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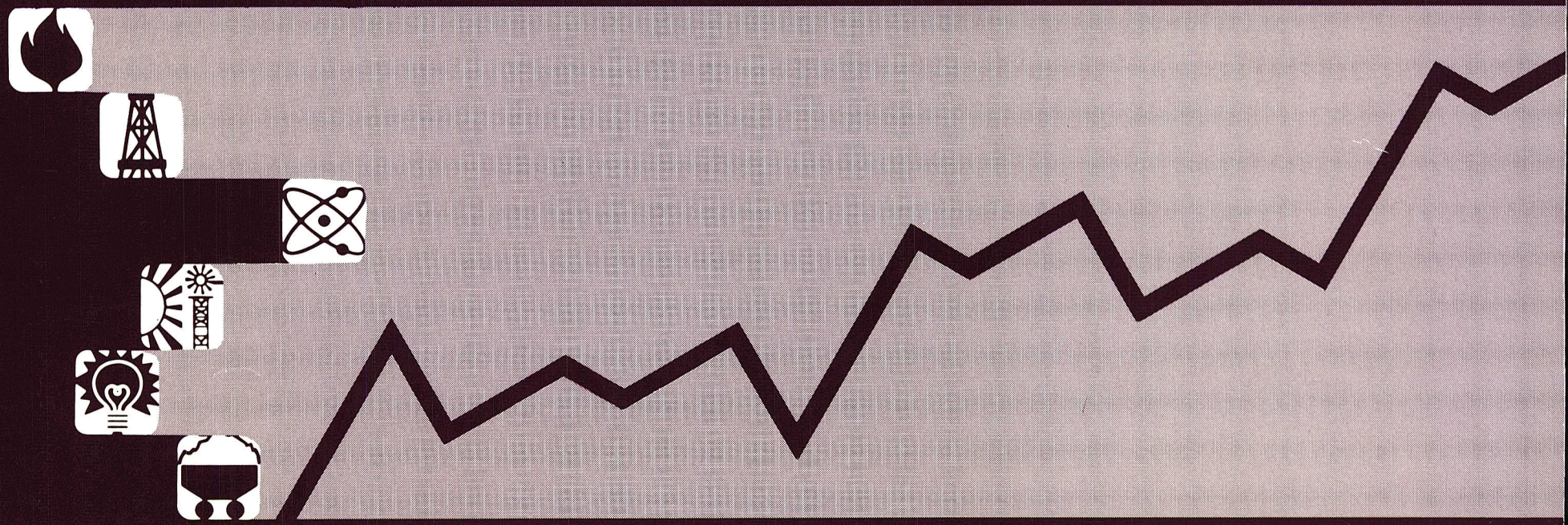
Annual Energy Review 1987



Annual Energy Review

The *Annual Energy Review* presents historical and current 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.

Publication of this report is in keeping with responsibilities given the Energy Information Administration in Public Law 95-91 (Section 205(a)(2)), which states:

> "The Administrator shall be responsible for carrying out a central, comprehensive, and unified energy data and information program which will collect, evaluate, assemble, analyze and disseminate data and information . . . ."

The *Annual Energy Review* is intended for use by Members of Congress, Federal and State agencies, and the general public. A copy of the 1987 report may be obtained by using the order form in the back of this publication.

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Major Energy Developments, 1987

Energy Markets Show Signs of Recovery

In 1987, world energy markets began to show signs of recovering from the disruptions of 1986, when world oil prices plunged. In 1986, excess production—sustained by the Organization of Petroleum Exporting Countries' (OPEC) struggles to regain market share—had led to the unprecedented decline in oil prices. In 1987, OPEC's ability to limit its production, coupled with a moderate increase in world oil demand, resulted in stable oil prices in the $18-per-barrel range for most of the year.

In the United States, economic conditions favored price recovery. Domestic gross national product (in constant dollars) was up 2.9 percent from the 1986 level, and the index of industrial production rose 4 percent in 1987. In combination with the relative stability of oil prices, the growth in the economy led to limited recovery in domestic markets, particularly during the second half of the year. Despite a decline in petroleum production, total energy production registered a small increase, to 65 quadrillion Btu, and energy demand rose to 76 quadrillion Btu, up more than 2 percent from the 1986 level (1).

Exploration and Production: Mixed Results

Although oil prices were higher than in 1986, they were still significantly below prices during the first half of the 1980's (63), and domestic crude oil production fell to less than 18 quadrillion Btu in 1987, down for the second consecutive year (2). Production in the lower 48 States suffered the effects of deferred well maintenance, shut-ins, and a decreasing number of new well completions. Increased production at Lisborne and Endicott fields boosted Alaskan production to a record high but failed to compensate for the decrease in lower-48 production (47).

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Continuing low oil prices led to further cutbacks in petroleum exploration, even from the low levels of 1986 (37 and 38). In 1987, the average number of seismic crews fell 12 percent to 176, the average number of rotary rigs in use fell 3 percent to 936, and completions of exploratory wells fell 9 percent to about 6 thousand.

In contrast, the domestic refinery industry had benefited from market conditions in 1986—in particular from netback pricing agreements that guaranteed refining margins. In 1987, the refinery utilization rate held to the 1986 level of 83 percent, much improved from the 78-percent rate in 1985 (54).

Unlike crude oil production, production of all other major forms of energy except hydroelectricity increased in 1987 (2). Coal production reached a record high of over 20 quadrillion Btu, surpassing crude oil production by 2.5 quadrillion Btu, the largest margin in over 30 years. Natural gas production rose to 17 quadrillion Btu, up 2 percent from the previous year.

Net generation of electricity rose 3 percent in 1987 to a record level of 2.6 trillion kilowatthours (83). The 1986-to-1987 growth in generation contrasted with 1985-to-1986 growth of less than 1 percent. Coal-fired generation increased by 6 percent, to 1.5 trillion kilowatthours, as competition from cheaply priced heavy oil eased. Coal continued to fuel over half of all generation, while natural gas and hydroelectricity accounted for 11 percent and 10 percent, respectively. Oil-fired generation accounted for a 5-percent share.

U.S. nuclear-based generation reached an all-time high in 1987 of 455 billion kilowatthours and provided nearly 18 percent of total U.S. generation (93). The United States remained the largest producer of nuclear-based generation among the non-Communist countries, and its share of the total rose to 32 percent (112). Nuclear-based generation in all non-Communist countries combined reached 1.5 trillion kilowatthours in 1987.

Adjustments in Energy Demand

U.S. total energy consumption,[1] which had crept upward in 1986, rose in 1987 by more than 2 percent (3). Expansion of the domestic economy encouraged demand for most forms of energy—including petroleum, despite the partial recovery in oil prices.

Consumption of petroleum products rose 2 percent to almost 17 million barrels per day in 1987, and increased demand for motor gasoline accounted for most of the increase (56). Increased highway travel, spurred by higher real disposable income, and legislation in 38 States allowing travel at higher speeds contributed to heightened demand.

Demand for residual fuel, which had enjoyed a renaissance in 1986 thanks to the oil price plunge, slackened in 1987 and consumption fell to 1.3 million barrels per day.

Natural gas prices declined in 1987, and consumption rose to 17 trillion cubic feet, up 3 percent from the 1986 level (70). Over recent years, structural changes in interstate natural gas markets (see box) have allowed natural gas prices to respond to changes in energy markets, particularly oil markets.

Of the three fossil fuels, coal registered the largest growth in consumption, an increase of 4 percent to 836 million short tons (76). Increased demand for coal by electric utilities, the coal industry's largest market, accounted for all of the growth.

The energy intensity of the U.S. economy continued its decade-long decline as economic growth outpaced growth in energy consumption (18). In 1987, the ratio of end-use consumption of energy to gross national product averaged 15 thousand Btu per constant dollar, down one-third since 1970. Per capita consumption, which had trended downward after 1973, rose from 231 million Btu in 1986 to 234 million Btu in 1987 (17).

Slower Growth in Energy Imports

The partial recovery in oil prices contributed to a slower growth in energy imports in 1987 than in 1986, but the level of net imports for the year—almost 12 quadrillion Btu (5)—fueled concerns about U.S. dependence on foreign sources of supply. In addition, the cost of net imports rose from $29 billion in 1986 to $39 billion in 1987 (16) and continued to contribute to the sizable national trade deficit.

Changes in the trade of all three major energy sources contributed to the growth in net imports. Petroleum net imports rose 6 percent, natural gas net imports rose 33 percent, and coal net exports fell 6 percent (5).

Petroleum continued to account for most of the energy trade. In 1987, petroleum net imports reached 5.8 million barrels per day, the highest level since 1980 but still well below the peak level of 8.6 million barrels per day in 1977 (52). Changes in foreign sources of U.S. petroleum imports reflected the worldwide erosion of OPEC's market share. In 1977, OPEC supplied 72 percent of U.S. petroleum net imports. By 1987, the share had declined to 52 percent.

Among the non-OPEC producers to capture market share from OPEC, Canada and Mexico were the most prominent. In 1987, U.S. net imports from Canada totaled 749 thousand barrels per day and net imports from Mexico totaled 575 thousand barrels per day.

Major Energy Legislation in 1987

•In April, Federal legislation was enacted allowing States **to raise the speed limit** on rural interstate highways to 65 miles per hour. Thirty-eight States had done so by the end of 1987.

•In May, the President signed legislation amending the Powerplant and Industrial Fuel Use Act of 1978 **to allow utilities to use petroleum or natural gas** in new baseload electricity generating units, with the provision that the units be able to convert to coal use. The legislation also **repeals the incremental pricing provisions** of the Natural Gas Policy Act of 1978.

•Federal Energy Regulatory Commission (FERC) Order 500, which replaced FERC Order 436 in September, continues **to promote nondiscriminatory access** to interstate natural gas pipelines and seeks to reduce existing take-or-pay liabilities.

•In December, the President approved legislation that continues the development of a 750-million-barrel **Strategic Petroleum Reserve**, with a minimum fill rate of 50 thousand barrels per day during fiscal year 1988.

[1]Total (gross) energy consumption includes energy consumed to produce, process, and transport energy.

1. Energy Overview

Energy Prices in a Volatile Market

Since the mid-1970's, changes in fossil fuel prices have become more frequent and more pronounced (10). Prior to the Arab oil embargo of 1973–74, the composite price (in 1982 constant dollars per million Btu) of crude oil, natural gas, and coal had gradually declined from $1.12 in 1949 to a post-World War II low of $0.75 in 1969. In 1974, the price rose to $1.25, and eventually peaked at $2.92 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 price of the major fossil fuels fell to $1.45. In 1987, the composite price rose only slightly, to $1.46.

Throughout the period, oil price changes dominated movements in the composite index. Oil prices trended downward between 1949 and 1970 and then rose sharply in 1973–74 and again in 1979–81. Thereafter, in the face of shrinking demand and excess production, price trends reversed sharply. The precipitous fall in 1986 brought oil prices back in line with 1973–74 levels.

Prices of coal and natural gas have been much less volatile than those of oil. Coal markets are more competitive than oil markets, where the output and pricing policies of the Organization of Petroleum Exporting Countries (OPEC) were a major influence throughout much of the 1970's and 1980's. Natural gas prices are 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 1986–87 slump in crude oil prices was severe enough to trigger declines in the prices of the other fossil fuels, particularly natural gas. In 1987, the price of crude oil per million Btu was $2.26, 39 percent below the 1985 price (10). The price of natural gas fell 35 percent, to $1.31, during the 2-year period. The decline in the price of bituminous coal and lignite was smaller—a decrease of 14 percent, to $0.89, in the 2-year period.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Production

Historically, three fossil fuels have accounted for the bulk of domestic energy production, which by 1987 totaled 65 quadrillion Btu (2). Coal accounted for the largest share of domestic energy production in 1949–51 and, after a long hiatus, again in 1984–87. In the interim, first crude oil and then natural gas dominated domestic production. In 1987, coal production totaled 20 quadrillion Btu, crude oil production totaled 18 quadrillion Btu, and dry natural gas production totaled 17 quadrillion Btu. Natural gas plant liquids accounted for another 2 quadrillion Btu.

Electricity generation increased throughout 1949–87, registering only one year-to-year decline (during the economic recession in 1982). Nuclear-based generation increased to the record level of 5 quadrillion Btu in 1987. Since the mid-1970's, coal and nuclear fuels have provided increasing shares of fuel input for power generation, displacing substantial quantities of both petroleum and natural gas.

Nonfuel Use of Energy Sources

The amount of energy used for nonfuel purposes is small compared with the amount of energy consumed by end users or used in the production, processing, and transportation of energy. In 1987, the 4 quadrillion Btu consumed for nonfuel uses represented a 6-percent share of total energy consumption (6).

The nonfuel use of energy is overwhelmingly the use of petroleum products, primarily asphalt and road oil, liquefied petroleum gases (LPG), and petrochemical feedstocks. Use of petroleum for nonfuel purposes appears to be less in 1987 than in 1980; the apparent decline reflects some combination of actual trends and changes in data collection procedures that resulted from the discontinuation of the Energy Information Administration's survey on LPG sales.

Hydroelectric generation accounted for over 1 quadrillion Btu of electricity in 1949 and since the 1970's has provided about 3 quadrillion Btu per year (2). Other sources of renewable energy still provide only a small part of total domestic energy supplied. Generation of electricity from geothermal energy totaled 0.2 quadrillion Btu in 1987, and generation of electricity from wood, waste, wind, photovoltaic, and solar thermal energy totaled 0.02 quadrillion Btu.

Consumption by Energy Source

Energy consumption more than doubled during the 1949–73 period, increasing from 30 quadrillion Btu in 1949 to 74 quadrillion Btu in 1973 (3), 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, rising to a peak of 79 quadrillion Btu in 1979 before returning, in the mid-1980's, to about the same level as in 1973. In contrast, the economy registered a net expansion of about one-third.

The composition of demand after 1973 reflects a shift away from petroleum and natural gas towards electricity generated by other fuels. In 1973, petroleum and natural gas accounted for 77 percent of total energy consumption; by 1987, their share had declined to 66 percent.

Consumption by Sector: Sharing the Energy Pie

Industrial sector consumption proved to be the most responsive to the turmoil in energy markets during the 1970's and 1980's (4). Consumption fluctuated after 1973, but, in 1987, was considerably below the sector's peak consumption in 1979. Increases in efficiencies in industrial operations and expansion in the service trades were primarily responsible for the decline.

Growth in electric utility consumption continued during the 1970's and 1980's despite rising energy prices. In 1987, that sector's consumption reached an all-time high of almost 28 quadrillion Btu. However, only 8 quadrillion Btu were sold to consumers; the remainder was used to generate, transmit, and distribute the electricity (85).

The transportation and residential and commercial sectors accounted for most of the growth in energy consumption during the 1949–87 period. Residential and commercial consumption leveled off in response to higher energy prices, but, when prices fell in 1986–87, grew to a record level of almost 28 quadrillion Btu. Transportation sector consumption grew more slowly over the 39-year period but also attained a record level (21 quadrillion Btu) in 1987.

Changing Patterns of Trade

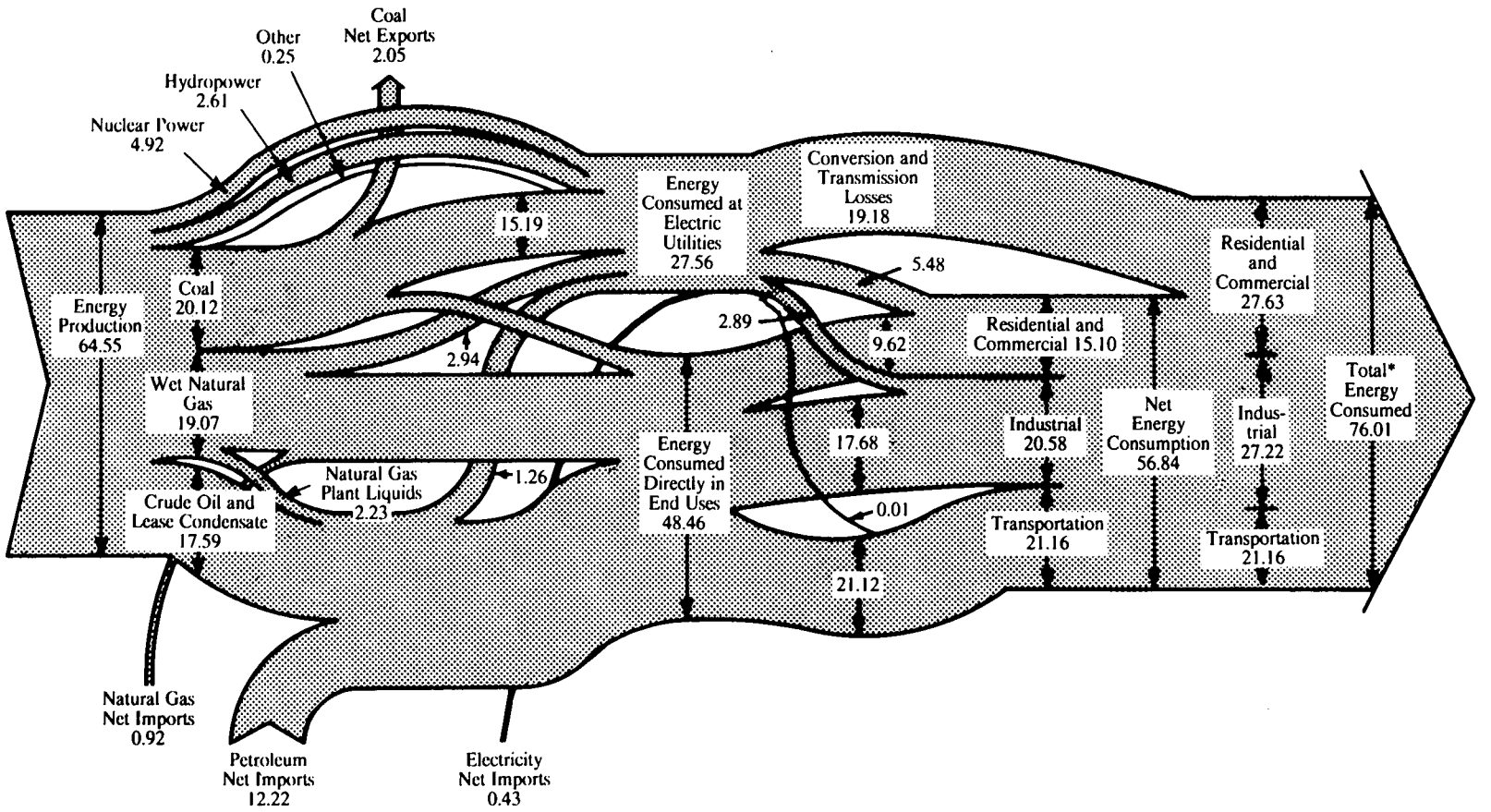
Since 1958, the United States has consumed more energy than it has produced, and the difference has been met by energy imports (5). Net imports of energy (primarily petroleum) grew rapidly from 1953 through 1973, as demand for cheap foreign oil eroded quotas on petroleum imports. In 1973, net imports of petroleum totaled 13 quadrillion Btu.

The Arab oil embargo of 1973–74, coupled with increases 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. That year, U.S. dependence on petroleum net imports also peaked, at 47 percent of consumption (52).

A second round of price increases, in 1979–80, suppressed demand for foreign oil. Net imports declined to 8 quadrillion Btu in 1985, and U.S. dependence fell to 27 percent of consumption. In 1987, however, when the price of crude oil was low, net imports of petroleum rose to 12 quadrillion Btu, and U.S. dependence on foreign sources of oil rose to 35 percent. The value of crude oil and petroleum product net imports increased from $31 billion in 1986 to $40 billion in 1987 (16).

Throughout the 1949-to-1987 period, the United States was a net exporter of coal (5). In 1987, net exports totaled 2 quadrillion Btu. Net exports of coal (including coal coke) were valued at over $3 billion (16).

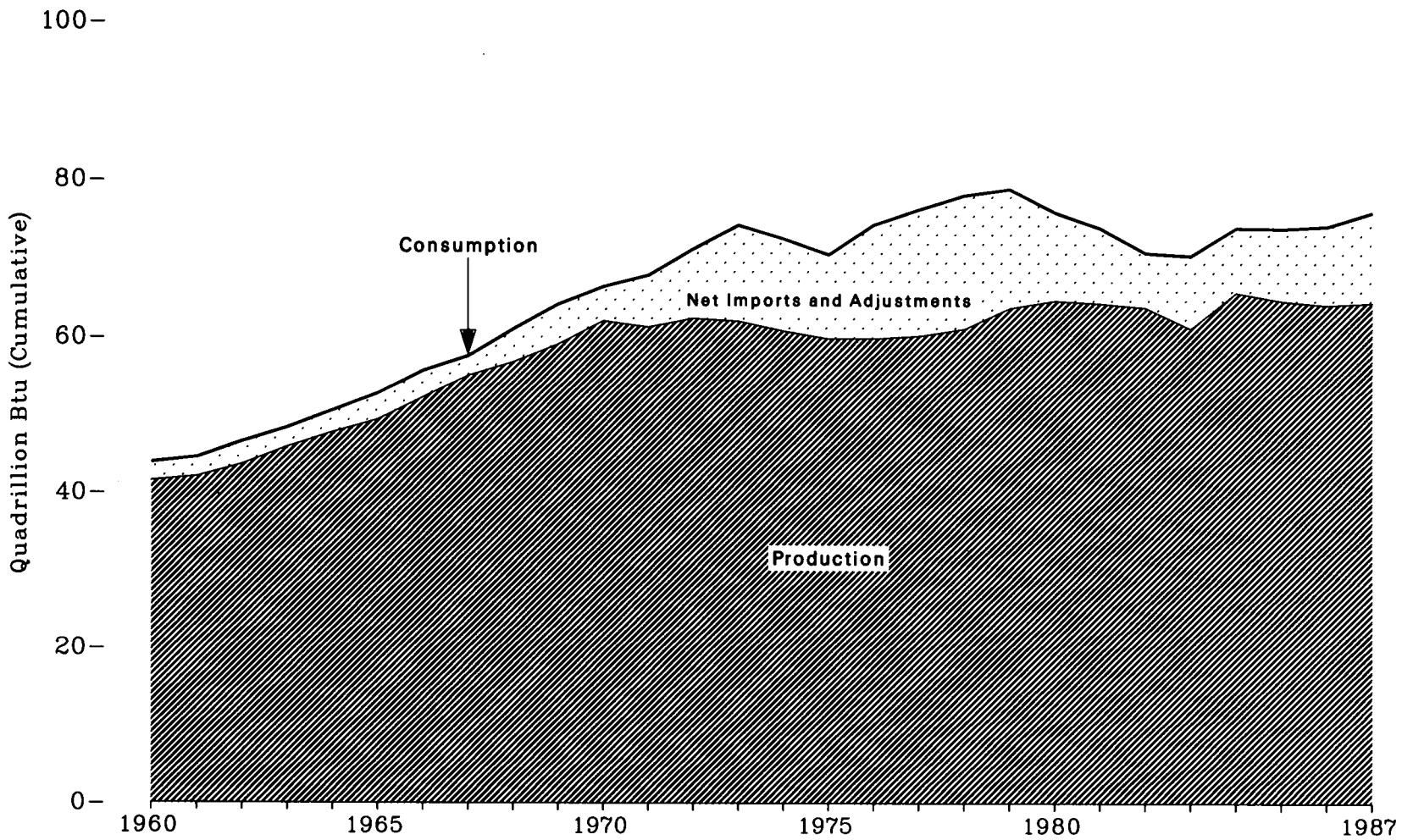
Diagram 1. Total Energy Flow, 1987
(Quadrillion Btu)



*Total Energy Consumed with conversion and transmission losses allocated to end-use sectors in proportion to the sectors' use of electricity.
Note: Sum of components does not equal total due to independent rounding; the use of preliminary conversion factors; and the exclusion of changes in stocks, miscellaneous supply and disposition, and unaccounted for quantities.

Sources: See Tables 2, 4, 5, and 85.

Figure 1. Energy Overview, 1960-1987



Source: See Tables 1,2, and 3.

Table 1. Energy Overview, 1960, 1965, 1970, 1975, and 1980-1987

(Quadrillion Btu)

Activity and Energy Source	1960	1965	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987 [1]
Production												
Crude Oil and Lease Condensate	14.93	16.52	20.40	17.73	18.25	18.15	18.31	18.39	18.85	18.99	18.38	17.59
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	2.23
Natural Gas [2]	12.66	15.78	21.67	19.64	19.91	19.70	18.25	16.53	17.93	16.91	16.47	16.84
Coal	10.82	13.06	14.61	14.99	18.60	18.38	18.64	17.25	19.72	19.33	19.51	20.12
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	4.92
Hydroelectric Power	1.61	2.06	2.63	3.15	2.90	2.76	3.26	3.50	3.31	2.94	3.03	2.61
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
Total Production	41.49	49.34	62.07	59.86	64.76	64.42	63.89	61.19	65.81	64.76	64.25	64.55
Imports												
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	9.99
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	3.89
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
Other [7]	0.07	0.04	0.07	0.19	0.31	0.42	0.36	0.44	0.48	0.54	0.48	0.55
Total Imports	4.23	5.92	8.39	14.11	15.97	13.97	12.09	12.03	12.76	12.10	14.43	15.41
Exports												
Coal	1.02	1.38	1.94	1.76	2.42	2.94	2.79	2.04	2.15	2.44	2.25	2.10
Crude Oil and Petroleum Products	0.43	0.39	0.55	0.44	1.16	1.26	1.73	1.57	1.54	1.66	1.67	1.66
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
Total Exports	1.48	1.85	2.66	2.36	3.72	4.33	4.63	3.72	3.80	4.23	4.05	3.88
Adjustments [9]	-0.43	-0.72	-1.37	-1.07	-1.05	-0.08	-0.51	1.00	-0.70	1.31	-0.36	-0.07
Consumption												
Petroleum Products [10]	19.92	23.25	29.52	32.73	34.20	31.93	30.23	30.05	31.05	30.92	32.20	32.63
Natural Gas	12.39	15.77	21.79	19.95	20.39	19.93	18.51	17.36	18.51	17.83	16.71	17.18
Coal	9.84	11.58	12.26	12.66	15.42	15.91	15.32	15.89	17.07	17.48	17.26	18.00
Nuclear Power	0.01	0.04	0.24	1.90	2.74	3.01	3.13	3.20	3.55	4.15	4.47	4.92
Hydroelectric Power [11]	1.66	2.06	2.65	3.22	3.12	3.11	3.56	3.87	3.72	3.36	3.40	3.04
Other [12]	(4)	-0.01	-0.04	0.09	0.08	0.11	0.09	0.12	0.16	0.20	0.21	0.25
Total Consumption	43.80	52.68	66.43	70.55	75.96	73.99	70.84	70.50	74.06	73.94	74.26	76.01

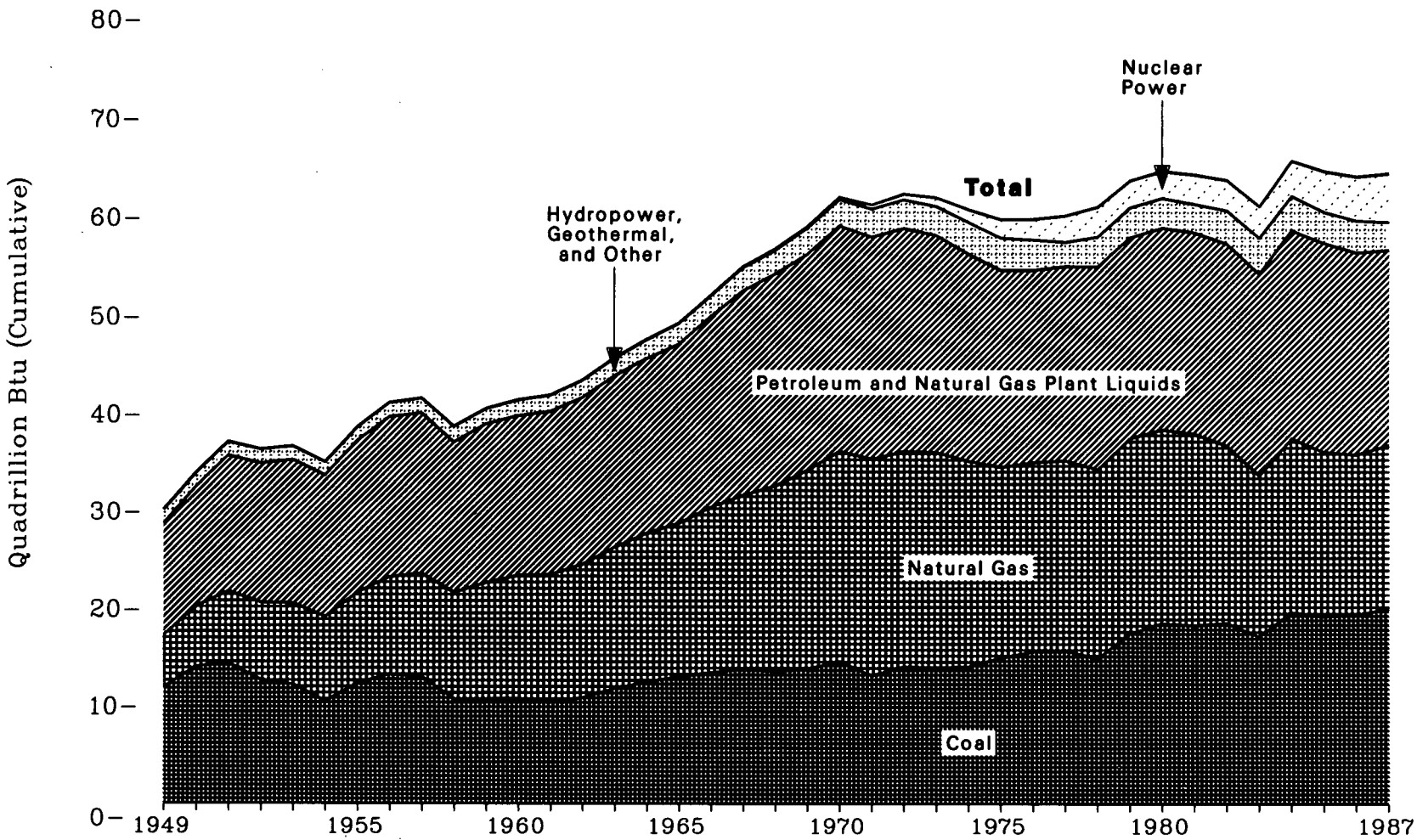
[1] Preliminary.
[2] Dry natural gas.
[3] Includes electricity produced from geothermal, wood, waste, wind, photovoltaic, and solar thermal sources connected to electric utility distribution systems (see Note).
[4] Less than 0.005 quadrillion Btu.
[5] Includes imports of crude oil for the Strategic Petroleum Reserve, which began in 1977.
[6] Includes imports of unfinished oils and natural gas plant liquids.
[7] Includes coal, coal coke, and hydroelectric power.
[8] Includes natural gas, coal coke, and hydroelectric power.
[9] A balancing item. Includes stock changes, losses, gains, miscellaneous blending components, unaccounted for supply, and anthracite shipped overseas to U.S. Armed Forces.
[10] Petroleum products supplied includes natural gas plant liquids and crude oil burned as fuel.
[11] Includes industrial generation of hydroelectric power and net electricity imports.
[12] Includes electricity produced from geothermal, wood, waste, wind, photovoltaic, and solar thermal sources connected to electric utility distribution systems (see Note) and net imports of coal coke.

Note: Data do not include the consumption of wood energy (other than that consumed by the electric utility industry) which amounted to an estimated 2.6 quadrillion Btu in 1984 (see Table 95). This table also does not include small quantities of other energy forms for which consistent historical data are not available, such as geothermal, waste, wind, photovoltaic, or solar thermal energy sources except that consumed by electric utilities.

Note: Sum of components may not equal total due to independent rounding.

Sources: Tables 46, 66, 74, 79, 82, and 84, EIA estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 2. Production of Energy by Source, 1949-1987



Source: See Table 2.

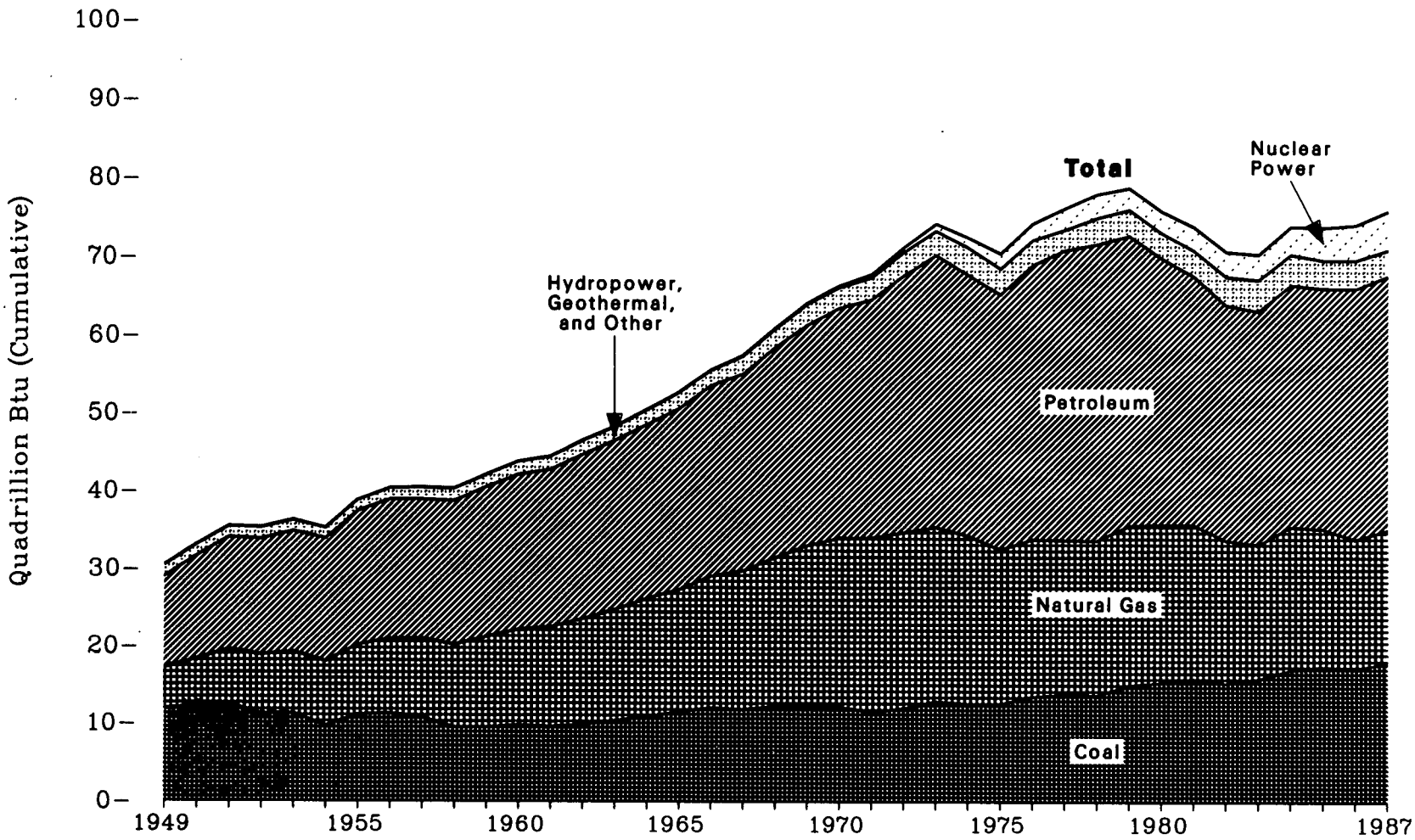
Table 2. Production of Energy by Source, 1949-1987

(Quadrillion Btu, Except as Noted)

Year	Coal	Natural Gas [1]	Crude Oil [2]	Natural Gas Plant Liquids	Hydroelectric Power [3]	Nuclear Electric Power [4]	Geothermal [4]	Other [5]	Total	Percent Change [6]
1949	11.97	5.38	10.68	0.71	1.42	0	0	0.01	30.18	—
1950	14.06	6.23	11.45	0.82	1.42	0	0	0.01	33.98	12.6
1951	14.42	7.42	13.04	0.92	1.42	0	0	0.01	37.22	9.5
1952	12.73	7.96	13.28	1.00	1.47	0	0	0.01	36.45	- 2.1
1953	12.28	8.34	13.67	1.06	1.41	0	0	0.01	36.77	0.9
1954	10.54	8.68	13.43	1.11	1.36	0	0	(7)	35.13	- 4.5
1955	12.37	9.34	14.41	1.24	1.36	0	0	(7)	38.73	10.2
1956	13.31	10.00	15.18	1.28	1.43	0	0	(7)	41.21	6.4
1957	13.06	10.61	15.18	1.29	1.52	0	0	(7)	41.65	1.1
1958	10.78	10.94	14.20	1.29	1.59	(7)	0	(7)	38.81	- 6.8
1959	10.78	11.95	14.93	1.38	1.55	(7)	0	(7)	40.60	4.6
1960	10.82	12.66	14.93	1.46	1.61	0.01	0	(7)	41.49	2.2
1961	10.45	13.10	15.21	1.55	1.66	0.02	(7)	(7)	41.99	1.2
1962	10.90	13.72	15.52	1.59	1.82	0.03	(7)	(7)	43.58	3.8
1963	11.85	14.51	15.97	1.71	1.77	0.04	(7)	(7)	45.85	5.2
1964	12.52	15.30	16.16	1.80	1.89	0.04	(7)	(7)	47.72	4.1
1965	13.06	15.78	16.52	1.88	2.06	0.04	(7)	(7)	49.34	3.4
1966	13.47	17.01	17.56	2.00	2.06	0.06	(7)	(7)	52.17	5.7
1967	13.83	17.94	18.65	2.18	2.35	0.09	0.01	(7)	55.04	5.5
1968	13.61	19.07	19.31	2.32	2.35	0.14	0.01	(7)	56.81	3.2
1969	13.86	20.45	19.56	2.42	2.65	0.15	0.01	(7)	59.10	4.0
1970	14.61	21.67	20.40	2.51	2.63	0.24	0.01	(7)	62.07	5.0
1971	13.19	22.28	20.03	2.54	2.82	0.41	0.01	(7)	61.29	- 1.3
1972	14.09	22.21	20.04	2.60	2.86	0.58	0.03	(7)	62.42	1.8
1973	13.99	22.19	19.49	2.57	2.86	0.91	0.04	(7)	62.06	- 0.6
1974	14.07	21.21	18.57	2.47	3.18	1.27	0.05	(7)	60.84	- 2.0
1975	14.99	19.64	17.73	2.37	3.15	1.90	0.07	(7)	59.86	- 1.6
1976	15.65	19.48	17.26	2.33	2.98	2.11	0.08	(7)	59.89	0.1
1977	15.76	19.57	17.45	2.33	2.33	2.70	0.08	0.01	60.22	0.5
1978	14.91	19.49	18.43	2.25	2.94	3.02	0.06	(7)	61.10	1.5
1979	17.54	20.08	18.10	2.29	2.93	2.78	0.08	0.01	63.80	4.4
1980	18.60	19.91	18.25	2.25	2.90	2.74	0.11	(7)	64.76	1.5
1981	18.38	19.70	18.15	2.31	2.76	3.01	0.12	(7)	64.42	- 0.5
1982	18.64	18.25	18.31	2.19	3.26	3.13	0.10	(7)	63.89	- 0.8
1983	17.25	16.53	18.39	2.18	3.50	3.20	0.13	(7)	61.19	- 4.2
1984	19.72	17.93	18.85	2.27	3.31	3.55	0.16	0.01	65.81	7.6
1985	19.33	16.91	18.99	2.24	2.94	4.15	0.20	0.01	64.76	- 1.6
1986	19.51	16.47	18.38	2.15	3.03	4.47	0.22	0.01	64.25	- 0.8
1987[8]	20.12	16.84	17.59	2.23	2.61	4.92	0.23	0.02	64.55	0.5

[1] Dry natural gas.
[2] Includes lease condensate.
[3] Electric utility and industrial generation of hydroelectric power, see Appendix E, Note 1.
[4] Generated by electric utilities, see Appendix E, Note 1.
[5] Includes electricity produced from wood, waste, wind, photovoltaic, and solar thermal sources connected to electric utility distribution systems. Converted to Btu by applying national average heat rates for fossil fuel steam electric plants. Data do not include the consumption of wood energy (other than that consumed by the electric utility industry) which amounted to an estimated 2.6 quadrillion Btu in 1984 (see Table 95). This table also does not include small quantities of energy forms for which consistent historical data are not available, such as geothermal, waste, wind, photovoltaic, or solar thermal energy sources except that consumed by electric utilities.
[6] Percent change from previous year calculated from data prior to rounding.
[7] Less than 0.005 quadrillion Btu.
[8] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: Tables 46, 66, 75, and 84, EIA estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 3. Consumption of Energy by Source, 1949-1987



Source: See Table 3.

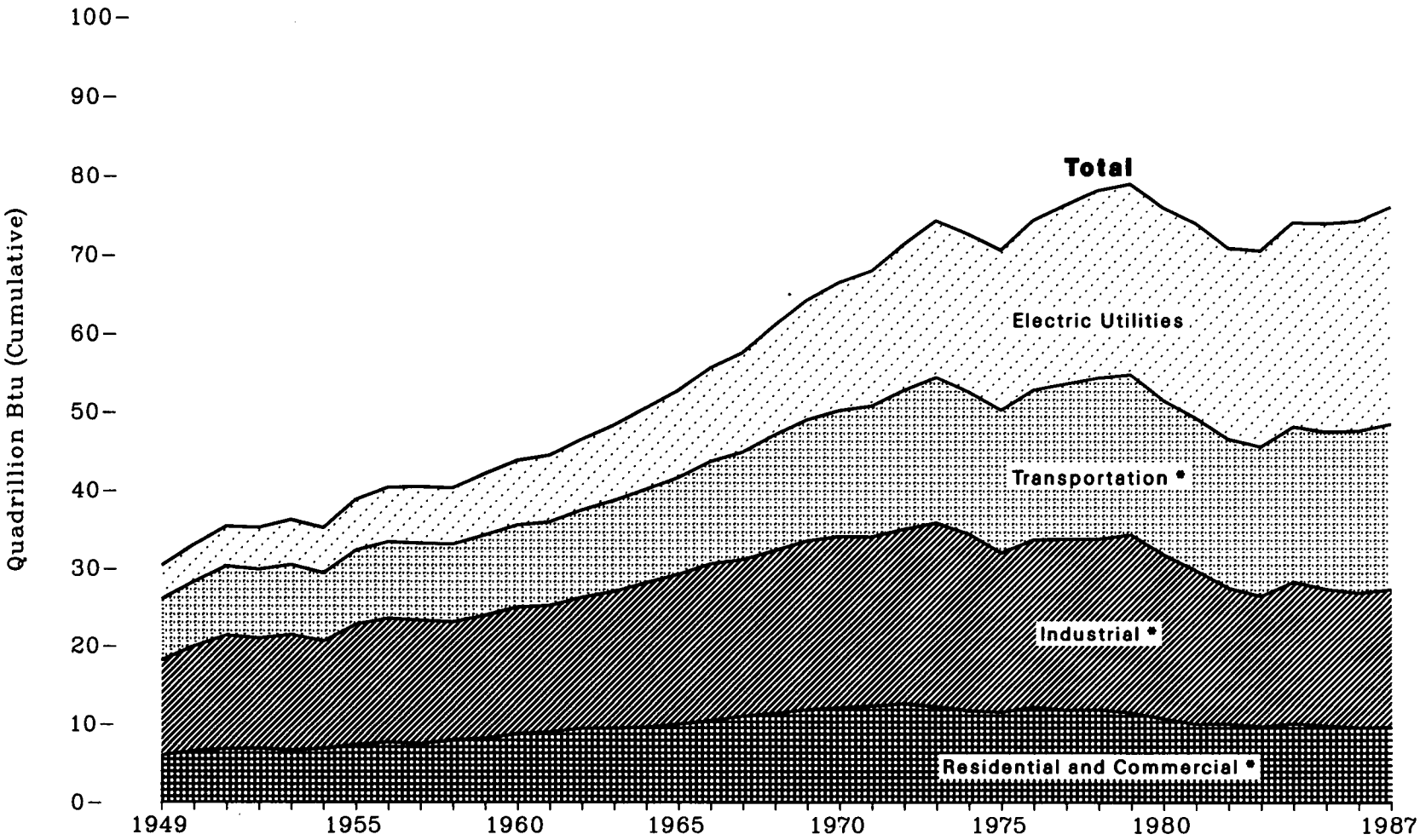
Table 3. Consumption of Energy by Source, 1949-1987

(Quadrillion Btu, Except as Noted)

Year	Coal	Natural Gas	Petroleum [1]	Hydroelectric Power [2]	Nuclear Electric Power [3]	Geothermal [3]	Other [4]	Total	Percent Change [5]
1949	11.98	5.15	11.88	1.45	0	0	(6)	30.46	—
1950	12.35	5.97	13.32	1.44	0	0	0.01	33.08	8.6
1951	12.55	7.05	14.43	1.45	0	0	-0.02	35.47	7.2
1952	11.31	7.55	14.96	1.50	0	0	-0.01	35.30	-0.5
1953	11.37	7.91	15.56	1.44	0	0	(6)	36.27	2.7
1954	9.71	8.33	15.84	1.39	0	0	(6)	35.27	-2.8
1955	11.17	9.00	17.25	1.41	0	0	-0.01	38.82	10.1
1956	11.35	9.61	17.94	1.49	0	0	-0.01	40.38	4.0
1957	10.82	10.19	17.93	1.56	0	0	-0.02	40.48	0.3
1958	9.53	10.66	18.53	1.63	(6)	0	(6)	40.35	-0.3
1959	9.52	11.72	19.32	1.59	(6)	0	-0.01	42.14	4.4
1960	9.84	12.39	19.92	1.66	0.01	(6)	(6)	43.80	3.9
1961	9.62	12.93	20.22	1.68	0.02	(6)	-0.01	44.46	1.5
1962	9.91	13.73	21.05	1.82	0.03	(6)	(6)	46.53	4.7
1963	10.41	14.40	21.70	1.77	0.04	(6)	-0.01	48.32	3.9
1964	10.96	15.29	22.30	1.91	0.04	(6)	-0.01	50.50	4.5
1965	11.58	15.77	23.25	2.06	0.04	(6)	-0.02	52.68	4.3
1966	12.14	17.00	24.40	2.07	0.06	(6)	-0.02	55.66	5.6
1967	11.91	17.94	25.28	2.34	0.09	0.01	-0.01	57.57	3.4
1968	12.33	19.21	26.98	2.34	0.14	0.01	-0.01	61.00	6.0
1969	12.38	20.68	28.34	2.66	0.15	0.01	-0.03	64.19	5.2
1970	12.26	21.79	29.52	2.65	0.24	0.01	-0.05	66.43	3.5
1971	11.60	22.47	30.56	2.86	0.41	0.01	-0.03	67.89	2.2
1972	12.08	22.70	32.95	2.94	0.58	0.03	-0.02	71.26	5.0
1973	12.97	22.51	34.84	3.01	0.91	0.04	(6)	74.28	4.2
1974	12.66	21.73	33.45	3.31	1.27	0.05	0.06	72.54	-2.3
1975	12.66	19.95	32.73	3.22	1.90	0.07	0.02	70.55	-2.8
1976	13.58	20.35	35.17	3.07	2.11	0.08	(6)	74.36	5.4
1977	13.92	19.93	37.12	2.51	2.70	0.08	0.02	76.29	2.6
1978	13.77	20.00	37.97	3.14	3.02	0.06	0.13	78.09	2.4
1979	15.04	20.67	37.12	3.14	2.78	0.08	0.07	78.90	1.0
1980	15.42	20.39	34.20	3.12	2.74	0.11	-0.03	75.96	-3.7
1981	15.91	19.93	31.93	3.11	3.01	0.12	-0.01	73.99	-2.6
1982	15.32	18.51	30.23	3.56	3.13	0.10	-0.02	70.84	-4.3
1983	15.89	17.36	30.05	3.87	3.20	0.13	-0.01	70.50	-0.5
1984	17.07	18.51	31.05	3.72	3.55	0.16	(6)	74.06	5.1
1985	17.48	17.83	30.92	3.36	4.15	0.20	(6)	73.94	-0.2
1986	17.26	16.71	32.20	3.40	4.47	0.22	(6)	74.26	0.4
1987[7]	18.00	17.18	32.63	3.04	4.92	0.23	0.02	76.01	2.4

[1] Petroleum products supplied including natural gas plant liquids and crude oil burned as fuel.
[2] Electric utility and industrial generation of hydroelectric power and net electricity imports.
[3] Generated by electric utilities.
[4] Includes net imports of coal coke and electricity produced from wood, waste, wind, photovoltaic, and solar thermal sources connected to electric utility distribution systems. Converted to Btu by applying national average heat rates for fossil fuel steam electric plants. Data do not include the consumption of wood energy (other than that consumed by the electric utility industry) which amounted to an estimated 2.6 quadrillion Btu in 1984 (see Table 95). This table also does not include small quantities of energy forms for which consistent historical data are not available, such as geothermal, waste, wind, photovoltaic, or solar thermal energy sources except that consumed by electric utilities.
[5] Percent change from previous year calculated from data prior to rounding.
[6] Less than 0.005 quadrillion Btu.
[7] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: Tables 46, 66, 74, 79, 82, and 84, EIA estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 4. Consumption of Energy by End-Use Sector, 1949-1987



* Fossil Fuels Only
Source: See Table 4.

Table 4. Consumption of Energy by End-Use Sector,[1] 1949-1987

(Quadrillion Btu)

Year	Residential and Commercial		Industrial		Transportation		Electric Utilities	Total
	Fossil Fuels[2]	Total[3]	Fossil Fuels[2]	Total[3]	Fossil Fuels[2]	Total[3]		
1949	6.06	8.21	12.08	14.26	7.88	7.99	4.36	30.46
1950	6.65	8.87	13.28	15.71	8.38	8.49	4.70	33.08
1951	6.87	9.30	14.50	17.13	8.93	9.04	5.09	35.47
1952	6.92	9.54	14.05	16.76	8.91	9.00	5.36	35.30
1953	6.73	9.50	14.71	17.65	9.03	9.12	5.75	36.27
1954	6.92	9.78	13.67	16.58	8.82	8.90	5.80	35.27
1955	7.39	10.41	15.42	18.86	9.48	9.55	6.50	38.82
1956	7.71	10.96	15.87	19.55	9.79	9.86	6.98	40.38
1957	7.49	10.98	15.86	19.60	9.84	9.90	7.26	40.48
1958	7.99	11.64	15.14	18.70	9.95	10.00	7.22	40.35
1959	8.19	12.15	15.79	19.64	10.30	10.35	7.82	42.14
1960	8.75	13.04	16.26	20.16	10.56	10.60	8.19	43.80
1961	8.96	13.44	16.26	20.25	10.73	10.77	8.47	44.46
1962	9.45	14.27	16.83	21.05	11.18	11.22	9.03	46.53
1963	9.48	14.71	17.56	21.96	11.62	11.65	9.63	48.32
1964	9.60	15.23	18.57	23.27	11.96	11.99	10.33	50.50
1965	10.00	16.03	19.25	24.23	12.39	12.42	11.01	52.68
1966	10.47	17.06	20.11	25.51	13.05	13.09	11.99	55.66
1967	11.04	18.10	20.10	25.74	13.70	13.73	12.70	57.57
1968	11.40	19.23	20.87	26.92	14.81	14.84	13.88	61.00
1969	11.90	20.59	21.63	28.12	15.45	15.48	15.18	64.19
1970	12.14	21.71	21.94	28.65	16.04	16.07	16.27	66.43
1971	12.35	22.59	21.68	28.59	16.67	16.70	17.15	67.89
1972	12.64	23.69	22.40	29.88	17.67	17.70	18.52	71.26
1973	12.27	24.14	23.55	31.53	18.57	18.60	19.85	74.28
1974	11.77	23.72	22.63	30.70	18.08	18.11	20.02	72.54
1975	11.60	23.90	20.37	28.41	18.20	18.24	20.35	70.55
1976	12.25	25.02	21.44	30.24	19.06	19.09	21.57	74.36
1977	11.87	25.39	21.89	31.09	19.77	19.81	22.71	76.29
1978	11.91	26.09	21.86	31.41	20.56	20.59	23.72	78.09
1979	11.53	25.81	22.78	32.62	20.43	20.47	24.13	78.90
1980	10.72	25.65	21.04	30.61	19.66	19.69	24.50	75.96
1981	10.04	25.24	19.69	29.25	19.46	19.50	24.76	73.99
1982	10.06	25.62	17.45	26.14	19.03	19.07	24.26	70.84
1983	9.71	25.61	16.72	25.74	19.10	19.14	24.93	70.50
1984	10.09	26.46	18.16	27.72	19.84	19.88	25.94	74.06
1985	9.83	26.75	17.53	27.07	20.08	20.12	26.48	73.94
1986	9.58	27.03	17.25	26.45	20.74	20.78	26.66	74.26
1987[4]	9.62	27.63	17.68	27.22	21.12	21.16	27.56	76.01

[1] Data do not include consumption of wood energy (other than that consumed by the electric utility industry) which amounted to an estimated 2.6 quadrillion Btu in 1984 (see Table 95). This table also does not include small quantities of other energy forms for which consistent historical data are not available, such as geothermal, waste, wind, photovoltaic, or solar thermal energy sources except that consumed by electric utilities. See Appendix E, Note 2.

[2] Includes only those fossil fuels consumed directly in the sector (see Diagram 1).

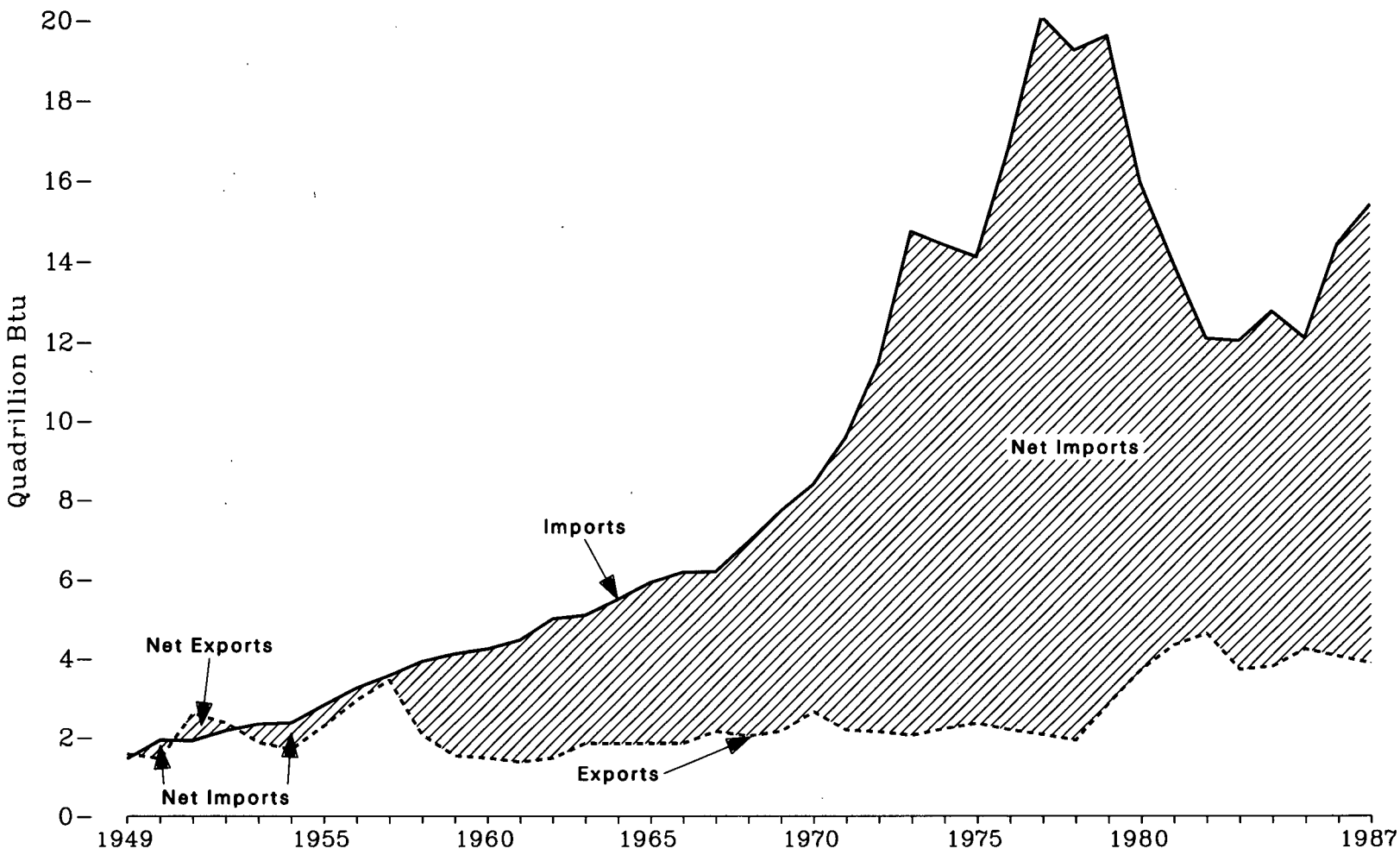
[3] Includes those fossil fuels consumed directly in the sector, utility electricity sales to the sector, and energy losses in the conversion and transmission of electricity. Conversion and transmission losses are allocated to sectors in proportion to electricity sales to sectors (see Diagram 1).

[4] Preliminary.

Note: Sum of components may not equal total due to independent rounding.

Sources: Tables 57, 70, 76, 79, 83, and 87, EIA estimates for industrial hydroelectric power, and conversion factors in Appendix A.

Figure 5. Energy Imports, Exports, and Net Imports, 1949-1987



Source: See Table 5.

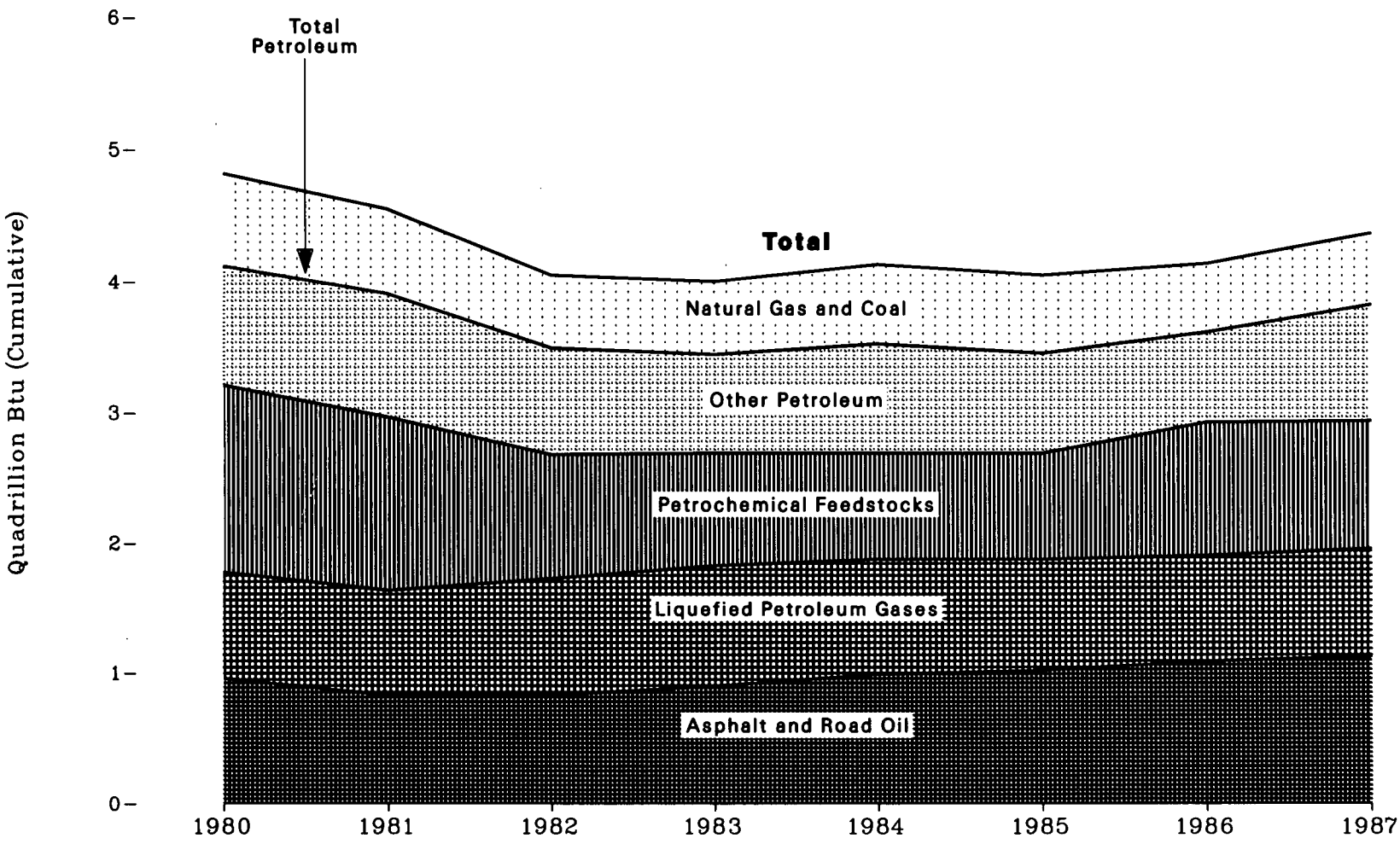
Table 5. Energy Imports, Exports, and Net Imports, 1949-1987

(Quadrillion Btu)

Year	Imports					Exports					Net Imports [1]				
	Coal	Petroleum [2]	Natural Gas (Dry)	Other [3]	Total	Coal	Petroleum	Natural Gas (Dry)	Other [3]	Total	Coal	Petroleum [2]	Natural Gas (Dry)	Other [3]	Total
1949	0.01	1.43	(4)	0.03	1.47	0.88	0.68	0.02	0.02	1.59	-0.87	0.75	-0.02	0.02	-0.13
1950	0.01	1.89	(4)	0.04	1.93	0.79	0.64	0.03	0.01	1.47	-0.78	1.24	-0.03	0.03	0.47
1951	0.01	1.87	(4)	0.04	1.92	1.68	0.89	0.03	0.03	2.62	-1.67	0.98	-0.03	0.01	-0.71
1952	0.01	2.11	0.01	0.04	2.17	1.40	0.91	0.03	0.02	2.37	-1.40	1.20	-0.02	0.02	-0.20
1953	0.01	2.28	0.01	0.04	2.34	0.98	0.84	0.03	0.02	1.87	-0.97	1.44	-0.02	0.02	0.47
1954	0.01	2.32	0.01	0.04	2.37	0.91	0.75	0.03	0.01	1.70	-0.91	1.58	-0.02	0.02	0.67
1955	0.01	2.75	0.01	0.06	2.83	1.46	0.77	0.03	0.02	2.29	-1.46	1.98	-0.02	0.04	0.54
1956	0.01	3.17	0.01	0.06	3.25	1.98	0.91	0.04	0.02	2.95	-1.98	2.26	-0.03	0.04	0.30
1957	0.01	3.46	0.04	0.06	3.57	2.17	1.20	0.04	0.03	3.45	-2.16	2.26	(4)	0.02	0.12
1958	0.01	3.72	0.14	0.05	3.92	1.42	0.58	0.04	0.02	2.06	-1.41	3.14	0.10	0.03	1.86
1959	0.01	3.91	0.14	0.05	4.11	1.05	0.45	0.02	0.02	1.54	-1.04	3.46	0.12	0.03	2.57
1960	0.01	4.00	0.16	0.06	4.23	1.02	0.43	0.01	0.02	1.48	-1.02	3.57	0.15	0.04	2.74
1961	(4)	4.19	0.23	0.04	4.46	0.98	0.37	0.01	0.02	1.38	-0.98	3.82	0.22	0.02	3.08
1962	0.01	4.56	0.42	0.03	5.01	1.08	0.36	0.02	0.03	1.48	-1.08	4.20	0.40	(4)	3.53
1963	0.01	4.65	0.42	0.03	5.10	1.36	0.44	0.02	0.03	1.85	-1.35	4.21	0.40	-0.01	3.25
1964	0.01	4.96	0.46	0.07	5.49	1.34	0.43	0.02	0.06	1.84	-1.33	4.53	0.44	0.01	3.65
1965	0.00	5.40	0.47	0.04	5.92	1.38	0.39	0.03	0.06	1.85	-1.37	5.01	0.44	-0.02	4.06
1966	(4)	5.63	0.50	0.05	6.18	1.35	0.41	0.03	0.06	1.85	-1.35	5.21	0.47	-0.01	4.32
1967	0.01	5.56	0.58	0.04	6.19	1.35	0.65	0.08	0.06	2.15	-1.35	4.91	0.50	-0.02	4.04
1968	0.01	6.21	0.67	0.04	6.93	1.38	0.49	0.10	0.06	2.03	-1.37	5.73	0.58	-0.02	4.90
1969	(4)	6.90	0.75	0.06	7.71	1.53	0.49	0.05	0.08	2.15	-1.53	6.42	0.70	-0.02	5.56
1970	(4)	7.47	0.85	0.07	8.39	1.94	0.55	0.07	0.11	2.66	-1.93	6.92	0.77	-0.04	5.72
1971	(4)	8.54	0.96	0.08	9.58	1.55	0.47	0.08	0.07	2.18	-1.54	8.07	0.88	(4)	7.41
1972	(4)	10.30	1.05	0.11	11.46	1.53	0.47	0.08	0.06	2.14	-1.53	9.83	0.97	0.05	9.32
1973	(4)	13.47	1.06	0.20	14.73	1.43	0.49	0.08	0.06	2.05	-1.42	12.98	0.98	0.14	12.68
1974	0.05	13.13	0.99	0.25	14.41	1.62	0.46	0.08	0.06	2.22	-1.57	12.66	0.91	0.19	12.19
1975	0.02	12.95	0.98	0.16	14.11	1.76	0.44	0.07	0.08	2.36	-1.74	12.51	0.90	0.08	11.75
1976	0.03	15.67	0.99	0.15	16.84	1.60	0.47	0.07	0.06	2.19	-1.57	15.20	0.92	0.09	14.65
1977	0.04	18.76	1.04	0.26	20.09	1.44	0.51	0.06	0.06	2.07	-1.40	18.24	0.98	0.20	18.02
1978	0.07	17.82	0.99	0.36	19.25	1.08	0.77	0.05	0.03	1.93	-1.00	17.06	0.94	0.33	17.32
1979	0.05	17.93	1.30	0.33	19.62	1.75	1.00	0.06	0.06	2.87	-1.70	16.93	1.24	0.27	16.75
1980	0.03	14.66	1.01	0.28	15.97	2.42	1.16	0.05	0.09	3.72	-2.39	13.50	0.96	0.18	12.25
1981	0.03	12.64	0.92	0.39	13.97	2.94	1.26	0.06	0.06	4.33	-2.92	11.38	0.86	0.33	9.65
1982	0.02	10.78	0.95	0.35	12.09	2.79	1.73	0.05	0.06	4.63	-2.77	9.05	0.90	0.28	7.46
1983	0.03	10.65	0.94	0.40	12.03	2.04	1.57	0.06	0.05	3.72	-2.01	9.08	0.89	0.35	8.31
1984	0.03	11.43	0.85	0.45	12.76	2.15	1.54	0.06	0.05	3.80	-2.12	9.89	0.79	0.39	8.95
1985	0.05	10.61	0.95	0.49	12.10	2.44	1.66	0.06	0.08	4.23	-2.39	8.95	0.89	0.41	7.87
1986	0.06	13.20	0.75	0.43	14.43	2.25	1.67	0.06	0.07	4.05	-2.19	11.53	0.69	0.35	10.38
1987[5]	0.04	13.88	0.99	0.51	15.41	2.10	1.66	0.06	0.07	3.88	-2.05	12.22	0.92	0.44	11.54

[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.
[5] Preliminary.
Note: Sum of components may not equal totals or net import items due to independent rounding.
Note: Includes trade between the United States (50 States and the District of Columbia) and its territories and possessions.
Source: Tables 46, 50, 66, 74, 79, and 82 and conversion factors in Appendix A.

Figure 6. Nonfuel Use of Fossil Fuels, 1980–1987



Source: See Table 6.

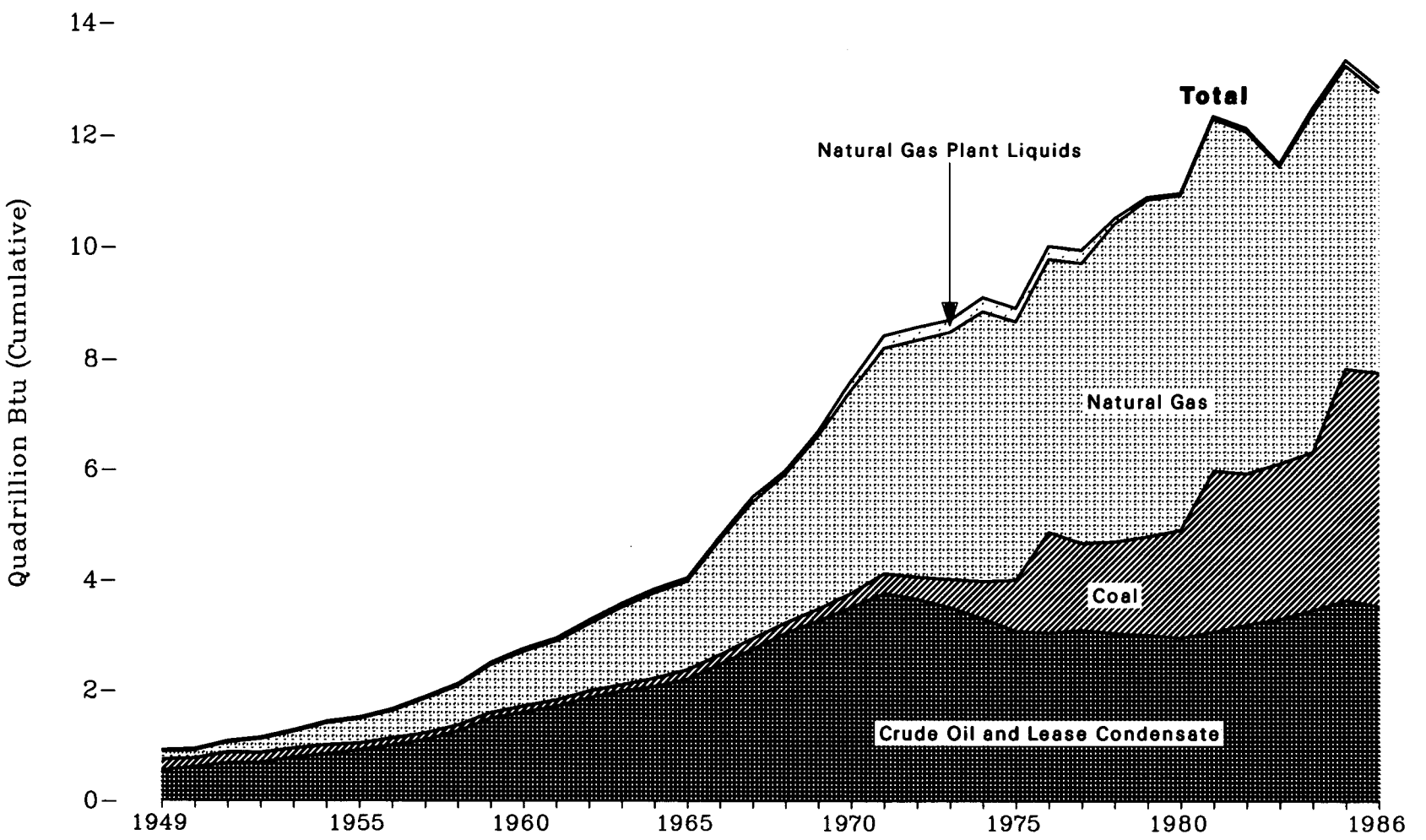
Table 6. Nonfuel Use of Fossil Fuels, 1980-1987

Year	Petroleum Products								Natural Gas	Coal	Total	Percent Total Energy Consumption
	Asphalt and Road Oil	Liquefied Petroleum Gases	Lubricants	Petrochemical Feedstock	Petroleum Coke	Special Naphtha	Other [1]	Total				
	Physical Units [2]											
1980	145	231	58	253	16	37	47	788	589	2.9	—	—
1981	125	230	56	236	34	27	43	752	546	2.5	—	—
1982	125	259	51	169	28	25	37	694	491	1.8	—	—
1983	136	267	53	153	15	30	34	688	482	1.5	—	—
1984	149	260	57	144	22	40	27	699	530	1.8	—	—
1985	153	255	53	143	23	30	27	684	520	1.8	—	—
1986	164	268	47	180	21	24	30	734	457	1.8	—	—
1987[3]	170	238	59	174	36	28	27	732	477	1.8	—	—
	Quadrillion Btu											
1980	0.96	0.82	0.35	1.43	0.10	0.19	0.27	4.13	0.60	0.10	4.82	6.0
1981	0.83	0.81	0.34	1.33	0.21	0.14	0.25	3.91	0.56	0.08	4.55	6.5
1982	0.83	0.90	0.31	0.95	0.17	0.13	0.21	3.50	0.50	0.05	4.05	5.8
1983	0.90	0.93	0.32	0.86	0.09	0.16	0.19	3.45	0.50	0.05	4.00	5.7
1984	0.99	0.89	0.35	0.81	0.13	0.21	0.15	3.53	0.55	0.05	4.13	5.9
1985	1.02	0.86	0.32	0.81	0.14	0.16	0.15	3.46	0.54	0.05	4.03	5.8
1986	1.09	0.82	0.29	1.02	0.13	0.13	0.14	3.62	0.47	0.05	4.14	5.9
1987[3]	1.13	0.83	0.36	0.98	0.24	0.14	0.15	3.83	0.49	0.05	4.37	5.5

[1] Includes wax and miscellaneous products.
[2] Petroleum - million barrels; natural gas - billion cubic feet; and coal - million short tons.
[3] Preliminary.
— Indicates data not applicable.

Sources: **Petroleum Products:** • 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual* and *Sales of Liquefied Petroleum Gases and Ethane in 1980.* •1981 through 1985—Energy Information Administration, *Petroleum Supply Annual* and unpublished data. • 1986—Energy Information Administration, *Petroleum Supply Monthly* and Energy Information Administration estimates. **Natural Gas:** • 1980— Bureau of the Census, 1980 Survey of Manufactures, *Hydrocarbon, Coal, and Coke Materials Consumed.* • 1981 and forward—Department of Commerce estimates. **Coal:** • 1980—Energy Information Administration, *Coke and Coal Chemicals in 1980.* • 1981—Energy Information Administration, Energy Data Report, *Coke Plant Report,* quarterly. • 1982 and forward—Energy Information Administration, *Quarterly Coal Report* and Energy Information Administration estimates.

Figure 7. Production of Fossil Fuels on Federally Administered Lands, 1949-1986



Source: See Table 7.

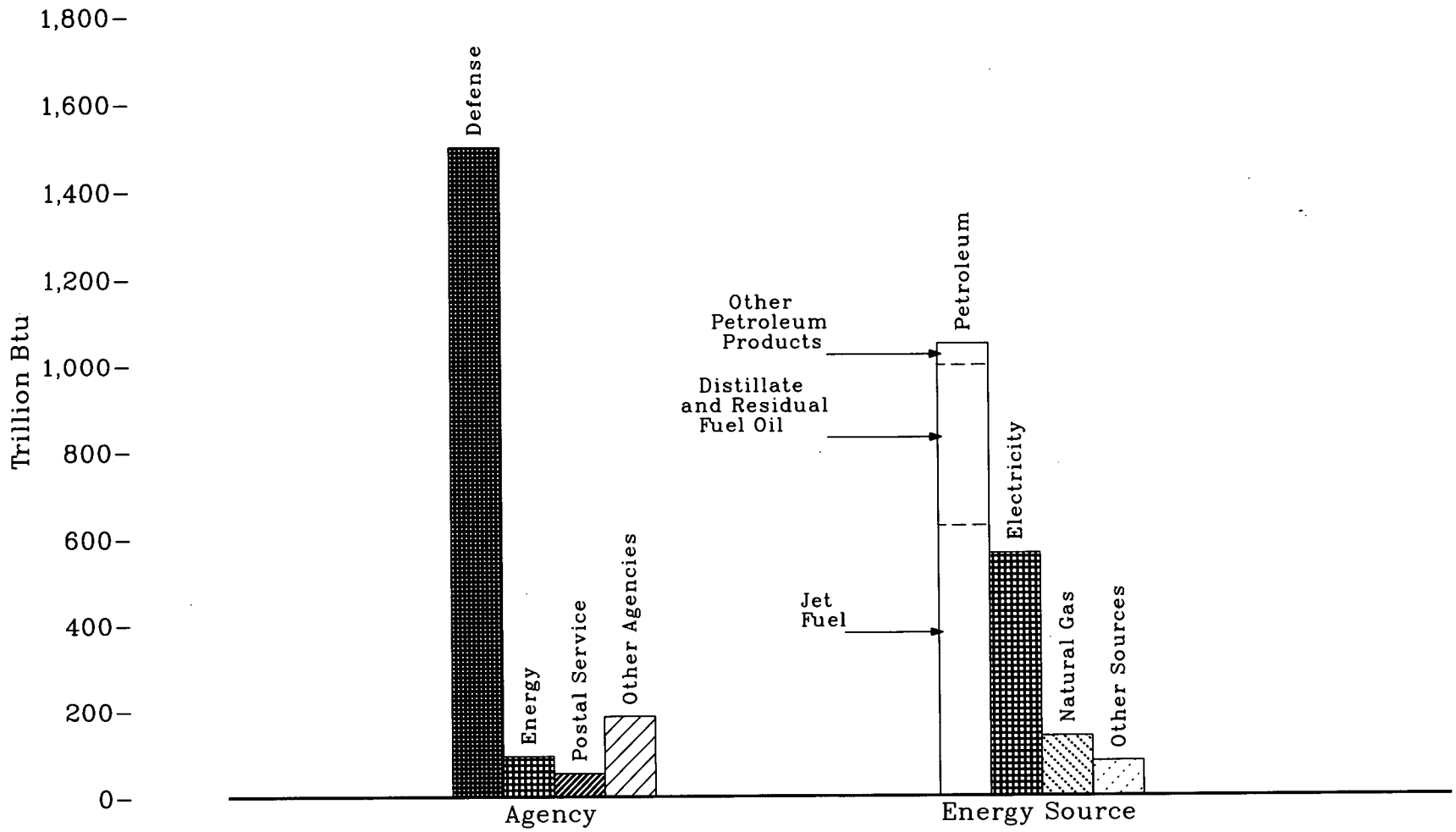
Table 7. Production of Fossil Fuels on Federally Administered Lands, 1949-1986

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	33.6	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	32.3	133.9	2.81	17.1	11.50	21.2
1984	595.8	3.46	18.3	25.4	0.10	4.3	5.88	6.07	33.8	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	32.0	199.7	4.19	22.6	13.35	23.2
1986	608.4	3.53	19.2	23.3	0.09	4.1	4.87	5.01	30.4	201.6	4.23	22.6	12.86	22.8

[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 same 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: **Coal:** •1949 through 1980—U.S. Geological Survey, *Coal, Phosphate, Potash, Sodium, and Other Mineral Production, Royalty Income, and Related Statistics,* June 1981. •1981 and forward—U.S. Minerals Management Service, *Mineral Revenues - The 1986 Report on Receipts from Federal and Indian Leases,* and predecessor annual reports. **Other:** •1949 through 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 through 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 and forward—U.S. Minerals Management Service, *Mineral Revenues - The 1986 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.

Figure 8. U.S. Government Energy Use, Fiscal Year 1987



Source: See Table 8.

Table 8. U.S. Government Energy Use, Fiscal Years 1976-1987

(Trillion Btu)

Activity	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987 [1]
Agency												
Defense	1,386.8	1,398.4	1,365.7	1,384.6	1,394.8	1,455.4	1,484.3	1,475.1	1,524.1	1,509.6	1,488.1	1,497.8
Energy	87.2	87.9	87.1	86.9	84.0	85.3	89.1	91.3	95.5	96.7	92.0	93.2
Postal Service	58.3	62.9	58.6	56.0	52.3	50.9	49.4	48.4	50.5	50.9	51.5	53.4
Veterans Administration	36.5	37.9	39.4	38.5	38.2	37.4	38.0	38.7	40.0	40.6	41.8	42.0
General Services Administration	41.1	41.1	41.3	40.5	38.9	39.1	38.9	37.8	38.0	35.4	34.1	32.4
Transportation	27.4	28.8	28.9	27.6	27.6	28.0	28.5	28.7	29.2	29.5	28.1	28.3
NASA	25.1	24.0	22.4	22.4	21.4	21.2	21.8	22.4	23.0	23.3	24.6	25.1
Agriculture	11.6	10.8	11.2	11.6	11.2	10.9	10.4	10.4	10.7	10.2	10.6	11.4
Interior	13.1	13.5	12.3	13.6	11.7	10.7	10.7	10.8	11.8	10.6	10.0	9.7
Health and Human Services	9.6	9.9	9.6	9.7	9.5	10.6	10.2	10.3	10.8	11.3	10.7	11.2
Justice	7.1	7.5	7.4	8.1	7.4	7.1	7.7	7.6	8.9	8.1	8.7	8.7
Other [2]	15.0	15.9	17.1	16.8	16.6	17.1	18.5	17.1	17.7	16.5	16.8	17.1
Total	1,718.9	1,738.6	1,701.0	1,716.3	1,713.5	1,773.7	1,807.5	1,798.6	1,860.2	1,842.7	1,817.0	1,830.3
Energy Source												
Petroleum												
Motor Gasoline	59.9	60.9	59.6	58.6	56.1	52.9	52.9	51.4	51.0	50.5	45.3	43.5
Aviation Gasoline	11.6	8.8	6.2	4.7	4.9	4.6	3.6	2.6	1.9	1.9	1.4	0.9
Jet Fuel	610.0	619.2	601.2	618.6	638.7	653.3	672.7	673.3	693.7	705.6	710.2	702.3
Distillate and Residual Fuel Oil	329.7	348.5	332.3	327.1	307.8	351.3	349.5	329.4	342.9	305.4	298.0	297.7
Liquefied Petroleum Gases	4.6	4.1	3.0	3.7	4.0	3.7	3.8	4.0	4.1	4.0	3.9	3.8
Subtotal	1,015.8	1,041.5	1,002.3	1,012.7	1,011.5	1,065.8	1,082.5	1,060.7	1,093.6	1,067.4	1,058.8	1,048.2
Electricity	473.5	479.7	479.2	479.9	482.2	491.5	501.6	515.2	530.1	548.2	539.8	563.3
Natural Gas	151.8	141.2	144.7	148.9	147.3	142.2	146.2	147.8	157.4	146.7	138.7	138.0
Coal	71.3	68.4	66.0	65.1	63.6	65.1	68.6	62.4	65.3	64.0	63.8	60.5
Purchased Steam	6.3	7.7	8.7	9.7	9.1	9.1	8.6	12.4	13.8	16.4	15.9	19.7
Total	1,718.9	1,738.6	1,701.0	1,716.3	1,713.5	1,773.7	1,807.5	1,798.6	1,860.2	1,842.7	1,817.0	1,830.3

[1] Preliminary. Energy usage data for Department of Labor, Department of Justice, Department of Defense, and Department of Treasury are estimated.

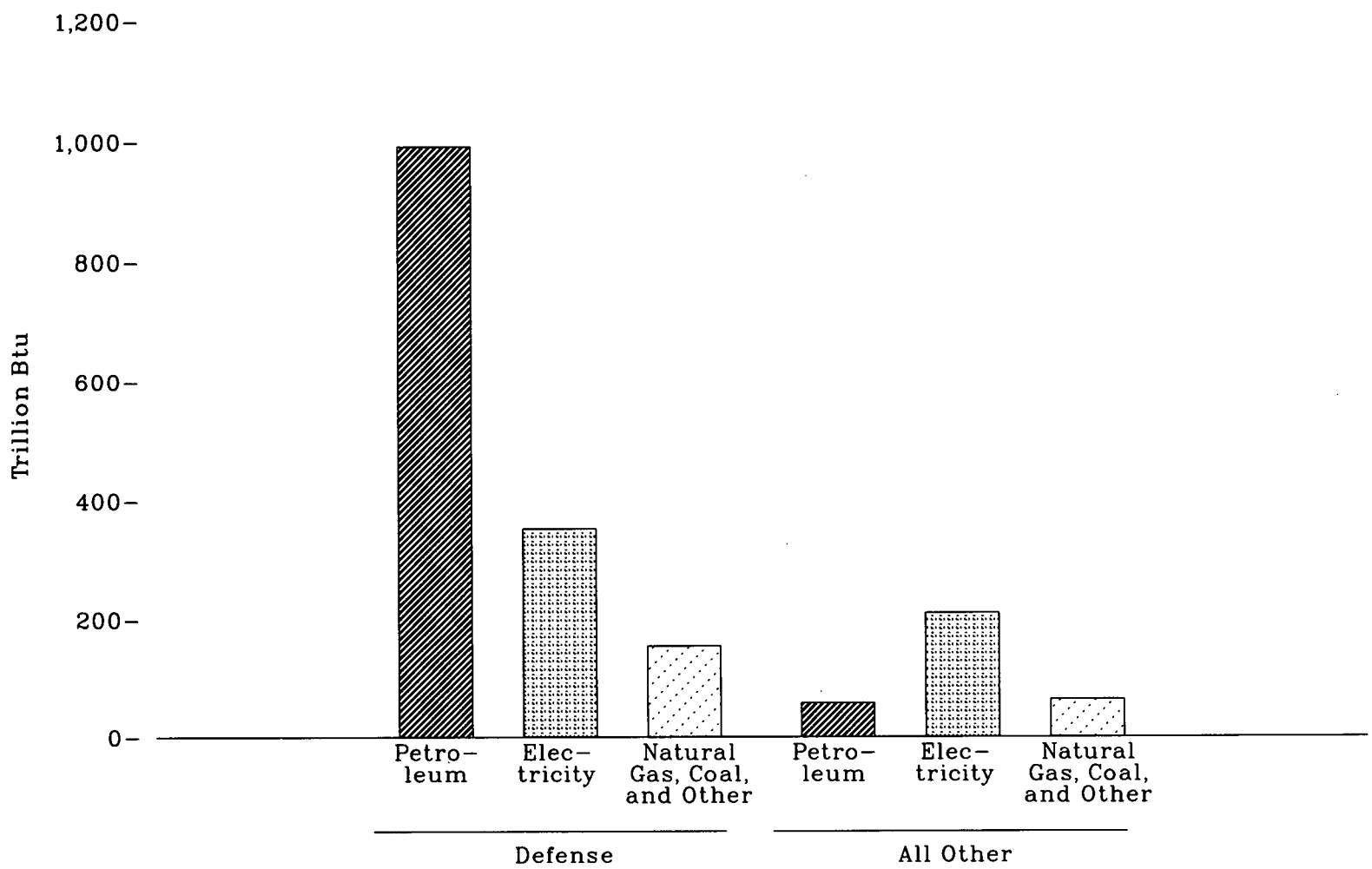
[2] Includes Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, Department of Labor, National Science Foundation, Department of Treasury, Federal Communications Commission, and Environmental Protection Agency. Environmental Protection Agency and the Department of Treasury data for 1982 are estimated. Department of Treasury data for 1983 are estimated.

Note: Sum of components may not equal total due to independent rounding.

Note: These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the 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.

Source: Department of Energy Form DOE 6200.2, "Quarterly Federal Energy Usage Report."

Figure 9. U.S. Government Energy Use by Agency, by Source, Fiscal Year 1987



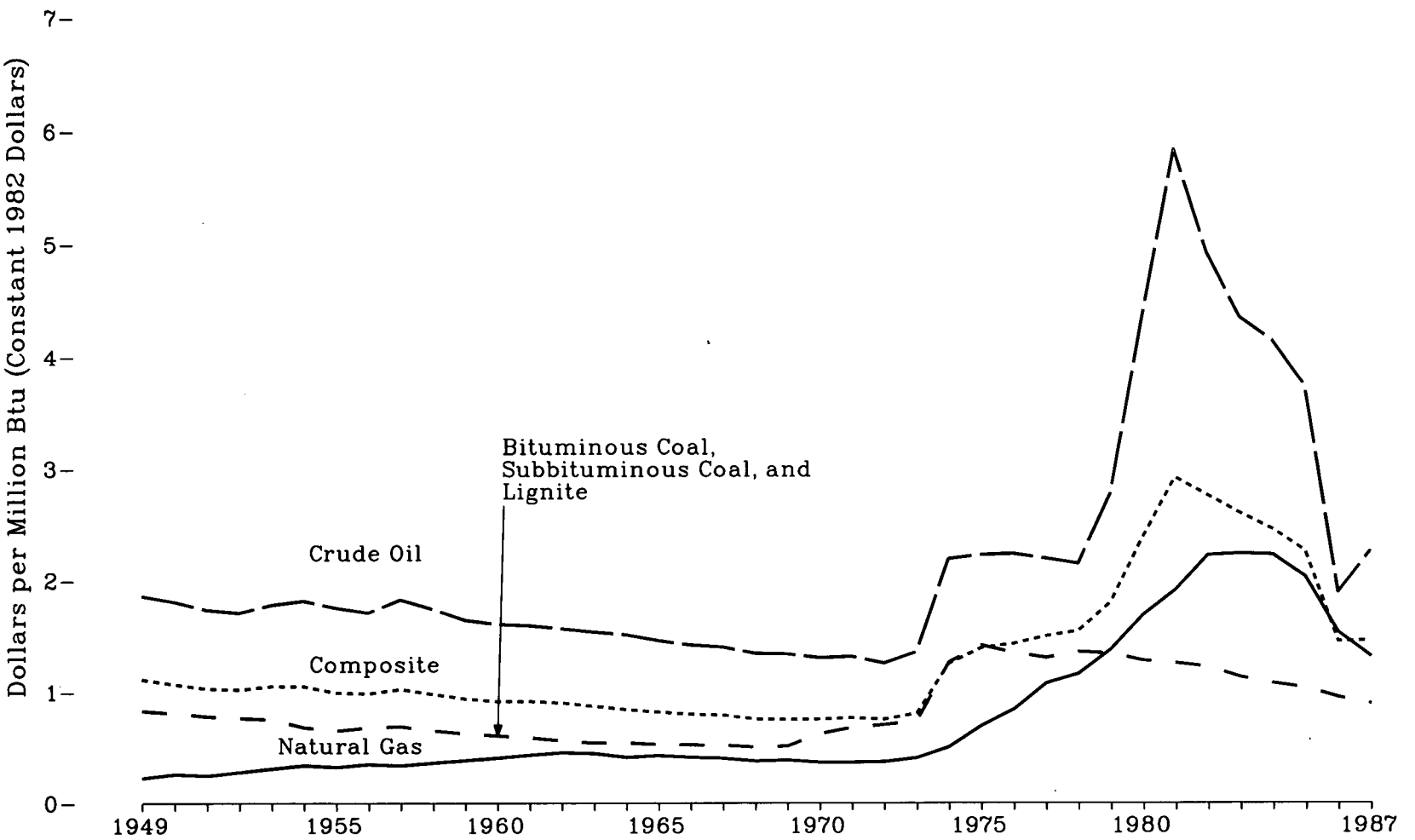
Source: See Table 9.

Table 9. U.S. Government Energy Use by Agency, by Source, Fiscal Years 1977 and 1987
(Trillion Btu)

	Petroleum							
	Motor Gasoline	Distillate and Residual Fuel Oils	Other [1]	Total	Electricity	Natural Gas	Coal and Other [2]	Total
1977								
Defense	31.9	308.4	623.3	936.6	291.2	98.0	45.7	1,398.4
Energy	1.3	5.2	0.4	6.9	51.4	9.9	19.7	87.9
Postal Service	10.8	3.8	0.1	14.7	42.2	4.4	1.6	62.9
Veterans Administration	0.6	7.3	0	7.9	16.4	12.0	1.7	37.9
General Services Administration	0.2	2.7	0	2.9	29.3	4.1	4.9	41.1
Transportation	1.6	8.3	5.7	15.5	11.7	1.2	0.3	28.8
NASA	0.4	1.5	1.3	3.2	16.5	3.1	1.2	24.0
Agriculture	4.9	1.2	0.3	6.3	2.7	1.7	0	10.8
Interior	2.8	2.5	0.6	5.9	5.6	1.9	0.1	13.5
Health and Human Services	0.7	3.1	0.1	3.9	4.2	1.7	0.1	9.9
Justice	2.0	0.9	0.1	3.0	2.3	1.9	0.5	7.5
Other [3]	3.8	3.7	0.4	7.9	6.3	1.3	0.4	15.9
Total	60.9	348.5	632.1	1,041.6	479.7	141.2	76.1	1,738.6
1987 [4]								
Defense	20.2	273.0	697.5	990.7	352.6	100.4	54.2	1,497.8
Energy	1.4	3.1	0.6	5.1	63.5	6.1	18.5	93.2
Postal Service	9.2	3.9	0.2	13.3	34.9	4.3	1.0	53.4
Veterans Administration	0.5	2.4	0	2.9	24.3	13.7	1.2	42.0
General Services Administration	0.1	0.5	0	0.6	26.3	2.4	3.0	32.4
Transportation	1.2	7.5	5.4	14.1	13.1	1.1	0	28.3
NASA	0.2	0.9	1.3	2.3	19.7	2.6	0.4	25.1
Agriculture	3.4	0.3	0.2	3.9	5.9	1.6	0	11.4
Interior	2.0	1.3	0.9	4.2	4.2	1.0	0.2	9.7
Health and Human Services	0.4	2.5	0.1	3.0	6.6	1.6	0	11.2
Justice	1.9	0.4	0.1	2.4	4.1	1.7	0.5	8.7
Other [3]	3.0	1.9	0.7	5.7	8.1	1.5	1.3	17.1
Total	43.5	297.7	707.0	1,048.2	563.3	138.0	80.2	1,830.3

[1] Includes aviation gasoline, jet fuel, liquefied petroleum gases, and other.
[2] Includes purchased steam, coal, and other.
[3] Includes Department of Commerce, Panama Canal Commission, Tennessee Valley Authority, Department of Labor, National Science Foundation, Department of Treasury, Federal Communications Commission, and Environmental Protection Agency.
[4] Preliminary. Energy usage data for Department of Defense, Department of Labor, Department of Justice, and Department of Treasury are estimated.
Note: Sum of components may not equal total due to independent rounding.
Note: These data include energy consumed at foreign installations and in foreign operations, including aviation and ocean bunkering, primarily by the 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.
Source: Department of Energy Form DOE 6200.2, "Quarterly Federal Energy Usage Report."

Figure 10. Fossil Fuel Prices, 1949-1987



Source: See Table 10.

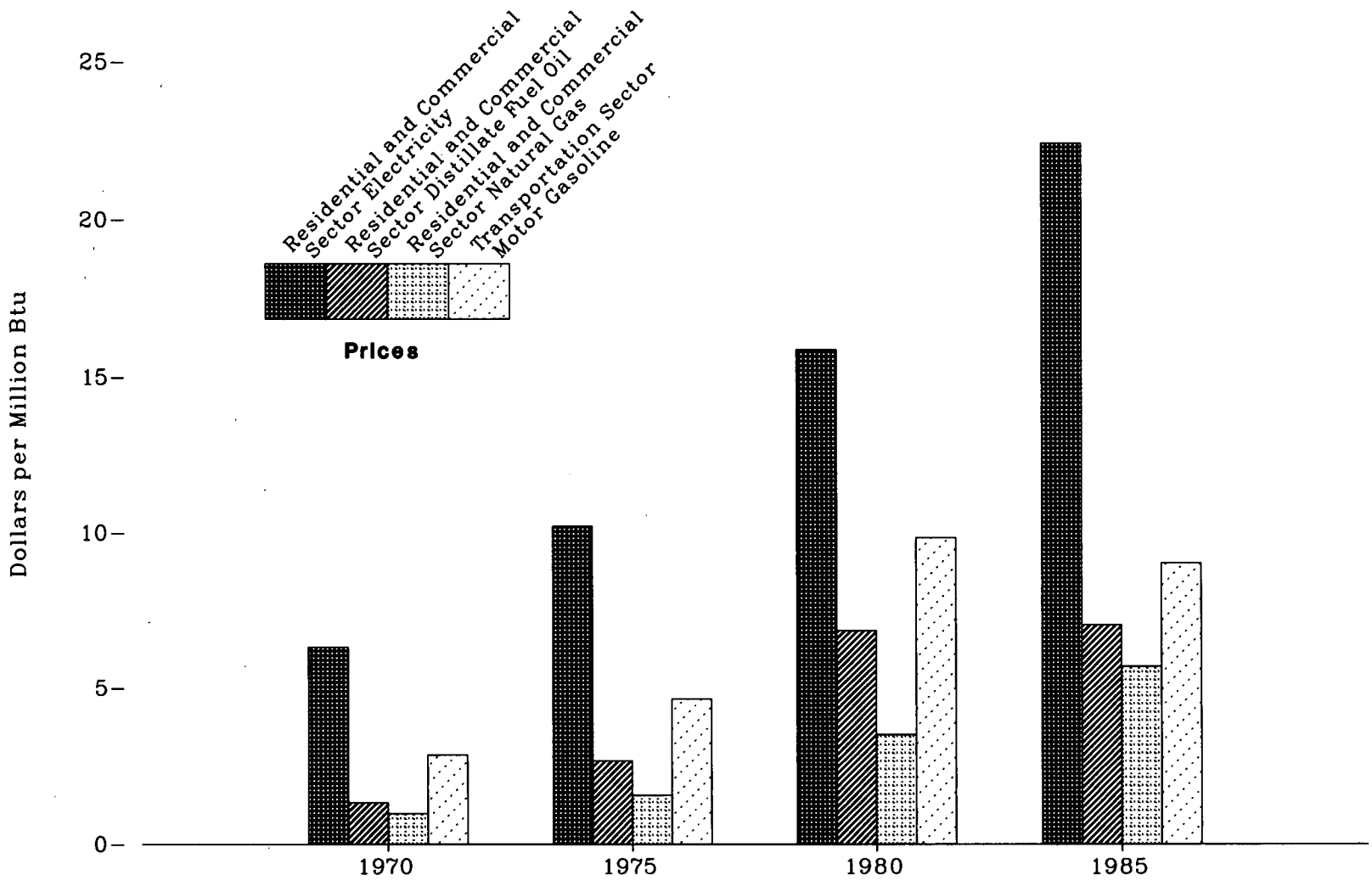
Table 10. Fossil Fuel Prices, 1949-1987

(Cents per Million Btu)

Year	Crude Oil [1]		Natural Gas [2]		Bituminous Coal, Subbituminous Coal, and Lignite		Anthracite		Composite [3]		
	Current	Constant [4]	Current	Constant [4]	Current	Constant [4]	Current	Constant [4]	Current	Constant [4]	Percent Change
1949	43.8	186.4	5.4	23.0	19.5	83.0	36.4	154.9	26.2	111.5	0.0
1950	43.3	181.2	6.3	26.4	19.3	80.8	37.9	158.6	25.6	107.1	-3.9
1951	43.6	173.7	6.3	25.1	19.6	78.1	40.7	162.2	25.9	103.2	-3.6
1952	43.6	171.0	7.2	28.2	19.5	76.5	39.3	154.1	26.1	102.4	-0.8
1953	46.2	178.4	8.1	31.3	19.5	75.3	40.7	157.1	27.3	105.4	2.9
1954	47.9	182.1	9.0	34.2	18.0	68.4	36.1	137.3	27.7	105.3	-0.1
1955	47.8	175.7	8.9	32.7	17.8	65.4	33.1	121.7	27.1	99.6	-5.4
1956	48.1	171.2	9.9	35.2	19.1	68.0	34.9	124.2	27.8	98.9	-0.7
1957	53.3	183.2	9.9	34.0	20.1	69.1	38.3	131.6	29.9	102.7	3.8
1958	51.9	174.7	10.8	36.4	19.4	65.3	38.0	127.9	29.2	98.3	-4.3
1959	50.0	164.5	11.7	38.5	19.1	62.8	35.9	118.1	28.6	94.1	-4.3
1960	49.7	160.8	12.6	40.8	18.8	60.8	33.8	109.4	28.3	91.6	-2.7
1961	49.8	159.6	13.5	43.3	18.4	59.0	34.6	110.9	28.6	91.7	0.1
1962	50.0	156.7	14.5	45.5	18.0	56.4	33.6	105.3	28.8	90.3	-1.5
1963	49.8	153.7	14.5	44.8	17.6	54.3	36.6	113.0	28.3	87.3	-3.3
1964	49.7	151.1	13.6	41.3	17.9	54.4	38.0	115.5	27.7	84.2	-3.6
1965	49.3	145.9	14.5	42.9	17.9	53.0	36.3	107.4	27.7	82.0	-2.6
1966	49.7	142.0	14.5	41.4	18.4	52.6	34.8	99.4	28.0	80.0	-2.4
1967	50.3	140.1	14.5	40.4	18.8	52.4	36.0	100.3	28.4	79.1	-1.1
1968	50.7	134.5	14.3	37.9	19.1	50.7	39.2	104.0	28.5	75.6	-4.4
1969	53.3	133.9	15.4	38.7	20.5	51.5	44.0	110.6	29.9	75.1	-0.7
1970	54.8	130.5	15.4	36.7	26.2	62.4	48.8	116.2	31.7	75.5	0.5
1971	58.4	131.5	16.3	36.7	30.1	67.8	53.2	119.8	34.0	76.6	1.5
1972	58.4	125.6	17.3	37.2	32.7	70.3	55.3	118.9	35.0	75.3	-1.7
1973	67.1	135.6	20.1	40.6	36.5	73.7	61.7	124.6	39.8	80.4	6.8
1974	118.4	219.3	27.3	50.6	68.2	126.3	102.2	189.3	67.6	125.2	55.7
1975	132.2	222.9	41.1	69.3	83.9	141.5	149.5	252.1	82.5	139.1	11.1
1976	141.2	223.8	53.1	84.2	85.0	134.7	153.9	243.9	90.2	142.9	2.7
1977	147.8	219.6	72.3	107.4	87.7	130.3	153.8	228.5	100.8	149.8	4.8
1978	155.2	215.0	83.6	115.8	97.9	135.6	152.7	211.5	111.6	154.6	3.2
1979	217.9	277.2	108.1	137.5	105.3	134.0	177.2	225.4	141.7	180.3	16.6
1980	372.2	434.3	144.8	169.0	109.4	127.7	185.9	216.9	204.2	238.3	32.2
1981	547.8	582.8	179.5	191.0	117.9	125.4	190.1	202.2	274.5	292.0	22.5
1982	491.7	491.7	222.2	222.2	122.1	122.1	214.0	214.0	275.8	275.8	-5.5
1983	451.6	434.6	232.3	223.6	117.2	112.8	230.0	221.4	270.1	260.0	-5.7
1984	446.2	414.3	239.9	222.7	115.9	107.6	208.7	193.8	264.6	245.7	-5.5
1985	415.3	373.5	225.7	203.0	114.8	103.2	204.2	183.6	251.2	225.9	-8.1
1986	215.7	189.0	174.8	153.2	108.2	94.8	191.1	167.5	165.3	144.9	-35.9
1987[5]	265.7	226.1	154.1	131.1	104.8	89.2	186.3	158.6	171.4	145.9	0.7

[1] Includes lease condensate.
[2] Wet natural gas, prior to extraction of natural gas plant liquids.
[3] 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.
[4] In 1982 dollars, calculated using implicit GNP price deflators.
[5] Preliminary.
Note: All fuel prices taken as close as possible to the point of production.
Sources: Tables 61, 72, and 81 and Appendices A and C.

Figure 11. Energy Price Estimates by Sector, Selected Years, 1970–1985



Source: See Table 11.

Table 11. Energy Price Estimates by Sector, 1970, 1975, and 1980-1985

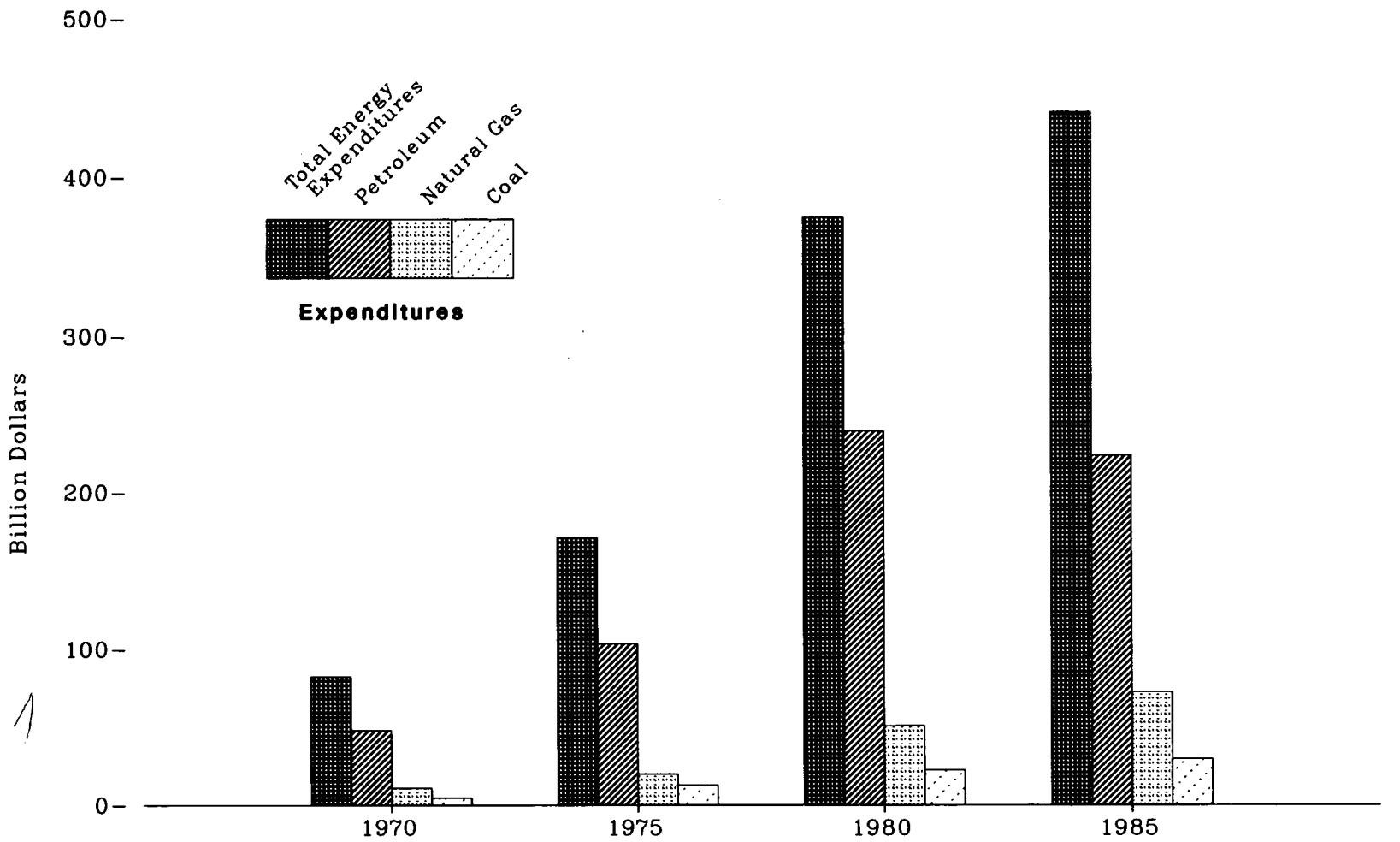
(Dollars per Million Btu)

End-Use Sector (Including Electric Utilities)	1970	1975	1980	1981	1982	1983	1984	1985
Residential and Commercial Sector	2.07	3.93	7.68	9.17	10.12	10.90	11.27	11.61
Primary Energy	1.08	1.97	4.36	5.09	5.59	6.11	6.15	6.06
Coal	0.73	1.78	2.11	2.39	2.44	2.21	2.32	2.25
Natural Gas	0.96	1.56	3.50	4.09	4.93	5.72	5.75	5.72
Petroleum Products [1]	1.32	2.82	6.58	7.98	7.85	7.52	7.57	7.28
Distillate Fuel Oil	1.32	2.66	6.86	8.44	8.17	7.34	7.41	7.05
Liquefied Petroleum Gases	1.98	3.81	7.51	7.99	8.80	9.07	8.91	8.58
Motor Gasoline	2.86	4.66	9.77	10.96	10.44	9.30	8.93	9.03
Residual Fuel Oil	0.45	1.91	4.12	5.12	4.67	4.51	4.71	4.19
Electricity	6.33	10.21	15.86	18.29	20.11	20.83	21.82	22.39
Industrial Sector	0.83	2.21	4.77	5.60	6.14	6.28	6.29	6.19
Primary Energy	0.60	1.67	3.83	4.48	4.74	4.74	4.73	4.54
Coal	0.45	1.50	1.87	2.06	2.09	1.93	1.91	1.89
Coking Coal	0.45	1.65	2.10	2.34	2.43	2.19	2.10	2.02
Steam Coal	0.44	1.28	1.57	1.76	1.84	1.75	1.77	1.81
Natural Gas	0.38	0.95	2.51	3.07	3.79	4.09	4.11	3.86
Petroleum Products [2]	0.98	2.45	5.76	6.85	6.52	6.49	6.52	6.29
Asphalt and Road Oil	0.68	1.89	3.68	5.02	4.24	4.32	4.54	4.77
Distillate Fuel Oil	0.72	2.23	5.54	6.52	6.63	6.19	6.35	6.00
Liquefied Petroleum Gases	1.10	2.52	5.18	5.76	6.18	6.65	6.49	6.27
Lubricants	5.08	7.49	14.36	18.00	17.25	16.98	17.63	17.61
Residual Fuel Oil	0.46	1.91	3.70	4.48	4.45	4.37	4.73	4.28
Electricity	2.99	6.07	10.81	12.57	14.51	14.54	14.77	15.12
Transportation Sector	2.33	4.03	8.64	9.86	9.45	8.54	8.20	8.20
Primary Energy	2.32	4.03	8.62	9.85	9.44	8.53	8.19	8.19
Coal	0.41	1.26	[3]	[3]	[3]	[3]	[3]	[3]
Petroleum Products [4]	2.32	4.03	8.62	9.85	9.44	8.53	8.19	8.19
Distillate Fuel Oil	1.31	2.80	7.19	8.55	8.14	7.30	7.24	7.01
Jet Fuel	0.73	2.05	6.36	7.57	7.23	6.51	6.24	5.91
Motor Gasoline	2.85	4.64	9.84	10.94	10.39	9.30	8.89	9.03
Residual Fuel Oil	0.38	1.73	3.31	4.44	4.54	4.42	4.67	4.41
Electricity	4.61	12.07	14.82	16.82	20.31	20.99	20.27	19.85
Electric Utilities	0.32	0.96	1.75	2.00	2.01	1.97	1.97	1.85
Coal	0.31	0.82	1.35	1.53	1.65	1.66	1.66	1.65
Natural Gas	0.28	0.75	2.20	2.80	3.37	3.47	3.58	3.42
Petroleum Products [5]	0.42	2.00	4.34	5.43	4.94	4.68	4.90	4.35
Heavy Oil [6]	0.41	1.99	4.25	5.32	4.83	4.60	4.82	4.24
Nuclear Fuel	0.18	0.24	0.43	0.48	0.54	0.57	0.67	0.70
Wood and Waste	0.65	0.92	1.74	1.24	1.28	1.12	1.28	0.79

[1] In addition to listed products, includes kerosene.
[2] 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.
[3] Not applicable.
[4] In addition to listed products, includes aviation gasoline, liquefied petroleum gases, and lubricants.
[5] In addition to listed products, includes distillate fuel oil, jet fuel, and petroleum coke.
[6] Heavy oil includes Grade Nos. 4, 5, and 6 fuel oils.

