.3**	**63.7**	**29.9**	**140.4**	**93.6**	**234.0**
Alaska	0	5.4	0.7	(6)	5.4	0.7	6.1
Colorado	(6)	12.0	0.6	4.2	12.0	4.8	16.8
Montana	(6)	71.0	33.2	15.8	71.0	48.9	119.9
New Mexico	0	2.1	2.3	0	2.1	2.3	4.4
North Dakota	0	0	0	9.6	0	9.6	9.6
Utah	0	5.8	0.3	0	5.8	0.3	6.0
Washington	0	1.3	0.1	(6)	1.3	0.1	1.4
Wyoming	0	42.5	26.5	0	42.5	26.5	69.1
Other [7]	0	0.1	0.1	0.4	0.1	0.5	0.6
U.S. Total	**7.5**	**314.8**	**107.1**	**44.7**	**318.9**	**155.1**	**474.1**
States East of the Mississippi River	7.4	169.9	36.9	1.1	173.8	41.4	215.2
States West of the Mississippi River	0.1	145.0	70.1	43.6	145.1	113.7	258.8

[1] Includes subbituminous coal.
[2] Includes 3,396.4 million short tons of surface mine reserves, of which 3,380.8 million tons are in Pennsylvania and 15.6 million tons are in Arkansas.
[3] There are no underground demonstrated reserves of lignite.
[4] Georgia, Maryland, North Carolina, and Tennessee.
[5] Arkansas, Kansas, Louisiana, and Michigan.
[6] Less than 0.05 billion short tons.
[7] Arizona, Idaho, Oregon, and South Dakota.

Notes: • Data represent 100 percent of known measured and indicated coal, with qualifying seam thicknesses and depths, in place as of January 1, 1993. Recoverability varies from less than 40 percent to more than 90 percent for individual deposits. Fifty-six percent of the demonstrated reserve base of coal in the United States is estimated to be recoverable. • Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration (EIA), *Coal Production 1992* (October 1993), Tables A1, A2, A3, and A4, and EIA, *U.S. Coal Reserves: An Update by Heat and Sulfur Content* (February 1994), page 23.

Figure 4.11 Uranium Exploration and Development Drilling, 1949-1992



Source: Table 4.11.

Table 4.11 Uranium Exploration and Development Drilling, 1949-1992

Year	Exploration [1]		Development [2]		Total	
	Holes Drilled (thousands)	Footage Drilled (million feet)	Holes Drilled (thousands)	Footage Drilled (million feet)	Holes Drilled (thousands)	Footage Drilled (million feet)
1949	NA	0.36	NA	0.05	NA	0.41
1950	NA	0.57	NA	0.21	NA	0.78
1951	NA	1.08	NA	0.35	NA	1.43
1952	NA	1.36	NA	0.30	NA	1.66
1953	NA	3.65	NA	0.37	NA	4.02
1954	NA	4.06	NA	0.55	NA	4.61
1955	NA	5.27	NA	0.76	NA	6.03
1956	NA	7.29	NA	1.50	NA	8.79
1957	NA	7.35	NA	1.85	NA	9.20
1958	25.32	3.76	22.93	3.49	48.25	7.25
1959	16.25	2.37	19.59	3.28	35.84	5.65
1960	7.34	1.40	24.40	4.21	31.73	5.61
1961	8.26	1.32	19.31	3.19	27.57	4.51
1962	6.44	1.48	12.87	2.43	19.31	3.91
1963	8.47	0.88	13.53	1.98	22.01	2.86
1964	5.97	0.97	9.91	1.25	15.88	2.21
1965	6.23	1.16	7.33	0.95	13.56	2.11
1966	5.75	1.80	13.18	2.40	18.93	4.20
1967	12.79	5.44	16.95	5.33	29.74	10.76
1968	38.47	16.23	19.53	7.53	58.00	23.75
1969	47.85	20.47	28.01	9.39	75.86	29.86
1970	43.98	17.98	14.87	5.55	58.85	23.53
1971	28.42	11.40	10.44	4.05	38.86	15.45
1972	26.91	11.82	9.71	3.61	36.62	15.42
1973	22.56	10.83	11.70	5.59	34.26	16.42
1974	27.40	14.72	12.30	6.84	39.70	21.56
1975	34.29	15.69	21.60	9.73	55.89	25.42
1976	40.41	20.36	27.23	14.44	67.64	34.80
1977	62.60	27.96	30.86	17.62	93.45	45.58
1978	75.07	28.95	29.29	19.15	104.35	48.10
1979	60.46	28.07	30.19	13.01	90.65	41.08
1980	39.61	19.60	20.19	8.59	59.80	28.19
1981	17.75	10.87	8.67	3.35	26.42	14.22
1982	6.97	4.23	3.00	1.13	9.97	5.36
1983	4.29	2.09	3.01	1.08	7.30	3.17
1984	4.80	2.26	0.72	0.29	5.52	2.55
1985	2.88	1.42	0.77	0.34	3.65	1.76
1986	1.99	1.10	1.85	0.97	3.83	2.07
1987	1.82	1.11	1.99	0.86	3.81	1.96
1988	2.03	1.28	3.18	1.73	5.21	3.01
1989	2.09	1.43	1.75	0.80	3.84	2.22
1990	1.51	0.87	1.91	0.81	3.42	1.68
1991	1.62	0.97	1.57	0.87	3.20	1.84
1992	0.94	0.56	0.83	0.50	1.77	1.06

[1] Includes surface drilling in search of new ore deposits or extensions of known deposits and drilling at the location of a discovery up to the time the company decides sufficient ore reserves are present to justify commercial exploitation.

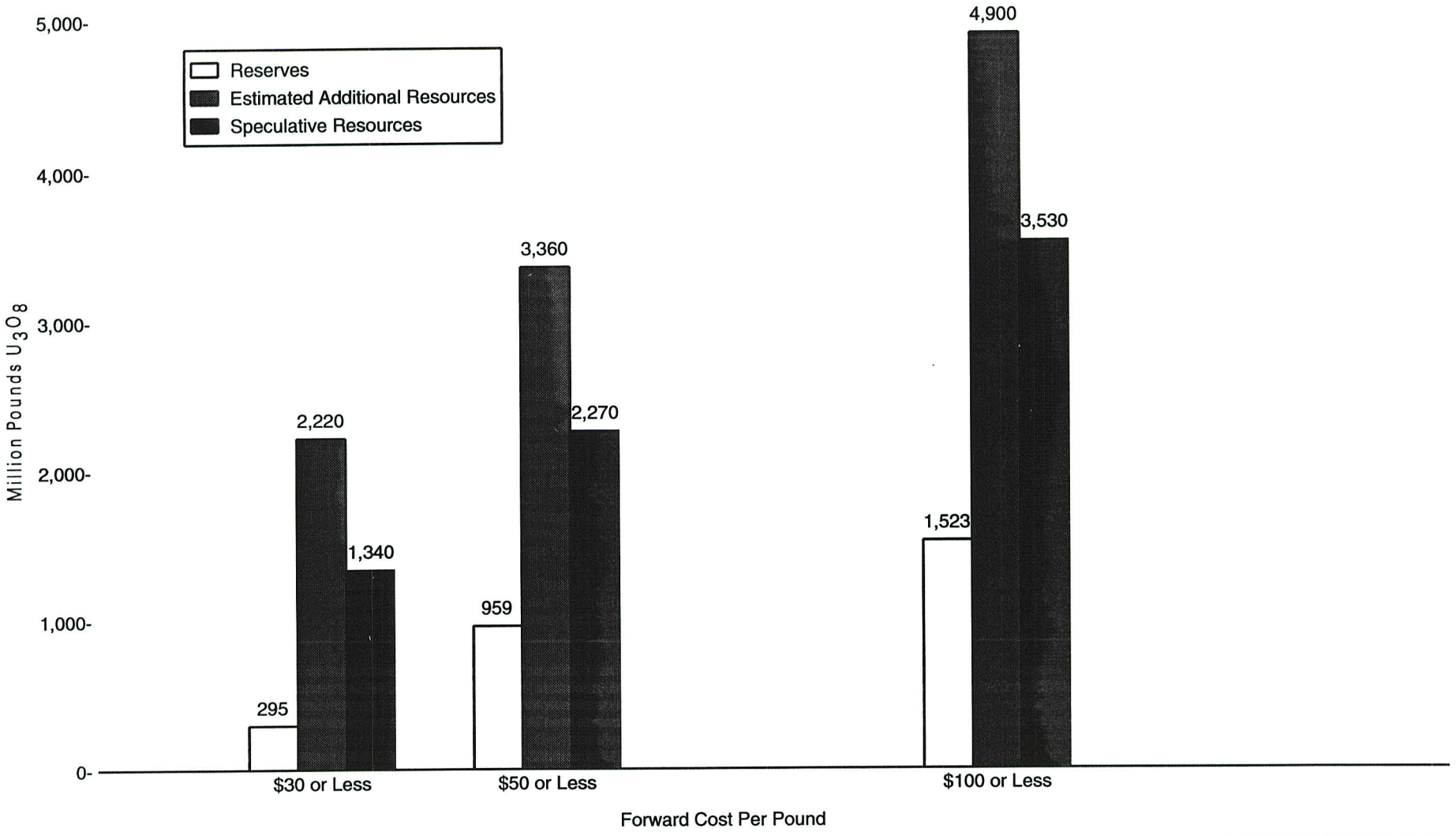
[2] Includes all surface drilling on an ore deposit to determine more precisely size, grade, and configuration subsequent to the time that commercial exploitation is deemed feasible.

NA=Not available.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1949-1981—U.S. Department of Energy, Grand Junction Office, *Statistical Data of the Uranium Industry*, January 1, 1983, Report No. GJO-100 (1983). • 1982 forward—Energy Information Administration, *Uranium Industry Annual 1992* (October 1993), Tables 3 and 4.

Figure 4.12 Uranium Resources, December 31, 1992



Source: Table 4.12.

Table 4.12 Uranium Resources, December 31, 1992

(Million Pounds U_3O_8)

Resource Category	Forward Cost Category (dollars per pound) [1]		
	$30 or Less	$50 or Less	$100 or Less
Reserves [2]	295	959	1,523
New Mexico	84	350	588
Wyoming	117	394	628
Texas	15	35	55
Arizona, Colorado, Utah	47	123	169
Others [3]	32	57	83
Potential Resources [4]			
Estimated Additional Resources	2,220	3,360	4,900
Speculative Resources	1,340	2,270	3,530

[1] Forward costs are all operating and capital costs (in current dollars) yet to be incurred in the production of uranium from estimated resources. Excluded are previous expenditures (such as exploration and land acquisitions) taxes, profit, and the cost of money. Generally, forward costs are lower than market prices. Resource values in forward-cost categories are cumulative, that is, the quantity at each level of forward-cost includes all reserves/resources at the lower cost in that category.

[2] The Energy Information Administration category of "uranium reserves" is equivalent to the internationally reported category of Reasonably Assured Resources (RAR).

[3] California, Idaho, Nebraska, Nevada, North Dakota, Oregon, South Dakota, and Washington.

[4] Shown are the mean values for the distribution of estimates for each forward-cost category, rounded to the nearest 10 million pounds U_3O_8.

Source: Energy Information Administration, *Uranium Industry Annual 1992* (October 1993), Tables 11 and B.4.

Energy Resources Note

For 1970 forward, annual well completions are estimated by the Energy Information Administration (EIA) using the American Petroleum Institute's drilling data files.

For more recent years, these files are not complete, due to delays in the reporting of wells drilled. Based on statistical analysis, EIA employs an adjustment process to impute missing data to show total well completions and footages for current years.

5. Petroleum

Fluctuations in Prices

After successive price hikes had brought the real price[1] of crude oil to a peak in 1981, oil prices began trending downward in 1982, and then plummeted in 1986 (5.20).[2] The average annual composite refiner acquisition cost of a barrel of crude oil fell from $28.34 in 1985 to $15.02 in 1986. Of the several factors contributing to the unprecedented decline in crude oil prices during 1986, the most important was increased worldwide production, primarily by members of the Organization of Petroleum Exporting Countries (OPEC) seeking to regain market share.

After 1986, crude oil prices fluctuated. In 1990, the Iraqi invasion of Kuwait drove up the real price of a barrel of crude oil to $19.61. In 1991, oil-producing nations' ability to replace Iraqi and Kuwaiti oil, when coupled with an economic recession that restrained petroleum demand, caused the real price to decline to $16.19 per barrel. In 1992, despite political unrest in several oil-producing countries (most notably Russia) and the oil sales embargo on Iraq, as well as attempts by OPEC to bolster crude oil prices, the real price of crude oil declined to $15.22 per barrel. In 1993, due to restrained demand and increased production worldwide, the real price of crude oil fell to $13.21, the lowest annual average in 20 years.

The end-use prices, excluding taxes, of almost all petroleum products also declined in 1993 (5.21). The average price of all types of motor gasoline declined from 78 cents per gallon in 1992 to 76 cents per gallon in 1993. In general, the price fell more steeply in less densely populated areas, particularly those without carbon monoxide pollution problems that require the use of more-expensive oxygenated motor gasoline. Distillate fuel oil and kerosene-type jet fuel average prices, excluding taxes, decreased. The price, excluding taxes, of residual fuel oil with a sulfur content of 1 percent or less was the primary exception. Its average price per gallon rose from 39 cents in 1992 to 40 cents in 1993.

[1]Real prices are expressed in 1987 dollars.

[2]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Consumption of Petroleum Products

Consumption of petroleum products (petroleum products supplied) increased throughout the 1949-to-1973 period at an average annual rate of 4.7 percent, and by 1973, consumption of petroleum products totaled 17 million barrels per day (5.1). In 1974, however, marked increases in the price of crude oil, coupled with a petroleum supply interruption, resulted in a 3.8-percent decline in petroleum consumption. Although demand recovered during the late 1970's, peaking at 19 million barrels per day in 1978, by 1983 it had declined to 15 million barrels per

Petroleum Stocks and the Strategic Petroleum Reserve

The U.S. Government established the Strategic Petroleum Reserve (SPR) in response to the oil supply disruptions of the early 1970's. Intended to minimize the effects of any future disruptions, the SPR began storing crude oil in 1977, and by the end of 1989, it held 580 million barrels (5.16). The first sales of SPR crude oil occurred following the Iraqi invasion of Kuwait in August 1990. In addition, SPR purchases were suspended in August 1990 due to concern about world crude oil supplies. Purchases resumed in 1992 and, at the end of 1993, the SPR held 587 million barrels.

One measure of the SPR's adequacy is the number of days of petroleum net imports it could provide in the event of an oil supply interruption. Through 1985, that measure of energy security increased every year, due to additions to the SPR and a decline in the level of net imports. In 1986, however, the measure declined for the first time, from 115 days in 1985 to 94 days in 1986. In 1993, the measure was 78 days.

At the end of 1993, SPR stocks plus 335 million barrels of privately held crude oil stocks totaled 922 million barrels (5.15). Private stocks of crude oil were less than the 341-million-barrel level recorded in 1977, when filling of the SPR began. At 723 million barrels, private stocks of petroleum products in 1993 remained considerably below the record level of 964 million barrels recorded in 1977.

day. After 1983, lower crude oil prices tended to promote consumption, which reached 17.3 million barrels per day in 1989. In 1990 and 1991, however, warm winters and a stagnant economy combined to restrain petroleum consumption, which fell to 16.7 million barrels per day in 1991. In the next 2 years, economic recovery contributed to an increase in consumption to 17.2 million barrels per day in 1993.

Consumption of motor gasoline, distillate fuel oil, and jet fuel was higher in 1993 than in 1992 (5.11). Consumption of motor gasoline, which consistently accounts for the largest share of all petroleum products supplied, rose 2.9 percent to 7.5 million barrels per day. Distillate fuel oil consumption rose 1.7 percent to 3.0 million barrels per day and consumption of jet fuel rose 1.4 percent to 1.5 million barrels per day in 1993. In contrast, consumption of liquefied petroleum gases fell 2.8 percent to 1.7 million barrels per day and residual fuel oil consumption fell 1.8 percent to 1.1 million barrels per day.

Production and Productivity

During much of the 1950's and 1960's, production capacity exceeded demand to such an extent that mechanisms such as production prorationing and import ceilings were implemented to protect domestic production. By the 1970's, however, petroleum demand had increased, the average productivity of wells began to decline, and oil production leveled off (5.2). Increases in Alaskan production at the end of the 1970's and through 1988 partially counteracted declines in Lower-48 production. In 1989 and 1990, however, even Alaskan production declined and total domestic production fell to 7.4 million barrels per day in 1990. In 1991, higher production in the first quarter of the year compensated for low production in the fourth quarter and total domestic production for the year remained at 7.4 million barrels per day, but, in 1992, production declined to 7.2 million barrels per day. In 1993, it declined further to 6.8 million barrels per day, the lowest level in 35 years.

Of total U.S. production in 1993, 82 percent came from onshore wells and 18 percent from offshore. The 584 thousand producing wells attained an average productivity of 12 barrels per day per well, down 3.3 percent from the 1992 level and significantly below peak productivity of over 18 barrels attained in the early 1970's.

Imports and Exports

Despite import quotas, net imports of low-priced petroleum increased throughout most of the 1949-to-1973 period, and in 1973 totaled 6.0 million barrels per day (5.1). Thereafter, net imports fluctuated, peaking at 8.6 million barrels per day in 1977, then declining to 4.3 million barrels per day in 1985. In 1986, excess world production drove prices down, inhibiting domestic production and boosting demand. Those factors, as well as stockbuilding, resulted in an increase in net imports in 1986 to 5.4 million barrels per day. Subsequently, with prices significantly below peak levels, net imports rose to 7.2 million barrels per day in 1989 and 1990. In 1991, lower demand for petroleum due to the economic recession contributed to a decline in petroleum imports. In addition, in 1991, the United States exported a record level of petroleum products, and petroleum net imports declined to 6.6 million barrels per day. In 1992 and 1993, petroleum net imports rose; the 1993 level of 7.5 million barrels per day was the highest in 14 years.

U.S. dependence on petroleum net imports peaked at 47 percent of consumption in 1977, then fell in 1985 to 27 percent, the lowest level since 1971 (5.7). In 1993, dependence on petroleum net imports reached a 16-year high of 44 percent. Saudi Arabia, Venezuela, Canada, Mexico, and Nigeria were the primary foreign suppliers of petroleum to the United States.

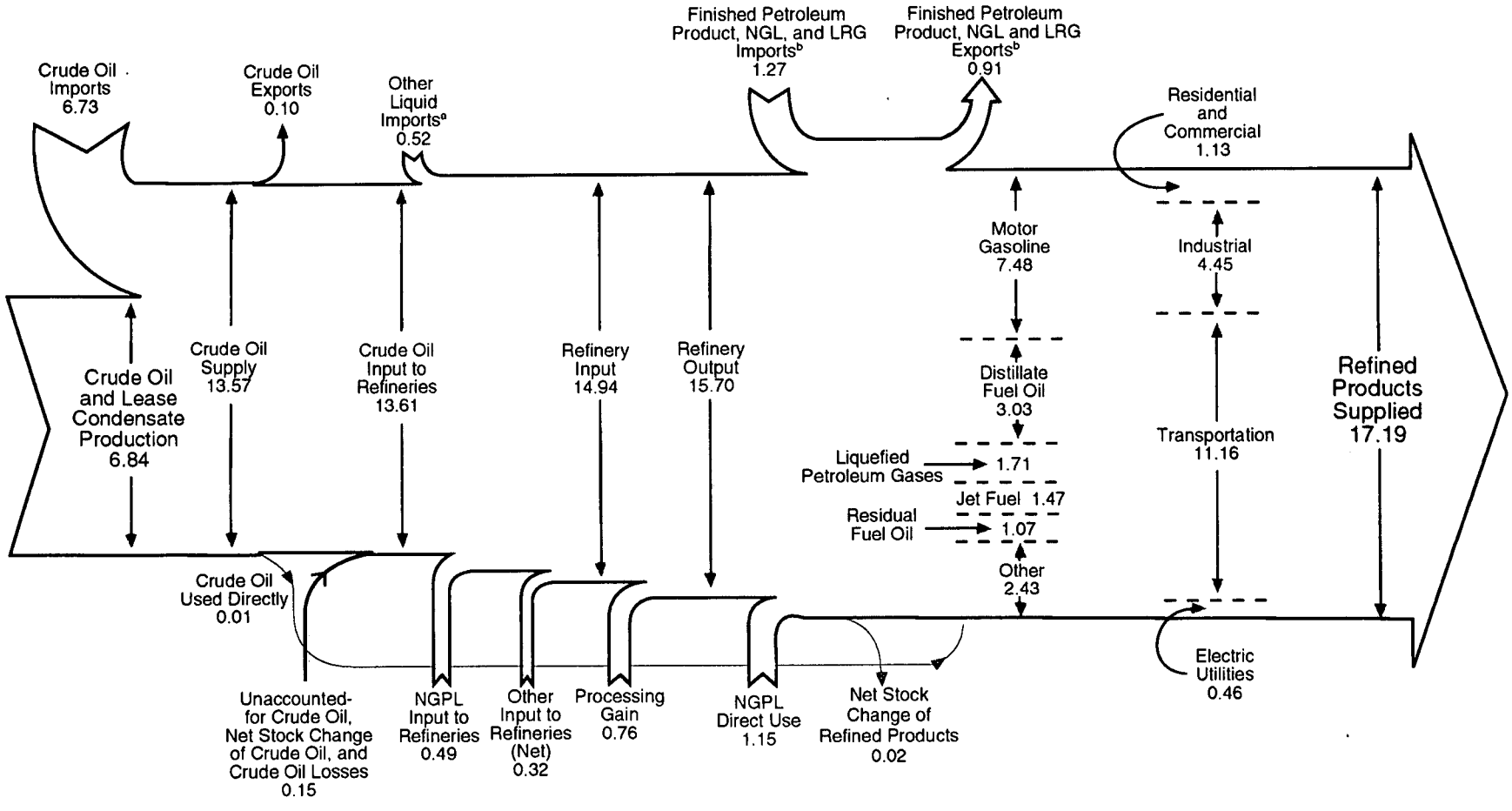
The Refining Industry in a Changing Market

The average daily output from U.S. refineries trended upward from 1949 through 1978, when it peaked at 16 million barrels per day (5.8). During the next 5 years, output declined, falling to 13 million barrels per day in 1983. As crude oil prices declined in the mid-1980's and the demand for petroleum rose, refinery output began to recover. In 1993, it averaged 16 million barrels per day.

The rate of refinery utilization fell below 80 percent in 1980 through 1985, despite deactivation of 16 percent of refinery capacity (5.9). Thereafter, the utilization rate improved. In 1986, the rate was 83 percent, well above its nadir of 69 percent in 1981. In 1987 through 1990, strong product demand contributed to even higher utilization rates, which reached 87 percent in 1990. By 1993, the utilization rate had climbed to 91 percent.

Diagram 2. Petroleum Flow, 1993

(Million Barrels per Day)



[a]Unfinished oils, motor gasoline and aviation gasoline blending components, and other hydrocarbons/alcohol.

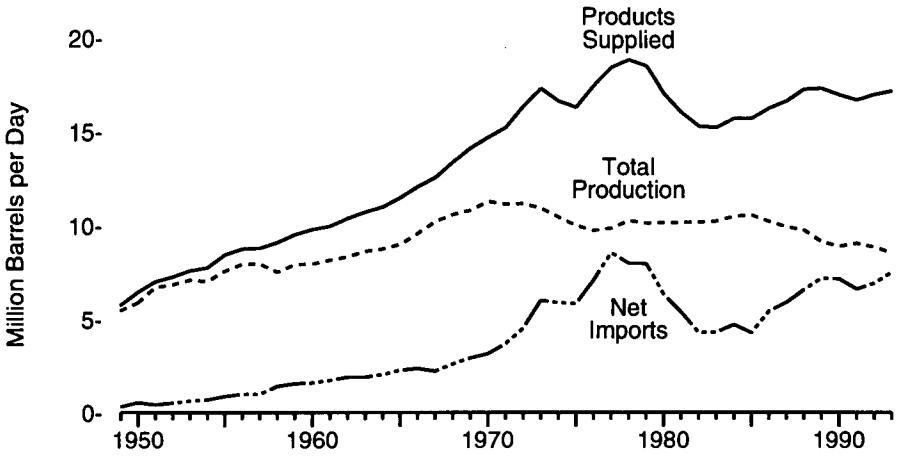
[b]Natural gas liquids and liquid refinery gas.

Notes: • Data are preliminary. • Totals may not equal sum of components due to independent rounding.

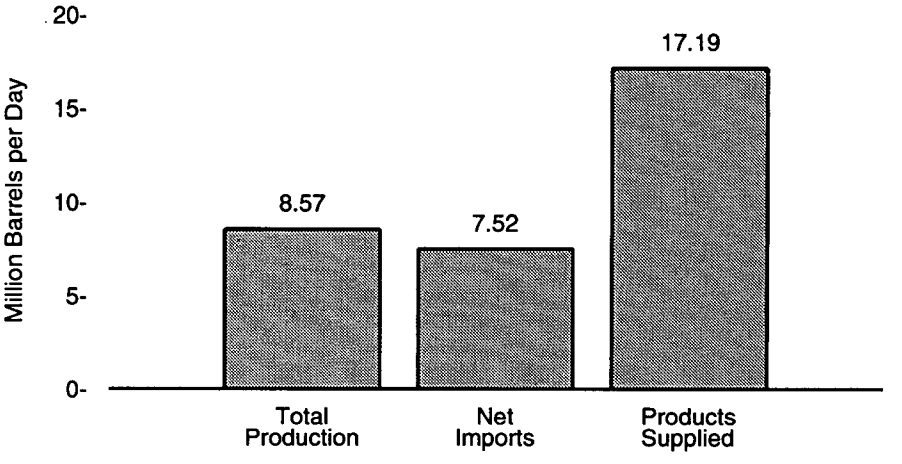
Sources: Tables 5.1, 5.5, 5.8, 5.11, and 5.12, and *Petroleum Supply Monthly*, February 1994, Table 3.

Figure 5.1 Petroleum Overview

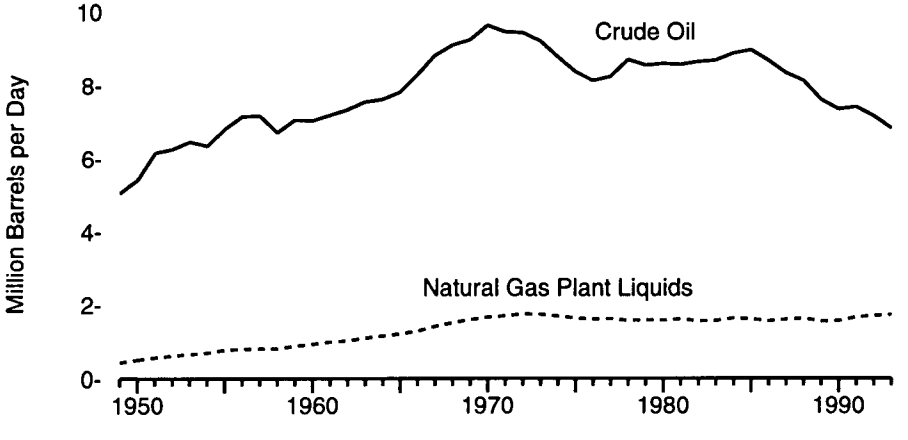
Overview, 1949-1993



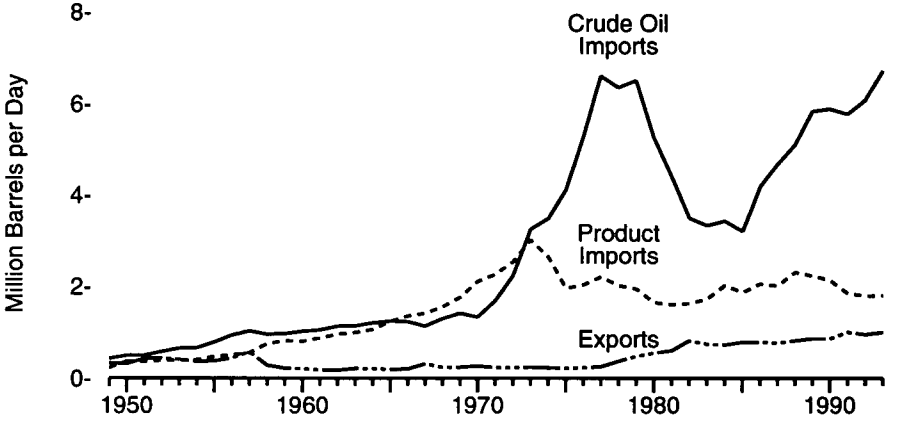
Overview, 1993



Production, 1949-1993



Trade, 1949-1993



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.1.

Table 5.1 Petroleum Overview, 1949-1993

(Million Barrels per Day)

Year	Production			Other Domestic Supply [2]	Trade					Crude Oil Losses	Change In Stocks [6]	Petroleum Products Supplied
	Crude Oil [1]	Natural Gas Plant Liquids	Total Production		Crude Oil Imports [3]	Petroleum Product Imports [4]	Total Imports	Exports	Net Imports [5]			
1949	5.05	0.43	5.48	([7])	0.42	0.22	0.65	0.33	0.32	0.04	0.01	5.76
1950	5.41	0.50	5.91	([7])	0.49	0.36	0.85	0.30	0.55	0.05	0.06	6.46
1951	6.16	0.56	6.72	0.01	0.49	0.35	0.84	0.42	0.42	0.03	-0.10	7.02
1952	6.26	0.61	6.87	0.01	0.57	0.38	0.95	0.43	0.52	0.02	-0.11	7.27
1953	6.46	0.65	7.11	0.02	0.65	0.39	1.03	0.40	0.63	0.02	-0.14	7.60
1954	6.34	0.69	7.03	0.02	0.66	0.40	1.05	0.36	0.70	0.03	0.03	7.76
1955	6.81	0.77	7.58	0.04	0.78	0.47	1.25	0.37	0.88	0.04	([7])	8.46
1956	7.15	0.80	7.95	0.04	0.93	0.50	1.44	0.43	1.01	0.05	-0.18	8.78
1957	7.17	0.81	7.98	0.04	1.02	0.55	1.57	0.57	1.01	0.05	-0.17	8.81
1958	6.71	0.81	7.52	0.06	0.95	0.75	1.70	0.28	1.42	0.03	0.14	9.12
1959	7.05	0.88	7.93	0.09	0.97	0.81	1.78	0.21	1.57	0.01	-0.05	9.53
1960	7.04	0.93	7.96	0.15	1.02	0.80	1.81	0.20	1.61	0.01	0.08	9.80
1961	7.18	0.99	8.17	0.18	1.05	0.87	1.92	0.17	1.74	0.01	-0.11	9.98
1962	7.33	1.02	8.35	0.18	1.13	0.96	2.08	0.17	1.91	0.01	-0.03	10.40
1963	7.54	1.10	8.64	0.20	1.13	0.99	2.12	0.21	1.91	0.01	([7])	10.74
1964	7.61	1.15	8.77	0.22	1.20	1.06	2.26	0.20	2.06	0.01	-0.01	11.02
1965	7.80	1.21	9.01	0.22	1.24	1.23	2.47	0.19	2.28	0.01	0.01	11.51
1966	8.30	1.28	9.58	0.25	1.22	1.35	2.57	0.20	2.37	0.01	-0.10	12.08
1967	8.81	1.41	10.22	0.29	1.13	1.41	2.54	0.31	2.23	0.01	-0.17	12.56
1968	9.10	1.50	10.60	0.35	1.29	1.55	2.84	0.23	2.61	0.01	-0.15	13.39
1969	9.24	1.59	10.83	0.34	1.41	1.76	3.17	0.23	2.93	0.01	0.05	14.14
1970	9.64	1.66	11.30	0.35	1.32	2.10	3.42	0.26	3.16	0.01	-0.10	14.70
1971	9.46	1.69	11.16	0.44	1.68	2.25	3.93	0.22	3.70	0.01	-0.07	15.21
1972	9.44	1.74	11.18	0.44	2.22	2.53	4.74	0.22	4.52	0.01	0.23	16.37
1973	9.21	1.74	10.95	0.49	3.24	3.01	6.26	0.23	6.02	0.01	-0.14	17.31
1974	8.77	1.69	10.46	0.49	3.48	2.64	6.11	0.22	5.89	0.01	-0.18	16.65
1975	8.37	1.63	10.01	0.51	4.10	1.95	6.06	0.21	5.85	0.01	-0.03	16.32
1976	8.13	1.60	9.74	0.59	5.29	2.03	7.31	0.22	7.09	0.01	0.06	17.46
1977	8.24	1.62	9.86	0.57	6.61	2.19	8.81	0.24	8.56	0.02	-0.55	18.43
1978	8.71	1.57	10.27	0.49	6.36	2.01	8.36	0.36	8.00	0.02	0.09	18.85
1979	8.55	1.58	10.14	0.58	6.52	1.94	8.46	0.47	7.99	0.02	-0.17	18.51
1980	8.60	1.57	10.17	0.68	5.26	1.65	6.91	0.54	6.36	0.01	-0.14	17.06
1981	8.57	1.61	10.18	0.64	4.40	1.60	6.00	0.59	5.40	([7])	-0.16	16.06
1982	8.65	1.55	10.20	0.65	3.49	1.63	5.11	0.82	4.30	([7])	0.15	15.30
1983	8.69	1.56	10.25	0.65	3.33	1.72	5.05	0.74	4.31	([7])	0.02	15.23
1984	8.88	1.63	10.51	0.78	3.43	2.01	5.44	0.72	4.72	([7])	-0.28	15.73
1985	8.97	1.61	10.58	0.76	3.20	1.87	5.07	0.78	4.29	([7])	0.10	15.73
1986	8.68	1.55	10.23	0.81	4.18	2.05	6.22	0.78	5.44	([7])	-0.20	16.28
1987	8.35	1.60	9.94	0.85	4.67	2.00	6.68	0.76	5.91	([7])	-0.04	16.67
1988	8.14	1.62	9.76	0.90	5.11	2.30	7.40	0.82	6.59	([7])	0.03	17.28
1989	7.61	1.55	9.16	0.92	5.84	2.22	8.06	0.86	7.20	([7])	0.04	17.33
1990	7.36	1.56	8.91	1.02	5.89	2.12	8.02	0.86	7.16	([7])	0.11	16.99
1991	7.42	1.66	9.08	1.00	5.78	1.84	7.63	1.00	6.63	([7])	-0.01	16.71
1992	[R]7.17	1.70	[R]8.87	[R]1.16	[R]6.08	[R]1.80	[R]7.89	0.95	[R]6.94	([7])	0.07	[R]17.03
1993[P]	6.84	1.73	8.57	1.25	6.73	1.80	8.53	1.00	7.52	([7])	-0.15	17.19

[1] Includes lease condensate.

[2] Includes benzol, other hydrocarbons, oxygenates, gasoline blending components, finished petroleum products, hydrogen, alcohol, processing gains, and unaccounted-for crude oil.

[3] Includes imports for the Strategic Petroleum Reserve, which began in 1977.

[4] For 1981 forward, includes motor gasoline blending components and aviation gasoline blending components.

[5] Net trade = imports minus exports.

[6] Negative numbers denote a net addition to stocks or a reduction in supply. Positive numbers denote a net withdrawal from stocks or an addition to supply.

[7] Less than 5,000 barrels per day.

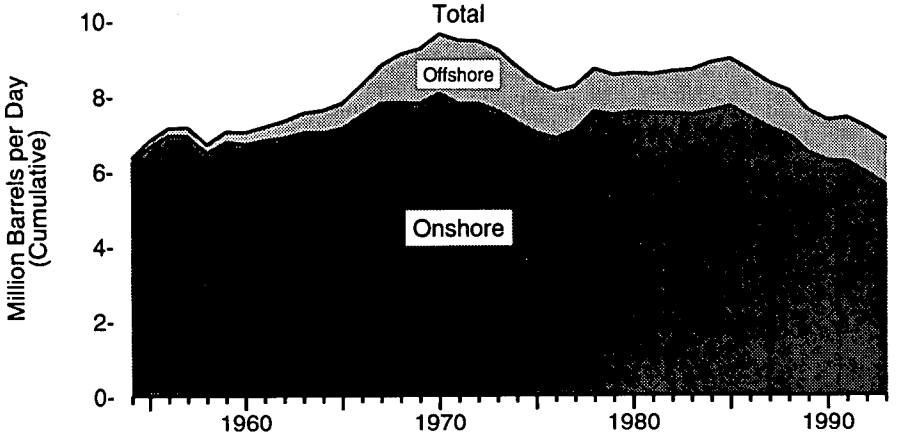
R=Revised data. P=Preliminary data.

Note: Totals may not equal sum of components due to independent rounding.

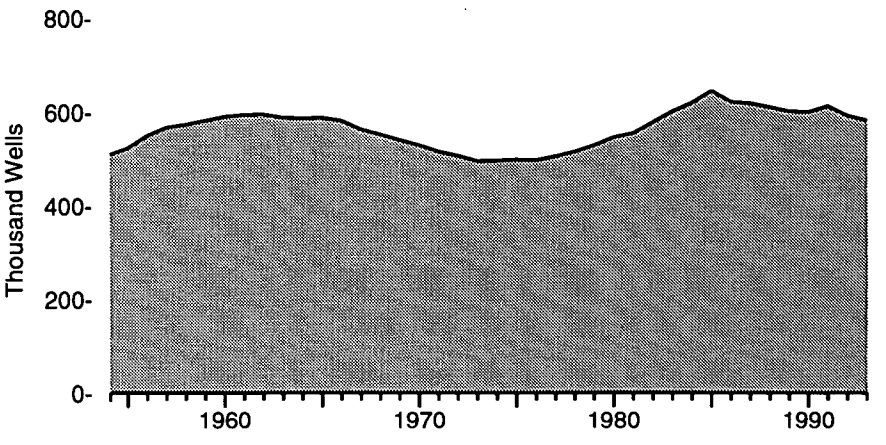
Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.2 Crude Oil and Lease Condensate Production and Oil Well Productivity, 1954-1993

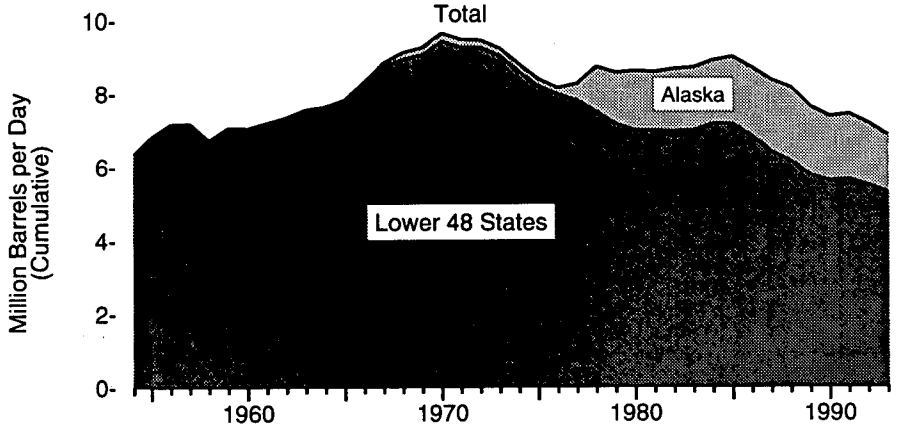
By Site



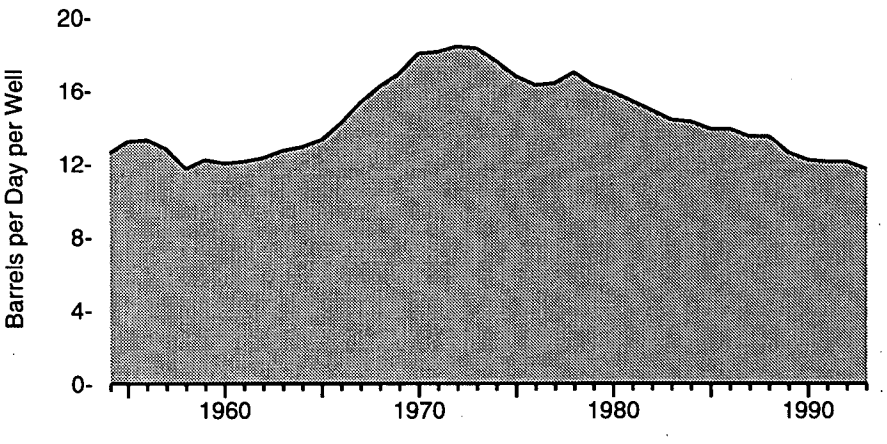
Number of Producing Oil Wells



By Geographic Location



Average Productivity



Source: Table 5.2.

Table 5.2 Crude Oil and Lease Condensate Production and Oil Well Productivity, 1954-1993

(Thousand Barrels per Day, Except as Noted)

Year	Geographic Location		Site		Type		Total Production	Oil Well Productivity	
	Lower 48	Alaska	Onshore	Offshore	Crude Oil	Lease Condensate		Producing Wells [1] (thousands)	Average Productivity [2] (barrels per day per well)
1954	6,342	0	6,209	133	6,342	(3)	6,342	511	12.6
1955	6,807	0	6,645	162	6,807	(3)	6,807	524	13.2
1956	7,151	0	6,951	201	7,151	(3)	7,151	551	13.3
1957	7,170	0	6,940	229	7,170	(3)	7,170	569	12.8
1958	6,710	0	6,473	236	6,710	(3)	6,710	575	11.7
1959	7,053	1	6,779	274	7,054	(3)	7,054	583	12.2
1960	7,034	2	6,716	319	7,035	(3)	7,035	591	12.0
1961	7,166	17	6,817	365	7,183	(3)	7,183	595	12.1
1962	7,304	28	6,888	444	7,332	(3)	7,332	596	12.3
1963	7,512	29	7,026	515	7,542	(3)	7,542	589	12.7
1964	7,584	30	7,027	587	7,614	(3)	7,614	588	12.9
1965	7,774	30	7,140	665	7,804	(3)	7,804	589	13.3
1966	8,256	39	7,473	823	8,295	(3)	8,295	583	14.2
1967	8,730	80	7,802	1,009	8,810	(3)	8,810	565	15.3
1968	8,915	181	7,808	1,287	8,660	436	9,096	554	16.2
1969	9,035	203	7,797	1,441	8,778	460	9,238	542	16.9
1970	9,408	229	8,060	1,577	9,180	457	9,637	531	18.0
1971	9,245	218	7,779	1,684	9,032	431	9,463	517	18.1
1972	9,242	199	7,780	1,660	8,998	443	9,441	508	18.4
1973	9,010	198	7,592	1,616	8,784	424	9,208	497	18.3
1974	8,581	193	7,285	1,489	8,375	399	8,774	498	17.6
1975	8,183	191	7,012	1,362	8,007	367	8,375	500	16.8
1976	7,958	173	6,868	1,264	7,776	356	8,132	499	16.3
1977	7,781	464	7,069	1,176	7,875	370	8,245	507	16.4
1978	7,478	1,229	7,571	1,136	8,353	355	8,707	517	17.0
1979	7,151	1,401	7,485	1,067	8,181	371	8,552	531	16.3
1980	6,980	1,617	7,562	1,034	8,210	386	8,597	548	15.9
1981	6,962	1,609	7,537	1,034	8,176	395	8,572	557	15.4
1982	6,953	1,696	7,538	1,110	8,261	387	8,649	580	14.9
1983	6,974	1,714	7,492	1,196	8,688	(3)	8,688	603	14.4
1984	7,157	1,722	7,596	1,283	8,879	(3)	8,879	621	14.3
1985	7,146	1,825	7,722	1,250	8,971	(3)	8,971	647	13.9
1986	6,814	1,867	7,426	1,254	8,680	(3)	8,680	623	13.9
1987	6,387	1,962	7,153	1,196	8,349	(3)	8,349	620	13.5
1988	6,123	2,017	6,949	1,191	8,140	(3)	8,140	612	13.5
1989	5,739	1,874	6,486	1,127	7,613	(3)	7,613	603	12.6
1990	5,582	1,773	6,273	1,082	7,355	(3)	7,355	602	12.2
1991	5,618	1,798	6,245	1,172	7,417	(3)	7,417	614	12.1
1992	R5,457	1,714	R5,953	R1,218	R7,171	(3)	R7,171	594	R12.1
1993P	5,255	1,583	5,605	1,233	6,838	(3)	6,838	584	11.7

[1] As of December 31.

[2] For 1954-1976, average productivity is based on the average number of producing wells. For 1977 forward, average productivity is based on the number of wells producing at end of year.

[3] Included in crude oil.

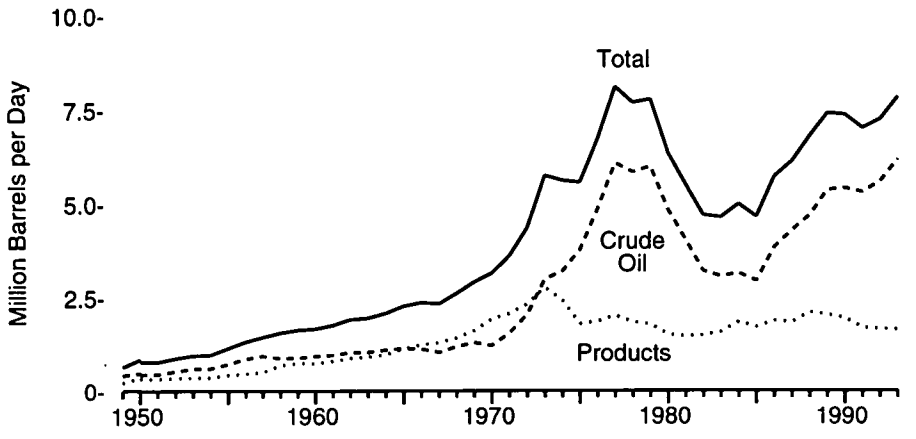
R=Revised data. P=Preliminary data.

Note: Totals may not equal sum of components due to independent rounding.

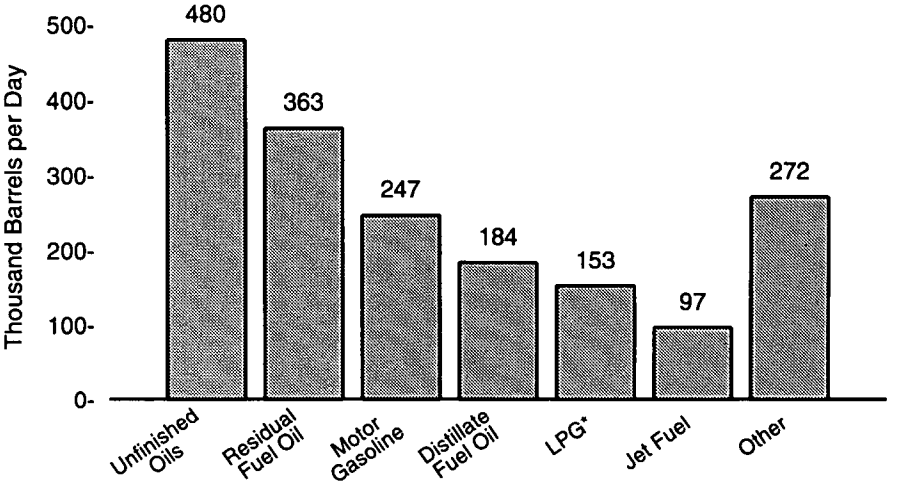
Sources: **Offshore:** • 1954-1969—U.S. Geological Survey, *Outer Continental Shelf Statistics*, June 1979. • 1970-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994). **Oil Well Productivity:** • 1954-1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. • 1976-1980—EIA, Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—Independent Petroleum Association of America, *The Oil Producing Industry in Your State.* • 1993—*World Oil*, February 1994. **All Other Data:** • 1954-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—EIA, Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.3 Petroleum Imports by Type

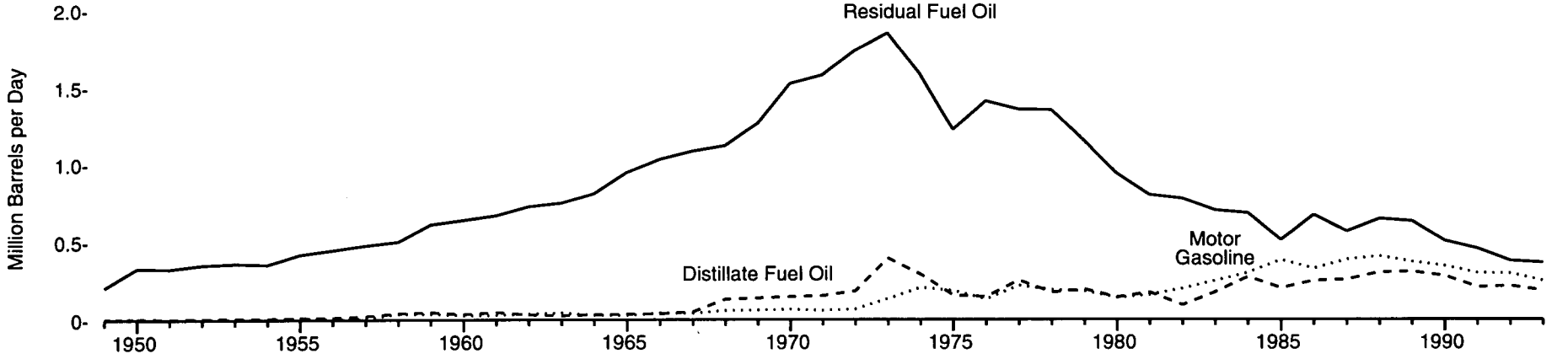
Total, 1949-1993



By Product, 1993



By Selected Product, 1949-1993



*Liquefied petroleum gases.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.3.

Table 5.3 Petroleum Imports by Type, 1949-1993

(Thousand Barrels per Day)

Year	Crude Oil [1]	Petroleum Products									Total Petroleum
		Distillate Fuel Oil	Jet Fuel [2]	Liquefied Petroleum Gases		Motor Gasoline [4]	Residual Fuel Oil	Unfinished Oils	Other Products [5]	Total	
				Propane [3]	Total						
1949	421	5	NA	0	0	0	206	10	3	224	645
1950	487	7	NA	0	0	([6])	329	21	6	363	850
1951	491	5	NA	0	0	1	326	14	7	354	844
1952	573	7	NA	0	0	5	351	9	7	380	952
1953	648	9	NA	0	0	1	360	9	7	386	1,034
1954	656	9	NA	0	0	3	354	21	9	396	1,052
1955	782	12	NA	0	0	13	417	15	9	466	1,248
1956	934	14	21	0	0	5	445	7	10	502	1,436
1957	1,023	23	25	0	0	8	475	3	18	552	1,574
1958	953	41	57	0	0	38	499	92	21	747	1,700
1959	965	48	37	0	0	37	610	63	19	814	1,780
1960	1,015	35	34	NA	4	27	637	45	17	799	1,815
1961	1,045	48	28	NA	5	29	666	69	26	872	1,917
1962	1,126	32	30	NA	6	38	724	89	36	955	2,082
1963	1,131	25	41	NA	7	44	747	87	41	992	2,123
1964	1,198	32	33	NA	11	29	808	89	58	1,060	2,259
1965	1,238	36	81	NA	21	28	946	92	27	1,229	2,468
1966	1,225	38	86	NA	29	43	1,032	97	24	1,348	2,573
1967	1,128	51	89	11	27	42	1,085	97	20	1,409	2,537
1968	1,291	132	105	15	32	59	1,120	80	22	1,549	2,840
1969	1,409	139	125	14	35	62	1,265	106	25	1,757	3,166
1970	1,324	147	144	26	52	67	1,528	108	49	2,095	3,419
1971	1,681	153	180	32	70	59	1,583	124	76	2,245	3,926
1972	2,216	182	194	43	89	68	1,742	125	126	2,525	4,741
1973	3,244	392	212	71	132	134	1,853	137	152	3,012	6,256
1974	3,477	289	163	59	123	204	1,587	121	148	2,635	6,112
1975	4,105	155	133	60	112	184	1,223	36	108	1,951	6,056
1976	5,287	146	76	68	130	131	1,413	32	97	2,026	7,313
1977	6,615	250	75	86	161	217	1,359	31	99	2,193	8,807
1978	6,356	173	86	57	123	190	1,355	27	53	2,008	8,363
1979	6,519	193	78	88	217	181	1,151	59	58	1,937	8,456
1980	5,263	142	80	69	216	140	939	55	76	1,646	6,909
1981	4,396	173	38	70	244	157	800	112	76	1,599	5,996
1982	3,488	93	29	63	226	197	776	174	131	1,625	5,113
1983	3,329	174	29	44	190	247	699	234	148	1,722	5,051
1984	3,426	272	62	67	195	299	681	231	272	2,011	5,437
1985	3,201	200	39	67	187	381	510	318	232	1,866	5,067
1986	4,178	247	57	110	242	326	669	250	254	2,045	6,224
1987	4,674	255	67	88	190	384	565	299	243	2,004	6,678
1988	5,107	302	90	106	209	405	644	360	285	2,295	7,402
1989	5,843	306	106	111	181	369	629	348	280	2,217	8,061
1990	5,894	278	108	115	188	342	504	413	291	2,123	8,018
1991	5,782	205	67	91	147	297	453	413	262	1,844	7,627
1992	[R]6,083	[R]216	[R]82	85	[R]131	[R]294	[R]375	[R]443	[R]264	[R]1,805	[R]7,888
1993[P]	6,731	184	97	102	153	247	363	480	272	1,795	8,526

[1] Includes imports for the Strategic Petroleum Reserve, which began in 1977.

[2] Prior to 1965, imports of kerosene-type jet fuel were included with kerosene, which is listed under "Other Products."

[3] Includes propylene.

[4] Excludes motor gasoline blending components after 1980. Prior to 1964, motor gasoline data were for total gasoline, including motor gasoline, aviation gasoline, and special naphtha.

[5] Aviation gasoline, motor gasoline blending components, aviation gasoline blending components, kerosene, petrochemical feedstocks, special naphthas, lubricants, wax, asphalt, petroleum coke, pentanes plus, and miscellaneous products.

[6] Less than 500 barrels per day.

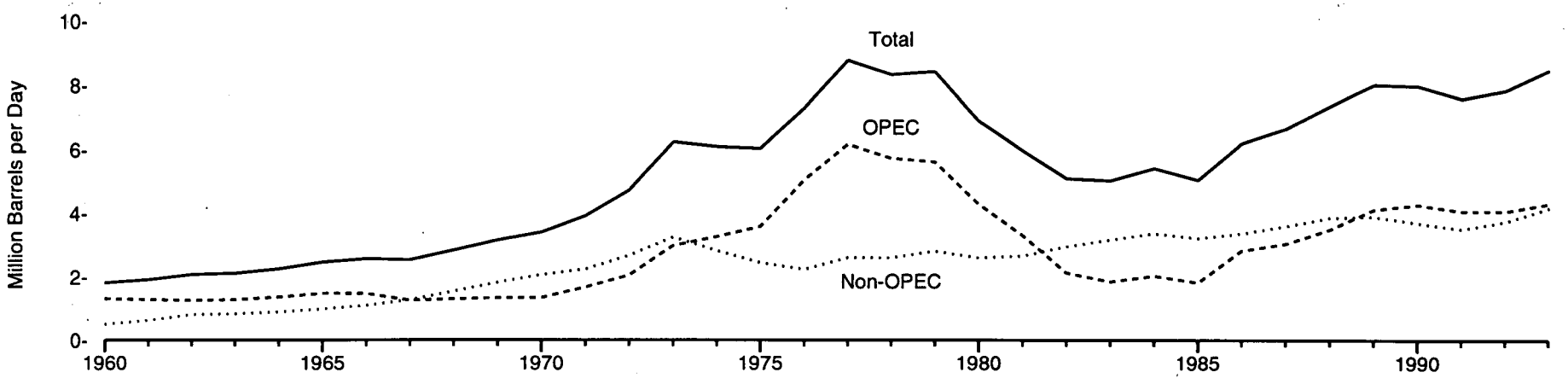
R=Revised data. P=Preliminary data. NA=Not available.

Notes: • Includes imports from U.S. possessions and territories. • Totals may not equal sum of components due to independent rounding.

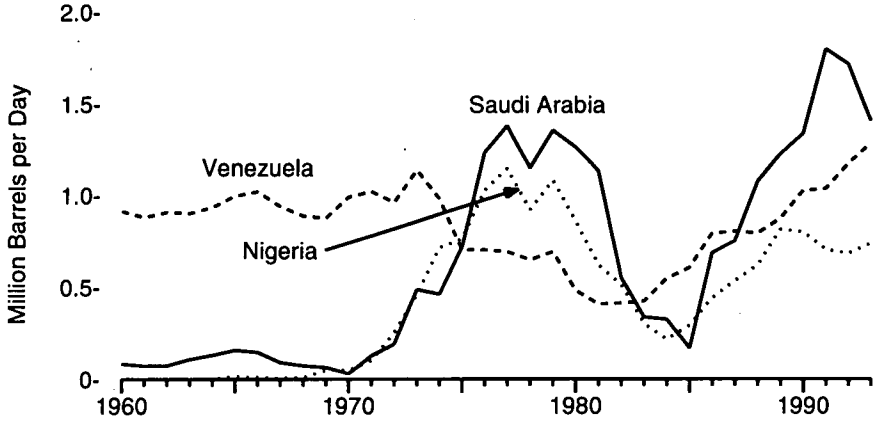
Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.4 Petroleum Imports by Country of Origin, 1960-1993

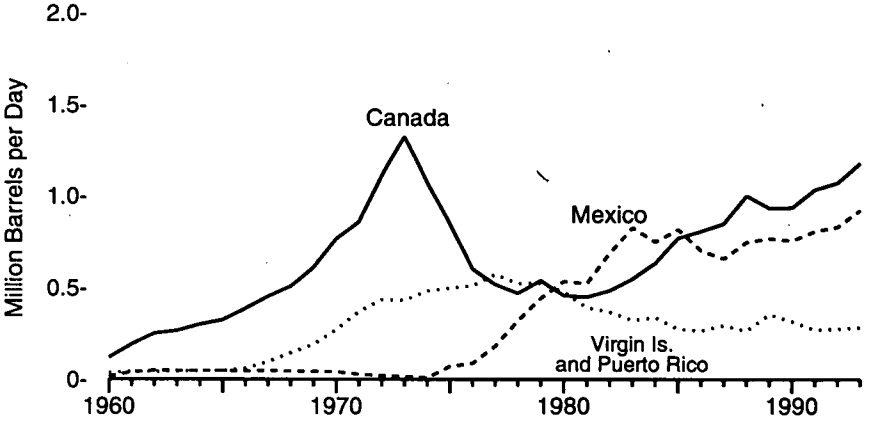
Total, OPEC, and Non-OPEC



Selected OPEC Countries



Selected Non-OPEC Countries



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.4.

Table 5.4 Petroleum Imports by Country of Origin, 1960-1993

(Thousand Barrels per Day)

	OPEC [1]								Non-OPEC					
Year	Algeria	Indonesia	Nigeria	Saudi Arabia	Venezuela	Other [2]	Total [3]	Arab OPEC [4]	Canada	Mexico	United Kingdom	Virgin Islands and Puerto Rico	Other	Total
1960	1	77	0	84	911	241	1,314	292	120	16	([5])	36	328	1,815
1961	0	62	0	73	879	272	1,286	284	190	40	1	44	357	1,917
1962	0	69	0	74	906	216	1,265	241	250	49	2	41	475	2,082
1963	1	63	0	108	900	211	1,283	258	265	48	3	44	480	2,123
1964	6	68	0	131	933	223	1,361	293	299	47	([5])	47	505	2,259
1965	9	63	15	158	994	237	1,476	324	323	48	([5])	47	574	2,468
1966	4	53	11	147	1,018	238	1,471	300	384	45	6	61	606	2,573
1967	5	66	5	92	938	153	1,259	177	450	49	11	96	673	2,537
1968	6	73	9	74	886	255	1,302	272	506	45	28	145	814	2,840
1969	2	88	49	65	875	256	1,336	276	608	43	20	189	971	3,166
1970	8	70	50	30	989	197	1,343	196	766	42	11	271	985	3,419
1971	15	111	102	128	1,020	296	1,673	327	857	27	10	368	991	3,926
1972	92	164	251	190	959	406	2,063	530	1,108	21	9	432	1,108	4,741
1973	136	213	459	486	1,135	564	2,993	915	1,325	16	15	429	1,479	6,256
1974	190	300	713	461	979	635	3,280	752	1,070	8	8	481	1,265	6,112
1975	282	390	762	715	702	750	3,601	1,383	846	71	14	496	1,026	6,056
1976	432	539	1,025	1,230	700	1,140	5,066	2,424	599	87	31	510	1,019	7,313
1977	559	541	1,143	1,380	690	1,880	6,193	3,185	517	179	126	571	1,221	8,807
1978	649	573	919	1,144	646	1,821	5,751	2,963	467	318	180	522	1,126	8,363
1979	636	420	1,080	1,356	690	1,456	5,637	3,058	538	439	202	523	1,116	8,456
1980	488	348	857	1,261	481	865	4,300	2,551	455	533	176	476	969	6,909
1981	311	366	620	1,129	406	491	3,323	1,848	447	522	375	389	939	5,996
1982	170	248	514	552	412	250	2,146	854	482	685	456	366	979	5,113
1983	240	338	302	337	422	223	1,862	632	547	826	382	322	1,111	5,051
1984	323	343	216	325	548	294	2,049	819	630	748	402	336	1,273	5,437
1985	187	314	293	168	605	264	1,830	472	770	816	310	275	1,066	5,067
1986	271	318	440	685	793	329	2,837	1,162	807	699	350	265	1,267	6,224
1987	295	285	535	751	804	390	3,060	1,274	848	655	352	294	1,469	6,678
1988	300	205	618	1,073	794	529	3,520	1,839	999	747	315	264	1,557	7,402
1989	269	183	815	1,224	873	776	4,140	2,130	931	767	215	353	1,654	8,061
1990	280	114	800	1,339	1,025	738	4,296	2,244	934	755	189	315	1,529	8,018
1991	253	111	703	1,802	1,035	188	4,092	2,064	1,033	807	138	270	1,287	7,627
1992	R196	78	681	R1,720	R1,170	R247	R4,092	R1,974	R1,069	R830	230	R275	R1,392	R7,888
1993P	220	81	738	1,408	1,285	598	4,331	1,994	1,175	919	340	283	1,479	8,526

[1] Organization of Petroleum Exporting Countries. See Glossary for membership.

[2] Ecuador, Gabon, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates. Prior to 1988, imports from the Neutral Zone between Kuwait and Saudi Arabia are included in imports from Saudi Arabia. From 1988 forward, those imports are included in imports from "Other."

[3] Ecuador, Gabon, Indonesia, Iran, Nigeria, and Venezuela, as well as the Arab members. Total OPEC imports exclude petroleum imported into the United States indirectly from OPEC countries, primarily from Caribbean and West European refining areas, as petroleum products that were refined from crude oil produced in OPEC countries.

[4] Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates. Imports from the Neutral Zone are included in imports from "Arab OPEC."

[5] Less than 500 barrels per day.

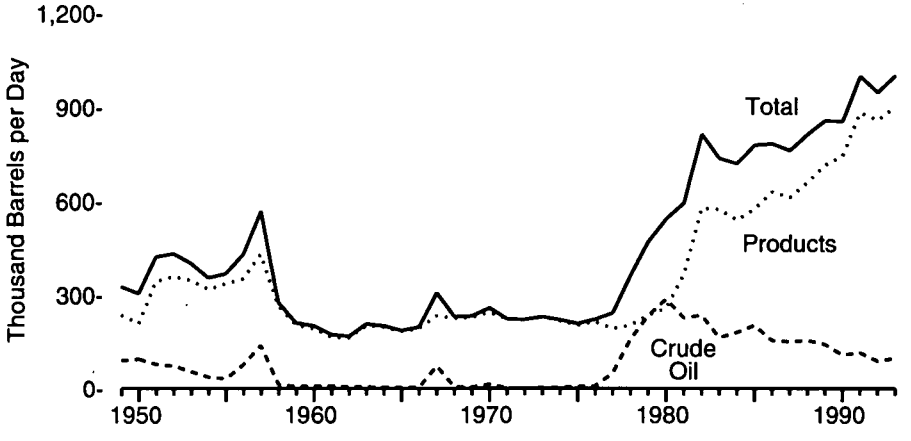
R=Revised data. P=Preliminary data.

Notes: • Data include imports for the Strategic Petroleum Reserve, which began in 1977. • Totals may not equal sum of components due to independent rounding.

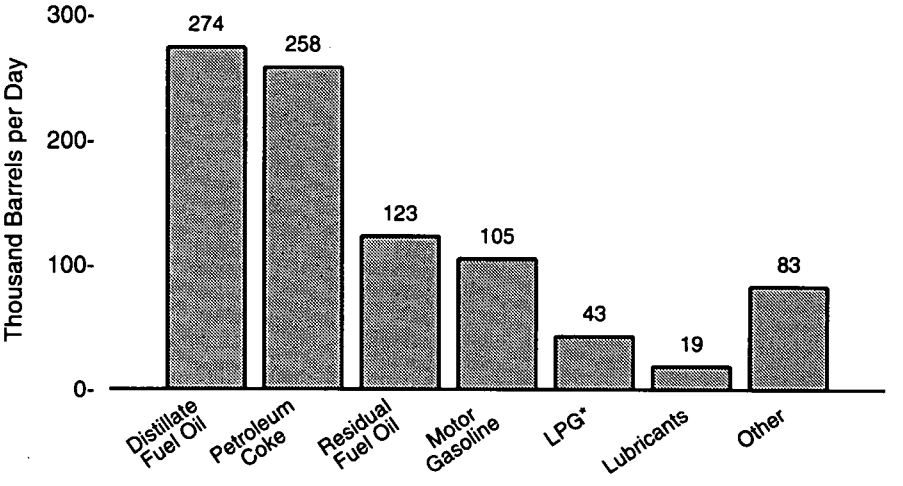
Sources: • 1960-1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" Chapter. • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *P.A.D. Districts Supply/Demand, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.5 Petroleum Exports by Type

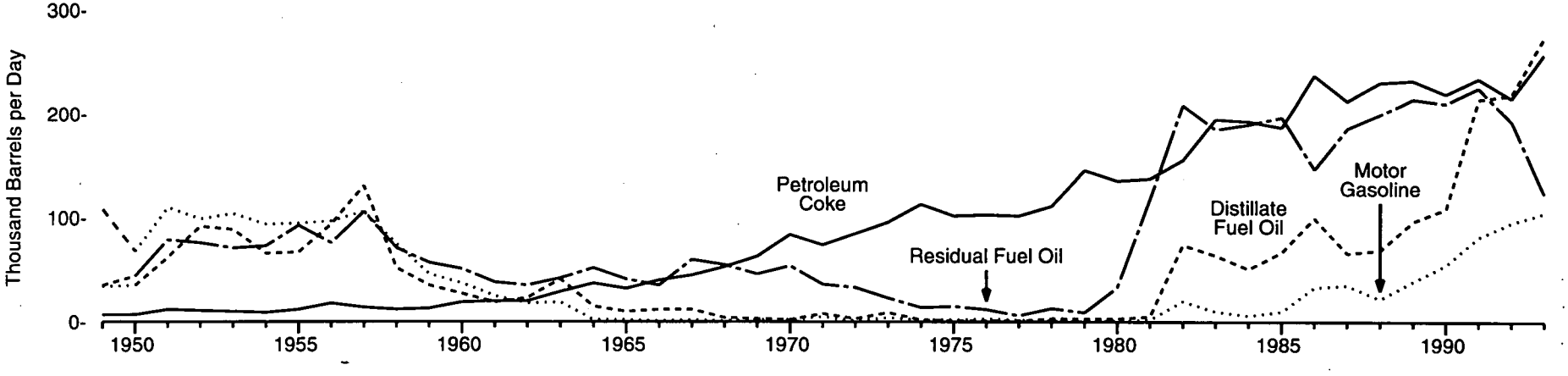
Total, 1949-1993



By Product, 1993



By Selected Product, 1949-1993



*Liquefied petroleum gases.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.5.

Table 5.5 Petroleum Exports by Type, 1949-1993

(Thousand Barrels per Day)

Year	Crude Oil	Petroleum Products										Total Petroleum
		Distillate Fuel Oil	Liquefied Petroleum Gases		Lubricants	Motor Gasoline [2]	Petroleum Coke	Petrochemical Feedstocks	Residual Fuel Oil	Other Products [3]	Total	
			Propane [1]	Total								
1949	91	34	NA	4	35	108	7	0	35	15	236	327
1950	95	35	NA	4	39	68	7	0	44	12	210	305
1951	78	62	NA	6	48	110	12	0	79	27	344	422
1952	73	92	NA	7	44	99	11	0	76	31	359	432
1953	55	89	NA	8	36	104	10	0	71	29	347	402
1954	37	66	NA	11	41	94	9	0	73	23	318	355
1955	32	67	NA	12	39	95	12	0	93	18	336	368
1956	78	94	NA	12	38	97	18	0	76	17	352	430
1957	138	131	NA	12	38	106	14	0	106	23	430	568
1958	12	52	NA	8	36	75	12	0	71	11	264	276
1959	7	35	NA	6	38	46	13	0	57	9	204	211
1960	8	27	NA	8	43	37	19	0	51	9	193	202
1961	9	19	NA	10	47	25	20	0	38	7	165	174
1962	5	23	NA	11	48	18	20	0	35	8	163	168
1963	5	41	NA	13	50	19	29	0	42	9	203	208
1964	4	15	NA	15	50	2	37	0	52	28	198	202
1965	3	10	NA	21	45	2	32	5	41	27	184	187
1966	4	12	NA	22	47	1	40	7	35	29	194	198
1967	73	12	5	25	51	2	45	8	60	31	234	307
1968	5	4	7	29	49	1	53	8	55	27	226	231
1969	4	3	7	35	45	2	63	11	46	24	229	233
1970	14	2	6	27	44	2	84	10	54	21	245	259
1971	1	8	13	26	43	5	74	14	36	17	223	224
1972	1	3	18	31	41	1	85	13	33	15	222	222
1973	2	9	15	27	35	4	96	19	23	16	229	231
1974	3	2	14	25	33	2	113	15	14	14	218	221
1975	6	1	13	26	25	2	102	22	15	11	204	209
1976	8	1	13	25	26	3	103	30	12	15	215	223
1977	50	1	10	18	26	2	102	24	6	12	193	243
1978	158	3	9	20	27	1	111	23	13	6	204	362
1979	235	3	8	15	23	([4])	146	31	9	9	236	471
1980	287	3	10	21	23	1	136	29	33	10	258	544
1981	228	5	18	42	19	2	138	26	118	17	367	595
1982	236	74	31	65	16	20	156	24	209	15	579	815
1983	164	64	43	73	16	10	195	20	185	12	575	739
1984	181	51	30	48	15	6	193	21	190	17	541	722
1985	204	67	48	62	15	10	187	19	197	19	577	781
1986	154	100	28	42	23	33	238	22	147	26	631	785
1987	151	66	24	38	23	35	213	20	186	33	613	764
1988	155	69	31	49	26	22	231	23	200	41	661	815
1989	142	97	24	35	19	39	233	26	215	54	717	859
1990	109	109	28	40	20	55	220	26	211	67	748	857
1991	116	215	28	41	18	82	235	0	226	67	885	1,001
1992	89	219	33	49	16	96	216	0	193	73	861	950
1993[P]	98	274	26	43	19	105	258	0	123	83	905	1,003

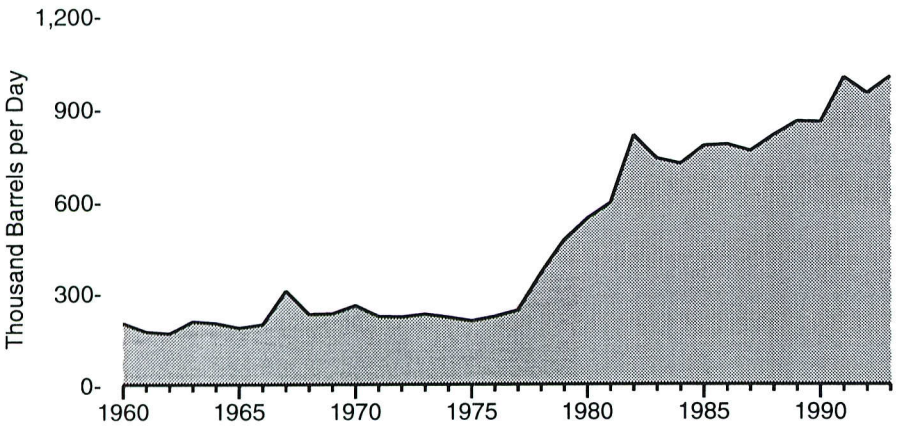
[1] Includes propylene.
[2] Includes aviation gasoline for the years 1949-1963.
[3] Aviation gasoline (for 1964 forward), motor gasoline blending components, jet fuel, kerosene, special naphthas, wax, asphalt, road oil, pentanes plus, and miscellaneous products.
[4] Less than 500 barrels per day.
P=Preliminary data. NA=Not available.

Notes: • Includes exports to U.S. possessions and territories. • Totals may not equal sum of components due to independent rounding.

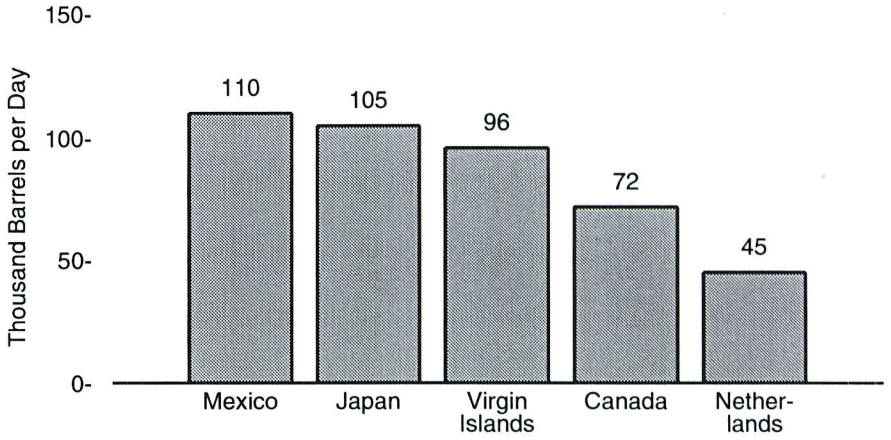
Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.6 Petroleum Exports by Country of Destination

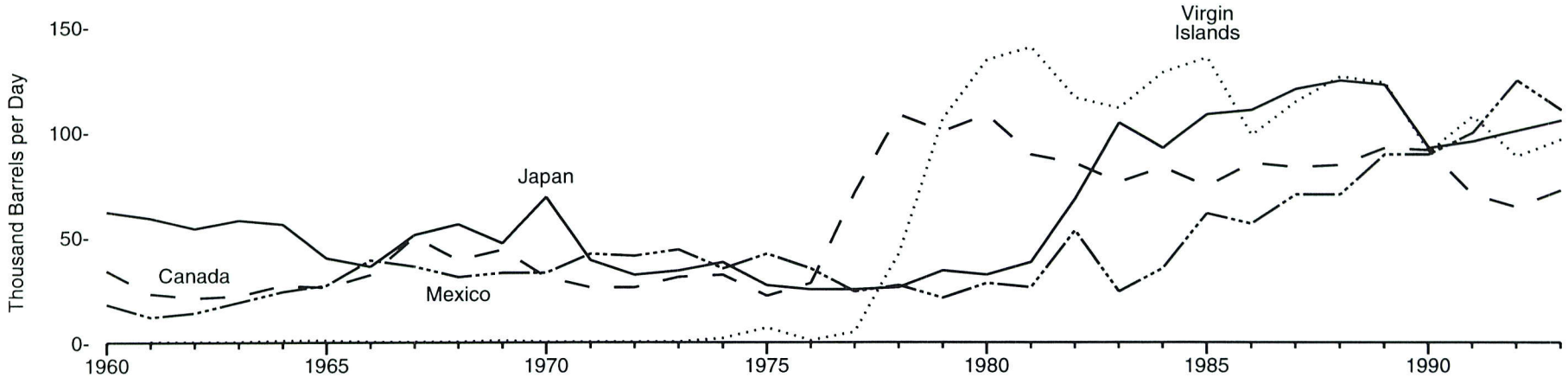
Total, 1960-1993



By Selected Countries, 1993



By Selected Countries, 1960-1993



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.6.

Table 5.6 Petroleum Exports by Country of Destination, 1960-1993

(Thousand Barrels per Day)

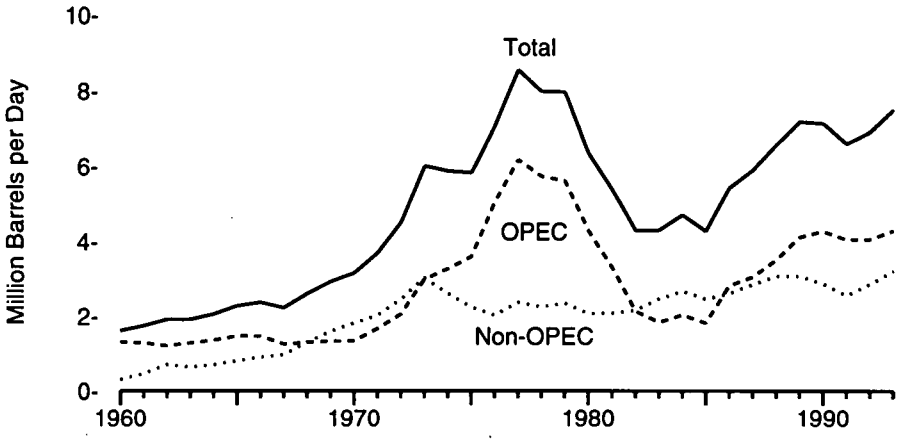
Year	Canada	Mexico	Japan	Netherlands	Belgium [1]	Italy	United Kingdom	France	Brazil	Puerto Rico	Virgin Islands	Other	Total
1960	34	18	62	6	3	6	12	4	4	1	NA	52	202
1961	23	12	59	4	4	5	10	4	4	1	(2)	48	174
1962	21	14	54	5	3	5	8	3	5	1	(2)	50	168
1963	22	19	58	13	9	8	11	4	4	1	(2)	59	208
1964	27	24	56	9	4	8	10	4	4	1	1	55	202
1965	26	27	40	10	3	7	12	3	3	1	1	54	187
1966	32	39	36	9	3	7	12	4	4	3	(2)	49	198
1967	50	36	51	13	5	9	62	3	6	7	(2)	65	307
1968	39	31	56	10	4	8	14	4	8	2	(2)	55	231
1969	44	33	47	9	4	9	13	4	7	2	1	59	233
1970	31	33	69	15	5	10	12	5	7	1	(2)	71	259
1971	26	42	39	11	7	8	9	5	9	3	(2)	67	224
1972	26	41	32	12	13	9	10	5	9	3	(2)	63	222
1973	31	44	34	13	15	9	9	5	8	3	(2)	60	231
1974	32	35	38	17	13	9	6	4	9	4	2	52	221
1975	22	42	27	23	9	10	7	6	6	5	7	44	209
1976	28	35	25	22	12	10	13	6	7	21	1	43	223
1977	71	24	25	17	16	10	9	9	6	6	5	44	243
1978	108	27	26	18	15	10	7	9	8	44	42	47	362
1979	100	21	34	28	19	15	7	13	7	64	106	57	471
1980	108	28	32	23	20	14	7	11	4	86	134	79	544
1981	89	26	38	42	12	22	5	15	1	81	140	124	595
1982	85	53	68	85	17	32	14	24	8	95	116	216	815
1983	76	24	104	49	22	35	8	23	2	33	111	251	739
1984	83	35	92	37	21	39	14	18	1	24	128	229	722
1985	74	61	108	44	26	30	14	11	3	26	135	248	781
1986	85	56	110	58	30	39	8	11	3	14	98	273	785
1987	83	70	120	39	17	42	6	12	2	22	114	236	764
1988	84	70	124	26	25	29	9	12	3	21	126	286	815
1989	92	89	122	36	23	37	9	11	5	18	123	294	859
1990	91	89	92	54	20	48	11	17	2	11	90	332	857
1991	70	99	95	72	22	55	13	27	13	10	107	418	1,001
1992	64	124	100	52	22	38	12	9	20	7	88	415	950
1993[P]	72	110	105	45	21	34	10	8	16	13	96	474	1,003

[1] Including Luxembourg.
[2] Less than 500 barrels per day.
P=Preliminary data. NA=Not available.
Note: Totals may not equal sum of components due to independent rounding.

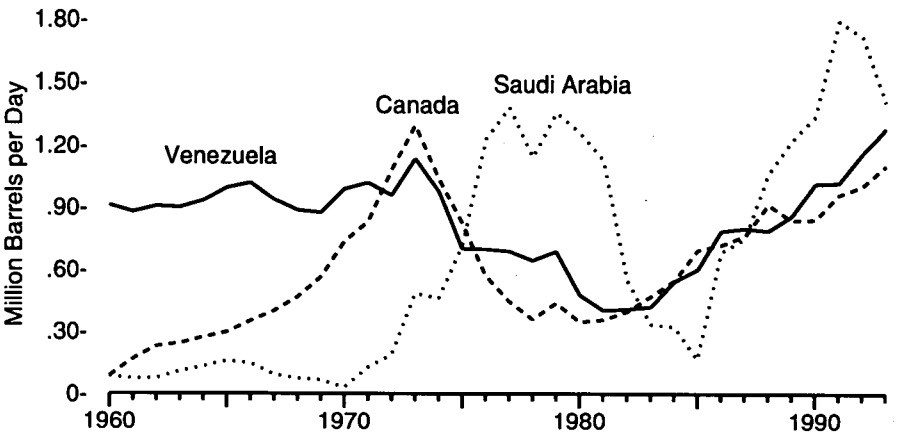
Sources: • 1960-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.7 Petroleum Net Imports by Country of Origin, 1960-1993

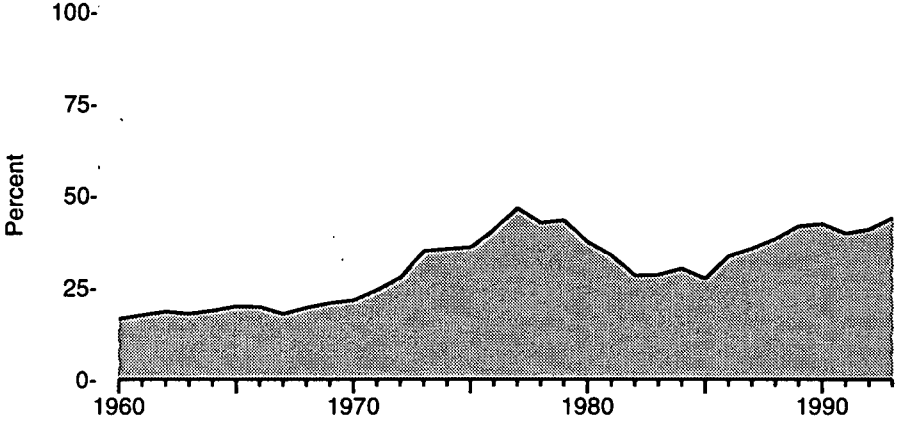
Total, OPEC, and Non-OPEC



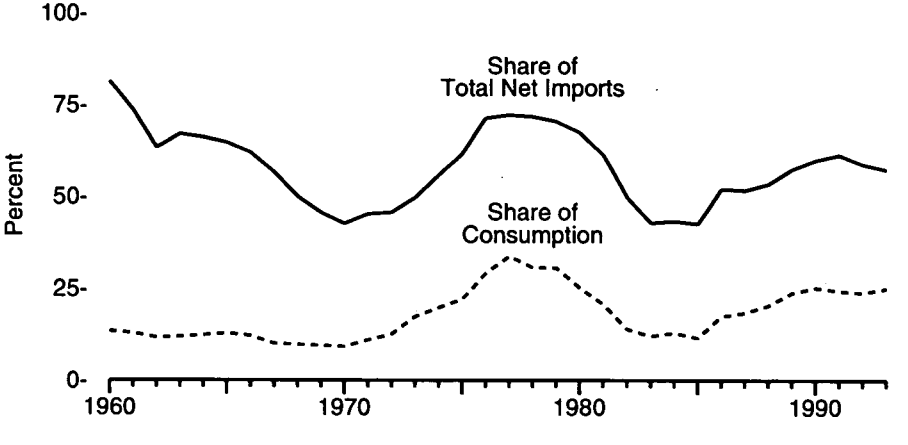
By Selected Country



Share of Consumption



Net Imports from OPEC



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.7.

Table 5.7 Petroleum Net Imports by Country of Origin, 1960-1993

Year	OPEC [1]						Non-OPEC					Total Net Imports	Total Net Imports Share of Consumption [5]	Net Imports from OPEC	
	Nigeria	Saudi Arabia	Venezuela	Other [2]	Total [3]	Arab OPEC [4]	Canada	Mexico	United Kingdom	Virgin Islands and Puerto Rico	Other			Share of Total Net Imports [6]	Share of Consumption [7]
	Thousand Barrels per Day												Percent		
1960	0	84	910	317	1,311	292	86	-2	-12	34	195	1,613	16.5	81.3	13.4
1961	0	73	878	333	1,283	284	167	27	-10	42	232	1,743	17.5	73.6	12.9
1962	0	74	905	232	1,210	241	229	35	-6	40	405	1,913	18.4	63.3	11.6
1963	0	108	899	274	1,282	258	243	29	-7	43	325	1,915	17.8	67.0	11.9
1964	0	131	932	296	1,359	293	272	23	-9	45	368	2,057	18.7	66.1	12.3
1965	15	158	994	308	1,475	324	297	21	-11	45	454	2,281	19.8	64.7	12.8
1966	11	147	1,018	295	1,470	291	352	6	-6	58	494	2,375	19.7	61.9	12.2
1967	5	92	937	224	1,258	177	400	13	-51	89	521	2,230	17.8	56.4	10.0
1968	9	74	886	332	1,302	272	468	15	13	143	668	2,609	19.5	49.9	9.7
1969	49	65	875	346	1,336	276	564	10	7	186	831	2,933	20.8	45.5	9.5
1970	50	30	989	274	1,343	196	736	9	-1	270	804	3,161	21.5	42.5	9.1
1971	102	128	1,019	422	1,671	327	831	-14	1	365	848	3,701	24.3	45.2	11.0
1972	251	189	959	662	2,061	529	1,082	-20	-1	428	969	4,519	27.6	45.6	12.6
1973	459	485	1,134	913	2,991	914	1,294	-28	([8])	426	1,343	6,025	34.8	49.6	17.3
1974	713	461	978	1,125	3,277	752	1,038	-27	1	475	1,127	5,892	35.4	55.6	19.7
1975	762	714	702	1,421	3,599	1,382	824	29	7	484	904	5,846	35.8	61.6	22.1
1976	1,025	1,229	699	2,110	5,063	2,423	571	53	24	488	891	7,090	40.6	71.4	29.0
1977	1,143	1,379	689	2,978	6,190	3,184	446	155	117	560	1,097	8,565	46.5	72.3	33.6
1978	919	1,142	644	3,042	5,747	2,962	359	291	173	436	996	8,002	42.5	71.8	30.5
1979	1,080	1,354	688	2,510	5,633	3,054	438	418	196	353	948	7,985	43.1	70.5	30.4
1980	857	1,259	478	1,699	4,293	2,549	347	506	169	256	794	6,365	37.3	67.5	25.2
1981	620	1,128	403	1,165	3,315	1,844	358	497	370	169	693	5,401	33.6	61.4	20.6
1982	512	551	409	663	2,136	852	397	632	442	154	538	4,298	28.1	49.7	14.0
1983	299	336	420	788	1,843	630	471	802	374	178	644	4,312	28.3	42.7	12.1
1984	215	324	544	953	2,037	817	547	714	388	184	847	4,715	30.0	43.2	13.0
1985	293	167	602	759	1,821	470	696	755	295	114	605	4,286	27.3	42.5	11.6
1986	440	685	788	915	2,828	1,160	721	642	342	152	753	5,439	33.4	52.0	17.4
1987	535	751	801	968	3,055	1,273	765	585	346	158	1,006	5,914	35.5	51.7	18.3
1988	618	1,064	790	1,041	3,513	1,837	916	677	306	117	1,058	6,587	38.1	53.3	20.3
1989	815	1,224	861	1,224	4,124	2,128	839	678	206	212	1,143	7,202	41.6	57.3	23.8
1990	800	1,339	1,016	1,130	4,285	2,243	843	666	179	213	976	7,161	42.2	59.8	25.2
1991	703	1,796	1,020	546	4,065	2,057	963	707	125	153	612	6,626	39.6	61.3	24.3
1992	680	[R]1,720	[R]1,161	[R]510	[R]4,071	[R]1,972	[R]1,005	[R]706	219	[R]180	[R]757	[R]6,938	[R]40.7	[R]58.7	[R]23.9
1993[P]	734	1,408	1,281	882	4,304	1,989	1,103	810	330	174	802	7,523	43.8	57.2	25.0

[1] Organization of Petroleum Exporting Countries. See Glossary for membership.

[2] Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates. Prior to 1988, imports from the Neutral Zone between Kuwait and Saudi Arabia are included in imports from Saudi Arabia. From 1988 forward, those imports are included in imports from "Other."

[3] Ecuador, Gabon, Indonesia, Iran, Nigeria, and Venezuela, as well as the Arab members. Total OPEC imports exclude petroleum imported into the United States indirectly from OPEC countries, primarily from Caribbean and West European refining areas, as petroleum products that were refined from crude oil produced in OPEC countries.

[4] Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates. Imports from the Neutral Zone are included in imports from "Arab OPEC."

[5] Calculated by dividing total net petroleum imports by total U.S. petroleum products supplied (consumption).

[6] Calculated by dividing net petroleum imports from OPEC countries by total net petroleum imports.

[7] Calculated by dividing net petroleum imports from OPEC countries by total U.S. petroleum product supplied (consumption).

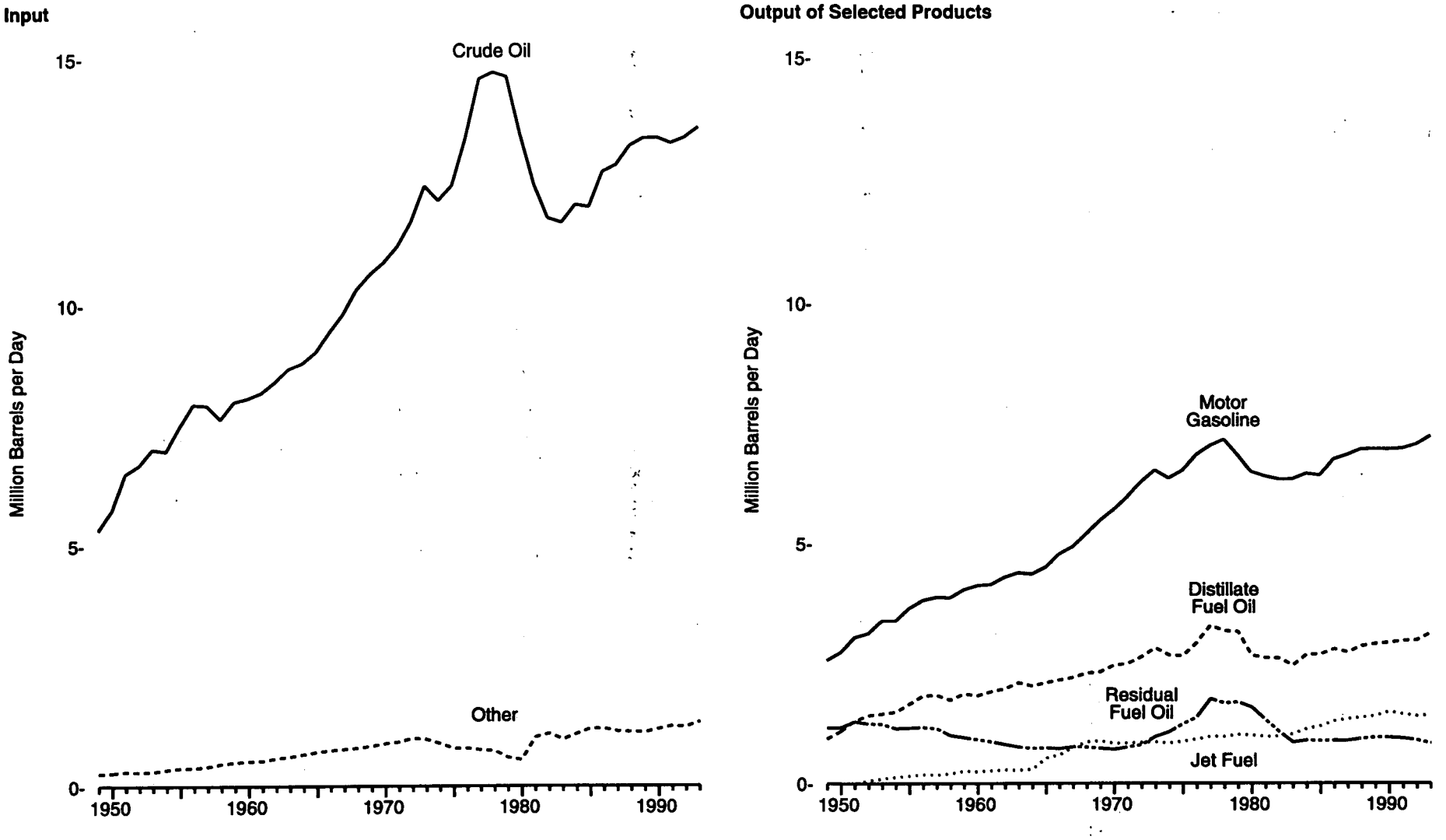
[8] Less than 500 barrels per day.

R=Revised data. P=Preliminary data.

Notes: • Net imports are imports minus exports; negative numbers indicate that exports exceed imports. • Data include imports for the Strategic Petroleum Reserve, which began in 1977. • Totals may not equal sum of components due to independent rounding.

Sources: • 1960-1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *P.A.D. Districts Supply/Demand, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.8 Refinery Input and Output, 1949-1993



Source: Table 5.8.

Table 5.8 Refinery Input and Output, 1949-1993

(Million Barrels per Day)

Year	Input				Output							Processing Gain
	Crude Oil	Natural Gas Plant Liquids	Other Liquids [1]	Total Input	Motor Gasoline [2]	Jet Fuel [2]	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other Products [3]	Total Output	
1949	5.33	0.23	0.03	5.59	2.57	NA	0.93	1.16	0.06	0.85	5.59	([4])
1950	5.74	0.26	0.02	6.02	2.74	NA	1.09	1.16	0.08	0.95	6.02	([4])
1951	6.49	0.27	0.03	6.80	3.04	NA	1.30	1.29	0.09	1.09	6.80	0.01
1952	6.67	0.28	0.01	6.97	3.12	0.06	1.42	1.24	0.08	1.06	6.97	0.01
1953	7.00	0.30	([4])	7.31	3.38	0.10	1.45	1.23	0.09	1.08	7.33	0.02
1954	6.96	0.32	0.02	7.30	3.38	0.13	1.49	1.14	0.09	1.10	7.32	0.02
1955	7.48	0.34	0.03	7.86	3.65	0.16	1.65	1.15	0.12	1.17	7.89	0.03
1956	7.94	0.37	0.01	8.32	3.82	0.18	1.82	1.17	0.14	1.24	8.36	0.04
1957	7.92	0.41	([4])	8.33	3.88	0.17	1.83	1.14	0.15	1.20	8.37	0.04
1958	7.64	0.37	0.09	8.11	3.87	0.20	1.73	1.00	0.16	1.22	8.17	0.06
1959	7.99	0.42	0.07	8.48	4.04	0.25	1.86	0.95	0.19	1.28	8.57	0.09
1960	8.07	0.45	0.06	8.58	4.13	0.24	1.82	0.91	0.21	1.42	8.73	0.15
1961	8.18	0.46	0.06	8.71	4.15	0.26	1.91	0.86	0.22	1.49	8.89	0.18
1962	8.41	0.50	0.08	8.99	4.30	0.28	1.97	0.81	0.21	1.59	9.16	0.18
1963	8.69	0.52	0.09	9.30	4.39	0.27	2.09	0.76	0.26	1.72	9.50	0.20
1964	8.81	0.58	0.07	9.46	4.37	0.29	2.03	0.73	0.29	1.97	9.68	0.22
1965	9.04	0.62	0.09	9.75	4.51	0.52	2.10	0.74	0.29	1.81	9.97	0.22
1966	9.44	0.65	0.09	10.18	4.77	0.59	2.15	0.72	0.29	1.90	10.43	0.25
1967	9.82	0.67	0.09	10.58	4.94	0.75	2.20	0.76	0.31	1.92	10.87	0.29
1968	10.31	0.71	0.08	11.10	5.20	0.86	2.29	0.75	0.32	1.99	11.42	0.32
1969	10.63	0.72	0.11	11.46	5.47	0.88	2.32	0.73	0.34	2.06	11.79	0.34
1970	10.87	0.76	0.12	11.75	5.70	0.83	2.45	0.71	0.35	2.08	12.11	0.36
1971	11.20	0.78	0.14	12.12	5.97	0.83	2.50	0.75	0.36	2.09	12.50	0.38
1972	11.70	0.83	0.17	12.69	6.28	0.85	2.63	0.80	0.36	2.17	13.08	0.39
1973	12.43	0.82	0.15	13.40	6.53	0.86	2.82	0.97	0.37	2.30	13.85	0.45
1974	12.13	0.75	0.14	13.02	6.36	0.84	2.67	1.07	0.34	2.23	13.50	0.48
1975	12.44	0.71	0.07	13.23	6.52	0.87	2.65	1.24	0.31	2.10	13.68	0.46
1976	13.42	0.73	0.06	14.20	6.84	0.92	2.92	1.38	0.34	2.28	14.68	0.48
1977	14.60	0.67	0.07	15.35	7.03	0.97	3.28	1.75	0.35	2.49	15.87	0.52
1978	14.74	0.64	0.09	15.47	7.17	0.97	3.17	1.67	0.35	2.64	15.97	0.50
1979	14.65	0.51	0.08	15.24	6.84	1.01	3.15	1.69	0.34	2.74	15.76	0.53
1980	13.48	0.46	0.08	14.02	6.49	1.00	2.66	1.58	0.33	2.56	14.62	0.60
1981	12.47	0.52	0.49	13.48	6.40	0.97	2.61	1.32	0.31	2.37	13.99	0.51
1982	11.77	0.52	0.57	12.86	6.34	0.98	2.61	1.07	0.27	2.13	13.39	0.53
1983	11.69	0.46	0.50	12.65	6.34	1.02	2.46	0.85	0.33	2.14	13.14	0.49
1984	12.04	0.50	0.58	13.13	6.45	1.13	2.68	0.89	0.36	2.16	13.68	0.55
1985	12.00	0.51	0.68	13.19	6.42	1.19	2.69	0.88	0.39	2.18	13.75	0.56
1986	12.72	0.48	0.71	13.91	6.75	1.29	2.80	0.89	0.42	2.37	14.52	0.62
1987	12.85	0.47	0.67	13.99	6.84	1.34	2.73	0.89	0.45	2.38	14.63	0.64
1988	13.25	0.51	0.61	14.37	6.96	1.37	2.86	0.93	0.50	2.42	15.02	0.66
1989	13.40	0.50	0.61	14.51	6.96	1.40	2.90	0.95	0.55	2.40	15.17	0.66
1990	13.41	0.47	0.71	14.59	6.96	1.49	2.92	0.95	0.50	2.45	15.27	0.68
1991	13.30	0.47	0.77	14.54	6.98	1.44	2.96	0.93	0.54	2.41	15.26	0.71
1992	13.41	0.47	R0.75	R14.63	7.06	1.40	R2.97	0.89	R0.61	R2.47	R15.40	R0.77
1993P	13.61	0.49	0.84	14.94	7.24	1.42	3.12	0.83	0.58	2.50	15.70	0.76

[1] Prior to 1981, includes unfinished oils (net), hydrogen, and hydrocarbons not included elsewhere. 1981 forward includes unfinished oils (net), motor gasoline blending components (net), aviation gasoline blending components (net), hydrogen, other hydrocarbons, and alcohol. See Note 1 at end of section.

[2] Prior to 1964, motor gasoline data were for total gasoline, including motor gasoline, aviation gasoline and special naphtha. Prior to 1965, kerosene-type jet fuel was included in kerosene.

[3] Kerosene, petrochemical feedstocks, lubricants, wax, petroleum coke, asphalt, road oil, still gas, and miscellaneous products. Since 1964, aviation gasoline and special naphthas are included.

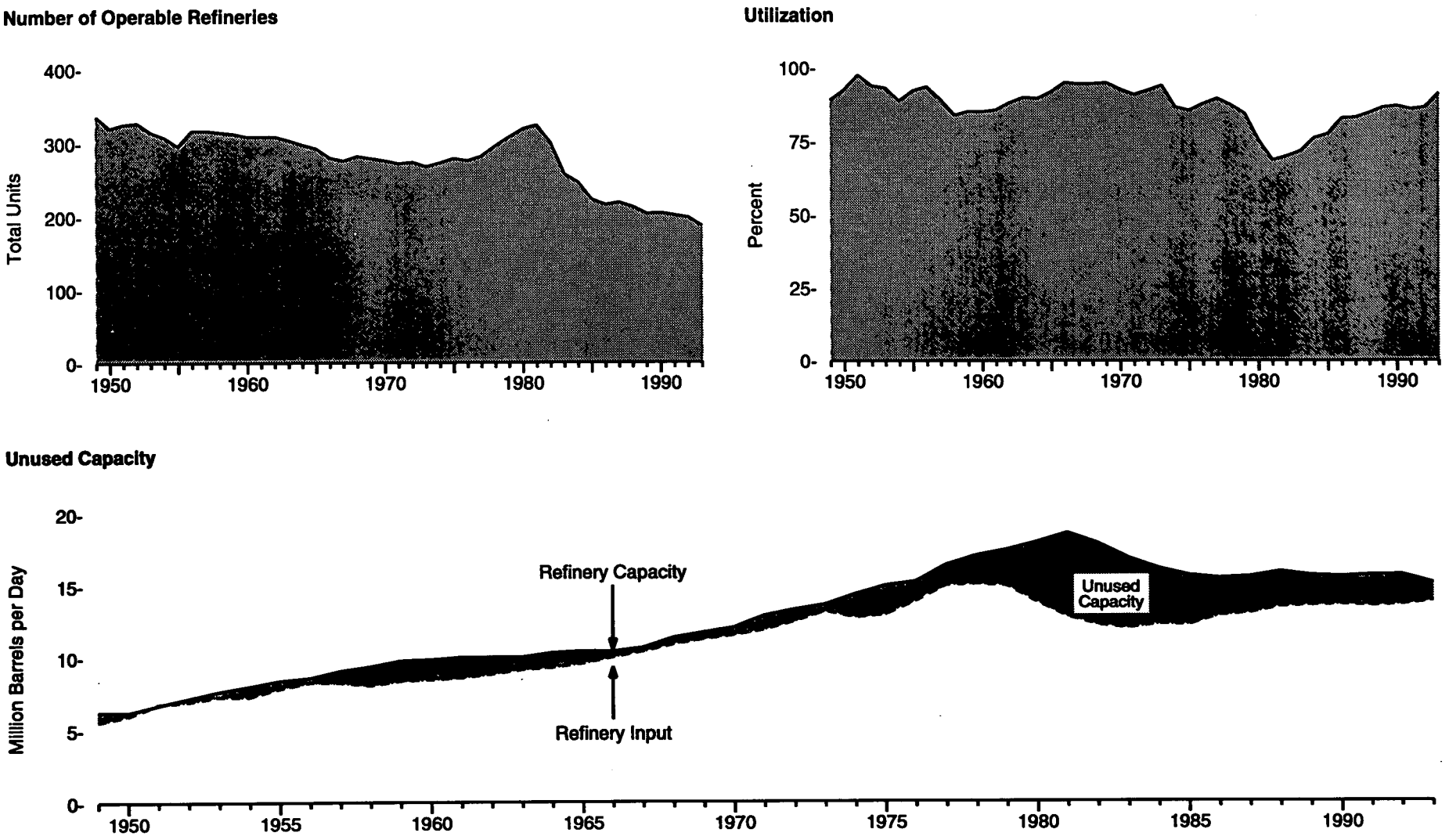
[4] Less than 5,000 barrels per day.

R=Revised data. P=Preliminary data. NA=Not available.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.9 Refinery Capacity and Utilization, 1949-1993



Source: Table 5.9.

Table 5.9 Refinery Capacity and Utilization, 1949-1993

Year	Operable Refineries		Gross Input to Distillation Units [3] (million barrels per day)	Utilization [4] (percent)
	Number [1]	Capacity [2] (million barrels per day)		
1949	336	6.23	5.56	89.2
1950	320	6.22	5.98	92.5
1951	325	6.70	6.76	97.5
1952	327	7.16	6.93	93.8
1953	315	7.62	7.26	93.1
1954	308	7.98	7.27	88.8
1955	296	8.39	7.82	92.2
1956	317	8.58	8.25	93.5
1957	317	9.07	8.22	89.2
1958	315	9.36	8.02	83.9
1959	313	9.76	8.36	85.2
1960	309	9.84	8.44	85.1
1961	309	10.00	8.57	85.7
1962	309	10.01	8.83	88.2
1963	304	10.01	9.14	90.0
1964	298	10.31	9.28	89.6
1965	293	10.42	9.56	91.8
1966	280	10.39	9.99	94.9
1967	276	10.66	10.39	94.4
1968	282	11.35	10.89	94.5
1969	279	11.70	11.25	94.8
1970	276	12.02	11.52	92.6
1971	272	12.86	11.88	90.9
1972	274	13.29	12.43	92.3
1973	268	13.64	13.15	93.9
1974	273	14.36	12.69	86.6
1975	279	14.96	12.90	85.5
1976	276	15.24	13.88	87.8
1977	282	16.40	14.98	89.6
1978	296	17.05	15.07	87.4
1979	308	17.44	14.96	84.4
1980	319	17.99	13.80	75.4
1981	324	18.62	12.75	68.6
1982	301	17.89	12.17	69.9
1983	258	16.86	11.95	71.7
1984	247	16.14	12.22	76.2
1985	223	15.66	12.17	77.6
1986	216	15.46	12.83	82.9
1987	219	15.57	13.00	83.1
1988	213	15.92	13.45	84.7
1989	204	15.65	13.55	86.6
1990	205	15.57	13.61	87.1
1991	202	15.68	13.51	86.0
1992	199	15.70	R13.60	R87.9
1993P	187	15.12	13.86	91.4

[1] Prior to 1956, the number of refineries includes only those in operation on January 1. For 1957 forward, the number of refineries includes all operable refineries on January 1 (see Glossary).

[2] Capacity in million barrels per calendar day on January 1.

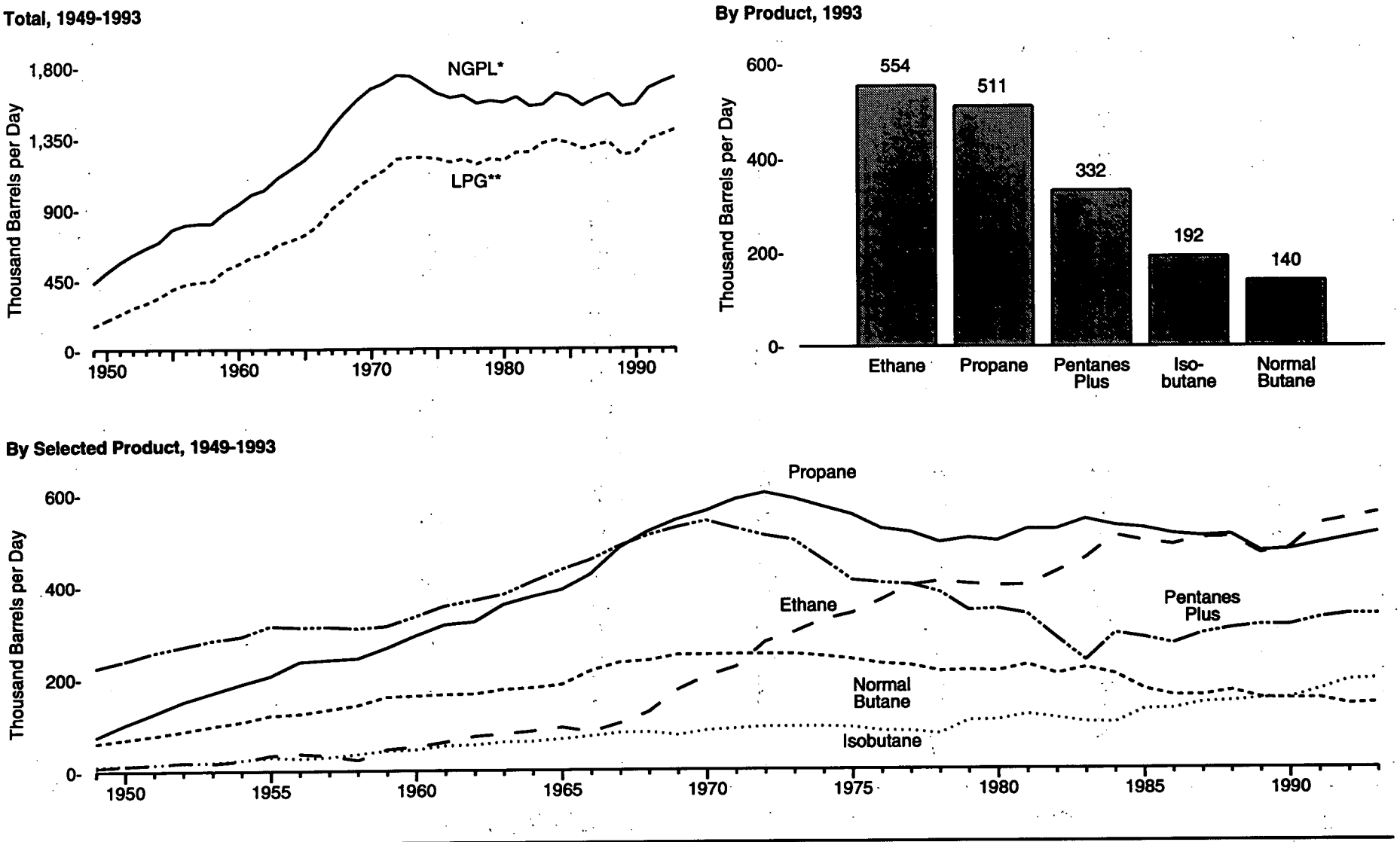
[3] See Note 2 at end of section.

[4] For 1949-1980, utilization is derived by dividing gross input to distillation units by one-half of the current year January 1 capacity and the following year January 1 capacity. Percentages were derived from unrounded numbers. For 1981 forward, utilization is derived by averaging reported monthly utilization.

R=Revised data. P=Preliminary data.

Sources: **Operable Refineries:** • 1949-1961—Bureau of Mines Information Circular, "Petroleum Refineries, Including Cracking Plants in the United States." • 1962-1977—Bureau of Mines, Mineral Industry Surveys, *Petroleum Refineries, Annual.* • 1978-1981—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories.* • 1982 forward—EIA, *Petroleum Supply Annual.* **Gross Input to Distillation Units:** • 1949-1966—Bureau of Mines, *Minerals Yearbook,* "Natural Gas Liquids" and "Crude Petroleum and Petroleum Products" chapters. • 1967-1977—Bureau of Mines, Mineral Industry Surveys, *Petroleum Refineries, Annual.* • 1978-1980—EIA, Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994). **Utilization:** • 1949-1980—calculated. • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.10 Natural Gas Plant Liquids Production



*Natural gas plant liquids. **Liquefied petroleum gases.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.10.

Table 5.10 Natural Gas Plant Liquids Production, 1949-1993

(Thousand Barrels per Day)

Year	Liquefied Petroleum Gases					Pentanes Plus [3]	Finished Petroleum Products [4]	Total
	Ethane [1]	Propane [1,2]	Normal Butane [2]	Isobutane	Total			
1949	8	74	61	11	155	223	53	430
1950	12	101	69	13	195	238	66	499
1951	15	125	77	15	232	256	73	561
1952	19	150	86	18	273	269	70	611
1953	17	169	97	19	301	282	71	654
1954	22	188	106	24	339	290	61	691
1955	34	205	120	30	390	313	68	771
1956	37	235	123	27	422	310	68	800
1957	33	239	132	30	434	311	63	808
1958	23	242	141	36	442	307	58	808
1959	46	265	159	43	514	312	54	879
1960	51	291	161	45	549	333	47	929
1961	61	315	164	53	593	355	43	991
1962	73	321	165	55	614	367	41	1,021
1963	78	358	175	61	672	380	47	1,098
1964	84	375	178	62	699	408	48	1,154
1965	92	390	185	67	734	434	41	1,210
1966	82	424	214	73	792	456	37	1,284
1967	101	482	232	80	895	486	29	1,409
1968	125	517	236	81	960	509	35	1,504
1969	173	543	248	74	1,037	526	27	1,590
1970	201	561	248	84	1,095	540	25	1,660
1971	221	586	249	88	1,144	523	25	1,693
1972	275	600	249	92	1,215	507	21	1,744
1973	296	587	249	92	1,225	497	16	1,738
1974	323	569	244	92	1,227	454	7	1,688
1975	337	552	237	90	1,217	409	7	1,633
1976	365	521	227	82	1,195	403	6	1,604
1977	397	513	223	81	1,214	399	5	1,618
1978	406	491	210	75	1,182	382	3	1,567
1979	400	500	212	104	1,216	342	26	1,584
1980	396	494	210	105	1,205	345	23	1,573
1981	397	519	224	117	1,256	334	18	1,609
1982	426	519	204	109	1,258	282	11	1,550
1983	456	541	217	100	1,314	233	12	1,559
1984	505	527	203	99	1,334	292	4	1,630
1985	493	521	171	127	1,313	282	14	1,609
1986	485	508	157	128	1,277	269	4	1,551
1987	499	503	157	141	1,300	291	4	1,595
1988	501	506	167	144	1,319	302	4	1,625
1989	466	471	151	149	1,237	309	(5)	1,546
1990	477	474	149	151	1,250	309	(5)	1,559
1991	530	487	150	169	1,336	324	(5)	1,659
1992	R541	R499	R137	R189	R1,365	R332	(5)	R1,697
1993P	554	511	140	192	1,397	332	(5)	1,729

[1] Reported production of ethane-propane mixtures has been allocated 70 percent ethane and 30 percent propane.

[2] Reported production of butane-propane mixtures has been allocated 60 percent butane and 40 percent propane.

[3] Prior to 1984, this category was reported separately as natural gasoline, isopentane, and plant condensate.

[4] Motor gasoline, aviation gasoline, special naphthas, distillate fuel oil, and miscellaneous products.

[5] Beginning in 1989, data on finished petroleum products production from natural gas processing plants were no longer available.

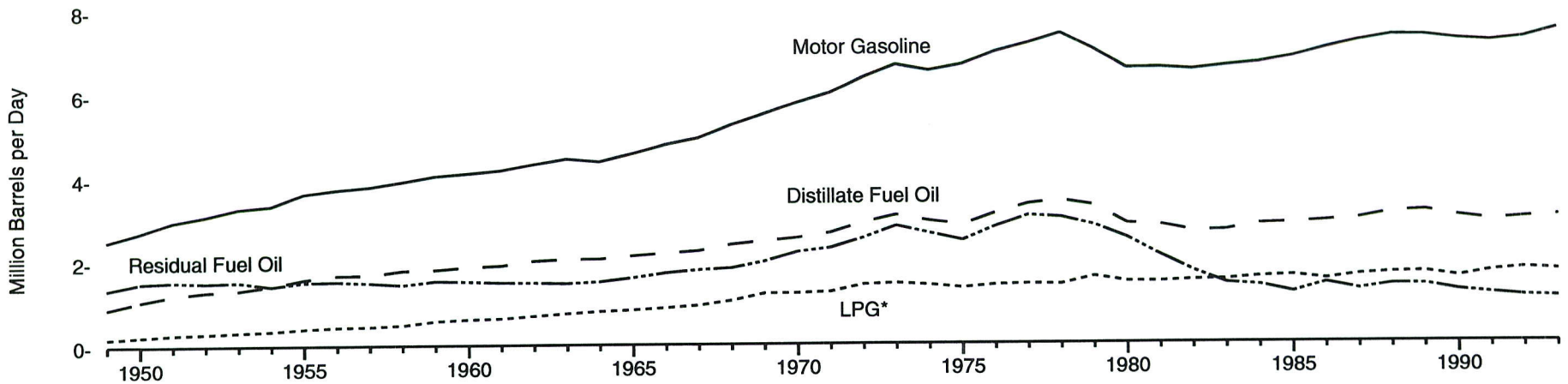
R=Revised data. P=Preliminary data.

Note: Totals may not equal sum of components due to independent rounding.