Sources: **Residential and Commercial Sector:** Energy Information Administration, "State Energy Price and Expenditure Data System 1985." **All Other Data:** Energy Information Administration, *State Energy Price and Expenditure Report 1985.*

Figure 12. Energy Expenditure Estimates, Selected Years, 1970-1985



Source: See Table 12.

Table 12. Energy Expenditure Estimates, 1970, 1975, and 1980-1985

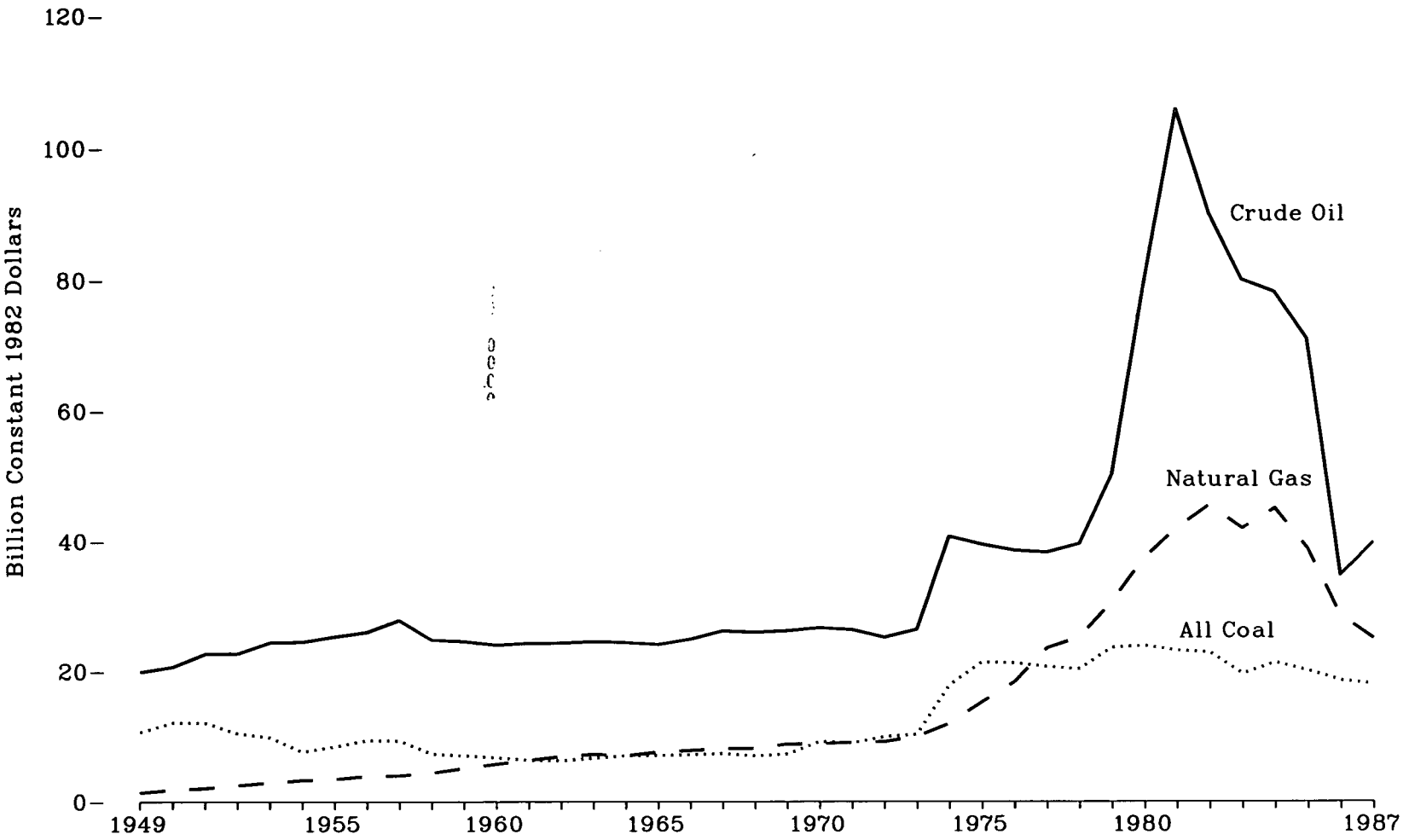
(Billion Dollars)

Energy Source	1970	1975	1980	1981	1982	1983	1984	1985
Coal								
Coking Coal	1.2	3.7	3.7	3.8	2.7	2.2	2.5	2.2
Steam Coal	3.4	9.4	18.9	22.4	23.7	24.9	26.6	27.4
Total	4.6	13.0	22.6	26.2	26.4	27.1	29.1	29.7
Natural Gas	10.9	20.1	51.0	60.5	68.2	71.9	77.0	72.9
Petroleum Products								
Asphalt and Road Oil	0.7	1.9	3.5	4.2	3.5	3.9	4.5	4.9
Aviation Gasoline	0.3	0.4	0.9	0.9	0.8	0.8	0.7	0.8
Distillate Fuel Oil	6.3	15.7	40.8	48.2	44.1	40.4	43.0	41.5
Jet Fuel	1.4	4.2	13.9	15.6	15.0	13.9	15.1	14.7
Kerosene	0.6	0.9	2.3	2.2	2.3	2.0	1.9	1.8
Liquefied Petroleum Gases	2.4	5.2	10.9	11.9	12.9	14.1	14.3	14.2
Lubricants	1.5	2.3	5.1	6.1	5.3	5.5	6.1	5.7
Motor Gasoline	31.6	59.4	124.4	138.1	130.3	118.1	114.4	118.3
Residual Fuel Oil	2.0	10.4	21.6	22.7	17.6	14.1	14.4	11.5
Other Petroleum Products [1]	1.0	3.2	15.8	16.9	12.0	10.1	11.2	10.1
Total	48.1	103.6	239.3	266.8	243.8	222.9	225.7	223.6
Nuclear Fuel, Wood, and Waste Electricity Generation	[2]	0.5	1.2	1.4	1.7	1.8	2.4	2.9
Imports of Coal Coke	[2]	0.2	0.1	[2]	[2]	[2]	[2]	[2]
Exports of Coal Coke [3]	0.1	0.1	0.1	0.1	0.1	[2]	0.1	0.1
Total Primary Energy	63.5	137.3	314.0	354.9	340.1	323.7	334.2	329.0
Electric Utility Fuel [3]	4.3	16.4	37.4	43.3	41.3	41.3	43.3	42.5
Electricity Purchased by End Users [4]	23.4	50.7	98.1	116.5	127.4	134.7	147.9	154.5
Total Energy [5]	82.6	171.5	374.7	428.1	426.2	417.1	438.7	441.0

[1] Includes 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] These are sales. In determining total energy expenditures, this is a positive quantity.
[5] There are no direct fuel costs for hydroelectric, geothermal, centralized solar, or wind energy. Wood and other biomass fuels are not included, except those consumed at the electric utilities.

Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *State Energy Price and Expenditure Report 1985.*

Figure 13. Value of Fossil Fuel Production, 1949-1987



Source: See Table 13.

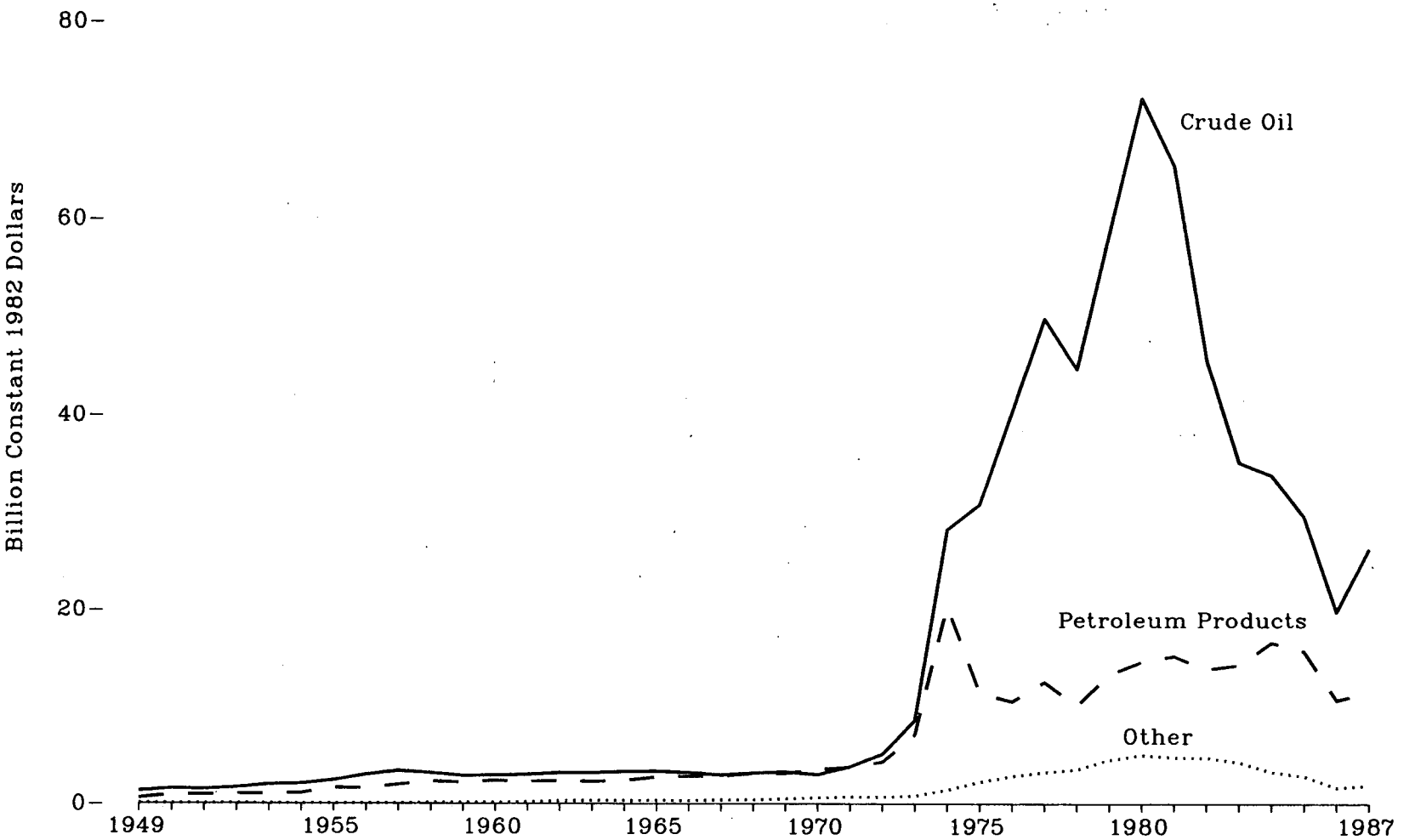
Table 13. Value of Fossil Fuel Production, 1949-1987

(Billion Dollars)

Year	Crude Oil [1]		Natural Gas (Marketed Production)		Bituminous Coal, Subbituminous Coal, and Lignite		Anthracite		Total	
	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]
1949	4.68	19.91	0.33	1.40	2.14	9.11	0.38	1.62	7.53	32.04
1950	4.95	20.71	0.44	1.84	2.50	10.46	0.41	1.72	8.30	34.73
1951	5.69	22.67	0.52	2.07	2.63	10.48	0.42	1.67	9.26	36.89
1952	5.79	22.71	0.64	2.51	2.29	8.98	0.39	1.53	9.11	35.73
1953	6.32	24.40	0.76	2.93	2.25	8.69	0.31	1.20	9.64	37.22
1954	6.44	24.49	0.87	3.31	1.77	6.73	0.25	0.95	9.33	35.48
1955	6.88	25.29	0.94	3.46	2.09	7.68	0.21	0.77	10.12	37.20
1956	7.30	25.98	1.11	3.95	2.41	8.58	0.24	0.85	11.06	39.36
1957	8.09	27.80	1.17	4.02	2.50	8.59	0.23	0.79	11.99	41.20
1958	7.37	24.81	1.32	4.44	1.99	6.70	0.19	0.64	10.87	36.59
1959	7.47	24.57	1.57	5.16	1.97	6.48	0.18	0.59	11.19	36.80
1960	7.42	24.01	1.79	5.79	1.95	6.31	0.15	0.49	11.31	36.60
1961	7.58	24.29	1.99	6.38	1.85	5.93	0.14	0.45	11.56	37.05
1962	7.76	24.33	2.22	6.96	1.89	5.92	0.13	0.41	12.00	37.62
1963	7.96	24.57	2.36	7.28	2.01	6.20	0.16	0.49	12.49	38.54
1964	8.03	24.41	2.33	7.08	2.17	6.60	0.15	0.46	12.68	38.55
1965	8.15	24.11	2.57	7.60	2.27	6.72	0.13	0.38	13.12	38.81
1966	8.72	24.91	2.75	7.86	2.42	6.91	0.10	0.29	13.99	39.97
1967	9.39	26.16	2.91	8.11	2.55	7.10	0.10	0.28	14.95	41.65
1968	9.79	25.97	3.09	8.20	2.55	6.76	0.10	0.27	15.53	41.20
1969	10.42	26.18	3.52	8.84	2.80	7.04	0.10	0.25	16.84	42.31
1970	11.19	26.64	3.73	8.88	3.77	8.98	0.11	0.26	18.80	44.76
1971	11.71	26.37	4.05	9.12	3.90	8.78	0.11	0.25	19.77	44.52
1972	11.71	25.18	4.28	9.20	4.56	9.81	0.09	0.19	20.64	44.38
1973	13.07	26.40	4.98	10.06	5.05	10.20	0.09	0.18	23.19	46.84
1974	22.00	40.74	6.48	12.00	9.50	17.59	0.15	0.28	38.13	70.61
1975	23.45	39.54	9.05	15.26	12.47	21.03	0.20	0.34	45.17	76.17
1976	24.37	38.62	11.57	18.34	13.19	20.90	0.21	0.33	49.34	78.19
1977	25.79	38.32	15.82	23.51	13.70	20.36	0.20	0.30	55.51	82.49
1978	28.60	39.61	18.18	25.18	14.49	20.07	0.18	0.25	61.45	85.11
1979	39.45	50.19	24.16	30.74	18.36	23.36	0.20	0.25	82.17	104.54
1980	67.93	79.26	32.09	37.44	20.20	23.57	0.26	0.30	120.48	140.57
1981	99.40	105.74	39.51	42.03	21.51	22.88	0.24	0.26	160.66	170.91
1982	90.03	90.03	45.56	45.56	22.62	22.62	0.23	0.23	158.44	158.44
1983	83.05	79.93	43.57	41.93	20.11	19.36	0.21	0.20	146.94	141.42
1984	84.10	78.09	48.49	45.02	22.75	21.12	0.20	0.19	155.54	144.42
1985	78.88	70.94	43.17	38.82	22.06	19.84	0.22	0.20	144.33	129.80
1986	39.63	34.73	32.57	28.55	21.00	18.40	0.19	0.17	93.39	81.85
1987[3]	46.74	39.78	29.35	24.98	20.99	17.86	0.18	0.15	97.26	82.77

[1] Includes lease condensate.
[2] In 1982 dollars, calculated using implicit GNP price deflators.
[3] Preliminary.
Note: Value is based on fuel prices taken as close as possible to the point of production.
Sources: Tables 47, 61, 66, 72, 75, and 81 and Appendix C.

Figure 14. Value of Fossil Fuel Imports, 1949-1987



Source: See Table 14.

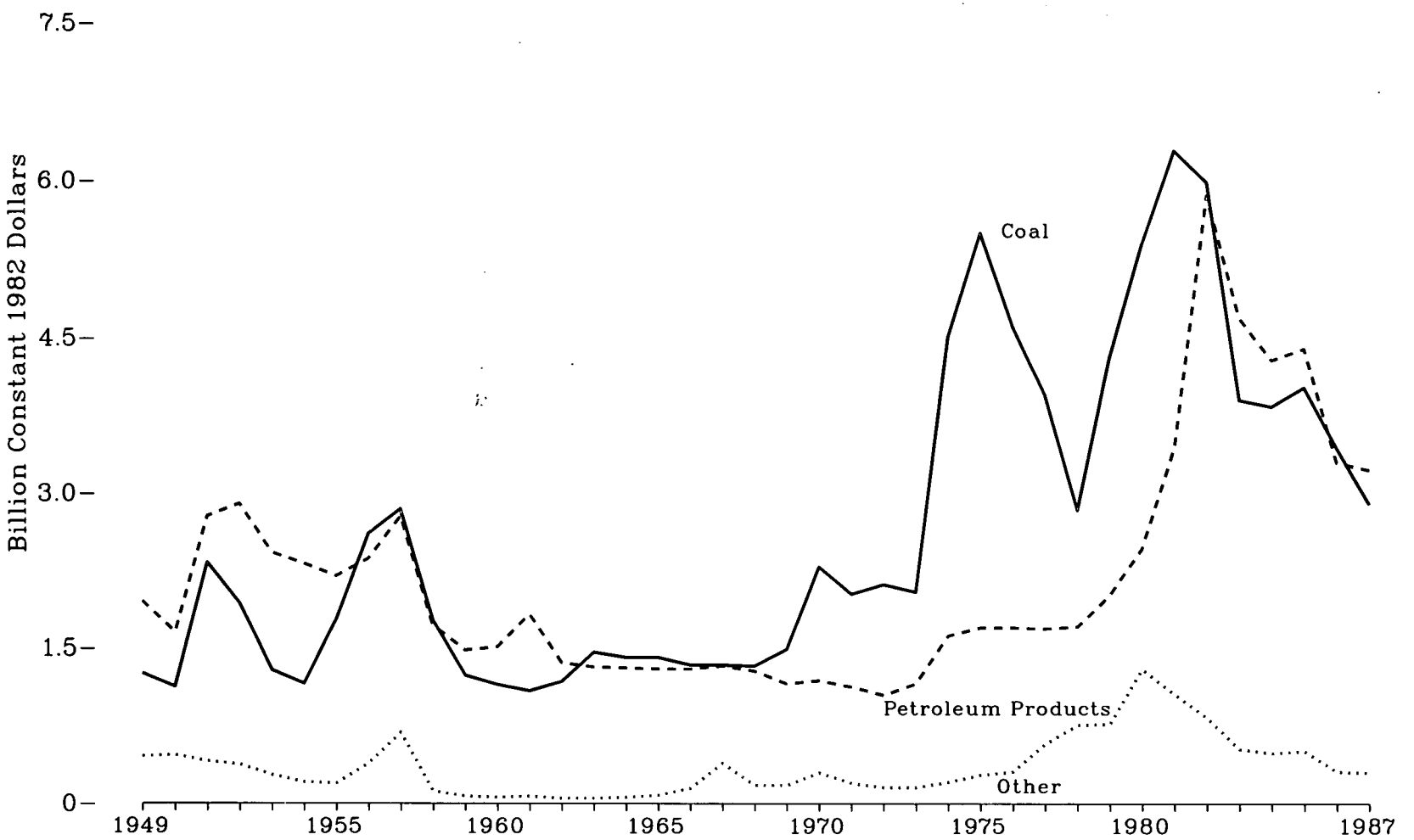
Table 14. Value of Fossil Fuel Imports, 1949-1987

(Billion Dollars)

Year	Coal		Coal Coke		Natural Gas		Crude Oil [1]		Petroleum Products		Total	
	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]
1949	[3]	0.01	[3]	0.02	[3]	[3]	0.30	1.30	0.14	0.58	0.45	1.91
1950	[3]	0.01	0.01	0.02	[3]	[3]	0.37	1.54	0.21	0.90	0.59	2.48
1951	[3]	0.01	[3]	0.01	[3]	[3]	0.37	1.49	0.23	0.90	0.61	2.41
1952	[3]	0.01	[3]	0.02	[3]	[3]	0.42	1.66	0.25	0.99	0.68	2.68
1953	[3]	0.01	[3]	0.01	[3]	[3]	0.51	1.97	0.25	0.97	0.77	2.96
1954	[3]	0.01	[3]	[3]	[3]	[3]	0.54	2.07	0.28	1.08	0.83	3.17
1955	[3]	0.01	[3]	0.01	[3]	[3]	0.65	2.41	0.44	1.62	1.10	4.05
1956	[3]	0.01	[3]	0.01	[3]	[3]	0.84	2.98	0.45	1.59	1.29	4.59
1957	[3]	0.01	[3]	0.01	[3]	0.01	0.98	3.37	0.57	1.95	1.56	5.35
1958	[3]	0.01	[3]	0.01	0.02	0.07	0.94	3.16	0.68	2.31	1.65	5.56
1959	[3]	0.01	[3]	[3]	0.03	0.09	0.87	2.87	0.66	2.18	1.57	5.15
1960	[3]	0.01	[3]	[3]	0.03	0.09	0.90	2.90	0.73	2.37	1.66	5.37
1961	[3]	[3]	[3]	[3]	0.04	0.14	0.93	2.99	0.71	2.28	1.69	5.42
1962	[3]	0.01	[3]	0.01	0.09	0.27	1.01	3.17	0.75	2.36	1.86	5.82
1963	[3]	0.01	[3]	0.01	0.10	0.30	1.03	3.16	0.74	2.28	1.87	5.76
1964	[3]	0.01	[3]	[3]	0.10	0.30	1.08	3.28	0.78	2.38	1.97	5.98
1965	[3]	[3]	[3]	[3]	0.11	0.31	1.12	3.31	0.92	2.73	2.15	6.37
1966	[3]	[3]	[3]	0.01	0.11	0.30	1.12	3.19	0.99	2.82	2.21	6.32
1967	[3]	0.01	[3]	[3]	0.13	0.36	1.06	2.96	1.02	2.83	2.21	6.17
1968	[3]	0.01	[3]	0.01	0.15	0.39	1.18	3.14	1.16	3.09	2.50	6.63
1969	[3]	[3]	[3]	0.01	0.20	0.49	1.30	3.26	1.24	3.11	2.74	6.88
1970	[3]	[3]	[3]	0.01	0.26	0.61	1.26	3.00	1.48	3.53	3.00	7.15
1971	[3]	[3]	0.01	0.01	0.31	0.70	1.69	3.80	1.66	3.73	3.66	8.25
1972	[3]	[3]	[3]	0.01	0.31	0.68	2.37	5.10	1.99	4.28	4.68	10.06
1973	[3]	[3]	0.04	0.08	0.36	0.73	4.24	8.57	3.50	7.07	8.14	16.45
1974	0.06	0.11	0.19	0.36	0.53	0.98	15.25	28.25	11.01	20.39	27.05	50.09
1975	0.02	0.04	0.16	0.26	1.15	1.94	18.29	30.84	6.77	11.41	26.39	44.50
1976	0.02	0.03	0.11	0.18	1.66	2.63	25.46	40.34	6.65	10.54	33.90	53.72
1977	0.04	0.06	0.13	0.19	2.00	2.97	33.59	49.91	8.42	12.51	44.18	65.64
1978	0.07	0.10	0.41	0.57	2.06	2.85	32.30	44.73	7.30	10.12	42.15	58.37
1979	0.05	0.07	0.34	0.43	3.13	3.98	46.06	58.60	10.45	13.30	60.03	76.37
1980	0.03	0.04	0.05	0.06	4.21	4.92	61.90	72.23	12.54	14.63	78.74	91.87
1981	0.03	0.03	0.04	0.05	4.41	4.69	61.46	65.38	14.30	15.21	80.24	85.36
1982	0.02	0.02	0.01	0.01	4.69	4.69	45.72	45.72	13.86	13.86	64.31	64.31
1983	0.04	0.04	[3]	[3]	4.39	4.22	36.49	35.12	14.84	14.28	55.77	53.67
1984	0.05	0.04	0.05	0.04	3.44	3.19	36.44	33.84	17.87	16.59	57.84	53.71
1985	0.07	0.06	0.04	0.04	3.05	2.74	32.90	29.59	17.47	15.71	53.53	48.14
1986	0.08	0.07	0.03	0.02	1.82	1.60	22.61	19.81	12.18	10.68	36.72	32.18
1987[4]	0.06	0.05	0.05	0.05	2.09	1.78	30.84	26.25	13.44	11.44	46.48	39.56

[1] Includes imports into the Strategic Petroleum Reserve, which began in 1977.
[2] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.
[3] Less than $5 million.
[4] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Note: 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.
Sources: **Natural Gas:** • 1949 through 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 through 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 through 1977—Federal Power Commission, *United States Imports and Exports of Natural Gas*, annual. • 1978 through 1981—Energy Information Administration, *U.S. Imports and Exports of Natural Gas*, annual. • 1982 through 1986—Energy Information Administration, *Natural Gas Monthly*. • 1987—EIA estimates. **Others:** • 1949 through 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 through 1986—Bureau of the Census, *U.S. Imports for Consumption*, FT135. • 1987—Bureau of the Census, *Advanced Report on U.S. Merchandise Trade*, FT900 Adv. (87-12).

Figure 15. Value of Fossil Fuel Exports, 1949-1987



Source: See Table 15.

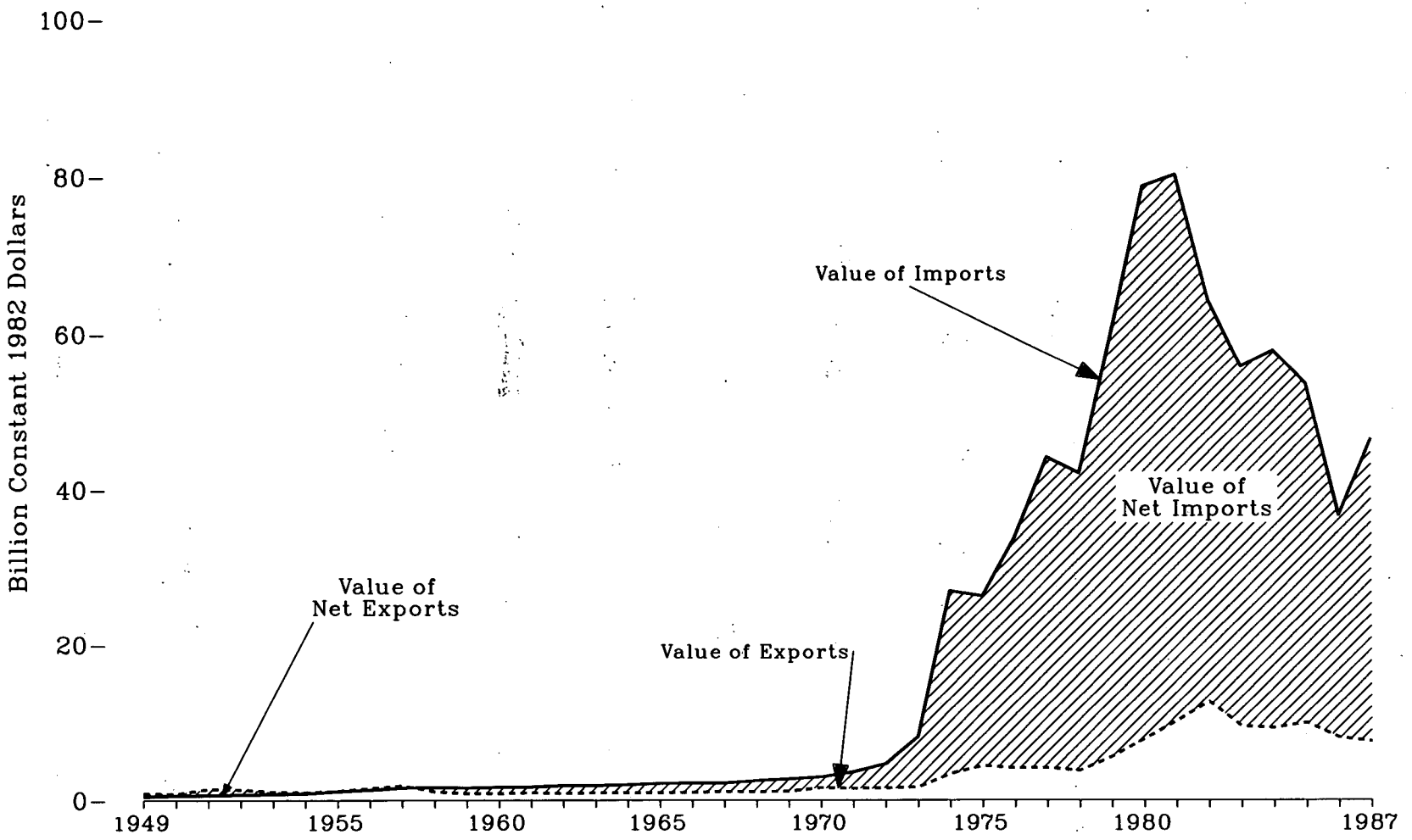
Table 15. Value of Fossil Fuel Exports, 1949-1987

(Billion Dollars)

Year	Coal		Coal Coke		Natural Gas		Crude Oil		Petroleum Products		Total	
	Current	Constant [1]	Current	Constant [1]	Current	Constant [1]	Current	Constant [1]	Current	Constant [1]	Current	Constant [1]
1949	0.30	1.26	0.01	0.04	[2]	0.01	0.10	0.42	0.46	1.96	0.87	3.69
1950	0.27	1.13	0.01	0.03	[2]	0.01	0.10	0.43	0.39	1.65	0.78	3.25
1951	0.59	2.33	0.02	0.07	[2]	0.01	0.08	0.33	0.70	2.78	1.39	5.53
1952	0.49	1.94	0.01	0.05	[2]	0.02	0.08	0.31	0.74	2.90	1.33	5.21
1953	0.34	1.29	0.01	0.04	[2]	0.02	0.06	0.23	0.63	2.43	1.04	4.01
1954	0.30	1.16	0.01	0.02	[2]	0.02	0.05	0.17	0.61	2.32	0.97	3.68
1955	0.48	1.78	0.01	0.03	0.01	0.02	0.04	0.14	0.60	2.20	1.14	4.18
1956	0.73	2.61	0.01	0.04	0.01	0.03	0.09	0.32	0.67	2.37	1.51	5.37
1957	0.83	2.85	0.01	0.05	0.01	0.04	0.17	0.60	0.81	2.78	1.84	6.31
1958	0.53	1.77	0.01	0.02	0.01	0.05	0.01	0.05	0.51	1.72	1.07	3.61
1959	0.38	1.24	0.01	0.03	0.01	0.02	0.01	0.02	0.45	1.48	0.85	2.80
1960	0.35	1.15	0.01	0.02	[2]	0.01	0.01	0.03	0.47	1.51	0.84	2.72
1961	0.34	1.09	0.01	0.03	[2]	0.01	0.01	0.03	0.57	1.83	0.93	2.99
1962	0.38	1.18	0.01	0.02	[2]	0.01	0.01	0.02	0.43	1.36	0.83	2.59
1963	0.47	1.46	0.01	0.03	[2]	0.01	[2]	0.01	0.43	1.32	0.92	2.84
1964	0.46	1.41	0.01	0.03	[2]	0.01	[2]	0.01	0.43	1.31	0.91	2.77
1965	0.48	1.41	0.02	0.05	0.01	0.02	[2]	0.01	0.44	1.30	0.95	2.80
1966	0.47	1.34	0.02	0.07	0.02	0.05	0.01	0.03	0.46	1.30	0.97	2.79
1967	0.48	1.34	0.02	0.05	0.03	0.09	0.09	0.26	0.48	1.33	1.10	3.07
1968	0.50	1.33	0.02	0.05	0.04	0.10	0.01	0.03	0.48	1.28	1.05	2.79
1969	0.59	1.49	0.04	0.10	0.03	0.07	0.01	0.02	0.46	1.16	1.13	2.83
1970	0.96	2.29	0.08	0.19	0.03	0.07	0.02	0.04	0.50	1.19	1.59	3.79
1971	0.90	2.03	0.04	0.10	0.04	0.09	0.01	0.01	0.50	1.13	1.49	3.36
1972	0.98	2.12	0.03	0.07	0.04	0.09	[2]	[2]	0.49	1.05	1.55	3.32
1973	1.01	2.05	0.03	0.07	0.04	0.08	[2]	0.01	0.57	1.16	1.66	3.36
1974	2.44	4.51	0.04	0.08	0.05	0.10	0.01	0.03	0.87	1.62	3.42	6.34
1975	3.26	5.50	0.07	0.13	0.09	0.15	[2]	[2]	1.01	1.70	4.43	7.47
1976	2.91	4.61	0.07	0.11	0.10	0.16	0.03	0.04	1.07	1.70	4.17	6.62
1977	2.66	3.95	0.07	0.11	0.11	0.16	0.21	0.31	1.14	1.69	4.18	6.21
1978	2.05	2.84	0.05	0.07	0.11	0.15	0.39	0.54	1.23	1.71	3.83	5.31
1979	3.40	4.32	0.08	0.10	0.13	0.16	0.39	0.50	1.58	2.02	5.58	7.10
1980	4.63	5.40	0.13	0.15	0.23	0.27	0.75	0.88	2.12	2.47	7.86	9.17
1981	5.92	6.29	0.07	0.08	0.35	0.37	0.58	0.61	3.24	3.44	10.16	10.80
1982	5.99	5.99	0.06	0.06	0.30	0.30	0.47	0.47	5.86	5.86	12.68	12.68
1983	4.06	3.90	0.05	0.04	0.28	0.27	0.22	0.22	4.88	4.69	9.48	9.13
1984	4.13	3.84	0.07	0.06	0.27	0.25	0.19	0.17	4.62	4.29	9.27	8.61
1985	4.47	4.02	0.08	0.07	0.26	0.24	0.23	0.20	4.90	4.40	9.93	8.93
1986	3.93	3.44	0.07	0.06	0.17	0.15	0.12	0.10	3.77	3.30	8.05	7.06
1987[3]	3.40	2.90	0.05	0.04	0.18	0.15	0.13	0.11	3.80	3.23	7.55	6.43

[1] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.
[2] Less than $5 million.
[3] Preliminary.
Note: 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.
Note: Sum of components may not equal total due to independent rounding.
Sources: **Natural Gas:** •1949 through 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 through 1977—Federal Power Commission, *United States Imports and Exports of Natural Gas*, annual. • 1978 through 1981—Energy Information Administration, *U.S. Imports and Exports of Natural Gas*, annual. • 1982 through 1986—Energy Information Administration, *Natural Gas Monthly*. • 1987—EIA estimates. **Others:** • 1949 through 1986—Bureau of the Census, *U.S. Exports*, FT410. •1987—Bureau of the Census, *Advanced Report on U.S. Merchandise Trade*, FT900 Adv. (87-12).

Figure 16. Value of Net Imports of Fossil Fuels, 1949–1987



Source: See Tables 14, 15, and 16.

Table 16. Value of Net Imports [1] of Fossil Fuels, 1949-1987

(Billion Dollars)

Year	Coal		Coal Coke		Natural Gas		Crude Oil		Petroleum Products		Total	
	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]	Current	Constant [2]
1949	-0.29	-1.25	(3)	-0.02	(3)	-0.01	0.21	0.88	-0.32	-1.38	-0.42	-1.78
1950	-0.27	-1.12	(3)	(3)	(3)	-0.01	0.27	1.12	-0.18	-0.75	-0.18	-0.77
1951	-0.58	-2.33	-0.02	-0.06	(3)	-0.01	0.29	1.17	-0.47	-1.88	-0.78	-3.12
1952	-0.49	-1.93	-0.01	-0.04	(3)	-0.01	0.34	1.35	-0.49	-1.91	-0.65	-2.53
1953	-0.33	-1.29	-0.01	-0.03	(3)	-0.01	0.45	1.74	-0.38	-1.46	-0.27	-1.05
1954	-0.30	-1.15	(3)	-0.02	(3)	-0.01	0.50	1.90	-0.32	-1.24	-0.14	-0.52
1955	-0.48	-1.77	-0.01	-0.03	-0.01	-0.02	0.62	2.27	-0.16	-0.58	-0.04	-0.13
1956	-0.73	-2.60	-0.01	-0.04	-0.01	-0.03	0.75	2.66	-0.22	-0.78	-0.22	-0.78
1957	-0.83	-2.84	-0.01	-0.04	-0.01	-0.03	0.81	2.77	-0.24	-0.83	-0.28	-0.97
1958	-0.52	-1.76	-0.01	-0.02	0.01	0.02	0.92	3.11	0.17	0.59	0.58	1.94
1959	-0.38	-1.24	-0.01	-0.02	0.02	0.07	0.87	2.85	0.21	0.70	0.71	2.35
1960	-0.35	-1.14	-0.01	-0.02	0.02	0.08	0.89	2.87	0.26	0.86	0.82	2.65
1961	-0.34	-1.09	-0.01	-0.02	0.04	0.13	0.92	2.96	0.14	0.44	0.76	2.43
1962	-0.38	-1.18	-0.01	-0.02	0.08	0.26	1.01	3.16	0.32	1.00	1.03	3.22
1963	-0.47	-1.45	-0.01	-0.02	0.09	0.29	1.02	3.15	0.31	0.95	0.95	2.92
1964	-0.46	-1.40	-0.01	-0.03	0.10	0.29	1.08	3.27	0.35	1.07	1.06	3.21
1965	-0.48	-1.41	-0.01	-0.04	0.10	0.29	1.11	3.30	0.48	1.43	1.21	3.57
1966	-0.47	-1.33	-0.02	-0.06	0.09	0.25	1.11	3.16	0.53	1.52	1.24	3.53
1967	-0.48	-1.34	-0.01	-0.04	0.10	0.27	0.97	2.71	0.54	1.50	1.11	3.10
1968	-0.50	-1.33	-0.02	-0.04	0.11	0.29	1.17	3.11	0.68	1.81	1.45	3.84
1969	-0.59	-1.49	-0.04	-0.09	0.17	0.42	1.29	3.25	0.78	1.95	1.61	4.05
1970	-0.96	-2.29	-0.08	-0.18	0.23	0.54	1.24	2.96	0.98	2.34	1.41	3.37
1971	-0.90	-2.03	-0.04	-0.09	0.27	0.62	1.68	3.79	1.15	2.60	2.17	4.89
1972	-0.98	-2.11	-0.03	-0.06	0.28	0.59	2.37	5.09	1.50	3.23	3.13	6.74
1973	-1.01	-2.04	0.01	0.01	0.32	0.65	4.24	8.56	2.93	5.91	6.48	13.09
1974	-2.38	-4.41	0.15	0.28	0.48	0.88	15.24	28.22	10.14	18.78	23.63	43.75
1975	-3.24	-5.46	0.08	0.14	1.06	1.79	18.29	30.84	5.76	9.72	21.96	37.03
1976	-2.89	-4.58	0.04	0.07	1.56	2.47	25.43	40.30	5.58	8.85	29.72	47.10
1977	-2.62	-3.89	0.06	0.09	1.89	2.81	33.38	49.60	7.28	10.82	40.00	59.43
1978	-1.98	-2.74	0.36	0.50	1.95	2.70	31.91	44.19	6.07	8.41	38.31	53.07
1979	-3.35	-4.26	0.26	0.33	3.00	3.81	45.66	58.10	8.87	11.28	54.44	69.26
1980	-4.60	-5.36	-0.08	-0.09	3.98	4.65	61.15	71.35	10.42	12.16	70.88	82.71
1981	-5.89	-6.26	-0.03	-0.03	4.06	4.32	60.88	64.77	11.06	11.77	70.09	74.56
1982	-5.97	-5.97	-0.05	-0.05	4.39	4.39	45.25	45.25	8.00	8.00	51.63	51.63
1983	-4.01	-3.86	-0.04	-0.04	4.11	3.96	36.27	34.91	9.96	9.59	46.28	44.55
1984	-4.09	-3.79	-0.02	-0.02	3.17	2.94	36.26	33.67	13.25	12.30	48.57	45.10
1985	-4.39	-3.95	-0.03	-0.03	2.79	2.50	32.68	29.39	12.57	11.30	43.60	39.21
1986	-3.85	-3.37	-0.04	-0.04	1.65	1.44	22.49	19.71	8.42	7.38	28.66	25.12
1987[4]	-3.35	-2.85	0.01	0.01	1.92	1.63	30.71	26.14	9.64	8.21	38.93	33.13

[1] Net imports = imports minus exports.
[2] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.
[3] Less than $5 million.
[4] Preliminary.
Note: Sum of components may not equal total due to independent rounding. Data on this table may not equal data on Table 14 minus data on Table 15 due to independent rounding.
Sources: Tables 14 and 15.

2. Energy Indicators

Indicators of Energy Intensity

The relationship between end-use energy consumption and real gross national product (GNP) is a primary indication of the energy intensity of the economy. In 1970, end-use consumption of energy was 23 thousand Btu per constant dollar of GNP (18). Higher energy prices in the early 1970's led to increases in energy efficiency and to the development of service industries at the expense of energy-intensive industries. As a result, the energy intensity of the economy as a whole fell to 15 thousand Btu per constant dollar in 1987, a decline of over one-third since 1970. Despite lower prices in 1987, the trend toward lower energy use per dollar of output was sustained.

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 (17). 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 226 million Btu in 1983. In 1987, end-use energy consumption was 234 million Btu per capita.

Energy consumption per household,[1] a third indicator of energy intensity, declined from 138 million Btu in 1978 to 103 million Btu in 1982, then inched up to 105 million Btu in 1984 (the most recent year for which data are available). Lower use of distillate fuel oil and kerosene accounted for most of the decline (21). Households in the South and West consumed the least amount of energy in 1984, an average of 85 million Btu per household. Energy consumption by households in the Northeast averaged 125 million Btu per household. Households in the North Central region averaged 129 million Btu per household.

[1]Five major energy sources—natural gas, electricity, distillate fuel oil, kerosene, and liquefied petroleum gases—are included in the data.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Household Uses of Energy

Energy consumed by households can be attributed to four primary applications: space heating, air conditioning, water heating, and appliance operation (22). In 1984 (the most recent year for which data are available), household energy consumption totaled 9 quadrillion Btu. Space heating, the most prevalent application of energy consumed by households, accounted for 5 quadrillion Btu. Natural gas was the primary source of energy for space heating and provided the main source of heat in almost 48 million households (23).

Nearly 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, automatic clothes washers, and ovens were the most common household appliances (25).

Electricity was essentially the only source of energy used for air conditioning. Although air conditioning accounted for only 4 percent of household energy consumption, it accounted for almost 8 percent ($7.5 billion) of total household energy expenditures of $97 billion.

The cost of energy used to operate appliances totaled $38 billion in 1984, and the cost for space heating was a close second at $37 billion. Energy expenses for water heating came to about $15 billion.

Improvements in Motor Vehicle Efficiency

Because motor gasoline consistently accounts for the largest share of all petroleum products supplied (56), demand for motor gasoline can have a significant effect on U.S. dependence on foreign sources of crude oil. In turn, the price and availability of crude oil influence motor gasoline demand.

In 1973, average annual mileage exceeded 10 thousand miles per passenger car (27). The fuel rate of passenger cars, which make up a sizable proportion of the U.S. motor vehicle fleet, was 13.3 miles per gallon. That measure of fuel efficiency had declined for the previous several years.

In 1973–74, however, crude oil supply interruptions and rising prices led to concerns about the continued availability of motor gasoline at desirable prices. Mileage per passenger car immediately declined, to an average of 9.6 thousand in 1974. At the same time, the fuel rate began to creep upward, and continued to increase throughout the remainder of the 1970's and 1980's, reaching 18.3 miles per gallon in 1986 (the most recent year for which data are available). Federal regulations designed to encourage improvements in the efficiency of the fleet played a role in the increases in fuel rates.

During 1987, however, new Federal legislation allowed States to raise the speed limit on some highways, and 38 States increased speed limits. Because vehicles traveling at speeds above 55 miles per hour are less efficient, higher speed limits tend to increase demand for motor fuel. Other factors, such as relatively low motor gasoline prices and increases in highway travel, also tend to increase demand.

Consumption of Energy for Manufacturing

Provisional estimates indicate that energy consumed by the manufacturing sector totaled 13.7 quadrillion Btu in 1985 (the most recent year for which data are available). Consumption of natural gas accounted for 4.6 quadrillion Btu, one-third of the total (31). Distillate and residual fuel oil consumption of 0.7 quadrillion Btu accounted for only 5 percent. The ratio of natural gas to fuel oil consumption was about 6.5 to 1.

Electricity[2] provided 2.3 quadrillion Btu of energy for manufacturing, and coal and coke provided 2.0 quadrillion Btu. The balance of manufacturing energy—4.2 quadrillion Btu—came from a variety of sources, including liquefied petroleum gases, other petroleum and natural gas products, byproducts and waste products (such as still gas, coke oven gas, pulping liquor, and wood waste), steam, roundwood, and biomass.

[2]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 inputs from onsite cogeneration and generation from combustible fuels.

Of the 20 major industry groups, 4 were major consumers of manufacturing energy: chemicals and allied products, petroleum and coal products, primary metal industries, and paper and allied products. Each of those industries consumed about 2.4 quadrillion Btu of energy in 1985, and together they accounted for 70 percent of the total consumed by the manufacturing sector.

Trends in Industrial Energy Consumption

Energy consumption by the industrial sector[3] increased throughout the 1960's and the first half of the 1970's, attaining an all-time high in 1973 of 26 quadrillion Btu (19). Thereafter, increasing energy prices tended to depress industrial sector demand for energy, and the rate of consumption trended downwards. By 1987, the annual total was 21 quadrillion Btu.

The industrial sector relied on the three major fossil fuels—petroleum, natural gas, and coal—and electricity throughout the 1960-to-1987 period, but the relative contributions of each form of energy changed over time. Coal, which accounted for a 26-percent share in 1960, provided only 13 percent of industrial energy in 1987. Meanwhile, electricity's share rose from 7 percent to 14 percent.

During the 28-year period, the shares supplied by petroleum ranged from 33 percent to 41 percent, and the share supplied by natural gas ranged from 33 percent to 42 percent. In 1987, petroleum's share was the largest, 40 percent, followed by natural gas, 33 percent, electricity, 14 percent, and coal, 13 percent.

One measure of energy efficiency in the industrial sector is the ratio of end-use energy consumption to industrial output (measured in thousand Btu per constant dollar). Throughout the 1960-to-1973 period, when energy was relatively cheap and supplies were assured, energy consumption per dollar of industrial output stayed within a narrow range, with a low of 11.5 in 1968 and a high of 12.4 in 1970 (20). After 1973, the measure began to decline, and by 1985 (the latest year for which data are available) had fallen to 8.7 thousand Btu per constant dollar of industrial output.

[3]In addition to manufacturing establishments, the industrial sector comprises construction, mining, agricultural, fishing, and forestry establishments.

Energy Industry Investments and Profitability

The 22 major energy companies included in the Financial Reporting System (see box) accounted for 57 percent of U.S. crude oil and natural gas liquids production, 46 percent of dry natural gas production, and smaller shares of coal and uranium production in 1986 (32). They also accounted for over three-fourths of refinery capacity and output in 1986. In 1986, the FRS companies played a diminished but still significant role in the U.S. economy, accounting for 22 percent of the profits and 26 percent of the assets of *Fortune's* 500 largest U.S. industrial firms.[4]

The FRS companies were involved in a wide range of business activities, but energy production, processing, and distribution were the most important. In particular, domestic petroleum and natural gas production accounted for 41 percent of net property investment in 1986 (33).

Because the FRS companies had invested so heavily in upstream petroleum, the 1986 collapse of crude oil prices had a devastating effect on their overall financial performance. Although net income had generally declined over the 1980-to-1985 period, the 1986 decline was unprecedented: net income fell by nearly one-half to $9 billion (32). (When the effects of unusual items are removed, net income fell by 38 percent to $14 billion.)

From 1975 through 1985, petroleum and natural gas production was the primary source of operating income for the FRS companies (35). When oil prices collapsed in 1986, however, operating income from domestic oil and gas production fell from $21 billion to $1 billion and operating income from foreign petroleum and natural gas production fell from $22 billion to $8 billion.

In response to the adverse economic climate, the FRS companies scaled back investments in domestic petroleum and natural gas production to $13 billion, the lowest level since 1978 (34). Investment in foreign petroleum and natural gas fell to about $5 billion, making 1986 the first year in a decade in which oil and gas production accounted for less than half of the FRS companies' capital expenditures. The retrenchment in exploration, development, and extraction is likely to lead to deterioration of the FRS companies' oil and gas reserves in the long term.

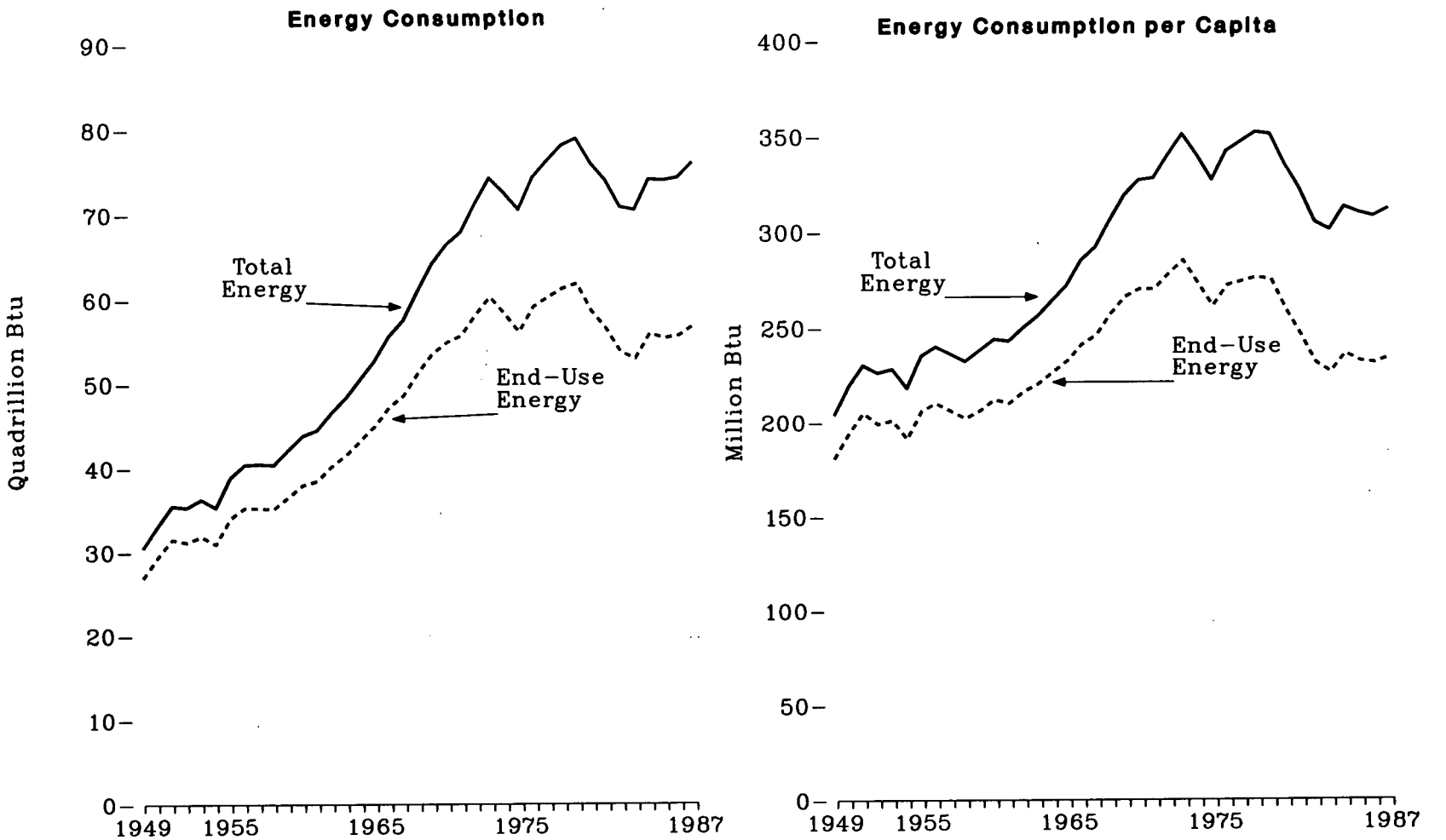
[4]Energy Information Administration, *Performance Profiles of Major Energy Producers 1986*, DOE/EIA-0206(86) (Washington, DC, January 1988), p. *xi*.

The FRS Companies in 1986

The Financial Reporting System (FRS) was designed by the Energy Information Administration to collect financial data from the major energy-producing companies. The FRS data base contains information on the companies' revenues, expenses, assets and liabilities, and sources and uses of funds for 1974 through 1986. In recent years, mergers have reduced the number of companies submitting data to the FRS (see Appendix E, "Explanatory Notes," note 3). The following 22 companies submitted data for the 1986 reporting year:

Amerada Hess Corporation
American Petrofina Incorporated
Amoco Corporation
Ashland Oil Inc.
Atlantic Richfield Company
Burlington Northern Inc.
Chevron Corporation
Coastal Corporation
E.I. du Pont de Nemours and Company
Exxon Corporation
Kerr-McGee Corporation
Mobil Corporation
Occidental Petroleum Corporation
Phillips Petroleum Company
Shell Oil Company
Standard Oil Company (of Ohio)
Sun Company
Tenneco Inc.
Texaco Inc.
Unocal Corporation
Union Pacific Corporation
USX Corporation

Figure 17. Energy Consumption and Energy Consumption per Capita, 1949–1987



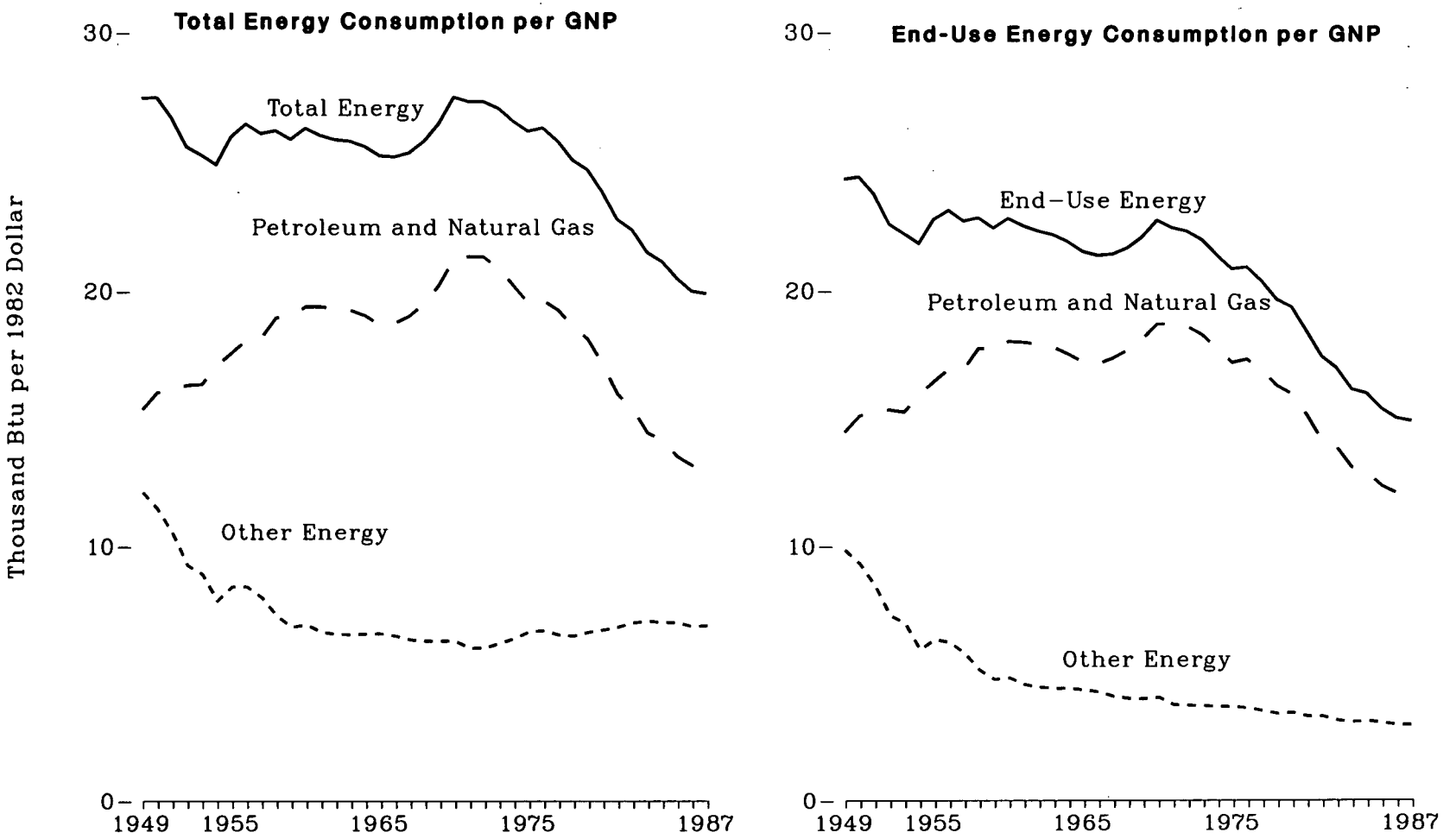
Source: See Table 17.

Table 17. Energy Consumption and Energy Consumption per Capita, 1949-1987

Year	Total Energy Consumption (quadrillion Btu)	End-Use Energy Consumption (quadrillion Btu)	Population (million) [1]	Consumption per Capita			
				Total Energy		End-Use Energy	
				Quantity (million Btu)	Change from Previous Year (percent) [2]	Quantity (million Btu)	Change from Previous Year (percent) [2]
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	61.25	222.1	352	1.4	276	0.7
1979	78.90	61.84	224.6	351	-0.3	275	-0.4
1980	75.96	58.60	226.5	335	-4.6	259	-5.8
1981	73.99	56.56	229.6	322	-3.9	246	-5.0
1982	70.84	53.70	232.0	305	-5.3	231	-6.1
1983	70.50	52.91	234.3	301	-1.3	226	-2.2
1984	74.06	55.92	236.5	313	4.0	236	4.4
1985	73.94	55.40	238.7	310	-1.0	232	-1.7
1986	74.26	55.62	241.1	308	-0.6	231	-0.4
1987[3]	76.01	56.84	243.4	312	1.3	234	1.3

[1] 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, and 1980.
[2] Percent change calculated from data prior to rounding.
[3] Preliminary.
Sources: **Total Energy Consumption:** Table 3. **End-Use Energy Consumption:** Tables 3 and 85. **Population:** Bureau of the Census, *Current Population Reports*, "Population Estimates and Projections," Series P-25, No. 990, July 1986. **Consumption per Capita:** Calculated by Energy Information Administration.

Figure 18. Total Energy and End-Use Energy Consumption per Constant Dollar of Gross National Product, 1949-1987



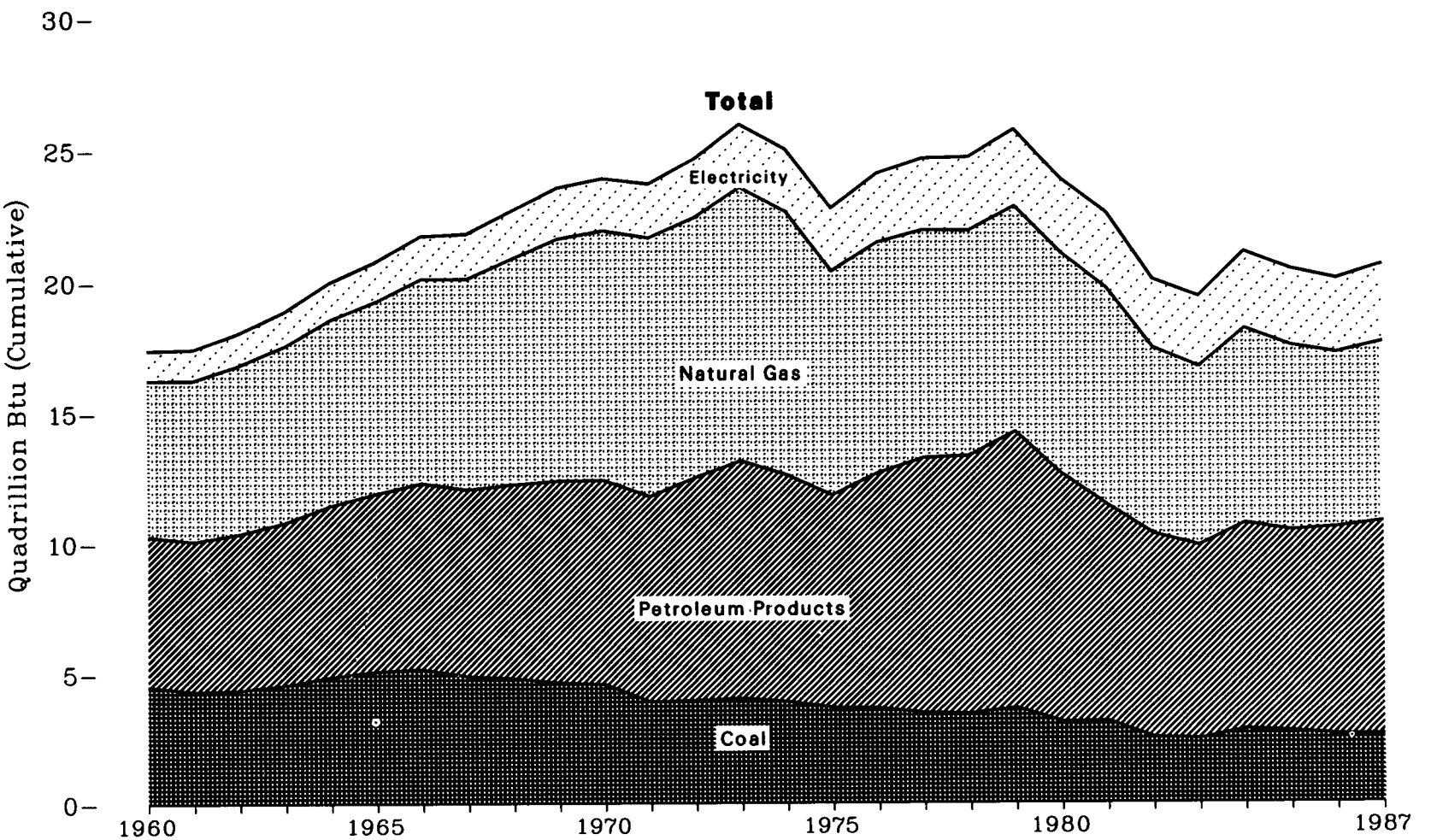
Source: See Table 18.

Table 18. Total Energy and End-Use Energy Consumption per Constant Dollar of Gross National Product, 1949-1987

Year	Total Energy Consumption per GNP [1] (thousand Btu per 1982 dollar, except as shown)				End-Use Energy Consumption [2] per GNP [1] (thousand Btu per 1982 dollar, except as shown)			
			Total				Total	
	Petroleum and Natural Gas	Other Energy	Quantity	Percent Change [3]	Petroleum and Natural Gas [4]	Other Energy [5]	Quantity	Percent Change [3]
1949	15.35	12.11	27.46	—	14.47	9.85	24.32	—
1950	16.02	11.46	27.48	0.1	15.09	9.32	24.40	0.3
1951	16.17	10.53	26.70	-2.8	15.27	8.44	23.72	-2.8
1952	16.31	9.27	25.58	-4.2	15.32	7.26	22.58	-4.8
1953	16.35	8.92	25.27	-1.2	15.24	6.96	22.21	-1.6
1954	17.07	7.84	24.90	-1.5	15.92	5.91	21.83	-1.7
1955	17.56	8.41	25.97	4.3	16.45	6.31	22.76	4.3
1956	18.06	8.41	26.47	1.9	16.92	6.19	23.11	1.5
1957	18.13	7.97	26.10	-1.4	16.92	5.77	22.69	-1.8
1958	18.96	7.25	26.21	0.4	17.73	5.10	22.82	0.6
1959	19.05	6.81	25.87	-1.3	17.68	4.74	22.42	-1.8
1960	19.40	6.90	26.30	1.7	17.99	4.80	22.79	1.7
1961	19.40	6.62	26.02	-1.1	17.96	4.54	22.51	-1.2
1962	19.33	6.53	25.86	-0.6	17.89	4.43	22.31	-0.9
1963	19.27	6.52	25.80	-0.2	17.78	4.39	22.17	-0.6
1964	19.05	6.54	25.59	-0.8	17.51	4.39	21.90	-1.2
1965	18.69	6.55	25.24	-1.4	17.20	4.32	21.52	-1.7
1966	18.75	6.46	25.20	-0.2	17.12	4.25	21.37	-0.7
1967	19.03	6.31	25.35	0.6	17.34	4.07	21.41	0.2
1968	19.53	6.26	25.79	1.7	17.65	4.00	21.65	1.1
1969	20.23	6.26	26.49	2.7	18.09	3.98	22.07	1.9
1970	21.24	6.26	27.49	3.8	18.68	4.04	22.72	2.9
1971	21.34	5.98	27.32	-0.6	18.69	3.75	22.44	-1.2
1972	21.33	5.99	27.32	0.0	18.58	3.73	22.30	-0.6
1973	20.90	6.17	27.07	-0.9	18.25	3.71	21.97	-1.5
1974	20.22	6.36	26.58	-1.8	17.70	3.68	21.38	-2.7
1975	19.55	6.63	26.18	-1.5	17.17	3.67	20.84	-2.5
1976	19.64	6.67	26.31	0.5	17.30	3.62	20.91	0.3
1977	19.28	6.50	25.79	-2.0	16.86	3.50	20.36	-2.6
1978	18.61	6.46	25.07	-2.8	16.27	3.39	19.66	-3.4
1979	18.10	6.61	24.71	-1.4	15.94	3.43	19.37	-1.5
1980	17.13	6.70	23.83	-3.6	15.11	3.28	18.39	-5.1
1981	15.96	6.81	22.77	-4.4	14.13	3.28	17.41	-5.3
1982	15.39	6.98	22.37	-1.8	13.84	3.12	16.96	-2.6
1983	14.46	7.04	21.50	-3.9	13.07	3.06	16.13	-4.9
1984	14.15	7.00	21.15	-1.6	12.87	3.10	15.97	-1.0
1985	13.52	6.98	20.50	-3.1	12.34	3.02	15.36	-3.8
1986	13.17	6.83	20.00	-2.4	12.05	2.92	14.98	-2.5
1987[6]	13.04	6.86	19.90	-0.5	11.94	2.94	14.88	-0.7

[1] In 1982 dollars, calculated using implicit GNP price deflators.
[2] 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).
[3] Percent change calculated from data prior to rounding.
[4] Total petroleum and natural gas consumption less consumption of these fuels by electric utilities.
[5] Total coal consumption less coal consumed at electric utilities, plus electric utility sales, hydroelectric power generated by non-electric utilities, and net imports of coal coke.
[6] Preliminary.
Sources: Tables 3 and 85 and Appendix C.

Figure 19. Industrial Energy Consumption by Source, 1960-1987



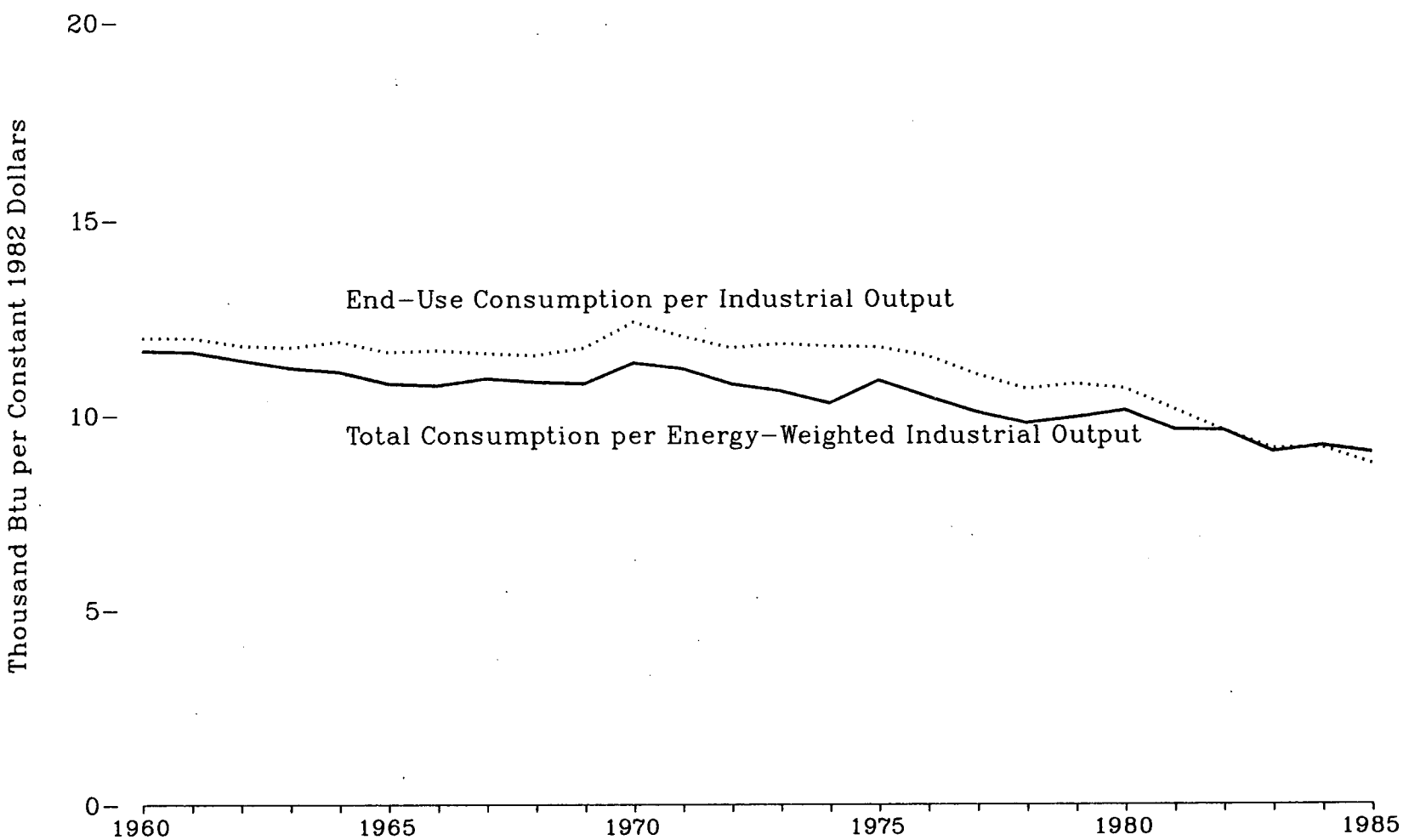
Source: See Table 19.

Table 19. Industrial Energy Consumption by Source, 1960-1987

Year	Petroleum Products		Natural Gas		Coal [1]		Electricity [2]		Total [2]
	Quadrillion Btu	Percent	Quadrillion Btu	Percent	Quadrillion Btu	Percent	Quadrillion Btu	Percent	Quadrillion Btu
1960	5.75	33	5.97	34	4.54	26	1.15	7	17.41
1961	5.76	33	6.17	35	4.34	25	1.19	7	17.45
1962	6.00	33	6.45	36	4.39	24	1.26	7	18.10
1963	6.23	33	6.76	36	4.59	24	1.32	7	18.91
1964	6.55	33	7.13	36	4.91	25	1.42	7	20.00
1965	6.80	33	7.35	35	5.12	25	1.50	7	20.76
1966	7.12	33	7.81	36	5.20	24	1.61	7	21.75
1967	7.14	33	8.06	37	4.93	23	1.69	8	21.82
1968	7.41	33	8.62	38	4.85	21	1.81	8	22.69
1969	7.72	33	9.22	39	4.68	20	1.94	8	23.56
1970	7.81	33	9.50	40	4.61	19	1.98	8	23.89
1971	7.88	33	9.85	42	3.92	17	2.04	9	23.69
1972	8.55	35	9.88	40	3.97	16	2.22	9	24.62
1973	9.11	35	10.39	40	4.05	16	2.38	9	25.93
1974	8.70	35	10.00	40	3.92	16	2.37	9	25.00
1975	8.15	36	8.53	38	3.68	16	2.38	10	22.74
1976	9.02	38	8.76	36	3.66	15	2.61	11	24.05
1977	9.79	40	8.64	35	3.47	14	2.72	11	24.61
1978	9.89	40	8.54	35	3.44	14	2.79	11	24.66
1979	10.58	41	8.55	33	3.66	14	2.91	11	25.69
1980	9.52	40	8.39	35	3.12	13	2.81	12	23.85
1981	8.30	37	8.26	37	3.14	14	2.85	13	22.54
1982	7.80	39	7.12	36	2.53	13	2.58	13	20.02
1983	7.42	38	6.82	35	2.47	13	2.68	14	19.40
1984	7.89	37	7.45	35	2.83	13	2.89	14	21.06
1985	7.70	38	7.08	35	2.75	13	2.88	14	20.41
1986	7.93	40	6.69	33	2.63	13	2.79	14	20.04
1987[3]	8.16	40	6.87	33	2.62	13	2.92	14	20.57

[1] Includes net imports of coal coke.
[2] Excludes energy losses from electricity generation, transmission, and distribution. Includes hydroelectric power generated by the industrial sector.
[3] Estimated.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1960 through 1972—Energy Information Administration, "State Energy Data System, 1960-1986." •1973 and forward—Energy Information Administration, *Monthly Energy Review*, December 1987.

Figure 20. Industrial Energy Consumption per Constant Dollar of Industrial Output, 1960-1985



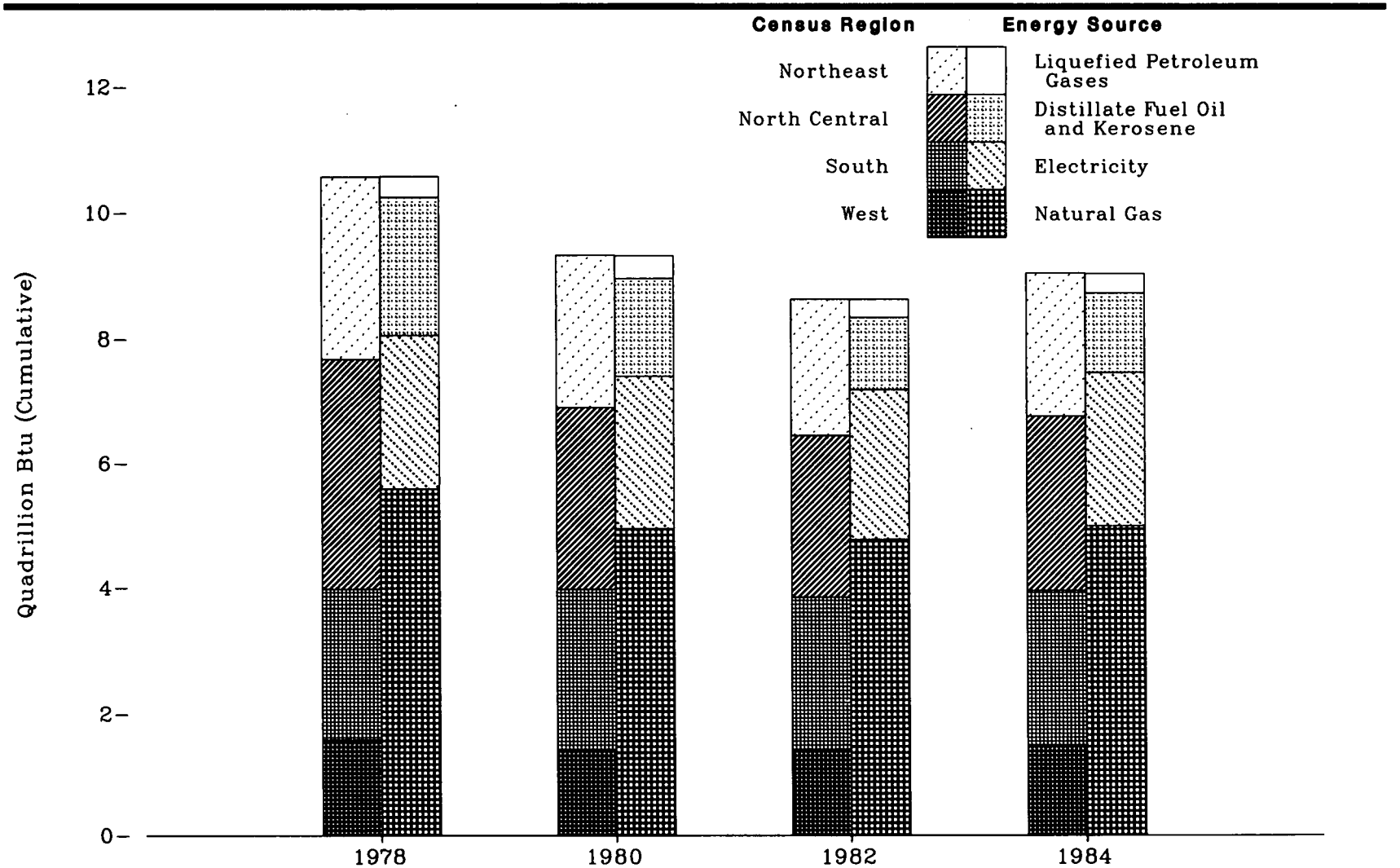
Source: See Table 20.

Table 20. Industrial Energy Consumption per Constant Dollar of Industrial Output, 1960-1985

Year	Energy-Weighted Industrial Output [1] (trillion 1982 dollars)	Total Consumption (quadrillion Btu)	Industrial Real Output (trillion 1982 dollars)	End-Use Consumption per Industrial Output (thousand Btu per 1982 dollar)	Total Consumption per Energy-Weighted Industrial Output (thousand Btu per 1982 dollar)
1960	1.731	20.164	1.683	11.981	11.649
1961	1.744	20.256	1.691	11.979	11.615
1962	1.846	21.053	1.788	11.775	11.405
1963	1.961	21.989	1.874	11.734	11.213
1964	2.097	23.296	1.961	11.880	11.109
1965	2.244	24.252	2.089	11.609	10.807
1966	2.375	25.543	2.191	11.658	10.755
1967	2.357	25.773	2.226	11.578	10.935
1968	2.483	26.937	2.337	11.526	10.849
1969	2.601	28.121	2.399	11.722	10.812
1970	2.523	28.610	2.308	12.396	11.340
1971	2.552	28.555	2.374	12.028	11.189
1972	2.767	29.874	2.548	11.724	10.800
1973	2.973	31.579	2.669	11.832	10.622
1974	2.978	30.697	2.610	11.761	10.308
1975	2.612	28.433	2.421	11.744	10.886
1976	2.982	30.268	2.629	11.513	10.466
1977	3.089	31.119	2.820	11.035	10.074
1978	3.213	31.464	2.948	10.673	9.793
1979	3.284	32.641	3.023	10.798	9.939
1980	3.028	30.629	2.868	10.680	10.115
1981	3.041	29.268	2.883	10.152	9.624
1982	2.722	26.135	2.722	9.601	9.601
1983	2.840	25.735	2.816	9.139	9.062
1984	3.013	27.756	3.027	9.169	9.212
1985	2.993	27.056	3.094	8.745	9.040

[1] See Glossary.
Source: Energy Information Administration, *Energy Conservation Indicators 1986 Annual Report.*

Figure 21. Energy Consumed by Households by Census Region, Selected Years, 1978–1984



Note: See Appendix D for Census Regions.
Source: See Table 21.

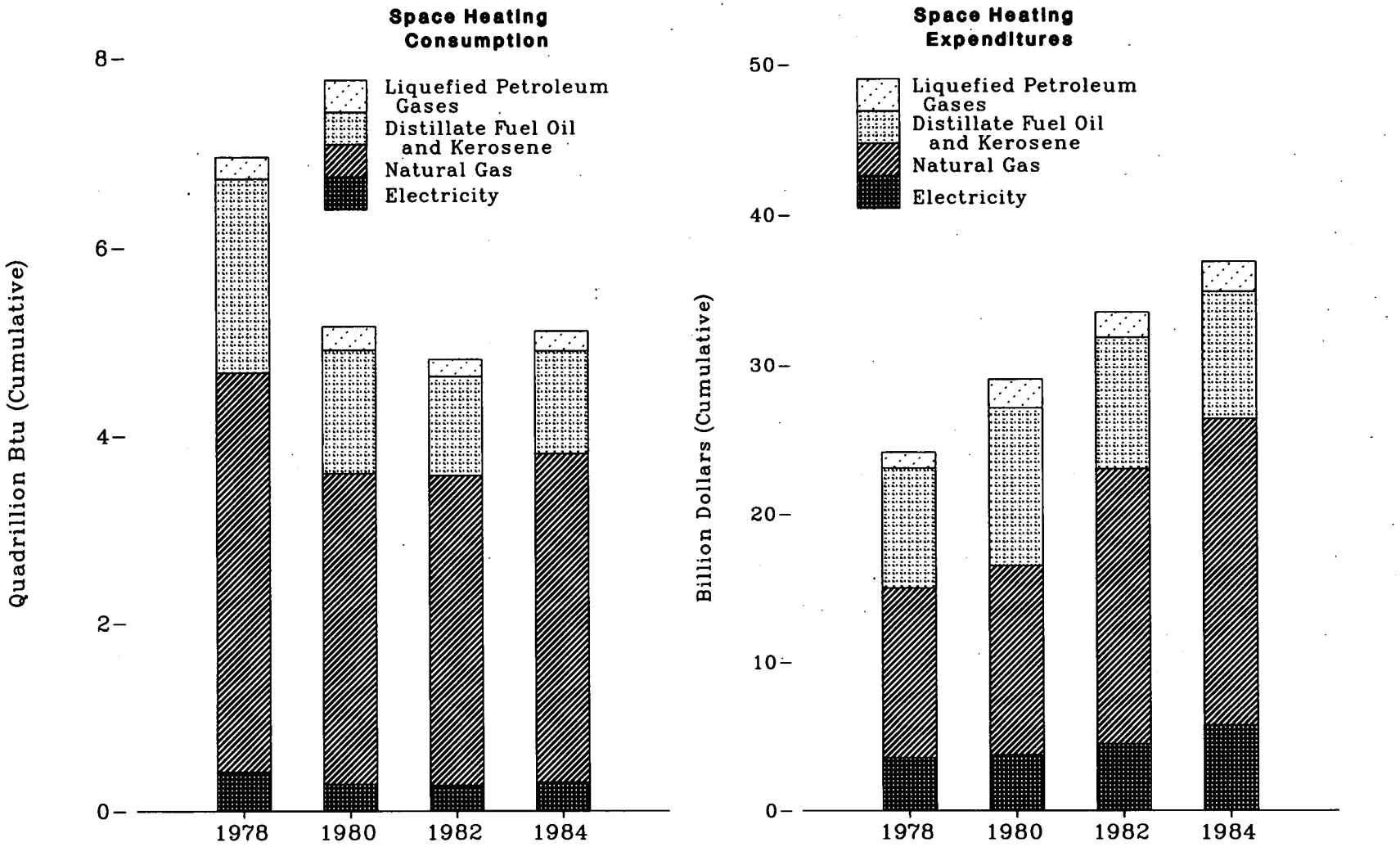
Table 21. Energy [1] Consumed by Households by Census Region, 1978-1982 and 1984 [2]

(Quadrillion Btu, Except as Noted)

Census Region [3]	1978	1979	1980	1981	1982	1984
Northeast						
Natural Gas	1.14	1.05	0.92	1.06	0.99	0.93
Electricity [4]	0.39	0.39	0.39	0.42	0.38	0.41
Distillate Fuel Oil and Kerosene	1.32	1.03	1.09	0.96	0.79	0.93
Liquefied Petroleum Gases	0.03	0.03	0.03	0.03	0.02	0.03
Total	2.89	2.50	2.43	2.47	2.18	2.29
Consumption per Household (million Btu)	166	145	138	138	122	125
North Central						
Natural Gas	2.53	2.48	2.02	2.24	1.76	1.99
Electricity [4]	0.60	0.59	0.60	0.57	0.57	0.55
Distillate Fuel Oil and Kerosene	0.46	0.31	0.16	0.17	0.15	0.13
Liquefied Petroleum Gases	0.12	0.10	0.15	0.13	0.11	0.13
Total	3.70	3.48	2.92	3.12	2.60	2.80
Consumption per Household (million Btu)	180	168	139	147	122	129
South						
Natural Gas	0.96	0.91	1.11	1.16	1.13	1.15
Electricity [4]	1.00	0.97	1.06	1.03	1.05	1.06
Distillate Fuel Oil and Kerosene	0.32	0.28	0.27	0.16	0.17	0.16
Liquefied Petroleum Gases	0.15	0.14	0.15	0.12	0.12	0.12
Total	2.43	2.30	2.59	2.46	2.46	2.50
Consumption per Household (million Btu)	99	92	96	89	88	85
West						
Natural Gas	0.95	0.88	0.89	0.93	0.89	0.91
Electricity [4]	0.48	0.47	0.41	0.46	0.42	0.47
Distillate Fuel Oil and Kerosene	0.09	0.09	0.04	0.03	0.03	0.04
Liquefied Petroleum Gases	0.03	0.04	0.04	0.04	0.04	0.03
Total	1.54	1.47	1.38	1.47	1.38	1.45
Consumption per Household (million Btu)	110	100	86	90	84	85
United States						
Natural Gas	5.58	5.31	4.94	5.39	4.77	4.98
Electricity [4]	2.47	2.42	2.46	2.48	2.42	2.48
Distillate Fuel Oil and Kerosene	2.19	1.71	1.55	1.33	1.14	1.26
Liquefied Petroleum Gases	0.33	0.31	0.36	0.31	0.29	0.31
Total	10.56	9.74	9.32	9.51	8.62	9.04
Consumption per Household (million Btu)	138	126	114	114	103	105

[1] Major energy items only, as shown.
[2] Data are for April of year shown through March of following year.
[3] See Appendix D for Census Regions.
[4] Includes electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.
Note: No data are available for 1983.
Note: Sum of components may not equal total due to independent rounding.
Source: •1978 and 1979—Energy Information Administration, Form EIA-84, "Residential Energy Consumption Survey." •1980 and forward—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 22. Household Energy Consumption and Expenditures for Space Heating, Selected Years, 1978-1984



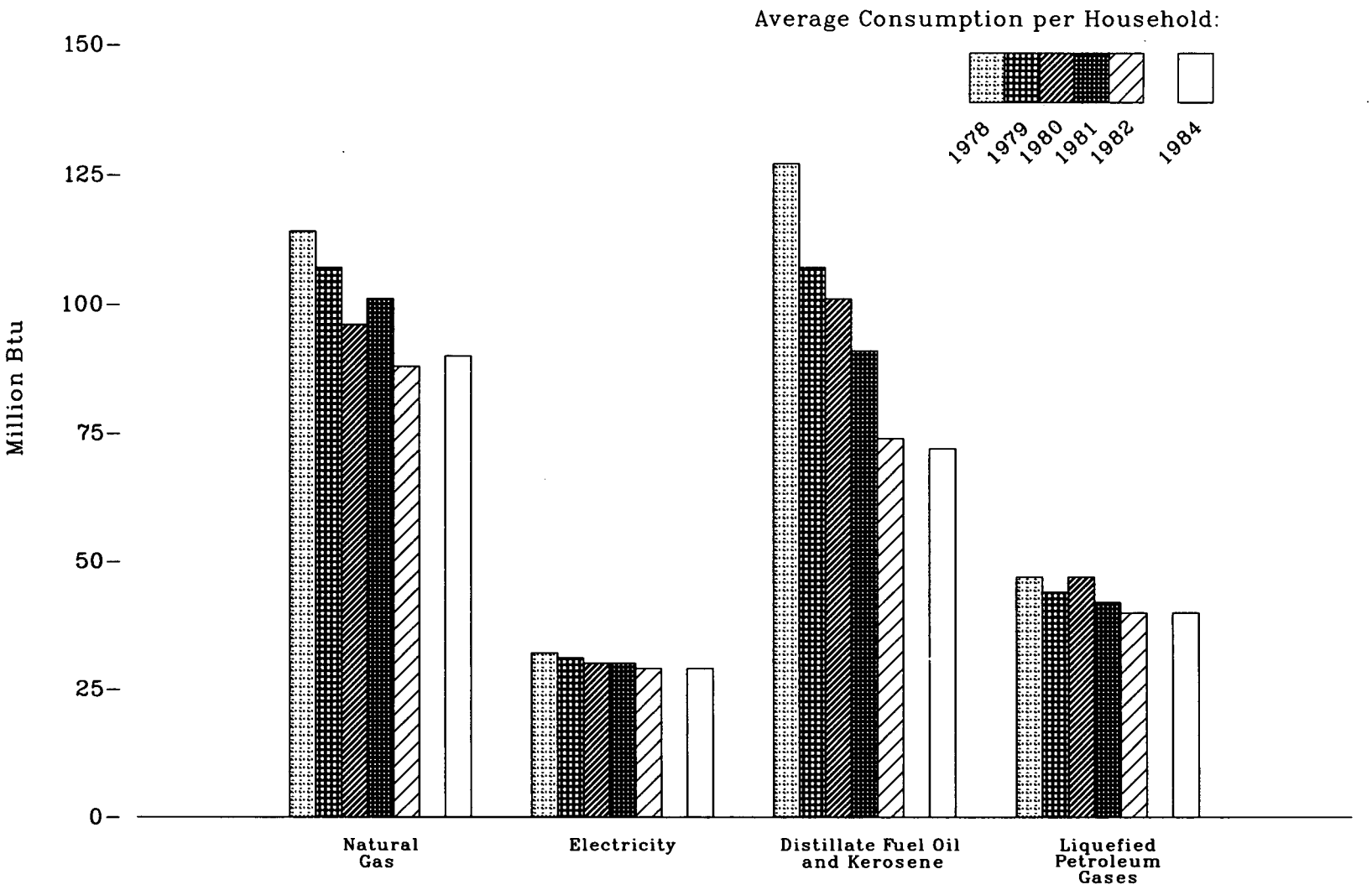
Source: See Table 22.

Table 22. Household Energy Consumption and Expenditures by Application and Fuel Source, 1978, 1980-1982, and 1984

Application and Fuel Source	Consumption (quadrillion Btu)					Expenditures (billion dollars)				
	1978	1980	1981	1982	1984	1978	1980	1981	1982	1984
Space Heating										
Natural Gas	4.26	3.32	3.81	3.31	3.51	11.49	12.80	17.07	18.55	20.66
Electricity [1]	0.41	0.28	0.30	0.27	0.30	3.53	3.71	4.60	4.45	5.71
Distillate Fuel Oil and Kerosene	2.05	1.32	1.13	1.05	1.10	8.06	10.59	9.99	8.84	8.51
Liquefied Petroleum Gases	0.23	0.25	0.22	0.19	0.21	1.05	1.90	1.84	1.68	2.00
Total	6.95	5.17	5.45	4.81	5.13	24.14	29.00	33.49	33.52	36.85
Air Conditioning										
Electricity [1]	0.31	0.32	0.33	0.30	0.36	3.97	5.07	5.96	6.05	7.51
Water Heating										
Natural Gas	1.04	1.24	1.10	1.08	1.10	2.88	4.79	4.93	6.08	6.63
Electricity [1]	0.29	0.31	0.33	0.33	0.32	3.15	4.54	5.32	5.90	6.44
Distillate Fuel Oil and Kerosene	0.14	0.24	0.21	0.09	0.15	0.56	1.89	1.83	0.75	1.09
Liquefied Petroleum Gases	0.06	0.07	0.06	0.06	0.06	0.36	0.59	0.53	0.57	0.58
Total	1.53	1.86	1.69	1.56	1.62	6.94	11.80	12.62	13.30	14.76
Appliances										
Natural Gas	0.28	0.38	0.49	0.39	0.35	0.93	1.71	2.50	2.42	2.31
Electricity [1]	1.46	1.55	1.53	1.52	1.53	19.24	26.82	30.02	32.02	34.95
Liquefied Petroleum Gases	0.03	0.04	0.03	0.04	0.04	0.25	0.41	0.37	0.47	0.54
Total	1.77	1.97	2.05	1.95	1.92	20.42	28.94	32.90	34.91	37.81
Total	10.57	9.32	9.51	8.62	9.04	55.47	74.81	84.96	87.78	97.00
Natural Gas	5.58	4.94	5.39	4.77	4.98	15.30	19.30	24.50	27.06	29.80
Electricity [1]	2.47	2.46	2.48	2.42	2.48	29.89	40.14	45.90	48.42	54.50
Distillate Fuel Oil and Kerosene	2.19	1.55	1.33	1.14	1.26	8.62	12.48	11.82	9.59	9.60
Liquefied Petroleum Gases	0.33	0.37	0.31	0.29	0.31	1.66	2.89	2.74	2.72	3.10

[1] Includes electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal electricity.
Note: Sum of components may not equal total due to independent rounding.
Note: No data are available for 1979 and 1983.
Sources: •1978—Energy Information Administration, Form EIA-84, "Residential Energy Consumption Survey." •1980 and forward—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 23. Household Energy Consumption Indicators, 1978–1982 and 1984



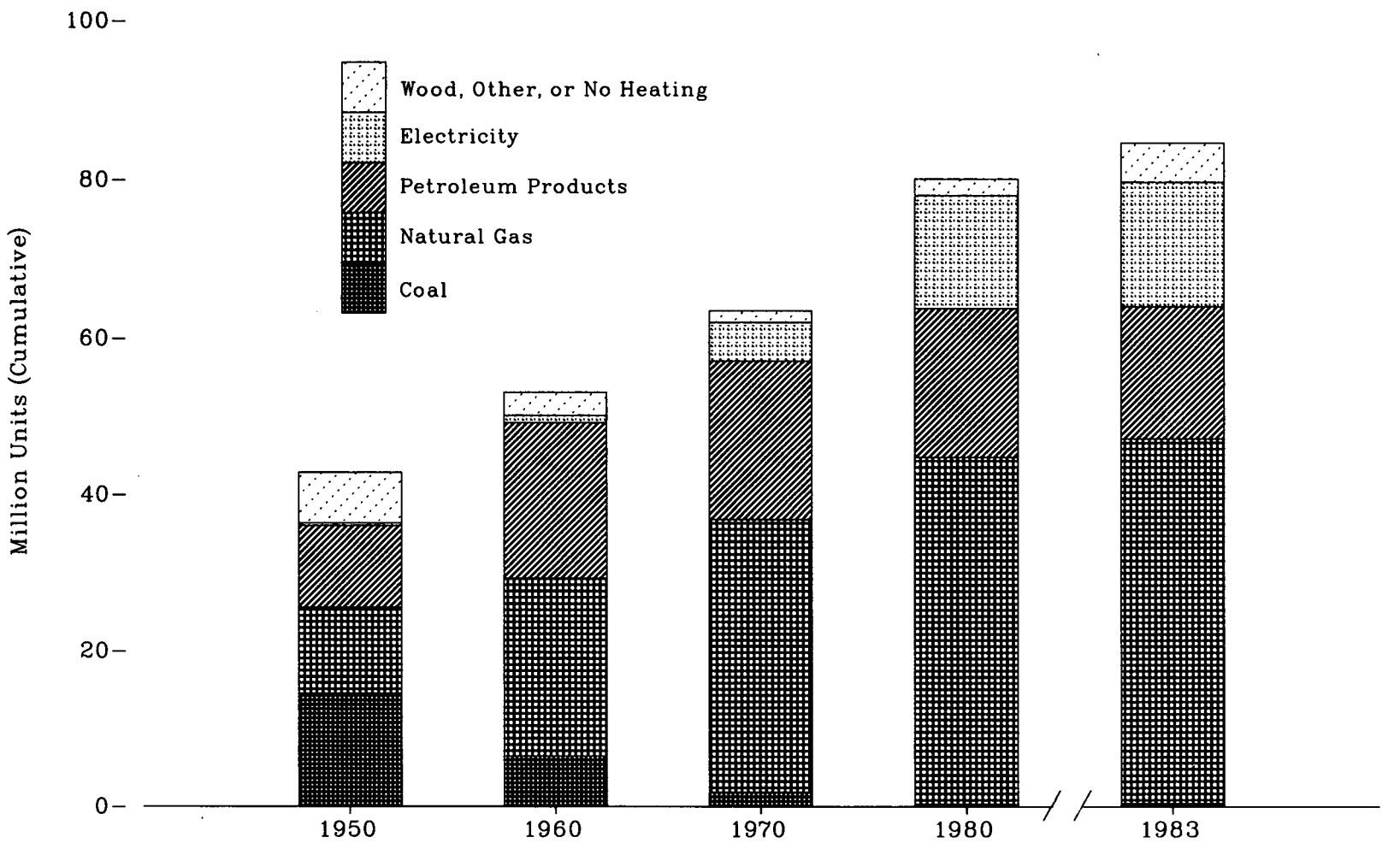
Note: No data available for 1983.
Source: See Table 23.

Table 23. Household Energy Consumption Indicators, 1978-1982 and 1984 [1]

Source	Unit of Measure	1978	1979	1980	1981	1982	1984
Natural Gas							
Households that use Natural Gas	Million	49.0	49.6	51.6	53.4	54.2	55.4
Average Consumption per Household	Million Btu	114	107	96	101	88	90
Households that use Natural Gas as Main Heating Source	Million	41.8	42.4	44.6	46.2	47.5	47.8
Average Consumption per Household	Million Btu	128	120	107	112	95	100
Heating Degree-Days	Degree-Days	5,207	5,136	4,847	4,988	4,596	4,863
Heated Floor Space	Square Feet	NA	NA	1,533	1,547	1,483	1,492
Electricity [2]							
Households that use Electricity	Million	76.6	77.5	81.6	83.1	83.7	86.3
Average Consumption per Household	Million Btu	32	31	30	30	29	29
Households that use Electricity as Main Heating Source and for Air-Conditioning	Million	7.6	8.4	10.7	10.6	10.2	11.4
Average Consumption per Household	Million Btu	68	59	56	55	57	52
Heating Degree-Days	Degree-Days	3,271	3,196	3,543	3,431	3,293	3,051
Cooling Degree-Days	Degree-Days	1,999	1,714	1,849	1,779	1,647	1,887
Heated Floor Space	Square Feet	NA	NA	1,398	1,305	1,364	1,324
Households that use Electricity as Main Heating Source but not for Air-Conditioning	Million	4.5	4.4	3.6	3.7	3.1	3.2
Average Consumption per Household	Million Btu	72	63	55	50	48	48
Heating Degree-Days	Degree-Days	5,862	5,737	5,181	4,913	4,990	5,305
Heated Floor Space	Square Feet	NA	NA	1,270	1,135	1,068	1,081
Households that use Electricity for Air-Conditioning but not as Main Heating Source	Million	33.8	33.0	34.3	36.5	37.8	39.5
Average Consumption per Household	Million Btu	30	30	29	29	28	28
Cooling Degree-Days	Degree-Days	1,294	1,008	1,317	1,155	1,062	1,217
Distillate Fuel Oil and Kerosene (Oil)							
Households that use Oil	Million	17.2	15.9	15.4	14.6	15.5	17.5
Average Consumption per Household	Million Btu	127	107	101	91	74	72
Households that use Oil as Main Heating Source	Million	16.9	14.6	13.4	12.2	12.0	12.2
Average Consumption per Household	Million Btu	129	113	112	103	90	95
Heating Degree-Days	Degree-Days	5,548	5,362	5,827	5,973	5,379	5,360
Heated Floor Space	Square Feet	NA	NA	1,571	1,573	1,505	1,514
Liquefied Petroleum Gases (LPG) [3]							
Households that use LPG [3]	Million	6.9	7.0	7.7	7.3	7.3	7.8
Average Consumption per Household	Million Btu	47	44	47	42	40	40
Households that use LPG as Main Heating Source	Million	3.1	3.7	3.7	3.7	3.8	3.9
Average Consumption per Household	Million Btu	80	67	77	67	59	60
Heating Degree-Days	Degree-Days	3,998	3,760	4,386	4,024	3,928	4,262
Heated Floor Space	Square Feet	NA	NA	1,234	1,288	1,247	1,139

[1] Data are for April of year shown through March of following year except for household counts and floor space data which are for November of year shown.
[2] Includes electricity generated for distribution from wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.
[3] Excludes household use of liquefied petroleum gases for cooking grills or recreation vehicles.
NA = Not available.
Note: Average consumption per household for each energy source is total average consumption per household and is not limited to space heating and cooling only.
Note: No data are available for 1983.
Sources: •1978 and 1979—Energy Information Administration, Form EIA-84, "Residential Energy Consumption Survey." •1980 and forward—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 24. Type of Heating in Occupied Housing Units, Selected Years, 1950–1983



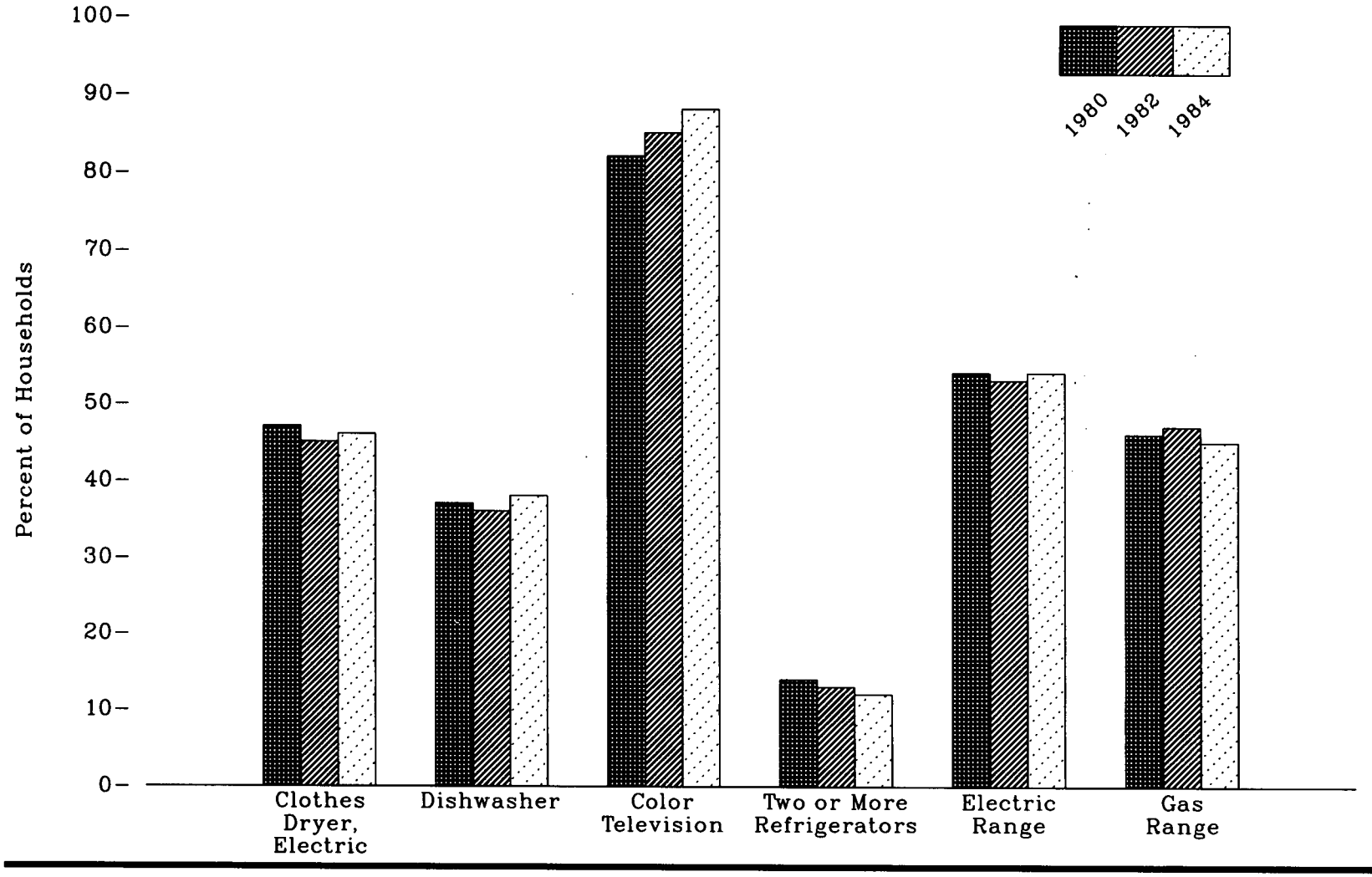
Source: See Table 24.

Table 24. Type of Heating in Occupied Housing Units,[1] Selected Years, 1950-1983

Year	Coal [2]	Natural Gas	Liquefied Gas	Distillate Fuel Oil	Kerosene	Electricity	Wood	Other	None [3]	Total
	Million									
1950	14.48	11.12	0.98	9.46	(4)	0.28	4.17	0.77	1.57	42.83
1960	6.46	22.85	2.69	17.16	(4)	0.93	2.24	0.22	0.48	53.02
1970	1.82	35.01	3.81	16.47	(4)	4.88	0.79	0.27	0.40	63.45
1973	0.80	38.46	4.42	17.24	(4)	7.21	0.60	0.15	0.45	69.34
1974	0.74	39.47	4.14	16.84	(4)	8.41	0.66	0.09	0.48	70.83
1975	0.57	40.93	4.15	16.30	(4)	9.17	0.85	0.08	0.47	72.52
1976	0.48	41.22	4.24	16.45	(4)	10.15	0.91	0.09	0.46	74.01
1977	0.45	41.54	4.18	15.62	0.44	11.15	1.24	0.15	0.51	75.28
1978	0.40	42.52	4.13	15.65	0.42	12.26	1.07	0.12	0.60	77.17
1979	0.36	43.32	4.13	15.30	0.41	13.24	1.14	0.10	0.57	78.57
1980	0.33	44.40	4.17	14.50	0.37	14.21	1.38	0.11	0.61	80.07
1981	0.36	46.08	4.17	14.13	0.37	15.49	1.89	0.10	0.59	83.18
1983[5]	0.43	46.70	3.87	12.59	0.45	15.68	4.09	0.16	0.68	84.64
	Percent									
1950	33.8	26.0	2.3	22.1	(4)	0.6	9.7	1.8	3.7	100.0
1960	12.2	43.1	5.1	32.4	(4)	1.8	4.2	0.4	0.9	100.0
1970	2.9	55.2	6.0	26.0	(4)	7.7	1.3	0.4	0.6	100.0
1973	1.2	55.5	6.4	24.9	(4)	10.4	0.9	0.2	0.7	100.0
1974	1.0	55.7	5.8	23.8	(4)	11.9	0.9	0.1	0.7	100.0
1975	0.8	56.4	5.7	22.5	(4)	12.6	1.2	0.1	0.6	100.0
1976	0.7	55.7	5.7	22.2	(4)	13.7	1.2	0.1	0.6	100.0
1977	0.6	55.2	5.6	20.7	0.6	14.8	1.6	0.2	0.7	100.0
1978	0.5	55.1	5.4	20.3	0.5	15.9	1.4	0.2	0.8	100.0
1979	0.5	55.1	5.3	19.5	0.5	16.9	1.4	0.1	0.7	100.0
1980	0.4	55.4	5.2	18.1	0.5	17.7	1.7	0.1	0.8	100.0
1981	0.4	55.4	5.0	17.0	0.4	18.6	2.3	0.1	0.7	100.0
1983[5]	0.5	55.2	4.6	14.9	0.5	18.5	4.8	0.2	0.8	100.0

[1] 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.
[2] Includes coal coke.
[3] Includes nonreporting units in 1950 and 1960 which totaled 997 and 2,000 units, respectively.
[4] Included in distillate fuel oil.
[5] Data for 1982 are not available. Since 1981, the *Annual Housing Survey* has been a biennial survey.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1950, 1960, and 1970—Bureau of the Census, *Census of Population and Housing.* •1973 and forward—Bureau of the Census, *Annual Housing Survey.*

Figure 25. Household Appliance Data, 1980, 1982 and 1984



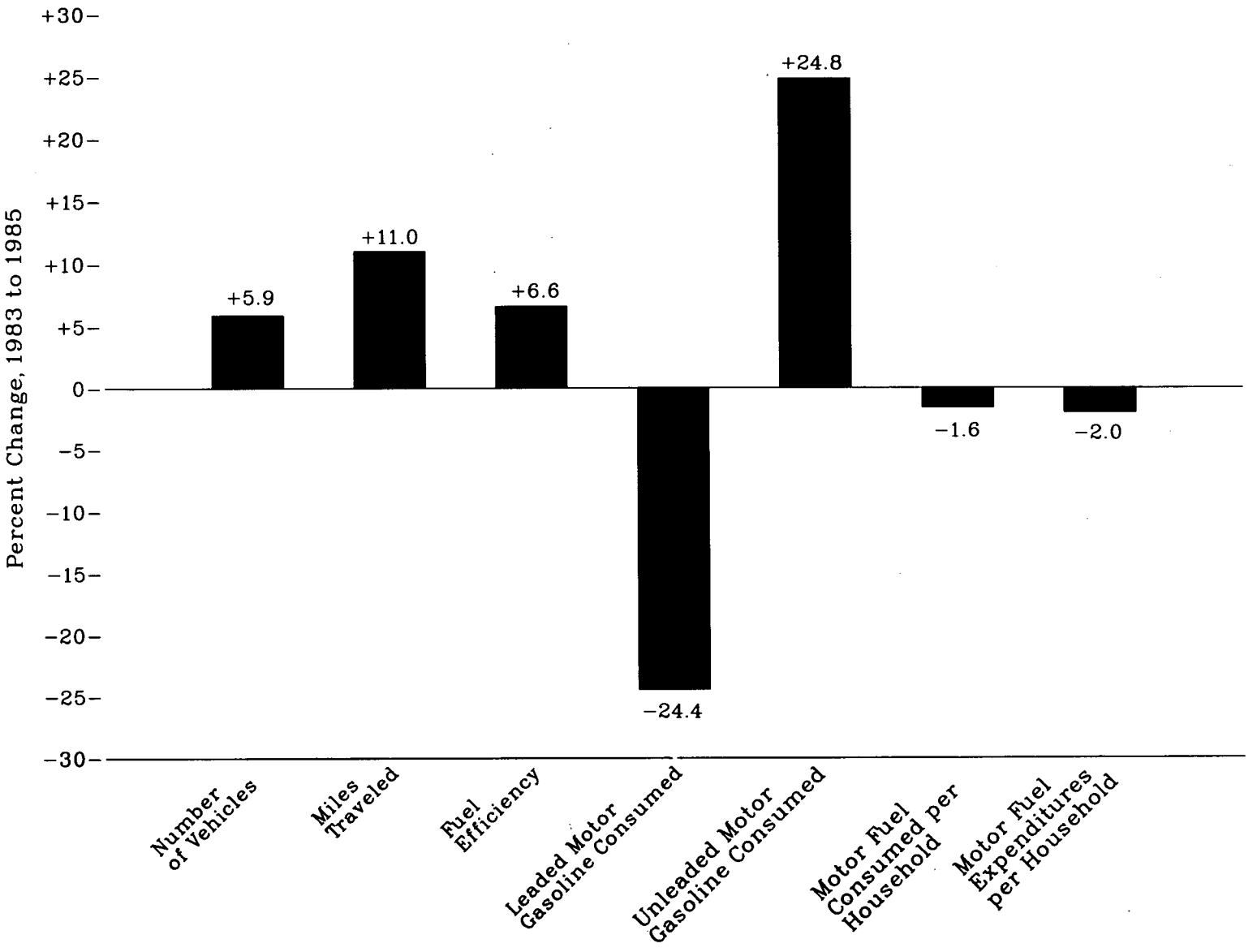
Source: See Table 25.

Table 25. Household Appliance Data, 1978-1982 and 1984

Appliance	Million Households						Percentage of Households					
	1978	1979	1980	1981	1982	1984	1978	1979	1980	1981	1982	1984
Total Households	76.6	77.5	81.6	83.1	83.8	86.3	100	100	100	100	100	100
Type Appliances												
Electric Appliances												
Television Set (Color)	NA	NA	67.0	68.4	71.0	75.9	NA	NA	82	82	85	88
Television Set (B/W)	NA	NA	41.9	39.5	38.9	37.3	NA	NA	51	48	47	43
Clothes Washer (Automatic)	54.0	NA	58.4	58.4	57.9	61.1	71	NA	72	70	69	71
Clothes Washer (Wringer)	3.4	NA	2.9	2.8	2.5	2.7	4	NA	4	3	3	3
Range (Stove-Top or Burners)	40.7	NA	43.8	45.2	44.7	46.5	53	NA	54	54	53	54
Oven, Regular or Microwave	41.5	NA	48.5	48.2	49.3	54.2	54	NA	59	58	59	63
Oven, Microwave	6.0	NA	11.6	14.0	17.3	29.6	8	NA	14	17	21	34
Clothes Dryer	34.5	NA	38.3	37.5	37.9	39.6	45	NA	47	45	45	46
Separate Freezer	27.0	NA	21.1	31.9	31.0	31.7	35	NA	38	38	37	37
Dishwasher	26.5	NA	30.4	30.5	30.3	32.5	35	NA	37	37	36	38
Humidifier	NA	NA	11.0	10.8	11.3	11.3	NA	NA	14	13	14	13
Dehumidifier	NA	NA	7.3	7.8	7.5	7.5	NA	NA	9	9	9	9
Window or Ceiling Fan	NA	NA	NA	NA	23.5	30.6	NA	NA	NA	NA	28	35
Whole House Cooling Fan	NA	NA	NA	NA	6.5	6.7	NA	NA	NA	NA	8	8
Evaporative Cooler	NA	NA	3.2	3.0	3.6	3.2	NA	NA	4	4	4	4
Gas Appliances												
Range (Stove-Top or Burners)	36.9	NA	37.5	38.2	39.0	39.0	48	NA	46	46	47	45
Oven	35.9	NA	34.2	33.0	35.0	35.9	47	NA	42	40	42	42
Clothes Dryer	11.0	NA	11.8	13.1	12.2	13.7	14	NA	14	16	15	16
Outdoor Gas Grill	NA	NA	7.1	7.4	9.4	11.5	NA	NA	9	9	11	13
Outdoor Gas Light	1.3	NA	1.6	1.4	1.4	1.2	2	NA	2	2	2	1
Swimming Pool Heater [1]	NA	NA	0.4	0.4	0.3	0.7	NA	NA	[2]	[2]	[2]	1
Refrigerators												
One	66.0	NA	70.0	72.4	72.4	75.8	86	NA	86	87	86	88
Two or More	10.4	NA	11.5	10.5	11.1	10.3	14	NA	14	13	13	12
None	0.2	NA	0.2	0.2	0.2	0.2	[2]	NA	[2]	[2]	[2]	[2]
Air Conditioning (A/C)												
Central	17.6	18.7	22.2	22.4	23.3	25.7	23	24	27	27	28	30
Individual Room Units	25.1	23.8	24.5	26.0	25.3	25.8	33	31	30	31	30	30
None	33.8	35.0	34.9	34.7	35.1	34.9	44	45	43	42	42	40

[1] In 1984, also includes heaters for jacuzzis and hot tubs.
[2] Less than 0.5 percent.
NA = Not available.
Note: No data are available for 1983.
Source: •1978 and 1979—Energy Information Administration, Form EIA-84, "Residential Energy Consumption Survey." •1980 and forward—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 26. Household Motor Vehicle Data, Percent Change, 1983 to 1985



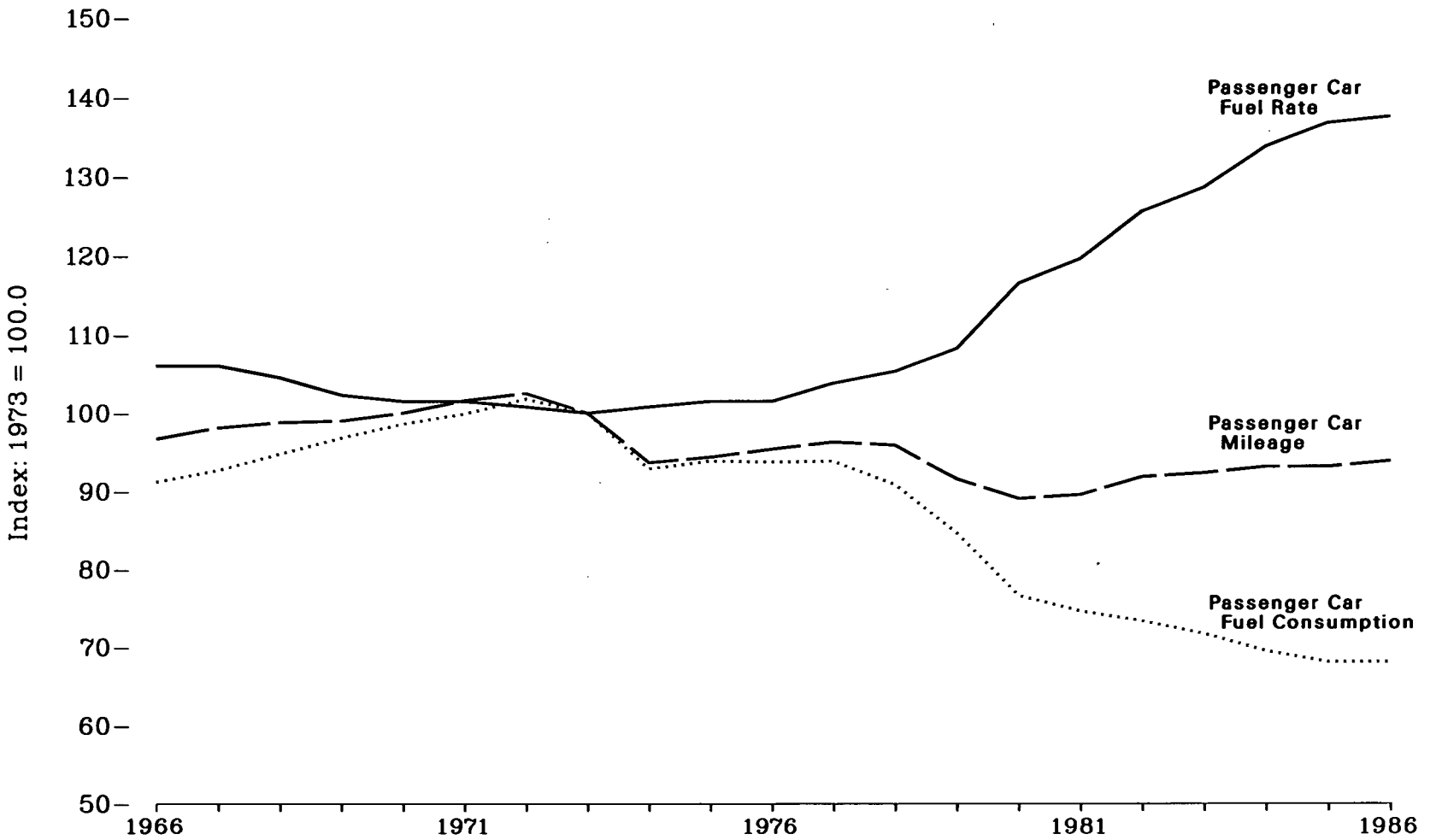
Source: See Table 26.

Table 26. Household Motor Vehicle Data, 1983 and 1985

	Family Income					
	Less than $25,000		$25,000 or More		All Income Categories	
	1983	1985	1983	1985	1983	1985
Fuel Efficiency (miles per gallon)	14.4	15.3	15.8	16.8	15.1	16.1
Miles Traveled (billions)	589	587	630	766	1,219	1,353
Households with Vehicles (millions)	42.9	43.3	30.5	34.5	73.4	77.7
Vehicles (millions)	66.7	65.4	63.0	71.9	129.7	137.3
Motor Fuel Consumed (billion gallons)	40.8	38.2	39.8	45.7	80.5	83.9
Motor Gasoline Consumed (billion gallons)						
Leaded	19.2	13.5	13.2	11.0	32.4	24.5
Unleaded	20.9	24.2	25.3	33.7	46.3	57.8
Motor Fuel Expenditures (billion dollars)	48.1	44.8	47.3	54.3	95.4	99.1
Averages per Household with Vehicles						
Vehicles	1.6	1.5	2.1	2.1	1.8	1.8
Miles Traveled	13,721	13,558	20,668	22,228	16,605	17,402
Motor Fuel Consumed (gallons)	950	883	1,305	1,326	1,097	1,079
Motor Fuel Expenditures (dollars)	1,121	1,035	1,552	1,575	1,300	1,274
Averages per Vehicle						
Miles Traveled	8,837	8,972	9,996	10,658	9,400	9,855
Motor Fuel Consumed (gallons)	612	585	631	636	621	611
Motor Fuel Expenditures (dollars)	722	685	751	755	736	722
Price of Motor Gasoline (dollars per gallon)						
Leaded	1.14	1.11	1.14	1.11	1.14	1.11
Unleaded	1.22	1.20	1.22	1.21	1.22	1.21

Note: 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.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, Form EIA-141 and Form EIA-429, "Residential Transportation Energy Consumption Survey."

Figure 27. Passenger Car Efficiency, 1966–1986



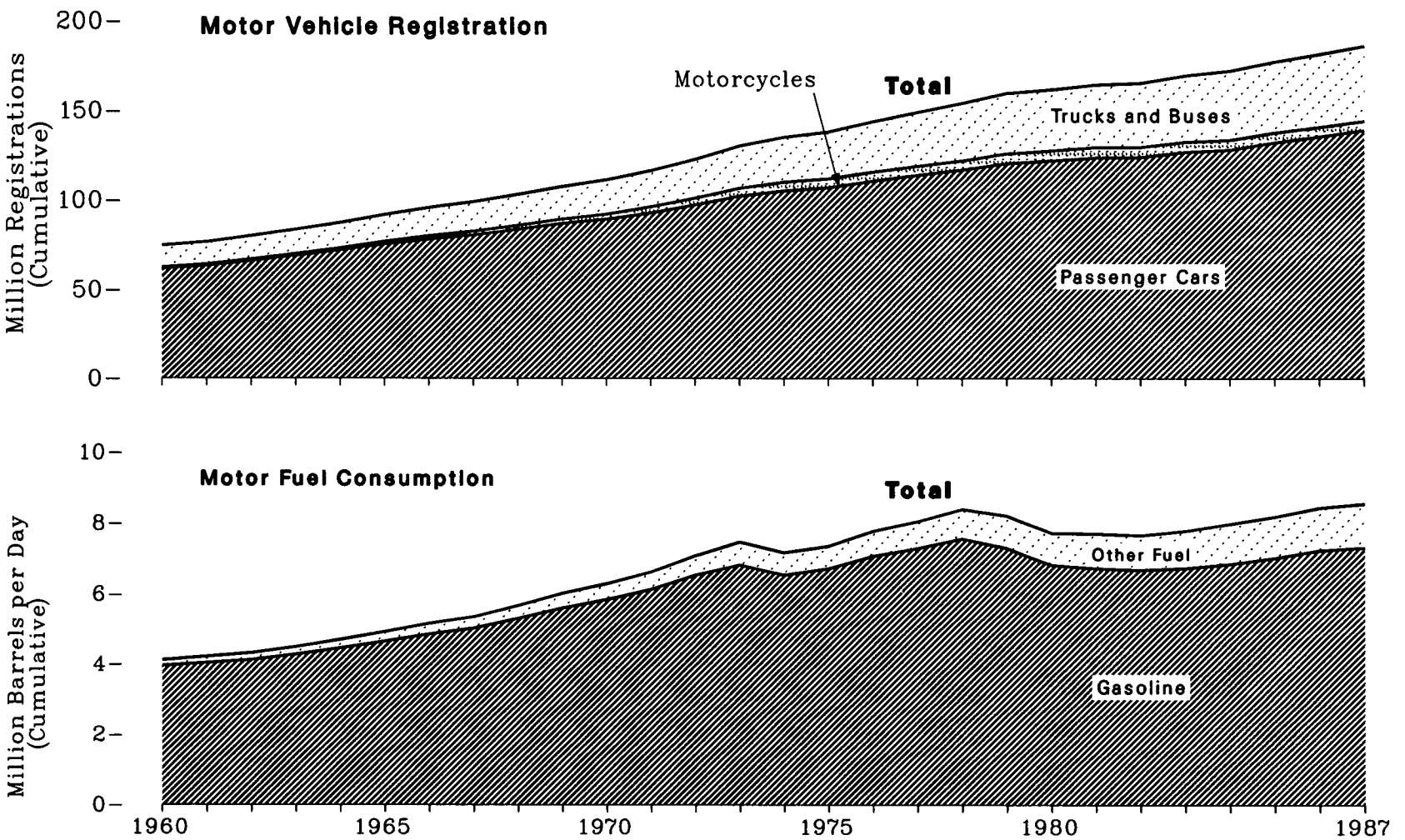
Source: See Table 27.

Table 27. Motor Vehicle Efficiency, 1966-1986

Year	Passenger Cars						All Motor Vehicles [1]					
	Mileage		Fuel Consumption		Fuel Rate		Mileage		Fuel Consumption		Fuel Rate	
	Thousand Miles per Car	Index 1973 = 100.0	Gallons per Car	Index 1973 = 100.0	Miles per Gallon	Index 1973 = 100.0	Thousand Miles per Vehicle	Index 1973 = 100.0	Gallons per Vehicle	Index 1973 = 100.0	Miles per Gallon	Index 1973 = 100.0
1966	9.92	96.7	703	91.2	14.1	106.0	9.68	95.8	780	91.8	12.4	96.1
1967	10.06	98.1	715	92.7	14.1	106.0	9.75	96.5	786	92.5	12.4	96.1
1968	10.14	98.8	731	94.8	13.9	104.5	9.86	97.6	805	94.7	12.3	95.4
1969	10.16	99.0	746	96.8	13.6	102.3	9.89	97.9	821	96.6	12.1	93.8
1970	10.27	100.0	760	98.6	13.5	101.5	10.00	99.0	830	97.7	12.0	93.0
1971	10.42	101.6	770	99.9	13.5	101.5	10.13	100.3	839	98.7	12.1	93.8
1972	10.52	102.5	785	101.8	13.4	100.8	10.28	101.8	857	100.1	12.0	93.0
1973	10.26	100.0	771	100.0	13.3	100.0	10.10	100.0	850	100.0	12.9	100.0
1974	9.61	93.7	716	92.9	13.4	100.8	9.49	94.0	788	92.7	12.1	93.8
1975	9.69	94.4	716	93.9	13.5	101.5	9.63	95.4	790	92.9	12.2	94.6
1976	9.79	95.4	723	93.8	13.5	101.5	9.74	96.4	806	94.8	12.1	93.8
1977	9.88	96.3	716	93.9	13.8	103.8	9.98	98.8	814	95.8	12.3	95.4
1978	9.84	95.9	701	90.9	14.0	105.3	10.08	99.8	816	96.0	12.4	96.1
1979	9.40	91.6	653	84.7	14.4	108.3	9.72	96.2	776	91.3	12.5	96.9
1980	9.14	89.1	591	76.7	15.5	116.5	9.46	93.2	712	83.8	13.3	103.1
1981	9.19	89.6	576	74.7	15.9	119.6	9.46	93.7	697	82.0	13.6	105.4
1982	9.43	91.9	566	73.4	16.7	125.6	9.64	95.5	686	80.7	14.1	109.3
1983	9.48	92.4	553	71.7	17.1	128.6	9.76	96.6	686	80.7	14.2	110.1
1984	9.56	93.2	536	69.5	17.8	133.8	10.02	99.2	691	81.3	14.5	112.4
1985	9.56	93.2	525	68.1	18.2	136.8	10.02	99.2	685	80.6	14.6	113.2
1986[2]	9.63	93.9	525	68.1	18.3	137.6	10.13	100.3	690	81.2	14.7	114.0

[1] Includes passenger cars, motorcycles, buses, and trucks.
[2] Preliminary.
Source: •1966 through 1985—Federal Highway Administration, *Highway Statistics Summary to 1985*, Table VM-201A. •1986—Federal Highway Administration, *Highway Statistics Annual*, Table VM-1.

Figure 28. Motor Vehicle Registration and Motor Fuel Consumption, 1960-1987



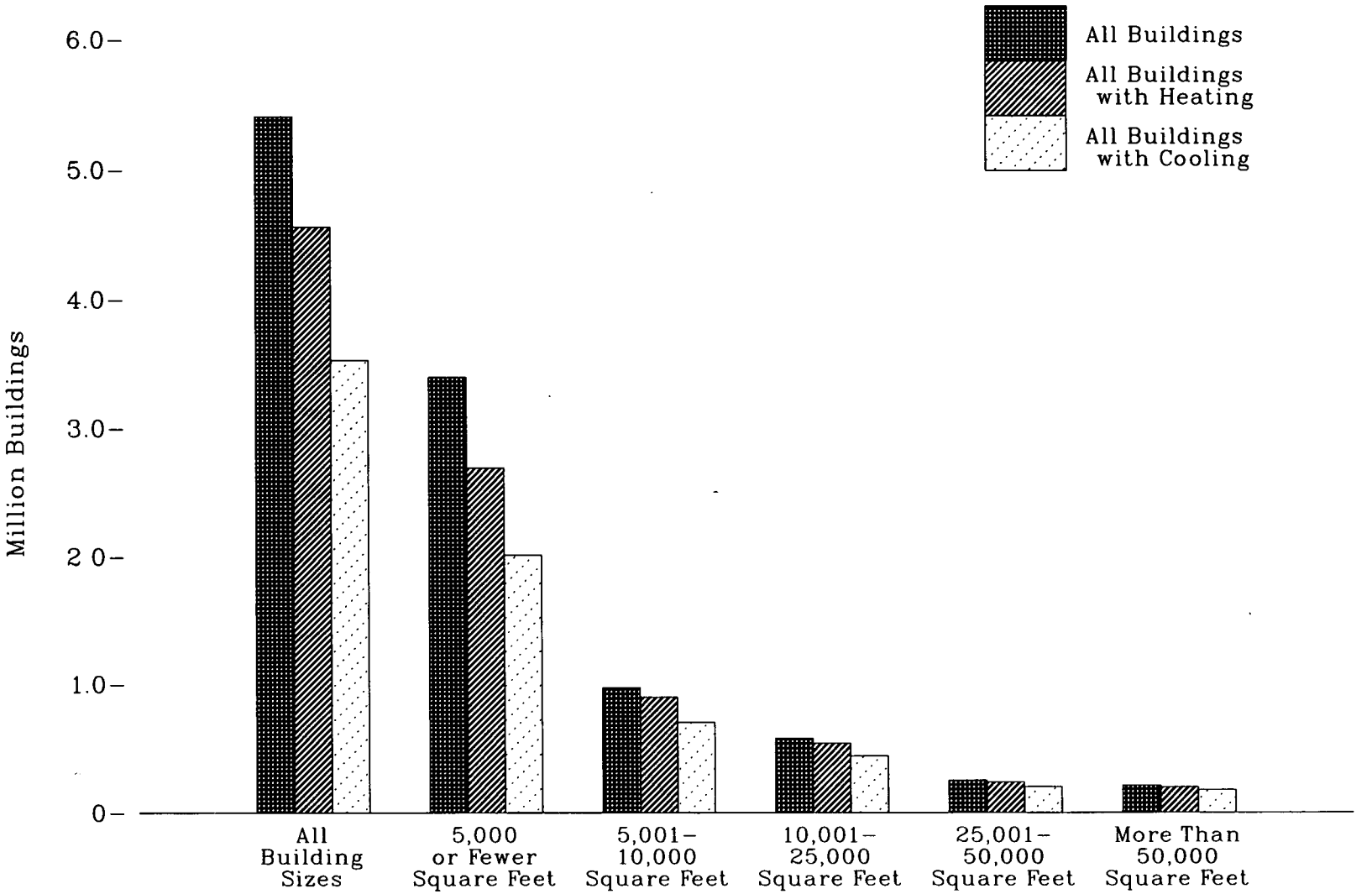
Source: See Table 28.

Table 28. Motor Vehicle Registration and Motor Fuel Consumption, 1960-1987

Year	Motor Vehicle Registration (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)	[6] 39.6	177.1	7,020	1,158	8,178
1986	135.4	5.3	(5)	[6] 40.8	181.5	7,229	1,202	8,431
1987[7]	139.0	5.1	(5)	41.9	186.1	7,305	1,237	8,542

[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] Includes motor gasoline, aviation gasoline, and gasohol.
[3] Includes 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] Estimated.
[6] Included in trucks.
[7] Includes buses.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1960 through 1975—Federal Highway Administration, *Highway Statistics Summary to 1975*, Tables MV-201 and MF-221. •1976 through 1986—Federal Highway Administration, *Highway Statistics Annual*, Tables MV-1, MF-21, and MF-25. •1987—Federal Highway Administration, *Selected Highway Statistics and Charts 1986*.

Figure 29. Characteristics of Commercial Buildings by Heating and Cooling End Uses, 1986



Source: See Table 29.

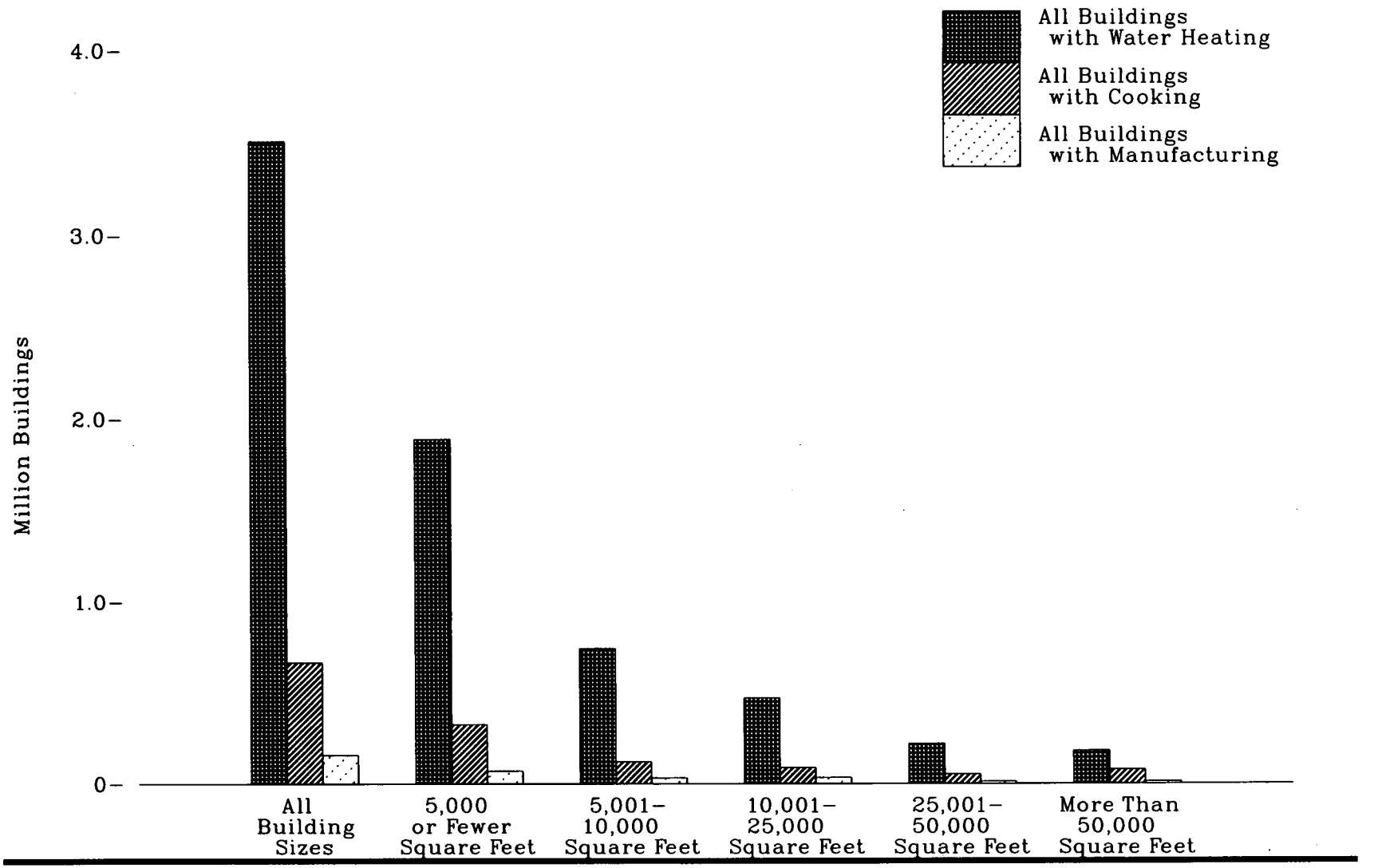
Table 29. Characteristics of Commercial Buildings by Heating and Cooling End Uses, 1979, 1983, and 1986

(Thousand Buildings)

	All Buildings			All Buildings with Space Heating			All Buildings with Space Cooling		
	1979	1983	1986 [1]	1979	1983	1986 [1]	1979	1983	1986 [1]
All Buildings	3,969	3,947	5,403	3,543	3,400	4,558	2,526	2,620	3,528
Fuels Used in the Building for All End Uses (Alone or in Combination)									
Electricity	3,840	3,764	5,155	3,532	3,391	4,554	2,524	2,620	3,528
Natural Gas	2,237	2,239	2,699	2,180	2,176	2,643	1,583	1,647	2,161
Fuel Oil or Kerosene	810	538	674	803	532	669	456	332	395
District Steam, Hot Water, or Chilled Water [2]	48	71	96	48	68	96	36	50	73
Propane	308	250	474	304	242	435	187	161	278
Census Region [3]									
Northeast	697	670	895	654	606	783	433	442	491
Midwest	1,236	1,211	1,415	1,146	1,090	1,189	793	796	835
South	1,471	1,493	2,040	1,259	1,230	1,761	1,055	1,100	1,550
West	565	574	1,053	484	474	825	246	282	652
Principal Activity Within the Building									
Assembly	475	457	654	459	433	596	292	291	436
Education	168	177	288	166	173	283	114	130	207
Food Sales/Service	384	380	390	364	349	357	313	313	339
Health Care	55	61	60	55	60	60	47	55	56
Lodging	107	106	231	105	101	186	72	79	140
Mercantile/Service	1,181	1,071	1,572	1,101	943	1,452	686	652	1,052
Office	545	575	739	533	559	728	495	522	690
Residential	272	236	166	272	223	162	183	164	127
Warehouse	451	425	737	271	294	390	173	226	238
Other	173	179	242	144	134	173	96	98	118
Vacant	159	281	324	75	130	172	54	92	125
Building Square Footage									
5,000 or Less [2]	2,313	2,248	3,396	1,966	1,832	2,688	1,327	1,331	2,010
5,001 to 10,000 [2]	744	725	971	707	664	899	490	516	702
10,001 to 25,000	544	567	576	518	532	538	416	441	442
25,001 to 50,000	205	222	251	195	199	237	159	178	200
50,001 to 100,000	99	107	124	95	99	114	80	88	100
100,001 to 200,000	42	50	53	41	47	51	35	41	45
200,001 to 500,000	18	24	25	18	23	24	16	22	23
Over 500,000	3	5	8	3	5	8	3	5	7

[1] Preliminary.
[2] These categories were apparently undercounted in 1979 and 1983.
[3] See Appendix D for Census Regions.
Source: •1979—Energy Information Administration, Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." •1983—Energy Information Administration, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." •1986—Energy Information Administration, Form EIA-871A, "Nonresidential Buildings Energy Consumption Survey."

Figure 30. Characteristics of Commercial Buildings by Nonheating, Noncooling End Uses, 1986



Source: See Table 30.

Table 30. Characteristics of Commercial Buildings by Nonheating, Noncooling End Uses, 1979, 1983, and 1986

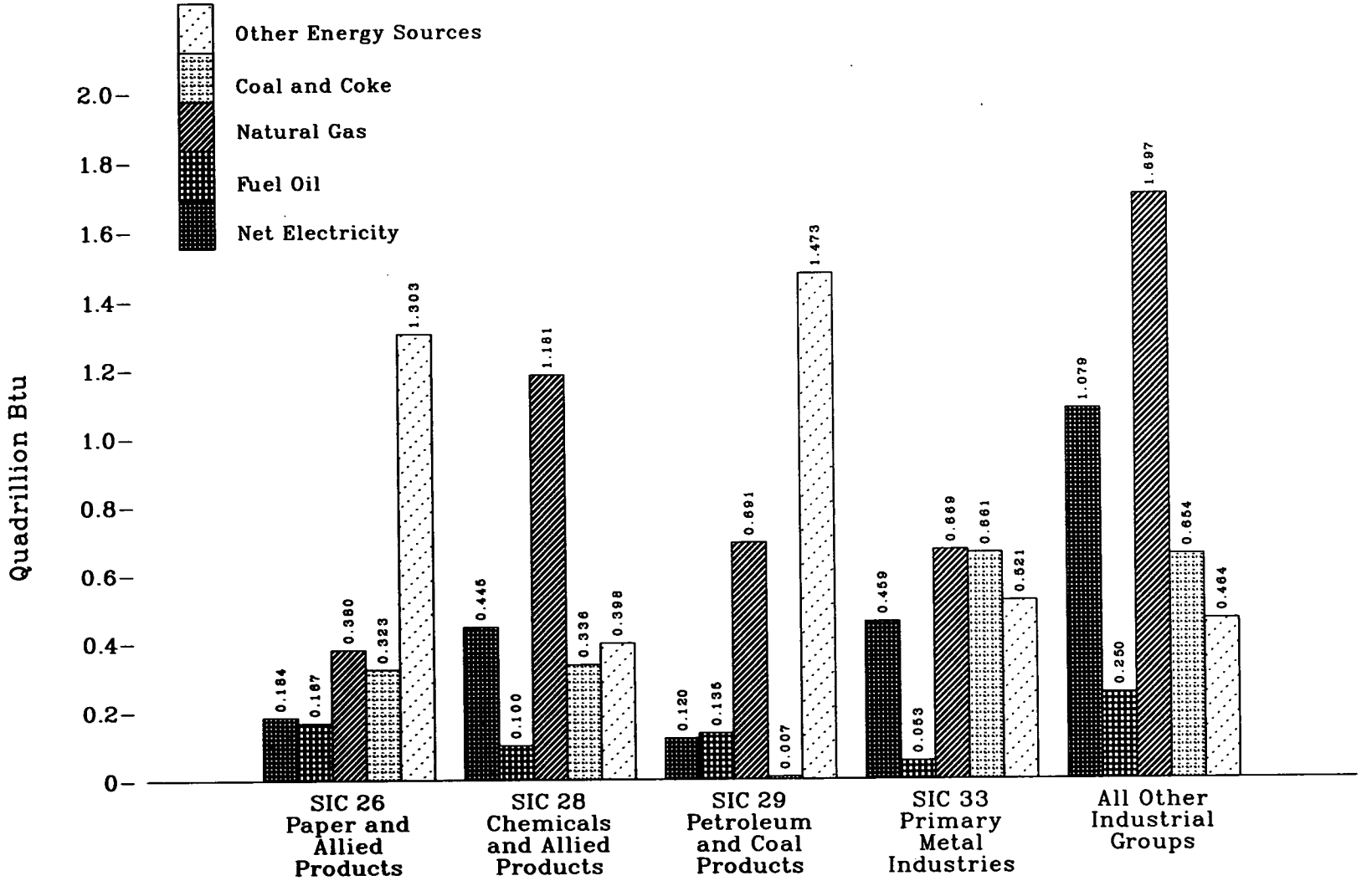
(Thousand Buildings)

	All Buildings with Water Heating			All Buildings with Cooking			All Buildings with Manufacturing		
	1979	1983	1986 [1]	1979	1983	1986 [1]	1979	1983	1986 [1]
All Buildings	2,642	2,865	3,507	1,319	1,443	666	299	381	156
Fuels Used in the Building for All End Uses (Alone or in Combination)									
Electricity	2,641	2,862	3,506	1,317	1,441	665	299	381	156
Natural Gas	1,738	1,913	2,175	900	997	478	178	258	96
Fuel Oil or Kerosene	574	437	501	330	231	107	75	48	20
District Steam, Hot Water, or Chilled Water [2]	37	66	81	18	31	14	2	4	3
Propane	206	170	337	162	122	100	32	28	13
Census Region [3]									
Northeast	541	562	628	321	323	142	50	73	21
Midwest	892	930	967	408	456	167	75	130	38
South	826	948	1,196	417	462	222	102	112	69
West	383	424	715	173	202	135	72	67	28
Principal Activity Within the Building									
Assembly	338	375	482	254	287	93	(4)	(4)	(4)
Education	133	157	199	87	107	68	6	7	(4)
Food Sales/Service	336	337	355	271	282	279	(4)	30	(4)
Health Care	51	57	54	29	27	12	(4)	(4)	(4)
Lodging	99	102	198	61	79	42	(4)	(4)	(4)
Mercantile/Service	676	680	961	156	154	82	152	166	60
Office	420	501	608	115	168	22	16	35	9
Residential	251	220	161	251	188	34	(4)	(4)	(4)
Warehouse	182	231	227	36	56	(4)	60	85	48
Other	97	101	129	40	53	14	25	16	10
Vacant	59	104	132	20	41	16	8	10	10
Building Square Footage									
5,000 or Less [2]	1,348	1,452	1,888	636	704	326	160	199	69
5,001 to 10,000 [2]	539	571	745	265	286	121	54	64	31
10,001 to 25,000	440	483	471	232	228	88	45	68	33
25,001 to 50,000	172	190	220	96	117	52	22	24	11
50,001 to 100,000	86	94	106	50	58	39	12	16	5
100,001 to 200,000	37	47	46	26	33	22	5	7	4
200,001 to 500,000	17	22	23	11	14	13	3	2	2
Over 500,000	3	5	7	3	4	4	0	1	(4)

[1] Preliminary.
[2] These categories were apparently undercounted in 1979 and 1983.
[3] See Appendix D for Census Regions.
[4] Data withheld either because the Relative Standard Error was greater than 50 percent, or fewer than 20 buildings were sampled.

Source: •1979—Energy Information Administration, Form EIA-143, "Nonresidential Buildings Energy Consumption Survey." •1983—Energy Information Administration, Form EIA-788, "Nonresidential Buildings Energy Consumption Survey." •1986—Energy Information Administration, Form EIA-871A, "Nonresidential Buildings Energy Consumption Survey."

Figure 31. Manufacturing Sector Energy Consumption for Heat and Power, by Industry Group, 1985



Source: See Table 31.

Table 31. Manufacturing Sector Energy Consumption for Heat and Power by Industry Group, 1985 [1]

(Trillion Btu)

SIC Code [2]	Industry Group	Net Electricity [3]	Fuel Oil [4]	Natural Gas	Coal and Coke	Other [5]	Total
20	Food and Kindred Products	165.8	65.1	458.9	131.7	132.9	954.3
21	Tobacco Products	4.6	2.3	3.4	9.4	0.1	19.8
22	Textile Mill Products	88.1	21.3	91.2	38.0	9.7	248.1
23	Apparel and Other Textile Products	15.3	2.9	12.5	1.4	0.4	32.4
24	Lumber and Wood Products	55.1	23.4	31.4	W	W	348.9
25	Furniture and Fixtures	15.2	2.7	19.6	2.1	9.1	48.6
26	Paper and Allied Products	183.6	166.9	379.7	322.5	1,302.9	2,355.6
27	Printing and Publishing	52.5	2.4	40.6	W	W	98.6
28	Chemicals and Allied Products	445.2	100.3	1,180.9	336.4	397.7	2,460.5
29	Petroleum and Coal Products	120.3	134.9	690.7	7.3	1,472.9	2,426.3
30	Rubber and Misc. Plastics Products	90.7	15.2	102.0	8.1	4.8	220.8
31	Leather and Leather Products	4.3	3.3	4.5	0.9	0.4	13.4
32	Stone, Clay, and Glass Products	116.3	33.1	397.0	349.0	32.3	927.6
33	Primary Metal Industries	458.7	53.2	669.2	660.6	520.5	2,362.2
34	Fabricated Metal Products	91.2	16.7	171.6	8.7	8.0	296.2
35	Machinery, except Electrical	114.2	14.6	113.7	30.6	4.5	277.6
36	Electric and Electronic Equipment	110.1	10.4	91.4	8.6	3.3	223.7
37	Transportation Equipment	115.0	25.7	120.7	43.8	17.0	322.2
38	Instruments and Related Products	29.2	8.1	23.6	W	W	79.7
39	Misc. Manufacturing Industries	11.4	2.6	15.4	1.3	0.7	31.3
—	Total	2,286.5	705.2	4,617.7	1,980.3	4,158.2	13,747.9

[1] Provisional estimates.

[2] The Standard Industrial Classification system was developed by the Office of Management and Budget for use in classifying establishments by the type of activity in which they are engaged. These activities are defined at the establishment level, that is, an economic unit, generally at a single physical location where business is conducted or where services or industrial operations are performed. Twenty major industry groups (SIC 20-39) constitute all manufacturing operations.

[3] "Net electricity" is obtained by summing purchases, transfers in, and generation from noncombustible renewable resources, minus quantities sold and transferred out. It does not include electricity inputs from onsite cogeneration or generation from combustible fuels because that energy has already been included as generating fuel (for example, coal).

[4] "Fuel oil" includes distillate and residual.

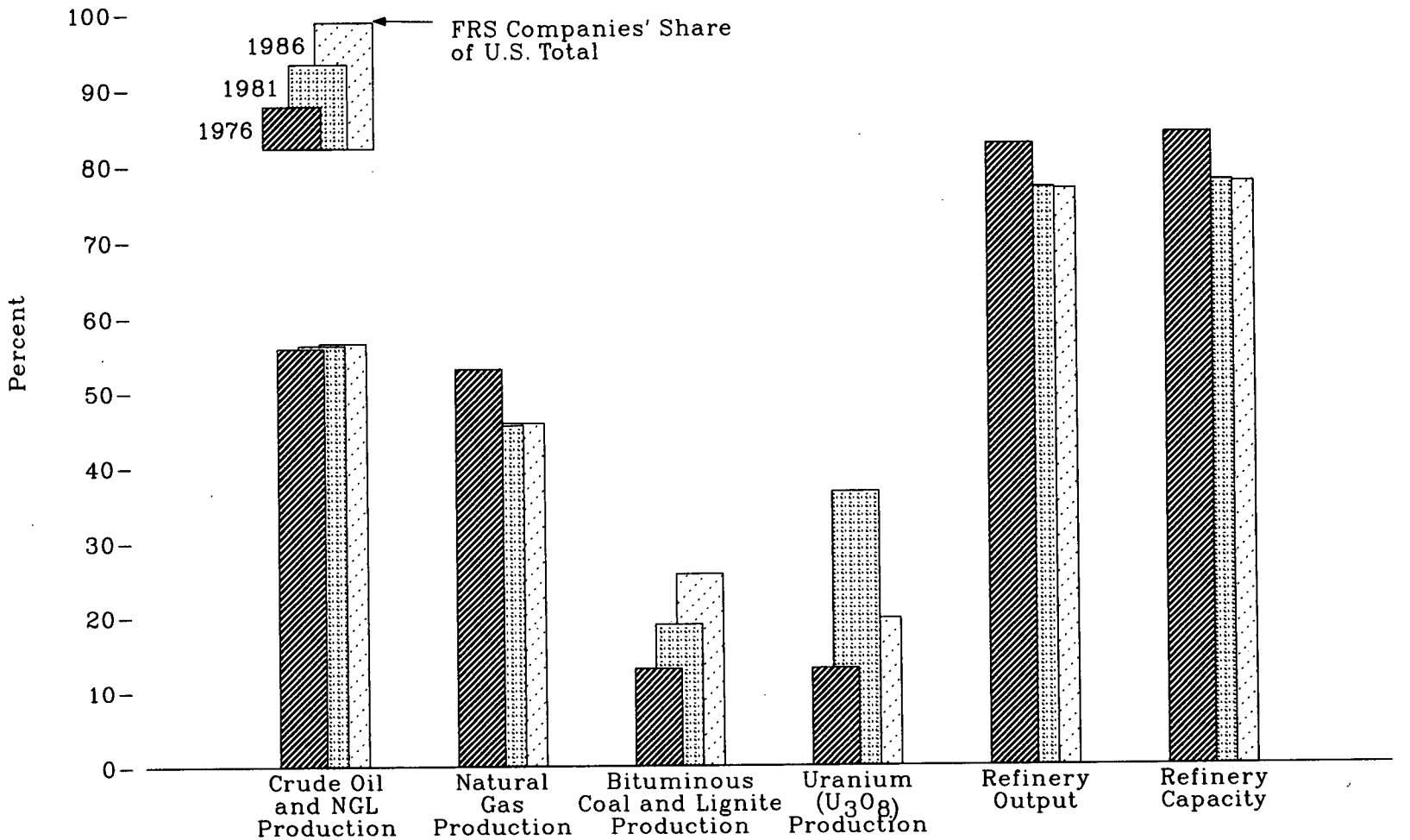
[5] "Other" includes liquefied petroleum gases (LPG), other petroleum and natural gas products not specifically shown, byproducts and waste products (for example, still gas, coke ovengas, pulping liquor, and wood waste), steam (the sum of purchases, generation from renewables, and net transfers), roundwood, biomass, and any other energy sources that the respondents indicated were used for the production of heat, steam, power, or generated electricity.

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

Note: Sum of components may not equal total due to independent rounding. Energy consumed for nonfuel purposes (for example, coal to produce coke, crude oil to produce petroleum products, hydrogen used as an atmosphere for electroplating) is not included.

Source: Energy Information Administration, Form EIA-846(F), "1985 Manufacturing Energy Consumption Survey."

Figure 32. Selected Statistics for FRS* Companies' Operations, 1976, 1981, and 1986



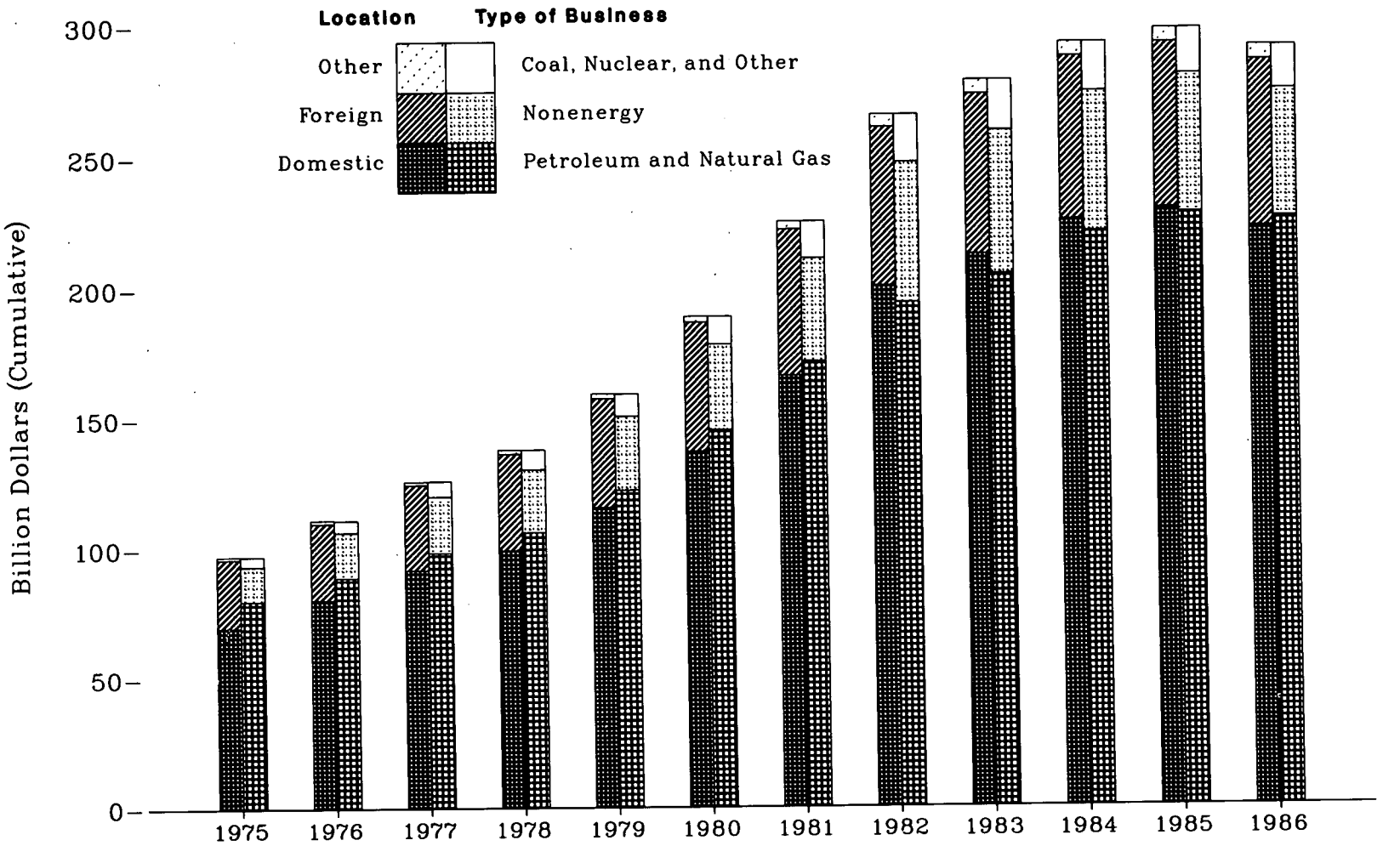
*FRS = Financial Reporting System (see Appendix E, Note 3).
Source: See Table 32.

Table 32. Selected Statistics for FRS [1] Companies' Operations, 1975-1986

Activity	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Production												
Crude Oil and NGL [2] (million barrels)	2,049.9	1,983.4	1,991.2	2,131.4	2,081.7	2,087.5	2,072.4	2,079.1	2,059.3	2,088.8	2,120.5	2,089.6
(Percent of U.S. Total)	(56.1)	(55.8)	(55.3)	(56.9)	(56.2)	(56.3)	(56.2)	(55.1)	(54.8)	(54.1)	(54.6)	(56.5)
Dry Natural Gas (trillion cubic feet)	11.0	10.6	10.3	10.1	9.9	9.3	9.2	8.3	7.4	7.9	7.3	7.1
(Percent of U.S. Total)	(54.9)	(53.0)	(51.5)	(50.5)	(48.4)	(45.9)	(45.5)	(46.8)	(45.9)	(45.7)	(44.6)	(45.8)
Bituminous Coal [3] and Lignite (million short tons)	88.1	88.5	89.1	85.5	123.3	142.3	154.8	195.2	185.2	226.0	230.4	227.6
(Percent of U.S. Total)	(13.6)	(13.0)	(12.9)	(12.9)	(15.9)	(17.3)	(18.9)	(23.4)	(23.8)	(25.3)	(26.2)	(25.7)
Uranium (million pounds of U_3O_8)	4.3	3.3	16.0	17.3	16.7	19.0	14.5	9.2	6.6	4.1	2.1	1.6
(Percent of U.S. Total)	(18.6)	(13.0)	(53.5)	(46.8)	(44.6)	(43.5)	(36.6)	(34.3)	(28.1)	(30.4)	(24.8)	(19.7)
Refining												
Capacity [4] (million barrels per day)	13.4	14.2	14.6	14.8	14.4	15.1	14.6	13.6	13.0	12.8	12.6	12.5
(Percent of U.S. Total)	(85.5)	(84.0)	(81.9)	(81.4)	(79.9)	(77.8)	(77.7)	(77.4)	(77.6)	(78.2)	(78.2)	(77.5)
Output (million barrels per day)	12.2	12.8	13.7	13.6	13.3	12.2	11.2	10.6	10.3	10.9	10.9	11.5
(Percent of U.S. Total)	(84.5)	(82.6)	(81.5)	(80.7)	(80.1)	(78.7)	(76.9)	(75.9)	(76.4)	(77.6)	(76.9)	(76.7)
Financial Indicators												
Net Income (billion dollars)	10.3	12.0	12.7	13.9	23.5	31.0	30.0	21.8	21.9	21.3	17.4	9.2
Net Income to Stockholders' Equity (percent)	12.3	13.1	12.6	12.8	18.8	21.1	18.1	11.9	11.4	12.1	10.5	5.6
Net Income Plus Interest to Total Invested Capital (percent)	11.3	11.7	11.6	12.3	16.9	18.7	16.8	11.9	11.5	12.0	11.4	8.1
Long-Term Debt to Stockholders' Equity (percent)	35.6	38.7	38.9	35.6	33.7	31.5	32.2	37.1	34.8	49.5	54.3	56.0
Addition to PP&E to Net PP&E [5] (percent)	21.7	20.8	19.1	18.1	23.6	25.1	26.2	26.9	17.1	26.6	16.2	13.0

[1] FRS = Financial Reporting System (see Appendix E, Note 3).
[2] NGL = Natural Gas Liquids.
[3] Includes subbituminous coal.
[4] Operable capacity as of January 1 of the following year.
[5] PP&E = Property Plant and Equipment.
Note: FRS Crude Oil and NGL and Natural Gas (Dry Marketed) production are on a net ownership interest basis (see Glossary).
Sources: **FRS Companies:** • 1975 through 1979— Energy Information Administration, *Energy Company Development Patterns in the Postembargo Era*, Vol. 2. • 1980 and forward—Energy Information Administration, *Performance Profiles of Major Energy Producers*. **U.S. Total, Production: Crude Oil and NGL:** • 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual*. • 1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual*. • 1981 and forward—Energy Information Administration, *Petroleum Supply Annual*. **U.S. Total, Production: Dry Natural Gas:** • 1975—Bureau of Mines, *Minerals Yearbook*, "Natural Gas" chapter. • 1976 through 1978— Energy Information Administration, Energy Data Reports, *Natural Gas, Annual*. • 1979—Energy Information Administration, *Natural Gas Production and Consumption*. • 1980 and forward—Energy Information Administration, *Natural Gas Annual*. **U.S. Total, Production: Bituminous Coal and Lignite:** • 1975—Bureau of Mines, *Minerals Yearbook*, "Coal — Bituminous and Lignite" chapter. • 1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976*. • 1977 and 1978— Energy Information Administration, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations*. • 1980—Energy Information Administration, Energy Data Report, *Weekly Coal Report*. • 1981 and forward—Energy Information Administration, *Weekly Coal Production*. **U.S. Total, Production: Uranium.** • 1975 through 1981—U.S. Department of Energy, Grand Junction Office, Colorado, *Statistical Data of the Uranium Industry*, Report No. GJO-100, annual. •1982 and 1983—Energy Information Administration, *Survey of United States Uranium Marketing Activity*. •1984 and forward—Energy Information Administration, *Uranium Industry Annual* **U.S. Total, Refining:** • 1975 through 1980—Energy Information Administration, *Energy Company Development Patterns in the Postembargo Era*, Vol. 1. • 1981 and forward—Energy Information Administration, *Petroleum Supply Annual*.

Figure 33. Net Property Investment by FRS* Companies, 1975–1986



*FRS = Financial Reporting System (see Appendix E, Note 3).
Source: See Table 33.

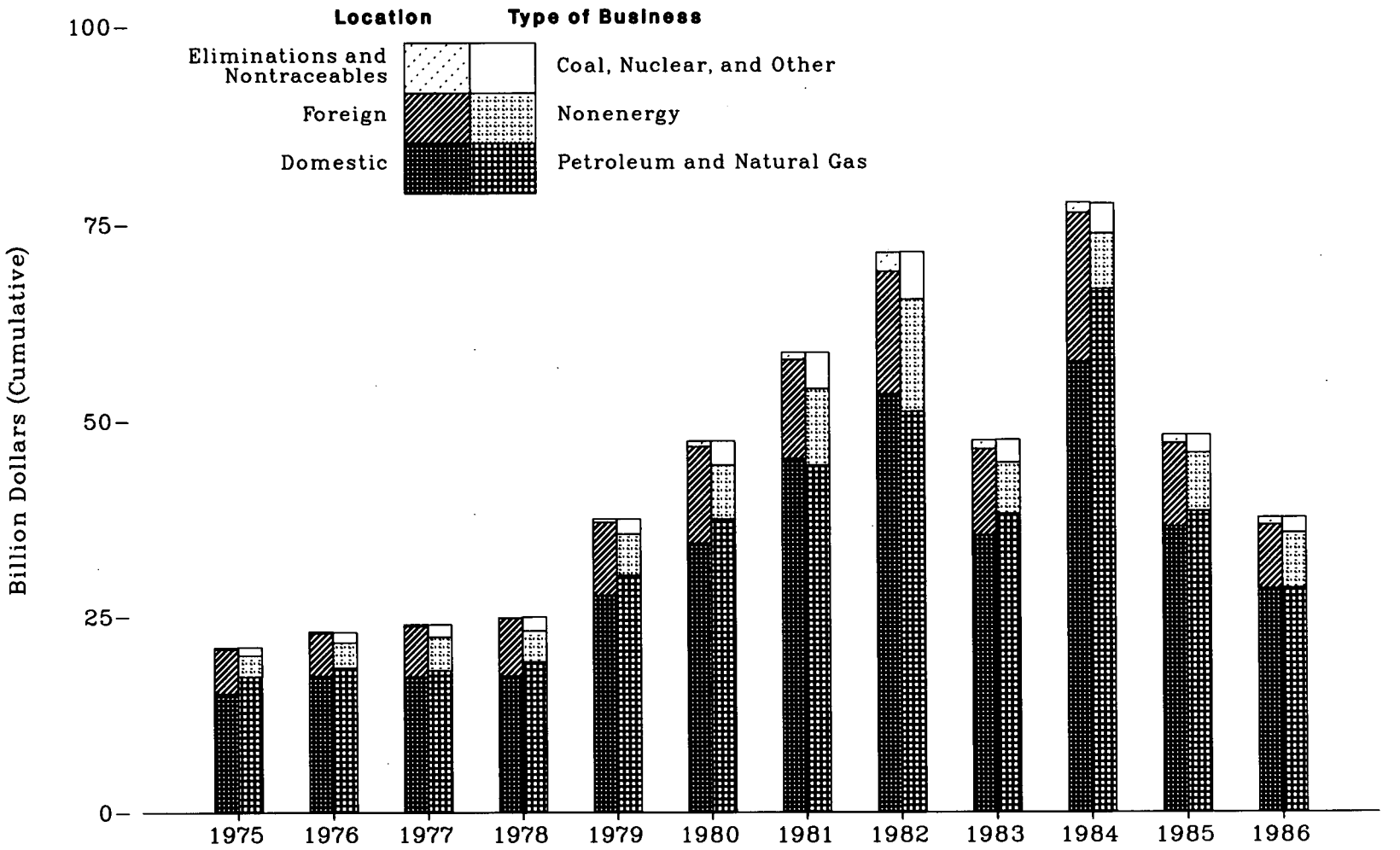
Table 33. Net Property [1] Investment by FRS [2] Companies, 1975-1986

(Billion Dollars)

Item	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Location												
Domestic	69.4	80.3	91.7	99.3	115.6	137.0	165.9	200.2	212.1	225.2	229.5	222.1
Foreign	26.8	29.6	33.0	37.2	42.0	49.7	56.0	60.5	61.0	62.1	62.8	63.4
Eliminations and Nontraceables	1.0	1.2	1.2	1.5	1.8	2.2	3.0	4.8	5.3	5.2	5.4	5.6
Total	97.3	111.1	125.9	138.0	159.4	188.9	224.9	265.5	278.4	292.4	297.7	291.1
Type of Business												
Petroleum and Natural Gas	79.8	88.9	98.4	106.2	122.4	145.3	171.3	193.9	204.6	220.6	227.8	226.0
Coal	1.6	2.0	2.7	3.1	3.7	4.6	6.8	8.4	9.0	9.0	8.3	7.7
Nuclear	0.3	0.4	0.7	0.9	1.1	1.2	1.3	1.2	1.1	0.6	0.3	0.2
Other Energy	0.8	1.0	1.2	2.2	2.1	2.7	3.0	3.7	3.6	3.7	3.3	3.0
Nonenergy	13.7	17.6	21.8	24.2	28.4	33.0	39.5	53.5	54.8	53.4	52.7	48.5
Eliminations and Nontraceables	1.0	1.1	1.2	1.4	1.6	2.1	3.0	4.8	5.3	5.2	5.4	5.6
Total	97.3	111.1	125.9	138.1	159.3	188.9	224.9	265.5	278.4	292.4	297.7	291.1
Domestic Petroleum and Natural Gas												
Production	27.8	31.4	36.4	40.4	51.7	65.7	83.1	100.4	108.1	122.8	125.8	118.6
Refining/Marketing	20.0	20.7	20.8	21.6	23.0	25.1	28.5	31.4	32.9	33.7	34.3	35.8
Rate Regulated Pipelines	7.0	9.5	11.0	11.0	10.8	10.9	10.9	10.5	11.7	11.6	14.7	18.8
Eliminations and Nontraceables	[3]	[3]	[3]	[3]	0.1	[3]	0.0	0.0	0.0	0.0	0.0	0.0
Total	54.8	61.7	68.1	73.1	85.5	101.7	122.5	142.3	152.7	168.0	174.8	173.1
Foreign Petroleum and Natural Gas												
Production	9.4	11.4	14.0	16.6	20.0	25.9	30.4	34.1	35.9	38.6	38.8	37.8
Refining/Marketing	10.3	10.3	10.5	11.1	11.3	12.4	13.6	13.3	12.4	11.2	12.0	13.1
International Marine	5.2	5.4	5.6	5.4	5.3	5.3	4.8	4.1	3.5	2.8	2.2	2.0
Eliminations and Nontraceables	[3]	[3]	[3]	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total	24.9	27.1	30.2	33.1	36.6	43.6	48.8	51.5	51.9	52.6	53.0	52.9

[1] Property, plant, and equipment.
[2] FRS = Financial Reporting System (see Appendix E, Note 3).
[3] Less than $50 million.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1975 through 1980 — Energy Information Administration, *Energy Company Development Patterns in the Postembargo Era*, Vol. 2. •1981 and forward— Energy Information Administration, *Performance Profiles of Major Energy Producers.*

Figure 34. Additions to Property by FRS* Companies, 1975-1986



*FRS = Financial Reporting System (see Appendix E, Note 3).
Source: See Table 34.

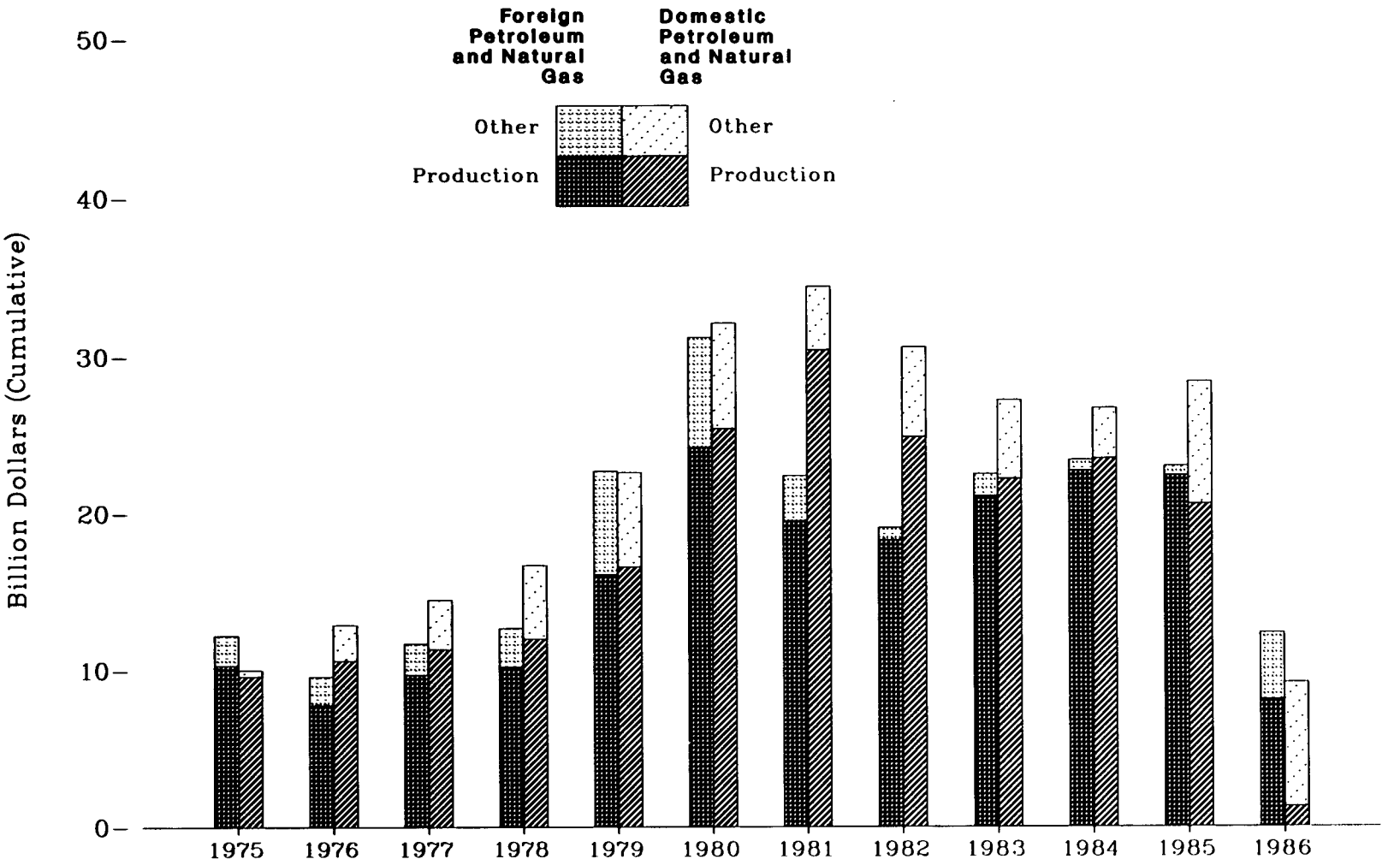
Table 34. Additions to Property [1] by FRS [2] Companies, 1975-1986

(Billion Dollars)

Item	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Location												
Domestic	15.1	17.4	17.3	17.4	27.8	34.4	45.2	53.4	35.4	57.5	36.5	28.6
Foreign	5.7	5.5	6.5	7.4	9.3	12.3	12.6	15.6	11.0	18.9	10.6	8.1
Eliminations and Nontraceables	0.2	0.2	0.2	0.1	0.4	0.7	1.0	2.4	1.1	1.3	1.1	1.0
Total	21.1	23.1	24.1	24.9	37.5	47.5	58.8	71.5	47.5	77.6	48.2	37.7
Type of Business												
Petroleum and Natural Gas	17.3	18.4	18.1	19.2	30.3	37.5	44.4	51.2	38.2	66.8	38.5	28.7
Coal	0.5	0.5	0.8	0.9	0.8	1.2	2.8	2.0	1.1	1.6	0.9	0.8
Nuclear	0.1	0.1	0.3	0.3	0.3	0.3	0.2	0.1	[3]	0.1	[3]	[3]
Other Energy	0.3	0.5	0.3	0.5	0.4	0.8	0.7	1.5	0.7	0.8	0.3	0.2
Nonenergy	2.7	3.3	4.3	4.0	5.3	6.9	9.7	14.3	6.5	7.0	7.4	7.0
Eliminations and Nontraceables	0.2	0.2	0.2	0.1	0.4	0.7	1.0	2.4	1.1	1.3	1.1	1.0
Total	21.1	23.1	24.1	24.9	37.5	47.5	58.8	71.5	47.5	77.6	48.2	37.7
Domestic Petroleum and Natural Gas												
Production	6.6	8.1	8.5	9.3	18.2	21.6	26.8	30.7	21.8	42.1	21.0	12.7
Refining/Marketing	2.8	2.8	2.2	2.8	3.5	4.2	6.0	6.9	5.2	6.8	4.6	4.3
Rate Regulated Pipelines	2.8	2.8	1.4	0.6	0.6	1.0	0.8	0.8	2.0	0.9	4.0	5.3
Eliminations and Nontraceables	0.0	[3]	[3]	[3]	[3]	[3]	0.0	0.0	0.0	0.0	0.0	0.0
Total	12.2	13.8	12.1	12.7	22.3	26.8	33.6	38.5	29.0	49.8	29.7	22.3
Foreign Petroleum and Natural Gas												
Production	2.6	2.9	4.2	4.8	6.1	8.1	8.1	10.3	7.4	14.0	6.9	4.8
Refining/Marketing	1.4	1.0	1.1	1.5	1.5	2.1	2.4	2.1	1.7	2.8	1.9	1.6
International Marine	1.1	0.7	0.7	0.2	0.5	0.5	0.3	0.3	[3]	0.2	[3]	[3]
Eliminations and Nontraceables	[3]	[3]	[3]	[3]	[3]	[3]	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.1	4.6	6.0	6.5	8.0	10.7	10.8	12.7	9.2	17.0	8.8	6.4

[1] Property, plant, and equipment.
[2] FRS = Financial Reporting System (see Appendix E, Note 3).
[3] Less than $50 million.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1975 through 1980 — Energy Information Administration, *Energy Company Development Patterns in the Postembargo Era*, Vol. 1 and Vol. 2, October 1982. • 1981 and forward—Energy Information Administration, *Performance Profiles of Major Energy Producers*.

Figure 35. Operating Income of FRS* Companies, 1975-1986



*FRS = Financial Reporting System (see Appendix E, Note 3).
Source: See Table 35.

Table 35. Operating Income of FRS [1] Companies, 1975-1986

(Billion Dollars)

Item	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Location												
Domestic	12.1	15.1	16.5	18.0	25.1	33.3	35.0	29.4	27.8	29.2	30.8	12.3
Foreign	12.5	9.9	12.1	13.4	23.8	32.6	22.9	18.8	23.7	24.9	24.3	14.2
Eliminations and Nontraceables	-0.4	-1.1	-1.3	-1.6	-2.1	-3.2	-3.0	-2.7	-3.4	-4.0	-6.8	-2.7
Total	24.3	24.0	27.3	29.8	46.8	62.7	54.8	45.5	48.2	50.1	48.3	24.0
Type of Business												
Petroleum and Natural Gas	22.2	22.4	26.2	29.5	45.4	63.2	56.9	49.9	49.8	50.0	51.5	21.7
Coal	0.4	0.3	0.2	0.1	0.2	0.3	0.2	0.4	0.5	0.7	0.6	0.4
Nuclear	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	[2]	-0.2	[2]	[2]
Other Energy	-0.2	-0.1	-0.1	-0.2	-0.2	[2]	-0.5	-0.5	-0.2	-0.2	-0.1	-0.1
Nonenergy	2.3	2.5	2.4	2.1	3.7	2.4	1.4	-1.4	1.5	3.8	3.1	4.9
Eliminations and Nontraceables	-0.4	-1.1	-1.3	-1.6	-2.1	-3.2	-3.0	-2.7	-3.4	-4.0	-6.8	-2.4
Total	24.3	24.0	27.3	29.8	46.8	62.7	54.8	45.5	48.2	50.1	48.3	24.0
Domestic Petroleum and Natural Gas												
Production	9.6	10.6	11.3	12.0	16.6	25.4	30.4	24.9	22.2	23.5	20.6	1.3
Refining/Marketing	-0.2	1.6	2.4	2.7	3.5	3.8	0.9	2.3	1.5	-1.0	3.6	3.3
Rate Regulated Pipelines	0.6	0.8	0.9	2.1	2.6	3.0	3.1	3.5	3.5	4.2	4.2	4.6
Eliminations and Nontraceables	[2]	-0.1	-0.1	-0.1	-0.1	-0.1	[2]	-0.1	[2]	[2]	[2]	[2]
Total	10.0	12.9	14.4	16.7	22.7	32.0	34.5	30.7	27.2	26.6	28.5	9.2
Foreign Petroleum and Natural Gas												
Production	10.3	7.8	9.7	10.2	16.1	24.2	19.5	18.3	21.1	22.7	22.4	8.1
Refining/Marketing	1.8	2.1	1.7	2.4	6.4	7.0	3.0	1.1	1.8	1.1	1.0	4.2
International Marine	-0.1	0.2	0.2	[2]	0.2	0.1	-0.1	-0.3	-0.5	-0.4	-0.4	0.1
Eliminations and Nontraceables	0.2	-0.5	0.1	0.1	[2]	-0.1	[2]	[2]	0.1	[2]	[2]	[2]
Total	12.2	9.5	11.8	12.8	22.7	31.2	22.4	19.2	22.5	23.4	23.0	12.4

[1] FRS = Financial Reporting System (see Appendix E, Note 3).
[2] Less than $50 million.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1975 through 1980—Energy Information Administration, *Energy Company Development Patterns in the Postembargo Era*, Vol. 2, October 1982 and Form EIA-28. •1981 and forward—Energy Information Administration, *Performance Profiles of Major Energy Producers*.

3. Energy Resources

Crude Oil and Natural Gas Proved Reserves

Proved reserves of crude oil, natural gas, and natural gas liquids combined increased every year from 1949 until 1968 (42), 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 fell each year through the 1970's before stabilizing at between 69 billion and 70 billion barrels (crude oil equivalent) in the first half of the 1980's. By 1986, proved reserves of crude oil had fallen from a 1970 peak of 39 billion barrels to 27 billion barrels. Proved reserves of natural gas had fallen from a 1967 peak of 293 trillion cubic feet to 192 trillion cubic feet in 1986, and proved reserves of natural gas liquids had declined from 8.6 billion barrels in 1967 to 8.2 billion barrels.

Crude Oil and Natural Gas Resources

The most recent U.S. Geological Survey assessment of U.S. undiscovered, recoverable resources provides mean estimates for 1980 of 83 billion barrels of crude oil and 594 trillion cubic feet of natural gas (36). Almost half of all onshore resources are located in the Colorado Plateau and Basin and Range and Gulf Coast regions. Almost one-third of all resources are estimated to be offshore, primarily near Alaska and in the Gulf of Mexico. In 1984, resources in the Federal offshore area were estimated to be 23 billion barrels of crude oil and 161 trillion cubic feet of natural gas.

Coal Resources: A 260-Year Supply

The Energy Information Administration has estimated that the demonstrated reserve base of coal contained 476 billion short tons at the beginning of 1987 (43). Although recoverability rates differ from site to site, the rate for the reserve base as a whole is estimated to be about 50 percent, enough to sustain coal production at current levels for about 260 years.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Uranium Resources

At the end of 1986, reasonably assured uranium resources with forward costs (those yet to be incurred in production) of up to $30 per pound totaled 322 million pounds of U_3O_8, over half of which was in New Mexico (45). Estimated additional resources and speculative resources in the $30-per-pound category in 1986 totaled 1.4 billion pounds and 1.0 billion pounds, respectively.

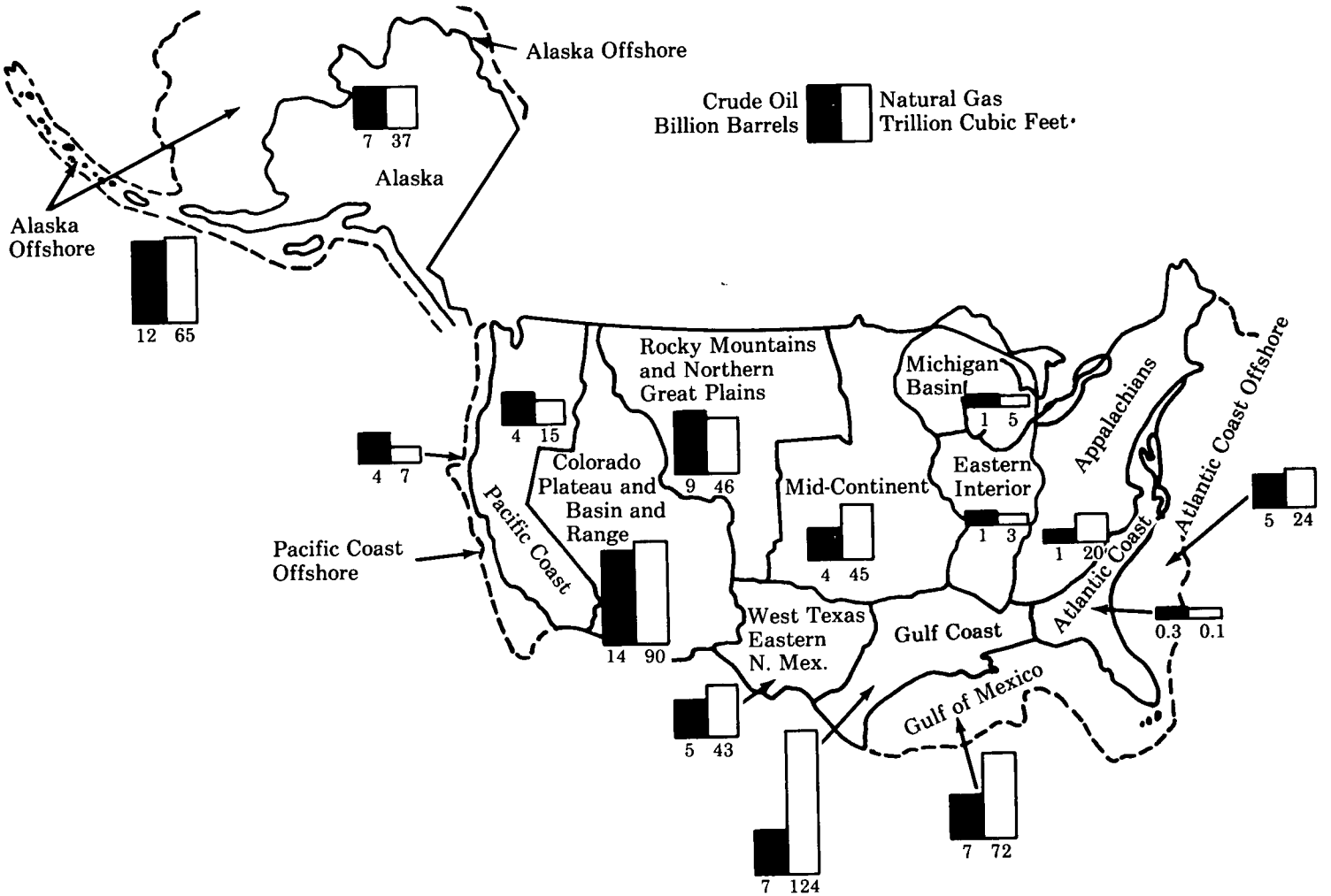
Exploring for Energy Resources

Exploration for oil and gas is closely tied to market conditions, particularly to the price of crude oil. When the price rose in 1974, the number of seismic crews and rotary rigs also rose (37) and exploratory well completions increased (38). A second price hike sent all three indicators to record levels in 1981 and 1982. Subsequently, prices declined and then collapsed, leading to drastic cutbacks in exploration in 1986. Seismic crews working were 201, rotary rigs in operation were 964, and completions of exploratory wells totaled only 7.0 thousand.

Despite modest recovery in the last months of 1987, exploration indicators for the year as a whole were again lower than previous-year levels: seismic crews, 176, rotary rigs, 936, and well completions, 6.4 thousand.

Exploration for uranium also reflects changes in energy markets. The number of exploratory and development holes drilled peaked in 1978 at 104 thousand (44). As uranium market conditions deteriorated after 1978, the number plunged to less than 4 thousand in 1985 and 1986—the lowest level in more than two decades.

Figure 36. Estimated Undiscovered Recoverable Crude Oil and Natural Gas Resources in the United States, 1980



Note: Quantities are scaled according to the Btu content of the resources. 1 billion barrels of crude oil equals approximately 5.3 trillion cubic feet of wet natural gas.
Source: See Table 36.

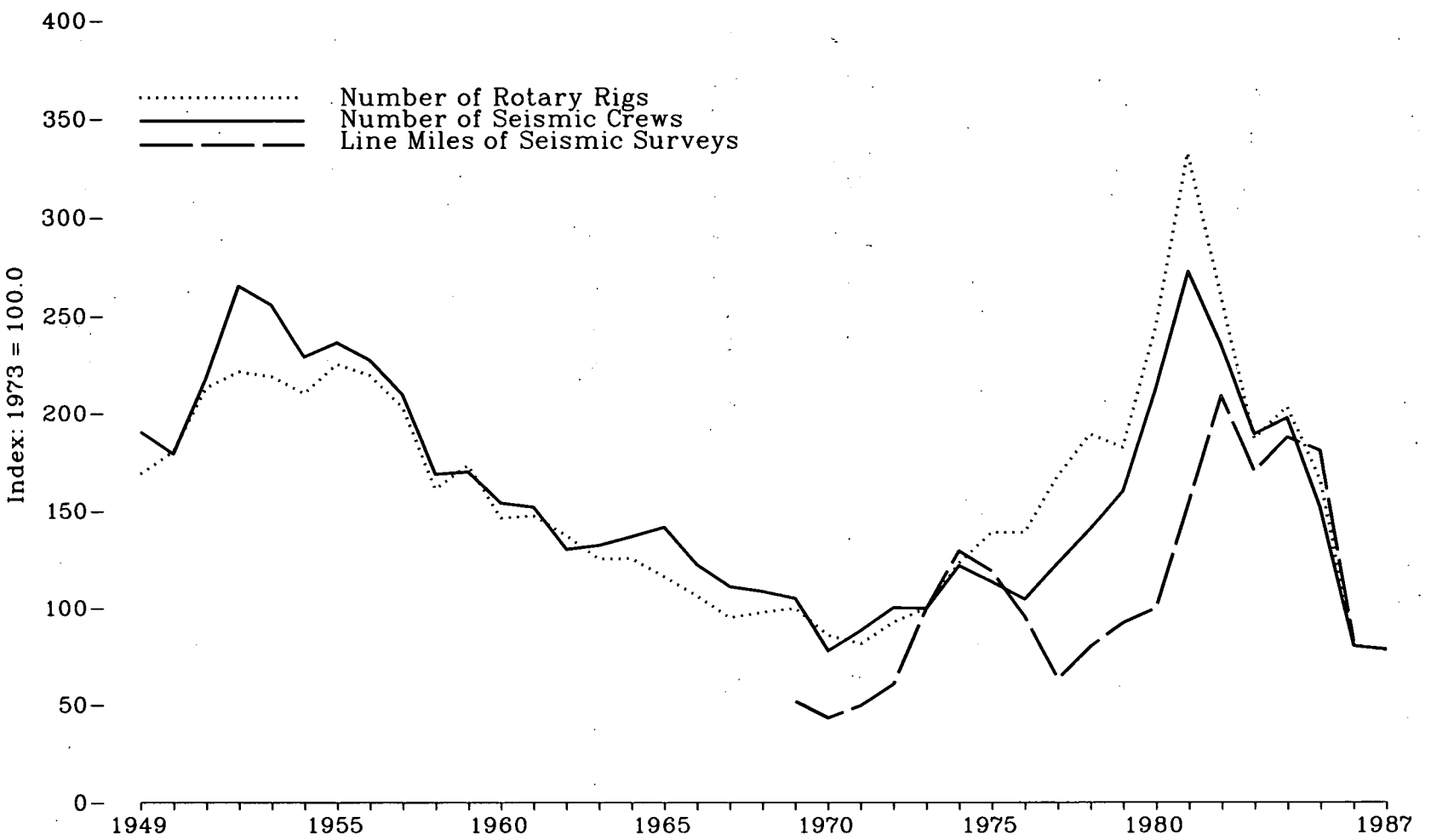
Table 36. Estimated Undiscovered Recoverable Crude Oil and Natural Gas Resources in the United States, 1980, and in the Federal Offshore, 1984

Region	Crude Oil (billion barrels)			Natural Gas (trillion cubic feet)		
		Estimated Range [1]			Estimated Range [1]	
	Mean [2]	Low	High	Mean [2]	Low	High
	United States, 1980					
Onshore						
Alaska	6.9	2.5	14.6	36.6	19.8	62.3
Pacific Coast	4.4	2.1	7.9	14.7	8.2	24.9
Colorado Plateau and Basin and Range	14.2	6.9	25.9	90.1	53.5	142.4
Rocky Mountains and Northern Great Plains	9.4	6.0	14.0	45.7	29.6	69.0
West Texas and Eastern New Mexico	5.4	2.7	9.4	42.8	22.4	75.2
Gulf Coast	7.1	3.6	12.6	124.4	56.5	249.1
Mid-Continent	4.4	2.3	7.7	44.5	22.9	80.8
Michigan Basin	1.1	0.3	2.7	5.1	1.8	10.9
Eastern Interior	0.9	0.3	1.9	2.7	1.2	5.0
Appalachians	0.6	0.1	1.5	20.1	6.4	45.8
Atlantic Coast	0.3	0.1	0.8	0.1	[3]	0.4
Total Onshore	54.6	41.7	71.0	426.8	322.5	567.9
Offshore						
Alaska [4]	12.2	4.6	24.2	64.6	33.3	109.6
Pacific Coast	3.8	1.7	7.9	6.9	3.7	13.6
Gulf of Mexico	6.5	3.1	11.1	71.8	41.7	114.2
Atlantic Coast	5.4	1.1	12.9	23.7	9.2	42.8
Total Offshore	28.0	16.9	43.5	167.0	117.4	230.6
Total United States	82.6	64.3	105.1	593.8	474.6	739.3
		Federal Offshore, 1984				
Federal Offshore [5]		Mean [2]	RMO [6]	Mean [2]	RMG [6]	
Alaska		12.6	3.3	62.7	13.9	
Pacific Coast		2.7	2.2	8.3	4.7	
Gulf of Mexico		6.0	6.0	59.6	59.6	
Atlantic Coast		1.6	0.7	30.4	12.3	
Total Federal Offshore		22.9	12.2	161.1	90.5	

[1] 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.
[2] The calculated mean from the probability curve using the Monte Carlo technique.
[3] Less than 0.1 trillion cubic feet.
[4] Includes quantities considered recoverable only if technology permits their exploitation beneath Arctic ice — a condition not yet met.
[5] Includes only the area encompassed by the Federally Controlled Outer Continental Shelf.
[6] RMO=risked mean oil, RMG=risked mean gas. The Minerals Management Service 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 may be non-productive.

Sources: **United States, 1980:** U.S. Geological Survey, *Geological Estimates of Undiscovered Recoverable Conventional Resources of Oil and Gas in the United States, A Summary*, Circular 860, 1981. **Federal Offshore, 1984:** Department of the Interior, Minerals Management Service, *Estimates of Undiscovered, Economically Recoverable Oil and Gas Resources for the Outer Continental Shelf (OCS) as of July 1984*, OCS Report MMS 85-0012, 1985.

Figure 37. Seismic Crews, Line Miles, and Rotary Rigs, 1949-1987



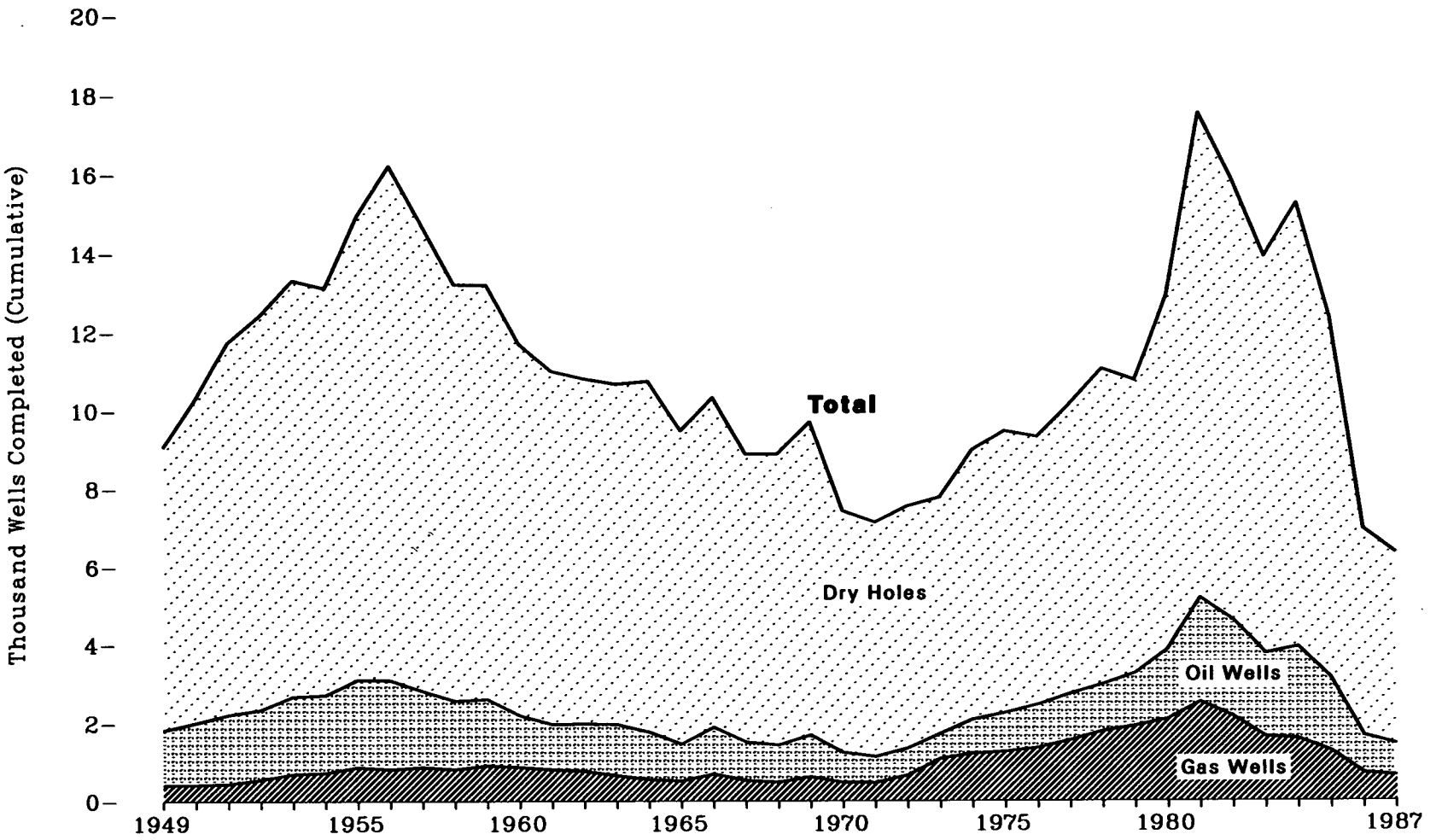
Source: See Table 37.

Table 37. Seismic Crews, Line Miles, and Rotary Rigs, 1949-1987

Year	Crews Engaged in Seismic Exploration				Line Miles of Seismic Surveys (thousand)				Rotary Rigs in Operation [1]	
	Offshore	Onshore	Total	Index [2]	Offshore	Onshore	Total	Index [2]	Total	Index [2]
1949	NA	NA	476	190.4	NA	NA	NA	NA	2,017	168.9
1950	NA	NA	448	179.2	NA	NA	NA	NA	2,154	180.4
1951	NA	NA	545	218.0	NA	NA	NA	NA	2,543	213.0
1952	NA	NA	663	265.2	NA	NA	NA	NA	2,641	221.2
1953	NA	NA	639	255.6	NA	NA	NA	NA	2,613	218.8
1954	NA	NA	572	228.8	NA	NA	NA	NA	2,508	210.1
1955	NA	NA	591	236.4	NA	NA	NA	NA	2,686	225.0
1956	NA	NA	568	227.2	NA	NA	NA	NA	2,620	219.4
1957	NA	NA	524	209.6	NA	NA	NA	NA	2,426	203.2
1958	NA	NA	422	168.8	NA	NA	NA	NA	1,922	161.0
1959	NA	NA	425	170.0	NA	NA	NA	NA	2,071	173.5
1960	NA	NA	385	154.0	NA	NA	NA	NA	1,748	146.4
1961	NA	NA	380	152.0	NA	NA	NA	NA	1,761	147.5
1962	NA	NA	326	130.4	NA	NA	NA	NA	1,641	137.4
1963	NA	NA	331	132.4	NA	NA	NA	NA	1,499	125.5
1964	NA	NA	342	136.8	NA	NA	NA	NA	1,501	125.7
1965	36	318	354	141.6	NA	NA	NA	NA	1,388	116.2
1966	38	268	306	122.4	NA	NA	NA	NA	1,272	106.5
1967	29	249	278	111.2	NA	NA	NA	NA	1,135	95.1
1968	20	252	272	108.8	NA	NA	NA	NA	1,169	97.9
1969	16	247	263	105.2	NA	NA	199.9	51.8	1,194	100.0
1970	10	185	195	78.0	NA	NA	167.3	43.3	1,028	86.1
1971	10	211	221	88.4	NA	NA	191.7	49.7	976	81.7
1972	12	239	251	100.4	NA	NA	235.7	61.0	1,107	92.7
1973	23	227	250	100.0	258.9	127.2	386.1	100.0	1,194	100.0
1974	31	274	305	122.0	341.8	158.6	500.4	129.6	1,472	123.3
1975	30	254	284	113.6	309.3	150.7	460.0	119.1	1,660	139.0
1976	25	237	262	104.8	226.3	142.9	369.2	95.6	1,658	138.9
1977	27	281	308	123.2	124.7	120.1	244.7	63.4	2,001	167.6
1978	25	327	352	140.8	174.6	135.9	310.5	80.4	2,259	189.2
1979	30	370	400	160.0	193.2	163.9	357.1	92.5	2,177	182.3
1980	37	493	530	212.0	202.7	184.1	386.8	100.2	2,909	243.6
1981	44	637	681	272.4	338.2	256.2	594.4	153.9	3,970	332.5
1982	57	531	588	235.2	558.5	248.5	806.9	209.0	3,105	260.1
1983	47	426	473	189.2	469.2	188.5	657.7	170.3	2,232	186.9
1984	49	445	494	197.6	538.5	185.9	724.4	187.6	2,428	203.4
1985	45	333	378	151.2	557.7	140.0	697.7	180.7	1,980	165.8
1986	24	176	201	80.4	252.6	67.6	320.2	82.9	964	80.7
1987	24	153	176	78.8	NA	NA	NA	NA	936	78.4

[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] Index: 1973 = 100.0.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •**Crews Engaged in Seismic Exploration and Line Miles of Seismic Surveys:** Society of Exploration Geophysicists, *SEG News Release, and Geophysics; The Leading Edge of Exploration*, Monthly, Tulsa, Oklahoma. •**Rotary Rigs in Operation:** *Rotary Rigs Running-By States*, Hughes Tool Company, Houston, Texas.

Figure 38. Exploratory Oil and Gas Wells Completed, 1949-1987



Source: See Table 38.

Table 38. Exploratory Oil and Gas Wells Completed and Footage Drilled, 1949-1987

Year	Wells Completed (thousands)				Footage Drilled (million feet)				Average Depth (feet)				Successful Wells (percent)
	Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total	
1949	1.41	0.42	7.23	9.06	6.0	2.4	26.4	34.8	4,232	5,682	3,658	3,842	20.2
1950	1.58	0.43	8.29	10.31	6.9	2.4	31.0	40.2	4,335	5,466	3,733	3,898	19.5
1951	1.76	0.45	9.54	11.76	8.1	2.5	38.7	49.3	4,609	5,497	4,059	4,197	18.9
1952	1.78	0.56	10.09	12.43	8.5	3.4	43.7	55.6	4,781	6,071	4,334	4,476	18.8
1953	1.98	0.70	10.63	13.31	9.4	4.0	47.3	60.7	4,761	5,654	4,447	4,557	20.1
1954	1.99	0.73	10.39	13.10	9.4	4.4	45.8	59.6	4,740	6,059	4,408	4,550	20.7
1955	2.24	0.87	11.83	14.94	10.8	5.2	53.2	69.2	4,819	5,964	4,498	4,632	20.8
1956	2.27	0.82	13.12	16.21	11.1	5.2	58.0	74.3	4,901	6,301	4,425	4,587	19.1
1957	1.95	0.87	11.90	14.71	9.8	6.0	53.4	69.2	5,036	6,898	4,488	4,702	19.1
1958	1.75	0.82	10.63	13.20	8.7	5.5	47.3	61.5	4,993	6,657	4,449	4,658	19.4
1959	1.70	0.91	10.58	13.19	8.5	6.0	48.7	63.3	5,021	6,613	4,602	4,795	19.8
1960	1.32	0.87	9.52	11.70	6.8	5.5	43.5	55.8	5,170	6,298	4,575	4,770	18.7
1961	1.16	0.81	9.02	10.99	5.9	5.2	43.3	54.4	5,099	6,457	4,799	4,953	17.9
1962	1.21	0.77	8.82	10.80	6.2	5.2	42.2	53.6	5,124	6,728	4,790	4,966	18.4
1963	1.31	0.66	8.69	10.66	6.4	4.2	42.8	53.5	4,878	6,370	4,933	5,016	18.5
1964	1.22	0.56	8.95	10.73	6.7	4.2	44.6	55.5	5,509	7,547	4,980	5,174	16.6
1965	0.95	0.52	8.01	9.47	5.4	3.8	40.1	49.2	5,672	7,295	5,007	5,198	15.4
1966	1.20	0.70	8.42	10.31	6.8	5.8	43.1	55.7	5,700	8,321	5,117	5,402	18.4
1967	0.99	0.53	7.36	8.88	5.7	4.0	38.2	47.8	5,758	7,478	5,188	5,388	17.1
1968	0.95	0.49	7.44	8.88	5.6	3.7	41.6	51.0	5,914	7,697	5,589	5,739	16.2
1969	1.08	0.62	8.00	9.70	6.6	5.0	45.9	57.5	6,054	8,092	5,739	5,924	17.5
1970	0.76	0.48	6.19	7.43	4.7	3.7	35.1	43.5	6,198	7,669	5,671	5,854	16.7
1971	0.66	0.47	6.00	7.13	3.8	3.6	34.6	42.0	5,702	7,654	5,765	5,885	15.9
1972	0.69	0.66	6.20	7.55	4.0	4.9	36.4	45.3	5,858	7,393	5,863	5,996	17.9
1973	0.65	1.08	6.04	7.77	4.0	7.1	34.9	46.0	6,187	6,556	5,785	5,926	22.3
1974	0.87	1.21	6.89	8.97	5.1	7.7	38.9	51.7	5,826	6,425	5,637	5,761	23.1
1975	0.99	1.26	7.21	9.46	5.8	8.5	40.8	55.1	5,875	6,714	5,655	5,819	23.8
1976	1.10	1.36	6.85	9.32	6.5	9.2	38.2	53.9	5,903	6,748	5,575	5,785	26.4
1977	1.18	1.56	7.40	10.15	6.9	10.2	41.1	58.3	5,821	6,562	5,557	5,743	27.1
1978	1.19	1.79	8.05	11.04	7.1	11.8	46.6	65.6	5,974	6,604	5,787	5,940	27.0
1979	1.34	1.92	7.48	10.73	8.0	12.6	42.7	63.4	5,985	6,579	5,715	5,903	30.3
1980	1.78	2.09	9.04	12.91	10.1	13.7	50.1	73.9	5,684	6,558	5,540	5,725	30.0
1981	2.67	2.53	12.30	17.50	15.4	17.0	68.8	101.3	5,789	6,724	5,598	5,790	29.7
1982	2.46	2.16	11.23	15.85	13.4	14.8	60.2	88.4	5,446	6,827	5,367	5,578	29.2
1983[1]	2.11	1.65	10.12	13.88	10.5	10.2	48.5	69.2	4,989	6,198	4,787	4,986	27.1
1984[1]	2.33	1.60	11.30	15.22	12.5	9.9	58.9	81.3	5,360	6,223	5,213	5,341	25.8
1985[1]	1.86	1.28	9.20	12.33	10.3	8.2	49.3	67.9	5,580	6,419	5,364	5,506	25.4
1986[1]	0.97	0.71	5.27	6.95	5.7	4.8	29.0	39.5	5,844	6,722	5,503	5,676	24.2
1987[1]	0.81	0.65	4.89	6.35	4.6	4.0	25.4	34.0	5,631	6,157	5,194	5,348	22.9

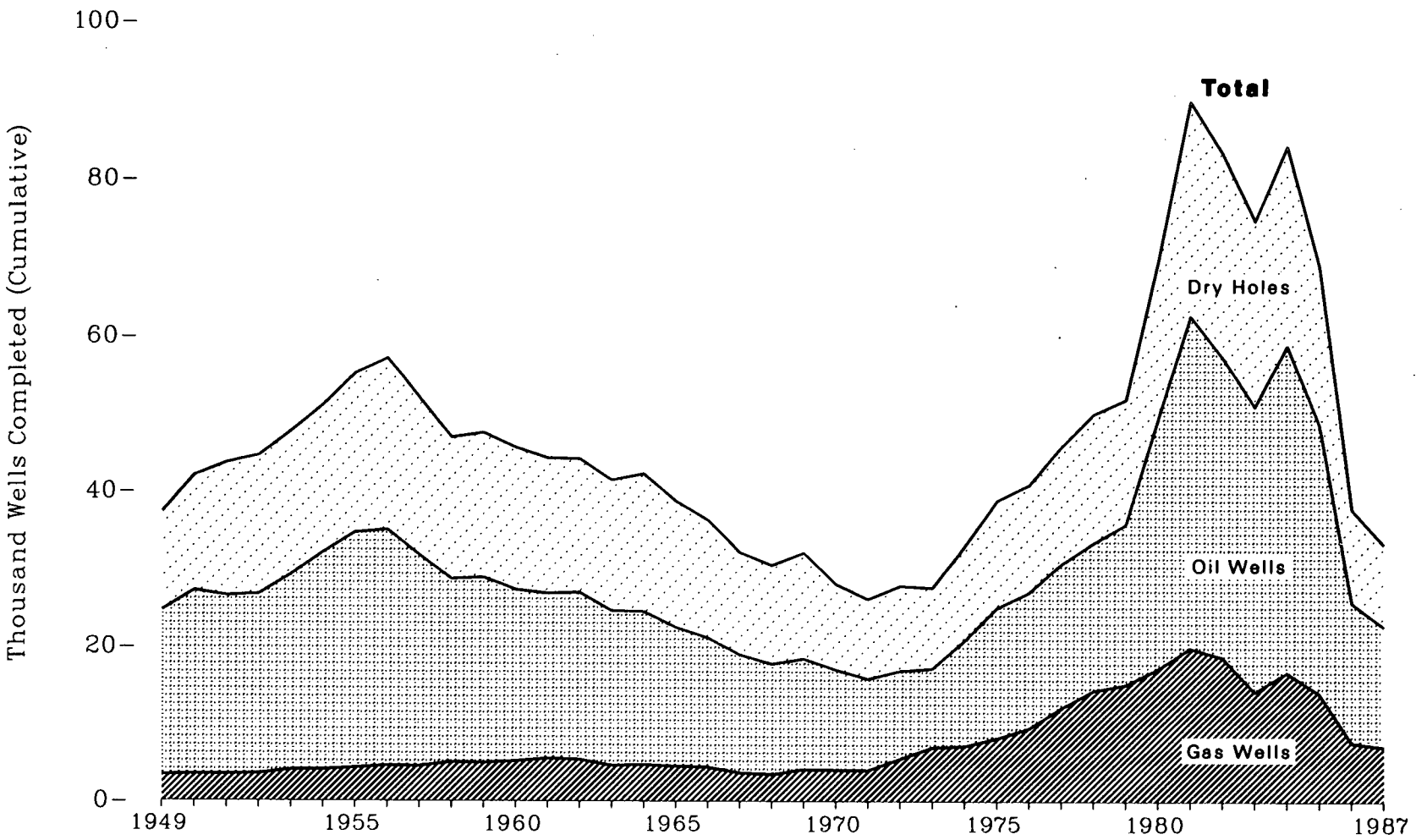
[1] Data for these years are preliminary. See Appendix E, Note 4.

Note: Sum of components may not equal total due to independent rounding. Average depth may not equal average of components due to independent rounding.

Note: For 1949 through 1959, data represent wells completed in a given year. For 1960 through 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 Appendix E, Note 4.

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

Figure 39. Total Oil and Gas Wells Completed, 1949-1987



Note: Includes exploratory and development wells; excludes service wells, stratigraphic tests, and core tests.
Source: See Table 39.

Table 39. Total Oil and Gas Wells Completed and Footage Drilled, 1949-1987

Year	Wells Completed (thousands)				Footage Drilled (million feet)				Average Depth (feet)				Successful Wells (percent)
	Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total	Oil	Gas	Dry Holes	Total	
1949	21.35	3.36	12.60	37.31	79.4	12.4	43.8	135.6	3,720	3,698	3,473	3,635	66.2
1950	23.81	3.44	14.80	42.05	92.7	13.7	51.0	157.4	3,893	3,979	3,445	3,742	64.8
1951	23.18	3.44	17.03	43.64	95.1	13.9	63.1	172.1	4,103	4,056	3,706	3,944	61.0
1952	23.29	3.51	17.76	44.56	98.1	15.3	70.7	184.1	4,214	4,342	3,983	4,132	60.1
1953	25.32	3.97	18.45	47.74	102.1	18.2	73.9	194.2	4,033	4,599	4,004	4,069	61.4
1954	28.14	4.04	18.93	51.11	113.4	18.9	75.8	208.0	4,028	4,670	4,004	4,070	63.0
1955	30.43	4.27	20.45	55.15	121.1	19.9	85.1	226.2	3,981	4,672	4,161	4,101	62.9
1956	30.53	4.53	22.11	57.17	120.4	22.7	90.2	233.3	3,942	5,018	4,079	4,080	61.3
1957	27.36	4.48	20.16	52.00	110.0	23.8	83.2	217.0	4,021	5,326	4,126	4,174	61.2
1958	23.77	5.01	18.16	46.94	93.1	25.6	74.6	193.3	3,916	5,106	4,110	4,118	61.3
1959	24.04	4.93	18.59	47.56	94.6	26.6	79.5	200.7	3,935	5,396	4,275	4,220	60.9
1960	22.26	5.15	18.21	45.62	86.6	28.2	77.4	192.2	3,889	5,486	4,248	4,213	60.1
1961	21.44	5.49	17.33	44.25	85.6	29.3	74.7	189.6	3,994	5,339	4,311	4,285	60.8
1962	21.73	5.35	17.08	44.16	88.4	28.9	77.3	194.6	4,070	5,408	4,524	4,408	61.3
1963	20.14	4.57	16.76	41.47	81.8	24.5	76.3	182.6	4,063	5,368	4,552	4,405	59.6
1964	19.91	4.69	17.69	42.29	80.5	25.6	81.4	187.4	4,042	5,453	4,598	4,431	58.2
1965	18.07	4.48	16.23	38.77	73.3	24.9	76.6	174.9	4,059	5,562	4,723	4,510	58.2
1966	16.78	4.38	15.23	36.38	67.3	25.9	69.6	162.9	4,013	5,928	4,573	4,478	58.1
1967	15.33	3.66	13.25	32.23	58.6	21.6	61.1	141.4	3,825	5,898	4,616	4,385	58.9
1968	14.33	3.46	12.81	30.60	59.5	20.7	64.7	145.0	4,153	5,994	5,053	4,738	58.1
1969	14.37	4.08	13.74	32.19	61.6	24.2	71.4	157.1	4,286	5,918	5,195	4,881	57.3
1970	13.04	4.03	11.10	28.17	56.8	23.6	58.1	138.6	4,357	5,859	5,236	4,918	60.6
1971	11.90	3.98	10.38	26.27	49.1	23.4	54.8	127.3	4,121	5,880	5,276	4,845	60.5
1972	11.44	5.48	11.01	27.93	49.5	30.3	59.1	138.8	4,327	5,517	5,362	4,969	60.6
1973	10.25	6.98	10.47	27.69	44.8	38.2	56.5	139.4	4,366	5,478	5,394	5,035	62.2
1974	13.66	7.17	12.21	33.04	52.1	38.5	63.2	153.8	3,811	5,369	5,180	4,655	63.1
1975	16.98	8.17	13.74	38.89	66.9	44.5	69.6	181.0	3,942	5,445	5,069	4,656	64.7
1976	17.70	9.44	13.81	40.94	68.8	49.2	69.3	187.3	3,889	5,213	5,017	4,575	66.3
1977	18.70	12.12	15.04	45.86	75.2	63.5	77.0	215.7	4,021	5,240	5,121	4,704	67.2
1978	19.07	14.41	16.59	50.06	76.6	75.6	86.2	238.4	4,019	5,247	5,194	4,762	66.9
1979	20.70	15.17	16.04	51.91	82.1	79.9	81.7	243.7	3,967	5,266	5,092	4,694	69.1
1980	32.28	17.22	20.34	69.84	123.6	90.7	98.1	312.3	3,829	5,264	4,821	4,472	70.9
1981	42.84	19.91	27.28	90.03	169.4	106.5	132.9	408.8	3,955	5,350	4,871	4,541	69.7
1982	38.75	18.73	25.96	83.43	147.4	105.1	122.4	374.8	3,804	5,612	4,714	4,493	68.9
1983[1]	36.77	14.28	23.85	74.90	135.1	75.8	103.8	314.7	3,673	5,310	4,354	4,202	68.2
1984[1]	42.20	16.79	25.36	84.35	159.9	88.7	118.8	367.3	3,788	5,285	4,682	4,355	69.9
1985[1]	34.57	14.10	20.51	69.18	133.3	74.5	99.2	307.0	3,856	5,283	4,837	4,438	70.3
1986[1]	18.20	7.69	12.01	37.89	71.4	40.8	57.9	170.1	3,922	5,313	4,819	4,489	68.3
1987[1]	15.61	7.16	10.56	33.32	59.6	37.3	50.6	147.5	3,816	5,211	4,793	4,425	68.3

[1] Data for these years are estimated. See Appendix E, Note 4.

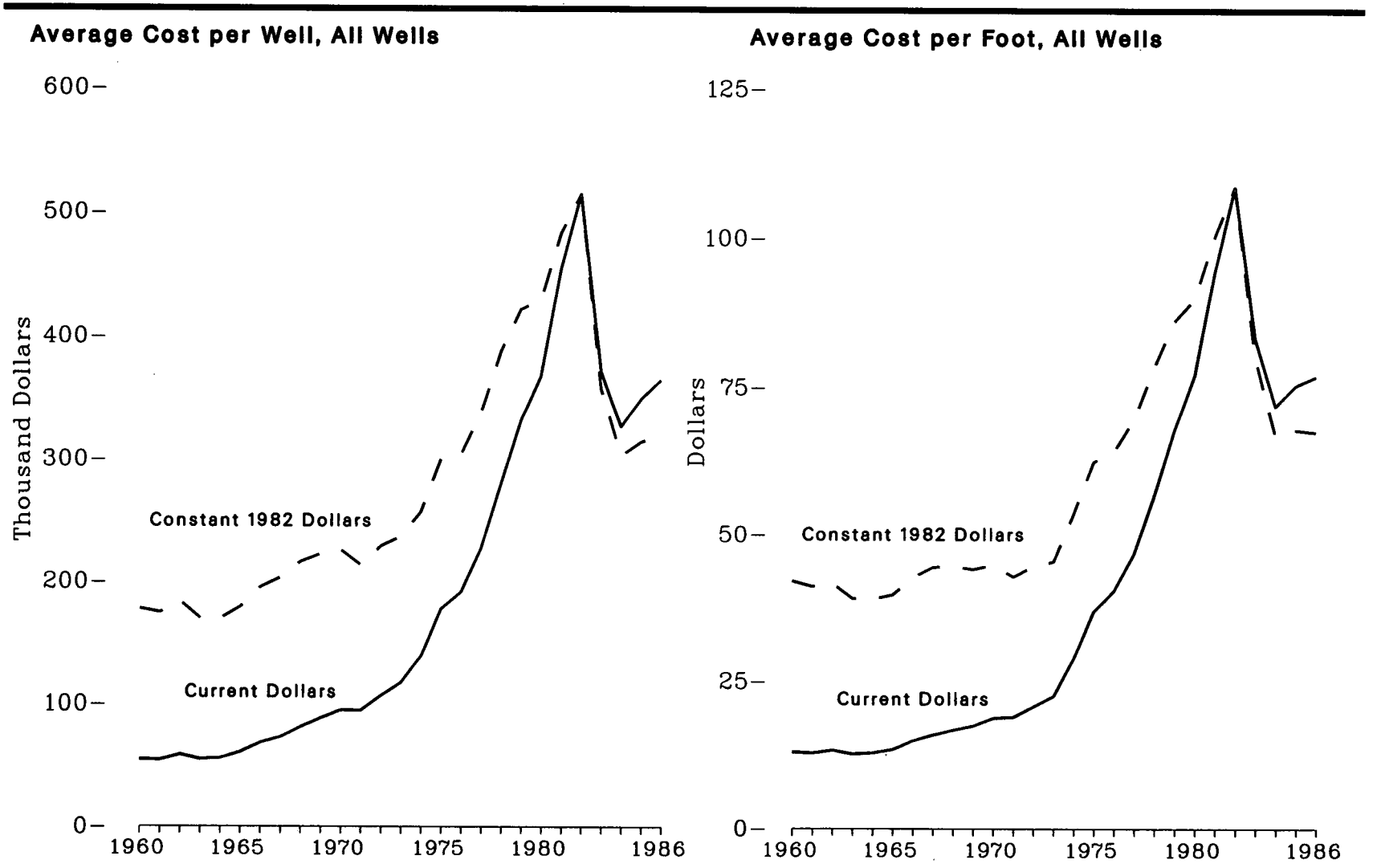
Note: Sum of components may not equal total due to independent rounding. Average depth may not equal average of components due to independent rounding.