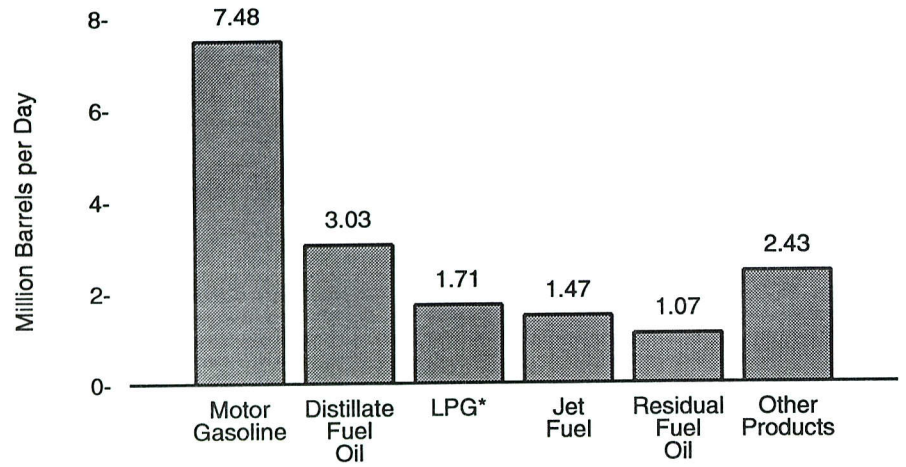
Sources: • 1949-1968—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. • 1969-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual*. • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual*. • 1981-1992—EIA, *Petroleum Supply Annual*. • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.11 Petroleum Products Supplied by Type

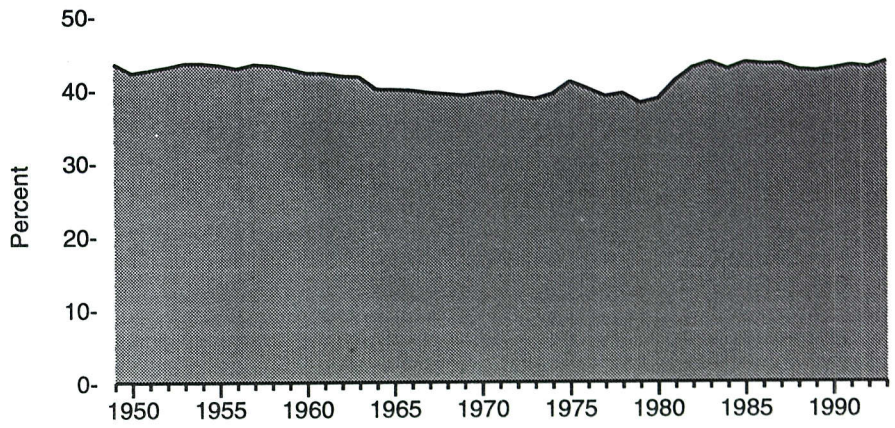
By Selected Product, 1949-1993



By Product, 1993



Motor Gasoline's Share of Total Petroleum Products Supplied, 1949-1993



*Liquefied petroleum gases.

Source: Table 5.11.

Table 5.11 Petroleum Products Supplied by Type, 1949-1993

(Million Barrels per Day)

Year	Motor Gasoline [1]	Jet Fuel	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases		Other Products [3]	Total Products	Percentage Change from Previous Year [4]
					Propane [2]	Total			
1949	2.50	NA	0.90	1.36	NA	0.19	0.81	5.76	—
1950	2.72	NA	1.08	1.52	NA	0.23	0.90	6.46	12.1
1951	2.99	NA	1.23	1.55	NA	0.28	0.98	7.02	8.6
1952	3.12	0.05	1.30	1.52	NA	0.30	0.98	7.27	3.9
1953	3.30	0.09	1.34	1.54	NA	0.33	1.00	7.60	4.3
1954	3.37	0.13	1.44	1.43	NA	0.35	1.03	7.76	2.1
1955	3.66	0.15	1.59	1.53	NA	0.40	1.12	8.46	9.0
1956	3.75	0.20	1.68	1.54	NA	0.44	1.16	8.78	4.1
1957	3.82	0.20	1.69	1.50	NA	0.45	1.15	8.81	0.1
1958	3.93	0.26	1.79	1.45	NA	0.49	1.19	9.12	3.5
1959	4.07	0.29	1.81	1.54	NA	0.58	1.24	9.53	4.5
1960	4.13	0.28	1.87	1.53	NA	0.62	1.36	9.80	3.1
1961	4.20	0.29	1.90	1.50	NA	0.64	1.44	9.98	1.5
1962	4.34	0.31	2.01	1.50	NA	0.70	1.55	10.40	4.2
1963	4.47	0.32	2.05	1.48	NA	0.76	1.68	10.74	3.3
1964	4.40	0.32	2.05	1.52	NA	0.81	1.92	11.02	2.9
1965	4.59	0.60	2.13	1.61	NA	0.84	1.74	11.51	4.2
1966	4.81	0.67	2.18	1.72	NA	0.89	1.82	12.08	5.0
1967	4.96	0.82	2.24	1.79	0.62	0.94	1.81	12.56	3.9
1968	5.26	0.95	2.39	1.83	0.69	1.05	1.91	13.39	6.9
1969	5.53	0.99	2.47	1.98	0.78	1.22	1.95	14.14	5.3
1970	5.78	0.97	2.54	2.20	0.78	1.22	1.98	14.70	4.0
1971	6.01	1.01	2.66	2.30	0.79	1.25	1.98	15.21	3.5
1972	6.38	1.05	2.91	2.53	0.89	1.42	2.08	16.37	7.9
1973	6.67	1.06	3.09	2.82	0.87	1.45	2.21	17.31	5.5
1974	6.54	0.99	2.95	2.64	0.83	1.41	2.13	16.65	-3.8
1975	6.67	1.00	2.85	2.46	0.78	1.33	2.00	16.32	-2.0
1976	6.98	0.99	3.13	2.80	0.83	1.40	2.16	17.46	7.3
1977	7.18	1.04	3.35	3.07	0.82	1.42	2.37	18.43	5.3
1978	7.41	1.06	3.43	3.02	0.78	1.41	2.51	18.85	2.3
1979	7.03	1.08	3.31	2.83	0.85	1.59	2.67	18.51	-1.8
1980	6.58	1.07	2.87	2.51	0.75	1.47	2.57	17.06	-7.6
1981	6.59	1.01	2.83	2.09	0.77	1.47	2.08	16.06	-6.1
1982	6.54	1.01	2.67	1.72	0.80	1.50	1.86	15.30	-4.7
1983	6.62	1.05	2.69	1.42	0.75	1.51	1.94	15.23	-0.4
1984	6.69	1.18	2.84	1.37	0.83	1.57	2.07	15.73	3.5
1985	6.83	1.22	2.87	1.20	0.88	1.60	2.01	15.73	-0.3
1986	7.03	1.31	2.91	1.42	0.83	1.51	2.09	16.28	3.5
1987	7.21	1.38	2.98	1.26	0.92	1.61	2.22	16.67	2.4
1988	7.34	1.45	3.12	1.38	0.92	1.66	2.34	17.28	4.0
1989	7.33	1.49	3.16	1.37	0.99	1.67	2.31	17.33	-0.0
1990	7.23	1.52	3.02	1.23	0.92	1.56	2.43	16.99	-1.9
1991	7.19	1.47	2.92	1.16	0.98	1.69	2.29	16.71	-1.6
1992	7.27	1.45	2.98	1.09	1.03	R1.76	R2.48	R17.03	R2.2
1993P	7.48	1.47	3.03	1.07	1.00	1.71	2.43	17.19	0.7

[1] Prior to 1964, motor gasoline data were for total gasoline, including motor gasoline, aviation gasoline, and special naphtha.

[2] Includes propylene.

[3] Kerosene, petrochemical feedstocks, lubricants, wax, petroleum coke, asphalt, road oil, still gas, pentanes plus, and miscellaneous products. Since 1964, aviation gasoline and special naphthas are included. Prior to 1965, kerosene-type jet fuel was included in kerosene. For 1981 forward, other products include negative barrels per day of distillate and residual fuel oil reclassified as unfinished oils and other products (from both primary and secondary supply) reclassified as gasoline blending components. Beginning in 1983, product supplied also includes crude oil burned as fuel.

[4] Percent change from previous year calculated from data prior to rounding.

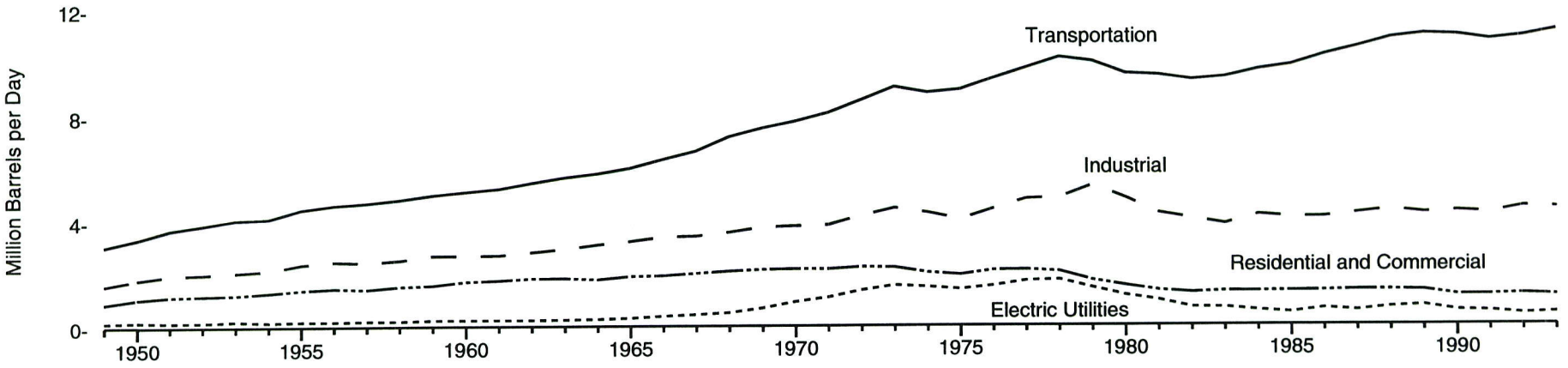
R=Revised data. P=Preliminary. NA=Not available. — = Not applicable.

Notes: • For the definition of petroleum products supplied, see Notes 1, 3, and 4 at end of section. • Totals may not equal sum of components due to independent rounding.

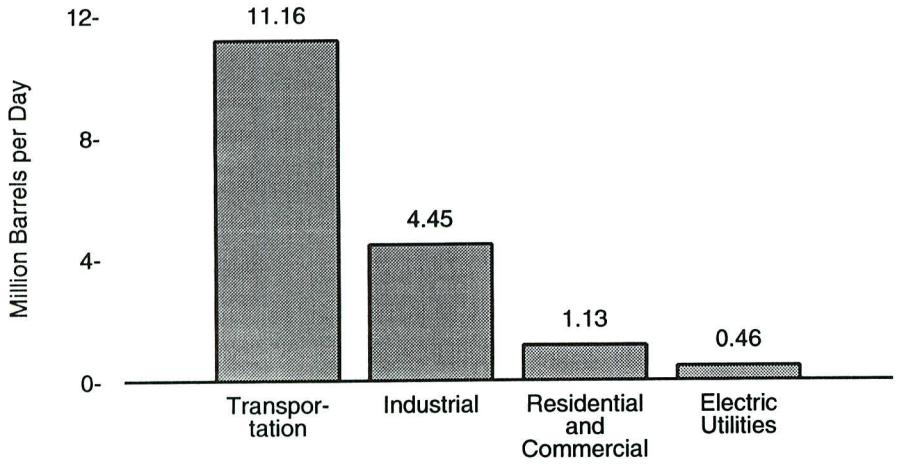
Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.12 Petroleum Products Supplied by Sector

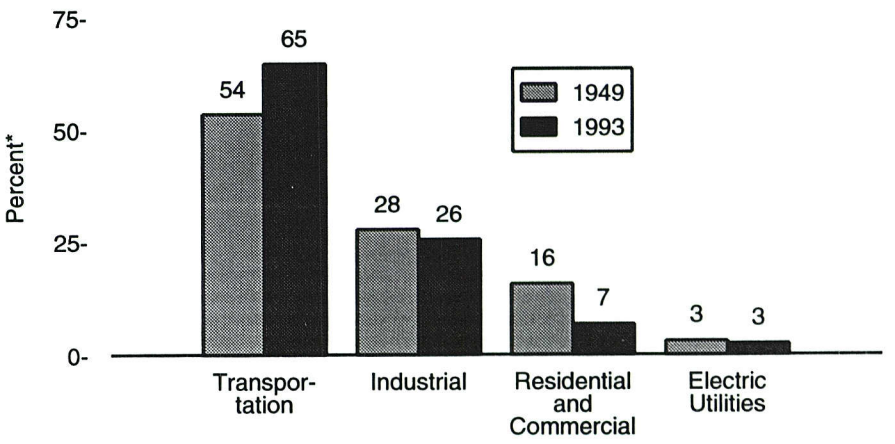
By Sector, 1949-1993



By Sector, 1993



Shares by Sector, 1949 and 1993



*Calculations based on data prior to rounding.

Source: Table 5.12.

Table 5.12 Petroleum Products Supplied by Sector, 1949-1993

(Million Barrels per Day)

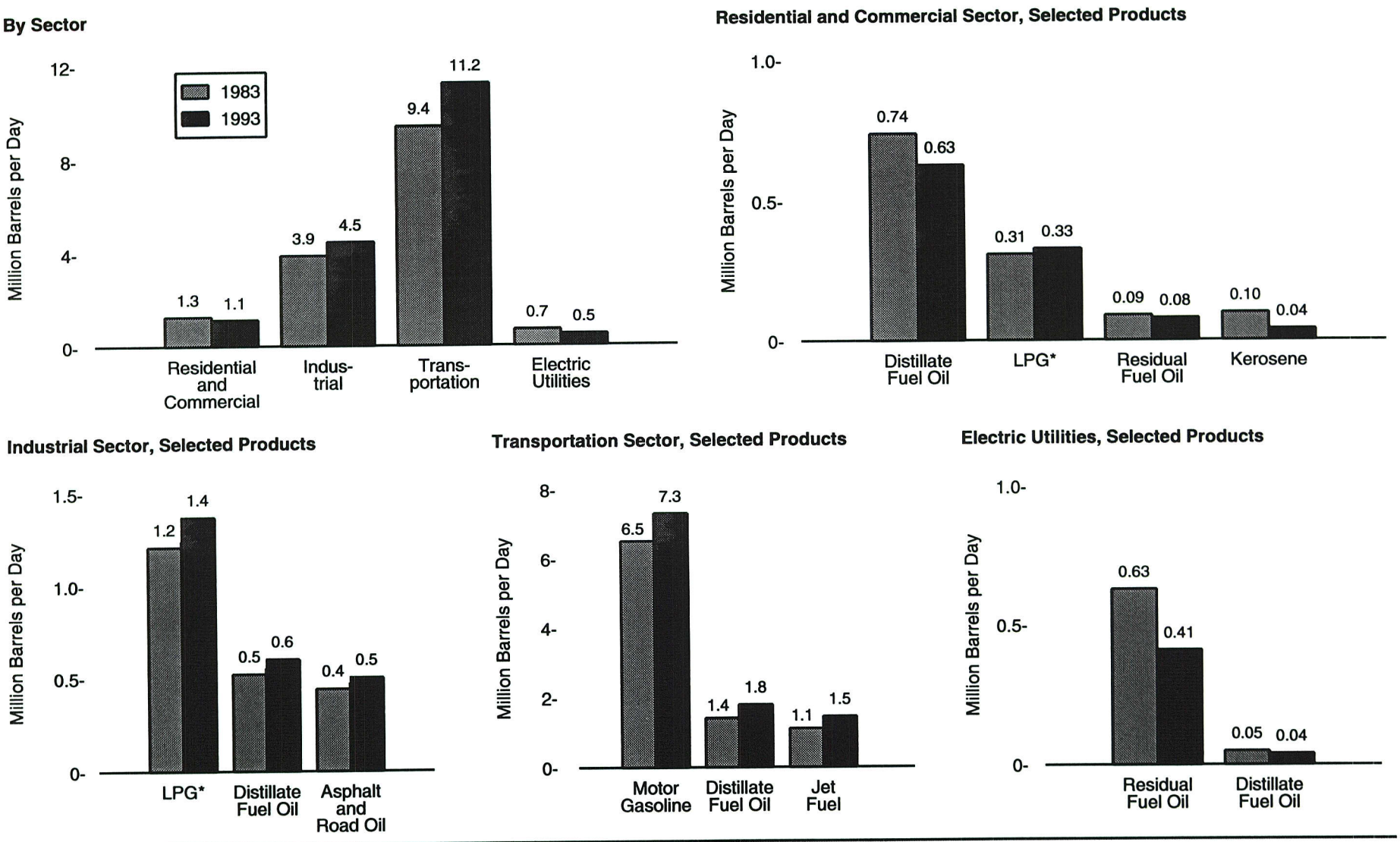
Year	Residential and Commercial	Industrial	Transportation	Electric Utilities	Total
1949	0.90	1.60	3.08	0.18	5.76
1950	1.07	1.82	3.36	0.21	6.46
1951	1.17	1.98	3.69	0.18	7.02
1952	1.20	2.02	3.87	0.18	7.27
1953	1.22	2.08	4.07	0.23	7.60
1954	1.30	2.16	4.11	0.18	7.76
1955	1.40	2.39	4.46	0.21	8.46
1956	1.46	2.49	4.62	0.20	8.78
1957	1.43	2.46	4.71	0.22	8.81
1958	1.53	2.54	4.83	0.21	9.12
1959	1.57	2.71	5.01	0.24	9.53
1960	1.71	2.71	5.14	0.24	9.80
1961	1.76	2.72	5.25	0.24	9.98
1962	1.84	2.84	5.48	0.24	10.40
1963	1.84	2.96	5.68	0.26	10.74
1964	1.79	3.12	5.83	0.28	11.02
1965	1.91	3.25	6.04	0.32	11.51
1966	1.94	3.40	6.36	0.39	12.08
1967	2.02	3.43	6.66	0.44	12.56
1968	2.10	3.58	7.20	0.52	13.39
1969	2.16	3.76	7.52	0.69	14.14
1970	2.18	3.81	7.78	0.93	14.70
1971	2.18	3.84	8.09	1.09	15.21
1972	2.25	4.19	8.57	1.36	16.37
1973	2.23	4.48	9.05	1.54	17.31
1974	2.04	4.30	8.84	1.48	16.65
1975	1.95	4.04	8.95	1.39	16.32
1976	2.12	4.45	9.37	1.52	17.46
1977	2.14	4.82	9.76	1.71	18.43
1978	2.07	4.87	10.16	1.75	18.85
1979	1.73	5.34	10.01	1.44	18.51
1980	1.52	4.84	9.55	1.15	17.06
1981	1.33	4.27	9.49	0.96	16.06
1982	1.24	4.06	9.31	0.69	15.30
1983	1.29	3.85	9.41	0.68	15.23
1984	1.29	4.19	9.68	0.56	15.73
1985	1.30	4.10	9.85	0.48	15.73
1986	1.31	4.11	10.23	0.64	16.28
1987	1.33	4.25	10.53	0.55	16.67
1988	1.34	4.39	10.87	0.68	17.28
1989	1.32	4.26	11.01	0.74	17.33
1990	1.14	4.32	10.97	0.55	16.99
1991	1.14	4.25	10.80	0.52	16.71
1992	R1.12	R4.55	R10.95	R0.42	R17.03
1993E	1.13	4.45	11.16	0.46	17.19

R=Revised data. E=Estimate.

Notes: • For the definition of petroleum products supplied, see Note 3 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: **Total:** • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (March 1994). **Sector Data:** • 1949-1959—EIA estimates. • 1960-1992—EIA, State Energy Data System 1992. • 1993—EIA, Integrated Modeling Data System output for the *Monthly Energy Review* (March 1994).

Figure 5.13 Petroleum Products Supplied by Type and Sector, 1983 and 1993



*Liquefied petroleum gases.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.13.

Table 5.13 Petroleum Products Supplied by Type and Sector, 1983 and 1993

Year and Refined Product	Residential and Commercial		Industrial		Transportation		Electric Utilities		Total	
	Million Barrels per Day	Quadrillion Btu	Million Barrels per Day	Quadrillion Btu	Million Barrels per Day	Quadrillion Btu	Million Barrels per Day	Quadrillion Btu	Million Barrels per Day	Quadrillion Btu
Total, 1983	**1.29**	**2.50**	**3.85**	**7.42**	**9.41**	**18.59**	**0.68**	**1.54**	**15.23**	**30.05**
Asphalt and Road Oil	0	0	0.37	0.90	0	0	0	0	0.37	0.90
Aviation Gasoline	0	0	0	0	0.03	0.05	0	0	0.03	0.05
Distillate Fuel Oil	0.74	1.58	0.54	1.14	1.37	2.91	0.05	0.10	2.69	5.72
Jet Fuel	0	0	0	0	1.05	2.14	0	0	1.05	2.14
Kerosene	0.10	0.20	0.03	0.07	0	0	0	0	0.13	0.26
Liquefied Petroleum Gases	0.31	0.41	1.17	1.54	0.03	0.04	0	0	1.51	1.99
Lubricants	0	0	0.08	0.17	0.07	0.16	0	0	0.15	0.32
Motor Gasoline	0.05	0.10	0.06	0.11	6.51	12.48	0	0	6.62	12.70
Residual Fuel Oil	0.09	0.21	0.34	0.79	0.36	0.82	0.63	1.44	1.42	3.26
Other [2]	0	0	1.27	2.70	0	0	([1])	0.01	1.27	2.71
Total, 1993 [E]	**1.13**	**2.13**	**4.45**	**8.43**	**11.16**	**22.16**	**0.46**	**1.05**	**17.19**	**33.77**
Asphalt and Road Oil	0	0	0.48	1.15	0	0	0	0	0.48	1.15
Aviation Gasoline	0	0	0	0	0.02	0.04	0	0	0.02	0.04
Distillate Fuel Oil	0.63	1.35	0.55	1.16	1.82	3.86	0.04	0.08	3.03	6.44
Jet Fuel	0	0	0	0	1.47	3.02	0	0	1.47	3.02
Kerosene	0.04	0.09	0.01	0.01	0	0	0	0	0.05	0.10
Liquefied Petroleum Gases	0.33	0.44	1.37	1.80	0.01	0.02	0	0	1.71	2.25
Lubricants	0	0	0.08	0.17	0.07	0.16	0	0	0.15	0.34
Motor Gasoline	0.04	0.08	0.10	0.20	7.34	14.07	0	0	7.48	14.35
Residual Fuel Oil	0.08	0.18	0.15	0.35	0.43	0.99	0.41	0.94	1.07	2.45
Other [2]	0	0	1.72	3.58	0	0	0.02	0.04	1.73	3.62

[1] Less than 5 thousand barrels per day, or less than 5 trillion Btu.

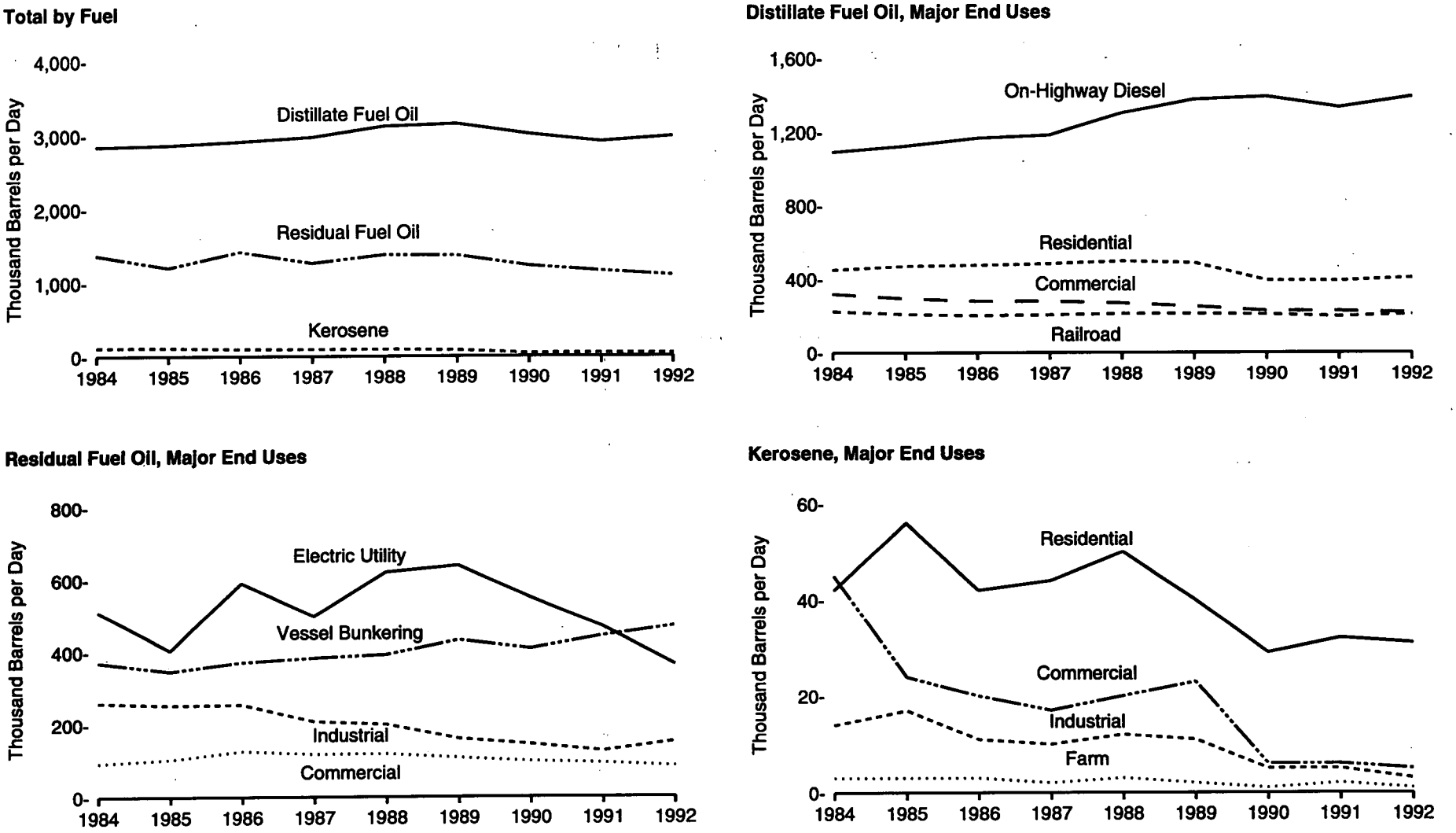
[2] "Other" in the industrial sector is petrochemical feedstocks, special naphthas, waxes, petroleum coke, still gas, natural gasoline, pentanes plus, crude oil, and miscellaneous products. "Other" for electric utilities is petroleum coke.

E=Estimate.

Notes: • For the definition of petroleum products supplied, see Notes 1 and 3 at end of section.
• Totals may not equal sum of components due to independent rounding.

Sources: • 1983—Energy Information Administration (EIA), State Energy Data System 1992.
• 1993—EIA, Integrated Modeling Data System output for the *Monthly Energy Review* (March 1994).

Figure 5.14 Fuel Oil and Kerosene Adjusted Sales, 1984-1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.14.

Table 5.14 Fuel Oil and Kerosene Adjusted Sales, 1984-1992

(Thousand Barrels per Day)

Year	Residential	Commercial	Industrial	Oil Company	Farm	Electric Utility	Railroad	Vessel Bunkering	On-Highway Diesel	Military	Off-Highway Diesel	All Other	Total
						Distillate Fuel Oil							
1984	450	319	153	59	193	45	225	110	1,093	45	109	44	2,845
1985	471	294	169	57	216	34	209	124	1,127	50	105	12	2,868
1986	476	280	175	49	220	40	202	133	1,169	50	111	9	2,914
1987	484	279	190	58	211	42	205	145	1,185	58	113	5	2,976
1988	498	269	170	57	223	52	212	150	1,304	64	119	4	3,122
1989	489	252	167	55	209	70	213	154	1,378	61	107	2	3,157
1990	393	228	160	63	215	48	209	143	1,393	51	116	([1])	3,021
1991	391	226	152	59	214	39	197	141	1,336	54	110	([1])	2,921
1992	407	218	145	51	229	31	210	146	1,394	42	113	([1])	2,987
						Residual Fuel Oil							
1984	—	92	258	76	—	509	([2])	370	—	14	—	50	1,369
1985	—	103	252	71	—	403	([2])	346	—	13	—	15	1,202
1986	—	126	254	51	—	590	([2])	371	—	12	—	15	1,418
1987	—	118	208	42	—	498	([2])	383	—	[E]12	—	3	1,264
1988	—	119	200	34	—	621	([2])	392	—	9	—	4	1,378
1989	—	108	160	22	—	639	([2])	432	—	7	—	2	1,370
1990	—	98	145	21	—	550	([2])	408	—	5	—	2	1,229
1991	—	93	126	20	—	468	NA	443	—	8	—	1	1,158
1992	—	84	152	19	—	364	NA	470	—	7	—	1	1,097
						Kerosene							
1984	42	45	14	—	3	—	—	—	—	—	—	11	115
1985	56	24	17	—	3	—	—	—	—	—	—	14	114
1986	42	20	11	—	3	—	—	—	—	—	—	22	98
1987	44	17	10	—	2	—	—	—	—	—	—	21	95
1988	50	20	12	—	3	—	—	—	—	—	—	11	96
1989	40	23	11	—	2	—	—	—	—	—	—	8	84
1990	29	6	5	—	1	—	—	—	—	—	—	1	43
1991	32	6	5	—	2	—	—	—	—	—	—	1	46
1992	31	5	3	—	1	—	—	—	—	—	—	([1])	42

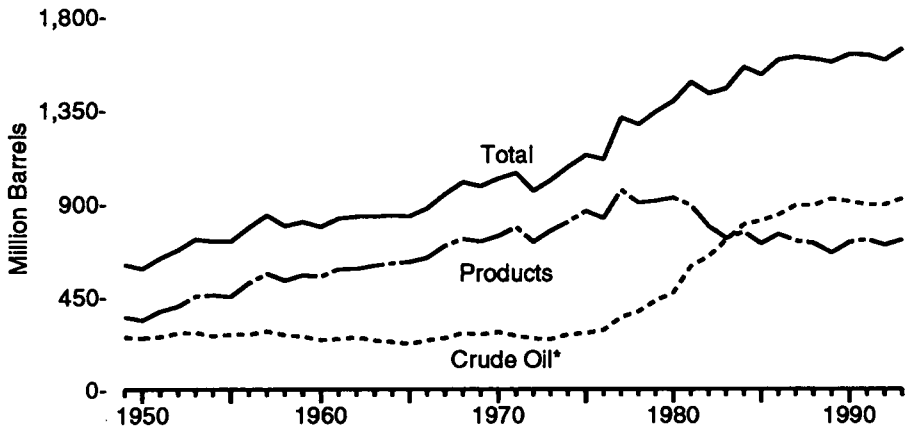
[1] Less than 0.5 thousand barrels per day.
[2] Included in "All Other."
E = Annual estimate based on eleven months of data. — = Not applicable.

Notes: • Distillate fuel oil and kerosene data are sales data that were adjusted at the Petroleum Administration for Defense district level to equal Energy Information Administration (EIA) volume estimates of products supplied in the U.S. marketplace. The residual fuel data are sales data adjusted at the national level to equal the EIA volume estimate of residual fuel oil products supplied. Additional information is available in EIA's report *Fuel Oil and Kerosene Sales 1992* (October 1993). • Totals may not equal sum of components due to independent rounding.

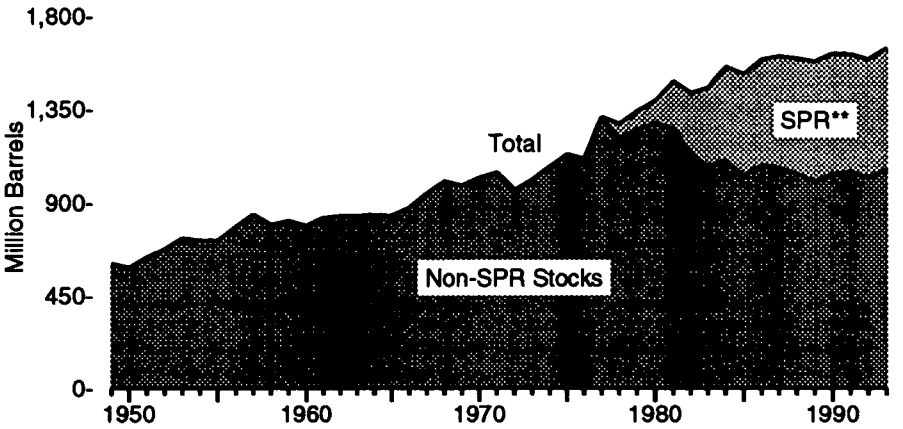
Sources: **Distillate Fuel Oil and Kerosene:** • 1984—EIA, *Petroleum Marketing Annual 1988*, Tables A13 and A15. • 1985-1989—EIA, *Fuel Oil and Kerosene Sales 1989* (January 1991), Tables 13 and 15. • 1990 forward—EIA, *Fuel Oil and Kerosene Sales 1992* (October 1993), Tables 13 and 15. **Residual Fuel Oil:** • 1984—EIA, *Petroleum Marketing Annual 1988*, Table A14. • 1985-1986—EIA, *Fuel Oil and Kerosene Sales 1990* (October 1991), Table A1. • 1987—EIA, *Fuel Oil and Kerosene Sales 1991* (November 1992), Table 14. • 1988 forward—EIA, *Fuel Oil and Kerosene Sales 1992* (October 1993), Table 14.

Figure 5.15 Petroleum Primary Stocks by Type, End of Year

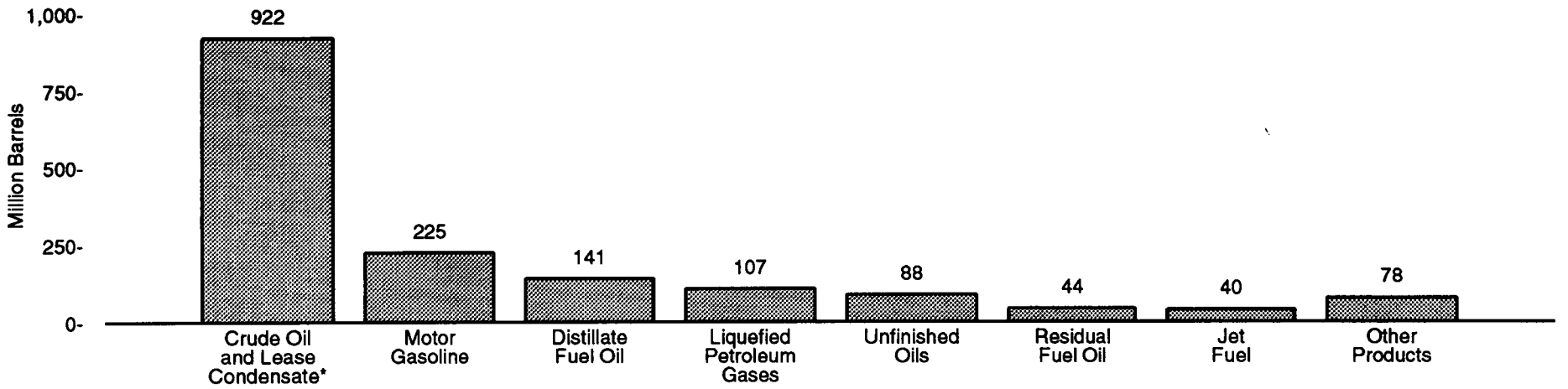
Total, Products, and Crude Oil, 1949-1993



Total, SPR, and Non-SPR, 1949-1993**



By Type, 1993



*Includes crude oil stored in the Strategic Petroleum Reserve (SPR).
**See Figure 5.16 for additional Strategic Petroleum Reserve information.

Note: Because vertical scales differ, graphs should not be compared.
Sources: Tables 5.15 and 5.16.

Table 5.15 Petroleum Primary Stocks by Type, End of Year 1949-1993

(Million Barrels)

Year	Crude Oil and Lease Condensate [1]	Petroleum Products										Total Petroleum
		Motor Gasoline [2]	Jet Fuel	Distillate Fuel Oil		Residual Fuel Oil	Liquefied Petroleum Gases		Unfinished Oils	Other Products [5]	Total Products	
				Low Sulfur [3]	Total		Propane [4]	Total				
1949	253	110	NA	NA	75	60	([6])	1	66	37	350	603
1950	248	116	NA	NA	72	41	([6])	2	70	34	334	583
1951	256	135	NA	NA	87	43	([6])	2	67	45	378	634
1952	272	135	2	NA	99	49	([6])	3	62	53	402	674
1953	274	158	3	NA	112	49	([6])	4	69	56	451	726
1954	258	155	3	NA	108	52	([6])	7	74	57	457	715
1955	266	165	3	NA	111	39	([6])	7	68	55	449	715
1956	266	187	5	NA	134	44	([6])	14	67	63	514	780
1957	282	197	5	NA	149	60	([6])	14	69	66	560	841
1958	263	187	6	NA	125	60	([6])	16	70	63	526	789
1959	257	188	8	NA	151	54	([6])	19	67	66	552	809
1960	240	195	7	NA	138	45	([6])	23	62	76	545	785
1961	245	184	8	NA	152	45	([6])	31	79	81	580	825
1962	252	189	10	NA	144	50	([6])	25	82	83	582	834
1963	237	191	9	NA	157	48	([6])	28	82	85	598	836
1964	230	186	19	NA	156	40	([6])	30	87	92	609	839
1965	220	175	19	NA	155	56	([6])	30	89	92	616	836
1966	238	186	19	NA	154	61	([6])	35	89	91	636	874
1967	249	200	22	NA	160	66	([6])	64	90	93	695	944
1968	272	204	24	NA	173	67	([6])	76	93	89	727	1,000
1969	265	211	28	NA	172	58	([6])	60	98	88	715	980
1970	276	209	28	NA	195	54	([6])	67	99	89	741	1,018
1971	260	219	28	NA	191	60	([6])	95	101	92	784	1,044
1972	246	213	25	NA	154	55	([6])	86	95	84	713	959
1973	242	209	29	NA	196	53	([6])	99	99	80	766	1,008
1974	265	218	29	NA	200	60	([6])	113	106	82	809	1,074
1975	271	235	30	NA	209	74	([6])	125	106	82	862	1,133
1976	285	231	32	NA	186	72	([6])	116	110	78	826	1,112
1977	348	258	35	NA	250	90	([6])	136	113	82	964	1,312
1978	376	238	34	NA	216	90	([6])	132	109	82	901	1,278
1979	430	237	39	NA	229	96	([6])	111	118	82	911	1,341
1980	466	261	42	NA	205	92	([6])	120	124	82	926	1,392
1981	594	253	41	NA	192	78	([6])	135	111	80	890	1,484
1982	644	235	37	NA	179	66	([6])	94	105	70	786	1,430
1983	723	222	39	NA	140	49	([6])	101	108	72	731	1,454
1984	796	243	42	NA	161	53	58	101	94	67	760	1,556
1985	814	223	40	NA	144	50	39	74	107	67	705	1,519
1986	843	233	50	NA	155	47	63	103	94	68	750	1,593
1987	890	226	50	NA	134	47	48	97	93	70	718	1,607
1988	890	228	44	NA	124	45	50	97	100	70	707	1,597
1989	921	213	41	NA	106	44	32	80	106	70	660	1,581
1990	908	220	52	NA	132	49	49	98	99	63	712	1,621
1991	893	219	49	NA	144	50	48	92	98	72	724	1,617
1992	893	[R]216	43	NA	141	43	39	89	95	[R]73	699	1,592
1993[P]	922	225	40	63	141	44	51	107	88	78	723	1,646

[1] Includes crude oil stored in the Strategic Petroleum Reserve, which began in 1977.

[2] Prior to 1964, motor gasoline data were for total gasoline, which included motor gasoline, aviation gasoline, and special naphthas. For 1981 forward, includes motor gasoline blending components.

[3] Sulfur content of 0.05 percent or less by weight.

[4] Includes propylene.

[5] Kerosene, petrochemical feedstocks, lubricants, wax, petroleum coke, asphalt, road oil, pentanes plus, and miscellaneous products. Since 1964, aviation gasoline and special naphthas are included. For 1981 forward, includes aviation gasoline blending components, hydrogen, other hydrocarbons, and alcohol.

[6] Included in liquefied petroleum gases total.

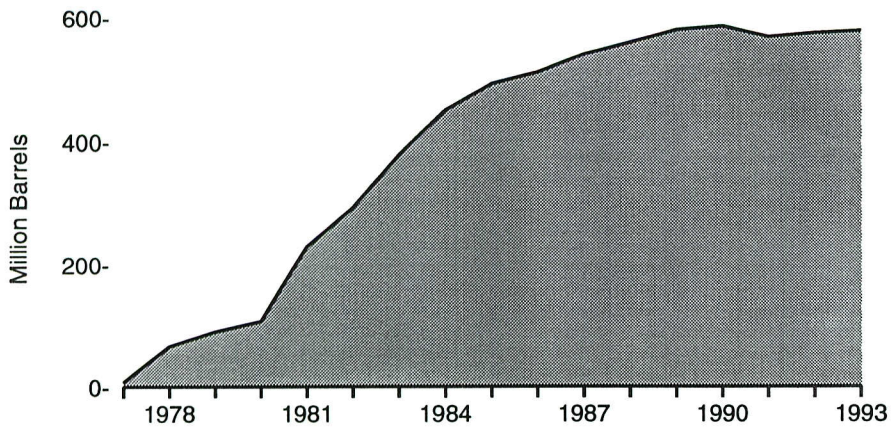
R=Revised data. P=Preliminary data. NA=Not available.

Note: Totals may not equal sum of components due to independent rounding.

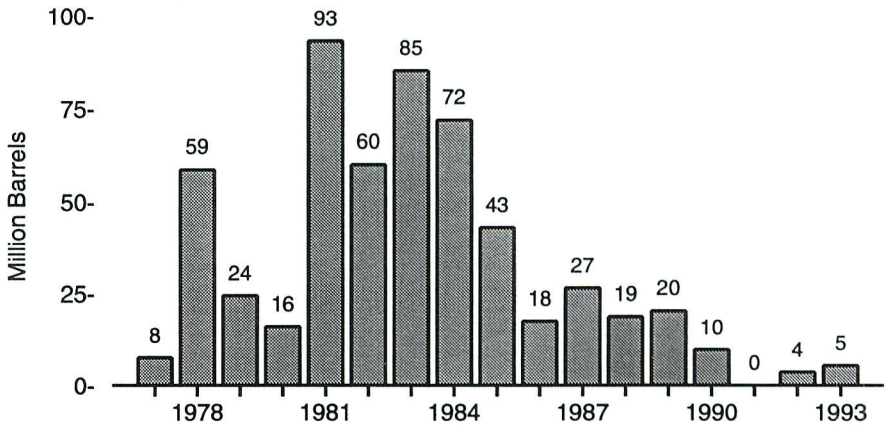
Sources: • 1949-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.16 Strategic Petroleum Reserve, 1977-1993

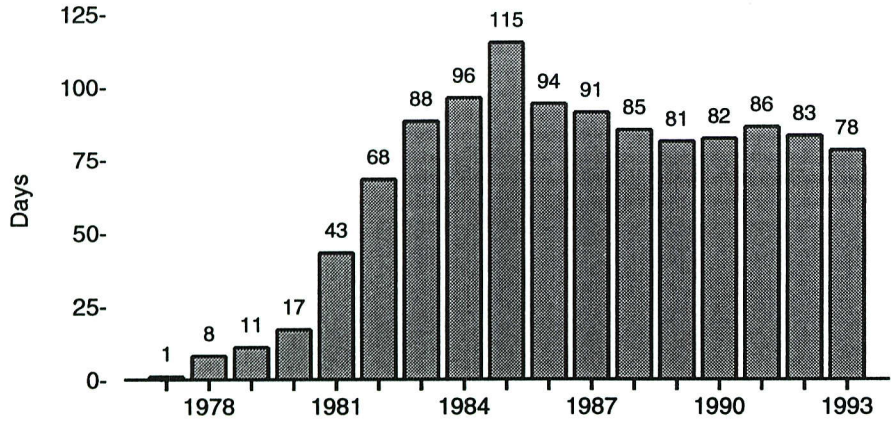
End-of-Year Stocks in SPR



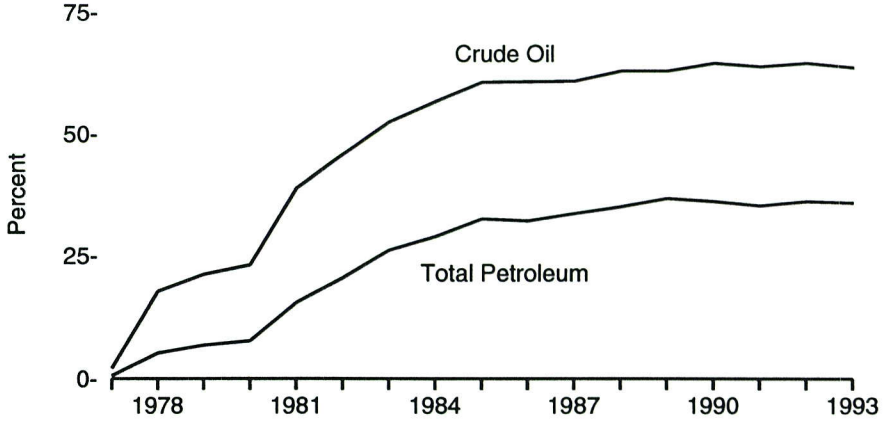
Crude Oil Imports for SPR



Days of Net Petroleum Imports Stored in SPR*



SPR as Share of Domestic Stocks



*Derived by dividing end-of-year Strategic Petroleum Reserve stocks by annual average daily net imports of all petroleum.
Notes: • SPR=Strategic Petroleum Reserve. • Because vertical scales differ, graphs should not be compared.
Source: Table 5.16.

Table 5.16 Strategic Petroleum Reserve, 1977-1993

(Million Barrels, Except as Noted)

Year	Crude Oil Imports	Domestic Crude Oil Deliveries	Domestic Crude Oil Sales	End-of-Year Stocks			Days of Net Petroleum Imports [3]
				Quantity [1]	Share of Crude Oil [2] Stocks (percent)	Share of Total Petroleum Stocks (percent)	
1977	7.54	[4]0.37	0.00	7.46	2.1	0.6	1
1978	58.80	0.00	0.00	66.86	17.8	5.2	8
1979	24.43	([5])	0.00	91.19	21.2	6.8	11
1980	16.07	1.30	0.00	107.80	23.1	7.7	17
1981	93.30	28.79	0.00	230.34	38.8	15.5	43
1982	60.19	3.79	0.00	293.83	45.7	20.5	68
1983	85.29	0.42	0.00	379.09	52.4	26.1	88
1984	72.04	0.05	0.00	450.51	56.6	28.9	96
1985	43.12	0.17	0.00	493.32	60.6	32.5	115
1986	17.56	1.21	0.00	511.57	60.7	32.1	94
1987	26.52	2.69	0.00	540.65	60.8	33.6	91
1988	18.76	0.01	0.00	559.52	62.9	35.0	85
1989	20.35	0.00	0.00	579.86	62.9	36.7	81
1990	9.77	0.00	3.91	585.69	64.5	36.1	82
1991	0.00	0.00	17.22	568.51	63.7	35.2	86
1992	3.59	2.60	0.00	574.72	64.4	36.1	83
1993	5.37	6.96	0.00	587.08	63.6	35.7	78

[1] Stocks do not include imported quantities in transit to Strategic Petroleum Reserve terminals, pipeline fill, and above-ground storage.

[2] Including lease condensate stocks.

[3] Derived by dividing end-of-year Strategic Petroleum Reserve stocks by annual average daily net imports of all petroleum. Calculated prior to rounding.

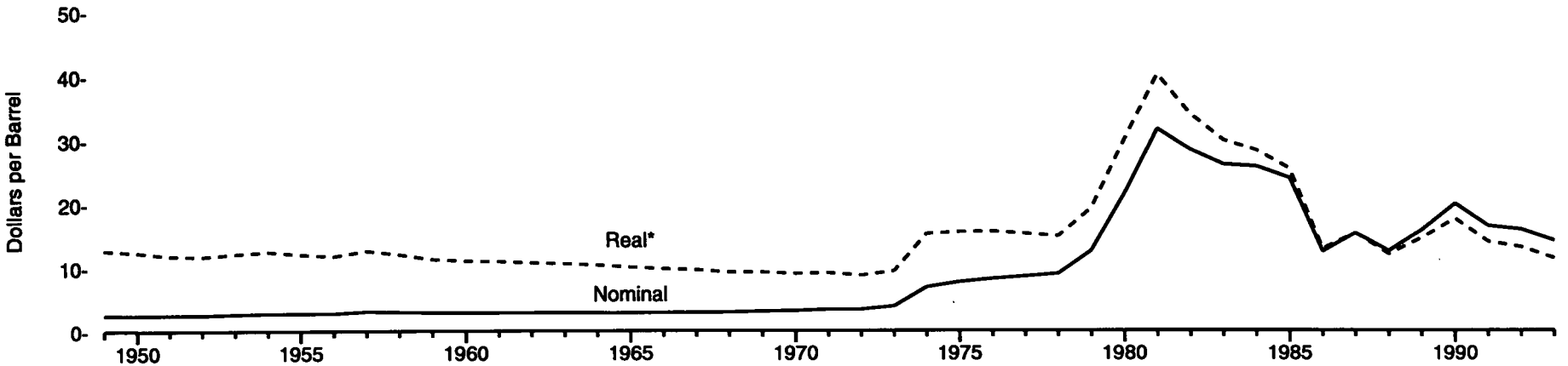
[4] The quantity of domestic fuel oil which was in storage prior to injection of foreign crude oil.

[5] Less than 0.005 million barrels.

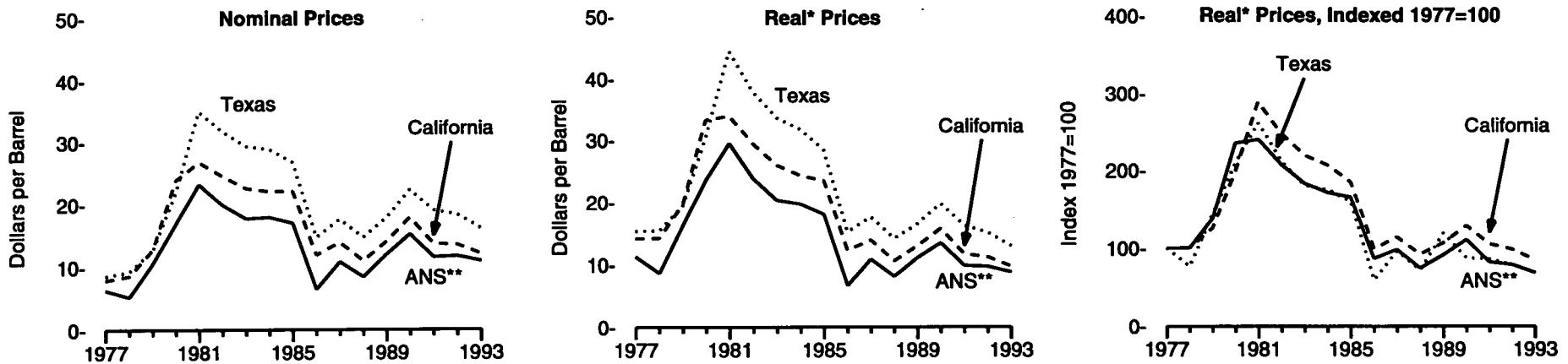
Sources: **Domestic Crude Oil Deliveries and Domestic Crude Oil Sales:** U.S. Department of Energy, Assistant Secretary for Fossil Energy, unpublished data. **All Other Data:** • 1977-1980—Energy Information Administration (EIA), Energy Data Report, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.17 Crude Oil Domestic First Purchase Prices, 1949-1993

U.S. Average Real* and Nominal Prices, 1949-1993



Alaska North Slope, California, and Texas, 1977-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

**Alaska North Slope.
Source: Table 5.17.

Table 5.17 Crude Oil Domestic First Purchase Prices, 1949-1993

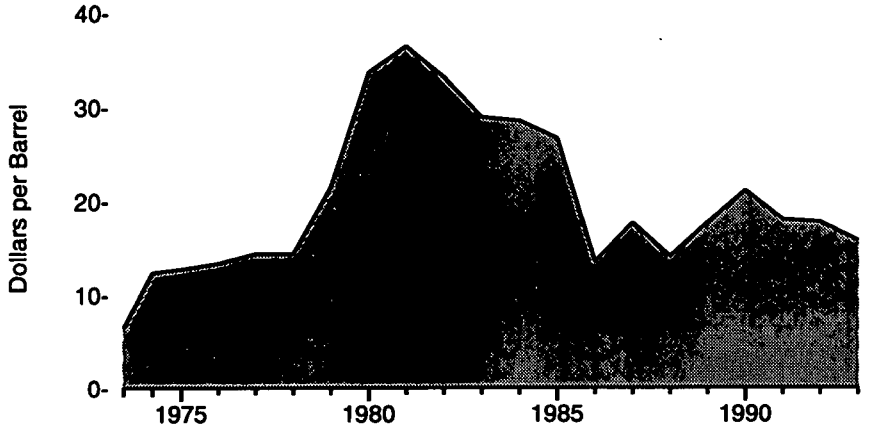
(Dollars per Barrel)

Year	Alaska North Slope		California		Texas		U.S. Average	
	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]
1949	—	—	—	—	—	—	2.54	12.76
1950	—	—	—	—	—	—	2.51	12.43
1951	—	—	—	—	—	—	2.53	11.88
1952	—	—	—	—	—	—	2.53	11.77
1953	—	—	—	—	—	—	2.68	12.18
1954	—	—	—	—	—	—	2.78	12.52
1955	—	—	—	—	—	—	2.77	12.10
1956	—	—	—	—	—	—	2.79	11.82
1957	—	—	—	—	—	—	3.09	12.66
1958	—	—	—	—	—	—	3.01	12.09
1959	—	—	—	—	—	—	2.90	11.33
1960	—	—	—	—	—	—	2.88	11.08
1961	—	—	—	—	—	—	2.89	10.99
1962	—	—	—	—	—	—	2.90	10.78
1963	—	—	—	—	—	—	2.89	10.63
1964	—	—	—	—	—	—	2.88	10.40
1965	—	—	—	—	—	—	2.86	10.07
1966	—	—	—	—	—	—	2.88	9.80
1967	—	—	—	—	—	—	2.92	9.64
1968	—	—	—	—	—	—	2.94	9.25
1969	—	—	—	—	—	—	3.09	9.25
1970	—	—	—	—	—	—	3.18	9.03
1971	—	—	—	—	—	—	3.39	9.14
1972	—	—	—	—	—	—	3.39	8.74
1973	—	—	—	—	—	—	3.89	9.42
1974	—	—	—	—	—	—	6.87	15.30
1975	—	—	—	—	—	—	7.67	15.59
1976	—	—	—	—	—	—	8.19	15.66
1977	R,2 6.29	2 11.25	7.92	14.17	8.58	15.35	8.57	15.33
1978	5.21	8.64	8.58	14.23	9.29	15.41	9.00	14.93
1979	10.57	16.14	12.78	19.51	12.65	19.31	12.64	19.30
1980	16.87	23.53	23.87	33.29	21.84	30.46	21.59	30.11
1981	23.23	29.44	26.80	33.97	35.06	44.44	31.77	40.27
1982	19.92	23.77	24.58	29.33	31.77	37.91	28.52	34.03
1983	17.69	20.29	22.61	25.93	29.35	33.66	26.19	30.03
1984	17.91	19.68	22.09	24.27	28.87	31.73	25.88	28.44
1985	16.98	17.99	22.14	23.45	26.80	28.39	24.09	25.52
1986	6.45	6.66	11.90	12.28	14.73	15.20	12.51	12.91
1987	10.83	10.83	13.92	13.92	17.55	17.55	15.40	15.40
1988	8.43	8.11	10.97	10.56	14.71	14.16	12.58	12.11
1989	12.00	11.06	14.06	12.96	17.81	16.41	15.86	14.62
1990	15.23	13.44	17.81	15.72	22.37	19.74	20.03	R 17.68
1991	11.57	9.83	13.72	11.66	19.04	16.18	16.54	R 14.05
1992	R 11.73	9.69	13.55	11.19	18.32	15.13	R 15.99	R 13.20
1993 P	10.96	8.82	12.09	9.73	16.13	12.99	14.24	11.47

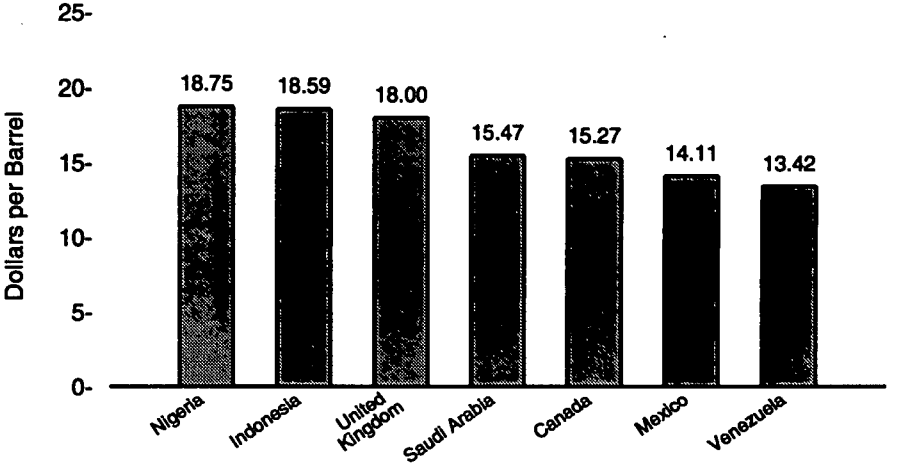
[1] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
[2] Average for July through December only.
R=Revised data. P=Preliminary data. — = Not applicable.
Note: For the definition of crude oil domestic first purchase prices, see Note 5 at end of section.
Sources: • 1949-1973—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. • 1974 through January 1976—Federal Energy Administration (FEA), Form FEA-90, "Crude Petroleum Production Monthly Report." • February 1976 through September 1979—FEA, Form FEA-P-124, "Domestic Crude Oil Purchaser's Monthly Report." • October 1979 through 1982—Economic Regulatory Administration, Form ERA-182, "Domestic Crude Oil First Purchase Report." • 1983 forward—Energy Information Administration, Form EIA-182, "Domestic Crude Oil First Purchase Report."

Figure 5.18 Landed Costs of Crude Oil Imports from Selected Countries

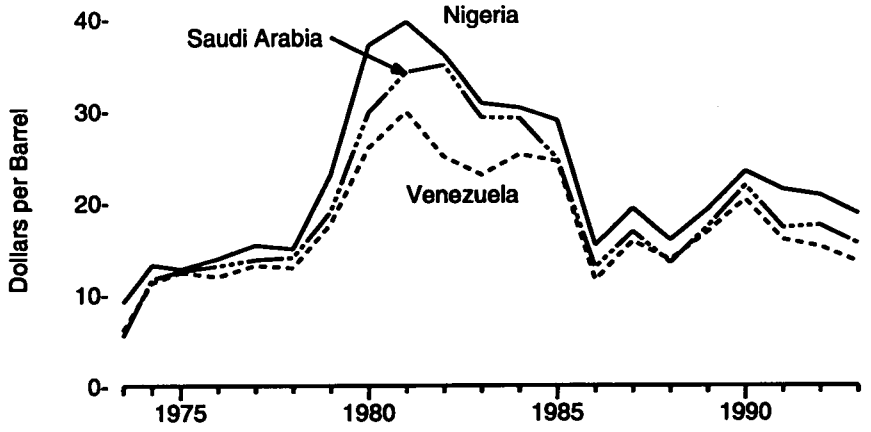
Total, 1973*-1993



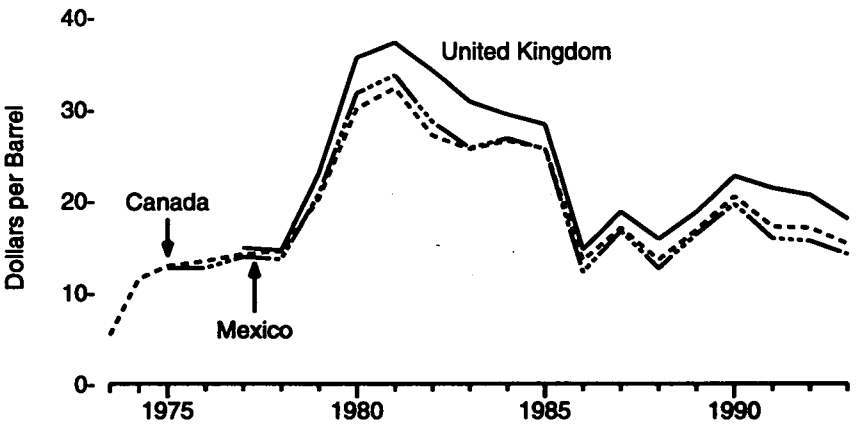
By Selected Country, 1993



By Selected OPEC Country, 1973*-1993



By Selected Non-OPEC Country, 1973*-1993



*1973 data are based on October, November, and December data only.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.18.

Table 5.18 Landed Costs of Crude Oil Imports from Selected Countries, 1973-1993

(Dollars per Barrel)

Year	OPEC [1]								Non-OPEC				Total
	Algeria	Indonesia	Nigeria	Saudi Arabia	Venezuela	Other [2]	Total [3]	Arab OPEC [4]	Canada	Mexico	United Kingdom	Other	
1973[5]	8.39	7.22	9.08	5.37	5.99	6.55	6.85	5.92	5.33	NA	NA	7.51	6.41
1974	13.97	13.20	13.16	11.63	11.25	12.61	12.49	12.39	11.48	W	NA	12.98	12.32
1975	12.86	13.83	12.70	12.50	12.36	12.66	12.70	12.71	12.84	12.61	NA	12.41	12.70
1976	13.90	13.85	13.81	13.06	11.89	13.16	13.32	13.31	13.36	12.64	W	13.48	13.32
1977	15.24	14.65	15.29	13.69	13.11	14.25	14.35	14.30	14.13	13.82	14.83	14.70	14.36
1978	14.93	14.65	14.88	13.94	12.84	14.31	14.34	14.36	14.41	13.56	14.53	14.74	14.35
1979	21.88	20.63	22.97	18.95	17.65	23.12	21.29	20.79	20.22	20.77	22.97	23.21	21.45
1980	37.92	33.92	37.15	29.80	25.92	36.08	33.56	32.97	30.11	31.77	35.68	36.16	33.67
1981	40.46	37.31	39.66	34.20	29.91	39.06	36.60	36.22	32.32	33.70	37.29	38.08	36.47
1982	35.35	36.70	36.16	34.99	24.93	34.13	34.81	35.15	27.15	28.63	34.25	33.87	33.18
1983	31.26	31.57	30.85	29.27	22.94	29.29	29.84	29.87	25.63	25.78	30.87	29.87	28.93
1984	29.06	30.87	30.36	29.20	25.19	28.85	29.06	29.10	26.56	26.85	29.45	29.33	28.54
1985	27.51	28.67	28.96	24.72	24.43	26.58	26.86	25.90	25.71	25.63	28.36	27.47	26.67
1986	14.82	14.63	15.29	12.84	11.52	13.42	13.46	13.14	13.43	12.17	14.63	14.49	13.49
1987	17.87	18.49	19.32	16.81	15.76	18.12	17.64	17.32	17.04	16.69	18.78	18.43	17.65
1988	W	15.15	15.88	13.37	13.66	13.83	14.18	13.60	13.50	12.58	15.82	14.88	14.08
1989	19.13	18.35	19.19	17.34	16.78	17.56	17.78	17.41	16.81	16.35	18.74	18.51	17.68
1990	W	22.50	23.33	21.82	20.31	18.65	21.23	20.64	20.48	19.64	22.65	21.96	21.13
1991	W	20.20	21.39	17.22	15.92	18.91	18.08	17.45	17.16	15.89	21.37	19.90	18.02
1992	W	R18.76	20.78	R17.48	R15.13	R19.15	R17.81	R17.63	17.04	15.60	R20.63	R19.29	17.75
1993P	17.34	18.59	18.75	15.47	13.42	15.52	15.73	15.34	15.27	14.11	18.00	17.01	15.76

[1] Organization of Petroleum Exporting Countries (OPEC). See Glossary for membership.

[2] Gabon, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates; Ecuador, which withdrew from OPEC on December 31, 1992, is included through 1992. Prior to 1988, imports from the Neutral Zone between Kuwait and Saudi Arabia are included in imports from Saudi Arabia. From 1988 forward, those imports are included in imports from "Other."

[3] Ecuador, which withdrew from OPEC on December 31, 1992, is included through 1992. Total OPEC imports exclude petroleum imported into the United States indirectly from OPEC countries, primarily from Caribbean and West European refining areas, as petroleum products that were refined from crude oil produced in OPEC countries.

[4] Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates. Imports from the Neutral Zone are included in imports from "Arab OPEC."

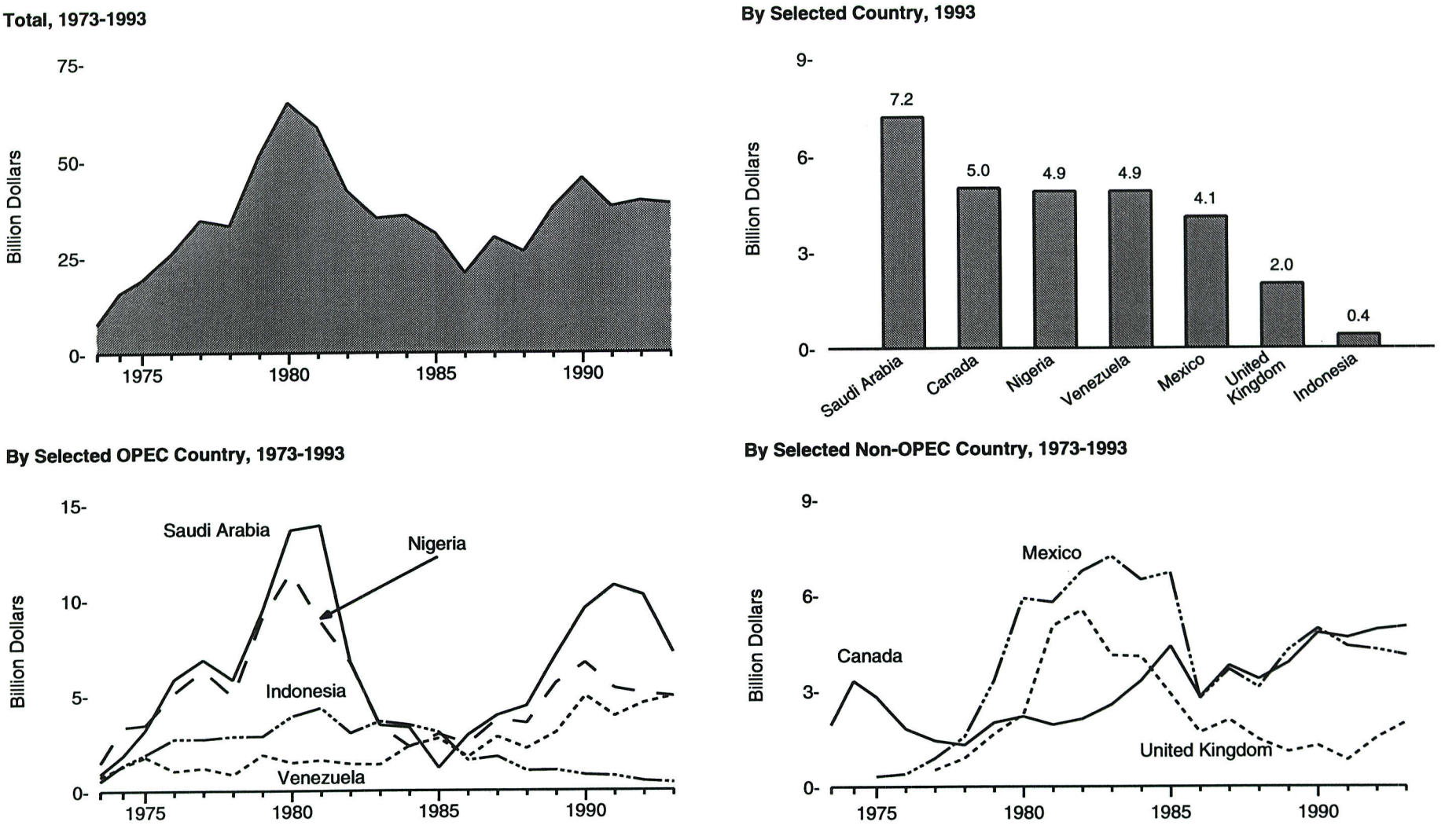
[5] Based on October, November, and December data only.

R=Revised data. P=Preliminary data. NA=Not available, included in "Other Non-OPEC." W=Value withheld to avoid disclosure of individual company data.

Notes: • Data include imports for the Strategic Petroleum Reserve, which began in 1977. • Totals may not equal sum of components due to independent rounding.

Sources: • 1973 through September 1977—Federal Energy Administration, Form FEA-F701-M-0, "Transfer Pricing Report." • October 1977 through January 1979—Energy Information Administration (EIA), Form FEA-F701-M-0, "Transfer Pricing Report." • February 1979 through September 1982—EIA, Form ERA-51, "Transfer Pricing Report." • October 1982 through June 1984—EIA, Form EP-51, "Foreign Crude Oil Transaction Report." • July 1984 forward—EIA, Form EIA-856, "Monthly Foreign Crude Oil Acquisition Report."

Figure 5.19 Value of Crude Oil Imports from Selected Countries



*1973 data are based on October, November, and December data only.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 5.19.

Table 5.19 Value of Crude Oil Imports from Selected Countries, 1973-1993

(Billion Dollars)

Year	OPEC [1]								Non-OPEC				
	Algeria	Indonesia	Nigeria	Saudi Arabia	Venezuela	Other [2]	Total [3]	Arab OPEC [4]	Canada	Mexico	United Kingdom	Other	Total [5]
1973	0.4	0.5	1.5	0.9	0.8	1.2	5.2	1.8	1.9	NA	NA	0.4	7.6
1974	0.9	1.4	3.3	1.9	1.3	2.9	11.6	3.2	3.3	W	NA	0.7	15.6
1975	1.2	1.9	3.5	3.2	1.8	3.4	14.9	6.2	2.8	0.3	NA	1.0	19.0
1976	2.1	2.7	5.1	5.8	1.0	5.4	22.2	11.6	1.8	0.4	W	1.3	25.8
1977	3.0	2.7	6.3	6.9	1.2	9.6	29.6	16.4	1.4	0.9	0.5	2.2	34.7
1978	3.5	2.9	4.9	5.8	0.8	9.3	27.1	15.4	1.3	1.6	0.9	2.4	33.3
1979	4.9	2.9	9.0	9.3	1.9	12.0	39.7	22.8	2.0	3.3	1.7	4.2	51.0
1980	6.3	3.9	11.4	13.6	1.5	11.2	47.5	30.2	2.2	5.9	2.3	6.9	64.9
1981	3.9	4.3	8.8	13.9	1.6	6.7	39.0	23.4	1.9	5.8	5.0	6.5	58.5
1982	1.2	3.0	6.7	6.8	1.4	2.8	22.0	9.4	2.1	6.7	5.5	5.6	42.2
1983	2.0	3.6	3.4	3.4	1.4	2.1	16.1	5.8	2.6	7.2	4.1	4.9	35.2
1984	2.1	3.4	2.3	3.3	2.3	2.6	16.1	6.7	3.3	6.5	4.1	5.8	35.8
1985	0.8	3.1	3.0	1.2	2.7	2.1	12.9	2.8	4.4	6.7	2.9	4.3	31.2
1986	0.4	1.6	2.4	2.9	1.8	1.3	10.4	4.1	2.8	2.8	1.7	2.9	20.6
1987	0.7	1.8	3.7	3.9	2.8	2.4	15.5	6.1	3.8	3.7	2.1	5.1	30.1
1988	W	1.0	3.5	4.4	2.2	2.5	14.0	7.0	3.4	3.1	1.5	4.4	26.3
1989	0.4	1.1	5.6	7.1	3.0	4.8	21.9	11.4	3.9	4.3	1.1	6.5	37.7
1990	W	0.8	6.7	9.5	4.9	4.8	27.2	14.0	4.8	4.9	1.3	7.2	45.5
1991	W	0.8	5.3	10.7	3.9	1.2	22.3	11.2	4.7	4.4	0.8	5.8	38.0
1992	W	0.5	5.1	10.2	4.6	R1.6	R22.2	10.7	R5.0	R4.3	1.5	R6.5	R39.5
1993P	0.1	0.4	4.9	7.2	4.9	2.9	20.6	9.3	5.0	4.1	2.0	7.1	38.7

[1] Organization of Petroleum Exporting Countries. See Glossary for membership.

[2] Gabon, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates; Ecuador, which withdrew from OPEC on December 31, 1992, is included through 1992. Prior to 1988, imports from the Neutral Zone between Kuwait and Saudi Arabia are included in imports from Saudi Arabia. From 1988 forward, those imports are included in imports from "Other."

[3] Ecuador, which withdrew from OPEC on December 31, 1992, is included through 1992. Total OPEC imports exclude petroleum imported into the United States indirectly from OPEC countries, primarily from Caribbean and West European refining areas, as petroleum products that were refined from crude oil produced in OPEC countries.

[4] Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates. Imports from the Neutral Zone are included in imports from "Arab OPEC."

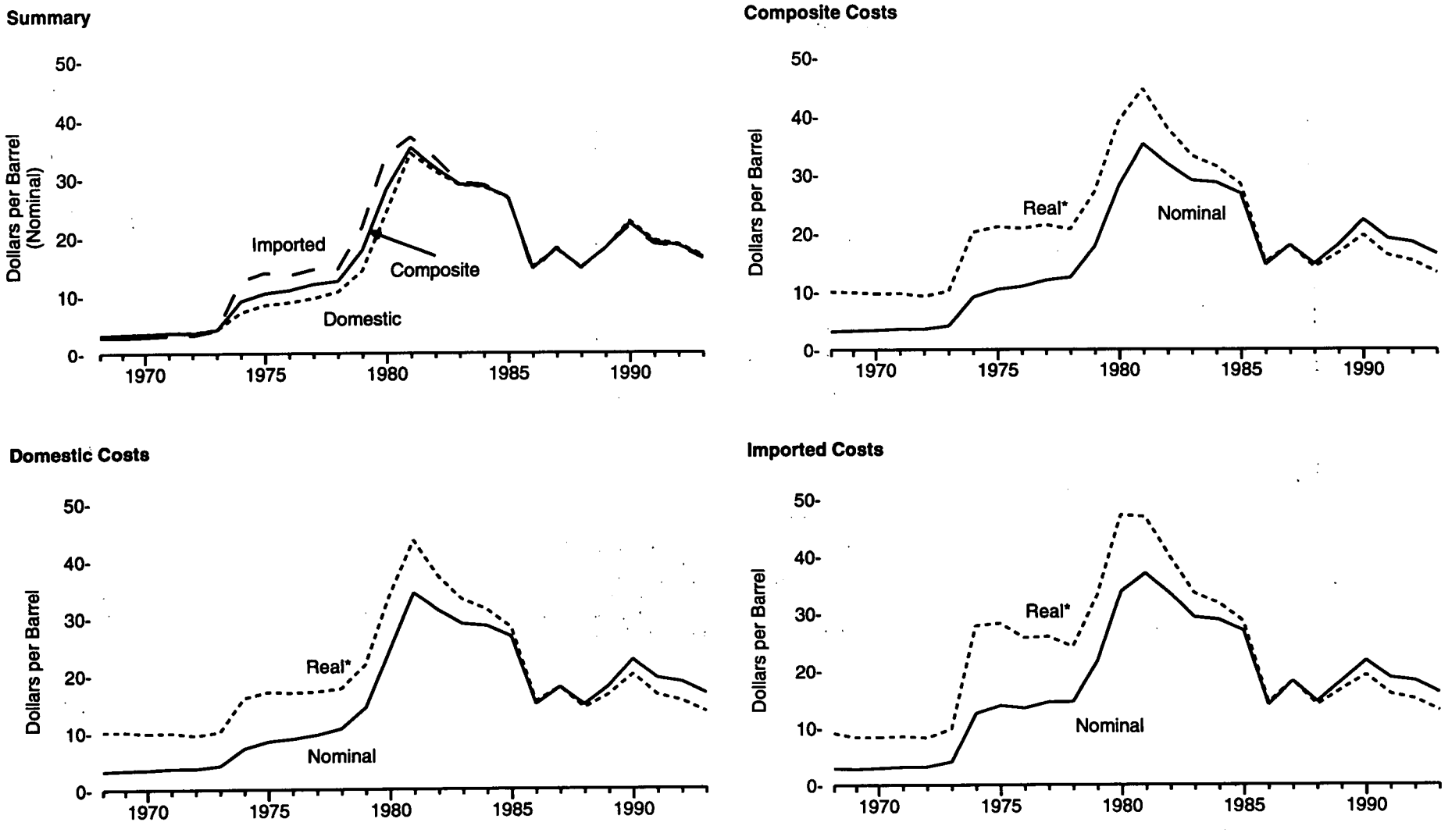
[5] Data shown here represent landed value; they differ from data in Table 3.5, which are data from U.S. Customs that represent crude oil value at the port of loading.

R=Revised data. P=Preliminary data. NA=Not available, included in "Other Non-OPEC." W=Value withheld to avoid disclosure of individual company data.

Note: Because the volumes associated with the landed costs are not the same as those used in the calculation of this table, the value of imports do not sum. The values were calculated independently.

Sources: Calculated by using prices on Table 5.18 and volume data as follows: • 1973-1975—U.S. Department of the Interior, Bureau of Mines, *Petroleum Statement, Annual.* • 1976-1980—Energy Information Administration (EIA), *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Petroleum Supply Monthly* (February 1994).

Figure 5.20 Crude Oil Refiner Acquisition Costs, 1968-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Source: Table 5.20.

Table 5.20 Crude Oil Refiner Acquisition Costs, 1968-1993

(Dollars per Barrel)

Year	Domestic		Imported		Composite	
	Nominal	Real [1]	Nominal	Real [1]	Nominal	Real [1]
1968	3.21	10.09	2.90	9.12	3.17	9.97
1969	3.37	10.09	2.80	8.38	3.29	9.85
1970	3.46	9.83	2.96	8.41	3.40	9.66
1971	3.68	9.92	3.17	8.54	3.60	9.70
1972	3.67	9.46	3.22	8.30	3.58	9.23
1973	4.17	10.10	4.08	9.88	4.15	10.05
1974	7.18	15.99	12.52	27.88	9.07	20.20
1975	8.39	17.05	13.93	28.31	10.38	21.10
1976	8.84	16.90	13.48	25.77	10.89	20.82
1977	9.55	17.08	14.53	25.99	11.96	21.40
1978	10.61	17.60	14.57	24.16	12.46	20.66
1979	14.27	21.79	21.67	33.08	17.72	27.05
1980	24.23	33.79	33.89	47.27	28.07	39.15
1981	34.33	43.51	37.05	46.96	35.24	44.66
1982	31.22	37.26	33.55	40.04	31.87	38.03
1983	28.87	33.11	29.30	33.60	28.99	33.25
1984	28.53	31.35	28.88	31.74	28.63	31.46
1985	26.66	28.24	26.99	28.59	26.75	28.34
1986	14.82	15.29	14.00	14.45	14.55	15.02
1987	17.76	17.76	18.13	18.13	17.90	17.90
1988	14.74	14.19	14.56	14.01	14.67	14.12
1989	17.87	16.47	18.08	16.66	17.97	16.56
1990	22.59	[R]19.94	21.76	[R]19.21	22.22	[R]19.61
1991	19.33	[R]16.42	18.70	[R]15.89	19.06	[R]16.19
1992	18.63	[R]15.38	18.20	[R]15.03	18.43	[R]15.22
1993[P]	16.66	13.41	16.14	13.00	16.41	13.21

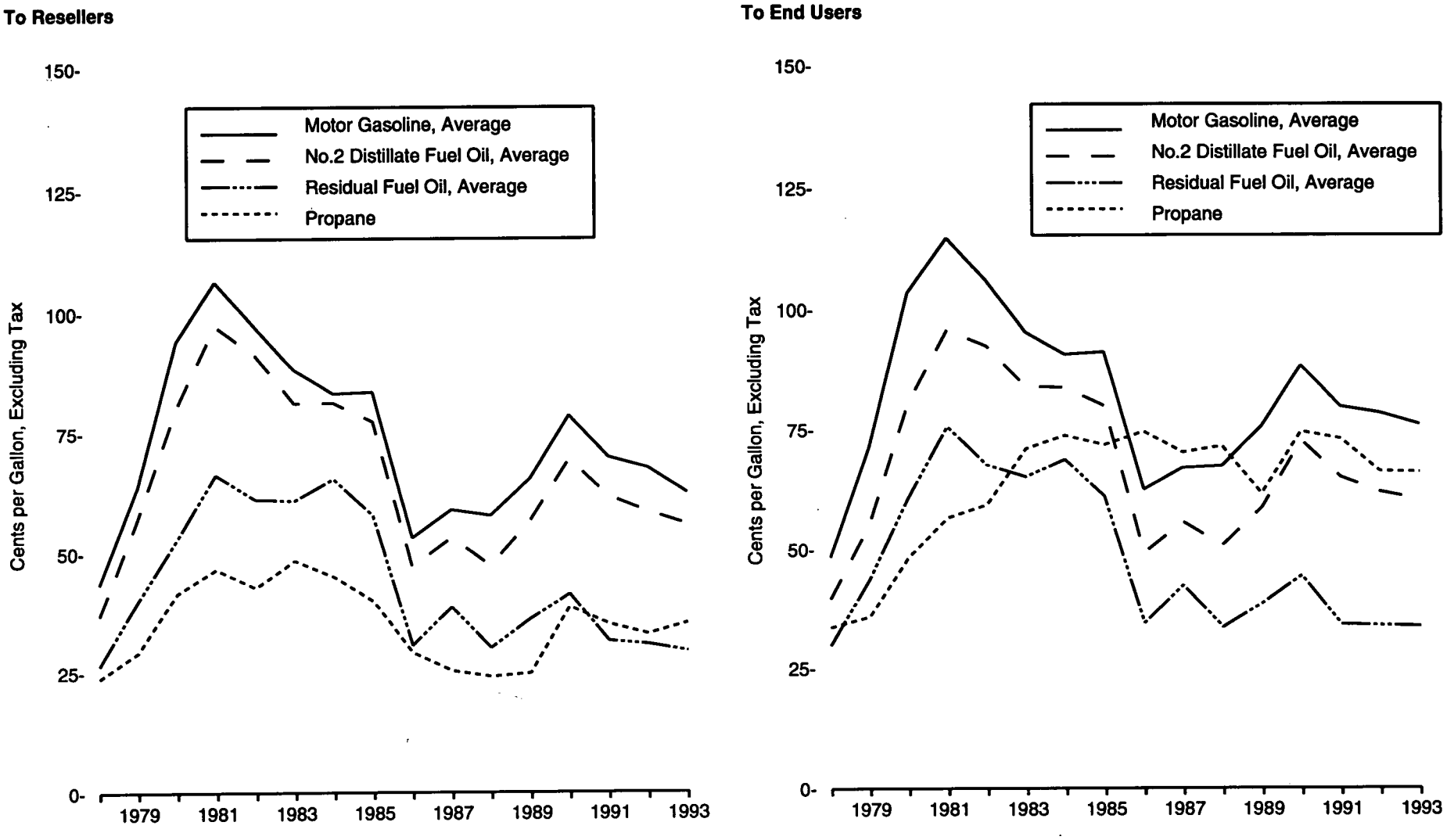
[1] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

R=Revised data. P=Preliminary data.

Note: Refiner acquisition cost of crude oil for each category and for the composite is derived by dividing the sum of the total purchasing (acquisition) costs of all refiners by the total volume of all refiners' purchases.

Sources: • 1968-1973—Estimated. See Note 6 at end of section. • 1974 through January 1976—Federal Energy Administration (FEA), Form FEA-96, "Monthly Cost Allocation Report." • February 1976 through September 1977—FEA, Form FEA-P110-M-1, "Refiners' Monthly Cost Allocation Report." • October 1977 through June 1978—Energy Information Administration (EIA), Form FEA-P110-M-1, "Refiners' Monthly Cost Allocation Report." • July 1978 through December 1980—EIA, Form ERA-49, "Domestic Crude Oil Entitlements Program Refiners Monthly Report." • 1981 forward—EIA, Form EIA-14, "Refiners' Monthly Cost Report."

Figure 5.21 Refiner Sales Prices of Selected Petroleum Products, 1978-1993



Source: Table 5.21.

Table 5.21 Refiner Sales Prices and Refiner Margins of Selected Petroleum Products, 1978-1993

(Cents per Gallon, Excluding Taxes)

Product	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 P
Sales Prices to Resellers: [1]																
Aviation Gasoline	53.7	72.1	112.8	125.0	122.8	117.8	116.5	113.0	91.2	85.9	85.0	95.0	106.3	100.1	99.1	96.4
Motor Gasoline	43.4	63.7	94.1	106.4	97.3	88.2	83.2	83.5	53.1	58.9	57.7	65.4	78.6	69.9	67.7	62.5
Leaded Regular	NA	NA	NA	NA	NA	85.0	79.5	79.3	50.1	56.5	54.8	63.1	75.4	65.7	69.3	66.5
Unleaded Regular	NA	NA	NA	NA	NA	89.5	84.2	84.3	52.2	56.9	54.8	61.8	75.8	67.2	64.4	59.2
Unleaded Midgrade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	68.6	81.4	73.3	70.7	66.0
Premium	NA	NA	NA	NA	NA	96.4	91.6	92.2	61.0	67.1	67.2	74.9	87.4	79.2	77.3	72.0
Kerosene	40.4	62.4	86.4	106.6	101.8	89.2	91.6	87.4	60.6	59.2	54.9	66.9	83.9	72.2	63.2	60.3
Jet Fuel, Kerosene-Type	38.6	66.0	86.8	101.2	95.3	85.4	83.0	79.4	49.5	53.8	49.5	58.3	77.3	65.0	60.4	57.7
No. 1 Distillate Fuel Oil	40.6	58.3	88.0	107.1	103.8	89.6	89.2	86.3	57.9	59.9	54.9	66.8	83.8	73.0	65.1	64.6
No. 2 Distillate Fuel Oil	36.7	57.1	80.2	97.4	91.4	81.2	81.3	77.4	47.0	53.1	47.3	56.6	69.5	61.8	58.5	55.9
No. 2 Fuel Oil	36.9	56.9	80.3	97.6	91.4	81.5	82.1	77.6	48.6	52.7	47.3	56.5	69.7	62.2	57.9	54.5
No. 2 Diesel Oil	36.5	57.4	80.1	97.2	91.4	80.8	80.3	77.2	45.2	53.4	47.3	56.7	69.4	61.5	59.0	57.1
No. 4 Distillate Fuel Oil [2]	30.5	47.0	67.0	78.3	73.7	72.6	70.7	67.2	40.9	46.2	42.5	48.0	59.0	55.6	49.5	48.8
Residual Fuel Oil	26.3	39.9	52.8	66.3	61.2	60.9	65.4	57.7	30.5	38.5	30.0	36.0	41.3	31.4	30.7	29.3
1% or Less Sulfur Content	29.3	45.0	60.8	74.8	69.5	64.3	68.5	61.0	32.8	41.2	33.3	40.7	47.2	36.4	35.4	33.8
Greater than 1% Sulfur Content	24.5	36.6	47.9	62.2	57.2	59.1	63.9	56.0	28.9	36.2	27.1	33.1	37.2	29.2	28.4	25.7
Propane (Consumer Grade)	23.7	29.1	41.5	46.6	42.7	48.4	45.0	39.8	29.0	25.2	24.0	24.7	38.6	34.9	32.8	35.1
Sale Prices to End Users: [1]																
Aviation Gasoline	51.6	68.9	108.4	130.3	131.2	125.5	123.4	120.1	101.1	90.7	89.1	99.5	112.0	104.7	102.7	99.0
Motor Gasoline	48.4	71.3	103.5	114.7	106.0	95.4	90.7	91.2	62.4	66.9	67.3	75.6	88.3	79.7	78.4	76.0
Leaded Regular	NA	NA	NA	NA	NA	90.6	84.8	84.2	57.3	61.8	61.9	71.0	83.1	71.5	78.5	75.9
Unleaded Regular	NA	NA	NA	NA	NA	97.0	91.5	91.7	61.6	65.0	64.1	71.4	84.9	76.1	74.1	71.2
Unleaded Midgrade	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	79.2	92.1	84.3	82.2	80.3
Premium	NA	NA	NA	NA	NA	105.7	101.5	102.3	73.7	78.4	78.8	86.7	98.5	90.7	R90.7	88.9
Kerosene	42.1	58.5	90.2	112.3	108.9	96.1	103.6	103.0	79.0	77.0	73.8	70.9	92.3	83.8	78.6	75.4
Jet Fuel, Kerosene-Type	38.7	54.7	86.8	102.4	96.3	87.8	84.2	79.6	52.9	54.3	51.3	59.2	76.6	65.2	61.0	57.9
No. 1 Distillate Fuel Oil	40.9	57.2	83.4	103.9	102.3	96.2	92.7	88.0	62.0	60.4	56.4	66.1	81.9	74.0	66.5	66.4
No. 2 Distillate Fuel Oil	39.6	55.1	80.4	95.8	92.5	83.9	83.7	79.9	49.1	55.6	50.7	58.5	72.6	65.0	61.9	60.3
No. 2 Fuel Oil	40.0	51.6	78.8	91.4	90.5	91.6	91.6	84.9	56.0	58.1	54.4	58.7	73.4	66.5	R62.7	60.2
No. 2 Diesel Oil	37.7	58.5	81.8	99.5	94.2	82.6	82.3	78.9	47.8	55.1	50.0	58.5	72.5	64.8	61.8	60.3
No. 4 Distillate Fuel Oil [2]	31.1	47.9	68.2	79.7	75.0	76.6	79.6	77.3	48.9	51.3	46.1	51.2	62.2	58.0	52.6	50.2
Residual Fuel Oil	29.8	43.6	60.7	75.6	67.6	65.1	68.7	61.0	34.3	42.3	33.4	38.5	44.4	34.0	33.8	33.6
1% or Less Sulfur Content	31.4	46.8	67.5	82.9	74.7	69.5	72.0	64.4	37.2	44.7	37.2	43.6	50.5	40.2	R38.9	40.3
Greater than 1% Sulfur Content	27.5	38.9	52.3	67.3	61.1	61.1	65.9	58.2	31.7	39.6	30.0	34.4	40.0	30.6	31.3	30.2
Propane (Consumer Grade)	33.5	35.7	48.2	56.5	59.2	70.9	73.7	71.7	74.5	70.1	71.4	61.5	74.5	73.0	66.2	66.0
Refiner Margins [3]																
Motor Gasoline	13.7	21.5	27.3	22.5	21.4	19.2	15.1	19.8	18.4	16.3	22.8	22.6	25.7	24.5	23.8	23.4
Jet Fuel, Kerosene-Type	8.9	23.8	20.0	17.3	19.4	16.4	14.9	15.8	14.9	11.2	14.6	15.5	24.4	19.6	16.5	18.6
No. 2 Distillate Fuel Oil	7.0	14.9	13.4	13.5	15.5	12.2	13.1	13.8	12.4	10.4	12.4	13.8	16.6	16.4	14.6	16.8
Residual Fuel Oil	-3.4	-2.3	-14.0	-17.6	-14.7	-8.1	-2.8	-6.0	-4.1	-4.1	-5.0	-6.8	-11.6	-14.0	-13.2	-9.8
Composite [4]	11.5	19.4	22.4	19.4	19.4	16.0	13.7	17.0	15.8	13.8	18.7	18.8	22.1	20.7	19.8	20.6

[1] Sales for resale, that is, wholesale sales, are those made to purchasers who are other than ultimate consumers. Sales to end users are those made directly to the ultimate consumer, including bulk customers, such as agriculture, industry, and utilities, as well as residential and commercial customers.

[2] Includes No. 4 fuel oil and No. 4 diesel fuel.

[3] On this table, refiner margin is the difference between the composite refiner acquisition price of crude oil and the price to resellers.

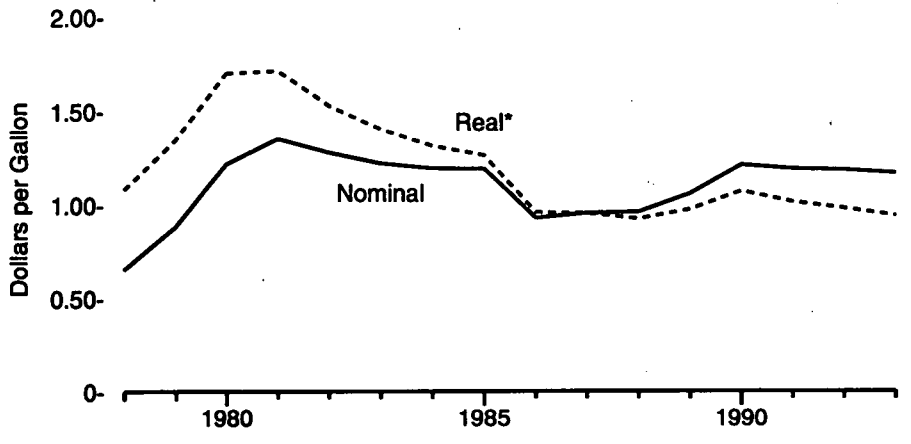
[4] Composite of aviation gasoline, kerosene-type jet fuel, kerosene, motor gasoline, distillate fuel nos. 1, 2, and 4, and residual fuel.

R=Revised data. P=Preliminary data. NA=Not available.

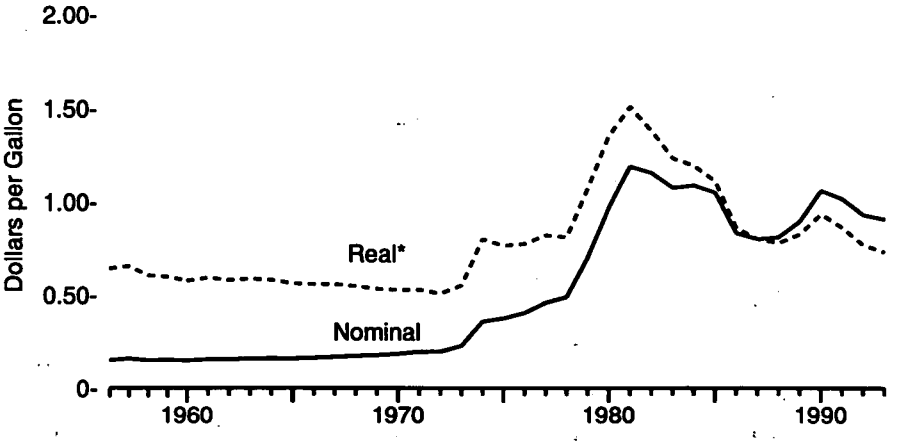
Sources: • 1978-1992—Energy Information Administration (EIA), Form EIA-460, "Petroleum Industry Monthly Report for Product Prices," the source for backcast estimates • 1983 forward—EIA, Form EIA-782A, "Monthly Petroleum Product Sales Report."

Figure 5.22 Motor Gasoline and Residential Heating Oil Retail Prices

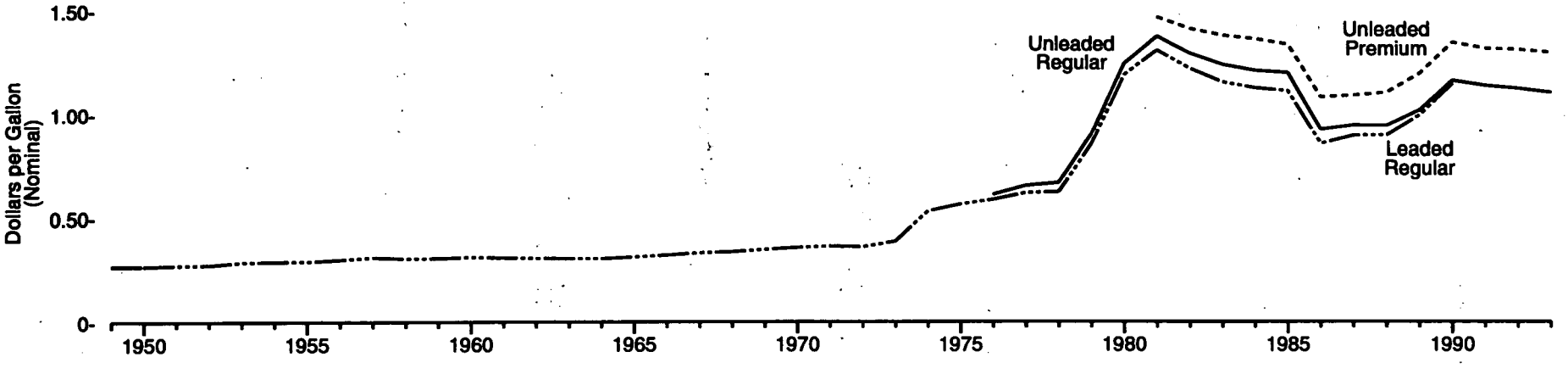
Motor Gasoline, All Types, 1978-1993



Residential Heating Oil, 1956-1993



Motor Gasoline by Type, 1949-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Notes: • Residential heating oil prices from 1978 forward exclude all taxes. • Because vertical scales differ, graphs should not be compared.

Source: Table 5.22.

Table 5.22 Motor Gasoline and Residential Heating Oil Retail Prices, 1949-1993

(Cents per Gallon)

Year	Motor Gasoline (Including Taxes)								Residential Heating Oil [2]	
	Leaded Regular [1]		Unleaded Regular		Unleaded Premium		All Types			
	Nominal	Real [3]	Nominal	Real [3]	Nominal	Real [3]	Nominal	Real [3]	Nominal	Real [3]
1949	26.8	134.7	NA	NA	NA	NA	NA	NA	NA	NA
1950	26.8	132.7	NA	NA	NA	NA	NA	NA	NA	NA
1951	27.2	127.7	NA	NA	NA	NA	NA	NA	NA	NA
1952	27.4	127.4	NA	NA	NA	NA	NA	NA	NA	NA
1953	28.7	130.5	NA	NA	NA	NA	NA	NA	NA	NA
1954	29.0	130.6	NA	NA	NA	NA	NA	NA	NA	NA
1955	29.1	127.1	NA	NA	NA	NA	NA	NA	NA	NA
1956	29.9	126.7	NA	NA	NA	NA	NA	NA	15.2	64.4
1957	31.0	127.0	NA	NA	NA	NA	NA	NA	16.0	65.6
1958	30.4	122.1	NA	NA	NA	NA	NA	NA	15.1	60.6
1959	30.5	119.1	NA	NA	NA	NA	NA	NA	15.3	59.8
1960	31.1	119.6	NA	NA	NA	NA	NA	NA	15.0	57.7
1961	30.8	117.1	NA	NA	NA	NA	NA	NA	15.6	59.3
1962	30.6	113.8	NA	NA	NA	NA	NA	NA	15.6	58.0
1963	30.4	111.8	NA	NA	NA	NA	NA	NA	16.0	58.8
1964	30.4	109.7	NA	NA	NA	NA	NA	NA	16.1	58.1
1965	31.2	109.9	NA	NA	NA	NA	NA	NA	16.0	56.3
1966	32.1	109.2	NA	NA	NA	NA	NA	NA	16.4	55.8
1967	33.2	109.6	NA	NA	NA	NA	NA	NA	16.9	55.8
1968	33.7	106.0	NA	NA	NA	NA	NA	NA	17.4	54.7
1969	34.8	104.2	NA	NA	NA	NA	NA	NA	17.8	53.3
1970	35.7	101.4	NA	NA	NA	NA	NA	NA	18.5	52.6
1971	36.4	98.1	NA	NA	NA	NA	NA	NA	19.6	52.8
1972	36.1	93.0	NA	NA	NA	NA	NA	NA	19.7	50.8
1973	38.8	93.9	NA	NA	NA	NA	NA	NA	22.8	55.2
1974	53.2	118.5	NA	NA	NA	NA	NA	NA	36.0	80.2
1975	56.7	115.2	NA	NA	NA	NA	NA	NA	37.7	76.6
1976	59.0	112.8	61.4	117.4	NA	NA	NA	NA	40.6	77.6
1977	62.2	111.3	65.6	117.4	NA	NA	NA	NA	46.0	82.3
1978	62.6	103.8	67.0	111.1	NA	NA	65.2	108.1	49.0	81.3
1979	85.7	130.8	90.3	137.9	NA	NA	88.2	134.7	70.4	107.5
1980	119.1	166.1	124.5	173.6	NA	NA	122.1	170.3	97.4	135.8
1981	131.1	166.2	137.8	174.7	[4]147.0	[4]186.3	135.3	171.5	119.4	151.3
1982	122.2	145.8	129.6	154.7	141.5	168.9	128.1	152.9	116.0	138.4
1983	115.7	132.7	124.1	142.3	138.3	158.6	122.5	140.5	107.8	123.6
1984	112.9	124.1	121.2	133.2	136.6	150.1	119.8	131.6	109.1	119.9
1985	111.5	118.1	120.2	127.3	134.0	141.9	119.6	126.7	105.3	111.5
1986	85.7	88.4	92.7	95.7	108.5	112.0	93.1	96.1	83.6	86.3
1987	89.7	89.7	94.8	94.8	109.3	109.3	95.7	95.7	80.3	80.3
1988	89.9	86.5	94.6	91.0	110.7	106.5	96.3	92.7	81.3	78.2
1989	99.8	92.0	102.1	94.1	119.7	110.3	106.0	97.7	90.0	82.9
1990	114.9	[R]101.4	116.4	[R]102.7	134.9	[R]119.1	121.7	[R]107.4	106.3	[R]93.8
1991	NA	NA	114.0	[R]96.9	132.1	[R]112.2	119.6	[R]101.6	101.9	[R]86.6
1992	NA	NA	112.7	[R]93.1	131.6	[R]108.7	119.0	[R]98.3	93.4	[R]77.1
1993	NA	NA	110.8	89.2	130.2	104.8	117.3	94.4	[P]91.1	[P]73.3

[1] Average motor gasoline prices are calculated from a sample of service stations providing all types of service (i.e., full-, mini-, and self-serve). Geographic coverage - 1949-1973, 55 representative cities; 1974-1977, 56 urban areas; 1978 forward, 85 urban areas.

[2] Average residential heating oil (No. 2 fuel oil) prices are derived by dividing the sum of the estimated national value of retail sales for residential heating by the estimated volume of retail sales for residential heating. Data for 1978 forward exclude all taxes.

[3] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

[4] Based on September through December data only.

R=Revised data. P=Preliminary data. NA=Not available.

Sources: **Motor Gasoline:** • 1949-1973—*Platt's Oil Price Handbook and Oilmanac, 1974*, 51st Edition. • 1974 forward—Energy Information Administration (EIA), simple annual averages of monthly data from Bureau of Labor Statistics, *Consumer Prices: Energy*. **Residential Heating Oil:** • 1956-1974—Bureau of Labor Statistics, *Retail Prices and Indexes of Fuels and Utilities for Residential Usage*, monthly. • January 1975 through September 1977—Federal Energy Administration, Form FEA-P112-M-1, "No. 2 Heating Oil Supply/Price Monitoring Report." • October 1977 through December 1977—EIA, Form EIA-9, "No. 2 Heating Oil Supply/Price Monitoring Report." • 1978-1992—EIA, *Petroleum Marketing Annual 1992* (August 1993), Table 16. • 1993—EIA estimates.

Petroleum Notes

1. Accurate calculation of the quantity of petroleum products supplied to the domestic market is complicated by the recycling of products at the refinery, the renaming of products involved in a transfer, and the receipt of products from outside of the primary supply system. Beginning in 1981, a single adjustment (always a negative quantity) is made to total product supplied to correct this accounting problem. The calculation of this adjustment, called "reclassified," involves only unfinished oils and gasoline blending components. It is the sum of their net changes in primary stocks (net withdrawals is a plus quantity, net additions is a minus quantity) plus imports minus net input to refineries.

2. The methods for deriving Gross Input to Distillation Units (GIDU) in this report are as follows: 1949-1966, GIDU is estimated by summing annual crude oil runs to stills, net unfinished oil reruns at refineries and shipments of natural gasoline and plant condensate from natural gas processing plants to refineries. 1967-1973, GIDU is estimated by summing annual crude oil runs to stills, net unfinished oil reruns, and refinery input of natural gasoline and plant condensate. 1974-1980, GIDU is published annual data. 1981 forward, GIDU is the sum of reported monthly data.

3. Total petroleum products supplied is the sum of the product supplied for each petroleum product, crude oil, unfinished oils, and gasoline blending components. For each of these, except crude oil, product supplied is calculated by adding refinery production, natural gas plant liquids production, new supply of other liquids, imports, and stock withdrawals, and subtracting stock additions, refinery inputs, and exports. Crude oil product supplied is the sum of crude oil burned on leases and at pipeline pump stations as reported on Form EIA-813. Prior to 1983, crude oil burned on leases and at pipeline pump stations was reported as either distillate or residual fuel oil and was included as product supplied for these products. Petroleum product supplied is an approximation of petroleum consumption and is synonymous with the term "Petroleum Consumption" in Section 1. Sector data for petroleum products used in more than one sector are derived from surveys of sales to ultimate consumers by refiners, marketers, distributors, and dealers and from receipts at electric utilities.

4. Beginning in January 1981, several Energy Information Administration survey forms and calculation methodologies were changed to reflect new developments in refinery and blending plant practices and to improve data integrity. These changes affect production and product supplied statistics for motor gasoline, distillate fuel oil, and residual fuel oil, and stocks of motor gasoline. On the new basis, motor gasoline production during the last half of 1980 would have averaged 289,000 barrels per day higher than that which was published on the old basis. Distillate and residual fuel oil production and product supplied for all of 1980 would have averaged, respectively, 105,000 and 54,000 barrels per day higher than the numbers that were published.

5. The Crude Oil Domestic First Purchase Prices were derived as follows: 1949-1973, weighted average domestic first purchase values as reported by State agencies and calculated by the Bureau of Mines; 1974 and 1975, weighted averages of a sample survey of major first purchasers' purchases; 1976 forward, weighted averages of all first purchasers' purchases.

6. The Refiner Acquisition Cost of Crude Oil was estimated for 1968-1973. The cost of domestic crude oil was derived by adding estimated transportation costs to the reported average domestic first purchase value. The cost of imported crude oils was derived by adding an estimated ocean transport cost based on the published "Average Freight Rate Assessment" to the average "Free Alongside Ship" value published by the U.S. Bureau of the Census. The composite cost was derived by weighting domestic costs and imported costs based on quantities produced and imported.

6. Natural Gas

Prices

Through the early 1970's, natural gas prices were relatively stable. Thereafter, the natural gas market underwent a period of price fluctuations brought on by deregulation and industry restructuring. The annual average wellhead price, in real terms,[1] trended downward from a 1983 peak of $2.97 per thousand cubic feet to a 15-year low of $1.39 per thousand cubic feet in 1991 (6.8).[2] Over the next 2 years, prices recovered somewhat, and in 1993 the annual average wellhead price was $1.59 per thousand cubic feet.

Prices to consumers vary by region; for example, prices are lower in main producing areas, where transmission costs are lower. Prices to consumers also vary by sector, and, when wellhead prices change, savings or price increases are sometimes passed on to consumers differentially. In 1993, the annual average wellhead nominal price rose 13 percent (6.8). The price per thousand cubic feet of natural gas sold to industrial consumers (excluding lease and plant fuel) rose 2.1 percent to $2.90 (6.9), while the price of natural gas sold to commercial consumers remained at $4.88 and the price to residential consumers remained at $5.89.

Sectoral Patterns of Demand

Throughout the 1950's and 1960's, the market for natural gas expanded as low prices encouraged demand (6.6). Of the many factors affecting natural gas markets during those decades, Federal and State regulatory commissions were the most influential. Below-market rates for certain categories of natural gas, coupled with strong demand, ultimately resulted in regional shortages during the second half of the 1970's.

In 1972, total consumption of natural gas reached an all-time high of 22 trillion cubic feet. Thereafter, uncertainties about supply and rising energy prices began to erode demand. By the 1980's, lower demand resulted in a short-term surplus of deliverable gas and production curtailments in many producing areas. In 1986, natural gas consumption totaled 16 trillion cubic feet, the lowest annual total since 1965.

Weakened demand spanned all end-use sectors but was most severe in the industrial and electric utility sectors, where, particularly during the early and mid-1980's, the option of fuel switching proved to be most viable. Lower consumption by the industrial sector accounted for over half of the 5.9-trillion-cubic-foot reduction from 1972 through 1986, and lower use at electric utilities accounted for close to one-fourth.

After the 1986 low point, natural gas consumption trended upward, reaching 20 trillion cubic feet in 1993 (6.6). All sectors except electric utilities consumed more natural gas in 1993 than they had in 1992. Consumption in the industrial sector (the largest consuming sector) rose from 8.7 trillion cubic feet in 1992 to 9.0 trillion cubic feet in 1993, a 3.8-percent increase. Residential consumption rose 5.5 percent to nearly 5.0 trillion cubic feet and commercial consumption rose 3.9 percent to 2.9 trillion cubic feet. In contrast, electric utility consumption of natural gas fell 3.2 percent to 2.7 trillion cubic feet.

Natural Gas Delivered for the Account of Others

During the 1980's, regulatory and legislative changes allowed consumers to purchase natural gas directly from producers and to arrange for pipeline and distribution companies to deliver it to them for a fee. Federal Energy Regulatory Commission (FERC) Order 636 (implemented November 1, 1993) extended that trend toward a more efficient market by requiring interstate pipeline companies to unbundle (separate) their sales and transportation services. In 1992, natural gas delivered for the account of others to industrial, electric utility, and commercial customers reached 7.4 trillion cubic feet (6.5). Such deliveries accounted for 70 percent of total deliveries to industrial customers, 64 percent of total deliveries to electric utilities, and 17 percent of total deliveries to commercial customers.

[1]Real prices are expressed in 1987 dollars. Prices are nominal unless specifically noted as real.

[2]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Natural Gas Production and Productivity

In 1993, gross withdrawals of natural gas from wells totaled 23 trillion cubic feet, up for the seventh consecutive year (6.2). Texas, Louisiana, and Oklahoma, the largest producers of natural gas, accounted for 62 percent of the U.S. total in 1993 (6.4). Most withdrawals came from onshore wells and State offshore wells, but 5.7 trillion cubic feet were Federal offshore withdrawals. The 23 trillion cubic feet of gross withdrawals in 1993 yielded 19 trillion cubic feet of marketed production (6.2).

The U.S. total of natural gas gross well withdrawals includes a small but rapidly growing amount of methane produced from coalbeds. In 1992 (the most recent year for which data are available), gross withdrawals of coalbed methane totaled about 535 billion cubic feet,[3] an amount equal to about 3 percent of U.S. total dry production. New drilling for coalbed methane was down, probably because easily developed prospects had already been drilled and because low prices for natural gas in 1992 made exploratory drilling less attractive. However, four States—Virginia, New Mexico, Colorado, and Alabama—posted large increases in their coalbed methane reserves. U.S. total reserves in coalbed methane fields rose 23 percent in 1992 and accounted for 6 percent of U.S. natural gas total reserves.

[3]Energy Information Administration, *Natural Gas Annual 1992*, DOE/EIA-0131(92) (Washington, DC, November 1993), p. 12.

Meeting Peak Demand

Seasonal, and even daily, fluctuations in natural gas demand are met by withdrawals from storage when demand is high and by injections into storage when demand is low compared with available gas flow in transmission lines. Net withdrawals from storage can provide more than half of some companies' peak winter deliveries. During the 1992-1993 heating season (October through March), net withdrawals from storage supplied 16 percent of total natural gas consumption.[4]

Natural gas in storage at the end of the year increased throughout the period of the 1970's, when local shortages resulted in curtailments to some consumers (6.7). Underground storage of working gas (that in excess of the base gas needed to maintain optimum reservoir pressure) equaled 7.1 percent of annual consumption in 1969 and 12 percent in 1993 (6.1 and 6.7). At the end of 1993, working gas in storage was 2.3 trillion cubic feet and base gas was 4.3 trillion cubic feet.

[4]Energy Information Administration, *Monthly Energy Review* March 1994, DOE/EIA-0035(94/04) (Washington, DC, March 1994), Tables 4.4 and 4.5.

About 286 thousand gas wells were in operation during 1993 (6.4). Withdrawals from those wells accounted for almost three-fourths of all gross withdrawals, while oil wells supplied the remainder (6.2). After peaking at 435 thousand cubic feet per day in 1971 (6.4), average gas well productivity trended downward; after 1984, productivity remained below 165 thousand cubic feet per day.

Imports and Exports

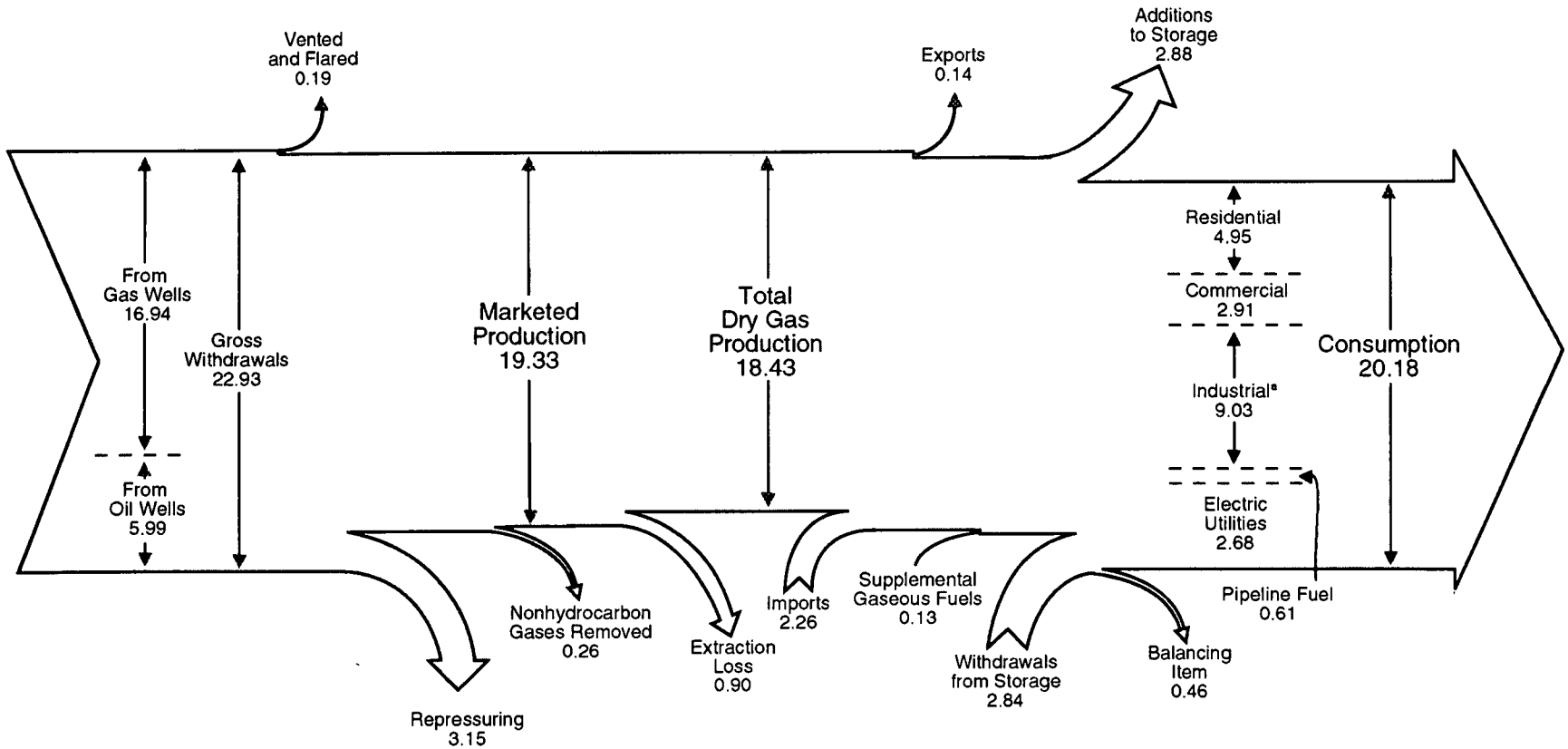
U.S. natural gas trade was limited to the border countries of Mexico and Canada until shipping natural gas in liquefied form emerged as an alternative to pipelines. In 1969, the first shipments of liquefied natural gas (LNG) were sent to Japan, and U.S. imports from Algeria began the following year (6.3). In 1993, U.S. net imports of natural gas by all routes totaled 2.1 trillion cubic feet, up 10 percent from 1992 net imports and the equivalent of 10.5 percent of domestic consumption, up from 9.8 percent in 1992.

Historically, Canada has been the major supplier of U.S. natural gas imports, with Algeria supplying smaller amounts. The remarkable growth in U.S. net imports of natural gas from the 1986 level of 689 billion cubic feet (a 17-year low at the time) to 2.1 trillion cubic feet in 1993 was due almost entirely to higher levels of imports from Canada. In 1993, Canada supplied net imports of 2.1 trillion cubic feet. Importing Canadian natural gas was facilitated by the completion of the Iroquois transportation system in January 1992.

From 1970 through 1990, Japan was the primary purchaser of U.S. natural gas. In 1991 and 1992, Mexico was the primary purchaser of U.S. natural gas. In 1993, Japan was once again the primary purchaser, buying 56 billion cubic feet of U.S. natural gas.

Diagram 3. Natural Gas Flow, 1993

(Trillion Cubic Feet)

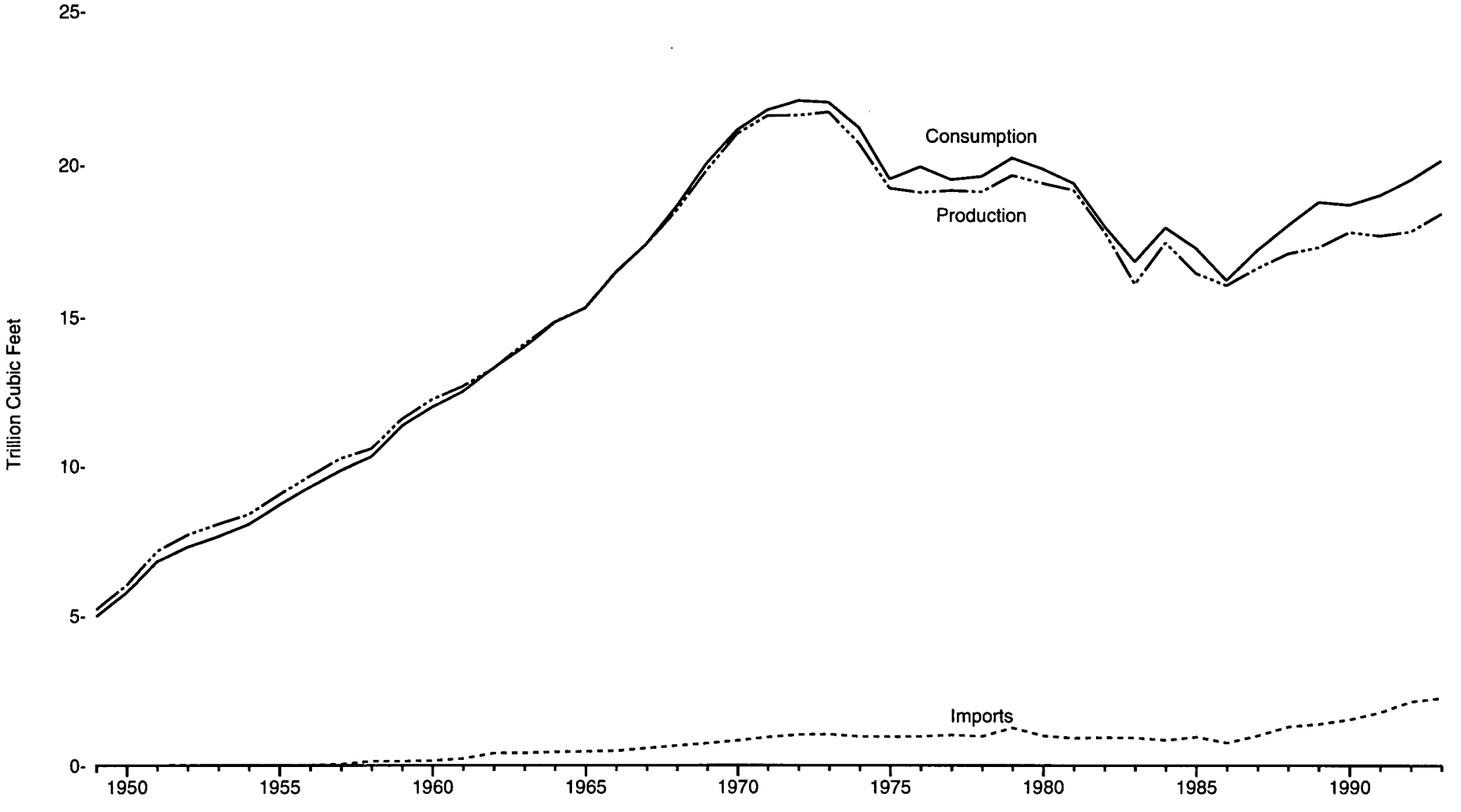


[a]Includes lease and plant fuel.

Notes: • Data are preliminary. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 6.1, 6.2, and 6.6.

Figure 6.1 Natural Gas Overview, 1949-1993



Source: Table 6.1.

Table 6.1 Natural Gas Overview, 1949-1993

(Trillion Cubic Feet)

Year	Total Dry Gas Production	Supplemental Gaseous Fuels	Imports	Exports	Withdrawals from Storage [1]	Additions to Storage [1]	Balancing Item [2]	Consumption
1949	5.20	NA	0.00	0.02	0.11	0.17	-0.14	4.97
1950	6.02	NA	0.00	0.03	0.18	0.23	-0.18	5.77
1951	7.16	NA	0.00	0.02	0.21	0.35	-0.19	6.81
1952	7.69	NA	0.01	0.03	0.22	0.40	-0.20	7.29
1953	8.06	NA	0.01	0.03	0.25	0.40	-0.24	7.64
1954	8.39	NA	0.01	0.03	0.33	0.43	-0.22	8.05
1955	9.03	NA	0.01	0.03	0.44	0.51	-0.25	8.69
1956	9.66	NA	0.01	0.04	0.45	0.59	-0.21	9.29
1957	10.25	NA	0.04	0.04	0.48	0.67	-0.21	9.85
1958	10.57	NA	0.14	0.04	0.62	0.70	-0.28	10.30
1959	11.55	NA	0.13	0.02	0.67	0.79	-0.22	11.32
1960	12.23	NA	0.16	0.01	0.71	0.84	-0.27	11.97
1961	12.66	NA	0.22	0.01	0.70	0.84	-0.23	12.49
1962	13.25	NA	0.40	0.02	0.85	0.94	-0.29	13.27
1963	14.08	NA	0.41	0.02	0.92	1.05	-0.36	13.97
1964	14.82	NA	0.44	0.02	0.89	1.01	-0.30	14.81
1965	15.29	NA	0.46	0.03	0.96	1.08	-0.32	15.28
1966	16.47	NA	0.48	0.02	1.14	1.21	-0.40	16.45
1967	17.39	NA	0.56	0.08	1.13	1.32	-0.30	17.39
1968	18.49	NA	0.65	0.09	1.33	1.43	-0.33	18.63
1969	19.83	NA	0.73	0.05	1.38	1.50	-0.33	20.06
1970	21.01	NA	0.82	0.07	1.46	1.86	-0.23	21.14
1971	21.61	NA	0.93	0.08	1.51	1.84	-0.34	21.79
1972	21.62	NA	1.02	0.08	1.76	1.89	-0.33	22.10
1973	21.73	NA	1.03	0.08	1.53	1.97	-0.20	22.05
1974	20.71	NA	0.96	0.08	1.70	1.78	-0.29	21.22
1975	19.24	NA	0.95	0.07	1.76	2.10	-0.24	19.54
1976	19.10	NA	0.96	0.06	1.92	1.76	-0.22	19.95
1977	19.16	NA	1.01	0.06	1.75	2.31	-0.04	19.52
1978	19.12	NA	0.97	0.05	2.16	2.28	-0.29	19.63
1979	19.66	NA	1.25	0.06	2.05	2.30	-0.37	20.24
1980	19.40	0.15	0.98	0.05	1.97	1.95	-0.64	19.88
1981	19.18	0.18	0.90	0.06	1.93	2.23	-0.50	19.40
1982	17.82	0.14	0.93	0.05	2.16	2.47	-0.54	18.00
1983	16.09	0.13	0.92	0.05	2.27	1.82	-0.70	16.83
1984	17.47	0.11	0.84	0.05	2.10	2.30	-0.22	17.95
1985	16.45	0.13	0.95	0.06	2.40	2.16	-0.43	17.28
1986	16.06	0.11	0.75	0.06	1.84	1.98	-0.49	16.22
1987	16.62	0.10	0.99	0.05	1.91	1.91	-0.44	17.21
1988	17.10	0.10	1.29	0.07	2.27	2.21	-0.45	18.03
1989	17.31	0.11	1.38	0.11	2.85	2.53	-0.22	18.80
1990	17.81	0.12	1.53	0.09	1.99	2.50	-0.15	18.72
1991	R17.70	0.11	1.77	0.13	2.75	2.67	R-0.50	R19.04
1992	R17.84	0.12	R2.14	R0.22	R2.77	R2.60	R-0.51	R19.54
1993P	18.43	0.13	2.26	0.14	2.84	2.88	-0.46	20.18

[1] Beginning with 1980, includes liquefied natural gas storage in above ground tanks.

[2] Quantities lost and imbalances in data due to differences among data sources. Excludes intransit shipments 1980 forward.

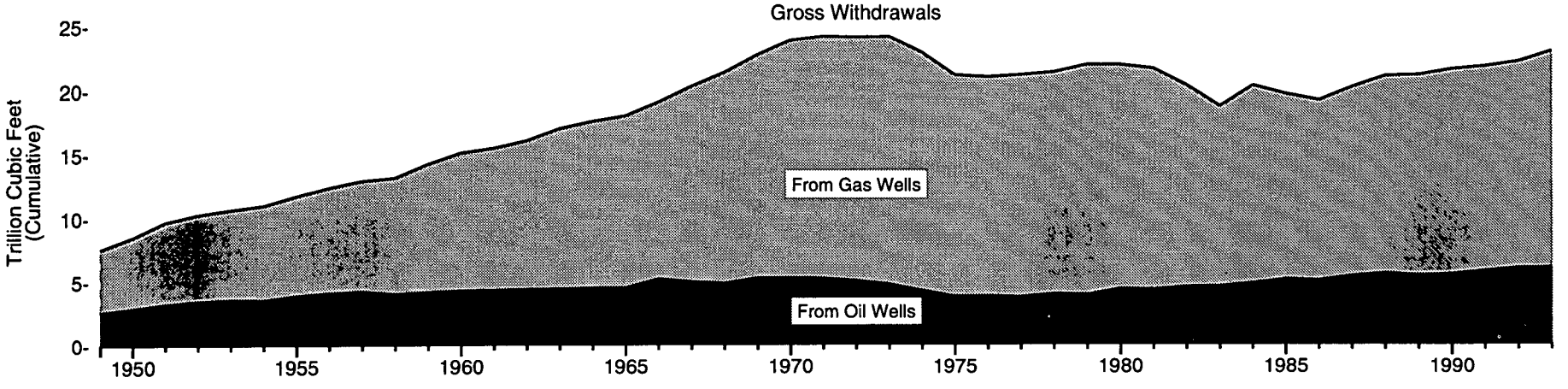
R=Revised data. P=Preliminary data. NA=Not available.

Notes: • Beginning with 1965, all volumes are shown on a pressure base of 14.73 p.s.i.a. at 60° F. For prior years, the pressure base is 14.65 p.s.i.a. at 60° F. • Totals may not equal sum of components due to independent rounding.

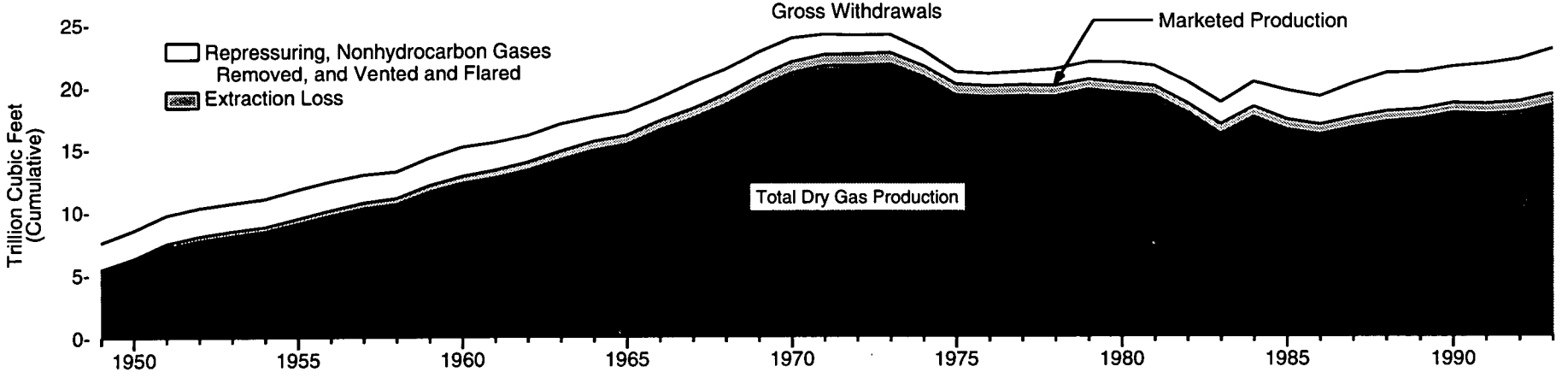
Sources: **1949-1987:** • Supplemental Gaseous Fuels—Energy Information Administration (EIA), *Natural Gas Annual 1992, Volume 2* (November 1993), Table 12. • All Other Data— EIA, *Natural Gas Annual 1992, Volume 2* (November 1993), Table 2. **1988 forward:** EIA, *Natural Gas Monthly* (March 1994), Table 2.

Figure 6.2 Natural Gas Production, 1949-1993

Gross Withdrawals by Well Type



Natural Gas Production by Phase



Source: Table 6.2.

Table 6.2 Natural Gas Production, 1949-1993

(Trillion Cubic Feet)

Year	Gross Withdrawals			Repressuring	Nonhydrocarbon Gases Removed	Vented and Flared	Marketed Production	Extraction Loss [1]	Total Dry Gas Production
	From Gas Wells	From Oil Wells	Total						
1949	4.99	2.56	7.55	1.27	NA	0.85	5.42	0.22	5.20
1950	5.60	2.88	8.48	1.40	NA	0.80	6.28	0.26	6.02
1951	6.48	3.21	9.69	1.44	NA	0.79	7.46	0.29	7.16
1952	6.84	3.43	10.27	1.41	NA	0.85	8.01	0.32	7.69
1953	7.10	3.55	10.65	1.44	NA	0.81	8.40	0.34	8.06
1954	7.47	3.52	10.98	1.52	NA	0.72	8.74	0.35	8.39
1955	7.84	3.88	11.72	1.54	NA	0.77	9.41	0.38	9.03
1956	8.31	4.07	12.37	1.43	NA	0.86	10.08	0.42	9.66
1957	8.72	4.19	12.91	1.42	NA	0.81	10.68	0.43	10.25
1958	9.15	3.99	13.15	1.48	NA	0.63	11.03	0.46	10.57
1959	10.10	4.13	14.23	1.61	NA	0.57	12.05	0.50	11.55
1960	10.85	4.23	15.09	1.75	NA	0.56	12.77	0.54	12.23
1961	11.20	4.27	15.46	1.68	NA	0.52	13.25	0.59	12.66
1962	11.70	4.34	16.04	1.74	NA	0.43	13.88	0.62	13.25
1963	12.61	4.37	16.97	1.84	NA	0.38	14.75	0.67	14.08
1964	13.11	4.43	17.54	1.65	NA	0.34	15.55	0.72	14.82
1965	13.52	4.44	17.96	1.60	NA	0.32	16.04	0.75	15.29
1966	13.89	5.14	19.03	1.45	NA	0.38	17.21	0.74	16.47
1967	15.35	4.91	20.25	1.59	NA	0.49	18.17	0.78	17.39
1968	16.54	4.79	21.33	1.49	NA	0.52	19.32	0.83	18.49
1969	17.49	5.19	22.68	1.46	NA	0.53	20.70	0.87	19.83
1970	18.59	5.19	23.79	1.38	NA	0.49	21.92	0.91	21.01
1971	18.93	5.16	24.09	1.31	NA	0.28	22.49	0.88	21.61
1972	19.04	4.97	24.02	1.24	NA	0.25	22.53	0.91	21.62
1973	19.37	4.70	24.07	1.17	NA	0.25	22.65	0.92	21.73
1974	18.67	4.18	22.85	1.08	NA	0.17	21.60	0.89	20.71
1975	17.38	3.72	21.10	0.86	NA	0.13	20.11	0.87	19.24
1976	17.19	3.75	20.94	0.86	NA	0.13	19.95	0.85	19.10
1977	17.42	3.68	21.10	0.93	NA	0.14	20.03	0.86	19.16
1978	17.39	3.91	21.31	1.18	NA	0.15	19.97	0.85	19.12
1979	18.03	3.85	21.88	1.25	NA	0.17	20.47	0.81	19.66
1980	17.57	4.30	21.87	1.37	0.20	0.13	20.18	0.78	19.40
1981	17.34	4.25	21.59	1.31	0.22	0.10	19.96	0.77	19.18
1982	15.81	4.46	20.27	1.39	0.21	0.09	18.58	0.76	17.82
1983	14.15	4.51	18.66	1.46	0.22	0.09	16.88	0.79	16.09
1984	15.51	4.75	20.27	1.63	0.22	0.11	18.30	0.84	17.47
1985	14.54	5.07	19.61	1.92	0.33	0.09	17.27	0.82	16.45
1986	14.15	4.98	19.13	1.84	0.34	0.10	16.86	0.80	16.06
1987	14.81	5.33	20.14	2.21	0.38	0.12	17.43	0.81	16.62
1988	15.47	5.53	21.00	2.48	0.46	0.14	17.92	0.82	17.10
1989	15.71	5.37	21.07	2.48	0.36	0.14	18.10	0.78	17.31
1990	16.05	5.47	21.52	2.49	0.29	0.15	18.59	0.78	17.81
1991	R16.02	R5.73	R21.75	2.77	0.28	0.17	R18.53	0.83	R17.70
1992	R16.16	R5.97	R22.13	R2.97	0.28	R0.17	R18.71	R0.87	R17.84
1993P	16.94	5.99	22.93	3.15	0.26	0.19	19.33	0.90	18.43

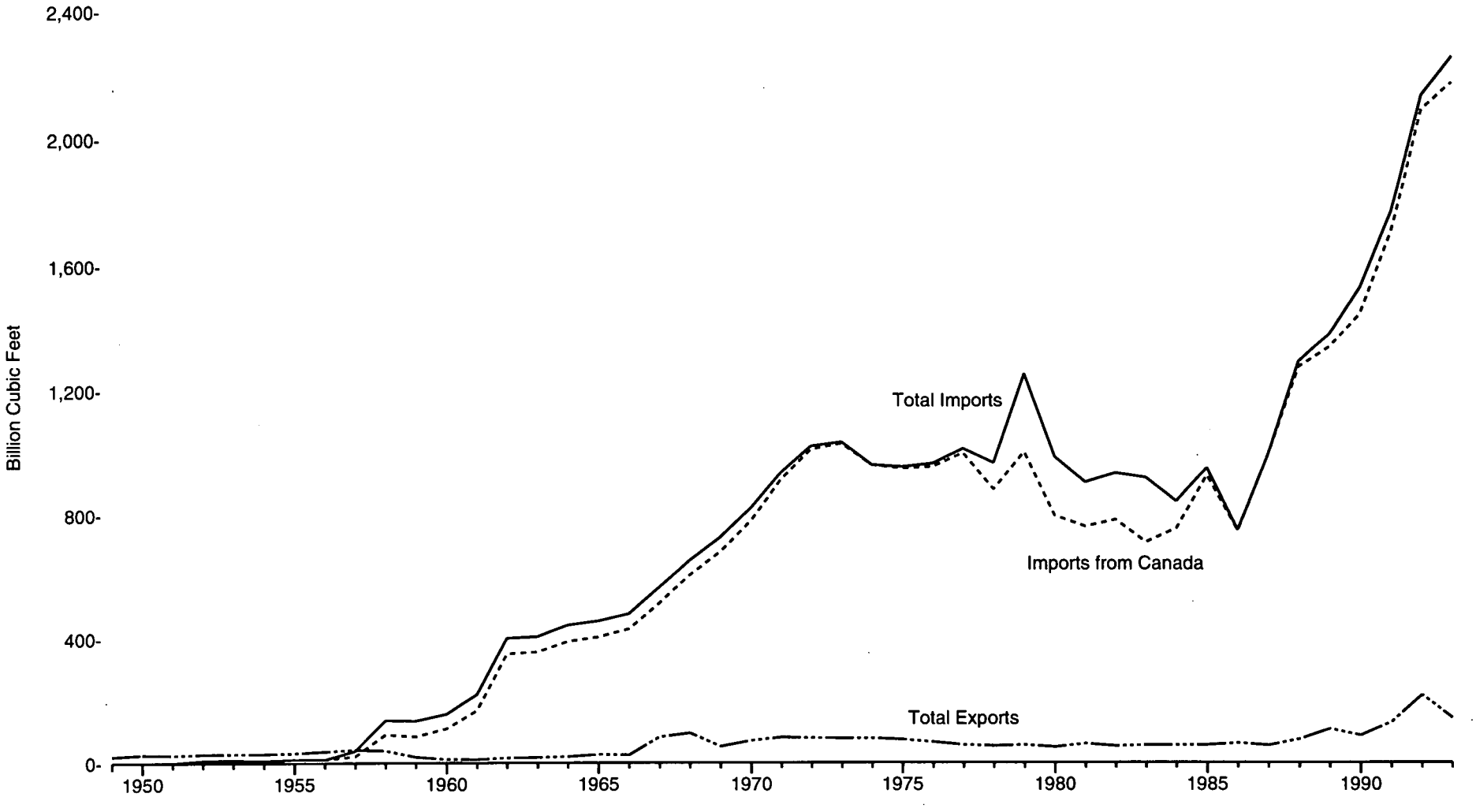
[1] Volume reduction resulting from the removal of natural gas plant liquids. Natural gas plant liquids are transferred to petroleum supply.

R=Revised data. P=Preliminary data. NA=Not available.

Notes: • Beginning with 1965 data, all volumes are shown on a pressure base of 14.73 p.s.i.a. at 60° F. For prior years, the pressure base is 14.65 p.s.i.a. at 60° F. • Totals may not equal sum of components due to independent rounding.

Sources: **From Gas Wells and From Oil Wells:** • 1949-1966—Bureau of Mines, *Minerals Yearbook*, "Natural Gas" chapter. • 1967-1992—Energy Information Administration (EIA), *Natural Gas Annual 1992, Volume 2* (November 1993), Table 5. • 1993—EIA, estimated data. **All Other Data:** • 1949-1987—EIA, *Natural Gas Annual 1992, Volume 2* (November 1993), Tables 1 and 5. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 1.

Figure 6.3 Natural Gas Imports and Exports, 1949-1993



Source: Table 6.3.

Table 6.3 Natural Gas Imports, Exports, and Net Imports, 1949-1993

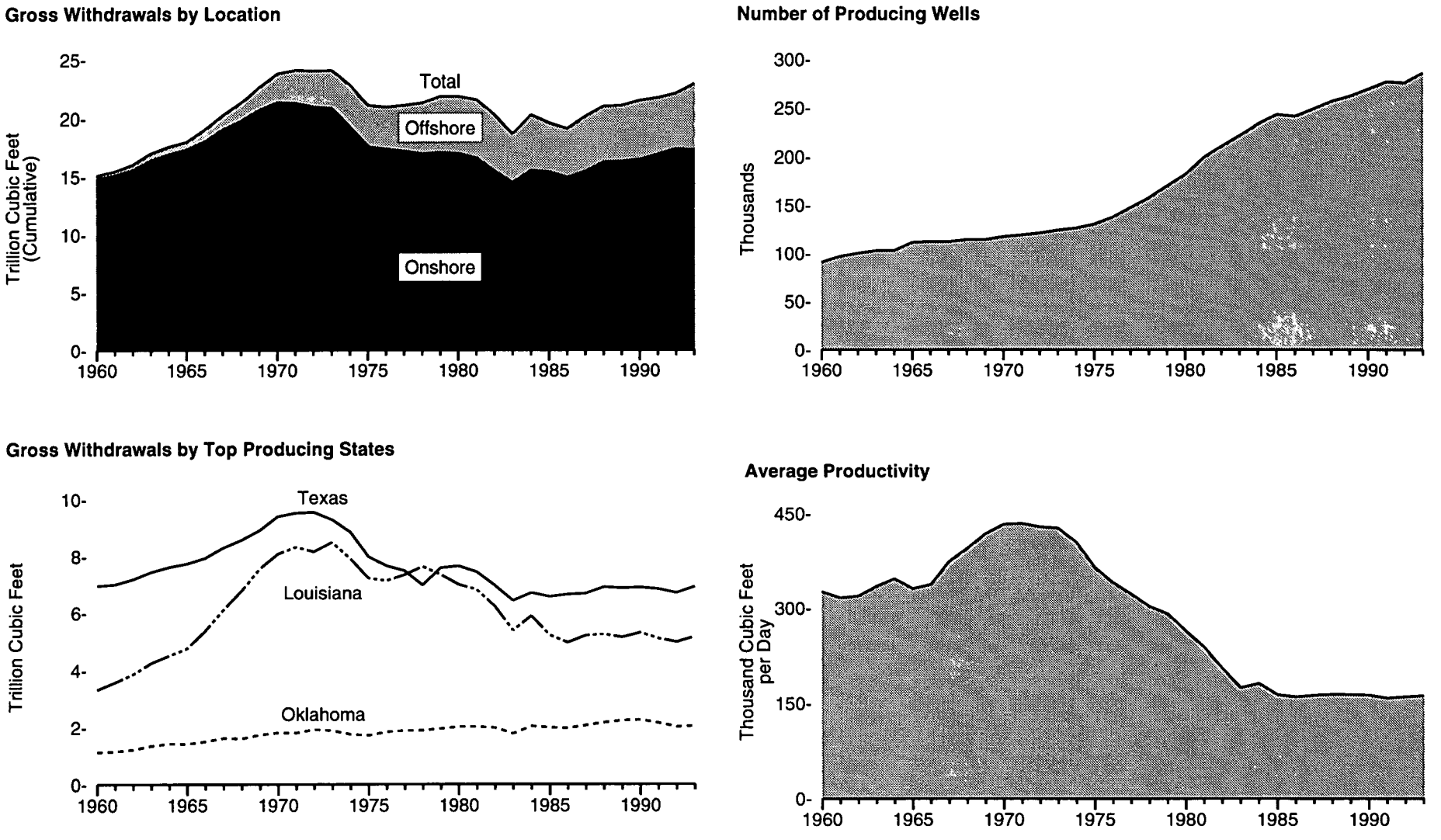
(Billion Cubic Feet, Except as Noted)

Year	Imports by Country of Origin					Exports by Country of Destination				Net Imports [1]	
	Canada	Mexico	Algeria [2]	Indonesia	Total	Canada	Mexico	Japan [2]	Total	Total	Percent of U.S. Consumption
1949	0	0	0	0	0	([3])	20	0	20	-20	([4])
1950	0	0	0	0	0	3	23	0	26	-26	([4])
1951	0	0	0	0	0	4	21	0	24	-24	([4])
1952	8	([3])	0	0	8	6	22	0	27	-20	([4])
1953	9	0	0	0	9	6	22	0	28	-19	([4])
1954	7	0	0	0	7	6	23	0	29	-22	([4])
1955	11	([3])	0	0	11	11	20	0	31	-20	([4])
1956	10	([3])	0	0	10	17	19	0	36	-26	([4])
1957	21	17	0	0	38	31	11	0	42	-4	([4])
1958	90	46	0	0	136	32	7	0	39	97	0.9
1959	83	51	0	0	134	12	7	0	18	116	1.0
1960	109	47	0	0	156	6	6	0	11	144	1.2
1961	167	52	0	0	219	6	5	0	11	208	1.7
1962	350	51	0	0	402	6	10	0	16	386	2.9
1963	356	50	0	0	406	7	10	0	17	389	2.8
1964	391	53	0	0	443	10	10	0	20	424	2.9
1965	405	52	0	0	456	18	8	0	26	430	2.8
1966	430	50	0	0	480	20	4	0	25	455	2.8
1967	513	51	0	0	564	70	11	0	82	483	2.8
1968	604	47	0	0	652	82	12	0	94	558	3.0
1969	680	47	0	0	727	35	13	3	51	676	3.4
1970	779	41	1	0	821	11	15	44	70	751	3.6
1971	912	21	1	0	935	14	16	50	80	854	3.9
1972	1,009	8	2	0	1,019	16	15	48	78	941	4.3
1973	1,028	2	3	0	1,033	15	14	48	77	956	4.3
1974	959	([3])	0	0	959	13	13	50	77	882	4.2
1975	948	0	5	0	953	10	9	53	73	880	4.5
1976	954	0	10	0	964	8	7	50	65	899	4.5
1977	997	2	11	0	1,011	([3])	4	52	56	955	4.9
1978	881	0	84	0	966	([3])	4	48	53	913	4.7
1979	1,001	0	253	0	1,253	([3])	4	51	56	1,198	5.9
1980	797	102	86	0	985	([3])	4	45	49	936	4.7
1981	762	105	37	0	904	([3])	3	56	59	845	4.4
1982	783	95	55	0	933	([3])	2	50	52	882	4.9
1983	712	75	131	0	918	([3])	2	53	55	864	5.1
1984	755	52	36	0	843	([3])	2	53	55	788	4.4
1985	926	0	24	0	950	([3])	2	53	55	894	5.2
1986	749	0	0	2	750	9	2	50	61	689	4.2
1987	993	0	0	0	993	3	2	49	54	939	5.5
1988	1,276	0	17	0	1,294	20	2	52	74	1,220	6.8
1989	1,339	0	42	0	1,382	38	17	51	107	1,275	6.8
1990	1,448	0	84	0	1,532	17	16	53	86	1,447	7.7
1991	1,710	0	64	0	1,773	15	60	54	129	1,644	8.6
1992	R2,094	0	R43	0	R2,138	R68	R96	R53	R216	R1,921	R9.8
1993P	2,179	1	82	0	2,261	50	37	56	142	2,119	10.5

[1] Net imports = imports minus exports.
[2] Imports from Algeria and exports to Japan are liquefied natural gas.
[3] Less than 0.5 billion cubic feet.
[4] Not meaningful because there were net exports during this year.
R=Revised data. P=Preliminary data.

Note: Totals may not equal sum of components due to independent rounding.
Sources: • 1949-1954—Energy Information Administration (EIA), Office of Oil and Gas, Reserves and Natural Gas Division, unpublished data. • 1955-1992—EIA, *Natural Gas Monthly* (March 1994), Tables 5, 6, and unpublished revisions. • 1993—EIA estimates.

Figure 6.4 Natural Gas Gross Withdrawals by State and Location and Gas Well Productivity, 1960-1993



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 6.4.

Table 6.4 Natural Gas Gross Withdrawals by State and Location and Gas Well Productivity, 1960-1993

(Trillion Cubic Feet, Except as Noted)

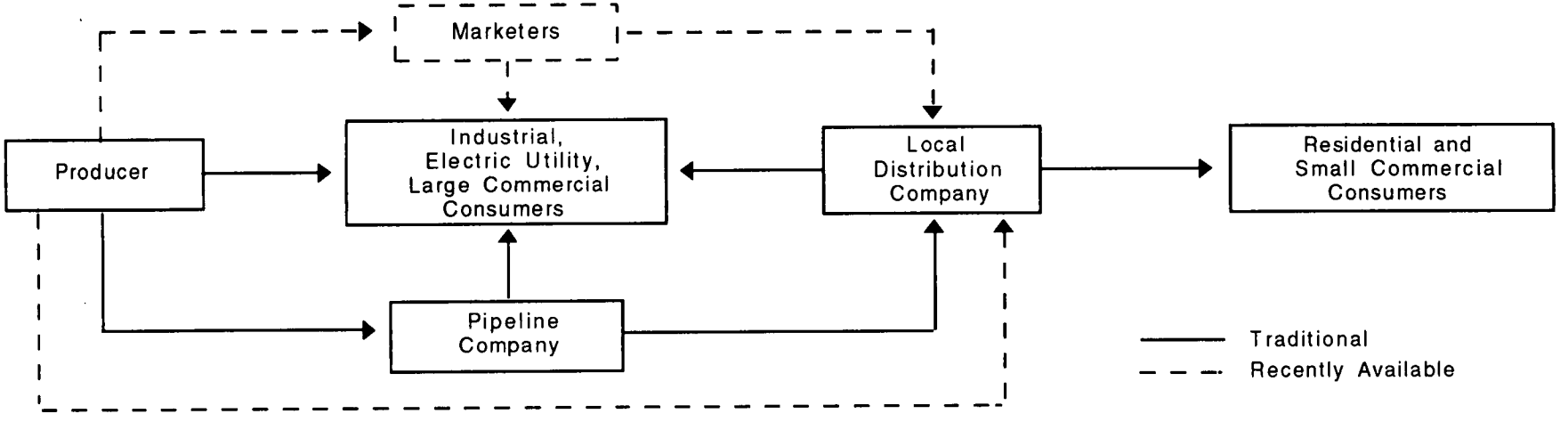
Year	State				Location		Gross Withdrawals from Oil and Gas Wells	Gas Well [1] Productivity		
	Texas	Louisiana	Oklahoma	Other	Onshore [2]	Offshore [3]		Gross Withdrawals from Gas Wells	Thousands of Producing Wells [4]	Average Productivity (thousand cubic feet per day)
1960	6.96	3.31	1.13	3.68	14.81	0.27	15.09	10.85	91	326.7
1961	7.02	3.57	1.16	3.71	15.14	0.32	15.46	11.20	97	316.8
1962	7.20	3.85	1.22	3.76	15.59	0.45	16.04	11.70	100	319.8
1963	7.45	4.25	1.35	3.92	16.41	0.56	16.97	12.61	103	335.4
1964	7.62	4.52	1.42	3.98	16.91	0.62	17.54	13.11	103	347.4
1965	7.74	4.76	1.41	4.04	17.32	0.65	17.96	13.52	112	331.8
1966	7.93	5.37	1.50	4.23	18.03	1.01	19.03	13.89	112	338.4
1967	8.29	6.09	1.62	4.25	19.06	1.19	20.25	15.35	112	374.3
1968	8.57	6.78	1.61	4.37	19.80	1.52	21.33	16.54	114	395.1
1969	8.91	7.56	1.74	4.46	20.72	1.95	22.68	17.49	114	418.6
1970	9.40	8.08	1.81	4.50	21.37	2.42	23.79	18.59	117	433.6
1971	9.52	8.32	1.81	4.44	21.31	2.78	24.09	18.93	119	434.8
1972	9.55	8.16	1.93	4.38	20.98	3.04	24.02	19.04	121	429.4
1973	9.29	8.49	1.89	4.40	20.86	3.21	24.07	19.37	124	427.4
1974	8.86	7.92	1.76	4.31	19.34	3.51	22.85	18.67	126	404.9
1975	7.99	7.24	1.72	4.15	17.55	3.55	21.10	17.38	130	365.3
1976	7.67	7.14	1.84	4.29	17.35	3.60	20.94	17.19	138	341.5
1977	7.50	7.35	1.89	4.36	17.16	3.93	21.10	17.42	148	323.1
1978	6.99	7.64	1.89	4.79	16.95	4.36	21.31	17.39	157	302.7
1979	7.59	7.36	1.96	4.97	17.06	4.82	21.88	18.03	170	290.8
1980	7.66	7.01	2.02	5.19	16.97	4.90	21.87	17.57	182	263.8
1981	7.45	6.83	2.02	5.29	16.60	4.99	21.59	17.34	199	238.9
1982	6.98	6.22	1.99	5.09	15.50	4.77	20.27	15.81	211	205.5
1983	6.43	5.38	1.78	5.07	14.48	4.18	18.66	14.15	222	174.7
1984	6.71	5.89	2.05	5.62	15.56	4.71	20.27	15.51	234	181.2
1985	6.58	5.22	1.99	5.82	15.42	4.19	19.61	14.54	243	163.6
1986	6.66	4.96	1.97	5.54	14.95	4.19	19.13	14.15	242	160.6
1987	6.69	5.20	2.07	6.17	15.47	4.67	20.14	14.81	249	162.8
1988	6.92	5.25	2.17	6.67	16.25	4.75	21.00	15.47	257	164.3
1989	6.88	5.14	2.24	6.81	16.30	4.77	21.07	15.71	262	164.0
1990	6.91	5.30	2.26	7.05	16.48	5.05	21.52	16.05	270	163.0
1991	R6.85	5.10	2.15	7.65	R16.90	4.85	R21.75	R16.02	277	R158.4
1992	R6.71	R4.98	R2.02	R8.43	R17.36	R4.77	R22.13	R16.16	R276	R160.5
1993P	6.93	5.16	2.05	8.79	17.26	5.67	22.93	16.94	286	162.2

[1] See Glossary.
[2] Includes State offshore gross withdrawals.
[3] Excludes State offshore gross withdrawals, includes Federal offshore (Outer Continental Shelf) gross withdrawals.
[4] As of December 31.
R=Revised data. P=Preliminary data.

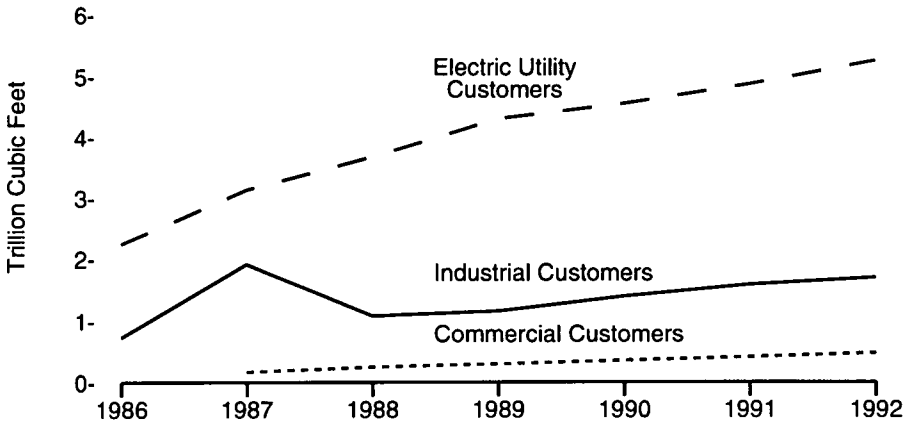
Sources: **Offshore** (Outer Continental Shelf): • 1960-1981—U.S. Geological Survey. • 1982-1985—The United States Minerals Management Service, *Mineral Revenues - The 1989 Report on Receipts from Federal and Indian Leases*, and predecessor annual reports. • 1986—Energy Information Administration (EIA), *Natural Gas Annual 1990, Volume 1* (December 1991), Table 4. • 1987—EIA, *Natural Gas Annual 1991* (October 1992), Table 4. • 1988-1992—EIA, *Natural Gas Annual 1992, Volume 1* (November 1993), Table 4. • 1993—The United States Minerals Management Service. **Gross Withdrawals:** • 1960-1966—Bureau of Mines, *Minerals Yearbook*, "Natural Gas" chapter. • 1967-1992—EIA, *Natural Gas Annual 1992, Volume 2* (November 1993), Table 5. • 1993—EIA, estimated data. **All Other Data:** • 1960-1966—Bureau of Mines, *Natural Gas Production and Consumption*. • 1967-1992—EIA, *Natural Gas Annual 1992, Volume 2* (November 1993), Tables 5 and 6. • 1993—EIA, *Natural Gas Monthly* (March 1994), Table 1, and Gulf Publishing Company, *World Oil*, February 1994.

Figure 6.5 Natural Gas Delivered for the Account of Others

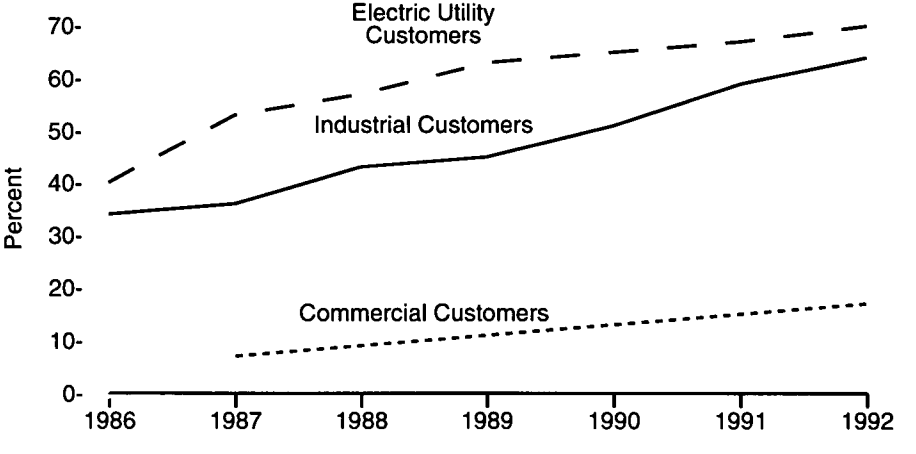
Transaction Paths for Natural Gas Purchases



Delivered for the Account of Others, 1986-1992



Share of Total Deliveries to Sector, 1986-1992



Source: Table 6.5.

Table 6.5 Natural Gas Delivered for the Account of Others, 1986-1992

Year	Commercial Customers			Industrial Customers			Electric Utilities [1]		
	Delivered for the Account of Others	Total Deliveries	Account of Others Share of Total	Delivered for the Account of Others	Total Deliveries	Account of Others Share of Total	Delivered for the Account of Others	Total Deliveries	Account of Others Share of Total [1]
	Billion Cubic Feet		Percent	Billion Cubic Feet		Percent	Billion Cubic Feet		Percent
1986	NA	2,318	NA	2,240	5,579	40	721	2,602	34
1987	167	2,430	7	3,129	5,953	53	914	2,844	36
1988	247	2,670	9	3,663	6,383	57	1,076	2,636	43
1989	296	2,718	11	4,298	6,816	63	1,152	2,787	45
1990	353	2,623	13	4,545	7,018	65	1,390	2,787	51
1991	R406	R2,729	15	4,864	7,231	67	1,580	2,789	59
1992	471	2,803	17	5,249	7,527	70	1,697	2,766	64

[1] For electric utilities, total deliveries data are from Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report"; deliveries for the account of others and their share of total deliveries are from EIA, Form EIA-176, "Annual Report of Natural and Supplemental Gas Supply and Disposition." Because of the different reporting universes for the two data collection forms, the account-of-others share of total deliveries for electric utilities cannot be derived from the data shown on this table.

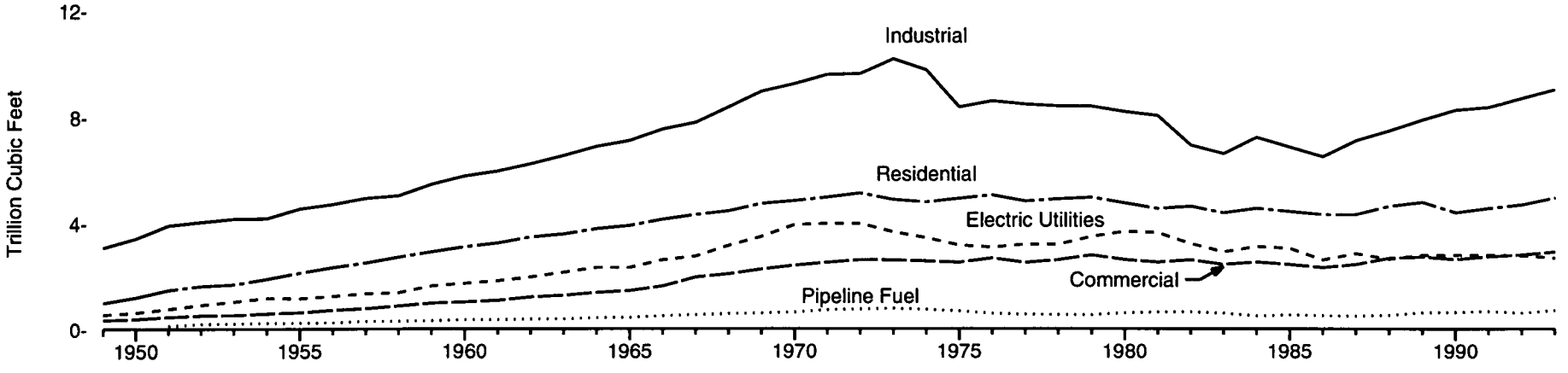
R=Revised data. NA=Not available.

Notes: • Percentages are based on data prior to rounding. • Deliveries for the account of others are deliveries to customers by transporters that do not own the natural gas but deliver it for others for a fee. Included are quantities covered by long-term contracts and quantities involved in short-term or spot market sales.

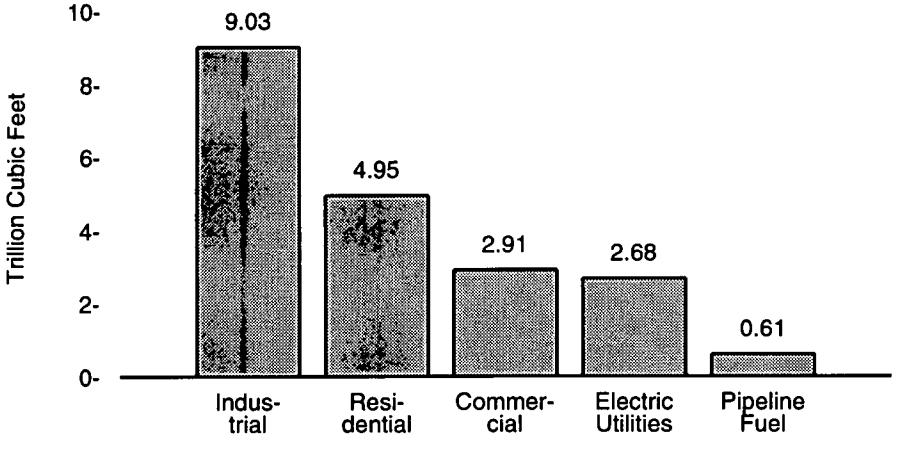
Sources: **Electric Utilities Total Deliveries:** EIA, Form EIA-759, "Monthly Power Plant Report." **Commercial Customers Total Deliveries:** • 1986—EIA, *Natural Gas Annual 1990, Volume 1* (December 1991), Tables 17-20. • 1987—EIA, *Natural Gas Annual 1991* (October 1992), Tables 17-20. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 3. **All Other Data:** • 1986—EIA, *Natural Gas Annual 1990, Volume 1* (December 1991), Tables 17-20. • 1987—EIA, *Natural Gas Annual 1991* (October 1992), Tables 17-20. • 1988 forward—EIA, *Natural Gas Annual 1992, Volume 1* (November 1993), Tables 17-20.

Figure 6.6 Natural Gas Consumption by Sector

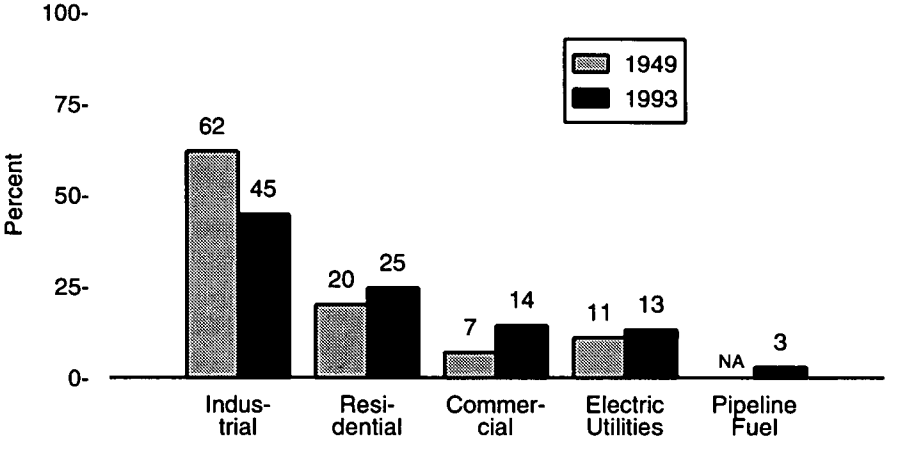
By Sector, 1949-1993



By Sector, 1993



Shares by Sector, 1949 and 1993



NA=Not available.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 6.6.

Table 6.6 Natural Gas Consumption by Sector, 1949-1993

(Trillion Cubic Feet)

Year	Residential	Commercial [1]	Industrial			Pipeline Fuel [2]	Electric Utilities	Total
			Lease and Plant Fuel	Other	Total Industrial			
1949	0.99	0.35	0.84	2.25	3.08	NA	0.55	4.97
1950	1.20	0.39	0.93	2.50	3.43	0.13	0.63	5.77
1951	1.47	0.46	1.15	2.77	3.91	0.19	0.76	6.81
1952	1.62	0.52	1.16	2.87	4.04	0.21	0.91	7.29
1953	1.69	0.53	1.13	3.03	4.16	0.23	1.03	7.64
1954	1.89	0.58	1.10	3.07	4.17	0.23	1.17	8.05
1955	2.12	0.63	1.13	3.41	4.54	0.25	1.15	8.69
1956	2.33	0.72	1.00	3.71	4.71	0.30	1.24	9.29
1957	2.50	0.78	1.05	3.89	4.93	0.30	1.34	9.85
1958	2.71	0.87	1.15	3.89	5.03	0.31	1.37	10.30
1959	2.91	0.98	1.24	4.22	5.46	0.35	1.63	11.32
1960	3.10	1.02	1.24	4.53	5.77	0.35	1.72	11.97
1961	3.25	1.08	1.29	4.67	5.96	0.38	1.83	12.49
1962	3.48	1.21	1.37	4.86	6.23	0.38	1.97	13.27
1963	3.59	1.27	1.41	5.13	6.55	0.42	2.14	13.97
1964	3.79	1.37	1.37	5.52	6.89	0.44	2.32	14.81
1965	3.90	1.44	1.16	5.96	7.11	0.50	2.32	15.28
1966	4.14	1.62	1.03	6.51	7.55	0.54	2.61	16.45
1967	4.31	1.96	1.14	6.65	7.79	0.58	2.75	17.39
1968	4.45	2.08	1.24	7.13	8.37	0.59	3.15	18.63
1969	4.73	2.25	1.35	7.61	8.96	0.63	3.49	20.06
1970	4.84	2.40	1.40	7.85	9.25	0.72	3.93	21.14
1971	4.97	2.51	1.41	8.18	9.59	0.74	3.98	21.79
1972	5.13	2.61	1.46	8.17	9.62	0.77	3.98	22.10
1973	4.88	2.60	1.50	8.69	10.18	0.73	3.66	22.05
1974	4.79	2.56	1.48	8.29	9.77	0.67	3.44	21.22
1975	4.92	2.51	1.40	6.97	8.36	0.58	3.16	19.54
1976	5.05	2.67	1.63	6.96	8.60	0.55	3.08	19.95
1977	4.82	2.50	1.66	6.82	8.47	0.53	3.19	19.52
1978	4.90	2.60	1.65	6.76	8.40	0.53	3.19	19.63
1979	4.97	2.79	1.50	6.90	8.40	0.60	3.49	20.24
1980	4.75	2.61	1.03	7.17	8.20	0.63	3.68	19.88
1981	4.55	2.52	0.93	7.13	8.06	0.64	3.64	19.40
1982	4.63	2.61	1.11	5.83	6.94	0.60	3.23	18.00
1983	4.38	2.43	0.98	5.64	6.62	0.49	2.91	16.83
1984	4.56	2.52	1.08	6.15	7.23	0.53	3.11	17.95
1985	4.43	2.43	0.97	5.90	6.87	0.50	3.04	17.28
1986	4.31	2.32	0.92	5.58	6.50	0.49	2.60	16.22
1987	4.31	2.43	1.15	5.95	7.10	0.52	2.84	17.21
1988	4.63	2.67	1.10	6.38	7.48	0.61	2.64	18.03
1989	4.78	2.72	1.07	6.82	7.89	0.63	2.79	18.80
1990	4.39	2.62	1.24	7.02	8.25	0.66	2.79	18.72
1991	4.56	2.73	R1.13	7.23	R8.36	0.60	2.79	R19.04
1992	R4.69	R2.80	R1.17	R7.53	R8.70	R0.59	2.77	R19.54
1993P	4.95	2.91	1.21	7.82	9.03	0.61	2.68	20.18

[1] Includes deliveries to municipalities and public authorities for institutional heating and other purposes. From 1990 forward, volumes include natural gas delivered for use as vehicle fuel.

[2] Natural gas consumed in the operation of pipelines, primarily in compressors.

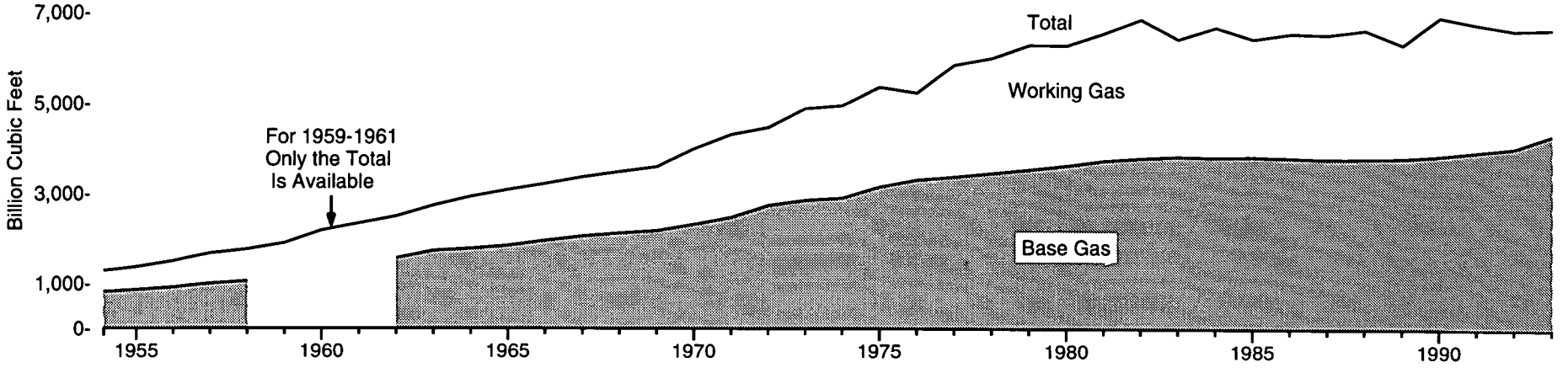
R=Revised data. P=Preliminary data. NA=Not available.

Notes: • For the definition of natural gas consumption, see Note 1 at end of section. • Beginning with 1965, all volumes are shown on a pressure base of 14.73 p.s.i.a. at 60° F. For prior years, the pressure base is 14.65 p.s.i.a. at 60° F. • Totals may not equal sum of components due to independent rounding.

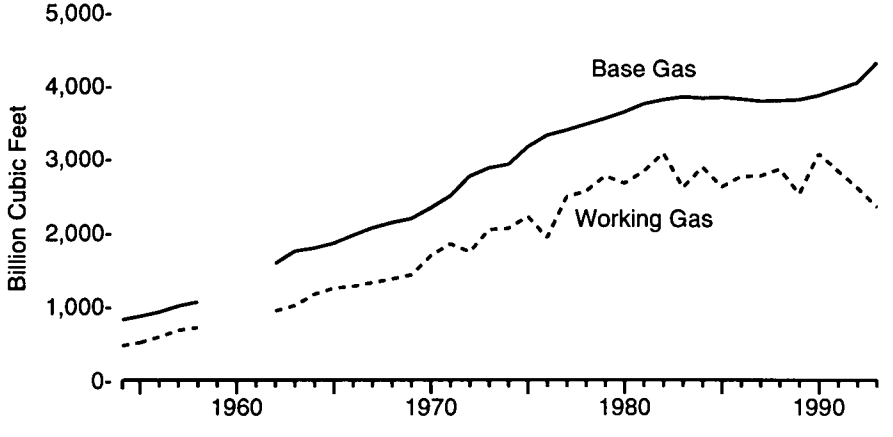
Sources: **Electric Utilities:** • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." 1982 forward—Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report." **All Other Data:** • 1949-1987—EIA, *Natural Gas Annual 1992, Volume 1* (November 1993), Table 97. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 3.

Figure 6.7 Natural Gas in Underground Storage, End of Year 1954-1993

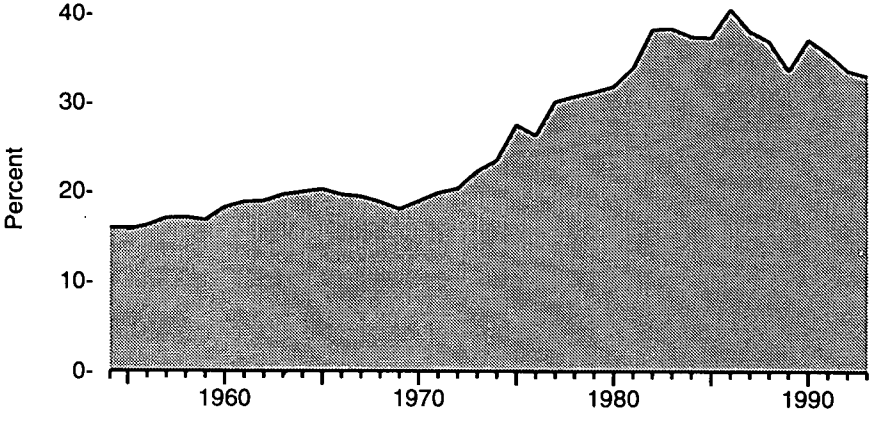
Total



Base Gas and Working Gas



End-of-Year Storage as a Share of Total Consumption



Note: Because vertical scales differ, graphs should not be compared.

Sources: Tables 6.6 and 6.7.

Table 6.7 Natural Gas in Underground Storage, End of Year 1954-1993

(Billion Cubic Feet)

Year	Base Gas [1]	Working Gas	Total [1]
1954	817	465	1,281
1955	863	505	1,368
1956	919	583	1,502
1957	1,001	673	1,674
1958	1,056	708	1,764
1959	NA	NA	1,901
1960	NA	NA	2,184
1961	NA	NA	2,344
1962	1,571	933	2,504
1963	1,738	1,007	2,745
1964	1,781	1,159	2,940
1965	1,848	1,242	3,090
1966	1,958	1,267	3,225
1967	2,058	1,318	3,376
1968	2,128	1,366	3,495
1969	2,181	1,421	3,602
1970	2,326	1,678	4,004
1971	2,485	1,840	4,325
1972	2,751	1,729	4,480
1973	2,864	2,034	4,898
1974	2,912	2,050	4,962
1975	3,162	2,212	5,374
1976	3,323	1,926	5,250
1977	3,391	2,475	5,866
1978	3,473	2,547	6,020
1979	3,553	2,753	6,306
1980	3,642	2,655	6,297
1981	3,752	2,817	6,569
1982	3,808	3,071	6,879
1983	3,847	2,595	6,442
1984	3,830	2,876	6,706
1985	3,842	2,607	6,448
1986	3,819	2,749	6,567
1987	3,792	2,756	6,548
1988	3,800	2,850	6,650
1989	3,812	2,513	6,325
1990	3,868	3,068	6,936
1991	3,954	2,824	6,778
1992	R4,044	R2,597	R6,641
1993	4,325	2,341	6,666

[1] Includes native gas.

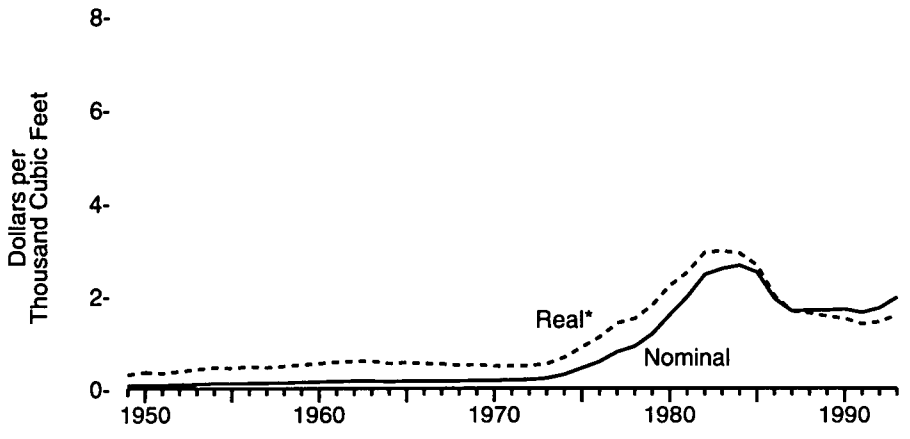
R=Revised data. NA=Not available.

Notes: • Beginning with 1965, all volumes are shown on a pressure base of 14.73 p.s.i.a. at 60 degrees F. For prior years, the pressure base is 14.65 p.s.i.a. at 60 degrees F. • Totals may not equal sum of components due to independent rounding.

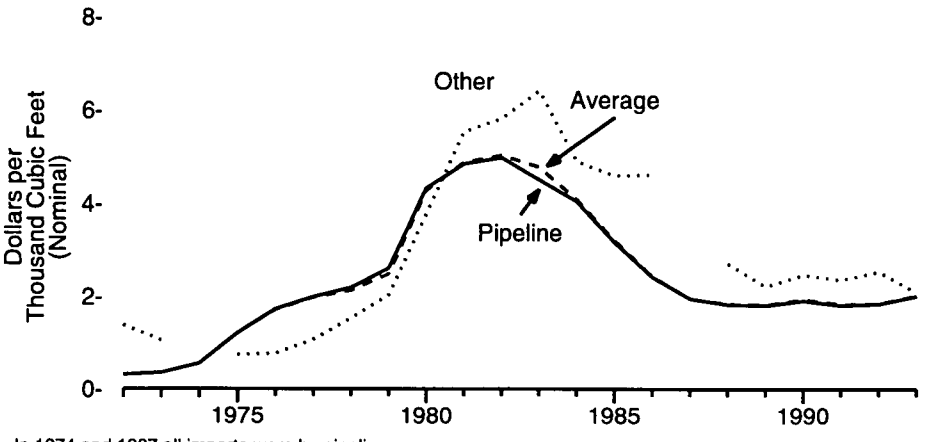
Sources: • 1954-1974—American Gas Association, *Gas Facts.* • 1975 and 1976—Federal Energy Administration, Form FEA-G318-M-O, and Federal Power Commission, Form FPC-8, "Underground Gas Storage Report." • 1977 and 1978—Energy Information Administration (EIA), and Federal Energy Administration, Form FEA-G318-M-O, and Federal Power Commission, Form FPC-8, "Underground Gas Storage Report." • 1979-1984—EIA, Form EIA-191 and Federal Energy Regulatory Commission, Form FERC-8, "Underground Gas Storage Report." • 1985—EIA, *Natural Gas Monthly* (March 1991), Table 17. • 1986—EIA, *Natural Gas Monthly* (March 1992), Table 17. • 1987—EIA, *Natural Gas Monthly* (March 1993), Table 13. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 13.

Figure 6.8 Natural Gas Wellhead and Import Prices

Wellhead, 1949-1993

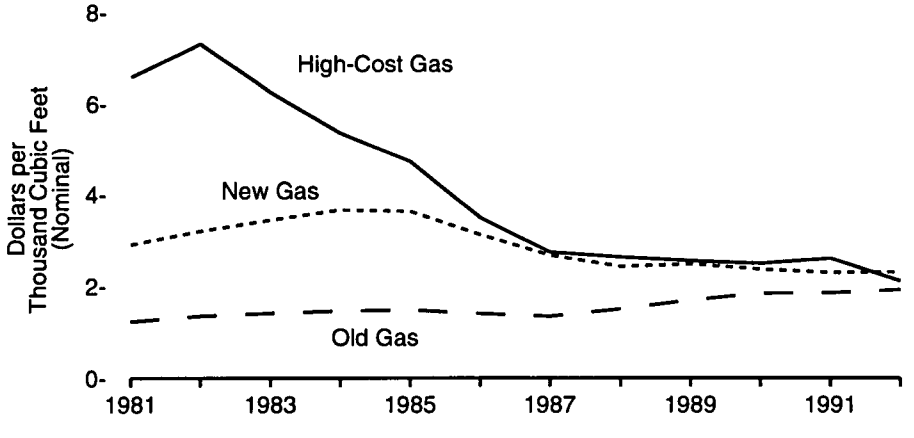


Imports, 1972-1993

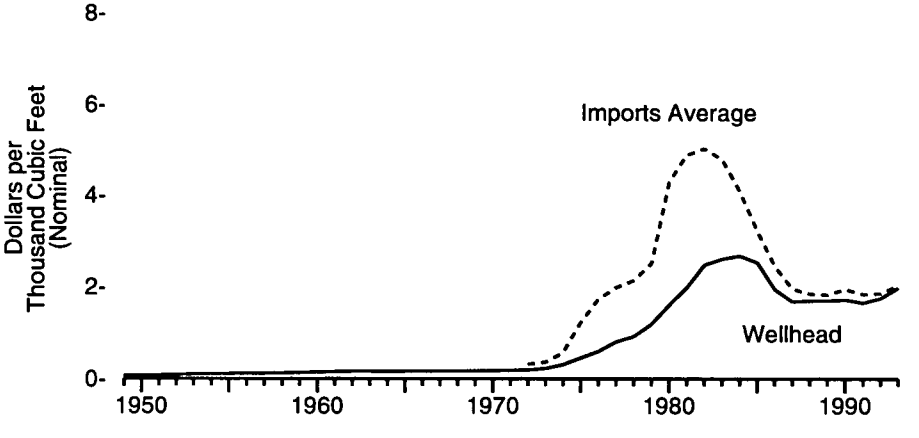


In 1974 and 1987 all imports were by pipeline.

Purchases by NGPA Categories, 1981-1992**



Domestic and Imported Average Prices, 1949-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

**NGPA=Natural Gas Policy Act.
Source: Table 6.8.

Table 6.8 Natural Gas Wellhead and Import Prices, 1949-1993

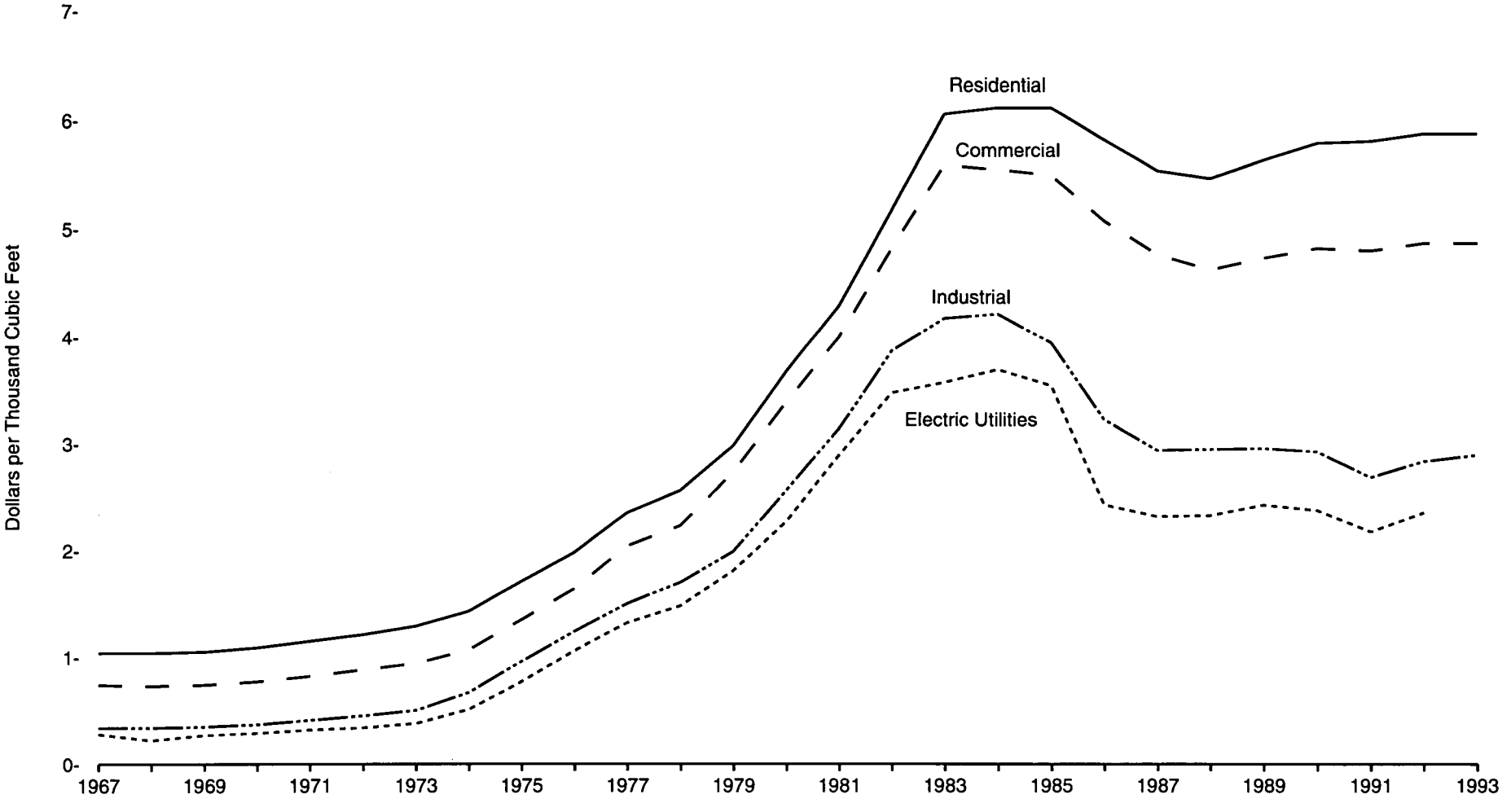
(Dollars per Thousand Cubic Feet)

Year	Wellhead [2]		Purchases by NGPA Categories [1]			Imports		
			Old Gas	New Gas	High-Cost Gas	Pipeline	Other [3]	Average
	Nominal	Real [4]	Nominal	Nominal	Nominal	Nominal	Nominal	Nominal
1949	0.06	0.30	—	—	—	NA	NA	NA
1950	0.07	0.35	—	—	—	NA	NA	NA
1951	0.07	0.33	—	—	—	NA	NA	NA
1952	0.08	0.37	—	—	—	NA	NA	NA
1953	0.09	0.41	—	—	—	NA	NA	NA
1954	0.10	0.45	—	—	—	NA	NA	NA
1955	0.10	0.44	—	—	—	NA	NA	NA
1956	0.11	0.47	—	—	—	NA	NA	NA
1957	0.11	0.45	—	—	—	NA	NA	NA
1958	0.12	0.48	—	—	—	NA	NA	NA
1959	0.13	0.51	—	—	—	NA	NA	NA
1960	0.14	0.54	—	—	—	NA	NA	NA
1961	0.15	0.57	—	—	—	NA	NA	NA
1962	0.16	0.59	—	—	—	NA	NA	NA
1963	0.16	0.59	—	—	—	NA	NA	NA
1964	0.15	0.54	—	—	—	NA	NA	NA
1965	0.16	0.56	—	—	—	NA	NA	NA
1966	0.16	0.54	—	—	—	NA	NA	NA
1967	0.16	0.53	—	—	—	NA	NA	NA
1968	0.16	0.50	—	—	—	NA	NA	NA
1969	0.17	0.51	—	—	—	NA	NA	NA
1970	0.17	0.48	—	—	—	NA	NA	NA
1971	0.18	0.49	—	—	—	NA	NA	NA
1972	0.19	0.49	—	—	—	0.31	1.38	0.31
1973	0.22	0.53	—	—	—	0.35	1.05	0.35
1974	0.30	0.67	—	—	—	0.55	([5])	0.55
1975	0.44	0.89	—	—	—	1.21	0.74	1.21
1976	0.58	1.11	—	—	—	1.73	0.77	1.72
1977	0.79	1.41	—	—	—	1.99	1.07	1.98
1978	0.91	1.51	—	—	—	2.19	1.53	2.13
1979	1.18	1.80	—	—	—	2.61	2.03	2.49
1980	1.59	2.22	—	—	—	4.33	3.77	4.28
1981	1.98	2.51	1.22	2.89	6.58	4.85	5.54	4.88
1982	2.46	2.94	1.34	3.19	7.31	4.98	5.82	5.03
1983	2.59	2.97	1.40	3.43	6.25	4.51	6.41	4.78
1984	2.66	2.92	1.45	3.65	5.35	4.04	4.90	4.08
1985	2.51	2.66	1.47	3.62	4.71	3.17	4.60	3.21
1986	1.94	2.00	1.39	3.11	3.48	2.42	4.62	2.43
1987	1.67	1.67	1.33	2.65	2.72	1.95	([5])	1.95
1988	1.69	1.63	1.49	2.41	2.61	1.83	2.71	1.84
1989	1.69	1.56	1.68	2.46	2.53	1.81	2.22	1.82
1990	1.71	1.51	1.83	2.35	2.47	1.91	2.47	1.94
1991	1.64	1.39	1.84	2.28	2.58	1.81	2.36	1.83
1992	[R]1.74	[R]1.44	1.91	2.29	2.10	[R]1.84	[R]2.54	[R]1.85
1993[E]	1.97	1.59	NA	NA	NA	2.01	2.09	2.02

[1] Projected natural gas wellhead purchase prices by major interstate pipeline companies by Natural Gas Policy Act of 1978 categories (see Note 2 at end of section).
[2] See Glossary for definition of Natural Gas Wellhead Price.
[3] Primarily liquefied natural gas from Algeria.
[4] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
[5] Not applicable. All imports were by pipeline.
R=Revised data. E=Estimate. NA=Not available. — = Not applicable.

Sources: **Wellhead:** • 1949-1987—Energy Information Administration (EIA), *Natural Gas Annual 1992, Volume 2* (November 1993), Table 1. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 4. **Old Gas, 1981-1986** and **New Gas, 1981:** EIA, *Natural Gas Monthly*, November 1987 (January 1988), Table 5. **New Gas, 1982-1986:** EIA, *Natural Gas Monthly*, January 1988 (March 1988), Table 5. **High-Cost Gas:** • 1981-1983—EIA, *Natural Gas Monthly*, December 1984 (February 1985), Table 22. • 1984-1986—EIA, *Natural Gas Monthly*, December 1987 (February 1988), Table 5. **Old Gas, New Gas,** and **High-Cost Gas:** • 1987-1992—EIA, *Natural Gas Monthly* (February 1993), Table 5. **Imports:** • 1972 and 1973—Federal Power Commission (FPC), *Pipeline Imports and Exports of Natural Gas - Imports and Exports of LNG.* • 1974-1976—FPC, *United States Imports and Exports of Natural Gas,* annual. • 1977-1992—EIA, *Natural Gas Monthly* (August 1993), Table FE7. • 1993—EIA estimates.

Figure 6.9 Natural Gas Prices by Sector, 1967-1993



Source: Table 6.9.

Table 6.9 Natural Gas Prices by Sector, 1967-1993

(Dollars per Thousand Cubic Feet)

Year	Residential	Commercial [1]	Industrial	Pipeline Fuel [2]	Electric Utilities
1967	1.04	0.74	0.34	0.20	0.28
1968	1.04	0.73	0.34	0.20	0.22
1969	1.05	0.74	0.35	0.21	0.27
1970	1.09	0.77	0.37	0.21	0.29
1971	1.15	0.82	0.41	0.22	0.32
1972	1.21	0.88	0.45	0.23	0.34
1973	1.29	0.94	0.50	0.25	0.38
1974	1.43	1.07	0.67	0.30	0.51
1975	1.71	1.35	0.96	0.40	0.77
1976	1.98	1.64	1.24	0.51	1.06
1977	2.35	2.04	1.50	0.77	1.32
1978	2.56	2.23	1.70	0.90	1.48
1979	2.98	2.73	1.99	1.32	1.81
1980	3.68	3.39	2.56	1.85	2.27
1981	4.29	4.00	3.14	2.39	2.89
1982	5.17	4.82	3.87	2.97	3.48
1983	6.06	5.59	4.18	3.15	3.58
1984	6.12	5.55	4.22	3.04	3.70
1985	6.12	5.50	3.95	2.92	3.55
1986	5.83	5.08	3.23	2.52	2.43
1987	5.54	4.77	2.94	2.17	2.32
1988	5.47	4.63	2.95	2.10	2.33
1989	5.64	4.74	2.96	2.01	2.43
1990	5.80	4.83	2.93	1.95	R2.38
1991	5.82	4.81	2.69	1.87	2.18
1992	R5.89	4.88	R2.84	R2.07	R2.36
1993P	5.89	4.88	2.90	NA	NA

[1] Includes deliveries to municipalities and public authorities for institutional heating and other purposes.

[2] Natural gas consumed in the operation of pipelines, primarily in compressors.

R=Revised data. P=Preliminary data. NA=Not available.

Notes: • Residential, commercial, and industrial price data represent prices of natural gas sold and delivered by local distribution companies to residential, commerical, and industrial consumers, respectively. The data do not reflect prices of natural gas transported for the account of others. • Dry natural gas, including supplemental gaseous fuels. • The average for each end-use sector is calculated by dividing the total value of the gas consumed by each sector by the total quantity consumed. See Note 1 at end of section.

Sources: • 1967-1987—Energy Information Administration (EIA), *Natural Gas Annual 1992, Volume 2* (November 1993), Table 4. • 1988 forward—EIA, *Natural Gas Monthly* (March 1994), Table 4.

Natural Gas Notes

1. Natural gas consumption statistics are compiled from surveys of natural gas production, transmission, and distribution companies and electric utility companies. Consumption by sector from these surveys is compiled on a national and individual State basis and then balanced with national and individual State supply data. Included in the data are the following: Commercial Sector–consumption by nonmanufacturing establishments, by municipalities for institutional heating and lighting, and those engaged in agriculture, forestry, and fishing; Electric Utility Sector–consumption by electric utilities for the generation of electric power; Industrial Sector–consumption by establishments engaged primarily in processing unfinished materials into another form of product (includes mining, petroleum refining, manufacturing, and natural gas industry use for lease and plant fuel); Residential Sector–consumption by private households for space heating, cooking, and other household uses; Transportation Sector–natural gas transmission (pipeline) fuel.

2. **Natural Gas Prices by Natural Gas Policy Act of 1978 (NGPA) Categories: Old Gas:** Includes natural gas dedicated to interstate commerce and natural gas purchased under existing interstate or rollover contracts (NGPA Sections 104, 105, and 106). **New Gas:** Includes new natural gas and certain natural gas produced from the Outer Continental Shelf, stripper well gas, and other new gas categories (NGPA Sections 102, 103, 108, and 109). **High-Cost Gas:** Includes natural gas from deep wells and low permeability (tight) reservoirs and unregulated gas (NGPA Section 107).

7. Coal

Changing Patterns of Coal Production

The 1993 strike by the United Mine Workers of America against member companies of the Bituminous Coal Operators' Association led to lower levels of coal production. In 1993, production of all types of coal totaled 947 million short tons, down from the 1992 level and from the 1990 record level of 1,029 million short tons (7.2).[1]

Of all coal production, bituminous and subbituminous coal accounted for by far the largest share (90 percent) in 1993 (7.2). Lignite and anthracite accounted for the remainder of coal produced. Despite its superior burning qualities, anthracite, mined in northeastern Pennsylvania, accounts for a diminishing share of total coal production. In 1949, anthracite accounted for 8.9 percent of the total; by 1993, its share had shrunk to 0.4 percent.

More coal is mined east of the Mississippi than in the West, but the West's share of total production increased almost every year after 1965 (7.2). That year, production of western coal was 27 million short tons, 5.2 percent of the total. By 1993, western production had increased by a factor of 15, to 420 million short tons (44 percent of the total). The growth in western coal was due in part to environmental concerns that led to increased demand for low-sulfur coal, which is concentrated in the West. In addition, surface mining, with its higher average productivity, is much more prevalent in the West.

Domestic Markets: Changes in Coal End Use

Electric utilities are the dominant consumers of coal (7.3). Their consumption grew from 84 million short tons, a 17-percent share, in 1949, to 814 million short tons, an 88-percent share, in 1993. In contrast, consumption by all other economic sectors in 1993 was lower than it had been in 1949. The most dramatic declines occurred in the transportation sector, where railroads switched to petroleum, and in the residential and commercial sector. In 1949, those two sectors accounted for 187 million short tons, 39 percent of total coal consumption. By 1993, their consumption totaled 6.7 million short tons, less than 1 percent of U.S. consumption.

Consumption by the industrial sector, including coke plants, trended downward after the mid-1960's. From 205 million short tons in 1966, industrial consumption fell to about 112 million short tons in 1986 and 1987. In 1988, growth in manufacturing activity was accompanied by a modest increase in industrial consumption, which rose to 118 million short tons. In 1989, industrial consumption fell to 117 million short tons, and, through 1992, slow growth in the economy restrained industrial demand for coal. In 1993, however, industrial consumption rose to 108 million short tons, up 1.2 percent from the 1992 level.

Foreign Markets

Since World War II, coal has been the United States' major energy export (1.4). Throughout most of the 1960's and 1970's, U.S. exports of

Coal Mining Productivity

The average productivity of all types of mines in the United States increased each year from 1949 to 1969, when it reached 2.4 short tons per miner hour (7.6). Productivity during the 1970's and early 1980's was lower, primarily due to the coal industry's compliance with the Federal Coal Mine Health and Safety Act of 1969, as well as to environmental and other factors.

The growing importance of surface coal mining, where productivity is generally higher than for underground mining, and the closing of nonproductive mines, led to increases in average productivity during the 1980's and 1990's. In 1992, average productivity in all mines (excluding anthracite) reached an all-time high of 4.4 short tons per miner hour. That year, productivity of underground mines (excluding anthracite) was 3.0 short tons per miner hour and productivity of surface mines (excluding anthracite) was 6.7 short tons per miner hour.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

coal increased, peaking at 113 million short tons in 1981 (7.4). Increased shipments to Canada, Japan, and European markets contributed to the growth.

The level of U.S. coal exports fluctuated throughout the 1980's, falling as low as 78 million short tons in 1983 but attaining 95 million short tons in 1988. That year, difficulties experienced by competing countries (particularly China, Australia, and Poland) allowed the United States to recapture some export markets, and thereafter coal exports rose each year through 1991, when coal exports totaled 109 million short tons. In 1992, coal exports fell to 103 million short tons. A large increase in exports to Canada was more than offset by lower levels of exports to Brazil and to European markets, particularly Italy. In 1993, the continuing weakness of the European economy and ongoing subsidies for domestic European coal caused exports to fall dramatically to 75 million short tons, the lowest level in 14 years.

Japan purchased the most U.S. coal (12 million short tons), followed by Canada (8.9 million short tons) and Italy (6.9 million short tons). Together, those three countries accounted for 37 percent of total coal exports in 1993.

Prices

In 1993, the average real price[2] of bituminous coal and lignite at the minemouth fell to $16.55 per short ton, down for the fifteenth year in a row (7.8). The 1993 price was less than half of the peak price of $39.09 per short ton recorded in 1975. Although the average real price of anthracite rose (for the first time in 11 years) to $30.43 per short ton, its 1993 price was also well below the 1975 peak of $65.57 per short ton. The decline in coal prices was the result of gains in productivity, the expanded use of longwall mining in underground mines, and the increased use of less-expensive western coal.

From 1961 on, electric utilities were the primary consumers of coal (7.3). Throughout the 1960's, the average real price of coal delivered to electric utilities declined. However, when prices of other fossil fuels rose rapidly after 1973, coal prices at electric utilities also increased, from $21.82 per short ton in 1973 to $34.43 per short ton the following year (7.8). (Despite that increase, coal remained the least expensive fossil fuel, on a Btu basis.) The price of coal at electric utilities gradually rose after 1974, peaking at $41.66 per short ton in 1982, and then declined each year through 1993, by which time the price had fallen to $23.06 per short ton.

[2]Real prices are expressed in 1987 dollars.

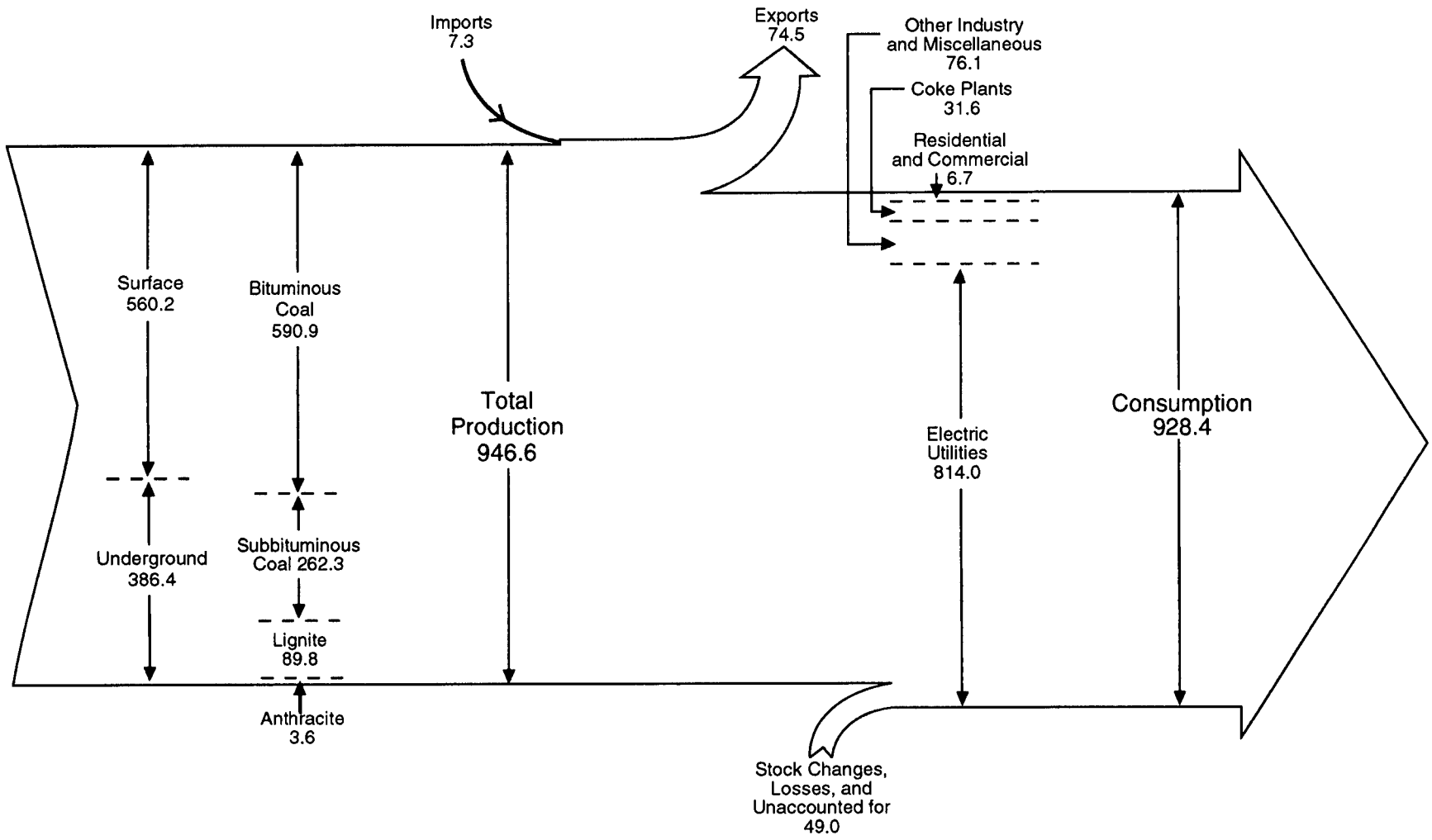
Stocks

Although there is little seasonal variation in demand, production of coal can vary considerably due to such factors as coal miners' strikes and bad weather. To compensate for possible supply interruptions, coal producers and distributors, as well as such major consumers as electric utilities and coke plants, generally maintain large stockpiles. For example, in 1980 coal stocks were built up to a year-end total of 228 million short tons (7.5) and then drawn down to augment supplies during the 1981 miners' strike. Despite stockpiling during the second half of 1981, after the strike had ended, year-end stocks totaled 209 million short tons, 19 million short tons below the level at the end of 1980.

Similarly, wildcat strikes in 1989 resulted in year-end stocks of 175 million short tons, the lowest level since 1978. In 1990, a major stock build-up by electric utilities brought year-end stocks to 202 million short tons. In 1991, year-end coal stocks declined slightly, to 201 million short tons. In 1992, year-end coal stocks declined again, to 198 million short tons, despite upcoming contract negotiations between the United Mine Workers of America (UMWA) and the Bituminous Coal Operators' Association. In 1993, the UMWA strike led to lower levels of coal production, as noted earlier, and stocks were drawn down to compensate. At year end, coal stocks totaled 147 million short tons.

In 1993, electric utilities held more than three-fourths of the coal, and coal producers and distributors held most of the remainder. Stocks at coke plants and other industrial sites were relatively small.

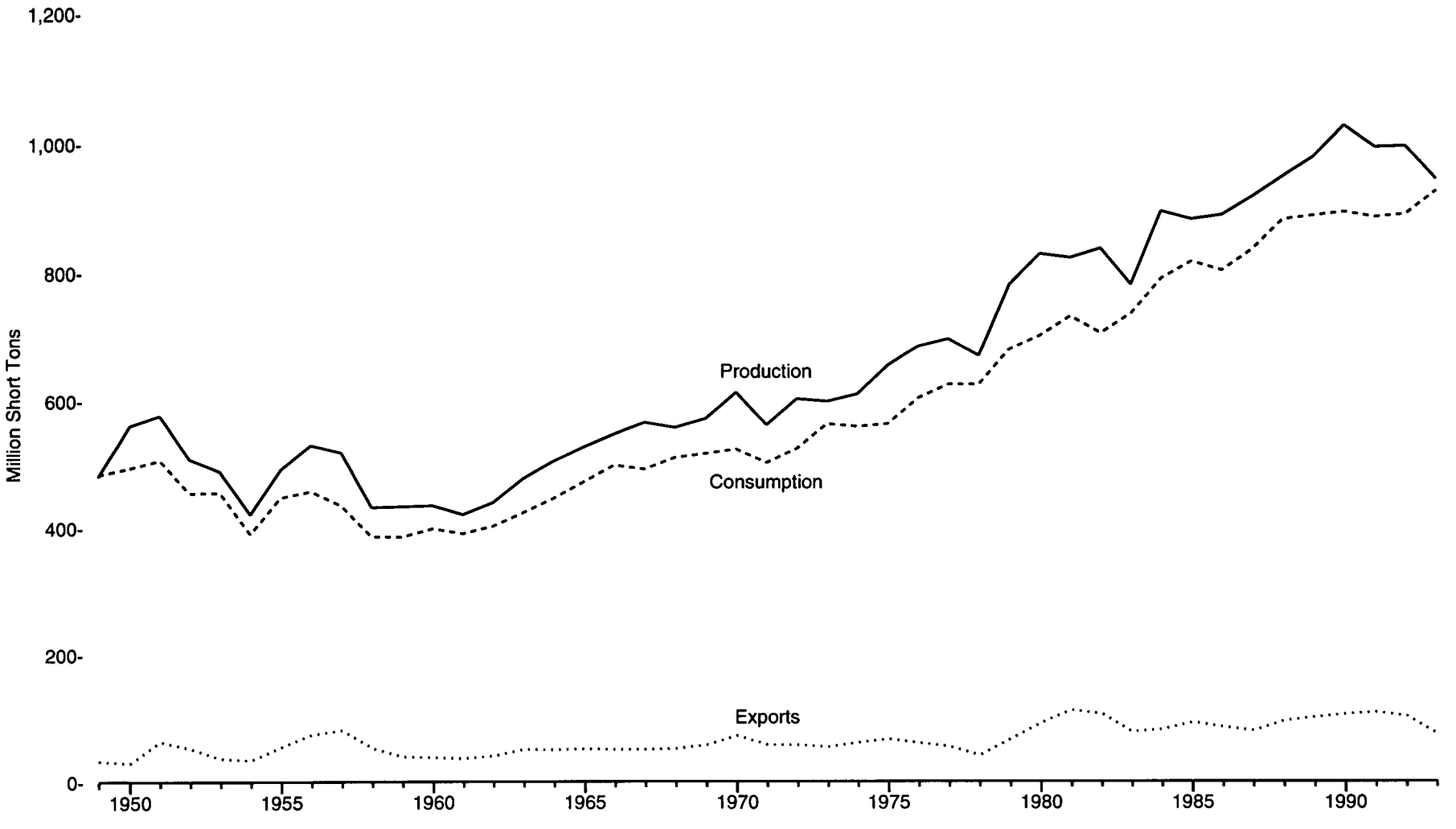
Diagram 4. Coal Flow, 1993
(Million Short Tons)



Notes: • Data are preliminary. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 7.1, 7.2, and 7.3.

Figure 7.1 Coal Overview, 1949-1993



Source: Table 7.1.

Table 7.1 Coal Overview, 1949-1993

(Million Short Tons)

Year	Production	Imports	Exports	Stock Changes, Losses, and Unaccounted for [1]	Consumption
1949	480.6	0.3	32.8	35.1	483.2
1950	560.4	0.4	29.4	-37.3	494.1
1951	576.3	0.3	62.7	-8.1	505.9
1952	507.4	0.3	52.2	-1.4	454.1
1953	488.2	0.3	36.5	2.8	454.8
1954	420.8	0.2	33.9	2.8	389.9
1955	490.8	0.3	54.4	10.3	447.0
1956	529.8	0.4	73.8	0.5	456.9
1957	518.0	0.4	80.8	-3.2	434.5
1958	431.6	0.3	52.6	6.4	385.7
1959	432.7	0.4	39.0	-9.0	385.1
1960	434.3	0.3	38.0	1.5	398.1
1961	420.4	0.2	36.4	6.2	390.4
1962	439.0	0.2	40.2	3.2	402.3
1963	477.2	0.3	50.4	-3.6	423.5
1964	504.2	0.3	49.5	-9.3	445.7
1965	527.0	0.2	51.0	-4.1	472.0
1966	546.8	0.2	50.1	0.8	497.7
1967	564.9	0.2	50.1	-23.6	491.4
1968	556.7	0.2	51.2	4.1	509.8
1969	571.0	0.1	56.9	2.2	516.4
1970	612.7	([2])	71.7	-17.7	523.2
1971	560.9	0.1	57.3	-2.2	501.6
1972	602.5	([2])	56.7	-21.5	524.3
1973	598.6	0.1	53.6	17.5	562.6
1974	610.0	2.1	60.7	7.0	558.4
1975	654.6	0.9	66.3	-26.6	562.6
1976	684.9	1.2	60.0	-22.3	603.8
1977	697.2	1.6	54.3	-19.2	625.3
1978	670.2	3.0	40.7	-7.2	625.2
1979	781.1	2.1	66.0	-36.6	680.5
1980	829.7	1.2	91.7	-36.4	702.7
1981	823.8	1.0	112.5	R20.3	732.6
1982	838.1	0.7	106.3	-25.7	706.9
1983	782.1	1.3	77.8	31.1	736.7
1984	895.9	1.3	81.5	-24.4	791.3
1985	883.6	2.0	92.7	25.1	818.0
1986	890.3	2.2	85.5	-2.8	804.2
1987	918.8	1.7	79.6	-4.0	836.9
1988	950.3	2.1	95.0	26.3	883.6
1989	980.7	2.9	100.8	6.9	889.7
1990	1,029.1	2.7	105.8	-30.5	895.5
1991	996.0	3.4	109.0	-2.8	887.6
1992	R997.5	3.8	102.5	R-6.4	R892.4
1993	946.6	7.3	74.5	E49.0	E928.4

[1] Includes changes in stocks at electric utilities, coke plants, other industries, retail dealers, and producers/distributors and the balancing item of losses and unaccounted for.

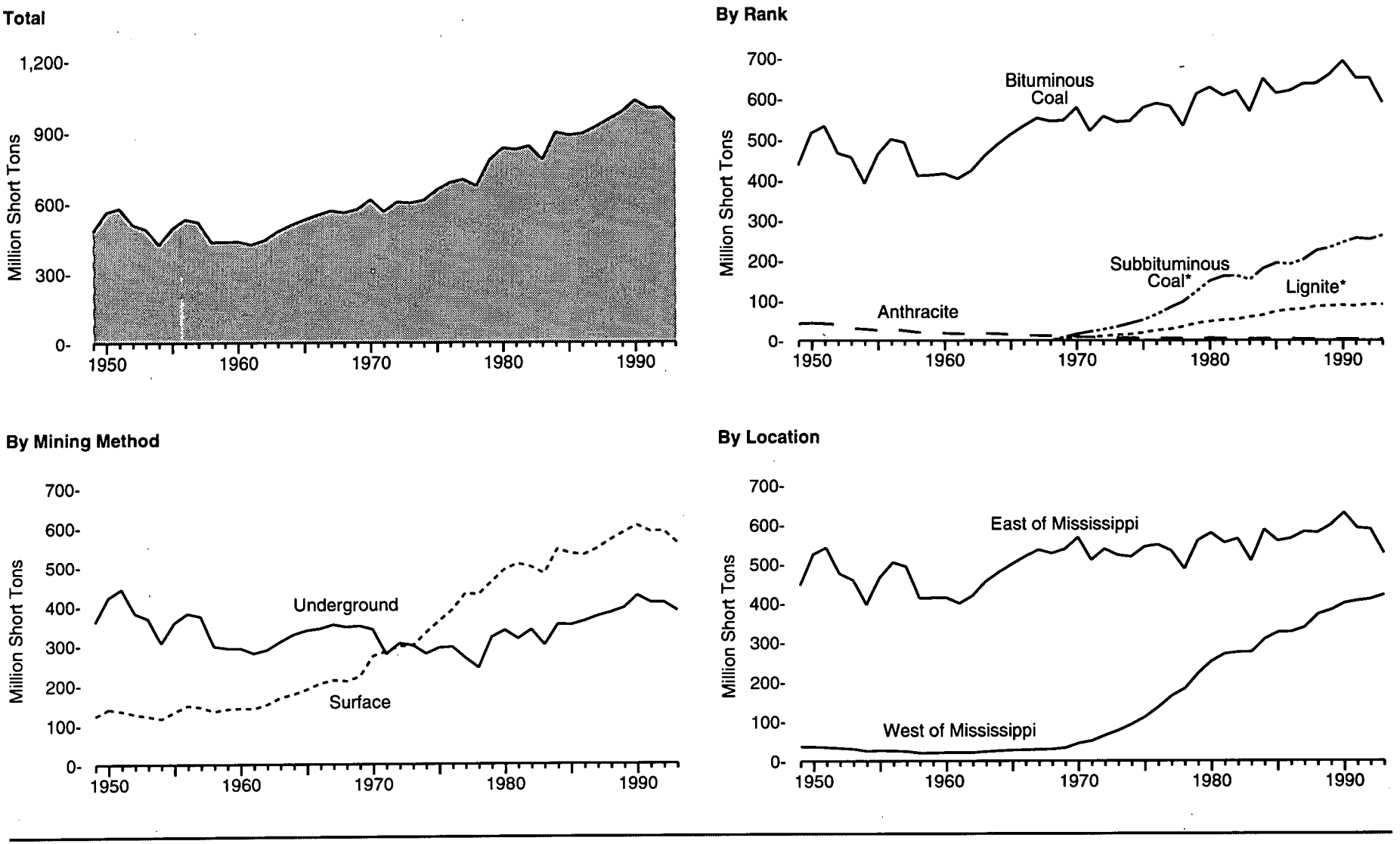
[2] Less than 0.05 million short tons.

R=Revised data. E=Estimate.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. • 1977 and 1978—EIA, Energy Data Reports, *Bituminous Coal and Lignite Production and Mine Operations-1977; 1978* and *Coal-Pennsylvania Anthracite 1977; 1978*. • 1979 and 1980—EIA, Energy Data Report, *Weekly Coal Report*. • 1981-1992—EIA, *Weekly Coal Production, Coal Production* (annual), and *Quarterly Coal Report October-December 1993* (May 1994), Table 1. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 6.1.

Figure 7.2 Coal Production, 1949-1993



*Included with bituminous coal prior to 1969.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 7.2.

Table 7.2 Coal Production, 1949-1993

(Million Short Tons)

Year	Rank				Mining Method		Location		Total
	Bituminous Coal	Subbituminous Coal	Lignite	Anthracite	Underground	Surface	West of the Mississippi	East of the Mississippi	
1949	437.9	([1])	([1])	42.7	358.9	121.7	36.4	444.2	480.6
1950	516.3	([1])	([1])	44.1	421.0	139.4	36.0	524.4	560.4
1951	533.7	([1])	([1])	42.7	442.2	134.2	34.6	541.7	576.3
1952	466.8	([1])	([1])	40.6	381.2	126.3	32.7	474.8	507.4
1953	457.3	([1])	([1])	30.9	367.4	120.8	30.6	457.7	488.2
1954	391.7	([1])	([1])	29.1	306.0	114.8	25.4	395.4	420.8
1955	464.6	([1])	([1])	26.2	358.0	132.9	26.6	464.2	490.8
1956	500.9	([1])	([1])	28.9	380.8	148.9	25.8	504.0	529.8
1957	492.7	([1])	([1])	25.3	373.6	144.5	24.7	493.4	518.0
1958	410.4	([1])	([1])	21.2	297.6	134.0	20.3	411.3	431.6
1959	412.0	([1])	([1])	20.6	292.8	139.8	20.3	412.4	432.7
1960	415.5	([1])	([1])	18.8	292.6	141.7	21.3	413.0	434.3
1961	403.0	([1])	([1])	17.4	279.6	140.9	21.8	398.6	420.4
1962	422.1	([1])	([1])	16.9	287.9	151.1	21.4	417.6	439.0
1963	458.9	([1])	([1])	18.3	309.0	168.2	23.7	453.5	477.2
1964	487.0	([1])	([1])	17.2	327.7	176.5	25.7	478.5	504.2
1965	512.1	([1])	([1])	14.9	338.0	189.0	27.4	499.5	527.0
1966	533.9	([1])	([1])	12.9	342.6	204.2	28.0	518.8	546.8
1967	552.6	([1])	([1])	12.3	352.4	212.5	28.9	536.0	564.9
1968	545.2	([1])	([1])	11.5	346.6	210.1	29.7	527.0	556.7
1969	547.2	8.3	5.0	10.5	349.2	221.7	33.3	537.7	571.0
1970	578.5	16.4	8.0	9.7	340.5	272.1	44.9	567.8	612.7
1971	521.3	22.2	8.7	8.7	277.2	283.7	51.0	509.9	560.9
1972	556.8	27.5	11.0	7.1	305.0	297.4	64.3	538.2	602.5
1973	543.5	33.9	14.3	6.8	300.1	298.5	76.4	522.1	598.6
1974	545.7	42.2	15.5	6.6	278.0	332.1	91.9	518.1	610.0
1975	577.5	51.1	19.8	6.2	293.5	361.2	110.9	543.7	654.6
1976	588.4	64.8	25.5	6.2	295.5	389.4	136.1	548.8	684.9
1977	581.0	82.1	28.2	5.9	266.6	430.6	163.9	533.3	697.2
1978	534.0	96.8	34.4	5.0	242.8	427.4	183.0	487.2	670.2
1979	612.3	121.5	42.5	4.8	320.9	460.2	221.4	559.7	781.1
1980	628.8	147.7	47.2	6.1	337.5	492.2	251.0	578.7	829.7
1981	608.0	159.7	50.7	5.4	316.5	507.3	269.9	553.9	823.8
1982	620.2	160.9	52.4	4.6	339.2	499.0	273.9	564.3	838.1
1983	568.6	151.0	58.3	4.1	300.4	481.7	274.7	507.4	782.1
1984	649.5	179.2	63.1	4.2	352.1	543.9	308.3	587.6	895.9
1985	613.9	192.7	72.4	4.7	350.8	532.8	324.9	558.7	883.6
1986	620.1	189.6	76.4	4.3	360.4	529.9	325.9	564.4	890.3
1987	636.6	200.2	78.4	3.6	372.9	545.9	336.8	581.9	918.8
1988	638.1	223.5	85.1	3.6	382.2	568.1	370.7	579.6	950.3
1989	659.8	231.2	86.4	3.3	393.8	586.9	381.7	599.0	980.7
1990	693.2	244.3	88.1	3.5	424.5	604.5	398.9	630.2	1,029.1
1991	650.7	255.3	86.5	3.4	407.2	588.8	404.7	591.3	996.0
1992	R651.9	R252.1	R90.1	R3.5	R407.2	R590.3	R409.0	R588.6	R997.5
1993E	590.9	262.3	89.8	3.6	386.4	560.2	419.7	526.9	946.6

[1] Included in bituminous coal.

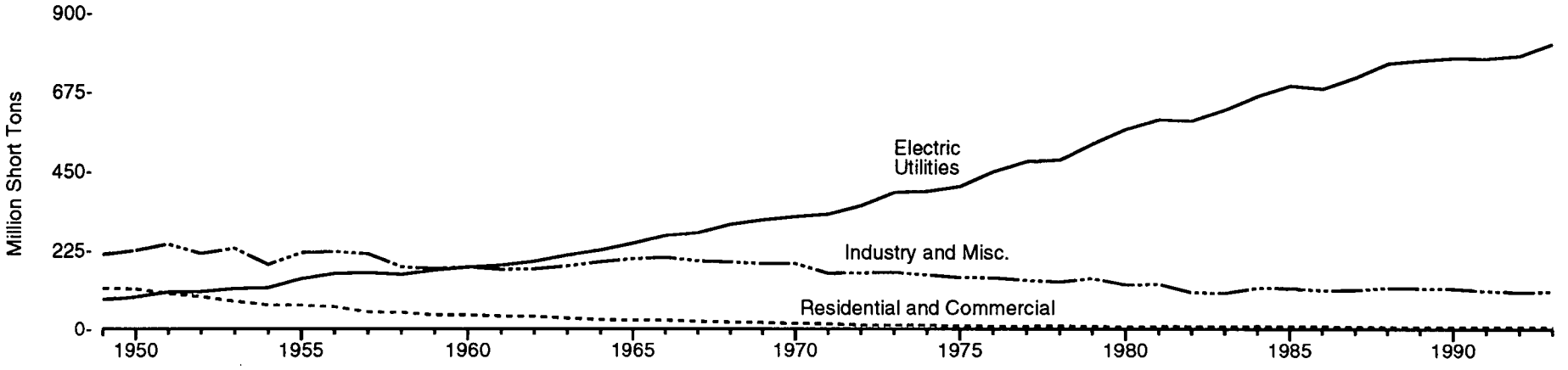
R=Revised data. E=Estimate.

Note: Totals may not equal sum of components due to independent rounding.

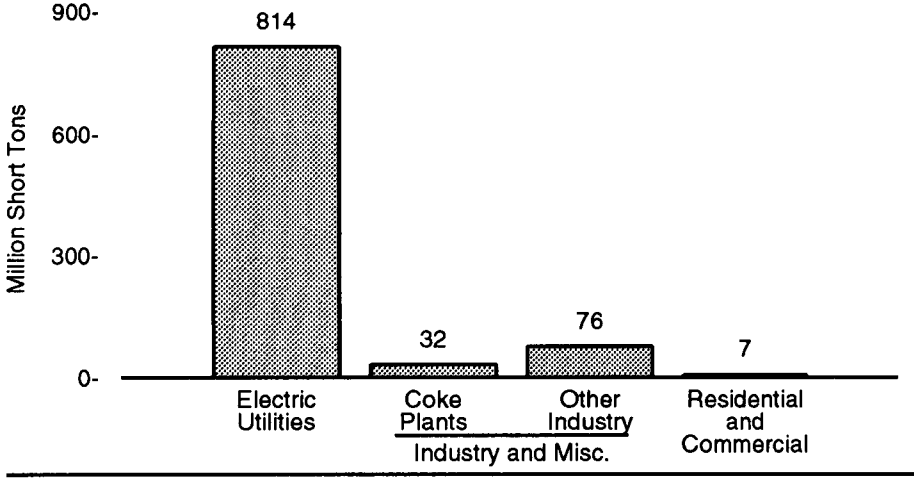
Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. • 1977 and 1978—EIA, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; 1978, Coal-Pennsylvania Anthracite 1977; 1978*, and *Coal Production* (annual). • 1979 and 1980—EIA, Energy Data Report, *Weekly Coal Report* and *Coal Production* (annual). • 1981 forward—EIA, *Weekly Coal Production* and *Coal Production* (annual), except for 1992 data by rank and mining method, which are EIA estimates.

Figure 7.3 Coal Consumption by Sector

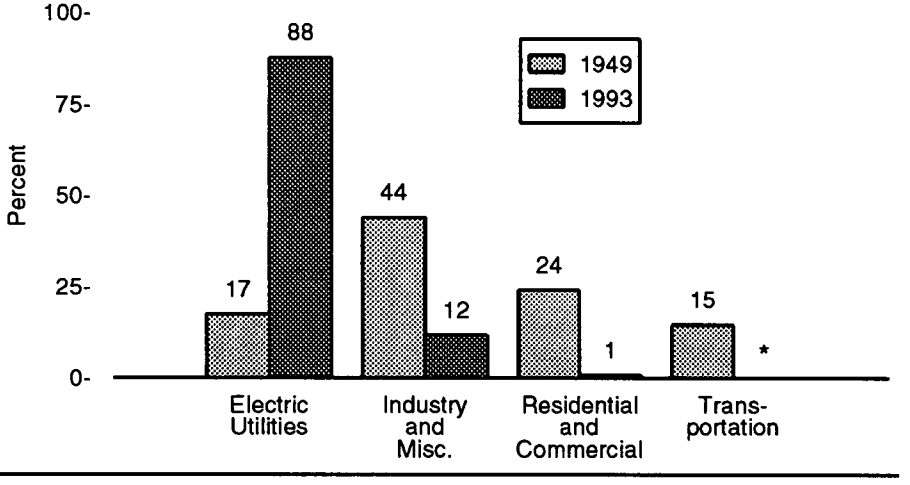
By Sector, 1949-1993



By Sector, 1993



Shares by Sector, 1949 and 1993



*Small amounts of coal for transportation use are included in Industry and Miscellaneous.

Source: Table 7.3.

Table 7.3 Coal Consumption by Sector, 1949-1993

(Million Short Tons)

Year	Residential and Commercial	Industry and Miscellaneous			Transportation	Electric Utilities	Total
		Coke Plants	Other Industry and Miscellaneous	Total			
1949	116.5	91.4	121.2	212.6	70.2	84.0	483.2
1950	114.6	104.0	120.6	224.6	63.0	91.9	494.1
1951	101.5	113.7	128.7	242.4	56.2	105.8	505.9
1952	92.3	97.8	117.1	214.9	39.8	107.1	454.1
1953	79.2	113.1	117.0	230.1	29.6	115.9	454.8
1954	69.1	85.6	98.2	183.9	18.6	118.4	389.9
1955	68.4	107.7	110.1	217.8	17.0	143.8	447.0
1956	64.2	106.3	114.3	220.6	13.8	158.3	456.9
1957	49.0	108.4	106.5	214.9	9.8	160.8	434.5
1958	47.9	76.8	100.5	177.4	4.7	155.7	385.7
1959	40.8	79.6	92.7	172.3	3.6	168.4	385.1
1960	40.9	81.4	96.0	177.4	3.0	176.7	398.1
1961	37.3	74.2	95.9	170.1	0.8	182.2	390.4
1962	36.5	74.7	97.1	171.7	0.7	193.3	402.3
1963	31.5	78.1	101.9	180.0	0.7	211.3	423.5
1964	27.2	89.2	103.1	192.4	0.7	225.4	445.7
1965	25.7	95.3	105.6	200.8	0.7	244.8	472.0
1966	25.6	96.4	108.7	205.1	0.6	266.5	497.7
1967	22.1	92.8	101.8	194.6	0.5	274.2	491.4
1968	20.0	91.3	100.4	191.6	0.4	297.8	509.8
1969	18.9	93.4	93.1	186.6	0.3	310.6	516.4
1970	16.1	96.5	90.2	186.6	0.3	320.2	523.2
1971	15.2	83.2	75.6	158.9	0.2	327.3	501.6
1972	11.7	87.7	72.9	160.6	0.2	351.8	524.3
1973	11.1	94.1	68.0	162.1	0.1	389.2	562.6
1974	11.4	90.2	64.9	155.1	0.1	391.8	558.4
1975	9.4	83.6	63.6	147.2	(1)	406.0	562.6
1976	8.9	84.7	61.8	146.5	(1)	448.4	603.8
1977	9.0	77.7	61.5	139.2	(1)	477.1	625.3
1978	9.5	71.4	63.1	134.5	(2)	481.2	625.2
1979	8.4	77.4	67.7	145.1	(2)	527.1	680.5
1980	6.5	66.7	60.3	127.0	(2)	569.3	702.7
1981	7.4	61.0	67.4	128.4	(2)	596.8	732.6
1982	8.2	40.9	64.1	105.0	(2)	593.7	706.9
1983	8.4	37.0	66.0	103.0	(2)	625.2	736.7
1984	9.1	44.0	73.7	117.8	(2)	664.4	791.3
1985	7.8	41.1	75.4	116.4	(2)	693.8	818.0
1986	7.7	35.9	75.6	111.5	(2)	685.1	804.2
1987	6.9	37.0	75.2	112.1	(2)	717.9	836.9
1988	7.1	41.9	76.3	118.1	(2)	758.4	883.6
1989	6.2	40.5	76.1	116.6	(2)	766.9	889.7
1990	6.7	38.9	76.3	115.2	(2)	773.5	895.5
1991	6.1	33.9	75.4	109.3	(2)	772.3	887.6
1992	R6.2	R32.4	R74.0	R106.4	(2)	R779.9	R892.4
1993	E6.7	E31.6	E76.1	E107.7	(2)	P814.0	E928.4

[1] Less than 0.05 million short tons.

[2] After 1977 small amounts of coal consumed by Transportation Sector are included in "Other Industry and Miscellaneous."

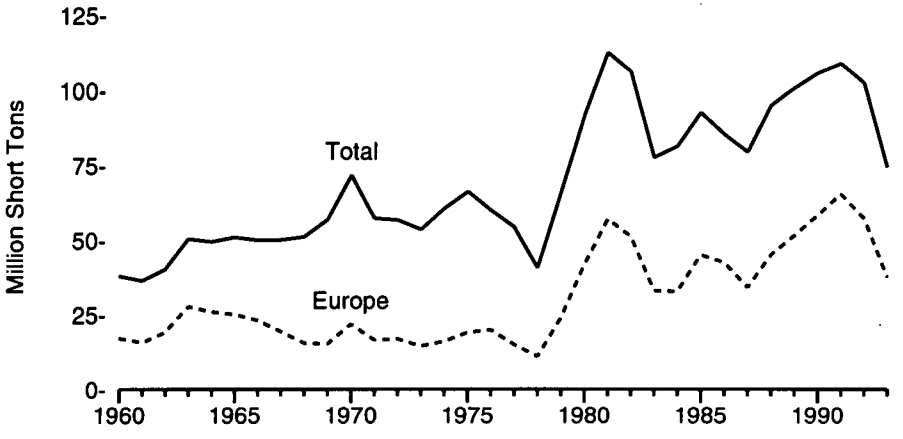
R=Revised data. P=Preliminary data. E=Estimate.

Notes: • See Note at end of section. • Totals may not equal sum of components due to independent rounding.

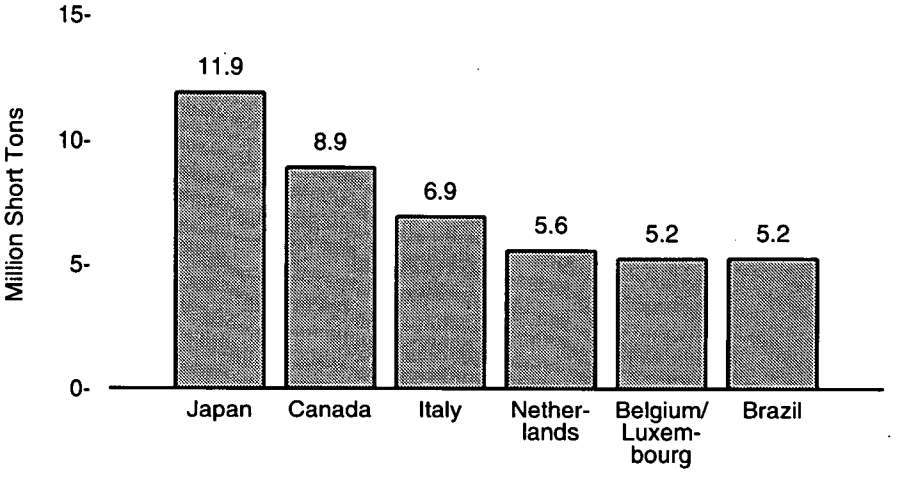
Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. • 1977 and 1978—EIA, Energy Data Report, *Coal-Pennsylvania Anthracite 1977; 1978*, and *Weekly Coal Report*. • 1979 and 1980—EIA, Energy Data Report, *Weekly Coal Report*. • 1981—EIA, *Weekly Coal Production*. • 1982—EIA, *Quarterly Coal Report October-December 1990* (May 1991), Table 23. • 1983—EIA, *Quarterly Coal Report October-December 1991* (May 1992), Table 23. • 1984—EIA, *Quarterly Coal Report October-December 1992* (May 1993), Table 45. • 1985-1992—EIA, *Quarterly Coal Report October-December 1993* (May 1994), Table 45. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 6.2.

Figure 7.4 Coal Exports by Country of Destination

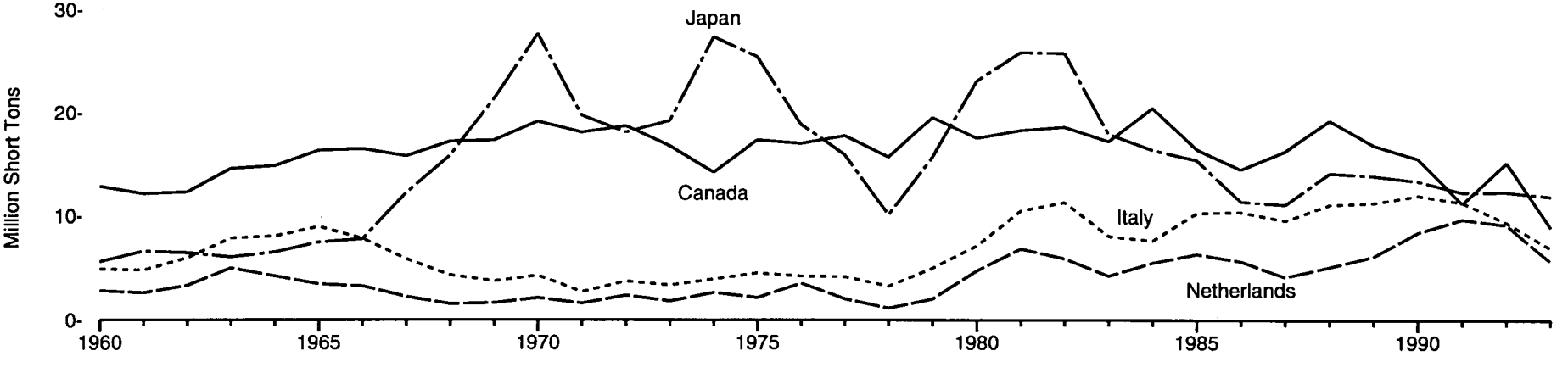
Total and Europe, 1960-1993



By Selected Country, 1993



By Selected Country, 1960-1993



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 7.4.