Note: Includes exploratory and development wells; excludes service wells, stratigraphic tests, and core tests.

Note: For 1949 through 1959, data represent wells completed in a given year. For 1960 through 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 Appendix E, Note 4.

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

Figure 40. Average Cost of Oil and Gas Wells Drilled, 1960-1986



Source: See Table 40.

Table 40. Average Cost of Oil and Gas Wells Drilled, 1960-1986

Year	Average Cost per Well (thousand dollars)					Average Cost per Foot (dollars)				
	Oil	Gas	Dry Holes	All		Oil	Gas	Dry Holes	All	
	(current)	(current)	(current)	(current)	(constant) [1]	(current)	(current)	(current)	(current)	(constant) [1]
1960	52.2	102.7	44.0	54.9	177.8	13.22	18.57	10.56	13.01	42.10
1961	51.3	94.7	45.2	54.5	174.7	13.11	17.65	10.56	12.85	41.19
1962	54.2	97.1	50.8	58.6	183.8	13.41	18.10	11.20	13.31	41.72
1963	51.8	92.4	48.2	55.0	169.8	13.20	17.19	10.58	12.69	39.17
1964	50.6	104.8	48.5	55.8	169.7	13.12	18.57	10.64	12.86	39.09
1965	56.6	101.9	53.1	60.6	179.4	13.94	18.35	11.21	13.44	39.76
1966	62.2	133.8	56.9	68.4	195.4	15.04	21.75	12.34	14.95	42.71
1967	66.6	141.0	61.5	72.9	203.1	16.61	23.05	12.87	15.97	44.48
1968	79.1	148.5	66.2	81.5	216.1	18.63	24.05	12.88	16.83	44.64
1969	86.5	154.3	70.2	88.6	222.5	19.28	25.58	13.23	17.56	44.12
1970	86.7	160.7	80.9	94.9	225.9	19.29	26.75	15.21	18.84	44.86
1971	78.4	166.6	86.8	94.7	213.3	18.41	27.70	16.02	19.03	42.86
1972	93.5	157.8	94.9	106.4	228.9	20.77	27.78	17.28	20.76	44.65
1973	103.8	155.3	105.8	117.2	236.7	22.54	27.46	19.22	22.50	45.45
1974	110.2	189.2	141.7	138.7	256.9	27.82	34.11	26.76	28.93	53.57
1975	138.6	262.0	177.2	177.8	299.8	34.17	46.23	33.86	36.99	62.38
1976	151.1	270.4	190.3	191.6	303.7	37.35	49.78	36.94	40.46	64.12
1977	170.0	313.5	230.2	227.2	337.6	41.16	57.57	43.49	46.81	69.55
1978	208.0	374.2	281.7	280.0	387.7	49.72	68.37	52.55	56.63	78.43
1979	243.1	443.1	339.6	331.4	421.6	58.29	80.66	64.60	67.70	86.13
1980	272.1	536.4	376.5	367.7	429.0	66.36	95.16	73.70	77.02	89.87
1981	336.3	698.6	464.0	453.7	482.7	80.40	122.17	90.03	94.30	100.32
1982	347.4	864.3	515.4	514.4	514.4	86.34	146.20	104.09	108.73	108.73
1983	283.8	608.1	366.5	371.7	357.8	72.65	108.37	79.10	83.34	80.21
1984	262.1	489.8	329.2	326.5	303.1	66.32	88.80	67.18	71.90	66.76
1985	270.4	508.7	372.3	349.4	314.2	66.78	93.09	73.69	75.35	67.76
1986	284.9	522.9	389.2	364.6	319.5	68.35	93.02	76.53	76.88	67.38

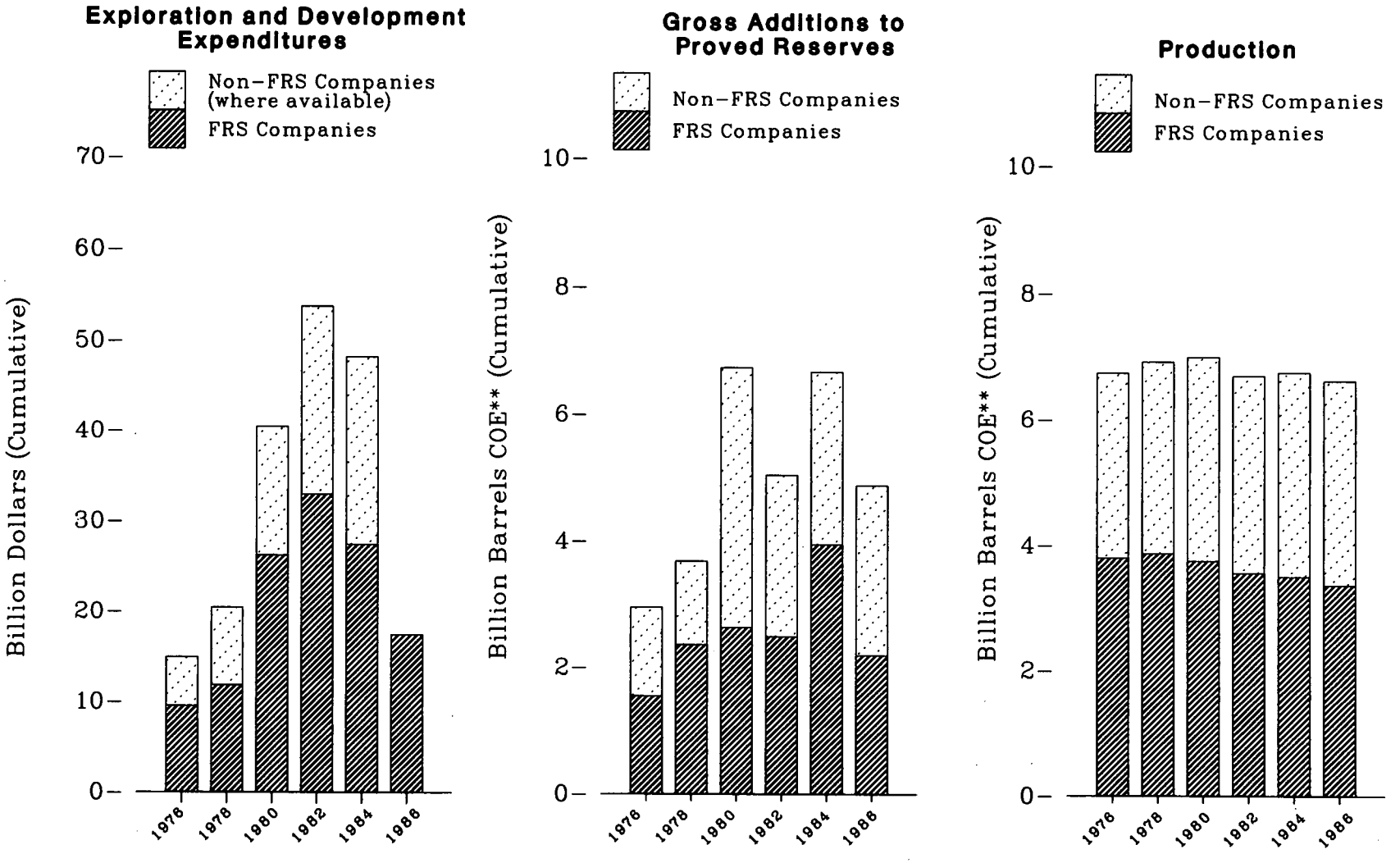
[1] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.

Note: 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.

Note: The information reported for 1965 and prior years is not strictly comparable with the more recent surveys.

Source: American Petroleum Institute, Independent Petroleum Association of America, Mid-Continent Oil and Gas Association, Washington, DC, *Joint Association Survey of the U.S. Oil and Gas Producing Industry.*

Figure 41. Exploration and Development Expenditures, Gross Additions to Proved Reserves, and Production of Liquid and Gaseous Hydrocarbons by FRS* Companies, 1976-1986



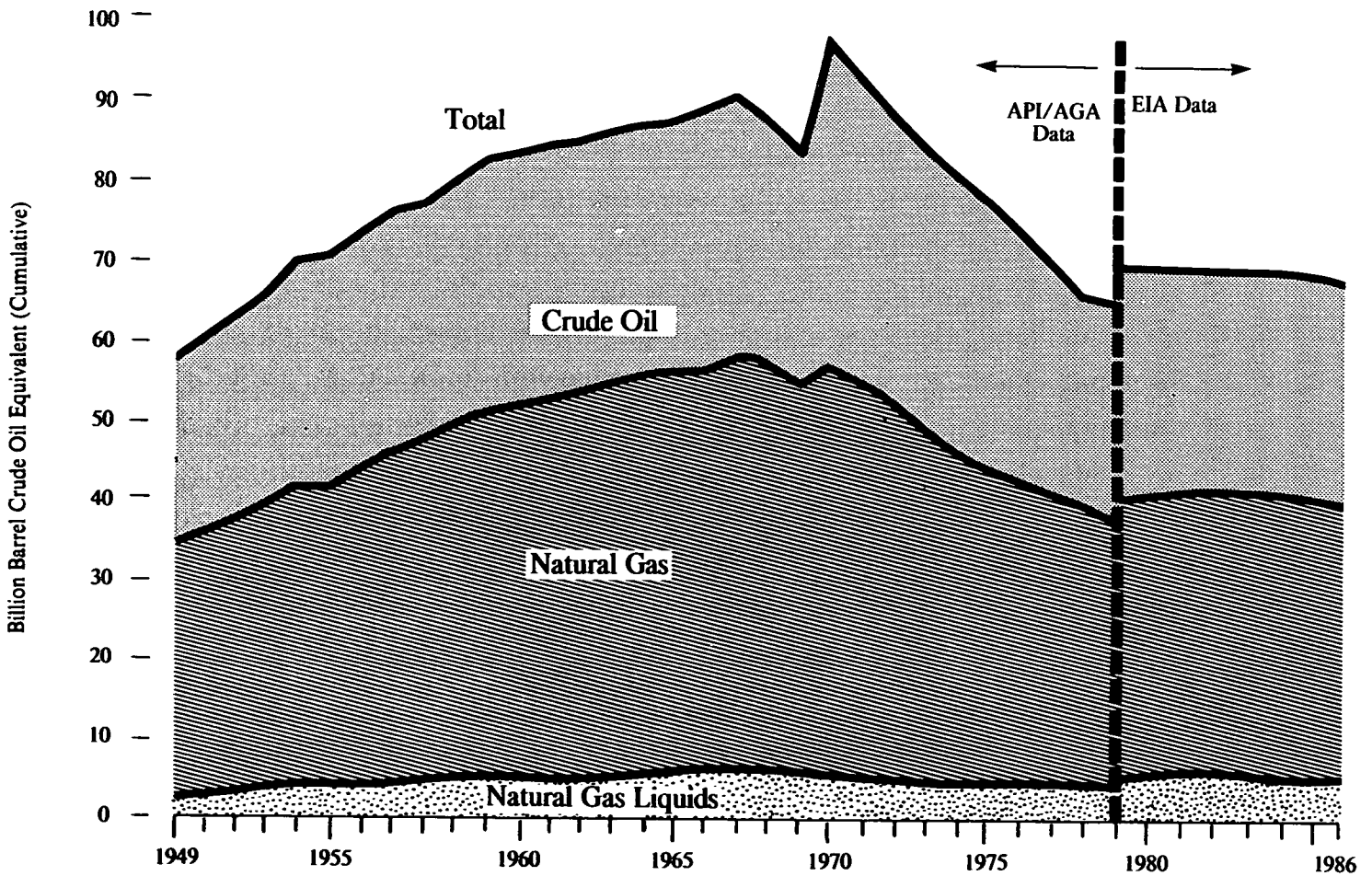
*FRS = Financial Reporting System (see Appendix E, Note 3).
**COE = Crude Oil Equivalent.
Source: See Table 41.

Table 41. Exploration and Development Expenditures, Gross Additions to Proved Reserves, and Production of Liquid and Gaseous Hydrocarbons by FRS [1] Companies, 1976-1986

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Exploration and Development Expenditures (billion dollars)											
FRS Companies [2]	9.5	10.7	11.8	21.3	26.2	33.0	32.9	27.1	27.4	28.5	17.4
U.S. Total	14.9	17.0	20.4	32.9	40.4	55.7	53.7	46.2	48.1	43.7	NA
Gross Additions to Proved Reserves [3] of Liquid and Gaseous Hydrocarbons [4] (million barrels COE [5])											
FRS Companies [6]	1,541.7	2,171.6	2,355.4	1,416.1	2,624.5	2,847.6	2,483.2	3,418.9	3,939.0	3,129.2	2,187.5
U.S. Total	2,946.6	3,765.3	3,678.9	5,071.3	6,723.1	7,303.6	5,029.6	6,412.2	6,653.1	6,189.7	4,866.2
Production of Liquid and Gaseous Hydrocarbons [4] (million barrels COE [5])											
FRS Companies [6]	3,796.5	3,760.7	3,867.1	3,822.0	3,746.9	3,693.0	3,552.6	3,364.1	3,496.8	3,427.1	3,361.8
U.S. Total	6,729.5	6,776.6	6,918.0	6,969.9	6,995.3	6,954.4	6,681.9	6,398.6	6,736.4	6,798.1	6,601.9

[1] FRS = Financial Reporting System (see Appendix E, Note 3).
[2] FRS data for 1982 and 1984 are adjusted to exclude purchases of proved reserves associated with mergers among the FRS Companies.
[3] Gross additions to proved reserves equal annual change in proved reserves plus annual production.
[4] Liquid and gaseous hydrocarbons include crude oil, natural gas liquids, and natural gas.
[5] Crude oil equivalent: converted to Btu based on annual average conversion factors. See Appendix A.
[6] Based on net ownership interest (see Glossary). Data for 1985 exclude Atlantic Richfield Company's downward revision of Alaskan natural gas reserves of 8.3 trillion cubic feet.
NA = Not available.
Note: Data in this table are for U.S. domestic operations only (see Appendix E, Note 3).
Sources: **FRS Companies:** Energy Information Administration, *Form EIA-28,* "Financial Reporting System." **U.S. Total, Exploration and Development Expenditures:** •1976 through 1982—Bureau of the Census, *Annual Survey of Oil and Gas.* •1983 through 1985—American Petroleum Institute, *Survey on Oil and Gas Expenditures 1985,* May 1987. **U.S. Total, Gross Additions to Proved Reserves of Liquid and Gaseous Hydrocarbons:** •1976 through 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 and forward—Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1986 Annual Report.* **U.S. Total, Production of Liquid and Gaseous Hydrocarbons:** •1976 and forward, see Tables 46 and 66.

Figure 42. Proved Reserves of Liquid and Gaseous Hydrocarbons, End of Year 1949–1986



Source: See Table 42.

Table 42. Proved Reserves of Liquid and Gaseous Hydrocarbons, End of Year 1949-1986

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
	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

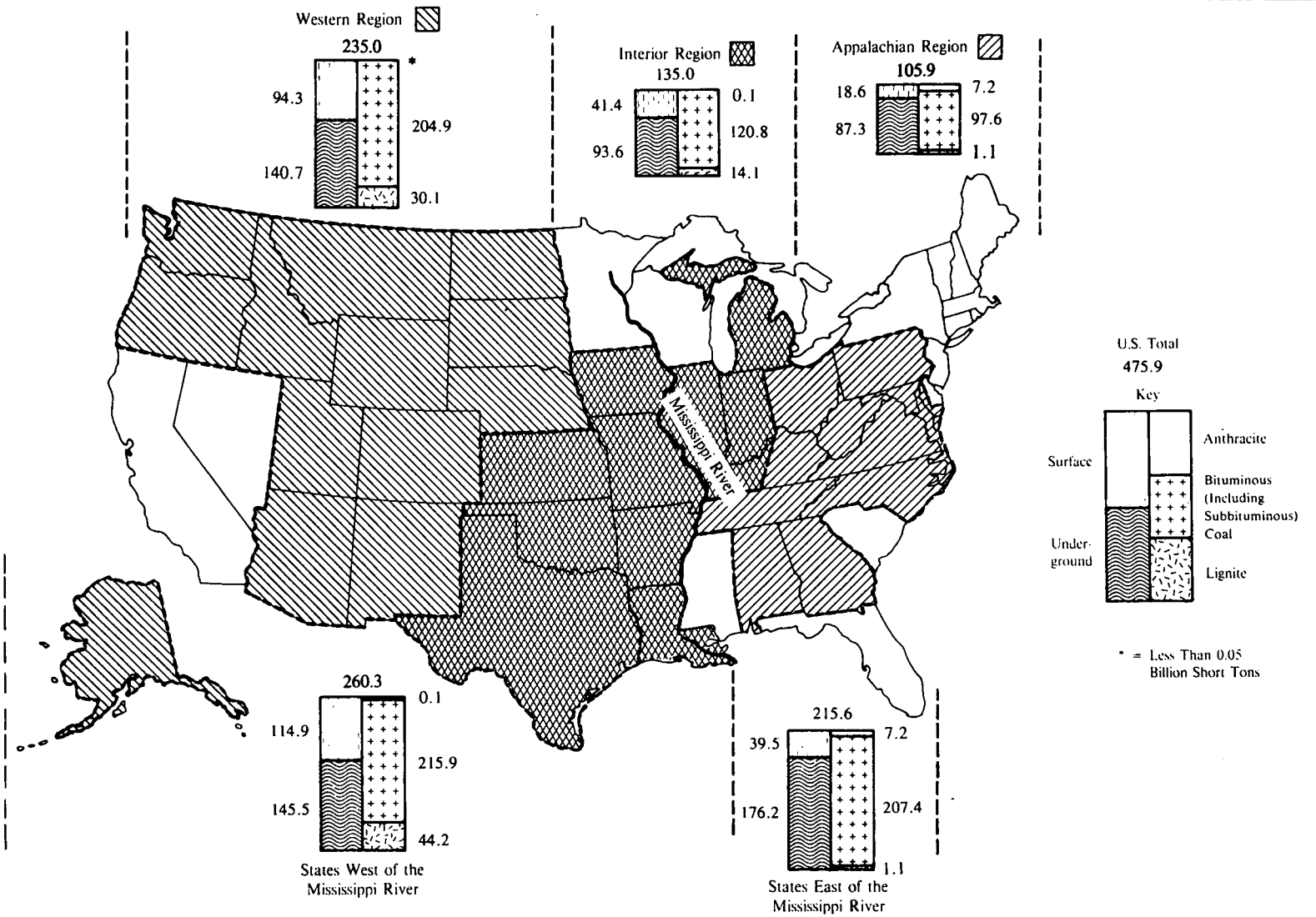
[1] The American Gas Association estimates of natural gas proved reserves include volumes of gas held in underground storage. In 1979, this volume amounted to 4.9 trillion cubic feet. Energy Information Administration data do not include gas in underground storage.

[2] Crude oil equivalent; converted to Btu based on 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—Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1986 Annual Report.*

Figure 43. Demonstrated Reserve Base of Coal, January 1, 1987
(Billion Short Tons)



Note: Sum of components may not equal total due to independent rounding.
Source: See Table 43.

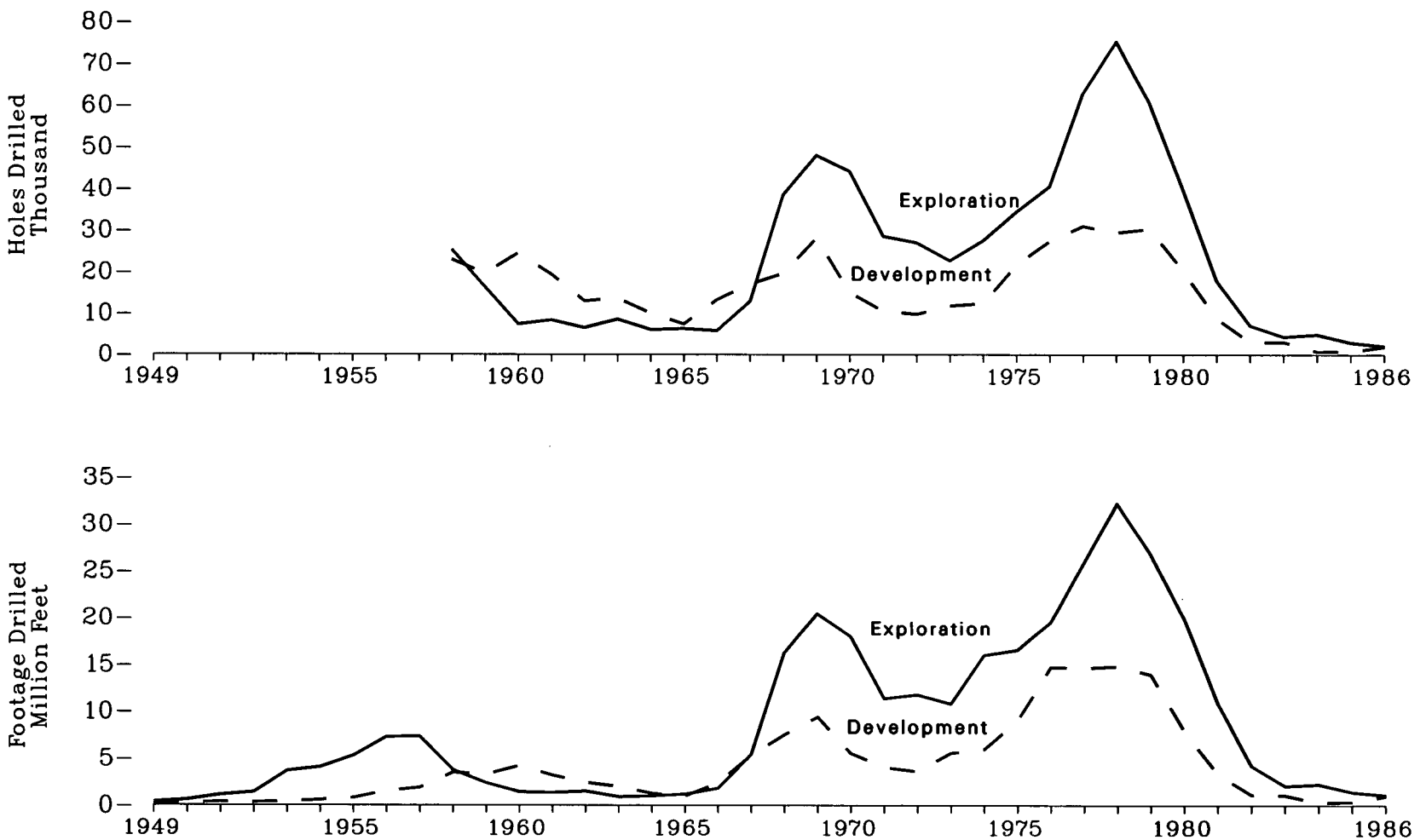
Table 43. Demonstrated Reserve Base of Coal,[1] January 1, 1987

(Billion Short Tons)

Region and State	Anthracite	Bituminous Coal[2]		Lignite	Total		
	Underground and Surface[3]	Underground	Surface	Surface[4]	Underground	Surface	Total
Appalachian							
Alabama	0	1.6	2.3	1.1	1.6	3.4	5.0
Kentucky, Eastern	0	7.9	1.9	0	7.9	1.9	9.8
Ohio	0	12.9	5.8	0	12.9	5.8	18.7
Pennsylvania	7.1	21.2	1.3	0	28.1	1.4	29.6
Virginia	0.1	2.1	0.8	0	2.2	0.8	3.0
West Virginia	0	33.2	5.0	0	33.2	5.0	38.2
Other[5]	0	1.3	0.4	0	1.3	0.4	1.7
Total	7.2	80.2	17.4	1.1	87.3	18.6	105.9
Interior							
Illinois	0	63.1	15.5	0	63.1	15.5	78.6
Indiana	0	8.9	1.4	0	8.9	1.4	10.3
Iowa	0	1.7	0.5	0	1.7	0.5	2.2
Kentucky, Western	0	16.7	3.9	0	16.7	3.9	20.6
Missouri	0	1.5	4.5	0	1.5	4.5	6.0
Oklahoma	0	1.2	0.4	0	1.2	0.4	1.6
Texas	0	0	0	13.6	0	13.6	13.6
Other[6]	0.1	0.3	1.1	0.5	0.4	1.6	2.0
Total	0.1	93.5	27.3	14.1	93.6	41.4	135.0
Western							
Alaska	0	5.4	0.7	(7)	5.4	0.7	6.1
Colorado	(7)	12.2	0.7	4.2	12.2	4.9	17.1
Montana	0	71.0	33.4	15.8	71.0	49.2	120.2
New Mexico	(7)	2.1	2.4	0	2.1	2.4	4.6
North Dakota	0	0	0	9.8	0	9.8	9.8
Utah	0	6.0	0.3	0	6.0	0.3	6.3
Washington	0	1.3	0.1	(7)	1.3	0.1	1.4
Wyoming	0	42.6	25.8	0	42.6	26.3	68.8
Other[8]	0	0.1	0.2	0.4	0.1	0.6	0.7
Total	(7)	140.7	64.2	30.1	140.7	94.3	235.0
U.S. Total	7.3	314.4	108.9	45.3	321.6	154.3	475.9
States East of the Mississippi River	7.2	169.1	38.3	1.1	176.2	39.5	215.6
States West of the Mississippi River	0.1	145.3	70.6	44.2	145.5	114.9	260.3

[1] Includes measured and indicated resource categories representing 100 percent of the coal in place. Recoverability varies from less than 40 percent to more than 90 percent for individual deposits. About one-half of the demonstrated reserve base of coal in the United States is estimated to be recoverable.
[2] Includes subbituminous coal.
[3] Includes 130.7 million short tons of surface mine reserves, of which 115.3 million tons are in Pennsylvania and 15.5 million tons are in Arkansas.
[4] There are no underground demonstrated coal reserves of lignite.
[5] Includes Georgia, Maryland, North Carolina, and Tennessee.
[6] Includes Arkansas, Kansas, Louisiana, and Michigan.
[7] Less than 0.05 billion short tons.
[8] Includes Arizona, Idaho, Oregon, and South Dakota.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *Coal Production 1986*.

Figure 44. Uranium Exploration and Development Drilling, 1949-1986



Source: See Table 44.

Table 44. Uranium Exploration and Development Drilling, 1949-1986

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	16.00	12.30	6.00	39.70	22.00
1975	34.29	16.54	21.60	9.00	55.89	25.54
1976	40.41	19.53	27.23	14.70	67.64	34.23
1977	62.60	25.92	30.86	14.63	93.45	40.55
1978	75.07	32.20	29.29	14.80	104.35	47.00
1979	60.46	26.84	30.19	13.93	90.65	40.77
1980	39.61	19.95	20.19	7.91	59.80	27.86
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

[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.

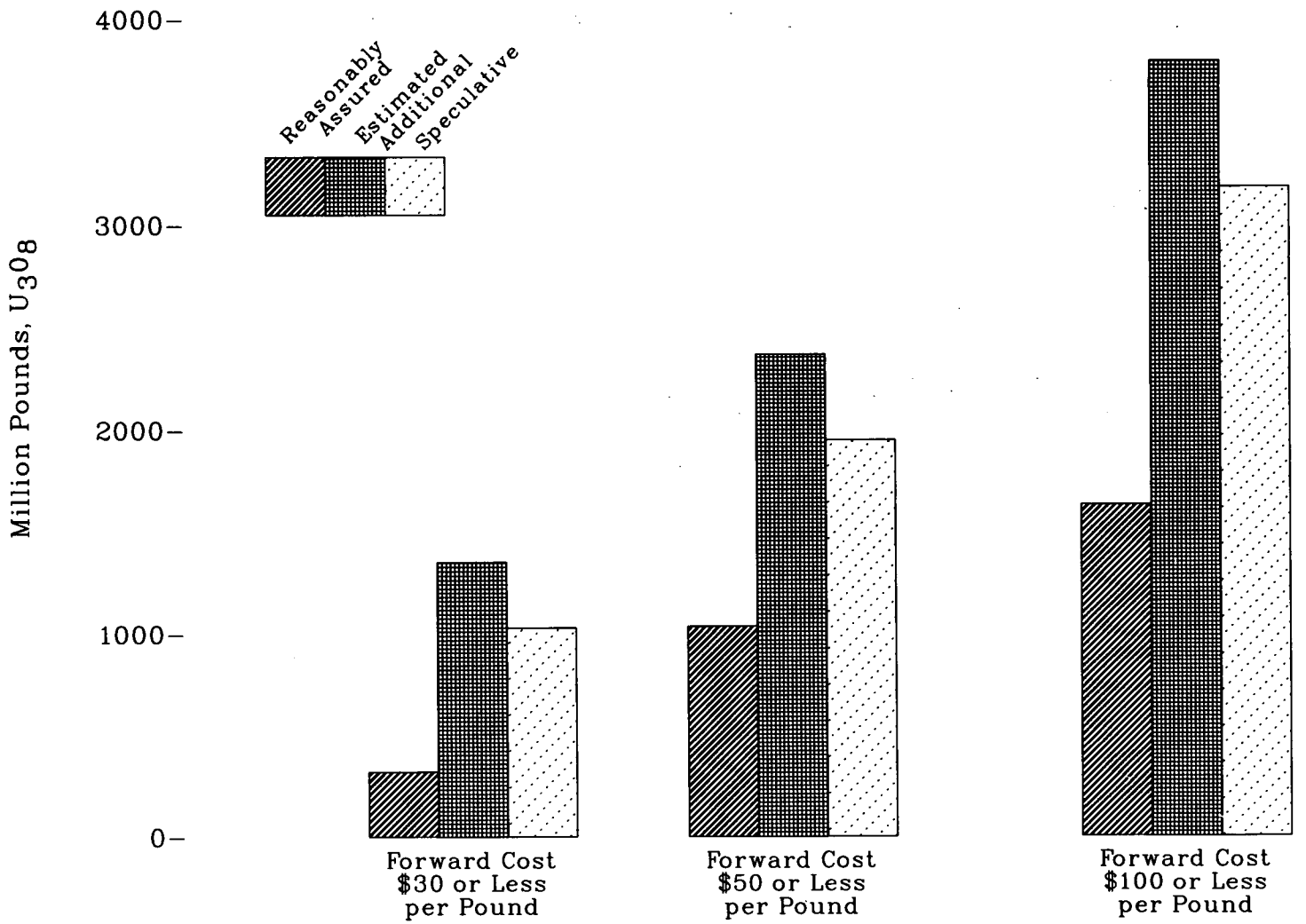
[2] Includes all surface drilling of an ore deposit to determine more precisely size, grade, and configuration subsequent to the time that commercial exploitation is deemed feasible.

NA = Not available.

Note: Sum of components may not equal total due to independent rounding.

Sources: •1949 through 1980—U.S. Department of Energy, Grand Junction Office, *Statistical Data of the Uranium Industry*, January 1, 1983, GJO-100 (annual). •1981 through 1983—Energy Information Administration, *Survey of U.S. Uranium Exploration 1983*. •1984 and forward—Energy Information Administration, *Uranium Industry Annual*.

Figure 45. Uranium Resources, December 31, 1986



Source: See Table 45.

Table 45. Uranium Resources, December 31, 1986

(Million Pounds, U_3O_8)

Resource Category	Forward Cost Category (dollars per pound) [1]		
	$30 or Less	$50 or Less	$100 or Less
Discovered Resources			
Reasonable Assured Resources			
New Mexico	181	455	683
Wyoming	71	351	611
Texas	16	43	73
Arizona, Colorado, Utah	32	123	170
Others [2]	22	64	93
Total [3]	322	1,036	1,630
Undiscovered Resources			
Estimated Additional Resources	1,350	2,370	3,790
Speculative Resources	1,030	1,950	3,180

[1] Forward costs are all operating and capital costs (in current dollars) still 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.
[2] Includes California, Idaho, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, and Washington.
[3] Does not include an estimated 55 million pounds of $30 per pound reserves from byproduct recovery facilities.
Source: Energy Information Administration, *Uranium Industry Annual 1986*.

4. Petroleum

Fluctuations in the Price of Crude Oil

After successive price hikes had brought the price of crude oil to a peak in 1981, oil prices began trending downward in 1982, and then plummeted in 1986 (63). The average annual composite refiner acquisition cost of crude oil fell from $26.75 per barrel in 1985 to $14.55 in 1986. In 1987, oil prices recovered somewhat and averaged $17.91 per barrel.

Of the several factors contributing to the unprecedented decline in crude oil prices during the first half of 1986, the most important was excess worldwide production—primarily by members of the Organization of Petroleum Exporting Countries (OPEC) seeking to regain market share. OPEC's expanded use of netback pricing agreements caused uncertainty in world oil markets, prolonging the slump. In 1987, oil prices were higher and more stable, due in part to OPEC's closer adherence to its self-imposed production quotas during the first several months of the year.

The swings in crude oil prices were reflected (though in attenuated form) in changes in the retail prices of petroleum products (65). For example, the average annual price of unleaded regular motor gasoline declined from $1.20 per gallon in 1985 to $0.93 in 1986 and then rose to $0.95 in 1987. Because crude oil price is not the only component of product price (refining and distribution costs and taxation are additional determinants), percent changes in product prices are dampened.

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 (46). In 1974, however, marked increases in the price of crude oil coupled with a petroleum supply interruption resulted in a consumption decline of 3.8 percent. 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 day. After that, lower crude oil prices led to higher consumption, which reached almost 17 million barrels per day in 1987.

Motor gasoline consistently accounts for the largest share of all petroleum products supplied (56). From 1949 through 1987, its share was between 38 percent and 43 percent of supply. After peaking in 1978 at 7.4 million barrels per day, consumption declined somewhat and then stabilized at about 6.6 million barrels per day during the early 1980's.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

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 1987, the Reserve held 541 million barrels (60).

One measure of the Reserve'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 Reserve and a decline in the level of net imports. Subsequently, however, the measure declined for the first time, from 115 days in 1985 to 94 days in 1986 and 1987, in part due to an increase in net imports.

At the end of 1987, SPR stocks plus 349 million barrels of privately held crude oil stocks totaled 890 million barrels (59). Private stocks of crude oil were higher than the 341-million-barrel level recorded in 1977, when filling of the SPR began, but, at 718 million barrels, private stocks of petroleum products in 1987 remained considerably below the record level of 964 million barrels recorded in 1977.

After 1982, declines in motor gasoline prices sparked renewed growth in demand, and demand remained strong throughout 1987 despite the partial recovery in prices that year. The fuel efficiency of the fleet increased throughout the 1982-to-1987 period (as it had since 1976), tending to depress demand, but other factors more than offset the increase in efficiency. In 1987, increased highway travel, spurred by higher real disposable income, and legislation in 38 States allowing travel at higher speeds (at which vehicles are less efficient) combined to keep demand strong.

In contrast, consumption of residual fuel oil declined markedly after 1978, accounting for a smaller and smaller share of products supplied, as major consumers switched to coal and uranium. Residual fuel consumption had reached an all-time high in 1977 of 3.1 million barrels per day, 17 percent of supply (56). After 8 years of decline, consumption had fallen to 1.2 million barrels per day, less than 8 percent of products supplied, in 1985. Sharply lower oil prices in 1986 encouraged demand for residual fuel, and consumption rose to 1.4 million barrels per day. However, when oil prices recovered in 1987, demand slackened and consumption fell to 1.3 million barrels per day, again less than 8 percent of products supplied.

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 and production neared 100 percent of capacity. The average productivity of wells began to decline, and oil production leveled off (47). Increases in Alaskan production at the end of the decade and through 1987 counteracted declines in lower-48 production. Nevertheless, by 1987 daily domestic production had declined to 8.3 million barrels, down from 9.6 million barrels produced in the peak year of 1970.

Of total U.S. production, 86 percent came from onshore wells and 14 percent from offshore in 1986 (the most recent year for which disaggregated data are available). In 1987, the 620 thousand producing wells attained an average productivity of 13 barrels per well per day, down from 14 barrels in 1986 and significantly below peak productivity of over 18 barrels attained in 1972.

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 (46). 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 stock-building, resulted in an increase in net imports to 5.4 million barrels per day. In 1987, with prices significantly below peak levels, net imports rose to 5.8 million barrels per day.

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 (52). By 1987, it had risen to 35 percent, and dependence on net imports from members of OPEC had risen from 12 percent of consumption in 1985 to 18 percent in 1987. Mexico was the major source of U.S. petroleum net imports in 1982 through 1985, but in 1986 and 1987, Venezuela, Canada, and Saudi Arabia each supplied more petroleum to the United States than did Mexico.

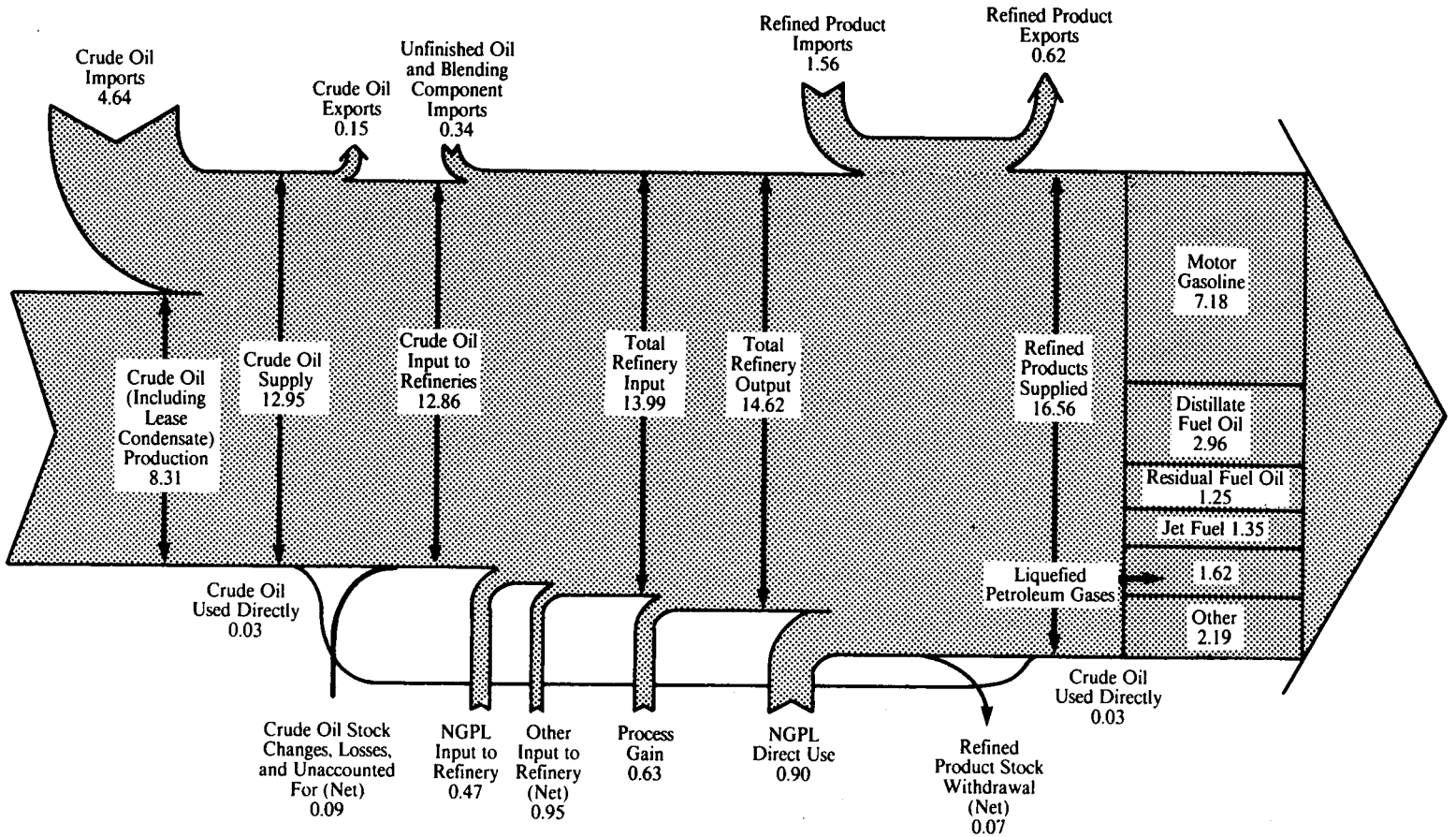
From 1973 on, crude oil net imports surpassed petroleum product net imports; in 1987, the ratio was over 2 to 1 (46). Net imports of residual fuel accounted for 29 percent of all product net imports (48 and 50).

The Refining Industry in a Changing Market

After 20 years of steady increases, average daily refinery output began to decline in 1979, falling to 13 million barrels per day in 1983 (53). As crude oil prices declined in the mid-1980's, however, refinery output began to rise, and in 1987 it reached 15 million barrels per day.

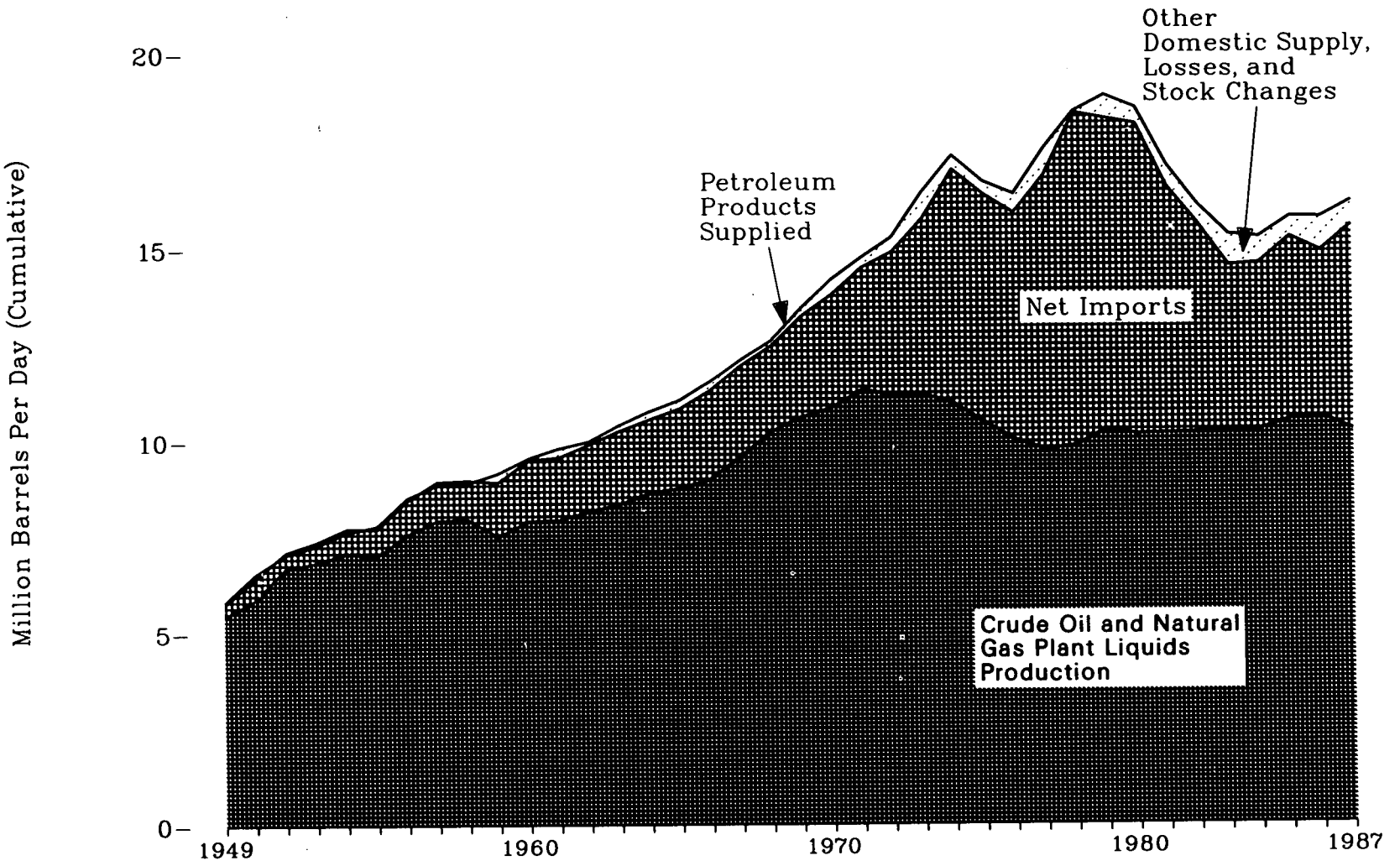
The rate of refinery utilization also had been in decline during the 1978-to-1981 period, but improved thereafter (54). In 1987, the utilization rate was 83 percent, well above its nadir of 69 percent in 1981. Decommissioning of less efficient refineries and margins guaranteed by netback pricing agreements in 1986 both contributed to amelioration within the domestic refining industry.

Diagram 2. Petroleum Flow, 1987
(Million Barrels per Day)



Note: Sum of components may not equal total due to independent rounding.
Sources: See Tables 46, 50, 53, and 56.

Figure 46. Petroleum Overview, 1949-1987



Source: See Table 46.

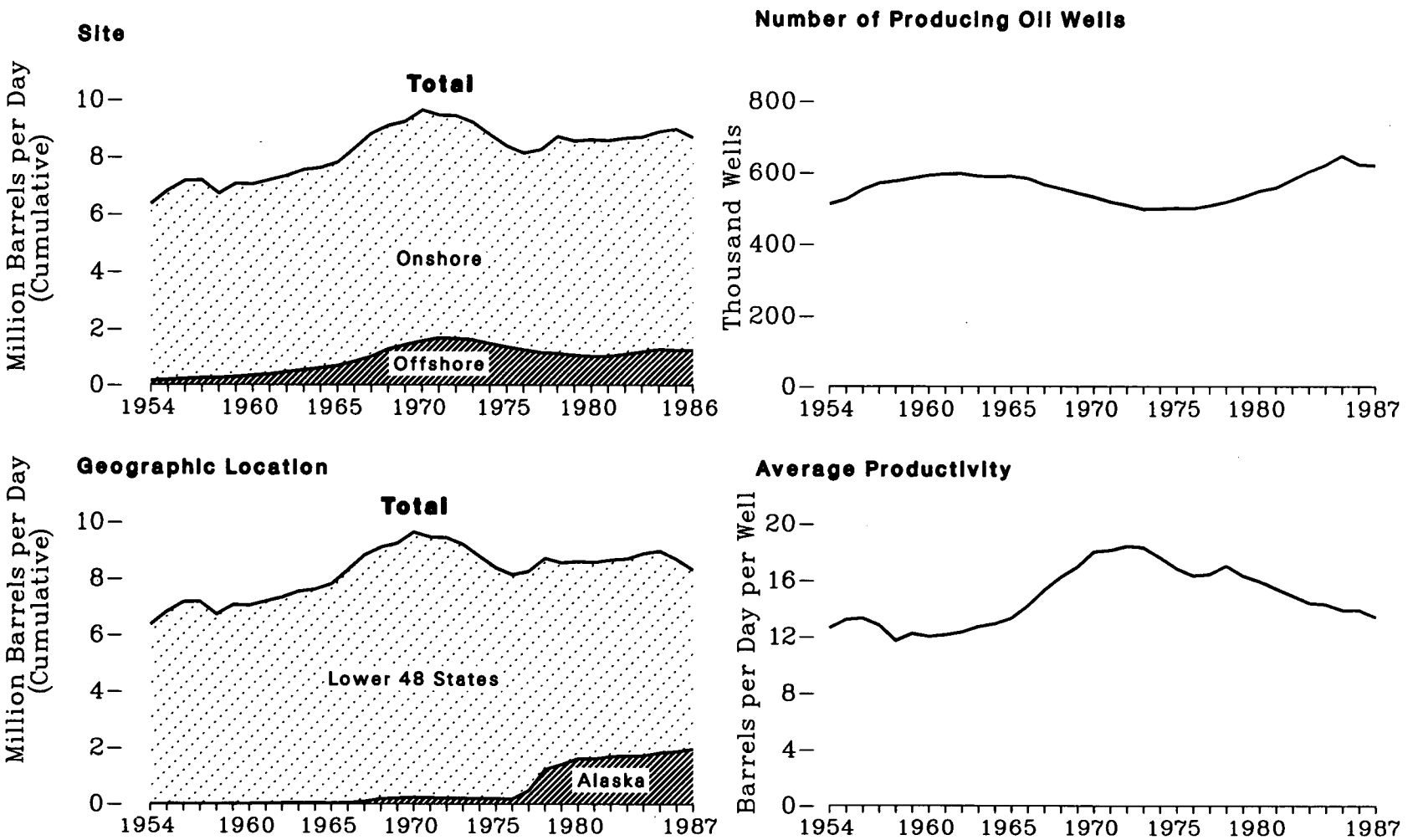
Table 46. Petroleum Overview, 1949-1987

(Million Barrels per Day)

Year	Production			Other Domestic Supply [2]	Foreign Trade					Crude Oil Losses	Change in Stocks [6]	Petroleum Products Supplied
					Imports							
	Crude Oil [1]	Natural Gas Plant Liquids	Total Production		Crude Oil [3]	Petroleum Products [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]	8.31	1.60	9.91	0.91	4.64	1.90	6.54	0.77	5.77	(7)	-0.04	16.56

[1] Includes lease condensate. [2] Includes benzol, other hydrocarbons, hydrogen, alcohol, processing gains, and unaccounted for crude oil. [3] Includes imports for the Strategic Petroleum Reserve, which began in 1977. [4] For 1981 and 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. [8] Preliminary. Note: Sum of components may not equal total due to independent rounding. Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 47. Crude Oil and Lease Condensate Production and Oil Well Productivity, 1954-1987



Source: See Table 47.

Table 47. Crude Oil and Lease Condensate Production and Oil Well Productivity, 1954-1987

(Thousand Barrels per Day, Except as Noted)

Year	Geographic Location		Site		Type			Oil Well Productivity	
	Lower 48	Alaska	Onshore	Offshore	Crude Oil	Lease Condensate	Total Production	Thousands of Producing Wells [1]	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[4]	6,349	1,961	NA	NA	8,311	[3]	8,311	620	13.4

[1] As of December 31.

[2] For 1954 through 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.

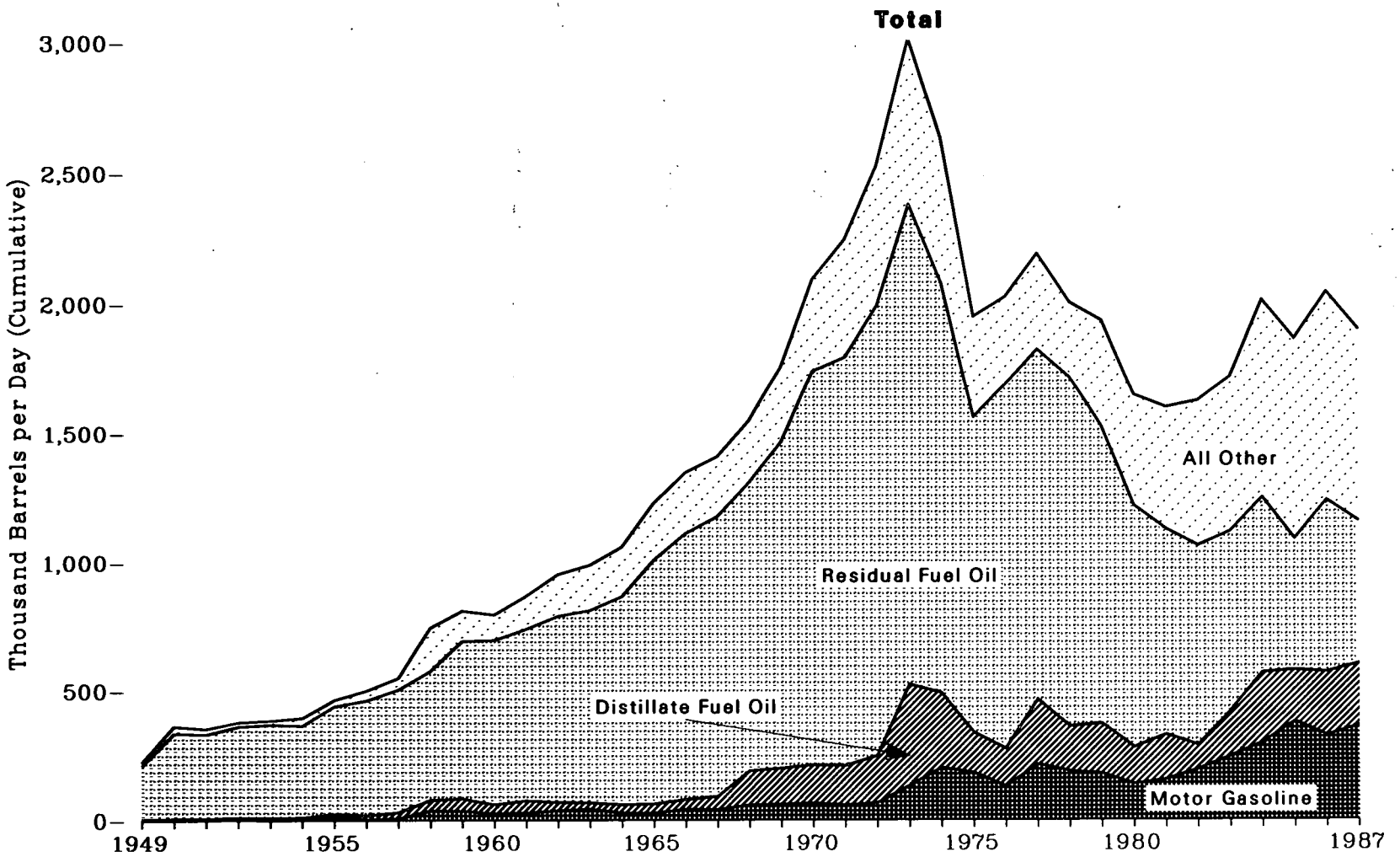
[4] Preliminary.

NA = Not available.

Note: Sum of components may not equal total due to independent rounding.

Sources: **Offshore:** •1954 through 1969—U.S. Geological Survey, *Outer Continental Shelf Statistics*, June 1979. •1970 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly.* **Oil Well Productivity:** •1954 through 1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Independent Petroleum Association of America, *The Oil Producing Industry in Your State.* •1987—*World Oil*, February 1988. **All Other Data:** •1954 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly*, December 1987.

Figure 48. Petroleum Product Imports by Type, 1949-1987



Source: See Table 48.

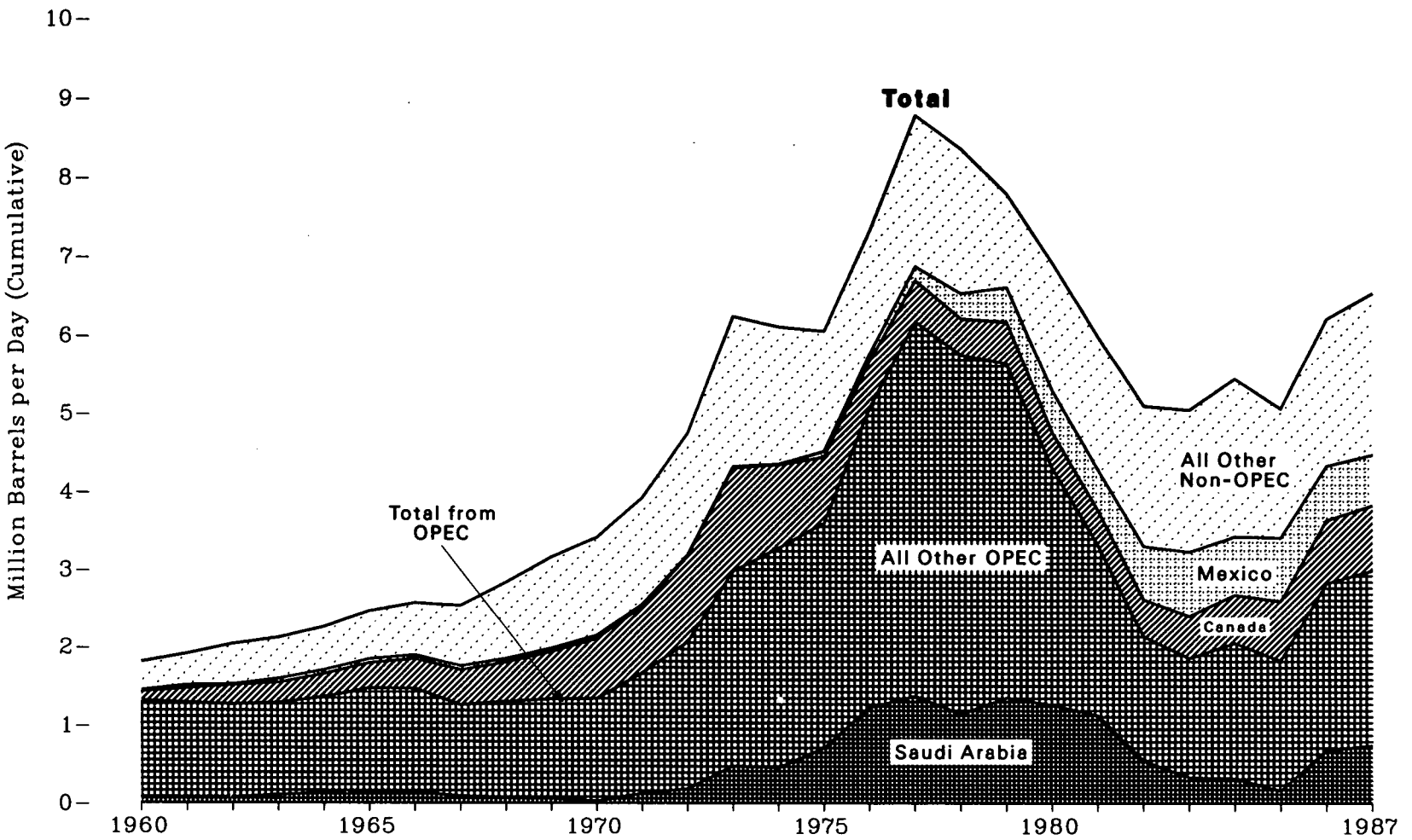
Table 48. Petroleum Product Imports [1] by Type, 1949-1987

(Thousand Barrels per Day)

Year	Motor Gasoline [2]	Jet Fuel [3]	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Unfinished Oils	Other Products [4]	Total
1949	0	NA	5	206	0	10	3	224
1950	(5)	NA	7	329	0	21	6	363
1951	1	NA	5	326	0	14	7	354
1952	5	NA	7	351	0	9	7	380
1953	1	NA	9	360	0	9	7	386
1954	3	NA	9	354	0	21	9	396
1955	13	NA	12	417	0	15	9	466
1956	5	21	14	445	0	7	10	502
1957	8	25	23	475	0	3	18	552
1958	38	57	41	499	0	92	21	747
1959	37	37	48	610	0	63	19	814
1960	27	34	35	637	4	45	17	799
1961	29	28	48	666	5	69	26	872
1962	38	30	32	724	6	89	36	955
1963	44	41	25	747	7	87	41	992
1964	29	33	32	808	11	89	58	1,060
1965	28	81	36	946	21	92	27	1,229
1966	43	86	38	1,032	29	97	24	1,348
1967	42	89	51	1,085	27	97	20	1,409
1968	59	105	132	1,120	32	80	22	1,549
1969	62	125	139	1,265	35	106	25	1,757
1970	67	144	147	1,528	52	108	49	2,095
1971	59	180	153	1,583	70	124	76	2,245
1972	68	194	182	1,742	89	125	126	2,525
1973	134	212	392	1,853	132	137	152	3,012
1974	204	163	289	1,587	123	121	148	2,635
1975	184	133	155	1,223	112	36	108	1,951
1976	131	76	146	1,413	130	32	97	2,026
1977	217	75	250	1,359	161	31	99	2,193
1978	190	86	173	1,355	123	27	53	2,008
1979	181	78	193	1,151	217	59	58	1,937
1980	140	80	142	939	216	55	76	1,646
1981	157	38	173	800	244	112	76	1,599
1982	197	29	93	776	226	174	131	1,625
1983	247	29	174	699	190	234	147	1,722
1984	299	62	272	681	195	231	272	2,011
1985	381	39	200	510	187	318	232	1,866
1986	326	57	247	669	242	250	254	2,045
1987[6]	366	35	240	553	190	280	236	1,901

[1] Includes imports from U.S. possessions and territories.
[2] 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.
[3] Prior to 1965, imports of kerosene-type jet fuel were included with kerosene, which is listed under "Other Products."
[4] Includes 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.
[5] Less than 500 barrels per day.
[6] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* • 1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 49. Crude Oil and Petroleum Product Imports by Country of Origin, 1960-1987



Source: See Table 49.

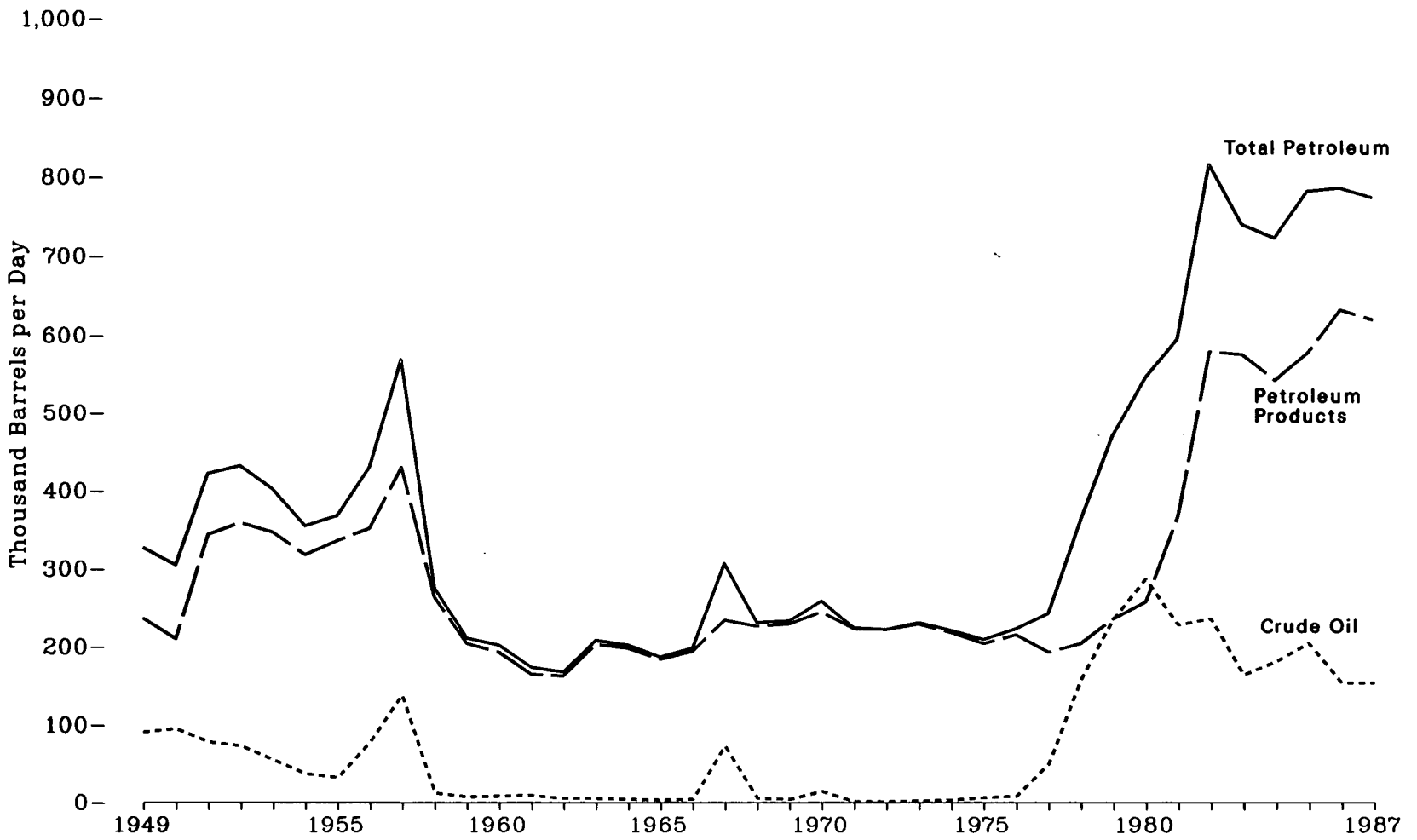
Table 49. Crude Oil and Petroleum Product Imports by Country of Origin, 1960-1987

(Thousand Barrels per Day)

Year	Organization of Petroleum Exporting Countries (OPEC) [1]													
	Algeria	Indonesia	Nigeria	Saudi Arabia	Venezuela	Other OPEC [2]	Total OPEC [3]	Arab Members of OPEC [4]	Canada	Mexico	United Kingdom	Virgin Is. and Puerto Rico	Other Non-OPEC	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	645	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	3,056	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[6]	284	277	530	747	768	387	2,994	1,255	837	645	349	294	1,422	6,541

[1] See Glossary for membership.
[2] Includes Ecuador, Gabon, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates.
[3] Excludes petroleum imported into the United States indirectly from OPEC countries, primarily from Caribbean and West European refining areas, as petroleum products which were refined from crude oil produced in OPEC countries.
[4] Includes Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates.
[5] Less than 500 barrels per day.
[6] Preliminary.
Note: Data include imports for the Strategic Petroleum Reserve, which began in 1977.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1960 through 1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" Chapter. •1976 through 1980—Energy Information Administration, Energy Data Reports, *P.A.D. Districts Supply/Demand, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly*, December 1987.

Figure 50. Crude Oil and Petroleum Product Exports by Type, 1949–1987



Source: See Table 50.

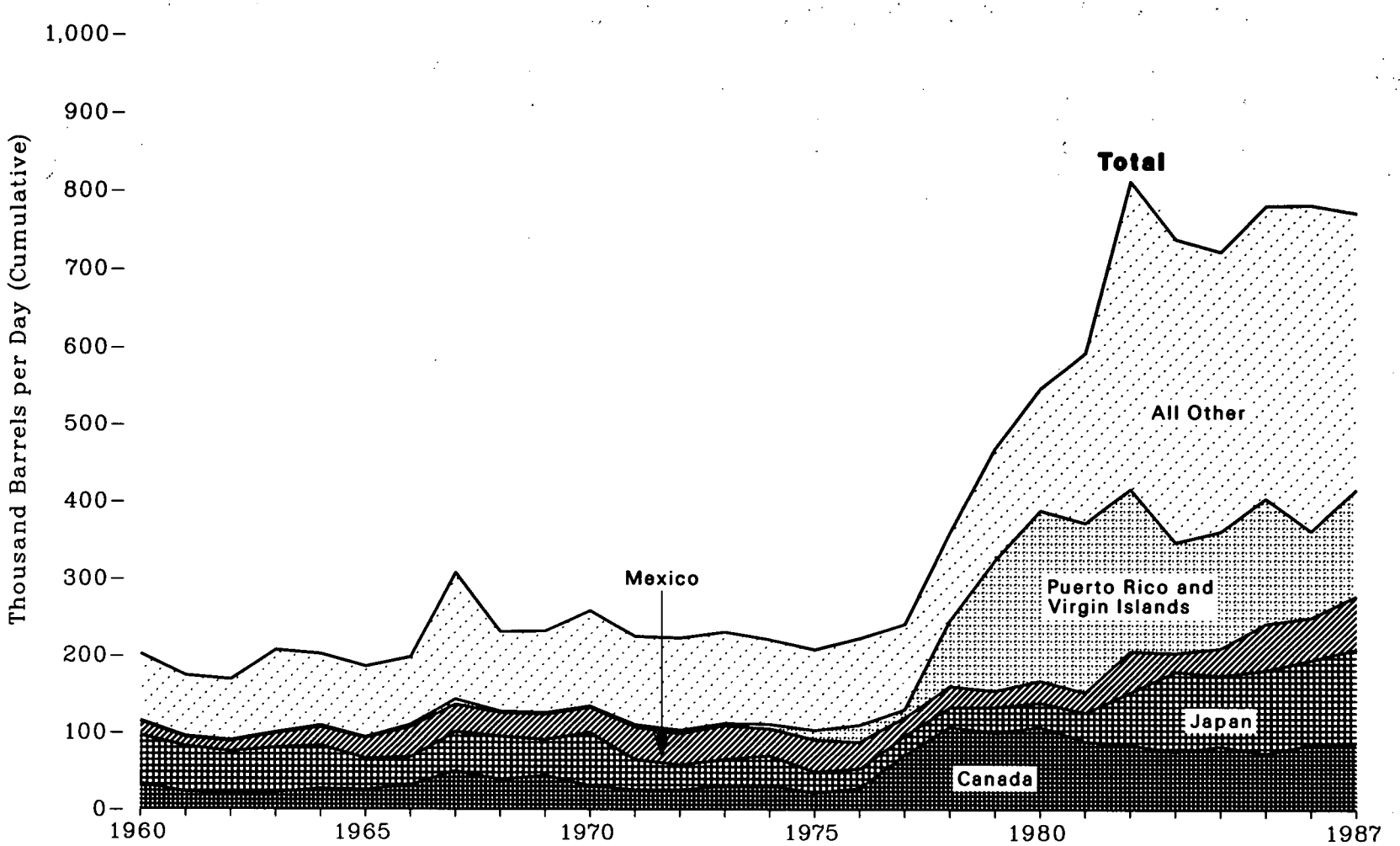
Table 50. Crude Oil and Petroleum Product Exports [1] by Type, 1949-1987

(Thousand Barrels per Day)

Year	Crude Oil	Petroleum Products							Total Petroleum
		Liquefied Petroleum Gases	Residual Fuel Oil	Petrochemical Feedstocks	Lubricants	Petroleum Coke	Other Products[2]	Total	
1949	91	4	35	0	35	7	156	236	327
1950	95	4	44	0	39	7	115	210	305
1951	78	6	79	0	48	12	199	344	422
1952	73	7	76	0	44	11	222	359	432
1953	55	8	71	0	36	10	222	347	402
1954	37	11	73	0	41	9	184	318	355
1955	32	12	93	0	39	12	180	336	368
1956	78	12	76	0	38	18	209	352	430
1957	138	12	106	0	38	14	260	430	568
1958	12	8	71	0	36	12	138	264	276
1959	7	6	57	0	38	13	90	204	211
1960	8	8	51	0	43	19	73	193	202
1961	9	10	38	0	47	20	50	165	174
1962	5	11	35	0	48	20	49	163	168
1963	5	13	42	0	50	29	69	203	208
1964	4	15	52	0	50	37	45	198	202
1965	3	21	41	5	45	32	40	184	187
1966	4	22	35	7	47	40	43	194	198
1967	73	25	60	8	51	45	45	234	307
1968	5	29	55	8	49	53	32	226	231
1969	4	35	46	11	45	63	29	229	233
1970	14	27	54	10	44	84	25	245	259
1971	1	26	36	14	43	74	29	223	224
1972	1	31	33	13	41	85	19	222	222
1973	2	27	23	19	35	96	29	229	231
1974	3	25	14	15	33	113	18	218	221
1975	6	26	15	22	25	102	14	204	209
1976	8	25	12	30	26	103	19	215	223
1977	50	18	6	24	26	102	15	193	243
1978	158	20	13	23	27	111	10	204	362
1979	235	15	9	31	23	146	12	236	471
1980	287	21	33	29	23	136	14	258	544
1981	228	42	118	26	19	138	24	367	595
1982	236	65	209	24	16	156	109	579	815
1983	164	73	185	20	16	195	87	575	739
1984	181	48	190	21	15	193	73	541	722
1985	204	62	197	19	15	187	96	577	781
1986	154	42	147	22	23	238	159	631	785
1987[3]	154	34	186	20	24	216	139	619	773

[1] Includes exports to U.S. possessions and territories.
[2] Includes aviation gasoline, motor gasoline, jet fuel, distillate fuel oil, kerosene, special naphthas, wax, asphalt, pentanes plus, and miscellaneous products.
[3] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 51. Crude Oil and Petroleum Product Exports by Country of Destination, 1960-1987



Source: See Table 51.

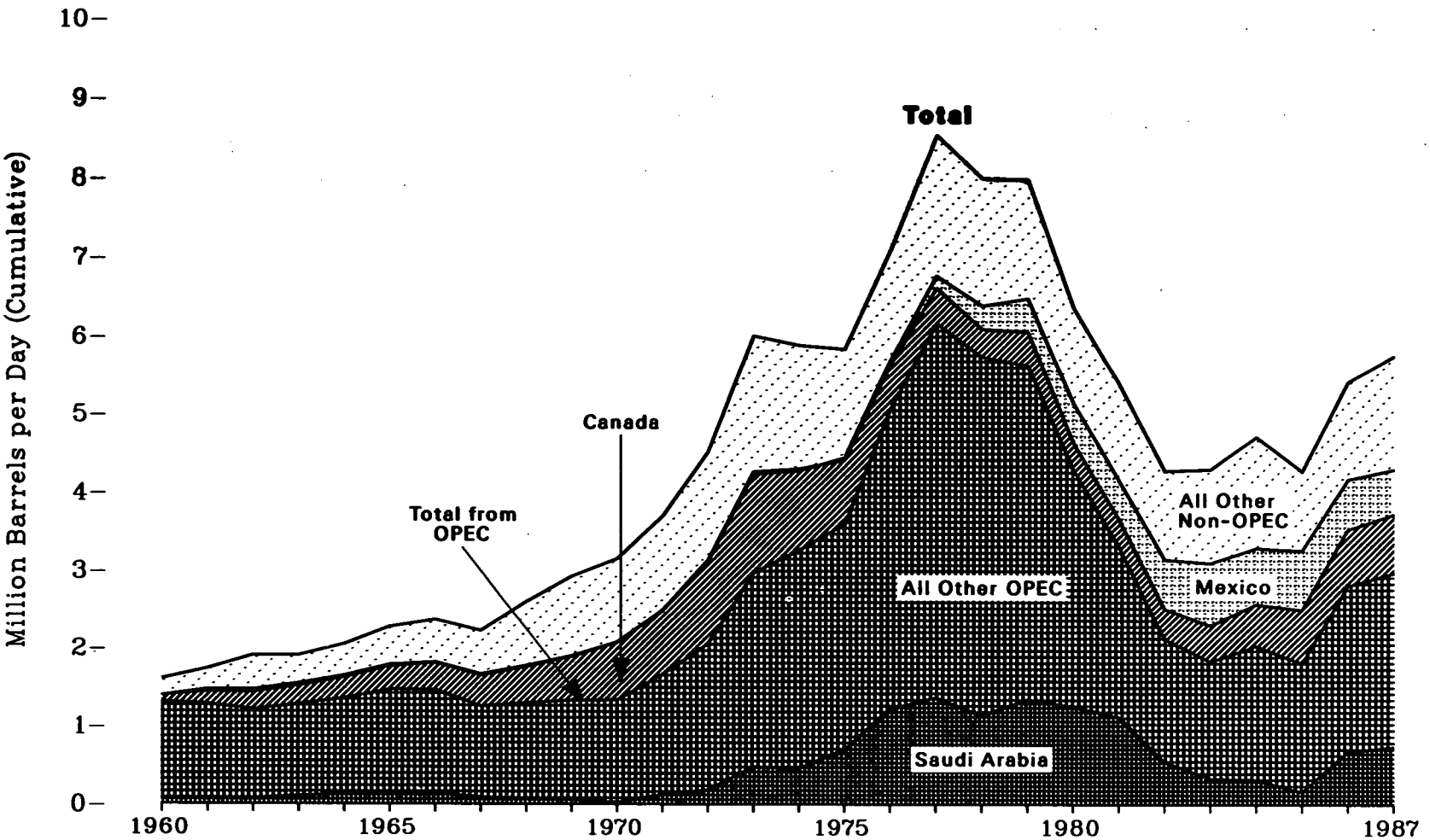
Table 51. Crude Oil and Petroleum Product Exports by Country of Destination, 1960-1987

(Thousand Barrels per Day)

Year	Canada	Japan	Mexico	Netherlands	Belgium[1]	Italy	United Kingdom	France	Brazil	Puerto Rico	Virgin Islands	Other	Total
1960	34	62	18	6	3	6	12	4	4	1	NA	52	202
1961	23	59	12	4	4	5	10	4	4	1	[2]	48	174
1962	21	54	14	5	3	5	8	3	5	1	[2]	50	168
1963	22	58	19	13	9	8	11	4	4	1	[2]	59	208
1964	27	56	24	9	4	8	10	4	4	1	1	55	202
1965	26	40	27	10	3	7	12	3	3	1	1	54	187
1966	32	36	39	9	3	7	12	4	4	3	[2]	49	198
1967	50	51	36	13	5	9	62	3	6	7	[2]	65	307
1968	39	56	31	10	4	8	14	4	8	2	[2]	55	231
1969	44	47	33	9	4	9	13	4	7	2	1	59	233
1970	31	69	33	15	5	10	12	5	7	1	[2]	71	259
1971	26	39	42	11	7	8	9	5	9	3	[2]	67	224
1972	26	32	41	12	13	9	10	5	9	3	[2]	63	222
1973	31	34	44	13	15	9	9	5	8	3	[2]	60	231
1974	32	38	35	17	13	9	6	4	9	4	2	52	221
1975	22	27	42	23	9	10	7	6	6	5	7	44	209
1976	28	25	35	22	12	10	13	6	7	21	1	43	223
1977	71	25	24	17	16	10	9	9	6	6	5	44	243
1978	108	26	27	18	15	10	7	9	8	44	42	47	362
1979	100	34	21	28	19	15	7	13	7	64	106	57	471
1980	108	32	28	23	20	14	7	11	4	86	134	79	544
1981	89	38	26	42	12	22	5	15	1	81	140	124	595
1982	85	68	53	85	17	32	14	24	8	95	116	216	815
1983	76	104	24	49	22	35	8	23	2	33	111	251	739
1984	83	92	35	37	21	39	14	18	1	24	128	229	722
1985	74	108	61	44	26	30	14	11	3	26	135	248	781
1986	85	110	56	58	30	39	8	11	3	14	98	273	785
1987[3]	88	121	70	39	17	42	6	13	2	22	116	237	773

[1] Including Luxembourg.
[2] Less than 500 barrels per day.
[3] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1960 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 52. Crude Oil and Petroleum Product Net Imports by Country of Origin, 1960–1987



Source: See Table 52.

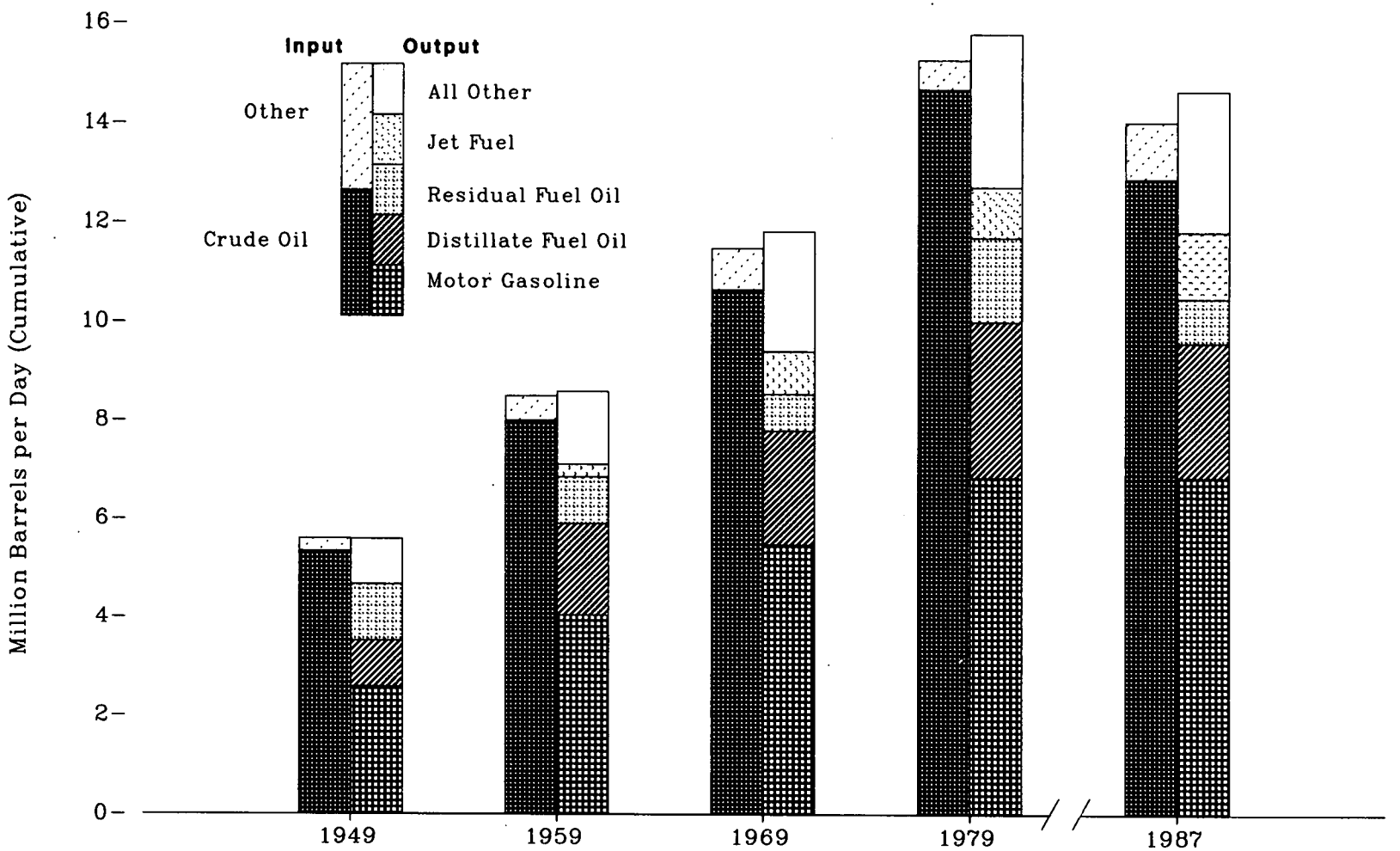
Table 52. Crude Oil and Petroleum Product Net Imports [1] by Country of Origin, 1960-1987

(Thousand Barrels per Day, Except as Shown)

Year	Organization of Petroleum Exporting Countries (OPEC)						Canada	Mexico	United Kingdom	Virgin Is. and Puerto Rico	Other Non-OPEC	Total Net Imports	Total Net Imports as Percent of Consumption [4]	Net Imports from OPEC	
	Nigeria	Saudi Arabia	Venezuela	Other OPEC [2]	Total OPEC	Arab Members of OPEC [3]								As Percent of Total Net Imports [5]	As Percent of Consumption [6]
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	(7)	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[8]	530	747	765	944	2,986	1,253	749	575	343	156	958	5,767	34.8	51.8	18.0

[1] Imports minus exports; negative numbers indicate that exports exceed imports.
[2] Includes Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Qatar, and United Arab Emirates.
[3] Includes Algeria, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and United Arab Emirates.
[4] Calculated by dividing total net petroleum imports by total U.S. petroleum products supplied (consumption).
[5] Calculated by dividing net petroleum imports from OPEC countries by total net petroleum imports.
[6] Calculated by dividing net petroleum imports from OPEC countries by total U.S. petroleum product supplied (consumption).
[7] Less than 500 barrels per day.
[8] Preliminary.
Note: Data include imports for the Strategic Petroleum Reserve which began in 1977.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1960 through 1975—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. •1976 through 1980—Energy Information Administration, Energy Data Reports, *P.A.D. Districts Supply/Demand, Annual*. •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual*. •1987—Energy Information Administration, *Petroleum Supply Monthly*, December 1987.

Figure 53. Refinery Input and Output, Selected Years, 1949-1987



Source: See Table 53.

Table 53. Refinery Input and Output, 1949-1987

(Million Barrels per Day)

Year	Input				Output							Processing Gain or Loss
	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[5]	12.86	0.47	0.67	13.99	6.84	1.34	2.73	0.89	0.45	2.38	14.62	0.63

[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 Appendix E, Note 5.

[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] Includes 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.

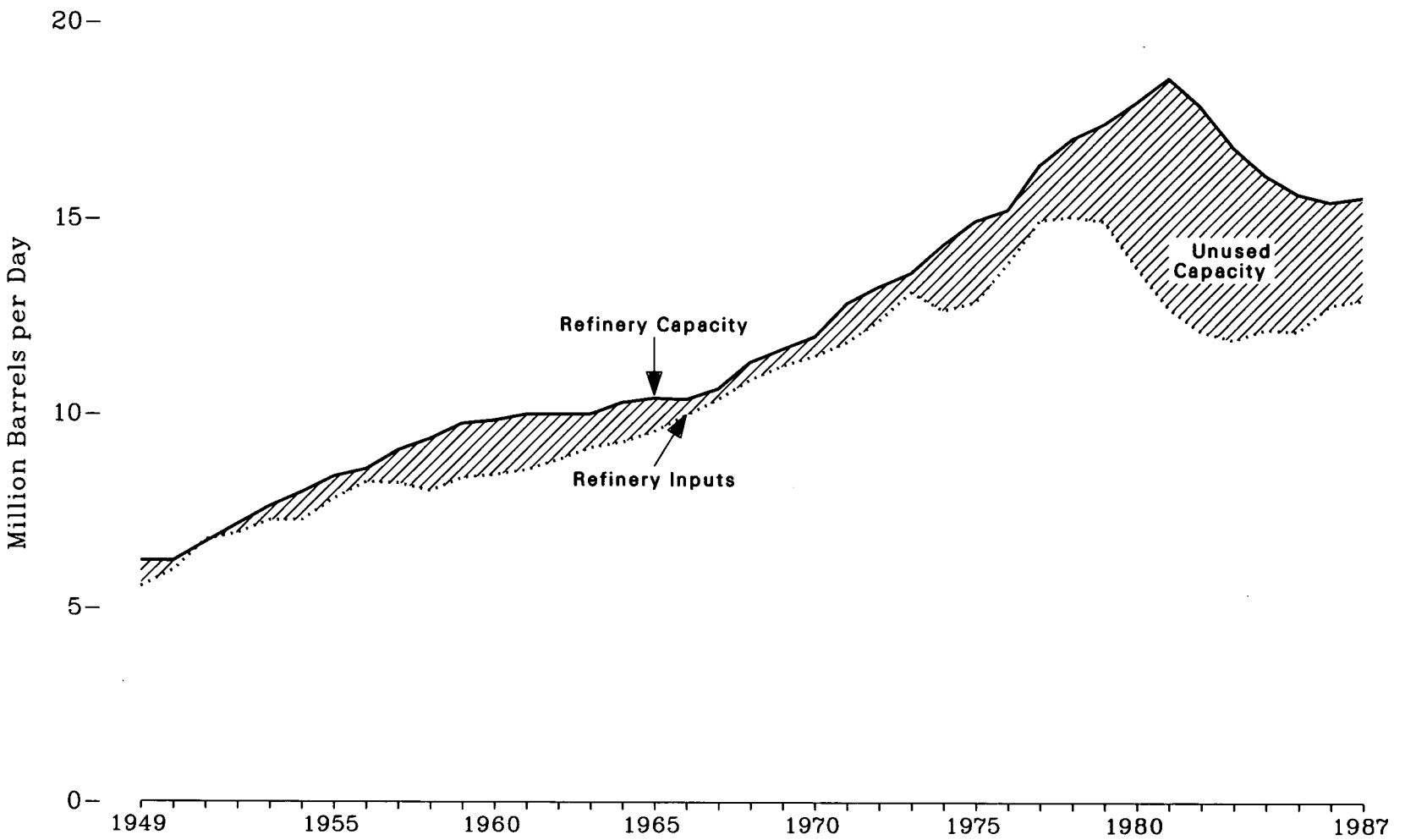
[5] Preliminary.

NA = Not available.

Note: Sum of components may not equal total due to independent rounding.

Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* • 1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 54. Refinery Capacity and Utilization, 1949–1987



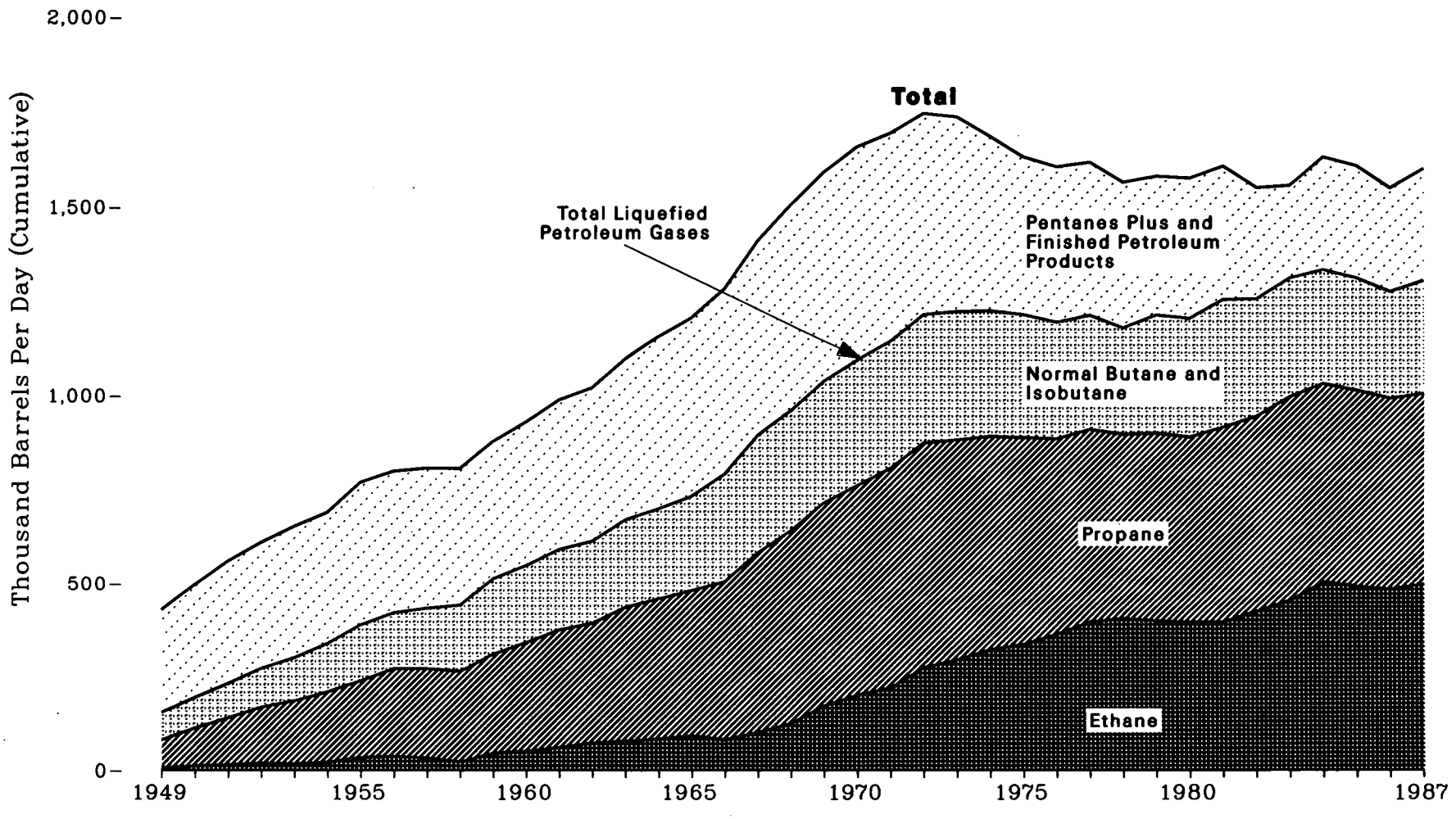
Source: See Table 54.

Table 54. Refinery Capacity and Utilization, 1949-1987

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[5]	219	15.57	12.96	82.6

[1] Prior to 1956, the number of refineries includes only those in operation on January 1. For 1957 and 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 Appendix E, Note 6. [4] For 1949 through 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 and forward, utilization is derived by averaging reported monthly utilization. [5] Preliminary. Note: Data are for refineries in the United States, excluding the Hawaiian Foreign Trade Zone. Sources: **Operable Refineries:** •1949 through 1977—Bureau of Mines, Mineral Industry Surveys, *Petroleum Refineries, Annual.* •1978 through 1981—Energy Information Administration, Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories.* • 1982 and forward—Energy Information Administration, *Petroleum Supply Annual.* **Gross Input to Distillation Units:** •1949 through 1966—Bureau of Mines, *Minerals Yearbook,* "Natural Gas Liquids" and "Crude Petroleum and Petroleum Products" chapters. •1967 through 1977—Bureau of Mines, Mineral Industry Surveys, *Petroleum Refineries, Annual.* •1978 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Refineries in the United States and U.S. Territories.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly.* **Utilization:** •1949 through 1980—calculated. •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 55. Natural Gas Plant Liquids Production, 1949–1987



Source: See Table 55.

Table 55. Natural Gas Plant Liquids Production, 1949-1987

(Thousand Barrels per Day)

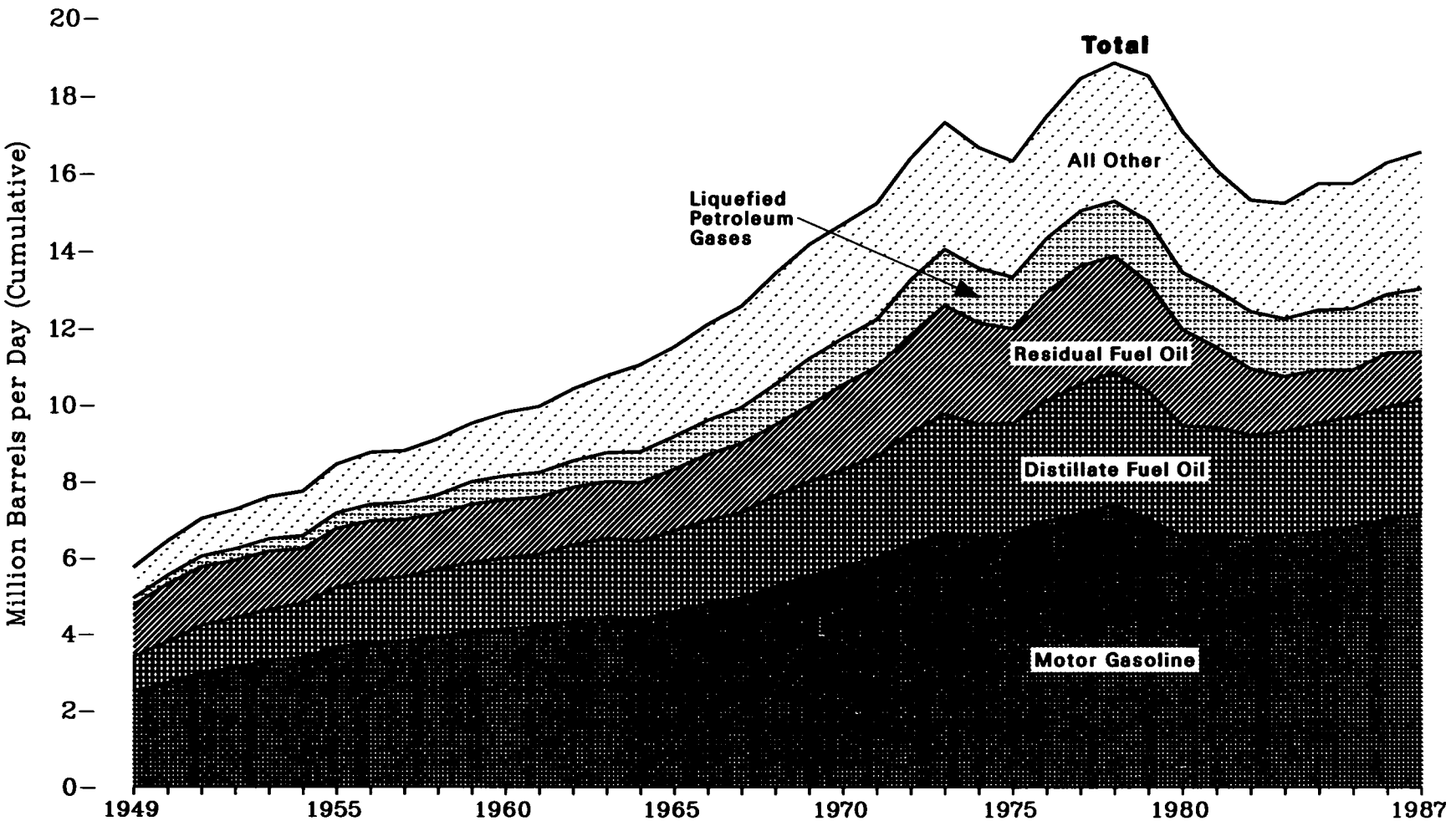
Year	Liquefied Petroleum Gases					Pentanes Plus [3]	Finished Petroleum Products [4]	Total
	Ethane [1]	Propane [1,2]	Normal Butane [2]	Isobutane	Total			
1949	8	74	61	11	155	223	53	430
1950	12	101	69	13	195	238	66	499
1951	15	125	77	15	232	256	73	561
1952	19	150	86	18	273	269	70	611
1953	17	169	97	19	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[5]	499	506	159	142	1,307	292	4	1,603

[1] Reported production of ethane-propane mixtures have been allocated 70 percent ethane and 30 percent propane.
[2] Reported production of butane-propane mixtures have 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] Includes motor gasoline, aviation gasoline, special naphthas, distillate fuel oil, and miscellaneous products.
[5] Preliminary.

Note: Sum of components may not equal total due to independent rounding.

Sources: •1949 through 1968—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. •1969 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly*, December 1987.

Figure 56. Petroleum Products Supplied by Type, 1949-1987



Source: See Table 56.

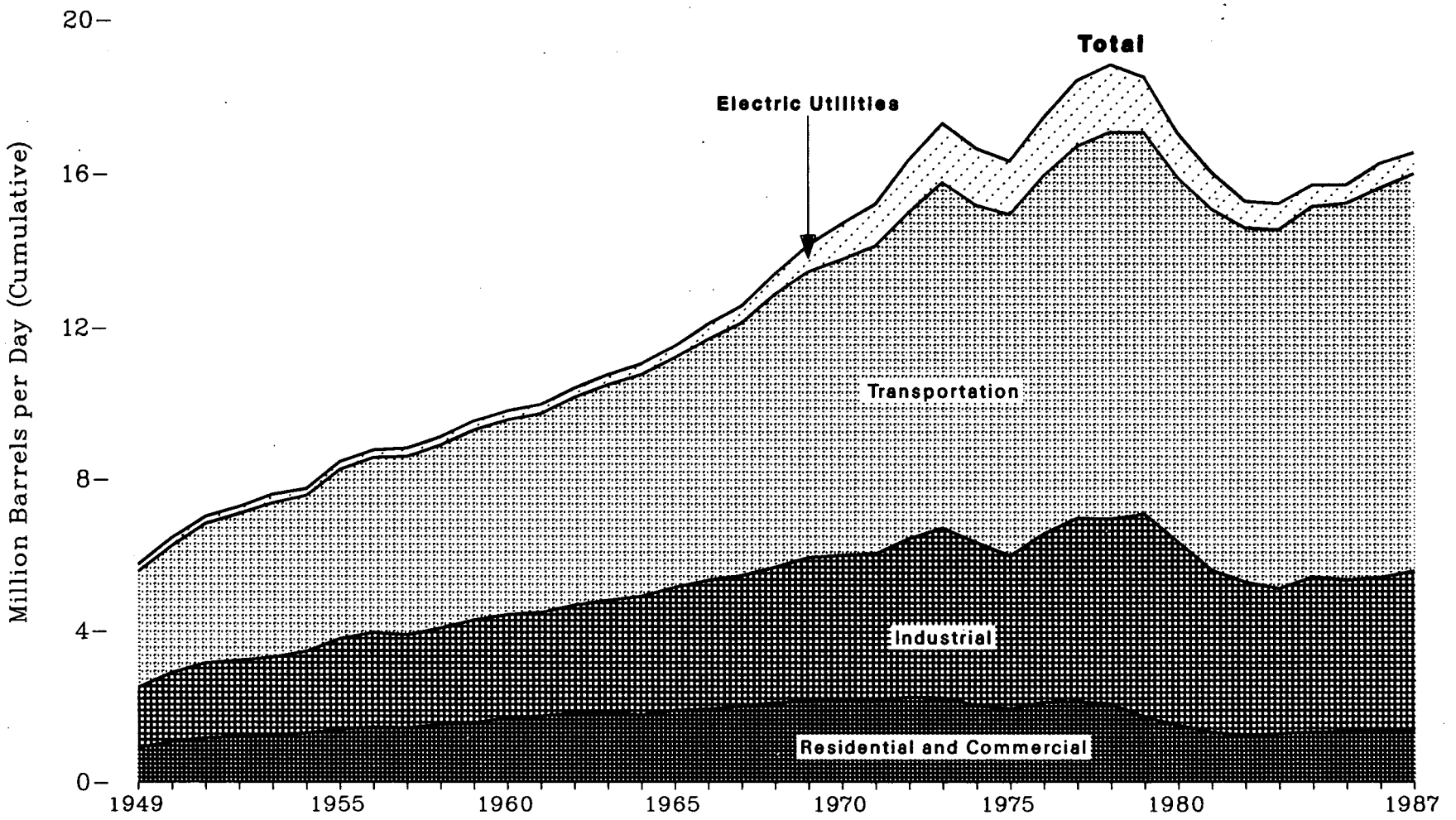
Table 56. Petroleum Products Supplied [1] by Type, 1949-1987

(Million Barrels per Day)

Year	Motor Gasoline [2]	Jet Fuel	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other Products [3]	Total Products	Percentage Change from Previous Year [4]
1949	2.50	NA	0.90	1.36	0.19	0.81	5.76	—
1950	2.72	NA	1.08	1.52	0.23	0.90	6.46	12.1
1951	2.99	NA	1.23	1.55	0.28	0.98	7.02	8.6
1952	3.12	0.05	1.30	1.52	0.30	0.98	7.27	3.9
1953	3.30	0.09	1.34	1.54	0.33	1.00	7.60	4.3
1954	3.37	0.13	1.44	1.43	0.35	1.03	7.76	2.1
1955	3.66	0.15	1.59	1.53	0.40	1.12	8.46	9.0
1956	3.75	0.20	1.68	1.54	0.44	1.16	8.78	4.1
1957	3.82	0.20	1.69	1.50	0.45	1.15	8.81	0.1
1958	3.93	0.26	1.79	1.45	0.49	1.19	9.12	3.5
1959	4.07	0.29	1.81	1.54	0.58	1.24	9.53	4.5
1960	4.13	0.28	1.87	1.53	0.62	1.36	9.80	3.1
1961	4.20	0.29	1.90	1.50	0.64	1.44	9.98	1.5
1962	4.34	0.31	2.01	1.50	0.70	1.55	10.40	4.2
1963	4.47	0.32	2.05	1.48	0.76	1.68	10.74	3.3
1964	4.40	0.32	2.05	1.52	0.81	1.92	11.02	2.9
1965	4.59	0.60	2.13	1.61	0.84	1.74	11.51	4.2
1966	4.81	0.67	2.18	1.72	0.89	1.82	12.08	5.0
1967	4.96	0.82	2.24	1.79	0.94	1.81	12.56	3.9
1968	5.26	0.95	2.39	1.83	1.05	1.91	13.39	6.9
1969	5.53	0.99	2.47	1.98	1.22	1.95	14.14	5.3
1970	5.78	0.97	2.54	2.20	1.22	1.98	14.70	4.0
1971	6.01	1.01	2.66	2.30	1.25	1.98	15.21	3.5
1972	6.38	1.05	2.91	2.53	1.42	2.08	16.37	7.9
1973	6.67	1.06	3.09	2.82	1.45	2.21	17.31	5.5
1974	6.54	0.99	2.95	2.64	1.41	2.13	16.65	-3.8
1975	6.67	1.00	2.85	2.46	1.33	2.00	16.32	-2.0
1976	6.98	0.99	3.13	2.80	1.40	2.16	17.46	7.3
1977	7.18	1.04	3.35	3.07	1.42	2.37	18.43	5.3
1978	7.41	1.06	3.43	3.02	1.41	2.51	18.85	2.3
1979	7.03	1.08	3.31	2.83	1.59	2.67	18.51	-1.8
1980	6.58	1.07	2.87	2.51	1.47	2.57	17.06	-7.6
1981	6.59	1.01	2.83	2.09	1.47	2.08	16.06	-6.1
1982	6.54	1.01	2.67	1.72	1.50	1.86	15.30	-4.7
1983	6.62	1.05	2.69	1.42	1.51	1.94	15.23	-0.4
1984	6.69	1.18	2.84	1.37	1.57	2.07	15.73	3.5
1985	6.83	1.22	2.87	1.20	1.60	2.01	15.73	-0.3
1986	7.03	1.31	2.91	1.42	1.51	2.09	16.28	3.5
1987 [5]	7.18	1.35	2.96	1.25	1.62	2.19	16.56	1.7

[1] See Appendix E, Notes 5, 7, and 8.
[2] Prior to 1964, motor gasoline data were for total gasoline, including motor gasoline, aviation gasoline, and special naphtha.
[3] Includes 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 and 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.
[5] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 57. Petroleum Products Supplied to End-Use Sectors, 1949-1987



Source: See Table 57.

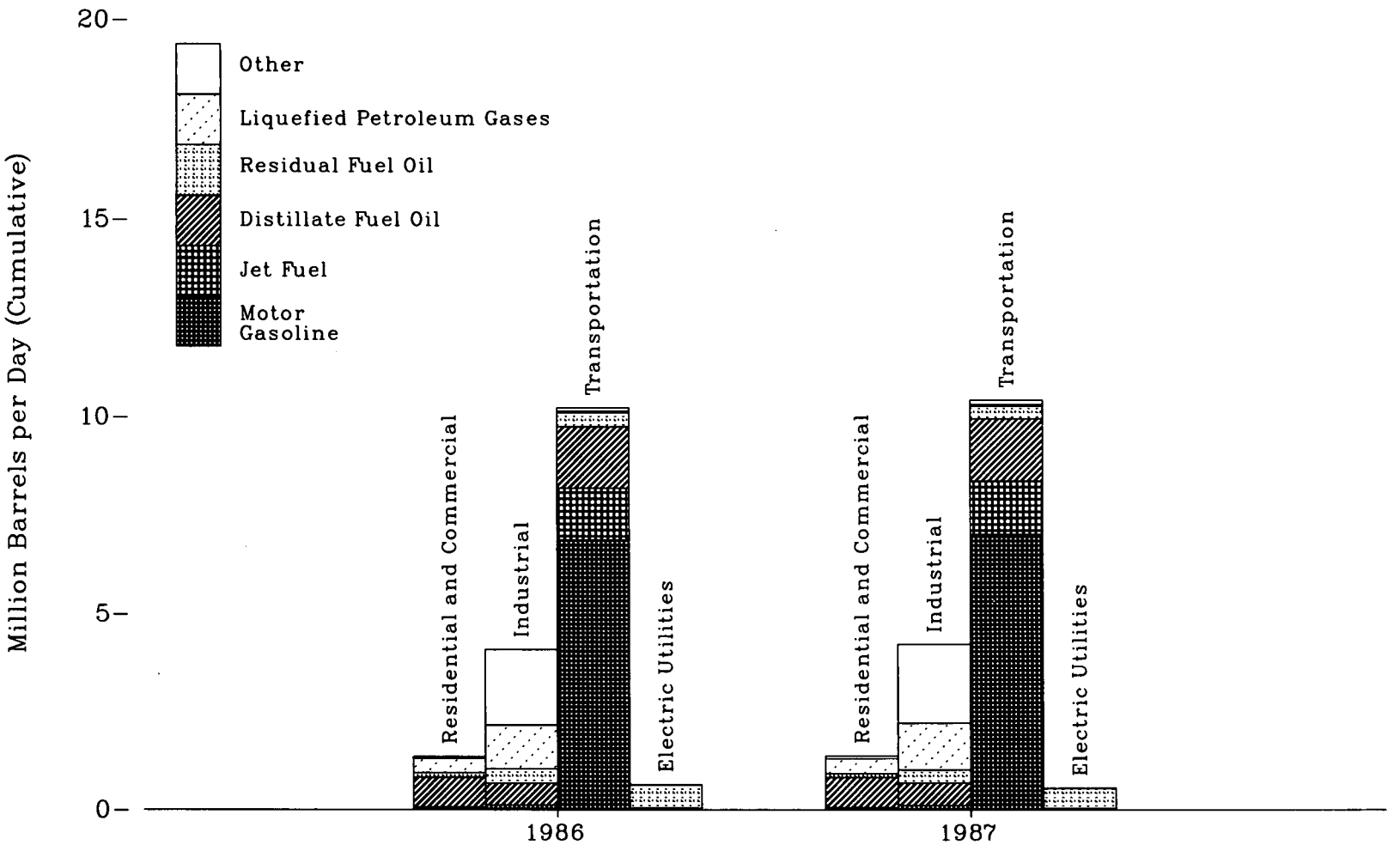
Table 57. Petroleum Products Supplied [1] to End-Use Sectors, 1949-1987

(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	2.97	5.68	0.26	10.74
1964	1.79	3.13	5.83	0.28	11.02
1965	1.91	3.25	6.03	0.32	11.51
1966	1.94	3.41	6.35	0.39	12.08
1967	2.02	3.45	6.65	0.44	12.56
1968	2.10	3.59	7.18	0.52	13.39
1969	2.16	3.78	7.51	0.69	14.14
1970	2.18	3.82	7.77	0.93	14.70
1971	2.18	3.86	8.08	1.09	15.21
1972	2.25	4.20	8.55	1.36	16.37
1973	2.23	4.49	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	4.83	9.75	1.71	18.43
1978	2.07	4.88	10.14	1.75	18.85
1979	1.73	5.35	10.00	1.44	18.51
1980	1.52	4.84	9.55	1.15	17.06
1981	1.33	4.28	9.48	0.96	16.06
1982	1.24	4.06	9.30	0.69	15.30
1983	1.29	3.85	9.41	0.68	15.23
1984	1.34	4.10	9.72	0.56	15.73
1985	1.35	4.01	9.88	0.48	15.73
1986	1.35	4.07	10.22	0.64	16.28
1987[2]	1.37	4.22	10.42	0.55	16.56

[1] See Appendix E, Note 7.
[2] Estimated.
Note: Sum of components may not equal total due to independent rounding.
Sources: **Total:** •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly* and *Weekly Petroleum Status Report.* **Other Data:** •1949 through 1959—Energy Information Administration estimates. •1960 through 1986—Energy Information Administration, "State Energy Data System, 1960-1986." •1987—Energy Information Administration estimates.