Table 7.4 Coal Exports by Country of Destination, 1960-1993

(Million Short Tons)

Year	Canada	Brazil	Europe										Japan	Other	Total
			Belgium/ Luxembourg	Denmark	France	Germany [1]	Italy	Netherlands	Spain	United Kingdom	Other	Total			
1960	12.8	1.1	1.1	0.1	0.8	4.6	4.9	2.8	0.3	0.0	2.4	17.1	5.6	1.3	38.0
1961	12.1	1.0	1.0	0.1	0.7	4.3	4.8	2.6	0.2	0.0	2.0	15.7	6.6	1.0	36.4
1962	12.3	1.3	1.3	(2)	0.9	5.1	6.0	3.3	0.8	(2)	1.8	19.1	6.5	1.0	40.2
1963	14.6	1.2	2.7	(2)	2.7	5.6	7.9	5.0	1.5	0.0	2.4	27.7	6.1	0.9	50.4
1964	14.8	1.1	2.3	(2)	2.2	5.2	8.1	4.2	1.4	0.0	2.6	26.0	6.5	1.1	49.5
1965	16.3	1.2	2.2	(2)	2.1	4.7	9.0	3.4	1.4	(2)	2.3	25.1	7.5	0.9	51.0
1966	16.5	1.7	1.8	(2)	1.6	4.9	7.8	3.2	1.2	(2)	2.5	23.1	7.8	1.0	50.1
1967	15.8	1.7	1.4	0.0	2.1	4.7	5.9	2.2	1.0	0.0	2.1	19.4	12.2	1.0	50.1
1968	17.1	1.8	1.1	0.0	1.5	3.8	4.3	1.5	1.5	0.0	1.9	15.5	15.8	0.9	51.2
1969	17.3	1.8	0.9	0.0	2.3	3.5	3.7	1.6	1.8	0.0	1.3	15.2	21.4	1.2	56.9
1970	19.1	2.0	1.9	0.0	3.6	5.0	4.3	2.1	3.2	(2)	1.8	21.8	27.6	1.2	71.7
1971	18.0	1.9	0.8	0.0	3.2	2.9	2.7	1.6	2.6	1.7	1.1	16.6	19.7	1.1	57.3
1972	18.7	1.9	1.1	0.0	1.7	2.4	3.7	2.3	2.1	2.4	1.1	16.9	18.0	1.2	56.7
1973	16.7	1.6	1.2	0.0	2.0	1.6	3.3	1.8	2.2	0.9	1.3	14.4	19.2	1.6	53.6
1974	14.2	1.3	1.1	0.0	2.7	1.5	3.9	2.6	2.0	1.4	0.9	16.1	27.3	1.8	60.7
1975	17.3	2.0	0.6	0.0	3.6	2.0	4.5	2.1	2.7	1.9	1.6	19.0	25.4	2.6	66.3
1976	16.9	2.2	2.2	(2)	3.5	1.0	4.2	3.5	2.5	0.8	2.1	19.9	18.8	2.1	60.0
1977	17.7	2.3	1.5	0.1	2.1	0.9	4.1	2.0	1.6	0.6	2.1	15.0	15.9	3.5	54.3
1978	15.7	1.5	1.1	0.0	1.7	0.6	3.2	1.1	0.8	0.4	2.2	11.0	10.1	2.5	40.7
1979	19.5	2.8	3.2	0.2	3.9	2.6	5.0	2.0	1.4	1.4	4.4	23.9	15.7	4.1	66.0
1980	17.5	3.3	4.6	1.7	7.8	2.5	7.1	4.7	3.4	4.1	6.0	41.9	23.1	6.0	91.7
1981	18.2	2.7	4.3	3.9	9.7	4.3	10.5	6.8	6.4	2.3	8.8	57.0	25.9	8.7	112.5
1982	18.6	3.1	4.8	2.8	9.0	2.3	11.3	5.9	5.6	2.0	7.6	51.3	25.8	7.5	106.3
1983	17.2	3.6	2.5	1.7	4.2	1.5	8.1	4.2	3.3	1.2	6.4	33.1	17.9	6.1	77.8
1984	20.4	4.7	3.9	0.6	3.8	0.9	7.6	5.5	2.3	2.9	5.3	32.8	16.3	7.2	81.5
1985	16.4	5.9	4.4	2.2	4.5	1.1	10.3	6.3	3.5	2.7	10.3	45.1	15.4	9.9	92.7
1986	14.5	5.7	4.4	2.1	5.4	0.8	10.4	5.6	2.6	2.9	8.4	42.6	11.4	11.4	85.5
1987	16.2	5.8	4.6	0.9	2.9	0.5	9.5	4.1	2.5	2.6	6.6	34.2	11.1	12.3	79.6
1988	19.2	5.3	6.5	2.8	4.3	0.7	11.1	5.1	2.5	3.7	8.5	45.1	14.1	11.3	95.0
1989	16.8	5.7	7.1	3.2	6.5	0.7	11.2	6.1	3.3	4.5	8.9	51.6	13.8	12.9	100.8
1990	15.5	5.8	8.5	3.2	6.9	1.1	11.9	8.4	3.8	5.2	9.5	58.4	13.3	12.7	105.8
1991	11.2	7.1	7.5	4.7	9.5	1.7	11.3	9.6	4.7	6.2	10.4	65.5	12.3	R13.0	109.0
1992	15.1	6.4	7.2	3.8	8.1	1.0	9.3	9.1	4.5	5.6	8.5	57.3	12.3	11.4	102.5
1993	8.9	5.2	5.2	0.3	4.0	0.5	6.9	5.6	4.1	4.1	6.9	37.6	11.9	11.0	74.5

[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany.

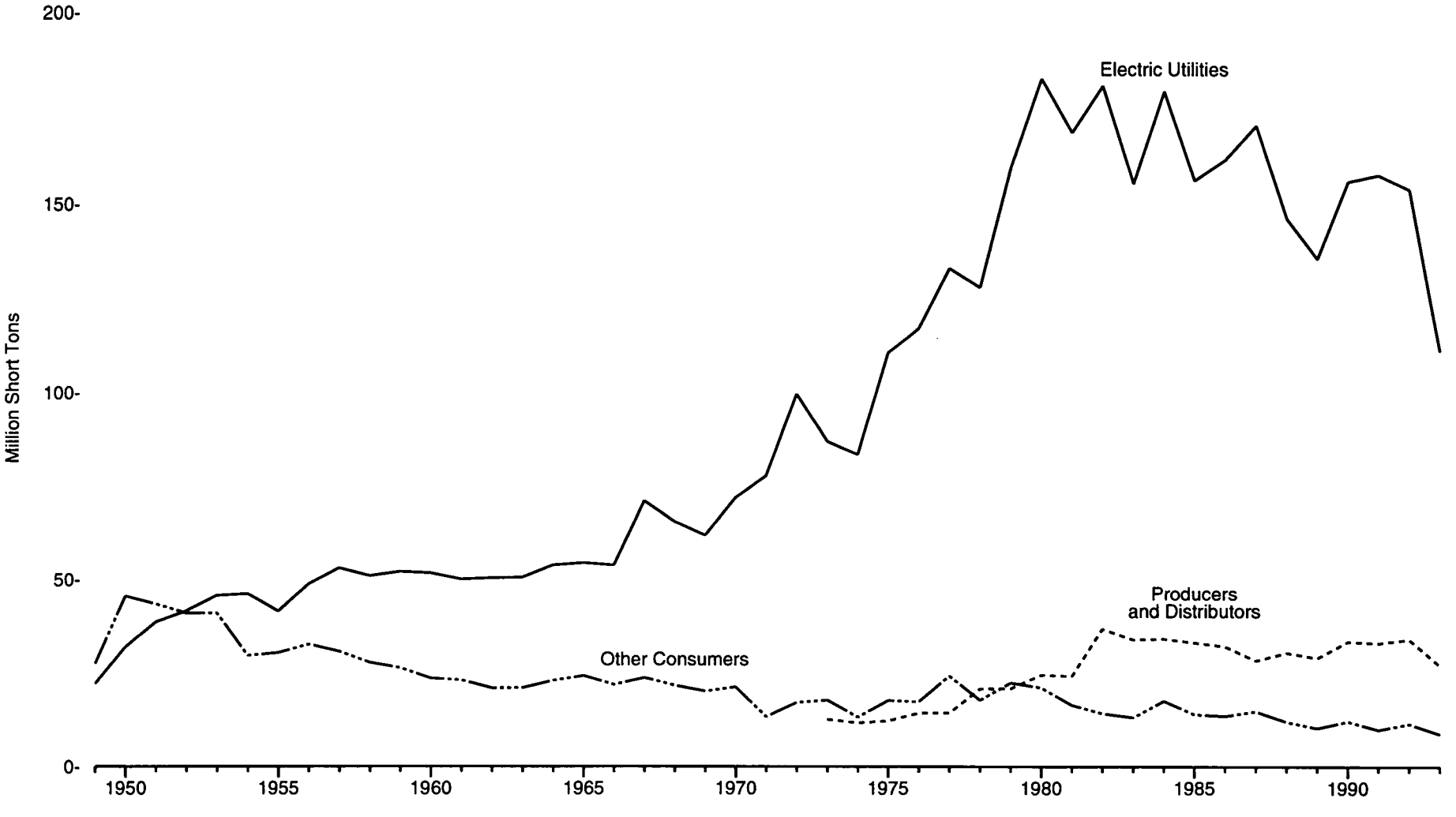
[2] Less than 50,000 tons.

R=Revised data.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1960-1988—U.S. Department of Commerce, Bureau of the Census. *U.S. Exports by Schedule B Commodities, EM 522.* • 1989 forward—U.S. Department of Commerce, Bureau of the Census, "Monthly Report EM 545."

Figure 7.5 Coal Stocks, End of Year 1949-1993



Source: Table 7.5.

Table 7.5 Coal Stocks, End of Year 1949-1993

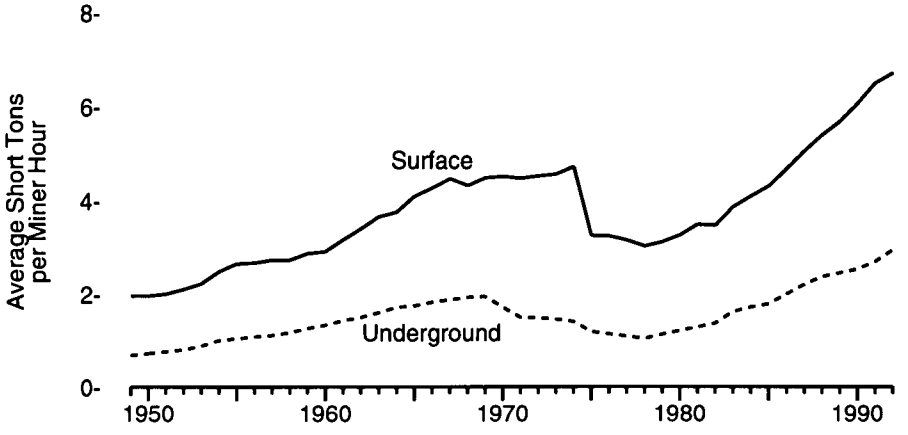
(Million Short Tons)

Year	Consumer					Producers and Distributors	Total
	Residential [1] and Commercial	Coke Plants	Other Industry [2]	Electric Utilities	Total		
1949	1.4	10.0	16.1	22.1	49.5	NA	NA
1950	2.5	16.8	26.2	31.8	77.3	NA	NA
1951	1.8	15.3	26.2	38.5	81.8	NA	NA
1952	1.7	14.5	24.7	41.5	82.4	NA	NA
1953	1.5	16.6	22.8	45.6	86.6	NA	NA
1954	0.8	12.4	16.4	46.1	75.7	NA	NA
1955	1.0	13.4	15.9	41.4	71.7	NA	NA
1956	1.1	14.0	17.4	48.8	81.3	NA	NA
1957	0.9	14.2	15.5	53.1	83.7	NA	NA
1958	0.9	13.1	13.7	51.0	78.7	NA	NA
1959	1.0	11.6	13.6	52.1	78.4	NA	NA
1960	0.7	11.1	11.6	51.7	75.2	NA	NA
1961	0.5	10.5	11.9	50.1	73.0	NA	NA
1962	0.5	8.4	12.0	50.4	71.3	NA	NA
1963	0.5	8.1	12.3	50.6	71.5	NA	NA
1964	0.4	10.2	12.2	53.9	76.7	NA	NA
1965	0.4	10.6	13.1	54.5	78.6	NA	NA
1966	0.2	9.3	12.2	53.9	75.6	NA	NA
1967	0.2	11.1	12.3	71.0	94.6	NA	NA
1968	0.2	9.7	11.7	65.5	87.0	NA	NA
1969	0.2	9.1	10.8	61.9	81.9	NA	NA
1970	0.3	9.0	11.8	71.9	93.0	NA	NA
1971	0.3	7.3	5.6	77.8	91.0	NA	NA
1972	0.3	9.1	7.6	99.7	116.8	NA	NA
1973	0.3	7.0	10.4	87.0	104.6	12.5	117.2
1974	0.3	6.2	6.6	83.5	96.6	11.6	108.2
1975	0.2	8.8	8.5	110.7	128.3	12.1	140.4
1976	0.2	9.9	7.1	117.4	134.7	14.2	148.9
1977	0.2	12.8	11.1	133.2	157.3	14.2	171.5
1978	0.4	8.3	9.0	128.2	145.9	20.7	166.6
1979	0.3	10.2	11.8	159.7	182.0	20.8	202.8
1980	NA	9.1	12.0	183.0	204.0	24.4	228.4
1981	NA	6.5	9.9	168.9	185.3	R24.1	209.4
1982	NA	4.6	9.5	181.1	195.3	36.8	232.0
1983	NA	4.3	8.7	155.6	168.7	33.9	R202.6
1984	NA	6.2	11.3	179.7	197.2	34.1	231.3
1985	NA	3.4	10.4	156.4	170.2	33.1	203.4
1986	NA	3.0	10.4	161.8	175.2	32.1	207.3
1987	NA	3.9	10.8	170.8	185.5	28.3	213.8
1988	NA	3.1	8.8	146.5	158.4	30.4	188.8
1989	NA	2.9	7.4	135.9	146.1	29.0	175.1
1990	NA	3.3	8.7	156.2	168.2	33.4	201.6
1991	NA	2.8	7.1	157.9	167.7	33.0	200.7
1992	NA	R2.6	R7.0	R154.1	R163.7	R34.0	R197.7
1993	NA	E2.1	E6.6	P111.3	E120.0	E27.0	E147.0

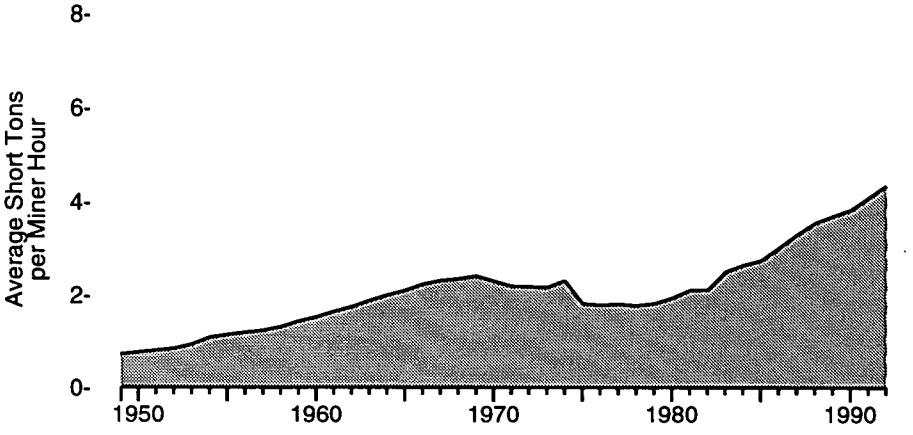
[1] Stocks at retail dealers, excluding anthracite.
[2] Includes transportation sector.
R=Revised data. P=Preliminary data. E=Estimate. NA=Not available.
Note: Totals may not equal sum of components due to independent rounding.
Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. • 1977 and 1978—EIA, Energy Data Report, *Coal-Pennsylvania Anthracite 1977; 1978*, and *Weekly Coal Report*. • 1979 and 1980—EIA, Energy Data Report, *Weekly Coal Report*. • 1981—EIA, *Weekly Coal Production*. • 1982—EIA, *Quarterly Coal Report October-December 1990* (May 1991), Table 31. • 1983—EIA, *Quarterly Coal Report October-December 1991* (May 1992), Table 31. • 1984—EIA, *Quarterly Coal Report October-December 1992* (May 1993), Table 52. • 1985-1992—EIA, *Quarterly Coal Report October-December 1993* (May 1994), Table 52. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 6.3.

Figure 7.6 Coal Mining Productivity, 1949-1992

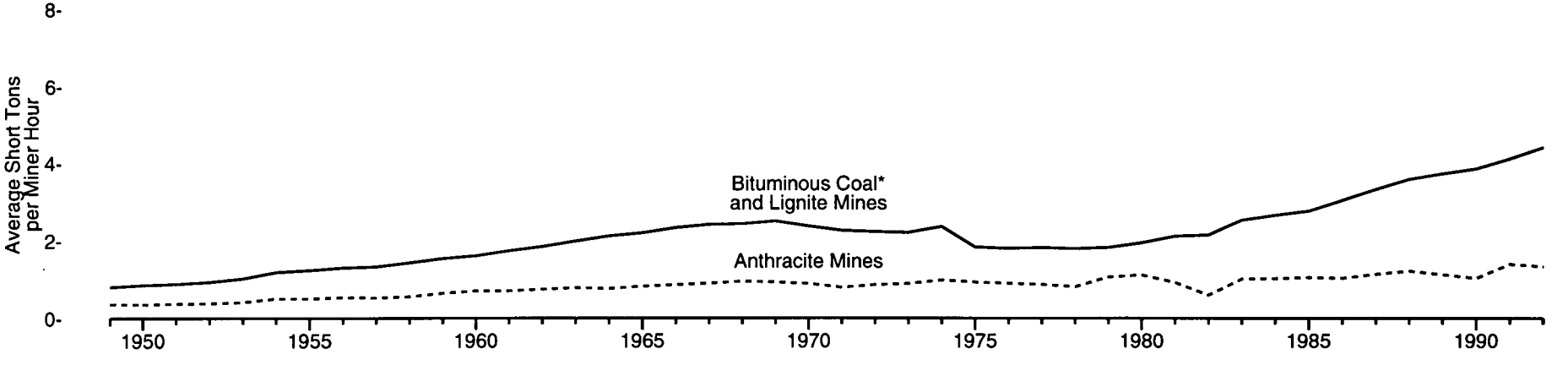
Bituminous Coal* and Lignite Mines, by Type



All Mines, Average



All Mines, by Coal Type



*Includes subbituminous coal.

Source: Table 7.6.

Table 7.6 Coal Mining Productivity, 1949-1992

(Short Tons per Miner Hour [1])

Year	Bituminous Coal [2] and Lignite Mines			Anthracite Mines	All Mines
	Underground	Surface	Average		
1949	0.68	1.92	0.80	0.36	0.72
1950	0.72	1.96	0.85	0.35	0.76
1951	0.76	2.00	0.88	0.37	0.80
1952	0.80	2.10	0.93	0.38	0.84
1953	0.88	2.22	1.02	0.41	0.93
1954	1.00	2.48	1.18	0.50	1.08
1955	1.04	2.65	1.23	0.50	1.14
1956	1.08	2.67	1.29	0.53	1.19
1957	1.11	2.73	1.32	0.52	1.23
1958	1.17	2.73	1.42	0.55	1.31
1959	1.26	2.87	1.53	0.64	1.43
1960	1.33	2.91	1.60	0.70	1.52
1961	1.43	3.16	1.73	0.70	1.64
1962	1.50	3.40	1.84	0.74	1.74
1963	1.60	3.66	1.98	0.78	1.87
1964	1.72	3.76	2.11	0.76	1.99
1965	1.75	4.10	2.19	0.82	2.09
1966	1.83	4.28	2.32	0.86	2.23
1967	1.88	4.48	2.40	0.90	2.31
1968	1.93	4.33	2.42	0.95	2.35
1969	1.95	4.50	2.49	0.93	2.41
1970	1.72	4.53	2.36	0.89	2.30
1971	1.50	4.49	2.25	0.79	2.19
1972	1.49	4.54	2.22	0.86	2.18
1973	1.46	4.58	2.20	0.89	2.16
1974	1.41	4.74	2.35	0.98	2.31
1975	1.19	3.26	1.83	0.93	1.81
1976	1.14	3.25	1.80	0.90	1.78
1977	1.09	3.16	1.82	0.87	1.80
1978	1.04	3.03	1.79	0.81	1.77
1979	1.13	3.12	1.82	1.06	1.81
1980	1.21	3.27	1.94	1.11	1.93
1981	1.29	3.50	2.11	0.92	2.10
1982	1.37	3.48	2.14	0.59	2.11
1983	1.62	3.87	2.52	1.01	2.50
1984	1.72	4.10	2.65	1.02	2.64
1985	1.79	4.32	2.76	1.05	2.74
1986	2.00	4.69	3.04	1.03	3.01
1987	2.21	5.06	3.32	1.13	3.30
1988	2.38	5.41	3.58	1.21	3.55
1989	2.46	5.70	3.73	1.12	3.70
1990	2.54	6.07	3.86	1.03	3.83
1991	2.70	6.51	4.12	1.39	4.09
1992	2.95	6.73	4.41	1.33	4.36

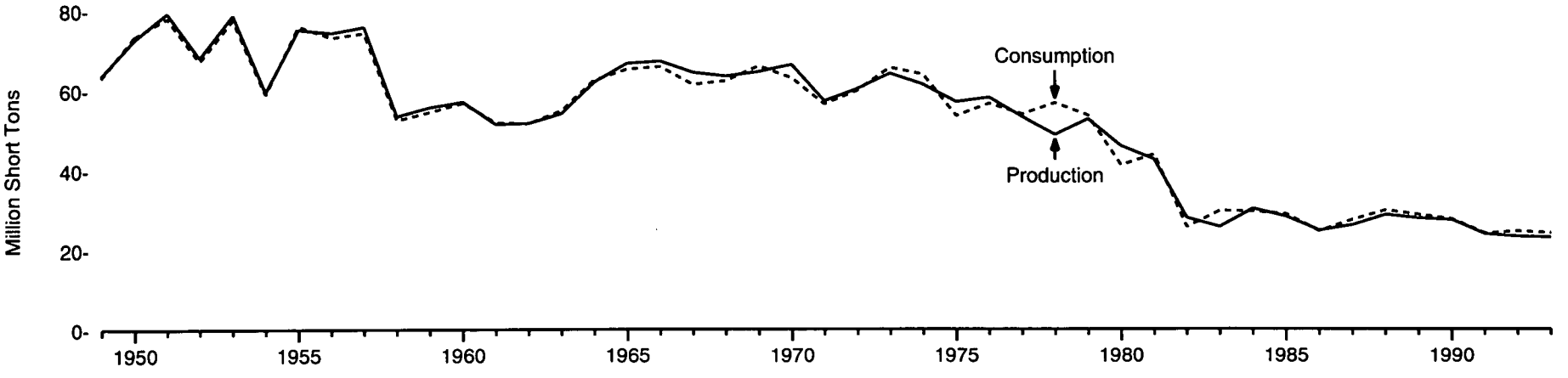
[1] Data for bituminous coal and lignite mines 1949-1973 and anthracite mines 1949-1978 were originally reported in short tons per miner-day. The data were converted to short-tons per miner hour by assuming an eight-hour day. All remaining data were calculated by dividing total production by total labor hours worked by all mine employees except office workers.

[2] Includes subbituminous coal.

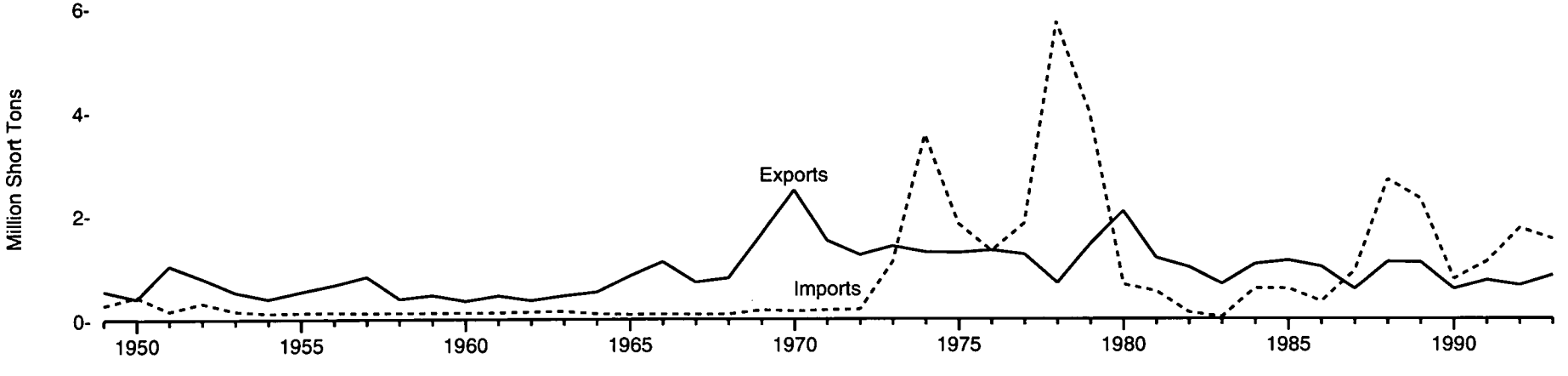
Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. • 1977 and 1978—EIA, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; 1978* and *Coal-Pennsylvania Anthracite 1977; 1978*. • 1979—EIA, Energy Data Report, *Coal Production-1979*. • 1980 forward—EIA, *Coal Production* (annual).

Figure 7.7 Coke Overview, 1949-1993

Production and Consumption



Imports and Exports



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 7.7.

Table 7.7 Coke Overview, 1949-1993

(Million Short Tons)

Year	Production	Imports	Exports	Stock Change [1]	Consumption [2]
1949	63.64	0.28	0.55	-0.18	63.19
1950	72.72	0.44	0.40	0.66	73.42
1951	79.33	0.16	1.03	-0.37	78.09
1952	68.25	0.31	0.79	-0.42	67.36
1953	78.84	0.16	0.52	-0.78	77.70
1954	59.66	0.12	0.39	-0.27	59.12
1955	75.30	0.13	0.53	1.25	76.15
1956	74.48	0.13	0.66	-0.63	73.32
1957	75.95	0.12	0.82	-0.81	74.43
1958	53.60	0.12	0.39	-0.68	52.66
1959	55.86	0.12	0.46	-0.86	54.67
1960	57.23	0.13	0.35	-0.06	56.95
1961	51.71	0.13	0.45	0.70	52.09
1962	51.91	0.14	0.36	0.14	51.82
1963	54.28	0.15	0.45	1.02	55.00
1964	62.15	0.10	0.52	0.91	62.64
1965	66.85	0.09	0.83	-0.73	65.38
1966	67.40	0.10	1.10	-0.38	66.02
1967	64.58	0.09	0.71	-2.39	61.57
1968	63.65	0.09	0.79	-0.52	62.44
1969	64.76	0.17	1.63	2.87	66.17
1970	66.53	0.15	2.48	-0.99	63.21
1971	57.44	0.17	1.51	0.59	56.69
1972	60.51	0.19	1.23	0.59	60.05
1973	64.33	1.09	1.40	1.74	65.77
1974	61.58	3.54	1.28	0.25	64.09
1975	57.21	1.82	1.27	-4.06	53.69
1976	58.33	1.31	1.32	-1.50	56.83
1977	53.51	1.83	1.24	0.05	54.14
1978	49.01	5.72	0.69	2.91	56.95
1979	52.94	3.97	1.44	-1.65	53.83
1980	46.13	0.66	2.07	-3.44	41.28
1981	42.79	0.53	1.17	1.90	44.05
1982	28.12	0.12	0.99	-1.47	25.78
1983	25.81	0.04	0.67	4.67	29.85
1984	30.40	0.58	1.05	-0.20	29.74
1985	28.44	0.58	1.12	1.16	29.06
1986	24.92	0.33	1.00	0.49	24.73
1987	26.30	0.92	0.57	1.00	27.65
1988	28.95	2.69	1.09	-0.52	30.02
1989	28.05	2.31	1.09	-0.34	28.93
1990	27.62	0.77	0.57	([3])	27.81
1991	24.05	1.10	0.74	-0.19	24.22
1992	23.41	1.74	0.64	0.22	24.73
1993	23.18	1.53	0.84	0.42	24.30

[1] Producer and distributor stocks at end of year. Negative numbers denote a net addition to stocks or a reduction in supply. Positive numbers denote a net withdrawal from stocks or an addition to supply.

[2] Consumption is the sum of production, imports, and stock change minus exports.

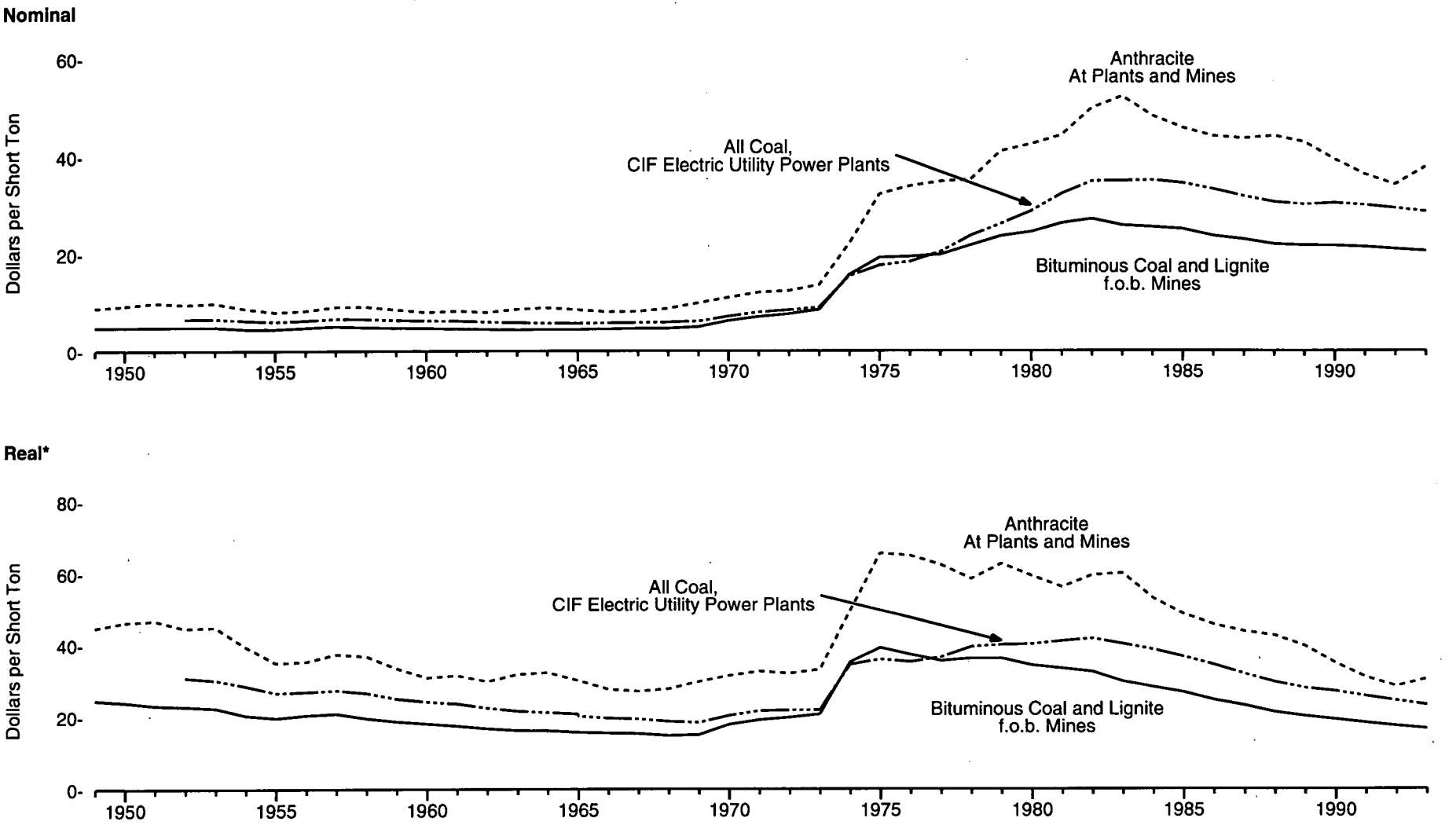
[3] Less than 0.005 million short tons.

R=Revised data.

Note: Totals may not equal sum of components due to independent rounding.

Sources: • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coke and Coal Chemicals" chapter. • 1976-1980—Energy Information Administration (EIA), Energy Data Report, *Coke and Coal Chemicals*, annual. • 1981—EIA, Energy Data Report, *Coke Plant Report*, quarterly. • 1982—EIA, *Quarterly Coal Report October-December 1990* (May 1991), Table A1. • 1983—EIA, *Quarterly Coal Report October-December 1991* (May 1992), Table A1. • 1984—EIA, *Quarterly Coal Report October-December 1992* (May 1993), Table 2. • 1985 forward—EIA, *Quarterly Coal Report October-December 1993* (May 1994), Table 2.

Figure 7.8 Coal Prices, 1949-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

Notes: Bituminous coal includes subbituminous coal. CIF=Cost, Insurance, and Freight. F.O.B.=Free on board. See Glossary.

Source: Table 7.8.

Table 7.8 Coal Prices, 1949-1993

(Dollars per Short Ton)

Year	Bituminous Coal [1] and Lignite		Anthracite		All Coal	
	F.O.B. [2] Mines		At Plants and Mines [3]		CIF [4] Electric Utility Power Plants	
	Nominal	Real [5]	Nominal	Real [5]	Nominal	Real [5]
1949	4.88	24.52	8.90	44.72	NA	NA
1950	4.84	23.96	9.34	46.24	NA	NA
1951	4.92	23.10	9.94	46.67	NA	NA
1952	4.90	22.79	9.58	44.56	6.61	30.74
1953	4.92	22.36	9.87	44.86	6.61	30.05
1954	4.52	20.36	8.76	39.46	6.31	28.42
1955	4.50	19.65	8.00	34.93	6.07	26.51
1956	4.82	20.42	8.33	35.30	6.32	26.78
1957	5.08	20.82	9.11	37.34	6.64	27.21
1958	4.86	19.52	9.14	36.71	6.58	26.43
1959	4.77	18.63	8.55	33.40	6.37	24.88
1960	4.69	18.04	8.01	30.81	6.26	24.08
1961	4.58	17.41	8.26	31.41	6.20	23.57
1962	4.48	16.65	7.99	29.70	6.02	22.38
1963	4.39	16.14	8.64	31.76	5.86	21.54
1964	4.45	16.06	8.93	32.24	5.74	20.72
1965	4.44	15.63	8.51	29.96	5.71	20.11
1966	4.54	15.44	8.08	27.48	5.76	19.59
1967	4.62	15.25	8.15	26.90	5.85	19.31
1968	4.67	14.69	8.78	27.61	5.93	18.65
1969	4.99	14.94	9.91	29.67	6.13	18.35
1970	6.26	17.78	11.03	31.34	7.13	20.26
1971	7.07	19.06	12.08	32.56	8.00	21.56
1972	7.66	19.74	12.40	31.96	8.44	21.75
1973	8.53	20.65	13.65	33.05	9.01	21.82
1974	15.75	35.08	22.19	49.42	15.46	34.43
1975	19.23	39.09	32.26	65.57	17.63	35.83
1976	19.43	37.15	33.92	64.86	18.38	35.14
1977	19.82	35.46	34.86	62.36	20.37	36.44
1978	21.78	36.12	35.25	58.46	23.75	39.39
1979	23.65	36.11	41.06	62.69	26.15	39.92
1980	24.52	34.20	42.51	59.29	28.76	40.11
1981	26.29	33.32	44.28	56.12	32.32	40.96
1982	27.14	32.39	49.85	59.49	34.91	41.66
1983	25.85	29.64	52.29	59.97	34.99	40.13
1984	25.51	28.03	48.22	52.99	35.12	38.59
1985	25.10	26.59	45.80	48.52	34.53	36.58
1986	23.70	24.46	44.12	45.53	33.30	34.37
1987	23.00	23.00	43.65	43.65	31.83	31.83
1988	22.00	21.17	44.16	42.50	30.64	29.49
1989	21.76	20.06	42.93	39.57	30.15	27.79
1990	21.71	R19.16	39.40	R34.77	30.45	R26.88
1991	21.45	R18.22	36.34	R30.88	R30.02	R25.51
1992	R20.98	R17.32	R34.24	R28.27	R29.36	R24.24
1993	E20.56	16.55	E37.80	30.43	P28.64	23.06

[1] Includes subbituminous coal.
[2] Free on board (see Glossary).
[3] For 1949-1978, prices are f.o.b. preparation plants. For 1979 forward, prices are f.o.b. mines.
[4] Cost, Insurance, and Freight (see Glossary).
[5] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.
R=Revised data. P=Preliminary data. E=Estimate. NA=Not available.

Sources: **Bituminous Coal and Lignite, F.O.B. Mines:** • 1949-1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" chapter. • 1976—Energy Information Administration (EIA), Energy Data Report, *Coal-Bituminous and Lignite in 1976*. • 1977 and 1978—EIA, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; 1978*. • 1979-1992—EIA, *Coal Production*, annual. • 1993—EIA estimates. **Anthracite:** • 1949-1976—Bureau of Mines, *Minerals Yearbook*, "Coal-Pennsylvania Anthracite" chapter. • 1977 and 1978—EIA, Energy Data Report, *Coal-Pennsylvania Anthracite 1977; 1978*. • 1979—EIA, Energy Data Report, *Coal Production-1979*. • 1980—EIA, *Coal Production-1980*. • 1981-1992—EIA, *Coal Production*, annual. • 1993—EIA estimates. **All Coal, CIF Electric Utility Power Plants:** • 1949-1972—National Coal Association, *Steam Electric Plant Factors*. • 1973-1982—Federal Power Commission, Form FPC-423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." • 1983 forward—Federal Energy Regulatory Commission, Form FERC-423, "Monthly Report of Cost and Quality of Fuel for Electric Utilities."

Coal Note

Data in this report on the consumption of bituminous coal (including subbituminous coal), lignite, and anthracite are generated primarily from consumption data reported in surveys. Included are data reported by all electric utility companies and coke plant companies. Data on coal consumption by all industrial and manufacturing establishments and by the residential and commercial sector are based on distribution data obtained quarterly from coal companies. Included in each sector's data are the following: Electric Utility Sector–consumption by privately and publicly owned establishments engaged in the generation and/or distribution of electric power primarily for sale or resale; Industrial and Miscellaneous Sector–consumption at manufacturing plants, large commercial establishments, coking plants, and by agriculture, mining (other than coal mining) and construction industries; Transportation Sector–sales to railroads and vessel bunker fuel; Residential and Commercial Sector–retail dealer sales to households and small commercial establishments.

8. Electricity

Net Summer Capability at Electric Utilities

Net summer capability, a common measure of generating capacity, is defined as the steady hourly output that generating equipment is expected to supply to the system load, exclusive of auxiliary power, as demonstrated by testing at the time of summer peak demand. Although data on net summer capability have been collected only since 1985, the Energy Information Administration has estimated values for prior years (8.7).[1] Estimates and collected data indicate that net summer capability during the 1949-to-1993 period increased at an average annual rate of 5.6 percent.

Conventional steam plants, fueled by fossil fuels, wood, and waste, were responsible for most of the growth. In 1993, they accounted for close to two-thirds of total net summer capability. Nuclear-powered plants accounted for 14 percent of the total in 1993. Conventional and pumped storage hydroelectric facilities accounted for 13 percent. Internal combustion and gas turbine plants, as well as plants powered by emerging sources of energy, such as geothermal, accounted for the remainder.

Electric Utility Net Generation

Net generation of electricity by electric utilities in 1993 totaled 2.9 trillion kilowatthours, up 3.0 percent from the 1992 level (8.2). Coal continued to fuel most of the generation and accounted for 1.6 trillion kilowatthours. Natural gas accounted for 259 billion kilowatthours. Lower petroleum prices contributed to an increase in petroleum-fired generation in 1993 to 100 billion kilowatthours. In contrast, nuclear-based generation declined for the first time in 13 years, down 1.5 percent (to 610 billion kilowatthours) from the all-time high in 1992 of 619 billion kilowatthours. Conventional hydroelectric generation totaled 269 billion kilowatthours, up 10 percent from generation in 1992. Hydroelectric pumped storage generation, however, was a negative 4 billion kilowatthours, because the energy used for pumping exceeded the generation. Geothermal and other renewable energy sources accounted for 10 billion kilowatthours.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

Fossil-fueled steam generators, consistently the major source of electricity, provided 68 percent of net generation in 1993 (8.3). Nuclear, conventional hydroelectric, geothermal, and other generators powered by renewables supplied 31 percent. Internal combustion, gas turbine, and hydroelectric pumped storage generators, usually reserved for meeting peak demand, supplied 0.7 percent of net generation.

Nonutility Net Generation

Nonutility power producers own electric generating capacity but, unlike electric utilities, they lack a designated service area. Cogenerators,

Demand-Side Management

The planning, implementation, and monitoring of electric utility activities designed to encourage customers to reduce the amount of electricity they consume overall or at certain periods is called demand-side management (DSM). Rebates to customers who install energy-efficient appliances and reduced rates for non-peakload use of electricity are examples of DSM programs.

DSM has both economic and environmental benefits. The economic benefit to customers lies in its ability to provide the same level of energy services at a lower cost. DSM is most advantageous when electric utilities can use it to eliminate the need for costly new capacity. The environmental benefit of DSM occurs when it lowers fossil fuel use. Because electricity generation relies heavily on the burning of fossil fuels, it is responsible for emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides. To the extent that DSM reduces fossil fuel consumption, it contributes to improving the quality of the environment.

In 1992, electric utilities spent $2.2 billion on DSM programs, up from $1.7 billion the previous year (8.6). The actual peakload reduction in 1992 totaled 17,657 megawatts, up from 16,739 megawatts in 1991. The energy savings attributable to DSM programs are calculated at 32 billion kilowatthours in 1992, up from 23 billion kilowatthours in 1991.

small power producers, and independent power producers are all classified as nonutility power producers. In 1992, nonutility power producers' gross generation totaled 296 billion kilowatthours, up 19 percent from the 1991 level (8.11). Over half of that total was sold to electric utilities (8.1 and 8.11). Whereas electric utilities rely heavily on coal as an energy input, 54 percent of the nonutilities' gross generation came from natural gas and 25 percent came from renewable energy sources.

Fossil Fuel Consumption at Electric Utilities

During the 1949-to-1993 period, consumption of coal at electric utilities grew at a faster rate than did consumption of natural gas and petroleum (8.4). On a Btu basis, coal accounted for 67 percent of total fossil fuel consumption in 1949 and 82 percent of the total in 1993. Seventeen quadrillion Btu of coal were consumed by electric utilities in 1993.

Electric utility consumption of both petroleum and natural gas increased during much of the period, but growth in the use of both fuels began to slow during the 1970's. During the first half of the 1980's, consumption actually decreased.

Changes in the consumption of petroleum and natural gas at electric utilities in 1986 through 1988 were particularly illustrative of the utilities' fuel-switching capabilities and their use of them to respond to fluctuations in fuel prices. In 1986, when petroleum prices fell dramatically, petroleum consumption at electric utilities rose 0.36 quadrillion Btu, while natural gas consumption fell 0.47 quadrillion Btu. When petroleum prices recovered somewhat in 1987, electric utilities scaled back consumption of petroleum by 0.19 quadrillion Btu while increasing natural gas consumption by 0.25 quadrillion Btu. In response to the 1988 decline in petroleum prices, electric utilities increased petroleum consumption by 0.30 quadrillion Btu and consumed 0.23 quadrillion Btu less of natural gas. After 1988, however, electric utility consumption of natural gas remained in the 2.7-to-2.9 quadrillion Btu range, while consumption of petroleum fell from 1.7 quadrillion Btu in 1989 to 1.1 quadrillion Btu in 1993.

Sales of Electricity to Consumers

During the 1949-to-1993 period, electricity sales increased at an average annual rate of 5.6 percent (8.5). Annual sales declined only two times, in 1974 and 1982. In 1974, the decline in sales spanned all sectors, whereas in 1982, lower sales to the industrial sector alone accounted for the decline.

Historically (from 1949 through 1990), sales of electricity to the industrial sector exceeded sales to other sectors. In 1991 and 1993, however, sales to the residential sector accounted for the largest share. In 1993, sales to the residential sector rose 6.2 percent to 994 billion kilowatthours, while sales to the industrial sector rose just 1.0 percent to 983 billion kilowatthours. Sales to the commercial sector of 790 billion kilowatthours were 3.8 percent above the 1992 level.

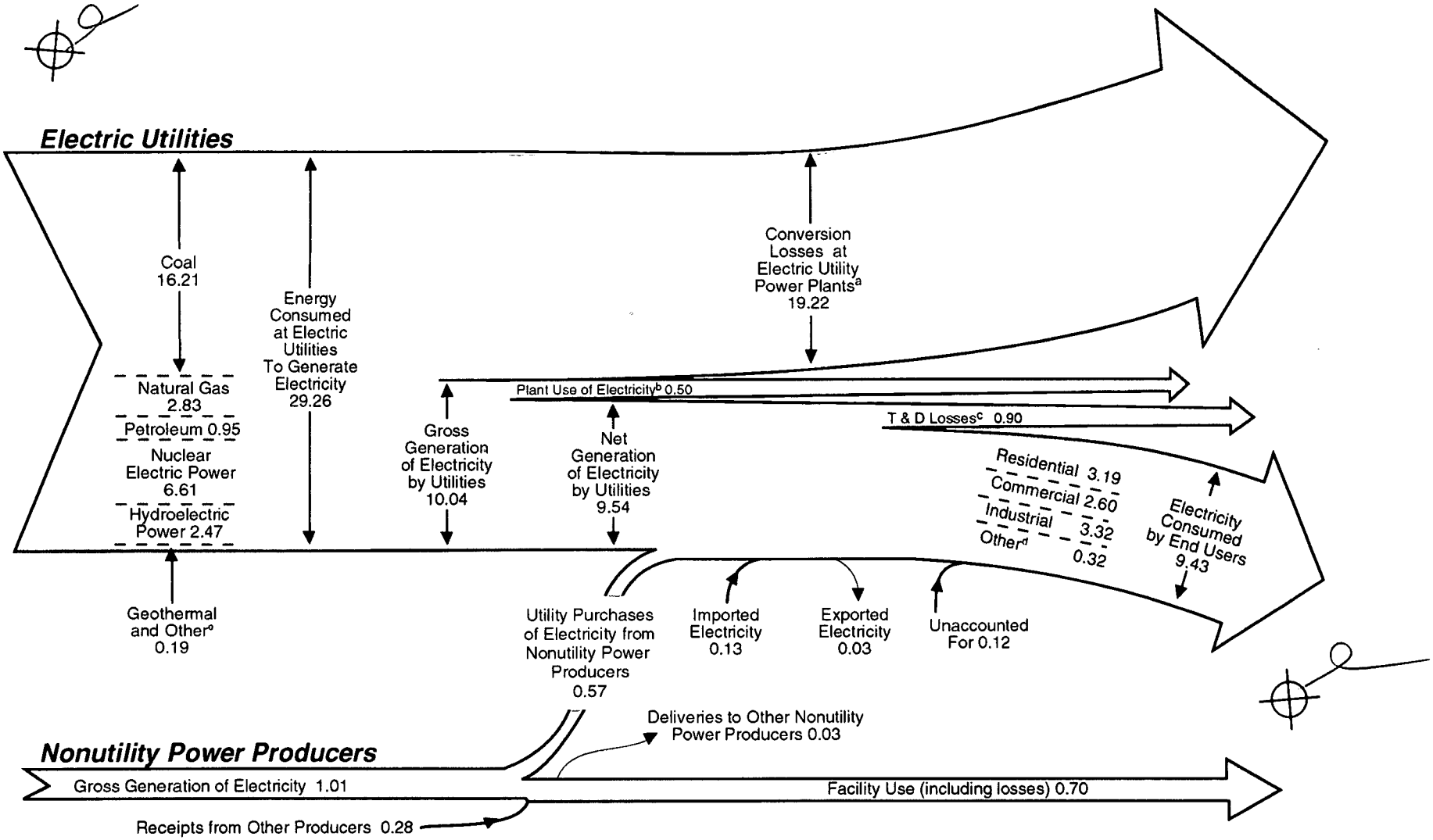
Retail Prices of Electricity

The weighted average real price[2] of electricity to all sectors in 1993 was 5.6 cents per kilowatthour, 19 percent below the price in 1960 (8.10). However, the apparent stability in electricity prices masked fluctuations that occurred throughout the period and variations in prices paid by consumers in different end-use sectors. And, although prices of the other major energy sources increased significantly during the 1960-1993 period, electricity remained by far the most expensive source of energy on a Btu basis. The average real price of electricity sold to the residential sector, where prices have usually been the highest, was 6.7 cents per kilowatthour in 1993, down 1.5 percent from the price in 1992. The commercial sector experienced a decrease, in real terms, of 3.1 percent, as the price declined to 6.2 cents per kilowatthour in 1993. Industrial customers continued to pay prices that were favorable compared with prices in other sectors. In 1993, the real price of electricity sold to industrial users was 3.9 cents per kilowatthour, down 2.5 percent from the price in 1992.

[2]Real prices are expressed in 1987 dollars.

Diagram 5. Electricity Flow, 1992

(Quadrillion Btu)



[a]Estimated as two-thirds of the energy consumed at electric utilities to generate electricity. See Note 1 at end of section.

[b]Estimated as 5 percent of gross generation of electricity by utilities. See Note 1 at end of section.

[c]Estimated as 9 percent of gross generation of electricity by utilities. See Note 1 at end of section.

[d]"Other" is public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

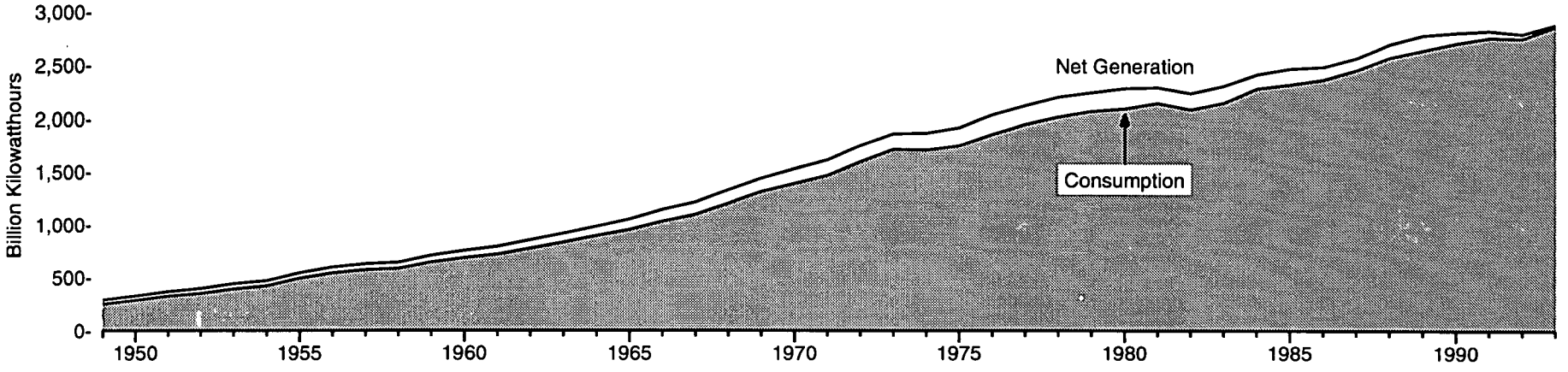
[e]"Other" is wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution. See Table 10.8.

Notes: Totals may not equal sum of components due to independent rounding.

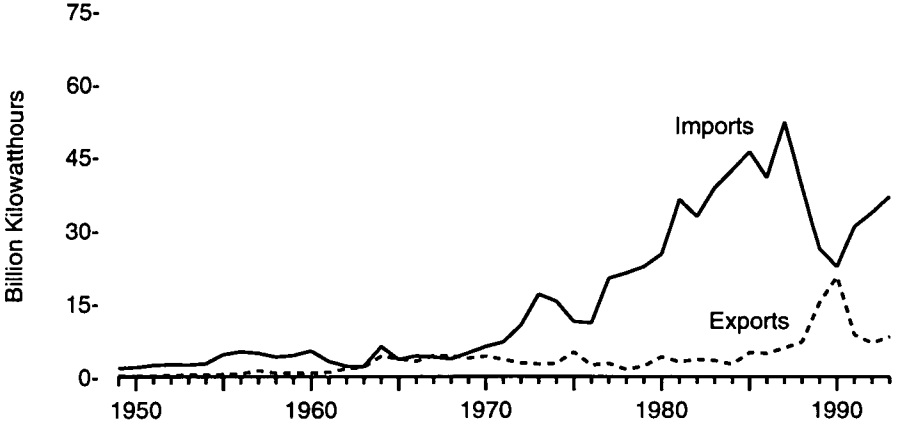
Sources: Tables 8.1, 8.2, 8.4, 8.5, 8.12, 10.8, and A7.

Figure 8.1 Electric Utility Industry Overview

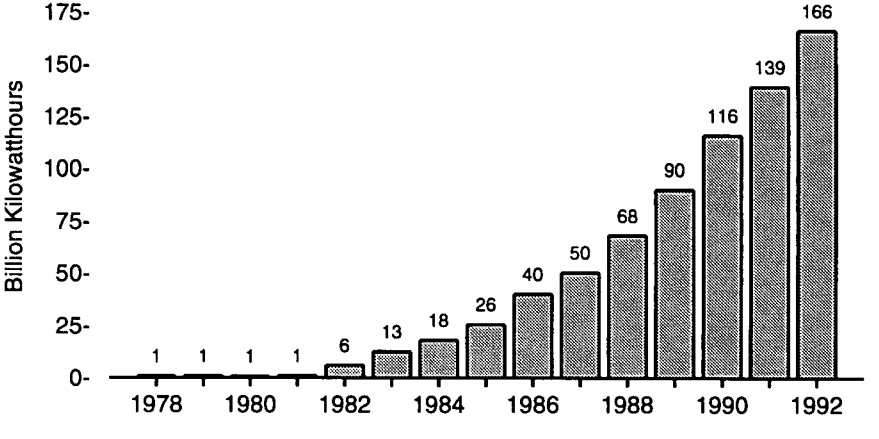
Net Generation and Consumption of Electricity, 1949-1993



Electricity Trade, 1949-1993



Electricity Purchases from Nonutility Power Producers, 1978-1992



Notes: • The difference between net generation and consumption is imports and purchases from nonutility power producers minus exports, losses, and unaccounted for.

• Because vertical scales differ, graphs should not be compared.
Source: Table 8.1.

Table 8.1 Electric Utility Industry Overview, 1949-1993

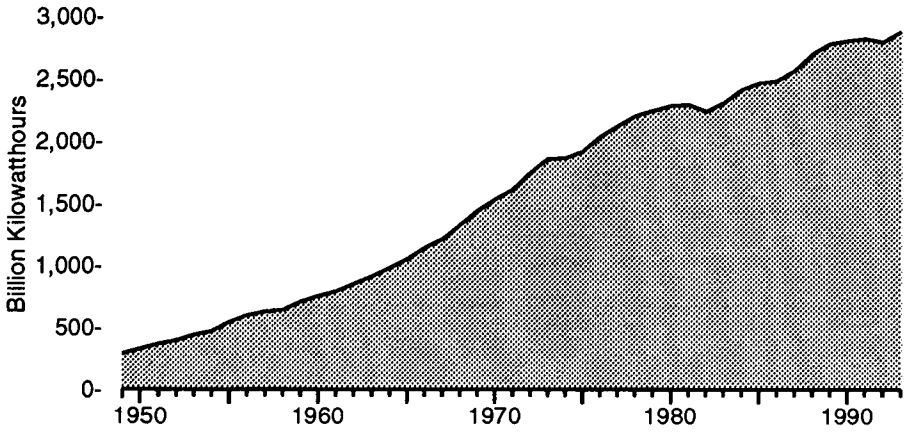
(Billion Kilowatthours)

Year	Net Generation [1]	Purchases from Nonutility Power Producers [2]	Imports [3]	Exports [3]	Losses and Unaccounted For [4]	Consumption
1949	291	NA	2	(5)	38	255
1950	329	NA	2	(5)	39	291
1951	371	NA	2	(5)	43	330
1952	399	NA	3	(5)	45	356
1953	443	NA	2	(5)	48	396
1954	472	NA	3	(5)	50	424
1955	547	NA	5	(5)	54	497
1956	601	NA	5	1	59	546
1957	632	NA	5	1	59	576
1958	645	NA	4	1	61	588
1959	710	NA	4	1	67	647
1960	756	NA	5	1	72	688
1961	794	NA	3	1	74	722
1962	855	NA	2	2	77	778
1963	917	NA	2	2	84	833
1964	984	NA	6	4	90	896
1965	1,055	NA	4	4	101	954
1966	1,144	NA	4	3	110	1,035
1967	1,214	NA	4	4	115	1,099
1968	1,329	NA	4	4	126	1,203
1969	1,442	NA	5	4	129	1,314
1970	1,532	NA	6	4	142	1,392
1971	1,613	NA	7	4	147	1,470
1972	1,750	NA	10	3	162	1,595
1973	1,861	NA	17	3	162	1,713
1974	1,867	NA	15	3	174	1,706
1975	1,918	NA	11	5	177	1,747
1976	2,038	NA	11	2	191	1,855
1977	2,124	NA	20	3	193	1,948
1978	2,206	1	21	1	209	2,018
1979	2,247	1	23	2	198	2,071
1980	2,286	1	25	4	214	2,094
1981	2,295	1	36	3	182	2,147
1982	2,241	6	33	4	190	2,086
1983	2,310	13	39	3	207	2,151
1984	2,416	18	42	3	188	2,286
1985	2,470	26	46	5	212	2,324
1986	2,487	40	41	5	194	2,369
1987	2,572	50	52	6	211	2,457
1988	2,704	68	39	7	226	2,578
1989	2,784	90	26	15	238	2,647
1990	2,808	116	23	21	214	2,713
1991	2,825	139	31	9	225	2,762
1992	R2,797	166	R37	R9	229	R2,763
1993P	2,882	NA	37	8	NA	2,865

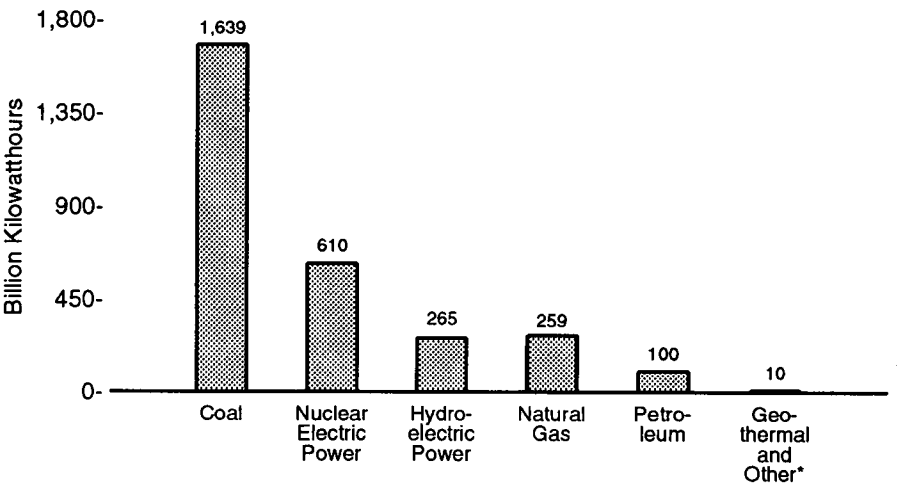
[1] See Note 2 at end of section.
[2] See Glossary.
[3] Electricity transmitted across U.S. borders with Canada and Mexico.
[4] Balancing item, mainly transmission and distribution losses.
[5] Less than 0.5 billion kilowatthours.
R=Revised data. P=Preliminary data. NA=Not available.
Notes: • See Note 3 at end of section. • Totals may not equal sum of components due to independent rounding.
Sources: **Net Generation:** See Table 8.2. **Purchases from Nonutility Power Producers:** • 1978-1985—Federal Energy Regulatory Commission, Form FERC-1, "Annual Report of Major Electric Utilities, Licensees and Others." • 1986 forward—Energy Information Administration (EIA), Form EIA-861, "Annual Electric Utility Report." **Imports and Exports:** • 1949-September 1977—unpublished Federal Power Commission data. • October 1977-1980—unpublished Economic Regulatory Administration (ERA) data. • 1981—Office of Energy Emergency Operations, "Report on Electric Energy Exchanges with Canada and Mexico for Calendar Year 1981," April 1982 (revised June 1982). • 1982 and 1983—ERA, *Electricity Exchanges Across International Borders.* • 1984-1986—ERA, *Electricity Transactions Across International Borders.* • 1987 and 1988—ERA, Form ERA-781R, "Annual Report of International Electrical Export/Import Data." • 1989-1992—Fossil Energy, Form FE-781R, "Annual Report of International Electrical Export/Import Data." • 1993—EIA estimates based on preliminary data from the National Energy Board of Canada and Department of Energy, Fossil Energy. **Consumption:** See Table 8.5.

Figure 8.2 Electric Utility Net Generation of Electricity by Energy Source

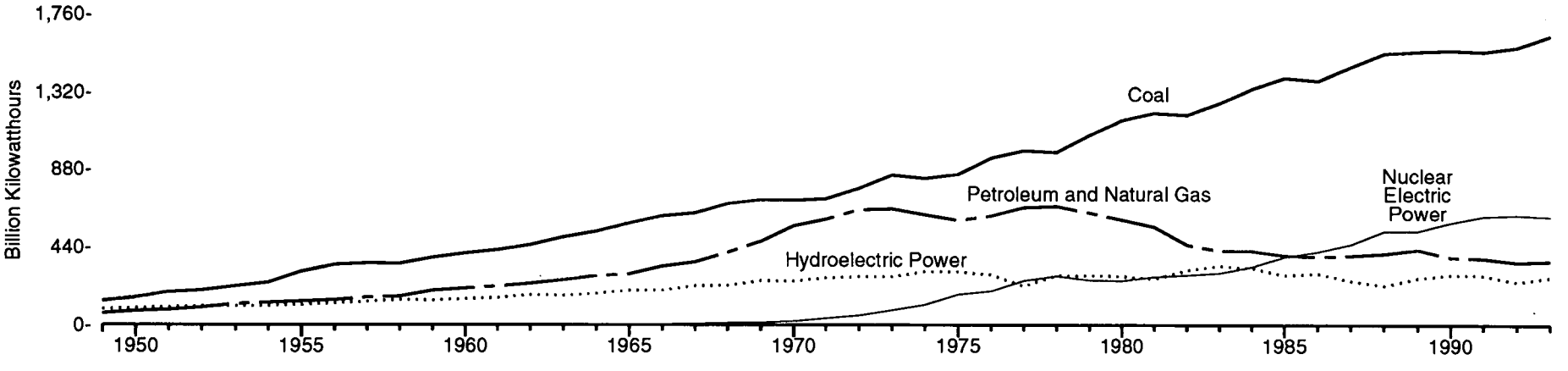
Total, 1949-1993



By Major Energy Source, 1993



Total, 1949-1993



*"Other" is wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 8.2.

Table 8.2 Electric Utility Net Generation of Electricity by Energy Source, 1949-1993

(Billion Kilowatthours)

Year	Fossil Fuels				Nuclear Electric Power	Hydroelectric Pumped Storage [2]	Renewable Energy			Total
	Coal	Natural Gas	Petroleum [1]	Total			Conventional Hydroelectric Power	Geothermal Energy and Other [3]	Total	
1949	135	37	29	201	0	(4)	90	(5)	90	291
1950	155	45	34	233	0	(4)	96	(5)	96	329
1951	185	57	29	271	0	(4)	100	(5)	100	371
1952	195	68	30	294	0	(4)	105	(5)	106	399
1953	219	80	38	337	0	(4)	105	(5)	106	443
1954	239	94	32	364	0	(4)	107	(5)	107	472
1955	301	95	37	434	0	(4)	113	(5)	113	547
1956	339	104	36	478	0	(4)	122	(5)	122	601
1957	346	114	40	501	(5)	(4)	130	(5)	130	632
1958	344	120	40	504	(5)	(4)	140	(5)	140	645
1959	378	147	47	572	(5)	(4)	138	(5)	138	710
1960	403	158	48	609	1	(4)	146	(5)	146	756
1961	422	169	49	640	2	(4)	152	(5)	152	794
1962	450	184	49	683	2	(4)	169	(5)	169	855
1963	494	202	52	748	3	(4)	166	(5)	166	917
1964	526	220	57	803	3	(4)	177	(5)	177	984
1965	571	222	65	857	4	(4)	194	(5)	194	1,055
1966	613	251	79	944	6	(4)	195	1	195	1,144
1967	630	265	89	985	8	(4)	222	1	222	1,214
1968	685	304	104	1,094	13	(4)	222	1	223	1,329
1969	706	333	138	1,177	14	(4)	250	1	251	1,442
1970	704	373	184	1,261	22	(4)	248	1	249	1,532
1971	713	374	220	1,307	38	(4)	266	1	267	1,613
1972	771	376	274	1,421	54	(4)	273	2	274	1,750
1973	848	341	314	1,503	83	(4)	272	2	274	1,861
1974	828	320	301	1,449	114	(4)	301	3	304	1,867
1975	853	300	289	1,442	173	(4)	300	3	303	1,918
1976	944	295	320	1,559	191	(4)	284	4	288	2,038
1977	985	306	358	1,649	251	(4)	220	4	225	2,124
1978	976	305	365	1,646	276	(4)	280	3	284	2,206
1979	1,075	329	304	1,708	255	(4)	280	4	284	2,247
1980	1,162	346	246	1,754	251	(4)	276	6	282	2,286
1981	1,203	346	206	1,755	273	(4)	261	6	267	2,295
1982	1,192	305	147	1,644	283	(4)	309	5	314	2,241
1983	1,259	274	144	1,678	294	(4)	332	6	339	2,310
1984	1,342	297	120	1,759	328	(4)	321	9	330	2,416
1985	1,402	292	100	1,794	384	(4)	281	11	292	2,470
1986	1,386	249	137	1,771	414	(4)	291	12	302	2,487
1987	1,464	273	118	1,855	455	(4)	250	12	262	2,572
1988	1,541	253	149	1,942	527	(4)	223	12	235	2,704
1989	1,554	267	158	1,979	529	(4)	265	11	276	2,784
1990	1,560	264	117	1,941	577	-4	283	11	294	2,808
1991	1,551	264	111	1,927	613	-5	280	10	290	2,825
1992	R1,576	264	R89	R1,929	619	-4	244	10	254	R2,797
1993P	1,639	259	100	1,997	610	-4	269	10	279	2,882

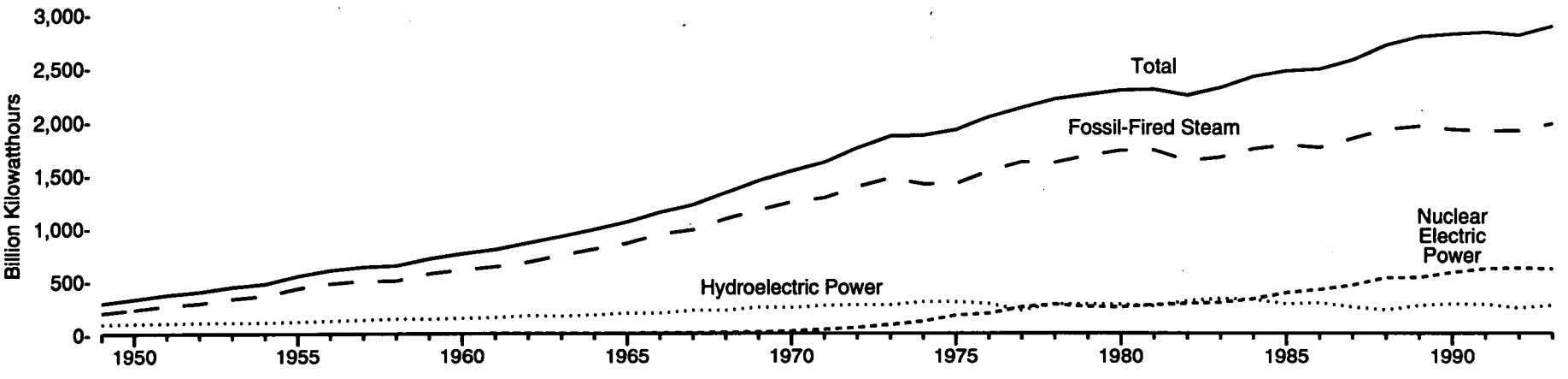
[1] Distillate fuel oil, residual fuel oil (including crude oil burned as fuel), jet fuel, and petroleum coke.
[2] Represents total pumped storage facility production minus energy used for pumping.
[3] "Other" is wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution. See Table 10.8 for components of this column.
[4] Included in conventional hydroelectric power.
[5] Less than 0.5 billion kilowatthours.
R=Revised data. P=Preliminary data.

Notes: • See Notes 2 and 3 at end of section. • Totals may not equal sum of components due to independent rounding.

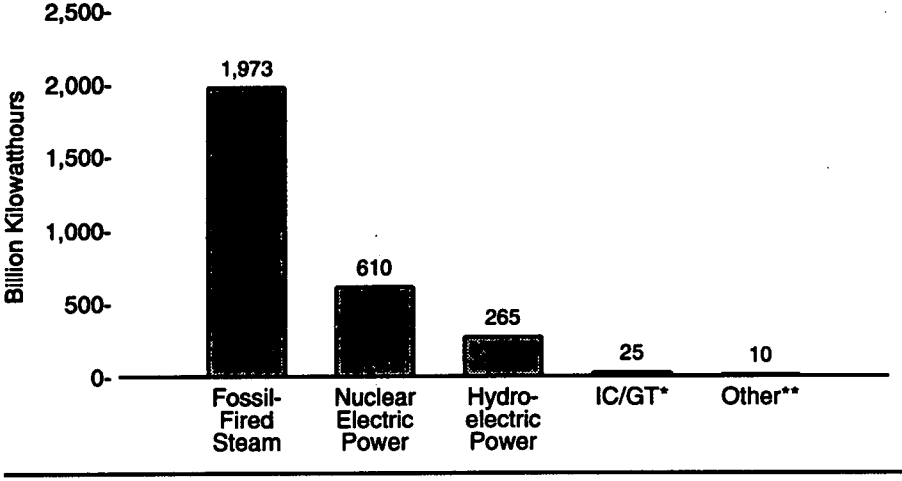
Sources: • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 8.3 Electric Utility Net Generation of Electricity by Prime Mover

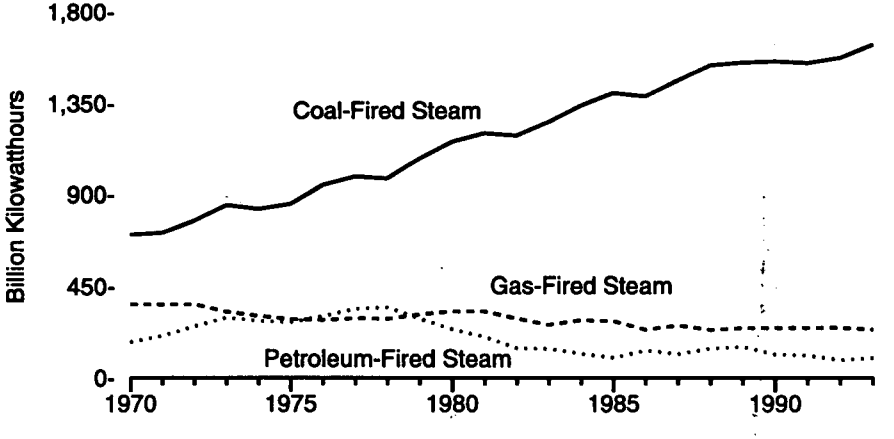
Total, 1949-1993



Total by Prime Mover, 1993



Fossil-Fired Steam by Fuel, 1970-1993



*IC/GT is internal combustion and gas combustion turbine units.
**"Other" is geothermal, wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 8.3.

Table 8.3 Electric Utility Net Generation of Electricity by Prime Mover, 1949-1993

(Billion Kilowatthours)

Year	Fossil-Fired Steam				Internal Combustion and Gas Turbine	Nuclear Electric Power	Hydroelectric Power			Other [1]	Total
	Coal-Fired	Petroleum-Fired	Gas-Fired	Total			Conventional	Pumped Storage	Total		
1949	135	NA	NA	197	3	0	90	(2)	90	(3)	291
1950	155	NA	NA	229	4	0	96	(2)	96	(3)	329
1951	185	NA	NA	267	4	0	100	(2)	100	(3)	371
1952	195	NA	NA	290	4	0	105	(2)	105	(3)	399
1953	219	NA	NA	333	4	0	105	(2)	105	(3)	443
1954	239	NA	NA	361	4	0	107	(2)	107	(3)	472
1955	301	NA	NA	430	4	0	113	(2)	113	(3)	547
1956	339	NA	NA	474	4	0	122	(2)	122	(3)	601
1957	346	NA	NA	497	4	(3)	130	(2)	130	(3)	632
1958	344	NA	NA	500	4	(3)	140	(2)	140	(3)	645
1959	378	NA	NA	567	4	(3)	138	(2)	138	(3)	710
1960	403	NA	NA	603	4	1	146	(2)	146	(3)	756
1961	422	NA	NA	634	5	2	152	(2)	152	(3)	794
1962	450	NA	NA	677	5	2	169	(2)	169	(3)	855
1963	494	NA	NA	742	5	3	166	(2)	166	(3)	917
1964	526	NA	NA	798	6	3	177	(2)	177	(3)	984
1965	571	NA	NA	851	6	4	194	(2)	194	(3)	1,055
1966	613	NA	NA	938	5	6	195	(2)	195	1	1,144
1967	630	NA	NA	980	5	8	222	(2)	222	1	1,214
1968	685	NA	NA	1,084	9	13	222	(2)	222	1	1,329
1969	706	NA	NA	1,163	14	14	250	(2)	250	1	1,442
1970	704	174	361	1,240	22	22	248	(2)	248	1	1,532
1971	713	206	360	1,279	28	38	266	(2)	266	1	1,613
1972	771	253	361	1,385	36	54	273	(2)	273	2	1,750
1973	848	296	323	1,467	36	83	272	(2)	272	2	1,861
1974	828	279	304	1,411	38	114	301	(2)	301	3	1,867
1975	853	273	288	1,414	28	173	300	(2)	300	3	1,918
1976	944	302	284	1,530	29	191	284	(2)	284	4	2,038
1977	985	338	292	1,615	34	251	220	(2)	220	4	2,124
1978	976	345	290	1,610	36	276	280	(2)	280	3	2,206
1979	1,075	290	311	1,676	32	255	280	(2)	280	4	2,247
1980	1,162	238	326	1,726	28	251	276	(2)	276	6	2,286
1981	1,203	202	325	1,730	25	273	261	(2)	261	6	2,295
1982	1,192	144	291	1,628	16	283	309	(2)	309	5	2,241
1983	1,259	141	261	1,661	17	294	332	(2)	332	6	2,310
1984	1,342	117	284	1,742	17	328	321	(2)	321	9	2,416
1985	1,402	97	279	1,778	16	384	281	(2)	281	11	2,470
1986	1,386	133	236	1,756	15	414	291	(2)	291	12	2,487
1987	1,464	115	258	1,837	18	455	250	(2)	250	12	2,572
1988	1,541	144	236	1,921	22	527	223	(2)	223	12	2,704
1989	1,554	151	245	1,950	29	529	265	(2)	265	11	2,784
1990	1,560	113	246	1,919	22	577	283	-4	280	11	2,808
1991	1,551	108	246	1,905	22	613	280	-5	276	10	2,825
1992	R1,576	86	R246	R1,908	21	619	244	-4	R240	10	R2,797
1993P	1,639	96	238	1,973	25	610	269	-4	265	10	2,882

[1] "Other" is geothermal, wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution.

[2] Included in conventional hydroelectric power.

[3] Less than 0.5 billion kilowatthours.

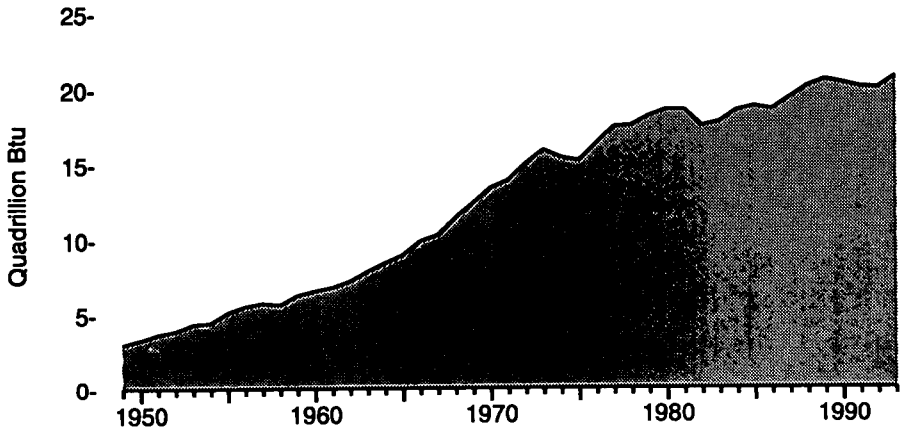
R=Revised data. P=Preliminary data. NA=Not available.

Notes: • See Notes 2 and 3 at end of section. • Totals may not equal sum of components due to independent rounding.

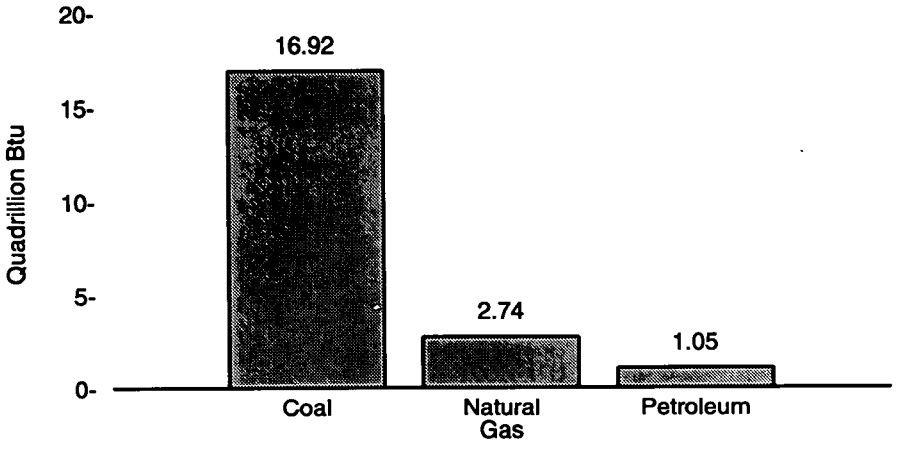
Sources: • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 8.4 Electric Utility Consumption of Fossil Fuels To Generate Electricity

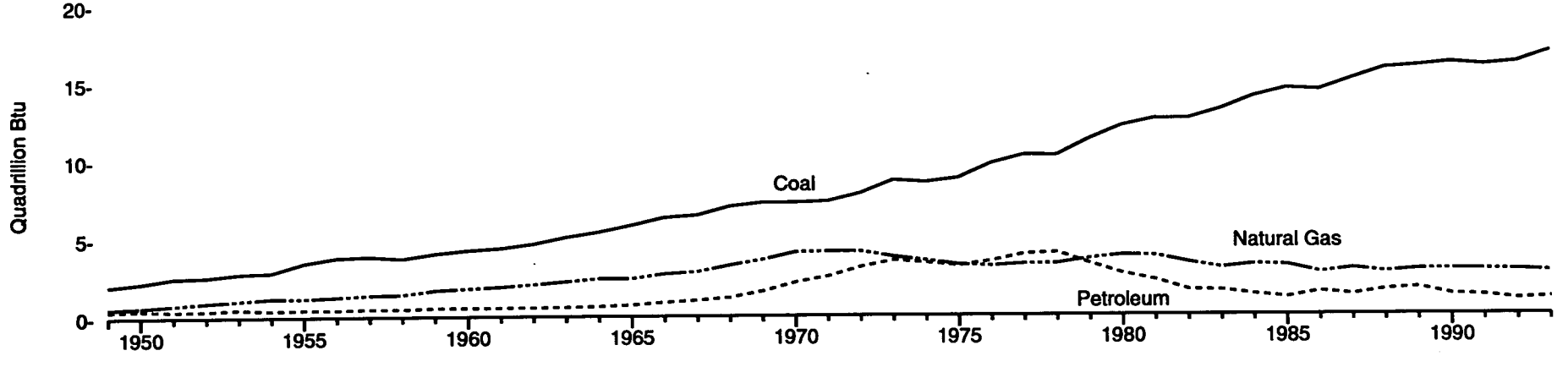
Total, 1949-1993



By Energy Source, 1993



By Energy Source, 1949-1993



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 8.4.

Table 8.4 Electric Utility Consumption of Fossil Fuels To Generate Electricity, 1949-1993

Year	Coal		Natural Gas		Petroleum [1]		Total
	Million Short Tons	Quadrillion Btu	Billion Cubic Feet	Quadrillion Btu	Million Barrels	Quadrillion Btu	Quadrillion Btu
1949	84.0	2.00	550.1	0.57	66.3	0.41	2.98
1950	91.9	2.20	628.9	0.65	75.4	0.47	3.32
1951	105.8	2.51	763.9	0.79	63.9	0.40	3.70
1952	107.1	2.56	910.1	0.94	67.2	0.42	3.92
1953	115.9	2.78	1,034.3	1.07	82.2	0.51	4.36
1954	118.4	2.84	1,165.5	1.21	66.7	0.42	4.46
1955	143.8	3.46	1,153.3	1.19	75.3	0.47	5.12
1956	158.3	3.79	1,239.3	1.28	72.7	0.45	5.53
1957	160.8	3.86	1,336.1	1.38	79.7	0.50	5.74
1958	155.7	3.72	1,372.9	1.42	77.7	0.49	5.63
1959	168.4	4.03	1,628.5	1.69	88.3	0.55	6.27
1960	176.7	4.23	1,724.8	1.79	88.2	0.55	6.57
1961	182.2	4.35	1,825.1	1.89	88.9	0.56	6.80
1962	193.3	4.62	1,966.0	2.03	89.3	0.56	7.22
1963	211.3	5.05	2,144.5	2.21	93.3	0.58	7.85
1964	225.4	5.38	2,322.9	2.40	101.1	0.63	8.41
1965	244.8	5.82	2,321.1	2.40	115.2	0.72	8.94
1966	266.5	6.30	2,609.9	2.70	140.9	0.88	9.88
1967	274.2	6.44	2,746.4	2.83	161.3	1.01	10.29
1968	297.8	6.99	3,147.9	3.25	188.6	1.18	11.42
1969	310.6	7.22	3,487.6	3.60	251.0	1.57	12.39
1970	320.2	7.23	3,931.9	4.05	338.7	2.12	13.40
1971	327.3	7.30	3,976.0	4.10	399.5	2.49	13.89
1972	351.8	7.81	3,976.9	4.08	496.9	3.10	14.99
1973	389.2	8.66	3,660.2	3.75	562.8	3.51	15.92
1974	391.8	8.53	3,443.4	3.52	539.4	3.36	15.42
1975	406.0	8.79	3,157.7	3.24	506.5	3.17	15.19
1976	448.4	9.72	3,080.9	3.15	556.3	3.48	16.35
1977	477.1	10.26	3,191.2	3.28	624.2	3.90	17.45
1978	481.2	10.24	3,188.4	3.30	637.8	3.99	17.52
1979	527.1	11.26	3,490.5	3.61	524.6	3.28	18.16
1980	569.3	12.12	3,681.6	3.81	421.1	2.63	18.57
1981	596.8	12.58	3,640.2	3.77	351.8	2.20	18.55
1982	593.7	12.58	3,225.5	3.34	250.5	1.57	17.49
1983	625.2	13.21	2,910.8	3.00	246.8	1.54	17.75
1984	664.4	14.02	3,111.3	3.22	205.7	1.29	18.53
1985	693.8	14.54	3,044.1	3.16	174.6	1.09	18.79
1986	685.1	14.44	2,602.4	2.69	232.0	1.45	18.59
1987	717.9	15.17	2,844.1	2.94	201.1	1.26	19.37
1988	758.4	15.85	2,635.6	2.71	250.1	1.56	20.12
1989	766.9	15.99	2,787.0	2.87	270.0	1.69	20.54
1990	773.5	16.19	2,787.3	2.88	200.2	1.25	20.32
1991	772.3	16.03	2,789.0	2.86	188.5	1.18	20.06
1992	R779.9	R16.21	R2,765.6	2.83	R152.3	0.95	R19.99
1993P	814.0	16.92	2,680.2	2.74	168.7	1.05	20.71

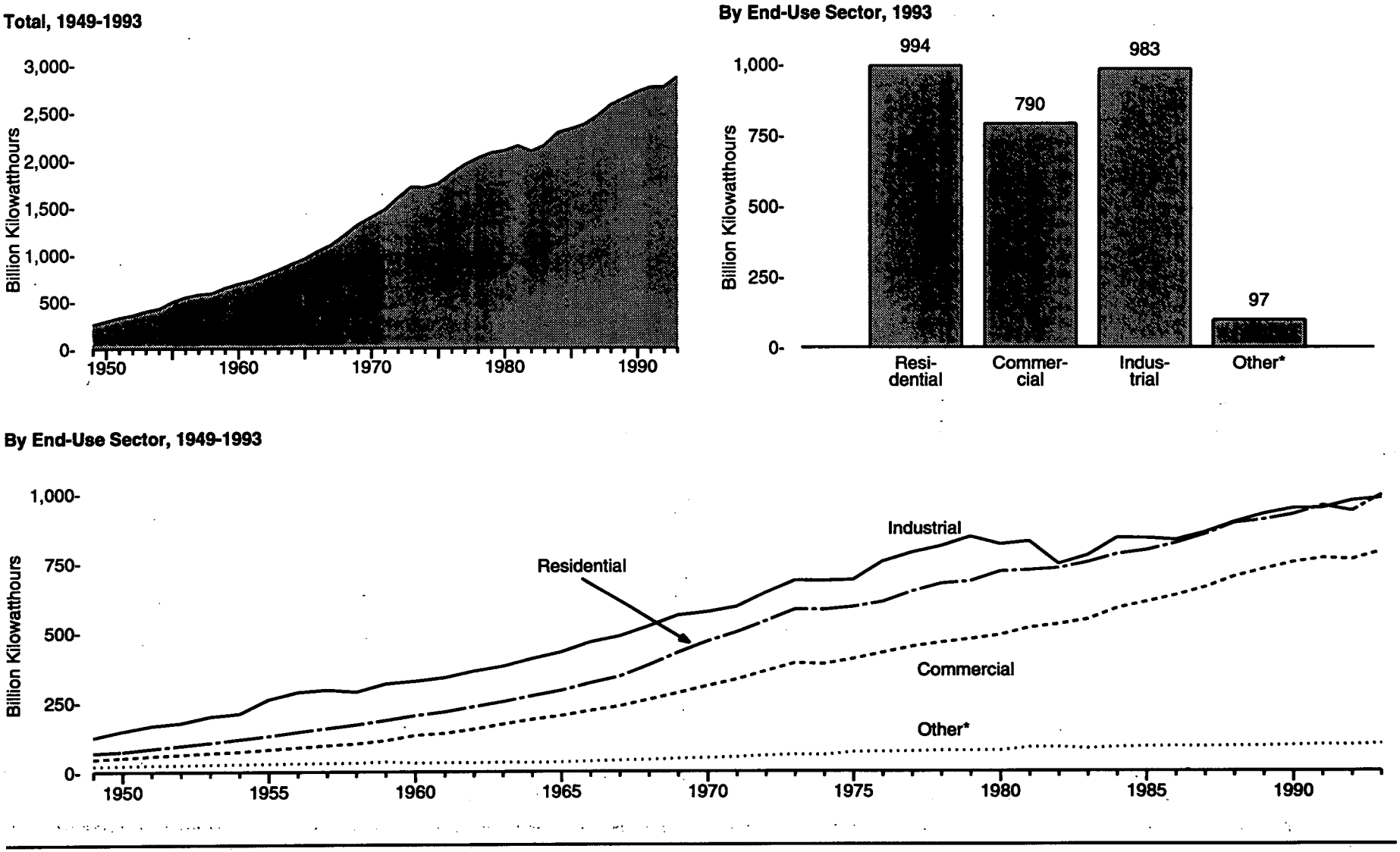
[1] These data are petroleum consumed by electric utilities and do not equate to petroleum supplied to (or delivered to) electric utilities. Included are residual fuel oil (including crude oil burned as fuel), distillate fuel oil, jet fuel, and petroleum coke, which is reported in short tons and has been converted to barrels at a rate of 5 barrels per short ton.

R=Revised data. P=Preliminary data.

Notes: • See Note 3 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 8.5 Electricity Sales by End-Use Sector



*"Other" is public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 8.5.

Table 8.5 Electricity Sales by End-Use Sector, 1949-1993

(Billion Kilowatthours)

Year	Residential	Commercial	Industrial	Other [1]	Total
1949	67	45	123	20	255
1950	72	51	146	22	291
1951	83	57	166	24	330
1952	94	62	176	24	356
1953	104	67	199	26	396
1954	116	72	208	27	424
1955	128	79	260	29	497
1956	143	87	286	30	546
1957	157	94	294	31	576
1958	169	100	287	32	588
1959	185	112	315	36	647
1960	201	131	324	32	688
1961	214	138	337	32	722
1962	233	153	360	32	778
1963	251	171	377	34	833
1964	272	187	405	32	896
1965	291	200	429	34	954
1966	317	218	464	37	1,035
1967	340	234	485	40	1,099
1968	382	258	521	42	1,203
1969	427	282	559	46	1,314
1970	466	307	571	48	1,392
1971	500	329	589	51	1,470
1972	539	359	641	56	1,595
1973	579	388	686	59	1,713
1974	578	385	685	58	1,706
1975	588	403	688	68	1,747
1976	606	425	754	70	1,855
1977	645	447	786	71	1,948
1978	674	461	809	73	2,018
1979	683	473	842	73	2,071
1980	717	488	815	74	2,094
1981	722	514	826	85	2,147
1982	730	526	745	86	2,086
1983	751	544	776	80	2,151
1984	780	583	838	85	2,286
1985	794	606	837	87	2,324
1986	819	631	831	89	2,369
1987	850	660	858	88	2,457
1988	893	699	896	90	2,578
1989	906	726	926	90	2,647
1990	924	751	946	92	2,713
1991	955	766	947	94	2,762
1992	R936	R761	R973	R93	R2,763
1993P	994	790	983	97	2,865

[1] "Other" is public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

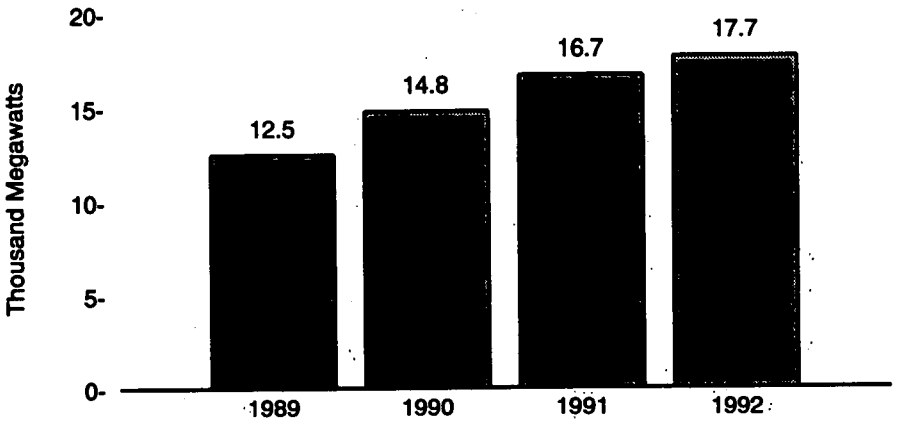
R=Revised data. P=Preliminary data.

Notes: • See Note 4 at end of section. • Totals may not equal sum of components due to independent rounding.

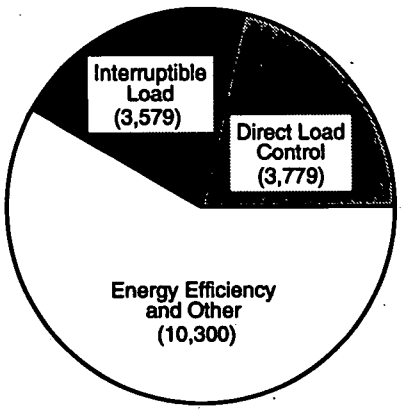
Sources: • 1949-September 1977—Federal Power Commission, Form FPC-5, "Monthly Statement of Electric Operating Revenue and Income." • October 1977-February 1980—Federal Energy Regulatory Commission (FERC), Form FPC-5, "Monthly Statement of Electric Operating Revenue and Income." • March 1980-1982—FERC, Form FPC-5, "Electric Utility Company Monthly Statement." • 1983—Energy Information Administration (EIA), Form EIA-826, "Electric Utility Company Monthly Statement." • 1984-1992—EIA, Form EIA-861, "Annual Electric Utility Report." • 1993—EIA, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Figure 8.6 Electric Utility Demand-Side Management Programs

Actual Peakload Reductions, Total of All Programs, 1989-1992

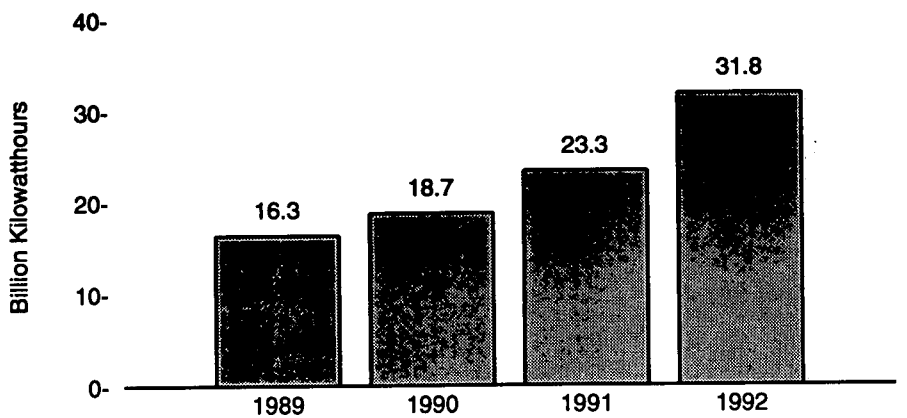


Actual Peakload Reductions by Program, 1992

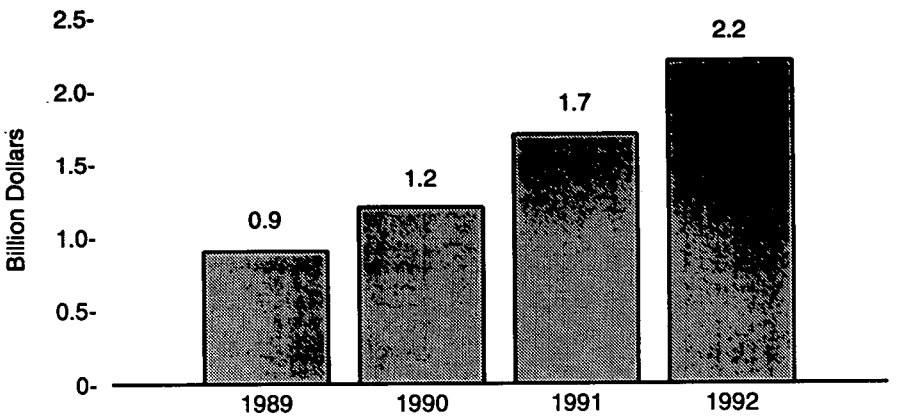


Total: 17,657 Megawatts

Energy Savings, 1989-1992



Costs, 1989-1992



Source: Table 8.6.

Table 8.6 Electric Utility Demand-Side Management Programs: Peakload Reductions, Energy Savings, and Costs, 1989-1992

Year	Actual Peakload Reductions (megawatts)				Energy Savings (million kilowatthours)	Costs (thousand dollars)
	Direct Load Control [1,2]	Interruptible Load [1,3]	Energy Efficiency [4] and Other [5]	Total		
1989	NA	NA	NA	12,463	16,268	872,935
1990	3,692	4,219	6,861	14,772	18,671	1,177,457
1991	5,093	3,674	7,972	16,739	23,343	1,747,933
1992	3,779	3,579	10,300	17,657	31,767	2,243,270

[1] The actual reduction in peak load reflects the change in demand for electricity that results from a utility demand-side management program that is in effect at the time that the utility experiences its actual peak load as opposed to the potential installed peakload reduction capability. Differences between actual and potential peak reduction result from changes in weather, economic activity, and other variable conditions.

[2] Direct load control refers to program activities that can interrupt consumer load at the time of annual peak load by direct control of the utility system operator by interrupting power supply to individual appliances or equipment on consumer premises. This type of control usually involves residential consumers.

[3] Interruptible load refers to program activities that, in accordance with contractual arrangements, can interrupt consumer load at times of seasonal peak load by direct control of the utility system operator or by action of the consumer at the direct request of the system operator. It usually involves commercial and industrial consumers. In some instances, the load reduction may be affected by direct action of the system operator (remote tripping) after notice to the consumer in accordance with contractual provisions.

[4] Energy efficiency refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided. These programs reduce overall electricity consumption, often without explicit consideration for the timing of program-induced savings. Such savings are generally achieved by substituting technically more advanced equipment to produce the same level of end-use services (e.g., lighting, heating, motor drive) with less electricity. Examples include high-efficiency appliances, efficient lighting programs, high-efficiency heating, ventilating and air conditioning systems or control modifications, efficient building design, advanced electric motor drives, and heat recovery systems.

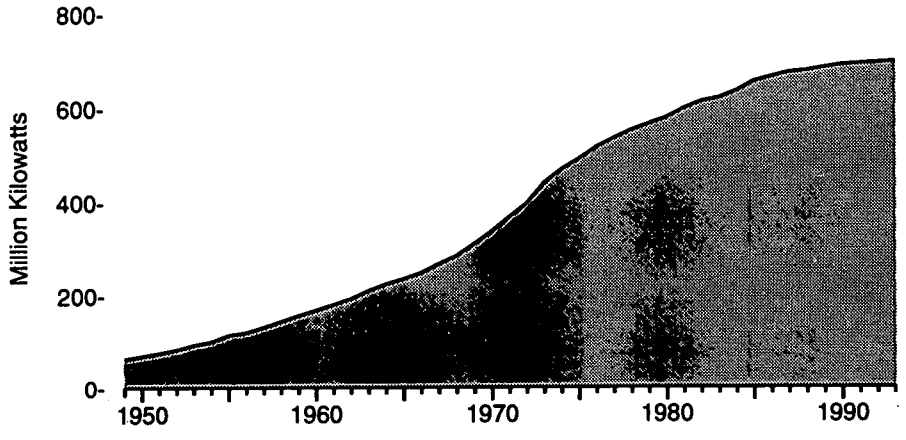
[5] For example, programs that promote consumer's substitution of electricity by other energy types and programs that limit or shift peak load from on-peak to off-peak time periods, such as space heating and water heating storage systems, cool storage systems, and load limiting devices in energy management systems.

NA=Not available.

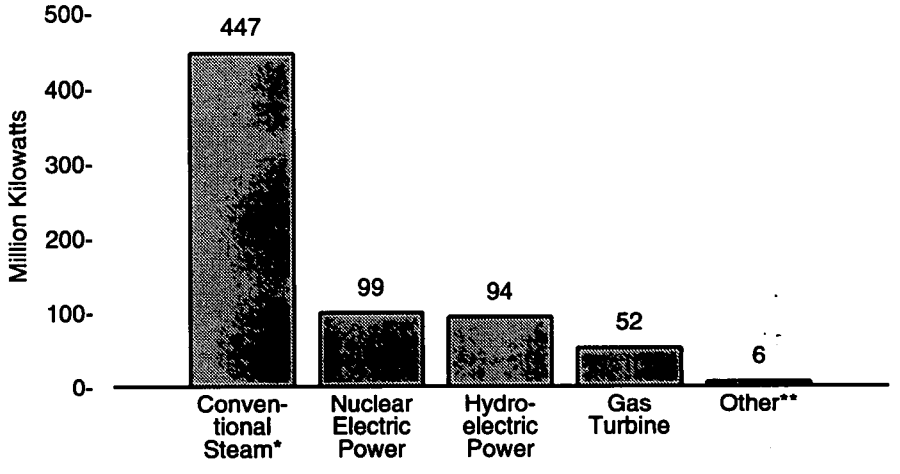
Sources: **Actual Peakload Reductions:** • 1989—Energy Information Administration (EIA), *Electric Power Annual 1992* (January 1994), Table 65. • 1990-1992—EIA, *Electric Power Annual 1992* (January 1994), Table 66. **Energy Savings and Costs:** EIA, *Electric Power Annual 1992* (January 1994), Table 65.

Figure 8.7 Electric Utility Net Summer Capability, End of Year

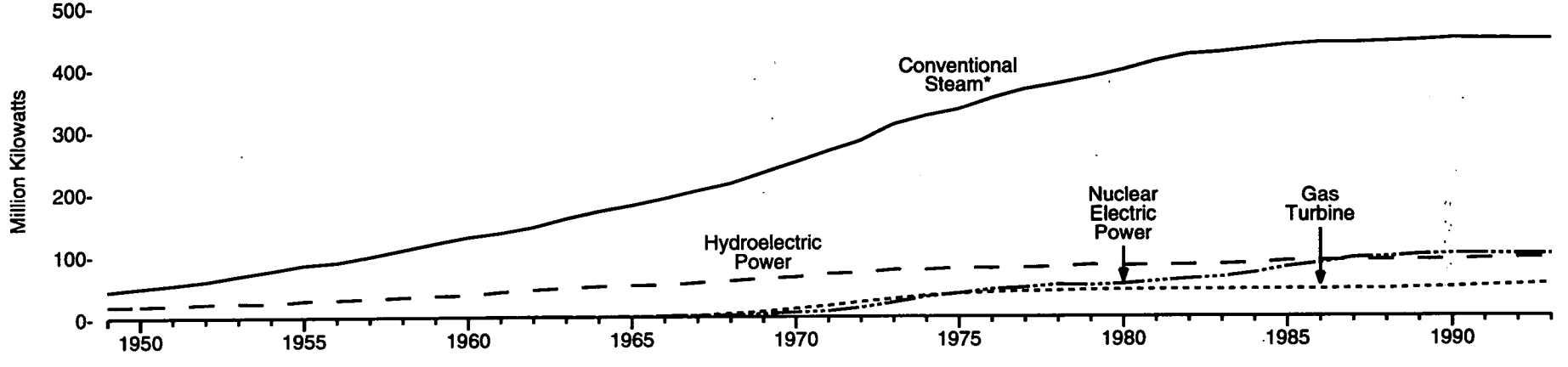
Total, 1949-1993



By Prime Mover, 1993



By Prime Mover, 1949-1993



*Includes fossil steam, wood, and waste.
**"Other" is internal combustion, geothermal, wind, photovoltaic, and solar thermal energy.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 8.7.

Table 8.7 Electric Utility Net Summer Capability, End of Year 1949-1993

(Million Kilowatts)

Year	Conventional Steam [1]	Internal Combustion	Gas Turbine	Nuclear Electric Power	Hydroelectric Power			Geothermal Energy and Other [2]	Total
					Conventional	Pumped Storage	Total		
1949	43.2	1.7	0.0	0.0	18.5	(3)	18.5	(4)	63.4
1950	48.2	1.8	0.0	0.0	19.2	(3)	19.2	(4)	69.2
1951	53.1	1.9	0.0	0.0	20.5	(3)	20.5	(4)	75.5
1952	58.8	2.0	0.0	0.0	22.4	(3)	22.4	(4)	83.2
1953	67.5	2.1	0.0	0.0	23.8	(3)	23.8	(4)	93.3
1954	75.4	2.2	0.0	0.0	22.5	(3)	22.5	(4)	100.0
1955	84.6	2.3	0.0	0.0	27.4	(3)	27.4	(4)	114.2
1956	88.8	2.4	0.0	0.0	28.5	(3)	28.5	(4)	119.7
1957	97.9	2.3	0.0	0.1	30.7	(3)	30.7	(4)	131.1
1958	108.2	2.4	0.0	0.1	32.5	(3)	32.5	(4)	143.3
1959	118.5	2.5	0.0	0.1	34.8	(3)	34.8	(4)	155.9
1960	128.3	2.6	0.0	0.4	35.8	(3)	35.8	(4)	167.1
1961	135.1	2.8	0.0	0.4	40.7	(3)	40.7	(4)	179.0
1962	144.6	2.8	0.0	0.7	44.0	(3)	44.0	(4)	192.1
1963	158.4	3.0	0.5	0.8	47.0	(3)	47.0	(4)	209.7
1964	169.6	3.1	0.8	0.8	49.4	(3)	49.4	(4)	223.7
1965	178.7	3.2	1.1	0.8	51.0	(3)	51.0	(4)	234.8
1966	189.6	3.3	1.6	1.7	51.2	(3)	51.2	(4)	247.5
1967	202.5	3.6	2.8	2.7	55.0	(3)	55.0	0.1	266.7
1968	214.3	3.8	5.3	2.7	57.9	(3)	57.9	0.1	284.0
1969	231.4	4.0	8.4	4.4	61.6	(3)	61.6	0.1	309.8
1970	248.0	4.1	13.3	7.0	63.8	(3)	63.8	0.1	336.4
1971	266.0	4.2	17.9	9.0	69.1	(3)	69.1	0.2	366.4
1972	282.3	4.5	23.9	14.5	70.5	(3)	70.5	0.3	396.0
1973	307.9	4.7	28.8	22.7	75.4	(3)	75.4	0.4	439.8
1974	322.4	4.7	33.7	31.9	75.5	(3)	75.5	0.4	468.5
1975	333.3	4.8	37.1	37.3	78.4	(3)	78.4	0.5	491.3
1976	350.9	5.0	39.1	43.8	78.0	(3)	78.0	0.5	517.2
1977	365.3	5.0	40.3	46.3	78.6	(3)	78.6	0.5	535.9
1978	374.5	5.2	41.2	50.8	79.9	(3)	79.9	0.5	552.1
1979	384.6	5.2	42.5	49.7	82.9	(3)	82.9	0.7	565.5
1980	396.6	5.2	42.5	51.8	81.7	(3)	81.7	0.9	578.6
1981	410.7	5.3	43.2	56.0	82.4	(3)	82.4	0.9	598.3
1982	421.4	4.8	43.5	60.0	83.0	(3)	83.0	1.1	613.7
1983	424.9	4.7	43.3	63.0	83.9	(3)	83.9	1.2	621.1
1984	430.8	4.5	43.5	69.7	85.3	(3)	85.3	1.3	635.1
1985	436.8	4.7	43.9	79.4	88.9	(3)	88.9	1.6	655.2
1986	440.6	4.6	43.4	85.2	89.3	(3)	89.3	1.6	664.8
1987	440.3	4.8	44.2	93.6	89.7	(3)	89.7	1.5	674.1
1988	442.4	4.7	43.9	94.7	90.3	(3)	90.3	1.7	677.7
1989	444.4	4.6	45.4	98.2	90.5	(3)	90.5	1.6	684.6
1990	447.5	4.6	46.3	99.6	73.6	17.3	90.9	1.6	690.5
1991	447.0	4.5	48.3	99.6	73.6	18.4	92.0	1.6	693.0
1992	R446.7	4.5	R49.8	99.0	74.3	19.0	R93.4	R1.7	R695.1
1993P	446.7	4.6	51.9	99.1	74.5	19.0	93.5	1.7	697.5

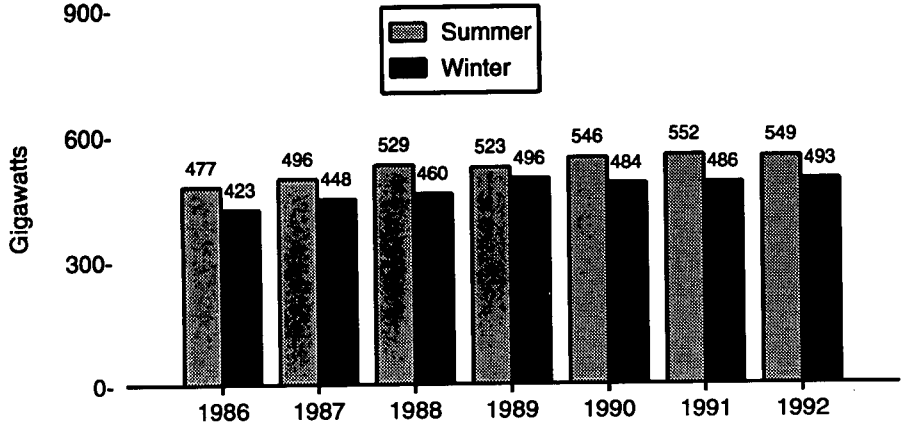
[1] Includes fossil steam, wood, and waste.
[2] "Other" is wind, photovoltaic, and solar thermal energy.
[3] Included in conventional hydroelectric power.
[4] Less than 0.05 million kilowatts.
R=Revised data. P=Preliminary data.

Notes: • See Glossary and Note 5 at end of section. • Totals may not equal sum of components due to independent rounding.

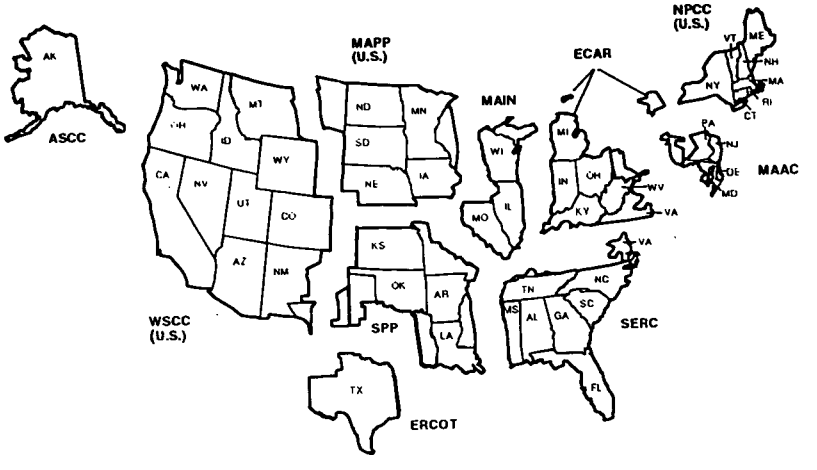
Sources: • 1949-1984—Energy Information Administration (EIA) estimates. • 1985 forward—EIA, Form EIA-860, "Annual Electric Generator Report."

Figure 8.8 Electric Utility Noncoincidental Peak Load

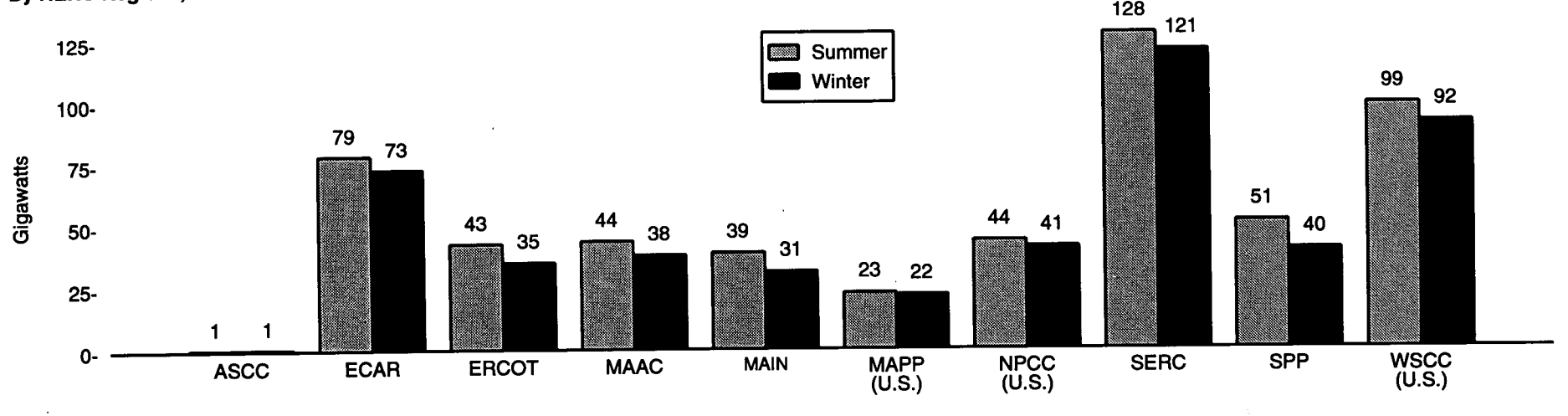
In the Contiguous United States, 1986-1992



North American Electric Reliability Council Map for the United States



By NERC Regions, 1992



Notes: • Noncoincidental peak load is the sum of two or more peak loads on individual systems that do not occur at the sametime interval. See Glossary for information on North American Electric Reliability Council. (NERC). • Because vertical scales differ, graphs should not be compared.
Source: Table 8.8.

Table 8.8 Electric Utility Noncoincidental Peak Load by Region, 1986-1992

(Megawatts)

Year	North American Electric Reliability Council Regions [1]									Contiguous United States	ASCC (Alaska)
	ECAR	ERCOT	MAAC	MAIN	MAPP (U.S.)	NPCC (U.S.)	SERC	SPP	WSCC (U.S.)		
	Summer										
1986	69,606	39,335	37,564	35,943	21,029	39,026	105,570	47,123	81,787	476,983	(2)
1987	72,561	39,339	40,526	37,446	23,162	42,651	109,798	47,723	82,967	496,173	(2)
1988	79,149	40,843	43,110	41,139	24,899	45,245	115,168	49,356	90,551	529,460	(2)
1989	75,442	40,402	41,614	39,460	23,531	45,031	117,051	49,439	90,657	522,627	455
1990	79,258	42,737	42,613	40,740	24,994	44,116	121,149	52,541	97,389	545,537	463
1991	81,539	41,870	45,937	41,598	25,498	46,594	124,688	51,885	92,096	551,705	471
1992	78,550	42,619	43,658	38,819	22,638	43,658	128,236	51,324	99,205	548,707	504
	Winter										
1986	64,561	28,730	32,807	28,036	18,850	37,976	101,849	33,877	76,171	422,857	(2)
1987	68,118	31,399	35,775	30,606	19,335	41,902	105,476	34,472	81,182	448,265	(2)
1988	67,771	34,621	36,363	30,631	20,162	42,951	108,649	35,649	82,937	459,734	(2)
1989	73,080	38,388	38,161	33,770	20,699	42,588	121,995	42,268	84,768	495,717	626
1990	67,097	35,815	36,551	32,461	21,113	40,545	117,231	38,949	94,252	484,014	613
1991	71,181	35,448	37,983	33,420	21,432	41,786	119,575	38,759	86,097	485,681	622
1992	72,885	35,055	37,915	31,289	21,866	41,125	121,250	39,912	91,686	492,983	635

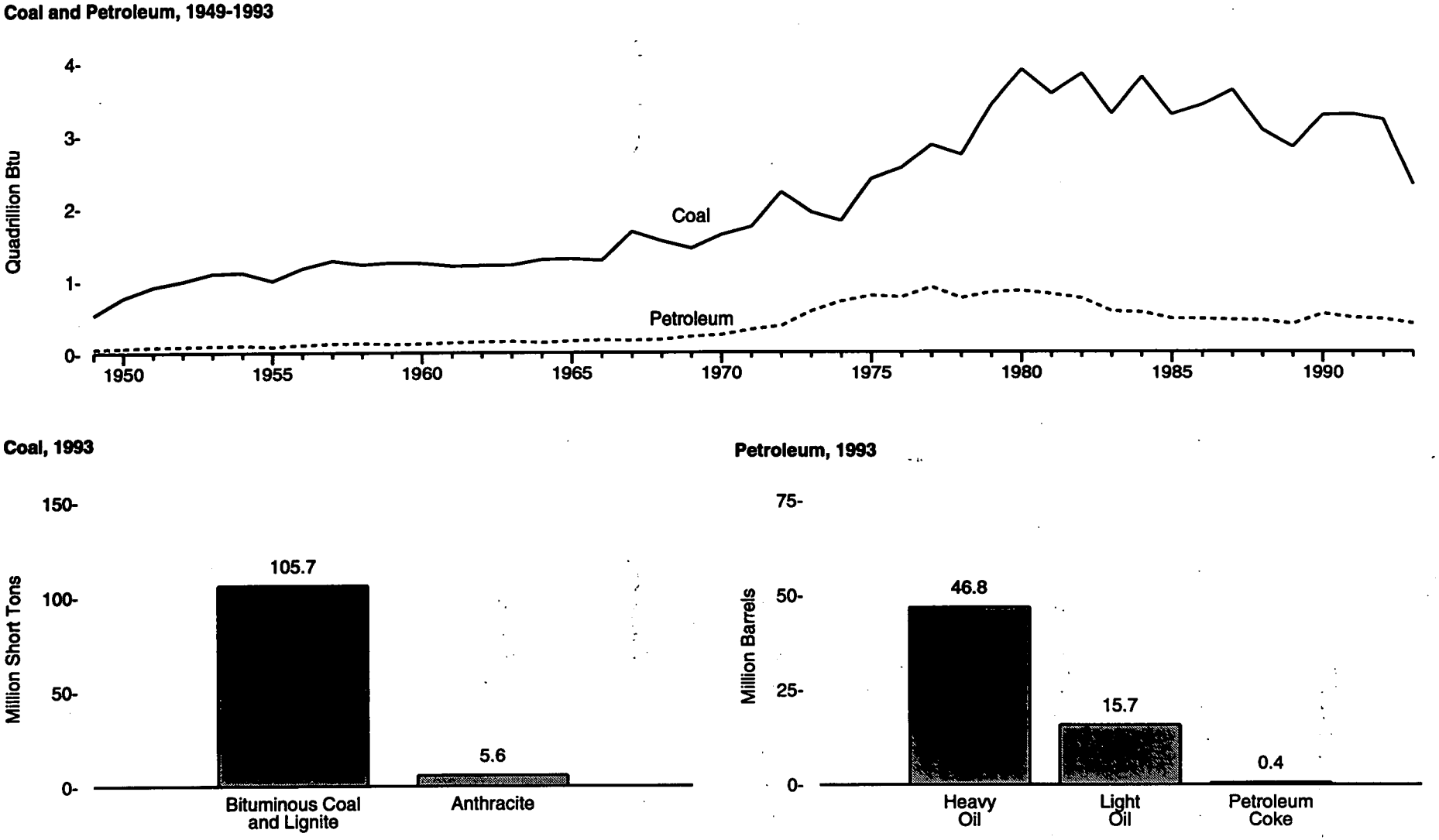
[1] See Glossary for information on the North American Electric Reliability Council (NERC). This table includes the U.S. portion of NERC only and does not cover Hawaii, Puerto Rico, and U.S. Trust Territories. See Figure 8.8 for an illustration of NERC regions.

[2] Data submission for ASCC (Alaska) began in 1989.

Note: Noncoincidental peak load is the sum of two or more peak loads on individual systems that do not occur at the same time interval.

Sources: • 1986—Energy Information Administration (EIA), *Electric Power Annual 1990* (January 1992), Table 53. • 1987 forward—EIA, *Electric Power Annual 1992* (February 1994), Table 52, except for 1991 NPCC and Contiguous United States, which are from EIA, Office of Coal, Nuclear, Electric and Alternate Fuels, Survey Management Division.

Figure 8.9 Electric Utility Stocks of Coal and Petroleum, End of Year



Source: Table 8.9.

Table 8.9 Electric Utility Stocks of Coal and Petroleum, End of Year 1949-1993

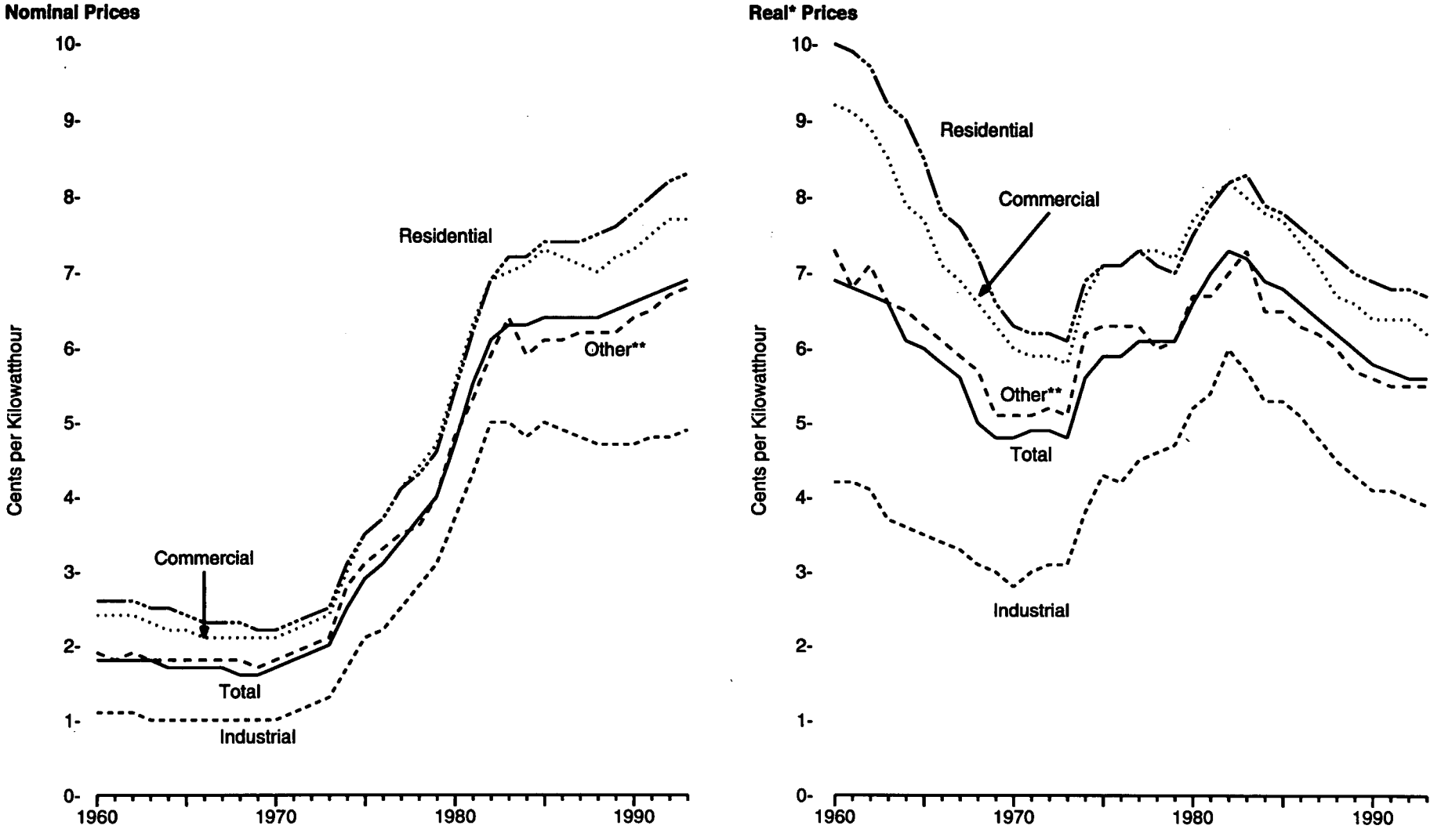
Year	Coal				Petroleum					
	Anthracite [1]	Bituminous Coal [2] and Lignite	Total		Heavy Oil [3]	Light Oil [4]	Total Liquids	Petroleum Coke [5]	Total	
	Million Short Tons		Million Short Tons	Trillion Btu	Million Barrels				Million Barrels	Trillion Btu
1949	4.3	17.8	22.1	524	NA	NA	8.6	NA	8.6	54
1950	4.7	27.1	31.8	762	NA	NA	10.2	NA	10.2	64
1951	5.1	33.4	38.5	913	NA	NA	12.8	NA	12.8	80
1952	5.6	35.9	41.5	991	NA	NA	13.7	NA	13.7	86
1953	5.9	39.8	45.6	1,094	NA	NA	15.0	NA	15.0	94
1954	6.4	39.7	46.1	1,106	NA	NA	15.9	NA	15.9	99
1955	3.2	38.2	41.4	996	NA	NA	13.7	NA	13.7	85
1956	2.8	46.0	48.8	1,168	NA	NA	17.3	NA	17.3	108
1957	2.8	50.3	53.1	1,273	NA	NA	20.1	NA	20.1	126
1958	2.2	48.8	51.0	1,218	NA	NA	20.8	NA	20.8	130
1959	2.0	50.1	52.1	1,247	NA	NA	18.5	NA	18.5	116
1960	1.8	49.9	51.7	1,238	NA	NA	19.6	NA	19.6	123
1961	1.5	48.6	50.1	1,197	NA	NA	22.0	NA	22.0	138
1962	1.4	49.0	50.4	1,205	NA	NA	23.8	NA	23.8	149
1963	1.3	49.3	50.6	1,209	NA	NA	24.9	NA	24.9	156
1964	1.2	52.7	53.9	1,286	NA	NA	22.4	NA	22.4	140
1965	1.1	53.4	54.5	1,297	NA	NA	25.6	NA	25.6	161
1966	1.0	52.9	53.9	1,274	NA	NA	27.4	NA	27.4	172
1967	1.3	69.7	71.0	1,669	NA	NA	26.7	NA	26.7	167
1968	1.3	64.2	65.5	1,538	NA	NA	28.7	NA	28.7	180
1969	1.3	60.6	61.9	1,438	NA	NA	35.3	NA	35.3	221
1970	1.1	70.8	71.9	1,623	NA	NA	38.0	1.2	39.2	245
1971	1.1	76.7	77.8	1,735	NA	NA	49.6	1.5	51.1	319
1972	0.9	98.8	99.7	2,214	NA	NA	57.7	1.4	59.1	368
1973	1.1	85.9	87.0	1,935	NA	NA	89.2	1.6	90.8	567
1974	0.9	82.6	83.5	1,819	NA	NA	112.9	0.2	113.1	705
1975	1.0	109.7	110.7	2,396	NA	NA	125.3	0.2	125.4	784
1976	1.0	116.4	117.4	2,546	NA	NA	121.7	0.2	121.9	762
1977	2.3	130.9	133.2	2,865	NA	NA	144.0	0.2	144.3	901
1978	2.2	126.0	128.2	2,728	NA	NA	118.8	1.0	119.8	749
1979	3.3	156.4	159.7	3,412	NA	NA	131.4	0.9	132.3	828
1980	4.7	178.3	183.0	3,897	105.4	30.0	135.4	0.3	135.6	848
1981	5.5	163.4	168.9	3,561	102.0	26.1	128.1	0.2	128.3	803
1982	6.1	175.1	181.1	3,839	95.5	23.4	118.9	0.2	119.1	745
1983	6.5	149.1	155.6	3,288	70.6	18.8	89.4	0.3	89.7	561
1984	6.7	173.0	179.7	3,792	68.5	19.1	87.6	0.3	87.9	549
1985	7.2	149.2	156.4	3,277	57.3	16.4	73.7	0.2	73.9	462
1986	7.1	154.7	161.8	3,412	56.8	16.3	73.1	0.2	73.3	459
1987	6.9	163.9	170.8	3,610	55.1	15.8	70.8	0.3	71.1	444
1988	6.6	139.9	146.5	3,062	54.2	15.1	69.3	0.4	69.7	436
1989	6.4	129.5	135.9	2,832	47.4	13.8	61.3	0.5	61.8	386
1990	6.5	149.7	156.2	3,268	67.0	16.5	83.5	0.5	84.0	525
1991	6.5	151.4	157.9	3,277	58.6	16.4	75.0	0.4	75.3	471
1992	6.2	R147.9	R154.1	R3,204	56.1	15.7	71.8	0.3	72.2	451
1993P	5.6	105.7	111.3	2,314	46.8	15.7	62.4	0.4	62.9	392

[1] Includes anthracite silt stored off-site.
[2] Includes subbituminous coal.
[3] Includes Grade Nos. 4, 5, and 6, and residual fuel oils.
[4] Includes Grade No. 2 heating oil, kerosene, and jet fuel.
[5] Petroleum coke, which is reported in short tons, has been converted to barrels at a rate of 5 barrels per short ton.
R=Revised data. P=Preliminary data. NA=Not available.

Notes: • See Note 3 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 8.10 Retail Prices of Electricity Sold by Electric Utilities, 1960-1993



*In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

**"Other" is public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

Source: Table 8.10.

Table 8.10 Retail Prices of Electricity Sold by Electric Utilities, 1960-1993

(Cents per Kilowatthour)

Year	Residential		Commercial		Industrial		Other [1]		Total	
	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]	Nominal	Real [2]
1960	2.6	10.0	2.4	9.2	1.1	4.2	1.9	7.3	1.8	6.9
1961	2.6	9.9	2.4	9.1	1.1	4.2	1.8	6.8	1.8	6.8
1962	2.6	9.7	2.4	8.9	1.1	4.1	1.9	7.1	1.8	6.7
1963	2.5	9.2	2.3	8.5	1.0	3.7	1.8	6.6	1.8	6.6
1964	2.5	9.0	2.2	7.9	1.0	3.6	1.8	6.5	1.7	6.1
1965	2.4	8.5	2.2	7.7	1.0	3.5	1.8	6.3	1.7	6.0
1966	2.3	7.8	2.1	7.1	1.0	3.4	1.8	6.1	1.7	5.8
1967	2.3	7.6	2.1	6.9	1.0	3.3	1.8	5.9	1.7	5.6
1968	2.3	7.2	2.1	6.6	1.0	3.1	1.8	5.7	1.6	5.0
1969	2.2	6.6	2.1	6.3	1.0	3.0	1.7	5.1	1.6	4.8
1970	2.2	6.3	2.1	6.0	1.0	2.8	1.8	5.1	1.7	4.8
1971	2.3	6.2	2.2	5.9	1.1	3.0	1.9	5.1	1.8	4.9
1972	2.4	6.2	2.3	5.9	1.2	3.1	2.0	5.2	1.9	4.9
1973	2.5	6.1	2.4	5.8	1.3	3.1	2.1	5.1	2.0	4.8
1974	3.1	6.9	3.0	6.7	1.7	3.8	2.8	6.2	2.5	5.6
1975	3.5	7.1	3.5	7.1	2.1	4.3	3.1	6.3	2.9	5.9
1976	3.7	7.1	3.7	7.1	2.2	4.2	3.3	6.3	3.1	5.9
1977	4.1	7.3	4.1	7.3	2.5	4.5	3.5	6.3	3.4	6.1
1978	4.3	7.1	4.4	7.3	2.8	4.6	3.6	6.0	3.7	6.1
1979	4.6	7.0	4.7	7.2	3.1	4.7	4.0	6.1	4.0	6.1
1980	5.4	7.5	5.5	7.7	3.7	5.2	4.8	6.7	4.7	6.6
1981	6.2	7.9	6.3	8.0	4.3	5.4	5.3	6.7	5.5	7.0
1982	6.9	8.2	6.9	8.2	5.0	6.0	5.9	7.0	6.1	7.3
1983	7.2	8.3	7.0	8.0	5.0	5.7	6.4	7.3	6.3	7.2
1984[3]	7.2	7.9	7.1	7.8	4.8	5.3	5.9	6.5	6.3	6.9
1985[3]	7.4	7.8	7.3	7.7	5.0	5.3	6.1	6.5	6.4	6.8
1986[3]	7.4	7.6	7.2	7.4	4.9	5.1	6.1	6.3	6.4	6.6
1987[3]	7.4	7.4	7.1	7.1	4.8	4.8	6.2	6.2	6.4	6.4
1988	7.5	7.2	7.0	6.7	4.7	4.5	6.2	6.0	6.4	6.2
1989	7.6	7.0	7.2	6.6	4.7	4.3	6.2	5.7	6.5	6.0
1990	7.8	6.9	7.3	6.4	4.7	R4.1	6.4	R5.6	6.6	5.8
1991	8.0	6.8	7.5	6.4	4.8	4.1	6.5	5.5	6.7	5.7
1992	8.2	6.8	R7.7	R6.4	4.8	4.0	6.7	5.5	6.8	5.6
1993[P]	8.3	6.7	7.7	6.2	4.9	3.9	6.8	5.5	6.9	5.6

[1] "Other" is public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

[2] In 1987 dollars, calculated by using gross domestic product implicit price deflators. See Appendix D.

[3] These data are revised by using the Form EIA-861, "Annual Electric Utility Report," and differ from the Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions," data published in previous issues of this publication.

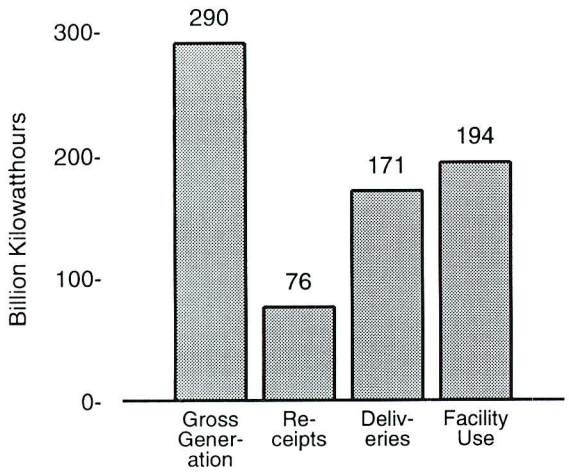
R=Revised data. P=Preliminary data.

Note: Data 1979 and earlier are for Classes A and B privately owned electric utilities only. Data 1980 forward are for selected Class A utilities whose electric operating revenues were $100 million or more during the previous year.

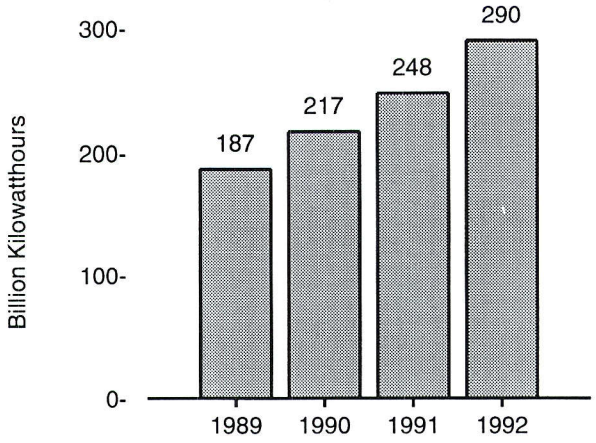
Sources: • 1960 through September 1977—Federal Power Commission, Form FPC-5, "Monthly Statement of Electric Operating Revenues and Income." • October 1977 through February 1980—Federal Energy Regulatory Commission (FERC), Form FPC-5, "Monthly Statement of Electric Operating Revenues and Income." • March 1980 through 1982—FERC, Form FERC-5, "Electric Utility Company Monthly Statement." • 1983—Energy Information Administration (EIA), Form EIA-826, "Electric Utility Company Monthly Statement." • 1984-1992—EIA, Form EIA-861, "Annual Electric Utility Report." • 1993—EIA, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Figure 8.11 Nonutility Power Overview, 1989-1992

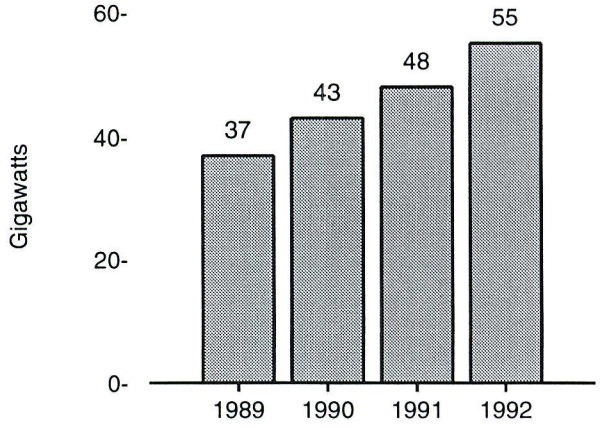
Supply and Disposition, 1992



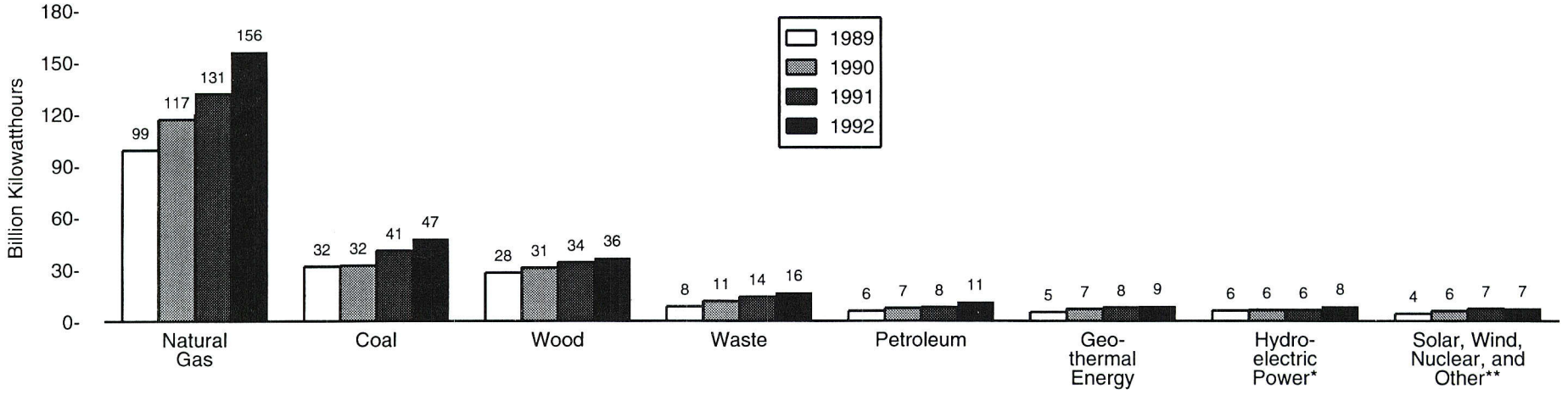
Gross Generation, 1989-1992



Installed Nameplate Capacity, 1989-1992



Gross Generation by Major Sources, 1989-1992



*Conventional hydroelectric power only; there are no pumped-storage projects in the nonutility sector.
**"Other" includes hydrogen, sulfur, batteries, chemicals, fish oil, and spent sulfite liquor.
Notes: • Data cover only facilities with installed nameplate capacity of 5 megawatts or more. • See Table 8.11 for descriptions of fuels. • Because vertical scales differ, graphs should not be compared.
Source: Table 8.11.

Table 8.11 Nonutility Power Overview, 1989-1992

Item	1989	1990	1991	1992 P		
	5 Megawatts or Greater [1]			5 Megawatts or Greater [1]	1 Megawatt to Less than 5 Megawatts [1]	Total [1]
Supply and Disposition (million kilowatthours)						
Gross Generation	187,356	217,241	248,448	289,856	6,145	296,001
Receipts [2]	61,479	63,743	68,264	76,198	7,223	83,421
Deliveries [3]	R98,916	R126,048	R140,537	171,836	3,324	175,160
Facility Use	R149,918	R154,936	R176,175	194,218	10,043	204,261
Gross Generation (million kilowatthours)	**187,356**	**217,241**	**248,448**	**289,856**	**6,145**	**296,001**
Coal [4]	31,511	32,131	40,587	47,160	203	47,363
Natural Gas [5]	98,875	116,706	131,340	156,317	2,481	158,798
Petroleum [6]	5,742	7,330	7,814	10,692	271	10,963
Hydroelectric Power [7]	5,931	6,235	6,243	7,611	1,835	9,446
Geothermal Energy	5,046	6,872	7,651	8,533	45	8,578
Wood [8]	27,835	30,812	33,785	36,024	231	36,255
Waste [9]	8,296	11,415	13,956	16,330	1,022	17,352
Solar	489	663	779	746	0	746
Wind	1,833	2,251	2,606	2,872	44	2,916
Nuclear [10]	49	116	80	67	0	67
Other [11]	1,750	2,710	3,609	3,504	12	3,516
Installed Nameplate Capacity (megawatts)	**36,645**	**42,869**	**48,171**	**55,163**	**1,651**	**56,814**
Coal [4]	6,229	6,712	7,291	8,443	60	8,503
Natural Gas [5]	13,999	16,682	20,259	21,104	438	21,542
Petroleum [6]	917	811	1,207	1,579	151	1,730
Petroleum and Natural Gas (dual fired)	4,439	6,167	5,049	8,354	124	8,478
Hydroelectric Power [7]	1,386	1,477	1,587	2,133	551	2,684
Geothermal Energy	944	1,031	1,048	1,243	11	1,254
Wood [8]	5,254	5,786	6,580	6,735	70	6,805
Waste [9]	1,742	2,230	2,627	2,805	201	3,006
Solar	200	360	360	360	0	360
Wind	1,339	1,405	1,652	1,786	36	1,822
Nuclear [10]	20	20	20	20	0	20
Other [11]	176	187	491	602	9	611

[1] Installed nameplate capacity. Facilities with capacity less than 5 megawatts were not surveyed prior to 1992.

[2] Includes purchases, interchanges, and exchanges of electric energy with utilities and other nonutilities.

[3] Includes sales, interchanges, and exchanges of electric energy with utilities and other nonutilities. The disparity in these data and data reported on other EIA surveys occurs due to differences in the respondent universe. The Form EIA-867 is filed by nonutilities reporting the energy delivered, while other data sources are filed by electric utilities reporting energy received. Differences in terminology and accounting procedures attribute to the disparity. In addition, because the frame for the Form EIA-867 is derived from utility surveys, the Form EIA-867 universe lags 1 year.

[4] Includes coal, anthracite culm, and coal waste.

[5] Includes natural gas, butane, ethane, propane, waste heat, and waste gases.

[6] Includes petroleum, petroleum coke, diesel, kerosene, and petroleum sludge and tar.

[7] Conventional hydroelectric power only; there are no pumped-storage projects in the nonutility sector.

[8] Includes wood, wood waste, peat, wood liquors, railroad ties, pitch, and wood sludge.

[9] Includes municipal solid waste, agricultural waste, straw, tires, landfill gases, and other waste.

[10] Nuclear reactor and generator at Argonne National Laboratory used primarily for research and development in testing reactor fuels as well as for training. The generation from the unit is used for internal consumption.

[11] Includes hydrogen, sulfur, batteries, chemicals, fish oil, and spent sulfite liquor. Data previously published for other energy sources in 1989 and 1990 have been reclassified and are included in the category that best reflects its characteristics.

R=Revised data. P=Preliminary data.

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *Electric Power Annual 1992* (January 1994), Table ~~65~~ 74.

Electricity Notes

1. Electrical system energy losses are estimated as the difference between total energy input at electric utilities and the total energy content of electricity sold to end-use consumers. Most of these losses occur at steam-electric power plants (conventional and nuclear) in the conversion of heat energy into mechanical energy to turn electric generators. This loss is a thermodynamically necessary feature of the steam-electric cycle. Part of the energy input-to-output losses are a result of imputing fossil energy equivalent inputs for hydroelectric and other energy sources, since there is no generally accepted practice for measuring these thermal conversion rates. In addition to conversion losses, other losses include power plant use of electricity, transmission and distribution of electricity from power plants to end-use consumers (also called "line-losses"), and unaccounted-for electricity. Total losses are allocated to the end-use sectors in proportion to each sector's share of total electricity sales. Overall, approximately 67 percent of total energy input is lost in conversion; of electricity generated, approximately 5 percent is lost in plant use and 9 percent is lost in transmission and distribution. Calculated electrical energy system losses may be less than actual losses, because primary consumption does not include the energy equivalent of utility purchases of electricity from non-electric utilities and from Canada and Mexico, although they are included in electricity sales.

2. Data on the generation of electricity in the United States represent net generation, which is gross output of electricity (measured at the generator terminals) minus power plant use. Nuclear electricity generation data identified by individual countries in Section 11 are gross output of electricity.

3. Prior to 1985, electric utility supply and distribution statistics included data reported by institutions (such as universities) and military facilities that generated electricity primarily for their own use. Beginning in 1985, electricity statistics exclude data for these facilities and include data only for those organizations that generate electricity primarily for public use. In 1989, data for nonutility power producers (cogenerators, small power producers, and independent power producers) are provided.

4. Data on the sales of electric utility electricity represent gross output of electricity (measured at the generator terminals) minus power plant use and transmission and distribution losses. Included in each end-use sector are the following: commercial sector—sales of electricity to businesses that generally require less than 1,000 kilowatts of service; industrial sector—sales of electricity to businesses that generally require more than 1,000 kilowatts of service; residential sector—sales of electricity to residences for household purposes; "other" sector—sales of electricity for public street and highway lighting, to public authorities, railways, and railroads, and interdepartmental sales.

5. Net summer capabilities were first collected on Form EIA-860 for 1984. Units not assigned a net summer capability rating by the utility were given an estimated rating by use of a statistical relationship between installed nameplate capacity and net summer capability for each prime mover. To estimate net summer capability for 1949-1984, two methods were used. For each prime mover except nuclear and "other," net summer capability estimates were calculated in two steps. First, the unit capacity values reported on Form EIA-860 and the unit start dates contained in the 1984 Generating Unit Reference File (GURF) were used to compute preliminary aggregate estimates of annual net summer capability and installed nameplate capacity. These preliminary estimates were obtained by aggregating unit capacity values for all units in service during a given year. Next, the ratio of the preliminary capability to nameplate estimate was computed for each year and multiplied by the previously published installed nameplate capacity values to produce the final estimates of net summer capability. The net summer capability data for nuclear and "other" units were used directly from the 1984 GURF for all years. Historical aggregates were then developed by using the unit start dates on the GURF.

Historical capacity has also been modified to estimate capability based upon the operable definition. This was accomplished by assuming that nonnuclear generating units became operable between 1 and 4 months prior to their commercial operation dates, depending upon the prime mover and time period. The actual operable dates for nuclear units were used. It should be noted that net summer capabilities are not currently collected for nonutilities.

9. Nuclear Energy

Status of Nuclear Generating Units

At the end of 1993, there were 109 operable nuclear generating units in the United States, the same number as in 1992 (9.1).[1] Most of the operable units were located east of the Mississippi River. On April 6, 1993, the Nuclear Regulatory Commission issued a full-power license for Texas Utilities Electric Company's Comanche Peak 2. However, one operable unit (Portland General Electric Company's Trojan in Oregon) was shut down on January 4, 1993. In addition to the operable units, seven units had received construction permits. No units had construction permits pending and there were no units on order.

The number of units in all stages of planning, construction, and operation in 1993 was 116, one fewer than in 1992. The 1993 total of 116 units was well below the total of 226 in 1974.[2] After 1974, many planned units were canceled; after 1977, no orders for new units were announced.

Environmental, safety, and economic concerns contributed to the decline in the number of planned nuclear units. Growth in electricity demand was slower than expected. Longer leadtimes for licensing and construction coupled with higher financing expenses increased the cost of nuclear power plants, and rising interest rates and an uncertain economic environment diminished electric utilities' willingness to commission new plants.

Contributions to Electricity Net Generation

Nuclear electric power's contribution to electricity net generation in the United States increased almost every year from the late 1950's through 1992, but in 1993 it declined (9.2). Nuclear electric power production in 1993 totaled 610 billion kilowatthours, down 1.4 percent from the all-time high of 619 billion kilowatthours in 1992. The nuclear portion of domestic electricity net generation fell from 22 percent in 1992 to 21 percent in 1993, and the capacity factor[3] fell from 70.9 percent in 1992 to 70.5 percent in 1993.

The Uranium Industry

From 1949 through 1967, the Atomic Energy Commission (AEC) was the major purchaser of uranium. The AEC's demand for uranium for military purposes was strong during the 1950's and domestic production, spurred by AEC incentives, grew from 0.4 million pounds of uranium oxide (U_3O_8) in 1949 to 35 million pounds in 1960 (9.3). As the AEC began to accumulate stockpiles, its purchases declined and U.S. production fell to 21 million pounds in 1965. From 1966 through 1976, production fluctuated between 21 and 27 million pounds. Subsequently, orders for new nuclear plants led to strong growth, and production peaked at 44 million pounds in 1980. However, plant cancellations and postponements during the late 1970's led to a decline in projected demand and, coupled with buildups of inventories at electric utilities and foreign competition, caused the second major decline in production, which fell to 11 million pounds in 1985. In 1993, production fell to 3.1 million pounds.

Historically, domestic producers have faced competition from low-cost uranium imports. From 1949 through 1960, net imports actually exceeded domestic production (9.3). In 1966, the AEC effectively suspended imports by curtailing enrichment services for foreign uranium intended for use in domestic facilities, and no uranium was imported from 1967 through 1974. With the gradual removal of the AEC restrictions during the 1977-to-1983 period, foreign uranium deliveries to the United States began to increase. In 1990 through 1993, net imports of U_3O_8 once again exceeded domestic production. For example, in 1993, net imports totaled an estimated 15 million pounds, compared with domestic production of 3.1 million pounds.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

[2]Energy Information Administration, *Monthly Energy Review* March 1994, DOE/EIA-0035(94/03) (Washington, DC, March 1994), Table 8.2.

[3]The actual generation in a given time period divided by the maximum possible generation in that time period.

Figure 9.1 Nuclear Generating Units, December 31, 1993

Note: Due to space limitations, symbols do not represent actual locations.

Source: Compiled by the Energy Information Administration from Nuclear Regulatory Commission sources.

Table 9.1 Nuclear Generating Units, End of Year 1990-1993

(Number of Reactors)

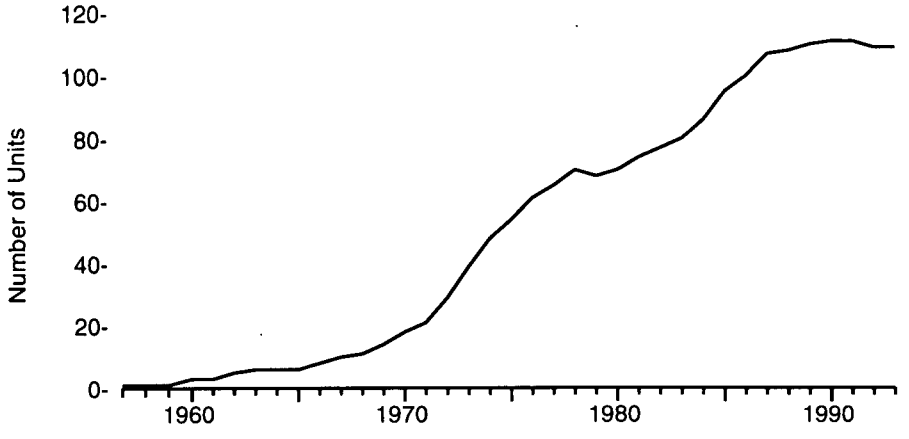
Status	1990			1991			1992			1993		
	Boiling Water Reactors	Pressurized Water Reactors	Total	Boiling Water Reactors	Pressurized Water Reactors	Total	Boiling Water Reactors	Pressurized Water Reactors	Total	Boiling Water Reactors	Pressurized Water Reactors	Total
Operable [1]	37	74	111	37	74	111	37	72	109	37	72	109
In Startup [2]	0	0	0	0	0	0	0	0	0	0	0	0
Construction Permits Granted	1	7	8	1	7	8	1	7	8	1	6	7
Construction Permits Pending	0	0	0	0	0	0	0	0	0	0	0	0
On Order	0	0	0	0	0	0	0	0	0	0	0	0
Total	38	81	119	38	81	119	38	79	117	38	78	116

[1] Units that have received a full-power license from the Nuclear Regulatory Commission.
[2] Units that have received a low-power license from the Nuclear Regulatory Commission authorizing fuel loading and low-power testing.

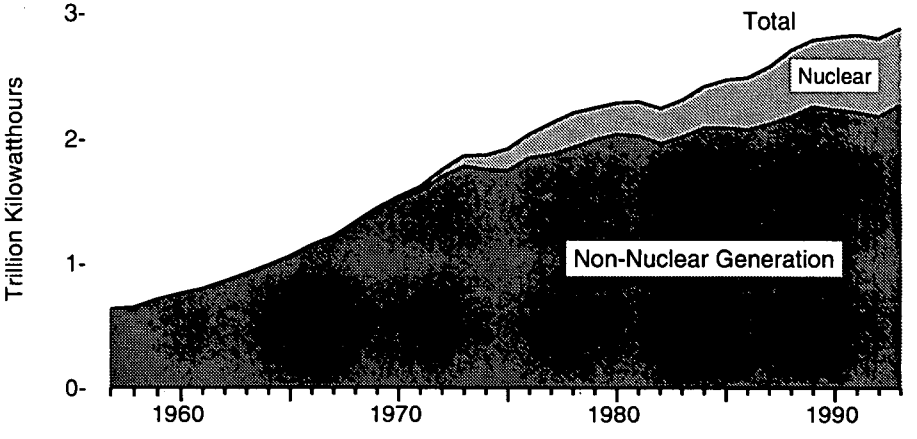
Sources: Compiled by the Energy Information Administration from Nuclear Regulatory Commission sources.

Figure 9.2 Nuclear Power Plant Operations

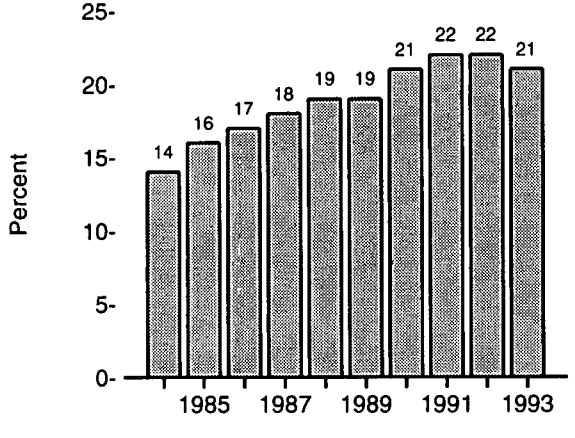
Operable Units, 1957-1993



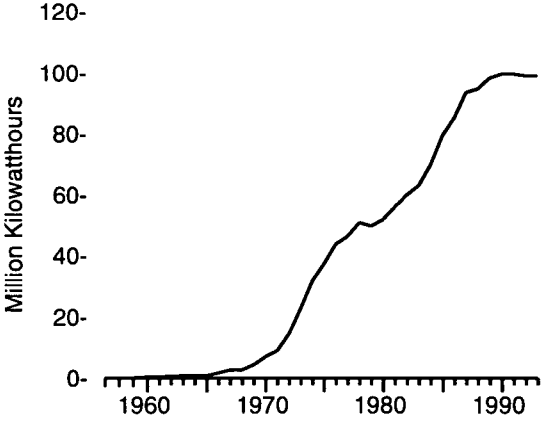
Nuclear and Total Net Generation of Electricity, 1957-1993



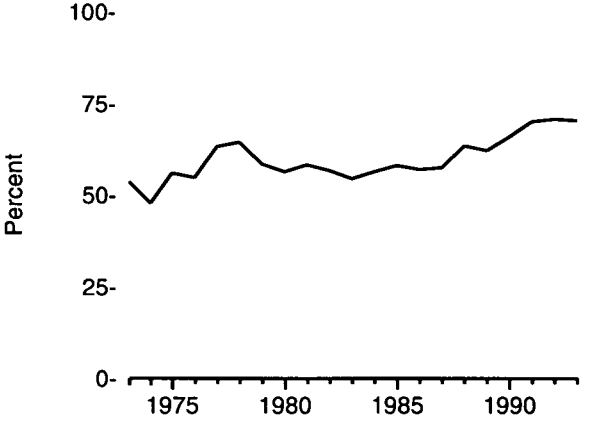
Nuclear Portion of Domestic Electricity Net Generation, 1984-1993



Net Summer Capability of Operable Units, 1957-1993



Capacity Factor, 1973-1993



Source: Tables 8.2 and 9.2.

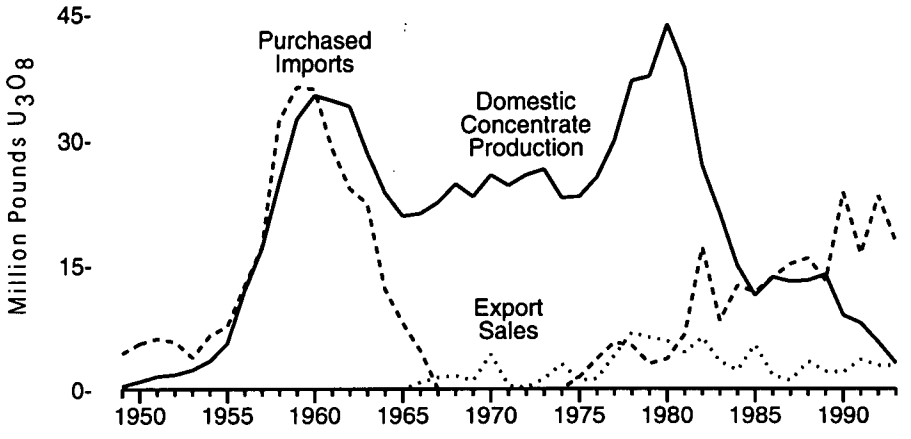
Table 9.2 Nuclear Power Plant Operations, 1957-1993

Year	Operable Units [1,2]	Nuclear Electricity Net Generation	Nuclear Portion of Domestic Electricity Net Generation	Net Summer Capability of Operable Units [1,3]	Capacity Factor [3]
	Number	Billion Kilowatthours	Percent	Million Kilowatts	Percent
1957	1	([4])	([5])	0.1	NA
1958	1	0.2	([5])	0.1	NA
1959	1	0.2	([5])	0.1	NA
1960	3	0.5	0.1	0.4	NA
1961	3	1.7	0.2	0.4	NA
1962	5	2.3	0.3	0.7	NA
1963	6	3.2	0.4	0.8	NA
1964	6	3.3	0.3	0.8	NA
1965	6	3.7	0.3	0.8	NA
1966	8	5.5	0.5	1.7	NA
1967	10	7.7	0.6	2.7	NA
1968	11	12.5	0.9	2.7	NA
1969	14	13.9	1.0	4.4	NA
1970	18	21.8	1.4	7.0	NA
1971	21	38.1	2.4	9.0	NA
1972	[2]29	54.1	3.1	[2]14.5	NA
1973	[2]39	83.5	4.5	[2]22.7	53.5
1974	48	114.0	6.1	31.9	47.8
1975	54	172.5	9.0	37.3	55.9
1976	61	191.1	9.4	43.8	54.7
1977	65	250.9	11.8	46.3	63.3
1978	70	276.4	12.5	50.8	64.5
1979	68	255.2	11.4	49.7	58.4
1980	70	251.1	11.0	51.8	56.3
1981	74	272.7	11.9	56.0	58.2
1982	77	282.8	12.6	60.0	56.6
1983	80	293.7	12.7	63.0	54.4
1984	86	327.6	13.6	69.7	56.3
1985	95	383.7	15.5	79.4	58.0
1986	100	414.0	16.6	85.2	56.9
1987	107	455.3	17.7	93.6	57.4
1988	108	527.0	19.5	94.7	63.5
1989	110	529.4	19.0	98.2	62.2
1990	111	576.9	20.5	99.6	66.0
1991	111	612.6	21.7	99.6	70.2
1992	109	618.8	22.1	99.0	70.9
1993[P]	109	610.3	21.2	99.1	70.5

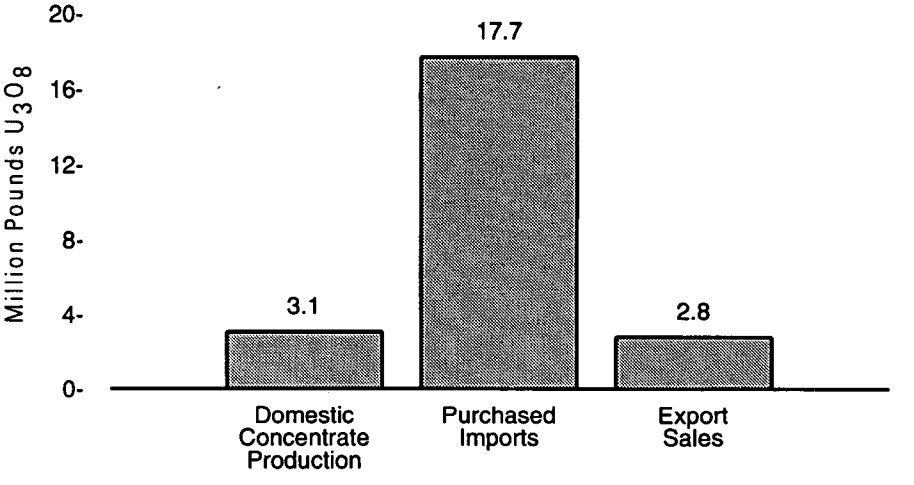
[1] At end of year.
[2] See Note 1 at end of section.
[3] See Note 2 at end of section.
[4] Less than 0.05 billion kilowatthours.
[5] Less than 0.05 percent.
P=Preliminary data. NA=Not available.
Sources: **Operable Units:** • 1957-1972—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • 1973 forward—Nuclear Regulatory Commission, *Licensed Operating Reactors*, (NUREG-0020), monthly. **Electricity Generation:** 1957-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—Energy Information Administration (EIA), Form EIA-759, "Monthly Power Plant Report." **Net Summer Capability of Operable Units:** • 1957-1983—See Note 2 at end of section. • 1984 forward—EIA, Form EIA-860, "Annual Electric Generator Report."

Figure 9.3 Uranium Overview

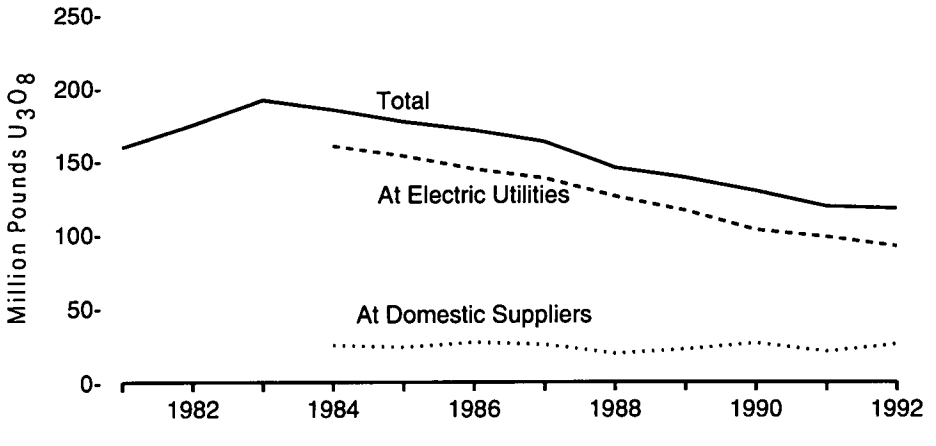
Production and Trade, 1949-1993



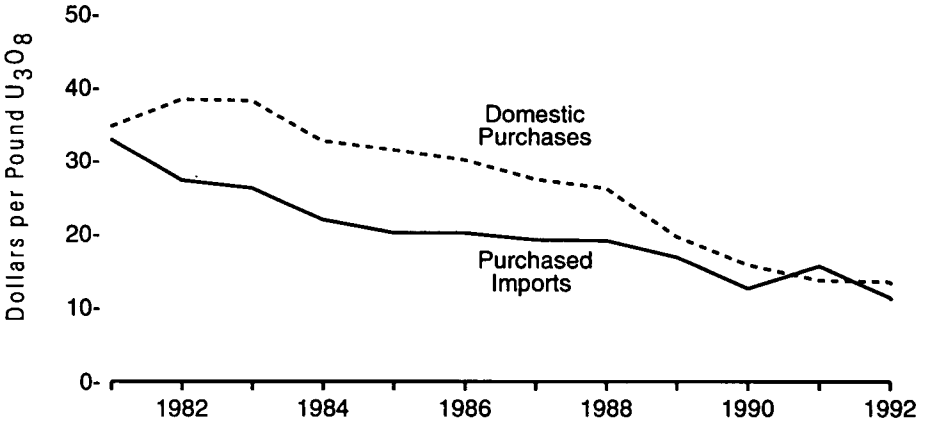
Production and Trade, 1993



Inventories, 1981-1992



Average Prices, 1981-1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 9.3.

Table 9.3 Uranium Overview, 1949-1993

Year	Domestic Concentrate Production	Purchased Imports [1]	Export [1] Sales	Utility Purchases from Domestic Suppliers	Loaded into U.S. Nuclear Reactors [2]	Inventories			Average Prices	
						At Domestic Suppliers	At Electric Utilities	Total	Of Purchased Imports	Of Domestic Purchases
	Million Pounds U_3O_8								U.S. Dollars per Pound U_3O_8	
1949	0.36	4.3	0.0	NA	NA	NA	NA	NA	NA	NA
1950	0.92	5.5	0.0	NA	NA	NA	NA	NA	NA	NA
1951	1.54	6.1	0.0	NA	NA	NA	NA	NA	NA	NA
1952	1.74	5.7	0.0	NA	NA	NA	NA	NA	NA	NA
1953	2.32	3.8	0.0	NA	NA	NA	NA	NA	NA	NA
1954	3.40	6.5	0.0	NA	NA	NA	NA	NA	NA	NA
1955	5.56	7.6	0.0	NA	NA	NA	NA	NA	NA	NA
1956	11.92	12.5	0.0	NA	NA	NA	NA	NA	NA	NA
1957	16.96	17.1	0.0	NA	NA	NA	NA	NA	NA	NA
1958	24.88	32.3	0.0	NA	NA	NA	NA	NA	NA	NA
1959	32.48	36.3	0.0	NA	NA	NA	NA	NA	NA	NA
1960	35.28	36.0	0.0	NA	NA	NA	NA	NA	NA	NA
1961	34.70	29.0	0.0	NA	NA	NA	NA	NA	NA	NA
1962	34.02	24.2	0.0	NA	NA	NA	NA	NA	NA	NA
1963	28.44	22.4	0.0	NA	NA	NA	NA	NA	NA	NA
1964	23.70	12.1	0.0	NA	NA	NA	NA	NA	NA	NA
1965	20.88	8.0	0.0	NA	NA	NA	NA	NA	NA	NA
1966	21.18	4.6	0.8	NA	NA	NA	NA	NA	NA	NA
1967	22.51	R0.0	1.4	NA	NA	NA	NA	NA	—	NA
1968	24.74	0.0	1.6	NA	NA	NA	NA	NA	—	NA
1969	23.22	0.0	1.0	NA	NA	NA	NA	NA	—	NA
1970	25.81	0.0	4.2	NA	NA	NA	NA	NA	—	NA
1971	24.55	0.0	0.4	NA	NA	NA	NA	NA	—	NA
1972	25.80	0.0	0.2	NA	NA	NA	NA	NA	—	NA
1973	26.47	0.0	1.2	NA	NA	NA	NA	NA	—	NA
1974	23.06	0.0	3.0	NA	NA	NA	NA	NA	—	NA
1975	23.20	1.4	1.0	NA	NA	NA	NA	NA	NA	NA
1976	25.49	3.6	1.2	NA	NA	NA	NA	NA	NA	NA
1977	29.88	5.6	4.0	NA	NA	NA	NA	NA	NA	NA
1978	36.97	5.2	6.8	NA	NA	NA	NA	NA	NA	NA
1979	37.47	3.0	6.2	NA	NA	NA	NA	NA	NA	NA
1980	43.70	3.6	5.8	NA	NA	NA	NA	NA	NA	NA
1981	38.47	6.6	4.4	32.6	NA	NA	NA	159.2	32.90	34.65
1982	26.87	17.1	6.2	27.1	NA	NA	NA	174.8	27.23	38.37
1983	21.16	8.2	3.3	24.2	NA	NA	NA	191.8	26.16	38.21
1984	14.88	12.5	2.2	22.5	NA	25.0	160.2	185.2	21.86	32.65
1985	11.31	11.7	5.3	21.7	NA	23.7	153.1	176.9	20.08	31.43
1986	13.51	13.5	1.6	18.9	NA	27.0	144.0	171.1	20.07	30.01
1987	12.99	15.1	1.0	20.8	NA	25.4	137.8	163.2	19.14	27.37
1988	13.13	15.8	3.3	17.6	NA	19.3	125.5	144.8	19.03	26.15
1989	13.84	13.1	2.1	18.4	NA	22.2	115.8	138.1	16.75	19.56
1990	8.89	23.7	2.0	20.5	NA	26.4	102.7	129.1	12.55	15.70
1991	7.95	16.3	3.5	26.8	34.6	20.7	98.0	118.7	15.55	13.66
1992	R5.65	R23.3	R2.8	23.4	43.0	25.6	91.6	117.2	11.34	13.45
1993P	3.07	17.7	2.8	17.9	NA	NA	NA	NA	NA	NA

[1] Import quantities through 1970 are reported for fiscal years. Prior to 1968, the Atomic Energy Commission was the sole purchaser of all imported U_3O_8. Trade data prior to 1982 are for transactions conducted by uranium supplier only. For 1982 forward, transactions by uranium buyers (consumers) are included. Buyer imports and exports prior to 1982 are believed to be small.

[2] Does not include any fuel rods removed from reactors and later reloaded into the reactor.

R=Revised data. P=Preliminary data. — = Not applicable. NA=Not available.

Sources: **1949-1966:** U.S. Department of Energy, Grand Junction Office, *Statistical Data of the Uranium Industry*, Report No. GJO-100, annual. **1967-1992:** Energy Information Administration (EIA), *Uranium Industry Annual 1992* (October 1993), Table 17 (for Domestic Concentrate Production); Table 30 (for Purchased Imports and Export Sales); Table ES1 (for Utility Purchases from Domestic Suppliers, Total Inventories, and Average Prices); page 61 text (for Loaded into U.S. Nuclear Reactors); Table 40 (for 1990-1992 Inventories at Domestic Suppliers and at Electric Utilities). Inventories at Domestic Suppliers and at Electric Utilities, 1984-1989: EIA, Form EIA-858, "Uranium Industry Annual Survey." **1993:** EIA, Form EIA-858, "Uranium Industry Annual Survey."

Nuclear Energy Notes

1. Prior to 1973, the number of operable units includes units that were in commercial operation by December 31 of the stated year. Units decommissioned or inoperative for extended periods were generally included. Also included are two U.S. Department of Energy (DOE)-operated plants that supply electricity to the commercial grid. A third DOE plant, which does not distribute electricity to the grid, is excluded. For 1973 forward, the number of units includes units issued full-power or operating licenses and generally does not include units in long-term shutdown status.

2. Net summer capabilities were first collected on Form EIA-860 for 1984. Units not assigned a net summer capability rating by the utility were given an estimated rating by use of a statistical relationship between installed nameplate capacity and net summer capability for each prime mover. To estimate net summer capability for 1949-1984, two methods were used. For each prime mover except nuclear and "other," net summer capability estimates were calculated in two steps. First, the unit capacity values reported on Form EIA-860 and the unit start dates contained in the 1984 Generating Unit Reference File (GURF) were used to compute preliminary aggregate estimates of annual net summer capability and installed nameplate capacity. These preliminary estimates were obtained by aggregating unit capacity values for all units in service during a given year. Next, the ratio of the preliminary capability to nameplate estimate was computed for each year and multiplied by the previously published installed nameplate capacity values to produce the final estimates of net summer capability. The net summer capability data for nuclear and "other" units were used directly from the 1984 GURF for all years. Historical aggregates were then developed by use of the unit start dates on the GURF.

Historical capacity has also been modified to estimate capability based upon the operable definition. This was accomplished by assuming that nonnuclear generating units became operable between 1 and 4 months prior to their commercial operation dates, depending upon the prime mover and time period. The actual operable dates for nuclear units were used.

10. Renewable Energy

Emerging Sources of Renewable Energy

After World War II, the United States relied on petroleum, natural gas, and coal, which, in addition to having high Btu contents, were inexpensive, readily accessible, and easy to transport. During the early 1970's, however, increases in the prices of petroleum and natural gas, concerns about the stability of supply, and environmental factors stimulated interest in alternative sources of energy. Technologies such as wood-burning stoves and solar thermal collectors for domestic water heating lend themselves to onsite applications, while technologies such as wind turbines can be used to generate electricity for transmission to distant markets. Although some sources with the potential for centralized applications, such as wind, solar, and ocean thermal energy, are not yet widely used, they may eventually contribute significantly to the domestic energy supply.

Renewable Energy Consumption

In 1992, the United States consumed an estimated 6.0 quadrillion Btu of renewable energy (10.1).[1] Of the total, 3.8 quadrillion Btu were consumed to generate electricity. The remaining amount was consumed for other uses. Electric utilities' use of renewable energy (excluding net imports), which is included in the Energy Information Administration (EIA) statistics on total energy consumption,[2] was 2.7 quadrillion Btu. Other sectors' use of renewable energy, which is not yet integrated into the EIA time series summaries of total energy consumption, is also estimated to be 3.0 quadrillion Btu. The industrial sector consumed 2.3 quadrillion Btu, the residential and commercial sector consumed 705 trillion Btu, and the transportation sector consumed 79 trillion Btu.

Conventional Hydroelectric Power. Almost all of the 2.9 quadrillion Btu of conventional hydroelectric power generation in 1992 occurred at electric utilities (10.1). The industrial sector accounted for only 97 trillion Btu.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

[2]Summary statistics on energy consumption in this report include only the portion of renewable energy consumed at electric utilities. See, for example, p. xix and Table 1.3.

Biofuels. Wood, waste, and alcohol fuels are the primary examples of biomass fuels. In 1992, biofuel consumption totaled 2.8 quadrillion Btu, most of which (2.2 quadrillion Btu) was wood (10.2). Some industries, such as the paper and lumber industries, have ready access to wood and wood byproducts, and those rely heavily on wood as an energy source. Consumption of municipal solid waste and other wastes totaled 457 trillion Btu in 1992, and consumption of alcohol fuels (ethanol) totaled 79 trillion Btu.

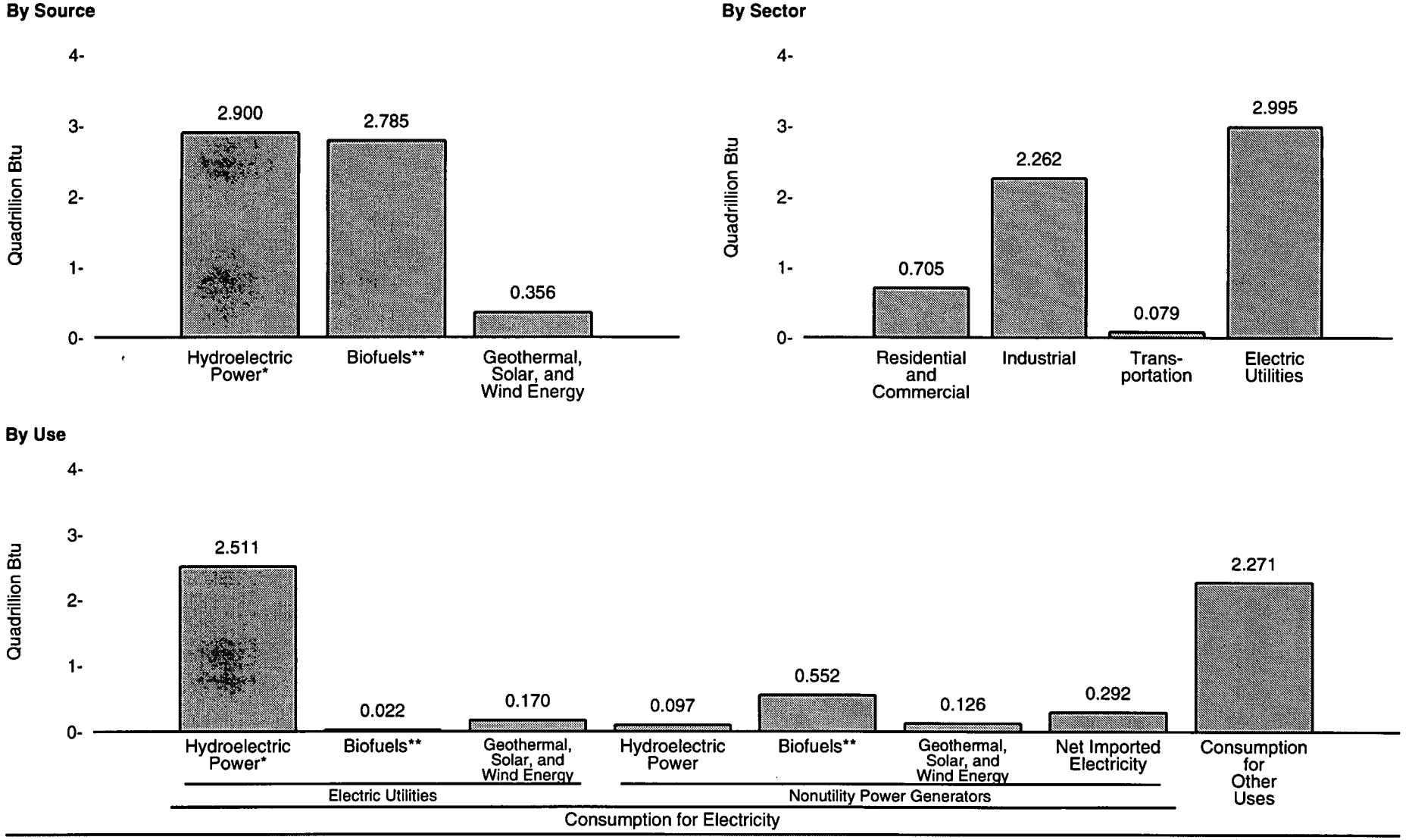
Geothermal Energy. The third biggest source of renewable energy in 1992 was geothermal energy, which can be used directly, for purposes such as space heating, or converted to electricity. In 1960, The Geysers in California became the first U.S. power plant to generate electricity from geothermal steam. In 1992, geothermal energy consumed at electric utilities reached 17 trillion Btu (10.1). The industrial sector consumed 88 trillion Btu.

Solar Energy. Of the 68 trillion Btu of solar energy consumed in 1993, most (60 trillion Btu) was used in the residential and commercial sector (10.1). The industrial sector accounted for the remainder.

Because it is difficult to measure solar energy use directly, producer shipments of equipment are used as an indicator (10.4). Shipments of low-temperature collectors, used primarily for heating swimming pools, reached 6.2 million square feet in 1992 (the most recent year for which data are available). Shipments of medium-temperature collectors, used for pool heating and domestic hot water, peaked at 12 million square feet in 1983 and 1984 but, following the expiration of the Federal energy tax credit in 1985, fell to 0.9 million square feet in 1992. Shipments of high-temperature collectors, used for electricity generation, reached 5.2 million square feet in 1990 but fell to near zero in 1991 and 1992, when Luz International Ltd. ceased operating. Shipments of photovoltaic cells and modules, which have a wide variety of applications, rose to 16 thousand peak kilowatts in 1992 (10.7).

Wind Energy. About 30 trillion Btu of wind energy was consumed in 1992, almost all in the industrial sector (10.1). Very small amounts (less than 0.5 trillion Btu) were consumed at electric utilities.

Figure 10.1 Renewable Energy Consumption Estimates, 1992



*Conventional hydroelectric power only. Hydroelectricity generated by pumped storage is not included in renewable energy.

**Biofuels are fuelwood, wood byproducts, waste wood, municipal solid waste, manufacturing process waste, and alcohol fuels.

Source: Table 10.1.

Table 10.1 Renewable Energy Consumption Estimates, 1990-1992

(Quadrillion Btu)

Part I: Estimates by Source

Sources	1990	1991	1992
Consumption for Electricity	R3.772	R4.013	3.770
Electric Utilities [1]	3.131	3.090	2.703
Hydroelectric Power [2]	2.929	2.899	2.511
Geothermal Energy	0.181	0.170	0.170
Biofuels [3]	0.021	0.021	0.022
Solar and Wind Energy [4]	(5)	(5)	(5)
Nonutility Power Generators [6]	R0.621	R0.692	0.775
Hydroelectric Power	0.083	0.084	0.097
Geothermal, Solar, and Wind Energy	R0.101	R0.114	0.126
Biofuels [3]	0.437	0.494	0.552
Net Imported Electricity [1]	0.020	R0.231	0.292
Consumption for Other Uses [7]	R2.234	R2.185	2.271
Biofuels [3]	R2.174	R2.125	2.211
Solar and Photovoltaic Energy	0.060	0.060	0.060
Total	R6.006	R6.198	6.041

Part II: Estimates by Sector and Source

	Residential and Commercial			Industrial			Transportation			Electric Utilities			Total		
Sources	1990	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992
Hydroelectric Power [2]	NA	NA	NA	0.083	0.084	0.097	NA	NA	NA	[8]2.949	[8]3.130	[8]2.803	3.032	3.214	2.900
Geothermal Energy	NA	NA	NA	0.071	0.079	0.088	NA	NA	NA	0.181	0.170	0.170	0.252	R0.249	0.258
Biofuels [3]	R0.581	R0.613	0.645	R1.948	R1.941	2.039	R,[9]0.082	R,[9]0.065	[9]0.079	0.021	0.021	0.022	R2.632	R2.640	2.785
Solar Energy	0.060	0.060	0.060	R0.007	R0.008	0.008	NA	NA	NA	(5)	(5)	(5)	R0.067	R0.068	0.068
Wind Energy	NA	NA	NA	0.023	0.027	0.030	NA	NA	NA	(5)	(5)	(5)	0.023	0.027	0.030
Total	R0.641	R0.673	0.705	R2.132	R2.139	2.262	R0.082	R 0.065	0.079	3.151	3.321	2.995	R6.006	R6.198	6.041

[1] Data are included in Tables 1.1, 1.2, 1.3, and 2.1 of this report.

[2] Conventional hydroelectric power only. Hydroelectricity generated by pumped storage is not included in renewable energy.

[3] Biofuels are fuelwood, wood byproducts, waste wood, municipal solid waste, manufacturing process waste, and alcohol fuels.

[4] Also includes photovoltaic thermal energy.

[5] Less than 0.0005 quadrillion Btu.

[6] Data are not yet incorporated into Tables 1.1, 1.2, 1.3, and 2.1 of this report, except for small amounts (0.033 quadrillion Btu) of hydroelectric power in the industrial sector.

[7] Data are not yet incorporated into Tables 1.1, 1.2, 1.3, and 2.1 of this report. "Consumption for Other Uses" includes nonutility thermal energy uses, such as space heating and industrial process heat production and excludes estimates for mechanical energy, such as shaft power from dams, wind machines, and solar-powered motors and activators.

[8] Includes net imported electricity, which is assumed to be hydroelectric power.

[9] Ethanol blended into gasoline.

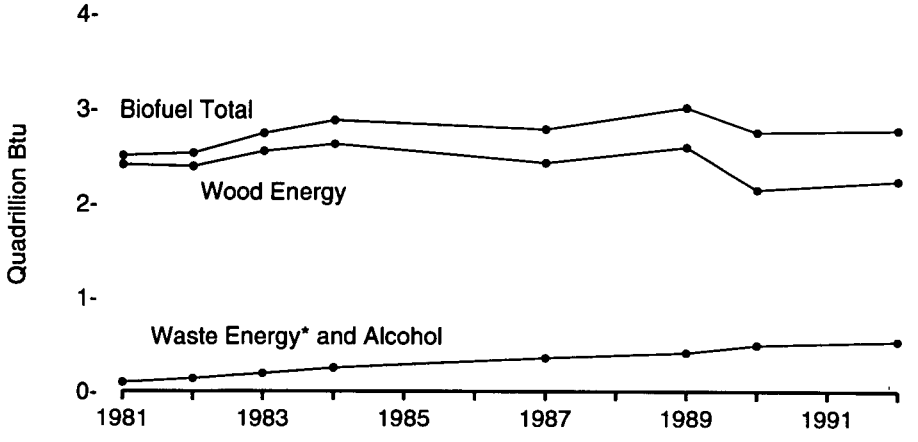
R=Revised data. NA=Not available.

Note: Totals may not equal sum of components due to independent rounding.

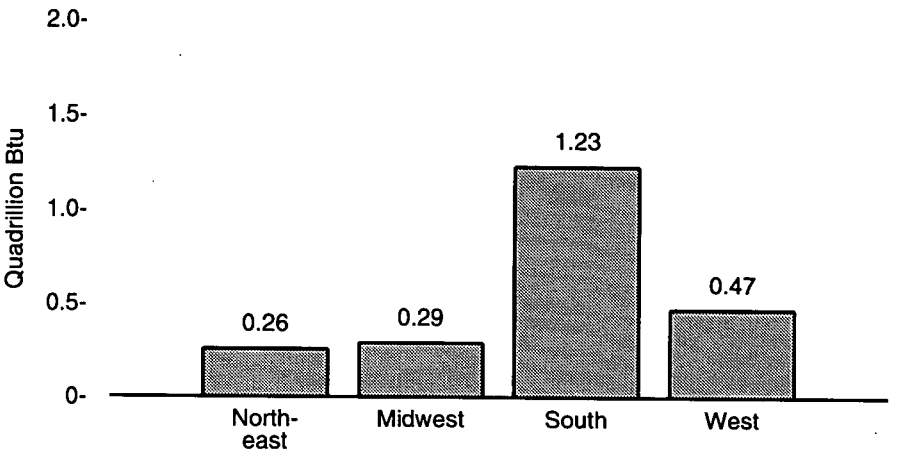
Sources: • Electric Utilities and Net Imported Electricity—Energy Information Administraion (EIA), Integrated Modeling Data System output for the *Monthly Energy Review* (March 1994). • All Other Estimates—EIA, Office of Coal, Nuclear, Electric and Alternate Fuels.

Figure 10.2 Wood and Waste Energy and Alcohol Fuels Consumption

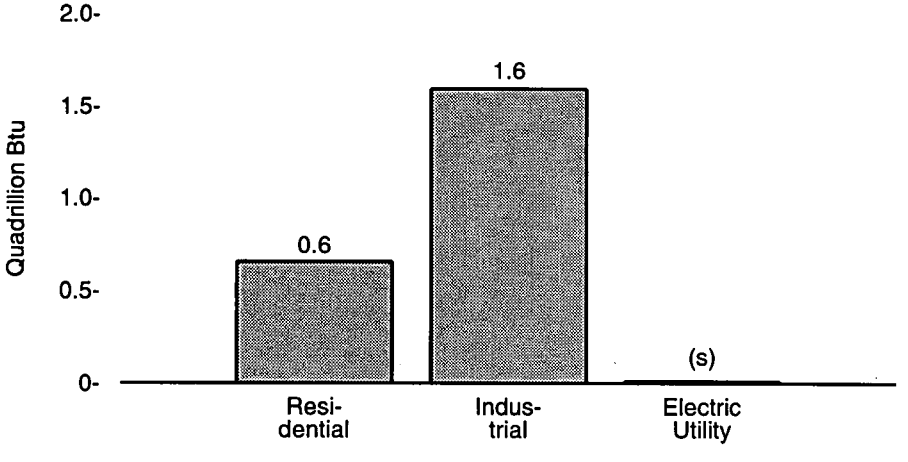
Biofuel Total, 1981-1984, 1987, 1989, 1990, and 1992



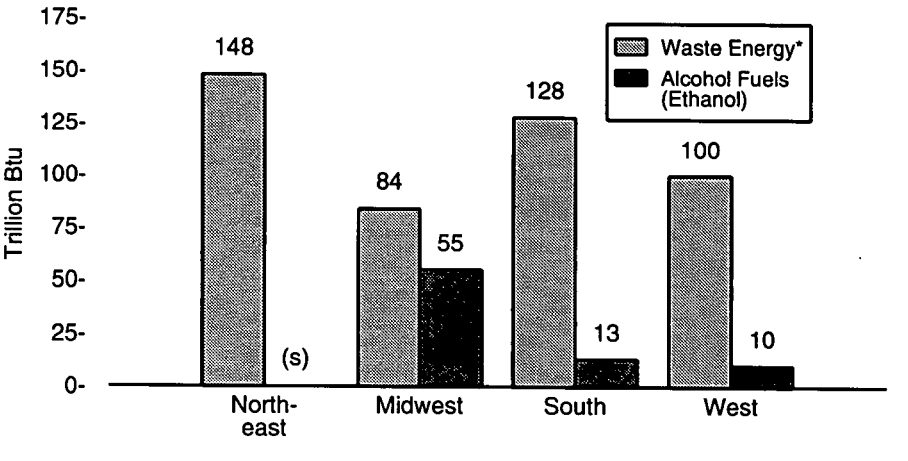
Wood Energy by Census Region, 1992



Wood Energy by Sector, 1992



Waste Energy and Alcohol Fuels by Census Region, 1992



(s)=Less than 0.5 trillion Btu.
*Municipal solid waste, manufacturing waste, refuse-derived fuel, and methane recovered from landfills.

Notes: • No data are available for 1985, 1986, 1988, and 1991. • See Appendix E for Census regions. • Because vertical scales differ, graphs should not be compared.
Source: Table 10.2.

Table 10.2 Wood and Waste Energy and Alcohol Fuels Consumption by Sector and Census Region, Selected Years, 1981-1992

(Trillion Btu)

Energy Source	1981	1982	1983	1984	1987	1989	1990	1992
Wood Energy	**2,495**	**2,478**	**2,640**	**2,633**	**2,437**	**2,604**	**R2,155**	**2,249**
Sector								
Residential	869	937	925	923	852	918	581	645
Commercial	21	22	22	22	(1)	(1)	(1)	(1)
Industrial	1,602	1,516	1,690	1,679	1,576	1,673	R1,562	1,593
Electric Utility	3	2	3	9	9	13	12	11
Census Region								
Northeast	395	358	380	349	350	432	256	264
Midwest	335	343	323	341	474	552	330	286
South	1,349	1,392	1,526	1,482	1,147	1,161	R1,064	1,234
West	416	385	411	461	467	459	505	466
Waste Energy [2]	**88**	**120**	**157**	**208**	**289**	**344**	**394**	**457**
Census Region								
Northeast	16	20	36	39	60	84	119	148
Midwest	5	13	17	21	47	64	89	84
South	37	50	56	57	108	145	114	128
West	30	36	48	91	74	51	73	100
Alcohol Fuels (Ethanol)	**7**	**19**	**35**	**43**	**69**	**71**	**R82**	**79**
Census Region								
Northeast	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Midwest	4	11	22	25	38	38	R17	55
South	1	4	8	13	26	26	R55	13
West	2	4	5	5	4	7	R10	10
Biofuel Total	**2,590**	**2,617**	**2,832**	**2,884**	**2,794**	**3,019**	**R2,632**	**2,785**

[1] Commercial wood energy use is not included because there are no accurate data sources to provide reliable estimates. However, from the "1986 Nonresidential Buildings Energy Consumption Survey," conducted by the Energy Information Administration (EIA), it is estimated that commercial sector use is about 20 trillion Btu to 40 trillion Btu.

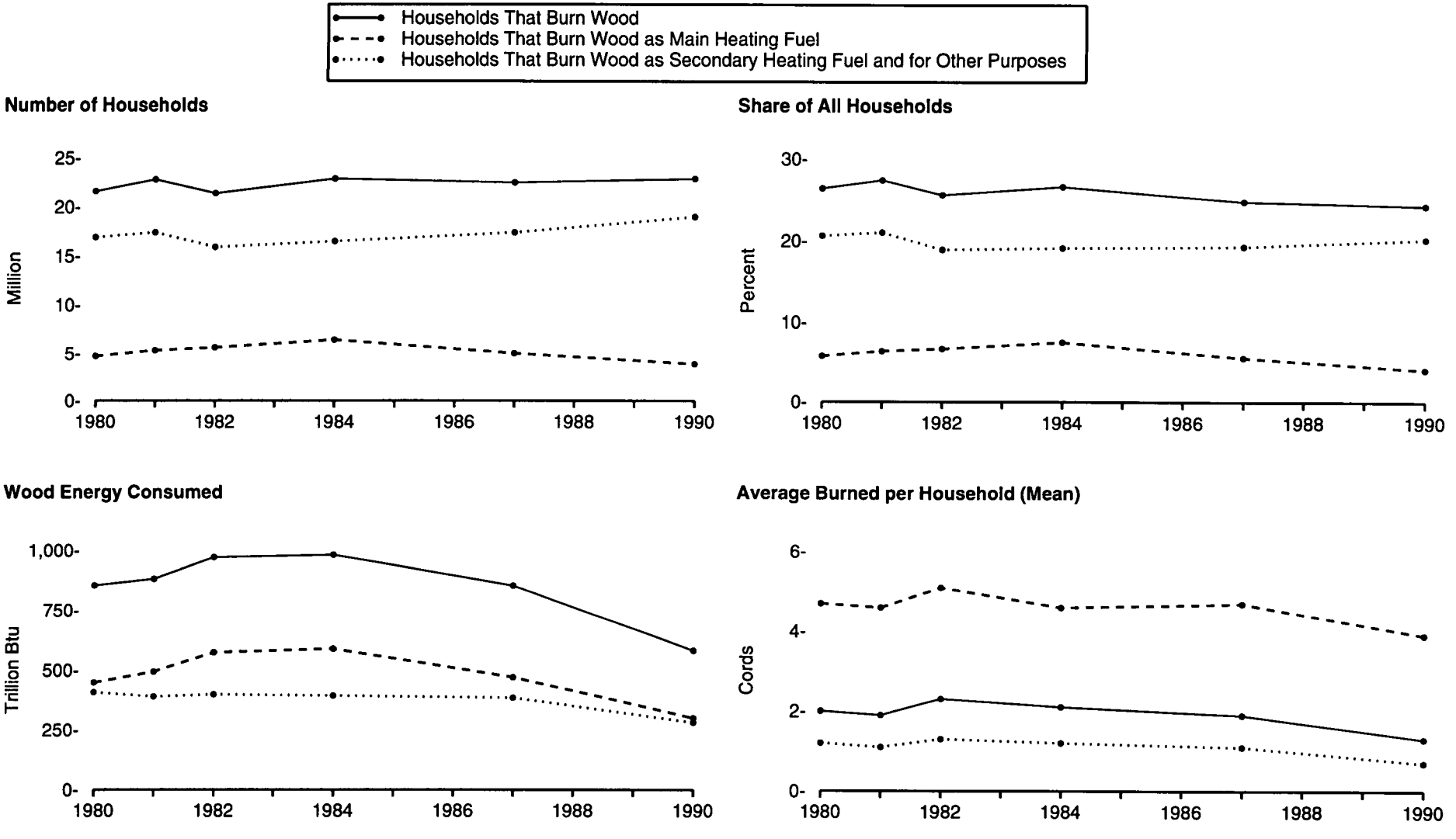
[2] Municipal solid waste, manufacturing waste, refuse-derived fuel, and methane recovered from landfills.

[3] Less than 0.5 trillion Btu.

Notes: • No data are available for years not shown. • See Appendix E for Census regions. • Totals may not equal sum of components due to independent rounding.

Sources: • **1981-1983, Wood Energy**—EIA, *Estimates of U.S. Wood Energy Consumption, 1980-1983* (November 1984), Tables ES1 and ES2. • **1981-1983 Waste Energy and Alcohol Fuels, and 1984**—EIA, Office of Coal, Nuclear, Electric and Alternate Fuels, unpublished data. • **1987**—EIA, *Estimates of Biofuels Consumption in the United States During 1987*, Tables ES1 and ES2. • **1989—Wood Energy, Industrial Sector:** American Paper Institute, *Fact Sheet on 1990 Energy Use in the U.S. Pulp and Paper Industry* (July 31, 1991). **All Other Data:** EIA, *Estimates of U.S. Biofuels Consumption 1989* (April 1991), Table ES1. • **1990—Wood Energy, Industrial Sector:** American Paper Institute, *Fact Sheet on 1990 Energy Use in the U.S. Pulp and Paper Industry* (July 1991). **Wood Energy, Residential Sector:** EIA, 1990 Residential Energy Consumption Survey. **Waste Energy:** EIA, *Estimates of U.S. Biofuels Consumption 1990* (October 1991), Table ES1. **Alcohol Fuels:** U.S. Department of Transportation, *Monthly Motor Fuel Reported by States*, FHWA-PL-92-011 (September 1991), and U.S. Department of Treasury, Bureau of Alcohol, Tobacco, and Firearms, *Monthly Distilled Spirits Report*, Report Symbol 76 (June 1991) and *Alcohol Fuels Report*, internal quarterly report (September 1991). • **1992:** EIA, *Estimates of U.S. Biomass Energy Consumption 1992* (May 1994).

Figure 10.3 Households That Burn Wood, Selected Years, 1980-1990



Note: No data are available for 1983, 1985, 1986, 1988, and 1989.

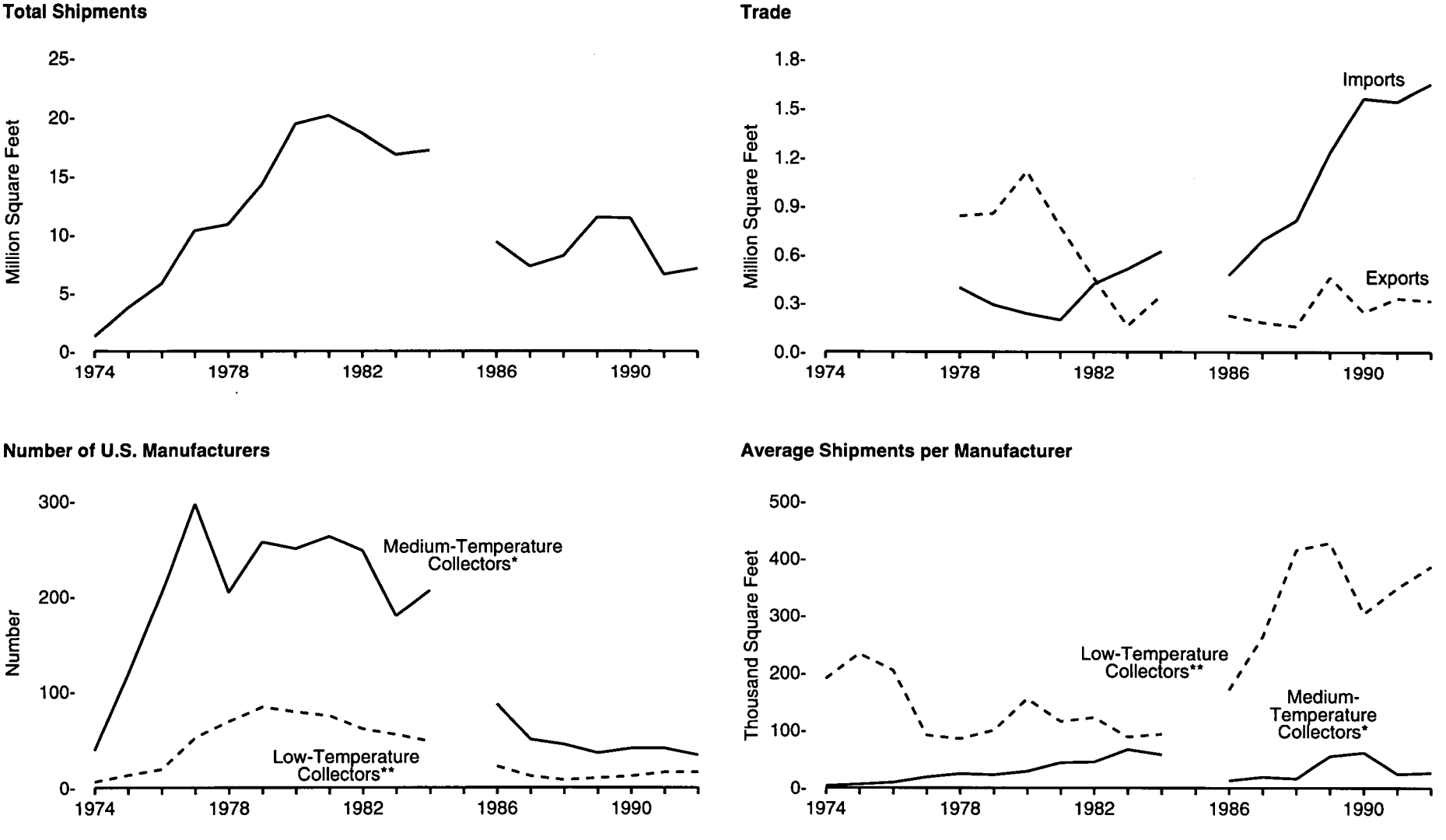
Source: Table 10.3.

Table 10.3 Households That Burn Wood, Selected Years, 1980-1990

Household Characteristic	1980	1981	1982	1984	1987	1990
Households That Burn Wood						
Number of Households (millions)	21.6	22.8	21.4	22.9	22.5	22.9
Share of All U.S. Households (percent)	26.4	27.4	25.6	26.6	24.8	24.3
Number of Cords Burned (millions)	42.7	44.0	48.6	49.0	42.6	29.1
Average Number of Cords Burned per Household						
Mean	2.0	1.9	2.3	2.1	1.9	1.3
Median	0.7	1.0	1.0	1.0	0.7	0.5
Wood Energy Consumed (trillion Btu)	854	881	971	981	853	582
Households That Burn Wood as Main Heating Fuel						
Number of Households (millions)	4.7	5.3	5.6	6.4	5.0	3.9
Share of All U.S. Households (percent)	5.8	6.4	6.7	7.5	5.6	4.1
Number of Cords Burned (millions)	22.4	24.7	28.7	29.4	23.5	15.0
Average Number of Cords Burned per Household						
Mean	4.7	4.6	5.1	4.6	4.7	3.9
Median	3.3	3.0	4.0	4.0	4.0	3.3
Wood Energy Consumed (trillion Btu)	448	493	574	589	470	300
Households That Burn Wood as Secondary Heating Fuel and for Other Purposes						
Number of Households (millions)	16.9	17.4	15.9	16.5	17.4	19.0
Share of All U.S. Households (percent)	20.6	21.0	18.9	19.1	19.3	20.2
Number of Cords Burned (millions)	20.3	19.4	19.9	19.6	19.2	14.1
Average Number of Cords Burned per Household						
Mean	1.2	1.1	1.3	1.2	1.1	0.7
Median	0.3	0.5	0.5	0.5	0.5	0.3
Wood Energy Consumed (trillion Btu)	406	388	397	392	383	282

Notes: • Data are for the heating season beginning with the latter part of the previous year shown.
• Consumption estimates are based on respondent reports and may be subject to reporting biases.
• No data are available for years not shown.
Source: Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 10.4 Solar Thermal Collector Shipments and Trade, 1974-1984 and 1986-1992



*Collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit.
**Collectors that generally operate at temperatures below 110 degrees Fahrenheit.

Notes: • Data were not collected for 1985. • Medium-temperature collectors include special collectors. • Because vertical scales differ, graphs should not be compared.
Source: Table 10.4.

Table 10.4 Solar Thermal Collector Shipments by Type and Trade, 1974-1984 and 1986-1992

Year	Low-Temperature Collectors [1]			Medium-Temperature Collectors [2]			High-Temperature Collector [3] Shipments (million square feet)	Total Shipments [4]	Imports	Exports
	Number of U.S. Manufacturers	Quantity Shipped (million square feet)	Average Annual Shipments per Manufacturer (thousand square feet)	Number of U.S. Manufacturers	Quantity Shipped (million square feet)	Average Annual Shipments per Manufacturer (thousand square feet)		Thousand Square Feet		
1974	6	1.14	189.5	39	0.14	3.5	NA	1,274	NA	NA
1975	13	3.03	232.8	118	0.72	6.1	NA	3,743	NA	NA
1976	19	3.88	204.0	203	1.93	9.5	NA	5,801	NA	NA
1977	52	4.74	91.2	297	5.57	18.8	NA	10,312	NA	NA
1978	69	5.87	85.1	204	4.99	24.5	NA	10,860	396	840
1979	84	8.39	100.0	257	5.86	22.8	NA	14,251	290	855
1980	79	12.23	154.8	250	7.17	28.7	NA	19,398	235	1,115
1981	75	8.68	115.7	263	11.46	43.6	NA	20,133	196	771
1982	61	7.48	122.6	248	11.15	44.9	NA	18,621	418	455
1983	55	4.85	88.2	179	11.98	66.9	NA	16,828	511	159
1984	48	4.48	93.3	206	11.94	58.0	0.77	17,191	621	348
1986	22	3.75	170.5	87	1.11	12.8	4.50	9,360	473	224
1987	12	3.16	263.1	50	0.96	19.1	3.16	7,269	691	182
1988	8	3.33	415.8	45	0.73	16.2	4.12	8,174	814	158
1989	10	4.28	428.3	36	1.99	55.3	5.21	11,482	1,233	461
1990	12	3.65	303.8	41	2.53	61.6	5.24	11,409	1,562	245
1991	16	5.59	349.0	41	0.99	24.1	([5])	6,574	1,543	332
1992	16	6.19	386.7	34	0.90	26.4	([5])	7,086	1,650	316

[1] Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110 degrees Fahrenheit.

[2] Medium-temperature collectors are solar thermal collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit. Special collectors are included in this category. Special collectors are evacuated tube collectors or concentrating (focusing) collectors. They operate in the temperature range from just above ambient temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

[3] High-temperature collectors are solar thermal collectors that generally operate at temperatures above 180 degrees Fahrenheit.

[4] Total shipments include all types of solar thermal collectors (low-temperature, medium-temperature, high-temperature, and other) and include import and export shipments.

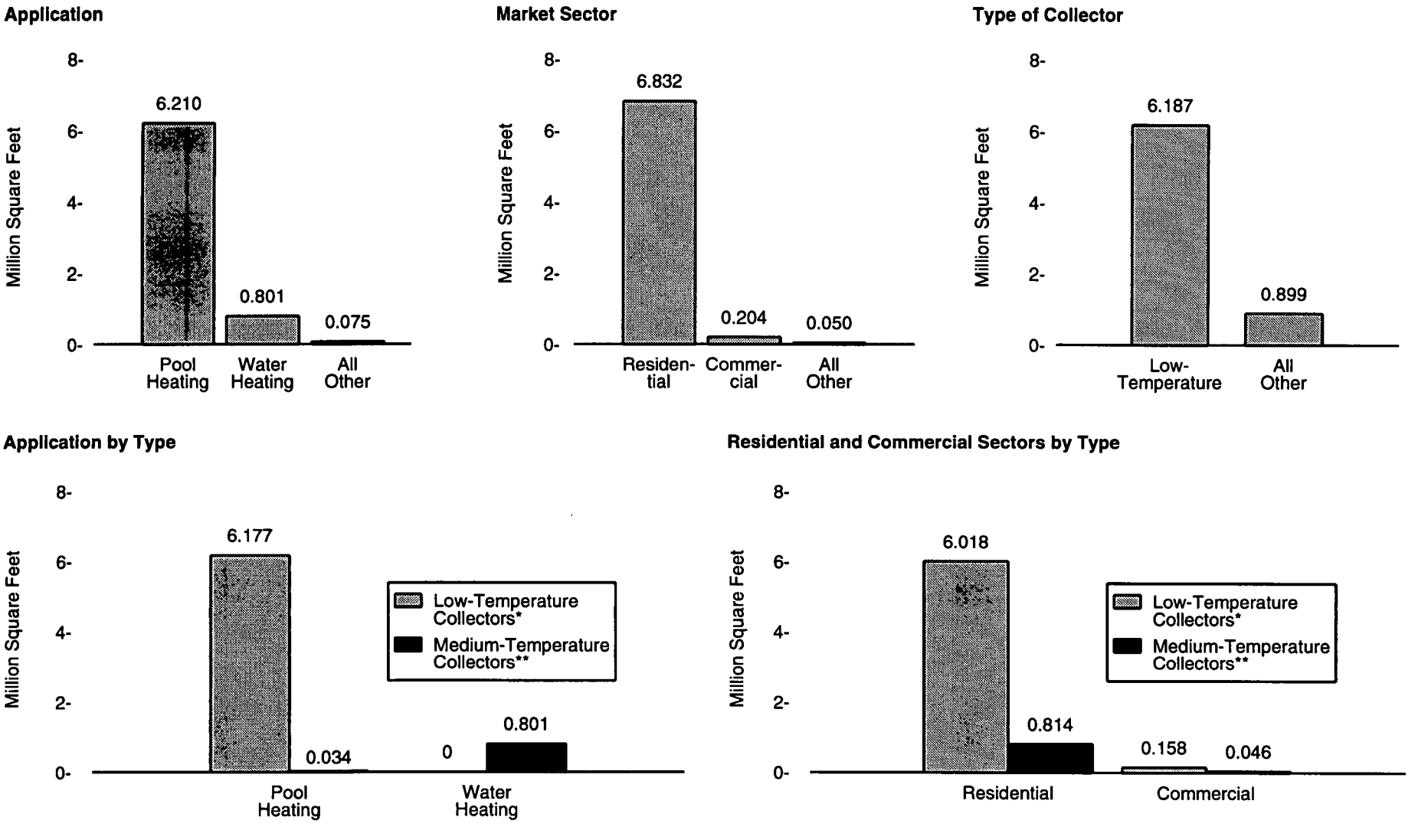
[5] Less than 0.005 million square feet.

NA=Not available.

Notes: • Manufacturers producing more than one type of collector are accounted for in both groups. • No data are available for 1985. • High-temperature collector shipments were dominated by one manufacturer.

Sources: **Number of U.S. Manufacturers:** Energy Information Administration (EIA), Form CE-63A, "Annual Solar Thermal Collector Manufacturers Survey," and prior form, Form EIA-63, "Annual Solar Thermal Collector and Photovoltaic Module Manufacturing Survey." **Shipments Data by Type:** • 1974-1976—Federal Energy Administration, *Solar Collector Manufacturing Activity*, semi-annual. • 1977—EIA, *Solar Collector Manufacturing Activity, July through December, 1981* (March 1982). • 1978 and 1979—EIA, *Solar Collector Manufacturing Activity*, annual. • 1980 forward—EIA, *Solar Collector Manufacturing Activity 1992* (December 1993), Table 9. **Total Shipments, Imports, and Exports:** EIA, *Solar Collector Manufacturing Activity 1992* (November 1993), Table 1.

Figure 10.5 Solar Thermal Collector Shipments by Type and End Use, 1992



*Collectors that generally operate at temperatures below 110 degrees Fahrenheit.
**Collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit.
Note: Because vertical scales differ, graphs should not be compared.
Source: Table 10.5.

Table 10.5 Solar Thermal Collector Shipments by Type and End Use, 1992

(Thousand Square Feet)

End Use	Low-Temperature Collectors [1]	Medium-Temperature Collectors [2]	High-Temperature Collectors [3]	Total
Application Total	**6,187**	**897**	**2**	**7,086**
Pool Heating	6,177	34	0	6,210
Water Heating	0	801	0	801
Space Heating	10	25	0	35
Space Cooling	0	W	1	1
Combined Space and Water Heating	0	5	0	5
Process Heating	0	31	([4])	32
Electricity Generation	0	([4])	([4])	1
Other [5]	0	0	1	1
Market Sector Total	**6,187**	**897**	**2**	**7,086**
Residential	6,018	814	0	6,832
Commercial	158	46	0	204
Industrial	10	17	0	27
Electric Utility	0	17	0	17
Other [5]	0	4	2	6

[1] Low-temperature collectors are solar thermal collectors that generally operate at temperatures below 110 degrees Fahrenheit.

[2] Medium-temperature collectors are solar thermal collectors that generally operate in the temperature range of 140 degrees Fahrenheit to 180 degrees Fahrenheit but can also operate at temperatures as low as 110 degrees Fahrenheit. Special collectors are included in this category. Special collectors are evacuated tube collectors or concentrating (focusing) collectors. They operate in the temperature range from just above ambient temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

[3] Parabolic dish/trough collectors used primarily by independent power producers to generate electricity for the electric grid. High-temperature collectors are solar thermal collectors that generally operate at temperatures above 180 degrees Fahrenheit.

[4] Less than 500 square feet.

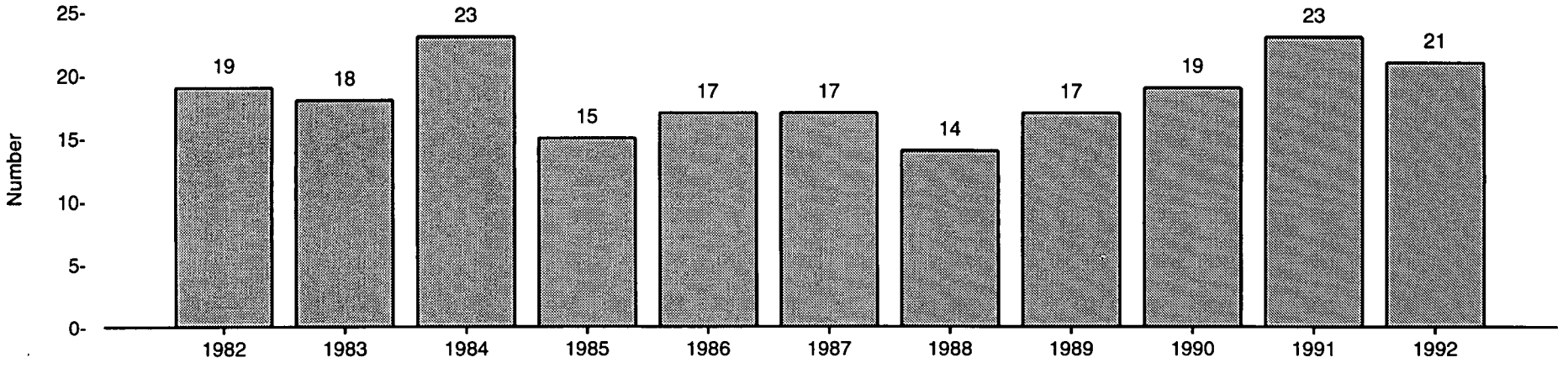
[5] Detoxification.

Notes: • Data represent shipments from U.S. manufacturers only. • Totals may not equal sum of components due to independent rounding.

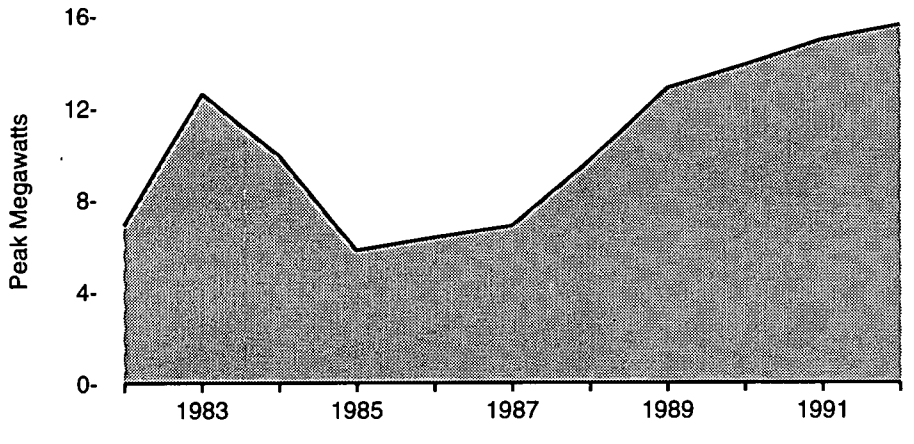
Source: Energy Information Administration, *Solar Collector Manufacturing Activity 1992* (November 1993), Tables 11 and 12.

Figure 10.6 Photovoltaic Cell and Module Shipments and Trade

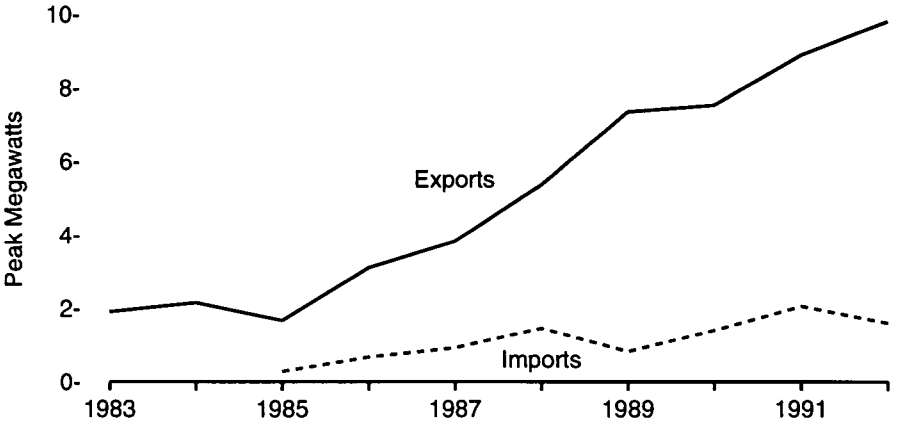
Number of U.S. Companies Reporting Shipments, 1982-1992



Total Shipments, 1982-1992



Trade, 1983-1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 10.6.

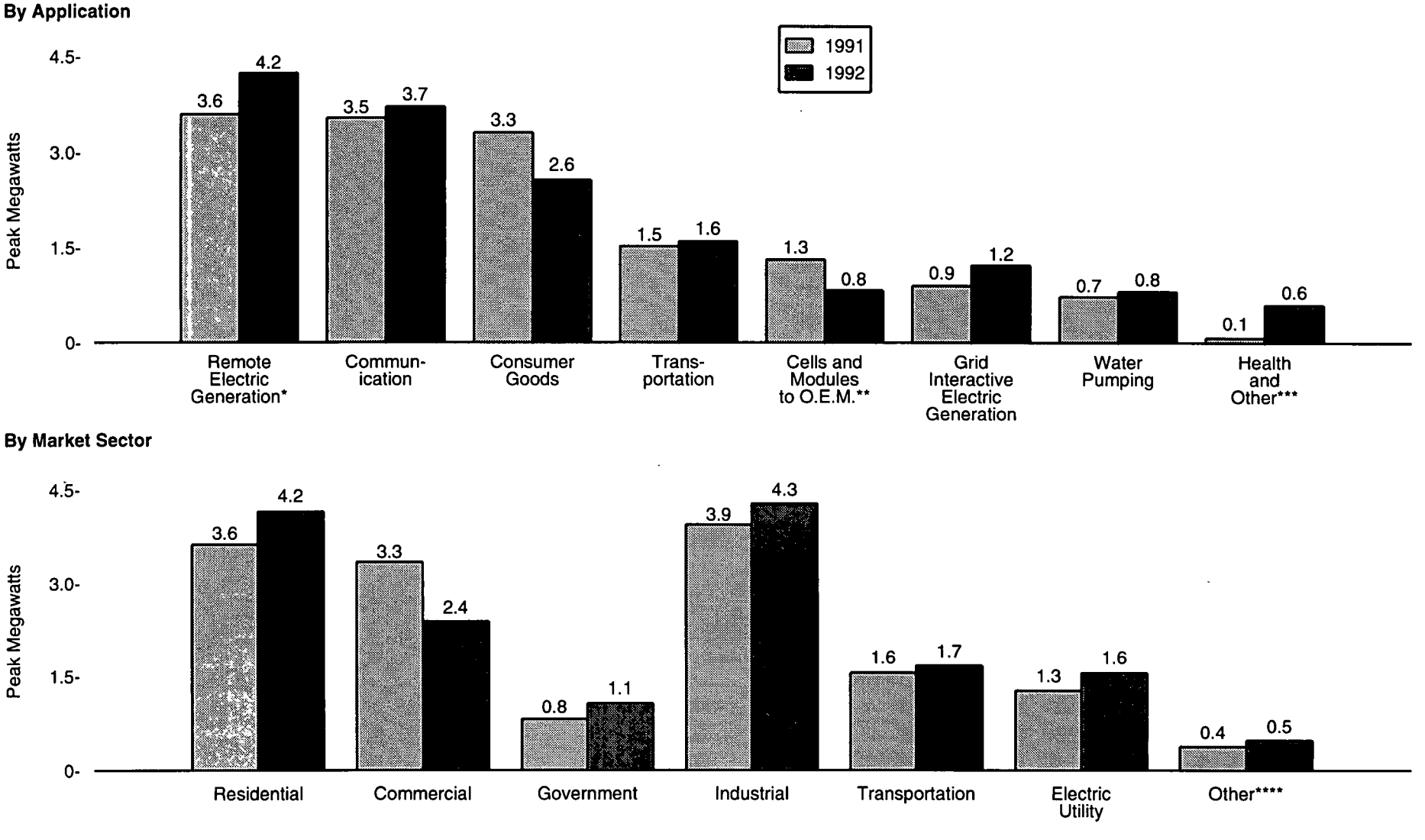
Table 10.6 Photovoltaic Cell and Module Shipments and Trade, 1982-1992

Year	Number of U.S. Companies Reporting Shipments	Total Shipments [1]	Imports	Exports
		Peak Kilowatts		
1982	19	6,897	NA	NA
1983	18	12,620	NA	1,903
1984	23	9,912	NA	2,153
1985[2]	15	5,769	285	1,670
1986[2]	17	6,333	678	3,109
1987[2]	17	6,850	921	3,821
1988[2]	14	9,676	1,453	5,358
1989[2]	17	12,825	826	7,363
1990[2]	[3]19	[3]13,837	1,398	7,544
1991[2]	23	14,939	2,059	8,905
1992[2]	21	15,583	1,602	9,823

[1] Total shipments include all types of photovoltaic cells and modules (single-crystal silicon, cast silicon, ribbon silicon, thin-film silicon, and concentrator silicon) and internationally traded cells and modules.
[2] Shipments of cells and modules for space and satellite applications are not included.
[3] Data were imputed for one nonrespondent who exited the industry during 1990.

NA=Not available.
Source: Energy Information Administration, *Solar Collector Manufacturing Activity 1992* (November 1993), Table 18.

Figure 10.7 Photovoltaic Cell and Module Shipments by End Use, 1991 and 1992



*Units designed for installations that are not grid-interactive.
**Original equipment manufacturers.
***Represents such applications as cooking food, desalinization, and distilling.
****Shipments to foreign governments and for specialty purposes.
Source: Table 10.7.

Table 10.7 Photovoltaic Cell and Module Shipments by End Use, 1989-1992

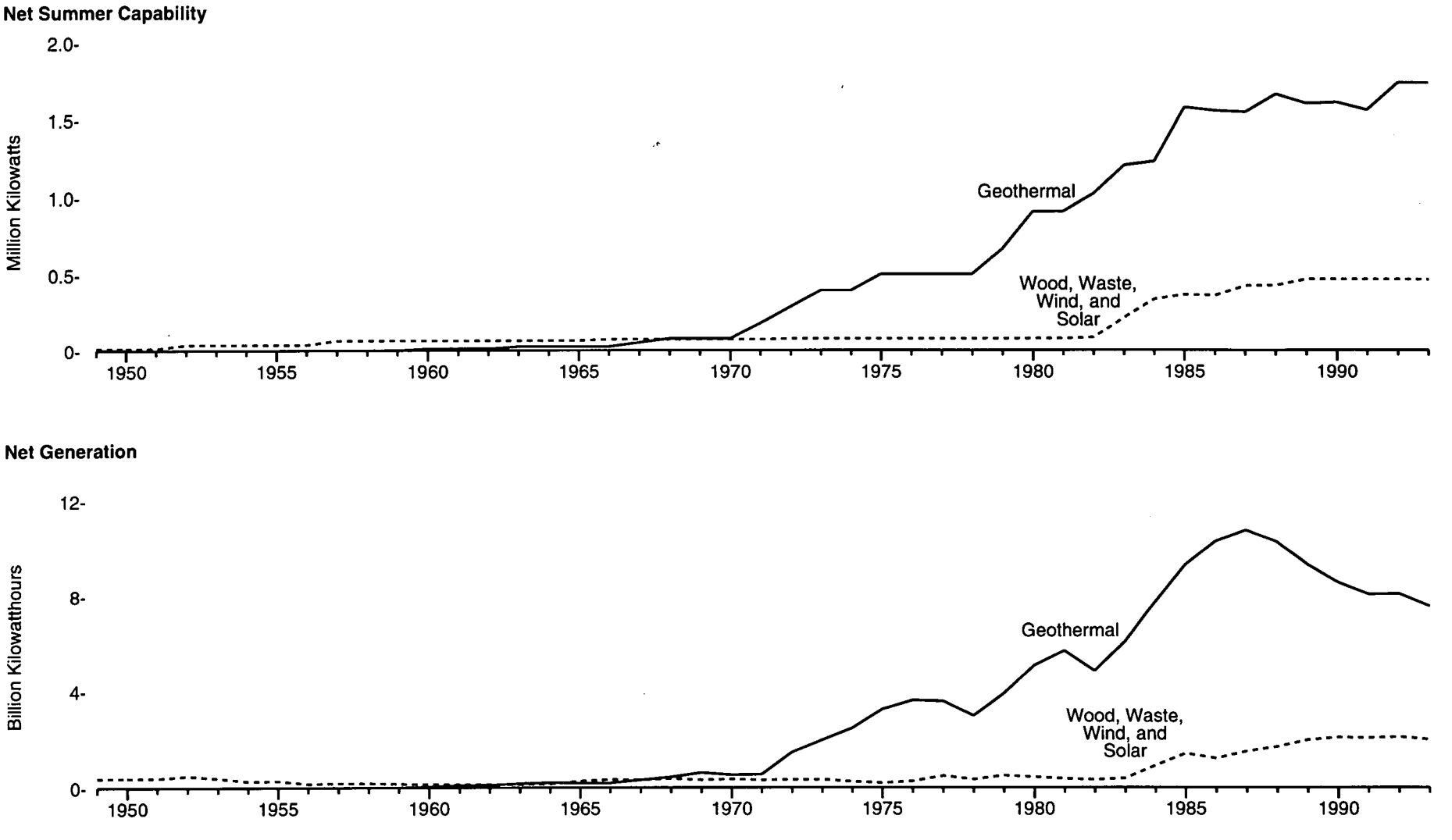
End Use	Amount Shipped (peak kilowatts)				Percent of Total			
	1989	1990	1991	1992	1989	1990	1991	1992
Application Total	**12,825**	**13,837**	**14,939**	**15,583**	**100.0**	**100.0**	**100.0**	**100.0**
Health	5	5	61	67	([1])	([1])	0.4	0.4
Water Pumping	711	1,014	729	809	5.5	7.3	4.9	5.2
Transportation	1,196	1,069	1,523	1,602	9.3	7.7	10.2	10.3
Communication	2,590	4,340	3,538	3,717	20.2	31.4	23.7	23.9
Consumer Goods	2,788	2,484	3,312	2,566	21.7	18.0	22.2	16.5
Electric Generation								
Grid Interactive	1,251	469	856	1,227	9.8	3.4	5.7	7.9
Remote [2]	2,620	3,097	3,594	4,238	20.4	22.4	24.1	27.2
Original Equipment Manufacturers [3]	[4] 1,595	[5] 1,119	[5] 1,315	828	12.4	8.1	8.8	5.3
Other [6]	[7] 69	240	13	530	0.5	1.7	0.1	3.4
Market Sector Total	**12,825**	**13,837**	**14,939**	**15,583**	**100.0**	**100.0**	**100.0**	**100.0**
Residential	1,439	1,701	3,624	4,154	11.2	12.3	24.3	26.7
Commercial	3,850	6,086	3,345	2,386	30.0	44.0	22.4	15.3
Government	1,077	1,002	815	1,063	8.4	7.2	5.5	6.8
Industrial	3,993	2,817	3,947	4,279	31.1	20.4	26.4	27.5
Electric Utility	785	826	1,275	1,553	6.1	6.0	8.5	10.0
Transportation	1,130	974	1,555	1,673	8.8	7.0	10.4	10.7
Other [8]	551	432	377	477	4.3	3.1	2.5	3.0

[1] Less than 0.05 percent.
[2] Electric power generation photovoltaic units designed for installations that are not grid-interactive.
[3] Original equipment manufacturers are non-photovoltaic manufacturers that combine photovoltaic technology into existing or newly developed product lines.
[4] Photovoltaic cells to original equipment manufacturers.
[5] Photovoltaic cells and modules to original equipment manufacturers.
[6] Represents such applications as cooking food, desalinization, and distilling.
[7] Includes modules to original equipment manufacturers.
[8] Shipments to foreign governments and for specialty purposes.

Note: Totals may not equal sum of components due to independent rounding.

Sources: **1989:** Energy Information Administration (EIA), *Solar Collector Manufacturing Activity 1989* (March 1991), Tables 17 and 18. **1990:** EIA, *Solar Collector Manufacturing Activity 1991* (December 1992), Tables 22 and 23. **1991 and 1992:** EIA, *Solar Collector Manufacturing Activity 1992* (November 1993), Tables 25 and 26.

Figure 10.8 Electric Utility Net Summer Capability and Net Generation of Electricity by Selected Renewable Energy Resources, 1949-1993



Source: Table 10.8.

Table 10.8 Electric Utility Net Summer Capability and Net Generation of Electricity by Selected Renewable Energy Resources, 1949-1993

Year	Geothermal Energy		Wood and Waste		Wind and Solar	
	Net Summer Capability [1] (thousand kilowatts)	Net Generation (million kilowatthours)	Net Summer Capability [1] (thousand kilowatts)	Net Generation (million kilowatthours)	Net Summer Capability [1] (thousand kilowatts)	Net Generation (million kilowatthours)
1949	([2])	([2])	13	386	0	0
1950	([2])	([2])	13	390	0	0
1951	([2])	([2])	13	391	0	0
1952	([2])	([2])	37	482	0	0
1953	([2])	([2])	37	389	0	0
1954	([2])	([2])	37	263	0	0
1955	([2])	([2])	37	276	0	0
1956	([2])	([2])	37	152	0	0
1957	([2])	([2])	64	177	0	0
1958	([2])	([2])	64	175	0	0
1959	([2])	([2])	64	153	0	0
1960	11	33	64	140	NA	NA
1961	11	94	64	126	NA	NA
1962	11	100	64	128	NA	NA
1963	24	168	64	128	NA	NA
1964	24	204	64	148	NA	NA
1965	24	189	64	269	NA	NA
1966	24	188	72	334	NA	NA
1967	51	316	72	316	NA	NA
1968	78	436	72	375	NA	NA
1969	78	615	72	320	NA	NA
1970	78	525	72	356	NA	NA
1971	184	548	72	311	NA	NA
1972	290	1,453	77	331	NA	NA
1973	396	1,966	77	328	NA	NA
1974	396	2,453	77	251	NA	NA
1975	502	3,246	77	191	NA	NA
1976	502	3,616	77	266	NA	NA
1977	502	3,582	77	481	NA	NA
1978	502	2,978	77	338	NA	NA
1979	667	3,889	78	498	NA	NA
1980	909	5,073	78	433	NA	NA
1981	909	5,686	78	368	([3])	NA
1982	1,022	4,843	79	321	6	NA
1983	1,207	6,075	212	379	6	3
1984	1,231	7,741	321	886	17	12
1985	1,580	9,325	350	1,383	18	16
1986	1,558	10,308	343	1,177	19	18
1987	1,549	10,775	401	1,477	25	14
1988	1,667	10,300	421	1,674	7	10
1989	1,606	9,342	465	1,965	4	3
1990	1,614	8,581	464	2,067	4	3
1991	1,563	8,087	464	2,046	4	4
1992	[R]1,739	8,104	464	[R]2,093	4	3
1993[P]	1,739	7,571	464	1,990	4	4

[1] At end of year.
[2] No geothermal energy capability prior to 1960.
[3] Less than 500 kilowatts.
R=Revised data. P=Preliminary data. NA=Not available.
Note: For the definition of net summer capability, see Glossary.

Sources: **Net Summer Capability at End of Year:** • 1960-1984—Energy Information Administration (EIA) estimates. • 1985 forward—EIA, Form EIA-860, "Annual Electric Generator Report." **Net Generation:** • 1949-September 1977—Federal Power Commission, Form FPC-4, "Monthly Power Plant Report." • October 1977-1981—Federal Energy Regulatory Commission, Form FPC-4, "Monthly Power Plant Report." • 1982 forward—EIA, Form EIA-759, "Monthly Power Plant Report."

11. International Energy

World Leaders in Energy Production

Worldwide energy production of 343 quadrillion Btu in 1992 was 63 quadrillion Btu greater than in 1983 (11.1).[1] The relative contributions of the four leading energy producers changed markedly over the 10-year period.

In 1983, the United States was the leading producer of energy and U.S. production of 61 quadrillion Btu accounted for 22 percent of the world total. The former U.S.S.R., the second leading producer, accounted for 59 quadrillion Btu, a 21-percent share. In 1986, the former U.S.S.R.'s production surpassed U.S. production for the first time and remained higher than U.S. production through 1990. In 1991, however, former U.S.S.R. production of 63 quadrillion Btu was lower than U.S. production of 67 quadrillion Btu.

As of December 31, 1991, the U.S.S.R. ceased to exist as a political entity. Three of the U.S.S.R.'s constituent republics (Russia, Ukraine, and Kazakhstan) produced 54 quadrillion Btu of energy in 1992. That year the United States produced 67 quadrillion Btu.

Energy production in China, the third largest producer of energy in 1983, exhibited the greatest growth over the 10-year period. In 1983, China produced 20 quadrillion Btu of energy, much of which was coal. By 1992, Chinese production had reached 30 quadrillion Btu.

At 12 quadrillion Btu, Saudi Arabia was the fourth largest producer of energy in 1983. During the 1983-to-1992 period, Saudi Arabian production levels varied widely. The low point came in 1985, when Saudi Arabia cut back production of energy (primarily petroleum) to 8.6 quadrillion Btu in an effort to regain control of world oil markets. By 1992, Saudi Arabian production had risen to 21 quadrillion Btu.

Crude Oil Production in 1993

World production of crude oil totaled 60 million barrels per day in 1993, down slightly from the 1992 level (11.5). The most noticeable production increase occurred in "other OPEC."[2] The most noticeable production declines occurred in Russia, where production fell from 7.4 million barrels per day in 1992 to 6.5 million barrels per day in 1993, and in the United States, where production declined from 7.2 million barrels per day to 6.8 million barrels per day. In Saudi Arabia, the largest producer of crude oil in 1993, production declined from 8.4 million barrels per day in 1992 to 8.2 million barrels per day in 1993. Crude oil production by all members of OPEC combined accounted for 43 percent of the world total in 1993.

Natural Gas Production in 1992

World production of dry natural gas totaled 75 trillion cubic feet (11.12) and, on a Btu basis, equaled 22 percent of world energy production in 1992 (11.2). Natural gas production in 1992 was 0.3 percent above the 1991 level (11.12). Russia was the major producer of natural gas in 1992 and accounted for 23 trillion cubic feet, a 30-percent share of the world total. The United States was the second largest producer and accounted for 18 trillion cubic feet, a 24-percent share.

Coal Production in 1992

World production of coal totaled 5.0 billion short tons (11.17) and, on a Btu basis, equaled 26 percent of world energy production in 1992 (11.2). That level of coal production was slightly above the 1991 level (11.17). China, the leading producer, accounted for 1.2 billion short tons in 1992. Coal production in the United States, the second leading producer, totaled 998 million short tons, down from the record level of 1,029 million short tons recorded in 1990. Russia, the world's third largest producer of coal in 1992, accounted for 372 million short tons, and Germany, the fourth largest, accounted for 346 million short tons.

Installed Capacity and Electricity Generation

As of January 1, 1992, world electricity installed capacity at all sites (including nonutility power producers) totaled 2.7 billion kilowatts (11.20). Most of the capacity (64 percent) was fossil fuel-fired. Hydroelectric

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

[2]OPEC is the Organization of Petroleum Exporting Countries. "Other OPEC" consists of Algeria, Gabon, Kuwait, Libya, Qatar, and the United Arab Emirates.

generating capacity accounted for 24 percent and nuclear electric generating capacity accounted for 12 percent. Renewable sources such as biofuels and geothermal, solar, and wind energy accounted for a small share of the world total.

World hydroelectric power net generation in 1992 totaled 2.2 trillion kilowatthours, up slightly from the 1991 level (11.21). Canada, the United States, Brazil, and Russia were the world leaders in hydroelectric power net generation and together accounted for 43 percent of the world total.

In 1993, nuclear-based electricity gross generation totaled 2.1 trillion kilowatthours (11.22). The U.S. share of the world total was 30 percent. France accounted for 17 percent, Japan for 11 percent, and Germany for 7.1 percent of the world total.

Fluctuations in Petroleum Prices and Demand

In 1973, the expanding post-World War II petroleum market reached 57 million barrels per day (11.10). At that point, oil-producing nations became able, for the first time, to exploit the relative inelasticity of petroleum demand in the short term by raising prices substantially. In response, petroleum consumption dipped for 2 years before resuming its climb to 65 million barrels per day in 1979.