Figure 58. Petroleum Products Supplied by Type and to End-Use Sectors, 1986 and 1987



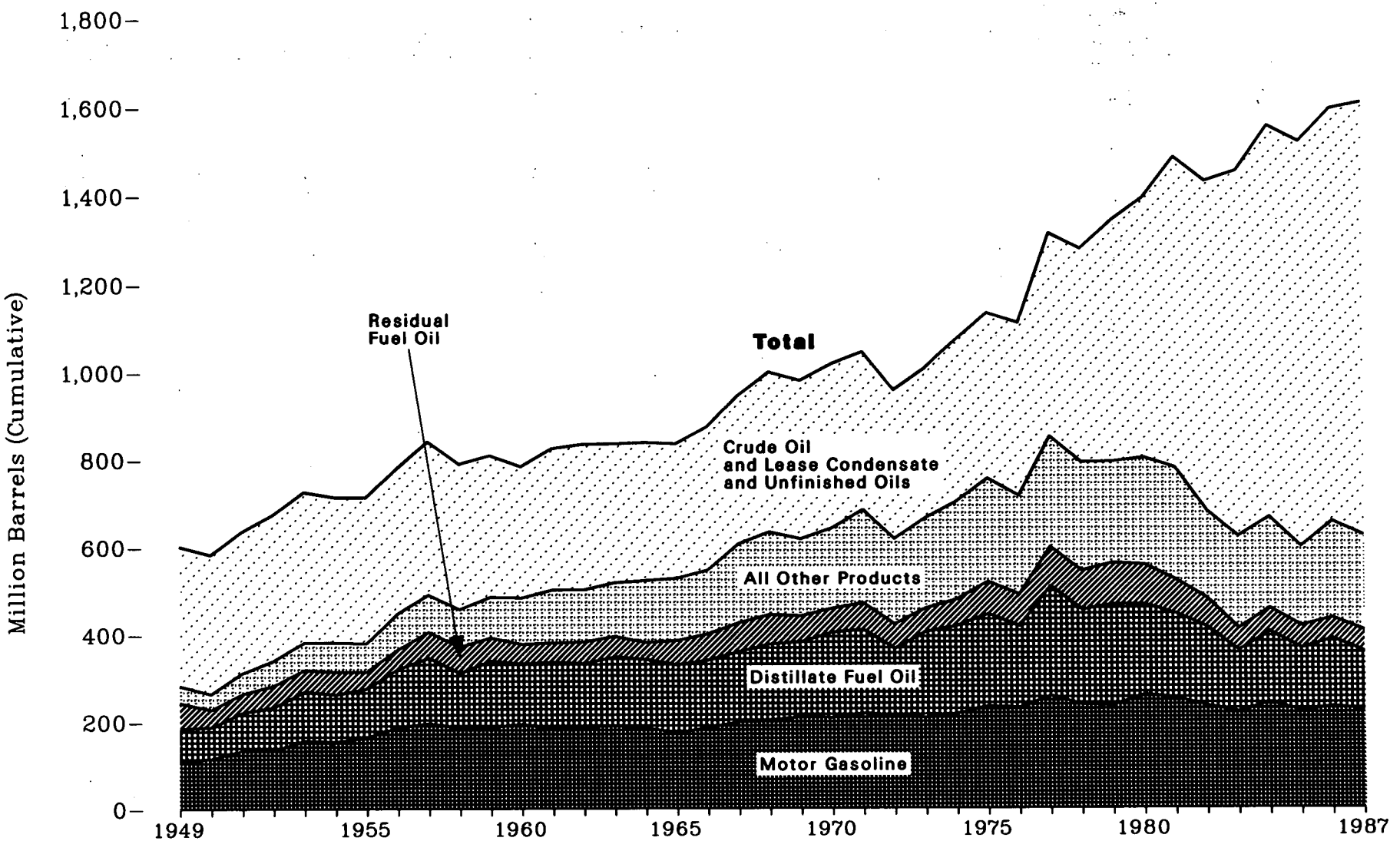
Source: See Table 58.

Table 58. Petroleum Products Supplied [1] by Type and to End-Use Sectors, 1986 and 1987

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
1986										
Asphalt and Road Oil	0	0	0.45	1.09	0	0	0	0	0.45	1.09
Aviation Gasoline	0	0	0	0	0.03	0.06	0	0	0.03	0.06
Distillate Fuel Oil	0.76	1.61	0.56	1.20	1.55	3.30	0.04	0.08	2.91	6.20
Jet Fuel	0	0	0	0	1.31	2.68	0	0	1.31	2.68
Kerosene	0.06	0.13	0.04	0.08	0	0	0	0	0.10	0.20
Liquefied Petroleum Gases	0.37	0.49	1.11	1.48	0.04	0.05	0	0	1.51	2.01
Lubricants	0	0	0.07	0.16	0.07	0.15	0	0	0.14	0.31
Motor Gasoline	0.06	0.11	0.11	0.21	6.87	13.17	0	0	7.03	13.49
Residual Fuel Oil	0.11	0.25	0.36	0.83	0.36	0.82	0.59	1.36	1.42	3.25
All Other [2]	0	0	1.37	2.90	0	0	(3)	0.01	1.37	2.91
Total	1.35	2.58	4.07	7.94	10.22	20.23	0.64	1.45	16.28	32.20
1987 [4]										
Asphalt and Road Oil	0	0	0.46	1.13	0	0	0	0	0.46	1.13
Aviation Gasoline	0	0	0	0	0.03	0.05	0	0	0.03	0.05
Distillate Fuel Oil	0.76	1.62	0.57	1.21	1.58	3.37	0.04	0.09	2.96	6.29
Jet Fuel	0	0	0	0	1.35	2.77	0	0	1.35	2.77
Kerosene	0.06	0.12	0.04	0.07	0	0	0	0	0.10	0.20
Liquefied Petroleum Gases	0.39	0.52	1.19	1.60	0.04	0.05	0	0	1.62	2.17
Lubricants	0	0	0.08	0.18	0.08	0.17	0	0	0.16	0.36
Motor Gasoline	0.06	0.11	0.11	0.21	7.02	13.46	0	0	7.18	13.77
Residual Fuel Oil	0.10	0.23	0.33	0.75	0.32	0.74	0.50	1.16	1.25	2.88
All Other [2]	0	0	1.43	3.01	0	0	(3)	0.01	1.44	3.02
Total	1.37	2.61	4.22	8.16	10.42	20.61	0.55	1.26	16.56	32.63

[1] See Appendix E, Notes 5, 7, and 8.
[2] Includes petrochemical feedstock, special naphthas, wax, petroleum coke, still gas, natural gasoline, pentanes plus, crude oil, and miscellaneous products.
[3] Less than 5 thousand barrels per day.
[4] Estimated.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1986—Energy Information Administration, "State Energy Data System, 1960-1986." •1987—Energy Information Administration estimates.

Figure 59. Primary Stocks of Crude Oil and Petroleum Products by Type, End of Year 1949–1987



Source: See Table 59.

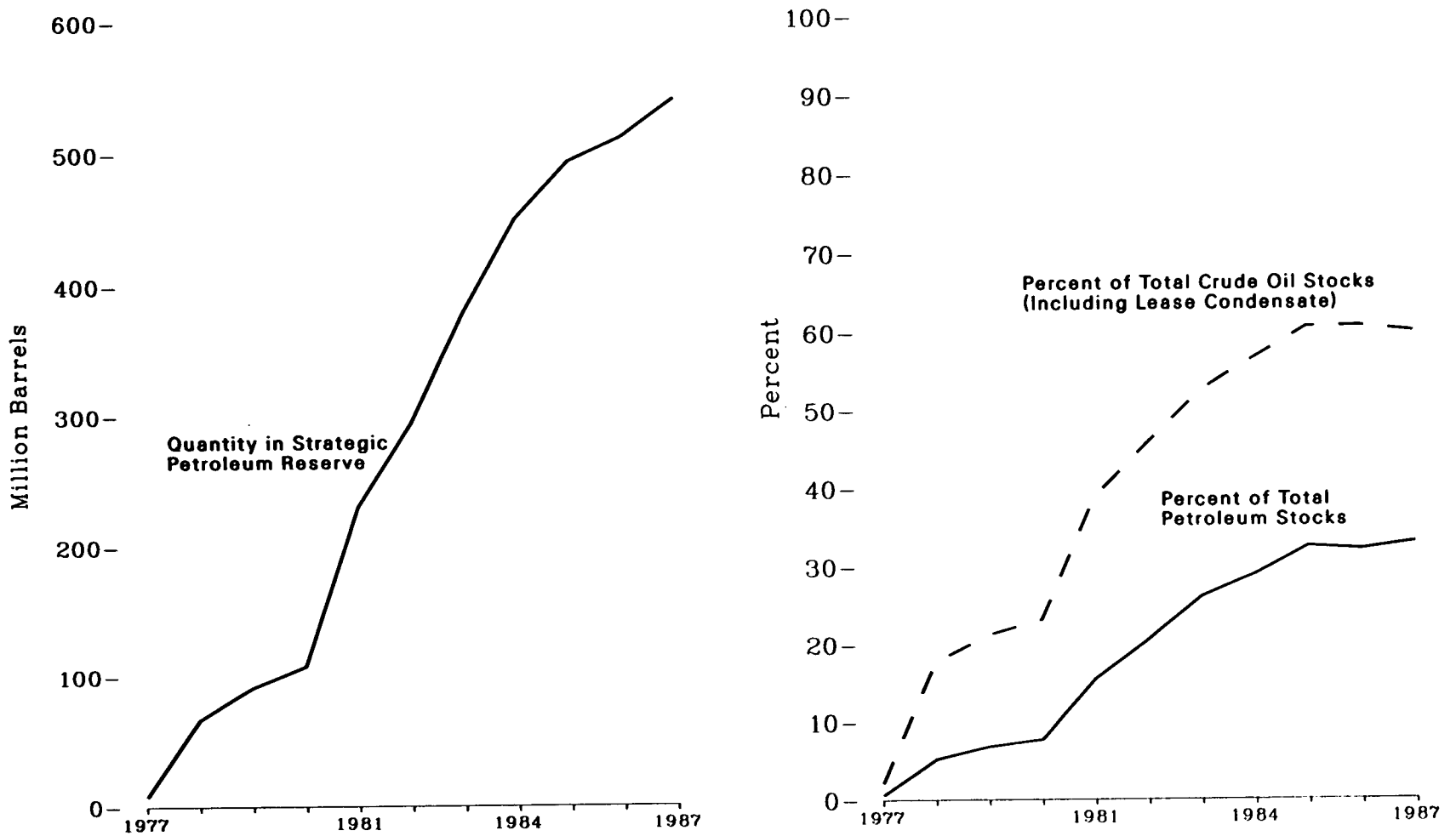
Table 59. Primary Stocks of Crude Oil and Petroleum Products by Type, End of Year 1949-1987

(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 [3]	Total Products	
1949	253	110	NA	75	60	1	66	37	350	603
1950	248	116	NA	72	41	2	70	34	334	583
1951	256	135	NA	87	43	2	67	45	378	634
1952	272	135	2	99	49	3	62	53	402	674
1953	274	158	3	112	49	4	69	56	451	726
1954	258	155	3	108	52	7	74	57	457	715
1955	266	165	3	111	39	7	68	55	449	715
1956	266	187	5	134	44	14	67	63	514	780
1957	282	197	5	149	60	14	69	66	560	841
1958	263	187	6	125	60	16	70	63	526	789
1959	257	188	8	151	54	19	67	66	552	809
1960	240	195	7	138	45	23	62	76	545	785
1961	245	184	8	152	45	31	79	81	580	825
1962	252	189	10	144	50	25	82	83	582	834
1963	237	191	9	157	48	28	82	85	598	836
1964	230	186	19	156	40	30	87	92	609	839
1965	220	175	19	155	56	30	89	92	616	836
1966	238	186	19	154	61	35	89	91	636	874
1967	249	200	22	160	66	64	90	93	695	944
1968	272	204	24	173	67	76	93	89	727	1,000
1969	265	211	28	172	58	60	98	88	715	980
1970	276	209	28	195	54	67	99	89	741	1,018
1971	260	219	28	191	60	95	101	92	784	1,044
1972	246	213	25	154	55	86	95	84	713	959
1973	242	209	29	196	53	99	99	80	766	1,008
1974	265	218	29	200	60	113	106	82	809	1,074
1975	271	235	30	209	74	125	106	82	862	1,133
1976	285	231	32	186	72	116	110	78	826	1,112
1977	348	258	35	250	90	136	113	82	964	1,312
1978	376	238	34	216	90	132	109	82	901	1,278
1979	430	237	39	229	96	111	118	82	911	1,341
1980	466	261	42	205	92	120	124	82	926	1,392
1981	594	253	41	192	78	135	111	80	890	1,484
1982	644	235	37	179	66	94	105	70	786	1,430
1983	723	222	39	140	49	101	108	72	731	1,454
1984	796	243	42	161	53	101	94	67	760	1,556
1985	814	223	40	144	50	74	107	67	705	1,519
1986	843	233	50	155	47	103	94	68	750	1,593
1987[4]	890	226	50	134	47	97	93	70	718	1,608

[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.
[3] Includes 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 and forward, includes aviation gasoline blending components, hydrogen, other hydrocarbons, and alcohol.
[4] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 60. Strategic Petroleum Reserve, End of Year 1977-1987



Source: See Table 60

Table 60. Strategic Petroleum Reserve, 1977-1987

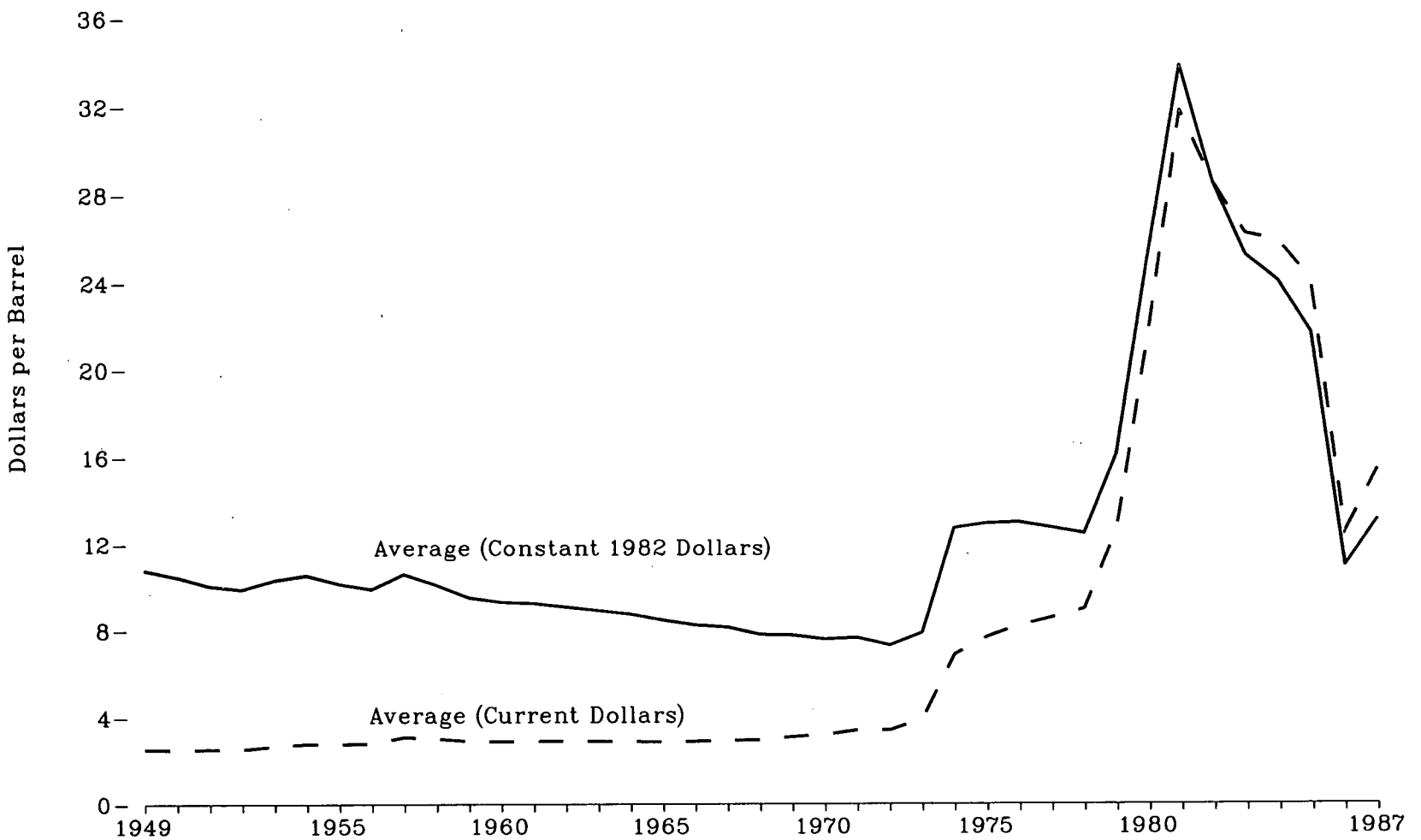
(Million Barrels, Except as Noted)

Year	Crude Oil Imports	Domestic Crude Oil Deliveries	End-of-Year Stocks			Days of Net Petroleum Imports [3]
			Quantity [1]	Percent of Crude Oil [2] Stocks	Percent of Total Petroleum Stocks	
1977	7.54	[4] 0.37	7.46	2.1	0.6	1
1978	58.80	0	66.86	17.8	5.2	8
1979	24.43	[5]	91.19	21.2	6.8	11
1980	16.07	1.30	107.80	23.1	7.7	17
1981	93.30	28.79	230.34	38.8	15.5	43
1982	60.19	3.79	293.83	45.7	20.5	68
1983	85.29	0.42	379.09	52.4	26.1	88
1984	72.04	0.05	450.51	56.6	28.9	96
1985	43.12	0.17	493.32	60.6	32.5	115
1986	17.56	1.20	511.57	60.7	32.1	94
1987	26.52	2.40	540.65	60.8	33.6	94

[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:** Department of Energy, Assistant Secretary for Fossil Energy, unpublished data. **All Other Data:** •1977 through 1980—Energy Information Administration, Energy Data Report, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* • 1987—Energy Information Administration, *Petroleum Supply Monthly,* December 1987.

Figure 61. Crude Oil Domestic First Purchase Price, 1949-1987



Source: See Table 61.

Table 61. Crude Oil Domestic First Purchase Price,[1] 1949-1987

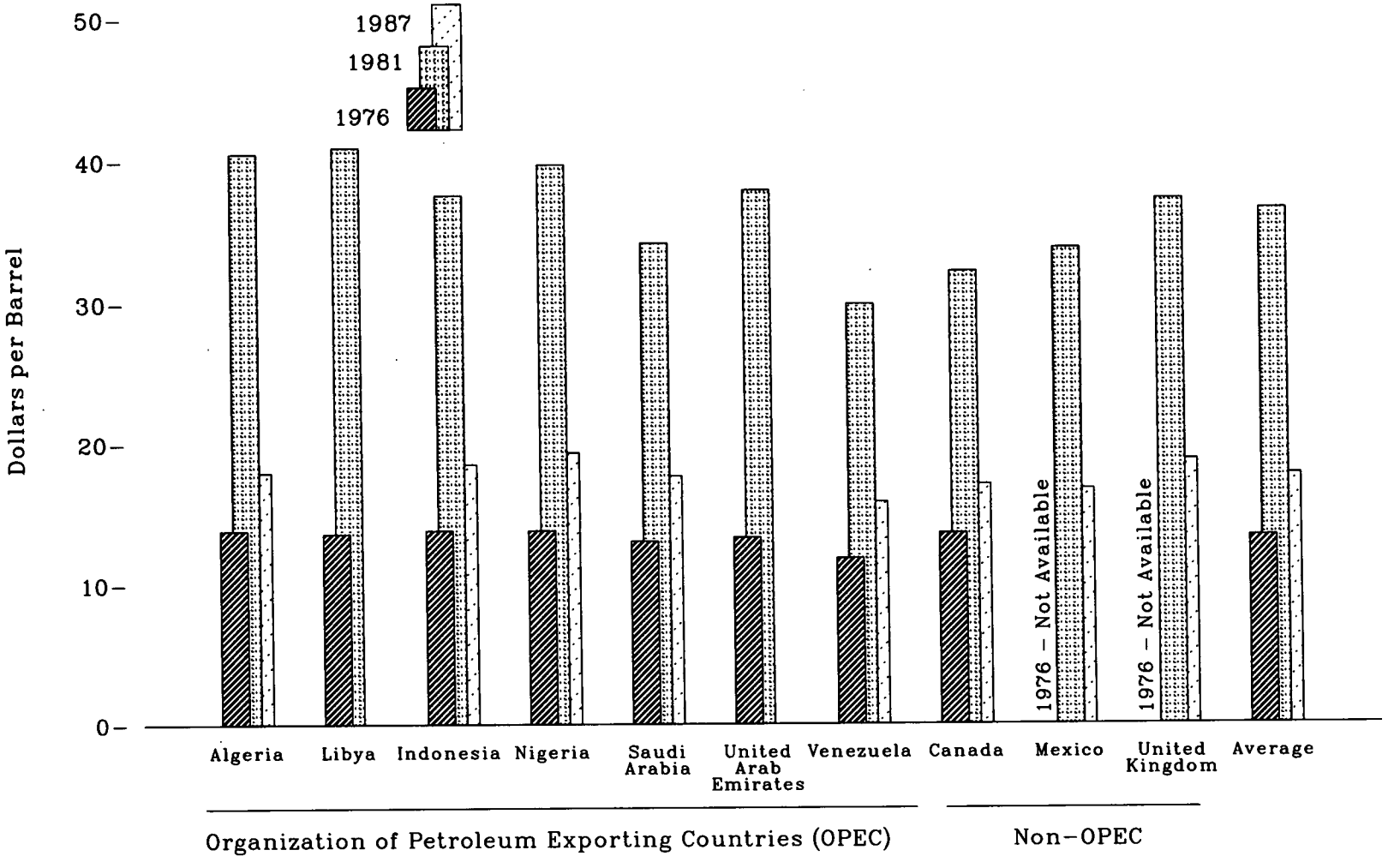
(Dollars per Barrel)

Year	Alaska North Slope (current)	Other U.S. (current)	U.S. Average (current)	U.S. Average (constant)[2]
1949	—	2.54	2.54	10.81
1950	—	2.51	2.51	10.50
1951	—	2.53	2.53	10.08
1952	—	2.53	2.53	9.92
1953	—	2.68	2.68	10.35
1954	—	2.78	2.78	10.57
1955	—	2.77	2.77	10.18
1956	—	2.79	2.79	9.93
1957	—	3.09	3.09	10.62
1958	—	3.01	3.01	10.13
1959	—	2.90	2.90	9.54
1960	—	2.88	2.88	9.32
1961	—	2.89	2.89	9.26
1962	—	2.90	2.90	9.09
1963	—	2.89	2.89	8.92
1964	—	2.88	2.88	8.75
1965	—	2.86	2.86	8.46
1966	—	2.88	2.88	8.23
1967	—	2.92	2.92	8.13
1968	—	2.94	2.94	7.80
1969	—	3.09	3.09	7.76
1970	—	3.18	3.18	7.57
1971	—	3.39	3.39	7.64
1972	—	3.39	3.39	7.29
1973	—	3.89	3.89	7.86
1974	—	6.87	6.87	12.72
1975	—	7.67	7.67	12.93
1976	—	8.19	8.19	12.98
1977	[3] 6.32	[3] 8.63	8.57	12.73
1978	5.21	9.56	9.00	12.47
1979	10.57	13.01	12.64	16.08
1980	16.87	22.65	21.59	25.19
1981	23.23	33.71	31.77	33.80
1982	19.92	30.43	28.52	28.52
1983	17.69	28.00	26.19	25.21
1984	17.91	27.59	25.88	24.03
1985	16.98	25.74	24.09	21.66
1986	6.45	14.13	12.51	10.96
1987[4]	10.84	16.83	15.41	13.11

[1] See Appendix E, Note 9.
[2] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.
[3] Average for July through December only.
[4] Preliminary.
— = Not applicable.

Sources: •1949 through 1973—Bureau of Mines, *Minerals Yearbook*, "Crude Petroleum and Petroleum Products" chapter. •1974 through January 1976—Federal Energy Administration, FEA Form 90, "Crude Petroleum Production Monthly Report." • February 1976 through September 1979—Federal Energy Administration, Form FEA P-124, "Domestic Crude Oil Purchaser's Monthly Report." • October 1979 through 1982—Economic Regulatory Administration, Form 182, "Domestic Crude Oil First Purchase Report." • 1983 and forward—Energy Information Administration, Form 182, "Domestic Crude Oil First Purchase Report."

Figure 62. Landed Cost of Crude Oil Imports from Selected Countries, 1976, 1981, and 1987



Source: See Table 62.

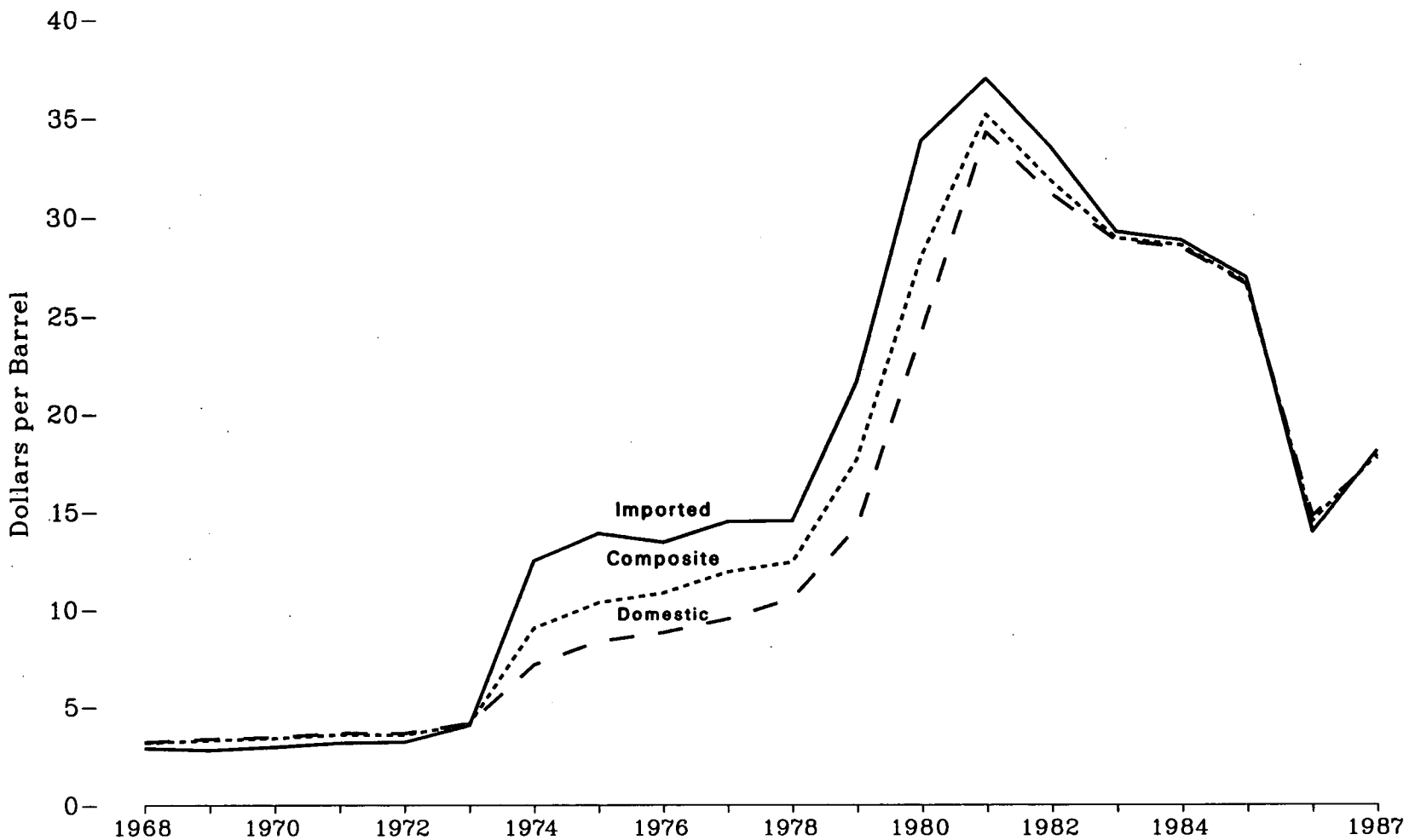
Table 62. Landed Cost of Crude Oil Imports from Selected Countries, 1976-1987

(Dollars per Barrel)

Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987 [1]
Algeria	13.81	15.20	14.91	21.90	37.90	40.49	35.28	31.26	29.08	27.46	14.82	17.91
Canada	13.57	14.21	14.50	20.43	30.47	32.16	26.92	25.63	26.59	25.71	13.43	17.04
Indonesia	13.82	14.63	14.64	20.69	33.92	37.57	36.75	31.57	30.64	28.67	14.63	18.51
Iran	12.82	13.80	13.88	25.02	[2]	[2]	32.40	29.81	28.67	25.79	12.38	18.26
Libya	13.58	14.87	14.72	23.68	37.72	40.92	36.05	[2]	[2]	[2]	[2]	[2]
Mexico	NA	13.75	13.54	20.86	31.80	33.78	28.64	25.78	26.87	25.63	12.17	16.71
Nigeria	13.80	15.25	14.86	22.96	37.05	39.70	36.17	30.84	30.50	28.96	15.29	19.35
Saudi Arabia	13.04	13.61	13.92	19.15	30.02	34.19	35.00	29.76	29.50	24.72	12.84	17.64
United Arab Emirates	13.30	14.04	14.39	21.90	32.89	37.87	36.42	29.50	29.75	NA	NA	NA
United Kingdom	NA	NA	NA	22.16	35.88	37.24	34.28	30.87	29.60	28.35	14.63	18.78
Venezuela	11.80	13.13	12.83	18.18	25.86	29.87	24.82	22.94	25.15	24.43	11.52	15.81
Others	13.31	14.57	14.74	23.45	36.06	37.69	33.78	29.72	29.20	27.33	14.25	18.36
Average	13.34	14.31	14.38	21.65	33.95	36.52	33.18	28.93	28.46	26.66	13.49	17.77

[1] Preliminary.
[2] Not applicable; little or no crude oil imported.
NA = Not available, included in "Others."
Sources: •1975 through September 1977—Federal Energy Administration, Form FEA-F701-M-0, "Transfer Pricing Report." • October 1977 through January 1979—Energy Information Administration, Form FEA-F701-M-0, "Transfer Pricing Report." • February 1980 through September 1982—Energy Information Administration, Form ERA-51, "Transfer Pricing Report." • October 1982 through June 1984—Energy Information Administration, Form EP-51, "Foreign Crude Oil Transaction Report." • July 1984 and forward—Energy Information Administration, Form EIA-856, "Monthly Foreign Crude Oil Acquisition Report."

Figure 63. Crude Oil Refiner Acquisition Cost, 1968-1987



Source: See Table 63.

Table 63. Crude Oil Refiner Acquisition Cost, [1] 1968-1987

(Dollars per Barrel)

Year	Domestic [2]		Imported [2]		Composite [2]	
	Current	Constant [3]	Current	Constant [3]	Current	Constant [3]
1968	3.21	8.51	2.90	7.69	3.17	8.41
1969	3.37	8.47	2.80	7.04	3.29	8.27
1970	3.46	8.24	2.96	7.05	3.40	8.10
1971	3.68	8.29	3.17	7.14	3.60	8.11
1972	3.67	7.89	3.22	6.92	3.58	7.70
1973	4.17	8.42	4.08	8.24	4.15	8.38
1974	7.18	13.30	12.52	23.19	9.07	16.80
1975	8.39	14.15	13.93	23.49	10.38	17.50
1976	8.84	14.01	13.48	21.36	10.89	17.26
1977	9.55	14.19	14.53	21.59	11.96	17.77
1978	10.61	14.70	14.57	20.18	12.46	17.26
1979	14.27	18.16	21.67	27.57	17.72	22.54
1980	24.23	28.27	33.89	39.54	28.07	32.75
1981	34.33	36.52	37.05	39.41	35.24	37.49
1982	31.22	31.22	33.55	33.55	31.87	31.87
1983	28.87	27.79	29.30	28.20	28.99	27.90
1984	28.53	26.49	28.88	26.82	28.63	26.58
1985	26.66	23.97	26.99	24.27	26.75	24.06
1986	14.82	12.99	14.00	12.27	14.55	12.75
1987[4]	17.77	15.12	18.15	15.45	17.91	15.24

[1] 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.

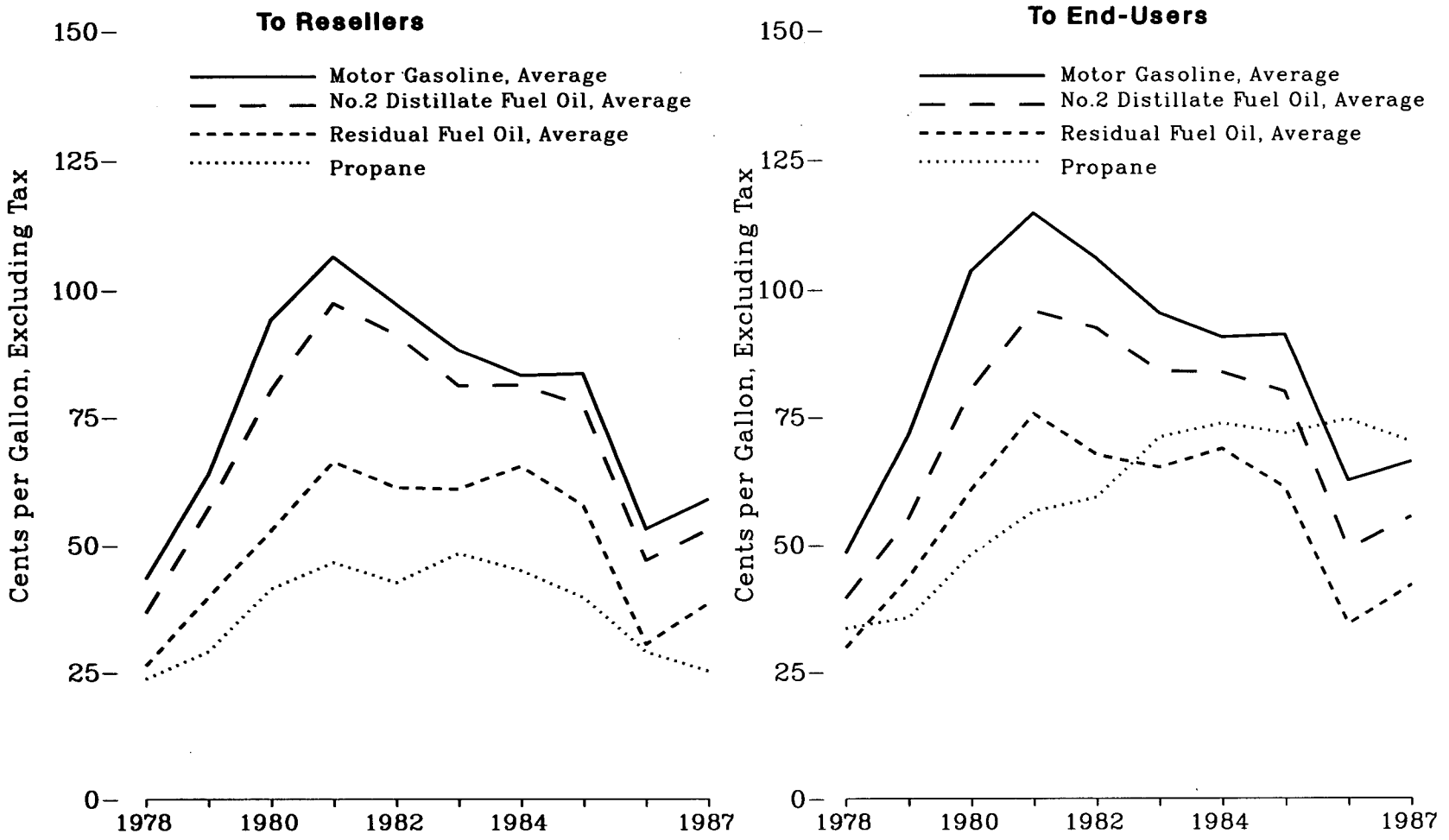
[2] Data 1968 through 1973 are estimated. See Appendix E, Note 10.

[3] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.

[4] Preliminary.

Sources: •1974 through January 1976—Federal Energy Administration, Form FEO-96, "Monthly Cost Allocation Report." •February 1976 through September 1977—Federal Energy Administration, Form FEA-P110-M-1, "Refiners' Monthly Cost Allocation Report." •October 1977 through June 1978—Energy Information Administration, Form FEA-P110-M-1, "Refiners' Monthly Cost Allocation Report." •July 1978 through December 1980—Energy Information Administration, Form ERA-49, "Domestic Crude Oil Entitlements Program Refiners Monthly Report." •1981 and forward—Energy Information Administration, Form EIA-14, "Refiners' Monthly Cost Report."

Figure 64. Refiner Sales Prices of Petroleum Products, 1978-1987



Source: See Table 64.

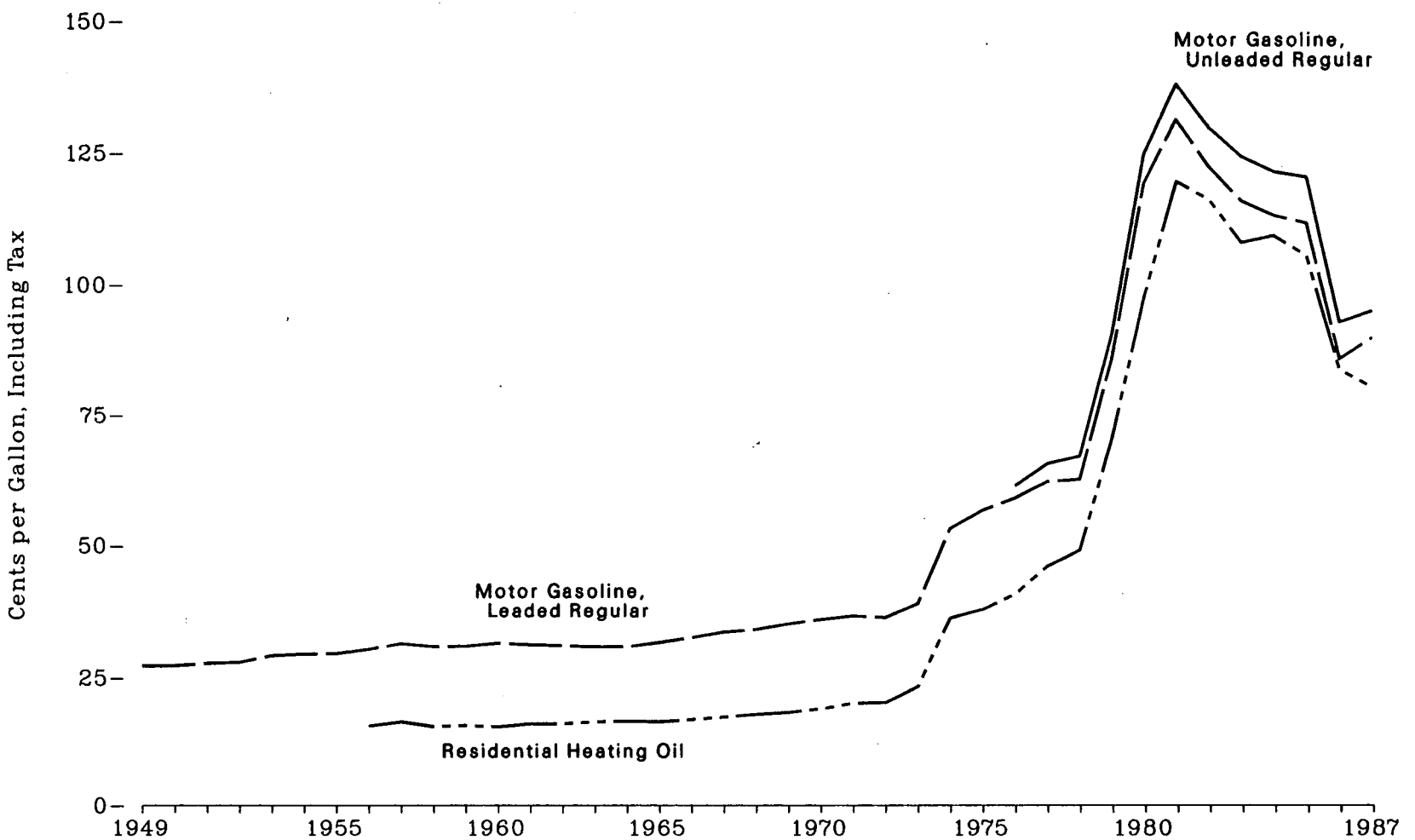
Table 64. Refiner Sales Prices of Petroleum Products, 1978-1987

(Cents per Gallon, Excluding Taxes)

Product	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987 [1]
To Resellers:										
Aviation Gasoline	53.7	72.1	112.8	125.0	122.8	117.8	116.5	113.0	91.2	85.7
Motor Gasoline										
Leaded Regular	NA	NA	NA	NA	NA	85.0	79.5	79.3	50.1	56.4
Unleaded Regular	NA	NA	NA	NA	NA	89.5	84.2	84.3	52.2	56.9
Premium	NA	NA	NA	NA	NA	96.4	91.6	92.2	61.0	67.1
Average	43.4	63.7	94.1	106.4	97.3	88.2	83.2	83.5	53.1	58.9
Kerosene	40.4	62.4	86.4	106.6	101.8	89.2	91.6	87.4	60.6	59.2
Jet Fuel, Kerosene-Type	38.6	66.0	86.8	101.2	95.3	85.4	83.0	79.4	49.5	53.6
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
No. 2 Distillate Fuel Oil										
No. 2 Fuel Oil	36.9	56.9	80.3	97.6	91.4	81.5	82.1	77.6	48.6	52.7
No. 2 Diesel Oil	36.5	57.4	80.1	97.2	91.4	80.8	80.3	77.2	45.2	53.4
Average	36.7	57.1	80.2	97.4	91.4	81.2	81.3	77.4	47.0	53.0
No. 4 Distillate Fuel Oil [2]	30.5	47.0	67.0	78.3	73.7	72.6	70.7	67.2	40.9	46.8
Residual Fuel Oil										
1% or Less Sulfur Content	29.3	45.0	60.8	74.8	69.5	64.3	68.5	61.0	32.8	41.3
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
Average	26.3	39.9	52.8	66.3	61.2	60.9	65.4	57.7	30.5	38.6
Propane (Consumer Grade)	23.7	29.1	41.5	46.6	42.7	48.4	45.0	39.8	29.0	25.2
To End Users:										
Aviation Gasoline	51.6	68.9	108.4	130.3	131.2	125.5	123.4	120.1	101.1	90.5
Motor Gasoline										
Leaded Regular	NA	NA	NA	NA	NA	90.6	84.8	84.2	57.3	61.5
Unleaded Regular	NA	NA	NA	NA	NA	97.0	91.5	91.7	61.6	64.4
Premium	NA	NA	NA	NA	NA	105.7	101.5	102.3	73.7	77.4
Average	48.4	71.3	103.5	114.7	106.0	95.4	90.7	91.2	62.4	66.2
Kerosene	42.1	58.5	90.2	112.3	108.9	96.1	103.6	103.0	79.0	76.9
Jet Fuel, Kerosene-Type	38.7	54.7	86.8	102.4	96.3	87.8	84.2	79.6	52.9	54.3
No. 1 Distillate Fuel Oil	40.9	57.2	83.4	103.9	102.3	96.2	92.7	88.0	62.0	60.3
No. 2 Distillate Fuel Oil										
No. 2 Fuel Oil	40.0	51.6	78.8	91.4	90.5	91.6	91.6	84.9	56.0	58.1
No. 2 Diesel Oil	37.7	58.5	81.8	99.5	94.2	82.6	82.3	78.9	47.8	54.9
Average	39.6	55.1	80.4	95.8	92.5	83.9	83.7	79.9	49.1	55.4
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
Residual Fuel Oil										
1% or Less Sulfur Content	31.4	46.8	67.5	82.9	74.7	69.5	72.0	64.4	37.2	44.3
Greater than 1% Sulfur Content	27.5	38.9	52.3	67.3	61.1	61.1	65.9	58.2	31.7	39.5
Average	29.8	43.6	60.7	75.6	67.6	65.1	68.7	61.0	34.3	42.1
Propane (Consumer Grade)	33.5	35.7	48.2	56.5	59.2	70.9	73.7	71.7	74.5	70.0

[1] Preliminary.
[2] Includes No. 4 fuel oil and No. 4 diesel fuel.
NA = Not available.
Sources: •1978 through 1982—Energy Information Administration, Form EIA-460, "Petroleum Industry Monthly Report for Product Prices," the source for backcast estimates. •1983 and forward—Energy Information Administration, Form EIA-782A, "Monthly Petroleum Product Sales Report."

Figure 65. Motor Gasoline and Residential Heating Oil Retail Prices, 1949-1987



Source: See Table 65.

Table 65. Motor Gasoline and Residential Heating Oil Retail Prices, 1949-1987

(Cents per Gallon, Including Tax)

Year	Motor Gasoline Leaded Regular [1]		Motor Gasoline Unleaded Regular [1]		Residential Heating Oil [2]	
	Current	Constant [3]	Current	Constant [3]	Current	Constant [3]
1949	26.8	114.0	NA	NA	NA	NA
1950	26.8	112.1	NA	NA	NA	NA
1951	27.2	108.4	NA	NA	NA	NA
1952	27.4	107.5	NA	NA	NA	NA
1953	28.7	110.8	NA	NA	NA	NA
1954	29.0	110.3	NA	NA	NA	NA
1955	29.1	107.0	NA	NA	NA	NA
1956	29.9	106.4	NA	NA	15.2	54.1
1957	31.0	106.5	NA	NA	16.0	55.0
1958	30.4	102.4	NA	NA	15.1	50.8
1959	30.5	100.3	NA	NA	15.3	50.3
1960	31.1	100.6	NA	NA	15.0	48.5
1961	30.8	98.7	NA	NA	15.6	50.0
1962	30.6	95.9	NA	NA	15.6	48.9
1963	30.4	93.8	NA	NA	16.0	49.4
1964	30.4	92.4	NA	NA	16.1	48.9
1965	31.2	92.3	NA	NA	16.0	47.3
1966	32.1	91.7	NA	NA	16.4	46.9
1967	33.2	92.5	NA	NA	16.9	47.1
1968	33.7	89.4	NA	NA	17.4	46.2
1969	34.8	87.4	NA	NA	17.8	44.7
1970	35.7	85.0	NA	NA	18.5	44.0
1971	36.4	82.0	NA	NA	19.6	44.1
1972	36.1	77.6	NA	NA	19.7	42.4
1973	38.8	78.4	NA	NA	22.8	46.1
1974	53.2	98.5	NA	NA	36.0	66.7
1975	56.7	95.6	NA	NA	37.7	63.6
1976	59.0	93.5	61.4	97.3	40.6	64.3
1977	62.2	92.4	65.6	97.5	46.0	68.4
1978	62.6	86.7	67.0	92.8	49.0	67.9
1979	85.7	109.0	90.3	114.9	70.4	89.6
1980	119.1	139.0	124.5	145.3	97.4	113.7
1981	131.1	139.5	137.8	146.6	119.4	127.0
1982	122.2	122.2	129.6	129.6	116.0	116.0
1983	115.7	111.4	124.1	119.4	107.8	103.8
1984	112.9	104.8	121.2	112.5	109.1	101.3
1985	111.5	100.3	120.2	108.1	105.3	94.7
1986	85.7	75.1	92.7	81.2	83.6	73.3
1987	89.7	76.3	94.8	80.7	[4] 80.1	[4] 68.2

[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 through 1973, 55 representative cities; 1974 through 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 and forward exclude a very small amount of State and local sales taxes. There is no Federal excise tax on residential heating oil. [3] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C. [4] Preliminary. NA = Not available.
Sources: **Motor Gasoline, Leaded Regular:** •1949 through 1973—*Platt's Oil Price Handbook and Oilmanac, 1974*, 51st Edition. •1974 and forward—Bureau of Labor Statistics, *Consumer Prices: Energy*, monthly. **Motor Gasoline, Unleaded Regular:** •1949 through 1973—*Platt's Oil Price Handbook and Oilmanac, 1974*, 51st Edition. •1974 and forward—Bureau of Labor Statistics, *Consumer Prices: Energy*, monthly. **Residential Heating Oil:** •1956 through 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—Energy Information Administration, Form EIA 9, "No. 2 Heating Oil Supply/Price Monitoring Report." •1978 through 1982—Energy Information Administration, Form EIA-9A, "No. 2 Distillate Price Monitoring Report," the source for backcast estimates. •1983 and forward—Energy Information Administration, Form EIA-782A, "Monthly Petroleum Product Sales Report" and Form EIA-782B, "Monthly No. 2 Distillate Sales Report."

5. Natural Gas

Price Changes in a Regulated Market

Due to different Federal and State rate structures, there are many price categories for natural gas. In addition, prices to consumers vary by region; for example, prices are lower in main producing areas, where transmission costs are lower. Estimated data indicate that the average wellhead price of all categories of natural gas fell from $1.94 per thousand cubic feet in 1986 to $1.71 in 1987 (72).

When wellhead prices change, savings or price increases are passed on to consumers differentially. In 1986 (the most recent year for which complete data are available), the average wellhead price declined 23 percent. The price to industrial consumers fell 18 percent to $3.06 per thousand cubic feet and the price to electric utilities fell 32 percent to $2.43 per thousand cubic feet (73). On the other hand, the price to the residential sector, where distribution costs are higher and ratesetting may lag market adjustments, fell only 5 percent, to $5.83 per thousand cubic feet.

Demand Declines After 1972

Throughout the 1950's and 1960's, the market for natural gas continued to expand as low prices encouraged demand (70). 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 ultimately resulted in regional shortages during the second half of the 1970's. But in 1973, uncertainties about supply coupled with rising energy prices began to erode demand. By the 1980's, the decline in demand resulted in a short-term surplus of deliverable gas and production curtailments in many producing areas.

The decline in demand spanned all end-use sectors but was most severe in the industrial and electric utility sectors, where, during the 1980's, the option of fuel-switching proved to be most viable. Total consumption of natural gas fell from a peak of 22 trillion cubic feet in 1972 to 17 trillion cubic feet in 1987. (During that 15-year period, there were occasional, modest year-to-year increases. For example, 1987 consumption was up 3 percent from the 1986 level.) Decreased consumption by the industrial sector accounted for over half of the 5-trillion-cubic-foot reduction, and lower use at electric utilities accounted for about one-fifth.

On a share basis, industrial consumption fell from 44 percent in 1972 to 40 percent in 1987, while the electric utilities' share fell from 18 percent to 17 percent in the same period. In contrast, residential consumption

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

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 1986-1987 heating season, net withdrawals of natural gas from storage supplied over 12 percent of total consumption.[1]

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 (71). Underground storage of working gas[2] grew from 7 percent of annual consumption in 1969 to 17 percent in 1987. At the end of the year, working gas in storage was 2.8 trillion cubic feet and base gas was 3.8 trillion cubic feet.

[1]Energy Information Administration, *Monthly Energy Review*, December 1987, DOE/EIA-0035(87/12) (Washington, DC, March 1988), Tables 4.3 and 4.4.

[2]Working gas is gas in excess of base gas, which is the volume of gas needed to maintain optimum reservoir pressure.

accounted for a larger share of the total in 1987 compared with 1972; its share rose from 23 percent to 26 percent. Similarly, the commercial sector's share rose from 12 percent to 14 percent. The amount of natural gas used as pipeline fuel (transportation use) declined faster than did total consumption of natural gas and, in 1987, accounted for a 3-percent share.

Natural Gas Production and Productivity

In 1987, gross withdrawals of natural gas rose to 20 trillion cubic feet, up 4 percent from the year before but considerably below the level during the early 1970's, when withdrawals averaged 24 trillion cubic feet per year (67). Texas, Louisiana, and Oklahoma, the largest producers of natural gas, accounted for 70 percent of the U.S. total (69). Most withdrawals came from onshore wells and State offshore wells, but 5 trillion cubic feet (close to one-fourth of the total) were Federal offshore withdrawals.

The 20 trillion cubic feet of gross withdrawals in 1987 yielded 17 trillion cubic feet of marketed production (67). Reservoir repressuring, venting and flaring, and removal of nonhydrocarbon gases accounted for nearly 3 trillion cubic feet.

About 254 thousand gas wells were in operation during 1987 (69). Withdrawals from those wells accounted for almost three-fourths of all gross withdrawals, while oil wells supplied the remainder. After peaking at 435 thousand cubic feet per day in 1971, average gas well productivity declined. By 1987, average productivity had fallen to 158 thousand cubic feet per day.

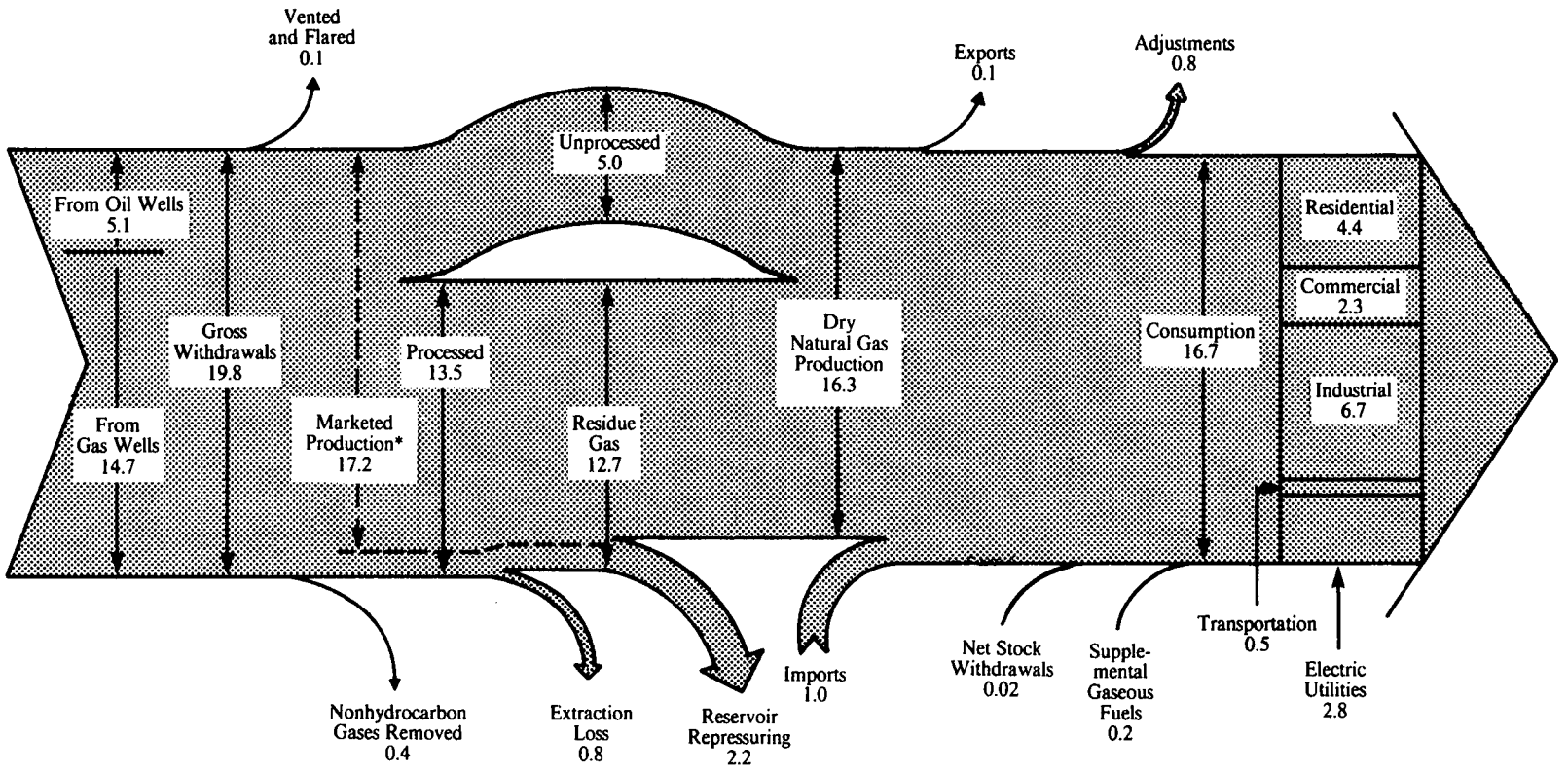
Imports and Exports

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 (68). In 1987, U.S. net imports of natural gas by all routes totaled 928 billion cubic feet, up 35 percent from 1986 net imports and the equivalent of 5.6 percent of domestic consumption.

Historically, Canada has been the major supplier of U.S. natural gas imports, with Mexico and, more recently, Algeria supplying smaller amounts. In 1986 and 1987, however, U.S. net imports from Mexico and Algeria fell essentially to zero, while Canada supplied net imports of 739 billion cubic feet in 1986 and 978 billion cubic feet in 1987.

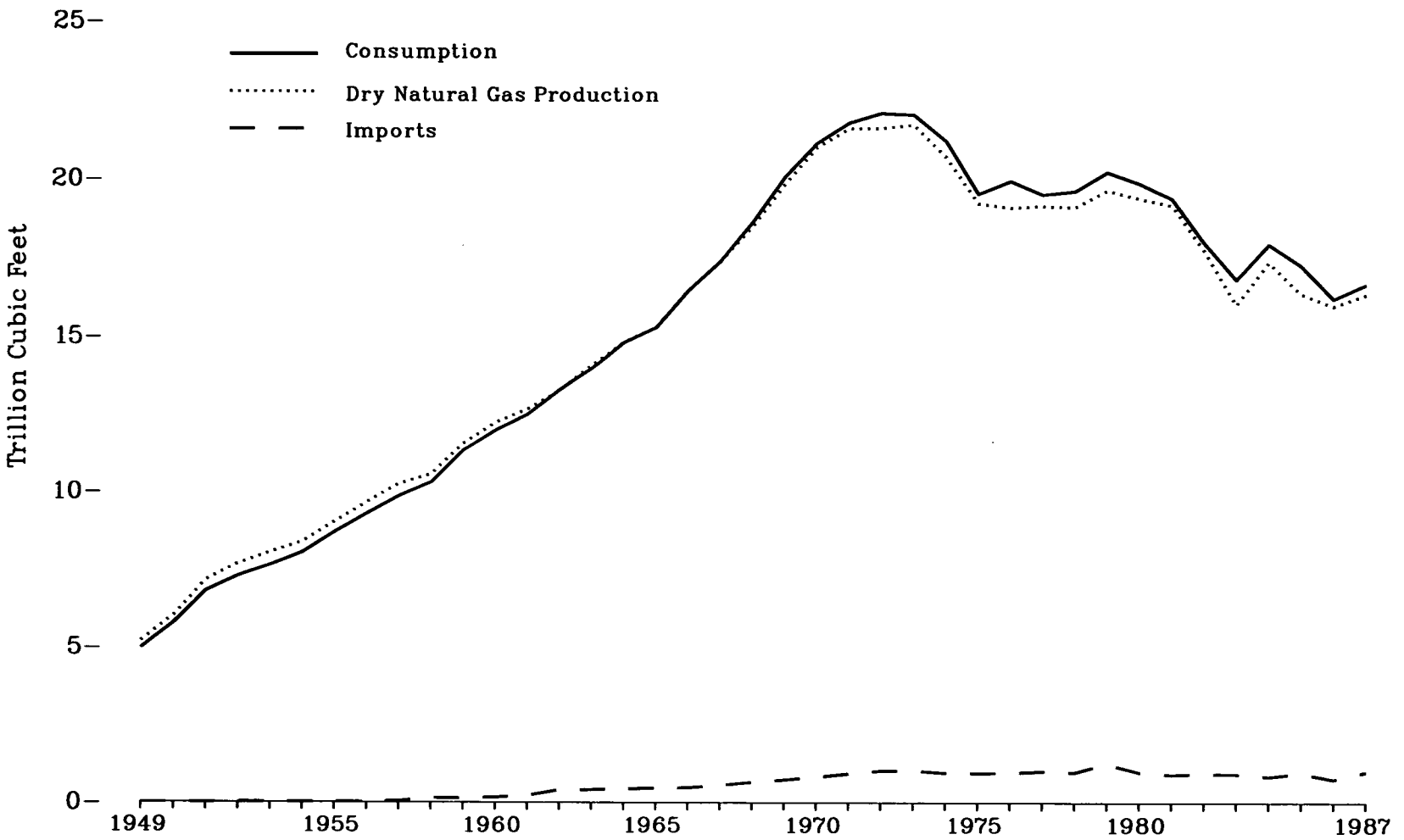
Since 1969, Japan has displaced both Canada and Mexico to become the primary purchaser of U.S. natural gas. In 1987, shipments of liquefied natural gas from Alaska to Japan totaled 48 billion cubic feet.

Diagram 3. Natural Gas Flow, 1987
(Trillion Cubic Feet)



*See Glossary.
Note: Sum of components may not equal totals due to independent rounding.
Sources: See Tables 66, 67, and 70.

Figure 66. Natural Gas Overview, 1949-1987



Source: See Table 66.

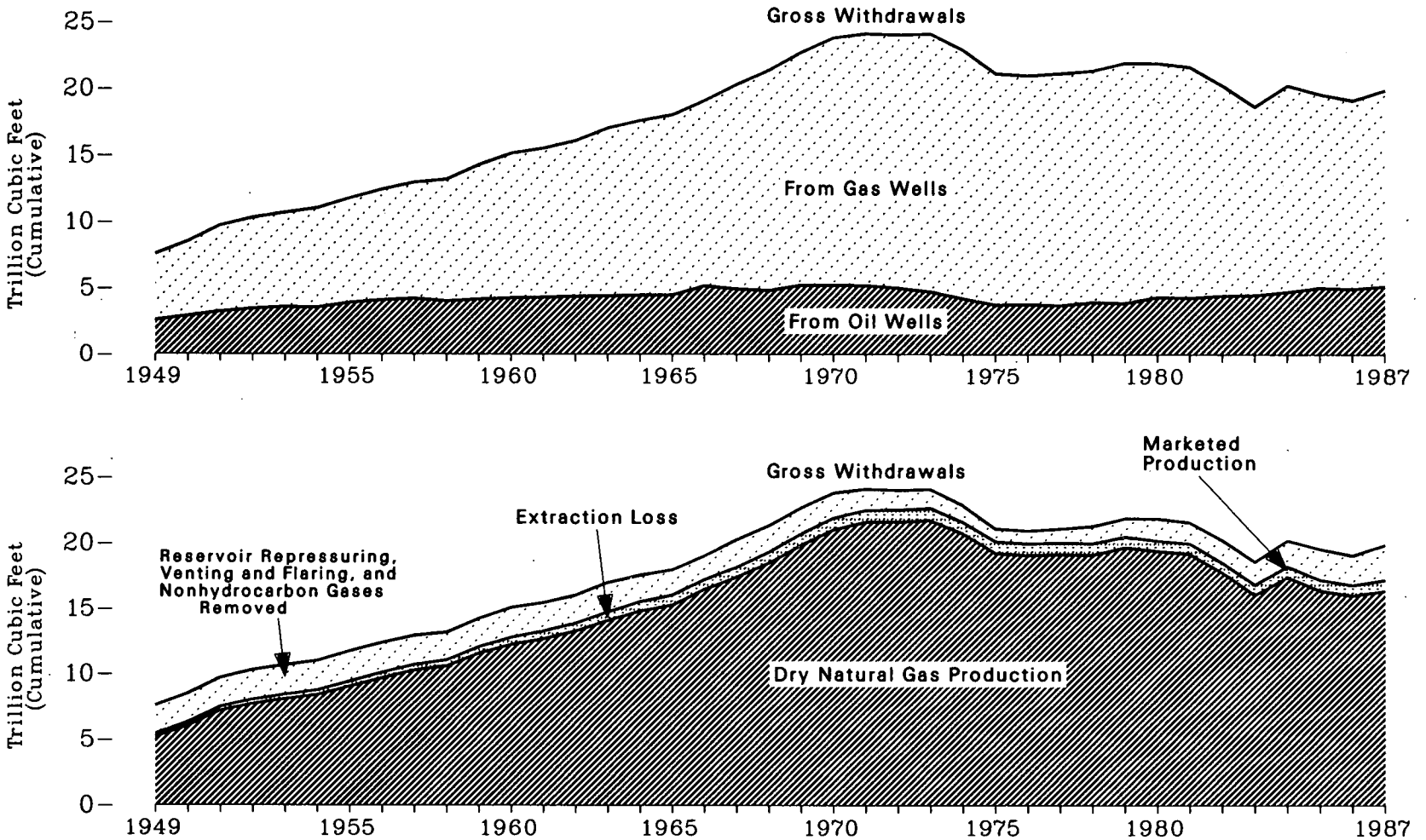
Table 66. Natural Gas Overview, 1949-1987

(Trillion Cubic Feet)

Year	Dry Natural Gas Production	Supplemental Gaseous Fuels	Imports	Exports	Withdrawals from Storage [1]	Additions to Storage [1]	Unaccounted For [2]	Consumption
1949	5.20	NA	0	0.02	0.11	0.17	0.14	4.97
1950	6.02	NA	0	0.03	0.18	0.23	0.18	5.77
1951	7.16	NA	0	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	17.76	0.14	0.93	0.05	2.16	2.47	0.47	18.00
1983	16.03	0.13	0.92	0.05	2.27	1.82	0.64	16.83
1984	17.39	0.11	0.84	0.05	2.10	2.30	0.14	17.95
1985	16.38	0.13	0.95	0.06	2.40	2.16	0.35	17.28
1986	15.99	0.11	0.75	0.06	1.84	1.98	0.43	16.22
1987[3]	16.35	0.16	0.99	0.06	1.98	1.96	0.77	16.68

[1] Beginning with 1980, includes liquefied natural gas (LNG) storage in above ground tanks.
[2] Unaccounted for gas, excluding intransit shipments for 1980 forward, is the imbalance between available supplies for consumption and actual consumption.
[3] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Note: 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.
Sources: •1949 through 1986—Energy Information Administration, *Natural Gas Annual 1986*, Table 26. •1987—Energy Information Administration, *Natural Gas Monthly*, January 1988.

Figure 67. Natural Gas Production, 1949-1987



Source: See Table 67.

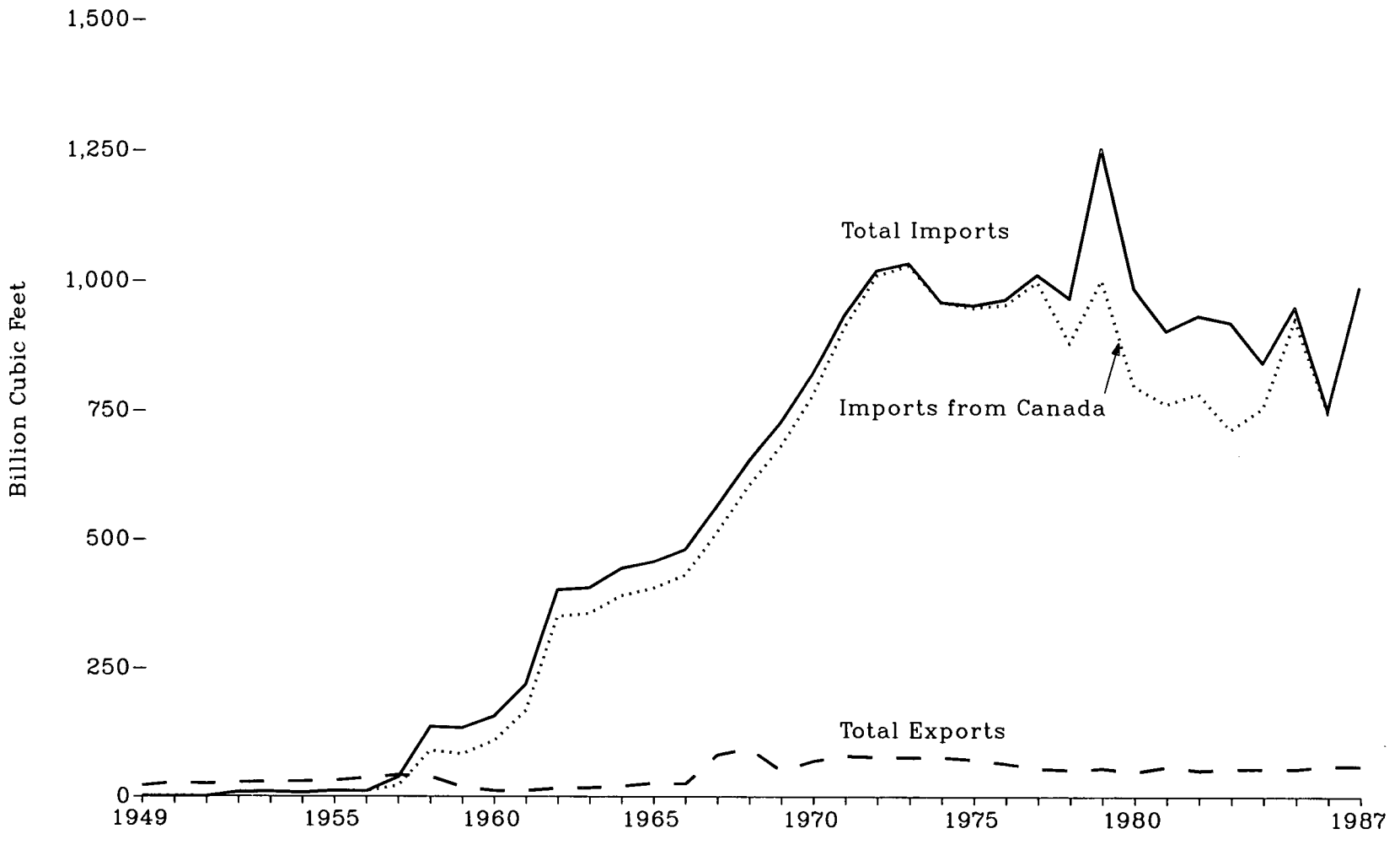
Table 67. Natural Gas Production, 1949-1987

(Trillion Cubic Feet)

Year	Gross Withdrawals: From Gas Wells	Gross Withdrawals: From Oil Wells	Gross Withdrawals: Total	Reservoir Repressuring	Non-hydrocarbon Gases Removed	Vented and Flared	Marketed Production	Extraction Loss [1]	Dry Natural Gas Production
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	15.80	4.41	20.21	1.39	0.21	0.09	18.52	0.76	17.76
1983	14.15	4.45	18.60	1.46	0.22	0.09	16.82	0.79	16.03
1984	15.51	4.69	20.19	1.63	0.22	0.11	18.23	0.84	17.39
1985	14.53	5.01	19.53	1.92	0.33	0.09	17.20	0.82	16.38
1986	14.15	4.92	19.06	1.84	0.34	0.10	16.79	0.80	15.99
1987[2]	14.72	5.12	19.83	2.16	0.40	0.11	17.16	0.82	16.35

[1] Volume reduction resulting from the removal of natural gas plant liquids. Natural gas plant liquids are transferred to petroleum supply.
[2] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Note: 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.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Natural Gas" chapter. •1976 through 1978—Energy Information Administration, Energy Data Reports, *Natural Gas, Annual*. •1979—Energy Information Administration, *Natural Gas Production and Consumption 1979* •1980 through 1986—Energy Information Administration, *Natural Gas Annual*. •1987—Energy Information Administration, *Natural Gas Monthly*, January 1988.

Figure 68. Natural Gas Imports and Exports, 1949-1987



Source: See Table 68.

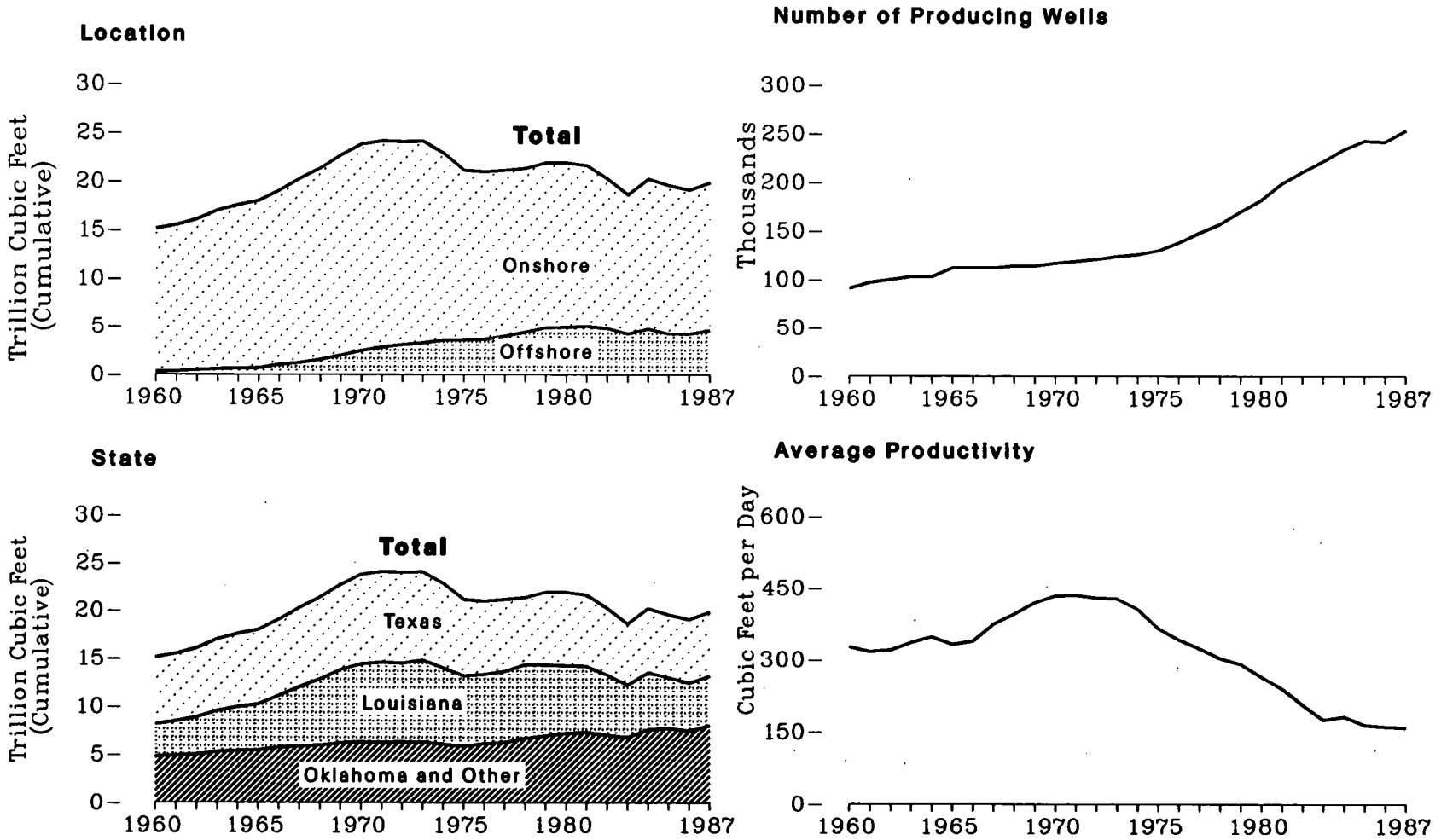
Table 68. Natural Gas Imports, Exports, and Net Imports, 1949-1987

(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	713	75	131	0	920	[3]	2	53	55	865	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	748	0	0	2	750	9	2	50	61	689	4.2
1987 [5]	988	0	0	0	988	10	2	48	60	928	5.6

[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.
[5] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1954—Energy Information Administration, unpublished data. •1955 through 1986—Energy Information Administration, *Natural Gas Monthly*, May 1987. •1987—Energy Information Administration, *Natural Gas Monthly*, January 1988.

Figure 69. Natural Gas Gross Withdrawals by State and Location and Gas Well Productivity, 1960-1987



Source: See Table 69.

Table 69. Natural Gas Gross Withdrawals by State and Location and Gas Well Productivity, 1960-1987

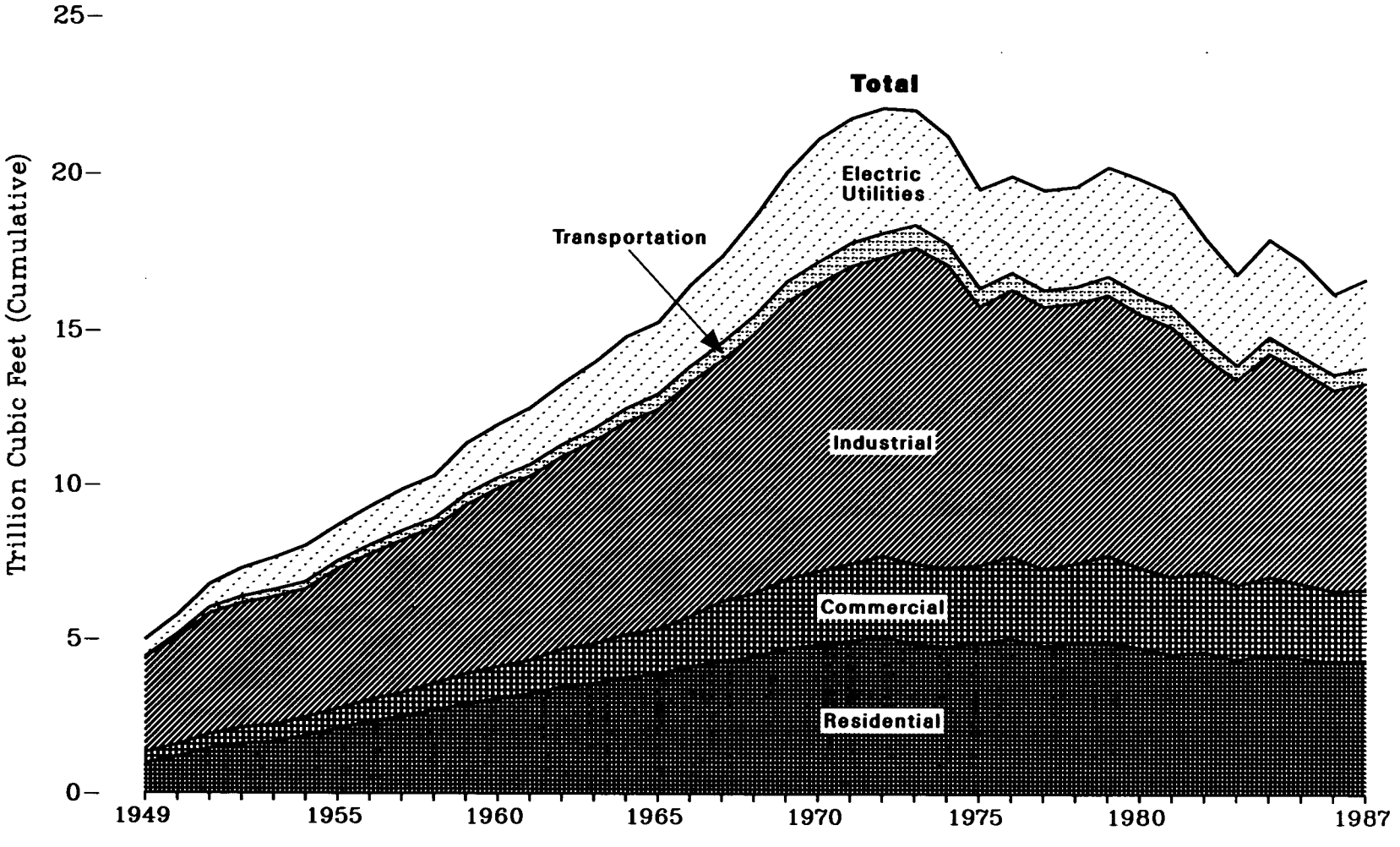
(Trillion Cubic Feet, Except as Noted)

Year	State				Location		Total	Gas Well [1] Productivity		
	Texas	Louisiana	Oklahoma	Other	Onshore [2]	Offshore [3]		Gross Withdrawals	Thousands of Producing Wells [4]	Average Productivity (thousand 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	1.93	5.08	15.44	4.77	20.21	15.80	211	205.4
1983	6.43	5.38	1.73	5.06	14.41	4.18	18.60	14.15	222	174.6
1984	6.71	5.89	1.99	5.61	15.49	4.71	20.19	15.51	234	181.2
1985	6.58	5.22	1.94	5.80	15.35	4.19	19.53	14.53	243	163.6
1986	6.66	4.96	1.92	5.52	14.88	4.19	19.06	14.15	242	160.5
1987[5]	6.70	5.12	1.98	6.02	15.26	4.57	19.83	14.72	254	158.4

[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.
[5] Preliminary.

Sources: **Offshore** (Outer Continental Shelf): •1960 through 1981—U.S. Geological Survey. •1982 and forward—The United States Minerals Management Service, *Mineral Revenues - The 1985 Report on Receipts from Federal and Indian Leases,* and predecessor annual reports. **All Other Data:** •1960 through 1966—Bureau of Mines, *Natural Gas Production and Consumption.* •1967 through 1986—Energy Information Administration, *Natural Gas Annual 1986.* •1987—Energy Information Administration, *Natural Gas Monthly,* January 1988, and *World Oil,* February 1988, Gulf Publishing Company, Houston, Texas.

Figure 70. Natural Gas Consumption by End-Use Sector, 1949-1987



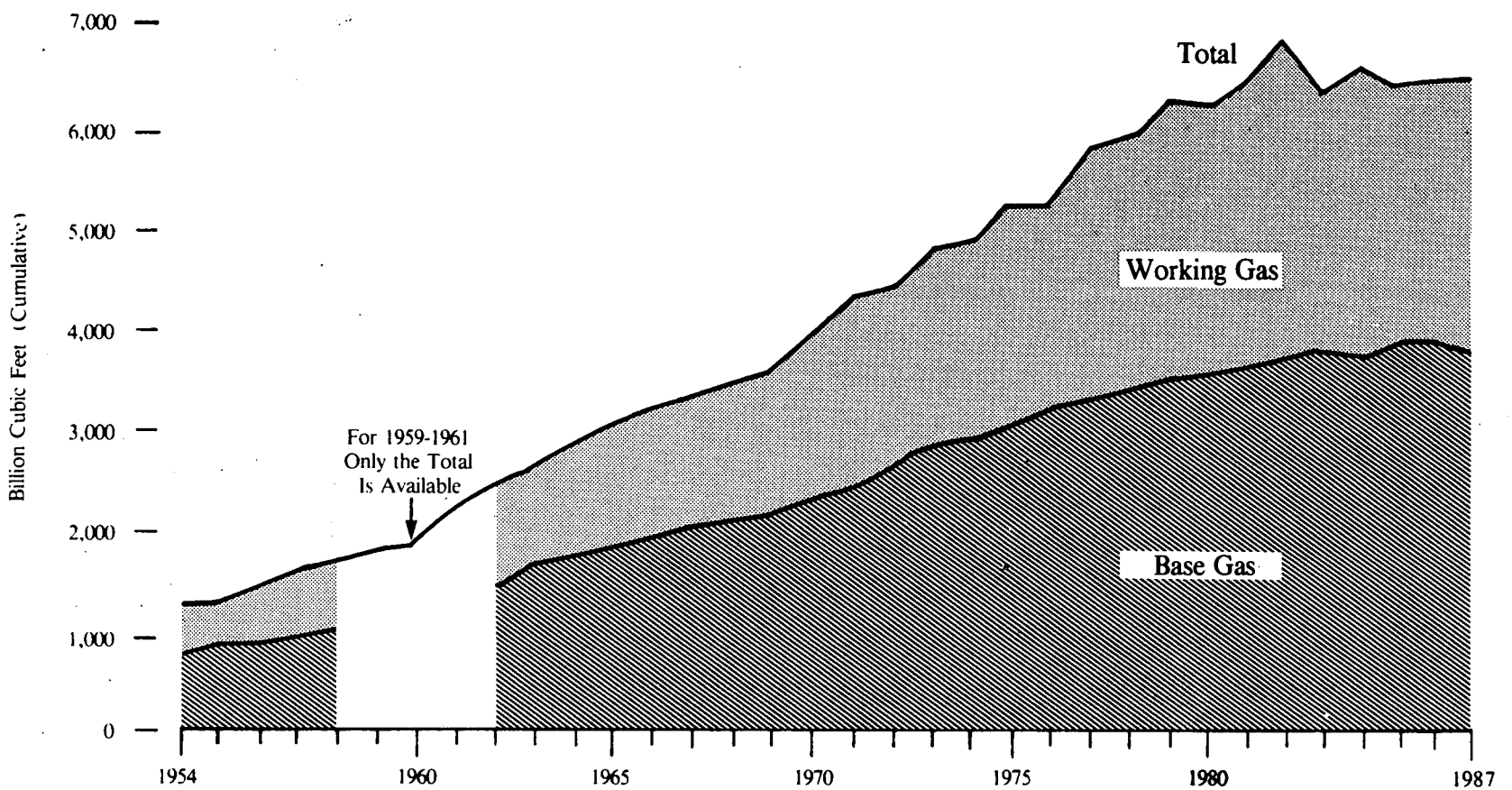
Source: See Table 70.

Table 70. Natural Gas Consumption by End-Use Sector,[1] 1949-1987
(Trillion Cubic Feet)

Year	Residential	Commercial[2]	Industrial			Electric Utilities	Transportation[3]	Total
			Lease and Plant Fuel	Other Industrial	Total Industrial			
1949	0.99	0.35	0.84	2.25	3.08	0.55	NA	4.97
1950	1.20	0.39	0.93	2.50	3.43	0.63	0.13	5.77
1951	1.47	0.46	1.15	2.77	3.91	0.76	0.19	6.81
1952	1.62	0.52	1.16	2.87	4.04	0.91	0.21	7.29
1953	1.69	0.53	1.13	3.03	4.16	1.03	0.23	7.64
1954	1.89	0.58	1.10	3.07	4.17	1.17	0.23	8.05
1955	2.12	0.63	1.13	3.41	4.54	1.15	0.25	8.69
1956	2.33	0.72	1.00	3.71	4.71	1.24	0.30	9.29
1957	2.50	0.78	1.05	3.89	4.93	1.34	0.30	9.85
1958	2.71	0.87	1.15	3.89	5.03	1.37	0.31	10.30
1959	2.91	0.98	1.24	4.22	5.46	1.63	0.35	11.32
1960	3.10	1.02	1.24	4.53	5.77	1.72	0.35	11.97
1961	3.25	1.08	1.29	4.67	5.96	1.83	0.38	12.49
1962	3.48	1.21	1.37	4.86	6.23	1.97	0.38	13.27
1963	3.59	1.27	1.41	5.13	6.55	2.14	0.42	13.97
1964	3.79	1.37	1.37	5.52	6.89	2.32	0.44	14.81
1965	3.90	1.44	1.16	5.96	7.11	2.32	0.50	15.28
1966	4.14	1.62	1.03	6.51	7.55	2.61	0.54	16.45
1967	4.31	1.96	1.14	6.65	7.79	2.75	0.58	17.39
1968	4.45	2.08	1.24	7.13	8.37	3.15	0.59	18.63
1969	4.73	2.25	1.35	7.61	8.96	3.49	0.63	20.06
1970	4.84	2.40	1.40	7.85	9.25	3.93	0.72	21.14
1971	4.97	2.51	1.41	8.18	9.59	3.98	0.74	21.79
1972	5.13	2.61	1.46	8.17	9.62	3.98	0.77	22.10
1973	4.88	2.60	1.50	8.69	10.18	3.66	0.73	22.05
1974	4.79	2.56	1.48	8.29	9.77	3.44	0.67	21.22
1975	4.92	2.51	1.40	6.97	8.36	3.16	0.58	19.54
1976	5.05	2.67	1.63	6.96	8.60	3.08	0.55	19.95
1977	4.82	2.50	1.66	6.82	8.47	3.19	0.53	19.52
1978	4.90	2.60	1.65	6.76	8.40	3.19	0.53	19.63
1979	4.97	2.79	1.50	6.90	8.40	3.49	0.60	20.24
1980	4.75	2.61	1.03	7.17	8.20	3.68	0.63	19.88
1981	4.55	2.52	0.93	7.13	8.06	3.64	0.64	19.40
1982	4.63	2.61	1.11	5.83	6.94	3.23	0.60	18.00
1983	4.38	2.43	0.98	5.64	6.62	2.91	0.49	16.83
1984	4.56	2.52	1.08	6.15	7.23	3.11	0.53	17.95
1985	4.43	2.43	0.97	5.90	6.87	3.04	0.50	17.28
1986	4.31	2.32	0.92	5.58	6.50	2.60	0.49	16.22
1987[4]	4.37	2.29	0.94	5.73	6.68	2.84	0.50	16.68

[1] See Appendix E, Note 11.
[2] Includes deliveries to municipalities and public authorities for institutional heating and other purposes.
[3] Pipeline fuel.
[4] Preliminary.
Note: Sum of components may not equal total due to independent rounding. 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.
Sources: Electric Utilities: •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration—Form EIA-759, "Monthly Power Plant Report." All Other Data: •1949 through 1982—Energy Information Administration, *Natural Gas Annual, 1983*, Appendix B. •1983 through 1986—Energy Information Administration, *Natural Gas Annual*. •1987—Energy Information Administration, *Natural Gas Monthly*, January 1988.

Figure 71. Underground Storage of Natural Gas, End of Year 1954-1987



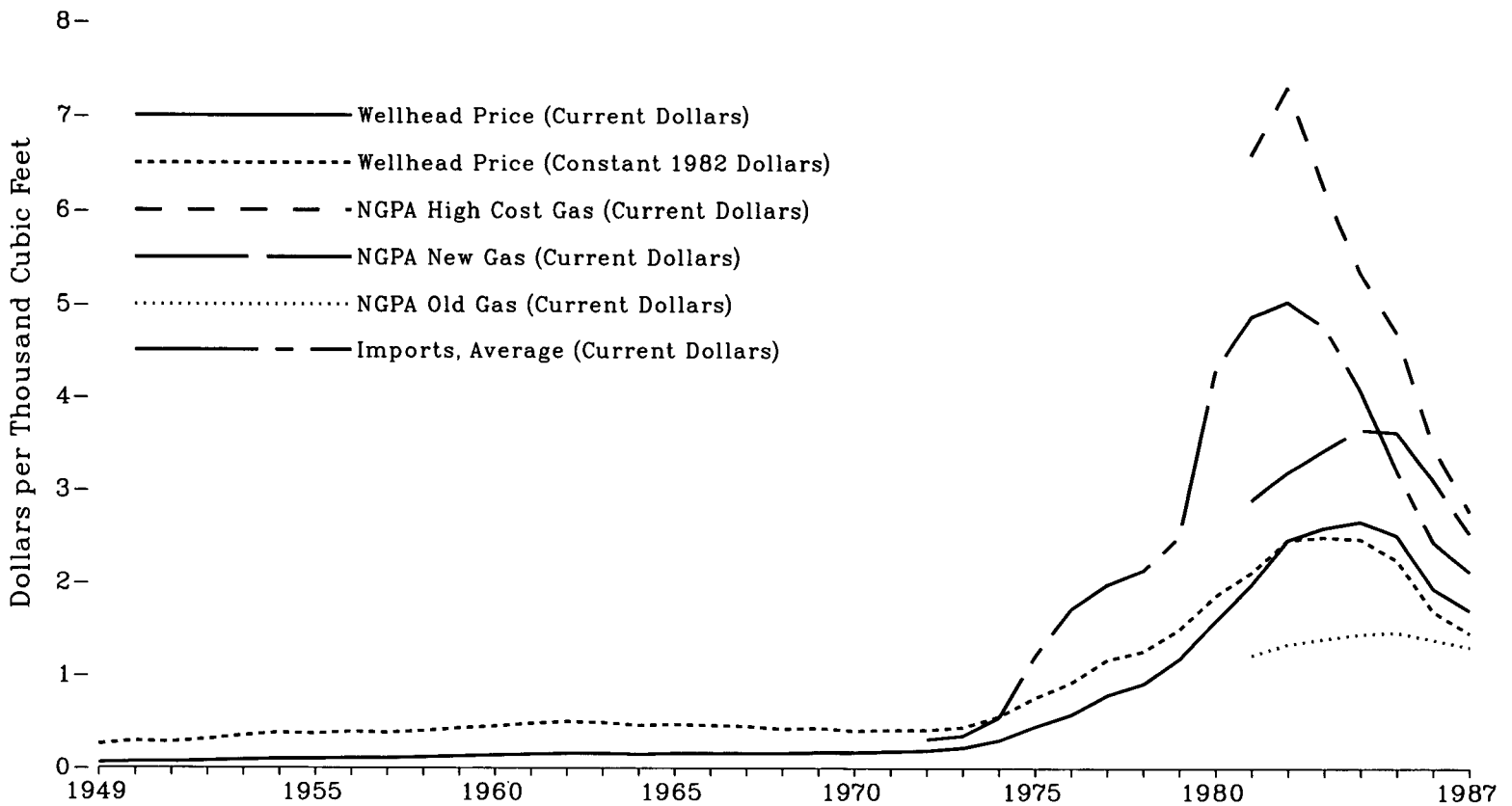
Source: See Table 71.

Table 71. Underground Storage of Natural Gas, End of Year 1954-1987
(Billion Cubic Feet)

Year	Base Gas [1]	Working Gas	Total Gas in Storage [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	2,755	6,547

[1] Includes native gas.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Note: 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.
Sources: •1954 through 1974—American Gas Association, *Gas Facts*. •1975 and 1976—Federal Energy Administration, Form G 318-M-O and Federal Power Commission, Form 8, "Underground Gas Storage Report." •1977 through 1978— Energy Information Administration, and Federal Energy Administration, Form G 318-M-O and Federal Power Commission, Form 8, "Underground Gas Storage Report." •1979 and forward—Energy Information Administration, EIA Form 191 and Federal Energy Regulatory Commission, FPC Form 8, "Underground Gas Storage Report."

Figure 72. Natural Gas Wellhead and Import Prices, 1949-1987



Source: See Table 72.

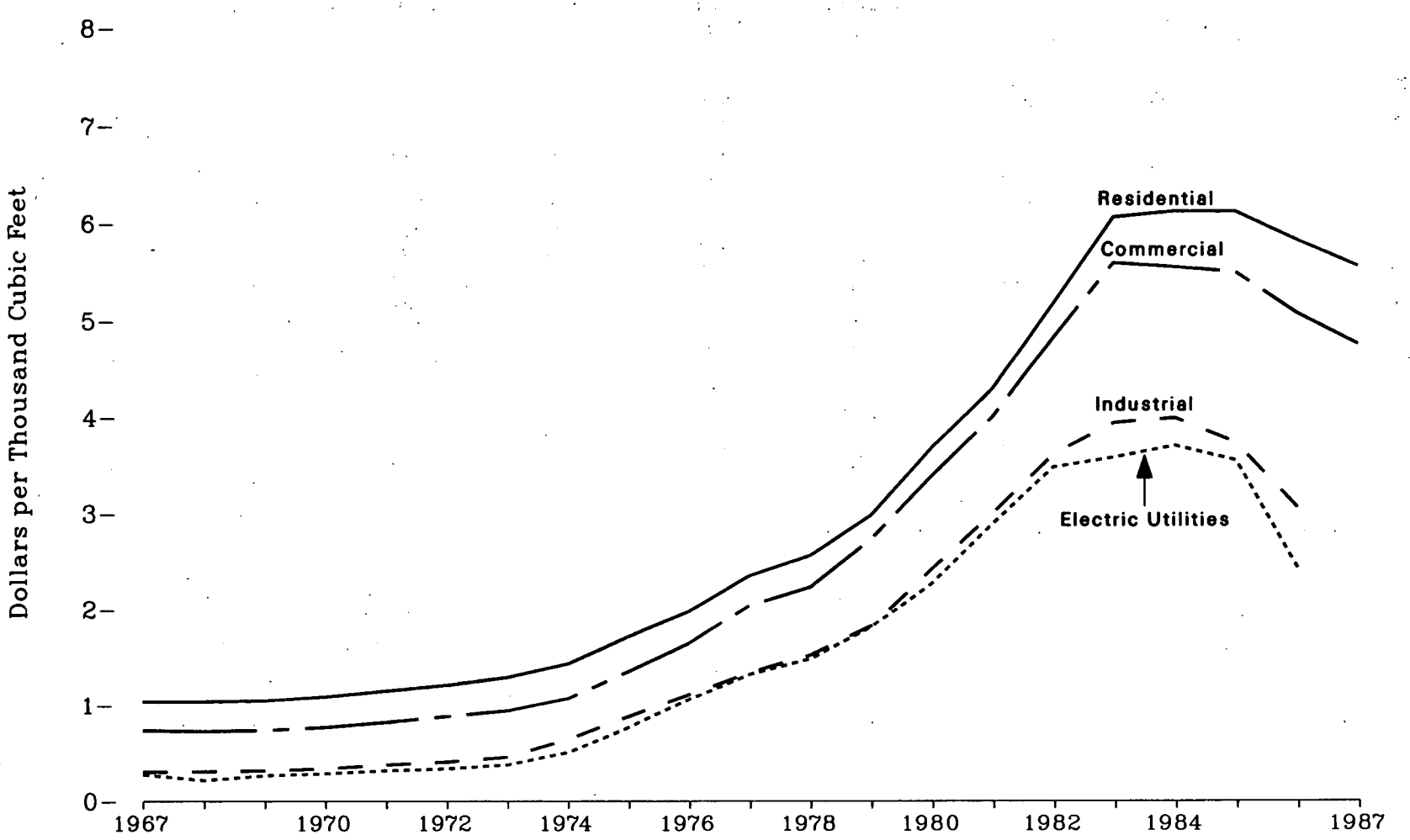
Table 72. Natural Gas Wellhead and Import Prices, 1949-1987

(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
	Current	Constant [4]	Current	Current	Current	Current	Current	Current
1949	0.06	0.26	—	—	—	NA	NA	NA
1950	0.07	0.29	—	—	—	NA	NA	NA
1951	0.07	0.28	—	—	—	NA	NA	NA
1952	0.08	0.31	—	—	—	NA	NA	NA
1953	0.09	0.35	—	—	—	NA	NA	NA
1954	0.10	0.38	—	—	—	NA	NA	NA
1955	0.10	0.37	—	—	—	NA	NA	NA
1956	0.11	0.39	—	—	—	NA	NA	NA
1957	0.11	0.38	—	—	—	NA	NA	NA
1958	0.12	0.40	—	—	—	NA	NA	NA
1959	0.13	0.43	—	—	—	NA	NA	NA
1960	0.14	0.45	—	—	—	NA	NA	NA
1961	0.15	0.48	—	—	—	NA	NA	NA
1962	0.16	0.50	—	—	—	NA	NA	NA
1963	0.16	0.49	—	—	—	NA	NA	NA
1964	0.15	0.46	—	—	—	NA	NA	NA
1965	0.16	0.47	—	—	—	NA	NA	NA
1966	0.16	0.46	—	—	—	NA	NA	NA
1967	0.16	0.45	—	—	—	NA	NA	NA
1968	0.16	0.42	—	—	—	NA	NA	NA
1969	0.17	0.43	—	—	—	NA	NA	NA
1970	0.17	0.40	—	—	—	NA	NA	NA
1971	0.18	0.41	—	—	—	NA	NA	NA
1972	0.19	0.41	—	—	—	0.31	1.38	0.31
1973	0.22	0.44	—	—	—	0.35	1.05	0.35
1974	0.30	0.56	—	—	—	0.55	(5)	0.55
1975	0.45	0.76	—	—	—	1.21	0.74	1.21
1976	0.58	0.92	—	—	—	1.73	0.77	1.72
1977	0.79	1.17	—	—	—	1.99	1.07	1.98
1978	0.91	1.26	—	—	—	2.19	1.53	2.13
1979	1.18	1.50	—	—	—	2.61	2.03	2.49
1980	1.59	1.86	—	—	—	4.33	3.77	4.28
1981	1.98	2.11	1.22	2.89	6.58	4.85	5.54	4.88
1982	2.46	2.46	1.34	3.19	7.31	4.98	5.82	5.03
1983	2.59	2.49	1.40	3.43	6.25	4.51	6.41	4.78
1984	2.66	2.47	1.45	3.65	5.35	4.04	4.90	4.08
1985	2.51	2.26	1.47	3.62	4.71	3.17	4.60	3.21
1986	1.94	1.70	1.39	3.11	3.48	2.42	4.62	2.44
1987[6]	1.71	1.46	1.31	2.53	2.77	2.12	0	2.12

[1] Projected natural gas wellhead purchase prices by major interstate pipeline companies by National Gas Policy Act of 1978 categories (see Appendix E, Note 12). [2] See Glossary for definition of Natural Gas Wellhead Price. [3] Primarily liquefied natural gas from Algeria. [4] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C. [5] Not applicable. All imports were by pipeline. [6] Estimated. — = Not applicable. NA = Not available. Sources: **Wellhead:** •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Natural Gas" chapter. •1976 through 1978—Energy Information Administration, Energy Data Reports, *Natural Gas, Annual.* •1979—Energy Information Administration, *Natural Gas Production and Consumption 1979.* •1980 through 1986—Energy Information Administration, *Natural Gas Annual.* •1987—Energy Information Administration, *Natural Gas Monthly.* **Purchases by NGPA Categories:** • 1981 and forward—Energy Information Administration, *Natural Gas Monthly.* **Imports:** • 1972 and 1973—Federal Power Commission, *Pipeline Imports and Exports of Natural Gas - Imports and Exports of LNG.* •1974 through 1976—Federal Power Commission, *United States Imports and Exports of Natural Gas,* annual. •1977 through 1986—Energy Information Administration, *Natural Gas Monthly,* May 1987. •1987—Energy Information Administration estimate.

Figure 73. Average Price of Natural Gas Consumed by End-Use Sector, 1967-1987



Source: See Table 73.

Table 73. Average Price of Natural Gas [1] Consumed by End-Use Sector, 1967-1987

(Dollars per Thousand Cubic Feet)

Year	Residential	Commercial [2]	Industrial			Electric Utilities	Transportation [3]	Average
			Lease and Plant Fuel	Other Industrial	Total Industrial			
1967	1.04	0.74	0.15	0.34	0.31	0.28	0.20	0.53
1968	1.04	0.73	0.16	0.34	0.31	0.22	0.20	0.51
1969	1.05	0.74	0.18	0.35	0.32	0.27	0.21	0.53
1970	1.09	0.77	0.18	0.37	0.34	0.29	0.21	0.55
1971	1.15	0.82	0.19	0.41	0.38	0.32	0.22	0.59
1972	1.21	0.88	0.20	0.45	0.41	0.34	0.23	0.63
1973	1.29	0.94	0.21	0.50	0.46	0.38	0.25	0.68
1974	1.43	1.07	0.51	0.67	0.65	0.51	0.30	0.84
1975	1.71	1.35	0.47	0.96	0.88	0.77	0.40	1.12
1976	1.98	1.64	0.57	1.24	1.11	1.06	0.51	1.38
1977	2.35	2.04	0.71	1.50	1.34	1.32	0.77	1.66
1978	2.56	2.23	0.79	1.70	1.52	1.48	0.90	1.85
1979	2.98	2.73	1.06	1.99	1.82	1.81	1.32	2.21
1980	3.68	3.39	1.43	2.56	2.42	2.27	1.85	2.80
1981	4.29	4.00	1.93	3.14	3.00	2.89	2.39	3.39
1982	5.17	4.82	2.23	3.87	3.61	3.48	2.97	4.15
1983	6.06	5.59	2.54	4.18	3.94	3.58	3.15	4.64
1984	6.12	5.55	2.71	4.22	3.99	3.70	3.04	4.67
1985	6.12	5.50	2.37	3.95	3.73	3.55	2.92	4.54
1986	5.83	5.08	2.02	3.23	3.06	2.43	2.52	3.97
1987	5.56	4.76	NA	2.71	NA	NA	NA	NA

[1] Dry natural gas including supplemental gaseous fuels.
[2] Includes deliveries to municipalities and public authorities for institutional heating and other purposes.
[3] Pipeline fuel.
NA = Not available.
Note: 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 Appendix E, Note 11.
Sources: **Electric Utilities:** •1967 through 1972 —Federal Power Commission, Form 4, "Monthly Power Plant Report." •1973 through 1976—Federal Power Commission, FPC Form 4, "Monthly Power Plant Report" and FPC Form 423, " Monthly Report of Cost and Quality of Fuels for Electric Plants." •1977—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report" and FPC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." •1978 through 1982—Energy Information Administration, FPC Form 4, "Monthly Power Plant Report" and FPC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." •1983 and forward—Energy Information Administration, *Electric Power Annual.* **All Other Data:** •1967 through 1975—Bureau of Mines, *Minerals Yearbook,* "Natural Gas" chapter. •1976 through 1978—Energy Information Administration, Energy Data Reports, *Natural Gas, Annual.* •1979—Energy Information Administration, *Natural Gas Production and Consumption 1979.* •1980 and forward—Energy Information Administration, *Natural Gas Annual.*

6. Coal

Prices

In 1975, the average real price[1] of bituminous coal and lignite at the minemouth peaked at $32.43 per short ton, and the average real price of anthracite peaked at $54.40 per short ton (81). After 1975, both prices declined, falling to about $19.57 per short ton of bituminous coal and lignite and to $36.60 per short ton of anthracite in 1987.

The average real price of coal purchased at electric utilities declined during the 1950's and 1960's (81). However, when prices of other fossil fuels rose rapidly after 1973, coal prices also increased, from $18.20 per short ton in 1973 to $28.63 per short ton the following year. (Despite that increase, coal remained the least expensive fossil fuel, on a Btu basis.) The price of coal gradually rose after 1974, peaking at $34.90 per short ton in 1982, and then declined each year through 1987, by which time the price had fallen to $27.23.

The average real price of coal coke consumed at blast furnaces also reached its highest level—$141.70 per short ton—in 1975, and then gradually declined to $90.97 per short ton in 1985.

Changing Patterns of Coal Production

Bituminous coal accounts for by far the largest share of all coal production. In 1987, production of all types of coal totaled 917 million short tons, of which 835 million were bituminous and subbituminous coal (75). Lignite and anthracite accounted for the remainder. Despite its superior burning qualities, anthracite, mined primarily in Pennsylvania, accounts for a diminishing share of total coal production. In 1950, anthracite accounted for 8 percent of the total; by 1987, its share had shrunk to less than one-half of 1 percent.

More coal is mined East of the Mississippi than in the West, but the West's share of total production increased steadily after 1968. That year, production of Western coal was 30 million shorts tons, 5 percent of the total. By 1987, Western production had increased by more than 11 times, to 337 million short tons—37 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.

The Peak in Productivity

The average productivity of all types of mines in the United States increased each year after 1949, reaching 2.4 short tons per miner hour in 1969 (80). 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 and to environmental concerns, among other factors.

The growing importance of surface coal mining, where productivity is generally higher than for underground mining, led to increases in average productivity during the mid-1980's. In 1986, average productivity reached an all-time high of 3.0 short tons per miner hour. That year, productivity of underground mines (excluding anthracite) was 2.0 short tons per miner hour and productivity of surface mines (excluding anthracite) was 4.7 short tons per miner hour.

[1]Real prices are expressed in 1982 constant dollars.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Domestic Markets: Changes in Coal End Use

Electric utilities are the dominant consumers of coal (76). Their consumption grew from 84 million short tons, a 17-percent share, in 1949, to 718 million short tons, an 86-percent share, in 1987.

In contrast, consumption by all other economic sectors in 1987 was lower than it had been in 1949. The most dramatic declines occurred in the transportation sector, where railroads switched to petroleum, and the residential and commercial sector. In 1949, those two sectors accounted for 187 million short tons, over one-third of total coal consumption. By 1987, their consumption had fallen to 7 million short tons, less than 1 percent of total consumption.

Consumption by the industrial sector, including coke plants, trended downward after the mid-1960's. In 1987, industrial consumption was down to 111 million short tons, about 13 percent of total domestic coal consumption, from an all-time high of 205 million short tons, 41 percent of the total, in 1966.

Foreign Markets

Since World War II, coal has been the United States' major energy export (5). Throughout most of the 1960's and 1970's, U.S. exports of coal increased, peaking at 113 million shorts tons in 1981 (77). Increased shipments to Canada and Japan and to European markets contributed to the growth.