Petroleum Stocks in OECD Countries

Following the oil supply disruptions in the mid-1970's, petroleum stocks held by members of the Organization for Economic Cooperation and Development (OECD) trended upward (11.11). In 1973, OECD petroleum stocks totaled 2.6 billion barrels. At the end of 1992, stocks were 3.6 billion barrels. Throughout the 20-year period, the United States held the largest share of total OECD stocks. U.S. petroleum stocks in 1973 totaled 1.0 billion barrels, a 39-percent share. In 1992, U.S. petroleum stocks of 1.6 billion barrels equaled a 44-percent share. Japan almost doubled its petroleum stocks over the same period, from 303 million barrels in 1973 to 603 million barrels in 1992.

A steep price hike in 1979 and 1980, combined with the longer-term effects of fuel switching and increased efficiency, began to curb consumption, even as the higher prices stimulated new sources of production. World petroleum consumption had fallen to 59 million barrels per day in 1983 when lowered demand and excess production began to erode the price of oil (11.10). In 1986, the price of crude oil plunged 46 percent to $14.55 per barrel (5.20). Prices stayed low in the second half of the 1980's and petroleum consumption reached 66 million barrels per day, a record level at the time, in 1989.

Following Iraq's invasion of Kuwait in August 1990, the average price of crude oil rose to $22.22 per barrel, the highest in 5 years (5.20), and year-to-year growth in world petroleum consumption of only 0.2 percent was the lowest in 5 years (11.10). In 1991, following the resolution of the war in the Persian Gulf, the average price of crude oil fell to $19.06 per barrel. World consumption of petroleum rose 0.8 percent to 67 million barrels per day. In 1992, the average price of crude oil fell to $16.41 per barrel. In real terms, the 1992 price was the lowest in 21 years. World consumption of petroleum, however, did not reflect the 11-percent price decline; it remained at the 1991 level of 67 million barrels per day.

From 1960 through 1992, the United States consumed more petroleum by far than any other country (11.10). In 1992, U.S. consumption accounted for 44 percent of the 39 million barrels per day consumed by the Organization for Economic Cooperation and Development (OECD) countries. Japan consumed 5.5 million barrels per day. Of the non-OECD countries, Russia was the biggest consumer, accounting for 4.3 million barrels per day.

Dry Natural Gas Consumption in 1992

Although natural gas can be transported across borders in pipelines and some natural gas is shipped as liquefied natural gas, in general, natural gas tends to be consumed closer to its site of production than does petroleum. Not surprisingly, the two top producers of dry natural gas in 1992 were also the top consumers (11.12 and 11.15). U.S. consumption of dry natural gas totaled 20 trillion cubic feet, equal to 110 percent of production. Russia consumed 16 trillion cubic feet, an amount equal to 71 percent of its production of dry natural gas. Germany, the third largest consumer of natural gas, consumed 2.7 trillion cubic feet, although it produced very little. Canadian consumption totaled 2.6 trillion cubic feet, equal to 57 percent of production.

Coal Consumption in 1992

World coal consumption in 1992 totaled 5.0 billion short tons, up 0.4 percent from the level of consumption in 1991 (11.19). China, the United States, Russia, and Germany, the world's leading producers of coal, were also the leading consumers. China consumed 1.2 billion short tons, the United States consumed 892 million short tons, Russia consumed 379 million short tons, and Germany consumed 363 million short tons of coal in 1992.

Energy Reserves

As of January 1, 1993, world crude oil reserves were estimated to equal about 996 billion barrels (11.3).[3] Two-thirds of the reserves were located in the Middle East, especially in Saudi Arabia, where about 39 percent of the region's reserves were estimated to be. Iraq, the United Arab Emirates, Kuwait, and Iran each were estimated to have more crude oil reserves than most regions in the world. Outside of the Middle East, three countries were estimated to have very large reserves: the former U.S.S.R., 57 billion barrels; Venezuela, 63 billion barrels; and Mexico, 51 billion barrels. The United States, at 24 billion barrels, had the tenth largest amount of crude oil reserves in the world.

The distribution of the world's 4.9 quadrillion cubic feet of natural gas reserves was different from the distribution of crude oil reserves (11.3).[4] Former U.S.S.R. reserves of 1.9 quadrillion cubic feet made the Eastern Europe and U.S.S.R. region first in the world in amount of natural gas reserves. The Middle East was estimated to have reserves of 1.5 quadrillion cubic feet, primarily in Iran, as well as in Qatar, the United Arab Emirates, Saudi Arabia, and Iraq. The United States, at 165 trillion cubic feet, had the sixth largest amount of natural gas reserves in the world.

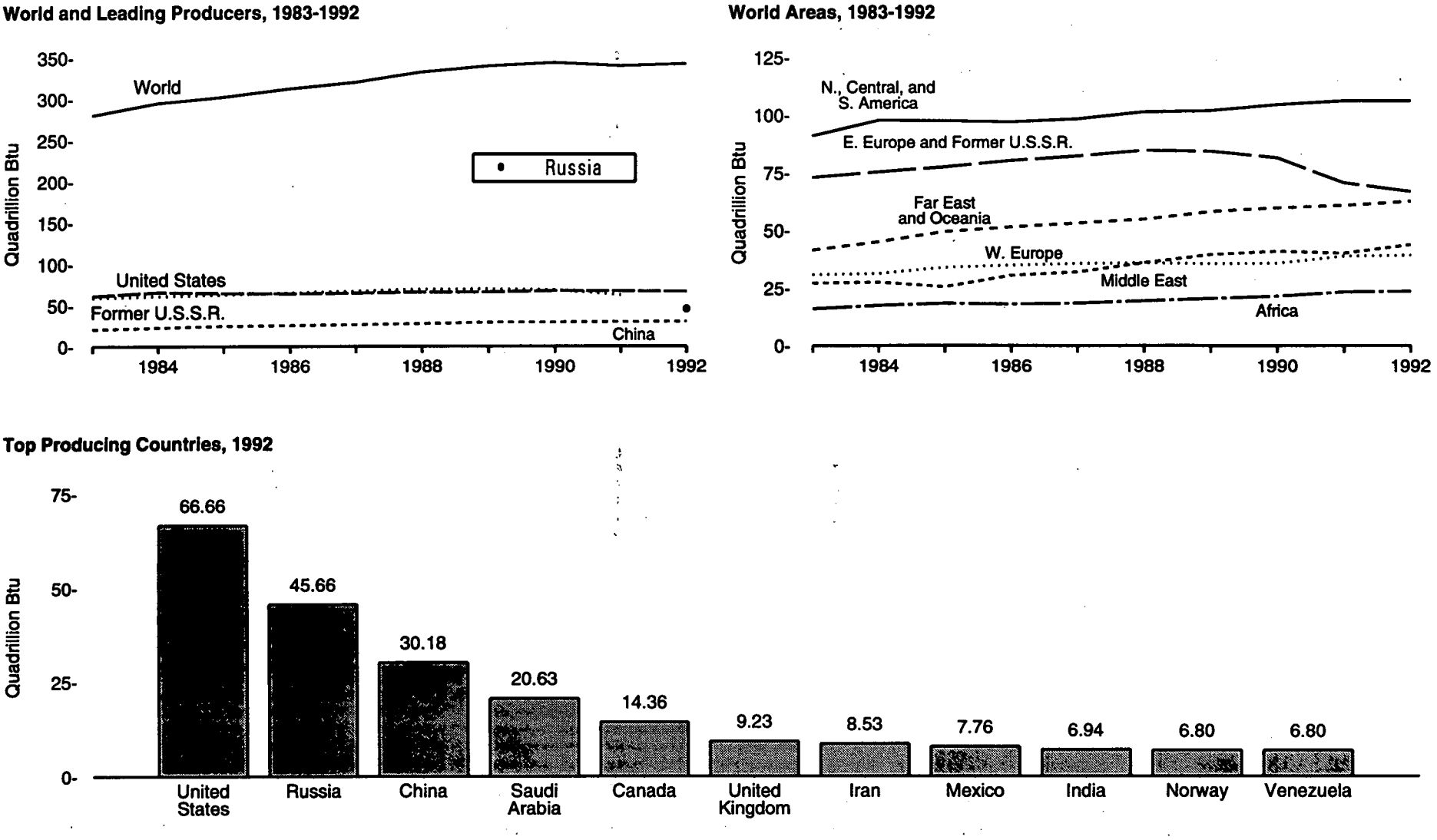
As of the end of 1992, recoverable reserves of coal were estimated to be 1.1 trillion short tons (11.16).[5] The three countries with the most plentiful coal reserves were estimated to be the U.S.S.R., with 266 billion short tons; the United States, with 265 billion short tons, and China, with 126 billion short tons.

[3] *Oil and Gas Journal* data.

[4] *Oil and Journal* data.

[5] British Petroleum data. Data for the U.S.S.R. and China are as of December 31, 1990, the most recent period for which they are available.

Figure 11.1 World Primary Energy Production



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.1.

Table 11.1 World Primary Energy Production, 1983-1992

(Quadrillion Btu)

Region and Country	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992 P
North, Central, and South America [1]	R91.10	R97.74	R97.60	R97.12	R98.43	R101.48	R101.97	R104.72	R106.38	106.38
Canada	10.14	11.01	11.80	11.71	12.32	13.17	13.10	13.07	R13.96	14.36
Mexico	R7.61	R7.80	R7.67	R6.97	R7.14	R7.21	R7.25	R7.42	R7.78	7.76
United States [1]	61.15	R65.79	R64.66	R64.12	R64.71	R65.87	R65.91	R67.65	R67.29	66.66
Venezuela	5.00	5.02	4.78	R5.20	R5.15	R5.60	5.74	R6.34	R6.86	6.80
Other	7.20	8.12	R8.69	R9.12	R9.11	R9.63	R9.97	R10.23	R10.48	10.80
Western Europe [2]	R30.94	R31.43	R34.04	R34.95	R35.72	R36.01	R35.60	R35.79	R38.96	39.31
France	2.96	3.37	3.54	3.81	3.97	4.09	4.09	4.20	R4.49	4.66
Germany [2]	R4.60	R4.79	R5.12	R4.95	R5.00	R5.02	R4.91	R4.78	R6.31	6.14
Netherlands	2.62	2.71	2.82	2.71	2.78	2.55	2.62	2.63	R2.94	2.91
Norway	3.42	3.66	3.83	3.98	4.48	4.74	5.77	5.96	R6.22	6.80
United Kingdom	9.85	8.78	10.11	10.55	10.24	9.96	8.95	8.78	R9.29	9.23
Other	7.49	8.12	R8.61	R8.96	9.26	9.64	9.26	R9.44	R9.70	9.57
Eastern Europe and Former U.S.S.R. [2]	R73.14	R75.53	R77.62	R80.42	R82.33	R84.80	R84.37	R81.62	R70.80	67.01
Kazakhstan	—	—	—	—	—	—	—	—	—	3.91
Poland	5.25	5.37	5.54	5.72	5.79	5.87	5.49	R4.71	R3.78	3.74
Romania	2.67	2.72	2.64	2.72	2.65	2.46	2.59	2.12	R1.72	1.59
Russia	—	—	—	—	—	—	—	—	—	45.66
Ukraine	—	—	—	—	—	—	—	—	—	4.18
Former U.S.S.R.	58.83	R60.86	62.66	R65.19	R67.17	69.59	69.63	R68.87	R62.51	—
Other [2]	R6.39	R6.58	R6.77	R6.78	R6.72	R6.87	R6.66	R5.92	R2.80	7.92
Middle East	27.29	27.65	25.66	30.62	32.09	36.04	39.61	R41.03	R40.23	43.94
Iran	5.67	5.29	5.57	5.06	5.66	5.70	7.01	7.67	R8.28	8.53
Iraq	2.17	2.61	3.09	3.66	4.58	5.97	6.47	4.54	R0.69	1.01
Kuwait	2.51	2.76	2.44	3.36	3.77	3.64	4.32	2.83	R0.43	2.48
Saudi Arabia	11.69	11.29	8.55	11.91	10.73	12.73	12.68	15.92	R19.75	20.63
United Arab Emirates	2.91	3.00	3.29	3.68	4.21	4.25	4.99	5.51	R6.27	6.23
Other	2.34	2.70	2.72	2.95	3.14	R3.76	4.14	4.55	R4.82	5.06
Africa	16.12	17.52	18.43	18.14	18.53	19.54	20.47	R21.49	R23.39	23.70
Algeria	3.46	3.71	3.77	3.55	4.01	4.02	4.28	4.52	R4.81	4.83
Libya	2.52	2.53	2.46	2.43	2.29	2.73	2.69	3.18	R3.44	3.46
Nigeria	2.77	3.12	3.35	3.30	3.04	3.29	3.88	4.05	R4.26	4.49
South Africa	3.45	3.87	4.17	4.26	4.23	4.39	4.28	4.19	R5.18	5.06
Other	3.92	4.30	4.67	R4.60	4.95	5.11	5.34	R5.55	R5.70	5.86
Far East and Oceania	41.57	45.18	49.50	51.56	53.24	54.94	R58.25	R59.89	R60.94	62.75
Australia	4.24	4.41	5.33	5.49	6.02	5.81	6.15	6.71	R6.30	6.66
China	20.47	22.39	24.60	25.34	26.25	27.50	29.15	29.29	R29.89	30.18
India	4.88	5.22	5.53	5.97	5.71	5.97	6.53	6.96	R6.71	6.94
Indonesia	3.84	4.27	4.24	4.33	4.36	4.49	4.86	5.14	R5.70	6.09
Japan	2.54	2.66	3.01	3.07	3.26	3.22	3.20	3.22	R3.47	3.43
Other	R5.61	6.23	6.80	R7.36	R7.62	R7.95	R8.36	R8.58	R8.88	9.45
World [1]	R280.16	R295.06	R302.85	R312.80	R320.35	R332.81	340.27	R344.54	R340.70	343.08

[1] Revised since release of the *International Energy Annual 1992* to reflect more current data for the United States.

[2] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Data differ from those published in the *International Energy Annual 1992*, Table A1, where Germany includes the former East Germany.

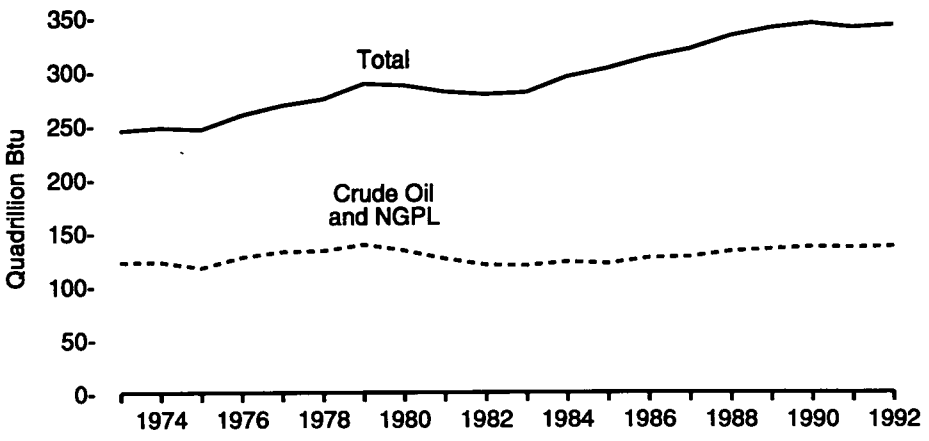
R=Revised data. P=Preliminary data. — = Not applicable.

Notes: • See Note 1 at end of section. • Primary energy includes crude oil, lease condensate, natural gas plant liquids, dry natural gas, coal, net hydroelectric power, and net nuclear power. It excludes wood, waste, geothermal, wind, photovoltaic, and solar thermal energy. • Totals may not equal sum of components due to independent rounding.

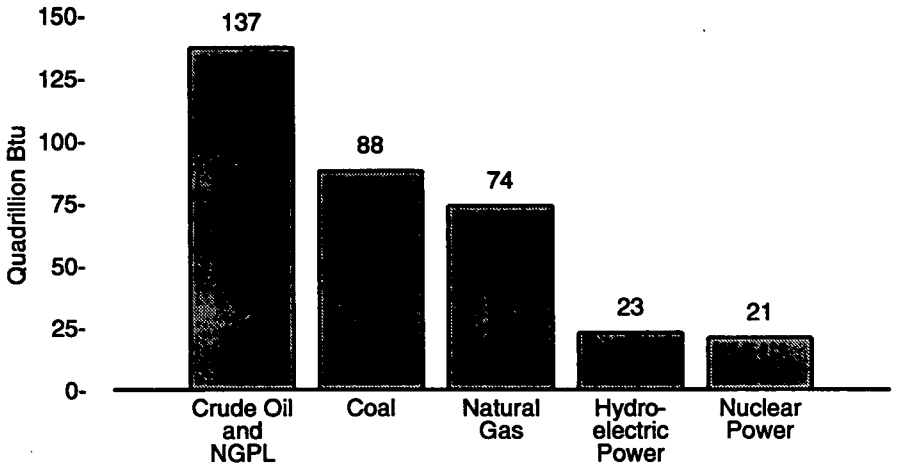
Sources: **United States:** Table 1.2. **All Other Data:** • 1983-1990—Energy Information Administration (EIA), Office of Energy Markets and End Use, International Database, March 1994. • 1991 and 1992—EIA, *International Energy Annual 1992* (January 1994), Table A1.

Figure 11.2 World Primary Energy Production by Source

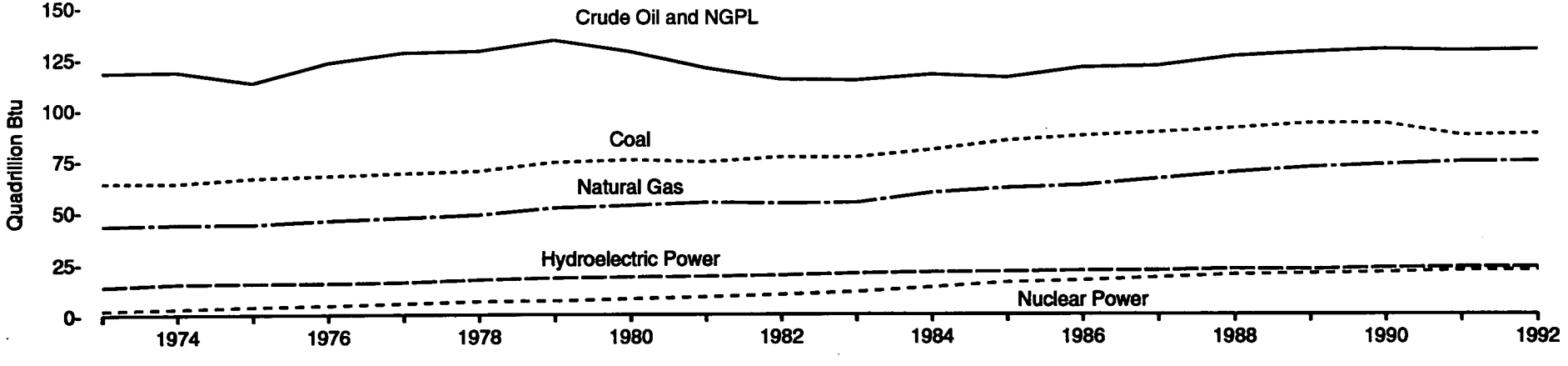
Total and Crude Oil and NGPL, 1973-1992



By Source, 1992



By Source, 1973-1992



Notes: • Crude oil includes lease condensate. • NGPL is natural gas plant liquids.
• Because vertical scales differ, graphs should not be compared.

Source: Table 11.2.

Table 11.2 World Primary Energy Production by Source, 1973-1992

(Quadrillion Btu)

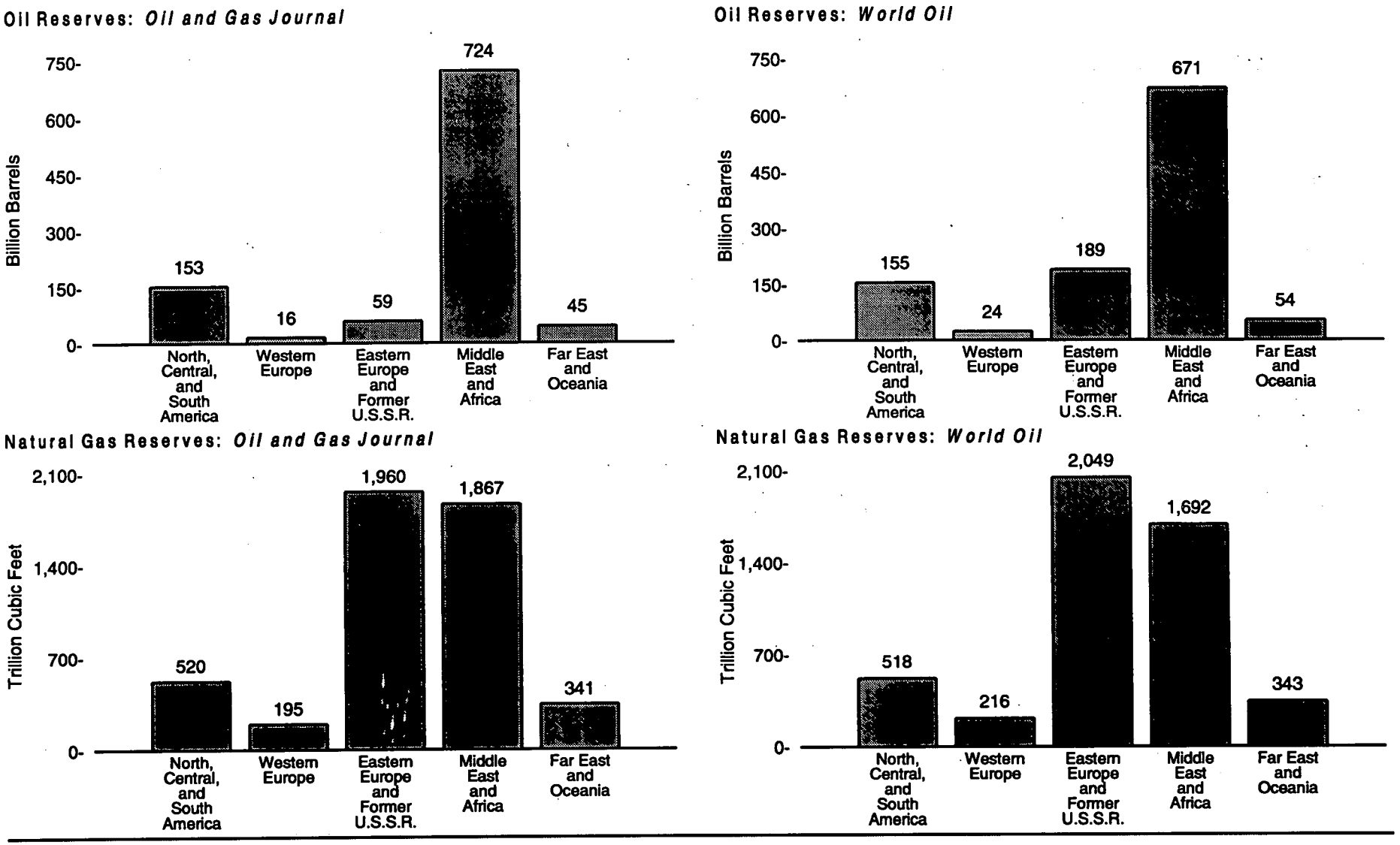
Year	Coal	Natural Gas [1]	Crude Oil [2]	Natural Gas Plant Liquids	Nuclear Power [3]	Hydroelectric Power [3]	Total [4]
1973	R63.87	43.18	117.83	R4.23	R2.15	13.52	244.79
1974	R63.79	43.76	118.22	R4.22	2.87	R14.84	R247.70
1975	R66.20	43.90	112.98	R4.12	3.85	R15.04	R246.09
1976	R67.33	45.68	122.72	R4.24	4.52	15.08	R259.57
1977	R68.47	46.88	127.63	R4.40	R5.41	15.56	R268.35
1978	R69.55	48.24	128.38	R4.55	R6.43	16.80	R273.95
1979	R73.80	51.57	133.79	R4.87	R6.69	17.69	R288.41
1980	75.02	52.79	128.12	5.10	R7.57	18.18	R286.78
1981	73.99	54.25	120.16	5.36	R8.52	R18.49	R280.77
1982	76.27	53.74	114.51	5.34	9.50	18.97	278.33
1983	R76.14	R54.03	113.97	5.34	10.71	19.90	R280.16
1984	R79.84	R59.07	116.86	5.71	12.99	20.51	R295.06
1985	R84.24	R61.31	115.40	5.72	15.36	R20.73	R302.85
1986	R86.50	R62.52	120.24	R6.00	16.33	R21.14	R312.80
1987	R88.22	R65.64	121.02	6.31	17.79	R21.29	R320.35
1988	R90.32	R68.73	125.77	6.62	19.29	R22.00	R332.81
1989	R92.88	R71.19	127.79	6.70	19.81	R21.84	R340.27
1990	R92.81	R72.59	129.30	7.01	20.30	R22.54	R344.54
1991	R86.74	R73.96	R128.55	R7.34	R21.27	R22.89	R340.70
1992P	87.63	74.27	129.22	7.60	21.47	22.90	343.08

[1] Dry production.
[2] Includes lease condensate.
[3] Net generation, i.e., gross generation less plant use.
[4] Total excludes wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.
R=Revised data. P=Preliminary data.

Notes: • See Note 1 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: • 1973-1982—Energy Information Administration (EIA), Office of Energy Markets and End Use, International Database, March 1994. • 1983 forward—EIA, *International Energy Annual 1992* (January 1994), Tables A1-A7, except for small updates to the natural gas and total world data.

Figure 11.3 World Crude Oil and Natural Gas Reserves, January 1, 1993



Source: Table 11.3.

Table 11.3 World Crude Oil and Natural Gas Reserves, January 1, 1993

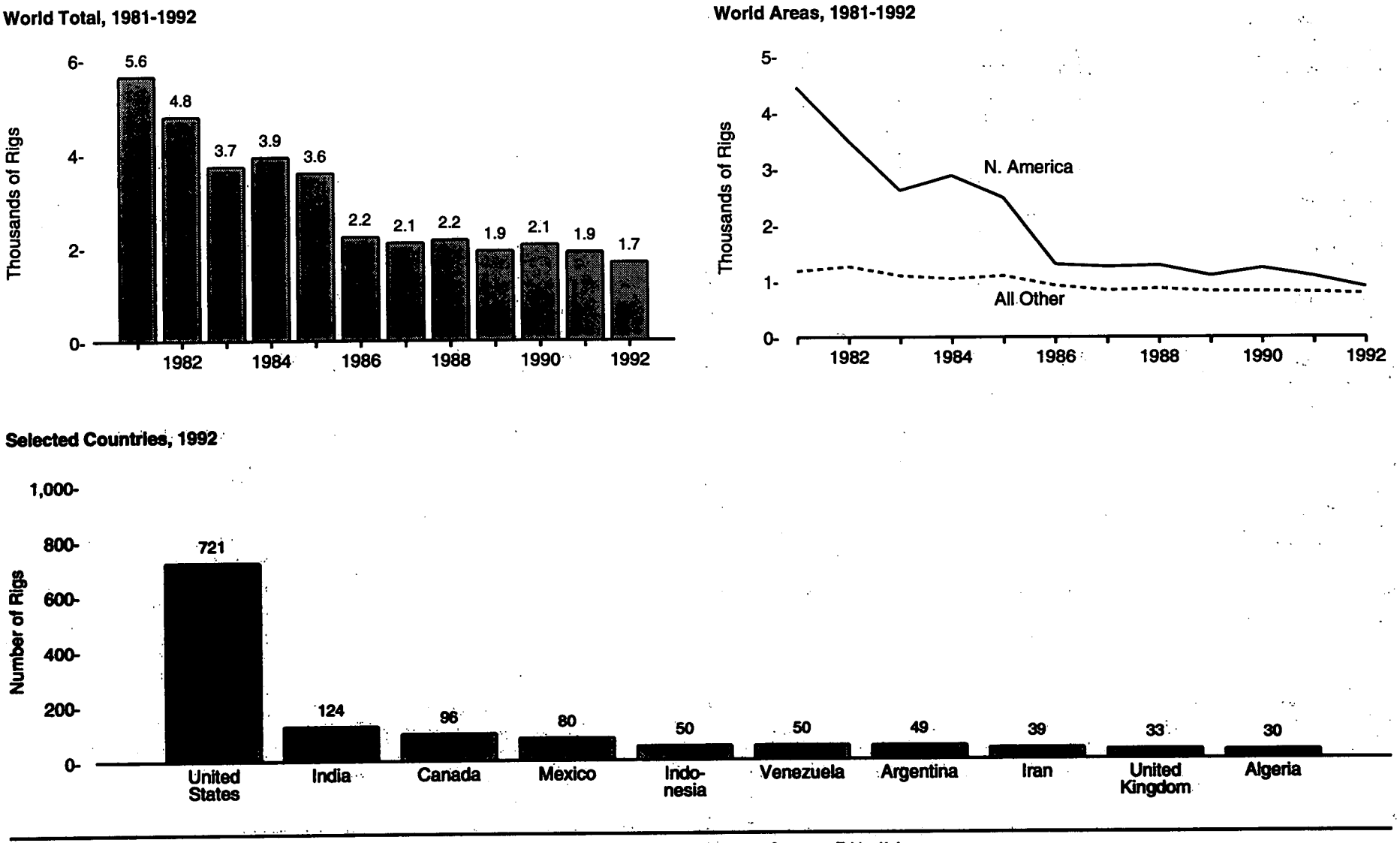
Region and Country	Crude Oil (billion barrels)		Natural Gas (trillion cubic feet)	
	Oil and Gas Journal	*World Oil*	*Oil and Gas Journal*	*World Oil*
North America	**80.3**	**80.6**	**331.6**	**329.2**
Canada	5.3	5.7	95.7	94.1
Mexico	51.3	51.2	70.9	70.0
United States	23.7	23.7	165.0	165.0
Central and South America	**72.5**	**74.3**	**188.6**	**189.0**
Argentina	1.6	1.6	22.7	23.8
Bolivia	0.1	0.1	4.1	4.2
Brazil	3.0	3.7	4.4	4.8
Colombia	1.9	1.6	7.2	3.9
Ecuador	1.6	2.0	3.9	4.0
Trinidad and Tobago	0.6	0.5	8.7	8.5
Venezuela	62.7	63.3	126.5	128.9
Other	1.0	1.3	11.1	10.9
Western Europe	**16.1**	**24.0**	**194.7**	**215.6**
Denmark	0.7	0.7	4.0	3.6
Germany	0.4	0.2	12.1	7.8
Italy	0.7	0.8	13.0	12.7
Netherlands	0.1	0.3	68.9	68.1
Norway	8.8	16.8	70.6	97.3
United Kingdom	4.1	4.6	19.1	21.5
Other	1.0	0.6	7.0	4.5
Eastern Europe and Former U.S.S.R.	**59.0**	**188.5**	**1,960.4**	**2,049.3**
Former U.S.S.R.	57.0	186.9	1,942.3	2,033.4
Other [1]	2.0	1.6	18.1	15.9
Middle East	**661.8**	**596.3**	**1,520.1**	**1,365.6**
Bahrain	0.1	0.1	5.8	5.6
Iran	92.9	61.3	699.2	610.0
Iraq	100.0	99.8	109.5	109.3
Kuwait	96.5	94.8	52.9	51.6
Oman	4.5	4.7	16.9	17.0
Qatar	3.7	4.3	227.0	165.0
Saudi Arabia	260.3	261.0	183.1	185.3
United Arab Emirates	98.1	65.1	204.6	198.4
Other	5.7	5.0	21.1	23.4
Africa	**61.9**	**74.7**	**346.9**	**326.0**
Algeria	9.2	10.4	128.0	128.9
Cameroon	0.4	0.3	3.9	3.9
Egypt	6.2	3.6	15.4	12.3
Libya	22.8	38.2	46.2	43.5
Nigeria	17.9	18.2	120.0	121.9
Tunisia	1.7	0.5	3.0	0.9
Other	3.7	3.6	30.4	14.6
Far East and Oceania	**44.6**	**54.0**	**341.0**	**342.7**
Australia	1.8	3.2	18.3	73.9
Brunei	1.4	1.1	14.0	13.1
China	24.0	29.6	49.4	45.0
India	6.0	5.9	26.0	23.9
Indonesia	5.8	8.4	64.4	48.5
Malaysia	3.7	4.3	67.8	66.9
New Zealand	0.2	0.2	3.4	3.1
Pakistan	0.4	0.1	31.0	23.7
Thailand	0.2	0.2	8.5	8.2
Other	1.1	1.0	58.4	36.3
World	**996.1**	**1,092.4**	**4,883.3**	**4,817.3**

[1] Albania, Bulgaria, former Czechoslovakia, Hungary, Poland, and Romania.

Notes: • Data for Kuwait and Saudi Arabia include one-half of the reserves in the Neutral Zone between Kuwait and Saudi Arabia. • All reserve figures except those for the former U.S.S.R. and natural gas reserves in Canada are proved reserves recoverable with present technology and prices. Former U.S.S.R. figures are "explored reserves," which include proved, probable, and some partially possible. The Canadian natural gas figure includes proved and some probable. The latest Energy Information Administration data for the United States are for December 31, 1992. See Table 4.8. • Totals may not equal sum of components due to independent rounding.

Sources: **United States:** Energy Information Administration (EIA), *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992 Annual Report* (October 1993). **All Other Data:** PennWell Publishing Company, *Oil and Gas Journal*, December 30, 1992. Gulf Publishing Company, *World Oil*, August 1993.

Figure 11.4 World Rotary Rigs in Operation



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.4.

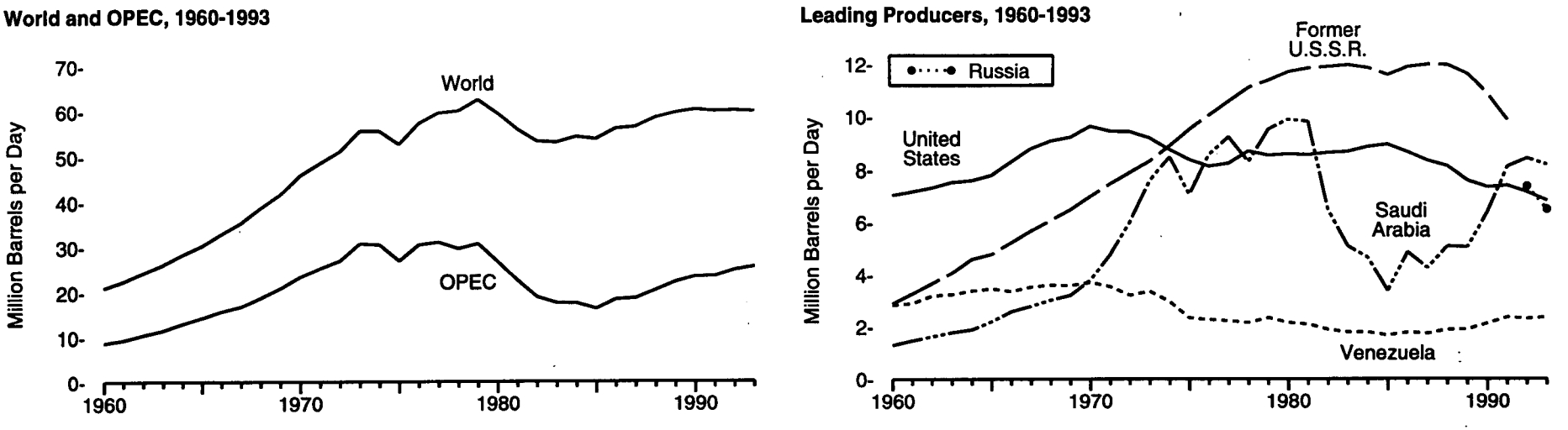
Table 11.4 World Rotary Rigs in Operation, 1981-1992

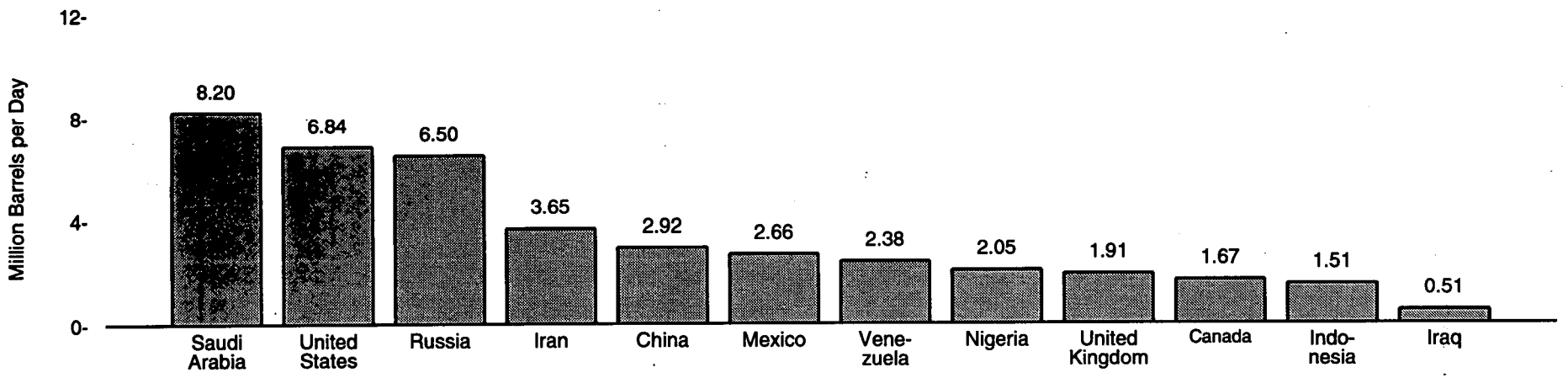
Region and Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
North America	R4,452	R3,506	2,620	2,883	2,487	1,305	1,260	1,287	1,102	1,238	1,090	897
Canada	R264	R199	201	259	311	178	181	196	130	138	121	96
Mexico	218	202	187	196	196	163	143	155	103	90	109	80
United States	3,970	3,105	2,232	2,428	1,980	964	936	936	869	1,010	860	721
Central and South America	303	320	264	R243	R247	208	195	180	158	158	167	170
Argentina	70	67	73	82	81	47	61	63	55	64	60	49
Brazil	81	94	83	70	76	77	60	39	28	23	21	26
Venezuela	63	69	41	30	33	29	18	25	28	32	45	50
Other	89	90	67	R61	R57	55	56	53	47	39	41	45
Western Europe	244	271	211	227	258	211	181	190	167	162	142	112
France	21	22	17	20	22	15	8	8	7	6	4	3
Italy	32	38	26	26	40	33	26	24	22	21	25	23
Netherlands	17	21	17	18	24	15	10	14	12	14	11	10
Norway	12	13	10	10	13	12	12	15	12	12	16	15
Turkey	26	34	26	24	25	27	26	21	20	17	19	15
United Kingdom	58	58	42	60	63	43	44	57	46	48	39	33
Yugoslavia	22	24	21	25	27	30	31	31	32	31	15	1
Other	R56	R61	R52	R44	R44	R36	R24	R20	R16	R13	R13	12
Eastern Europe and Former U.S.S.R.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26	21
Hungary	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	2
Poland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22	18
Former U.S.S.R.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Middle East	R117	R130	142	R136	139	R118	90	102	110	108	92	128
Iran	0	3	13	20	20	18	18	18	20	19	21	39
Iraq	14	11	23	19	28	21	10	23	26	[1]23	NA	NA
Saudi Arabia	29	29	26	16	11	6	5	4	5	10	16	22
Syria	16	15	15	23	26	27	22	24	24	17	14	17
United Arab Emirates	R37	50	45	36	28	18	11	10	9	12	16	18
Other	21	R22	20	R22	28	R28	24	23	26	27	25	32
Africa	240	R242	R181	R140	R155	R130	R113	112	101	107	106	94
Algeria	91	81	54	27	35	41	40	32	24	35	31	30
Egypt	27	36	35	36	37	33	23	21	18	15	17	16
Libya	33	31	24	26	30	20	12	16	17	15	15	15
Nigeria	23	27	17	11	10	10	11	13	14	18	21	16
Other	66	R67	R51	R40	R43	R26	R27	30	28	24	22	17
Far East and Oceania	281	311	303	295	298	254	259	287	286	284	273	254
Australia	23	33	25	34	31	15	16	19	14	14	12	10
India	44	50	56	57	62	70	116	131	135	137	136	124
Indonesia	86	92	88	82	80	62	37	44	46	52	53	50
Myanmar (Burma)	30	32	36	33	33	33	29	26	23	19	22	18
Other	98	104	98	89	92	74	61	67	68	62	50	52
World	5,637	R4,780	R3,721	R3,924	R3,584	2,226	R2,098	2,158	1,924	2,057	1,896	1,676

[1] Average rigs January through August.
R=Revised data. NA=Not available.

Source: Baker Hughes, Inc., Houston, Texas.

Figure 11.5 World Crude Oil Production





Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.5.

Table 11.5 World Crude Oil Production, 1960-1993

(Million Barrels per Day)

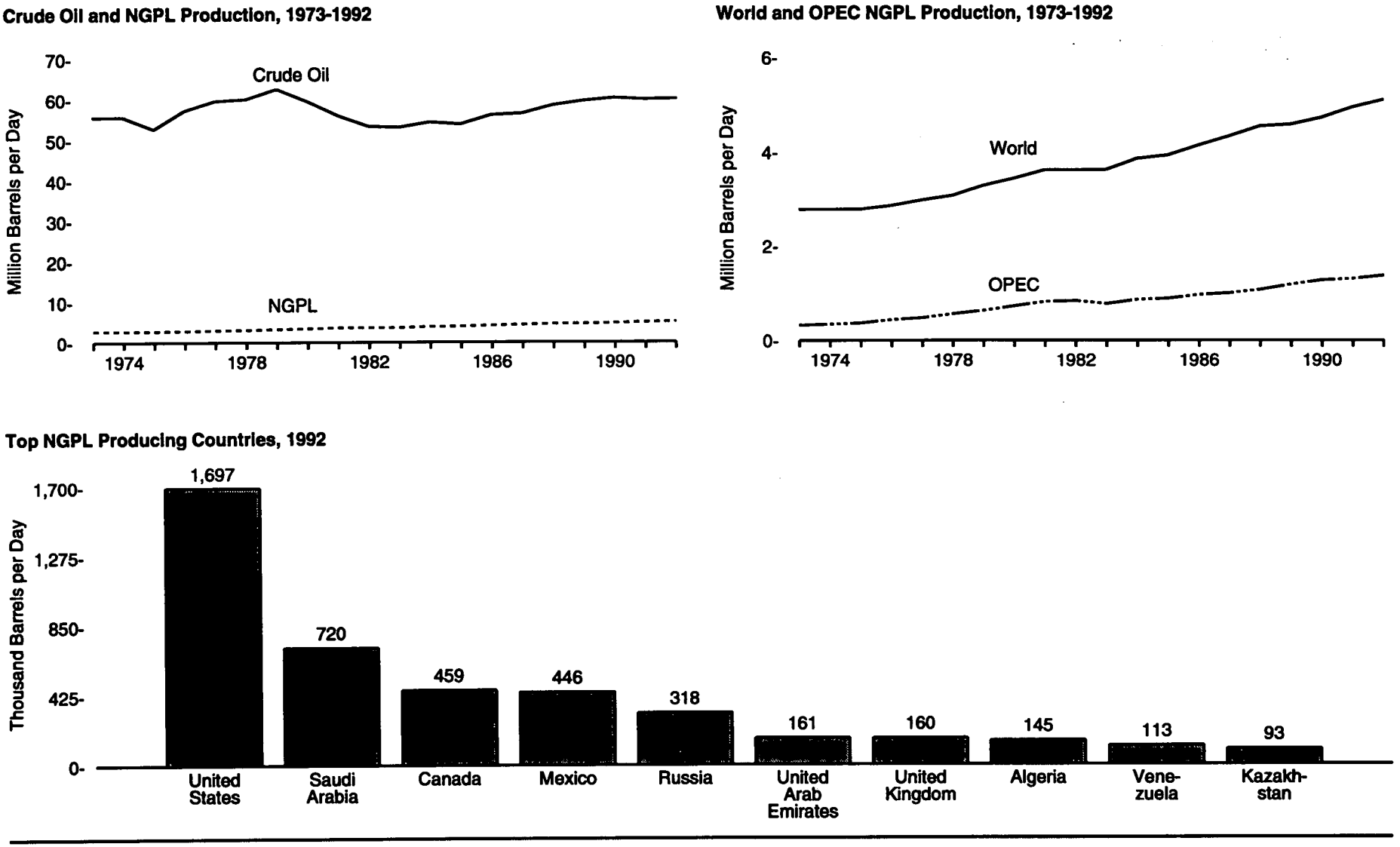
	OPEC [1]								Non-OPEC								
Year	Indonesia	Iran	Iraq	Nigeria	Saudi Arabia [2]	Venezuela	Other	Total	Canada	China	Mexico	Russia	United Kingdom	United States	Former U.S.S.R.	Other	World
1960	0.41	1.07	0.97	0.02	1.31	2.85	R2.06	R8.69	0.52	0.10	0.27	—	([3])	7.04	2.91	R1.43	20.96
1961	0.42	1.20	1.01	0.05	1.48	2.92	2.28	9.36	0.61	0.11	0.29	—	([3])	7.18	3.28	1.60	22.43
1962	0.45	1.34	1.01	0.07	1.64	3.20	R2.79	R10.50	0.67	0.12	0.31	—	([3])	7.33	3.67	R1.72	24.32
1963	0.44	1.49	1.16	0.08	1.79	3.25	3.30	11.51	0.71	0.13	0.32	—	([3])	7.54	4.07	1.85	26.13
1964	0.46	1.71	1.26	0.12	1.90	3.39	4.14	12.98	0.75	0.18	0.32	—	([3])	7.61	4.60	1.92	28.36
1965	0.48	1.91	1.31	0.27	2.21	3.47	R4.68	R14.33	0.81	0.23	0.32	—	([3])	7.80	4.79	R2.02	30.30
1966	0.47	2.13	1.39	0.42	2.60	3.37	R5.38	R15.76	0.88	0.29	0.33	—	([3])	8.30	5.23	R2.14	32.93
1967	0.51	2.60	1.23	0.32	2.81	3.54	5.84	R16.84	0.96	0.28	0.37	—	([3])	8.81	5.68	R2.43	35.37
1968	0.60	2.84	1.50	0.14	3.04	3.61	R7.05	R18.78	1.19	0.30	0.39	—	([3])	9.10	6.08	R2.80	38.64
1969	R0.74	3.38	1.52	0.54	3.22	3.59	7.91	R20.90	1.13	0.48	0.46	—	([3])	9.24	6.48	R3.00	41.69
1970	0.85	3.83	1.55	1.08	3.80	3.71	8.59	23.41	1.26	0.60	0.49	—	([3])	9.64	6.99	3.50	45.89
1971	0.89	4.54	1.69	1.53	4.77	3.55	8.35	R25.32	1.35	0.78	0.49	—	([3])	9.46	7.48	3.64	48.52
1972	1.08	5.02	1.47	1.82	6.02	3.22	R8.39	R27.02	1.53	0.90	0.51	—	([3])	9.44	7.89	R3.85	51.14
1973	1.34	5.86	2.02	2.05	7.60	3.37	R8.55	R30.78	1.80	1.09	0.47	—	([3])	9.21	8.32	R4.01	55.68
1974	1.38	6.02	1.97	2.26	8.48	2.98	R7.47	R30.55	1.55	1.32	0.57	—	([3])	8.77	8.91	R4.04	55.72
1975	1.31	5.35	2.26	1.78	7.08	2.35	R6.87	R26.99	1.43	1.49	0.71	—	0.01	8.37	9.52	R4.30	52.83
1976	1.50	5.88	2.42	2.07	8.58	2.29	R7.81	R30.55	1.31	1.67	0.83	—	0.25	8.13	10.06	R4.54	57.34
1977	1.69	5.66	2.35	2.09	9.25	2.24	R7.85	R31.12	1.32	1.87	0.98	—	0.77	8.24	10.60	R4.80	59.71
1978	1.64	5.24	2.56	1.90	8.30	2.17	R7.87	R29.67	1.32	2.08	1.21	—	1.08	8.71	11.11	R4.98	60.16
1979	1.59	3.17	3.48	2.30	9.53	2.36	R8.36	R30.78	1.50	2.12	1.46	—	1.57	8.55	11.38	R5.30	62.67
1980	1.58	1.66	2.51	2.06	9.90	2.17	R6.91	R26.78	1.44	2.11	1.94	—	1.62	8.60	11.71	R5.41	59.60
1981	1.61	1.38	1.00	1.43	9.82	2.10	R5.30	R22.63	1.29	2.01	2.31	—	1.81	8.57	11.85	R5.60	56.08
1982	1.34	2.21	1.01	1.30	6.48	1.90	R4.70	R18.93	1.27	2.05	2.75	—	2.07	8.65	11.91	R5.86	53.48
1983	1.34	2.44	1.01	1.24	5.09	1.80	R4.74	R17.65	1.36	2.12	2.69	—	2.29	8.69	11.97	R6.49	53.26
1984	1.41	2.17	1.21	1.39	4.66	1.80	R4.96	R17.60	1.44	2.30	2.78	—	2.48	8.88	11.86	R7.16	54.49
1985	1.33	2.25	1.43	1.50	3.39	1.68	R4.79	R16.35	1.47	2.51	2.75	—	2.53	8.97	11.59	R7.82	53.98
1986	1.39	2.04	1.69	1.47	4.87	1.79	R5.20	R18.44	1.47	2.62	2.44	—	2.54	8.68	11.90	R8.14	56.23
1987	1.34	2.30	2.08	1.34	4.27	1.75	R5.59	R18.67	1.54	2.69	2.55	—	2.41	8.35	11.99	R8.42	56.60
1988	1.34	2.24	2.69	1.45	5.09	1.90	R5.78	R20.48	1.62	2.73	2.51	—	2.23	8.14	11.98	R8.97	58.66
1989	1.41	2.81	2.90	1.72	5.06	1.91	R6.48	R22.28	1.56	2.76	2.52	—	1.80	7.61	11.63	R9.62	59.77
1990	1.46	3.09	2.04	1.81	6.41	2.14	R6.52	R23.47	1.55	2.77	2.55	—	1.82	7.36	10.88	R10.07	60.47
1991	R1.59	R3.31	R0.31	1.89	R8.12	2.38	R5.98	R23.57	1.55	R2.84	2.68	—	1.80	7.42	9.89	R10.37	R60.11
1992	R1.57	3.43	R0.45	1.98	8.44	2.33	R6.75	R24.95	1.60	2.84	2.67	7.39	1.83	R7.17	—	R11.82	R60.26
1993P	1.51	3.65	0.51	2.05	8.20	2.38	7.39	25.68	1.67	2.92	2.66	6.50	1.91	6.84	—	11.89	60.06

[1] Organization of Petroleum Exporting Countries. See Glossary for membership.
[2] Includes about one-half of the production in the Neutral Zone between Kuwait and Saudi Arabia.
[3] Less than 5,000 barrels per day.
R=Revised data. P=Preliminary data. — = Not applicable.

Notes: • Includes lease condensate, excludes natural gas plant liquids. • Totals may not equal sum of components due to independent rounding.

Sources: **China:** • 1960-1972—Central Intelligence Agency, unpublished data. • 1973-1979—Energy Information Administration (EIA), *International Energy Annual 1983*, Table 8. • 1980—EIA, *International Energy Annual 1989*, Table 1. • 1981—EIA, *International Energy Annual 1990*, Table 1. • 1982—EIA, *International Energy Annual 1991* (December 1992), Table 1. • 1983-1992—EIA, *International Energy Annual 1992* (January 1994), Table 1. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 10.1. **United States:** • 1960-1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976-1980—EIA, Energy Data Reports, *Petroleum Statement, Annual.* • 1981-1992—EIA, *Petroleum Supply Annual.* • 1993—EIA, *Monthly Energy Review* (March 1994), Table 10.1. **U.S.S.R.:** • 1960-1969—U.S.S.R. Central Statistical Office, *Narodnoye Khozyaystvo SSSR* (National Economy USSR). • 1970-1981—EIA, *International Petroleum Statistics Report*, February 1993, Table 4.1. • 1982—EIA, *International Energy Annual 1991* (December 1992), Table 1. • 1983-1991—EIA, *International Energy Annual 1992* (January 1994), Table 1. **Russia:** • 1992—EIA, *International Energy Annual 1992* (January 1994), Table 1. • 1993—EIA, Office of Energy Markets and End Use, International Database, March 1994. **OPEC Nations:** • 1960-1972—Organization of Petroleum Exporting Countries, *Annual Statistical Bulletin 1979.* • 1973-1979—EIA, *International Energy Annual 1983*, Table 8. • 1980—EIA, *International Energy Annual 1989*, Table 1. • 1981—EIA, *International Energy Annual 1990*, Table 1. • 1982—EIA, *International Energy Annual 1991* (December 1992), Table 1. • 1983-1992—EIA, *International Energy Annual 1992* (January 1994), Table 1. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 10.1. **All Other Countries:** • 1960-1969—Bureau of Mines, *International Petroleum Annual, 1969.* • 1970-1972—EIA, *International Petroleum Annual, 1978.* • 1973-1979—EIA, *International Energy Annual 1983*, Table 8. • 1980—EIA, *International Energy Annual 1989*, Table 1. • 1981—EIA, *International Energy Annual 1990*, Table 1. • 1982—EIA, *International Energy Annual 1991* (December 1992), Table 1. • 1983-1992—EIA, *International Energy Annual 1992* (January 1994), Table 1. • 1993—EIA, *Monthly Energy Review* (March 1994), Table 10.1.

Figure 11.6 World Natural Gas Plant Liquids Production



Note: Because vertical scales differ, graphs should not be compared.

Sources: Tables 11.5 and 11.6.

Table 11.6 World Natural Gas Plant Liquids Production, 1973-1992

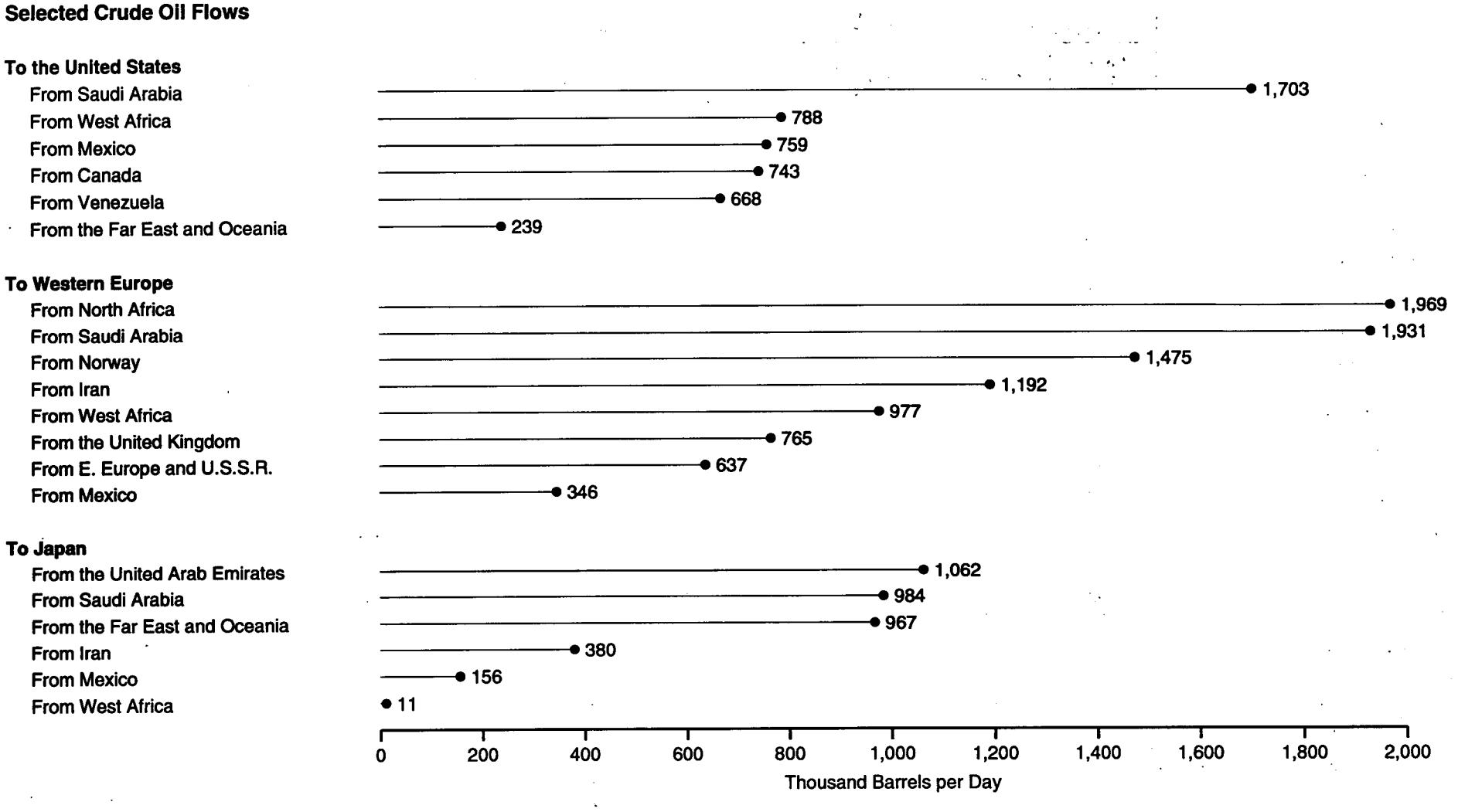
(Thousand Barrels per Day)

Year	OPEC [1]							Non-OPEC								World
	Algeria	Kuwait [2]	Saudi Arabia [2]	United Arab Emirates	Venezuela	Other	Total	Canada	Kazakhstan	Mexico	Russia	United Kingdom	United States	Former U.S.S.R.	Other	
1973	9	60	90	([3])	89	76	R324	314	—	75	—	5	1,738	170	R160	R2,786
1974	12	50	130	([3])	84	71	347	314	—	80	—	5	1,688	190	R166	R2,790
1975	20	50	140	([3])	76	86	R372	309	—	80	—	15	1,633	205	R177	R2,791
1976	24	50	185	([3])	77	R105	442	289	—	95	—	15	1,604	220	R203	R2,867
1977	19	55	215	15	78	100	482	290	—	105	—	30	1,618	235	R224	R2,984
1978	25	75	250	30	61	R125	R566	281	—	115	—	40	1,567	255	R256	R3,080
1979	30	95	303	30	69	R110	R637	331	—	150	—	45	1,584	270	R270	R3,287
1980	36	95	369	35	60	R137	R732	331	—	193	—	45	1,573	285	R285	3,444
1981	49	60	433	60	55	R168	R825	330	—	241	—	50	1,609	300	R270	3,625
1982	58	40	430	90	60	R164	R842	318	—	255	—	78	1,550	315	R268	3,626
1983	56	55	330	120	57	R162	R780	309	—	265	—	111	1,559	330	R281	3,635
1984	105	67	355	130	57	R155	R869	336	—	257	—	136	1,630	340	R301	3,869
1985	120	54	375	160	63	R120	R892	337	—	271	—	145	1,609	350	R334	3,938
1986	120	75	385	185	97	R107	R969	328	—	352	—	152	1,551	440	R358	4,150
1987	140	95	418	145	94	R114	R1,006	367	—	338	—	162	1,595	495	R381	4,344
1988	120	100	499	130	98	R130	R1,077	381	—	370	—	159	1,625	525	R419	4,556
1989	130	105	503	130	108	R212	R1,188	410	—	384	—	140	1,546	515	R410	4,593
1990	130	65	620	135	114	R217	R1,281	426	—	428	—	108	1,559	520	R413	4,735
1991	140	0	R680	165	R117	R210	R1,312	R431	—	457	—	R141	1,659	525	R430	R4,955
1992P	145	15	720	161	113	226	1,380	459	93	446	318	160	1,697	—	565	5,118

[1] Organization of Petroleum Exporting Countries. See Glossary for membership.
[2] Includes about one-half of the production in the Neutral Zone between Kuwait and Saudi Arabia.
[3] Less than 500 barrels per day.
R=Revised data. P=Preliminary data. — = Not applicable.

Note: Totals may not equal sum of components due to independent rounding.
Sources: • 1973-1982—Energy Information Administration (EIA), Office of Energy Markets and End Use, International Database, March 1994. • 1983 forward—EIA, *International Energy Annual 1992* (January 1994), Table 2.

Figure 11.7 International Crude Oil Flow, 1991



Source: Table 11.7.

Table 11.7 International Crude Oil Flow, 1991

(Thousand Barrels per Day)

Exporters	Importers										
	North America		Central and South America						Far East and Oceania		
	United States	Canada	Caribbean Islands	Other	Western Europe	Eastern Europe and U.S.S.R.	Middle East	Africa	Japan	Other	Total [1]
North America											
Canada	743	—	0	0	0	0	0	0	1	8	752
Mexico	759	15	44	14	346	0	32	0	156	3	1,369
United States	—	5	[2] 111	0	([3])	0	0	0	0	0	116
Central and South America											
Ecuador	53	0	24	54	0	0	0	0	0	48	179
Peru	2	0	0	0	0	0	0	0	0	0	2
Trinidad and Tobago	72	0	0	0	0	0	0	0	0	0	72
Venezuela	668	35	374	96	199	0	0	0	9	0	1,381
Other	132	0	42	25	9	0	0	0	0	0	208
Western Europe											
Norway	74	157	0	0	1,475	0	23	0	0	0	1,729
United Kingdom	106	191	11	0	765	0	0	0	0	0	1,073
Other	3	0	0	0	134	0	0	0	0	0	137
Eastern Europe and U.S.S.R.	1	0	5	0	637	493	10	6	2	51	1,205
Middle East											
Iran	32	2	7	141	1,192	114	10	31	380	511	2,420
Iraq	0	0	0	0	0	0	42	0	0	0	42
Saudi Arabia	1,703	72	12	190	1,931	0	216	34	984	1,310	6,452
United Arab Emirates	2	3	63	1	193	0	5	238	1,062	628	2,195
Other	33	12	88	180	251	132	51	104	608	379	1,838
Africa											
North [4]	61	5	1	7	1,969	90	105	116	0	54	2,408
West [5]	788	54	31	64	977	0	([3])	85	11	8	2,018
Other	311	0	44	0	155	5	15	2	0	11	543
Far East and Oceania [6]	239	0	0	12	12	0	13	5	967	1,019	2,267
World	5,782	551	857	784	10,245	834	522	621	4,180	4,030	28,406

[1] The data in this column are total exports plus adjustments; they do not equal total reported exports because of changes in stocks at sea, exchanges, transshipments, and other statistical discrepancies.

[2] Includes shipments to Puerto Rico and the Virgin Islands.

[3] Less than 500 barrels per day.

[4] Algeria, Egypt, Libya, Morocco, and Tunisia.

[5] Benin, Cameroon, Equatorial Guinea, Gabon, Ivory Coast, Nigeria, and Togo.

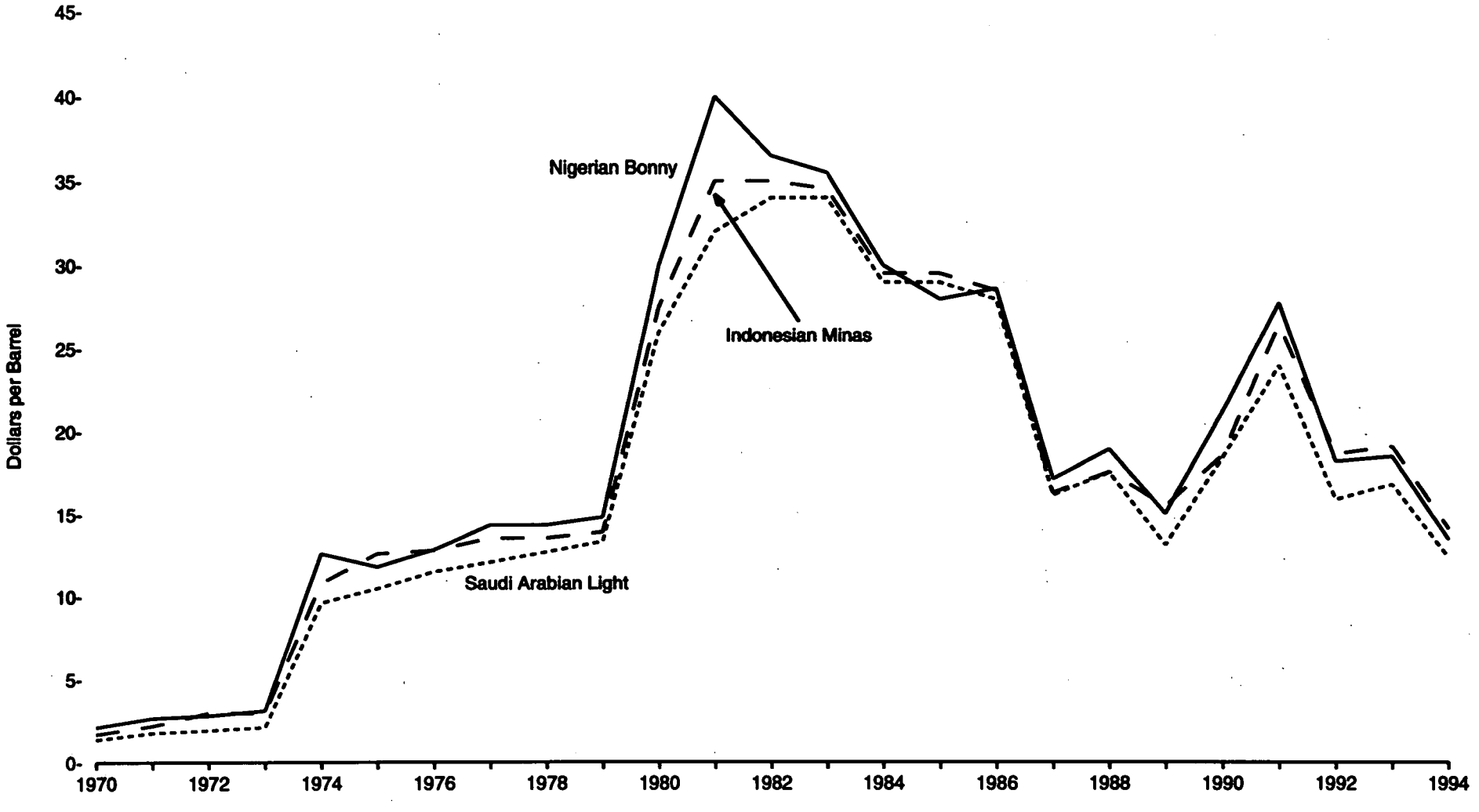
[6] Primarily Indonesia, China, Malaysia, and Brunei.

— = Not applicable.

Notes: • Transshipments are assigned to the country of original lading, if known. • Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 20.

Figure 11.8 Official Prices of Selected Foreign Crude Oils, 1970-1994



Note: Prices are as of January 1, except in 1987, when prices are as of February 1. Source: Table 11.8.

Table 11.8 Official Prices of Selected Foreign Crude Oils, 1970-1994

(Dollars per Barrel)

Year	Saudi Arabian Light-34° API	Iranian Light-34° API	Libyan [1] Es Sider-37° API	Nigerian [2] Bonny-37° API	Indonesian Minas-34° API	Venezuelan Tia Juana [3]	Mexico [4] Maya-22° API	United Kingdom [5] Brent Blend-38° API
1970	1.35	1.36	2.09	2.10	1.67	2.05	NA	NA
1971	1.75	1.76	2.80	2.65	2.18	2.45	NA	NA
1972	1.90	1.91	2.80	2.80	2.96	2.45	NA	NA
1973	2.10	2.11	3.10	3.10	2.96	2.60	NA	NA
1974	9.60	10.63	14.30	12.60	10.80	9.30	NA	NA
1975	10.46	10.67	11.98	11.80	12.60	11.00	NA	NA
1976	11.51	11.62	12.21	12.84	12.80	11.12	NA	NA
1977	12.09	12.81	13.74	14.33	13.55	12.72	NA	NA
1978	12.70	12.81	13.80	14.33	13.55	12.82	NA	NA
1979	13.34	13.45	14.52	14.80	13.90	13.36	15.45	15.70
1980	26.00	[R,6]30.37	34.50	29.97	27.50	25.20	28.00	26.02
1981	32.00	37.00	40.78	40.00	35.00	32.88	34.50	39.25
1982	34.00	34.20	36.50	36.50	35.00	32.88	26.50	36.60
1983	34.00	31.20	[R]35.10	35.50	34.53	32.88	25.50	33.50
1984	29.00	28.00	30.15	30.00	29.53	27.88	25.00	30.00
1985	29.00	28.00	30.15	28.00	29.53	27.88	25.50	28.65
1986	28.00	28.05	30.15	28.65	28.53	27.10	21.93	26.00
1987	16.15	16.14	16.95	17.13	16.28	[R]15.10	14.00	18.25
1988	17.52	15.55	18.52	18.92	17.56	[R]17.62	11.10	18.00
1989	13.15	12.75	15.40	15.05	15.50	12.27	10.63	15.80
1990	18.40	18.20	20.40	21.20	18.55	24.69	17.05	21.00
1991	24.00	23.65	26.90	27.80	26.50	28.62	20.00	27.20
1992	15.90	15.50	17.20	18.20	18.65	19.67	10.75	17.75
1993	16.80	16.70	17.55	18.50	19.10	17.97	12.50	17.90
1994	12.40	12.40	12.55	13.50	14.15	12.97	9.01	13.15

[1] Prices for 1974 and 1975 are for 40 degrees API gravity. Prices for 1980 include $4.72 in retroactive charges and market premiums.

[2] Prices from 1977 forward include 2 cents per barrel harbor dues.

[3] 1970-1985—26° API; 1986 forward—31° API.

[4] Mexico does not post official crude oil prices. Prices are formula-determined for each contract. For example, the prices given here are for free on board (f.o.b.) deliveries to Houston, Texas. They are based on a variety of U.S. domestic crude oil postings and on quotations for fuel oil imports into U.S. Gulf of Mexico ports.

[5] The United Kingdom does not post official crude oil prices. Prices for 1979-1984 are estimated long-term contract prices; prices for 1985 forward are contractural arrangements based on spot market quotations.

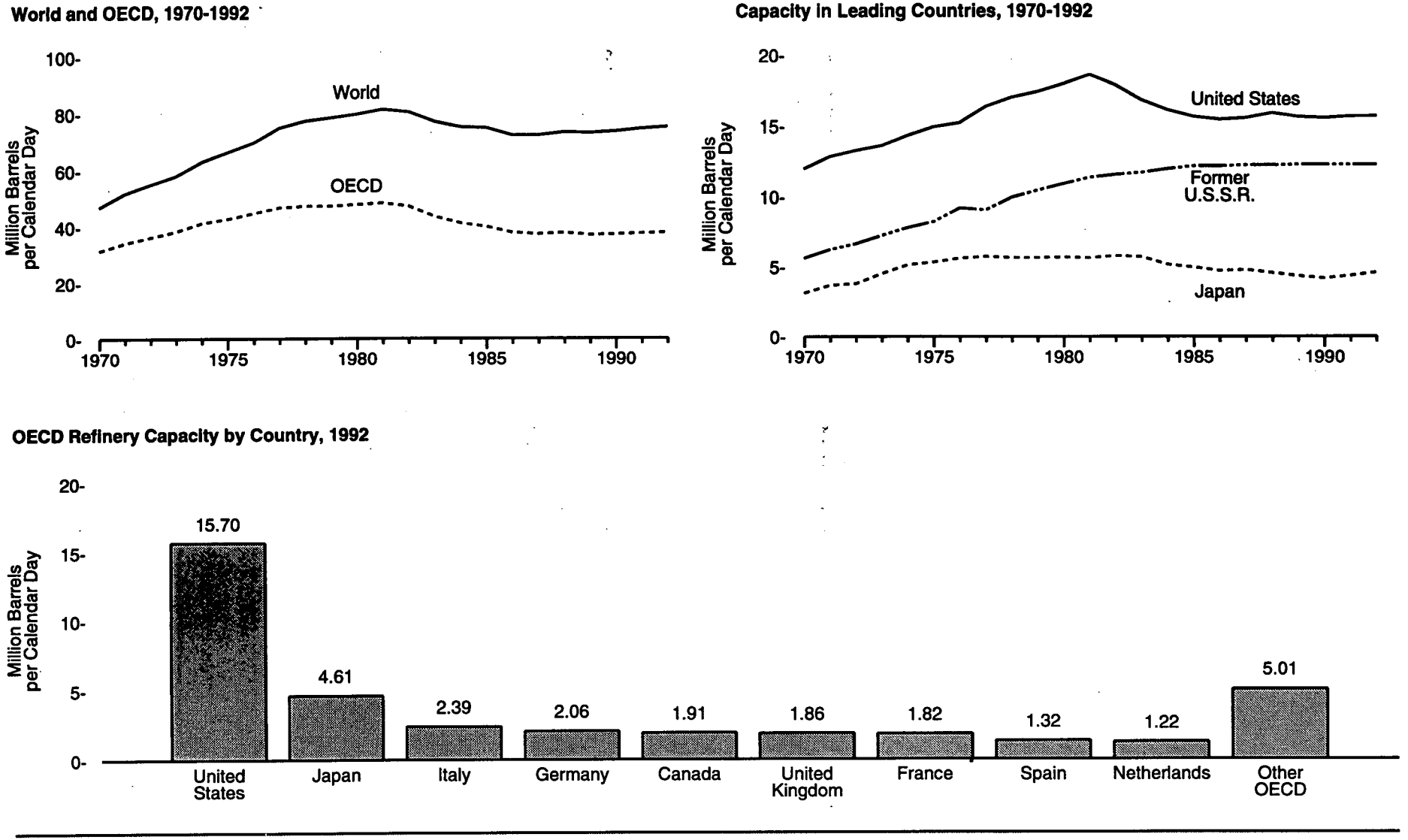
[6] Price for 1980 includes $1.87 market premiums and credit charges.

R=Revised data. NA=Not available.

Notes: • The Organization of Petroleum Exporting Countries (OPEC) adopted major changes in their crude oil pricing system at the beginning of 1986. The primary result of these changes was a switch from official prices to netback arrangements and spot crude oil sales for the January 1986 through January 1987 time period. On February 1, 1987, official contract prices were again being used by OPEC as their primary pricing mechanism. However, subsequently in 1987 all OPEC producers moved to spot crude oil sales as a basis for their crude oil pricing systems. Spot market related pricing continued through 1990 and into 1992. • Prices are usually f.o.b. at the foreign port of lading. Prices for the period mid-1974 forward are official selling prices. • As of January 1, except in 1987, when prices are as of February 1.

Sources: • 1970-1978—Petroleum and Energy Intelligence Weekly, Inc., *Petroleum Intelligence Weekly*. • 1979 forward—Energy Information Administration, *Weekly Petroleum Status Report*.

Figure 11.9 World Petroleum Refinery Capacity



Notes: • Capacity is as of January 1. • Because vertical scales differ, graphs should not be compared.

Source: Table 11.9.

Table 11.9 World Petroleum Refinery Capacity, 1970-1992

(Million Barrels per Calendar Day)

	OECD [1]											Non-OECD					
Year	Canada	France	Germany[2]	Italy	Japan	Netherlands	Spain	United Kingdom	United States	Other	Total	Brazil	China	Mexico	Former U.S.S.R.	Other	World
1970	1.40	2.32	2.36	2.96	3.14	1.36	0.69	2.30	12.02	2.96	31.51	0.50	0.30	0.50	5.64	8.65	47.10
1971	1.45	2.53	2.54	3.24	3.70	1.39	0.85	2.39	12.86	3.40	34.35	0.51	0.42	0.57	6.27	9.79	51.91
1972	1.45	2.69	2.56	3.68	3.82	1.64	0.87	2.59	13.29	3.82	36.41	0.56	0.48	0.59	6.68	10.41	55.13
1973	1.73	2.95	2.70	3.59	4.53	1.83	1.03	2.47	13.64	3.97	38.42	0.72	0.50	0.63	7.26	10.67	58.20
1974	1.79	3.14	2.83	3.88	5.15	1.83	1.16	2.76	14.36	4.47	41.37	0.79	0.60	0.63	7.81	11.96	63.15
1975	1.88	3.34	2.99	3.95	5.35	1.84	1.17	2.78	14.96	4.63	42.89	0.96	0.85	0.76	8.24	12.83	66.52
1976	2.02	3.31	3.10	4.08	5.63	1.99	1.32	2.89	15.24	5.38	44.97	0.99	1.01	0.76	9.23	12.97	69.93
1977	2.10	3.52	3.08	4.26	5.76	2.03	1.28	3.01	16.40	5.55	46.98	1.12	1.40	0.94	9.10	15.58	75.12
1978	2.17	3.46	3.08	4.23	5.67	1.87	1.27	2.91	17.05	5.81	47.51	1.16	1.46	1.38	9.98	15.97	77.46
1979	2.23	3.47	3.10	4.20	5.68	1.86	1.43	2.53	17.44	5.61	47.52	1.21	1.58	1.24	10.48	16.55	78.58
1980	2.22	3.40	2.99	4.13	5.71	1.83	1.46	2.53	17.99	5.83	48.08	1.21	1.60	1.39	10.95	16.62	79.85
1981	2.17	3.34	3.02	4.09	5.66	1.83	1.46	2.63	18.62	5.75	48.57	1.40	1.81	1.39	11.40	16.99	81.56
1982	2.20	3.29	2.94	4.00	5.81	1.71	1.52	2.48	17.89	5.64	47.48	1.41	1.81	1.47	11.60	16.87	80.63
1983	2.02	2.87	2.47	3.28	5.73	1.55	1.52	2.26	16.86	5.18	43.75	1.22	2.00	1.29	11.75	17.21	77.21
1984	1.81	2.67	2.39	3.05	5.17	1.55	1.49	2.09	16.14	5.01	41.37	1.30	2.05	1.27	12.00	17.43	75.42
1985	1.87	2.39	2.17	3.10	4.97	1.50	1.49	2.01	15.66	4.91	40.05	1.31	2.15	1.27	12.20	18.14	75.12
1986	1.86	1.95	1.93	2.74	4.72	1.47	1.37	1.79	15.46	4.67	37.95	1.31	2.15	1.27	12.20	17.68	72.56
1987	1.76	1.83	1.72	2.68	4.79	1.40	1.31	1.78	15.57	4.60	37.43	1.32	2.20	1.35	12.26	18.01	72.57
1988	1.87	1.94	1.65	2.56	4.57	1.38	1.31	1.80	15.92	4.86	37.85	1.41	2.20	1.35	12.26	18.50	73.57
1989	1.86	1.88	1.52	2.45	4.36	1.38	1.29	1.80	15.65	4.93	37.12	1.41	2.20	1.35	12.30	18.96	73.34
1990	1.85	1.82	1.51	2.80	4.20	1.38	1.29	1.83	15.57	5.02	37.28	1.40	2.20	1.51	12.30	19.18	73.86
1991	1.88	1.82	2.07	2.39	4.38	1.20	1.32	1.87	15.68	5.03	37.62	1.41	2.20	1.68	12.30	19.56	74.76
1992	1.91	1.82	2.06	2.39	4.61	1.22	1.32	1.86	15.70	5.01	37.88	1.41	2.20	1.57	12.30	19.98	75.34

[1] Organization for Economic Cooperation and Development. See Glossary for membership. "Other OECD" includes the United States territories of Puerto Rico, Virgin Islands, Guam, and Hawaiian Free Trade Zone. As of January 1, 1987, Hawaiian Free Trade Zone data are included in U.S. 50 States data.

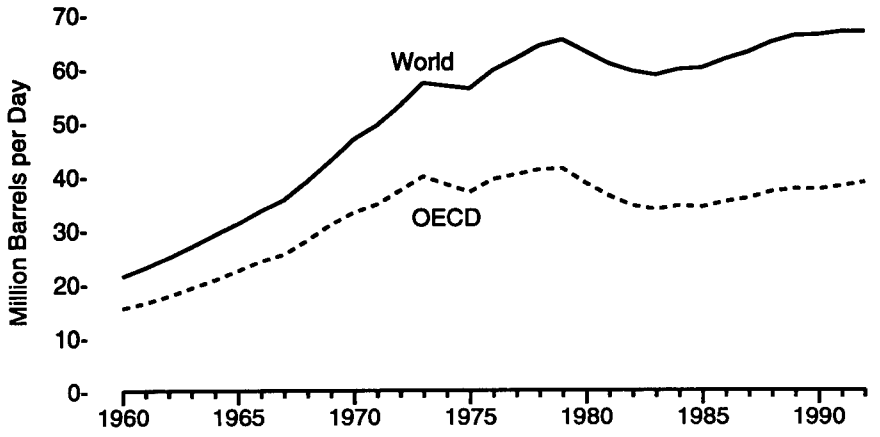
[2] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany.

Notes: • Capacity is as of January 1. • Totals may not equal sum of components due to independent rounding.

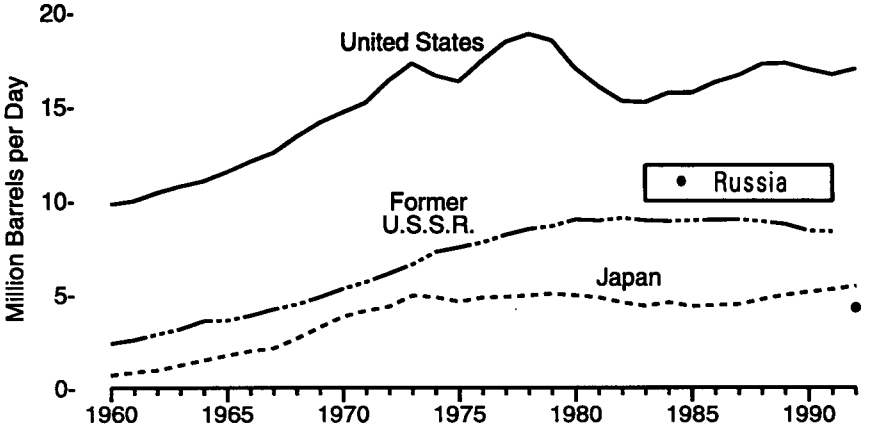
Sources: **United States:** • 1970-1977—Bureau of Mines, Mineral Industry Surveys, *Petroleum Refineries, Annual.* • 1978-1981—Energy Information Administration (EIA), Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories.* • 1982 forward—EIA, *Petroleum Supply Annual.* **China and U.S.S.R.:** • 1970-1976—Ballinger Publishing Company, *The Energy Decade, 1970-1980, A Statistical and Graphic Chronicle.* • 1977-forward—PennWell Publishing Company, *Oil and Gas Journal.* **All Other Countries:** PennWell Publishing Company, *Oil and Gas Journal.*

Figure 11.10 World Petroleum Consumption

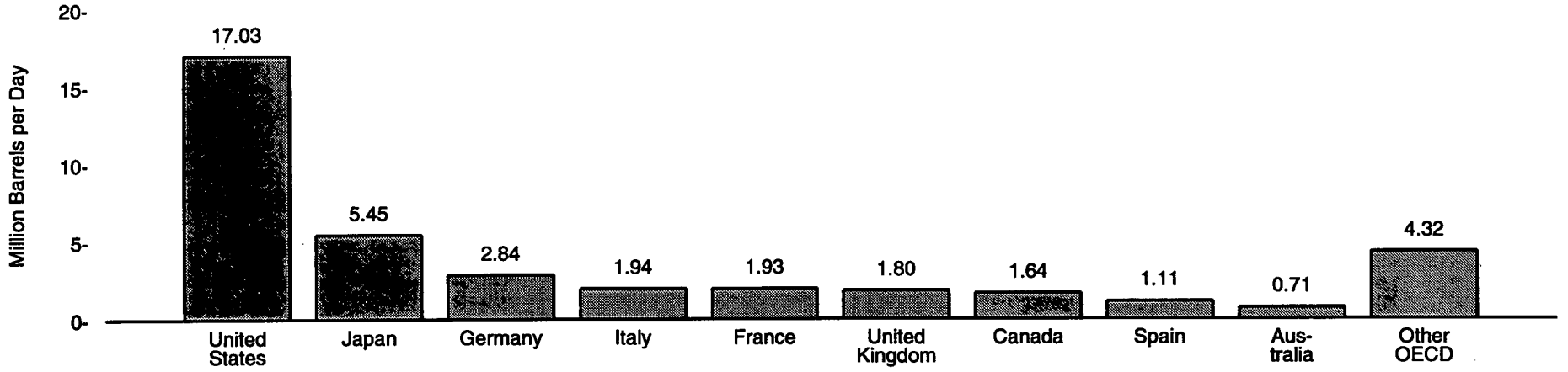
World and OECD, 1960-1992



Leading Consumers, 1960-1992



OECD Consumers, 1992



Notes: • OECD=Organization for Economic Cooperation and Development. See Glossary for membership. • Because vertical scales differ, graphs should not be compared.

Source: Table 11.10.

Table 11.10 World Petroleum Consumption, 1960-1992

(Million Barrels per Day)

	OECD [1]											Non-OECD					
Year	Australia	Canada	France	Germany[2]	Italy	Japan	Spain	United Kingdom	United States	Other	Total	Brazil	China	Mexico	Russia	Former U.S.S.R.	World
1960	0.22	0.84	0.56	0.63	0.44	0.66	0.10	0.94	9.80	1.28	15.47	0.27	0.17	0.30	—	2.38	21.34
1961	0.23	0.87	0.63	0.79	0.54	0.82	0.12	1.04	9.98	1.45	16.46	0.28	0.17	0.29	—	2.57	23.00
1962	0.25	0.92	0.73	1.00	0.67	0.93	0.12	1.12	10.40	1.62	17.74	0.31	0.14	0.30	—	2.87	24.89
1963	0.29	0.99	0.86	1.17	0.77	1.21	0.12	1.27	10.74	1.85	19.26	0.34	0.17	0.31	—	3.15	26.92
1964	0.32	1.05	0.98	1.36	0.90	1.48	0.20	1.36	11.02	2.03	20.70	0.35	0.20	0.33	—	3.58	29.08
1965	0.35	1.14	1.09	1.61	0.98	1.74	0.23	1.49	11.51	2.30	22.44	0.33	0.23	0.34	—	3.61	31.14
1966	0.37	1.21	1.19	1.80	1.08	1.98	0.31	1.58	12.08	2.61	24.20	0.38	0.30	0.36	—	3.87	33.56
1967	0.41	1.25	1.34	1.86	1.19	2.14	0.36	1.64	12.56	2.72	25.48	0.38	0.28	0.39	—	4.22	35.59
1968	0.45	1.34	1.46	1.99	1.40	2.66	0.46	1.82	13.39	3.08	28.05	0.46	0.31	0.41	—	4.48	38.96
1969	0.49	1.42	1.66	2.33	1.69	3.25	0.49	1.98	14.14	3.49	30.94	0.48	0.44	0.45	—	4.87	42.89
1970	0.52	1.52	1.94	2.61	1.71	3.82	0.58	2.10	14.70	3.79	33.27	0.53	0.62	0.50	—	5.31	46.81
1971	0.48	1.56	2.12	2.70	1.84	4.14	0.64	2.14	15.21	3.92	34.76	0.58	0.79	0.52	—	5.66	49.42
1972	0.50	1.66	2.32	2.86	1.95	4.36	0.68	2.28	16.37	4.29	37.28	0.66	0.91	0.59	—	6.12	53.09
1973	0.57	1.73	2.60	3.06	2.07	4.95	0.78	2.34	17.31	4.50	39.90	0.78	1.12	0.67	—	6.60	57.24
1974	0.66	1.78	2.45	2.75	2.00	4.86	0.86	2.21	16.65	4.16	38.38	0.86	1.19	0.71	—	7.28	56.68
1975	0.64	1.78	2.25	2.65	1.86	4.62	0.87	1.91	16.32	4.08	36.98	0.92	1.36	0.75	—	7.52	56.20
1976	0.67	1.82	2.42	2.88	1.97	4.84	0.97	1.89	17.46	4.44	39.36	1.00	1.53	0.83	—	7.78	59.67
1977	0.68	1.85	2.29	2.87	1.90	4.88	0.94	1.91	18.43	4.49	40.24	1.02	1.64	0.88	—	8.18	61.83
1978	0.70	1.90	2.41	2.93	1.95	4.95	0.98	1.94	18.85	4.59	41.19	1.11	1.79	0.99	—	8.48	64.16
1979	0.69	1.97	2.46	3.00	2.04	5.05	1.02	1.97	18.51	4.65	41.38	1.18	1.84	1.10	—	8.64	65.26
1980	0.59	1.87	2.26	2.71	1.93	4.96	0.99	1.73	17.06	4.50	38.60	1.15	1.77	1.27	—	9.00	63.07
1981	0.58	1.77	2.02	2.45	1.87	4.85	0.94	1.59	16.06	4.13	36.27	1.09	1.71	1.40	—	8.94	60.87
1982	0.62	1.58	1.88	2.37	1.78	4.58	1.00	1.59	15.30	3.82	34.52	1.06	1.66	1.48	—	9.08	59.50
1983	0.59	1.45	1.84	2.32	1.75	4.40	1.01	1.53	15.23	3.67	33.79	0.98	1.73	1.35	—	8.95	58.74
1984	0.61	1.47	1.75	2.32	1.65	4.58	0.91	1.85	15.73	3.63	34.50	1.03	1.74	1.45	—	8.91	59.84
1985	0.63	1.50	1.78	2.34	1.72	4.38	0.85	1.63	15.73	3.72	34.27	1.08	1.89	1.47	—	8.95	60.10
1986	0.63	1.51	1.77	2.50	1.74	4.44	0.88	1.65	16.28	3.90	35.28	1.24	2.00	1.49	—	8.98	61.76
1987	0.64	1.55	1.79	2.42	1.86	4.48	0.90	1.60	16.67	4.00	35.91	1.26	2.12	1.52	—	9.00	63.01
1988	0.65	1.69	1.80	2.42	1.84	4.75	0.98	1.70	17.28	3.98	37.09	1.30	2.28	1.55	—	8.89	64.83
1989	0.69	1.73	1.86	2.28	1.93	4.98	1.03	1.74	17.33	4.01	37.57	1.32	2.38	1.66	—	8.74	66.03
1990	0.71	1.69	1.82	2.38	1.87	5.14	1.01	1.75	16.99	4.12	37.48	1.34	2.30	1.73	—	8.39	66.16
1991	R0.71	R1.62	R1.94	2.83	R1.86	R5.28	R1.07	R1.80	16.71	R4.25	R38.07	R1.35	R2.50	1.80	—	R8.35	R66.71
1992P	0.71	1.64	1.93	2.84	1.94	5.45	1.11	1.80	17.03	4.32	38.77	1.41	2.63	1.85	4.30	—	66.74

[1] Organization for Economic Cooperation and Development. See Glossary for membership. "Other OECD" includes the United States territories of Puerto Rico, Virgin Islands, Guam, and Hawaiian Free Trade Zone. As of January 1, 1987, Hawaiian Free Trade Zone data are included in U.S. 50 States data.

[2] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and the former West Germany. Data for 1983 through 1990 differ from those published in the *International Energy Annual 1992*, Table 8, where Germany includes the former East Germany.

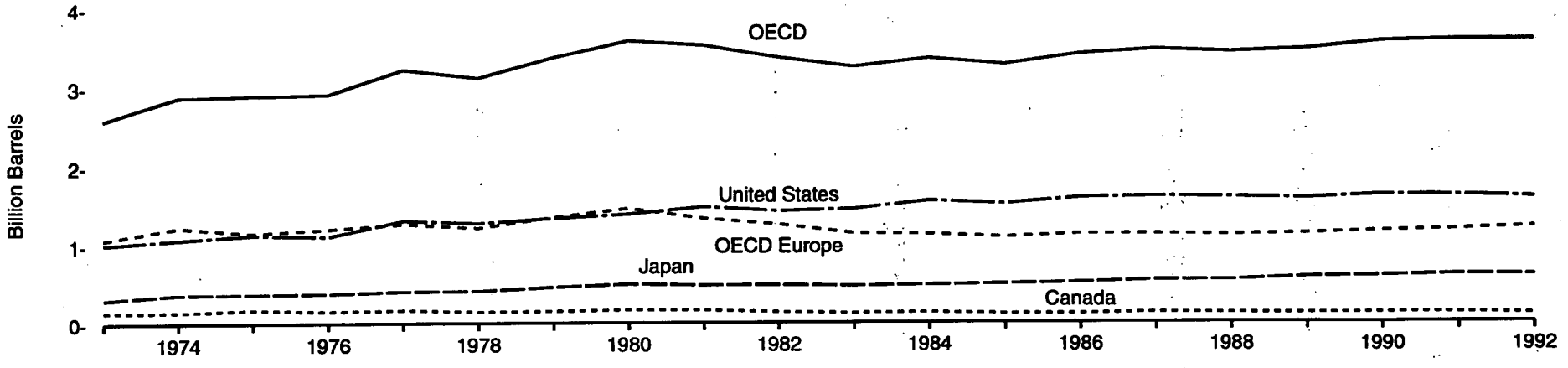
R=Revised data. P=Preliminary data. — = Not applicable.

Note: Totals may not equal sum of components due to independent rounding.

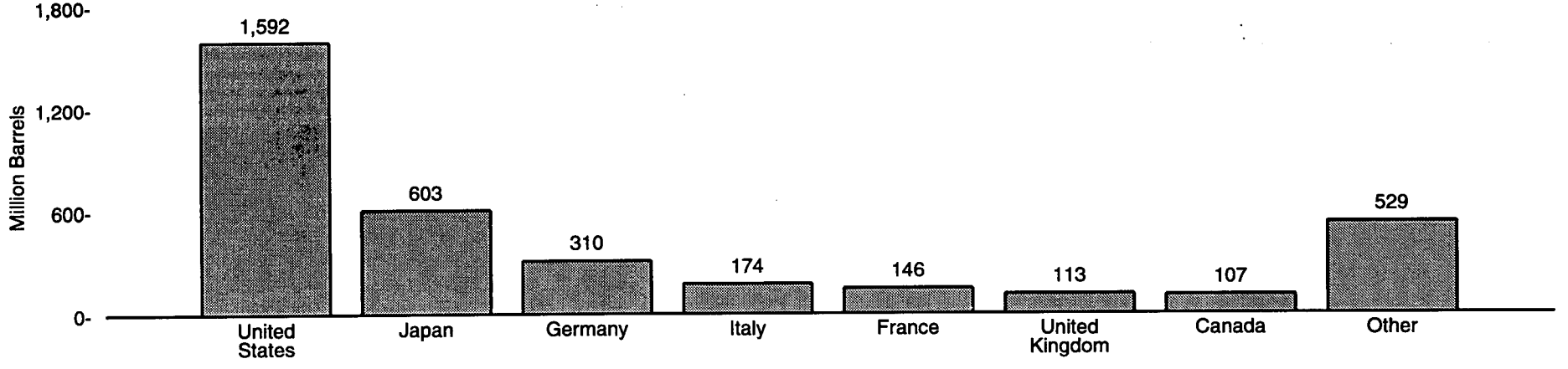
Sources: • 1960-1982—Energy Information Administration (EIA), Office of Energy Markets and End Use International Database, March 1994. • 1983 forward—EIA, *International Energy Annual* (January 1994), Table 8.

Figure 11.11 Petroleum Stocks in OECD Countries, End of Year

Total, 1973-1992



By Country, 1992



Note: OECD=Organization for Economic Cooperation and Development. See Glossary for membership.

Source: Table 11.11.

Table 11.11 Petroleum Stocks in OECD Countries, End of Year 1973-1992

(Million Barrels)

Year	France	Germany [1]	Italy	United Kingdom	Other OECD Europe	OECD Europe	Canada	Japan	United States	Other OECD [2]	OECD
1973	201	181	152	156	380	1,070	140	303	1,008	67	2,588
1974	249	213	167	191	437	1,227	145	370	1,074	64	2,880
1975	225	187	143	165	434	1,154	174	375	1,133	67	2,903
1976	234	208	143	165	455	1,205	153	380	1,112	68	2,918
1977	239	225	161	148	495	1,268	167	409	1,312	68	3,224
1978	201	238	154	157	469	1,219	144	413	1,278	68	3,122
1979	226	272	163	169	523	1,353	150	460	1,341	75	3,379
1980	243	319	170	168	564	1,464	164	495	1,392	72	3,587
1981	214	297	167	143	516	1,337	161	482	1,484	67	3,531
1982	193	272	179	125	489	1,258	136	484	1,430	68	3,376
1983	153	249	149	118	473	1,142	121	470	1,454	68	3,255
1984	152	239	159	112	468	1,130	128	479	1,556	69	3,362
1985	139	233	157	123	440	1,092	113	494	1,519	66	3,284
1986	127	252	155	124	475	1,133	111	509	1,593	72	3,418
1987	127	259	169	121	454	1,130	126	540	1,607	72	3,474
1988	140	266	155	112	444	1,118	116	538	1,597	71	3,440
1989	138	271	164	118	442	1,133	114	577	1,581	71	3,476
1990	140	265	172	112	475	1,163	121	590	1,621	73	3,568
1991	153	R288	160	R119	459	R1,182	119	R607	1,617	65	R3,589
1992	146	310	174	113	462	1,219	107	603	1,592	67	3,589

[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany.

[2] Australia, New Zealand, and U.S. Territories.

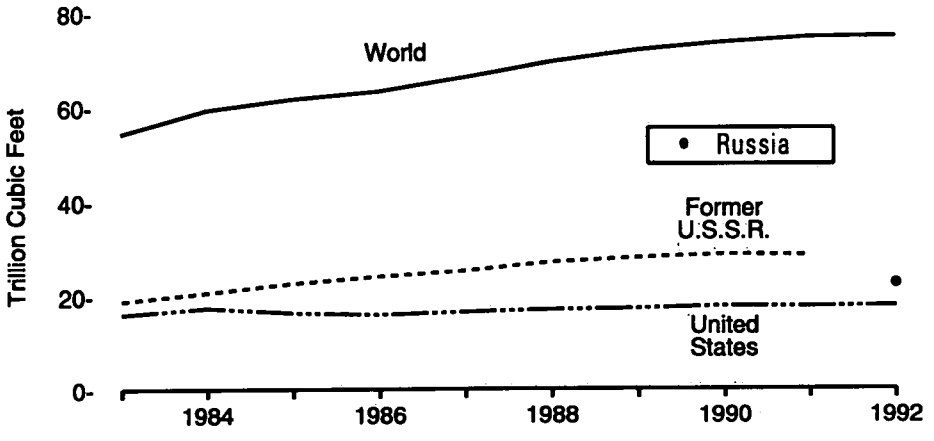
R=Revised data.

Notes: • Includes crude oil, lease condensate, natural gas plant liquids, unfinished oils, and finished petroleum products. See Note 2 at end of section. • Organization for Economic Cooperation and Development. See Glossary for membership. • Totals may not equal sum of components due to independent rounding.

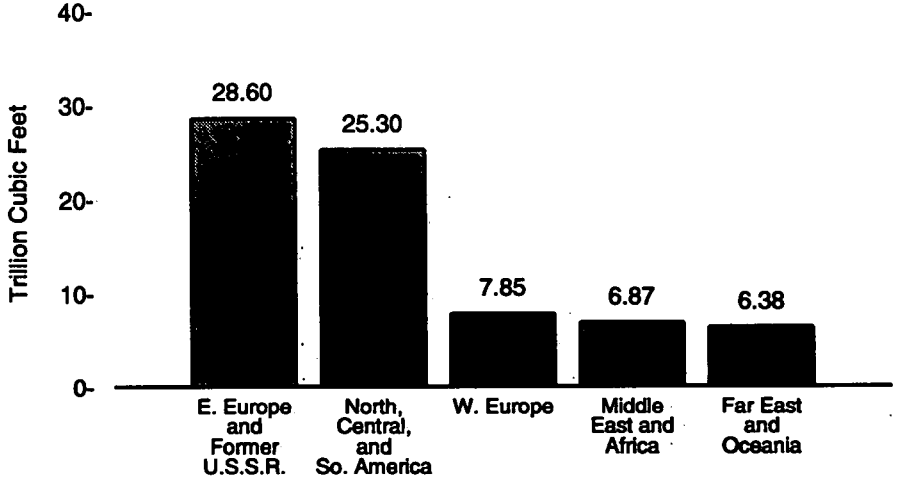
Sources: **United States:** Table 5.15. **All Other Data:** Organization for Economic Cooperation and Development, International Energy Agency, *Quarterly Oil and Gas Statistics*.

Figure 11.12 World Dry Natural Gas Production

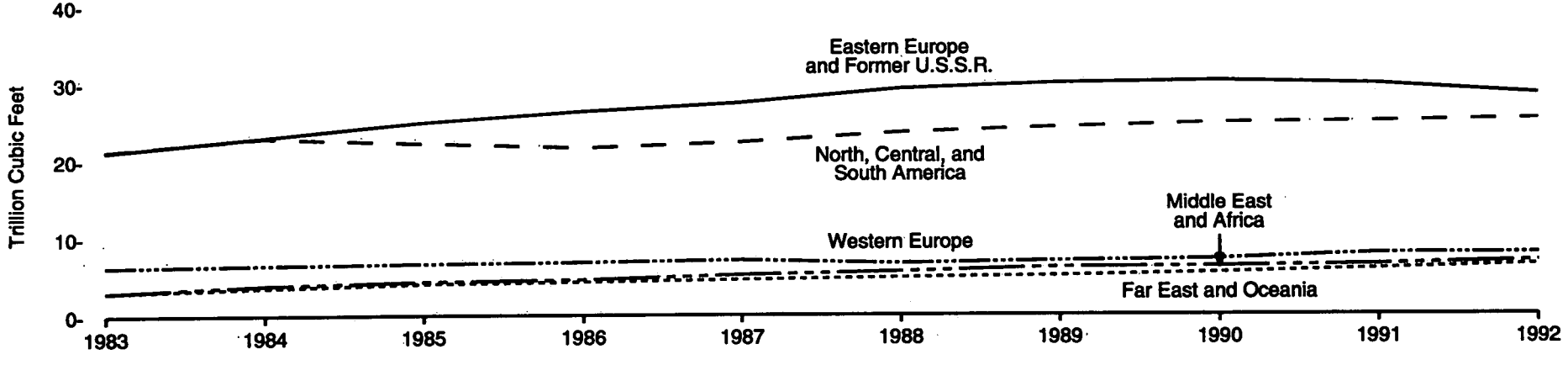
World and Leading Producers, 1983-1992



World Areas, 1992



World Areas, 1983-1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.12.

Table 11.12 World Dry Natural Gas Production, 1983-1992

(Trillion Cubic Feet)

Region and Country	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992 P
North, Central, and South America	R21.20	R22.82	R22.14	R21.57	R22.25	R23.47	R24.16	R24.76	R24.93	25.30
Argentina	0.45	0.49	0.50	0.55	0.53	0.63	0.72	0.63	R0.64	0.61
Canada	2.52	2.61	2.98	R2.81	R3.03	R3.58	R3.80	R3.89	R4.12	4.49
Mexico	1.10	1.04	0.95	0.92	0.86	0.92	0.93	0.94	0.94	0.93
United States	16.09	17.47	16.45	16.06	16.62	17.10	17.31	17.81	R17.70	17.84
Venezuela	0.58	0.61	0.62	0.67	0.66	0.66	0.77	0.86	R0.83	0.84
Other	0.47	0.60	0.64	R0.56	0.55	0.58	0.64	R0.62	R0.65	0.66
Western Europe [1]	R6.20	R6.43	R6.58	R6.77	R7.02	R6.59	6.88	R7.10	R7.82	7.85
Germany [1]	R0.48	R0.49	R0.44	R0.41	R0.50	R0.43	R0.43	0.53	R0.67	0.67
Italy	0.46	0.49	0.50	0.56	R0.58	0.59	0.60	0.61	R0.61	0.64
Netherlands	2.58	2.65	2.73	R2.76	R2.77	R2.45	R2.67	R2.69	R3.04	3.06
Norway	0.86	0.93	0.94	R0.99	R1.06	1.05	R1.09	R0.98	R0.96	0.98
United Kingdom	1.40	1.42	1.52	1.60	1.68	1.62	1.58	R1.80	R2.01	1.97
Other	0.43	0.45	0.46	0.44	R0.44	0.46	R0.51	R0.50	R0.53	0.53
Eastern Europe and Former U.S.S.R. [1]	R21.09	R22.91	R24.84	R26.34	R27.43	R29.26	R29.98	30.28	R29.85	28.60
Romania	1.40	1.34	1.27	1.34	1.32	1.28	1.13	1.03	R0.88	0.78
Russia	—	—	—	—	—	—	—	—	—	22.62
Turkmenistan	—	—	—	—	—	—	—	—	—	2.12
Ukraine	—	—	—	—	—	—	—	—	—	0.74
Former U.S.S.R.	18.93	20.74	22.71	24.19	25.36	27.19	28.11	28.78	R28.62	—
Uzbekistan	—	—	—	—	—	—	—	—	—	1.41
Other [1]	R0.76	R0.83	R0.86	R0.80	R0.76	R0.79	R0.74	0.47	0.35	0.93
Middle East and Africa	R2.95	R3.81	4.24	4.51	5.13	5.55	6.08	6.17	R6.38	6.87
Algeria	1.31	1.36	1.36	1.33	1.52	1.63	1.71	1.79	R1.93	1.97
Iran	0.31	0.48	0.60	0.54	0.57	0.71	0.78	0.84	R0.92	0.88
Saudi Arabia	0.19	0.62	0.72	0.89	0.95	1.03	1.05	1.08	R1.13	1.20
United Arab Emirates	0.27	0.34	0.48	0.54	0.68	0.66	0.81	0.78	R0.92	0.99
Other	0.86	1.01	1.08	1.22	1.42	1.52	1.72	R1.69	R1.48	1.83
Far East and Oceania	2.96	3.50	3.98	R4.21	R4.50	R4.78	R4.98	R5.37	R5.84	6.38
Australia	0.39	0.40	0.45	R0.52	R0.53	R0.56	0.57	R0.72	R0.76	0.83
Brunei	0.33	0.30	0.30	0.29	0.31	0.30	0.31	0.32	R0.28	0.28
China	0.43	0.44	0.46	0.48	0.49	0.49	0.51	0.51	R0.53	0.50
India	0.11	0.11	0.14	0.18	0.23	0.31	0.32	0.40	0.45	0.46
Indonesia	0.78	1.06	1.23	1.18	1.29	1.34	1.42	1.53	R1.72	1.91
Malaysia	0.15	0.33	0.44	0.53	0.55	0.58	0.61	0.65	R0.75	0.92
Pakistan	0.34	0.35	0.37	0.39	0.42	0.44	0.47	0.42	R0.53	0.58
Other	R0.44	R0.51	R0.62	R0.64	R0.67	R0.75	R0.78	R0.83	R0.82	0.89
World	R54.40	R59.46	R61.78	R63.40	R66.33	R69.65	R72.09	R73.68	R74.81	75.00

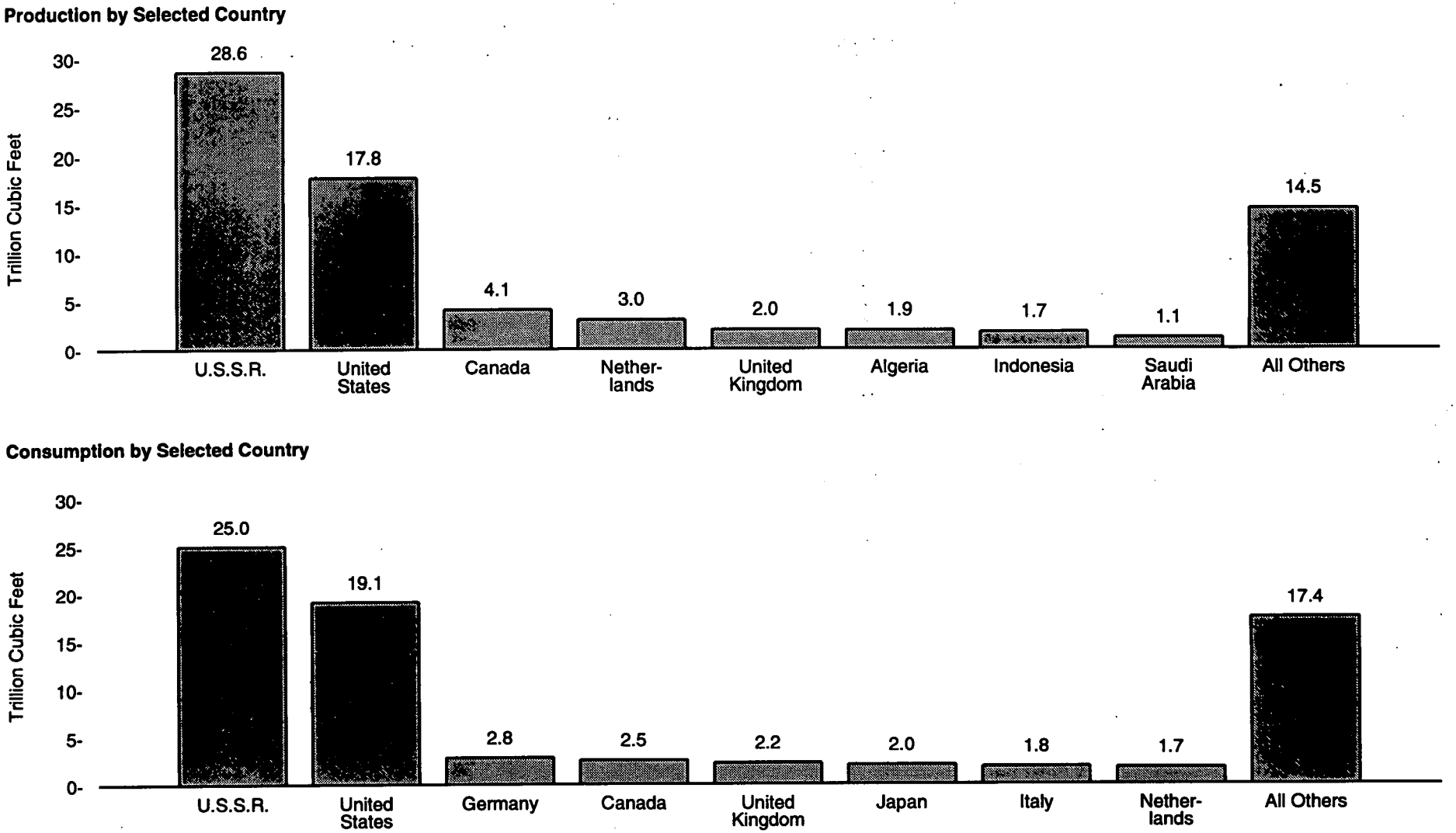
[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Germany, Western Europe, and "Eastern Europe and Former U.S.S.R." data for 1983 through 1990 differ from those published in the *International Energy Annual 1992*, Table 3, where Germany includes the former East Germany.

R=Revised data. P=Preliminary data. — = Not applicable.

Note: Totals may not equal sum of components due to independent rounding and the inclusion of more recent U.S. data from an alternative source.

Sources: **United States:** Table 6.1. **All Other Data:** Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 3.

Figure 11.13 World Dry Natural Gas Production and Consumption, 1991



Source: Table 11.13.

Table 11.13 World Dry Natural Gas Supply and Disposition, 1991

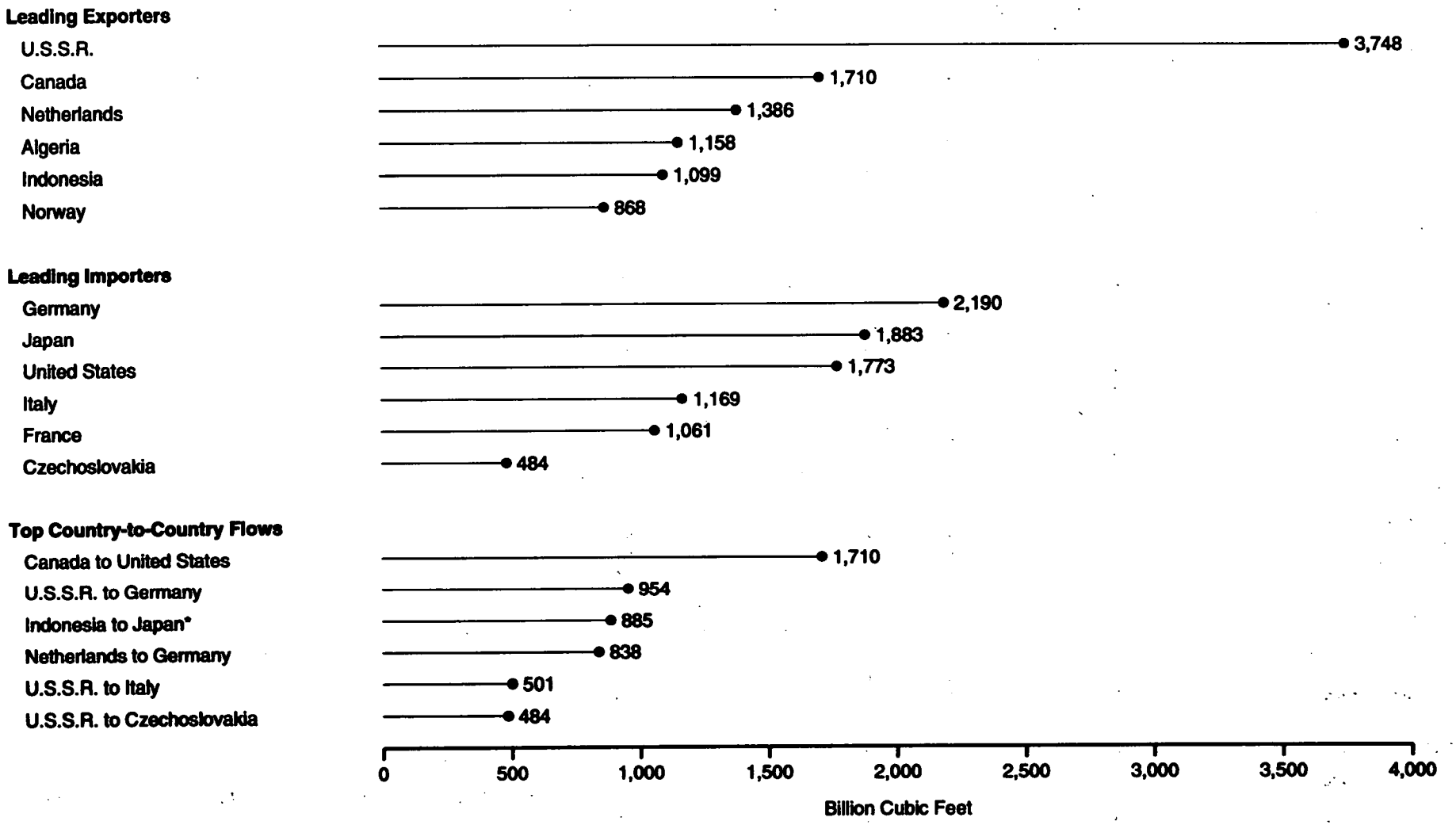
(Billion Cubic Feet)

Region and Country	Supply		Disposition	
	Dry Natural Gas Production	Imports [1]	Exports [1]	Apparent Consumption [2]
North, Central, and South America	**24,929**	**1,922**	**1,909**	**24,696**
Argentina	643	78	0	721
Canada	4,122	11	1,710	2,454
Mexico	936	60	0	994
United States	17,751	1,773	121	19,129
Venezuela	826	0	0	826
Other	651	0	78	572
Western Europe	**7,818**	**5,973**	**2,434**	**11,359**
Belgium and Luxembourg	0	376	16	363
France	104	1,061	3	1,149
Germany	668	2,190	106	2,790
Italy	614	1,169	1	1,775
Netherlands	3,044	86	1,386	1,744
Norway	962	0	868	94
United Kingdom	2,005	225	0	2,220
Other	421	866	54	1,224
Eastern Europe and U.S.S.R.	**29,849**	**1,461**	**3,753**	**27,561**
Bulgaria	0	200	0	204
Czechoslovakia	15	484	5	494
Hungary	176	216	0	393
Poland	146	258	0	403
Romania	876	164	0	1,040
U.S.S.R.	28,623	139	3,748	25,014
Other	13	0	0	13
Middle East and Africa	**6,380**	**36**	**1,440**	**4,976**
Algeria	1,933	0	1,158	775
Egypt	321	0	0	321
Iran	918	0	107	811
Kuwait	18	0	0	18
Libya	238	0	46	192
Saudi Arabia	1,130	0	0	1,130
United Arab Emirates	916	0	126	790
Other	906	36	3	939
Far East and Oceania	**5,837**	**2,097**	**1,953**	**5,907**
Australia	759	0	196	563
China	526	0	0	526
India	449	0	0	449
Indonesia	1,724	0	1,099	557
Japan	75	1,883	0	1,962
Malaysia	747	0	364	383
Pakistan	534	0	0	534
Other	1,023	214	294	933
World	**74,813**	**11,489**	**11,489**	**74,500**

[1] Includes liquefied natural gas.
[2] Includes stock changes.

Note: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 23.

Figure 11.14 International Natural Gas Flow, 1991



*Liquefied natural gas.

Source: Table 11.14.

Table 11.14 International Natural Gas Flow, 1991

(Billion Cubic Feet)

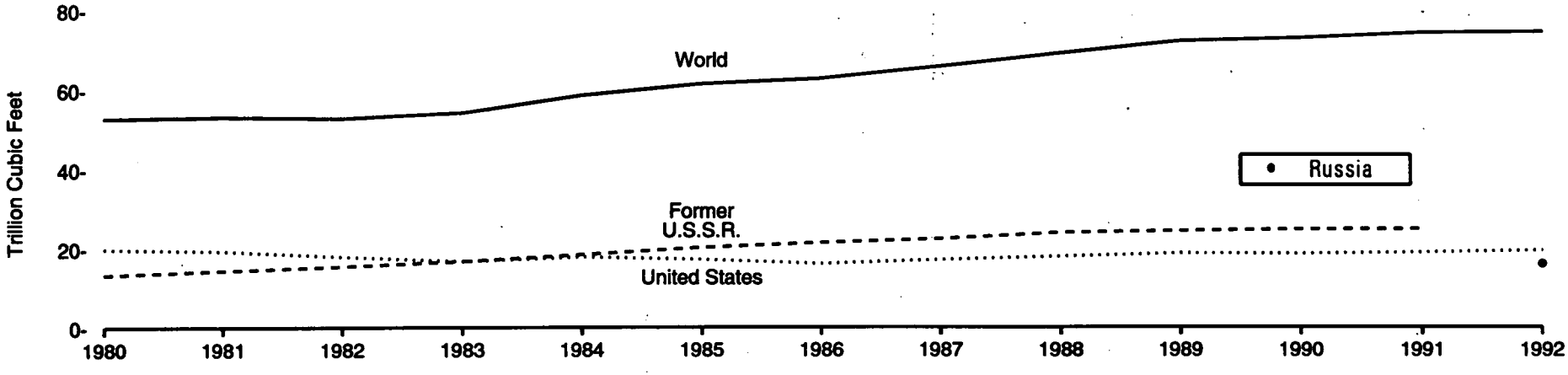
Importers	Exporters													
	North and South America			Western Europe			Eastern Europe		Middle East [1]	Africa		Far East and Oceania		Total
	Canada	United States	Other	Nether-lands	Norway	Other	U.S.S.R.	Other		Algeria	Other	Indonesia	Other	
North America														
Canada	—	11	0	0	0	0	0	0	0	0	0	0	0	11
Mexico	0	60	0	0	0	0	0	0	0	0	0	0	0	60
United States	1,710	—	0	0	0	0	0	0	0	[2] 63	0	0	0	[2] 1,773
Central and South America														
Argentina	0	0	78	0	0	0	0	0	0	0	0	0	0	78
Western Europe														
Austria	0	0	0	0	0	8	173	0	0	0	0	0	0	181
Belgium and Luxembourg	0	0	0	141	67	18	0	0	0	[2] 150	0	0	0	[2] 376
Finland	0	0	0	0	0	0	100	0	0	0	0	0	0	100
France	0	0	0	177	204	0	376	0	0	[2] 304	0	0	0	[2] 1,061
Germany	0	0	0	838	362	31	954	5	0	0	0	0	0	2,190
Italy	0	0	0	188	0	0	501	0	0	477	3	0	0	1,169
Netherlands	0	0	0	—	0	86	0	0	0	0	0	0	0	86
Spain	0	0	0	0	0	0	0	0	0	[2] 124	[2] 46	0	0	[2] 170
Sweden	0	0	0	0	0	23	0	0	0	0	0	0	0	23
Switzerland	0	0	0	42	10	14	22	0	0	4	0	0	0	92
Turkey	0	0	0	0	0	0	142	0	0	0	0	0	0	142
United Kingdom	0	0	0	0	225	0	0	0	0	0	0	0	0	225
Yugoslavia	0	0	0	0	0	0	158	0	0	0	0	0	0	158
Eastern Europe and U.S.S.R.														
Bulgaria	0	0	0	0	0	0	200	0	0	0	0	0	0	200
Czechoslovakia	0	0	0	0	0	0	484	0	0	0	0	0	0	484
Hungary	0	0	0	0	0	0	216	0	0	0	0	0	0	216
Poland	0	0	0	0	0	0	258	0	0	0	0	0	0	258
Romania	0	0	0	0	0	0	164	0	0	0	0	0	0	164
U.S.S.R.	0	0	0	0	0	0	—	0	107	0	0	0	32	139
Middle East														
Kuwait	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United Arab Emirates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Africa														
Tunisia	0	0	0	0	0	0	0	0	0	36	0	0	0	36
Far East and Oceania														
Japan	0	[2] 50	0	0	0	0	0	0	[2] 126	0	0	[2] 885	[2] 822	[2] 1,883
South Korea	0	0	0	0	0	0	0	0	0	0	0	[2] 136	0	[2] 136
Taiwan	0	0	0	0	0	0	0	0	0	0	0	[2] 78	0	[2] 78
World	1,710	[2] 121	78	1,386	868	180	3,748	5	[2] 233	[2] 1,158	[2] 49	[2] 1,099	[2] 854	[2] 11,489

[1] United Arab Emirates and Iran.
[2] Includes liquefied natural gas.
— = Not applicable.

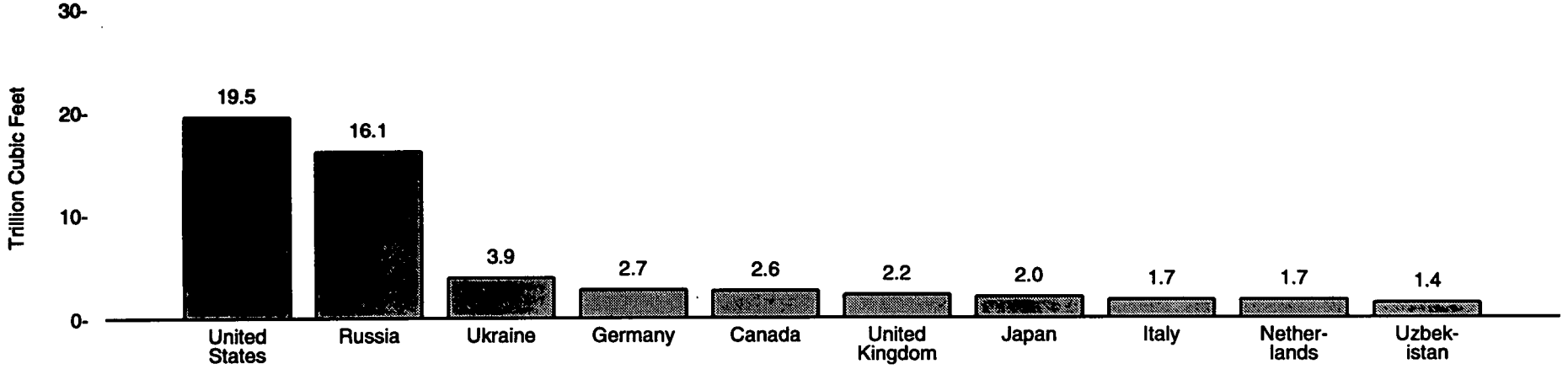
Note: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 24.

Figure 11.15 World Dry Natural Gas Consumption

World and Leading Consumers, 1980-1992



Top Consuming Countries, 1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.15.

Table 11.15 World Dry Natural Gas Consumption, 1980-1992

(Billion Cubic Feet)

Year	Canada	France	Germany[1]	Italy	Japan	Mexico	Nether-lands	Romania	Russia	Saudi Arabia	Ukraine	United Kingdom	United States	Former U.S.S.R.	Uzbek-istan	Other	World
1980	R1,812	R1,006	R1,972	R973	R903	908	R1,493	1,251	—	517	—	R1,702	19,877	13,328	—	R7,110	R52,852
1981	1,708	996	R1,861	983	886	930	1,421	1,267	—	460	—	1,671	19,404	14,440	—	R7,238	R53,265
1982	1,664	913	R1,699	989	919	1,016	1,511	1,411	—	201	—	1,570	18,001	15,522	—	R7,528	R52,944
1983	1,807	1,049	R1,778	1,009	1,008	1,078	1,371	1,446	—	200	—	1,774	16,835	16,822	—	R8,193	R54,370
1984	1,855	1,029	R1,784	1,171	1,367	990	1,395	1,395	—	253	—	1,900	17,951	18,512	—	R9,241	R58,843
1985	2,054	1,093	R1,789	1,222	1,419	955	1,267	1,336	—	716	—	1,995	17,281	20,302	—	R10,151	R61,580
1986	R2,060	R1,127	R1,806	R1,238	R1,494	923	R1,620	1,410	—	890	—	R2,020	16,221	21,522	—	R10,611	R62,942
1987	R2,042	R1,057	R2,037	R1,371	R1,543	865	R1,672	1,405	—	946	—	R2,079	17,211	22,462	—	R11,381	R66,071
1988	R2,331	R961	R1,917	R1,460	R1,618	926	R1,513	1,306	—	1,028	—	R1,972	18,030	24,092	—	R12,248	R69,400
1989	R2,498	R991	R2,047	R1,578	R1,731	943	R1,550	1,384	—	1,052	—	R1,951	18,801	24,529	—	R13,267	R72,322
1990	R2,420	R1,022	R2,267	R1,672	R1,851	946	R1,644	1,290	—	1,077	—	R2,059	18,716	24,961	—	R13,206	R73,131
1991	R2,454	R1,149	R2,790	R1,775	R1,962	R994	R1,744	1,040	—	R1,130	—	R2,220	R19,035	R25,014	—	R13,099	R74,500
1992P	2,569	1,148	2,673	1,725	2,009	1,015	1,697	886	16,131	1,201	3,933	2,182	19,544	—	1,359	16,467	74,742

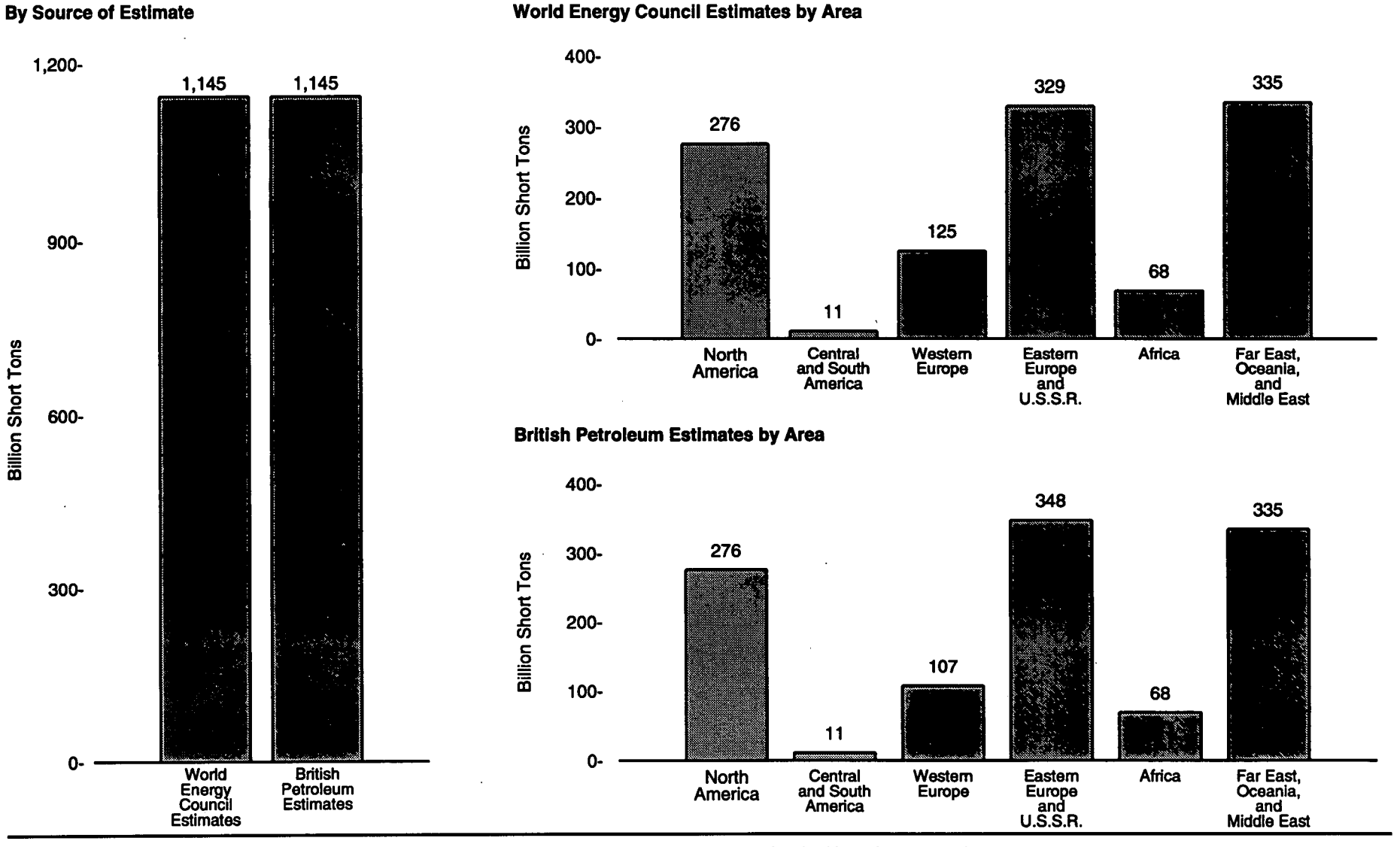
[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Data for 1983 through 1990 differ from those in the *International Energy Annual 1992*, Table 9, where Germany includes the former East Germany.

R=Revised data. P=Preliminary data. — = Not applicable.

Note: Totals may not equal sum of components due to independent rounding and the inclusion of more recent U.S. data from an alternative source.

Sources: **United States:** Table 6.1. **All Other Data:** • 1980-1982—Energy Information Administration (EIA), Office of Energy Markets and End Use, International Database, March 1994. • 1983 forward—EIA, *International Energy Annual 1992* (January 1994), Table 9.

Figure 11.16 World Recoverable Reserves of Coal



Notes: • World Energy Council estimates are as of the end of 1991. British Petroleum estimates are as of the end of 1992. • Because vertical scales differ, graphs should not be compared.
Source: Table 11.16.

Table 11.16 World Recoverable Reserves of Coal

(Million Short Tons)

Region and Country	Anthracite and Bituminous Coal		Subbituminous Coal and Lignite		Total	
	World Energy Council [1]	British Petroleum [1]	World Energy Council [1]	British Petroleum [1]	World Energy Council [1]	British Petroleum [1]
North America	**123,741**	**123,741**	**152,544**	**152,342**	**276,285**	**276,083**
Canada	4,970	4,970	4,535	4,535	9,505	9,505
Mexico	1,380	1,380	516	516	1,896	1,896
United States [2]	117,391	117,391	147,291	147,291	264,682	264,682
Other	—	—	202	—	202	—
Central and South America	**6,226**	**6,226**	**4,478**	**4,476**	**10,703**	**10,702**
Brazil	—	—	2,600	2,600	2,600	2,600
Chile	34	—	1,268	—	1,302	—
Colombia	4,674	4,674	330	330	5,003	5,003
Peru	1,058	—	110	—	1,168	—
Other	460	1,552	169	1,546	629	3,098
Western Europe	**32,411**	**32,334**	**92,493**	**74,506**	**124,904**	**106,840**
Germany	26,366	26,366	61,895	61,895	88,261	88,261
Greece	—	—	3,307	3,307	3,307	3,307
Spain	937	—	661	—	1,598	—
Turkey	179	179	7,701	7,701	7,879	7,879
United Kingdom	3,638	3,638	551	551	4,189	4,189
Yugoslavia	77	—	18,188	—	18,265	—
Other	1,215	2,152	189	1,052	1,404	3,204
Eastern Europe and U.S.S.R.	**150,021**	**150,098**	**179,436**	**197,625**	**329,457**	**347,723**
Bulgaria	33	—	4,079	—	4,112	—
Czechoslovakia	2,061	—	3,858	—	5,919	—
Hungary	657	—	4,260	—	4,917	—
Poland	32,628	32,628	12,787	12,787	45,415	45,415
U.S.S.R.	114,640	114,640	151,017	151,017	265,657	265,657
Other	1	2,830	3,436	33,821	3,437	36,651
Africa	**67,024**	**67,033**	**1,397**	**1,397**	**68,420**	**68,429**
Botswana	3,858	—	—	—	3,858	—
South Africa	60,994	60,994	—	—	60,994	60,994
Swaziland	—	—	1,101	—	1,101	—
Zimbabwe	809	809	—	—	809	809
Other	1,434	5,229	295	1,397	1,730	6,626
Far East, Oceania, and Middle East	**188,450**	**188,523**	**146,710**	**146,668**	**335,160**	**335,194**
Australia	49,979	49,979	50,265	50,251	100,244	100,230
China	68,564	68,564	57,651	57,635	126,215	126,198
India	66,853	66,853	2,094	2,094	68,947	68,947
Indonesia	1,060	1,060	34,283	34,273	35,343	35,334
Japan	912	912	19	19	930	930
Other	1,082	1,156	2,398	2,397	3,479	3,552
World	**567,946**	**567,743**	**577,057**	**577,015**	**1,145,002**	**1,144,758**

[1] See Note 3 at end of Section.

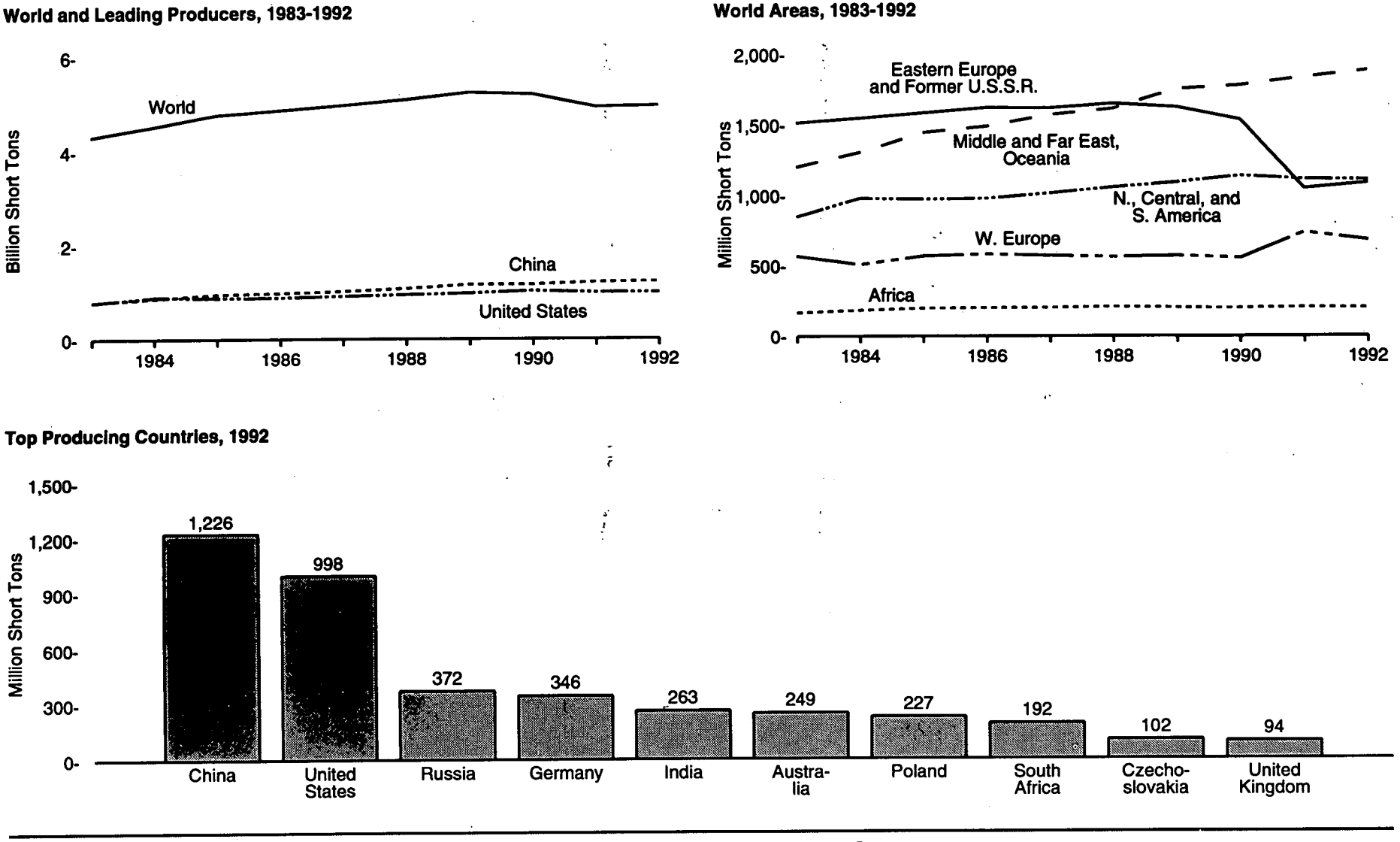
[2] U.S. data are more current than other data on this table. They represent recoverable reserves as of December 31, 1991; data for the other countries are as of December 31, 1990, the most resent period for which they are available. U.S. reserves represent both measured and indicated tonnage. The U.S. term "measured" approximates the term "proved," which is used by the World Energy Council and British Petroleum. The U.S. "measured and indicated" data have been combined prior to depletion adjustments and cannot be recaptured as "measured alone."

— = Not applicable.

Notes: • The EIA does not certify the international reserves data but reproduces the information as a matter of convenience for the reader. • Totals may not equal sum of components due to independent rounding.

Source: EIA, *International Energy Annual 1992* (January 1994), Table 37.

Figure 11.17 World Coal Production



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.17.

Table 11.17 World Coal Production, 1983-1992

(Million Short Tons)

Region and Country	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992 P
North, Central, and South America	R852	R982	R976	R981	R1,017	R1,061	R1,096	R1,142	R1,118	1,114
Canada	50	63	67	64	67	78	78	75	78	72
Colombia	6	8	10	12	15	17	21	23	26	26
United States	782	896	884	890	919	950	981	1,029	996	998
Other	R14	R15	R16	R15	R16	R16	R17	R15	R17	18
Western Europe [1]	571	510	570	584	573	564	571	555	R738	682
France	22	21	19	18	17	17	17	15	14	13
Germany[1]	236	233	231	222	211	207	206	196	R388	346
Greece	33	35	40	42	49	51	57	57	R58	60
Spain	44	44	44	42	40	43	46	46	R32	37
Turkey	32	38	43	51	52	43	44	53	R59	54
United Kingdom	127	55	104	119	115	117	111	98	R106	94
Yugoslavia	65	72	75	77	78	78	82	84	R74	74
Other	R13	R13	R15	R12	R11	R9	R3	R6	R6	5
Eastern Europe and Former U.S.S.R. [1]	1,518	1,550	1,587	1,625	1,622	1,654	1,628	1,538	R1,053	1,092
Bulgaria	36	36	34	35	39	38	38	35	R31	39
Czechoslovakia	140	143	140	139	137	137	130	119	R111	102
Hungary	28	28	27	25	24	23	22	19	19	17
Kazakhstan	—	—	—	—	—	—	—	—	—	139
Poland	258	267	275	286	290	294	275	237	231	227
Romania	39	49	51	52	50	58	68	42	R36	38
Russia	—	—	—	—	—	—	—	—	—	372
Ukraine	—	—	—	—	—	—	—	—	—	148
Former U.S.S.R.	707	700	714	741	750	761	761	775	R624	—
Other [1]	R311	R329	R346	R346	R333	R345	R334	R311	R1	9
Africa	167	184	198	201	202	208	202	200	205	201
South Africa	161	179	192	195	195	200	194	191	R197	192
Other	6	5	6	6	R8	8	8	R8	9	9
Middle East, Far East, and Oceania	R1,206	R1,308	R1,448	R1,491	R1,573	R1,618	R1,754	R1,780	R1,838	1,886
Australia	146	153	186	187	209	198	216	231	R236	249
China	787	870	961	985	1,023	1,080	1,162	1,162	R1,213	1,226
India	158	168	173	188	207	208	230	250	R249	263
Indonesia	1	1	2	3	3	5	10	12	15	25
North Korea	50	51	53	54	57	58	59	59	R58	58
South Korea	21	23	26	28	25	24	23	19	17	13
Thailand	2	3	6	6	9	7	19	14	16	17
Other	R41	R40	R40	R40	R39	R38	R35	R33	R34	34
World	R4,314	R4,534	R4,779	R4,882	R4,987	R5,105	R5,252	R5,214	R4,952	4,975

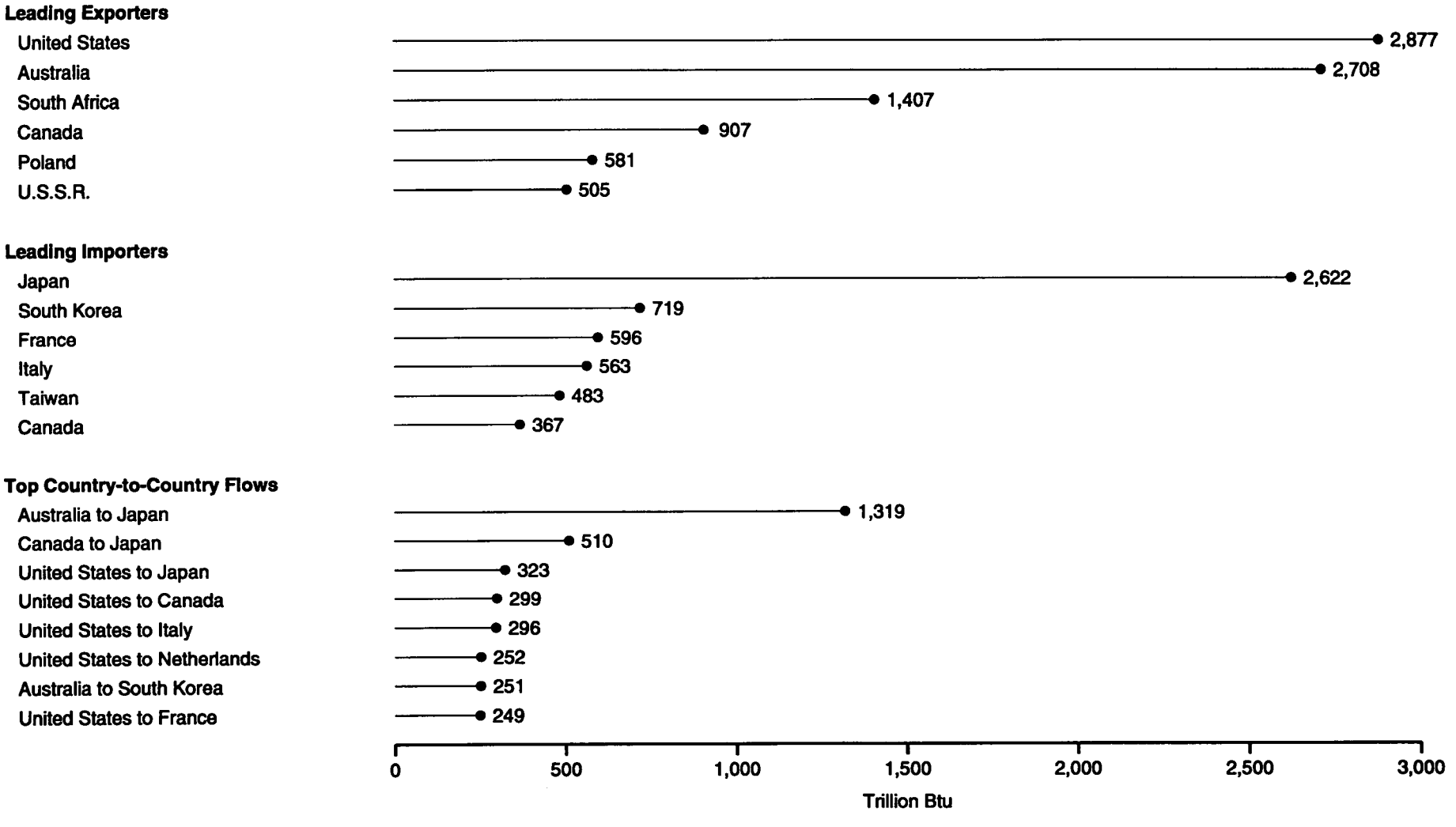
[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Germany, Western Europe, and "Eastern Europe and Former U.S.S.R." data for 1983 through 1990 differ from those published in the *International Energy Annual 1992*, Table 4, where Germany includes the former East Germany.

R=Revised data. P=Preliminary data. — = Not applicable.

Notes: • Coal includes anthracite, subanthracite, bituminous coal, subbituminous coal, lignite, and brown coal. • Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 4.

Figure 11.18 International Coal Flow, 1991



Source: Table 11.18.

Table 11.18 International Coal Flow, 1991

(Trillion Btu)

Importers	Exporters															
	North, Central, and South America			Western Europe				Eastern Europe			Africa	Far East			Other	Total
	Canada	United States	Colombia	Belgium	Germany	Netherlands	United Kingdom	Czechoslovakia	Poland	U.S.S.R.	South Africa	Australia	China	Japan		
North America																
Canada	—	299	0	0	0	0	0	0	0	0	0	0	0	0	67	367
United States	22	—	44	0	0	0	1	0	0	0	0	5	[1]	21	23	116
Other	2	5	0	0	0	0	0	0	0	0	0	0	0	0	[1]	7
Central and South America																
Brazil	36	188	1	0	[1]	0	[1]	0	21	0	20	45	4	0	13	330
Other	10	22	16	[1]	10	0	0	0	9	0	18	14	0	0	[1]	99
Western Europe																
Belgium and Luxembourg	3	197	4	—	24	18	4	0	15	10	105	38	5	0	39	464
Denmark	24	122	68	[1]	[1]	0	5	[1]	24	29	0	45	2	0	4	327
Finland	0	14	16	[1]	1	5	2	2	63	19	0	[1]	7	0	0	130
France	14	249	49	4	33	6	10	0	10	18	25	96	39	0	38	596
Germany	12	46	18	11	—	5	6	32	120	5	158	31	5	0	10	461
Italy	9	296	11	1	17	0	[1]	[1]	20	20	141	33	8	0	3	563
Netherlands	11	252	26	6	11	—	[1]	[1]	24	[1]	33	127	1	0	[1]	494
Spain	5	124	16	3	8	3	8	[1]	6	8	141	26	0	0	8	359
United Kingdom	25	162	62	5	7	45	—	0	19	19	19	107	6	0	31	509
Other	16	203	33	6	19	13	14	42	106	52	114	57	[1]	2	38	727
Eastern Europe and U.S.S.R.																
Bulgaria	0	25	0	0	0	0	0	[1]	0	71	0	0	0	0	1	97
Czechoslovakia	0	0	0	0	0	0	0	—	78	46	0	0	0	0	5	130
Romania	0	30	0	0	0	0	0	[1]	5	82	0	17	4	0	1	140
U.S.S.R.	0	1	0	0	0	0	0	[1]	0	—	0	0	0	0	29	31
Other	0	3	0	0	0	0	0	5	31	[1]	0	0	0	0	25	65
Middle East																
Israel	0	17	15	[1]	[1]	0	[1]	0	0	0	71	12	0	0	0	115
Other	3	[1]	0	[1]	[1]	0	0	0	[1]	0	0	9	0	0	[1]	13
Africa																
Algeria	0	14	0	0	0	0	[1]	0	0	0	0	10	0	0	12	36
Egypt	0	20	0	0	0	0	[1]	0	0	0	0	10	0	0	3	33
Other	0	33	0	[1]	0	0	3	2	[1]	3	21	1	0	3	1	69
Far East and Oceania																
Hong Kong	0	16	0	0	0	0	0	0	0	0	62	80	55	0	34	248
Japan	510	323	8	0	0	0	0	0	[1]	98	236	1,319	99	—	27	2,622
South Korea	170	97	0	0	0	0	0	0	0	11	77	251	100	0	10	719
Taiwan	20	119	0	0	0	0	0	0	0	0	152	159	32	[1]	[1]	483
Other	9	[1]	10	0	1	0	[1]	25	22	8	7	207	89	48	4	432
World	907	2,877	399	37	135	95	56	114	581	505	1,407	2,708	460	75	427	10,783

[1] Less than 500 million Btu.

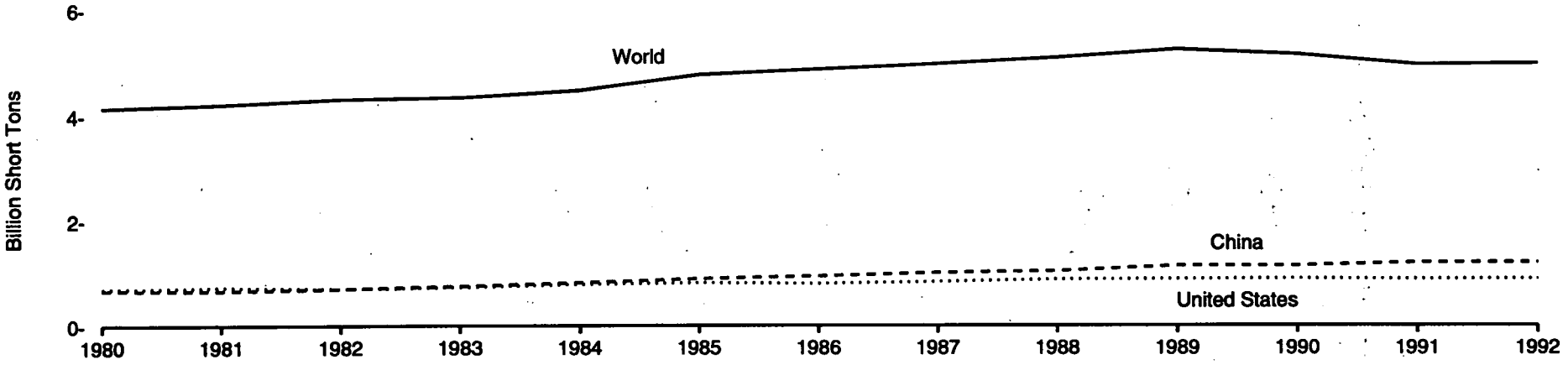
– = Not applicable.

Notes: • Includes coal coke. • Totals may not equal sum of components due to statistical discrepancies, losses, unaccounted for coal and coal trade not in national accounts, such as the United States shipment of coal to United States Armed Forces in Europe.

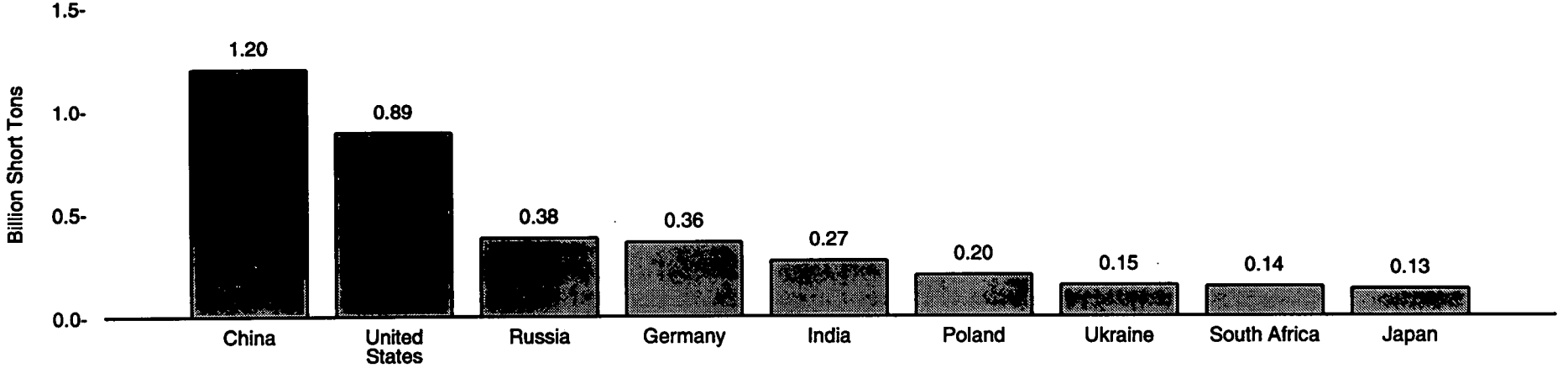
Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 27.

Figure 11.19 World Coal Consumption

World and Leading Consumers, 1980-1992



Top Consuming Countries, 1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.19.

Table 11.19 World Coal Consumption, 1980-1992

(Million Short Tons)

Year	Australia	China	Czecho-slovakia	Germany [1]	India	Japan	Kazakh-stan	Poland	Russia	South Africa	Ukraine	United Kingdom	United States	Former U.S.S.R.	Yugo-slavia	Other	World
1980	59	672	136	213	126	106	—	251	—	98	—	147	703	699	60	R869	R4,141
1981	61	667	136	223	145	117	—	230	—	110	—	131	733	688	68	R906	R4,214
1982	94	706	138	235	149	108	—	251	—	122	—	137	707	704	68	R900	R4,320
1983	86	756	142	232	159	107	—	210	—	129	—	124	737	703	75	R894	R4,353
1984	68	824	141	219	168	118	—	202	—	136	—	63	791	696	78	R983	R4,488
1985	71	897	139	230	201	128	—	218	—	140	—	113	818	701	81	R1,042	R4,779
1986	83	949	140	227	221	120	—	237	—	142	—	125	804	717	83	R1,038	R4,887
1987	94	1,011	137	213	211	127	—	256	—	147	—	120	837	721	84	R1,032	R4,990
1988	95	1,045	136	209	211	129	—	259	—	151	—	127	884	731	83	R1,052	R5,112
1989	105	1,147	130	210	234	121	—	241	—	145	—	127	890	729	87	R1,104	R5,269
1990	108	R1,145	118	198	253	125	—	203	—	142	—	110	895	744	87	R1,041	R5,172
1991	R104	R1,204	R111	R399	R257	127	—	R227	—	R143	—	R131	888	R595	R76	R720	R4,981
1992P	119	1,204	101	363	270	125	94	202	379	137	151	119	892	—	75	1,299	5,001

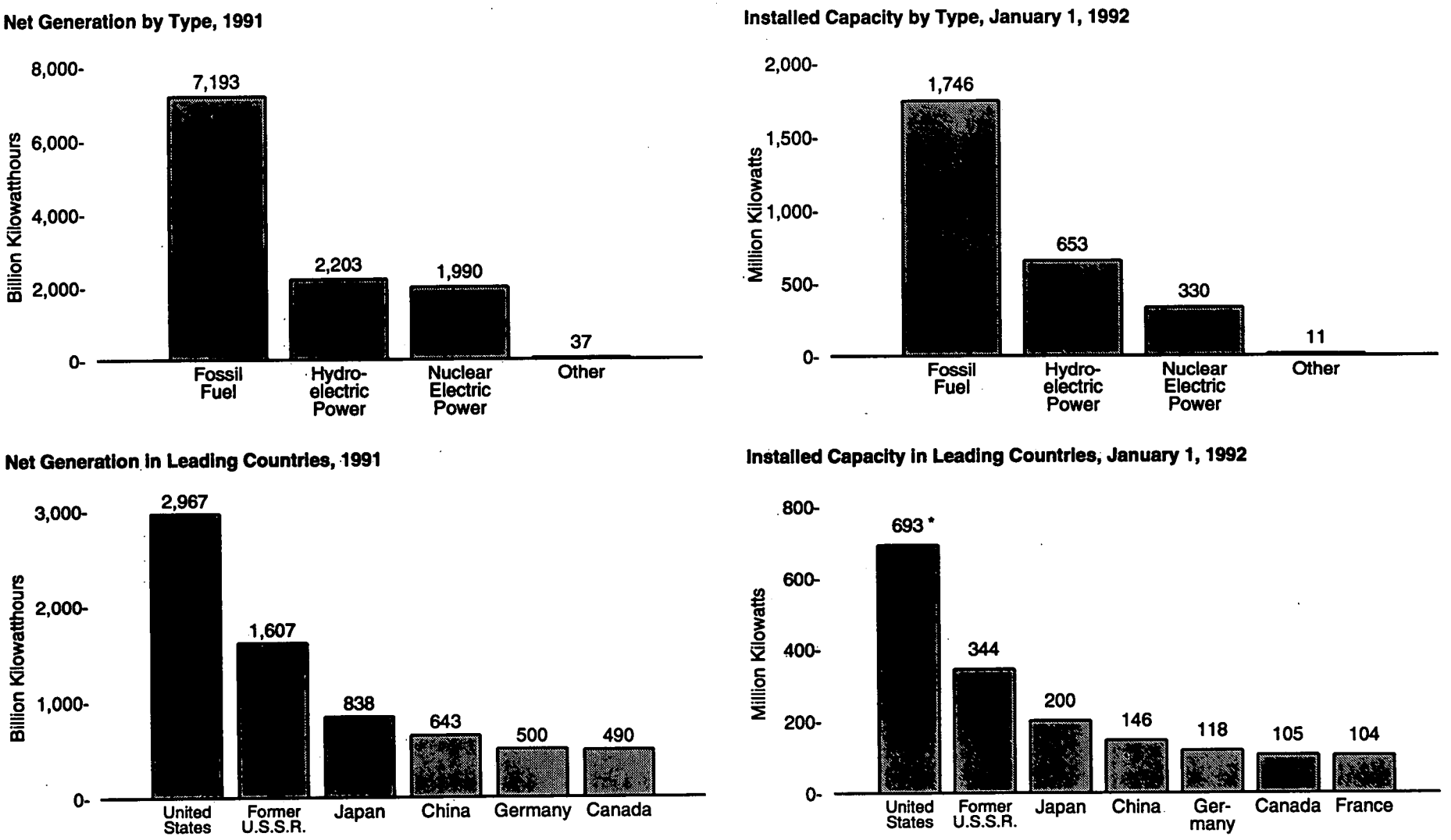
[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Data for 1983 through 1990 differ from those published in the *International Energy Annual 1992*, Table 10, where Germany includes the former East Germany.

R=Revised data. P=Preliminary data. — = Not applicable.

Note: Totals may not equal sum of components due to independent rounding and the inclusion of more recent U.S. data from an alternative source.

Sources: **United States:** Table 7.1. **All Other Data:** • 1980-1982—Energy Information Administration (EIA), Office of Energy Markets and End Use, International Database, March 1994. • 1983 forward—EIA, *International Energy Annual 1992* (January 1994), Table 10.

Figure 11.20 World Net Generation of Electricity and Installed Capacity by Type



*Net summer capability.

Notes: • Data include both electric utility and non-electric utility sources. • "Other" is geothermal, solar, biomass, wind, and other renewable energy sources. • Because vertical scales differ, graphs should not be compared.

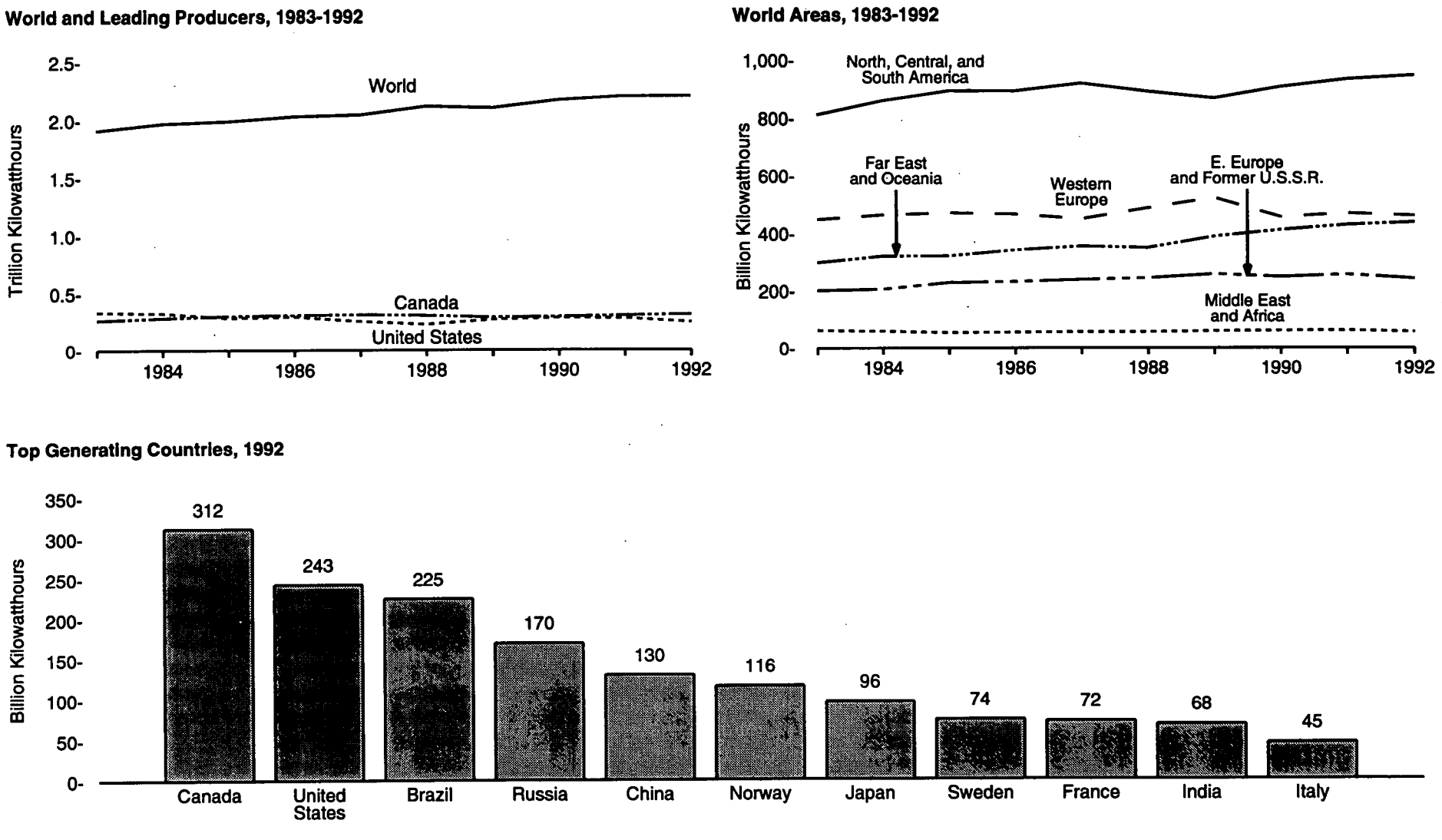
Source: Table 11.20.

Table 11.20 World Net Generation of Electricity and Installed Capacity by Type

Region and Country	Net Generation, 1991					Installed Capacity, January 1, 1992				
	Fossil Fuel	Nuclear Electric Power	Hydro-electric Power	Other [1]	Total	Fossil Fuel	Nuclear Electric Power	Hydro-electric Power	Other [1]	Total
	Billion Kilowatthours					Million Kilowatts				
North America	**2,265.7**	**696.7**	**607.3**	**15.2**	**3,584.9**	**551.0**	**113.3**	**160.1**	**2.8**	**827.2**
Canada	105.4	80.1	304.3	([2])	489.9	31.3	13.1	60.2	([3])	104.6
Mexico	93.8	4.0	24.3	5.0	127.1	20.1	0.7	7.8	0.7	29.3
United States	2,065.8	612.6	278.7	10.1	2,967.2	[4]499.4	[4]99.6	[4]92.0	[4]2.0	[4]693.0
Other	0.7	0.0	0.0	0.0	0.7	([3])	0.0	0.0	0.0	([3])
Central and South America	**130.0**	**9.1**	**369.7**	**7.2**	**516.0**	**40.1**	**1.7**	**90.9**	**4.8**	**137.5**
Argentina	28.1	7.7	16.3	0.0	52.0	9.8	1.0	6.6	0.0	17.5
Brazil	7.7	1.4	215.6	6.5	231.2	2.1	0.7	46.7	4.7	54.1
Colombia	8.4	0.0	27.4	0.0	35.8	2.1	0.0	7.6	0.0	9.7
Venezuela	21.5	0.0	34.0	0.0	55.4	5.8	0.0	12.0	0.0	17.7
Other	64.4	0.0	76.5	0.7	141.5	20.2	0.0	18.1	([3])	38.4
Western Europe	**1,192.4**	**731.9**	**468.9**	**4.8**	**2,398.0**	**316.1**	**119.6**	**166.3**	**1.4**	**603.4**
France	57.8	315.0	60.7	0.6	434.1	22.6	56.8	24.7	([3])	104.3
Germany	342.7	139.4	18.2	([2])	500.3	87.0	22.5	8.6	0.0	118.1
Italy	162.4	0.0	45.1	3.0	210.5	38.2	0.0	19.1	0.6	57.9
Norway	([2])	0.0	109.5	0.0	110.0	([3])	0.0	26.9	0.0	27.1
Spain	67.2	53.2	27.9	0.0	148.4	20.3	7.0	16.3	0.0	43.6
Sweden	6.7	73.5	62.9	([2])	143.1	8.2	10.0	16.3	([3])	34.5
United Kingdom	233.4	62.8	5.9	([2])	302.1	54.5	11.4	4.2	([3])	70.0
Other	321.7	88.0	138.7	1.2	549.6	85.1	12.1	50.2	0.6	147.9
Eastern Europe and Former U.S.S.R.	**1,426.7**	**249.5**	**258.4**	([2])	**1,934.6**	**311.6**	**45.8**	**79.1**	([3])	**436.6**
Czechoslovakia	52.9	22.5	3.1	0.0	78.6	14.8	3.5	3.0	0.0	21.3
Poland	123.4	0.0	3.4	0.0	126.8	29.1	0.0	1.9	0.0	31.0
Former U.S.S.R.	1,173.0	201.5	232.7	([2])	1,607.2	240.8	37.9	65.0	([3])	343.7
Other	77.3	25.5	19.2	0.0	122.1	27.0	4.4	9.1	0.0	40.5
Middle East	**182.5**	**0.0**	**13.6**	([2])	**196.1**	**68.9**	**0.0**	**3.1**	**0.0**	**72.1**
Iraq	19.3	0.0	([2])	0.0	19.6	8.9	0.0	([3])	0.0	9.0
Saudi Arabia	44.8	0.0	0.0	0.0	44.8	18.4	0.0	0.0	0.0	18.4
Other	118.4	0.0	13.3	([2])	131.7	41.7	0.0	3.0	0.0	44.7
Africa	**251.1**	**9.2**	**52.5**	([2])	**313.2**	**54.6**	**1.9**	**19.5**	([3])	**76.0**
Egypt	28.7	0.0	9.8	0.0	38.5	10.6	0.0	2.7	0.0	13.3
South Africa	153.7	9.2	0.6	0.0	163.5	24.0	1.9	0.6	0.0	26.5
Other	68.7	0.0	42.1	([2])	111.2	20.0	0.0	16.2	([3])	36.2
Far East and Oceania	**1,744.6**	**294.0**	**432.2**	**9.4**	**2,480.2**	**403.2**	**47.9**	**133.5**	**1.5**	**586.0**
Australia	132.0	0.0	16.0	0.0	148.0	26.6	0.0	7.3	0.0	33.9
China	519.3	0.0	123.8	0.0	643.2	108.0	0.0	38.0	0.0	146.0
India	222.2	5.2	66.8	([2])	294.3	58.2	1.6	19.8	([3])	79.5
Japan	530.1	201.4	104.5	1.7	837.7	127.2	33.4	39.1	([3])	200.0
South Korea	53.8	53.5	5.0	0.0	112.3	14.5	7.6	2.4	0.0	24.6
Other	287.0	33.9	116.0	7.8	444.7	68.7	5.3	26.8	1.2	102.0
World	**7,192.9**	**1,990.4**	**2,202.7**	**37.0**	**11,423.0**	**1,745.5**	**330.3**	**652.5**	**10.6**	**2,738.8**

[1] Geothermal, solar, biomass, wind, and other renewable energy sources.
[2] Less than 0.5 billion kilowatthours.
[3] Less than 0.5 million kilowatts.
[4] Net summer capability.
Notes: • Data include both electric utility and non-electric utility sources. • Totals may not equal sum of components due to independent rounding.
Sources: Energy Information Administration (EIA), *International Energy Annual 1992* (January 1994), Tables 30 and 31; except U.S. capacity, which is net summer capability from EIA, *Electric Power Annual 1992* (January 1994), Table 2.

Figure 11.21 World Hydroelectric Power Net Generation



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 11.21.

Table 11.21 World Hydroelectric Power Net Generation, 1983-1992

(Billion Kilowatthours)

Region and Country	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992 [P]
North, Central, and South America	860	[R]895	[R]897	[R]932	[R]908	[R]886	[R]926	[R]955	[R]977	960
Argentina	18	20	20	21	22	16	[R]13	18	[R]16	16
Brazil	150	165	177	181	184	197	203	205	[R]216	225
Canada	263	283	301	308	313	304	288	293	304	312
Chile	9	9	10	11	12	11	10	9	10	10
Colombia	18	20	22	25	21	24	26	27	28	28
Mexico	21	23	26	20	18	21	24	[R]24	24	25
Peru	8	9	9	10	11	10	10	10	11	12
United States	335	324	284	294	253	226	268	283	279	243
Venezuela	18	20	[R]22	[R]27	31	34	[R]37	[R]33	[R]34	33
Other	[R]20	[R]22	[R]26	[R]35	[R]43	[R]43	[R]47	[R]53	[R]55	56
Western Europe [1]	464	471	466	449	488	524	456	469	[R]469	498
Austria	30	29	31	31	36	36	36	32	[R]32	36
Finland	13	13	12	12	14	13	13	11	[R]13	15
France	71	67	64	65	72	77	50	57	[R]61	72
Germany [1]	19	18	18	19	21	21	19	18	18	21
Italy	44	45	44	44	42	43	37	35	[R]45	45
Norway	106	106	103	97	103	109	118	120	[R]110	116
Portugal	8	10	11	9	9	12	6	9	9	5
Spain	29	33	33	27	28	36	20	26	28	21
Sweden	63	67	70	60	71	70	71	72	63	74
Switzerland	36	31	32	33	35	36	31	31	[R]33	34
Turkey	11	13	12	12	18	29	18	23	22	26
Yugoslavia	22	26	24	28	26	26	23	20	19	18
Other	[R]11	[R]13	[R]12	[R]12	[R]13	[R]16	[R]14	[R]15	[R]16	15
Eastern Europe and Former U.S.S.R. [1]	206	229	232	239	245	[R]258	249	[R]255	[R]258	248
Romania	10	11	12	11	11	14	13	11	[R]14	14
Russia	—	—	—	—	—	—	—	—	—	170
Former U.S.S.R.	180	203	205	214	218	229	221	[R]231	[R]233	—
Other [1]	16	15	[R]16	[R]15	[R]17	16	[R]16	[R]13	[R]12	64
Middle East and Africa	59	54	55	56	56	59	60	[R]65	[R]66	65
Egypt	10	10	8	8	8	8	8	[R]10	[R]10	10
Zambia	10	10	10	10	8	8	7	8	[R]8	6
Other	39	34	37	38	39	43	45	[R]47	[R]49	49
Far East and Oceania	321	322	342	355	350	390	[R]411	[R]426	[R]432	434
Australia	13	12	14	15	14	14	15	15	[R]16	16
China	86	87	92	95	100	108	117	125	[R]124	130
India	50	53	51	53	47	57	62	65	67	68
Japan	87	76	87	85	80	96	97	95	[R]105	96
Korea, North	26	27	28	29	29	31	31	31	[R]31	32
New Zealand	20	20	20	22	22	23	22	23	[R]23	23
Pakistan	11	13	12	14	15	17	17	17	18	19
Other	[R]28	[R]34	[R]38	[R]42	[R]43	[R]44	[R]50	[R]55	[R]48	50
World	1,910	1,971	[R]1,992	[R]2,032	[R]2,046	[R]2,117	[R]2,102	[R]2,169	[R]2,203	2,204

[1] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany. Germany, Western Europe, and "Eastern Europe and Former U.S.S.R." data for 1983 through 1990 differ from those published in the *International Energy Annual 1992*, Table 5, where Germany includes the former East Germany.

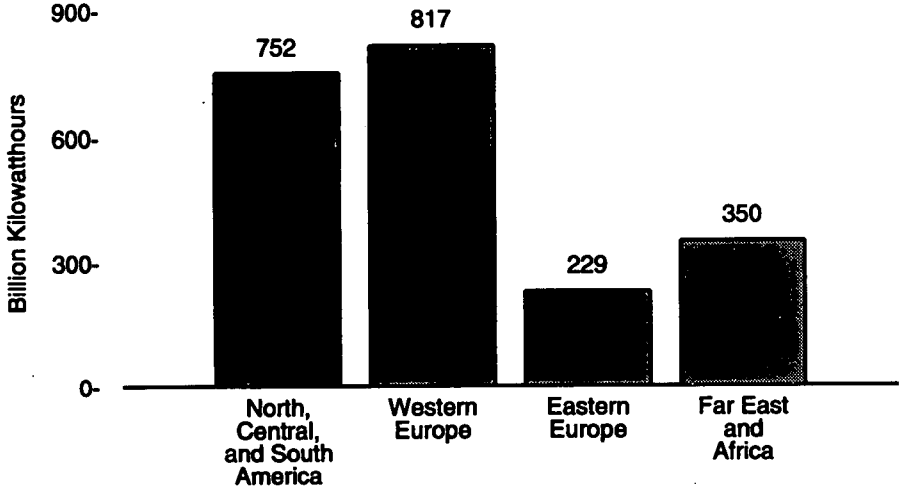
R=Revised data. P=Preliminary data. — = Not applicable.

Notes: • See Note 4 at end of section. • Generation data consist of both utility and non-utility sources. • Totals may not equal sum of components due to independent rounding.

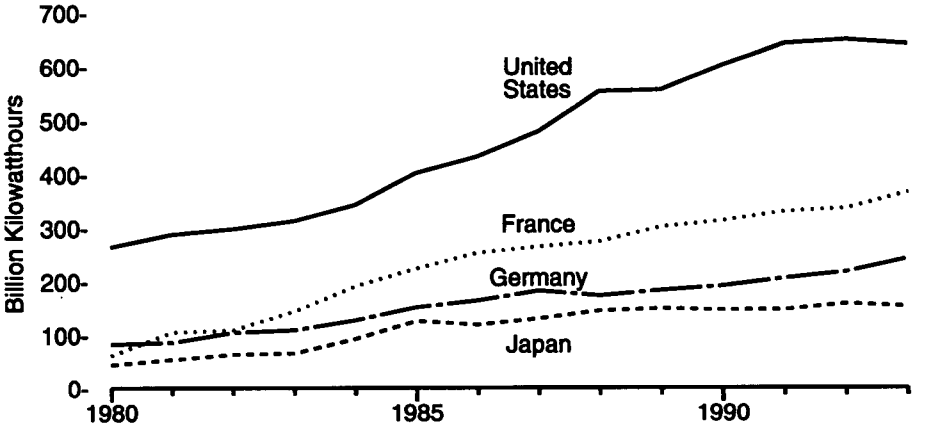
Source: Energy Information Administration, *International Energy Annual 1992* (January 1994), Table 5.

Figure 11.22 Nuclear Electricity Gross Generation

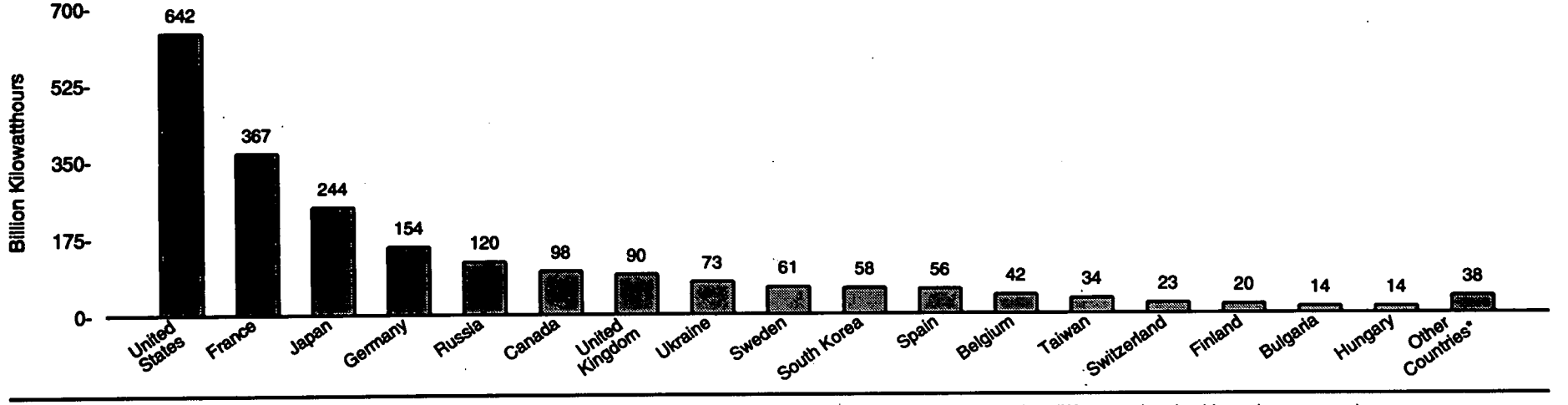
By Region, 1993



By Major Producers, 1980-1993



By Country, 1993



* "Other countries" are Argentina, Brazil, Mexico, Netherlands, Czech Republic, Slovenia, India, Pakistan, and South Africa.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 11.22.

Table 11.22 Nuclear Electricity Gross Generation, 1980-1993

(Billion Kilowatthours)

Region and Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
North, Central, and South America	**308.1**	**334.6**	**343.1**	**370.2**	**404.1**	**474.8**	**514.6**	**566.3**	**645.2**	**646.9**	**690.7**	**742.6**	R744.0	E752.1
Argentina	2.3	2.8	1.9	3.4	4.5	5.8	5.7	5.2	5.1	5.0	7.4	R7.7	7.1	E7.1
Brazil	0.0	0.0	0.1	0.2	2.1	3.4	0.1	1.0	0.3	1.6	2.0	1.4	1.8	0.4
Canada	40.4	43.3	42.6	53.0	53.8	62.9	74.6	80.6	85.6	83.2	75.8	86.1	R81.3	97.6
Mexico	—	—	—	—	—	—	—	—	—	—	2.1	4.2	3.9	4.9
United States [1]	265.4	288.5	298.6	313.6	343.8	402.7	434.1	479.5	554.1	557.0	603.4	643.0	650.0	642.0
Western Europe	**214.2**	**293.4**	**321.8**	**377.2**	**485.4**	**582.8**	**631.5**	**648.3**	**688.1**	**732.0**	**738.6**	**769.7**	**783.9**	E816.5
Belgium	12.5	12.8	15.6	24.1	27.7	34.5	38.6	41.9	43.1	41.2	42.7	42.9	43.5	41.9
Finland	7.0	14.5	16.5	17.4	18.5	18.8	18.8	19.4	19.3	18.8	18.9	19.2	19.0	19.6
France	61.2	105.2	108.9	144.2	191.2	224.0	254.3	265.5	274.9	302.5	314.1	331.4	337.6	366.7
Germany [2]	43.7	53.4	63.4	65.8	92.6	125.8	118.9	130.2	145.2	149.5	147.2	147.3	158.8	153.5
Italy	2.2	2.7	6.8	5.8	6.9	7.0	8.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	4.2	3.7	3.9	3.6	3.8	3.9	4.2	3.6	3.7	4.0	3.4	3.3	3.8	3.9
Spain	5.2	9.4	8.8	10.7	23.1	28.0	37.5	41.3	50.4	56.1	54.3	55.6	55.8	56.1
Sweden	26.7	37.7	38.8	40.4	51.3	58.6	69.9	67.2	69.4	65.6	68.2	76.8	63.5	61.4
Switzerland	14.3	15.2	15.0	15.5	16.3	22.4	22.5	23.0	22.7	22.8	23.6	22.9	23.4	23.3
United Kingdom	37.2	38.9	44.1	49.6	54.1	59.7	58.2	56.2	59.4	71.6	66.1	70.4	78.5	E90.0
Eastern Europe	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E271.5	E228.5
Bulgaria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E12.2	14.0
Czech Republic [3]	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	E12.9	E3.6
Hungary	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA	NA	E13.8	13.8
Kazakhstan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E0.5	NA
Lithuania	—	—	—	—	—	NA	NA	NA	NA	NA	NA	NA	E16.4	NA
Romania [4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Russia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E125.6	120.4
Slovakia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E11.7	NA
Slovenia	—	—	—	NA	NA	NA	NA	NA	NA	NA	NA	NA	E4.0	4.0
Ukraine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	E74.6	E72.7
Far East and Africa	**97.4**	**102.9**	**123.6**	**140.1**	**171.9**	**207.9**	**232.9**	**266.1**	**259.6**	**275.2**	**293.2**	**313.0**	R325.1	E350.4
China [5]	—	—	—	—	—	—	—	—	—	—	—	—	—	NA
India	2.9	3.1	2.2	2.9	4.1	4.5	5.1	5.5	6.1	4.0	6.3	5.4	R6.3	6.2
Japan	82.8	86.0	104.5	109.1	127.2	152.0	164.8	182.8	173.6	183.7	191.9	205.8	R218.0	243.5
Pakistan	0.1	0.2	0.1	0.2	0.3	0.3	0.5	0.3	0.2	0.1	0.4	0.4	0.6	0.4
South Africa	—	—	—	—	4.2	5.9	9.3	6.6	11.1	11.7	8.9	9.7	9.9	7.7
South Korea	3.5	2.9	3.8	9.0	11.8	16.5	26.1	37.8	38.7	47.4	52.8	56.3	56.4	58.1
Taiwan	8.2	10.7	13.1	18.9	24.3	28.7	26.9	33.1	29.9	28.3	32.9	35.3	33.8	34.3
World [6]	**619.8**	**730.9**	**788.5**	**887.5**	**1,061.5**	**1,265.4**	**1,378.9**	**1,480.8**	**1,592.8**	**1,654.2**	**1,722.5**	R1,825.2	R,E2,124.5	E2,147.5

[1] See Note 4 at end of section.

[2] Through 1990, the data for Germany are for the former West Germany only. Beginning with 1991, the data for Germany are for the unified Germany, i.e., the former East Germany and West Germany.

[3] The reported data for 1993 was for September through December only. The 1993 total for the Czech Republic is for the last third of 1993.

[4] Romania has one nuclear generating unit under construction. Its earliest initial commercial operation is projected to be in 1995.

[5] China has one nuclear generating unit in commercial operation and two under construction which are projected for initial commercial operation in 1994.

[6] Eastern European countries are included in the total figure beginning in 1992.

Note: Totals may not equal sum of components due to independent rounding.

R=Revised data. E=Estimate. — = Not applicable. NA=Not available.

Source: McGraw-Hill Publishing Co., Inc., *Nucleonics Week*.

International Energy Notes

1. World primary energy production includes only crude oil and lease condensate, natural gas plant liquids, dry natural gas, coal, and electricity from hydroelectric power and nuclear electric power. Crude oil production is measured at the wellhead and includes lease condensate. Natural gas plant liquids are products obtained from processing natural gas at natural gas processing plants, including natural gas plants, cycling plants, and fractionators. Dry natural gas production is that amount of natural gas production that is available to be marketed and consumed as a gas. Coal (anthracitic, subanthracitic, bituminous, subbituminous, lignitic, and brown coal) production is the sum of sales, mine consumption, issues to miners, and issues to coking, briquetting, and other ancillary plants at mines. Coal production data include quantities extracted from surface and underground workings and normally exclude wastes removed at mines or associated preparation plants. The production of electricity from hydroelectric power and nuclear electric power includes both electric utility and industrial production reported on a net basis, thus excluding electricity that is generally used by the electric power plant for its own operating purposes or electricity losses in the transformers that are considered integral parts of the station.

2. Petroleum stocks reported by the Organization for Economic Cooperation and Development (OECD) include those held at (or in) the following locations or facilities: leases, refineries, natural gas processing plants, bulk terminals, tanks associated with pipelines, barges, intercoastal tankers, ocean tankers in port, inland ship bunkers, major final consumers, and the strategic storage reserve. For an individual country, stocks include those held for the account of that country but located in another country. U.S. stocks include those held in the 50 States and the District of Columbia. "Other OECD" includes stocks held in Puerto Rico and the Virgin Islands. The OECD definition of petroleum stocks excludes petroleum in pipelines, rail tank cars, tank trucks, oceangoing ship bunkers, service stations, retail stores, and tankers at sea. An exception is U.S. stocks, which include petroleum in pipelines.

3. World Energy Council definition of "Proved Recoverable Reserves": The tonnage of Proved Amount in Place that can be recovered (extracted from the earth in raw form) under present and expected local economic conditions with existing technology. Data are from the *1992 Survey of Energy Resources.*

British Petroleum definition of "Proved Reserves": Proved reserves of coal are generally taken to be those quantities that geological and engineering information indicate with reasonable certainty can be recovered in the future from known deposits under existing economic and operating conditions. Data are from the *BP Statistical Review of World Energy* (June 1993).

4. Data on the generation of electricity in the United States represent net generation, which is gross output of electricity (measured at the generator terminals) minus power plant use. Nuclear electricity generation data identified by individual countries in Table 11.22 are gross output of electricity.

12. Environmental Indicators

Emissions of Greenhouse Gases

Greenhouse gases—carbon dioxide, methane, nitrous oxide, carbon monoxide, and other gases—are those which block infrared radiation from Earth to space and reradiate the captured heat to the atmosphere. This warming effect, known as the greenhouse effect, keeps Earth's climate hospitable to plant, animal, and human life. But some scientists believe that manmade additions to greenhouse gases will raise global average temperatures and produce deleterious changes in the global climate.

Manmade emissions of carbon dioxide totaled 5.0 billion metric tons in 1990 (the most recent year for which data are available), up from 4.7 billion tons in 1985 (12.1).[1] In contrast, manmade emissions of three other greenhouse gases declined. Carbon monoxide emissions fell from 83 million metric tons in 1985 to 68 million metric tons in 1990. Methane emissions fell from 30 million metric tons to 29 million metric tons, and nonmethane volatile organic compounds (VOC's) fell from 20 million metric tons to 18 million metric tons. Nitrous oxide emissions were unchanged at 0.3 million metric tons.

Carbon dioxide accounts for the largest share by far of total manmade emissions of greenhouse gases, and the preponderance of carbon dioxide emissions comes from the burning of fossil fuels (12.1 and 12.2). Energy-related carbon dioxide emissions totaled 1.3 billion metric tons of carbon in 1991 (12.2). In terms of the amount of carbon emitted, in 1991 the industrial and transportation sectors were the sources of the most emissions: 428 million metric tons of carbon and 425 million metric tons of carbon, respectively. The residential and commercial sectors emitted 257 million metric tons of carbon and 206 million metric tons of carbon, respectively.

Consumption of petroleum (in particular, motor gasoline) by the transportation sector and coal at electric utilities were the biggest sources of carbon dioxide emissions in 1991 (12.3). Natural gas consumed by all sectors accounted for a total of 280 million metric tons of carbon. Energy-related activities also accounted for a big share of methane emissions (8.2 million metric tons) in 1991 (12.4). But agricultural sources (such as digestive processes in ruminant animals and the anaerobic decomposition of organic materials in animal wastes and rice paddies) emitted 10 million metric tons of methane.

[1]Numbers in parentheses indicate related tables. Annual data are the most recent available; they frequently are preliminary and may be revised in future publications.

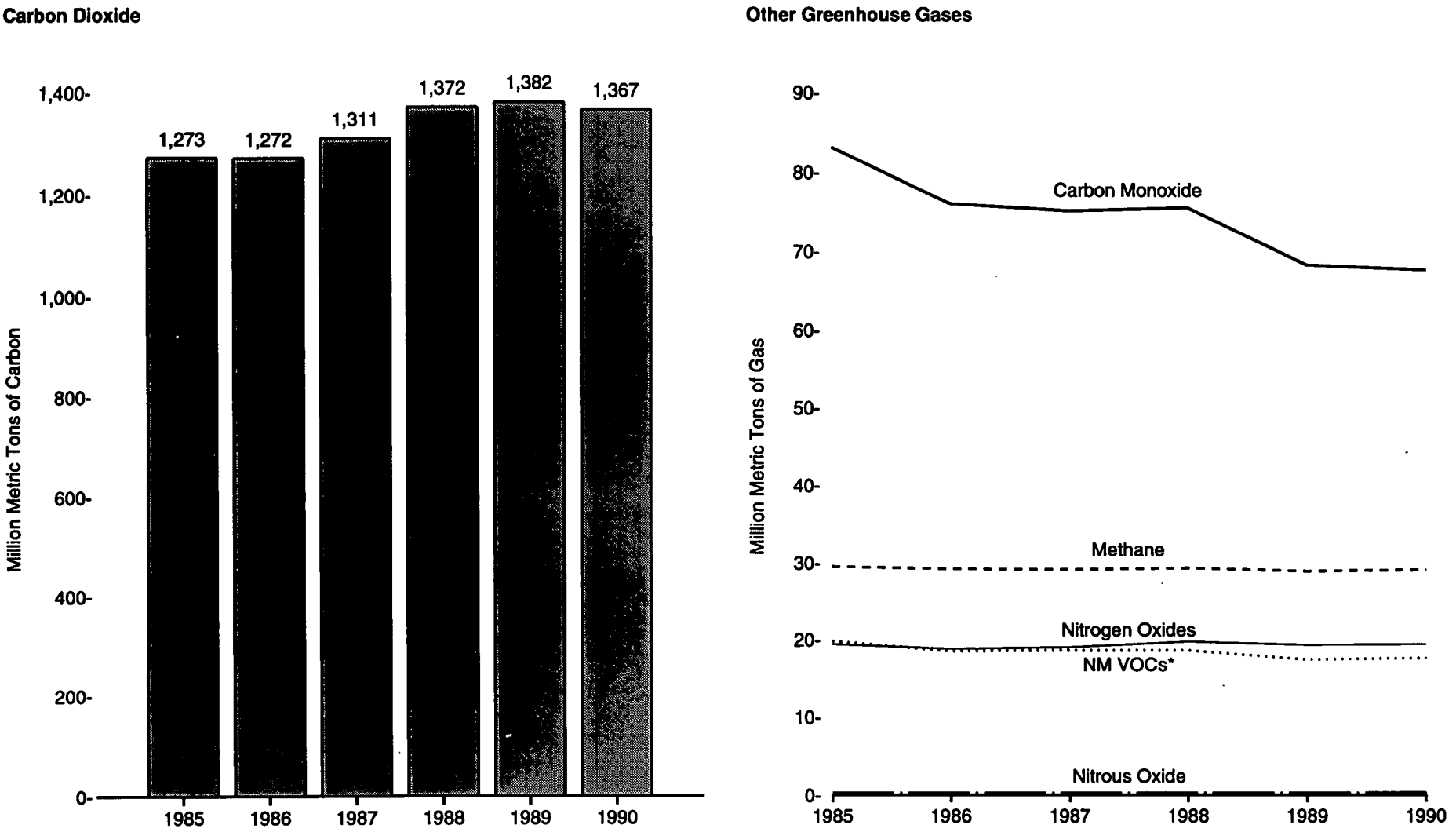
Emissions and Environmental Equipment at Electric Utilities

In general, changes in electric utility consumption of fossil fuels are accompanied by concomitant changes in the emission of the products of fossil fuel combustion. Two greenhouse gases—carbon dioxide and nitrogen oxides—are good examples. In 1985 (the first year of the Energy Information Administration's electric utility emissions data series), consumption of fossil fuels to generate electricity totaled 19 quadrillion Btu (8.4). Emissions of carbon dioxide from fossil-fueled steam-electric generating units totaled 1.9 billion short tons and nitrogen oxide emissions totaled 7.9 million short tons (12.5). In 1992 (the most recent year for which for which data are available), consumption of fossil fuels to generate electricity totaled 20 quadrillion Btu, 6.4 percent higher than in 1985. Carbon dioxide emissions from fossil-fueled stream-electric generating units were 10 percent higher than in 1985, and nitrogen oxide emissions were 8 percent higher.

In contrast, emissions of sulfur dioxide were actually lower in 1992 than they were in 1985. As is true of carbon dioxide and nitrogen oxide emissions, most emissions of sulfur dioxide were attributable to coal combustion. Coal accounted for 81 percent of fossil fuels consumed at electric utilities in 1992 (8.4), but 96 percent of sulfur dioxide emissions (12.5). However, sulfur dioxide emissions from coal combustion can be controlled through the use of coal with a lower sulfur content and through the use of scrubbers (flue-gas desulfurization units). From 1985 through 1992, the amount of coal-fired capacity equipped with scrubbers increased 25 percent to 71 million kilowatts (12.6). Although consumption of coal to generate electricity rose 12 percent during the 1985-to-1992 period, coal-related sulfur dioxide emissions declined 2.9 percent (12.5).

Coal is also the principal source of ash, which can be prevented from reaching the atmosphere by the use of particulate collectors. Almost all coal-fired capacity (320 million kilowatts) was equipped with particulate collectors in 1992 (12.6).

Figure 12.1 Estimated Emissions of Greenhouse Gases, 1985-1990



*Nonmethane volatile organic compounds.
Note: Because vertical scales differ, graphs should not be compared.

Source: Table 12.1.

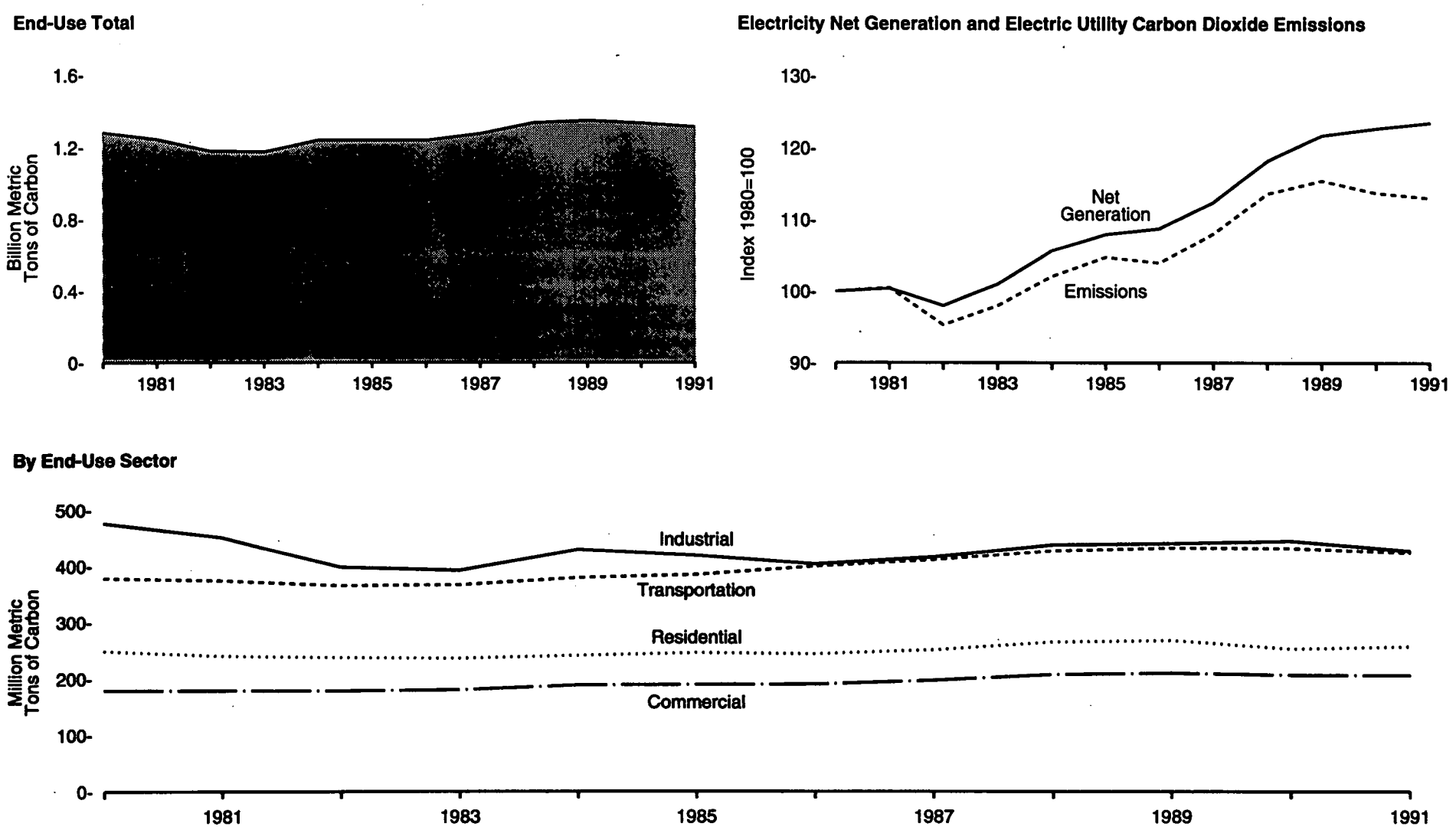
Table 12.1 Estimated Emissions of Greenhouse Gases, 1985-1990

(Million Metric Tons of Gas and Million Metric Tons of Carbon)

Greenhouse Gas	1985	1986	1987	1988	1989	1990
Carbon Dioxide	4,667.1	4,662.1	4,806.3	5,031.6	5,067.5	5,012.4
	(1,272.9)	(1,271.5)	(1,310.8)	(1,372.3)	(1,382.1)	(1,367.0)
Methane	29.5	29.2	29.1	29.3	28.9	29.1
	(22.1)	(21.9)	(21.8)	(22.0)	(21.7)	(21.8)
Nitrous Oxide	0.3	0.3	0.3	0.3	0.3	0.3
Carbon Monoxide	83.1	76.0	75.1	75.5	68.3	67.7
	(35.6)	(32.6)	(32.2)	(32.4)	(29.3)	(29.0)
Nitrogen Oxides	19.4	18.8	19.0	19.7	19.3	19.4
Nonmethane VOCs [1]	19.8	18.5	18.6	18.6	17.4	17.6
CFC[2]-11, CFC-12, CFC-13	NA	NA	NA	NA	NA	0.2

[1] Volatile organic compounds.
[2] Chlorofluorocarbons.
NA=Not available.
Note: Carbon dioxide, carbon monoxide, and methane can be measured either in terms of the full molecular weight of the gas or in terms of their carbon content only. For each carbon-containing gas in this table, the full molecular weight is shown on the top line and the weight of the carbon content is shown in parentheses below the full weight.
Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1985-1990*, Second Printing, November 1993, Table ES1.

Figure 12.2 Carbon Dioxide Emissions from Fossil Energy Consumption by Sector, 1980-1991



Sources: Tables 8.1 and 12.2.

Table 12.2 Carbon Dioxide Emissions from Fossil Energy Consumption by Sector, 1980-1991

(Million Metric Tons of Carbon)

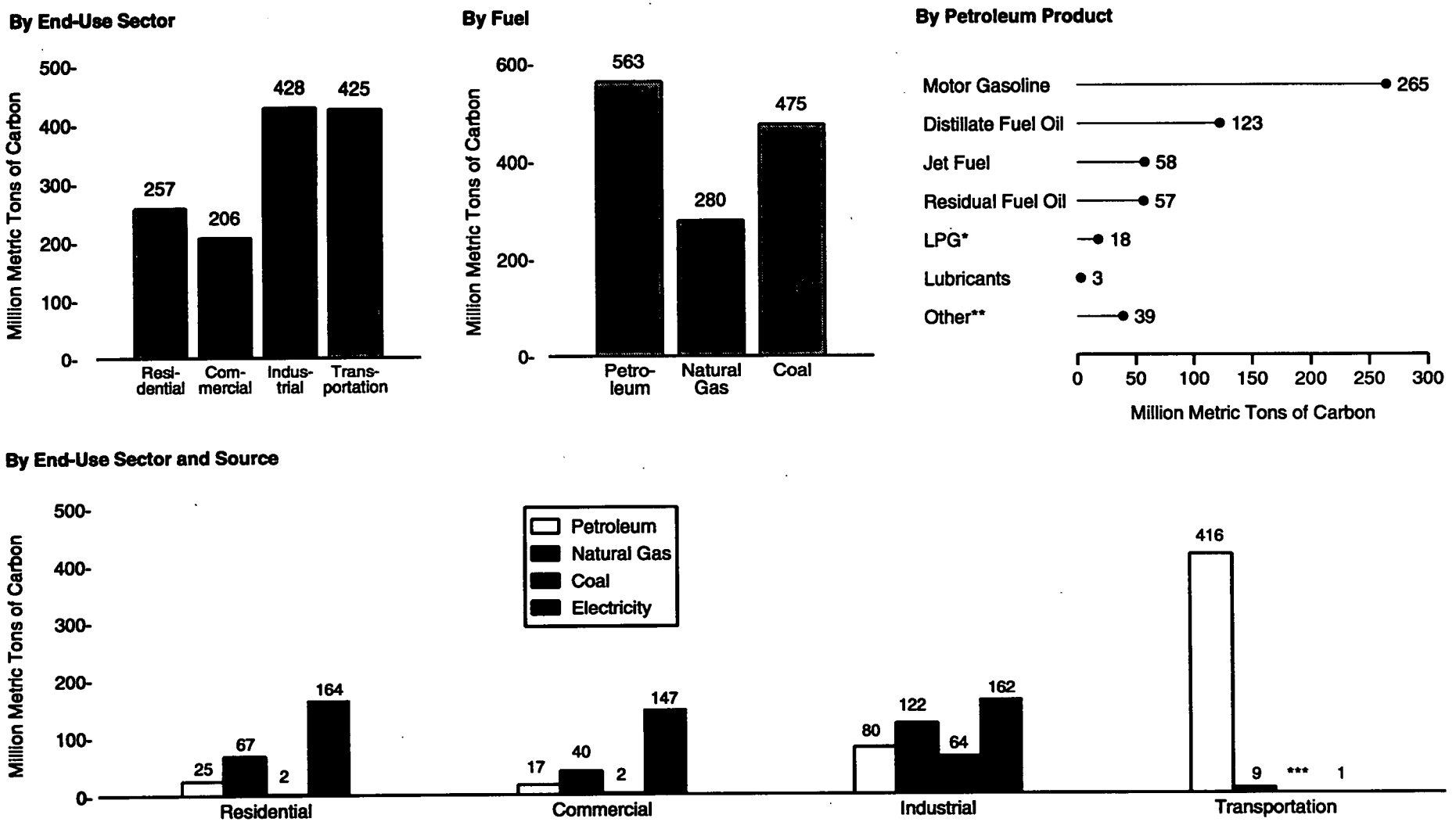
Year	Residential	Commercial	Industrial	Transportation	End-Use Total	Electric Utilities [1]
1980	248.6	178.5	475.8	378.7	1,281.6	418.9
1981	240.1	178.5	451.1	374.7	1,244.3	421.1
1982	237.6	178.3	398.3	366.1	1,180.3	399.4
1983	236.2	180.1	392.5	367.5	1,176.3	410.5
1984	241.2	188.8	430.1	380.1	1,240.3	427.9
1985	245.9	189.7	419.5	385.4	1,240.6	439.1
1986	244.1	190.5	404.2	400.1	1,239.1	435.7
1987	251.1	197.2	417.1	412.2	1,277.6	452.8
1988	265.0	207.7	438.6	428.4	1,339.8	476.2
1989	267.6	210.1	440.9	433.4	1,352.0	483.7
1990	253.1	206.7	445.4	432.9	1,338.0	476.7
1991	257.2	206.4	428.3	425.2	1,317.2	473.6

[1] Electric utility emissions are distributed across end-use sectors.

Notes: • Includes energy from petroleum, natural gas, and coal. • Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1985-1990*, Second Printing, November 1993, Tables 8 and B1-B5.

Figure 12.3 Carbon Dioxide Emissions from Energy Use by Sector, 1991



*Liquefied petroleum gases.
**"Other" includes aviation gasoline, kerosene, and other products.
***Included in the industrial sector.

Note: Because vertical scales differ, graphs should not be compared.
Source: Table 12.3.

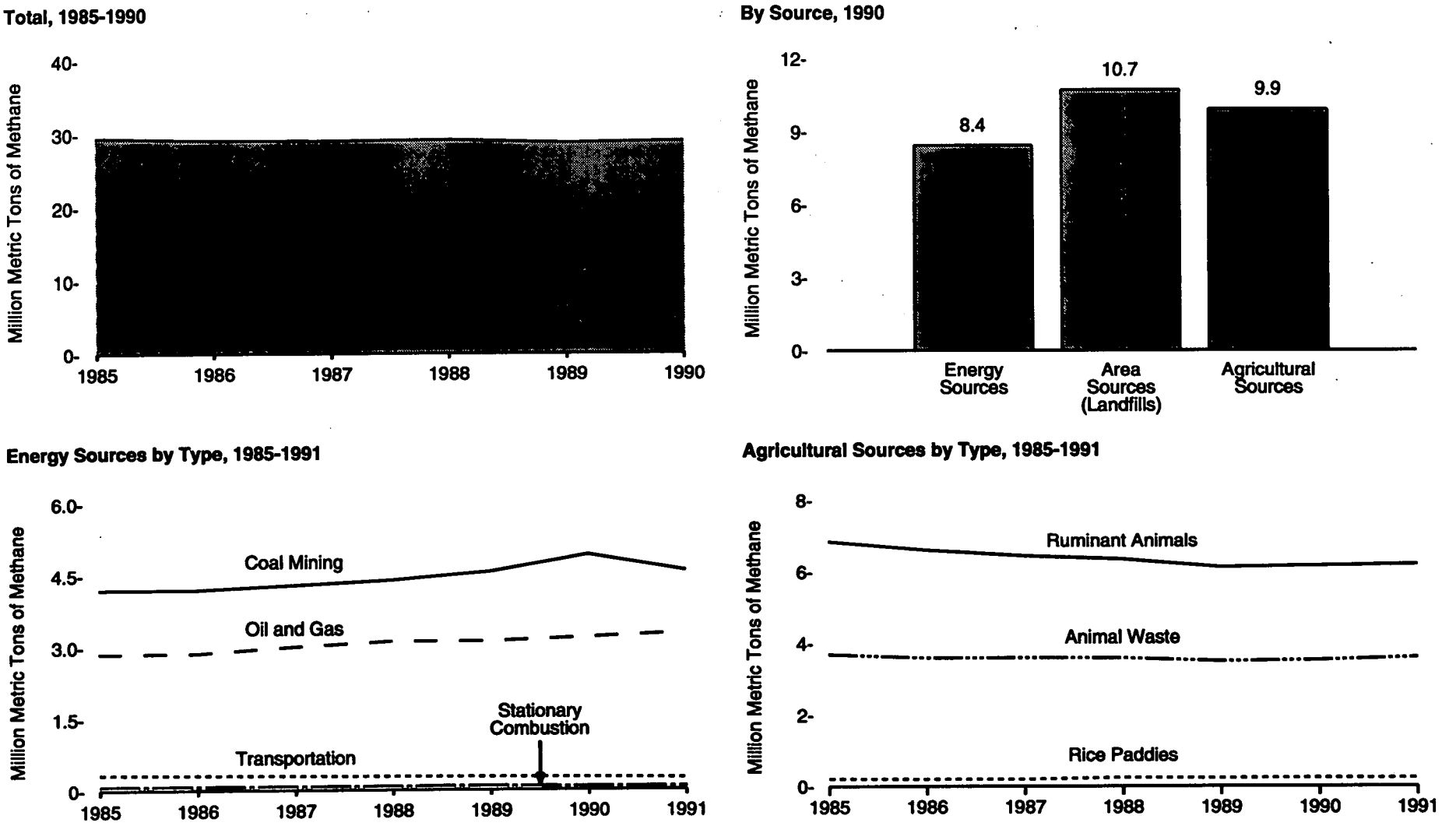
Table 12.3 Carbon Dioxide Emissions from Energy Use by Sector, 1991

(Million Metric Tons of Carbon)

Energy Source	Residential	Commercial	Industrial	Transportation	End-Use Total	Electric Utilities [1]	Total
Petroleum	**24.5**	**17.1**	**80.2**	**415.6**	**537.5**	**25.2**	**562.7**
Aviation Gasoline	—	—	—	0.8	0.8	—	0.8
Distillate Fuel	16.4	9.5	22.5	72.7	121.2	[2] 1.6	122.8
Jet Fuel	—	—	—	58.3	58.3	—	58.3
Kerosene	1.4	0.2	0.2	—	1.8	—	1.8
Liquefied Petroleum Gases	6.7	1.2	9.4	0.3	17.6	—	17.6
Lubricants	—	—	1.8	1.7	3.4	—	3.4
Motor Gasoline	—	1.6	3.7	259.7	265.0	—	265.0
Residual Fuel	—	4.6	7.2	22.1	33.9	[3] 23.1	57.0
Other	—	—	35.4	—	35.4	[4] 0.6	36.0
Natural Gas	67.4	40.4	121.7	8.9	238.5	41.1	279.5
Coal	1.5	2.1	64.0	([5])	67.6	407.3	474.9
Electricity	163.8	146.8	162.3	0.7	473.6	—	—
Total	257.2	206.4	428.3	425.2	1,317.2	473.6	1,317.2

[1] Electric utility emissions are distributed across end-use sectors. Electric utilities include independent power producers but exclude cogeneration facilities.
[2] Light fuel oil.
[3] Heavy fuel oil.
[4] Petroleum coke.
[5] Included in the industrial sector.
— = Not applicable.
Note: Totals may not equal sum of components due to independent rounding.
Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1985-1990*, Second Printing, November 1993, Tables B1-B5.

Figure 12.4 Methane Emissions from Anthropogenic Sources



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 12.4.

Table 12.4 Methane Emissions from Anthropogenic Sources, 1985-1991

(Thousand Metric Tons of Methane)

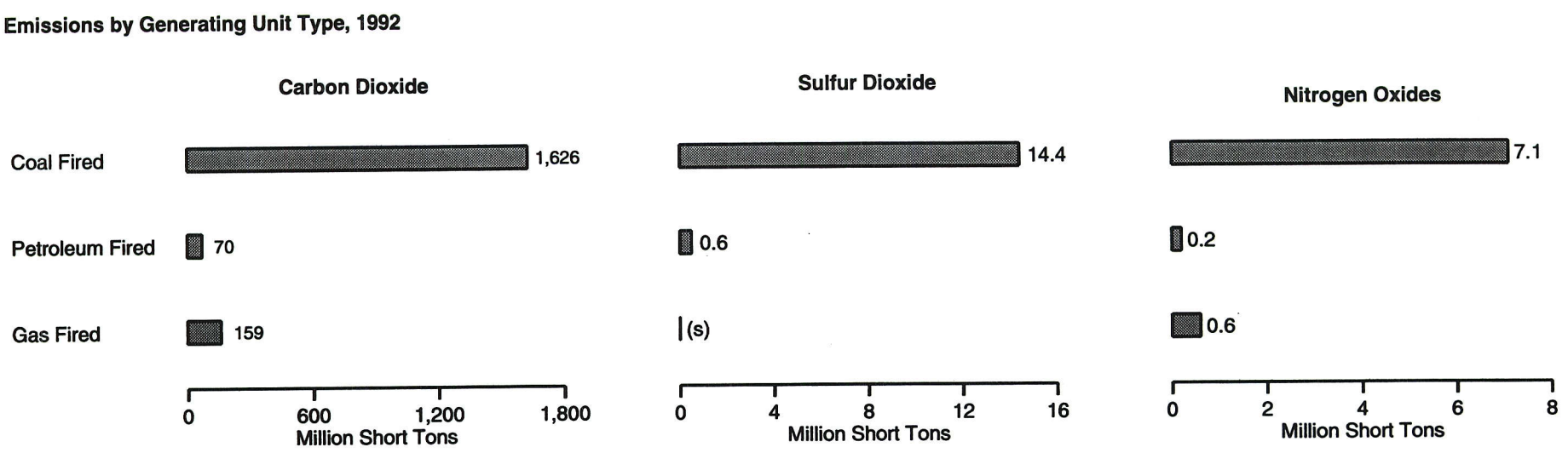
Year	Energy Sources					Area Sources	Agricultural Sources				Total
	Oil and Gas	Coal Mining	Transportation	Stationary Combustion	Total	Landfills	Ruminant Animals	Animal Waste	Rice Paddies	Total	
1985	2,850	4,190	323	79	7,442	11,310	6,840	3,685	209	10,734	29,486
1986	2,860	4,190	309	77	7,436	11,360	6,600	3,586	197	10,383	29,179
1987	3,000	4,290	297	78	7,665	11,240	6,440	3,594	195	10,229	29,134
1988	3,110	4,390	286	79	7,865	11,220	6,350	3,585	243	10,178	29,263
1989	3,110	4,570	276	83	8,039	10,980	6,130	3,497	225	9,852	28,871
1990	3,190	4,920	264	72	8,446	10,720	6,170	3,527	236	9,933	29,099
1991	3,280	4,590	248	72	8,190	NA	6,210	3,604	232	10,046	NA

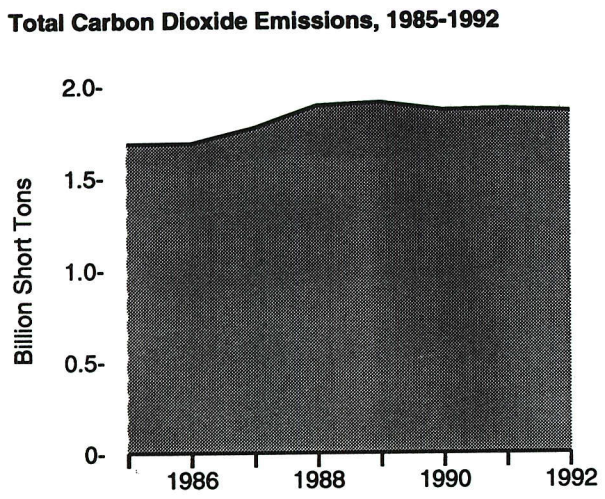
NA=Not available.

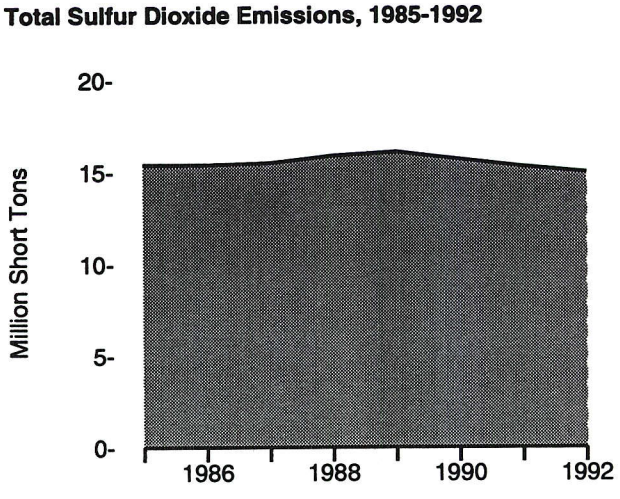
Notes: • Estimates of methane emissions are, in general, highly uncertain. The level of precision is probably on the order of 30 to 50 percent. For additional information, see "Uncertainties Associated with Methane Emissions" in the source report, pp. 69-71. • Anthropogenic, in the context of emissions, means produced as the result of human activities. • Ruminant animals, such as cattle, buffalo, sheep, goats, and camels, emit methane as a product of the digestive process. • Under certain conditions, methane may be produced naturally via anaerobic decomposition of organic materials in landfills, animal wastes, and rice paddies.

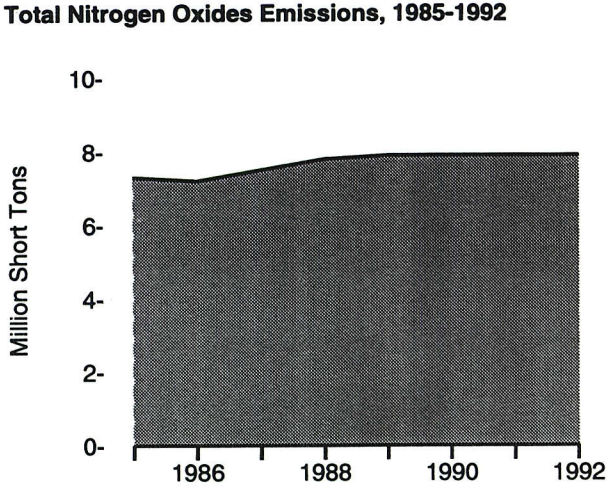
Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1985-1990*, Second Printing, November 1993, Table 19.

Figure 12.5 Emissions from Fossil-Fueled Steam-Electric Generating Units at Electric Utilities









(s)=Less than 0.05 million short tons.
Note: Because horizontal and vertical scales differ, graphs should not be compared.

Source: Table 12.5.

Table 12.5 Emissions from Fossil-Fueled Steam-Electric Generating Units at Electric Utilities, 1985-1992

(Thousand Short Tons)

Year	Coal Fired			Petroleum Fired			Gas Fired			Total [1]		
	Carbon Dioxide	Sulfur Dioxide	Nitrogen Oxides	Carbon Dioxide	Sulfur Dioxide	Nitrogen Oxides	Carbon Dioxide	Sulfur Dioxide	Nitrogen Oxides	Carbon Dioxide	Sulfur Dioxide	Nitrogen Oxides
1985	1,430,704	14,871	6,439	81,401	552	185	173,710	1	666	1,686,382	15,426	7,293
1986	1,422,436	14,654	6,380	110,655	762	260	150,581	1	572	1,685,809	15,418	7,217
1987	1,509,662	14,883	6,613	94,278	630	219	165,227	1	629	1,771,414	15,515	7,464
1988	1,623,317	15,202	6,963	114,303	716	272	149,834	1	580	1,891,049	15,923	7,822
1989	1,623,130	15,297	7,045	120,688	760	284	158,666	1	605	1,906,568	16,060	7,944
1990	1,613,100	15,038	7,076	91,978	623	219	157,091	1	588	1,866,408	15,666	7,893
1991	1,621,926	14,695	7,078	87,697	637	209	159,562	1	602	1,871,561	15,336	7,892
1992	1,625,788	14,445	7,113	69,803	531	167	159,221	1	601	1,858,772	14,981	7,889

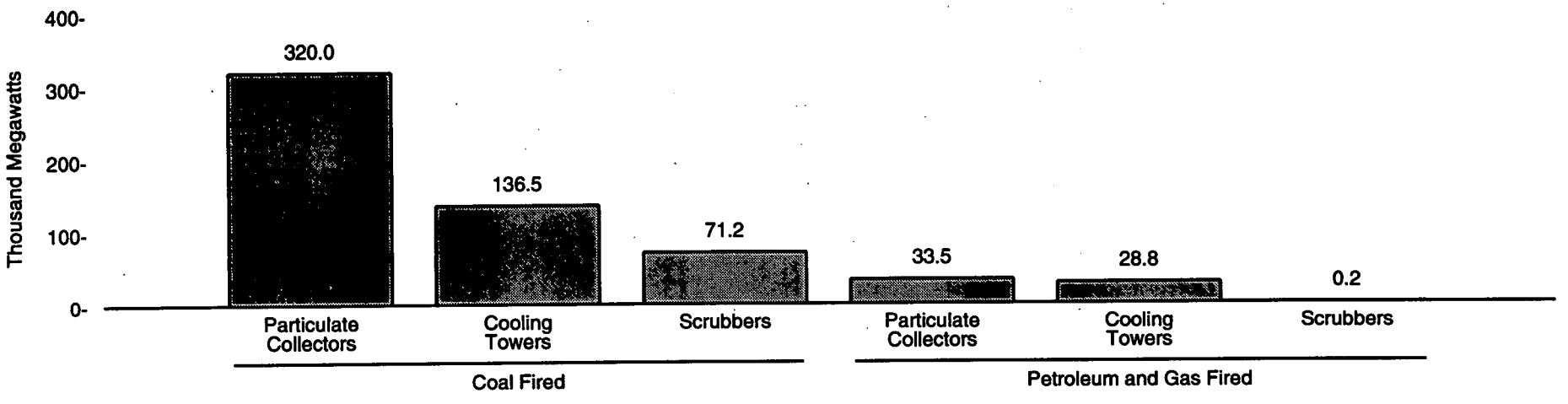
[1] In addition to coal, petroleum, and gas, also includes light oil, methane, coal-oil mixture, propane gas, blast furnace gas, wood, and refuse.

Notes: • Historical data are revised to reflect changed emission factors for the calculation of carbon dioxide and sulfur dioxide and reductions from nitrogen oxides control technologies. See Technical Notes in the *Electric Power Annual 1992* for additional information. • Emissions are based on fuel consumption data reported on Form EIA-767 for steam-electric generating units of 10 megawatts or larger. Total carbon dioxide emissions based on fuel consumption data reported on Form EIA-759 are published in *Emissions of Greenhouse Gases in the United States 1985-1990*. • All data are preliminary and may be revised in future publications. • Totals may not equal sum of components due to independent rounding.

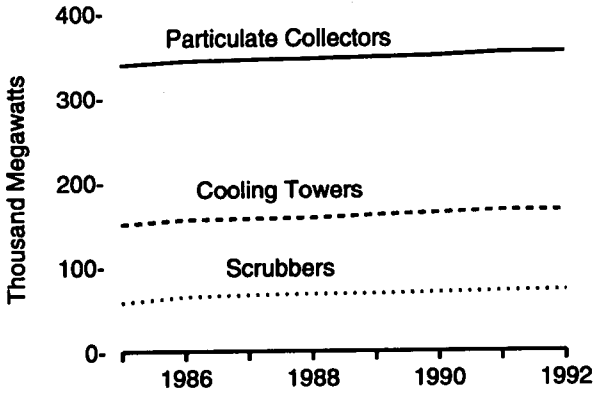
Sources: **Coal Fired, Petroleum Fired, and Gas Fired:** • 1985-1991—Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 1992—EIA, *Electric Power Annual 1992* (January 1994), Table 47. **Total:** • 1985-1987—EIA, Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 1988 forward—EIA, *Electric Power Annual 1992* (January 1994), Table 44.

Figure 12.6 Installed Nameplate Capacity of Fossil-Fueled Steam-Electric Generators for Electric Utility Plants With Environmental Equipment

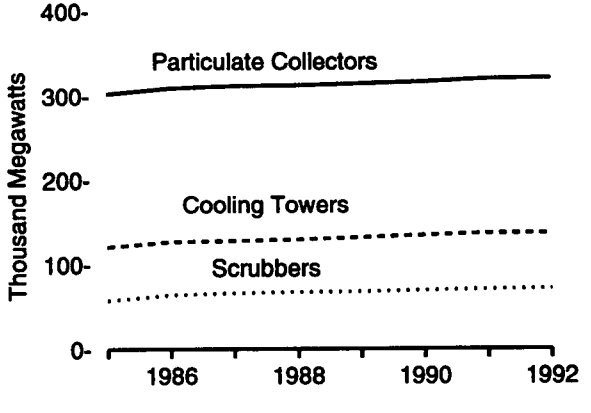
By Fuel and Equipment Type, 1992



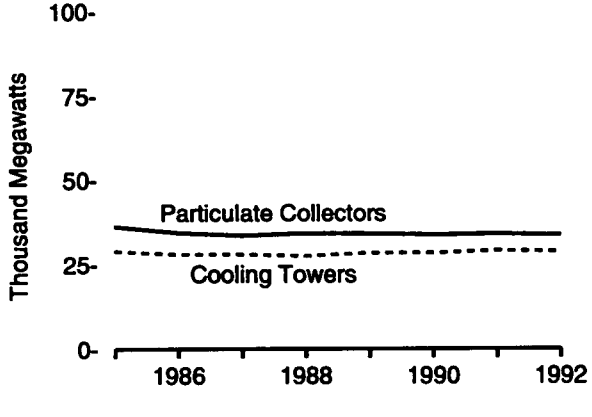
Total by Equipment Type, 1985-1992



Coal-Fired Units by Equipment Type, 1985-1992



Petroleum- and Gas-Fired Units by Equipment Type, 1985-1992



Note: Because vertical scales differ, graphs should not be compared.

Source: Table 12.6.

Table 12.6 Installed Nameplate Capacity of Fossil-Fueled Steam-Electric Generators for Electric Utility Plants With Environmental Equipment, 1985-1992

(Megawatts)

Year	Coal Fired				Petroleum and Gas Fired				Total			
	Particulate Collectors	Cooling Towers	Scrubbers	Total [1]	Particulate Collectors	Cooling Towers	Scrubbers	Total [1]	Particulate Collectors	Cooling Towers	Scrubbers	Total [1]
1985	302,056	120,591	56,955	304,706	36,054	28,895	65	62,371	338,110	149,486	57,020	367,078
1986	308,566	126,731	63,735	311,217	34,258	27,919	65	59,618	342,825	154,650	63,800	370,835
1987	311,043	127,875	65,688	312,885	33,431	27,912	65	58,783	344,474	155,786	65,753	371,668
1988	311,776	129,366	67,156	313,618	34,063	27,434	65	58,937	345,839	156,800	67,221	372,555
1989	313,708	131,697	67,506	315,549	33,975	28,386	65	59,736	347,683	160,083	67,571	375,285
1990	315,681	134,199	69,057	317,522	33,639	28,359	65	59,372	349,319	162,557	69,122	376,894
1991	319,127	136,270	70,294	319,189	33,864	29,067	260	59,773	352,990	165,337	70,554	378,963
1992	320,016	136,542	71,157	320,078	33,509	28,764	195	59,116	353,525	165,306	71,351	379,194

[1] Components are not additive because some generators are included in more than one category.

Notes: • Historical data are revised to include emissions from other fuels (including light oil, methane, coal-oil mixture, propane gas, blast furnace gas, wood, and refuse); to incorporate reevaluation and resubmission of data by respondents to The Clean Air Act Amendments of 1990; and to reflect revisions to the methodology used to estimate emissions. • All data are preliminary and may be revised in future publications. • Coverage is plants with fossil-fueled steam-electric capacity of 100 megawatts or greater.

Sources: **Coal Fired and Petroleum and Gas Fired:** • 1985-1991—Energy Information Administration (EIA), Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 1992—EIA, *Electric Power Annual 1992* (January 1994), Tables 48 and 49. **Total:** • 1985 and 1987—EIA, Form EIA-767, "Steam-Electric Plant Operation and Design Report." • 1988 forward—EIA, *Electric Power Annual 1992* (January 1994), Table 45.

Appendix A

Thermal Conversion Factors

Using Thermal Conversion Factors

The thermal conversion factors presented in the following seven tables can be used to estimate the heat content in British thermal units (Btu) of a given amount of energy measured in physical units, such as barrels or cubic feet. For example, 10 barrels of asphalt has a heat content of approximately 66.36 million Btu (10 barrels x 6.636 million Btu/barrel = 66.36 million Btu).

In general, the annual thermal conversion factors presented in Tables A2 through A7 are computed from final annual data. However, if the current year's final data are not available in time for publication, thermal conversion factors for the current year are computed from the best available data and are labeled "preliminary." The source of each factor is described in a section entitled "Thermal Conversion Factor Source Documentation," which follows Table A7 in this appendix.

Thermal conversion factors for hydrocarbon mixes are weighted averages of the thermal conversion factors for each hydrocarbon included in the mix. For example, in calculating the thermal conversion factor for a 60-40 butane-propane mixture, the thermal conversion factor for butane is weighted 1.5 times more heavily than the thermal conversion factor for propane.

More information about British thermal units (the standardized unit of measure for energy) can be found in Appendix C, "Energy Units in Perspective," and in the Glossary.

Table A1. Approximate Heat Content of Petroleum Products and Wood

Energy Source	Heat Content
	Million Btu per Barrel
Asphalt	6.636
Aviation Gasoline	5.048
Butane	4.326
Butane-Propane Mixture (60 percent-40 percent)	4.130
Distillate Fuel Oil	5.825
Ethane	3.082
Ethane-Propane Mixture (70 percent-30 percent)	3.308
Isobutane	3.974
Jet Fuel, Kerosene-Type	5.670
Jet Fuel, Naphtha-Type	5.355
Kerosene	5.670
Lubricants	6.065
Motor Gasoline	5.253
Natural Gasoline and Isopentane	4.620
Pentane Plus	4.620
Petrochemical Feedstocks	
Naphtha less than 401° F	5.248
Other Oils equal to or greater than 401° F	5.825
Still Gas	6.000
Petroleum Coke	6.024
Plant Condensate	5.418
Propane	3.836
Residual Fuel Oil	6.287
Road Oil	6.636
Special Naphthas	5.248
Still Gas	6.000
Unfinished Oils	5.825
Unfractionated Stream	5.418
Waxes	5.537
Miscellaneous	5.796
	Million Btu per Short Ton
Hardwood, dry (average)	17.2

Table A2. Approximate Heat Content of Crude Oil, Crude Oil and Products, and Natural Gas Plant Liquids, 1949-1993

(Million Btu per Barrel)

Year	Crude Oil Only			Crude Oil and Products		Natural Gas Plant Liquids
	Production	Imports	Exports	Imports	Exports	Production
1949	5.800	5.952	5.800	6.059	5.692	4.544
1950	5.800	5.943	5.800	6.080	5.766	4.522
1951	5.800	5.938	5.800	6.075	5.762	4.495
1952	5.800	5.938	5.800	6.067	5.774	4.464
1953	5.800	5.924	5.800	6.052	5.742	4.450
1954	5.800	5.931	5.800	6.052	5.745	4.415
1955	5.800	5.924	5.800	6.040	5.768	4.406
1956	5.800	5.916	5.800	6.024	5.754	4.382
1957	5.800	5.918	5.800	6.023	5.780	4.369
1958	5.800	5.916	5.800	5.993	5.779	4.366
1959	5.800	5.916	5.800	6.020	5.829	4.311
1960	5.800	5.911	5.800	6.021	5.834	4.295
1961	5.800	5.900	5.800	5.991	5.832	4.283
1962	5.800	5.890	5.800	6.004	5.841	4.273
1963	5.800	5.894	5.800	6.002	5.840	4.264
1964	5.800	5.882	5.800	5.998	5.844	4.268
1965	5.800	5.872	5.800	5.997	5.743	4.264
1966	5.800	5.863	5.800	5.993	5.729	4.259
1967	5.800	5.838	5.800	5.999	5.777	4.232
1968	5.800	5.836	5.800	5.977	5.763	4.218
1969	5.800	5.825	5.800	5.974	5.714	4.170
1970	5.800	5.822	5.800	5.985	5.810	4.146
1971	5.800	5.824	5.800	5.961	5.775	4.117
1972	5.800	5.809	5.800	5.935	5.741	4.070
1973	5.800	5.817	5.800	5.897	5.752	4.049
1974	5.800	5.827	5.800	5.884	5.774	4.011
1975	5.800	5.821	5.800	5.858	5.748	3.984
1976	5.800	5.808	5.800	5.856	5.745	3.964
1977	5.800	5.810	5.800	5.834	5.797	3.941
1978	5.800	5.802	5.800	5.839	5.808	3.925
1979	5.800	5.810	5.800	5.810	5.832	3.955
1980	5.800	5.812	5.800	5.796	5.820	3.914
1981	5.800	5.818	5.800	5.775	5.821	3.930
1982	5.800	5.826	5.800	5.775	5.820	3.872
1983	5.800	5.825	5.800	5.774	5.800	3.839
1984	5.800	5.823	5.800	5.745	5.850	3.812
1985	5.800	5.832	5.800	5.736	5.814	3.815
1986	5.800	5.903	5.800	5.808	5.832	3.797
1987	5.800	5.901	5.800	5.820	5.858	3.804
1988	5.800	5.900	5.800	5.820	5.840	3.800
1989	5.800	5.906	5.800	5.833	5.857	3.826
1990	5.800	5.934	5.800	5.849	5.833	3.822
1991	5.800	5.948	5.800	5.873	5.823	3.807
1992	5.800	5.953	5.800	R5.877	R5.777	R3.804
1993P	5.800	5.954	5.800	5.879	5.761	3.800

R=Revised data. P=Preliminary data.
Note: Includes lease condensate.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A3. Approximate Heat Content of Petroleum Product Weighted Averages, 1949-1993

(Million Btu per Barrel)

Year	Consumption					Imports	Exports
	Residential and Commercial	Industrial	Transportation	Electric Utilities	Total		
1949	5.631	5.947	5.465	6.254	5.649	6.261	5.651
1950	5.626	5.940	5.461	6.254	5.649	6.263	5.751
1951	5.626	5.913	5.458	6.254	5.634	6.265	5.753
1952	5.621	5.905	5.442	6.254	5.621	6.261	5.768
1953	5.606	5.897	5.426	6.254	5.608	6.268	5.732
1954	5.603	5.883	5.412	6.254	5.595	6.252	5.738
1955	5.607	5.866	5.408	6.254	5.591	6.234	5.765
1956	5.601	5.856	5.406	6.254	5.585	6.225	5.744
1957	5.587	5.842	5.405	6.254	5.577	6.219	5.774
1958	5.582	5.832	5.393	6.254	5.567	6.091	5.778
1959	5.549	5.811	5.389	6.254	5.557	6.142	5.830
1960	5.570	5.800	5.388	6.267	5.555	6.161	5.835
1961	5.570	5.795	5.386	6.268	5.552	6.102	5.833
1962	5.555	5.784	5.386	6.267	5.545	6.138	5.842
1963	5.532	5.759	5.384	6.266	5.534	6.126	5.841
1964	5.517	5.728	5.388	6.267	5.528	6.129	5.845
1965	5.535	5.728	5.387	6.267	5.532	6.123	5.742
1966	5.523	5.722	5.388	6.266	5.532	6.112	5.728
1967	5.473	5.682	5.391	6.266	5.515	6.128	5.758
1968	5.450	5.646	5.394	6.263	5.504	6.095	5.762
1969	5.399	5.603	5.394	6.259	5.492	6.093	5.713
1970	5.404	5.604	5.393	6.252	5.503	6.088	5.811
1971	5.392	5.600	5.389	6.245	5.504	6.062	5.775
1972	5.368	5.564	5.388	6.233	5.500	6.045	5.741
1973	5.387	5.568	5.395	6.245	5.515	5.983	5.752
1974	5.377	5.538	5.394	6.238	5.504	5.959	5.773
1975	5.358	5.528	5.392	6.250	5.494	5.935	5.747
1976	5.383	5.538	5.395	6.251	5.504	5.980	5.743
1977	5.389	5.555	5.400	6.249	5.518	5.908	5.796
1978	5.382	5.553	5.404	6.251	5.519	5.955	5.814
1979	5.471	5.418	5.428	6.258	5.494	5.811	5.864
1980	5.468	5.376	5.440	6.254	5.479	5.748	5.841
1981	5.409	5.313	5.432	6.258	5.448	5.659	5.837
1982	5.392	5.263	5.422	6.258	5.415	5.664	5.829
1983	5.286	5.273	5.415	6.255	5.406	5.677	5.800
1984	5.384	5.223	5.422	6.251	5.395	5.613	5.867
1985	5.326	5.221	5.423	6.247	5.387	5.572	5.819
1986	5.357	5.286	5.427	6.257	5.418	5.624	5.839
1987	5.316	5.253	5.430	6.249	5.403	5.599	5.860
1988	5.320	5.248	5.434	6.250	5.410	5.618	5.842
1989	5.257	5.233	5.440	6.241	5.410	5.641	5.869
1990	5.208	5.272	5.445	6.247	5.411	5.614	5.838
1991	5.163	5.192	5.442	6.248	5.384	5.636	5.827
1992	R5.169	R5.188	R5.445	6.243	R5.378	5.623	5.774
1993P	5.176	5.194	5.441	6.241	5.381	5.602	5.757

R=Revised data. P=Preliminary data.