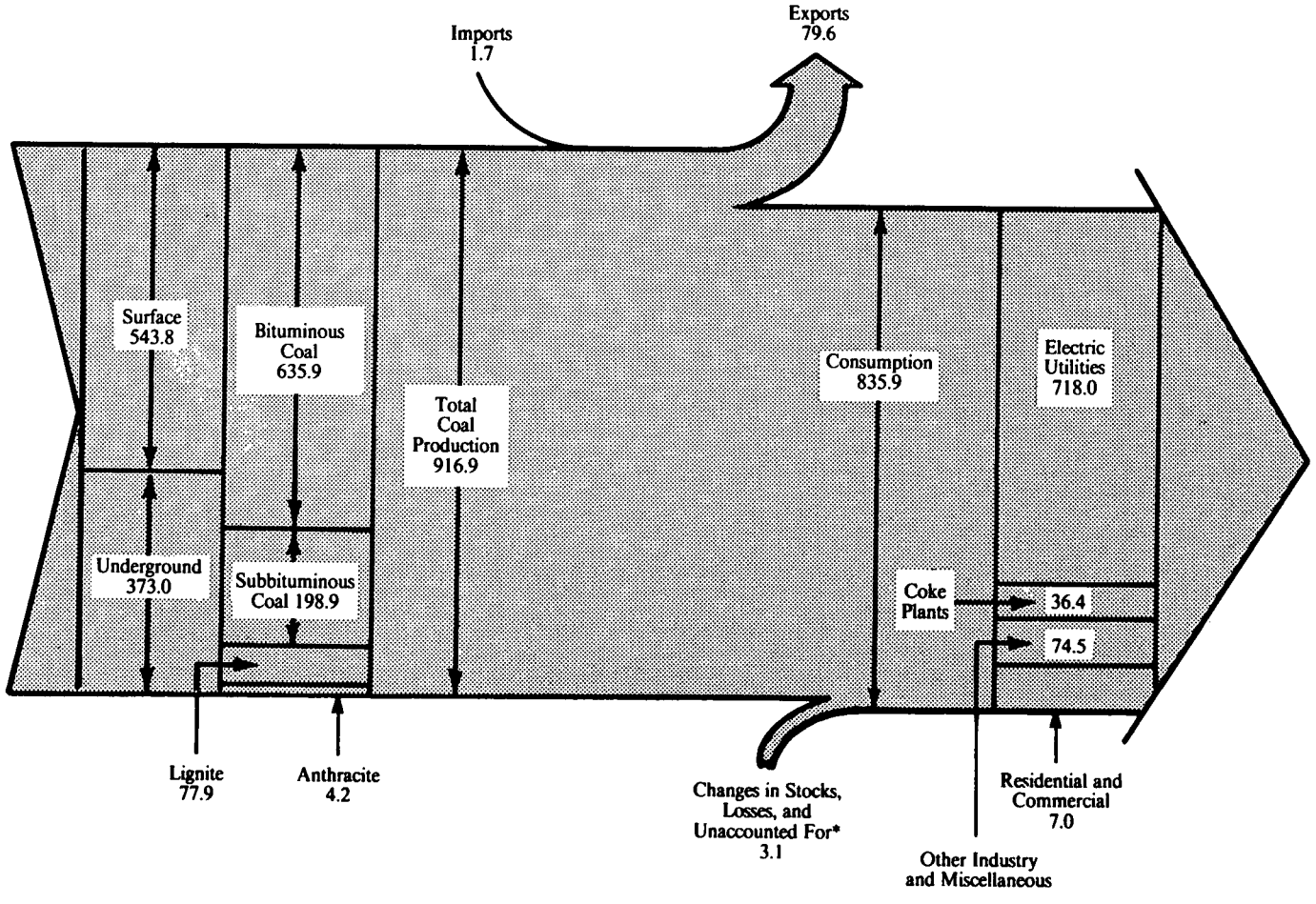
U.S. coal exports declined after 1981 and, despite a partial recovery in 1984 and 1985, exports in 1987 had fallen to 80 million short tons. Canada, Italy, and Japan remained the three largest markets for U.S. coal and together accounted for 46 percent of total exports in 1987. However, Japan's 1987 purchases were less than half those of 1981, and U.S. exports to France, West Germany, Spain, and Denmark also were down markedly compared with 1981 levels.

Stocks

Although there is little seasonal variation in demand, production of coal can vary considerably due to factors such as coal miners' strikes and bad weather. To compensate for possible supply interruptions, coal producers and distributors, as well as major consumers such 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 (78) and then drawn down to augment supplies during the 1981 miners' strike. Despite stockpiling during the second half of the year, after the strike had ended, 1981 year-end stocks totaled 209 million short tons, 19 million short tons below the level at the end of the previous year.

At the end of 1987, coal stocks totaled 217 million short tons. Electric utilities held over 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.

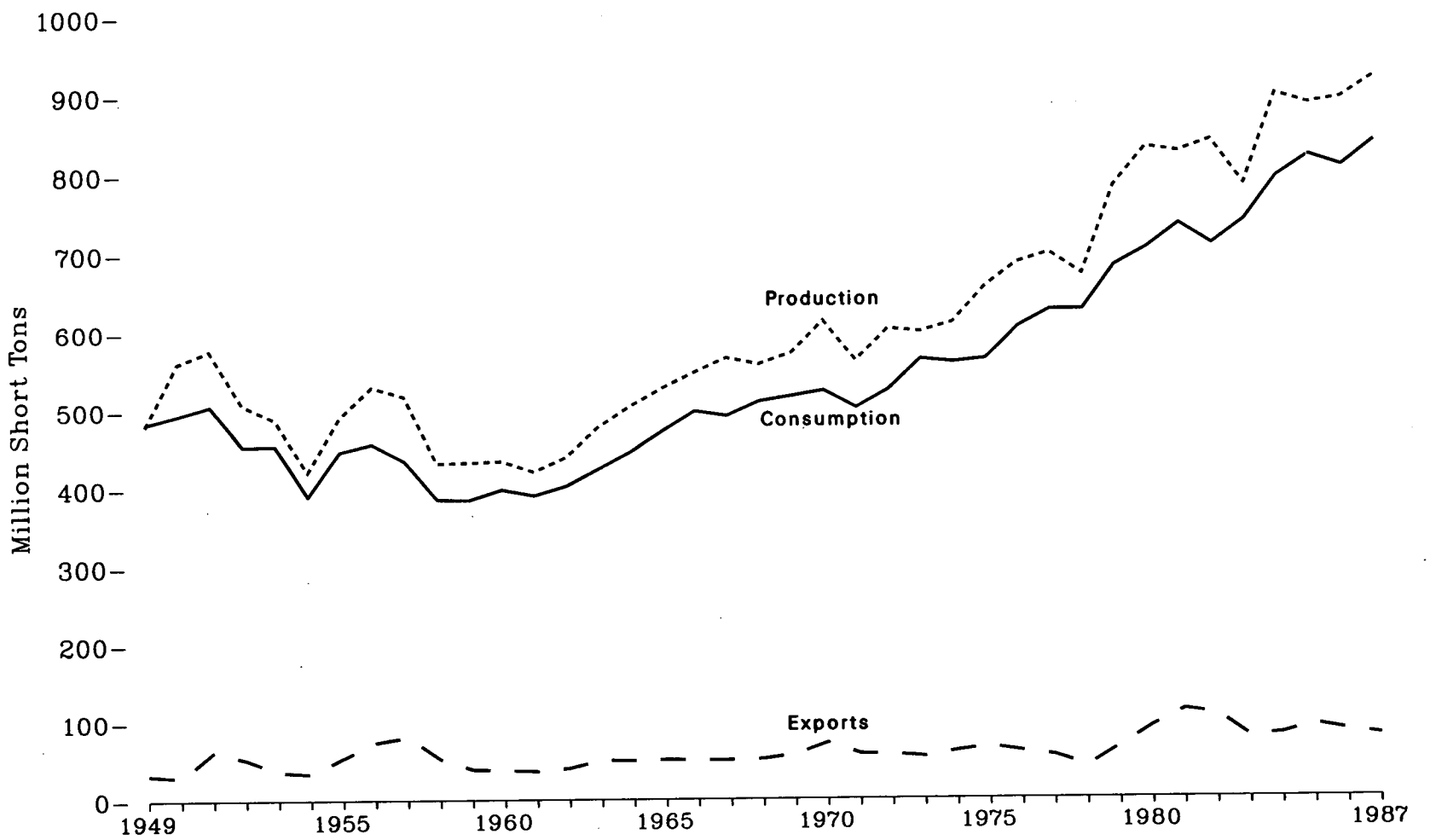
Diagram 4. Coal Flow, 1987
(Million Short Tons)



*Also includes overseas shipments to U.S. Armed Forces.

Note: Sum of components may not equal totals due to independent rounding.
Sources: See Tables 74, 75, and 76.

Figure 74. Coal Overview, 1949-1987



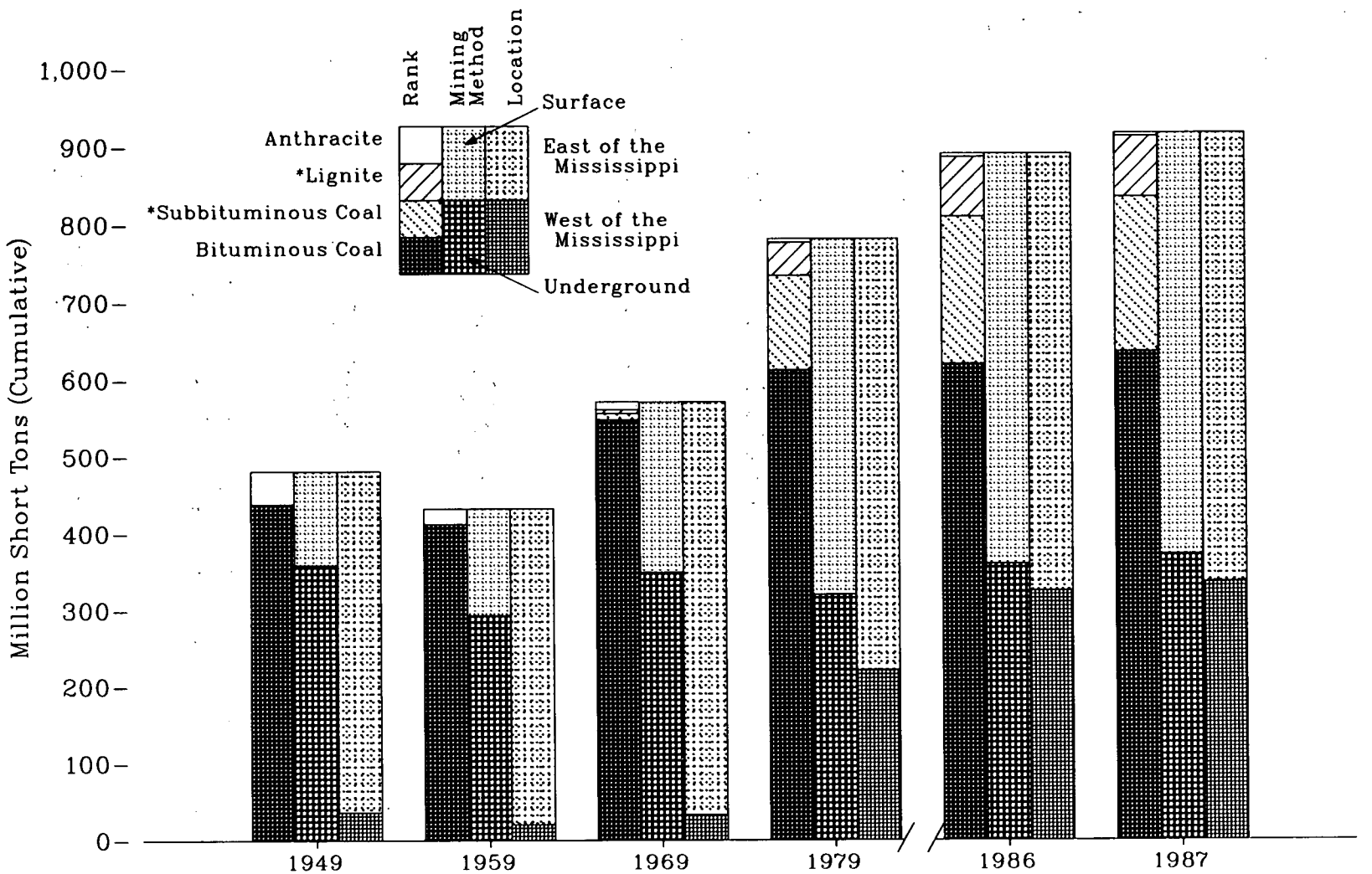
Source: See Table 74.

Table 74. Coal Overview, 1949-1987
(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	20.4	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	-2.7	804.3
1987[3]	916.9	1.7	79.6	-3.1	835.9

[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. Also includes overseas shipments to U.S. Armed Forces. Net additions to stocks are considered as negative numbers. Net withdrawals from stocks are considered as positive numbers.
[2] Less than 0.05 million short tons.
[3] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. •1977 and 1978—Energy Information Administration, Energy Data Reports, *Bituminous Coal and Lignite Production and Mine Operations-1977;....1978* and *Coal-Pennsylvania Anthracite 1977;....1978*. • 1979 through 1980—Energy Information Administration, Energy Data Report, *Weekly Coal Report*. •1981 and forward—Energy Information Administration, *Weekly Coal Production*.

Figure 75. Coal Production, Selected Years, 1949–1987



*Included with bituminous coal for 1949 and 1959.
Source: See Table 75.

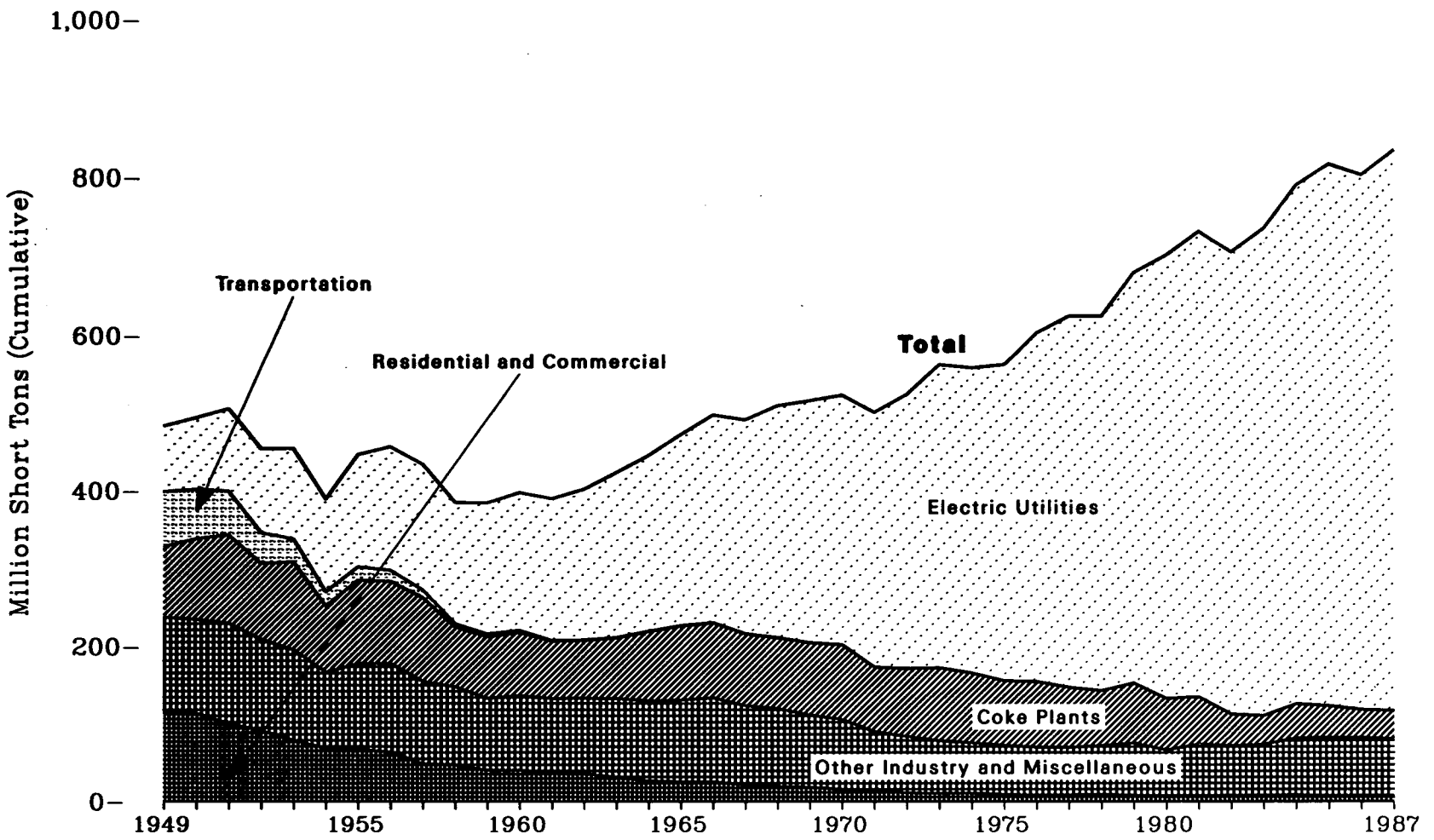
Table 75. Coal Production, 1949-1987

(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[2]	635.9	198.9	77.9	4.2	373.0	543.8	336.6	580.3	916.9

[1] Included in bituminous coal.
[2] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. •1977 and 1978—Energy Information Administration, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; ...1978, Coal-Pennsylvania Anthracite 1977; ...1978*, and *Coal Production* (annual). •1979 through 1980—Energy Information Administration, Energy Data Report, *Weekly Coal Report* and *Coal Production* (annual). •1981 and forward—Energy Information Administration, *Weekly Coal Production* and *Coal Production* (annual).

Figure 76. Coal Consumption by End-Use Sector, 1949-1987



Source: See Table 76.

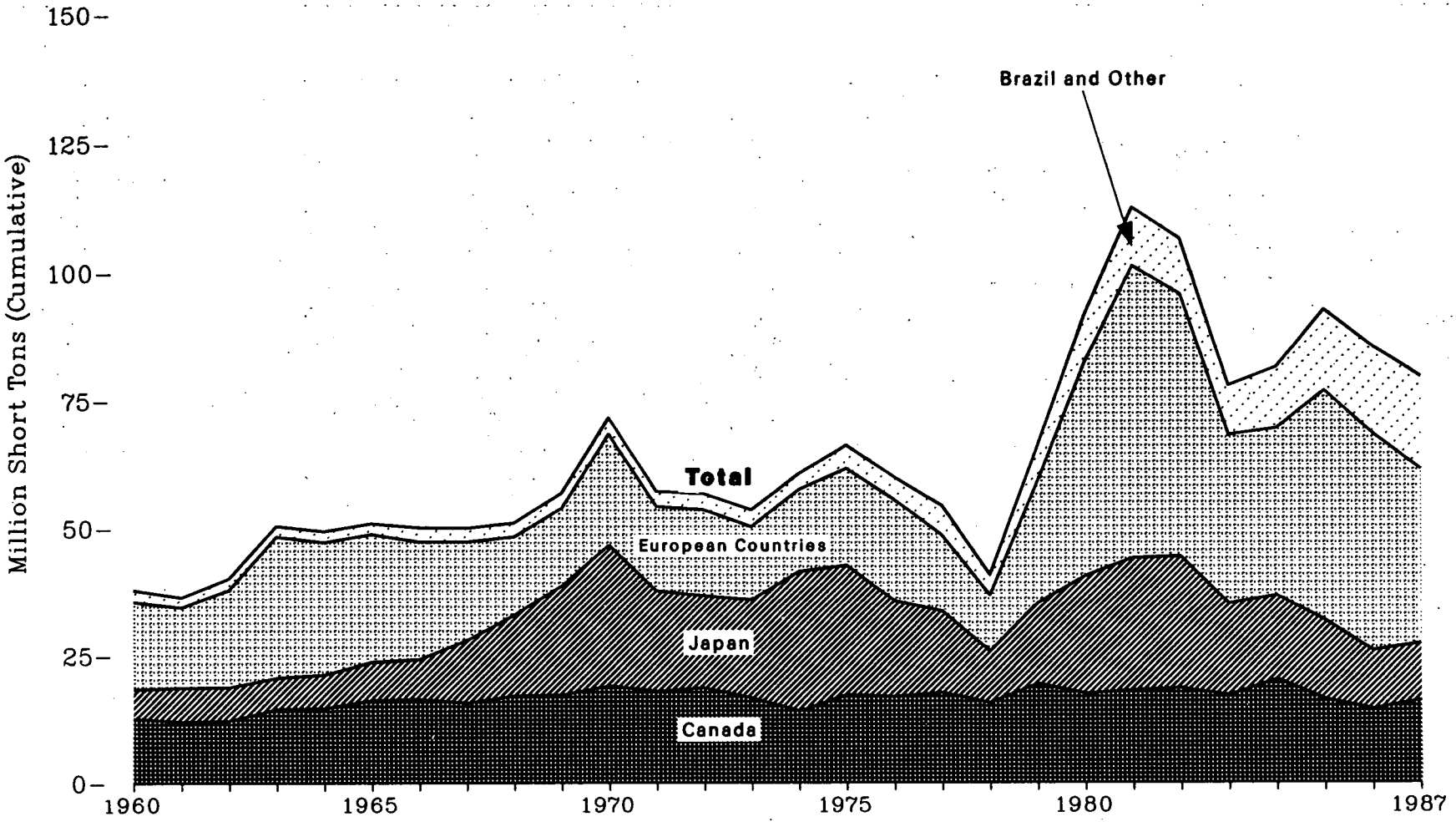
Table 76. Coal Consumption by End-Use Sector,[1] 1949-1987

(Million Short Tons)

Year	Industry and Miscellaneous				Transportation	Residential and Commercial	Total
	Electric Utilities	Coke Plants	Other Industry and Miscellaneous	Total			
1949	84.0	91.4	121.2	212.6	70.2	116.5	483.2
1950	91.9	104.0	120.6	224.6	63.0	114.6	494.1
1951	105.8	113.7	128.7	242.4	56.2	101.5	505.9
1952	107.1	97.8	117.1	214.9	39.8	92.3	454.1
1953	115.9	113.1	117.0	230.1	29.6	79.2	454.8
1954	118.4	85.6	98.2	183.9	18.6	69.1	389.9
1955	143.8	107.7	110.1	217.8	17.0	68.4	447.0
1956	158.3	106.3	114.3	220.6	13.8	64.2	456.9
1957	160.8	108.4	106.5	214.9	9.8	49.0	434.5
1958	155.7	76.8	100.5	177.4	4.7	47.9	385.7
1959	168.4	79.6	92.7	172.3	3.6	40.8	385.1
1960	176.7	81.4	96.0	177.4	3.0	40.9	398.1
1961	182.2	74.2	95.9	170.1	0.8	37.3	390.4
1962	193.3	74.7	97.1	171.7	0.7	36.5	402.3
1963	211.3	78.1	101.9	180.0	0.7	31.5	423.5
1964	225.4	89.2	103.1	192.4	0.7	27.2	445.7
1965	244.8	95.3	105.6	200.8	0.7	25.7	472.0
1966	266.5	96.4	108.7	205.1	0.6	25.6	497.7
1967	274.2	92.8	101.8	194.6	0.5	22.1	491.4
1968	297.8	91.3	100.4	191.6	0.4	20.0	509.8
1969	310.6	93.4	93.1	186.6	0.3	18.9	516.4
1970	320.2	96.5	90.2	186.6	0.3	16.1	523.2
1971	327.3	83.2	75.6	158.9	0.2	15.2	501.6
1972	351.8	87.7	72.9	160.6	0.2	11.7	524.3
1973	389.2	94.1	68.0	162.1	0.1	11.1	562.6
1974	391.8	90.2	64.9	155.1	0.1	11.4	558.4
1975	406.0	83.6	63.6	147.2	(2)	9.4	562.6
1976	448.4	84.7	61.8	146.5	(2)	8.9	603.8
1977	477.1	77.7	61.5	139.2	(2)	9.0	625.3
1978	481.2	71.4	63.1	134.5	(2)	9.5	625.2
1979	527.1	77.4	67.7	145.1	(2)	8.4	680.5
1980	569.3	66.7	60.3	127.0	(2)	6.5	702.7
1981	596.8	61.0	67.4	128.4	(2)	7.4	732.6
1982	593.7	40.9	64.1	105.0	(2)	8.2	706.9
1983	625.2	37.0	66.0	103.0	(2)	8.4	736.7
1984	664.4	44.0	73.7	117.8	(2)	9.1	791.3
1985	693.8	41.1	75.4	116.4	(2)	7.8	818.0
1986	685.1	36.0	75.6	111.6	(2)	7.7	804.3
1987[3]	718.0	36.4	74.5	110.9	(2)	7.0	835.9

[1] See Appendix E, Note 13.
[2] Less than 0.05 million short tons. Quantities are included in the Other Industry and Miscellaneous category.
[3] Preliminary, except for electric utilities which is final.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. •1977 and 1978—Energy Information Administration, Energy Data Report, *Coal-Pennsylvania Anthracite 1977;....1978* and *Weekly Coal Report*. • 1979 through 1980—Energy Information Administration, Energy Data Report, *Weekly Coal Report*. •1981—Energy Information Administration, *Weekly Coal Production*. •1982 and forward—Energy Information Administration, *Quarterly Coal Report*.

Figure 77. Coal Exports by Country of Destination, 1960–1987



Source: See Table 77.

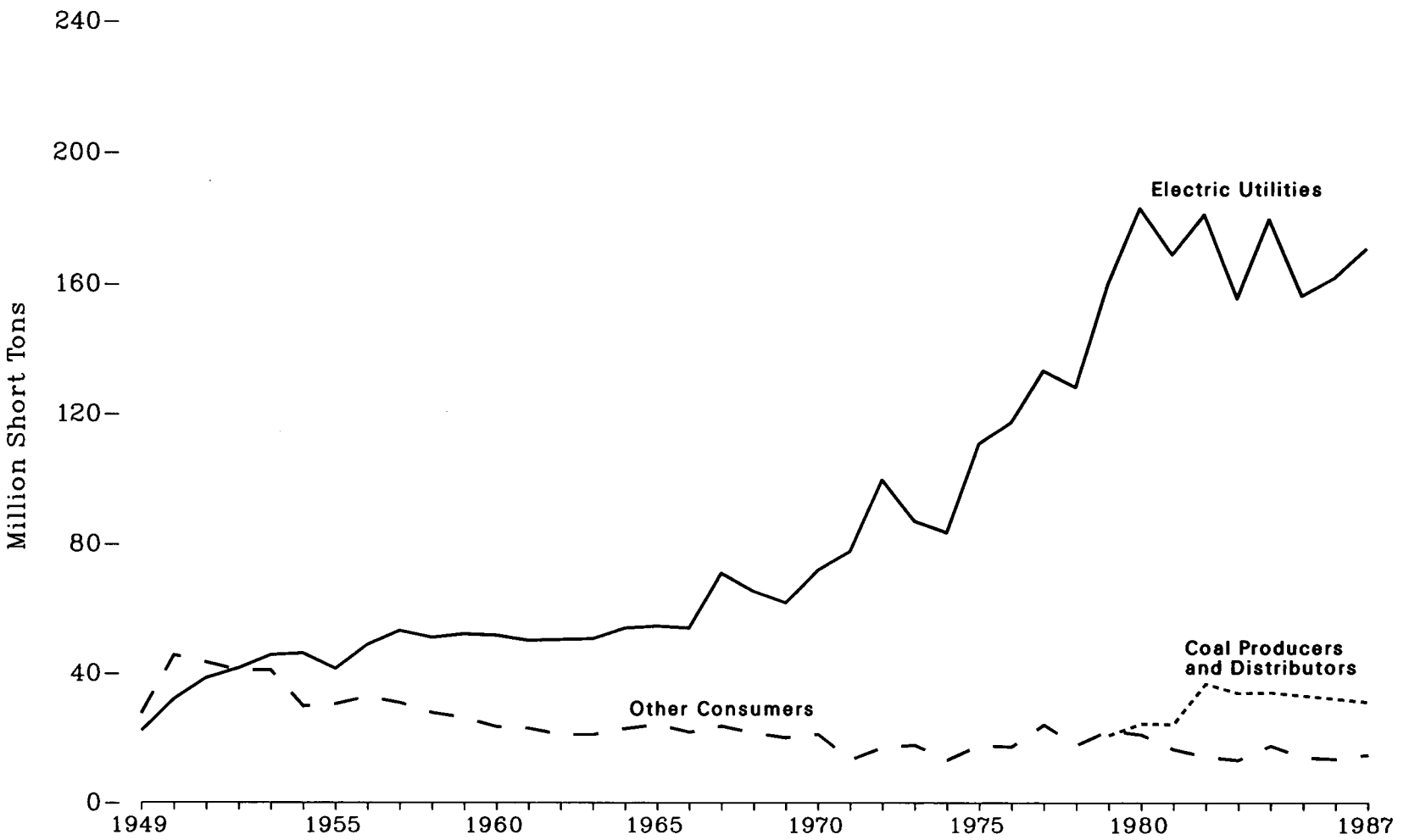
Table 77. Coal Exports[1] by Country of Destination, 1960-1987

(Million Short Tons)

Year	Canada	Brazil	Europe												
			Belgium/ Luxem-bourg	Denmark	France	West Germany	Italy	Nether-lands	Spain	United Kingdom	Other	Total	Japan	Other	Total
1960	12.8	1.1	1.1	0.1	0.8	4.6	4.9	2.8	0.3	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	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	(2)	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	(2)	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	2.1	4.7	5.9	2.2	1.0	0	2.1	19.4	12.2	1.0	50.1
1968	17.1	1.8	1.1	(2)	1.5	3.8	4.3	1.5	1.5	(2)	1.9	15.5	15.8	0.9	51.2
1969	17.3	1.8	0.9	0	2.3	3.5	3.7	1.6	1.8	(2)	1.3	15.2	21.4	1.2	56.9
1970	19.1	2.0	1.9	(2)	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	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	(2)	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	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	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	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	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

[1] Excludes overseas shipments to U.S. Armed Forces.
[2] Less than 50,000 tons.
Note: Sum of components may not equal total due to independent rounding.
Source: Bureau of the Census, *U.S. Exports by Schedule B Commodities*, EM 522.

Figure 78. Coal Stocks, End of Year 1949-1987



Source: See Table 78.

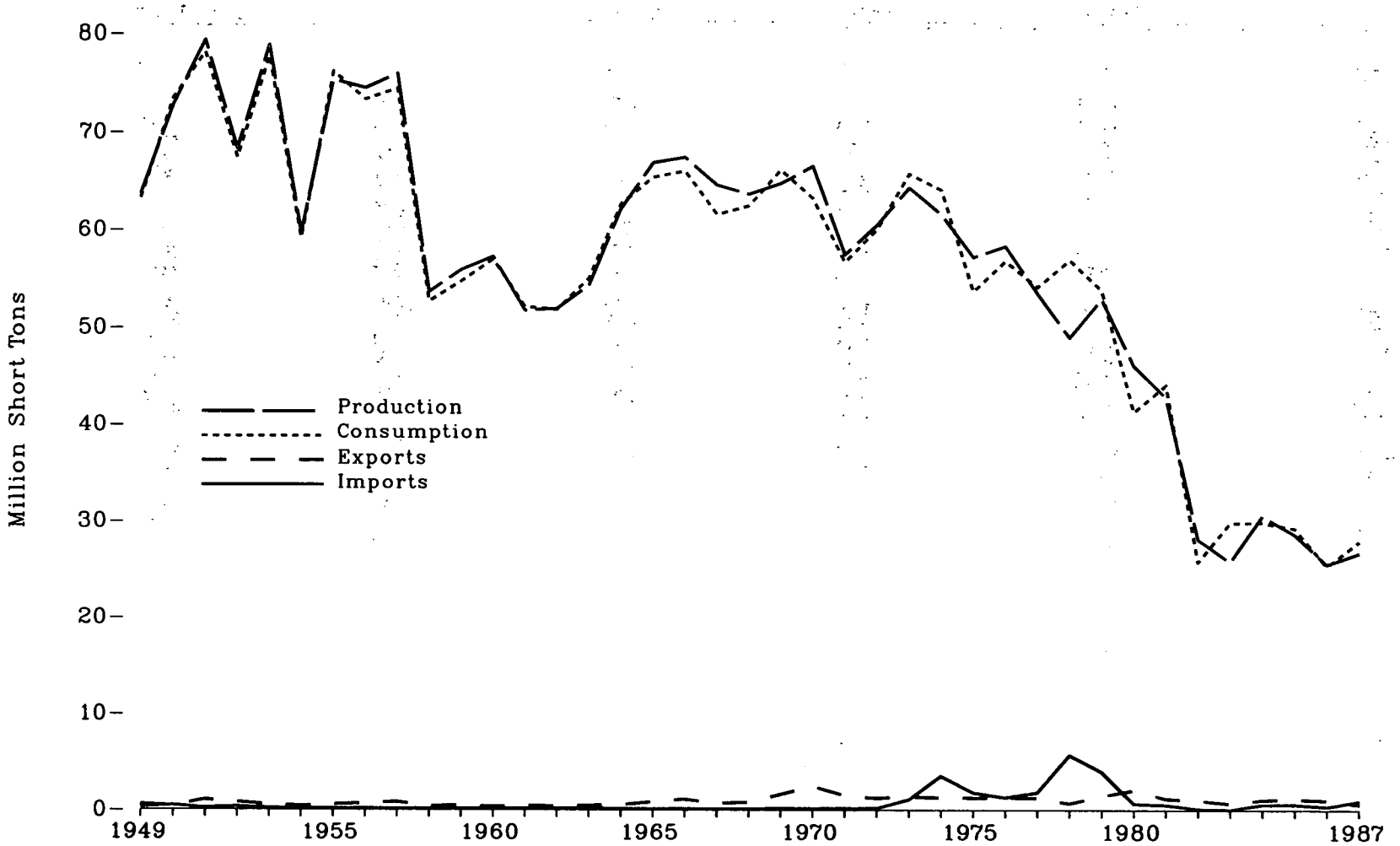
Table 78. Coal Stocks, End of Year 1949-1987

(Million Short Tons)

Year	Coal Consumers					Coal Producers and Distributors	Total
	Electric Utilities	Coke Plants	Other Industry [1]	Residential [2] and Commercial	Total		
1949	22.1	10.0	16.1	1.4	49.5	NA	NA
1950	31.8	16.8	26.2	2.5	77.3	NA	NA
1951	38.5	15.3	26.2	1.8	81.8	NA	NA
1952	41.5	14.5	24.7	1.7	82.4	NA	NA
1953	45.6	16.6	22.8	1.5	86.6	NA	NA
1954	46.1	12.4	16.4	0.8	75.7	NA	NA
1955	41.4	13.4	15.9	1.0	71.7	NA	NA
1956	48.8	14.0	17.4	1.1	81.3	NA	NA
1957	53.1	14.2	15.5	0.9	83.7	NA	NA
1958	51.0	13.1	13.7	0.9	78.7	NA	NA
1959	52.1	11.6	13.6	1.0	78.4	NA	NA
1960	51.7	11.1	11.6	0.7	75.2	NA	NA
1961	50.1	10.5	11.9	0.5	73.0	NA	NA
1962	50.4	8.4	12.0	0.5	71.3	NA	NA
1963	50.6	8.1	12.3	0.5	71.5	NA	NA
1964	53.9	10.2	12.2	0.4	76.7	NA	NA
1965	54.5	10.6	13.1	0.4	78.6	NA	NA
1966	53.9	9.3	12.2	0.2	75.6	NA	NA
1967	71.0	11.1	12.3	0.2	94.6	NA	NA
1968	65.5	9.7	11.7	0.2	87.0	NA	NA
1969	61.9	9.1	10.8	0.2	81.9	NA	NA
1970	71.9	9.0	11.8	0.3	93.0	NA	NA
1971	77.8	7.3	5.6	0.3	91.0	NA	NA
1972	99.7	9.1	7.6	0.3	116.8	NA	NA
1973	87.0	7.0	10.4	0.3	104.6	NA	NA
1974	83.5	6.2	6.6	0.3	96.6	NA	NA
1975	110.7	8.8	8.5	0.2	128.3	NA	NA
1976	117.4	9.9	7.1	0.2	134.7	NA	NA
1977	133.2	12.8	11.1	0.2	157.3	NA	NA
1978	128.2	8.3	9.0	0.4	145.9	NA	NA
1979	159.7	10.2	11.8	0.3	182.0	20.8	202.8
1980	183.0	9.1	12.0	NA	204.0	24.4	228.4
1981	168.9	6.5	9.9	NA	185.3	24.2	209.4
1982	181.1	4.6	9.5	NA	195.3	36.8	232.0
1983	155.6	4.3	8.7	NA	168.7	33.9	202.6
1984	179.7	6.2	11.3	NA	197.2	34.1	231.3
1985	156.4	3.4	10.4	NA	170.2	33.1	203.4
1986	161.8	3.0	10.4	NA	175.2	32.1	207.3
1987[3]	170.8	3.6	11.0	NA	185.5	31.0	216.5

[1] Includes transportation sector.
[2] Stocks at retail dealers, excluding anthracite.
[3] Estimated, except electric utilities which is final.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. •1977 and 1978—Energy Information Administration, Energy Data Report, *Coal-Pennsylvania Anthracite 1977;....1978* and *Weekly Coal Report*. •1979 through 1980—Energy Information Administration, Energy Data Report, *Weekly Coal Report*. •1981—Energy Information Administration, *Weekly Coal Production*. •1982 and forward—Energy Information Administration, *Quarterly Coal Report*.

Figure 79. Coke Overview, 1949-1987



Source: See Table 79.

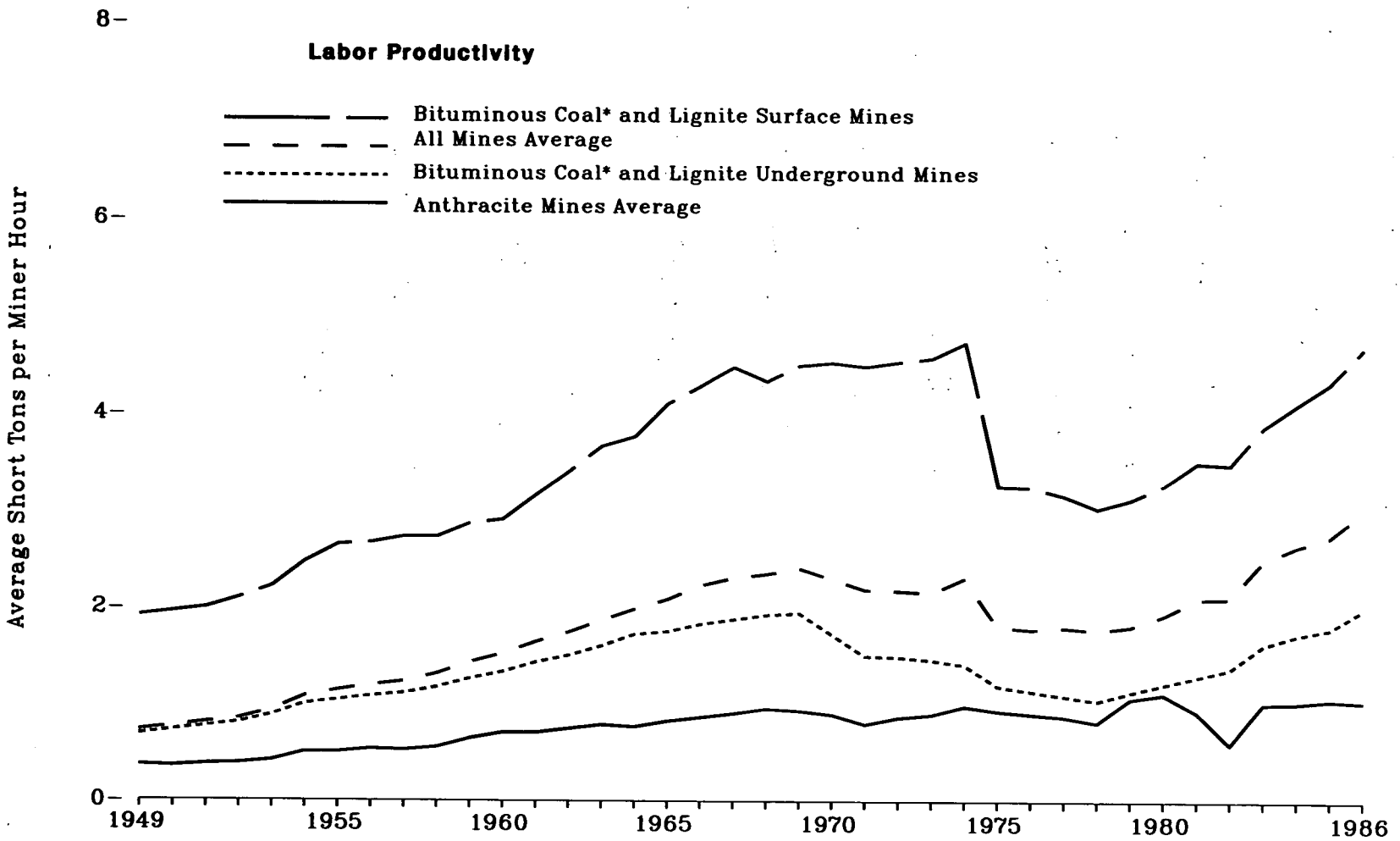
Table 79. Coke Overview, 1949-1987

(Million Short Tons)

Year	Production	Imports	Exports	Stock Change [1]	Consumption
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	1.76	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	30.56	0.58	1.05	-0.20	29.90
1985	28.65	0.58	1.12	1.16	29.27
1986	25.54	0.33	1.00	0.49	25.35
1987[2]	26.70	0.92	0.57	0.67	27.90

[1] 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] Preliminary, except imports and exports which are final.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coke and Coal Chemicals" chapter. •1976 through 1980—Energy Information Administration, Energy Data Report, *Coke and Coal Chemicals*, annual. •1981—Energy Information Administration, Energy Data Report, *Coke Plant Report*, quarterly. •1982 and forward—Energy Information Administration, *Quarterly Coal Report*.

Figure 80. Coal Mining Productivity, 1949–1986



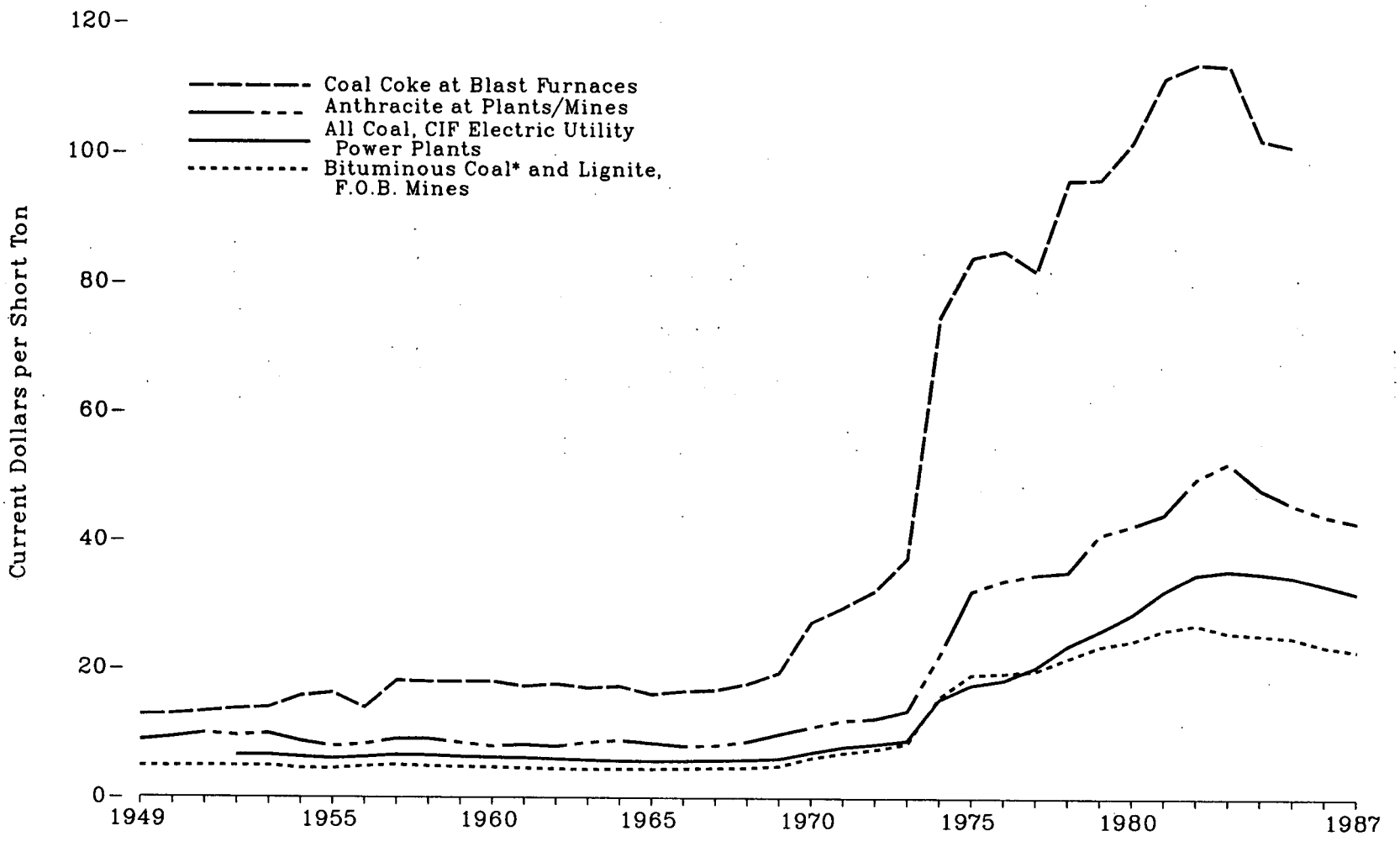
*Includes subbituminous coal.
Source: See Table 80.

Table 80. Coal Mining Productivity, 1949-1986

Year	Bituminous Coal [1] and Lignite Mines									Anthracite Mines			All Mines Average		
	Underground			Surface			Average								
	Production[2]	Productive Capacity[3]	Utilization Rate[4]	Production[2]	Productive Capacity[3]	Utilization Rate[4]	Production[2]	Productive Capacity[3]	Utilization Rate[4]	Production[2]	Productive Capacity[3]	Utilization Rate[4]	Production[2]	Productive Capacity[3]	Utilization Rate[4]
1949	0.68	NA	NA	1.92	NA	NA	0.80	NA	NA	0.36	NA	NA	0.72	NA	NA
1950	0.72	NA	NA	1.96	NA	NA	0.85	NA	NA	0.35	NA	NA	0.76	NA	NA
1951	0.76	NA	NA	2.00	NA	NA	0.88	NA	NA	0.37	NA	NA	0.80	NA	NA
1952	0.80	NA	NA	2.10	NA	NA	0.93	NA	NA	0.38	NA	NA	0.84	NA	NA
1953	0.88	NA	NA	2.22	NA	NA	1.02	NA	NA	0.41	NA	NA	0.93	NA	NA
1954	1.00	NA	NA	2.48	NA	NA	1.18	NA	NA	0.50	NA	NA	1.08	NA	NA
1955	1.04	NA	NA	2.65	NA	NA	1.23	NA	NA	0.50	NA	NA	1.14	NA	NA
1956	1.08	NA	NA	2.67	NA	NA	1.29	NA	NA	0.53	NA	NA	1.19	NA	NA
1957	1.11	NA	NA	2.73	NA	NA	1.32	NA	NA	0.52	NA	NA	1.23	NA	NA
1958	1.17	NA	NA	2.73	NA	NA	1.42	NA	NA	0.55	NA	NA	1.31	NA	NA
1959	1.26	NA	NA	2.87	NA	NA	1.53	NA	NA	0.64	NA	NA	1.43	NA	NA
1960	1.33	NA	NA	2.91	NA	NA	1.60	NA	NA	0.70	NA	NA	1.52	NA	NA
1961	1.43	NA	NA	3.16	NA	NA	1.73	NA	NA	0.70	NA	NA	1.64	NA	NA
1962	1.50	NA	NA	3.40	NA	NA	1.84	NA	NA	0.74	NA	NA	1.74	NA	NA
1963	1.60	NA	NA	3.66	NA	NA	1.98	NA	NA	0.78	NA	NA	1.87	NA	NA
1964	1.72	NA	NA	3.76	NA	NA	2.11	NA	NA	0.76	NA	NA	1.99	NA	NA
1965	1.75	NA	NA	4.10	NA	NA	2.19	NA	NA	0.82	NA	NA	2.09	NA	NA
1966	1.83	NA	NA	4.28	NA	NA	2.32	NA	NA	0.86	NA	NA	2.23	NA	NA
1967	1.88	NA	NA	4.48	NA	NA	2.40	NA	NA	0.90	NA	NA	2.31	NA	NA
1968	1.93	NA	NA	4.33	NA	NA	2.42	NA	NA	0.95	NA	NA	2.35	NA	NA
1969	1.95	NA	NA	4.50	NA	NA	2.49	NA	NA	0.93	NA	NA	2.41	NA	NA
1970	1.72	NA	NA	4.53	NA	NA	2.36	NA	NA	0.89	NA	NA	2.30	NA	NA
1971	1.50	NA	NA	4.49	NA	NA	2.25	NA	NA	0.79	NA	NA	2.19	NA	NA
1972	1.49	NA	NA	4.54	NA	NA	2.22	NA	NA	0.86	NA	NA	2.18	NA	NA
1973	1.46	NA	NA	4.58	NA	NA	2.20	NA	NA	0.89	NA	NA	2.16	NA	NA
1974	1.41	NA	NA	4.74	NA	NA	2.35	NA	NA	0.98	NA	NA	2.31	NA	NA
1975	1.19	NA	NA	3.26	NA	NA	1.83	NA	NA	0.93	NA	NA	1.81	NA	NA
1976	1.14	NA	NA	3.25	NA	NA	1.80	NA	NA	0.90	NA	NA	1.78	NA	NA
1977	1.09	NA	NA	3.16	NA	NA	1.82	NA	NA	0.87	NA	NA	1.80	NA	NA
1978	1.04	NA	NA	3.03	NA	NA	1.79	NA	NA	0.81	NA	NA	1.77	NA	NA
1979	1.13	1,615	90.1	3.12	2,102	86.1	1.82	3,717	87.8	1.06	18	100.0	1.81	3,736	87.9
1980	1.21	1,734	88.3	3.27	2,300	85.2	1.94	4,034	86.5	1.11	30	86.9	1.93	4,066	86.5
1981	1.29	1,854	87.5	3.50	2,357	86.9	2.11	4,211	87.1	0.92	26	82.8	2.10	4,239	87.1
1982	1.37	1,859	90.7	3.48	2,234	88.4	2.14	4,093	89.4	0.59	17	96.7	2.11	4,112	89.5
1983	1.62	1,658	89.6	3.87	2,169	88.7	2.52	3,827	89.1	1.01	22	83.2	2.50	3,849	89.0
1984	1.72	1,773	92.1	4.10	2,320	91.6	2.65	4,092	91.8	1.02	19	92.8	2.64	4,111	91.8
1985	1.79	1,813	88.6	4.32	2,268	91.1	2.76	4,081	90.0	1.05	25	90.8	2.74	4,106	90.0
1986	2.00	1,807	92.6	4.69	2,214	93.8	3.04	4,022	93.3	1.03	18	94.0	3.01	4,040	93.3

[1] Includes subbituminous coal.
[2] Short tons per miner hour. Data for bituminous coal and lignite mines 1949 through 1973 and anthracite mines 1949 through 1978 were originally reported in short tons per miner-day. These data have been 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.
[3] Thousand short tons per day, at end of year.
[4] Percent. Calculated by dividing average daily production by daily productive capacity and multiplying by 100.
NA = Not available.
Sources: **Production per Miner Hour:** •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" and "Coal-Pennsylvania Anthracite" chapters. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976* and *Coal-Pennsylvania Anthracite 1976*. •1977 and 1978—Energy Information Administration, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; ....1978* and *Coal-Pennsylvania Anthracite 1977; ....1978*. •1979—Energy Information Administration, Energy Data Report, *Coal Production-1979*. •1980 and forward—Energy Information Administration, *Coal Production* (annual). **All Other Data:** Energy Information Administration, Form EIA-7A, "Coal Production Report."

Figure 81. Coal and Coal Coke Prices, 1949–1987



*Includes subbituminous coal
Source: See Table 81.

Table 81. Coal and Coal Coke Prices, 1949-1987

(Dollars per Short Ton)

Year	Bituminous Coal [1] and Lignite		Anthracite		All Coal		Coal Coke	
	F.O.B. [2] Mines		At Plants/Mines [3]		CIF [4] Electric Utility Power Plants		At Blast Furnaces	
	Current	Constant [5]	Current	Constant [5]	Current	Constant [5]	Current	Constant [5]
1949	4.88	20.77	8.90	37.87	NA	NA	12.90	54.89
1950	4.84	20.25	9.34	39.08	NA	NA	12.96	54.23
1951	4.92	19.60	9.94	39.60	NA	NA	13.36	53.23
1952	4.90	19.22	9.58	37.57	6.61	25.92	13.81	54.16
1953	4.92	19.00	9.87	38.11	6.61	25.52	14.03	54.17
1954	4.52	17.19	8.76	33.31	6.31	23.99	15.82	60.15
1955	4.50	16.54	8.00	29.41	6.07	22.32	16.29	59.89
1956	4.82	17.15	8.33	29.64	6.32	22.49	14.03	49.93
1957	5.08	17.46	9.11	31.31	6.64	22.82	18.15	62.37
1958	4.86	16.36	9.14	30.77	6.58	22.15	17.98	60.54
1959	4.77	15.69	8.55	28.13	6.37	20.95	18.01	59.24
1960	4.69	15.18	8.01	25.92	6.26	20.26	18.02	58.32
1961	4.58	14.68	8.26	26.47	6.20	19.87	17.27	55.35
1962	4.48	14.04	7.99	25.05	6.02	18.87	17.64	55.30
1963	4.39	13.55	8.64	26.67	5.86	18.09	17.06	52.65
1964	4.45	13.53	8.93	27.14	5.74	17.45	17.30	52.58
1965	4.44	13.14	8.51	25.18	5.71	16.89	16.11	47.66
1966	4.54	12.97	8.08	23.09	5.76	16.46	16.56	47.31
1967	4.62	12.87	8.15	22.70	5.85	16.30	16.74	46.63
1968	4.67	12.39	8.78	23.29	5.93	15.73	17.72	47.00
1969	4.99	12.54	9.91	24.90	6.13	15.40	19.42	48.79
1970	6.26	14.90	11.03	26.26	7.13	16.98	27.43	65.31
1971	7.07	15.92	12.08	27.21	8.00	18.02	29.73	66.96
1972	7.66	16.47	12.40	26.67	8.44	18.15	32.33	69.53
1973	8.53	17.23	13.65	27.58	9.01	18.20	37.42	75.60
1974	15.75	29.17	22.19	41.09	15.46	28.63	75.00	138.89
1975	19.23	32.43	32.26	54.40	17.63	29.73	84.03	141.70
1976	19.43	30.79	33.92	53.76	18.38	29.13	85.09	134.85
1977	19.82	29.45	34.86	51.80	20.37	30.27	81.91	121.71
1978	21.78	30.17	35.25	48.82	23.75	32.89	95.95	132.89
1979	23.65	30.09	41.06	52.24	26.15	33.27	96.11	122.28
1980	24.52	28.61	42.51	49.60	28.76	33.56	101.93	118.94
1981	26.29	27.97	44.28	47.11	32.31	34.37	111.79	118.93
1982	27.14	27.14	49.85	49.85	34.90	34.90	113.91	113.91
1983	25.85	24.88	52.29	50.33	35.50	34.17	113.55	109.29
1984	25.51	23.69	48.22	44.77	35.12	32.61	102.34	95.02
1985	25.10	22.57	45.80	41.19	34.53	31.05	101.16	90.97
1986	23.70	20.77	44.12	38.67	33.30	29.18	NA	NA
1987 [6]	23.00	19.57	43.00	36.60	32.00	27.23	NA	NA

[1] Includes subbituminous coal. [2] Free on board (see Glossary). [3] For 1949 through 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 1982 dollars, calculated using implicit GNP price deflators. See Appendix C. [6] Estimate. NA = Not available. Note: During certain years, the average F.O.B. mine price exceeded the average CIF electric utility price. This reflected long-term contract buying and occurred during a period of rapid and steep F.O.B. mine price increases.
Sources: **Bituminous Coal and Lignite, F.O.B. Mines** •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coal-Bituminous and Lignite" chapter. •1976—Energy Information Administration, Energy Data Report, *Coal-Bituminous and Lignite in 1976*. •1977 and 1978—Energy Information Administration, Energy Data Report, *Bituminous Coal and Lignite Production and Mine Operations-1977; ....1978*. •1979 through 1986—Energy Information Administration, *Coal Production*, annual. •1987—Energy Information Administration estimates. **Anthracite** •1949 through 1976—Bureau of Mines, *Minerals Yearbook*, "Coal-Pennsylvania Anthracite" chapter. •1977 and 1978—Energy Information Administration, Energy Data Report, *Coal-Pennsylvania Anthracite 1977; ....1978*. •1979—Energy Information Administration, Energy Data Report, *Coal Production-1979*. •1980—Energy Information Administration, *Coal Production-1980*. •1981 through 1986—Energy Information Administration, *Coal Production*, annual. •1987—Energy Information Administration estimates. **All Coal, CIF Electric Utility Power Plants** •1949 through 1972—National Coal Association, *Steam Electric Plant Factors*. •1973 through 1982—Federal Power Commission, FPC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants." •1983 and forward—Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuel for Electric Utilities." **Coal Coke** •1949 through 1975—Bureau of Mines, *Minerals Yearbook*, "Coke and Coal Chemicals" chapter. •1976 through 1980—Energy Information Administration, Energy Data Report, *Coke and Coal Chemicals*, annual. •1981—Energy Information Administration, Energy Data Report, *Coke Plant Report*, quarterly. •1982 and forward—Energy Information Administration, *Quarterly Coal Report*.

7. Electricity

Measuring Electricity Generation

Electricity generation is measured and recorded in kilowatthours. Theoretically, a 1,000-kilowatt generator operating at maximum capacity for 1 year would produce 8,760,000 kilowatthours of electricity (1,000 kilowatts times 24 hours per day times 365 days per year). However, generators require maintenance and therefore cannot operate continuously.

In addition, electricity demand varies both daily and seasonally, so that continuous operation of all generators is not necessary to meet demand. Utilities rely on "baseload" generating plants, usually conventional steam, nuclear, and large hydroelectric plants, to satisfy steady demand. Gas turbine, internal combustion, and other hydroelectric plants are generally used to satisfy peak demand. Those "peaking" plants are used only during relatively short periods of high demand.

Generating Capacity

Generating capacity is expressed as net summer capability, a measure of the steady hourly output that generating equipment is expected to supply to the system under summer operating conditions as demonstrated by test. Although data on net summer capability have been collected only since 1984, the Energy Information Administration has estimated values for prior years (88). Estimates indicate that generating capacity during the 1949-to-1987 period increased at an average annual rate of 6.4 percent.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Conventional steam plants, fueled by fossil fuels, wood, and waste, were responsible for most of the growth. In 1987, they accounted for almost two-thirds of total generation capacity. Nuclear power accounted for 14 percent and hydroelectric power accounted for 13 percent of the total in 1987. Internal combustion and gas turbine plants, as well as plants powered by emerging sources of energy such as geothermal, accounted for the remainder.

Generation by Source and Prime Mover

Net generation of electricity by electric utilities in 1987 reached 2.6 trillion kilowatthours, up more than 3 percent from the 1986 level (83). The 1986-to-1987 growth in generation exceeded 1985-to-1986 growth of less than 1 percent. Domestic generation by utilities and nonutilities supplied most of the Nation's electricity and net imports from Canada and Mexico supplied the remainder.

Fossil fuels, particularly coal, continued to fuel most of the generation in 1987 (83). Coal accounted for 1,464 billion kilowatthours, and natural gas accounted for 273 billion kilowatthours. Oil-fired generation, which had increased 37 percent in 1986 as oil prices fell, decreased 14 percent in 1987, to 118 billion kilowatthours, as oil prices recovered somewhat.

Nuclear-based generation surpassed its previous-year level for the seventh consecutive year, reaching an all-time high in 1987 of 455 billion kilowatthours. Hydroelectric generation, however, was down to 250 billion kilowatthours. Geothermal and other alternative sources of energy accounted for 12 billion kilowatthours.

Fossil-fueled steam generators, consistently the major source of electricity, provided 71 percent of net generation in 1987 (84). Nuclear, hydroelectric, geothermal, and other generators powered by renewables supplied 28 percent. Internal combustion and gas turbine generators, usually reserved for meeting peak demand, supplied less than 1 percent of net generation.

Fossil Fuel Consumption

During the 1949-to-1987 period, consumption of coal at electric utilities grew at a faster rate than did consumption of natural gas and petroleum (86). On a Btu basis, coal accounted for 67 percent of total fossil fuel consumption in 1949. Although electric utility consumption of both petroleum and natural gas increased during most of the period, growth in the use of both fuels began to slow during the 1970's and, during the first half of the 1980's, consumption actually decreased. In 1986, petroleum consumed by electric utilities increased for the first time in 7 years, and, in 1987, natural gas consumption at electric utilities was up 9 percent. However, in 1987, coal still accounted for by far the largest share—78 percent—of total fossil fuel consumption at electric utilities.

Sales to Consumers

From 1949 through 1987, electricity sales increased at an average annual rate of over 6 percent (87). Annual sales declined only twice, during the economic recessions of 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.

Throughout almost all of the 39-year period, sales of electricity to the industrial sector exceeded sales to other sectors, but in 1986 sales to residential customers surpassed industrial sales for the first time. Of the 2,455-billion-kilowatthour total in 1987, residential sales accounted for 850 billion and industrial sales for 847 billion. Sales to the commercial sector totaled 672 billion kilowatthours.

Electricity Prices[1]

The weighted average real price[2] of electricity to all sectors in 1987 was 5.4 cents per kilowatthour, 5 percent below the price in 1960 (91). 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.

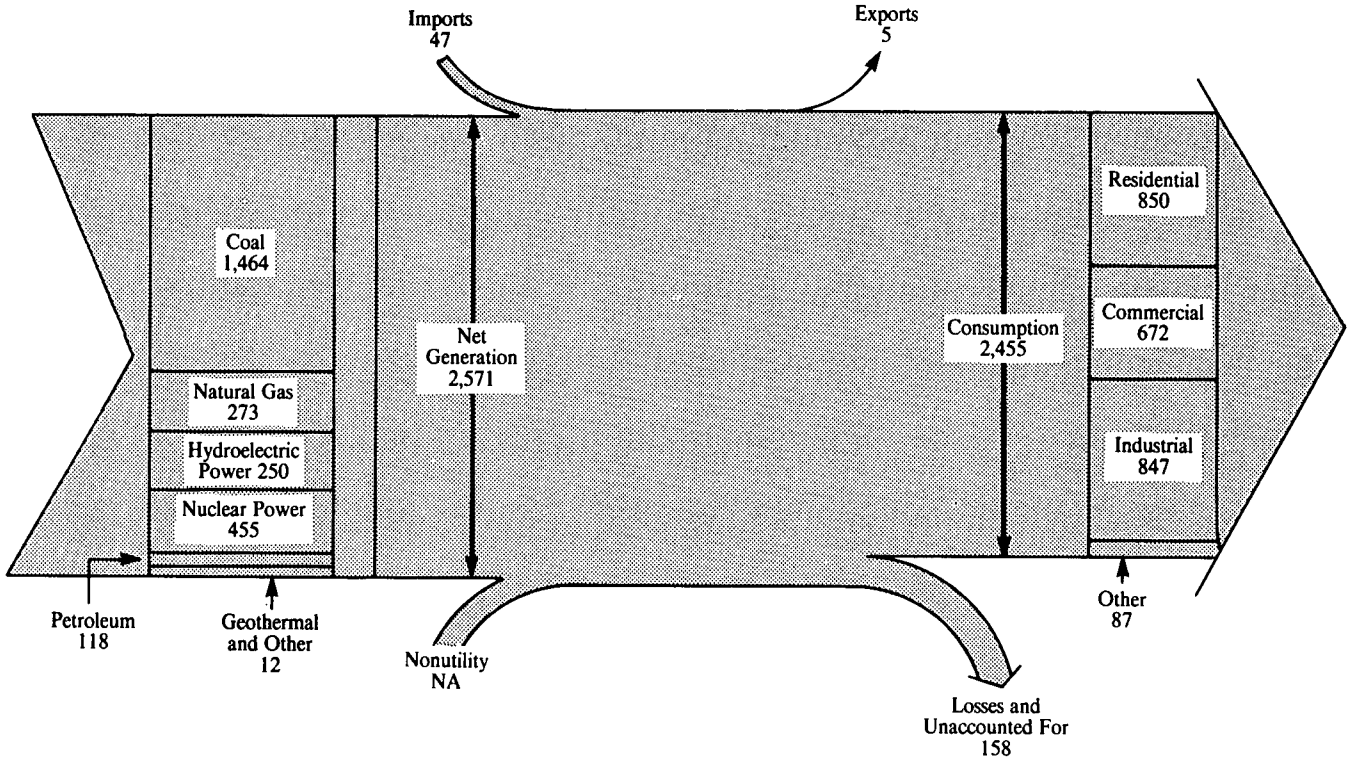
The average real price of electricity sold to the residential sector, where prices have usually been the highest, was 6.3 cents per kilowatthour in 1987, 22 percent below the price in 1960. Similarly, the commercial sector experienced a decline, in real terms, of 21 percent, as the price declined to 6.0 cents per kilowatthour in 1987. Meanwhile, industrial customers continued to pay prices favorable compared with prices in other sectors. In 1987, electricity was sold to industrial users at 4.0 cents per kilowatthour.

Although prices of the other major energy sources increased significantly during the 27-year period, electricity remained by far the most expensive source of energy on a Btu basis.

[1]Percent changes are calculated using "old series" data, which are based on a sample of privately owned electric utilities and which are available for 1960 through 1987. Beginning in 1986, "new series" data, based on a sample of both publicly and privately owned electric utilities, are also available; the 1987 prices cited above are based on the new series. Publication of both series will continue until sufficient information exists to estimate historical data based on the new series. See Table 91.

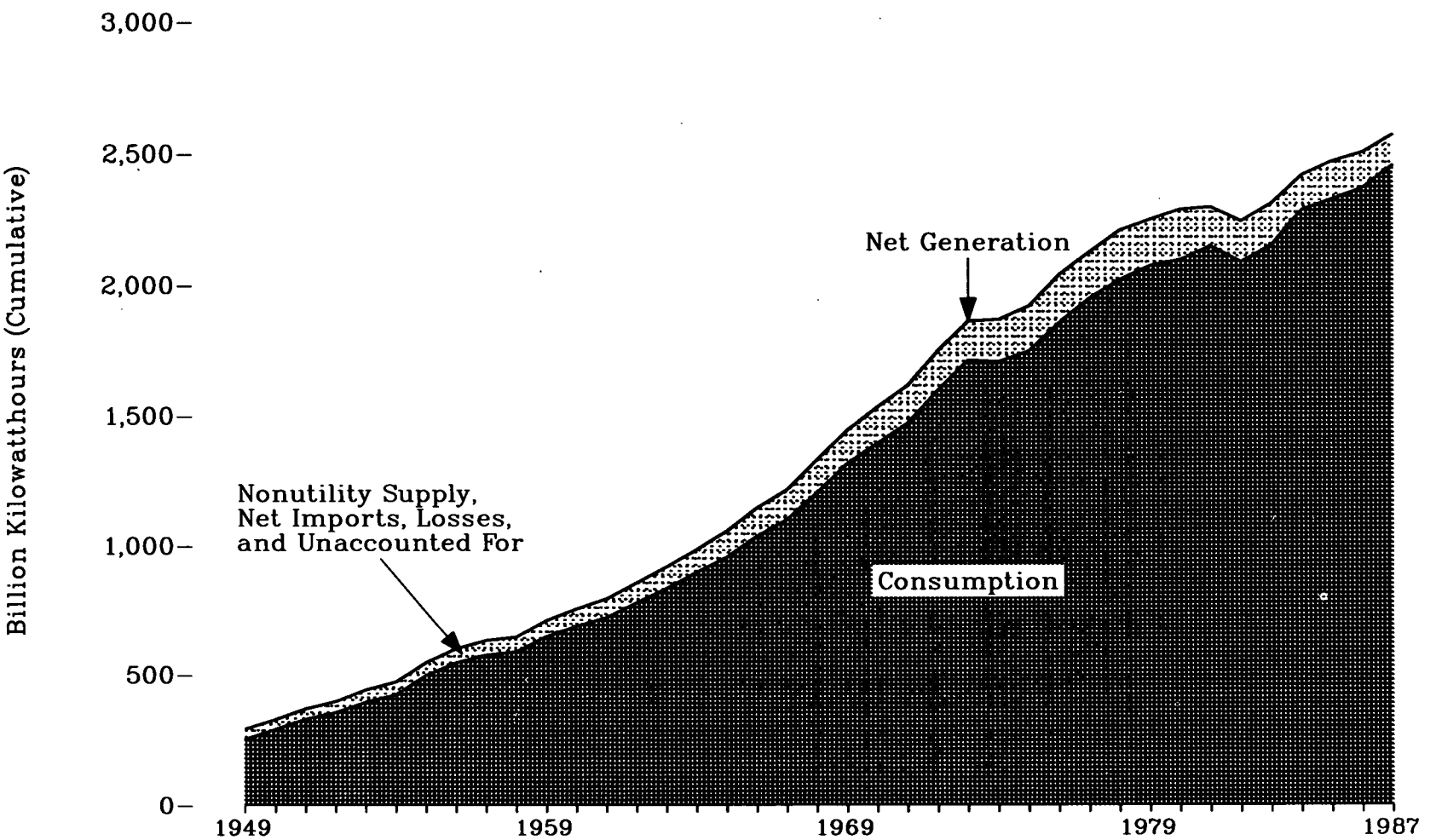
[2]Real prices are expressed in 1982 constant dollars.

Diagram 5. Electric Utility Electricity Flow, 1987
(Billion Kilowatthours)



Note: Sum of components may not equal totals due to independent rounding.
Sources: See Tables 82, 83, and 87.

Figure 82. Electric Utility Industry Overview, 1949–1987



Source: See Table 82.

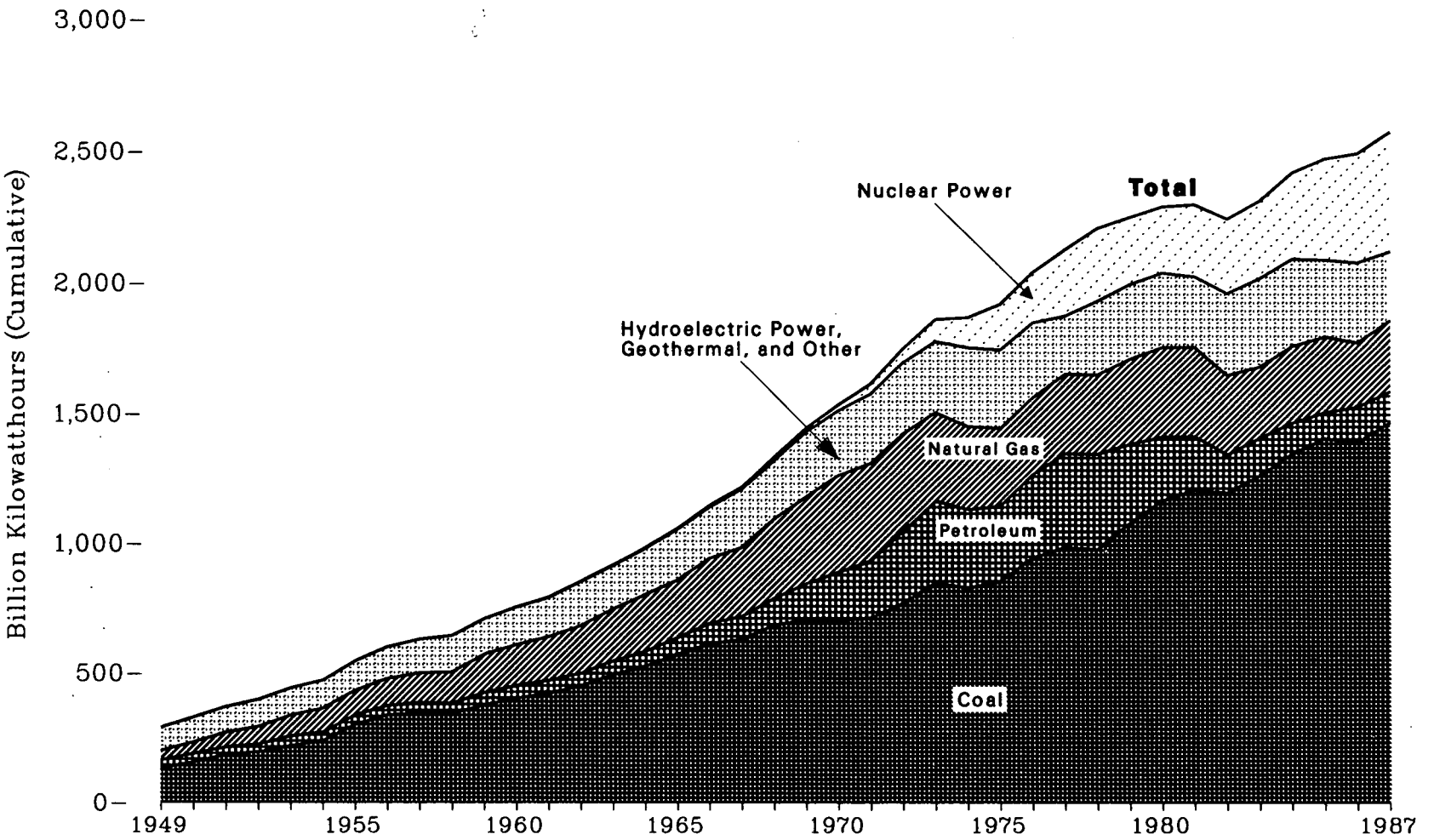
Table 82. Electric Utility Industry Overview, 1949-1987 [1]

(Billion Kilowatthours)

Year	Net Generation [2]	Nonutility Supply [3]	Imports [4]	Exports [4]	Losses and Unaccounted For [5]	Consumption
1949	291	NA	2	(*)	38	255
1950	329	NA	2	(*)	39	291
1951	371	NA	2	(*)	43	330
1952	399	NA	3	(*)	45	356
1953	443	NA	2	(*)	48	396
1954	472	NA	3	(*)	50	424
1955	547	NA	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	189	2,285
1985	2,470	26	46	5	211	2,326
1986[7]	2,487	37	41	5	210	2,351
1987[7]	2,571	NA	47	5	NA	2,455

[1] See Appendix E, Note 14. [2] See Appendix E, Note 1. [3] Electricity purchased from nonutility sources, including cogenerators, small power producers, and other nonutility power producing establishments. [4] Electricity transmitted across U.S. borders with Canada and Mexico. [5] Balancing item, mainly transmission and distribution losses. [6] Less than 0.5 billion kilowatthours. [7] Preliminary. NA = Not available. Note: Sum of components may not equal total due to independent rounding. Sources: **Net Generation:** •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report." **Consumption:** •1949 through September 1977—Federal Power Commission, Form 5, "Monthly Statement of Electric Operating Revenue and Income." •October 1977 through February 1980—Federal Energy Regulatory Commission, FPC Form 5, "Monthly Statement of Electric Operating Revenue and Income." •March 1980 through 1982—Federal Energy Regulatory Commission, FERC Form 5, "Electric Utility Company Monthly Statement." •1983 through 1986—Energy Information Administration, Form EIA-826, "Electric Utility Company Monthly Statement." •1987—Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions." •1984 and 1985—Energy Information Administration, Form EIA-861, "Annual Electric Utility Report." **Imports and Exports:** •1949 through September 1977—unpublished Federal Power Commission data; •October 1977 through 1981—unpublished Economic Regulatory Administration data. •1982 and forward—Economic Regulatory Administration, *Electricity Transactions Across International Borders - 1986*, October 1987. **Nonutility Supply:** •1978 and forward—Federal Energy Regulatory Commission, FERC Form 1, "Annual Report of Major Electric Utilities, Licensees and Others."

Figure 83. Net Generation of Electricity by Electric Utilities by Energy Source, 1949-1987



Source: See Table 83.

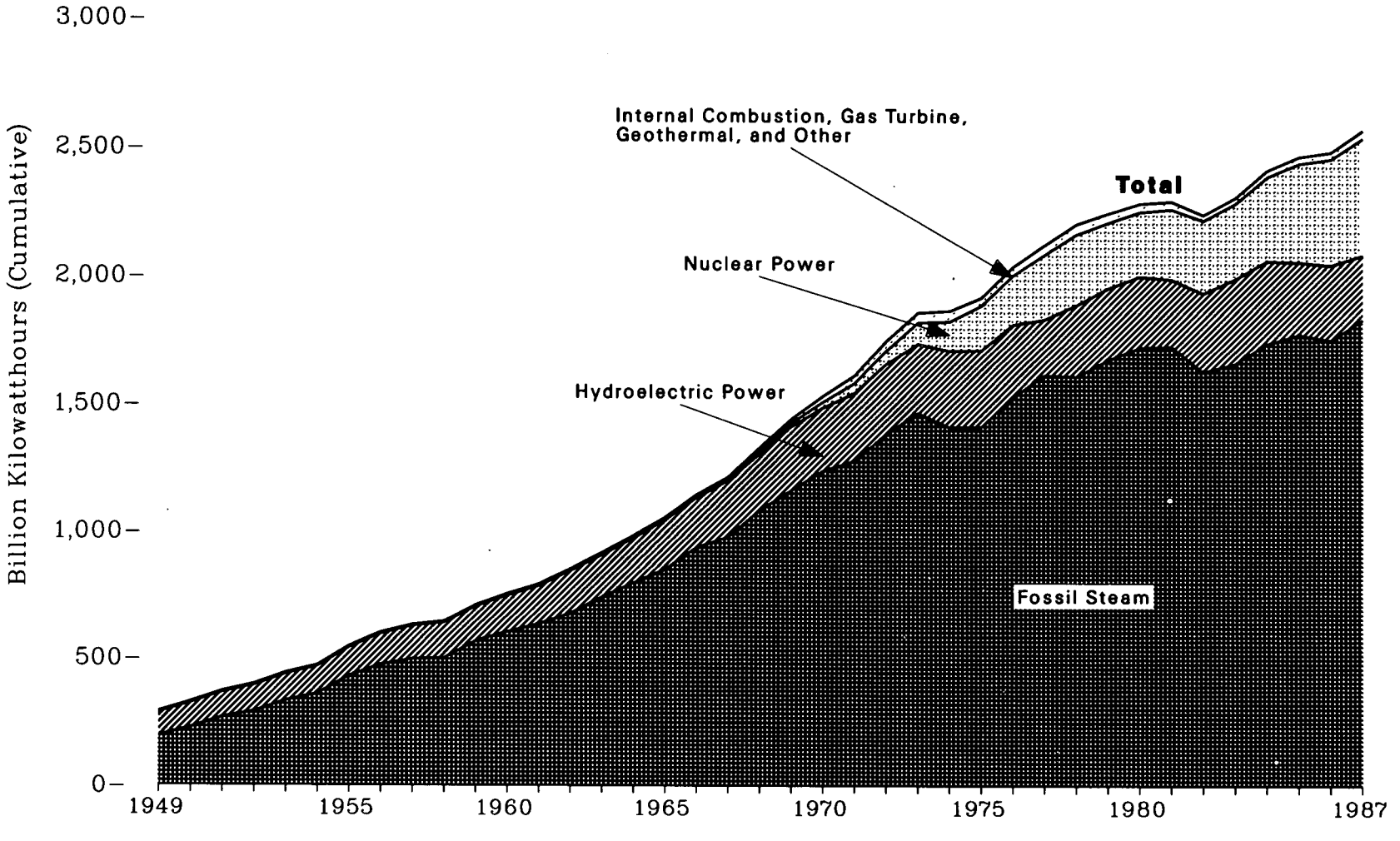
Table 83. Net Generation of Electricity [1] by Electric Utilities by Energy Source, 1949-1987 [2]

(Billion Kilowatthours)

Year	Coal	Petroleum [3]	Natural Gas	Nuclear Power	Hydroelectric Power	Geothermal and Other [4]	Total
1949	135	29	37	0	90	(5)	291
1950	155	34	45	0	96	(5)	329
1951	185	29	57	0	100	(5)	371
1952	195	30	68	0	105	(5)	399
1953	219	38	80	0	105	(5)	443
1954	239	32	94	0	107	(5)	472
1955	301	37	95	0	113	(5)	547
1956	339	36	104	0	122	(5)	601
1957	346	40	114	(5)	130	(5)	632
1958	344	40	120	(5)	140	(5)	645
1959	378	47	147	(5)	138	(5)	710
1960	403	48	158	1	146	(5)	756
1961	422	49	169	2	152	(5)	794
1962	450	49	184	2	169	(5)	855
1963	494	52	202	3	166	(5)	917
1964	526	57	220	3	177	(5)	984
1965	571	65	222	4	194	(5)	1,055
1966	613	79	251	6	195	1	1,144
1967	630	89	265	8	222	1	1,214
1968	685	104	304	13	222	1	1,329
1969	706	138	333	14	250	1	1,442
1970	704	184	373	22	248	1	1,532
1971	713	220	374	38	266	1	1,613
1972	771	274	376	54	273	2	1,750
1973	848	314	341	83	272	2	1,861
1974	828	301	320	114	301	3	1,867
1975	853	289	300	173	300	3	1,918
1976	944	320	295	191	284	4	2,038
1977	985	358	306	251	220	4	2,124
1978	976	365	305	276	280	3	2,206
1979	1,075	304	329	255	280	4	2,247
1980	1,162	246	346	251	276	6	2,286
1981	1,203	206	346	273	261	6	2,295
1982	1,192	147	305	283	309	5	2,241
1983	1,259	144	274	294	332	6	2,310
1984	1,342	120	297	328	321	9	2,416
1985	1,402	100	292	384	281	11	2,470
1986	1,386	137	249	414	291	12	2,487
1987[6]	1,464	118	273	455	250	12	2,571

[1] See Appendix E, Note 1.
[2] See Appendix E, Note 14.
[3] Includes distillate fuel oil, residual fuel oil (including crude oil burned as fuel), jet fuel, and petroleum coke.
[4] Other is wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution.
[5] Less than 0.5 billion kilowatthours.
[6] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 84. Net Generation of Electricity by Electric Utilities by Prime Mover, 1949-1987



Source: See Table 84.

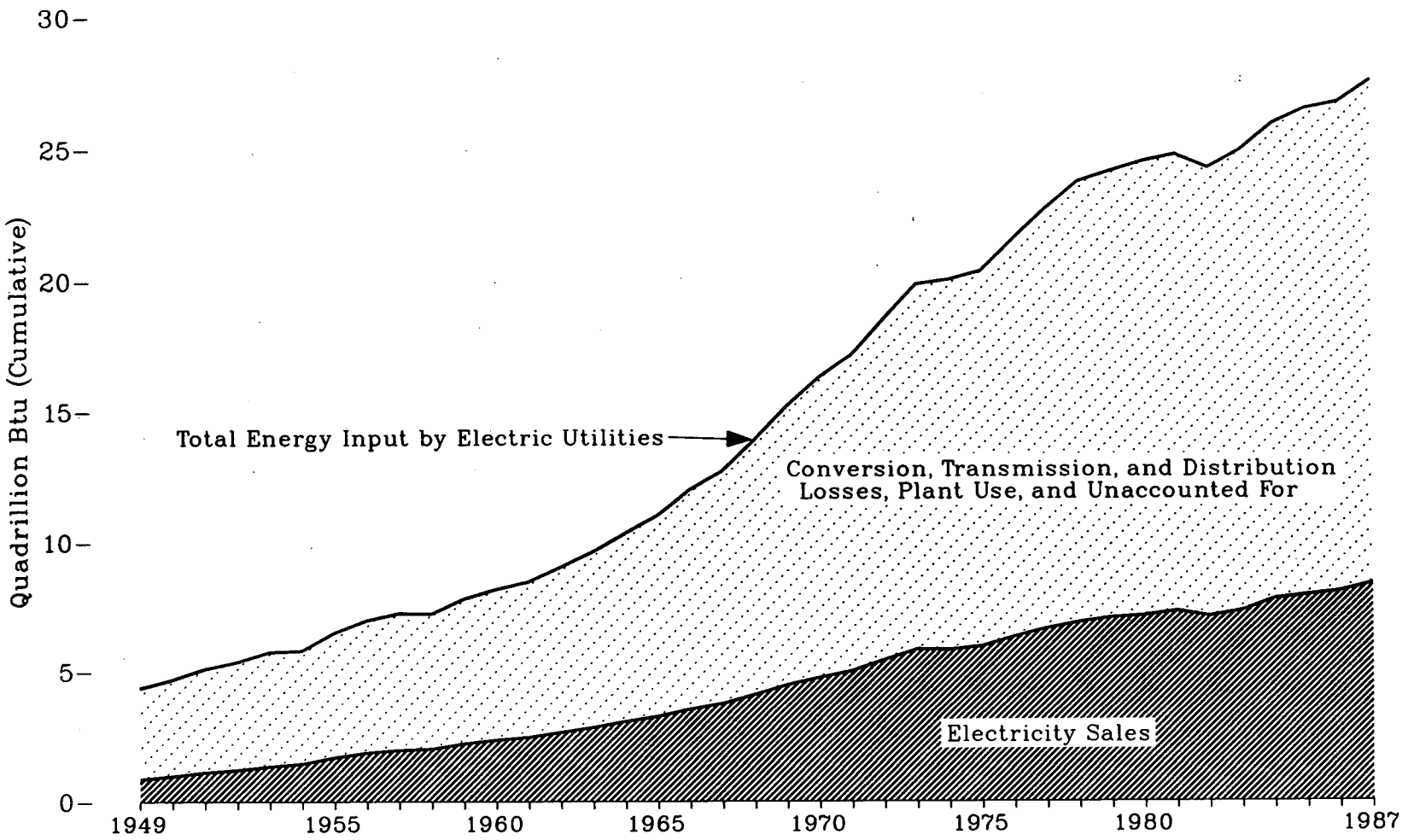
Table 84. Net Generation of Electricity [1] by Electric Utilities by Prime Mover, 1949-1987 [2]

(Billion Kilowatthours)

Year	Fossil Steam [3]	Internal Combustion	Gas Turbine	Nuclear Power	Hydroelectric Power	Geothermal and Other [4]	Total
1949	197	3	0	0	90	[5]	291
1950	229	4	0	0	96	[5]	329
1951	267	4	0	0	100	[5]	371
1952	290	4	0	0	105	[5]	399
1953	333	4	0	0	105	[5]	443
1954	361	4	0	0	107	[5]	472
1955	430	4	0	0	113	[5]	547
1956	474	4	0	0	122	[5]	601
1957	497	4	0	[5]	130	[5]	632
1958	500	4	0	[5]	140	[5]	645
1959	567	4	0	[5]	138	[5]	710
1960	603	4	0	1	146	[5]	756
1961	634	5	0	2	152	[5]	794
1962	677	5	0	2	169	[5]	855
1963	742	5	[5]	3	166	[5]	917
1964	798	5	1	3	177	[5]	984
1965	851	5	1	4	194	[5]	1,055
1966	938	5	NA	6	195	1	1,144
1967	980	5	NA	8	222	1	1,214
1968	1,084	5	4	13	222	1	1,329
1969	1,163	6	8	14	250	1	1,442
1970	1,240	6	16	22	248	1	1,532
1971	1,279	6	22	38	266	1	1,613
1972	1,385	7	29	54	273	2	1,750
1973	1,467	7	30	83	272	2	1,861
1974	1,411	6	32	114	301	3	1,867
1975	1,414	6	22	173	300	3	1,918
1976	1,530	5	24	191	284	4	2,038
1977	1,615	5	29	251	220	4	2,124
1978	1,610	5	31	276	280	3	2,206
1979	1,676	4	28	255	280	4	2,247
1980	1,726	4	24	251	276	6	2,286
1981	1,730	3	22	273	261	6	2,295
1982	1,628	2	14	283	309	5	2,241
1983	1,661	2	14	294	332	6	2,310
1984	1,742	2	15	328	321	9	2,416
1985	1,778	2	14	384	281	11	2,470
1986	1,756	2	14	414	291	12	2,487
1987[p]	1,837	2	16	455	250	12	2,571

[1] See Appendix E, Note 1.
[2] See Appendix E, Note 14.
[3] Plants whose steam is produced by burning fossil fuels only (coal, petroleum, and/or natural gas).
[4] Other is wood, waste, wind, photovoltaic, and solar thermal energy used to generate electricity for distribution.
[5] Less than 0.5 billion kilowatthours.
[p] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 85. Energy Input by Electric Utilities and Electricity Sales, 1949-1987



Source: See Table 85.

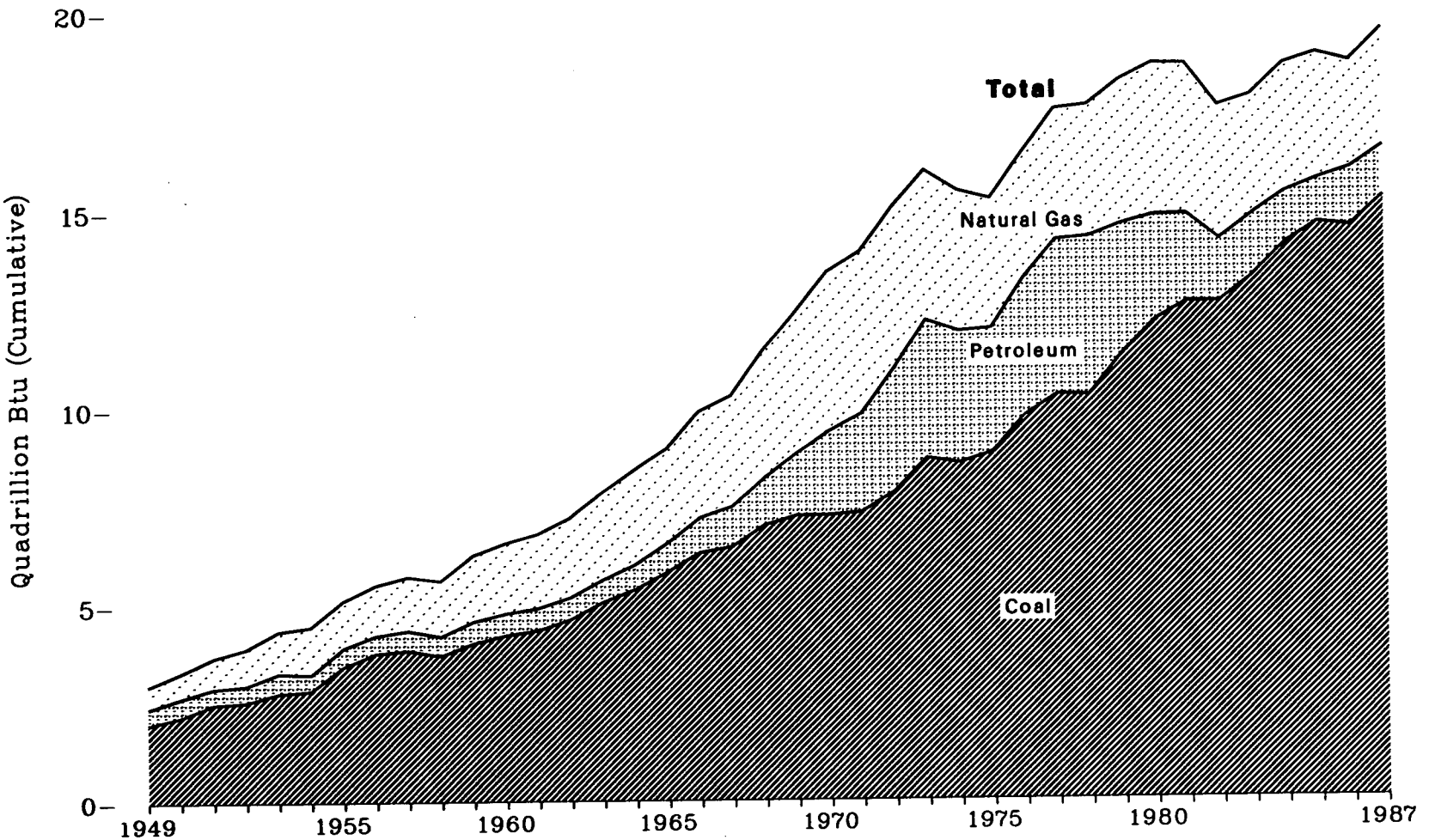
Table 85. Energy Input at Electric Utilities and Electricity Sales, 1949-1987 [1]

(Quadrillion Btu)

	Input/Generation													
				Hydroelectric Power [2]		Nuclear Power		Geothermal, Wood, Waste, and Wind		Total		Losses and Other [3]		
Year	Coal	Natural Gas	Petroleum	Fossil Fuel Equivalent [4]	Electricity Equivalent [5]	Heat Equivalent [6]	Electricity Equivalent [5]	Heat Equivalent [7]	Electricity Equivalent [5]	Fossil Fuel/Heat Equivalent [8]	Electricity Equivalent [9]	Fossil Fuel/Heat Equivalent [10]	Electricity Equivalent [11]	Electricity Sales
1949	2.00	0.57	0.41	1.37	0.31	0	0	0.01	(12)	4.36	3.29	3.49	2.42	0.87
1950	2.20	0.65	0.47	1.37	0.33	0	0	0.01	(12)	4.70	3.66	3.70	2.66	0.99
1951	2.51	0.79	0.40	1.39	0.35	0	0	0.01	(12)	5.09	4.05	3.97	2.92	1.13
1952	2.56	0.94	0.42	1.43	0.37	0	0	0.01	(12)	5.36	4.29	4.15	3.07	1.22
1953	2.78	1.07	0.51	1.38	0.37	0	0	0.01	(12)	5.75	4.73	4.40	3.38	1.35
1954	2.84	1.21	0.42	1.33	0.37	0	0	(12)	(12)	5.80	4.84	4.35	3.39	1.45
1955	3.46	1.19	0.47	1.37	0.40	0	0	(12)	(12)	6.50	5.52	4.80	3.83	1.69
1956	3.79	1.28	0.45	1.45	0.43	0	0	(12)	(12)	6.98	5.96	5.11	4.10	1.86
1957	3.86	1.38	0.50	1.52	0.46	(12)	(12)	(12)	(12)	7.26	6.19	5.29	4.23	1.96
1958	3.72	1.42	0.49	1.59	0.49	(12)	(12)	(12)	(12)	7.22	6.12	5.22	4.11	2.01
1959	4.03	1.69	0.55	1.55	0.48	(12)	(12)	(12)	(12)	7.82	6.75	5.61	4.54	2.21
1960	4.23	1.79	0.55	1.62	0.51	0.01	(12)	(12)	(12)	8.19	7.08	5.84	4.73	2.35
1961	4.35	1.89	0.56	1.64	0.53	0.02	0.01	(12)	(12)	8.47	7.33	6.01	4.87	2.46
1962	4.62	2.03	0.56	1.79	0.58	0.03	0.01	(12)	(12)	9.03	7.80	6.38	5.15	2.65
1963	5.05	2.21	0.58	1.74	0.57	0.04	0.01	0.01	(12)	9.63	8.42	6.79	5.58	2.84
1964	5.38	2.40	0.63	1.87	0.61	0.04	0.01	0.01	(12)	10.33	9.03	7.27	5.98	3.06
1965	5.82	2.40	0.72	2.02	0.66	0.04	0.01	0.01	(12)	11.01	9.61	7.76	6.36	3.25
1966	6.30	2.70	0.88	2.04	0.67	0.06	0.02	0.01	(12)	11.99	10.57	8.46	7.04	3.53
1967	6.44	2.83	1.01	2.31	0.75	0.09	0.03	0.01	(12)	12.70	11.07	8.95	7.32	3.75
1968	6.99	3.25	1.18	2.31	0.76	0.14	0.04	0.01	(12)	13.88	12.22	9.78	8.12	4.10
1969	7.22	3.60	1.57	2.62	0.86	0.15	0.05	0.02	(12)	15.18	13.29	10.70	8.81	4.48
1970	7.23	4.05	2.12	2.62	0.85	0.24	0.07	0.02	(12)	16.27	14.33	11.52	9.58	4.75
1971	7.30	4.10	2.49	2.83	0.92	0.41	0.13	0.02	(12)	17.15	14.95	12.13	9.93	5.01
1972	7.81	4.08	3.10	2.91	0.96	0.58	0.18	0.03	0.01	18.52	16.14	13.08	10.70	5.44
1973	8.66	3.75	3.51	2.98	0.98	0.91	0.28	0.05	0.01	19.85	17.19	14.01	11.35	5.84
1974	8.53	3.52	3.36	3.28	1.07	1.27	0.39	0.06	0.01	20.02	16.89	14.20	11.07	5.82
1975	8.79	3.24	3.17	3.19	1.04	1.90	0.59	0.07	0.01	20.35	16.84	14.39	10.88	5.96
1976	9.72	3.15	3.48	3.03	1.00	2.11	0.65	0.08	0.01	21.57	18.01	15.24	11.68	6.33
1977	10.26	3.28	3.90	2.48	0.81	2.70	0.86	0.08	0.01	22.71	19.13	16.07	12.48	6.65
1978	10.24	3.30	3.99	3.11	1.02	3.02	0.94	0.07	0.01	23.72	19.50	16.84	12.62	6.89
1979	11.26	3.61	3.28	3.11	1.02	2.78	0.87	0.09	0.01	24.13	20.07	17.06	13.00	7.07
1980	12.12	3.81	2.63	3.08	1.01	2.74	0.86	0.11	0.02	24.50	20.46	17.36	13.31	7.15
1981	12.58	3.77	2.20	3.07	1.00	3.01	0.93	0.13	0.02	24.76	20.51	17.43	13.18	7.33
1982	12.58	3.34	1.57	3.53	1.16	3.13	0.96	0.11	0.02	24.26	19.63	17.14	12.51	7.12
1983	13.21	3.00	1.54	3.84	1.25	3.20	1.00	0.13	0.02	24.93	20.03	17.59	12.69	7.34
1984	14.02	3.22	1.29	3.68	1.23	3.55	1.12	0.17	0.03	25.94	20.90	18.14	13.11	7.80
1985	14.54	3.16	1.09	3.33	1.10	4.15	1.31	0.21	0.04	26.48	21.24	18.55	13.30	7.94
1986	14.44	2.69	1.45	3.37	1.11	4.47	1.41	0.23	0.04	26.66	21.15	18.64	13.13	8.02
1987[13]	15.19	2.94	1.26	3.01	0.99	4.92	1.55	0.24	0.04	27.56	21.98	19.18	13.60	8.38

[1] See Appendix E, Note 14. [2] Includes net imports of electricity. [3] Conversion, transmission, and distribution losses, plant use, and unaccounted for. [4] The equivalent of fossil fuel energy required to generate the electricity distributed using the average fossil fuel steam electric plant thermal efficiency. [5] The equivalent amount of heat that could be produced by the electricity distributed using the conversion factor 3,412 Btu per kilowatthour. [6] The amount of heat released in reactors by fissioning uranium at electric utilities. [7] Includes for geothermal plants the heat content of the steam consumed and for wood, waste, wind and solar plants the fossil fuel equivalent using national average heat rate for fossil fuel steam electric plants. [8] Total of fossil fuels and the fossil fuel/heat equivalent of nonfossil fuel energy sources. [9] Total of fossil fuels and electricity equivalent of nonfossil fuel energy sources. [10] Balancing item, the difference between Total Fossil Fuel/Heat Equivalent and Electricity Sales, see Appendix E, Note 15. [11] Balancing item, the difference between Total Electricity Equivalent and Electricity Sales. [12] Less than 0.005 quadrillion Btu. [13] Preliminary. Note: Sum of components may not equal total due to independent rounding. Sources: Tables 84, 86, and 87 and conversion factors in Appendix A.

Figure 86. Fossil Fuels Consumed by Electric Utilities to Generate Electricity, 1949-1987



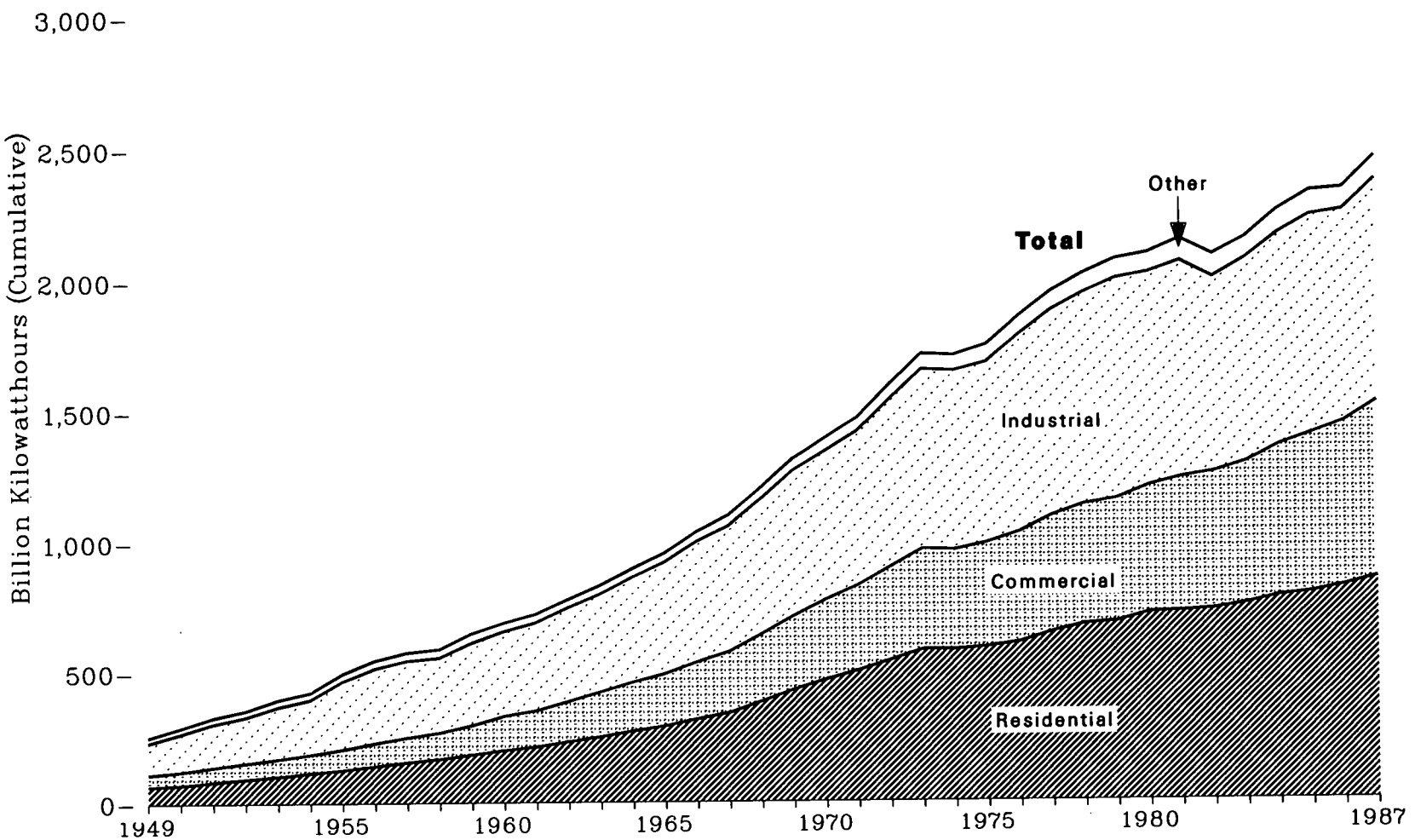
Source: See Table 86.

Table 86. Fossil Fuels Consumed by Electric Utilities to Generate Electricity, 1949-1987 [1]

Year	Coal		Petroleum [2]		Natural Gas		Total
	(million short tons)	(quadrillion Btu)	(million barrels)	(quadrillion Btu)	(billion cubic feet)	(quadrillion Btu)	(quadrillion Btu)
1949	84.0	2.00	66.3	0.41	550	0.57	2.98
1950	91.9	2.20	75.4	0.47	629	0.65	3.32
1951	105.8	2.51	63.9	0.40	764	0.79	3.70
1952	107.1	2.56	67.2	0.42	910	0.94	3.92
1953	115.9	2.78	82.2	0.51	1,034	1.07	4.36
1954	118.4	2.84	66.7	0.42	1,165	1.21	4.46
1955	143.8	3.46	75.3	0.47	1,153	1.19	5.12
1956	158.3	3.79	72.7	0.45	1,239	1.28	5.53
1957	160.8	3.86	79.7	0.50	1,336	1.38	5.74
1958	155.7	3.72	77.7	0.49	1,373	1.42	5.63
1959	168.4	4.03	88.3	0.55	1,629	1.69	6.27
1960	176.7	4.23	88.2	0.55	1,725	1.79	6.57
1961	182.2	4.35	88.9	0.56	1,825	1.89	6.80
1962	193.3	4.62	89.3	0.56	1,966	2.03	7.22
1963	211.3	5.05	93.3	0.58	2,144	2.21	7.85
1964	225.4	5.38	101.1	0.63	2,323	2.40	8.41
1965	244.8	5.82	115.2	0.72	2,321	2.40	8.94
1966	266.5	6.30	140.9	0.88	2,610	2.70	9.88
1967	274.2	6.44	161.3	1.01	2,746	2.83	10.29
1968	297.8	6.99	188.6	1.18	3,148	3.25	11.42
1969	310.6	7.22	251.0	1.57	3,488	3.60	12.39
1970	320.2	7.23	338.7	2.12	3,932	4.05	13.40
1971	327.3	7.30	399.5	2.49	3,976	4.10	13.89
1972	351.8	7.81	496.9	3.10	3,977	4.08	14.99
1973	389.2	8.66	562.8	3.51	3,660	3.75	15.92
1974	391.8	8.53	539.4	3.36	3,443	3.52	15.42
1975	406.0	8.79	506.5	3.17	3,158	3.24	15.19
1976	448.4	9.72	556.3	3.48	3,081	3.15	16.35
1977	477.1	10.26	624.2	3.90	3,191	3.28	17.45
1978	481.2	10.24	637.8	3.99	3,188	3.30	17.52
1979	527.1	11.26	524.6	3.28	3,491	3.61	18.16
1980	569.3	12.12	421.1	2.63	3,682	3.81	18.57
1981	596.8	12.58	351.8	2.20	3,640	3.77	18.55
1982	593.7	12.58	250.5	1.57	3,226	3.34	17.49
1983	625.2	13.21	246.8	1.54	2,911	3.00	17.75
1984	664.4	14.02	205.7	1.29	3,111	3.22	18.53
1985	693.8	14.54	174.6	1.09	3,044	3.16	18.79
1986	685.1	14.44	232.0	1.45	2,602	2.69	18.59
1987[3]	718.0	15.19	201.4	1.26	2,843	2.94	19.39

[1] See Appendix E, Note 14.
[2] 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.
[3] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 87. Electricity Sales by End-Use Sector, 1949-1987



Note: 1949-1983 are "old series" data; 1984-1987 are "new series" data.
Source: See Table 87.

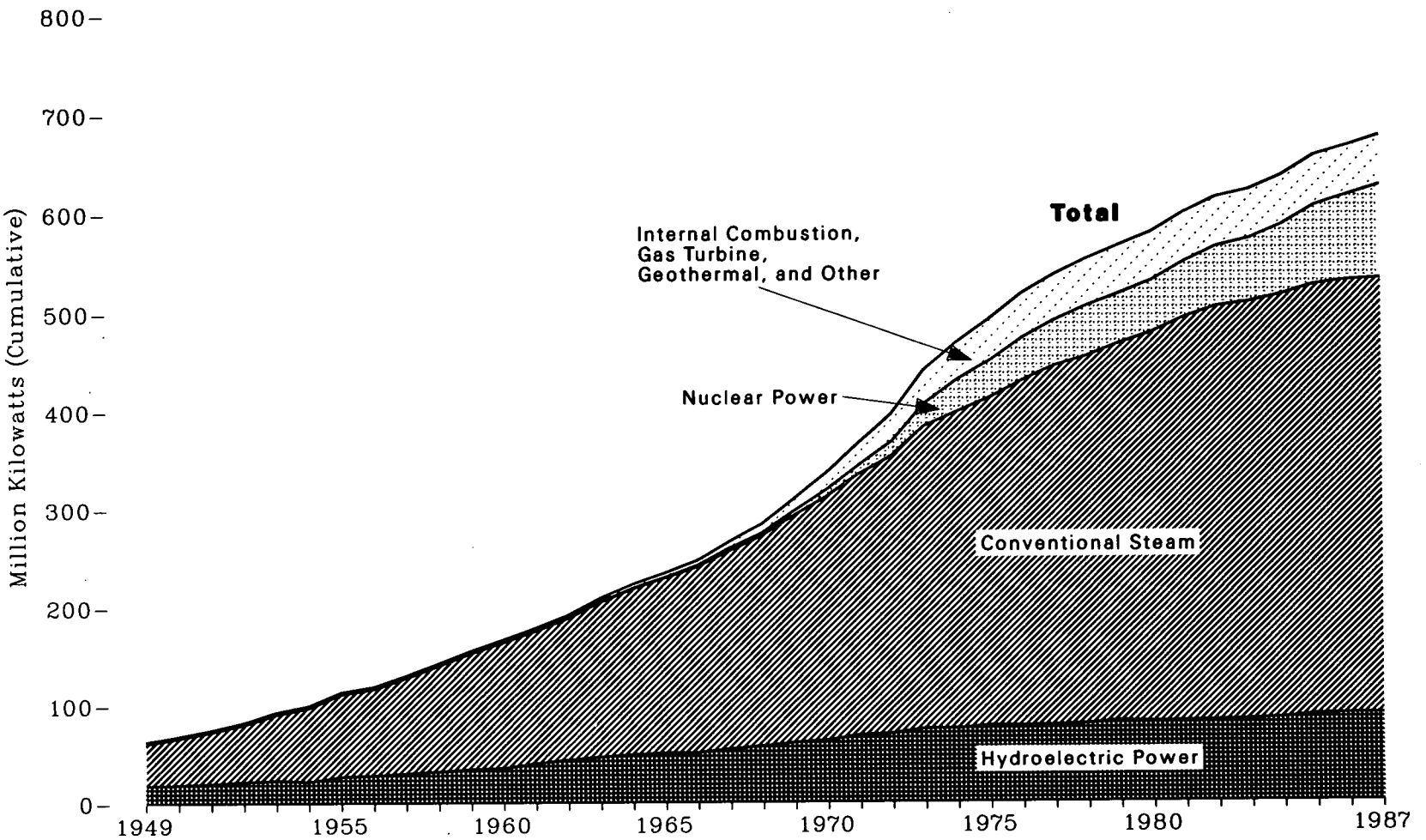
Table 87. Electricity Sales by End-Use Sector, [1] 1949-1987 [2]

(Billion Kilowatthours)

Year	Residential		Commercial		Industrial		Other		Total	
	Old Series	New Series	Old Series	New Series	Old Series	New Series	Old Series	New Series	Old Series	New Series
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	778	[3] 780	578	[3] 577	841	[3] 839	82	[3] 89	2,278	[3] 2,285
1985	791	[3] 794	609	[3] 605	825	[3] 835	85	[3] 92	2,310	[3] 2,326
1986 [4]	—	818	—	641	—	808	—	83	—	2,351
1987 [4]	—	850	—	672	—	847	—	87	—	2,455

[1] See Appendix E, Note 16. [2] See Appendix E, Note 14. [3] Based on Form EIA-861, "Annual Electric Utility Report," which collects data from all electric utilities in the United States, American Samoa, Guam, Puerto Rico, and the Virgin Islands; values shown are for the United States only. [4] Beginning in January 1986, Form EIA-826 electricity sales estimates are based on a new sample and new expansion factors from data reported on Form EIA-861. These data are preliminary. Note: Sum of components may not equal total due to independent rounding. Sources: Old Series: •1949 through September 1977—Federal Power Commission, FPC Form 5, "Monthly Statement of Electric Operating Revenue and Income." •October 1977 through February 1980—Federal Energy Regulatory Commission, FPC Form 5, "Monthly Statement of Electric Operating Revenue and Income." March 1980 through 1982—Federal Energy Regulatory Commission, FPC Form 5, "Electric Utility Company Monthly Statement." •1983 through 1986—Energy Information Administration, Form EIA-826, "Electric Utility Company Monthly Statement." •1987—Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions." New Series: 1984 and 1985—Energy Information Administration, Form EIA-861, "Annual Electric Utility Report." •1986—Energy Information Administration, Form EIA-826, "Electric Utility Company Monthly Statement." •1987—Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Figure 88. Net Summer Capability of Electric Utilities, End of Year 1949–1987



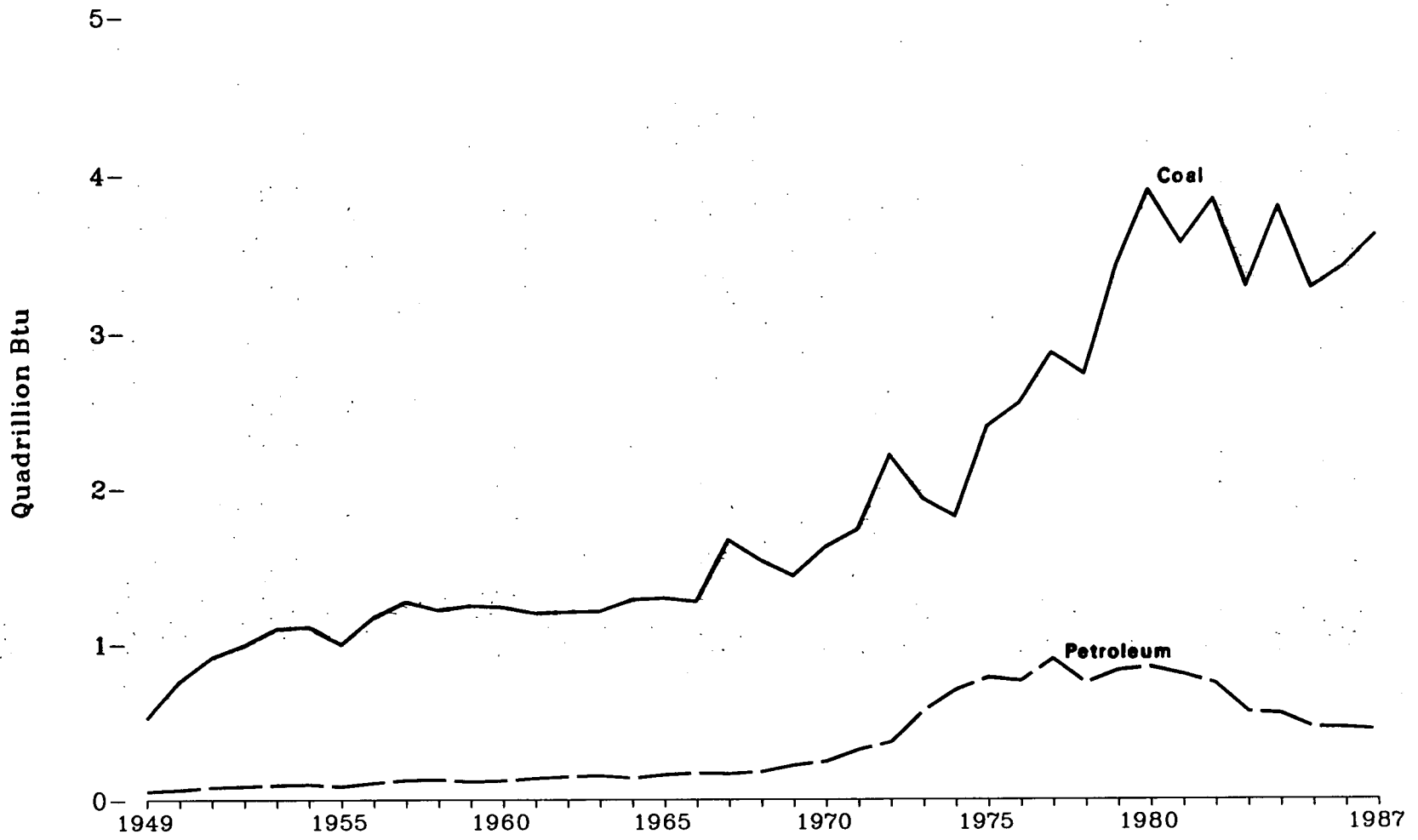
Source: See Table 88.

Table 88. Net Summer Capability [1] of Electric Utilities, End of Year 1949-1987 [2]
(Million Kilowatts)

Year	Conventional Steam [3]	Internal Combustion	Gas Turbine	Nuclear Power	Hydroelectric Power	Geothermal and Other [4]	Total
1949	43.2	1.7	0	0	18.5	(5)	63.4
1950	48.2	1.8	0	0	19.2	(5)	69.2
1951	53.1	1.9	0	0	20.5	(5)	75.5
1952	58.8	2.0	0	0	22.4	(5)	83.2
1953	67.5	2.1	0	0	23.8	(5)	93.3
1954	75.4	2.2	0	0	22.5	(5)	100.0
1955	84.6	2.3	0	0	27.4	(5)	114.2
1956	88.8	2.4	0	0	28.5	(5)	119.7
1957	97.9	2.3	0	0.1	30.7	(5)	131.1
1958	108.2	2.4	0	0.1	32.5	(5)	143.3
1959	118.5	2.5	0	0.1	34.8	(5)	155.9
1960	128.3	2.6	0	0.4	35.8	(5)	167.1
1961	135.1	2.8	0	0.4	40.7	(5)	179.0
1962	144.6	2.8	0	0.7	44.0	(5)	192.1
1963	158.4	3.0	0.5	0.8	47.0	(5)	209.7
1964	169.6	3.1	0.8	0.8	49.4	(5)	223.7
1965	178.7	3.2	1.1	0.8	51.0	(5)	234.8
1966	189.6	3.3	1.6	1.7	51.2	(5)	247.5
1967	202.5	3.6	2.8	2.7	55.0	0.1	266.7
1968	214.3	3.8	5.3	2.7	57.9	0.1	284.0
1969	231.4	4.0	8.4	4.4	61.6	0.1	309.8
1970	248.0	4.1	13.3	7.0	63.8	0.1	336.4
1971	266.0	4.2	17.9	9.0	69.1	0.2	366.4
1972	282.3	4.5	23.9	14.5	70.5	0.3	396.0
1973	307.9	4.7	28.8	22.6	75.4	0.4	439.8
1974	322.4	4.7	33.7	31.8	75.5	0.4	468.5
1975	333.3	4.8	37.1	37.2	78.4	0.5	491.3
1976	350.9	5.0	39.1	43.7	78.0	0.5	517.2
1977	365.3	5.0	40.3	46.2	78.6	0.5	535.9
1978	374.5	5.2	41.2	50.7	79.9	0.5	552.1
1979	384.6	5.2	42.5	49.6	82.9	0.7	565.5
1980	396.6	5.2	42.5	51.7	81.7	0.9	578.6
1981	410.7	5.3	43.2	55.9	82.4	0.9	598.3
1982	421.4	4.8	43.5	59.9	83.0	1.1	613.7
1983	424.9	4.7	43.3	63.0	83.9	1.2	621.1
1984	430.8	4.5	43.5	69.7	85.3	1.3	635.1
1985	436.8	4.7	43.9	79.4	88.9	1.6	655.2
1986	440.6	4.6	43.4	85.2	89.3	1.6	664.8
1987[6]	442.1	4.8	43.4	93.7	89.6	1.6	675.2

[1] See Glossary and Appendix E, Note 17.
[2] See Appendix E, Note 14.
[3] Includes fossil steam, wood, and waste.
[4] Other is wind, photovoltaic, and solar thermal energy.
[5] Less than 0.05 million kilowatts.
[6] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through 1984—Energy Information Administration estimates. •1985 and forward—Energy Information Administration, Form EIA-860, "Annual Electric Generator Report."

Figure 89. Coal and Petroleum Stocks at Electric Utilities, End of Year 1949–1987



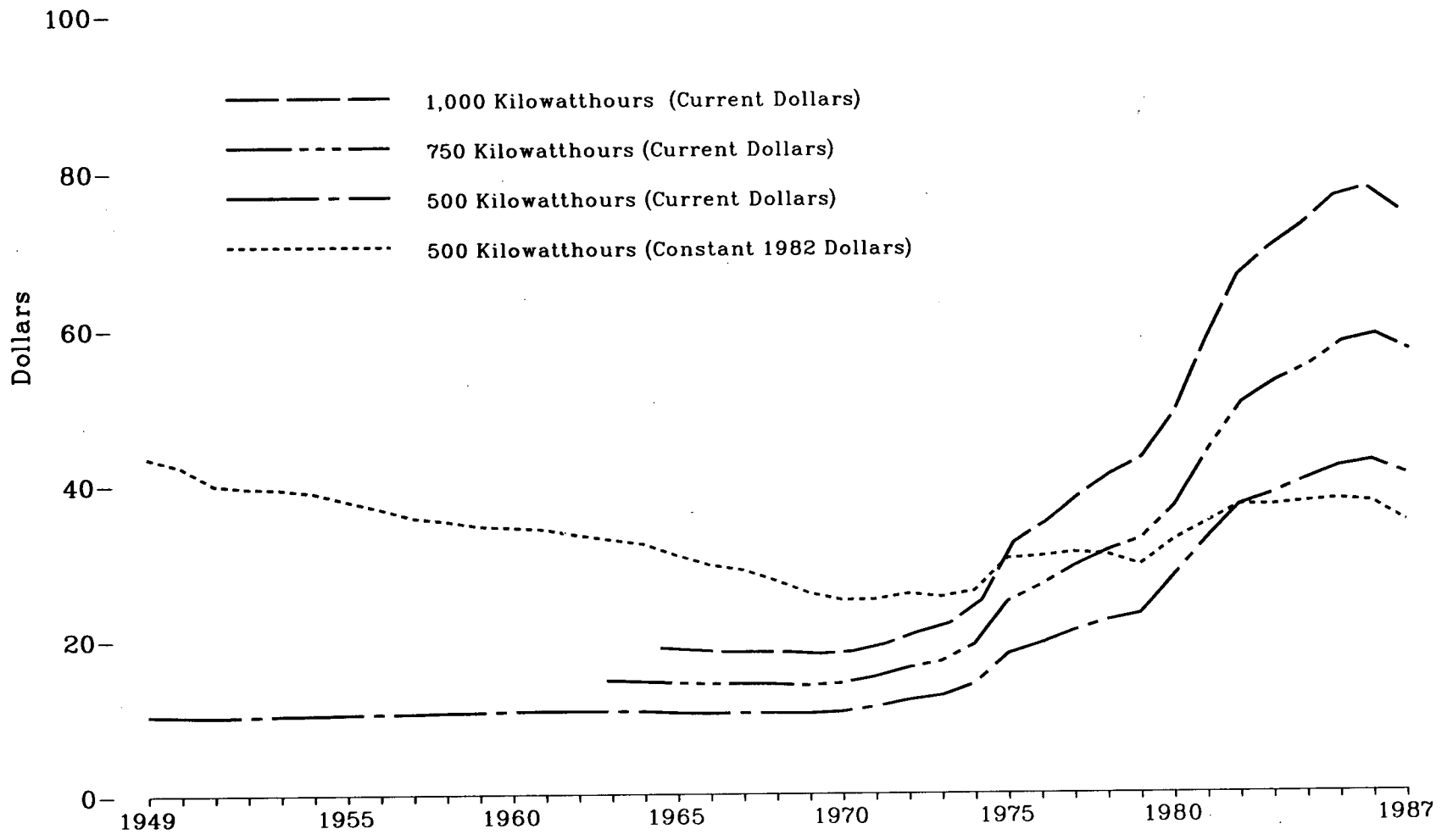
Source: See Table 89.

Table 89. Coal and Petroleum Stocks at Electric Utilities, End of Year 1949-1987 [1]

Year	Coal				Petroleum			
	Anthracite [2]	Bituminous Coal [3] and Lignite	Total		Oil [4]	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	8.6	NA	8.6	54
1950	4.7	27.1	31.8	762	10.2	NA	10.2	64
1951	5.1	33.4	38.5	913	12.8	NA	12.8	80
1952	5.6	35.9	41.5	991	13.7	NA	13.7	86
1953	5.9	39.8	45.6	1,094	15.0	NA	15.0	94
1954	6.4	39.7	46.1	1,106	15.9	NA	15.9	99
1955	3.2	38.2	41.4	996	13.7	NA	13.7	85
1956	2.8	46.0	48.8	1,168	17.3	NA	17.3	108
1957	2.8	50.3	53.1	1,273	20.1	NA	20.1	126
1958	2.2	48.8	51.0	1,218	20.8	NA	20.8	130
1959	2.0	50.1	52.1	1,247	18.5	NA	18.5	116
1960	1.8	49.9	51.7	1,238	19.6	NA	19.6	123
1961	1.5	48.6	50.1	1,197	22.0	NA	22.0	138
1962	1.4	49.0	50.4	1,205	23.8	NA	23.8	149
1963	1.3	49.3	50.6	1,209	24.9	NA	24.9	156
1964	1.2	52.7	53.9	1,286	22.4	NA	22.4	140
1965	1.1	53.4	54.5	1,297	25.6	NA	25.6	161
1966	1.0	52.9	53.9	1,274	27.4	NA	27.4	172
1967	1.3	69.7	71.0	1,669	26.7	NA	26.7	167
1968	1.3	64.2	65.5	1,538	28.7	NA	28.7	180
1969	1.3	60.6	61.9	1,438	35.3	NA	35.3	221
1970	1.1	70.8	71.9	1,623	38.0	1.2	39.2	245
1971	1.1	76.7	77.8	1,735	49.6	1.5	51.1	319
1972	0.9	98.8	99.7	2,214	57.7	1.4	59.1	368
1973	1.1	85.9	87.0	1,935	89.2	1.6	90.8	567
1974	0.9	82.6	83.5	1,819	112.9	0.2	113.1	705
1975	1.0	109.7	110.7	2,396	125.3	0.2	125.4	784
1976	1.0	116.4	117.4	2,546	121.7	0.2	121.9	762
1977	2.3	130.9	133.2	2,865	144.0	0.2	144.3	901
1978	2.2	126.0	128.2	2,728	118.8	1.0	119.8	749
1979	3.3	156.4	159.7	3,412	131.4	0.9	132.3	828
1980	4.7	178.3	183.0	3,897	135.4	0.3	135.6	848
1981	5.5	163.4	168.9	3,561	128.1	0.2	128.3	803
1982	6.1	175.1	181.1	3,839	118.9	0.2	119.1	745
1983	6.5	149.1	155.6	3,288	89.4	0.3	89.7	561
1984	6.7	173.0	179.7	3,792	87.6	0.3	87.9	549
1985	7.2	149.2	156.4	3,277	73.7	0.2	73.9	462
1986	7.1	154.7	161.8	3,412	73.1	0.2	73.3	459
1987[6]	6.9	163.9	170.8	3,615	70.9	0.3	71.2	445

[1] See Appendix E, Note 14.
[2] Includes anthracite silt stored off-site.
[3] Includes subbituminous coal.
[4] Includes residual fuel oil (including crude oil burned as fuel), distillate fuel oil, 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.
[6] Preliminary.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Sources: •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 90. Residential Weighted Average Monthly Electric Bill, January 1, 1949–1987



Source: See Table 90.

Table 90. Residential Weighted Average Monthly Electric Bill, January 1, 1949-1987

(Dollars)

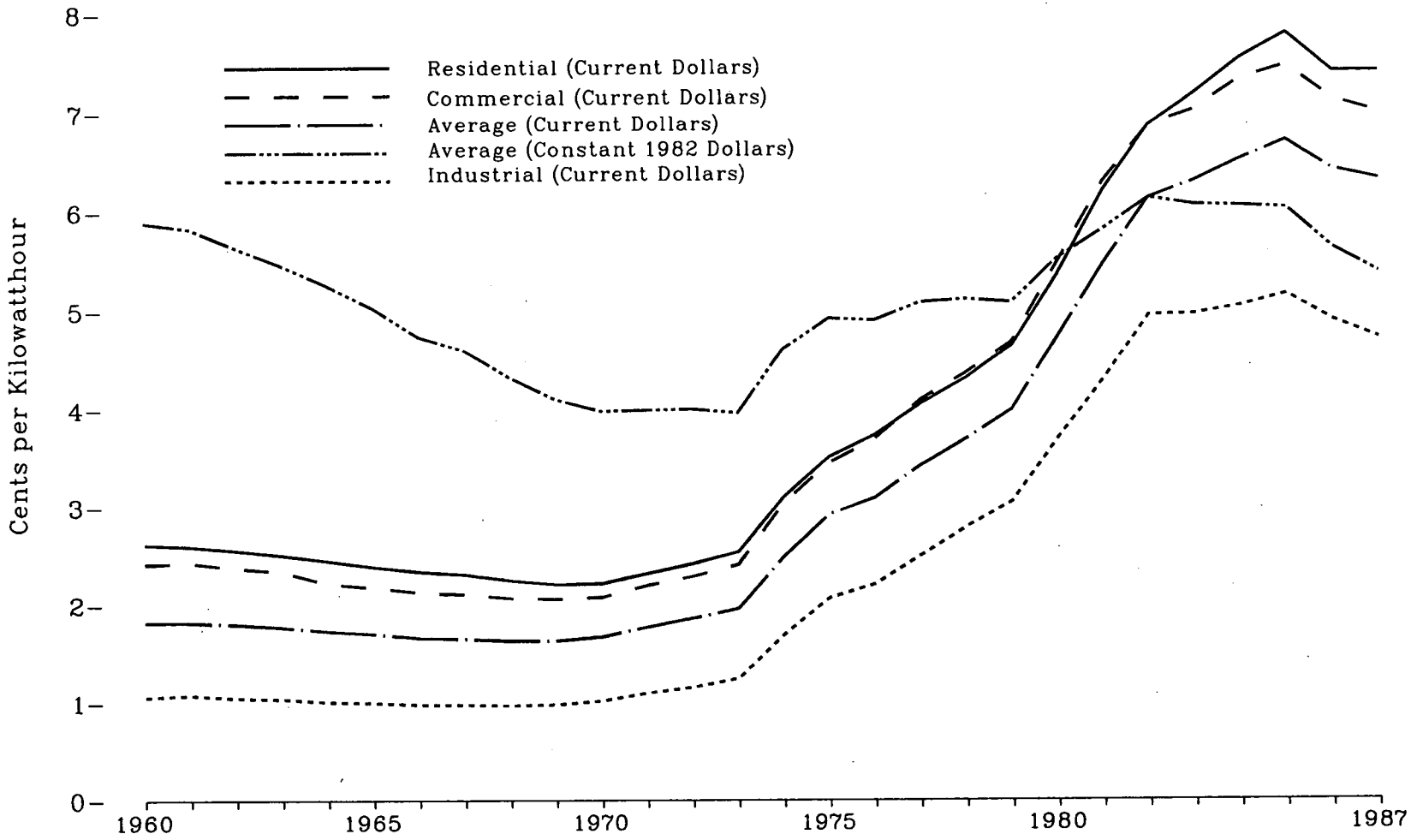
Year	500 kWh [1]		750 kWh [2]		1,000 kWh [3]	
	Current	Constant [4]	Current	Constant [4]	Current	Constant [4]
1949	10.22	43.49	NA	NA	NA	NA
1950	10.11	42.30	NA	NA	NA	NA
1951	10.02	39.92	NA	NA	NA	NA
1952	10.08	39.53	NA	NA	NA	NA
1953	10.20	39.38	NA	NA	NA	NA
1954	10.23	38.90	NA	NA	NA	NA
1955	10.30	37.87	NA	NA	NA	NA
1956	10.36	36.87	NA	NA	NA	NA
1957	10.39	35.70	NA	NA	NA	NA
1958	10.47	35.25	NA	NA	NA	NA
1959	10.51	34.57	NA	NA	NA	NA
1960	10.62	34.37	NA	NA	NA	NA
1961	10.65	34.13	NA	NA	NA	NA
1962	10.66	33.42	NA	NA	NA	NA
1963	10.64	32.84	14.65	45.22	NA	NA
1964	10.61	32.25	14.51	44.10	18.86	57.33
1965	10.41	30.80	14.34	42.43	18.59	55.00
1966	10.34	29.54	14.19	40.54	18.32	52.34
1967	10.37	28.89	14.21	39.58	18.32	51.03
1968	10.37	27.51	14.16	37.56	18.27	48.46
1969	10.32	25.93	13.97	35.10	18.03	45.30
1970	10.51	25.02	14.22	33.86	18.31	43.60
1971	11.13	25.07	14.99	33.76	19.24	43.33
1972	11.99	25.78	16.14	34.71	20.70	44.52
1973	12.56	25.37	16.96	34.26	21.85	44.14
1974	14.10	26.11	19.14	35.44	24.85	46.02
1975	17.93	30.24	24.72	41.69	32.29	54.45
1976	19.26	30.52	26.78	42.44	34.85	55.23
1977	20.86	31.00	29.22	43.42	38.15	56.69
1978	22.19	30.73	31.23	43.25	40.98	56.76
1979	23.05	29.33	32.72	41.63	43.12	54.86
1980	27.80	32.44	36.94	43.10	48.79	56.93
1981	32.61	34.69	43.99	46.80	58.16	61.87
1982	36.96	36.96	50.07	50.07	66.39	66.39
1983	38.35	36.91	52.74	50.76	69.96	67.33
1984	40.18	37.31	54.76	50.84	72.77	67.57
1985	41.86	37.64	57.86	52.03	76.37	68.68
1986	42.54	37.28	58.79	51.52	77.50	67.92
1987	40.88	34.79	56.78	48.32	74.57	63.46

[1] Weighted average monthly bill of residential consumers of 500 kilowatthours.
[2] Weighted average monthly bill of residential consumers of 750 kilowatthours.
[3] Weighted average monthly bill of residential consumers of 1,000 kilowatthours.
[4] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C.
NA = Not available.

Note: The U.S. average is calculated by multiplying the bill for each community included in the typical bill report by the community's population and dividing the sum of the products for all communities by the sum of their populations. Bills are based on rates, fuel adjustments, and taxes in effect January 1 of each year.

Sources: •1949 through September 1977—Federal Power Commission, Form 3, "Typical Net Monthly Bills." •October 1977 through June 1979—Federal Energy Regulatory Commission, FPC Form 3, "Typical Net Monthly Bills." •July 1979 and forward—Energy Information Administration, Form EIA-213, "Typical Net Monthly Bills."

Figure 91. Retail Prices of Electricity Sold by Electric Utilities, 1960-1987



Note: All prices are "old series."
Source: See Table 91.

Table 91. Retail Prices of Electricity Sold by Electric Utilities,[1] 1960-1987

(Cents per Kilowatthour)

Year	Residential		Commercial		Industrial		Other		Total	
	Current	Constant[2]	Current	Constant[2]	Current	Constant[2]	Current	Constant[2]	Current	Constant[2]
	Old Series[3]									
1960	2.62	8.48	2.42	7.83	1.06	3.43	1.91	6.18	1.82	5.89
1961	2.60	8.33	2.43	7.79	1.08	3.46	1.83	5.87	1.82	5.83
1962	2.56	8.03	2.38	7.46	1.05	3.29	1.86	5.83	1.80	5.64
1963	2.51	7.75	2.34	7.22	1.04	3.21	1.83	5.65	1.77	5.46
1964	2.45	7.45	2.22	6.75	1.01	3.07	1.83	5.56	1.73	5.26
1965	2.39	7.07	2.18	6.45	1.00	2.96	1.82	5.38	1.70	5.03
1966	2.34	6.69	2.13	6.09	0.98	2.80	1.80	5.14	1.66	4.74
1967	2.31	6.43	2.11	5.88	0.98	2.73	1.76	4.90	1.65	4.60
1968	2.25	5.97	2.07	5.49	0.97	2.57	1.76	4.67	1.63	4.32
1969	2.21	5.55	2.06	5.18	0.98	2.46	1.74	4.37	1.63	4.10
1970	2.22	5.29	2.08	4.95	1.02	2.43	1.80	4.29	1.67	3.98
1971	2.32	5.23	2.20	4.95	1.10	2.48	1.91	4.30	1.77	3.99
1972	2.42	5.20	2.29	4.92	1.16	2.49	1.98	4.26	1.86	4.00
1973	2.54	5.13	2.41	4.87	1.25	2.53	2.10	4.24	1.96	3.96
1974	3.10	5.74	3.04	5.63	1.69	3.13	2.75	5.09	2.49	4.61
1975	3.51	5.92	3.45	5.82	2.07	3.49	3.08	5.19	2.92	4.92
1976	3.73	5.91	3.69	5.85	2.21	3.50	3.27	5.18	3.09	4.90
1977	4.05	6.02	4.09	6.08	2.50	3.71	3.51	5.22	3.42	5.08
1978	4.31	5.97	4.36	6.04	2.79	3.86	3.62	5.01	3.69	5.11
1979	4.64	5.90	4.68	5.95	3.05	3.88	3.96	5.04	3.99	5.08
1980	5.36	6.25	5.48	6.39	3.69	4.31	4.76	5.55	4.73	5.52
1981	6.20	6.60	6.29	6.69	4.29	4.56	5.28	5.62	5.46	5.81
1982	6.86	6.86	6.86	6.86	4.95	4.95	5.92	5.92	6.13	6.13
1983	7.18	6.91	7.02	6.76	4.96	4.77	6.38	6.14	6.30	6.06
1984	7.54	7.00	7.33	6.81	5.04	4.68	6.78	6.30	6.52	6.05
1985	7.79	7.01	7.47	6.72	5.16	4.64	6.96	6.26	6.71	6.03
1986	7.80	6.84	7.41	6.49	5.10	4.47	7.08	6.21	6.70	5.87
1987[4]	7.76	6.60	7.24	6.16	4.87	4.14	7.01	5.97	6.56	5.58
	New Series[3]									
1986	7.41	6.49	7.13	6.25	4.90	4.29	6.64	5.82	6.42	5.63
1987[4]	7.41	6.31	7.00	5.96	4.72	4.02	6.64	5.65	6.32	5.38

[1] 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. [2] In 1982 dollars, calculated using implicit GNP price deflators. See Appendix C. [3] Beginning with January 1986, national average price estimates are based on a statistically derived sample of both publicly and privately owned electric utilities. Prior to that time, national average price estimates were based on a sample of only privately owned electric utilities. Respondents to Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions," formerly the "Electric Utility Company Monthly Statement," consist of a sample of 201 electric utilities that were statistically chosen using stratification techniques. The respondents were chosen from more than 3,000 electric utilities reporting on Form EIA-861, "Annual Electric Utility Report." This scheme differs from the cut-off sample used prior to January 1986. Data are shown for both the old and new series. Publication of both series will continue until sufficient information exists to estimate historical data based on the new series. Data are preliminary. [4] Preliminary. Sources: •1960 through September 1977—Federal Power Commision, Form 5, "Monthly Statement of Electric Operating Revenues and Income." •October 1977 through February 1980—Federal Energy Regulatory Commission, FPC Form 5, "Monthly Statement of Electric Operating Revenues and Income." •March 1980 through 1982—Federal Energy Regulatory Commission, Form 5, "Electric Utility Company Monthly Statement." •1983 through 1986—Energy Information Administration, Form EIA-826, "Electric Utility Company Monthly Statement." •1987—Energy Information Administration, Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

8. Nuclear Energy

Status of Nuclear Generating Units

At the end of 1987, there were 107 operable nuclear generating units in the United States (92). Most of the units were located in the eastern half of the country. In addition, 4 units had reached the startup stage (authorization by the Nuclear Regulatory Commission for fuel loading and low-power testing); 14 units had received construction permits; and 2 (in Illinois) were on order.

Although the number of operable units reached an all-time high in 1987, the total of 127 units in all stages of planning, construction, and operation was well below the total of 236 in 1975.[1] After 1972, many planned units were cancelled; after 1978, no orders for new units were announced.

A number of factors 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 further eroded electric utilities' willingness to commission new plants.

Contributions to Electricity Generation

Nuclear power's contribution to electricity generation in the United States increased almost every year from the mid 1960's through 1987; the exceptions were 1979 and 1980 (93). In 1987, 455 billion net kilowatthours (18 percent of total U.S. generation) came from nuclear power. Net summer capability, a measure of the steady hourly output that generating equipment is expected to supply to the system, also increased almost every year, reaching 94 million kilowatts by December 31, 1987.

[1]Energy Information Administration, *Monthly Energy Review*, December 1987, DOE/EIA-0035(87/12) (Washington, DC, March 1988), Table 8.2.

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

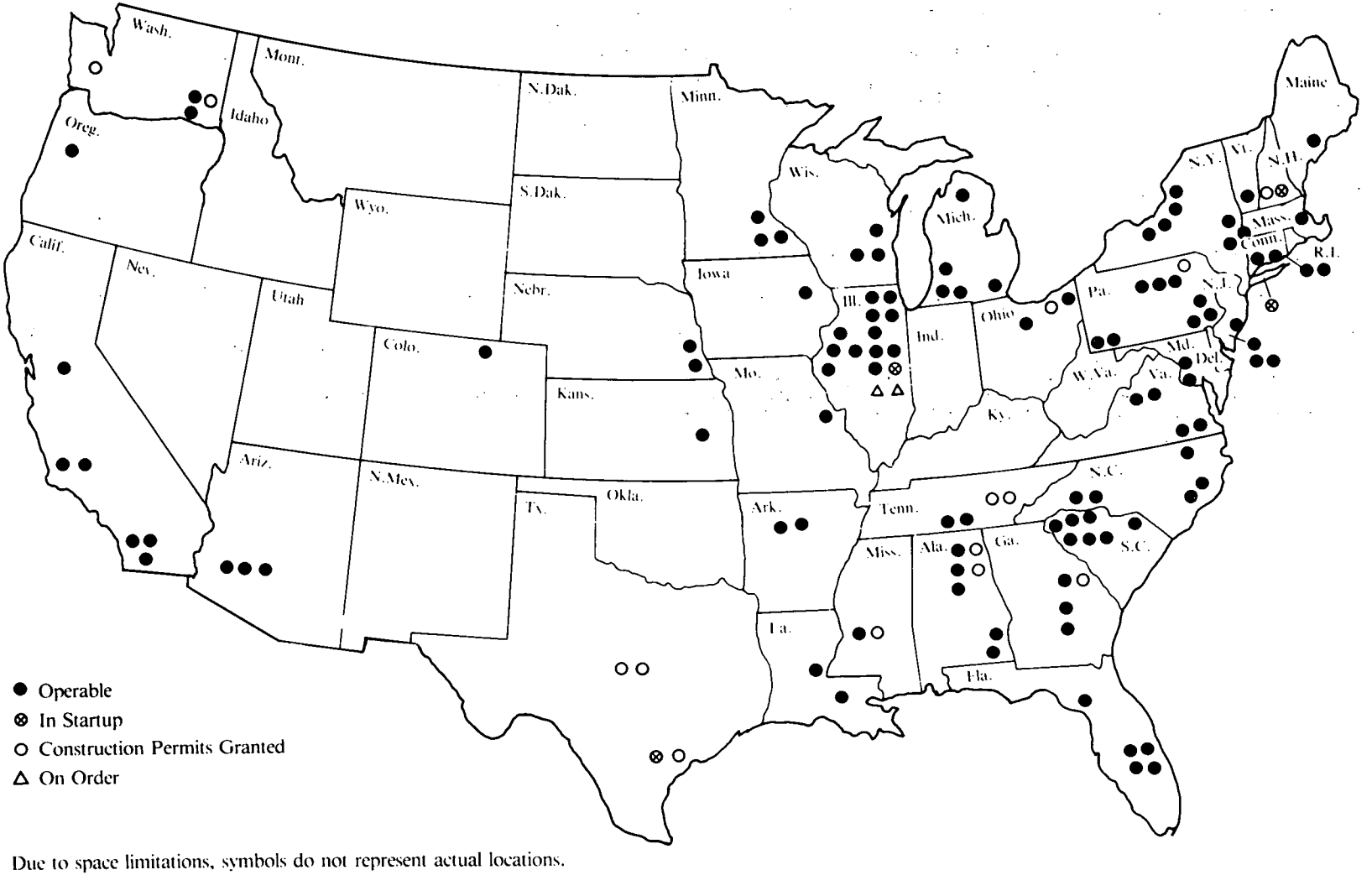
The Uranium Industry

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 (94). As the AEC began to accumulate stockpiles, its purchases declined. U.S. annual production of uranium totaled 23 million pounds in 1967.

In the late 1960's, the decline was reversed when orders for new nuclear plants led to higher projections of demand and increased domestic production. During the late 1970's, however, projected demand fell as planned units were cancelled or postponed. Buildups of inventories at electric utilities and competition from foreign suppliers also contributed to the second major decline in domestic production, which stood at 13 million pounds in 1987.

Historically, domestic producers have faced competition from low-cost uranium imports. From 1949 through 1960, net imports actually exceeded domestic production (94). 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 1968 through 1974. With the gradual removal of the AEC restrictions during the 1977-to-1983 period, foreign uranium deliveries to the United States increased. Contracts in place as of June 30, 1987, indicate net imports of 9 million pounds of U_3O_8 in 1987.

Figure 92. Status of Nuclear Generating Units, December 31, 1987



Due to space limitations, symbols do not represent actual locations.

Source: See Table 92.

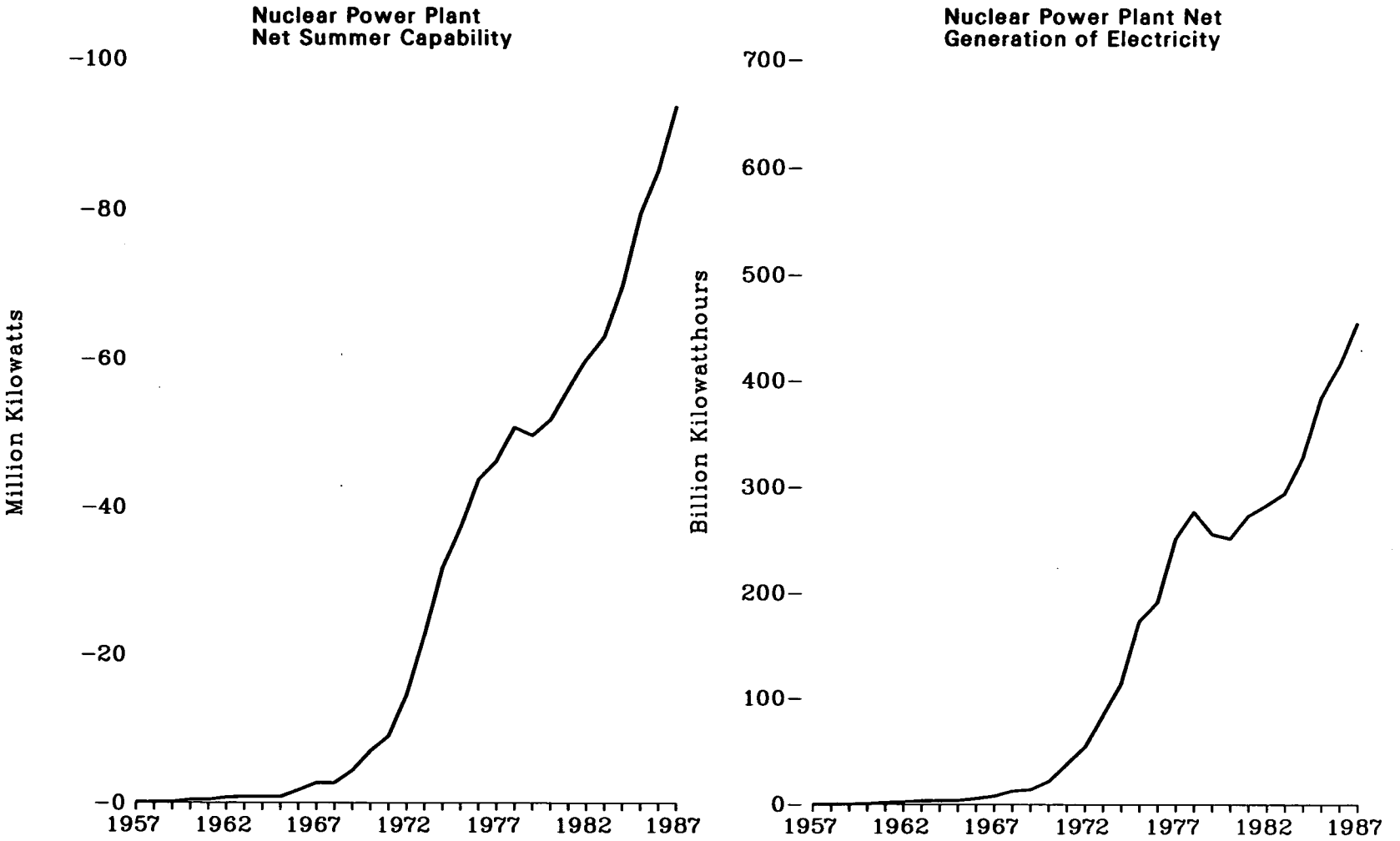
Table 92. Status of Nuclear Generating Units, December 31, 1985, 1986, and 1987

(Number of Reactors)

Status	1985				1986				1987			
	Boiling Water Reactors	Pressurized Water Reactors	Other [1]	Total	Boiling Water Reactors	Pressurized Water Reactors	Other [1]	Total	Boiling Water Reactors	Pressurized Water Reactors	Other [1]	Total
Operable [2]	33	60	2	95	35	63	2	100	37	68	2	107
In Startup [3]	1	2	0	3	3	4	0	7	1	3	0	4
Construction Permits Granted	7	23	0	30	3	16	0	19	3	11	0	14
Construction Permits Pending	0	0	0	0	0	0	0	0	0	0	0	0
On Order	0	2	0	2	0	2	0	2	0	2	0	2
Total	41	87	2	130	41	85	2	128	41	84	2	127

[1] Includes one graphite-moderated and one gas-cooled reactor.
[2] Units that have received a Full Power Operating License from the Nuclear Regulatory Commission, plus the Hanford-N reactor.
[3] Units that have received a Low Power Operating 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 93. Nuclear Power Plant Net Summer Capability and Net Generation of Electricity, 1957–1987



Source: See Table 93.

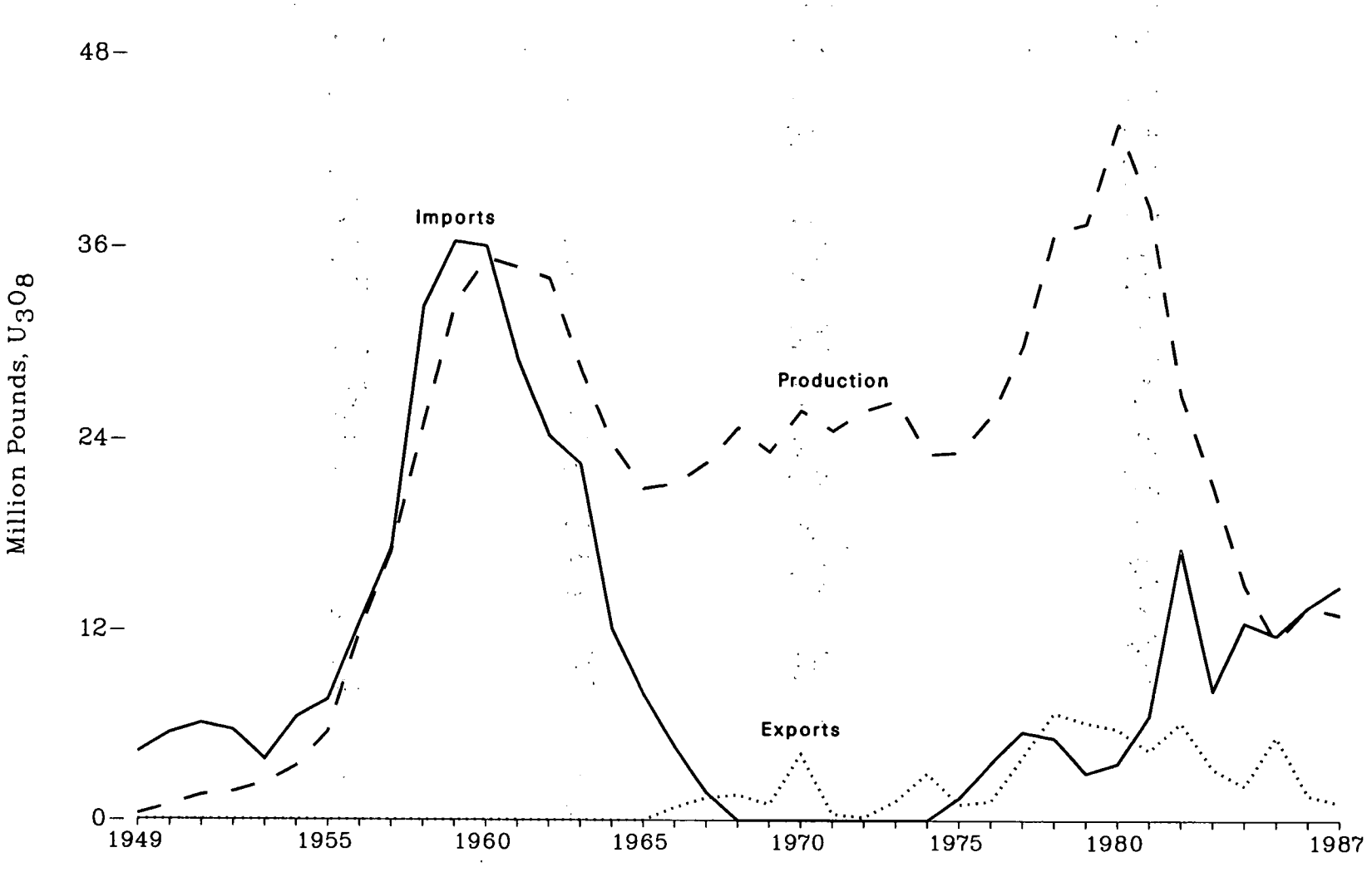
Table 93. Nuclear Power Plant Net Summer Capability [1] and Net Generation of Electricity, 1957-1987

Year	Operable Units [2] at End of Year	Net Summer Capability (million kilowatts)	Net Generation of Electricity (billion net kilowatthours)	Net Generation of Electricity (percent of total U.S. generation)	Capacity Factor [1]
1957	1	0.1	[3]	[4]	NA
1958	1	0.1	0.2	[4]	NA
1959	1	0.1	0.2	[4]	NA
1960	3	0.4	0.5	0.1	NA
1961	3	0.4	1.7	0.2	NA
1962	5	0.7	2.3	0.3	NA
1963	6	0.8	3.2	0.4	NA
1964	6	0.8	3.3	0.3	NA
1965	6	0.8	3.7	0.3	NA
1966	8	1.7	5.5	0.5	NA
1967	10	2.7	7.7	0.6	NA
1968	11	2.7	12.5	0.9	NA
1969	14	4.4	13.9	1.0	NA
1970	18	7.0	21.8	1.4	NA
1971	21	9.0	38.1	2.4	NA
1972	[2] 29	[2] 14.5	54.1	3.1	NA
1973	[2] 39	[2] 22.6	83.5	4.5	53.7
1974	48	31.8	114.0	6.1	47.9
1975	54	37.2	172.5	9.0	56.0
1976	61	43.7	191.1	9.4	54.9
1977	65	46.2	250.9	11.8	63.4
1978	70	50.7	276.4	12.5	64.7
1979	68	49.6	255.2	11.4	58.5
1980	70	51.7	251.1	11.0	56.4
1981	74	55.9	272.7	11.9	58.4
1982	77	59.9	282.8	12.6	56.7
1983	80	63.0	293.7	12.7	54.4
1984	86	69.7	327.6	13.6	56.3
1985	95	79.4	383.7	15.5	58.0
1986	100	85.2	414.0	16.6	56.9
1987[6]	107	93.7	454.8	17.7	57.4

[1] See Glossary.
[2] See Appendix E, Note 18.
[3] Less than 0.05 billion kilowatthours.
[4] Less than 0.05 percent.
[6] Preliminary.
NA = Not available.

Sources: **Operable Units at End of Year:** •1957 through 1972—Federal Power Commission, Form 4, "Monthly Power Plant Report." •1973 and forward—Nuclear Regulatory Commission, Report NUREG-0020, *Licensed Operating Reactors*, monthly. **Net Summer Capability:** •1957 through 1983—See Appendix E, Note 17. •1984 and forward—Energy Information Administration, Form EIA-860, "Annual Electric Generator Report." **Electricity Generation.** •1957 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

Figure 94. Uranium Production, Exports, and Imports, 1949-1987



Source: See Table 94.

Table 94. Uranium Production, Exports, and Imports, 1949-1987

(Million Pounds of U_3O_8)

Year	Domestic Production	Exports	Imports [1]
1949	0.36	0	4.26
1950	0.92	0	5.48
1951	1.54	0	6.10
1952	1.74	0	5.66
1953	2.32	0	3.80
1954	3.40	0	6.48
1955	5.56	0	7.60
1956	11.92	0	12.48
1957	16.96	0	17.14
1958	24.88	0	32.26
1959	32.48	0	36.32
1960	35.28	0	36.02
1961	34.70	0	29.00
1962	34.02	0	24.22
1963	28.44	0	22.44
1964	23.70	0	12.14
1965	20.88	0	8.00
1966	21.18	0.80	4.64
1967	22.51	1.40	1.76
1968	24.74	1.60	0
1969	23.22	1.00	0
1970	25.81	4.20	0
1971	24.55	0.40	0
1972	25.80	0.20	0
1973	26.47	1.20	0
1974	23.06	3.00	0
1975	23.20	1.00	1.40
1976	25.49	1.20	3.60
1977	29.88	4.00	5.60
1978	36.97	6.80	5.20
1979	37.47	6.20	3.00
1980	43.70	5.80	3.60
1981	38.47	4.40	6.60
1982	26.87	6.20	17.10
1983	21.16	3.30	8.20
1984	14.88	2.20	12.50
1985	11.31	5.30	11.70
1986	13.51	1.60	13.50
1987	[2] 13.01	[3] 1.09	[3] 14.80

[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.

[2] Preliminary.

[3] Export and import values for 1987 are contracts in place as of June 30, 1987.

Note: Import and export data prior to 1982 are for transactions conducted by uranium suppliers only. For 1982 forward, transactions by uranium buyers (consumers) are included. In 1983, buyer imports totalled 3,800 million pounds of U_3O_8 and buyer exports totalled 1,000 million pounds of U_3O_8. Buyer imports and exports prior to 1982 are believed to be small.

Sources: •1949 through 1967—U.S. Department of Energy, Grand Junction Area Office, Colorado, *Statistical Data of the Uranium Industry*, Report No. GJO-100, annual. •1968 through 1986—Energy Information Administration, *Uranium Industry Annual 1986*. •1987—Energy Information Administration, Form EIA-858, "Uranium Industry Annual Survey."

9. 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, coupled with concerns about the stability of supply, stimulated interest in alternatives to conventional energy. Since 1973, renewable sources of energy have accounted for small but growing shares of the domestic energy market.

Some sources of renewable energy lend themselves to onsite applications such as the burning of wood for heat and the use of flat-plate solar thermal collectors for domestic hot water. Other sources, such as photovoltaics, can be used to generate electricity for transmission to distant markets. Although other sources with the potential for centralized applications, such as windmills, heliostats, and ocean thermal energy conversion, are not yet widely used, they may eventually contribute significantly to the domestic energy supply.

Wood and Other Biomass Energy

Energy derived from wood totaled 2.6 quadrillion Btu (95) in 1984. Almost 1.7 quadrillion Btu of wood was consumed by the industrial sector. Industries with ready access to wood and wood byproducts, such as the paper and lumber industries, relied heavily on wood as an energy source. In the residential sector, wood supplied 0.9 quadrillion Btu and over 6 million households relied on wood as the main heating fuel (96).

Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

Energy derived from other biomass sources, such as agricultural and solid wastes and alcohol fuels, totaled 0.3 quadrillion Btu in 1984.

Solar Energy

Solar energy is an inexhaustible, universally available source of energy. Converting solar energy to useful forms, however, requires large collection areas, and therefore the amount that can be harnessed is limited.

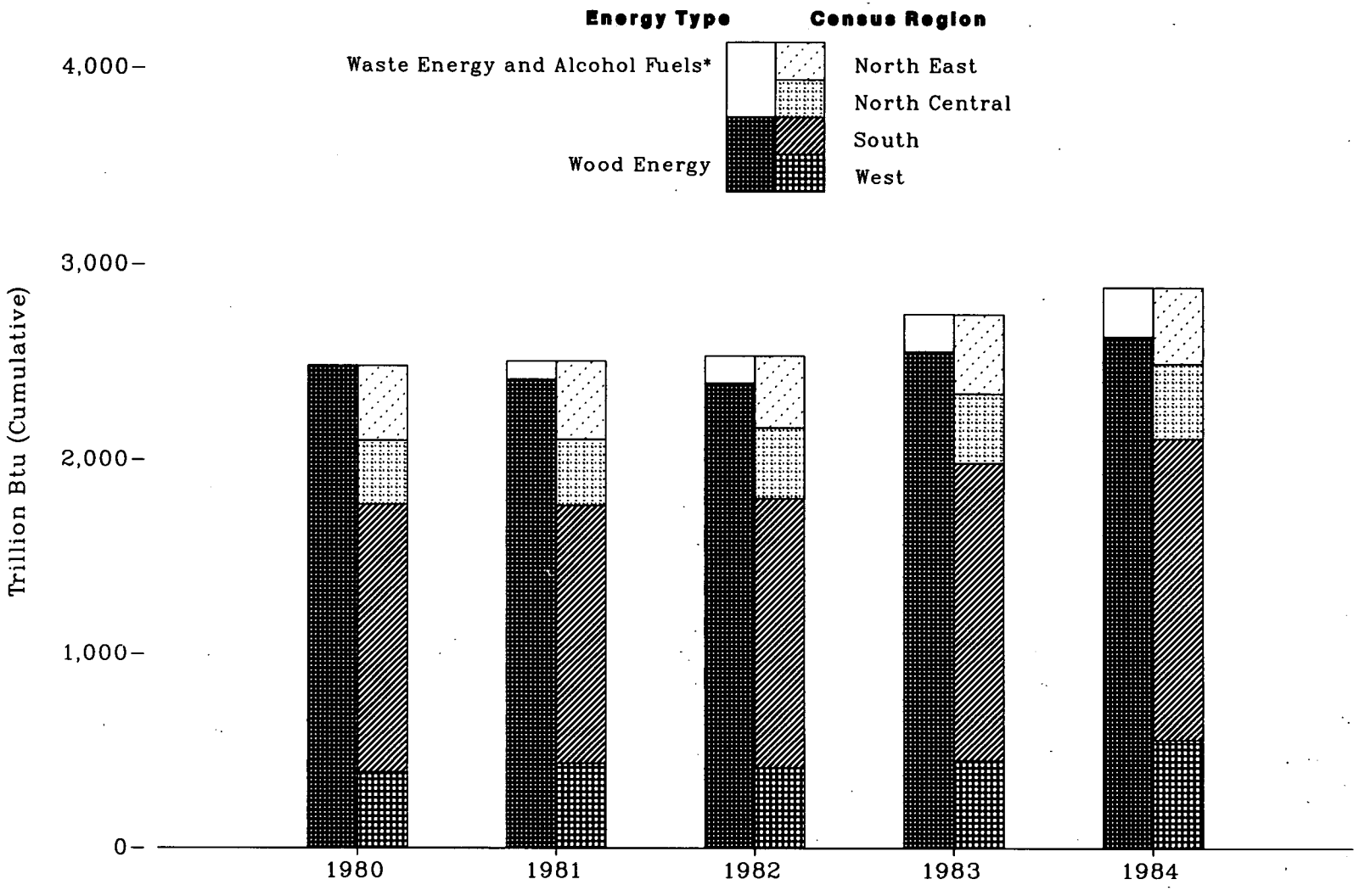
Producer shipments of equipment are used as one measure of solar energy consumption. Shipments of low-temperature collectors, used primarily for heating swimming pools, dipped to 3.8 million square feet in 1986 (97). Shipments of medium-temperature, special, and other collectors, used primarily for domestic hot water, peaked at 12 million square feet in 1983, but fell to 1 million square feet in 1986 after the Federal energy tax credit expired at the end of 1985. Shipments of photovoltaic modules increased to 6.3 thousand peak kilowatts in 1986 (99).

Geothermal Energy

Most of the vast quantity of geothermal energy is inaccessible, trapped below the Earth's crust in layers of molten rock. However, when that energy reaches regions where the crust is thinner, it can be tapped. Hydrothermal reservoirs, the most common sources of geothermal energy, yield hot water or, more rarely, steam. Two other sources, geopressurized reservoirs and hot dry rock, are more difficult to harness.

Geothermal energy may be used directly, for purposes such as space heating, or it may be converted to electricity. In 1960, The Geysers in California became the first U.S. utility to generate electricity from geothermal steam. Subsequently, electricity generation from geothermal sources increased almost every year, even after 1982, when prices of conventional energy began to decline (100). In 1987, The Geysers and other, smaller plants, generated 11 billion kilowatthours of electricity.

Figure 95. Consumption of Wood and Waste Energy and Alcohol Fuels by Census Region, 1980–1984



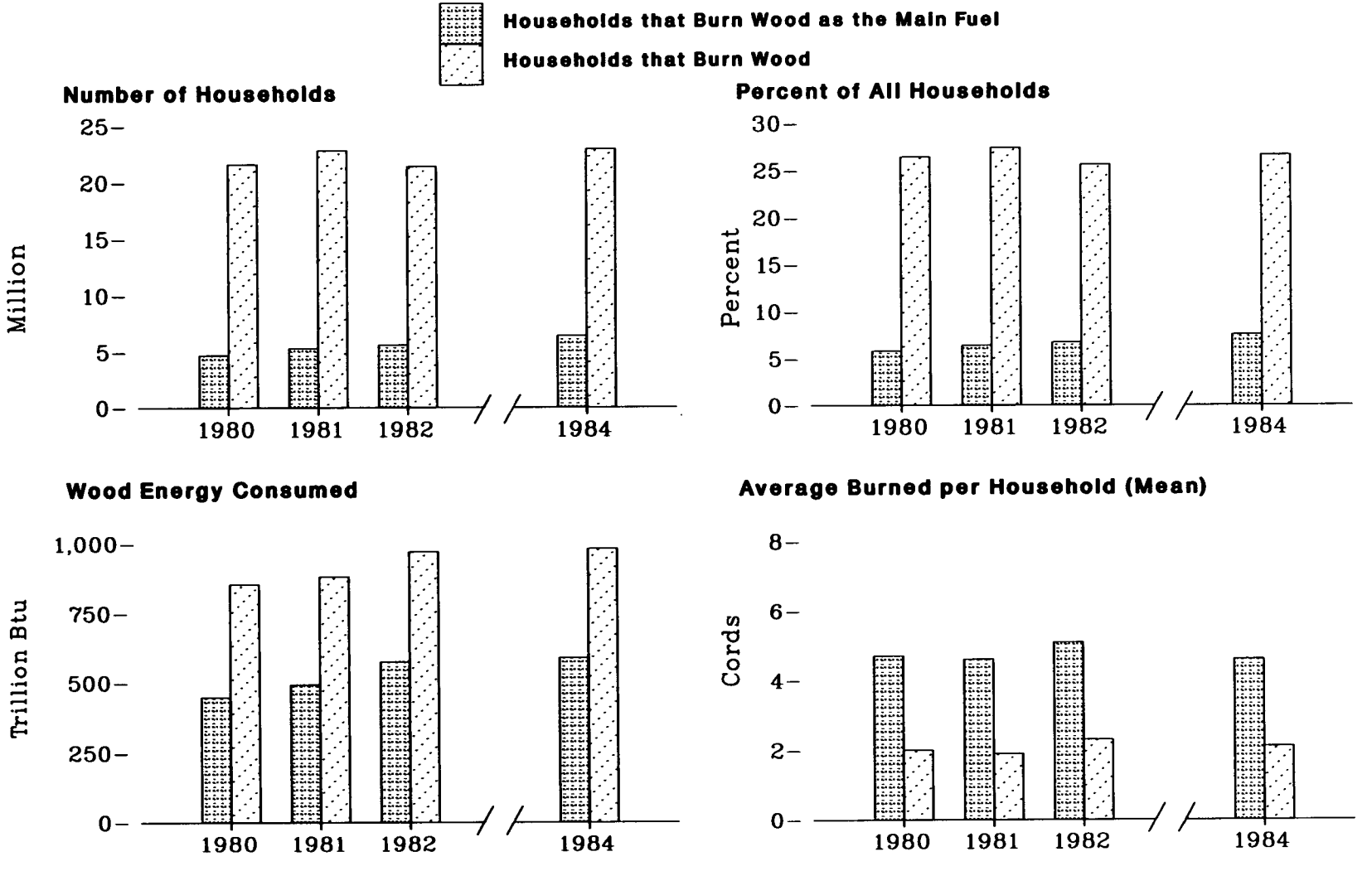
*Data are not available for 1980.
Note: See Appendix D for Census Regions.
Source: See Table 95.

Table 95. Consumption of Wood and Waste Energy and Alcohol Fuels by End-Use Sector and Census Region, 1980-1984

	1980		1981		1982		1983		1984	
	Million Short Tons [1]	Trillion Btu	Million Short Tons [1]	Trillion Btu	Million Short Tons [1]	Trillion Btu	Million Short Tons [1]	Trillion Btu	Million Short Tons [1]	Trillion Btu
Wood Energy										
End-Use Sector										
Industrial	93	1,600	88	1,519	83	1,434	93	1,606	98	1,679
Residential	50	859	51	869	55	937	54	925	54	923
Commercial	1	21	1	21	1	22	1	22	1	22
Electric Utility	[2]	4	[2]	3	[2]	2	[2]	3	1	9
Census Region [3]										
Northeast	22	386	22	389	20	351	21	369	20	349
North Central	19	329	20	331	20	339	18	318	20	341
South	80	1,380	75	1,291	78	1,334	86	1,471	86	1,482
West	23	388	23	402	22	372	23	396	27	461
Total	144	2,483	140	2,412	139	2,395	148	2,556	153	2,633
Waste Energy [4]										
Census Region [3]										
Northeast	NA	NA	NA	16	NA	20	NA	36	NA	39
North Central	NA	NA	NA	5	NA	13	NA	17	NA	21
South	NA	NA	NA	37	NA	50	NA	56	NA	57
West	NA	NA	NA	30	NA	36	NA	48	NA	91
Total	NA	NA	NA	88	NA	120	NA	157	NA	208
Alcohol Fuels										
Census Region [3]										
Northeast	NA	NA	NA	[5]	NA	[5]	NA	[5]	NA	[5]
North Central	NA	NA	NA	4	NA	11	NA	22	NA	25
South	NA	NA	NA	1	NA	4	NA	8	NA	13
West	NA	NA	NA	2	NA	4	NA	5	NA	5
Total	NA	NA	NA	7	NA	19	NA	35	NA	43
Total Biomass	NA	NA	NA	2,507	NA	2,534	NA	2,748	NA	2,884

[1] Oven-dried equivalent which averages approximately 17.2 million Btu per short ton.
[2] Less than 500,000 short tons.
[3] See Appendix D for Census Regions.
[4] Includes landfill methane, mass burning, refuse derived fuels, and agricultural waste.
[5] Less than 0.5 trillion Btu.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Source: •1980—Energy Information Administration, *Estimates of U.S. Wood Energy Consumption, 1980-1983.* •1981 and forward—Energy Information Administration, previously unpublished data.

Figure 96. Households that Burn Wood, 1980–1982 and 1984



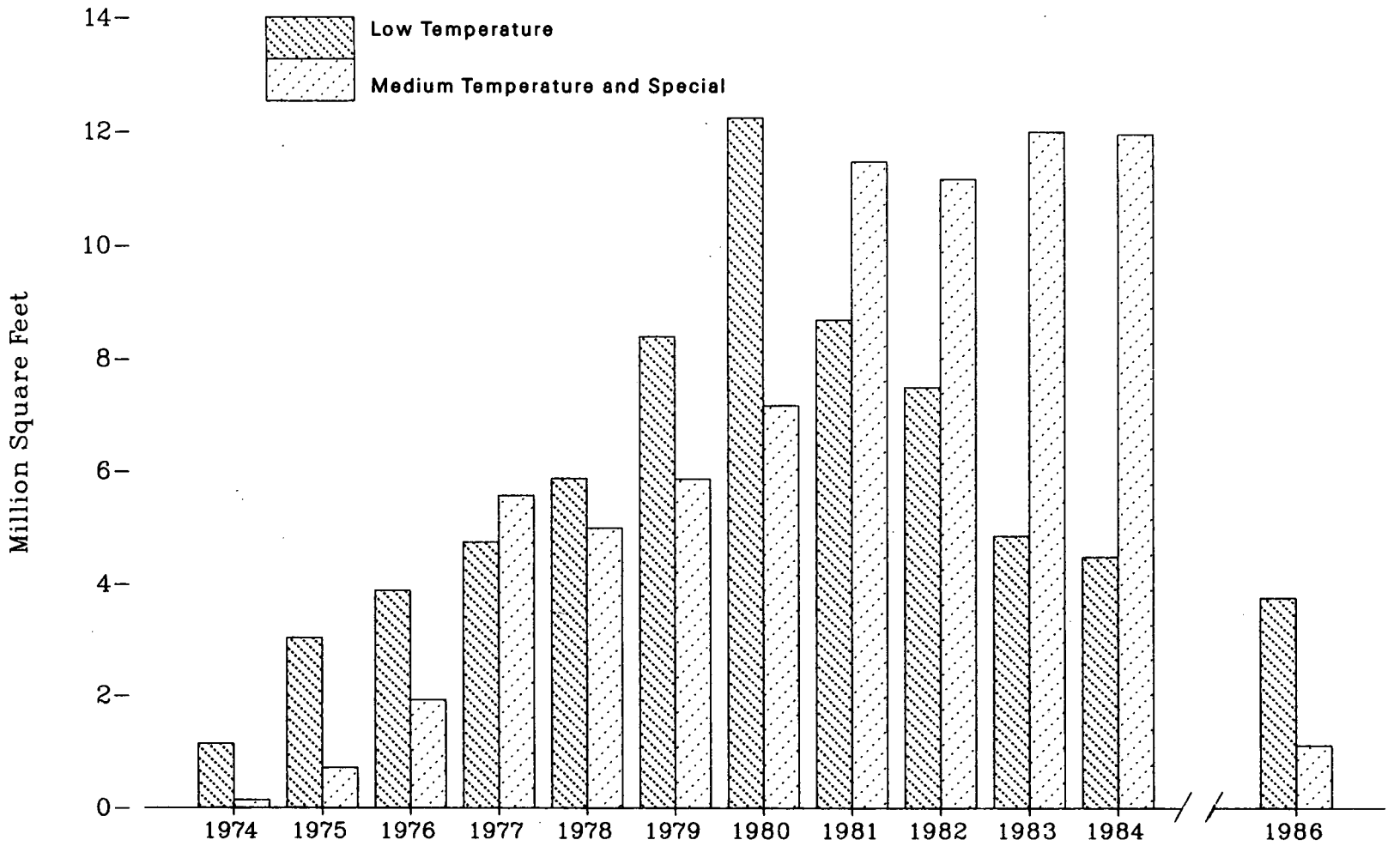
Source: See Table 96.

Table 96. Households that Burn Wood, 1980-1982 and 1984 [1]

	1980	1981	1982	1984
Households that Burn Wood				
Number of Households (millions)	21.6	22.8	21.4	22.9
Percent of All U.S. Households	26.4	27.4	25.6	26.6
Number of Cords Burned (millions)	42.7	44.0	48.6	49.0
Average Number of Cords Burned per Household				
Mean	2.0	1.9	2.3	2.1
Median	0.7	1.0	1.0	1.0
Wood Energy Consumed (trillion Btu)	854	881	971	981
Households that Burn Wood as Main Heating Fuel				
Number of Households (millions)	4.7	5.3	5.6	6.4
Percent of All U.S. Households	5.8	6.4	6.7	7.5
Number of Cords Burned (millions)	22.4	24.7	28.7	29.4
Average Number of Cords Burned per Household				
Mean	4.7	4.6	5.1	4.6
Median	3.3	3.0	4.0	4.0
Wood Energy Consumed (trillion Btu)	448	493	574	589

[1] Data are for the heating season beginning with the latter part of the previous year shown.
Note: Consumption estimates are based on respondent reports and may be subject to reporting biases.
Note: No data are available for 1983.
Source: •1980 through 1982—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey." •1984—Energy Information Administration, Form EIA-457, "Residential Energy Consumption Survey."

Figure 97. Producer Shipments of Solar Thermal Collectors, 1974-1984 and 1986



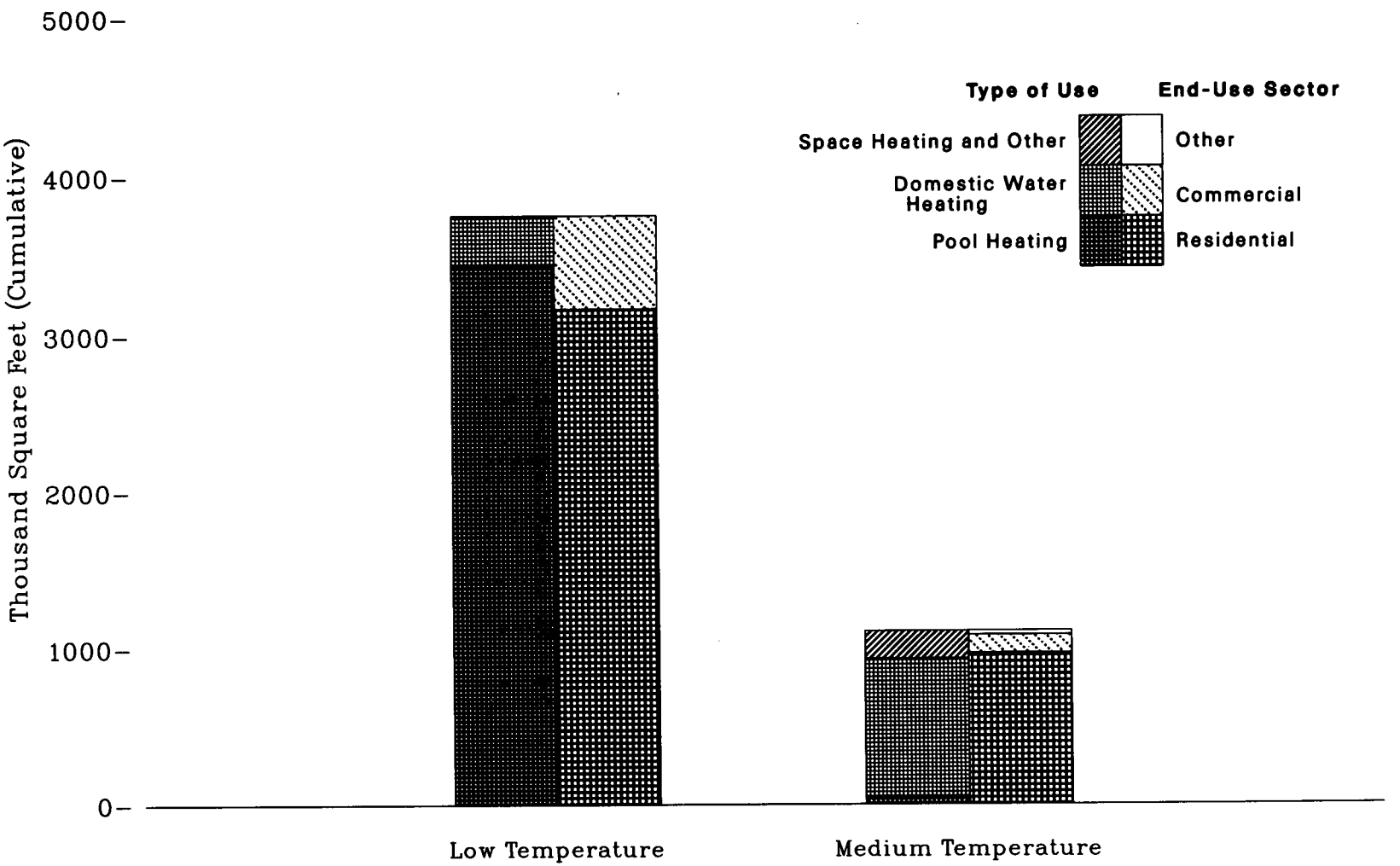
Source: See Table 97.

Table 97. Producer Shipments of Solar Thermal Collectors, 1974-1984 and 1986

Year	Low-Temperature Collectors		Medium-Temperature, Special, and Other Collectors	
	Number of Manufacturers	Quantity Shipped (million square feet)	Number of Manufacturers	Quantity Shipped (million square feet)
1974	6	1.14	39	0.14
1975	13	3.03	118	0.72
1976	19	3.88	203	1.92
1977	52	4.74	297	5.57
1978	69	5.87	204	4.99
1979	84	8.39	257	5.86
1980	79	12.23	250	7.16
1981	75	8.68	263	11.46
1982	61	7.48	248	11.15
1983	55	4.85	179	11.98
1984	48	4.48	206	11.94
1986	22	3.75	87	1.11

Note: Manufacturers producing more than one type of collector are accounted for in both groups.
Note: No data are available for 1985.
Sources: •1974 through 1976—Federal Energy Administration, *Solar Collector Manufacturing Activity*, semi-annual •1977—Energy Information Administration, *Solar Collector Manufacturing Activity, July through December, 1981*. March 1982 (semi-annual), •1978 and forward—Energy Information Administration, *Solar Collector Manufacturing Activity*, annual.

Figure 98. Producer Shipments of Solar Thermal Collectors by Type of Collector and Application, 1986



Source: See Table 98.

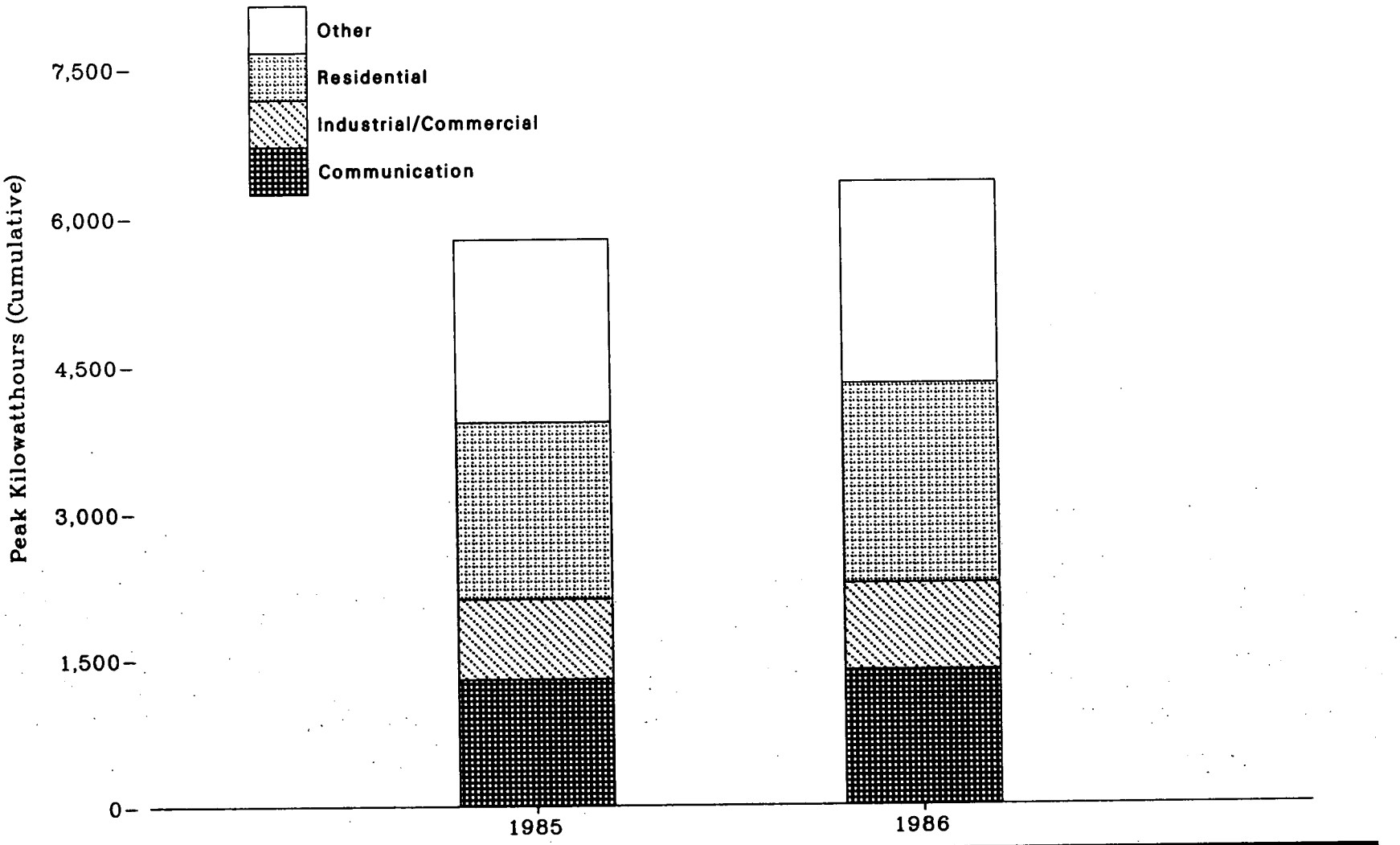
Table 98. Producer Shipments of Solar Thermal Collectors by Type of Collector and Application, 1986

(Thousand Square Feet)

Application	Type of Collector			Total
	Low Temperature	Medium-Temperature		
		Air	Liquid	
Type of Use				
Pool Heating	3,443	0	51	3,494
Domestic Hot Water	301	29	851	1,181
Space Heating	8	53	66	127
Other	0	9	51	60
Total	3,751	91	1,020	4,862
End-Use Sector				
Residential	3,165	64	902	4,131
Commerical	586	23	94	703
Other	(1)	4	24	28
Total	3,751	91	1,020	4,862

[1] Less than 0.05 thousand square feet.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *Solar Collector Manufacturing Activity 1986.*

Figure 99. Producer Shipments of Photovoltaic Modules, 1985 and 1986



Source: See Table 99.

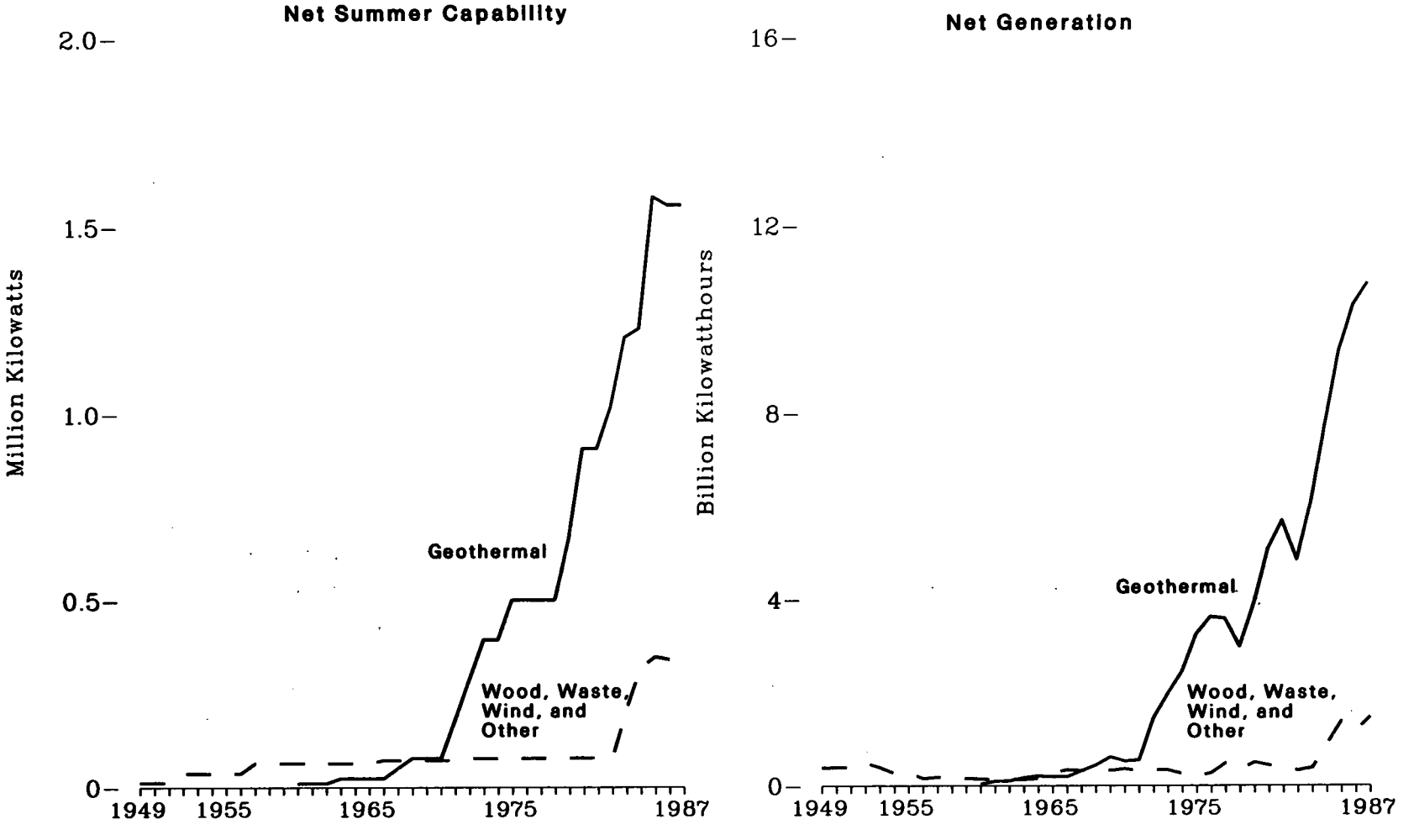
Table 99. Producer Shipments of Photovoltaic Modules, 1985 and 1986

(Peak Kilowatts)

Application	1985	1986
End Use		
Water Pumping	545	591
Transportation	370	419
Communication	1,292	1,375
Consumer Goods	244	294
Military	112	101
Residential	1,800	2,029
Industrial/Commercial	826	895
Utility	518	553
Other	63	76
Total	5,769	6,333

Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *Solar Collector Manufacturing Activity 1986.*

Figure 100. Net Summer Capability and Net Generation of Electric Utility Electricity from Renewable Energy Resources, 1949-1987



Source: See Table 100.

Table 100. Net Summer Capability [1] and Net Generation of Electric Utility Electricity from Renewable Energy Resources, 1949-1987

Year	Geothermal		Wood and Waste		Wind and Other [2]	
	Net Summer Capability [3] (thousand kilowatts)	Net Generation (million kilowatthours)	Net Summer Capability [3] (thousand kilowatts)	Net Generation (million kilowatthours)	Net Summer Capability [3] (thousand kilowatts)	Net Generation (million kilowatthours)
1949	(4)	(4)	13	386	0	0
1950	(4)	(4)	13	390	0	0
1951	(4)	(4)	13	391	0	0
1952	(4)	(4)	37	482	0	0
1953	(4)	(4)	37	389	0	0
1954	(4)	(4)	37	263	0	0
1955	(4)	(4)	37	276	0	0
1956	(4)	(4)	37	152	0	0
1957	(4)	(4)	64	177	0	0
1958	(4)	(4)	64	175	0	0
1959	(4)	(4)	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	(5)	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[6]	1,558	10,775	343	1,477	19	14

[1] See Glossary.
[2] Includes photovoltaic and solar thermal energy.
[3] At end of year.
[4] No geothermal capability prior to 1960.
[5] Less than 500 kilowatts.
[6] Preliminary.

Sources: **Net Summer Capability at End of Year:** •1960 through 1984—Energy Information Administration estimates. •1985 and forward—Energy Information Administration, Form EIA-860, "Annual Electric Generator Report." **Net Generation:** •1949 through September 1977—Federal Power Commission, Form 4, "Monthly Power Plant Report." •October 1977 through 1981—Federal Energy Regulatory Commission, FPC Form 4, "Monthly Power Plant Report." •1982 and forward—Energy Information Administration, Form EIA-759, "Monthly Power Plant Report."

10. International Energy

The Rise and Fall of Crude Oil Prices

In the mid-1970's, 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. By the 1980's, however, the effects of conservation, fuel switching, and increased efficiency had begun to inhibit demand, even as higher prices stimulated new sources of production. In response, crude oil prices declined slowly at first and then plunged in 1986, as netback pricing agreements supported continued excess production. Prices recovered only moderately in 1987.

Fluctuations in Petroleum Demand

The expanding post-war petroleum market reached 56 million barrels per day in 1973 (105). Following the 1973 price hike, demand dipped and then grew slowly to a peak of 65 million barrels per day in 1979. After the 1979–80 price hike, world petroleum consumption began to fall, down to 59 million barrels per day by 1983. At that point, lowered demand and excess production began to erode the price of oil. In 1985, consumption was up to 60 million barrels per day.

U.S. consumption of petroleum products in 1985 accounted for 16 million barrels per day out of the 34 million barrels per day consumed by the Organization for Economic Cooperation and Development (OECD) countries. Japan consumed 4 million barrels per day. Of the non-OECD countries, the U.S.S.R. was the biggest consumer, accounting for 9 million barrels per day.

Energy Production by Source

World production of crude oil totaled 56 million barrels per day in 1987, unchanged from the 1986 level (103). Production gains in Iran and the U.S.S.R. compensated for cut-backs in other countries, most notably in Saudi Arabia and the United States. The Organization of Petroleum Exporting Countries (OPEC) accounted for 33 percent, and the U.S.S.R. and the United States, combined, for 36 percent, of world production.

In 1986, the U.S.S.R. and the United States were the major producers of dry natural gas (107). Together, they accounted for 40 trillion cubic feet out of the world total of 63 trillion cubic feet.

Coal production rose from 3.8 billion short tons in 1976 to 5.0 billion short tons in 1986 (110). China, the leading producer, boosted production to 959 million short tons in 1986. The United States, the second leading producer, mined 890 million short tons.

In 1987, nuclear-based electricity generation by non-Communist countries reached 1.5 trillion kilowatthours (112). The U.S. share of the world total rose to 32 percent. France accounted for 18 percent, Japan for 12 percent, and West Germany for 9 percent of the world total.

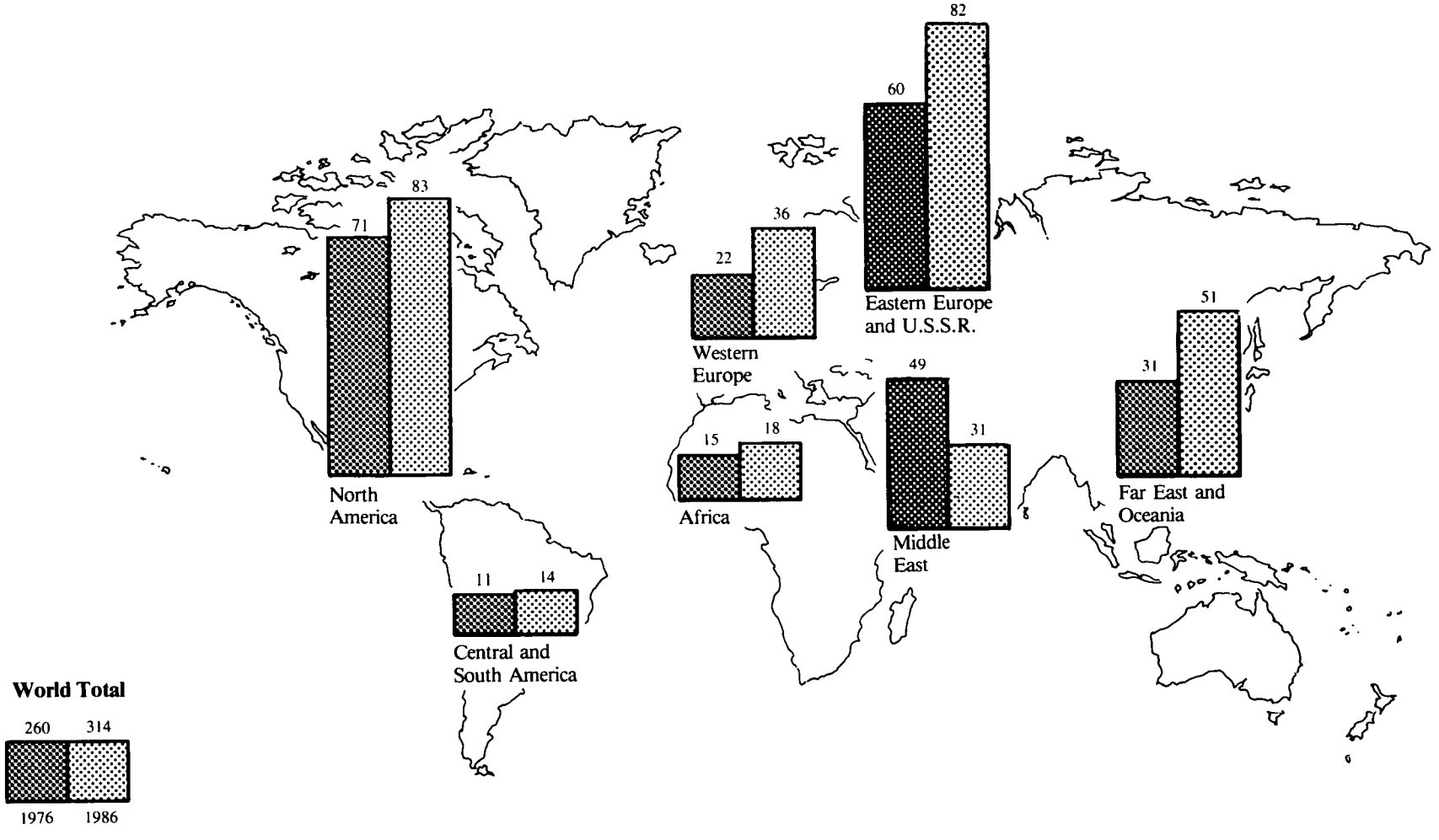
Note: •Numbers in parentheses indicate related tables. •Annual data are the most recent available and frequently are preliminary.

World Leaders in Energy Production

Worldwide energy production of 314 quadrillion Btu was 54 quadrillion Btu greater than in 1976 (101). The U.S.S.R. accounted for 19 quadrillion Btu of the world increase and, in 1986, the U.S.S.R.'s production (66 quadrillion Btu) surpassed U.S. production (64 quadrillion Btu) for the first time. China contributed almost 10 quadrillion Btu to the increase in world supply and, in 1982, became the third largest energy producer. Production in the United Kingdom rose from 5 quadrillion Btu in 1976 to 11 quadrillion Btu in 1986.

In contrast, Middle Eastern countries cut back production of energy (primarily petroleum) from 49 quadrillion Btu in 1976 to 26 quadrillion Btu in 1985 in an effort to regain control of world oil markets. Saudi Arabia registered a substantial decline, from 19 quadrillion Btu in 1976 to less than 9 quadrillion Btu in 1985, before increasing production to 12 quadrillion Btu in its 1986 attempt to recapture market share.

Figure 101. World Primary Energy Production by Area and Country, 1976 and 1986
(Quadrillion Btu)



Source: See Table 101.

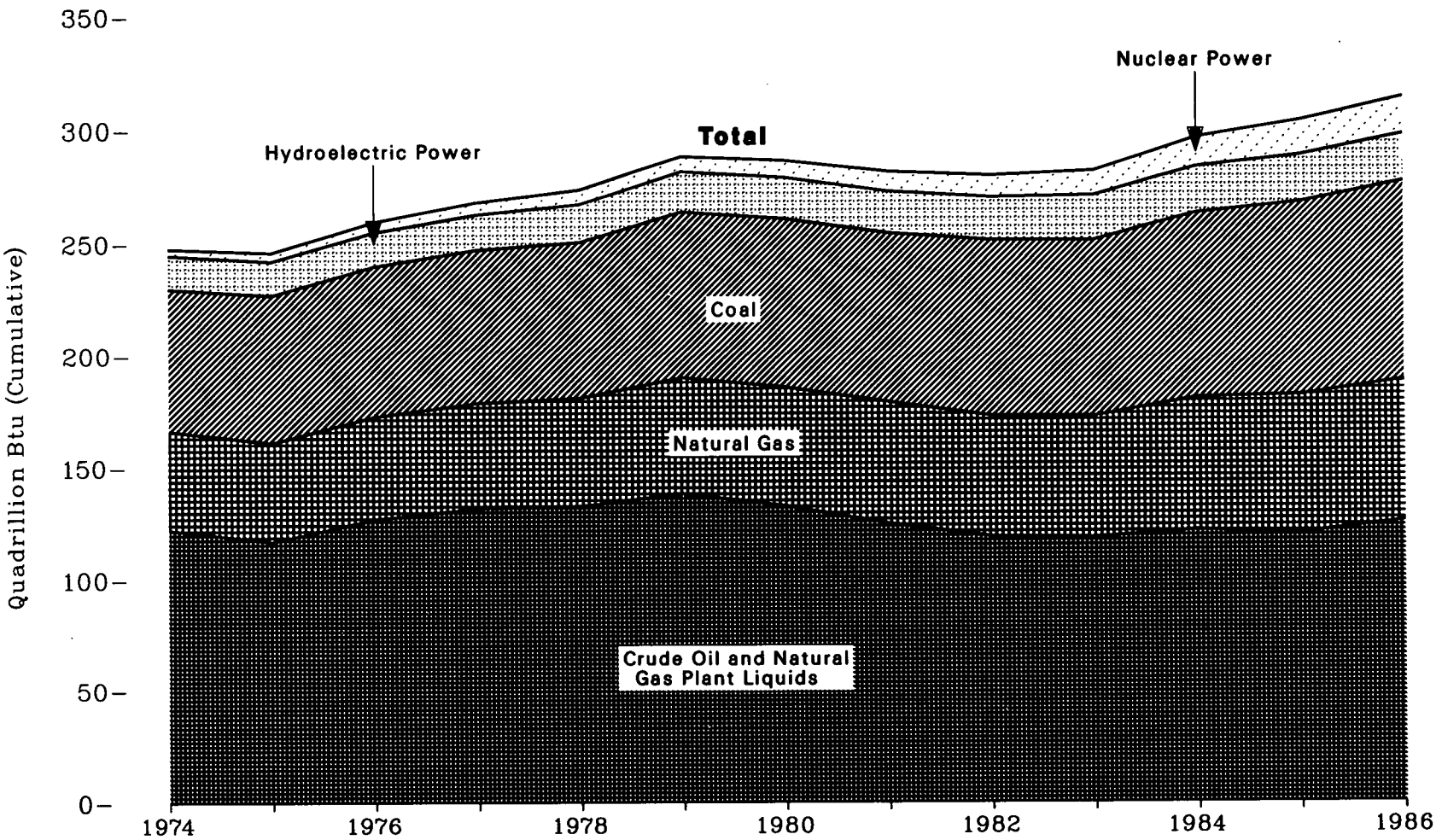
Table 101. World Primary Energy Production [1] by Area and Country, 1976-1986

(Quadrillion Btu)

Area and Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986 [2]
North, Central, and South America											
Canada	8.68	9.06	9.18	10.05	10.09	9.81	9.71	10.19	11.03	11.83	11.98
Mexico	2.74	3.14	3.76	4.51	5.80	6.78	7.82	7.70	7.88	7.74	7.10
United States	59.81	60.14	61.03	63.71	64.64	64.30	63.78	61.06	65.64	64.57	64.09
Venezuela	5.79	5.69	5.52	6.04	5.71	5.58	5.22	4.99	5.02	4.77	5.13
Other	4.88	5.18	5.67	6.19	6.44	6.56	6.82	7.21	8.11	8.64	8.96
Total	81.89	83.21	85.16	90.50	92.68	93.03	93.36	91.16	97.68	97.56	97.26
Western Europe											
France	1.71	2.00	2.02	2.03	2.26	2.65	2.62	2.97	3.38	3.56	3.87
Netherlands	3.44	2.90	2.49	2.69	3.32	3.10	2.67	2.62	2.71	2.82	2.74
Norway	1.47	1.47	2.07	2.68	3.02	3.09	3.17	3.48	3.74	3.91	4.00
United Kingdom	5.39	6.58	7.19	8.24	8.40	8.71	9.49	9.92	8.86	10.18	10.53
West Germany	5.14	5.12	5.12	5.44	5.44	5.57	5.72	5.53	5.73	6.03	5.81
Other	5.19	5.86	5.93	6.31	6.21	6.63	7.04	7.42	8.00	8.51	8.67
Total	22.34	23.93	24.81	27.40	28.66	29.76	30.71	31.94	32.42	35.01	35.61
Eastern Europe and U.S.S.R.											
East Germany	2.25	2.30	2.32	2.36	2.44	2.53	2.57	2.66	2.81	2.96	2.96
Poland	5.00	5.18	5.36	5.51	5.28	4.54	5.16	5.25	5.37	5.50	5.69
Romania	2.39	2.48	2.34	2.47	2.47	2.54	2.65	2.67	2.72	2.63	2.74
U.S.S.R.	47.46	49.79	52.11	53.88	55.67	56.71	58.27	59.96	62.00	63.68	66.48
Other	3.13	3.20	3.27	3.30	3.34	3.35	3.53	3.60	3.66	3.73	3.82
Total	60.23	62.95	65.40	67.52	69.20	69.67	72.18	74.14	76.55	78.51	81.69
Middle East											
Iran	13.43	12.88	11.93	7.46	3.91	3.28	5.12	5.67	5.29	5.57	4.74
Iraq	5.25	5.08	5.53	7.49	5.45	2.16	2.19	2.17	2.61	3.09	3.63
Kuwait	4.84	4.46	4.90	5.78	3.88	2.70	1.98	2.51	2.76	2.44	3.33
Saudi Arabia	18.88	20.51	18.45	21.24	22.48	22.57	14.86	11.69	11.29	8.55	12.24
United Arab Emirates	4.20	4.45	4.09	4.12	3.89	3.45	3.00	2.91	3.00	3.29	3.80
Other	2.54	2.39	2.40	2.57	2.45	2.49	2.39	2.34	2.70	2.73	3.00
Total	49.13	49.77	47.29	48.65	42.06	36.65	29.54	27.29	27.66	25.67	30.75
Africa											
Algeria	2.65	2.73	3.27	3.22	2.75	2.85	2.81	3.20	3.35	3.40	3.26
Libya	4.26	4.53	4.40	4.63	4.03	2.57	2.61	2.52	2.53	2.46	2.42
Nigeria	4.51	4.50	4.06	4.95	4.50	3.18	2.86	2.77	3.11	3.35	3.29
South Africa, Republic of	1.84	2.03	2.15	2.46	2.74	3.09	3.24	3.45	3.87	4.17	4.29
Other	2.23	2.70	2.77	3.06	3.32	3.31	3.61	3.92	4.29	4.68	4.56
Total	15.49	16.49	16.65	18.32	17.35	15.00	15.13	15.86	17.15	18.06	17.83
Far East and Oceania											
Australia	3.35	3.43	3.51	3.66	3.53	3.89	4.04	4.24	4.42	5.34	5.68
China	15.35	16.16	18.05	18.53	18.32	18.10	19.13	20.46	22.39	24.21	24.96
India	2.88	2.95	3.14	3.30	3.35	4.09	4.43	4.87	5.21	5.59	5.85
Indonesia	3.38	3.85	3.71	3.83	4.16	4.27	3.65	3.80	4.24	4.20	4.35
Japan	1.86	1.65	1.91	2.00	2.30	2.27	2.45	2.52	2.56	2.90	2.99
Other	3.78	3.92	4.07	4.55	4.83	4.81	5.13	5.55	6.18	6.75	7.12
Total	30.59	31.96	34.40	35.88	36.50	37.42	38.83	41.44	45.00	48.98	50.96
World Total	259.67	268.30	273.71	288.27	286.44	281.54	279.74	281.82	296.46	303.78	314.09

[1] See Appendix E, Note 19.
[2] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Note: 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.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 102. World Primary Energy Production by Source, 1974-1986



Source: See Table 102.

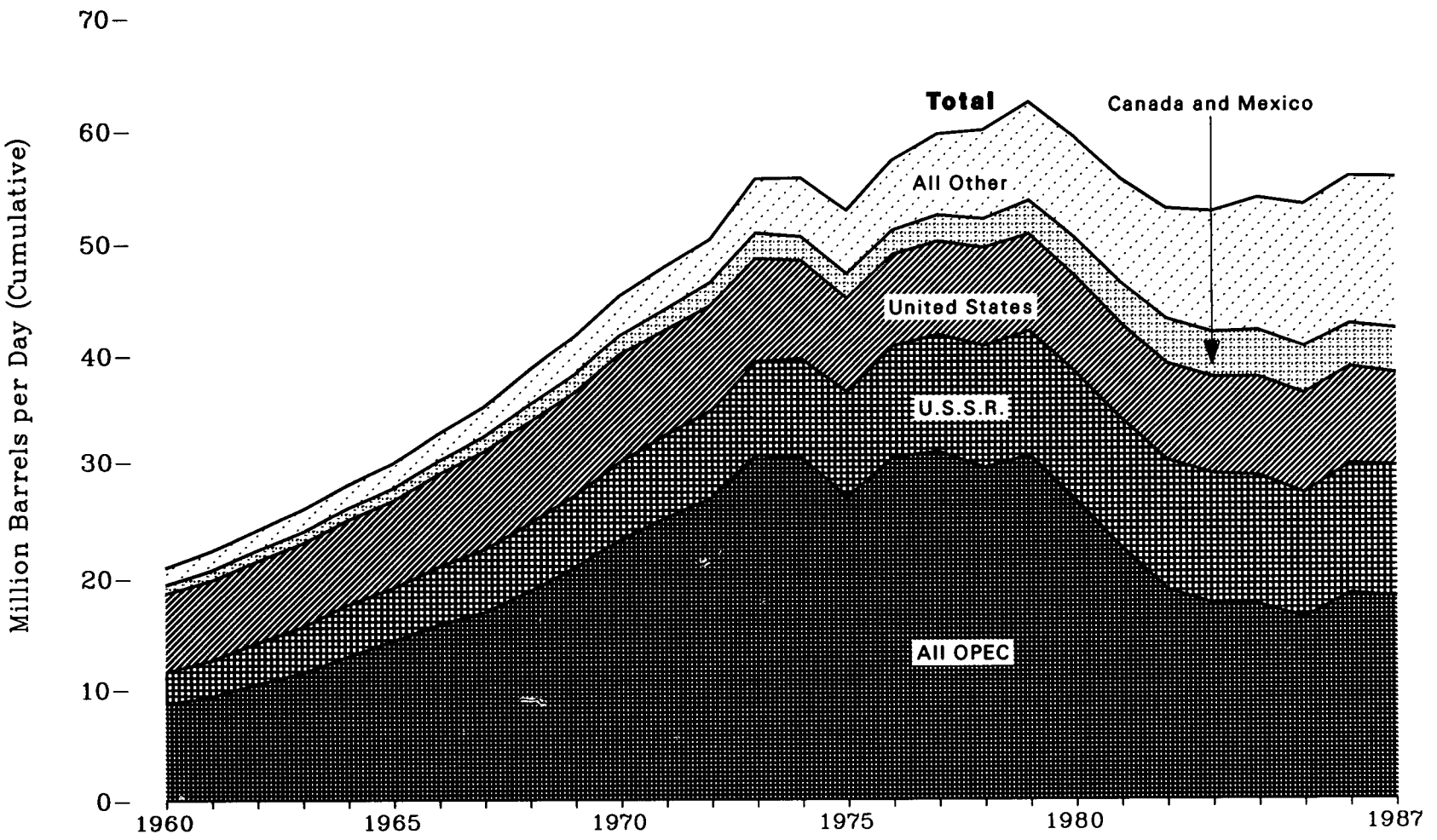
Table 102. World Primary Energy Production [1] by Source, 1974-1986

(Quadrillion Btu)

Year	Crude Oil [2] and Natural Gas Plant Liquids	Natural Gas [3]	Coal	Hydroelectric Power [4]	Nuclear Power [4]	Total [5]
1974	122.46	43.76	63.82	14.83	2.87	247.74
1975	117.22	43.90	66.17	15.03	3.85	246.18
1976	127.08	45.68	67.32	15.08	4.52	259.67
1977	132.03	46.88	68.46	15.52	5.42	268.30
1978	132.75	48.24	69.53	16.75	6.45	273.71
1979	138.52	51.57	73.81	17.64	6.73	288.27
1980	133.00	52.75	75.02	18.17	7.50	286.44
1981	125.20	54.16	75.21	18.43	8.54	281.54
1982	119.41	53.66	78.44	18.89	9.35	279.74
1983	118.91	53.97	78.45	19.81	10.67	281.82
1984	122.13	59.03	82.16	20.34	12.81	296.46
1985	120.57	61.47	85.95	20.61	15.18	303.78
1986	126.12	62.63	88.22	20.73	16.40	314.09

[1] See Appendix E, Note 19.
[2] Includes lease condensate.
[3] Dry production.
[4] Net generation, i.e., gross generation less plant use.
[5] Total excludes wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 103. World Crude Oil Production, 1960-1987



Source: See Table 103.

Table 103. World Crude Oil [1] Production, 1960-1987

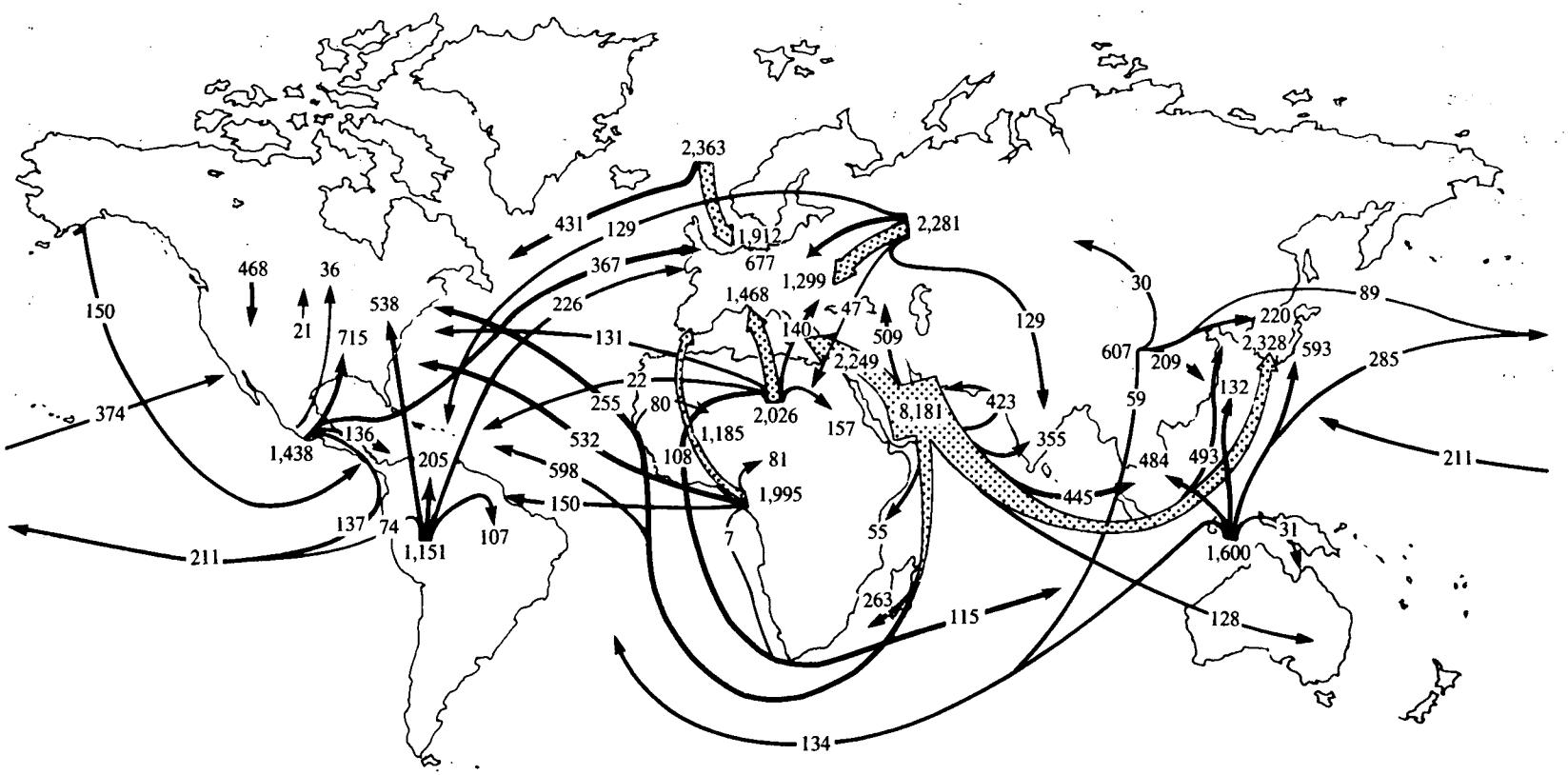
(Million Barrels per Day)

Year	Organization of Petroleum Exporting Countries (OPEC) [2]							Canada	China	Mexico	United Kingdom	United States	U.S.S.R.	Other Non-OPEC	Total World	Non-Communist World
	Indonesia	Iran	Nigeria	Saudi Arabia [3]	Venezuela	Other OPEC	Total OPEC									
1960	0.41	1.07	0.02	1.31	2.85	3.04	8.70	0.52	0.10	0.27	(4)	7.04	2.91	1.42	20.96	17.65
1961	0.42	1.20	0.05	1.48	2.92	3.29	9.36	0.61	0.11	0.29	(4)	7.18	3.28	1.60	22.43	18.66
1962	0.45	1.34	0.07	1.64	3.20	3.81	10.51	0.67	0.12	0.31	(4)	7.33	3.67	1.71	24.32	20.14
1963	0.44	1.49	0.08	1.79	3.25	4.46	11.51	0.71	0.13	0.32	(4)	7.54	4.07	1.85	26.13	21.52
1964	0.46	1.71	0.12	1.90	3.39	5.40	12.98	0.75	0.18	0.32	(4)	7.61	4.60	1.92	28.36	23.15
1965	0.48	1.91	0.27	2.21	3.47	6.00	14.34	0.81	0.23	0.32	(4)	7.80	4.79	2.01	30.30	24.85
1966	0.47	2.13	0.42	2.60	3.37	6.78	15.77	0.88	0.29	0.33	(4)	8.30	5.23	2.13	32.93	26.96
1967	0.51	2.60	0.32	2.81	3.54	7.07	16.85	0.96	0.28	0.37	(4)	8.81	5.68	2.42	35.37	28.95
1968	0.60	2.84	0.14	3.04	3.61	8.56	18.79	1.19	0.30	0.39	(4)	9.10	6.08	2.79	38.64	31.85
1969	0.75	3.38	0.54	3.22	3.59	9.43	20.91	1.13	0.48	0.46	(4)	9.24	6.48	2.99	41.69	34.42
1970	0.85	3.83	1.08	3.80	3.71	10.14	23.41	1.26	0.60	0.49	(4)	9.64	6.97	2.92	45.29	37.36
1971	0.89	4.54	1.53	4.77	3.55	10.05	25.33	1.35	0.78	0.49	(4)	9.46	7.44	2.99	47.84	39.29
1972	1.08	5.02	1.82	6.02	3.22	9.93	27.09	1.53	0.90	0.51	(4)	9.44	7.88	2.91	50.26	41.31
1973	1.34	5.86	2.05	7.60	3.37	10.77	30.99	1.80	1.09	0.47	(4)	9.21	8.33	3.69	55.57	45.69
1974	1.38	6.02	2.26	8.48	2.98	9.61	30.73	1.55	1.32	0.57	(4)	8.77	8.86	3.84	55.64	45.00
1975	1.31	5.35	1.78	7.08	2.35	9.29	27.16	1.43	1.49	0.71	0.01	8.38	9.47	4.12	52.76	41.32
1976	1.50	5.88	2.07	8.58	2.29	10.42	30.74	1.31	1.67	0.83	0.25	8.13	9.99	4.30	57.21	45.07
1977	1.69	5.66	2.09	9.25	2.24	10.37	31.30	1.32	1.87	0.98	0.77	8.25	10.49	4.55	59.52	46.68
1978	1.64	5.24	1.90	8.30	2.17	10.56	29.81	1.32	2.08	1.21	1.08	8.71	10.95	4.72	59.87	46.37
1979	1.59	3.17	2.30	9.53	2.36	11.98	30.93	1.50	2.12	1.46	1.57	8.55	11.19	5.04	62.36	48.60
1980	1.58	1.66	2.06	9.90	2.17	9.52	26.89	1.44	2.11	1.94	1.62	8.60	11.46	5.17	59.23	45.23
1981	1.61	1.38	1.43	9.82	2.10	6.31	22.65	1.29	2.01	2.31	1.81	8.57	11.55	5.36	55.55	41.55
1982	1.34	2.21	1.30	6.48	1.90	5.64	18.87	1.27	2.05	2.75	2.07	8.65	11.62	5.64	52.90	38.79
1983	1.34	2.44	1.24	5.09	1.80	5.67	17.58	1.36	2.12	2.69	2.29	8.69	11.68	6.24	52.66	38.39
1984	1.41	2.17	1.39	4.66	1.80	6.05	17.48	1.44	2.30	2.78	2.48	8.88	11.58	6.92	53.85	39.52
1985	1.33	2.25	1.50	3.39	1.68	6.11	16.24	1.47	2.51	2.75	2.53	8.97	11.25	7.57	53.28	39.07
1986	1.39	1.88	1.47	5.05	1.79	6.93	18.51	1.47	2.61	2.43	2.55	8.68	11.62	7.88	55.74	41.06
1987 [5]	1.31	2.43	1.29	4.21	1.74	7.18	18.15	1.51	2.69	2.54	2.47	8.31	11.79	8.21	55.69	40.75

[1] Includes lease condensate, excludes natural gas plant liquids.
[2] See Glossary for membership.
[3] Saudi Arabia includes one-half of the production in the Partitioned Zone (formerly Neutral Zone).
[4] Less than 5,000 barrels per day.
[5] Preliminary.
Note: Sum of components may not equal total due to independent rounding.