Note: Weighted averages of the products included in each category are calculated by using heat content values shown in Table A1.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A4. Approximate Heat Content of Natural Gas, 1949-1993

(Btu per Cubic Foot)

Year	Production		Consumption			Imports	Exports
	Dry	Marketed (Wet)	Sectors Other Than Electric Utilities	Electric Utilities	Total		
1949	1,035	1,120	1,035	1,035	1,035	—	1,035
1950	1,035	1,119	1,035	1,035	1,035	—	1,035
1951	1,035	1,114	1,035	1,035	1,035	—	1,035
1952	1,035	1,115	1,035	1,035	1,035	1,035	1,035
1953	1,035	1,116	1,035	1,035	1,035	1,035	1,035
1954	1,035	1,115	1,035	1,035	1,035	1,035	1,035
1955	1,035	1,120	1,035	1,035	1,035	1,035	1,035
1956	1,035	1,116	1,035	1,035	1,035	1,035	1,035
1957	1,035	1,113	1,035	1,035	1,035	1,035	1,035
1958	1,035	1,110	1,035	1,035	1,035	1,035	1,035
1959	1,035	1,109	1,035	1,035	1,035	1,035	1,035
1960	1,035	1,107	1,035	1,035	1,035	1,035	1,035
1961	1,035	1,108	1,035	1,035	1,035	1,035	1,035
1962	1,035	1,107	1,035	1,035	1,035	1,035	1,035
1963	1,031	1,103	1,031	1,031	1,031	1,031	1,031
1964	1,032	1,102	1,032	1,032	1,032	1,032	1,032
1965	1,032	1,101	1,032	1,032	1,032	1,032	1,032
1966	1,033	1,103	1,033	1,033	1,033	1,033	1,033
1967	1,032	1,105	1,032	1,032	1,032	1,032	1,032
1968	1,031	1,115	1,031	1,031	1,031	1,031	1,031
1969	1,031	1,103	1,031	1,031	1,031	1,031	1,031
1970	1,031	1,102	1,031	1,031	1,031	1,031	1,031
1971	1,031	1,103	1,031	1,031	1,031	1,031	1,031
1972	1,027	1,100	1,027	1,027	1,027	1,027	1,027
1973	1,021	1,093	1,020	1,024	1,021	1,026	1,023
1974	1,024	1,097	1,024	1,022	1,024	1,027	1,016
1975	1,021	1,095	1,020	1,026	1,021	1,026	1,014
1976	1,020	1,093	1,019	1,023	1,020	1,025	1,013
1977	1,021	1,093	1,019	1,029	1,021	1,026	1,013
1978	1,019	1,088	1,016	1,034	1,019	1,030	1,013
1979	1,021	1,092	1,018	1,035	1,021	1,037	1,013
1980	1,026	1,098	1,024	1,035	1,026	1,022	1,013
1981	1,027	1,103	1,025	1,035	1,027	1,014	1,011
1982	1,028	1,107	1,026	1,036	1,028	1,018	1,011
1983	1,031	1,115	1,031	1,030	1,031	1,024	1,010
1984	1,031	1,109	1,030	1,035	1,031	1,005	1,010
1985	1,032	1,112	1,031	1,038	1,032	1,002	1,011
1986	1,030	1,110	1,029	1,034	1,030	997	1,008
1987	1,031	1,112	1,031	1,032	1,031	999	1,011
1988	1,029	1,109	1,029	1,028	1,029	1,002	1,018
1989	1,031	1,107	1,031	1,030	1,031	1,004	1,019
1990	1,031	1,106	1,030	1,034	1,031	1,012	1,018
1991	1,030	1,108	1,031	1,024	1,030	1,014	1,022
1992	1,030	[R]1,110	1,031	[R]1,022	1,030	[R]1,011	[R]1,018
1993[P]	1,030	1,110	1,031	1,022	1,030	1,011	1,018

R=Revised data. P=Preliminary data. — = Not applicable.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A5. Approximate Heat Content of Coal and Coal Coke, 1949-1993

(Million Btu per Short Ton)

Year	Coal								Coal Coke
		Consumption							
	Production	Residential and Commercial	Coke Plants	Other Industries [1]	Electric Utilities	Total	Imports	Exports	Imports and Exports
1949	24.916	24.263	26.797	24.612	23.761	24.793	25.000	26.759	24.800
1950	25.090	24.461	26.798	24.820	23.937	24.989	25.020	26.788	24.800
1951	25.019	24.281	26.796	24.521	23.701	24.813	25.034	26.848	24.800
1952	25.096	24.371	26.796	24.724	23.885	24.901	25.040	26.859	24.800
1953	25.147	24.383	26.796	24.785	23.964	25.006	25.048	26.881	24.800
1954	25.054	24.362	26.795	24.788	23.996	24.913	25.012	26.865	24.800
1955	25.201	24.373	26.794	24.821	24.056	24.982	25.000	26.907	24.800
1956	25.117	24.195	26.792	24.664	23.943	24.843	25.000	26.886	24.800
1957	25.213	24.238	26.792	24.707	23.980	24.905	25.001	26.914	24.800
1958	24.983	24.287	26.794	24.606	23.897	24.716	25.005	26.931	24.800
1959	24.910	24.224	26.790	24.609	23.924	24.719	25.003	26.927	24.800
1960	24.906	24.226	26.791	24.609	23.927	24.713	25.003	26.939	24.800
1961	24.849	24.248	26.792	24.580	23.904	24.653	25.002	26.937	24.800
1962	24.828	24.173	26.788	24.562	23.911	24.627	25.013	26.928	24.800
1963	24.831	24.033	26.784	24.509	23.897	24.588	25.007	26.894	24.800
1964	24.840	24.037	26.785	24.477	23.864	24.602	25.000	26.949	24.800
1965	24.775	24.028	26.787	24.385	23.780	24.537	25.000	26.973	24.800
1966	24.629	23.915	26.786	24.226	23.648	24.396	25.000	26.976	24.800
1967	24.475	23.685	26.781	24.040	23.506	24.243	25.000	26.981	24.800
1968	24.445	23.621	26.780	24.014	23.486	24.186	25.000	26.984	24.800
1969	24.280	23.474	26.779	23.724	23.240	23.976	25.000	26.982	24.800
1970	23.842	23.203	26.784	22.983	22.573	23.440	25.000	26.982	24.800
1971	23.507	23.090	26.784	22.670	22.301	23.124	25.000	26.981	24.800
1972	23.389	22.998	26.782	22.550	22.204	23.036	25.000	26.979	24.800
1973	23.376	22.831	26.780	22.586	22.246	23.057	25.000	26.596	24.800
1974	23.072	22.479	26.778	22.419	21.781	22.677	25.000	26.700	24.800
1975	22.897	22.261	26.782	22.436	21.642	22.506	25.000	26.562	24.800
1976	22.855	22.774	26.781	22.530	21.679	22.498	25.000	26.601	24.800
1977	22.597	22.919	26.787	22.322	21.508	22.265	25.000	26.548	24.800
1978	22.248	22.466	26.789	22.207	21.275	22.017	25.000	26.478	24.800
1979	22.454	22.242	26.788	22.452	21.364	22.100	25.000	26.548	24.800
1980	22.415	22.543	26.790	22.690	21.295	21.947	25.000	26.384	24.800
1981	22.308	22.474	26.794	22.585	21.085	21.713	25.000	26.160	24.800
1982	22.239	22.695	26.797	22.712	21.194	21.674	25.000	26.223	24.800
1983	22.052	22.775	26.798	22.691	21.133	21.576	25.000	26.291	24.800
1984	22.010	22.844	26.799	22.543	21.101	21.573	25.000	26.402	24.800
1985	21.870	22.646	26.798	22.020	20.959	21.366	25.000	26.307	24.800
1986	21.913	22.947	26.798	22.198	21.084	21.462	25.000	26.292	24.800
1987	21.922	23.404	26.799	22.381	21.136	21.517	25.000	26.291	24.800
1988	21.823	23.571	26.799	22.360	20.900	21.328	25.000	26.299	24.800
1989	21.765	23.650	26.800	22.347	20.848	21.272	25.000	26.160	24.800
1990	21.822	23.137	26.799	22.457	20.929	21.331	25.000	26.202	24.800
1991	21.681	23.114	26.799	22.460	20.755	21.146	25.000	26.188	24.800
1992	R21.646	R23.105	26.799	R22.250	R20.787	R21.143	25.000	R26.161	24.800
1993P	21.646	23.105	26.799	22.250	20.787	21.143	25.000	26.161	24.800

[1] Includes transportation.

R=Revised data. P=Preliminary data.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A6. Approximate Heat Content of Coal by Type, 1949-1993

(Million Btu per Short Ton)

Year	Bituminous Coal [1] and Lignite								Anthracite				
		Consumption								Consumption			
	Production	Residential and Commercial	Coke Plants	Other Industry [2]	Electric Utilities	Total	Imports	Exports	Production	Sectors Other Than Electric Utilities	Electric Utilities	Total	Imports and Exports
1949	24.965	24.044	26.800	24.601	24.022	24.836	25.000	27.000	24.421	24.954	17.500	24.291	25.400
1950	25.126	24.162	26.800	24.804	24.200	25.024	25.000	27.000	24.667	25.297	17.500	24.592	25.400
1951	25.065	23.988	26.800	24.503	23.936	24.854	25.000	27.000	24.439	25.082	17.500	24.289	25.400
1952	25.157	24.108	26.800	24.711	24.118	24.955	25.000	27.000	24.400	25.063	17.500	24.257	25.400
1953	25.207	24.143	26.800	24.773	24.172	25.062	25.000	27.000	24.264	25.132	17.500	24.147	25.400
1954	25.115	24.144	26.800	24.775	24.174	24.971	25.000	27.000	24.234	25.015	17.500	24.130	25.400
1955	25.258	24.166	26.800	24.811	24.206	25.034	25.000	27.000	24.194	25.084	17.500	24.053	25.400
1956	25.187	24.082	26.800	24.668	24.080	24.913	25.000	27.000	23.899	24.548	17.500	23.580	25.400
1957	25.286	24.108	26.800	24.711	24.118	24.979	25.000	27.000	23.785	24.587	17.500	23.441	25.400
1958	25.031	24.039	26.800	24.592	24.014	24.758	25.000	27.000	24.059	25.003	17.500	23.903	25.400
1959	24.965	24.047	26.800	24.606	24.026	24.773	25.000	27.000	23.817	24.666	17.500	23.664	25.400
1960	24.960	24.054	26.800	24.604	24.029	24.765	25.000	27.000	23.717	24.721	17.500	23.592	25.400
1961	24.892	24.034	26.800	24.569	23.993	24.693	25.000	27.000	23.854	24.870	17.500	23.707	25.400
1962	24.869	24.027	26.800	24.558	23.988	24.668	25.000	27.000	23.811	24.666	17.500	23.515	25.400
1963	24.879	24.007	26.800	24.524	23.962	24.639	25.000	27.000	23.633	24.110	17.500	23.107	25.400
1964	24.887	23.988	26.800	24.490	23.928	24.652	25.000	27.000	23.507	24.164	17.500	23.128	25.400
1965	24.813	23.928	26.800	24.387	23.836	24.575	25.000	27.000	23.471	24.316	17.500	23.175	25.400
1966	24.664	23.836	26.800	24.227	23.699	24.431	25.000	27.000	23.202	24.193	17.500	22.906	25.400
1967	24.516	23.737	26.800	24.056	23.554	24.287	25.000	27.000	22.655	23.506	17.500	22.291	25.400
1968	24.487	23.724	26.800	24.034	23.531	24.229	25.000	27.000	22.426	23.293	17.500	22.037	25.400
1969	24.313	23.553	26.800	23.737	23.274	24.011	25.000	27.000	22.543	23.200	17.500	22.003	25.400
1970	23.862	23.111	26.800	22.973	22.603	23.461	25.000	27.000	22.603	23.476	17.500	22.102	25.400
1971	23.519	22.927	26.800	22.653	22.325	23.138	25.000	27.000	22.718	23.572	17.500	22.210	25.400
1972	23.400	22.861	26.800	22.539	22.225	23.050	25.000	27.000	22.422	23.403	17.500	21.822	25.400
1973	23.391	22.887	26.800	22.585	22.262	23.073	25.000	26.612	22.132	22.674	17.920	21.464	25.400
1974	23.087	22.523	26.800	22.420	21.799	22.694	25.000	26.716	21.711	22.330	17.200	20.919	25.400
1975	22.910	22.258	26.800	22.439	21.659	22.522	25.000	26.573	21.582	22.272	17.064	20.762	25.400
1976	22.863	22.819	26.800	22.528	21.692	22.509	25.000	26.613	22.045	22.618	17.526	21.254	25.400
1977	22.597	22.594	26.800	22.290	21.521	22.266	25.000	26.561	22.661	24.101	17.244	22.066	25.400
1978	22.242	22.078	26.800	22.175	21.284	22.014	25.000	26.501	23.079	24.388	17.104	22.398	25.400
1979	22.449	21.884	26.800	22.436	21.372	22.100	25.000	26.570	23.170	24.272	17.454	22.069	25.400
1980	22.411	22.488	26.800	22.690	21.301	21.950	25.000	26.404	22.869	22.719	17.652	21.405	25.400
1981	22.301	22.010	26.800	22.572	21.091	21.710	25.000	26.176	23.291	23.749	18.168	22.080	25.400
1982	22.233	22.226	26.800	22.695	21.200	21.670	25.000	26.231	23.289	24.578	18.160	22.518	25.400
1983	22.048	22.438	26.800	22.680	21.141	21.576	25.000	26.300	22.734	24.536	16.516	21.583	25.400
1984	22.005	22.406	26.800	22.525	21.108	21.570	25.000	26.410	23.107	25.128	17.018	22.322	25.400
1985	21.867	22.568	26.800	22.013	20.965	21.368	25.000	26.320	22.428	23.031	16.784	20.817	25.400
1986	21.908	22.669	26.800	22.185	21.091	21.462	25.000	26.308	23.084	24.399	15.578	21.512	25.400
1987	21.918	22.800	26.800	22.360	21.143	21.514	25.000	26.304	23.108	26.293	15.962	22.435	25.400
1988	21.817	23.135	26.800	22.341	20.905	21.324	25.000	26.308	23.266	26.021	17.312	22.423	25.400
1989	21.759	22.917	26.800	22.324	20.854	21.268	25.000	26.166	23.385	27.196	16.310	22.623	25.400
1990	21.819	22.678	26.800	22.444	20.935	21.330	25.000	26.207	22.574	25.199	16.140	21.668	25.400
1991	21.678	22.635	26.800	22.448	20.761	21.146	25.000	26.192	22.573	25.268	15.858	21.410	25.400
1992	R21.643	R22.768	26.800	R22.242	R20.792	R21.142	25.000	R26.165	R22.572	R24.617	R16.944	R21.423	25.400
1993P	21.643	22.768	26.800	22.242	20.792	21.142	25.000	26.165	22.572	24.617	16.944	21.423	25.400

[1] Including subbituminous coal.
[2] Includes transportation.

R=Revised data. P=Preliminary data.
Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A7. Approximate Heat Rates for Electricity, 1949-1993

(Btu per Kilowatthour)

Year	Electricity Generation			Electricity Consumption
	Fossil-Fueled Steam-Electric Plants [1]	Nuclear Steam-Electric Plants	Geothermal Energy Plants	
1949	15,033	—	—	3,412
1950	14,030	—	—	3,412
1951	13,641	—	—	3,412
1952	13,361	—	—	3,412
1953	12,889	—	—	3,412
1954	12,180	—	—	3,412
1955	11,699	—	—	3,412
1956	11,456	—	—	3,412
1957	11,365	11,629	—	3,412
1958	11,085	11,629	—	3,412
1959	10,970	11,629	—	3,412
1960	10,760	11,629	23,200	3,412
1961	10,650	11,629	23,200	3,412
1962	10,558	11,629	23,200	3,412
1963	10,482	11,877	22,182	3,412
1964	10,462	11,912	22,182	3,412
1965	10,453	11,804	22,182	3,412
1966	10,415	11,623	22,182	3,412
1967	10,432	11,555	21,770	3,412
1968	10,398	11,297	21,606	3,412
1969	10,447	11,037	21,606	3,412
1970	10,494	10,977	21,606	3,412
1971	10,478	10,837	21,655	3,412
1972	10,379	10,792	21,668	3,412
1973	10,389	10,903	21,674	3,412
1974	10,442	11,161	21,674	3,412
1975	10,406	11,013	21,611	3,412
1976	10,373	11,047	21,611	3,412
1977	10,435	10,769	21,611	3,412
1978	10,361	10,941	21,611	3,412
1979	10,353	10,879	21,545	3,412
1980	10,388	10,908	21,639	3,412
1981	10,453	11,030	21,639	3,412
1982	10,454	11,073	21,629	3,412
1983	10,520	10,905	21,290	3,412
1984	10,440	10,843	21,303	3,412
1985	10,447	10,813	21,263	3,412
1986	10,446	10,799	21,263	3,412
1987	10,419	10,776	21,263	3,412
1988	10,324	10,743	21,096	3,412
1989	10,317	10,724	21,096	3,412
1990	10,335	10,680	21,096	3,412
1991	10,352	10,740	20,997	3,412
1992[P]	[R]10,302	[R]10,678	[R]20,955	3,412
1993[P]	10,302	10,678	20,955	3,412

[1] This is used as the thermal conversion factor for hydroelectric power generation and for wood and waste, wind, photovoltaic, and solar thermal energy consumed at electric utilities.

R=Revised data. P=Preliminary data. — = Not applicable.

Source: See "Thermal Conversion Factor Source Documentation," which follows this table.

Thermal Conversion Factor Source Documentation

Approximate Heat Content of Petroleum and Natural Gas Plant Liquids

Asphalt. The Energy Information Administration (EIA) adopted the thermal conversion factor of 6.636 million British thermal units (Btu) per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956.*

Aviation Gasoline. EIA adopted the thermal conversion factor of 5.048 million Btu per barrel as adopted by the Bureau of Mines from the Texas Eastern Transmission Corporation publication *Competition and Growth in American Energy Markets 1947-1985,* a 1968 release of historical and projected statistics.

Butane. EIA adopted the Bureau of Mines thermal conversion factor of 4.326 million Btu per barrel as published in the *California Oil World and Petroleum Industry,* First Issue, April 1942.

Butane-Propane Mixture. EIA adopted the Bureau of Mines calculation of 4.130 million Btu per barrel based on an assumed mixture of 60 percent butane and 40 percent propane. See **Butane** and **Propane.**

Crude Oil, Exports. Assumed by EIA to be 5.800 million Btu per barrel or equal to the thermal conversion factor for crude oil produced in the United States. See **Crude Oil and Lease Condensate, Production.**

Crude Oil, Imports. Calculated annually by EIA by weighting the thermal conversion factor of each type of crude oil imported by the quantity imported. Thermal conversion factors for each type were calculated on a foreign country basis, by determining the average American Petroleum Institute (API) gravity of crude imported from each foreign country from Form ERA-60 in 1977 and converting average API gravity to average Btu content by using National Bureau of Standards, Miscellaneous Publication No. 97, *Thermal Properties of Petroleum Products,* 1933.

Crude Oil and Lease Condensate, Production. EIA adopted the thermal conversion factor of 5.800 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Crude Oil and Petroleum Products, Exports. Calculated annually by EIA as the average of the thermal conversion factors for each petroleum product exported and crude oil exported weighted by the quantity of each petroleum product and crude oil exported. See **Petroleum Products, Exports** and **Crude Oil, Exports.**

Crude Oil and Petroleum Products, Imports. Calculated annually by EIA as the average of the thermal conversion factors for each petroleum product and each crude oil imported weighted by the quantity of each petroleum product and each type of crude oil imported. See **Crude Oil, Imports** and **Petroleum Products, Imports.**

Distillate Fuel Oil. EIA adopted the Bureau of Mines thermal conversion factor of 5.825 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Ethane. EIA adopted the Bureau of Mines thermal conversion factor of 3.082 million Btu per barrel as published in the *California Oil World and Petroleum Industry,* First Issue, April 1942.

Ethane-Propane Mixture. EIA calculation of 3.308 million Btu per barrel based on an assumed mixture of 70 percent ethane and 30 percent propane. See **Ethane** and **Propane.**

Isobutane. EIA adopted the Bureau of Mines thermal conversion factor of 3.974 million Btu per barrel as published in the *California Oil World and Petroleum Industry,* First Issue, April 1942.

Jet Fuel, Kerosene Type. EIA adopted the Bureau of Mines thermal conversion factor of 5.670 million Btu per barrel for "Jet Fuel, Commercial" as published by the Texas Eastern Transmission Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* a 1968 release of historical and projected statistics.

Jet Fuel, Naphtha Type. EIA adopted the Bureau of Mines thermal conversion factor of 5.355 million Btu per barrel for "Jet Fuel, Military" as published by the Texas Eastern Transmission Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* a 1968 release of historical and projected statistics.

Kerosene. EIA adopted the Bureau of Mines thermal conversion factor of 5.670 million Btu per barrel as reported in a Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Lubricants. EIA adopted the thermal conversion factor of 6.065 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956.*

Miscellaneous Products. EIA adopted the thermal conversion factor of 5.796 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956.*

Motor Gasoline. EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel for "Gasoline, Motor Fuel" as published by the Texas Eastern Transmission Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* a 1968 release of historical and projected statistics.

Natural Gas Plant Liquids, Production. Calculated annually by EIA as the average of the thermal conversion factors of each natural gas plant liquid produced weighted by the quantity of each natural gas plant liquid produced.

Natural Gasoline. EIA adopted the thermal conversion factor of 4.620 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956.*

Pentanes Plus. EIA assumed the thermal conversion factor to be 4.620 million Btu or equal to that for natural gasoline. See **Natural Gasoline.**

Petrochemical Feedstocks, Naphtha less than 401° F. Assumed by EIA to be 5.248 million Btu per barrel, equal to the thermal conversion factor for special naphtha. See **Special Naphthas.**

Petrochemical Feedstocks, Other Oils equal to or greater than 401° F. Assumed by EIA to be 5.825 million Btu per barrel, equal to the thermal conversion factor for distillate fuel oil. See **Distillate Fuel Oil.**

Petrochemical Feedstocks, Still Gas. Assumed by EIA to be 6.000 million Btu per barrel, equal to the thermal conversion factor for still gas. See **Still Gas.**

Petroleum Coke. EIA adopted the thermal conversion factor of 6.024 million Btu per barrel as reported in Btu per short ton in the Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950." The Bureau of Mines calculated this factor by dividing 30,120,000 Btu per short ton, as given in the referenced Bureau of Mines internal memorandum, by 5.0 barrels per short ton, as given in the Bureau of Mines Form 6-1300-M and successor EIA forms.

Petroleum Products, Total Consumption. Calculated annually by EIA as the average of the thermal conversion factors for all petroleum products consumed, weighted by the quantity of each petroleum product consumed.

Petroleum Products, Consumption by Electric Utilities. Calculated annually by EIA as the average of the thermal conversion factors for all petroleum products consumed at electric utilities, weighted by the quantity of each petroleum product consumed at electric utilities. The quantity of petroleum products consumed is estimated in the State Energy Data System as documented in the *State Energy Data Report.*

Petroleum Products, Consumption by Industrial Users. Calculated annually by EIA as the average of the thermal conversion factors for all petroleum products consumed in the industrial sector, weighted by the estimated quantity of each petroleum product consumed in the industrial sector. The quantity of petroleum products consumed is estimated in the State Energy Data System as documented in the *State Energy Data Report.*

Petroleum Products, Consumption by Residential and Commercial Users. Calculated annually by EIA as the average of the thermal conversion factors for all petroleum products consumed by the residential and commercial sector, weighted by the estimated quantity of each petroleum product consumed in the residential and commercial sector. The quantity of petroleum products consumed is estimated in the State Energy Data System as documented in the *State Energy Data Report.*

Petroleum Products, Consumption by Transportation Users. Calculated annually by EIA as the average of the thermal conversion factor for all petroleum products consumed in the transportation sector, weighted by the estimated quantity of each petroleum product consumed in the transportation sector. The quantity of petroleum products consumed is estimated in the State Energy Data System as documented in the *State Energy Data Report.*

Petroleum Products, Exports. Calculated annually by EIA as the average of the thermal conversion factors for each petroleum product weighted by the quantity of each petroleum product exported.

Petroleum Products, Imports. Calculated annually by EIA as the average of the thermal conversion factors for each petroleum product imported weighted by the quantity of each petroleum product imported.

Plant Condensate. Estimated to be 5.418 million Btu per barrel by EIA from data provided by McClanahan Consultants, Inc., Houston, Texas.

Propane. EIA adopted the Bureau of Mines thermal conversion factor of 3.836 million Btu per barrel as published in the *California Oil World and Petroleum Industry*, First Issue, April 1942.

Residual Fuel Oil. EIA adopted the thermal conversion factor of 6.287 million Btu per barrel as reported in the Bureau of Mines internal memorandum, "Bureau of Mines Standard Average Heating Values of Various Fuels, Adopted January 3, 1950."

Road Oil. EIA adopted the Bureau of Mines thermal conversion factor of 6.636 million Btu per barrel, which was assumed to be equal to that of asphalt (see **Asphalt**) and was first published by the Bureau of Mines in the *Petroleum Statement, Annual, 1970.*

Special Naphtha. EIA adopted the Bureau of Mines thermal conversion factor of 5.248 million Btu per barrel, which was assumed to be equal to that of total gasoline (aviation and motor) factor and was first published in the *Petroleum Statement, Annual, 1970.*

Still Gas. EIA adopted the Bureau of Mines estimated thermal conversion factor of 6.000 million Btu per barrel and was first published in the *Petroleum Statement, Annual, 1970.*

Unfinished Oil. EIA assumed the thermal conversion factor to be 5.825 million Btu per barrel or equal to that for distillate fuel oil (see **Distillate Fuel Oil**) and first published in the *Annual Report to Congress, Volume 3, 1977.*

Unfractionated Stream. EIA assumed the thermal conversion factor to be 5.418 million Btu per barrel or equal to that for plant condensate (see **Plant Condensate**) and first published in the *Annual Report to Congress, Volume 2, 1981.*

Wax. EIA adopted the thermal conversion factor of 5.537 million Btu per barrel as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956.*

Approximate Heat Content of Natural Gas

Natural Gas, Total Consumption. • 1949-1962: EIA adopted the thermal conversion factor of 1,035 Btu per cubic foot as estimated by the Bureau of Mines and first published in the *Petroleum Statement, Annual, 1956* . • 1963-1979: EIA adopted the thermal conversion factor calculated annually by the American Gas Association (AGA) and published in *Gas Facts*, an AGA annual publication. • 1980-1992: Calculated annually by EIA by dividing the total heat content of natural gas consumed by the total quantity of natural gas consumed. The heat content and quantity consumed are from Form EIA-176. Published sources are: • 1980-1989: EIA, *Natural Gas Annual 1992, Volume 2*, Table 15. • 1990-1992: EIA, *Natural Gas Annual 1992, Volume 2*, Table 16. • 1993: 1992 value used as an estimate.

Natural Gas, Exports. • 1949-1972: Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See Natural Gas, Total Consumption. • 1973 forward: Calculated annually by EIA by dividing the heat content of exported natural gas by the quantity of natural gas exported, both reported on Form FPC-14.

Natural Gas, Imports. • 1949-1972: Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See **Natural Gas, Total Consumption.** • 1973 forward: Calculated annually by EIA by dividing the heat content of imported natural gas by the quantity of natural gas imported, both reported on Form FPC-14.

Natural Gas, Production (Dry). Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See **Natural Gas, Total Consumption.**

Natural Gas, Production (Wet). Calculated annually by EIA by adding the heat content of natural gas, dry production, and the total heat content of natural gas plant liquids production and dividing this sum by the total quantity of marketed (wet) natural gas production.

Approximate Heat Content of Coal and Coal Coke

Anthracite, Total Consumption. Calculated annually by EIA by dividing the sum of the heat content of anthracite consumed by electric utilities and all other sectors combined by the total quantity of anthracite consumed.

Anthracite, Consumption by Electric Utilities. • 1949-1972: Assumed by EIA that all anthracite consumed at electric utilities was recovered from culm banks and river dredging and estimated to have an average heat content of 17.500 million Btu per short ton. • 1973 forward: Calculated annually by EIA by dividing the heat content of anthracite receipts at electric utilities by the quantity of anthracite received at electric utilities, as reported on Form FERC-423 and predecessor forms.

Anthracite, Consumption by Sectors Other Than Electric Utilities. Calculated annually by EIA by dividing the heat content of anthracite production less the heat content of the anthracite consumed at electric utilities, net exports, and shipments to U.S. Armed Forces overseas by the quantity of anthracite consumed by sectors other than electric utilities less the quantity of anthracite stock changes, losses, and "unaccounted for."

Anthracite, Imports and Exports. EIA assumed the anthracite imports and exports to be freshly mined anthracite having an estimated heat content of 25.400 million Btu per short ton.

Anthracite, Production. Calculated annually by EIA by dividing the sum of the heat content of freshly mined anthracite (estimated to have an average heat content of 25.400 million Btu per short ton) and the heat content of anthracite recovered from culm banks and river dredging (estimated to have an average heat content of 17.500 million Btu per short ton) by the total quantity of anthracite production.

Bituminous Coal and Lignite, Total Consumption. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite consumed by electric utilities, coal coke plants, other industrial plants, and by the residential and commercial sector and the transportation sector by the sum of their respective tonnages.

Bituminous Coal and Lignite, Consumption by Coke Plants: Estimated by EIA to be 26.800 million Btu per short ton based on input-output analysis of coal carbonization.

Bituminous Coal and Lignite, Consumption by Electric Utilities. •1949-1972: EIA adopted the average thermal conversion factor of the Bureau of Mines, which used the National Coal Association average thermal conversion factor for electric utilities calculated from Form FPC-1 and published in *Steam Electric Plant Factors*, a National Coal Association annual report. • 1973 forward: Calculated annually by EIA by dividing the total heat content of bituminous coal and lignite received at electric utilities by the total quantity received at electric utilities. Heat contents and receipts are from Form FERC-423 and predecessor forms.

Bituminous Coal and Lignite, Consumption by Other Industrial Users. • 1949-1973: Calculated annually by EIA through regression analysis measuring the difference between the average Btu value of coal consumed by other industrial users and that of coal consumed at electric utilities in the 1974-1983 period. • 1974 forward: Calculated annually by EIA by assuming that the bituminous coal and lignite delivered to other industrial users from each coal-producing area (reported on Form EIA-6 and predecessor Bureau of Mines Form 6-1419-Q) contained a heat value equal to that of bituminous coal and lignite received at electric utilities from each of the same coal-producing areas (reported on Form FERC-423). The average Btu value of coal by coal-producing area was applied to the volume of deliveries to other industrial users from each coal-producing area, and the sum total of the heat content was divided by the total volume of deliveries. Coal-producing areas are the Bureau of Mines coal-producing districts for 1974 through 1989 and coal-producing States for 1990.

Bituminous Coal and Lignite, Consumption by Residential and Commercial Users. • 1949-1973: Calculated annually by EIA through regression analysis measuring the difference between the average Btu value of coal consumed by residential and commercial users and that of coal consumed by electric utilities in the 1974-1983 period. • 1974 forward: Calculated annually by EIA by assuming that the bituminous coal and lignite delivered to residential and commercial users from each coal-producing area (reported on Form EIA-6 and predecessor Bureau of Mines Form 6-1419-Q) contained a heat value equal to that of bituminous coal and lignite received at electric utilities from each of the same coal-producing areas (reported on Form FERC-423). The average Btu value of coal by coal-producing area was applied to the volume of deliveries to residential and commercial users from each coal-producing area, and the sum total of the heat value was divided by the total volume of deliveries. Coal-producing areas are the Bureau of Mines

coal-producing districts for 1974 through 1989 and coal-producing States for 1990.

Bituminous Coal and Lignite, Consumption by Transportation Users: Assumed by EIA to be equal to the Btu conversion factor for **Bituminous Coal and Lignite, Consumption by Other Industrial Users.**

Bituminous Coal and Lignite, Exports. • 1949-1972: Assumed by EIA to be all metallurgical coal and to have an average thermal content of 27.000 million Btu per short ton. • 1973 forward: Calculated annually by EIA by dividing the sum of the heat content of exported metallurgical coal (estimated to average 27.000 million Btu per short ton) and the heat content of exported steam coal (estimated to have an average thermal content of 25.000 million Btu per short ton) by the total quantity of bituminous coal and lignite exported.

Bituminous Coal and Lignite, Imports. EIA estimated the average thermal conversion factor to be 25.000 million Btu per short ton.

Bituminous Coal and Lignite, Production. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite consumption, net exports, stock changes, and unaccounted for by the sum of their respective tonnages. Consumers' stock changes by sectors were assumed to have the same conversion factor as that for the consumption sector. Producers' stock changes and unaccounted for were assumed to have the same conversion factor as that for consumption by all users.

Coal, Total Consumption. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite consumption by the sum of their respective tonnages.

Coal, Consumption by Electric Utilities. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite received at electric utilities by the sum of their respective tonnages received.

Coal, Consumption by Sectors Other Than Electric Utilities. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite consumed by sectors other than electric utilities by the sum of their respective tonnages.

Coal, Exports. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite exported by the sum of their respective tonnages.

Coal, Imports. Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite imported by the sum of their respective tonnages.

Coal, Production. Calculated annually by EIA by dividing the sum of the total heat content of bituminous coal and lignite and anthracite production by the sum of their respective tonnages.

Coal Coke, Imports and Exports. EIA adopted the Bureau of Mines estimate of 24.800 million Btu per short ton.

Approximate Heat Rates for Electricity

Fossil-Fueled Steam-Electric Plant Generation. There is no generally accepted practice for measuring the thermal conversion rates for power plants that generate electricity from hydroelectric, wood and waste, wind, photovoltaic, or solar thermal energy sources. Therefore, EIA used data from Form-767 to calculate a rate factor that is equal to the prevailing annual average heat rate factor for fossil-fueled steam-electric power plants in the United States. By using that factor, it is possible to evaluate fossil fuel requirements for replacing those sources during periods of interruption, such as droughts. The heat content of a kilowatthour of electricity produced, regardless of the generation process, is 3,412 Btu per kilowatthour. • 1949-1955: The weighted annual average heat rate for fossil-fueled steam-electric power plants in the United States, as published by EIA in *Thermal-Electric Plant Construction Cost and Annual Production Expenses–1981* and *Steam-Electric Plant Construction Cost and Annual Production Expenses–1978.* • 1956 through 1991: The weighted annual average heat rate for fossil-fueled steam-electric power plants in the United States, as published in EIA, *Electric Plant Cost and Power Production Expenses 1991*, Table 9. • 1992 forward: Unpublished factors calculated on the basis of data from Form EIA-676.

Geothermal Energy Plant Generation. • 1960-1981: Calculated annually by EIA by weighting the annual average heat rates of operating geothermal units by the installed nameplate capacities as reported on Form FPC-12. • 1982 forward: Estimated annually by EIA based on an informal survey of relevant plants.

Nuclear Steam-Electric Plant Generation. • 1957-1991: Calculated annually by EIA by dividing the total heat content consumed in nuclear generating units by the total (net) electricity generated by nuclear generating units. The heat content and electricity generation are reported on Form FERC-1, Form EIA-412, and predecessor forms. The factors, beginning with 1982 data, are published in the following EIA reports–1982: *Historical Plant Cost and Annual Production Expenses for Selected Electric Plants 1982*, page 215. 1983-1991: *Electric Plant Cost and Power Production Expenses 1991*, Table 13. • 1992 forward: Calculated annually by EIA by dividing the total heat content of the steam leaving the nuclear generating units to generate electricity by the total (net) electricity generated by nuclear generating units. The heat content and electricity generation data are reported in Nuclear Regulatory Commission, *Licensed Operating Reactors—Status Summary Report*.

Appendix B

Metric and Other Physical Conversion Factors

Data presented in the *Annual Energy Review* and in other Energy Information Administration publications are expressed predominately in units that historically have been used in the United States, such as British thermal units, barrels, cubic feet, and short tons. However, because U.S. commerce involves other nations, most of which use metric units of measure, the U.S. Government is committed to the transition to the metric system, as stated in the Metric Conversion Act of 1975 (Public Law 94–168), amended by the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100–418), and Executive Order 12770 of July 25, 1991.

The metric conversion factors presented in Table B1 can be used to calculate the metric-unit equivalents of values expressed in U.S. customary units. For example, 500 short tons are the equivalent of 453.6 metric tons (500 short tons x 0.9071847 metric tons/short ton = 453.6 metric tons).

In the metric system of weights and measures, the names of multiples and subdivisions of any unit may be derived by combining the name of the unit with prefixes, such as deka, hecto, and kilo, meaning, respectively, 10, 100, 1,000, and deci, centi, and milli, meaning, respectively, one-tenth, one-hundredth, and one-thousandth. Common metric prefixes can be found in Table B2.

The conversion factors presented in Table B3 can be used to calculate equivalents in various physical units commonly used in energy analyses. For example, 10 barrels are the equivalent of 420 U.S. gallons (10 barrels x 42 gallons/barrel = 420 gallons).

Table B1. Metric Conversion Factors

U.S. Unit	*multiplied by*	Conversion Factor	*equals*	Metric Unit
Mass				
short tons (2,000 lb)	x	0.907 184 7	=	metric tons (t)
long tons	x	1.016 047	=	metric tons (t)
pounds (lb)	x	0.453 592 37[a]	=	kilograms (kg)
pounds uranium oxide (lb U_3O_8)	x	0.384 647[b]	=	kilograms uranium (kgU)
ounces, avoirdupois (avdp oz)	x	28.349 52	=	grams (g)
Length				
miles (mi)	x	1.609 344[a]	=	kilometers (km)
yards (yd)	x	0.914 4[a]	=	meters (m)
feet (ft)	x	0.304 8[a]	=	meters (m)
inches (in)	x	2.54[a]	=	centimeters (cm)
Energy				
British thermal units (Btu)	x	1,055.056[c]	=	joules (J)
calories (cal)	x	4.186 8[a]	=	joules (J)
kilowatthours (kWh)	x	3.6[a]	=	megajoules (MJ)
Volume				
barrels of oil (bbl)	x	0.158 987 3	=	cubic meters (m^3)
cubic yards (yd^3)	x	0.764 555	=	cubic meters (m^3)
cubic feet (ft^3)	x	0.028 316 85	=	cubic meters (m^3)
U.S. gallons (gal)	x	3.785 412	=	liters (L)
ounces, fluid (fl oz)	x	29.573 53	=	milliliters (mL)
cubic inches (in^3)	x	16.387 06	=	milliliters (mL)
Area				
acres	x	0.404 69	=	hectares (ha)
square miles (mi^2)	x	2.589 988	=	square kilometers (km^2)
square yards (yd^2)	x	0.836 127 4	=	square meters (m^2)
square feet (ft^2)	x	0.092 903 04[a]	=	square meters (m^2)
square inches (in^2)	x	6.451 6[a]	=	square centimeters (cm^2)
Temperature				
degrees Fahrenheit (°F)	x	5/9 (after subtracting 32)[a,d]	=	degrees Celsius (°C)

[a]Exact conversion.
[b]Calculated by the Energy Information Administration.
[c]The Btu used in this table is the International Table Btu adopted by the Fifth International Conference on Properties of Steam, London, 1956.
[d]To convert degrees Celsius (°C) to degrees Fahrenheit (°F) exactly, multiply by 9/5, then add 32.

Notes: • Spaces have been inserted after every third digit to the right of the decimal for ease of reading. • Most metric units belong to the International System of Units (SI), and the liter, hectare, and metric ton are accepted for use with the SI units. For more information about the SI units, contact Dr. Barry Taylor at Building 221, Room B610, National Institute of Standards and Technology, Gaithersburg, MD 20899, or on telephone number 301–975–4220.

Sources: • General Services Administration, Federal Standard 376B, *Preferred Metric Units for General Use by the Federal Government* (Washington, DC, January 27, 1993), pp. 9–11, 13, and 16. • National Institute of Standards and Technology, Special Publications 330, 811, and 814. • American National Standards Institute/Institute of Electrical and Electronic Engineers, ANSI/IEEE Std 268–1992, pp. 28 and 29.

Table B2. Metric Prefixes

Unit Multiple	Prefix	Symbol	Unit Multiple	Prefix	Symbol
10^{1}	deka	da	10^{-1}	deci	d
10^{2}	hecto	h	10^{-2}	centi	c
10^{3}	kilo	k	10^{-3}	milli	m
10^{6}	mega	M	10^{-6}	micro	μ
10^{9}	giga	G	10^{-9}	nano	n
10^{12}	tera	T	10^{-12}	pico	p
10^{15}	peta	P	10^{-15}	femto	f
10^{18}	exa	E	10^{-18}	atto	a
10^{21}	zetta	Z	10^{-21}	zepto	z
10^{24}	yotta	Y	10^{-24}	yocto	y

Source: U.S. Department of Commerce, National Institute of Standards and Technology, *The International System of Units (SI)*, NIST Special Publication 330, 1991 Edition (Washington, DC, August 1991), p. 10.

Table B3. Other Physical Conversion Factors

Energy Source	Original Unit	*multiplied by*	Conversion Factor	*equals*	Final Unit
Petroleum	barrels (bbl)	x	42[a]	=	U.S. gallons (gal)
Coal	short tons	x	2,000[a]	=	pounds (lb)
	long tons	x	2,240[a]	=	pounds (lb)
	metric tons (t)	x	1,000[a]	=	kilograms (kg)
Wood	cords (cd)	x	1.25[b]	=	short tons
	cords (cd)	x	128[a]	=	cubic feet (ft^3)

[a]Exact conversion.
[b]Calculated by the Energy Information Administration.
Source: U.S. Department of Commerce, National Institute of Standards and Technology, *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*, NIST Handbook 44, 1994 Edition (Washington, DC, October 1993), pp. B–10, C–17, and C–21.

Appendix C

Energy Units in Perspective

Using Appendix C

The two tables in this appendix are intended to help the nontechnical reader understand the value of the various energy units used in the *Annual Energy Review*. The values shown here (especially the equivalents in Table C2) are approximations intended to convey a general idea of the magnitude of energy units. The tables can be used to relate a familiar measure of energy, such as gallons, to energy measures used in this report. For example, using information from Table C1, the reader can calculate that 8 gallons of motor gasoline was, on average, about a six-and-a-half-day supply per capita in 1993. Table C2 indicates that 8 gallons of motor gasoline equals about 10 therms of natural gas or approximately 1 million British thermal units (see Glossary).

Table C1. U.S. Daily Per Capita Consumption of Energy by Type, 1973, 1983, and 1993

Type of Energy	Type of Unit	1973	1983	1993	Percent Change 1973-1983	Percent Change 1983-1993
Petroleum Products	gallons	3.4	2.7	2.8	-20.6	2.6
Motor Gasoline	gallons	1.3	1.2	1.2	-10.5	2.7
Natural Gas (dry)	cubic feet	286	197	214	-31.1	8.9
Coal	pounds	14.6	17.2	19.7	18.1	14.5
Hydroelectricity	kilowatthours	3.5	3.9	2.8	10.1	-27.5
Nuclear Electricity	kilowatthours	1.1	3.4	6.5	317.4	88.8
Total Electricity	kilowatthours	22.2	25.2	30.4	13.3	21.0
Total Energy	thousand Btu	963	825	892	-14.3	8.1

Note: Percent change is calculated from data prior to rounding.
Sources: Tables 1.5, 2.1, 5.1, 5.11, 6.1, 7.1, 8.1, 8.2, and 8.3.

Table C2. Energy Equivalents

Unit of Energy		Energy Equivalent[a]
1 Btu of energy	1	match tip
	250	calories (International Steam Table)
	0.25	kilocalories (food calories)
1 million Btu of energy	90	pounds of coal
	8	gallons of motor gasoline
	10	therms of dry natural gas
	11	gallons of propane
	1.1	days of U.S. energy consumption per capita
1 quadrillion[b] Btu of energy	45	million short tons of coal
	60	million short tons of oven-dried hardwood
	1	trillion cubic feet of dry natural gas
	170	million barrels of crude oil
	470	thousand barrels of crude oil per day for 1 year
	21	days of U.S. petroleum imports
	25	days of U.S. motor gasoline use
	26	hours of world energy use (1992)
1 barrel of crude oil	15	days of U.S. petroleum consumption per capita
	5.6	thousand cubic feet of dry natural gas
	0.26	short tons (520 pounds) of coal
	1.7	thousand kilowatthours of electricity[c]
1 short ton of coal	101	days of U.S. coal consumption per capita
	3.8	barrels of crude oil
	21	thousand cubic feet of dry natural gas
	6.5	thousand kilowatthours of electricity
1,000 cubic feet of natural gas	4.7	days of U.S. natural gas consumption per capita
	300	kilowatthours of electricity[c]
1,000 kilowatthours of electricity	33	days of U.S. electricity use per capita

[a]Equivalents are approximate.
[b]One quadrillion equals 1,000,000,000,000,000.
[c]However, because of net energy losses associated with the generation of electricity, about three times as much fossil fuel is required to generate 1,000 kilowatthours: 1.8 barrels of crude oil, 0.47 short tons of coal, or 10,000 cubic feet of natural gas.

Note: • One million Btu of fossil fuels burned at electric utilities can generate about 100 kilowatthours of electricity, while it takes about 300 kilowatthours of electricity generated at electric utilities to produce 1 million Btu of heat. • Calculations are based on 1993 data where applicable, unless otherwise noted.

Appendix D

Gross Domestic Product and Implicit Price Deflators

Table D1. Gross Domestic Product and Implicit Price Deflators, 1949-1993

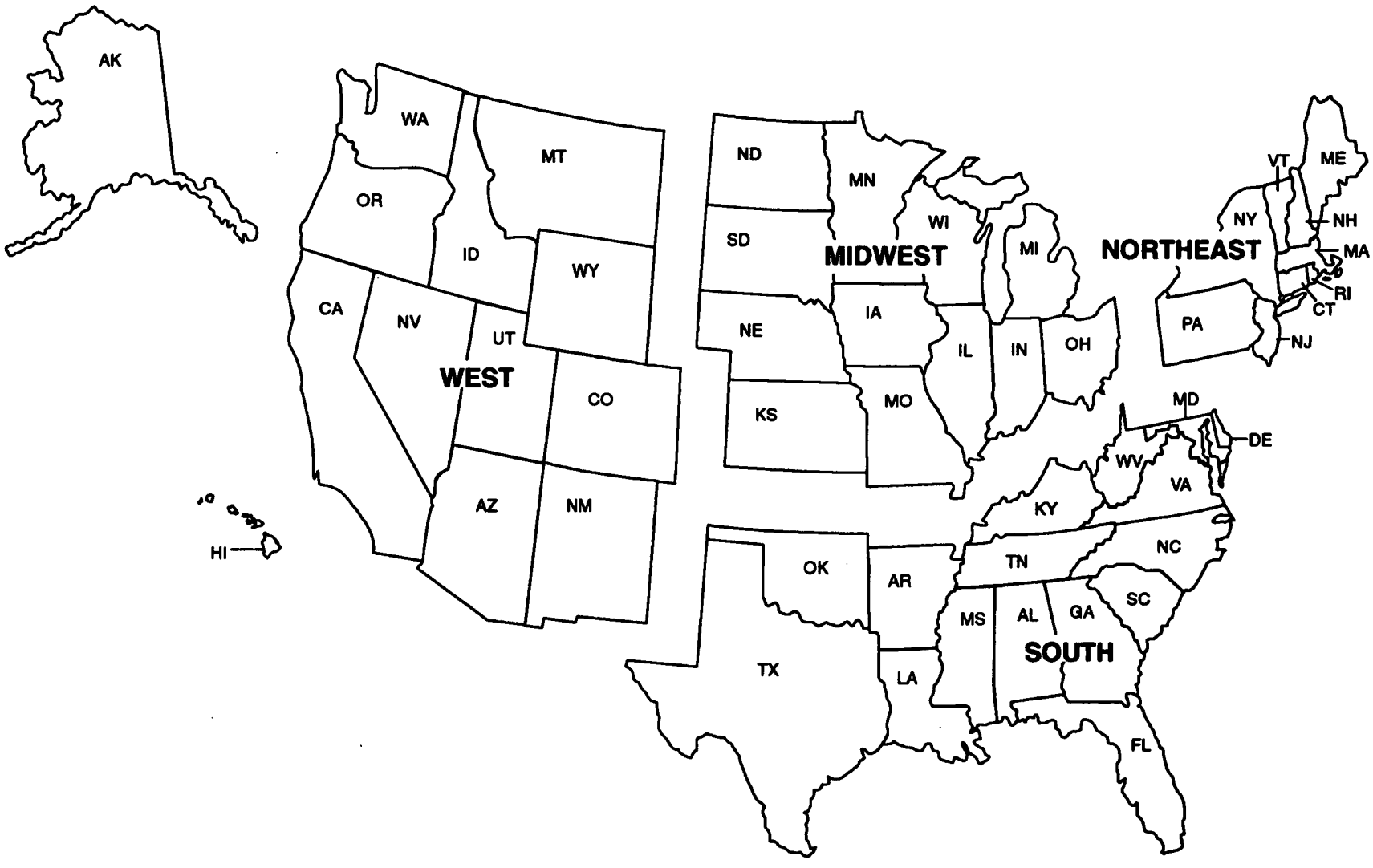
Years 1949-1970	Gross Domestic Product (billion 1987 dollars)	Implicit Price Deflator (1987=100)	Years 1971-1993	Gross Domestic Product (billion 1987 dollars)	Implicit Price Deflator (1987=100)
1949	1,305.5	19.9	1971	2,955.9	37.1
			1972	3,107.1	38.8
1950	1,418.5	20.2	1973	3,268.6	41.3
1951	1,558.4	21.3	1974	3,248.1	44.9
1952	1,624.9	21.5	1975	3,221.7	49.2
1953	1,685.5	22.0	1976	3,380.8	52.3
1954	1,673.8	22.2	1977	3,533.3	55.9
1955	1,768.3	22.9	1978	3,703.5	60.3
1956	1,803.6	23.6	1979	3,796.8	65.5
1957	1,838.2	24.4			
1958	1,829.1	24.9	1980	3,776.3	71.7
1959	1,928.8	25.6	1981	3,843.1	78.9
			1982	3,760.3	83.8
1960	1,970.8	26.0	1983	3,906.6	87.2
1961	2,023.8	26.3	1984	4,148.5	91.0
1962	2,128.1	26.9	1985	4,279.8	94.4
1963	2,215.6	27.2	1986	4,404.5	96.9
1964	2,340.6	27.7	1987	4,539.9	100.0
1965	2,470.5	28.4	1988	4,718.6	103.9
1966	2,616.2	29.4	1989	4,838.0	108.5
1967	2,685.2	30.3			
1968	2,796.9	31.8	1990	R4,897.3	R113.3
1969	2,873.0	33.4	1991	R4,861.4	R117.7
			1992	R4,986.3	R121.1
1970	2,873.9	35.2	1993	5,137.7	124.2

R=Revised data.

Sources: **Gross Domestic Product:** • 1949-1992—Bureau of Economic Analysis (BEA), U.S. Department of Commerce (DOC), *Survey of Current Business* (September 1993), Table 2. • 1993—BEA, DOC, *United States Department of Commerce News* (March 1, 1994), Table 2. **Implicit Price Deflators:** • 1949-1958—United States Department of Commerce, *Economic Bulletin Board.* • 1959-1992—BEA, DOC, *Survey of Current Business* (September 1993), Table 3. • 1993—BEA, DOC, *United States Department of Commerce News* (March 1, 1994), Table 3.

Appendix E

U.S. Census Region Map



Source: U.S. Department of Commerce, Bureau of Census

Glossary

Account of Others (natural gas): Natural gas deliveries for the account of others are deliveries to customers by transporters that do not own the natural gas but deliver it for others for a fee. Included are quantities covered by long-term contracts and quantities involved in short-term or spot market sales.

Additions to Property: The current year's expenditures on property, plant, and equipment. The amount is predicated upon each reporting company's accounting practices. That is, accounting practices with regard to capitalization of certain items may differ across companies, and, therefore, this figure is a function of each reporting company's policy.

Alcohol: The family name of a group of organic chemical compounds composed of carbon, hydrogen, and oxygen. The series of molecules vary in chain length and are composed of a hydrocarbon plus a hydroxyl group; CH_3-$(CH_2)_n$-OH (e.g., methanol, ethanol, and tertiary butyl alcohol).

Anthracite: A hard, black, lustrous coal containing a high percentage of fixed carbon and a low percentage of volatile matter. Often referred to as hard coal. It conforms to ASTM Specification D388-84 for anthracite, meta-anthracite, and semianthracite.

API: The American Petroleum Institute, a trade association.

API Gravity: An arbitrary scale expressing the gravity or density of liquid petroleum products. The measuring scale is calibrated in terms of degrees API. A lighter, less dense product has a higher API gravity.

Apparent Consumption, Natural Gas (international): The total of an individual nation's marketed natural gas production plus imports less exports.

Apparent Consumption, Petroleum (international): Consumption which includes internal consumption, refinery fuel and loss, and bunkering. For countries in the Organization for Economic Cooperation and Development (OECD), apparent consumption is derived from refined product output plus refined product imports minus refined product exports plus refined product stock changes plus other oil consumption (such as direct use of crude oil). For countries outside the OECD, apparent consumption is either a reported figure or is derived from refined product output plus refined product imports minus refined product exports, with stock levels assumed to remain the same. Apparent consumption also includes, where available, liquefied petroleum gases sold directly from natural gas processing plants, for fuel or chemical uses.

Asphalt: A dark-brown-to-black cement-like material containing bitumens as the predominant constituents. It is obtained by petroleum processing. The definition includes crude asphalt as well as the following finished products: cements, fluxes, the asphalt content of emulsions (exclusive of water), and petroleum distillates blended with asphalt to make cutback asphalts.

ASTM: The American Society for Testing and Materials.

Aviation Gasoline Blending Components: Naphthas that are used for blending or compounding into finished aviation gasoline (e.g., straight-run gasoline, alkylate, and reformate). Excluded are oxygenates (alcohols, ethers), butane, and pentanes plus.

Aviation Gasoline, Finished: All special grades of gasoline for use in aviation reciprocating engines, as given in ASTM Specification D910 and Military Specification MIL-G-5572. Excludes blending components that will be used in blending or compounding into finished aviation gasoline.

Barrel (petroleum): A unit of volume equal to 42 U.S. gallons.

Barrels per Calendar Day (operable refinery capacity): The maximum number of barrels of input that can be processed during a 24-hour period after making allowances for the following limitations: the capability of downstream facilities to absorb the output of crude oil processing facilities of a given refinery (no reduction is made when a planned distribution of intermediate streams through other than downstream facilities is part of a refinery's normal operation); the types and grades of inputs to be processed; the types and grades of

products to be manufactured; the environmental constraints associated with refinery operations; the reduction of capacity for scheduled downtime, such as routine inspection, mechanical problems, maintenance, repairs, and turnaround; and the reduction of capacity for unscheduled downtime, such as mechanical problems, repairs, and slowdowns.

Base (Cushion) Gas: The volume of gas needed as a permanent inventory to maintain adequate underground storage reservoir pressures and deliverability rates throughout the withdrawal season. All native gas is included in the base gas volume.

Biofuels: Wood, waste, and alcohol fuels.

Bituminous Coal: A dense black coal, often with well-defined bands of bright and dull material, with a moisture content usually less than 20 percent. Often referred to as soft coal. It is the most common coal and is used primarily for generating electricity, making coke, and space heating. It conforms to ASTM Specification D388-84 for bituminous coal. In this report, bituminous coal includes subbituminous coal.

British Thermal Unit (Btu): The quantity of heat needed to raise the temperature of 1 pound of water by 1° F at or near 39.2° F. (See **Heat Content of a Quantity of Fuel, Gross,** and **Heat Content of a Quantity of Fuel, Net.**)

Butane: A normally gaseous straight-chain or branched-chain hydrocarbon (C_4H_{10}). It is extracted from natural gas or refinery gas streams. It includes isobutane and normal butane and is designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial butane. *Isobutane:* A normally gaseous branched-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of 10.9° F. It is extracted from natural gas or refinery gas streams. *Normal Butane:* A normally gaseous straight-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of 31.1° F. It is extracted from natural gas or refinery gas streams.

Butylene: An olefinic hydrocarbon (C_4H_8) recovered from refinery processes.

Capacity Factor: The ratio of the electrical energy produced by a generating unit for a given period of time to the electrical energy that could have been produced at continuous full-power operation during the same period.

CIF: See **Cost, Insurance, Freight.**

City Gate: A point or measuring station at which a distribution gas utility receives gas from a natural gas pipeline company or transmission system.

Class A Electric Utility: An electric utility having annual electric operating revenues of $2.5 million or more. (Use of this term ceased on December 31, 1983.)

Class B Electric Utility: An electric utility having annual electric operating revenues of $1.0 million or more but less than $2.5 million. (Use of this term ceased on December 31, 1983.)

Coal: A black or brownish-black solid, combustible substance formed by the partial decomposition of vegetable matter without access to air. The rank of coal, which includes anthracite, bituminous coal, subbituminous coal, and lignite, is based on fixed carbon, volatile matter, and heating value. Coal rank indicates the progressive alteration, or coalification, from lignite to anthracite. Lignite contains approximately 9 to 17 million Btu per ton. The heat contents of subbituminous and bituminous coal range from 16 to 24 million Btu per ton, and from 19 to 30 million Btu per ton, respectively. Anthracite contains approximately 22 to 28 million Btu per ton.

Coalbed Methane: Methane that is produced from coalbeds in the same manner as natural gas produced from other strata. Methane is the principal component of natural gas.

Coal Coke: A hard, porous product made from baking bituminous coal in ovens at temperatures as high as 2,000° F. It is used both as a fuel and as a reducing agent in smelting iron ore in a blast furnace.

Cogenerator: A generating facility that produces electricity and another form of useful thermal energy (such as heat or steam) used for industrial, commercial, heating, and cooling purposes.

Commercial Building: A building with more than 50 percent of its floorspace used for commercial activities. Commercial buildings include, but are not limited to, stores, offices, schools, churches,

gymnasiums, libraries, museums, hospitals, clinics, warehouses, and jails. Government buildings are included, except buildings on military bases or reservations.

Commercial Sector: The commercial sector, as defined economically, consists of business establishments that are not engaged in transportation or in manufacturing or other types of industrial activity (agriculture, mining, or construction). Commercial establishments include hotels, motels, restaurants, wholesale businesses, retail stores, laundries, and other service enterprises; religious and nonprofit organizations; health, social, and educational institutions; and Federal, State, and local governments. Street lights, pumps, bridges, and public services are also included if the establishment operating them is considered commercial. Standard Industrial Classification (SIC) codes used to classify an establishment as commercial are 50 through 87, 89, and 91 through 97.

Completion: The installation of permanent equipment for the production of oil or gas. If a well is equipped to produce only oil or gas from one zone or reservoir, the definition of a well (classified as an oil well or gas well) and the definition of a completion are identical. However, if a well is equipped to produce oil and/or gas separately from more than one reservoir, a well is not synonymous with a completion.

Constant Dollars: Amounts expressed in constant dollars have been adjusted to remove the effect of changes in the purchasing power of the dollar. Prices expressed in constant dollars usually reflect buying power relative to a base year.

Conversion Factor: A number that translates units of one system into corresponding values of another system. Conversion factors can be used to translate physical units of measure for various fuels into Btu equivalents.

Cost, Insurance, Freight (CIF): A type of sale in which the buyer of the product agrees to pay a unit price that includes the f.o.b. value of the product at the point of origin, plus all costs of insurance and transportation. This type of transaction differs from a "delivered" purchase in that the buyer accepts the quantity as determined at the loading port (as certified by the Bill of Loading and Quality Report) rather than pay on the basis of the quantity and quality ascertained at the unloading port. It is similar to the terms of an f.o.b. sale, except that the seller, as a service for which he is compensated, arranges for transportation and insurance.

Crude Oil f.o.b. Price: The crude oil price actually charged at the oil-producing country's port of loading. Includes deductions for any rebates and discounts or additions of premiums, where applicable. It is the actual price paid with no adjustment for credit terms.

Crude Oil (Including Lease Condensate): A mixture of hydrocarbons that exists in liquid phase in underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Included are lease condensate and liquid hydrocarbons produced from tar sands, gilsonite, and oil shale. Drip gases are also included, but topped crude oil (residual oil) and other unfinished oils are excluded. Where identifiable, liquids produced at natural gas processing plants and mixed with crude oil are likewise excluded.

Crude Oil Landed Cost: The price of crude oil at the port of discharge, including charges associated with the purchase, transporting, and insuring of a cargo from the purchase point to the port of discharge. The cost does not include charges incurred at the discharge port (e.g., import tariffs or fees, wharfage charges, and demurrage).

Crude Oil Refinery Input: The total crude oil put into processing units at refineries.

Crude Oil Stocks: Stocks of crude oil and lease condensate held at refineries, in pipelines, at pipeline terminals, and on leases.

Crude Oil Used Directly: Crude oil consumed as fuel by crude oil pipelines and on crude oil leases.

Cubic Foot (natural gas): A unit of volume equal to 1 cubic foot at a pressure base of 14.73 pounds standard per square inch absolute and a temperature base of 60° F.

Current Dollars: Amounts expressed in current dollars have not been adjusted to remove the effect of changes in the purchasing power of the dollar.

Demonstrated Reserve Base (coal): A collective term for the sum of coal in both measured and indicated resource categories of reliability, representing 100 percent of the in-place coal in those categories as of a

certain date. Includes beds of bituminous coal and anthracite 28 or more inches thick and beds of subbituminous coal 60 or more inches thick that can occur at depths of up to 1,000 feet. Includes beds of lignite 60 or more inches thick that can be surface mined. Includes also thinner and/or deeper beds that presently are being mined or for which there is evidence that they could be mined commercially at a given time. Represents that portion of the identified coal resource from which reserves are calculated.

Design Electrical Rating, Net: The nominal net electrical output of a nuclear unit as specified by the electric utility for the purpose of plant design.

Development Well: A well drilled within the proved area of an oil or gas reservoir to the depth of a stratigraphic horizon known to be productive.

Distillate Fuel Oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. Included are products known as No. 1, No. 2, and No. 4 fuel oils and No. 1, No. 2, and No. 4 diesel fuels. It is used primarily for space heating, on- and off-highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation.

Distillation Unit (atmospheric): The primary distillation unit that processes crude oil (including mixtures of other hydrocarbons) at approximately atmospheric conditions. It includes a pipe still for vaporizing the crude oil and a fractionation tower for separating the vaporized hydrocarbon components in the crude oil into fractions with different boiling ranges. This is done by continuously vaporizing and condensing the components to separate higher boiling point material. The selected boiling ranges are set by the processing scheme, the properties of the crude oil, and the product specifications.

District Heat: Steam or hot water from an outside source used as an energy source in a building. The steam or hot water is produced in a central plant and piped into the building. The district heat may be purchased from a utility or provided by a physical plant in a separate building that is part of the same facility (for example, a hospital complex or university).

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

Dry Natural Gas Production (as a decrement from gas reserves): The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs, and conservation operations; (2) shrinkage resulting from the removal of lease condensate and plant liquids; and (3) nonhydrocarbon gases, where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas that has been transferred to the storage category are not considered in production. This is not the same as marketed production, since the latter also excludes vented and flared gas but contains liquids.

Dry Natural Gas Production (as an increment to gas supply): Gross withdrawals from production reservoirs less gas used in reservoir repressuring, amounts vented and flared, nonhydrocarbons removed, and various natural gas constituents, such as ethane, propane, and butane, removed at natural gas processing plants. The parameters for measurement are 60° F and 14.73 pounds standard per square inch absolute.

Electrical System Energy Losses: The amount of energy lost during generation, transmission, and distribution of electricity, including plant and unaccounted-for uses.

Electricity Generation: The process of producing electric energy or transforming other forms of energy into electric energy. Also the amount of electric energy produced or expressed in watthours (Wh).

Electricity Generation, Gross: The total amount of electric energy produced by the generating station or stations, measured at the generator terminals.

Electricity Generation, Net: Gross generation less electricity consumed at the generating plant for station use. Electricity required for pumping at pumped-storage plants is regarded as plant use and is deducted from gross generation.

Electricity Production: Net electricity (gross electricity output measured at generator terminals minus power plant use) generated by

publicly and privately owned electric utilities. Excludes industrial electricity generation (except autogeneration of hydroelectric power).

Electricity Sales: The amount of kilowatthours sold in a given period of time; usually grouped by classes of service, such as residential, commercial, industrial, and other. "Other" sales include sales for public street and highway lighting and other sales to public authorities and railways, and interdepartmental sales.

Electric Power Plant: A station containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or fission energy into electric energy.

Electric Utilities: All privately owned companies and all publicly owned agencies engaged in the generation, transmission, or distribution of electric power for public use. Publicly owned agencies include municipal electric utilities; Federal power projects, such as the Tennessee Valley Authority (TVA); rural electrification cooperatives; power districts; and State power projects.

Electric Utility: A corporation, person, agency, authority, or other legal entity or instrumentality that owns and/or operates facilities within the United States, its territories, or Puerto Rico for the generation, transmission, distribution, or sale of electric energy, primarily for use by the public, and that files forms listed in the *Code of Federal Regulations*, Title 18, Part 141. Facilities that qualify as cogenerators or small power producers under the Public Utility Regulatory Policies Act are not considered electric utilities.

Electric Utility Sector: The electric utility sector consists of privately and publicly owned establishments that generate, transmit, distribute, or sell electricity primarily for use by the public and that meet the definition of an electric utility. Nonutility power producers are not included in the electric utility sector.

Eliminations: Revenues and expenses resulting from transactions between segments. Consolidated company accounts do not include intersegment revenues and expenses. Therefore, such intersegment transactions must be eliminated.

End-Use Sectors: The residential, commercial, industrial, and transportation sectors of the economy.

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks. Electrical energy is usually measured in kilowatthours, while heat energy is usually measured in British thermal units.

Energy Consumption: The use of energy as a source of heat or power or as an input in the manufacturing process.

Energy Consumption, End-Use: The sum of fossil fuel consumption by the four end-use sectors (residential, commercial, industrial, and transportation) plus electric utility sales to those sectors and generation of hydroelectric power by nonelectric utilities. Net end-use energy consumption excludes electrical system energy losses. Total end-use energy consumption includes electrical system energy losses.

Energy Consumption, Total: The sum of fossil fuel consumption by the five sectors (residential, commercial, industrial, transportation, and electric utility) plus hydroelectric power, nuclear electric power, net imports of coal coke, and electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

Energy Expenditures: The money directly spent by consumers to purchase energy. Expenditures equal the amount of energy used by the consumer times the price per unit paid by the consumer.

Energy Source: A substance, such as petroleum, natural gas, or coal, that supplies heat or power. In Energy Information Administration (EIA) reports, electricity and renewable forms of energy, such as biomass, geothermal, wind, and solar, are considered to be energy sources.

Energy-Weighted Industrial Output: The weighted sum of real output for all two-digit Standard Industrial Classification (SIC) manufacturing industries plus agriculture, construction, and mining. The weight for each industry is the ratio of the quantity of end-use energy consumption to the value of real output. The base year for those weights is either 1981 or 1982, depending on data availability.

Ethane: A normally gaseous straight-chain hydrocarbon (C_2H_6). It is a colorless, paraffinic gas that boils at a temperature of -127.48° F. It is extracted from natural gas and refinery gas streams.

Ethylene: An olefinic hydrocarbon (C_2H_4) recovered from refinery processes or petrochemical processes.

Exploratory Well: A well drilled to find and produce oil or gas in an unproved area, to find a new reservoir in a field previously found to be productive of oil or gas in another reservoir, or to extend the limit of a known oil or gas reservoir.

Exports: Shipments of goods from the 50 States and the District of Columbia to foreign countries and to Puerto Rico, the Virgin Islands, and other U.S. possessions and territories.

Extraction Loss: The reduction in volume of natural gas due to the removal of natural gas constituents, such as ethane, propane, and butane, at natural gas processing plants.

f.a.s.: See **Free Alongside Ship**.

Federal Energy Regulatory Commission (FERC): The Federal agency with jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification. FERC is an independent regulatory agency within the Department of Energy and is the successor to the Federal Power Commission.

Federal Power Commission (FPC): The predecessor agency of the Federal Energy Regulatory Commission. The Federal Power Commission was created by an Act of Congress under the Federal Water Power Act on June 10, 1920. It was charged originally with regulating the electric power and natural gas industries. It was abolished on September 30, 1977, when the Department of Energy was created. Its functions were divided between the Department of Energy and the Federal Energy Regulatory Commission, an independent regulatory agency.

First Purchase Price: The marketed first sales price of domestic crude oil, consistent with the removal price defined by the provisions of the Windfall Profits Tax on Domestic Crude Oil (Public Law 96-223, Sec. 4998 [c]).

Fiscal Year: The U.S. Government's fiscal year runs from October 1 through September 30. The fiscal year is designated by the calendar year in which it ends; e.g., fiscal year 1992 begins on October 1, 1991, and ends on September 30, 1992.

Flared Natural Gas: Natural gas burned in flares on the base site or at gas processing plants.

Floorspace: All the area enclosed by the exterior walls of a building, including indoor parking facilities, basements, hallways, lobbies, stairways, and elevator shafts. For aggregate floorspace statistics, square footage was summed or aggregated over all buildings in a category (such as all office buildings in the United States).

f.o.b.: See **Free on Board.**

Former U.S.S.R.: See **U.S.S.R.**

Footage Drilled: Total footage for wells in various categories, as reported for any specified period, includes (1) the deepest total depth (length of well bores) of all wells drilled from the surface, (2) the total of all bypassed footage drilled in connection with reported wells, and (3) all new footage drilled for directional sidetrack wells. Footage reported for directional sidetrack wells does not include footage in the common bore, which is reported as footage for the original well. In the case of old wells drilled deeper, the reported footage is that which was drilled below the total depth of the old well.

Forward Costs: The operating and capital costs still to be incurred in the production of uranium from estimated reserves; such costs are used in assigning the uranium reserves to cost categories. Those costs include labor, materials, power and fuel, royalties, payroll and production taxes, insurance, and applicable general and administrative costs. They exclude expenditures prior to reserve estimates—e.g., for property acquisition, exploration, mine development, and mill construction from the forward cost determinations, as well as income taxes, profit, and the cost of money. Forward costs are neither the full costs of production nor the market price at which the uranium will be sold.

Fossil Fuel: Any naturally occurring organic fuel, such as petroleum, coal, and natural gas.

Fossil Fuel Steam-Electric Power Plant: An electricity generation plant in which the prime mover is a turbine rotated by high-pressure steam produced in a boiler by heat from burning fossil fuels.

Free Alongside Ship (f.a.s.): The value of a commodity at the port of exportation, generally including the purchase price, plus all charges incurred in placing the commodity alongside the carrier at the port of exportation.

Free on Board (f.o.b.): A transaction whereby the seller makes the product available within an agreed-on period at a given port at a given price. It is the responsibility of the buyer to arrange for the transportation and insurance.

Fuel Ethanol: An anhydrous, denatured aliphatic alcohol (C_2H_5OH) intended for motor gasoline blending. See **Oxygenates.**

Fuel-Switching Capability: The short-term capability of a manufacturing establishment to have used substitute energy sources in place of those actually consumed. Capability to use substitute energy sources means that the establishment's combustors (for example, boilers, furnaces, ovens, and blast furnaces) had the machinery or equipment either in place or available for installation so that substitutions could actually have been introduced within 30 days without extensive modifications. Fuel-switching capability does not depend on the relative prices of energy sources; it depends only on the characteristics of the equipment and certain legal constraints.

Full-Power Operation: Operation of a nuclear generating unit at 100 percent of its design capacity. Full-power operation precedes commercial operation.

Gasohol: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol but sometimes methanol) limited to 10 percent by volume of alcohol. Gasohol is included in finished leaded and unleaded motor gasoline.

Gas-Turbine Electric Power Plant: A plant in which the prime mover is a gas turbine. A gas turbine typically consists of an axial-flow air compressor, one or more combustion chambers where liquid or gaseous fuel is burned and the hot gases expand to drive the generator and then are used to run the compressor.

Gas Well: A well completed for the production of natural gas from one or more gas zones or reservoirs. (Wells producing both crude oil and natural gas are classified as oil wells.)

Gas Well Productivity: Derived annually by dividing gross natural gas withdrawals from gas wells by the number of producing gas wells on December 31 and then dividing the quotient by the number of days in the year.

Geothermal Energy: Energy from the internal heat of the Earth, which may be residual heat, friction heat, or a result of radioactive decay. The heat is found in rocks and fluids at various depths and can be extracted by drilling and/or pumping.

Geothermal Energy (as used at electric utilities): Hot water or steam, extracted from geothermal reservoirs in the Earth's crust, and supplied to steam turbines at electric utilities that drive generators to produce electricity.

Gross Domestic Product (GDP): The total value of goods and services produced by labor and property located in the United States. As long as the labor and property are located in the United States, the supplier (that is, the workers and, for property, the owners) may be either U.S. residents or residents of foreign countries.

Gross Domestic Product (GDP) Implicit Price Deflator: The implicit price deflator, published by the U.S. Department of Commerce, Bureau of Economic Analysis, is used to convert nominal figures to real figures.

Gross Input to Atmospheric Crude Oil Distillation Units: Total input to atmospheric crude oil distillation units. Includes all crude oil, lease condensate, natural gas plant liquids, unfinished oils, liquefied refinery gases, slop oils, and other liquid hydrocarbons produced from tar sands, gilsonite, and oil shale.

Heat Content of a Quantity of Fuel, Gross: The total amount of heat released when a fuel is burned. Coal, crude oil, and natural gas all include chemical compounds of carbon and hydrogen. When those fuels are burned, the carbon and hydrogen combine with oxygen in the air to produce carbon dioxide and water. Some of the energy released in burning goes into transforming the water into steam and is usually lost. The amount of heat spent in transforming the water into

steam is counted as part of gross heat content but is not counted as part of net content. Also referred to as the higher heating value. Btu conversion factors typically used by EIA represent gross heat content.

Heat Content of a Quantity of Fuel, Net: The amount of usable heat energy released when a fuel is burned under conditions similar to those in which it is normally used. Also referred to as the lower heating value. Btu conversion factors typically used by EIA represent gross heat content.

Heavy Oil: The fuel oils remaining after the lighter oils have been distilled off during the refining process. Except for start-up and flame stabilization, virtually all petroleum used in steam-electric power plants is heavy oil.

Household: A family, an individual, or a group of up to nine unrelated persons occupying the same housing unit. Occupy means the housing unit was the person's usual or permanent place of residence. The household includes babies, lodgers, boarders, employed persons who live in the housing unit, and persons who usually live in the household but are away traveling or in a hospital. The household does not include persons who are normally members of the household but who are away from home as college students or members of the armed forces. The household does not include persons temporarily visiting with the household if they have a place of residence elsewhere, persons who take their meals with the household but usually lodge or sleep elsewhere, domestic employees or other persons employed by the household who do not sleep in the same housing unit, or persons who are former members of the household, but have since become inmates of correctional or penal institutions, mental institutions, homes for the aged or needy, homes or hospitals for the chronically ill or handicapped, nursing homes, convents or monasteries, or other places in which residents may remain for long periods of time. By definition, the number of households is the same as the number of occupied housing units.

Housing Unit: A structure or part of a structure where a household lives. It has access from the outside of the building either directly or through a common hall. Housing units do not include group quarters, such as prisons or nursing homes where 10 or more unrelated persons live. Hotel and motel rooms are considered housing units if occupied as the usual or permanent place of residence.

Hydrocarbon: An organic chemical compound of hydrogen and carbon in the gaseous, liquid, or solid phase. The molecular structure of hydrocarbon compounds varies from the simplest (methane, a constituent of natural gas) to the very heavy and very complex.

Hydroelectric Power: The production of electricity from the kinetic energy of falling water.

Hydroelectric Power Plant: A plant in which the turbine generators are driven by falling water.

Imports: Receipts of goods into the 50 States and the District of Columbia from foreign countries and from Puerto Rico, the Virgin Islands, and other U.S. possessions and territories.

Indicated Resources, Coal: Coal for which estimates of the rank, quality, and quantity are based partly on sample analyses and measurements and partly on reasonable geologic projections. Indicated resources are computed partly from specified measurements and partly from projection of visible data for a reasonable distance on the basis of geologic evidence. The points of observation are 1/2 to 1-1/2 miles apart. Indicated coal is projected to extend as a 1/2-mile-wide belt that lies more than 1/4 mile from the outcrop or points of observation or measurement.

Industrial Sector: The industrial sector comprises manufacturing industries which make up the largest part of the sector along with mining, construction, agriculture, fisheries, and forestry. Establishments in this sector range from steel mills, to small farms, to companies assembling electronic components. The SIC codes used to classify establishments as industrial are 1 through 39.

Internal Combustion Electric Power Plant: A power plant in which the prime mover is an internal combustion engine. Diesel or gas-fired engines are the principal types used in electric power plants. The plant is usually operated during periods of high demand for electricity.

International Bunkers: Storage compartments, found on vessels and aircraft engaged in international commerce, where fuel to be used by the vessel or aircraft is stored.

Jet Fuel: The term includes kerosene-type jet fuel and naphtha-type jet fuel. Kerosene-type jet fuel is a kerosene-quality product used primarily for commercial turbojet and turboprop aircraft engines. Naphtha-type jet fuel is a fuel in the heavy naphthas range used primarily for military turbojet and turboprop aircraft engines.

Kerosene: A petroleum distillate that has a maximum distillation temperature of 401° F at the 10-percent recovery point, a final boiling point of 572° F, and a minimum flash point of 100° F. Included are the two grades designated in ASTM D3699 (No. 1-K and No. 2-K) and all grades of kerosene called range or stove oil. Kerosene is used in space heaters, cook stoves, and water heaters; it is suitable for use as an illuminant when burned in wick lamps.

Lease and Plant Fuel: Natural gas used in well, field, and lease operations (such as gas used in drilling operations, heaters, dehydrators, and field compressors), and as fuel in natural gas processing plants.

Lease Condensate: A natural gas liquid recovered from gas well gas (associated and non-associated) in lease separators or natural gas field facilities. Lease condensate consists primarily of pentanes and heavier hydrocarbons.

Light Oil: Lighter fuel oils distilled off during the refining process. Virtually all petroleum used in internal combustion and gas-turbine engines is light oil.

Lignite: A brownish-black coal of low rank with a high content of moisture and volatile matter. Often referred to as brown coal. It is used almost exclusively for electric power generation. It conforms to ASTM Specification D388-84 for lignite.

Line-Miles of Seismic Exploration: The distance along the Earth's surface that is covered by seismic surveying.

Liquefied Natural Gas (LNG): Natural gas (primarily methane) that has been liquefied by reducing its temperature to -260° F at atmospheric pressure.

Liquefied Petroleum Gases (LPG): Ethane, ethylene, propane, propylene, normal butane, butylene, and isobutane produced at refineries or natural gas processing plants, including plants that fractionate new natural gas plant liquids.

Liquefied Refinery Gases (LRG): Liquefied petroleum gases fractionated from refinery or still gases. Through compression and/or refrigeration, they are retained in the liquid state. The reported categories are ethane/ethylene, propane/propylene, normal butane/butylene, and isobutane. Excludes still gas.

Low-Power Testing: The period of time between a nuclear generating unit's initial fuel loading date and the issuance of its operating (full-power) license. The maximum level of operation during that period is 5 percent of the unit's design thermal rating.

Lubricants: Substances used to reduce friction between bearing surfaces or as process materials either incorporated into other materials used as processing aids in the manufacturing of other products or as carriers of other materials. Petroleum lubricants may be produced either from distillates or residues. Other substances may be added to impart or improve certain required properties. Excluded are by-products of lubricating oil refining, such as aromatic extracts derived from solvent extraction or tars derived from deasphalting. Lubricants include all grades of lubricating oils from spindle oil to cylinder oil and those used in greases. Lubricant categories include paraffinic and naphthenic.

Main Cooking Fuel: Fuel most often used for cooking.

Main Heating Equipment: Equipment used primarily for heating ambient air in the housing unit.

Main Heating Fuel: Fuel that powers the main heating equipment.

Major Electric Utility: A utility that, in the last 3 consecutive calendar years, had sales or transmission services exceeding one of the following: (1) 1 million megawatthours of total annual sales; (2) 100 megawatthours of annual sales for resale; (3) 500 megawatthours of annual gross interchange out; or (4) 500 megawatthours of wheeling (deliveries plus losses) for others.

Major Fuels: The energy sources or fuels for which consumption and expenditure data were collected on the 1986 Nonresidential Building Energy Consumption Survey. Those fuels or energy sources are as follows: electricity, fuel oil, liquefied petroleum gases, natural gas, district steam, district hot water, and district chilled water.

Manufacturing Establishment: An economic unit at a single physical location where the mechanical or chemical transformation of materials or substances into new products is performed. Those operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and material handling equipment. In addition, the assembly of components of manufactured products is considered manufacturing, as is the blending of materials, such as lubricating oil, plastics, resins, or liquors. Manufacturing establishments are covered by SIC codes 20 through 39.

Manufacturing Sector: The universe of manufacturing establishments within the 50 States and the District of Columbia.

Measured Resources, Coal: Coal resources for which estimates of the rank, quality, and quantity have been computed, within a margin of error of less than 20 percent, from sample analyses and measurements from closely spaced and geologically well known sample sites. Measured resources are computed from dimensions revealed in outcrops, trenches, mine workings, and drill holes. The points of observation and measurement are so closely spaced and the thickness and extent of coals are so well defined that the tonnage is judged to be accurate within 20 percent. Although the spacing of the point of observation necessary to demonstrate continuity of the coal differs from region to region, according to the character of the coalbeds, the points of observation are no greater than 1/2 mile apart. Measured coal is projected to extend as a belt 1/4 mile wide from the outcrop or points of observation or measurement.

Metallurgical Coal: Coal that meets the requirements for making coke. It must be low in ash and sulfur and form a coke that is capable of supporting the charge of iron ore and limestone in a blast furnace. A blend of two or more bituminous coals is usually required to make coke.

Methanol: A light, volatile alcohol (CH_3OH) eligible for motor gasoline blending. See **Oxygenates.**

Metropolitan: Refers to buildings located within Metropolitan Statistical Areas (MSA's) as defined in the 1980 Census. Except in New England, an MSA is a county or a group of contiguous counties that contains at least one city of 50,000 inhabitants or more, or twin cities with a combined population of 50,000 or more. The contiguous counties are included in an MSA if they are essentially metropolitan in character and are socially and economically integrated with the central city. In New England, MSA's consist of towns and cities rather than counties.

Miscellaneous Petroleum Products: All finished petroleum products not classified elsewhere, for example, petrolatum, lube refining by-products (aromatic extracts and tars), absorption oils, ram-jet fuel, petroleum rocket fuels, synthetic natural gas feedstocks, and specialty oils.

Motor Gasoline: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, obtained by blending appropriate refinery streams to form a fuel suitable for use in spark-ignition engines. Motor gasoline includes both leaded and unleaded grades of finished motor gasoline, blending components, and gasohol.

Motor Gasoline Blending Components: Naphthas that will be used for blending or compounding into finished motor gasoline (e.g., straight-run gasoline, alkylate, reformate, benzene, toluene, and xylene). Excluded are oxygenates (alcohols and ethers), butane, and pentanes plus.

Motor Gasoline, Finished: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, that has been blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as given in ASTM Specification D439 or Federal Specification VV-G-1690B, includes a range in distillation temperatures from 122 to 158° F at the 10-percent recovery point and from 365 to 374° F at the 90-percent recovery point. Motor gasoline includes reformulated motor gasoline, oxygenated motor gasoline (Environmental Protection Agency [EPA] approved), and other finished motor gasoline. Blendstock is excluded until blending has been completed.

- *Reformulated Motor Gasoline:* Motor gasoline, formulated for use in motor vehicles, the composition and properties of which are certified as "reformulated motor gasoline" by the EPA.
- *Oxygenated Motor Gasoline (EPA Approved):* Motor gasoline, formulated for use in motor vehicles, that is intended for use in the EPA carbon monoxide nonattainment program. Reformulated motor gasoline is excluded.
- *Other Finished:* Motor gasoline that is not included in the reformulated or oxygenated categories.

Motor Gasoline, Finished Gasohol: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol, but sometimes methanol) in which 10 percent or more of the product is alcohol.

Motor Gasoline, Finished Leaded: Motor gasoline that contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon. Premium and regular grades are included, depending on the octane rating. Includes leaded gasohol. Blendstock is excluded until blending has been completed. Alcohol that is to be used in the blending of gasohol is also excluded.

Motor Gasoline, Finished Leaded Premium: Motor gasoline having an antiknock index, calculated as (R+M)/2, greater than 90 and containing more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon.

Motor Gasoline, Finished Leaded Regular: Motor gasoline having an antiknock index, calculated as (R+M)/2 greater than or equal to 87 and less than or equal to 90 and containing more than 0.05 gram of lead or 0.005 gram of phosphorus per gallon.

Motor Gasoline, Finished Unleaded: Motor gasoline containing not more than 0.05 gram of lead per gallon and not more than 0.005 gram of phosphorus per gallon. Premium and regular grades are included, depending on the octane rating. Includes unleaded gasohol. Blendstock is excluded until blending has been completed. Alcohol that is to be used in the blending of gasohol is also excluded.

Motor Gasoline, Finished Unleaded Midgrade: Motor gasoline having an antiknock index calculated as (R+M)/2, greater than or equal to 88 and less than or equal to 90 and containing not more than 0.05 gram of phosphorus per gallon.

Motor Gasoline, Finished Unleaded Premium: Motor gasoline having an antiknock index calculated as (R+M)/2, greater than 90 and containing not more than 0.05 gram of lead or 0.005 gram of phosphorus per gallon.

Motor Gasoline, Finished Unleaded Regular: Motor gasoline having an antiknock index, calculated as (R+M)/2, of 87 and containing not more than 0.05 gram of lead per gallon and not more than 0.005 gram of phosphorus per gallon.

Motor Gasoline, Leaded: Motor gasoline that contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon. Premium and regular grades are included.

Motor Gasoline Retail Prices: Motor gasoline prices calculated each month by the Bureau of Labor Statistics (BLS) in conjunction with the construction of the Consumer Price Index (CPI). Those prices are collected in 85 urban areas selected to represent all urban consumers–about 80 percent of the total U.S. population. The service stations are selected initially, and on a replacement basis, in such a way that they represent the purchasing habits of the CPI population. Service stations in the current sample include those providing all types of service (i.e., full-, mini-, and self-service).

Motor Gasoline, Total: Includes finished leaded motor gasoline (premium and regular), finished unleaded motor gasoline (premium, midgrade, and regular), motor gasoline blending components, and gasohol.

Motor Gasoline, Unleaded: Gasoline that contains not more than 0.05 gram of lead per gallon and not more than 0.005 gram of phosphorus per gallon. Premium and regular grades are included, depending on the octane rating.

MTBE (Methyl Tertiary Butyl Ether): An ether, $(CH_3)_3COCH_3$, intended for motor gasoline blending. See **Oxygenates.**

Naphtha: A generic term applied to a petroleum fraction with an approximate boiling range between 122 and 400° F.

Native Gas: The total volume of natural gas indigenous to the storage reservoir at the time the storage started.

Natural Gas: A mixture of hydrocarbons (principally methane) and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in underground reservoirs.

Natural Gas, Dry: The marketable portion of natural gas production, which is obtained by subtracting extraction losses, including natural gas liquids removed at natural gas processing plants, from total production.

Natural Gas Gross Withdrawals: Full well stream volume of produced natural gas, excluding condensate separated at the lease.

Natural Gas Liquids (NGL): Those hydrocarbons in natural gas that are separated as liquids from the gas. Natural gas liquids include natural gas plant liquids (primarily ethane, propane, butane, and isobutane), and lease condensate (primarily pentanes produced from natural gas at lease separators and field facilities.)

Natural Gas Marketed Production: Gross withdrawals of natural gas from production reservoirs, less gas used for reservoir repressuring; nonhydrocarbon gases removed in treating and processing operations; and quantities vented and flared.

Natural Gas Plant Liquids (NGPL): Natural gas liquids recovered from natural gas in processing plants and, in some situations, from natural gas field facilities, as well as those extracted by fractionators. Natural gas plant liquids are defined according to the published specifications of the Gas Processors Association and the American Society for Testing and Materials as follows: ethane, propane, normal butane, isobutane, pentanes plus, and other products from natural gas processing plants (i.e., products meeting the standards for finished petroleum products produced at natural gas processing plants, such as finished motor gasoline, finished aviation gasoline, special naphthas, kerosene, distillate fuel oil, and miscellaneous products).

Natural Gas Wellhead Price: The wellhead price of natural gas is calculated by dividing the total reported value at the wellhead by the total quantity produced as reported by the appropriate agencies of individual producing States and the U.S. Minerals Management Service. The price includes all costs prior to shipment from the lease, including gathering and compression costs, in addition to State production, severance, and similar charges.

Natural Gas, Wet: Natural gas prior to the extraction of liquids and other miscellaneous products.

NERC: See **North American Electric Reliability Council.**

Net Income: Operating income plus earnings from unconsolidated affiliates; gains from disposition of property, plant, and equipment; minority interest income; and foreign currency translation effects less income taxes, extraordinary items, and the cumulative effect of accounting changes.

Net Ownership Interest: The sum of net working interest and royalty interest. Net ownership interest applies to both production and reserves.

Net Property Investment: The original cost of property, plant, and equipment (PP&E), less accumulated depreciation.

Net Summer Capability: The steady hourly output that generating equipment is expected to supply to system load, exclusive of auxiliary power, as demonstrated by testing at the time of summer peak demand.

Net Working Interest: A company's working interest, not including any basic royalty or overriding royalty interests.

Nominal Price: The price paid for a product or service at the time of the transaction. The nominal price, which is expressed in current dollars, is not adjusted to remove the effect of changes in the purchasing power of the dollar.

Nonhydrocarbon Gases: Typical nonhydrocarbon gases that may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide, and nitrogen.

Nonmetropolitan: Refers to buildings not located within Metropolitan Statistical Areas as defined in the 1980 Census.

Nontraceables: Those revenues, costs, assays, and liabilities that cannot be directly attributed to a type of business by use of a reasonable allocation method developed on the basis of operating-level utilities.

Nonutility Power Producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns electric generating capacity and is not an electric utility. Nonutility power producers include qualifying cogenerators, qualifying small power producers, and other nonutility generators (including independent power producers) without a designated, franchised service area that do not file forms listed in the *Code of Federal Regulations*, Title 18, Part 141.

North American Electric Reliability Council (NERC): A council formed in 1968 by the electric utility industry to promote the reliability and adequacy of bulk power supply in the electric utility systems of North America. The NERC consists of nine regional reliability councils and encompasses essentially all the power systems of the contiguous United States and Canada. The NERC regions are as follows: (1) East Central Area Reliability Coordination Agreement (ECAR); (2) Electric Reliability Council of Texas (ERCOT); (3) Mid-America Interpol Network (MAIN); (4) Mid-Atlantic Area Council (MAAC); (5) Mid-Continent Area Power Pool (MAPP); (6) Northeast Power Coordinating Council (NPCC); (7) Southeastern Electric Reliability Council (SERC); (8) Southwest Power Pool (SPP); and (9) Western Systems Coordinating Council (WSCC).

Nuclear Electric Power: Electricity generated by an electric power plant whose turbines are driven by steam generated in a reactor by heat from the fissioning of nuclear fuel.

Nuclear Electric Power Plant: A single-unit or multi-unit facility in which heat produced in one or more reactors by the fissioning of nuclear fuel is used to drive one or more steam turbines.

Nuclear Reactor: An apparatus in which the nuclear fission chain can be initiated, maintained, and controlled so that energy is released at a specific rate. The reactor includes fissionable material (fuel), such as uranium or plutonium; fertile material; moderating material (unless it is a fast reactor); a heavy-walled pressure vessel; shielding to protect personnel; provision for heat removal; and control elements and instrumentation.

Offshore: That geographic area that lies seaward of the coastline. In general, the coastline is the line of ordinary low water along with that portion of the coast that is in direct contact with the open sea or the line marking the seaward limit of inland water.

Oil: See **Crude Oil (Including Lease Condensate).**

Oil Well: A well completed for the production of crude oil from one or more oil zones or reservoirs. Wells producing both crude oil and natural gas are classified as oil wells.

Operable (nuclear): A U.S. nuclear generating unit is considered operable after it completes low-power testing and is issued a full-power operating license by the Nuclear Regulatory Commission. A foreign nuclear generating unit is considered operable once it has generated electricity to the grid.

Operable Refineries: Refineries that were in one of the following three categories at the beginning of a given year: in operation; not in operation and not under active repair, but capable of being placed into operation within 30 days; or not in operation, but under active repair that could be completed within 90 days.

Operating Income: Operating revenues less operating expenses. Excludes items of other revenue and expense, such as equity in earnings of unconsolidated affiliates, dividends, interest income and expense, income taxes, extraordinary items, and cumulative effect of accounting changes.

Organization for Economic Cooperation and Development (OECD): Current members are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States and its territories (Guam, Puerto Rico, and the Virgin Islands), and Germany.

Organization of Petroleum Exporting Countries (OPEC): Countries that have organized for the purpose of negotiating with oil companies on matters of oil production, prices, and future concession rights. OPEC members are Algeria, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela. As of December 31, 1992, Equador withdrew its membership in OPEC.

Other Hydrocarbons (petroleum): Other materials processed at refineries. Includes coal tar derivatives, hydrogen, gilsonite, and natural gas received by the refinery for reforming into hydrogen.

Oxygenated Motor Gasoline: See **Motor Gasoline, Finished.**

Oxygenates: Any substance which, when added to motor gasoline, increases the amount of oxygen in that motor gasoline blend. Through a series of waivers and interpretive rules, the Environmental Protection Agency (EPA) has determined the allowable limits for oxygenates in unleaded gasoline. The "Substantially Similar" Interpretive Rules (56 FR [February 11, 1991]) allows blends of aliphatic alcohols other

than methanol and aliphatic ethers, provided the oxygen content does not exceed 2.7 percent by weight. The "Substantially Similar" Interpretive Rules also provide for blends of methanol up to 0.3 percent by volume exclusive of other oxygenates, and butanol or alcohols of a higher molecular weight up to 2.75 percent by weight. Individual waivers pertaining to the use of oxygenates in unleaded motor gasoline have been issued by the EPA. They include the following:

- *Fuel Ethanol:* Blends of up to 10 percent by volume anhydrous ethanol (200 proof).
- *Methanol:* Blends of methanol and gasoline-grade tertiary butyl alcohol (GTBA) such that the total oxygen content does not exceed 3.5 percent by weight and the ratio of methanol to GTBA is less than or equal to 1. It is also specified that this blended fuel must meet ASTM volatility specifications.
  Blends of up to 5.0 percent by volume methanol with a minimum of 2.5 percent by volume cosolvent alcohols having carbon number of 4 or less (i.e., ethanol, propanol, butanol, and/or GTBA). The total oxygen must not exceed 3.7 percent by weight, and the blend must meet ASTM volatility specfications as well as phase separation and alcohol purity specifications.
- *MTBE (Methyl tertiary butyl ether):* Blends up to 15.0 percent by volume MTBE that must meet the ASTM D4814 specifications. Blenders must take precautions that the blends are not used as base gasolines for other oxygenated blends.

Pentanes Plus: A mixture of hydrocarbons, mostly pentanes and heavier, extracted from natural gas. Includes isopentane, natural gasoline, and plant condensate.

Petrochemical Feedstocks: Chemical feedstocks derived from petroleum principally for the manufacture of chemicals, synthetic rubber, and a variety of plastics. The categories reported are naphthas less than 401°F endpoint and other oils equal to or greater than 401°F endpoint.

Petroleum: A generic term applied to oil and oil products in all forms, such as crude oil, lease condensate, unfinished oils, petroleum products, natural gas plant liquids, and nonhydrocarbon compounds blended into finished petroleum products.

Petroleum Coke: A residue that is the final product of the condensation process in cracking. The product is either marketable petroleum coke or catalyst petroleum coke.

Petroleum Coke, Catalyst: The carbonaceous residue that is deposited on and deactivates the catalyst used in many catalytic operations (e.g., catalytic cracking). Carbon is deposited on the catalyst, thus deactivating the catalyst. The catalyst is reactivated by burning off the carbon, which is used as a fuel in the refining process. That carbon or coke is not recoverable in a concentrated form.

Petroleum Coke, Marketable: Those grades of coke produced in delayed or fluid cokers that may be recovered as relatively pure carbon. Marketable petroleum coke may be sold as is or further purified by calcining.

Petroleum Consumption: The sum of all refined petroleum products supplied. For each refined petroleum product, the amount supplied is calculated by adding production and imports, then subtracting changes in primary stocks (net withdrawals are a plus quantity and net additions are a minus quantity) and exports.

Petroleum Imports: Imports of petroleum into the 50 States and the District of Columbia from foreign countries and from Puerto Rico, the Virgin Islands, and other U.S. territories and possessions. Included are imports for the Strategic Petroleum Reserve and withdrawals from bonded warehouses for onshore consumption, offshore bunker use, and military use. Excluded are receipts of foreign petroleum into bonded warehouses and into U.S. territories and U.S. Foreign Trade Zones.

Petroleum Products: Products obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, liquefied petroleum gases, pentanes plus, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Petroleum Products Supplied: See **Petroleum Consumption.**

Petroleum Stocks, Primary: For individual products, quantities that are held at refineries, in pipelines, and at bulk terminals that have a capacity of 50,000 barrels or more, or that are in transit thereto. Stocks held by product retailers and resellers, as well as tertiary stocks held at the point of consumption, are excluded. Stocks of individual products

held at gas processing plants are excluded from individual product estimates but are included in other oil estimates and total.

Photovoltaic and Solar Thermal Energy (as used at electric utilities): Energy radiated by the sun as electromagnetic waves (electromagnetic radiation) that is converted at electric utilities into electricity by means of solar (photovoltaic) cells or concentrating (focusing) collectors.

Photovoltaic Module: A group of photovoltaic cells. (Cells are solid-state devices that produce electricity when exposed to sunlight.) The electricity is used primarily in applications requiring remote power, such as radio communication, cathodic protection, and navigational aids.

Pipeline: A continuous pipe conduit, complete with such equipment as valves, compressor stations, communications systems, and meters for transporting natural gas and/or supplemental gaseous fuels from one point to another, usually from a point in or beyond the producing field or processing plant to another pipeline or to points of utilization. Also refers to a company operating such facilities.

Plant Condensate: One of the natural gas liquids, mostly pentanes and heavier hydrocarbons, recovered and separated as liquids at gas inlet separators or scrubbers in processing plants.

Primary Energy Consumption Expenditures: Expenditures for energy consumed in each of the four major end-use sectors, excluding energy in the form of electricity, plus expenditures by the electric utilities sector for energy used to generate electricity. There are no fuel-associated expenditures for hydroelectric power, geothermal energy, photovoltaic and solar energy, or wind energy. Also excluded are the quantifiable consumption expenditures that are an integral part of process fuel consumption.

Process Fuel: All energy consumed in the acquisition, processing, and transportation of energy. Quantifiable process fuel includes three categories: natural gas lease and plant operations, natural gas pipeline operations, and oil refinery operations.

Processing Gain: The amount by which total volume of refinery ouput is greater than the volume of input for a given period of time. The processing gain arises when crude oil and other hydrocarbons are processed into products that are, on average, less dense than the input.

Processing Loss: The amount by which total volume of refinery output is less than input for a given period of time. The processing loss arises when crude oil and other hydrocarbons are processed into products that are, on average, more dense than the input.

Processing Plant (natural gas): A surface installation designed to separate and recover natural gas liquids from a stream of produced natural gas through the processes of condensation, absorption, refrigeration, or other methods, and to control the quality of natural gas marketed or returned to oil or gas reservoirs for pressure maintenance, repressuring, or cycling.

Propane: A normally gaseous straight-chain hydrocarbon (C_3H_8). It is a colorless paraffinic gas that boils at a temperature of -43.67° F. It is extracted from natural gas or refinery gas streams. It includes all products designated in ASTM Specification D1835 and Gas Processors Association Specifications for commercial propane and HD-5 propane.

Propylene: An olefinic hydrocarbon (C_3H_6) recovered from refinery or petrochemical processes.

Proved Reserves, Crude Oil: The estimated quantities of all liquids defined as crude oil that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Proved Reserves, Lease Condensate: The volumes of lease condensate expected to be recovered in future years in conjunction with the production of proved reserves of natural gas based on the recovery efficiency of lease and/or field separation facilities installed.

Proved Reserves, Natural Gas: The estimated quantities of natural gas that analysis of geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Proved Reserves, Natural Gas Liquids: Those volumes of natural gas liquids (including lease condensate) demonstrated with reasonable certainty to be separable in the future from proved natural gas reserves, under existing economic and operating conditions.

Real Price: A price that has been adjusted to remove the effect of changes in the purchasing power of the dollar. Real prices, which are

expressed in constant dollars, usually reflect buying power relative to a base year.

Refiner Acquisition Cost of Crude Oil: The cost of crude oil to the refiner, including transportation and fees. The composite cost is the weighted average of domestic and imported crude oil costs.

Refinery Input: The raw materials and intermediate materials processed at refineries to produce finished petroleum products. They include crude oil, products of natural gas processing plants, unfinished oils, other hydrocarbons and alcohol, motor gasoline and aviation gasoline blending components, and finished petroleum products.

Refinery Output: The total amount of petroleum products produced at a refinery. Includes petroleum consumed by the refinery.

Refinery (petroleum): An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and alcohol.

Renewable Energy: Energy obtained from sources that are essentially inexhaustible (unlike, for example, the fossil fuels, of which there is a finite supply). Renewable sources of energy include wood, waste, photovoltaic, and solar thermal energy.

Reservoir Repressuring: The injection of a pressurized fluid (such as air, gas, or water) into oil and gas reservoir formations to effect greater ultimate recovery.

Residential Building: A structure used primarily as a dwelling for one or more households.

Residential Sector: The residential sector is considered to consist of all private residences, whether occupied or vacant, owned or rented, including single-family homes, multifamily housing units, and mobile homes. Secondary homes, such as summer homes, are also included. Institutional housing, such as school dormitories, hospitals, and military barracks, generally are not included in the residential sector; they are included in the commercial sector. The Standard Industrial Classification (SIC) code used to classify an establishment as residential is 88 (Household).

Residential Vehicles: Motorized vehicles used by U.S. households for personal transportation. Excluded are motorcycles, mopeds, large trucks, and buses. Included are automobiles, station wagons, passenger vans, cargo vans, motor homes, pickup trucks, and jeeps or similar vehicles. In order to be included, vehicles must be: (1) owned by members of the household, or (2) company cars not owned by household members but regularly available to household members for their personal use and ordinarily kept at home, or (3) rented or leased for 1 month or more.

Residual Fuel Oil: The heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations and that conform to ASTM Specifications D396 and D975. Included are No. 5, a residual fuel oil of medium viscosity; Navy Special, for use in steam-powered vessels in government service and in shore power plants; and No. 6, which includes Bunker C fuel oil and is used for commercial and industrial heating, electricity generation, and to power ships. Imports of residual fuel oil include imported crude oil burned as fuel.

Road Oil: Any heavy petroleum oil, including residual asphaltic oil, used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades, from 0, the most liquid, to 5, the most viscous.

Rotary Rig: A machine used for drilling wells that employs a rotating tube attached to a bit for boring holes through rock.

Royalty Interest: An interest in a mineral property provided through a royalty contract.

Rural Area: A place that had a population of less than 2,500 as of the 1980 U.S. Census.

Short Ton (coal): A unit of weight equal to 2,000 pounds.

SIC: See **Standard Industrial Classification.**

Solar Collector: Equipment that actively concentrates thermal energy from the sun. The energy is usually used for space heating, for water heating, or for heating swimming pools. Either air or liquid is the working fluid.

Solar Energy: The radiant energy of the sun that can be converted into other forms of energy, such as heat or electricity.

Solar Thermal Collector: A device designed to receive solar radiation and convert it into thermal energy. Normally, a solar thermal collector includes a frame, glazing, and an absorber, together with appropriate insulation. The heat collected by the solar thermal collector may be used immediately or stored for later use.

Solar Thermal Collector, High-Temperature: A collector that generally operates at temperatures above 180° F.

Solar Thermal Collector, Low-Temperature: A collector that generally operates at temperatures below 110° F. Typically, it has no glazing or insulation and is made of plastic or rubber, although some are made of metal.

Solar Thermal Collector, Medium-Temperature: A collector that generally operates at temperatures of 140 to 180° F but can also operate at temperatures as low as 110° F. Typically, it has one or two glazings, a metal frame, a metal absorption panel with integral flow channels or attached tubing (liquid collector) or with integral ducting (air collector) and insulation on the sides and back of the panel.

Solar Thermal Collector, Special: An evacuated tube collector or a concentrating (focusing) collector. Special collectors operate in the temperature range from just above ambient temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

Space Heating: The use of mechanical equipment (including wood stoves and active solar heating devices) to heat all, or part, of a building to at least 50° F.

Special Naphthas: All finished products within the naphtha boiling range that are used as paint thinners, cleaners, or solvents. Those products are refined to a specified flash point. Special naphthas include all commercial hexane and cleaning solvents conforming to ASTM Specifications D1836 and D484, respectively. Naphthas to be blended or marketed as motor gasoline or aviation gasoline, or that are to be used as petrochemical and synthetic natural gas (SNG) feedstocks, are excluded.

Spot Market Price: A transaction price concluded "on the spot," that is, on a one-time, prompt basis; usually the transaction involves only one specific quantity of product. This contrasts with a term contract sale price, which obligates the seller to deliver a product at an agreed frequency and price over an extended period.

Standard Industrial Classification (SIC): A set of codes developed by the Office of Management and Budget which categorizes industries according to groups with similar economic activities.

Startup Test Phase of Nuclear Power Plant: A nuclear power plant that has been licensed by the Nuclear Regulatory Commission to operate but is still in the initial testing phase, during which the production of electricity may not be continuous. In general, when the electric utility is satisfied with the plant's performance, it formally accepts the plant from the manufacturer and places it in commercial operation status. A request is then submitted to the appropriate utility rate commission to include the power plant in the rate base calculation.

Steam-Electric Power Plant: A plant in which the prime mover is a steam turbine. The steam used to drive the turbine is produced in a boiler where fossil fuels are burned.

Still Gas (refinery gas): Any form or mixture of gas produced in refineries by distillation, cracking, reforming, and other processes. The principal constituents are methane, ethane, ethylene, normal butane, butylene, propane, and propylene. It is used primarily as refinery fuel and petrochemical feedstock.

Strategic Petroleum Reserve (SPR): Petroleum stocks maintained by the Federal Government for use during periods of major supply interruption.

Stripper Well (natural gas): A well that produces 60 thousand cubic feet per day or less of gas-well gas, for a period of 3 consecutive months while producing at its maximum rate flow. In determining abandonments, a stripper well is one that produced less than 22.5 million cubic feet in its last 12 months of production.

Stripper Well Property (petroleum): A property whose average daily production of crude oil per well (excluding condensate recovered in nonassociated natural gas production) did not exceed an average of 10

barrels per day during any preceding consecutive 12-month period beginning after December 31, 1972.

Subbituminous Coal: A dull, black coal of rank intermediate between lignite and bituminous coal. It conforms to ASTM Specification D388-84 for subbituminous coal. In this report, subbituminous coal is included in bituminous coal.

Supplemental Gaseous Fuels: Any gaseous substance that, introduced into or commingled with natural gas, increases the volume available for disposition. Such substances include, but are not limited to, propane-air, refinery gas, coke oven gas, still gas, manufactured gas, biomass gas, or air or inert gases added for Btu stabilization.

Synthetic Natural Gas (SNG): A manufactured product chemically similar in most respects to natural gas, resulting from the conversion or reforming of petroleum hydrocarbons. It may easily be substituted for, or interchanged with, pipeline quality natural gas. Also referred to as substitute natural gas.

Transportation Sector: The transportation sector consists of private and public vehicles that move people and commodities. Included are automobiles, trucks, buses, motorcycles, railroads, and railways (including streetcars), aircraft, ships, barges, and natural gas pipelines. The SIC codes used to classify establishments as belonging to the transportation sector are 40 through 49.

Unaccounted-for Crude Oil: Arithmetic difference between the calculated supply and the calculated disposition of crude oil. The calculated supply is the sum of crude oil production and imports, less changes in crude oil stocks. The calculated disposition of crude oil is the sum of crude oil input to refineries, crude oil exports, crude oil burned as fuel, and crude oil losses.

Unaccounted-for Natural Gas: Quantities lost, the net result of flow data metered at varying temperature and pressure conditions and converted to a standard temperature and pressure base; metering inaccuracies; differences between the billing cycle and calendar period timeframes; the effect of variations in company accounting and billing practices; and imbalances from the merger of data reporting systems which vary in scope, format, definitions, and type of respondents.

Underground Storage: The storage of natural gas in underground reservoirs at a different location from which it was produced.

Undiscovered Recoverable Reserves (crude oil and natural gas): Those economic resources of crude oil and natural gas, yet undiscovered, that are estimated to exist in favorable geologic settings.

Unfinished Oils: All oils requiring further refinery processing, except those requiring only mechanical blending. Includes naphthas and lighter oils, kerosene and light gas oils, heavy gas oils, and residuum.

Unfractionated Streams: Mixtures of unsegregated natural gas liquid components, excluding those in plant condensate. This product is extracted from natural gas.

United States: Unless otherwise noted, United States in this publication means the 50 States and the District of Columbia. U.S. exports include shipments to U.S. territories, and imports include receipts from U.S. territories.

Uranium: A heavy, naturally radioactive, metallic element (atomic number 92). Its two principally occurring isotopes are uranium-235 and uranium-238. Uranium-235 is indispensable to the nuclear industry, because it is the only isotope existing in nature to any appreciable extent that is fissionable by thermal neutrons. Uranium-238 is also important, because it absorbs neutrons to produce a radioactive isotope that subsequently decays to plutonium-239, an isotope that also is fissionable by thermal neutrons.

Uranium Ore: Rock containing uranium mineralization (typically 1 to 4 pounds of U_3O_8 per ton or 0.05 percent to 0.2 percent U_3O_8) that can be mined economically.

Uranium Oxide: Uranium concentrate or yellowcake.

Uranium Resources: Uranium resource estimates are divided into three separate categories reflecting different levels of confidence in the quantities estimated: reasonable assured resources, estimated additional resources, and speculative resources. Reasonably assured resources refers to uranium in known mineral deposits of such size, grade, and configuration that it could be recovered within the given cost ranges, with currently proven mining and processing technology. Estimated additional resources refers to

uranium in addition to reasonably assured resources that is expected, mostly on the basis of direct geological evidence, to occur in extensions of well-explored deposits and in deposits in which geological continuity has been well established, as well as in deposits believed to exist in well-defined geologic trends or areas of mineralization with known deposits. Deposits in this category can be discovered and delineated and the uranium subsequently recovered, all within the given cost range. Speculative resources refers to uranium in addition to estimated additional resources that are thought to exist, mostly on the basis of indirect evidence and geological extrapolations.

Urban Area: A place that had a population of 2,500 or more as of the 1970 U.S. Census.

U.S.S.R.: The Union of Soviet Socialist Republics consisted of 15 constituent republics: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. As a political entity, the U.S.S.R. ceased to exist as of December 31, 1991.

Vented Natural Gas: Gas released into the air on the base site or at processing plants.

Vessel: Tankers used to transport crude oil and petroleum products. Vessel categories are as follows: Ultra Large Crude Carrier (ULCC), Very Large Crude Carrier (VLCC), Other Tanker, and Specialty Ships (LPG/LNG).

Waxes: Solid or semisolid materials derived from petroleum distillates or residues. Waxes are light-colored, more or less translucent crystalline masses, slightly greasy to the touch, consisting of a mixture of solid hydrocarbons in which the paraffin series predominates. Included are all marketable waxes, whether crude scale or fully refined. Waxes are used primarily as industrial coating for surface protection.

Well: A hole drilled in the Earth for the purpose of finding or producing crude oil or natural gas; or providing services related to the production of crude oil or natural gas. Wells are classified as oil wells, gas wells, dry holes, stratigraphic test wells, or service wells. The latter two types of wells are counted for Federal Reporting System data reporting. Oil wells, gas wells, and dry holes are classified as exploratory wells or development wells. Exploratory wells are subclassified as new-pool wildcats, deeper-pool tests, shallow-pool tests, and outpost (extension) tests. Well classifications reflect the status of wells after drilling has been completed.

Wellhead Price: The value of crude oil or natural gas at the mouth of the well.

Well Servicing Unit: Truck-mounted equipment generally used for downhole services after a well is drilled. Services include well completions and recompletions, maintenance, repairs, workovers, and well plugging and abandonments. Jobs range from minor operations, such as pulling the rods and rod pumps out of an oil well, to major workovers, such as milling out and repairing collapsed casing. Well depth and characteristics determine the type of equipment used.

Wind Energy (as used at electric utilities): The kinetic energy of wind converted at electric utilities into mechanical energy by wind turbines (i.e., blades rotating from a hub) that drive generators to produce electricity for distribution.

Wood and Waste (as used at electric utilities): Wood energy, garbage, bagasse, sewerage gas, and other industrial, agricultural, and urban refuse used to generate electricity for distribution.

Wood Energy: Wood and wood products used as fuel, including round wood (cord wood), limb wood, wood chips, bark, sawdust, forest residues, charcoal, pulp waste, and spent pulping liquor.

Working Gas: The gas in a reservoir that is in addition to the base (cushion) gas. It may or may not be completely withdrawn during any particular withdrawal season. Conditions permitting, the total working capacity could be used more than once during any given season.

Working Interest: An interest in a mineral property that entitles the owner to explore, develop, and operate a property. The working interest owner bears the costs of exploration, development, and operation of the property and, in return, is entitled to a share of the mineral production from the property or to a share of the proceeds.

Yellowcake: A uranium oxide concentrate that results from milling (concentrated) uranium ore. It is the final precipitate formed in the milling process. U_3O_8, a common form of triuranium oxide, is the powder obtained by evaporating an ammonia solution of the oxide. Yellowcake typically contains 80 percent to 90 percent U_3O_8.

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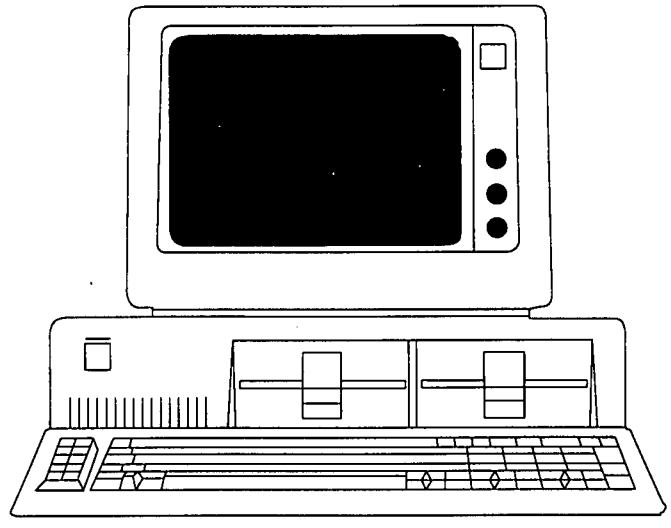

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Historical Integrated Energy Data Reports from the Energy Information Administration

The ***Monthly Energy Review**** (DOE/EIA–0035) presents current monthly data on production, consumption, stocks, imports, exports, and prices of the principal energy commodities in the United States. Also included are data on international production of crude oil, consumption of petroleum products, petroleum stocks, and production of electricity from nuclear-powered facilities.

The ***Historical Monthly Energy Review**** (DOE/EIA–0035(73-92)), available in September 1994, presents monthly data from January 1973 through December 1992 for most of the series that are published for current months only in the *Monthly Energy Review.*

The ***Annual Energy Review**** (DOE/EIA–0384) presents long-term historical annual energy data. Most series begin in 1949. U.S. energy consumption, production, trade, and prices are included. Major sections of the report are energy overview, consumption indicators, financial indicators, energy resources, petroleum, natural gas, coal, electricity, nuclear energy, renewable energy, and international energy.

The ***State Energy Data Report**** (DOE/EIA–0214) presents estimates of annual energy consumption at the State and national levels by major sector (i.e., residential, commercial, industrial, transportation, and electric utilities) and by principal energy type for selected years. The base year is 1960. The report includes documentation of the consumption estimates for each source of energy, the sources of all data, and a summary of changes made to historical data in the report since its previous release.

The ***State Energy Price and Expenditure Report**** (DOE/EIA–0376) presents annual energy price and expenditure estimates at the State and national levels for selected years. The base year is 1970. The estimates are presented by energy source (e.g., petroleum, natural gas, coal, and electricity) and by major sector (i.e., residential, commercial, industrial, transportation, and electric utilities). The report includes documentation of the price estimates for each type of energy, the sources of all data, and a summary of any changes made to historical data in the report since its previous release.

The ***International Energy Annual*** (DOE/EIA–0219) presents annual data for production, consumption, imports, and exports of primary energy commodities in more than 190 countries, dependencies, and areas of special sovereignty. Also included are prices of crude oil and petroleum products in selected countries. The data presented are derived largely from national publications, international organizations, and other authoritative sources. The data are converted to units of measurement and thermal values familiar to the American public.

The ***International Petroleum Statistics Report*** (DOE/EIA–0520) presents current monthly international petroleum data on production, consumption, imports, and stocks. Included are oil consumption and stocks for specific countries in the Organization for Economic Cooperation and Development (OECD). Also provided are the oil supply-consumption balances for the world in quarterly intervals and oil imports by OECD countries.

* Data for this report are also available on computer diskettes.

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