Sources: **China** •1960 through 1972—Central Intelligence Agency, unpublished data. •1973 through 1986—Energy Information Administration, *International Energy Annual.* •1987—Energy Information Administration, *Monthly Energy Review.* **United States** •1960 through 1975—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1976 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 through 1986—Energy Information Administration, *Petroleum Supply Annual.* •1987—Energy Information Administration, *Monthly Energy Review.* **U.S.S.R.:** •1960 through 1972—USSR Central Statistical Office, *Narodnoye Khozyaystvo SSSR* (National Economy USSR). •1973 through 1986—Energy Information Administration, *International Energy Annual.* •1987—Energy Information Administration, *Monthly Energy Review.* **OPEC Nations:** •1960 through 1972—Organization of Petroleum Exporting Countries, *Annual Statistical Bulletin 1979.* •1973 through 1986—Energy Information Administration, *International Energy Annual.* •1987—Energy Information Administration, *Monthly Energy Review.* **All other countries:** •1960 through 1969—Bureau of Mines, *International Petroleum Annual, 1969.* •1970 through 1972—Energy Information Administration, *International Petroleum Annual, 1978.* •1973 through 1986—Energy Information Administration, *International Energy Annual.* •1987—Energy Information Administration, *Monthly Energy Review,* December 1987.

Figure 104. International Crude Oil Flow, 1985
(Thousand Barrels per Day)



Arrows Indicate Origins and Destinations but Not Necessarily Specific Routes. Several Minor Routes and Quantities Are Not Displayed.
Source: See Table 104.

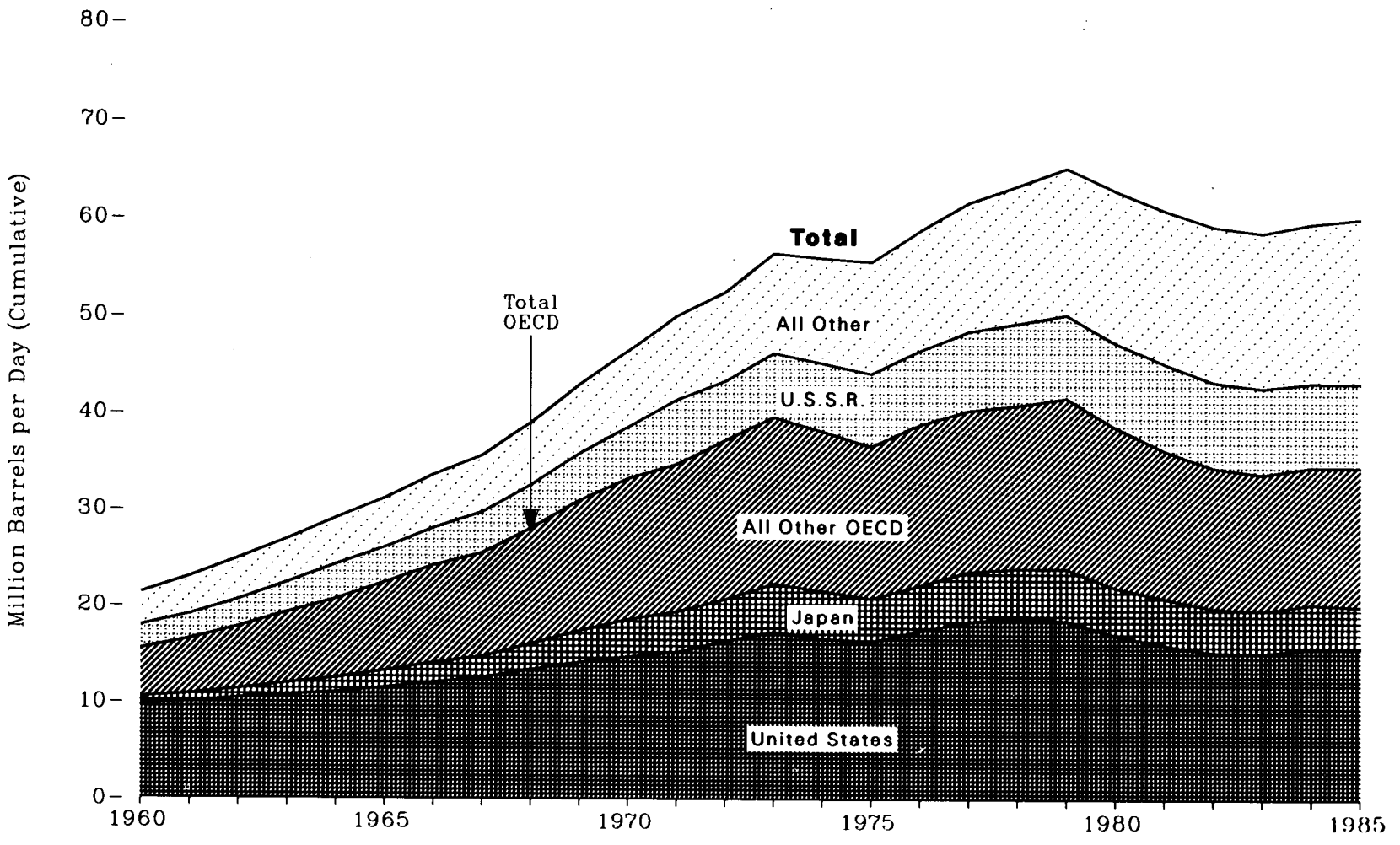
Table 104. International Crude Oil Flow, 1985

(Thousand Barrels per Day)

Exporting Area and Country	Importing Area or Country										
	North America		Central and South America						Far East and Oceania		
	United States	Canada	Caribbean Area	Other	Western Europe	Eastern Europe and U.S.S.R.	Middle East	Africa	Japan	Other	Total [1]
North America											
Canada	468	—	6	—	1	—	—	—	—	—	475
Mexico	715	36	82	54	367	—	47	—	134	3	1,438
United States	—	21	[2] 150	—	—	—	—	—	—	33	204
Central and South America											
Ecuador	56	—	40	16	—	—	—	—	2	55	169
Peru	12	—	6	—	—	—	—	—	—	6	24
Trinidad and Tobago	98	—	—	—	—	—	—	—	—	—	98
Venezuela	306	61	153	80	214	1	—	2	9	—	826
Other	5	—	6	11	12	—	—	—	—	—	34
Western Europe											
Norway	31	35	15	—	565	—	15	—	—	—	661
United Kingdom	278	58	11	1	1,287	—	—	—	—	—	1,635
Other	1	1	—	—	60	2	—	—	—	3	67
U.S.S.R. and Eastern Europe	—	—	99	30	677	1,299	14	33	3	126	2,281
Middle East											
Iran	27	10	40	20	632	95	170	100	245	230	1,569
Iraq	46	—	—	175	602	85	32	60	72	51	1,123
Saudi Arabia	132	—	133	144	561	100	125	125	665	550	2,535
United Arab Emirates	35	—	—	—	133	—	—	34	691	215	1,108
Other [3]	5	—	60	26	321	229	96	79	655	375	1,846
Africa											
North	99	32	2	20	1,468	140	41	116	42	66	2,026
West	360	19	7	72	1,080	—	—	47	—	7	1,592
Other	153	—	60	11	105	40	—	34	—	—	403
Far East and Oceania [4]	374	—	50	50	54	10	—	—	813	856	2,207
World Total	3,201	273	920	710	8,139	2,001	540	630	3,331	2,576	22,321

[1] The data in this column are total imports; they do not equal 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] Primarily tanker shipments to countries bordering the Indian or Pacific Oceans.
[4] Primarily Indonesia, China, Malaysia, and Brunei.
— = Not applicable.
Note: Transshipments are assigned to the country of original lading, if known.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 105. World Petroleum Consumption, 1960–1985



Source: See Table 105.

Table 105. World Petroleum Consumption, 1960-1986

(Million Barrels per Day)

Year	Organization for Economic Cooperation and Development (OECD) [1]																
	Australia	Canada	France	West Germany	Italy	Japan	Spain	United Kingdom	United States	Other OECD	Total	Brazil	China	Mexico	U.S.S.R.	Total World	Non-Communist 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	18.32
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	19.57
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	21.20
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	22.90
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	24.76
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	26.45
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	28.53
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	30.08
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	32.96
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	36.37
1970	0.51	1.49	1.89	2.43	1.84	3.85	0.56	2.09	14.70	3.87	33.22	0.51	0.62	0.50	5.30	46.36	39.06
1971	0.54	1.53	2.05	2.61	1.93	4.18	0.60	2.09	15.21	3.95	34.71	0.56	0.79	0.52	6.65	49.99	41.04
1972	0.54	1.62	2.24	2.76	2.07	4.36	0.67	2.24	16.37	4.32	37.18	0.65	0.91	0.56	6.10	52.44	43.83
1973	0.59	1.71	2.42	2.92	2.15	5.07	0.74	2.30	17.31	4.41	39.61	0.77	1.12	0.61	6.57	56.42	46.95
1974	0.62	1.74	2.26	2.61	2.09	4.96	0.78	2.14	16.65	4.27	38.12	0.83	1.38	0.67	7.01	55.94	45.73
1975	0.60	1.72	2.14	2.52	1.94	4.50	0.84	1.87	16.32	4.16	36.60	0.87	1.58	0.74	7.47	55.55	44.53
1976	0.62	1.75	2.28	2.71	1.99	4.77	0.98	1.86	17.46	4.45	38.86	0.97	1.68	0.80	7.65	58.79	47.37
1977	0.66	1.78	2.24	2.84	1.91	5.23	0.93	1.88	18.43	4.47	40.36	1.01	1.83	0.84	8.18	61.70	49.43
1978	0.61	1.82	2.17	3.05	1.95	5.14	0.95	1.85	18.85	4.51	40.89	1.06	1.81	0.99	8.47	63.43	50.65
1979	0.61	1.89	2.39	3.07	2.01	5.48	0.98	1.93	18.51	4.76	41.65	1.18	1.85	1.10	8.58	65.25	52.07
1980	0.59	1.87	2.26	2.71	1.93	4.96	0.99	1.73	17.06	4.50	38.60	1.16	1.83	1.27	8.75	62.95	49.64
1981	0.58	1.77	2.02	2.45	1.87	4.85	0.94	1.59	16.06	4.13	36.27	1.10	1.68	1.40	8.90	60.95	47.81
1982	0.61	1.58	1.93	2.32	1.78	4.55	1.01	1.58	15.30	3.84	34.49	1.08	1.66	1.48	8.82	59.30	46.27
1983	0.58	1.49	1.89	2.29	1.73	4.37	1.02	1.52	15.23	3.69	33.79	1.01	1.72	1.43	8.90	58.65	45.55
1984	0.62	1.49	1.84	2.30	1.63	4.57	0.92	1.82	15.73	3.65	34.57	1.07	1.72	1.48	8.65	59.60	46.63
1985	0.65	1.52	1.80	2.35	1.67	4.33	0.85	1.61	15.73	3.69	34.18	1.13	1.74	1.53	8.65	59.75	46.71
1986	0.62	1.52	1.83	2.49	1.67	4.38	0.84	1.58	16.28	3.93	35.14	NA	NA	NA	NA	NA	NA

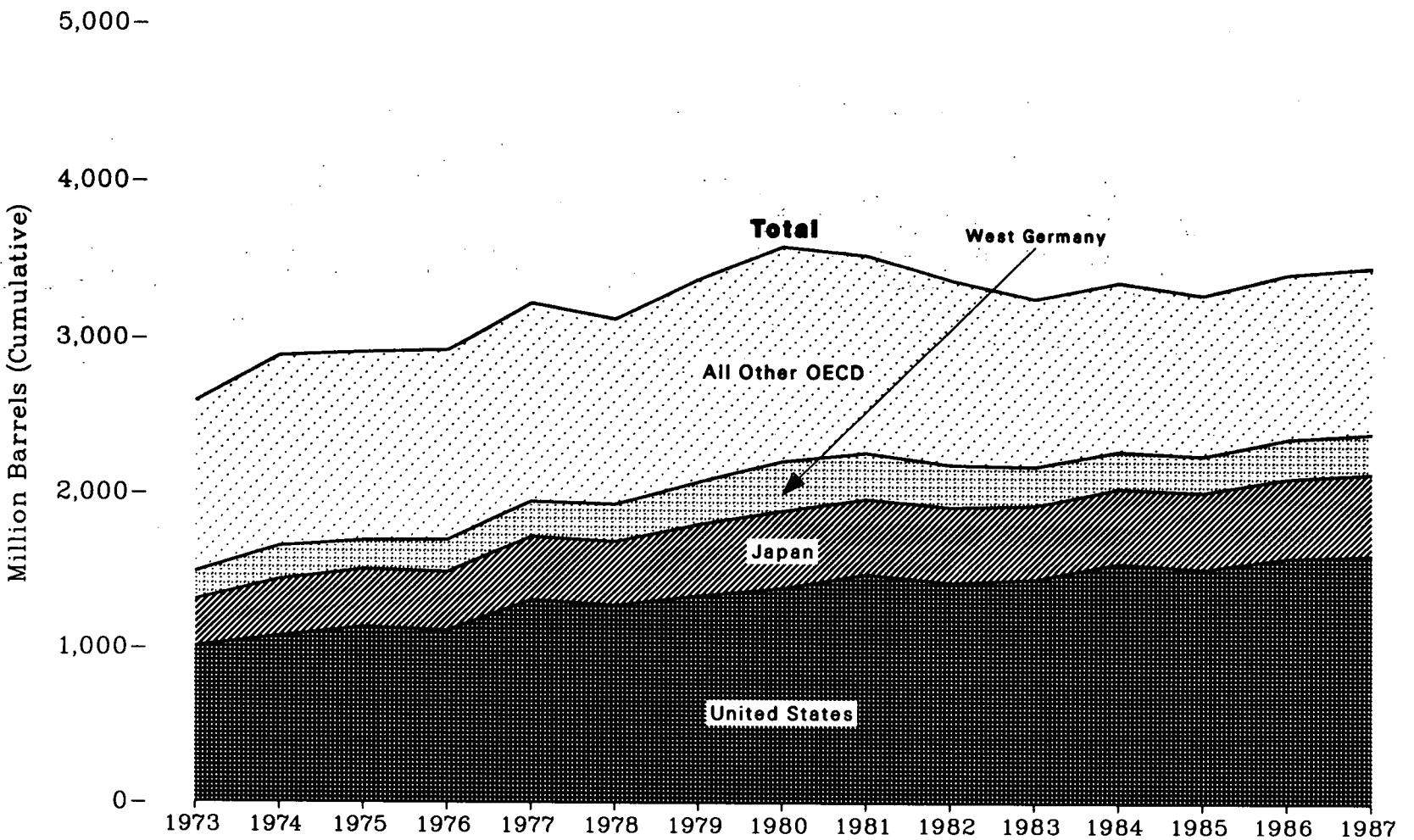
[1] See Glossary for membership. "Other OECD" includes the United States territories of Puerto Rico, Virgin Islands, Guam, and Hawaiian Trade Zone.

NA = Not available.

Note: Sum of components may not equal total due to independent rounding.

Sources: **United States:** •1960 through 1976—Bureau of Mines, Mineral Industry Surveys, *Petroleum Statement, Annual.* •1977 through 1980—Energy Information Administration, Energy Data Reports, *Petroleum Statement, Annual.* •1981 and forward—Energy Information Administration, *Petroleum Supply Annual.* **U.S.S.R.:** •1960 through 1976—U.S.S.R. Central Statistical Office, *Narodnoye Khozyaystvo SSSR* (National Economy U.S.S.R.), and *Vneshnyaya Torgvliya SSSR* (Foreign Trade of the U.S.S.R.), annual issues. •1977 through 1979—U.S.S.R. Central Statistical Office, *Narodnoye Khozyaystvo SSSR* (National Economy U.S.S.R.), annual issues; U.S.S.R. trade as imports reported by their trading partners in official trade statistics of the respective countries. •1980 and forward—Energy Information Administration, *International Energy Annual.* **China:** •1960 through 1979—Central Intelligence Agency, unpublished data. •1980 and forward—Energy Information Administration, *International Energy Annual.* **All other countries:** •1960 through 1969—Bureau of Mines, *International Petroleum Annual, 1969.* •1970 through 1978—Energy Information Administration, *International Petroleum Annual, 1978.* •1979 through 1985—Energy Information Administration, *International Energy Annual.* •1986—OECD, *Quarterly Oil Statistics.*

Figure 106. Petroleum Stocks in OECD Countries, End of Year 1973-1987



Source: See Table 106.

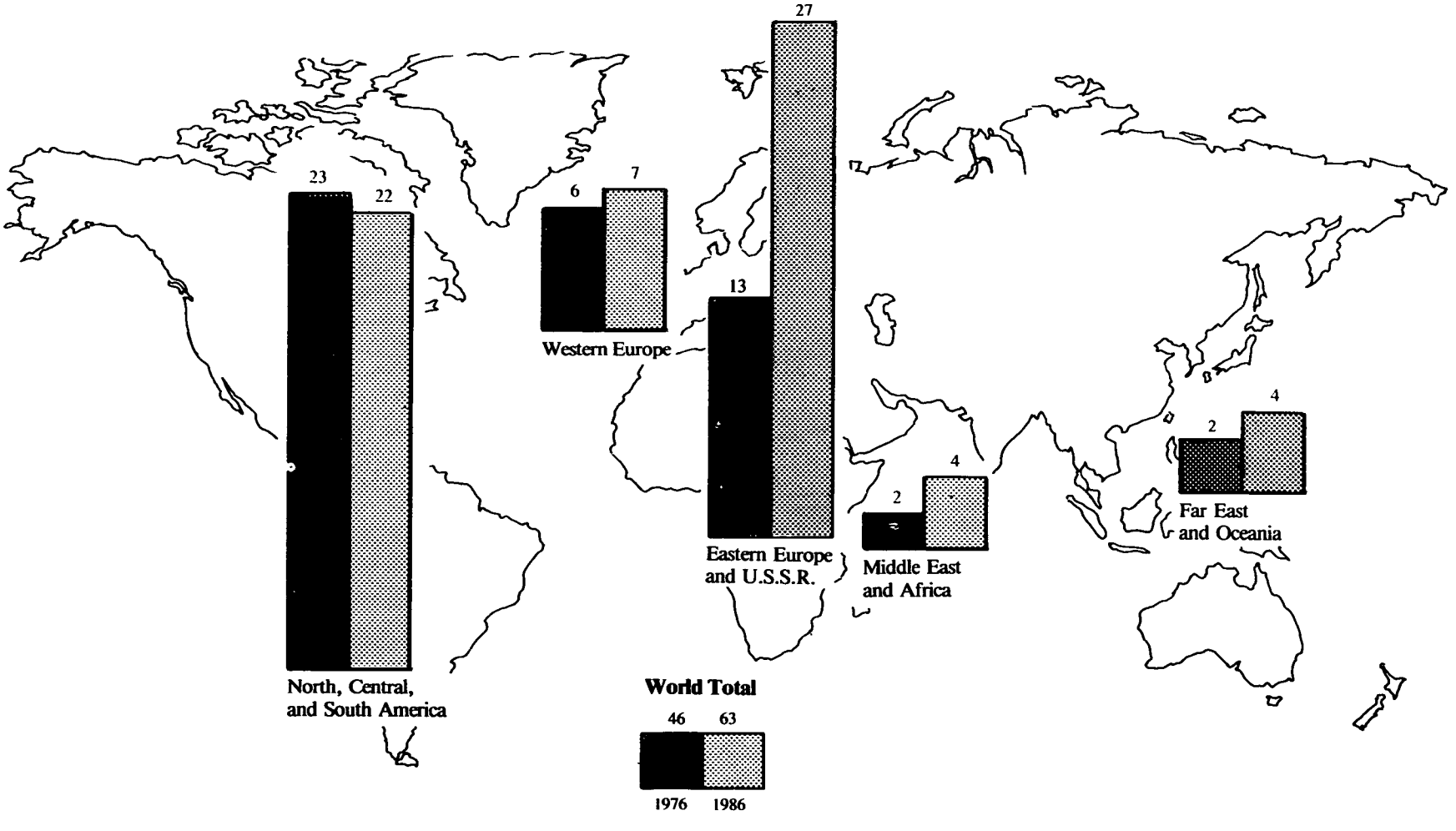
Table 106. Petroleum Stocks [1] in OECD Countries, [2] End of Year 1973-1987

(Million Barrels)

Year	France	West Germany	Italy	United Kingdom	Other OECD Europe	Total OECD Europe	Canada	Japan	United States	Other Non-Europe OECD [3]	Total OECD
1973	201	181	152	156	380	1,070	140	303	1,008	67	2,588
1974	249	213	167	161	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	250	149	119	474	1,145	120	471	1,454	68	3,258
1984	153	240	159	113	467	1,132	127	480	1,556	69	3,364
1985	139	233	157	123	442	1,094	112	495	1,519	67	3,286
1986	127	253	155	124	475	1,134	110	510	1,593	71	3,418
1987 [4]	129	257	167	120	466	1,139	118	524	1,609	72	3,462

[1] Includes crude oil, lease condensate, natural gas plant liquids, unfinished oils, and finished petroleum products. See Appendix E, Note 20.
[2] Organization for Economic Cooperation and Development. See Glossary for membership.
[3] Includes Australia, New Zealand, and United States Territories.
[4] As of September 30.
Note: Sum of components may not equal total due to independent rounding.
Sources: **United States:** Energy Information Administration, *Petroleum Supply Monthly.* **Other Data:** Organization for Economic Cooperation and Development/International Energy Agency, *Quarterly Oil and Gas Statistics.*

Figure 107. World Dry Natural Gas Production, 1976 and 1986
(Trillion Cubic Feet)



Source: See Table 107.

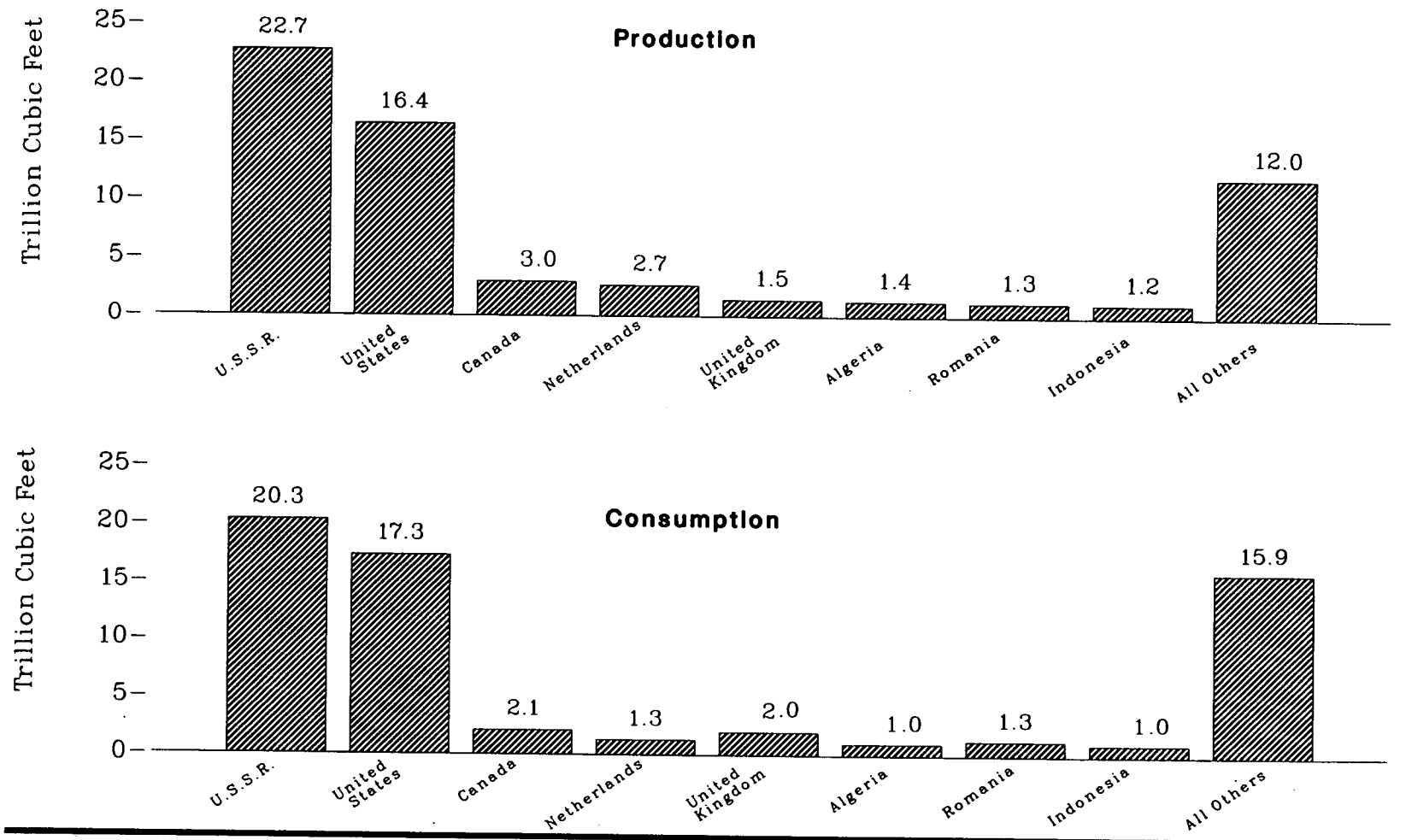
Table 107. World Dry Natural Gas Production, 1976-1986

(Trillion Cubic Feet)

Area and Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986 [1]
North, Central, and South America											
Argentina	0.27	0.28	0.28	0.26	0.28	0.35	0.40	0.44	0.49	0.50	0.50
Canada	2.46	2.59	2.47	2.66	2.65	2.47	2.45	2.52	2.61	2.98	2.96
Mexico	0.51	0.54	0.67	0.81	1.01	1.03	1.11	1.10	1.04	0.95	0.93
United States	19.10	19.16	19.12	19.66	19.40	19.18	17.76	16.03	17.39	16.38	16.04
Venezuela	0.40	0.39	0.40	0.46	0.49	0.52	0.60	0.58	0.61	0.62	0.67
Other	0.33	0.40	0.53	0.61	0.53	0.44	0.43	0.47	0.61	0.64	0.63
Total	23.07	23.36	23.48	24.46	24.36	23.99	22.75	21.14	22.75	22.07	21.75
Western Europe											
Italy	0.55	0.48	0.48	0.46	0.42	0.49	0.51	0.46	0.49	0.50	0.50
Netherlands	3.50	2.93	2.50	2.72	3.38	3.15	2.67	2.58	2.65	2.73	2.60
Norway	0.01	0.09	0.39	0.76	0.88	0.89	0.90	0.86	0.93	0.94	0.94
United Kingdom	1.32	1.33	1.30	1.31	1.23	1.22	1.36	1.40	1.42	1.52	1.57
West Germany	0.68	0.68	0.72	0.73	0.67	0.68	0.59	0.62	0.66	0.61	0.60
Other	0.40	0.45	0.38	0.41	0.44	0.40	0.41	0.42	0.44	0.46	0.36
Total	6.46	6.01	5.77	6.39	7.02	6.83	6.44	6.34	6.59	6.75	6.59
Eastern Europe and U.S.S.R.											
Romania	1.14	1.20	1.07	1.20	1.20	1.24	1.35	1.40	1.34	1.27	1.35
U.S.S.R.	11.33	12.22	13.14	14.36	15.37	16.43	17.68	18.93	20.74	22.71	24.19
Other	0.80	0.83	0.89	0.76	0.77	0.82	0.76	0.85	0.94	0.98	0.97
Total	13.27	14.25	15.10	16.32	17.34	18.49	19.79	21.18	23.02	24.96	26.51
Middle East and Africa											
Algeria	0.28	0.21	0.66	0.55	0.41	0.77	0.94	1.31	1.36	1.36	1.27
Iran	0.58	0.55	0.50	0.54	0.25	0.21	0.25	0.31	0.48	0.60	0.54
Other	0.84	1.01	1.14	1.45	1.36	1.76	1.28	1.33	1.96	2.28	2.45
Total	1.70	1.77	2.30	2.54	2.02	2.74	2.47	2.95	3.80	4.24	4.26
Far East and Oceania											
Australia	0.21	0.24	0.26	0.28	0.32	0.38	0.38	0.39	0.40	0.45	0.45
Brunei	0.25	0.29	0.30	0.29	0.32	0.34	0.32	0.33	0.30	0.29	0.30
China	0.36	0.41	0.50	0.51	0.50	0.45	0.38	0.43	0.44	0.63	0.63
Indonesia	0.13	0.20	0.20	0.39	0.63	0.66	0.67	0.78	1.06	1.23	1.26
Pakistan	0.16	0.18	0.19	0.23	0.29	0.32	0.35	0.34	0.35	0.36	0.37
Other	0.37	0.41	0.39	0.31	0.32	0.42	0.57	0.69	0.92	1.18	1.21
Total	1.48	1.73	1.84	2.01	2.38	2.57	2.67	2.96	3.50	4.15	4.22
World Total	45.98	47.14	48.50	51.73	53.11	54.62	54.12	54.57	59.66	62.17	63.33

[1] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 108. World Natural Gas Supply and Disposition, 1985



Source: See Table 108.

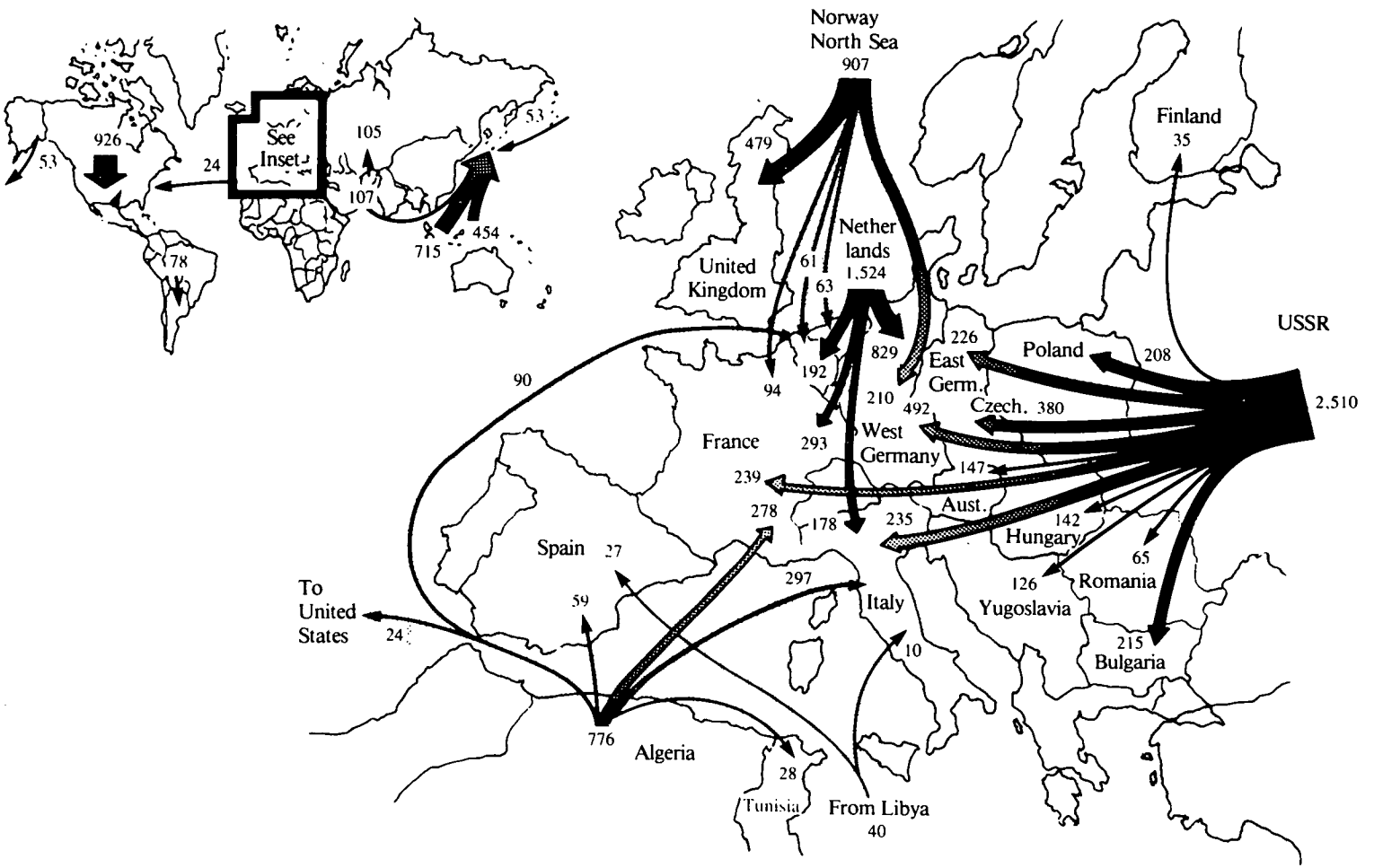
Table 108. World Natural Gas Supply and Disposition, 1985

(Billion Cubic Feet)

Area and Country	Supply		Disposition	
	Dry Natural Gas Production	Imports	Apparent Consumption	Exports
North, Central, and South America				
Argentina	500	78	578	0
Canada	2,980	0	2,054	926
Mexico	953	2	955	0
United States	16,382	950	[1] 17,281	55
Venezuela	618	0	618	0
Other	638	0	560	78
Total	22,071	1,030	22,046	1,059
Western Europe				
France	189	904	1,093	0
Italy	502	720	1,222	0
Netherlands	2,728	63	1,267	1,524
Norway	938	0	31	907
United Kingdom	1,516	479	1,995	0
West Germany	608	1,544	2,104	48
Other	270	820	1,074	16
Total	6,751	4,530	8,786	2,495
Eastern Europe and U.S.S.R.				
Czechoslovakia	25	382	407	0
East Germany	460	226	684	2
Hungary	262	142	404	0
Poland	225	208	433	0
Romania	1,271	65	1,336	0
U.S.S.R.	22,707	105	20,302	2,510
Other	14	215	229	0
Total	24,964	1,343	23,795	2,512
Middle East and Africa				
Algeria	1,360	0	584	776
Iran	600	0	600	0
Kuwait	140	0	140	0
Saudi Arabia	716	0	716	0
Other	1,421	28	1,305	144
Total	4,237	28	3,345	920
Far East and Oceania				
Australia	448	0	448	0
Brunei	295	0	53	242
China	625	0	625	0
Indonesia	1,228	0	513	715
Japan	90	1,329	1,419	0
Pakistan	365	0	365	0
Other	1,098	0	781	317
Total	4,149	1,329	4,204	1,274
World Total	62,172	8,260	62,176	8,260

[1] Actual consumption.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 109. International Natural Gas Flow, 1985
(Billion Cubic Feet)



Note: Arrows indicate origins and destinations but not necessarily specific routes. Several minor routes and quantities are not shown.
Source: See Table 109.

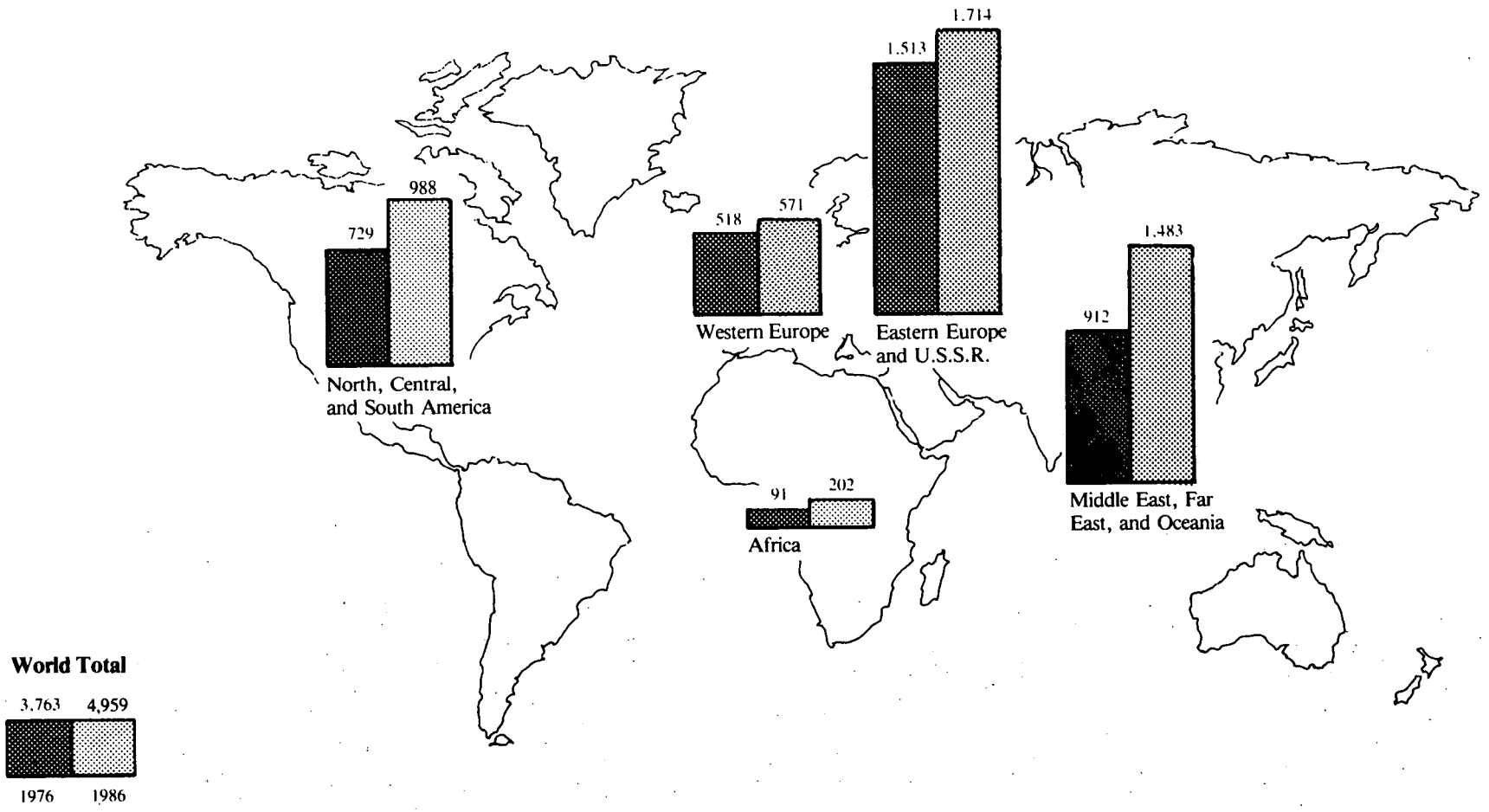
Table 109. International Natural Gas Flow, 1985

(Billion Cubic Feet)

Importing Area and Country	Exporting Area or Country													
	North and South America			Western Europe			Eastern Europe			Africa		Far East and Oceania		
	Canada	United States	Other	Nether-lands	Norway	Other	U.S.S.R.	Other	Middle East[1]	Algeria	Libya	Indonesia	Other	Total
North America														
Mexico	—	2	—	—	—	—	—	—	—	—	—	—	—	2
United States	926	—	—	—	—	—	—	—	—	[2] 24	—	—	—	950
Central and South America														
Argentina	—	—	78	—	—	—	—	—	—	—	—	—	—	78
Western Europe														
Austria	—	—	—	—	—	—	147	—	—	—	—	—	—	147
Belgium and Luxembourg	—	—	—	192	61	—	—	—	—	[2] 90	—	—	—	343
France	—	—	—	293	94	—	239	—	—	[2] 278	—	—	—	904
Italy	—	—	—	178	—	—	235	—	—	297	[2] 10	—	—	720
Netherlands	—	—	—	—	63	—	—	—	—	—	—	—	—	63
Spain	—	—	—	—	—	—	—	—	—	[2] 59	[2] 27	—	—	[2] 86
United Kingdom	—	—	—	—	479	—	—	—	—	—	—	—	—	479
West Germany	—	—	—	829	210	13	492	—	—	—	—	—	—	1,544
Yugoslavia	—	—	—	—	—	—	126	—	—	—	—	—	—	126
Other	—	—	—	32	—	51	35	—	—	—	—	—	—	118
Eastern Europe and U.S.S.R.														
Bulgaria	—	—	—	—	—	—	215	—	—	—	—	—	—	215
Czechoslovakia	—	—	—	—	—	—	380	2	—	—	—	—	—	382
East Germany	—	—	—	—	—	—	226	—	—	—	—	—	—	226
Hungary	—	—	—	—	—	—	142	—	—	—	—	—	—	142
Poland	—	—	—	—	—	—	208	—	—	—	—	—	—	208
Romania	—	—	—	—	—	—	65	—	—	—	—	—	—	65
U.S.S.R.	—	—	—	—	—	—	—	—	—	—	—	—	105	105
Africa														
Tunisia	—	—	—	—	—	—	—	—	—	28	—	—	—	28
Far East and Oceania														
Japan	—	[2] 53	—	—	—	—	—	—	[2] 107	—	—	[2] 715	[2] 454	1,329
World Total	926	55	78	1,524	907	64	2,510	2	[2] 107	776	[2] 37	[2] 715	559	8,260

[1] United Arab Republic.
[2] Liquefied natural gas.
— = Not applicable.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986*.

Figure 110. World Coal Production, 1976 and 1986
(Million Short Tons)



Source: See Table 110.

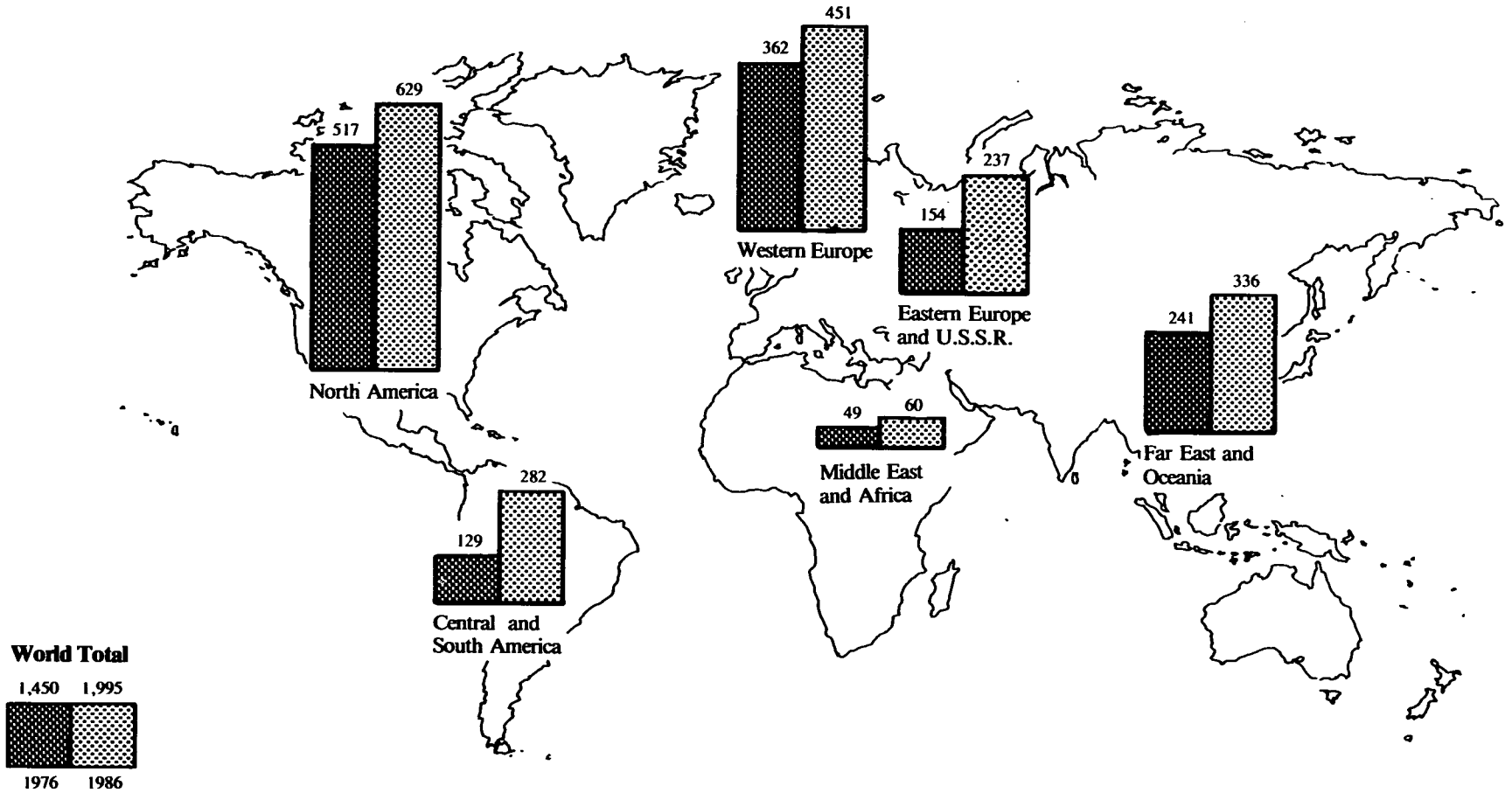
Table 110. World Coal Production, 1976-1986

(Million Short Tons)

Area and Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986 [1]
North, Central, and South America											
Canada	28	32	34	37	40	44	47	50	63	67	66
United States	685	697	670	781	830	824	838	782	896	884	890
Other	16	17	17	24	24	22	25	25	28	30	31
Total	729	746	721	842	894	890	910	857	987	981	988
Western Europe											
Spain	16	19	22	24	32	38	43	44	44	44	42
Turkey	11	13	15	22	18	19	24	32	38	43	48
United Kingdom	137	135	136	135	141	138	137	127	55	104	115
West Germany	247	229	228	239	239	241	247	236	233	231	222
Yugoslavia	41	43	44	46	52	58	60	65	72	75	72
Other	66	67	64	63	61	67	66	67	68	73	72
Total	518	506	509	529	543	561	577	571	510	570	571
Eastern Europe and U.S.S.R.											
Bulgaria	28	28	28	31	33	32	35	36	36	34	39
Czechoslovakia	130	134	136	137	136	137	139	140	143	140	141
East Germany	273	280	279	282	285	294	304	309	327	344	343
Poland	241	250	258	264	254	219	250	258	267	275	286
U.S.S.R.	784	796	798	792	790	776	792	789	785	798	825
Other	57	58	61	65	68	72	73	69	77	80	80
Total	1,513	1,546	1,560	1,571	1,566	1,529	1,593	1,601	1,635	1,671	1,714
Africa											
South Africa, Republic of	85	94	100	114	127	144	151	161	179	192	196
Other	6	6	6	7	6	5	6	6	5	6	6
Total	91	100	106	121	133	149	157	167	184	198	202
Middle East, Far East, and Oceania											
Australia	109	111	114	119	116	130	140	146	153	186	210
China	586	606	681	698	684	683	734	788	870	931	959
India	116	115	116	118	125	142	148	158	168	173	184
Other	101	103	104	108	112	114	116	113	117	127	130
Total	912	935	1,015	1,043	1,037	1,069	1,138	1,205	1,308	1,417	1,483
World Total	3,763	3,834	3,911	4,105	4,173	4,198	4,375	4,402	4,623	4,839	4,959

[1] Preliminary.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986* and *Coal Production 1986.*

Figure 111. World Hydroelectric Power Generation, 1976 and 1986
(Billion Kilowatthours)



Source: See Table 111.

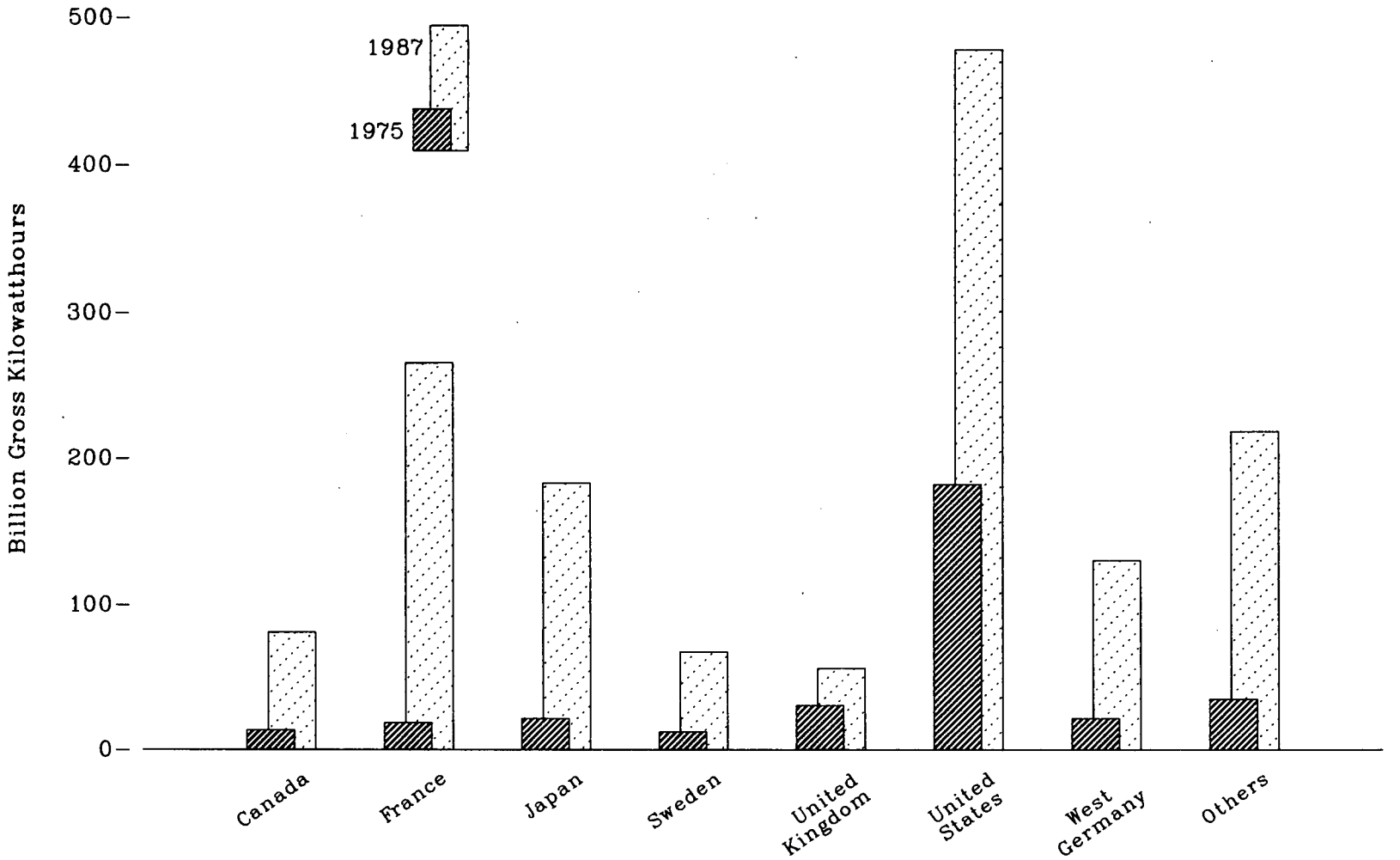
Table 111. World Hydroelectric Power Generation,[1] 1976-1986

(Billion Kilowatthours)

Area and Country	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986[2]
North, Central, and South America											
Argentina	5	6	8	11	15	15	17	18	20	20	21
Brazil	82	94	103	115	127	130	140	150	165	177	180
Canada	213	220	234	243	251	263	255	263	283	301	308
Colombia	10	11	12	13	15	18	18	19	19	19	20
Mexico	17	19	16	18	17	25	23	21	24	26	27
United States	287	224	284	283	279	264	312	335	324	284	294
Venezuela	11	12	12	13	15	15	16	18	20	20	21
Other	21	21	23	25	28	29	31	33	39	40	40
Total	646	606	692	721	747	757	812	857	893	889	911
Western Europe											
Austria	20	25	25	28	29	31	31	30	29	31	32
Finland	9	12	10	11	10	13	13	13	13	12	12
France	49	76	69	67	69	73	71	71	67	64	64
Italy	41	53	47	48	49	45	44	44	45	44	44
Norway	81	72	80	88	83	92	92	105	105	102	96
Portugal	5	10	11	12	8	5	7	8	10	11	8
Spain	22	40	41	47	31	23	28	29	33	33	27
Sweden	54	53	57	60	59	60	55	64	67	70	60
Switzerland	27	36	33	32	34	36	37	36	31	32	34
West Germany	14	17	18	18	21	20	19	19	18	17	18
Yugoslavia	20	24	25	26	28	25	23	22	25	24	27
Other	19	20	22	24	25	26	29	25	30	28	29
Total	362	437	436	461	444	450	449	466	473	468	451
Eastern Europe and U.S.S.R.											
Romania	8	9	11	11	13	13	12	10	11	12	12
U.S.S.R.	134	146	168	170	182	185	173	179	201	204	211
Other	11	13	13	13	15	14	13	14	14	15	14
Total	154	168	191	195	210	212	198	203	226	231	237
Middle East and Africa											
Egypt	8	9	9	9	10	10	10	10	10	11	11
Zambia	7	9	8	9	9	10	10	10	10	10	10
Other	34	37	39	46	50	43	42	41	36	38	39
Total	49	54	56	64	68	63	62	61	56	59	60
Far East and Oceania											
Australia	15	14	15	16	17	15	14	13	13	15	15
China	51	47	44	50	58	65	74	86	86	92	92
India	35	38	47	45	46	49	48	50	53	57	58
Japan	88	76	74	84	91	90	83	87	73	81	78
Korea, North	17	17	19	20	22	23	25	26	27	28	29
New Zealand	15	14	16	15	16	19	18	19	20	20	20
Other	21	20	21	27	28	28	30	32	40	45	44
Total	241	226	236	257	278	289	292	312	313	338	336
World Total	1,450	1,491	1,611	1,698	1,747	1,771	1,816	1,903	1,961	1,984	1,995

[1] See Appendix E, Note 1.
[2] Preliminary.
Note: Data include industrial and utility generation of hydroelectric power.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

Figure 112. Nuclear Electricity Generation by Non-Communist Countries, 1975 and 1987



Source: See Table 112.

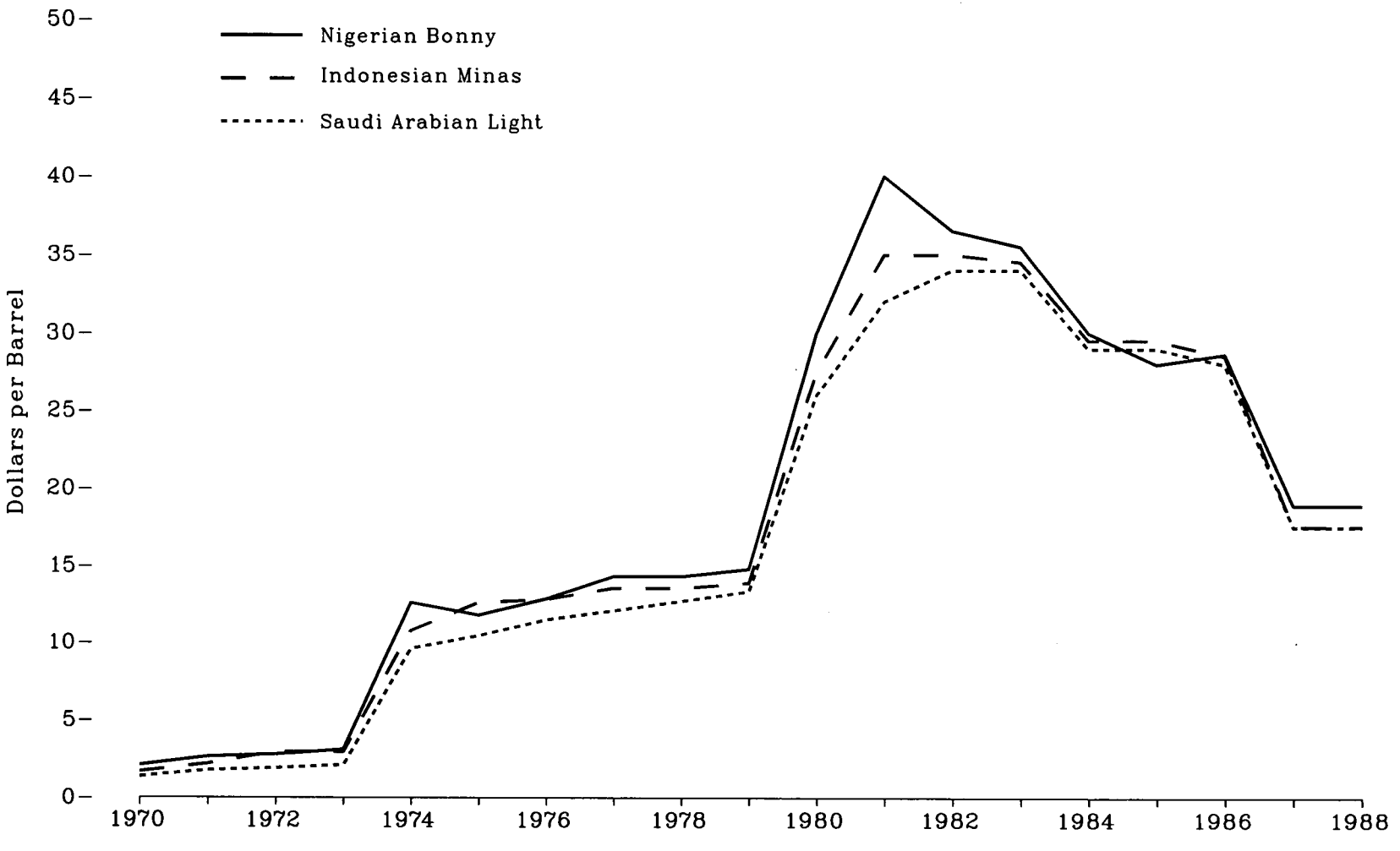
Table 112. Nuclear Electricity Generation[1] by Non-Communist Countries, 1975-1987

(Billion Gross Kilowatthours)

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
North America													
Canada	13.2	18.0	26.6	33.0	38.4	40.4	43.3	42.6	53.0	53.8	62.9	74.6	80.6
United States	182.3	201.8	264.2	292.4	270.6	265.4	288.5	298.6	313.6	343.8	402.6	432.9	477.9
Total	195.5	219.8	290.8	325.4	309.0	305.8	331.8	341.2	366.6	397.6	465.5	507.6	558.5
Central and South America													
Argentina	2.5	2.6	1.6	2.9	2.7	2.3	2.8	1.9	3.4	4.5	5.8	5.7	5.2
Brazil	0	0	0	0	0	0	0	0.1	0.2	2.1	3.4	0.1	1.0
Total	2.5	2.6	1.6	2.9	2.7	2.3	2.8	1.9	3.6	6.6	9.1	5.8	6.2
Western Europe													
Belgium	6.8	10.0	11.9	12.5	11.4	12.5	12.8	15.6	24.1	27.7	34.5	38.6	41.9
Finland	0	0	2.7	3.3	6.7	7.0	14.5	16.5	17.4	18.5	18.8	18.8	19.4
France	18.3	15.8	17.9	30.6	39.9	61.2	105.2	108.9	144.2	191.2	224.0	254.3	265.5
Italy	3.8	3.8	3.4	4.5	2.6	2.2	2.7	6.8	5.8	6.9	7.0	8.7	0.2
Netherlands	3.3	3.9	3.7	4.1	3.5	4.2	3.7	3.9	3.6	3.8	3.9	4.2	3.6
Spain	7.5	7.6	6.5	7.6	6.7	5.2	9.4	8.8	10.7	23.1	28.0	37.5	41.2
Sweden	12.0	16.0	19.9	23.8	21.0	26.7	37.7	38.8	40.4	51.3	58.6	69.9	67.2
Switzerland	7.7	7.9	8.1	8.3	11.8	14.3	15.2	15.0	15.5	16.3	22.4	22.5	23.0
United Kingdom	30.5	36.8	38.1	36.6	38.5	37.2	38.9	44.1	49.6	54.1	59.6	58.2	56.2
West Germany	21.7	24.5	36.0	35.7	42.2	43.7	53.4	63.4	65.8	92.6	125.8	118.9	130.2
Total	111.7	126.2	148.1	166.9	184.3	214.2	293.4	321.8	377.2	485.4	582.6	631.5	648.3
Far East and Africa													
India	2.5	3.2	2.8	2.3	3.2	2.9	3.1	2.2	2.9	4.1	4.5	5.1	5.5
Japan	21.3	36.6	28.2	53.1	62.0	82.8	86.0	104.5	109.1	127.2	152.0	164.8	182.8
Pakistan	0.5	0.5	0.3	0.2	(2)	0.1	0.2	0.1	0.2	0.3	0.3	0.5	0.3
South Africa	0	0	0	0	0	0	0	0	0	4.2	5.7	9.3	6.6
South Korea	0	0	0.1	2.3	3.2	3.5	2.9	3.8	9.0	11.8	16.5	26.1	37.8
Taiwan	0	0	0.1	2.7	6.3	8.2	10.7	13.1	18.9	24.3	28.7	26.9	33.1
Total	24.4	40.3	31.5	60.6	74.7	97.4	102.9	123.6	140.1	171.9	207.8	232.9	266.1
Total	334.1	388.9	472.0	555.9	570.7	619.8	730.9	788.5	887.5	1,061.5	1,265.0	1,377.8	1,479.1

[1] See Appendix E, Note 1.
[2] Less than 0.05 billion gross kilowatthours.
Note: Sum of components may not equal total due to independent rounding.
Source: *Nucleonics Week*, McGraw-Hill Publishing Co., Inc.

Figure 113. Official Prices of Selected Foreign Crude Oils, 1970-1988*



*As of January 1, except in 1987, when prices are as of February 1.
Source: See Table 113.

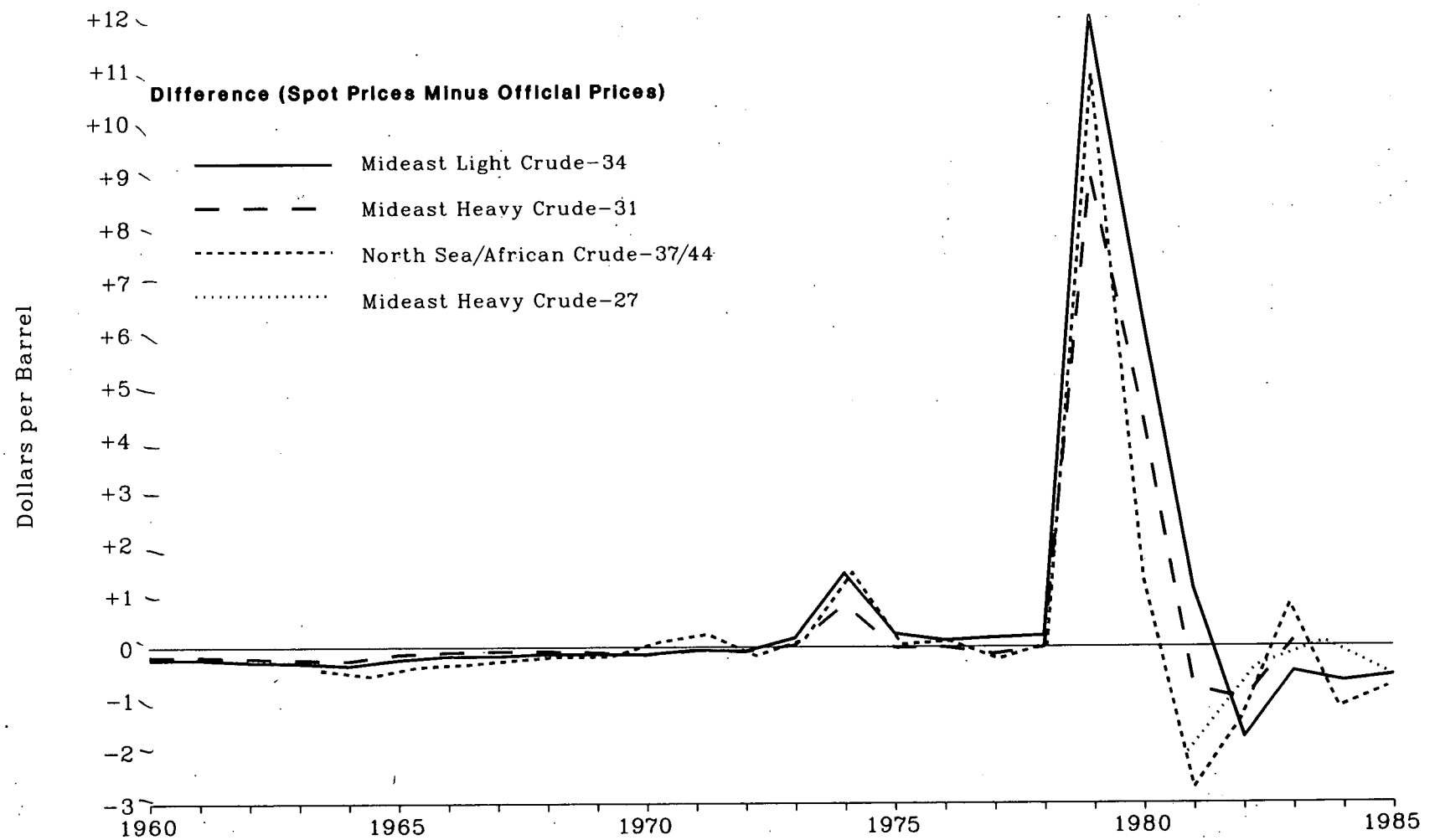
Table 113. Official Prices [1] of Selected Foreign Crude Oils, 1970-1988 [2]

(Dollars per Barrel)

Year	Saudi Arabian Light-34° API	Iranian Light-34° API	Libyan [3] Es Sider-37° API	Nigerian [4] Bonny-37° API	Indonesian Minas-34° API	Venezuelan Tia Juana-26° API	Mexico [5] Maya-22° API	United Kingdom [6] 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	[7] 30.00	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	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	17.52	17.50	18.52	18.92	17.56	16.72	14.00	18.25
1988	17.52	17.50	18.52	18.92	17.56	16.72	11.10	18.00

[1] Prices are usually free on board (f.o.b.) at the foreign port of lading. Prices for the period mid-1974 forward are official selling prices.
[2] As of January 1, except in 1987, when prices are as of February 1 (see Note below).
[3] Prices for 1974 and 1975 are for 40 degrees API gravity. Prices for 1980 include $4.72 in retroactive charges and market premiums.
[4] Prices from 1977 forward include 2 cents per barrel harbor dues.
[5] Mexico does not post official crude oil prices. Prices are formula-determined for each contract. For example, the prices given here are for 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.
[6] The United Kingdom does not post official crude oil prices. Prices for 1979 through 1984 are estimated long-term contract prices; prices for 1985 and forward are contractural arrangements based on spot market quotations.
[7] Price for 1980 includes $1.87 market premiums and credit charges.
NA = Not available.
Note: 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. As of February 1, 1987, official contract prices were again being used by OPEC as their primary pricing mechanism.
Sources: •1970 through 1978—Petroleum and Energy Intelligence Weekly, Inc., *Petroleum Intelligence Weekly.* •1979 and forward—Energy Information Administration, *Weekly Petroleum Status Report.*

Figure 114. Differences Between Spot Prices and Official Prices for Selected Foreign Crude Oil Mixes, 1960-1985



Source: See Table 114.

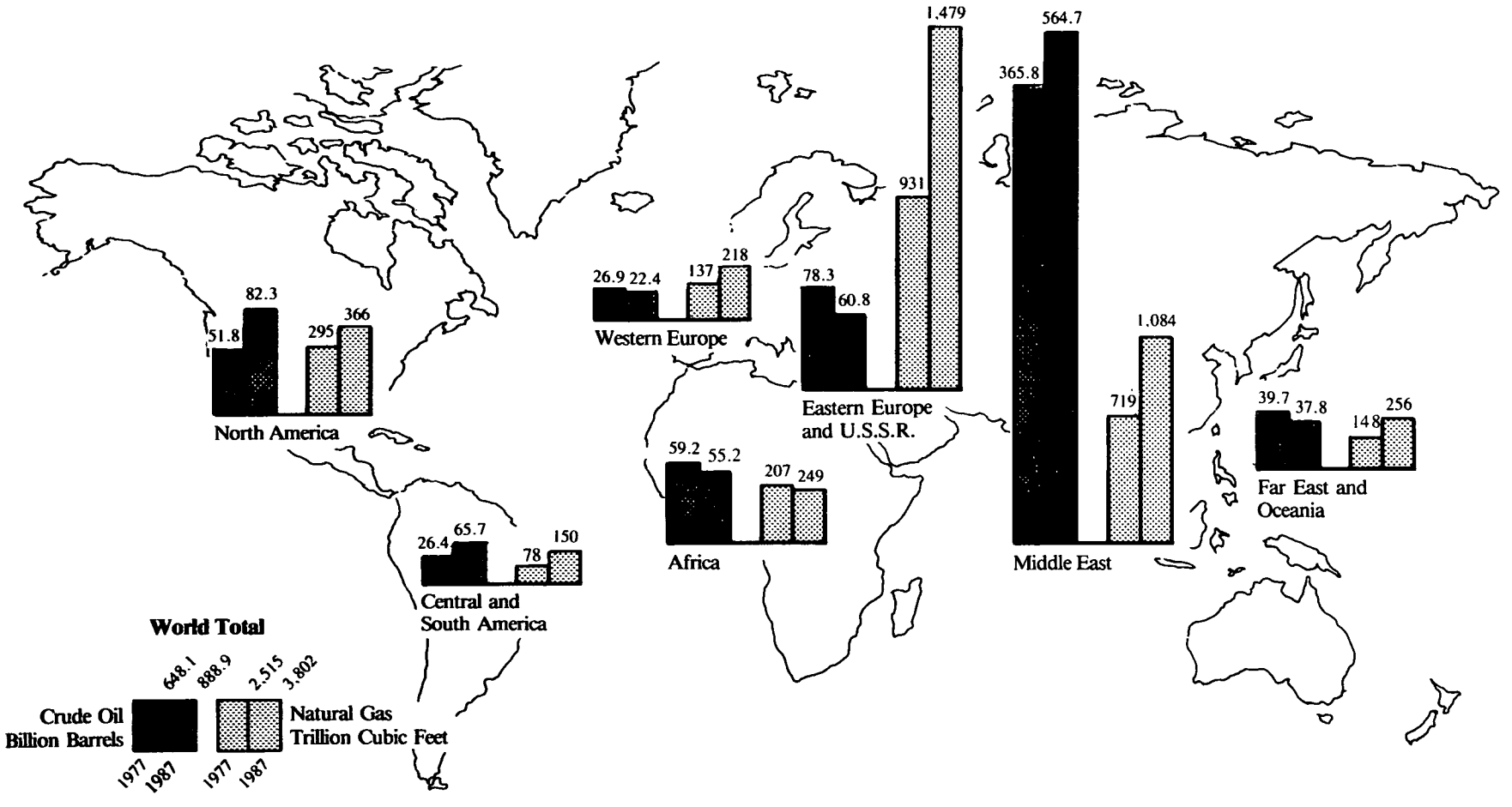
Table 114. Differences Between Average Annual Spot Prices and Official Prices for Selected Foreign Crude Oil Mixes, 1960-1987

(Dollars per Barrel)

Year	Mideast Light Crude -34 [1]			Mideast Heavy Crude -31 [2]			Mideast Heavy Crude -27 [3]			North Sea/African Crude -37/44 [4]		
	Official Price	Spot Price [5]	Difference [6]	Official Price	Spot Price	Difference [6]	Official Price	Spot Price [5]	Difference [6]	Official Price	Spot Price [5]	Difference [6]
1960	1.86	1.63	-0.23	1.64	1.46	-0.18	NA	NA	NA	NA	NA	NA
1961	1.80	1.57	-0.23	1.59	1.41	-0.18	NA	NA	NA	NA	NA	NA
1962	1.80	1.52	-0.28	1.59	1.38	-0.21	NA	NA	NA	2.23	NA	NA
1963	1.80	1.50	-0.30	1.59	1.35	-0.24	NA	NA	NA	2.23	1.85	-0.38
1964	1.80	1.45	-0.35	1.59	1.33	-0.26	NA	NA	NA	2.23	1.73	-0.50
1965	1.66	1.42	-0.24	1.45	1.31	-0.14	NA	NA	NA	2.00	1.68	-0.32
1966	1.53	1.36	-0.17	1.38	1.28	-0.10	NA	NA	NA	1.90	1.63	-0.27
1967	1.50	1.33	-0.17	1.35	1.27	-0.08	NA	NA	NA	1.95	1.76	-0.19
1968	1.45	1.32	-0.13	1.32	1.24	-0.08	NA	NA	NA	2.00	1.88	-0.12
1969	1.40	1.27	-0.13	1.30	1.20	-0.10	NA	NA	NA	1.95	1.83	-0.12
1970	1.35	1.21	-0.14	1.30	1.15	-0.15	NA	NA	NA	2.10	2.26	0.16
1971	1.75	1.69	-0.06	1.68	1.61	-0.07	NA	NA	NA	2.35	2.66	0.31
1972	1.90	1.82	-0.08	1.80	1.71	-0.09	NA	NA	NA	2.80	2.69	-0.11
1973	[7] 2.64	2.81	0.17	2.04	2.07	0.03	NA	NA	NA	3.20	3.40	0.20
1974	[7] 9.56	10.98	1.42	9.44	10.25	0.81	NA	NA	NA	11.40	12.92	1.52
1975	10.46	10.71	0.25	10.37	10.35	-0.02	NA	NA	NA	11.61	11.50	-0.11
1976	11.51	11.63	0.12	11.26	11.25	-0.01	NA	NA	NA	12.97	13.14	0.17
1977	12.40	12.57	0.17	12.37	12.23	-0.14	NA	NA	NA	14.48	14.30	-0.18
1978	12.70	12.91	0.21	12.27	12.26	-0.01	NA	NA	NA	14.10	14.21	0.11
1979	17.84	29.82	11.98	18.04	27.04	9.00	NA	NA	NA	21.04	32.11	11.07
1980	29.38	35.85	6.47	29.81	34.34	4.53	NA	NA	NA	36.50	37.89	1.39
1981	33.16	34.29	1.13	33.74	32.96	-0.78	NA	NA	NA	39.39	36.68	-2.71
1982	33.51	31.76	-1.75	31.38	30.36	-1.02	31.00	28.98	-2.02	34.75	33.42	-1.33
1983	29.20	28.72	-0.48	27.50	27.61	0.11	26.83	26.50	-0.33	30.72	29.82	-0.90
1984	28.75	28.08	-0.67	NA	NA	NA	27.10	27.26	0.16	29.95	28.81	-1.14
1985	28.08	27.52	-0.56	NA	NA	NA	26.29	25.78	-0.51	28.62	27.88	-0.74
1986[8]	NA	13.84	NA	NA	NA	NA	NA	11.94	NA	NA	15.41	NA
1987	17.52	17.29	-0.23	NA	NA	NA	16.27	16.13	-0.14	18.92	18.51	-0.41

[1] Primarily Arabian Light Crude Oil, 34 degrees API. Beginning in 1985, data are for Arabian Light Crude Oil, 34 degrees API only.
[2] Primarily Kuwait Heavy Crude Oil, 31 degrees API.
[3] In 1984, Mideast Heavy was redefined and is now primarily Arabian Heavy Crude Oil, 27 degrees API and prices were computed for 1982 and forward. Beginning in 1985, data are for Arabian Heavy, 27 degrees API only.
[4] Primarily Libyan Brega Crude Oil, 40 degrees API during the 1960's. Broadened to include Algeria Saharan Crude Oil, 44 degrees API and Nigerian Bonny, 37 degrees API from 1970 through 1980. Further broadened in 1981 to include United Kingdom-Brent, 38 degrees API and Norway-Ekofisk, 43 degrees API. Beginning in 1985, data are for Nigerian Bonny, 37 degrees API only.
[5] For 1986, this price is the market-related price, see Footnote 8.
[6] Spot price minus official price.
[7] Actual contract prices for Arabian Light Crude -34 degrees API. Although an official Arabian Light Crude -34 degrees API price existed, it applied to only a few direct sales contracts.
[8] For 1986, official prices were replaced by market-related pricing mechanisms, such as the netback prices indicated for 1986. Netback arrangements are crude oil price contracts based on the prices of petroleum products in the final market. For 1987 and before 1986, official sales prices were used as the primary indicator of long-term crude oil contract prices.
NA = Not available.
Sources: Petroleum and Energy Intelligence Weekly, Inc., *Petroleum Intelligence Weekly*. McGraw-Hill Inc., *Platt's Oilgram Price Report*.

Figure 115. World Crude Oil and Natural Gas Proved Reserves, End of Year 1977 and 1987



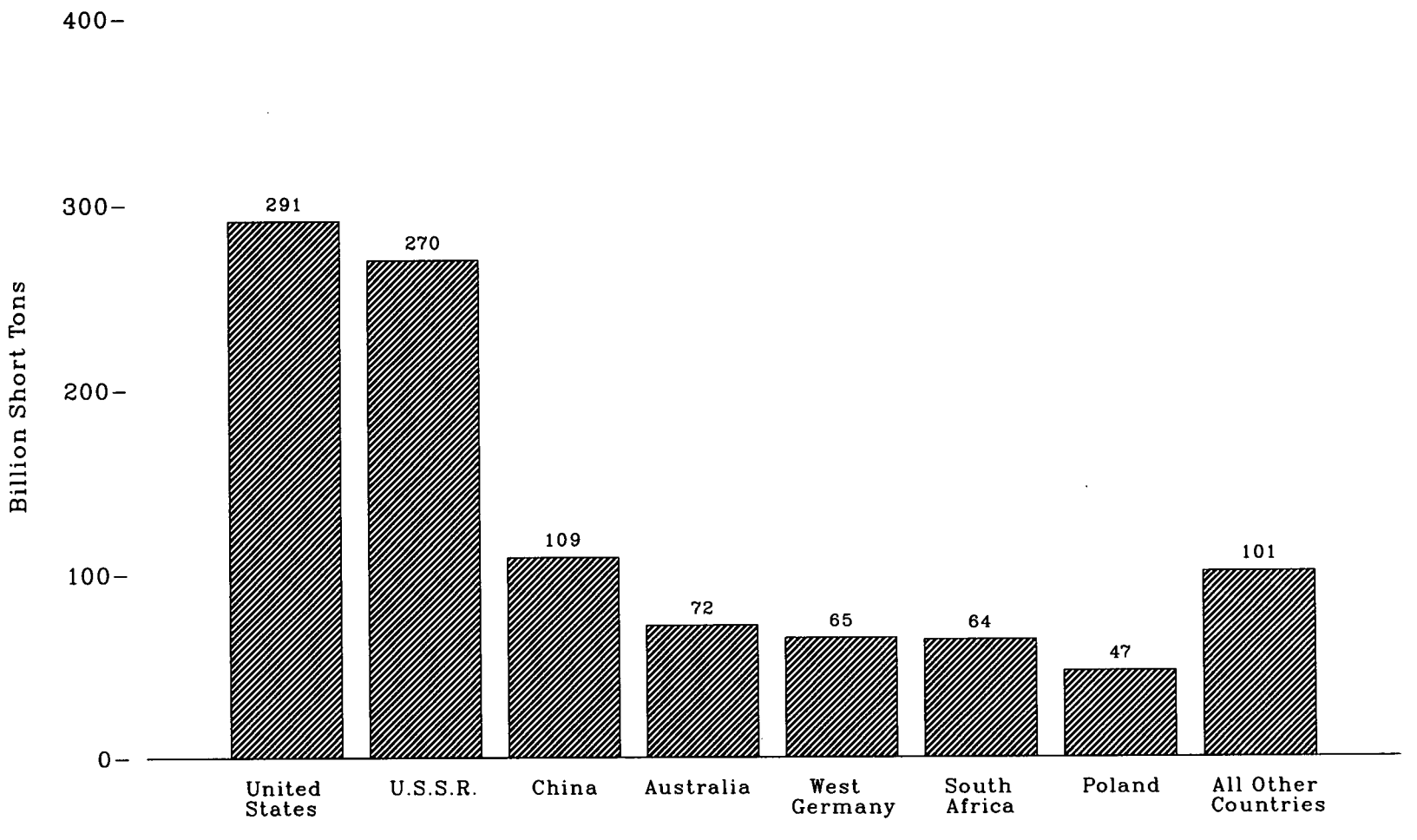
Note: Bars are scaled in proportion to the Btu contents of the reserves. One billion barrels of crude oil equals approximately 5.3 trillion cubic feet of wet natural gas.
Source: See Table 115.

Table 115. World Crude Oil and Natural Gas Proved Reserves, End of Year 1977 and 1987

Area and Country	Crude Oil (billion barrels)		Natural Gas (trillion cubic feet)	
	1977	1987	1977	1987
North America				
Canada	6.0	6.8	58	98
Mexico	14.0	48.6	30	77
United States	31.8	26.9	207	192
Total	51.8	82.3	295	366
Central and South America				
Argentina	2.5	2.3	8	24
Bolivia	0.4	0.2	5	5
Brazil	0.9	2.3	1	4
Chile	0.4	0.3	2	4
Colombia	1.0	1.6	6	4
Ecuador	1.6	1.6	5	4
Peru	0.7	0.5	1	1
Trinidad and Tobago	0.7	0.6	9	10
Venezuela	18.2	56.3	41	95
Other	[2]	0.1	0	[3]
Total	26.4	65.7	78	150
Western Europe				
Denmark	0.1	0.4	2	4
Italy	0.6	0.7	8	10
Netherlands	0.1	0.2	60	64
Norway	6.0	14.8	20	106
United Kingdom	19.0	5.2	29	22
West Germany	0.3	0.3	7	6
Other	0.8	0.8	10	5
Total	26.9	22.4	137	218
Eastern Europe and U.S.S.R.				
U.S.S.R.	75.0	59.0	920	1,450
Other [4]	3.3	1.8	11	29
Total	78.3	60.8	931	1,479
Middle East				
Bahrain	0.3	0.1	3	7
Iran	62.0	92.9	500	489
Iraq	34.5	100.0	28	26
Kuwait [1]	70.1	94.5	34	43
Oman	5.7	4.0	2	10
Qatar	5.6	3.2	40	157
Saudi Arabia [1]	153.1	169.6	88	146
Syria	2.2	1.8	3	2
United Arab Emirates	32.4	98.1	22	204
Other	[2]	0.6	[3]	2
Total	365.8	564.7	719	1,084
Africa				
Algeria	6.6	8.5	125	106
Angola	1.2	1.1	2	2
Cameroon	0.1	0.5	0	4
Congo	0.4	0.7	[3]	2
Egypt	2.5	4.3	3	10
Gabon	2.1	0.6	2	1
Libya	25.0	21.0	26	26
Nigeria	18.7	16.0	43	84
Tunisia	2.7	1.8	6	3
Other	0.2	0.6	[3]	11
Total	59.2	55.2	207	249
Far East and Oceania				
Australia	2.0	1.7	32	19
Bangladesh	0.0	[2]	8	13
Brunei	1.6	1.4	8	7
China	20.0	18.4	25	31
India	3.0	4.3	4	18
Indonesia	10.0	8.4	24	73
Malaysia	2.5	2.9	17	52
New Zealand	0.1	0.2	6	5
Pakistan	0.3	0.1	16	22
Thailand	[2]	0.1	5	4
Other	0.3	0.3	4	12
Total	39.7	37.8	148	256
World Total	648.1	888.9	2,515	3,802

[1] Includes one-half of the Partitioned Zone (formerly called Neutral Zone).
[2] Less than 0.05 billion barrels.
[3] Less than 0.5 trillion cubic feet.
[4] Includes also Cuba, Mongolia, North Korea, and Vietnam.
Note: Sum of components may not equal total due to independent rounding.
Note: All reserve figures except those for the U.S.S.R. and natural gas reserves in Canada are proved reserves recoverable with present technology and prices. U.S.S.R. figures are "explored reserves," which include proved, probable, and some 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, 1986. See Table 42.
Source: **United States:** •1977—Table 42. **World Total:** Derived by Energy Information Administration. **All Other Data:** •1977—*Oil and Gas Journal*, December 26, 1977. Petroleum Publishing Co., Tulsa, Oklahoma. •1987—*Oil and Gas Journal*, December 28, 1987. PennWell Publishing Co., Tulsa, Oklahoma. The Energy Information Administration does not necessarily subscribe to the *Oil and Gas Journal* data but reproduces it as a matter of convenience.

Figure 116. World Recoverable Reserves of Coal, 1984



Source: See Table 116.

Table 116. World Recoverable Reserves of Coal, 1984 [1]

(Billion Short Tons)

Area and Country	Anthracite and Bituminous Coal [2]			Lignite		Total Recoverable
	Recoverable	Portion Surface Minable	Portion Coking Quality	Recoverable	Portion Surface Minable	
North, Central, and South America						
Canada	4.88	4.10	2.58	2.67	2.67	7.55
United States	254.78	64.37	NA	36.06	36.06	290.84
Other	7.77	3.02	1.77	0.02	0.00	7.79
Total	267.43	[3] 71.49	[3] 4.35	38.75	38.73	306.18
Western Europe						
Turkey	0.10	0.00	0.09	5.25	3.68	5.35
United Kingdom	5.07	0.00	1.98	0.00	0.00	5.07
West Germany	26.37	NA	15.82	38.75	38.75	65.12
Yugoslavia	1.73	0.58	0.00	16.50	13.20	18.23
Other	2.22	[3] 0.31	[3] 0.61	3.69	0.36	5.91
Total	35.49	[3] 0.89	[3] 18.50	64.19	[3] 55.99	99.68
Eastern Europe and U.S.S.R.						
Bulgaria	0.03	NA	0.02	4.00	2.60	4.03
Czechoslovakia	3.00	NA	NA	3.15	0.00	6.15
Hungary	1.74	0.00	0.17	3.18	3.18	4.92
Poland	31.20	0.00	10.00	15.88	14.33	47.08
U.S.S.R.	165.56	39.11	60.00	104.20	96.88	269.76
Other	0.00	0.00	0.00	23.95	23.90	23.95
Total	201.53	[3] 39.11	[3] 70.19	154.36	[3] 140.89	355.89
Africa						
Botswana	3.85	0.00	0.00	0.00	0.00	3.85
South Africa, Republic of	64.38	NA	NA	0.00	0.00	64.38
Swaziland	1.00	0.00	0.00	0.00	0.00	1.00
Other	2.06	0.56	0.55	0.00	0.00	2.06
Total	71.29	[3] 0.56	[3] 0.55	0.00	0.00	71.29
Middle East, Far East, and Oceania						
Australia	32.53	7.26	12.10	39.90	39.90	72.43
China	108.90	14.16	32.67	0.00	0.00	108.90
India	NA	NA	NA	1.74	1.65	1.74
Other	2.30	[3] 0.07	[3] 0.71	0.92	0.70	3.22
Total	143.73	[3] 21.49	[3] 45.48	42.56	[3] 42.25	186.29
World Total	719.47	[3] 133.54	[3] 139.07	299.86	[3] 277.86	1,019.33

[1] The reference year for most of the reserves data in the source report is 1984.
[2] Includes subbituminous coal.
[3] Not all countries in this group reported under this category.
NA = Not available.
Note: Sum of components may not equal total due to independent rounding.
Source: Energy Information Administration, *International Energy Annual 1986.*

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[1] (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.

[1]More information about British thermal units—the standardized unit of measure for energy—can be found in Appendix B, "Energy Units in Perspective," and in the Glossary.

Table A1. Approximate Heat Content of Refined Petroleum Products, Electricity Consumed, 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 400 °F or less	5.248
Other Oils over 400 °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 Naphtha	5.248
Still Gas	6.000
Unfinished Oils	5.825
Unfractionated Stream	5.418
Wax	5.537
Miscellaneous	5.796
	Btu per Kilowatthour
Electricity	3,412
	Million Btu per Short Ton
Hardwood, dry (average)	17.2

Table A2. Approximate Heat Content of Petroleum Produced and Traded and for NGPL [1] Produced, 1949-1987

(Million Btu per Barrel)

Year	Petroleum							Natural Gas Plant Liquids
	Production of Crude Oil and Lease Condensate	Imports of Crude Oil and Petroleum Products	Imports of Crude Oil	Imports of Petroleum Products	Exports of Crude Oil and Petroleum Products	Exports of Crude Oil	Exports of Petroleum Products	Production
1949	5.8	6.059	5.952	6.261	5.692	5.8	5.651	4.544
1950	5.8	6.080	5.943	6.263	5.766	5.8	5.751	4.522
1951	5.8	6.075	5.938	6.265	5.762	5.8	5.753	4.495
1952	5.8	6.067	5.938	6.261	5.774	5.8	5.768	4.464
1953	5.8	6.052	5.924	6.268	5.742	5.8	5.732	4.450
1954	5.8	6.052	5.931	6.252	5.745	5.8	5.738	4.415
1955	5.8	6.040	5.924	6.234	5.768	5.8	5.765	4.406
1956	5.8	6.024	5.916	6.225	5.754	5.8	5.744	4.382
1957	5.8	6.023	5.918	6.219	5.780	5.8	5.774	4.369
1958	5.8	5.993	5.916	6.091	5.779	5.8	5.778	4.366
1959	5.8	6.020	5.916	6.142	5.829	5.8	5.830	4.311
1960	5.8	6.021	5.911	6.161	5.834	5.8	5.835	4.295
1961	5.8	5.991	5.900	6.102	5.832	5.8	5.833	4.283
1962	5.8	6.004	5.890	6.138	5.841	5.8	5.842	4.273
1963	5.8	6.002	5.894	6.126	5.840	5.8	5.841	4.264
1964	5.8	5.998	5.882	6.129	5.844	5.8	5.845	4.268
1965	5.8	5.997	5.872	6.123	5.743	5.8	5.742	4.264
1966	5.8	5.993	5.863	6.112	5.729	5.8	5.728	4.259
1967	5.8	5.999	5.838	6.128	5.777	5.8	5.758	4.232
1968	5.8	5.977	5.836	6.095	5.763	5.8	5.762	4.218
1969	5.8	5.974	5.825	6.093	5.714	5.8	5.713	4.170
1970	5.8	5.985	5.822	6.088	5.810	5.8	5.811	4.146
1971	5.8	5.961	5.824	6.062	5.775	5.8	5.775	4.117
1972	5.8	5.935	5.809	6.045	5.741	5.8	5.741	4.070
1973	5.8	5.897	5.817	5.983	5.752	5.8	5.752	4.049
1974	5.8	5.884	5.827	5.959	5.774	5.8	5.773	4.011
1975	5.8	5.858	5.821	5.935	5.748	5.8	5.747	3.984
1976	5.8	5.856	5.808	5.980	5.745	5.8	5.743	3.964
1977	5.8	5.834	5.810	5.908	5.797	5.8	5.796	3.941
1978	5.8	5.839	5.802	5.955	5.808	5.8	5.814	3.925
1979	5.8	5.810	5.810	5.811	5.832	5.8	5.864	3.955
1980	5.8	5.796	5.812	5.748	5.820	5.8	5.841	3.914
1981	5.8	5.775	5.818	5.659	5.821	5.8	5.837	3.930
1982	5.8	5.775	5.826	5.664	5.820	5.8	5.829	3.872
1983	5.8	5.774	5.825	5.677	5.800	5.8	5.800	3.839
1984	5.8	5.745	5.823	5.613	5.850	5.8	5.867	3.812
1985	5.8	5.736	5.832	5.572	5.814	5.8	5.819	3.815
1986	5.8	5.808	5.903	5.624	5.832	5.8	5.839	3.797
1987[2]	5.8	5.823	5.902	5.599	5.868	5.8	5.885	3.805

[1] NGPL = Natural gas plant liquids.
[2] Preliminary.
Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A3. Approximate Heat Content of Petroleum Consumed, by Sector, 1949-1987

(Million Btu per Barrel)

Year	Petroleum Consumption				
	All Users	Residential and Commercial	Industrial	Transportation	Electric Utilities
1949	5.649	5.631	5.947	5.465	6.254
1950	5.649	5.626	5.940	5.461	6.254
1951	5.634	5.626	5.913	5.458	6.254
1952	5.621	5.621	5.905	5.442	6.254
1953	5.608	5.606	5.897	5.426	6.254
1954	5.595	5.603	5.883	5.412	6.254
1955	5.591	5.607	5.866	5.408	6.254
1956	5.585	5.601	5.856	5.406	6.254
1957	5.577	5.587	5.842	5.405	6.254
1958	5.567	5.582	5.832	5.393	6.254
1959	5.557	5.549	5.811	5.389	6.254
1960	5.555	5.570	5.799	5.388	6.267
1961	5.552	5.570	5.794	5.387	6.268
1962	5.545	5.555	5.783	5.386	6.267
1963	5.534	5.532	5.757	5.385	6.266
1964	5.528	5.517	5.727	5.389	6.267
1965	5.532	5.535	5.725	5.388	6.267
1966	5.532	5.523	5.717	5.390	6.266
1967	5.515	5.473	5.675	5.394	6.266
1968	5.504	5.450	5.638	5.398	6.263
1969	5.492	5.399	5.596	5.397	6.259
1970	5.503	5.404	5.598	5.395	6.252
1971	5.504	5.392	5.593	5.392	6.245
1972	5.500	5.368	5.559	5.390	6.233
1973	5.515	5.387	5.565	5.397	6.245
1974	5.504	5.377	5.537	5.394	6.238
1975	5.494	5.358	5.527	5.392	6.250
1976	5.504	5.383	5.535	5.396	6.251
1977	5.518	5.389	5.552	5.402	6.249
1978	5.519	5.382	5.546	5.407	6.251
1979	5.494	5.471	5.416	5.430	6.258
1980	5.479	5.468	5.376	5.440	6.254
1981	5.448	5.409	5.310	5.434	6.258
1982	5.415	5.392	5.262	5.423	6.258
1983	5.406	5.286	5.273	5.416	6.255
1984	5.395	5.261	5.256	5.423	6.251
1985	5.387	5.203	5.265	5.421	6.247
1986	5.418	5.238	5.336	5.423	6.257
1987[1]	5.399	5.208	5.298	5.420	6.249

[1] Preliminary.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A4. Approximate Heat Content of Natural Gas, 1949-1987

(Btu per Cubic Foot)

Year	Natural Gas (Dry)						Natural Gas Production, Marketed (Wet)
		Consumption					
	Production	All Users	Electric Utilities	Non-Electric Utility	Imports	Exports	
1949	1,035	1,035	1,035	1,035	—	1,035	1,120
1950	1,035	1,035	1,035	1,035	—	1,035	1,119
1951	1,035	1,035	1,035	1,035	—	1,035	1,114
1952	1,035	1,035	1,035	1,035	1,035	1,035	1,115
1953	1,035	1,035	1,035	1,035	1,035	1,035	1,116
1954	1,035	1,035	1,035	1,035	1,035	1,035	1,115
1955	1,035	1,035	1,035	1,035	1,035	1,035	1,120
1956	1,035	1,035	1,035	1,035	1,035	1,035	1,116
1957	1,035	1,035	1,035	1,035	1,035	1,035	1,113
1958	1,035	1,035	1,035	1,035	1,035	1,035	1,110
1959	1,035	1,035	1,035	1,035	1,035	1,035	1,109
1960	1,035	1,035	1,035	1,035	1,035	1,035	1,107
1961	1,035	1,035	1,035	1,035	1,035	1,035	1,108
1962	1,035	1,035	1,035	1,035	1,035	1,035	1,107
1963	1,031	1,031	1,031	1,031	1,031	1,031	1,103
1964	1,032	1,032	1,032	1,032	1,032	1,032	1,102
1965	1,032	1,032	1,032	1,032	1,032	1,032	1,101
1966	1,033	1,033	1,033	1,033	1,033	1,033	1,103
1967	1,032	1,032	1,032	1,032	1,032	1,032	1,105
1968	1,031	1,031	1,031	1,031	1,031	1,031	1,115
1969	1,031	1,031	1,031	1,031	1,031	1,031	1,103
1970	1,031	1,031	1,031	1,031	1,031	1,031	1,102
1971	1,031	1,031	1,031	1,031	1,031	1,031	1,103
1972	1,027	1,027	1,027	1,027	1,027	1,027	1,100
1973	1,021	1,021	1,024	1,020	1,026	1,023	1,093
1974	1,024	1,024	1,022	1,024	1,027	1,016	1,097
1975	1,021	1,021	1,026	1,020	1,026	1,014	1,095
1976	1,020	1,020	1,023	1,019	1,025	1,013	1,093
1977	1,021	1,021	1,029	1,019	1,026	1,013	1,093
1978	1,019	1,019	1,034	1,016	1,030	1,013	1,088
1979	1,021	1,021	1,035	1,018	1,037	1,013	1,092
1980	1,026	1,026	1,035	1,024	1,022	1,013	1,098
1981	1,027	1,027	1,035	1,025	1,014	1,011	1,103
1982	1,028	1,028	1,036	1,026	1,018	1,011	1,107
1983	1,031	1,031	1,030	1,031	1,024	1,010	1,115
1984	1,031	1,031	1,035	1,030	1,005	1,010	1,109
1985	1,032	1,032	1,038	1,031	1,002	1,011	1,112
1986	1,030	1,030	1,034	1,029	997	1,008	1,110
1987[1]	1,030	1,030	1,034	1,029	997	1,008	1,110

[1] Preliminary.
— = Not applicable.
Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A5. Approximate Heat Content of Coal by Type, 1949-1987

(Million Btu per Short Ton)

Year	Bituminous Coal [1] and Lignite								Anthracite				
		Consumption								Consumption			
	Production	All Users	Residential and Commercial	Coke Plants	Other Industry [2]	Electric Utilities	Imports	Exports	Production	All Users	Electric Utilities	Non-electric Utility	Imports and Exports
1949	24.965	24.836	24.044	26.800	24.601	24.022	25.000	27.000	24.421	24.291	17.500	24.954	25.400
1950	25.126	25.024	24.162	26.800	24.804	24.200	25.000	27.000	24.667	24.592	17.500	25.297	25.400
1951	25.065	24.854	23.988	26.800	24.503	23.936	25.000	27.000	24.439	24.289	17.500	25.082	25.400
1952	25.157	24.955	24.108	26.800	24.711	24.118	25.000	27.000	24.400	24.257	17.500	25.063	25.400
1953	25.207	25.062	24.143	26.800	24.773	24.172	25.000	27.000	24.264	24.147	17.500	25.132	25.400
1954	25.115	24.971	24.144	26.800	24.775	24.174	25.000	27.000	24.234	24.130	17.500	25.015	25.400
1955	25.258	25.034	24.166	26.800	24.811	24.206	25.000	27.000	24.194	24.053	17.500	25.084	25.400
1956	25.187	24.913	24.082	26.800	24.668	24.080	25.000	27.000	23.899	23.580	17.500	24.548	25.400
1957	25.286	24.979	24.108	26.800	24.711	24.118	25.000	27.000	23.785	23.441	17.500	24.587	25.400
1958	25.031	24.758	24.039	26.800	24.592	24.014	25.000	27.000	24.059	23.903	17.500	25.003	25.400
1959	24.965	24.773	24.047	26.800	24.606	24.026	25.000	27.000	23.817	23.664	17.500	24.666	25.400
1960	24.960	24.765	24.054	26.800	24.604	24.029	25.000	27.000	23.717	23.592	17.500	24.721	25.400
1961	24.892	24.693	24.034	26.800	24.569	23.993	25.000	27.000	23.854	23.707	17.500	24.870	25.400
1962	24.869	24.668	24.027	26.800	24.558	23.988	25.000	27.000	23.811	23.515	17.500	24.666	25.400
1963	24.879	24.639	24.007	26.800	24.524	23.962	25.000	27.000	23.633	23.107	17.500	24.110	25.400
1964	24.887	24.652	23.988	26.800	24.490	23.928	25.000	27.000	23.507	23.128	17.500	24.164	25.400
1965	24.813	24.575	23.928	26.800	24.387	23.836	25.000	27.000	23.471	23.175	17.500	24.316	25.400
1966	24.664	24.431	23.836	26.800	24.227	23.699	25.000	27.000	23.202	22.906	17.500	24.193	25.400
1967	24.516	24.287	23.737	26.800	24.056	23.554	25.000	27.000	22.655	22.291	17.500	23.506	25.400
1968	24.487	24.229	23.724	26.800	24.034	23.531	25.000	27.000	22.426	22.037	17.500	23.293	25.400
1969	24.313	24.011	23.553	26.800	23.737	23.274	25.000	27.000	22.543	22.003	17.500	23.200	25.400
1970	23.862	23.461	23.111	26.800	22.973	22.603	25.000	27.000	22.603	22.102	17.500	23.476	25.400
1971	23.519	23.138	22.927	26.800	22.653	22.325	25.000	27.000	22.718	22.210	17.500	23.572	25.400
1972	23.400	23.050	22.861	26.800	22.539	22.225	25.000	27.000	22.422	21.822	17.500	23.403	25.400
1973	23.391	23.073	22.887	26.800	22.585	22.262	25.000	26.612	22.132	21.464	17.920	22.674	25.400
1974	23.087	22.694	22.523	26.800	22.420	21.799	25.000	26.716	21.711	20.919	17.200	22.330	25.400
1975	22.910	22.522	22.258	26.800	22.439	21.659	25.000	26.573	21.582	20.762	17.064	22.272	25.400
1976	22.863	22.509	22.819	26.800	22.528	21.692	25.000	26.613	22.045	21.254	17.526	22.618	25.400
1977	22.597	22.266	22.594	26.800	22.290	21.521	25.000	26.561	22.661	22.066	17.244	24.101	25.400
1978	22.242	22.014	22.078	26.800	22.175	21.284	25.000	26.501	23.079	22.398	17.104	24.388	25.400
1979	22.449	22.100	21.884	26.800	22.436	21.372	25.000	26.570	23.170	22.069	17.454	24.272	25.400
1980	22.411	21.950	22.488	26.800	22.690	21.301	25.000	26.404	22.869	21.405	17.652	22.719	25.400
1981	22.301	21.710	22.010	26.800	22.572	21.091	25.000	26.176	23.291	22.080	18.168	23.749	25.400
1982	22.233	21.670	22.226	26.800	22.695	21.200	25.000	26.231	23.289	22.518	18.160	24.578	25.400
1983	22.048	21.576	22.438	26.800	22.680	21.141	25.000	26.300	22.734	21.583	16.516	24.536	25.400
1984	22.005	21.570	22.406	26.800	22.525	21.108	25.000	26.410	23.107	22.322	17.018	25.128	25.400
1985	21.867	21.368	22.568	26.800	22.013	20.965	25.000	26.320	22.428	20.817	16.784	23.031	25.400
1986	21.908	21.462	22.669	26.800	22.185	21.091	25.000	26.308	23.084	21.512	15.578	24.399	25.400
1987[3]	21.941	21.531	23.441	26.800	22.345	21.164	25.000	26.358	23.085	21.657	15.970	25.014	25.400

[1] Including subbituminous coal.
[2] Includes transportation.
[3] Preliminary.
Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A6. Approximate Heat Content of All Coal and Coal Coke, 1949-1987

(Million Btu per Short Ton)

Year	All Coal						Coal Coke
		Consumption					
	Production	All Users	Electric Utilities	Non-Electric Utility	Imports	Exports	Imports and Exports
1949	24.916	24.793	23.761	25.011	25.000	26.759	24.800
1950	25.090	24.989	23.937	25.229	25.020	26.788	24.800
1951	25.019	24.813	23.701	25.106	25.034	26.848	24.800
1952	25.096	24.901	23.885	25.214	25.040	26.859	24.800
1953	25.147	25.006	23.964	25.362	25.048	26.881	24.800
1954	25.054	24.913	23.996	25.312	25.012	26.865	24.800
1955	25.201	24.982	24.056	25.421	25.000	26.907	24.800
1956	25.117	24.843	23.943	25.320	25.000	26.886	24.800
1957	25.213	24.905	23.980	25.449	25.001	26.914	24.800
1958	24.983	24.716	23.897	25.271	25.005	26.931	24.800
1959	24.910	24.719	23.924	25.337	25.003	26.927	24.800
1960	24.906	24.713	23.927	25.340	25.003	26.939	24.800
1961	24.849	24.653	23.904	25.309	25.002	26.937	24.800
1962	24.828	24.627	23.911	25.289	25.013	26.928	24.800
1963	24.831	24.588	23.897	25.276	25.007	26.894	24.800
1964	24.840	24.602	23.864	25.358	25.000	26.949	24.800
1965	24.775	24.537	23.780	25.352	25.000	26.973	24.800
1966	24.629	24.396	23.648	25.259	25.000	26.976	24.800
1967	24.475	24.243	23.506	25.175	25.000	26.981	24.800
1968	24.445	24.186	23.486	25.168	25.000	26.984	24.800
1969	24.280	23.976	23.240	25.089	25.000	26.982	24.800
1970	23.842	23.440	22.573	24.806	25.000	26.982	24.800
1971	23.507	23.124	22.301	24.671	25.000	26.981	24.800
1972	23.389	23.036	22.204	24.733	25.000	26.979	24.800
1973	23.376	23.057	22.246	24.878	25.000	26.596	24.800
1974	23.072	22.677	21.781	24.783	25.000	26.700	24.800
1975	22.897	22.506	21.642	24.745	25.000	26.562	24.800
1976	22.855	22.498	21.679	24.861	25.000	26.601	24.800
1977	22.597	22.265	21.508	24.701	25.000	26.548	24.800
1978	22.248	22.017	21.275	24.496	25.000	26.478	24.800
1979	22.454	22.100	21.364	24.626	25.000	26.548	24.800
1980	22.415	21.947	21.295	24.731	25.000	26.384	24.800
1981	22.308	21.713	21.085	24.470	25.000	26.160	24.800
1982	22.239	21.674	21.194	24.187	25.000	26.223	24.800
1983	22.052	21.576	21.133	24.062	25.000	26.291	24.800
1984	22.010	21.573	21.101	24.041	25.000	26.402	24.800
1985	21.870	21.366	20.959	23.639	25.000	26.307	24.800
1986	21.913	21.462	21.084	23.635	25.000	26.292	24.800
1987[1]	21.946	21.531	21.157	23.811	25.000	26.344	24.800

[1] Preliminary.

Source: See "Thermal Conversion Factor Source Documentation," which follows Table A7.

Table A7. Approximate Heat Rates for Electricity by Type of Generation, 1949-1987

(Btu per Kilowatthour)

Year	Fossil Fuel Steam-Electric Power Plant Generation [1]	Nuclear Power Plant Generation	Geothermal Energy Power Plant Generation
1949	15,033	*	*
1950	14,030	*	*
1951	13,641	*	*
1952	13,361	*	*
1953	12,889	*	*
1954	12,180	*	*
1955	11,699	*	*
1956	11,456	*	*
1957	11,365	11,629	*
1958	11,085	11,629	*
1959	10,970	11,629	*
1960	10,760	11,629	23,200
1961	10,650	11,629	23,200
1962	10,558	11,629	23,200
1963	10,482	11,877	22,182
1964	10,462	11,912	22,182
1965	10,453	11,804	22,182
1966	10,415	11,623	22,182
1967	10,432	11,555	21,770
1968	10,398	11,297	21,606
1969	10,447	11,037	21,606
1970	10,494	10,977	21,606
1971	10,478	10,837	21,655
1972	10,379	10,792	21,668
1973	10,389	10,903	21,674
1974	10,442	11,161	21,674
1975	10,406	11,013	21,611
1976	10,373	11,047	21,611
1977	10,435	10,769	21,611
1978	10,361	10,941	21,611
1979	10,353	10,879	21,545
1980	10,388	10,908	21,639
1981	10,453	11,030	21,639
1982	10,423	11,073	21,629
1983	10,445	10,905	21,290
1984	10,211	10,843	21,303
1985	10,339	10,809	21,263
1986[2]	10,320	10,807	21,263
1987[2]	10,320	10,807	21,263

[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.

[2] Preliminary.

— = Not applicable.

Source: See "Thermal Conversion Factor Source Documentation," which follows this table.

Thermal Conversion Factor Source Documentation

PETROLEUM AND NATURAL GAS PLANT LIQUIDS

Asphalt. • 1949 forward: 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. • 1965 forward: 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,* 1968.

Butane. • 1949 forward: 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. • 1949-1983: 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." EIA use of this term ceased in 1983.

Crude Oil, Exports. • 1949 forward: 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. • 1949 forward: 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 using National Bureau of Standards, Miscellaneous Publication No. 97, *Thermal Properties of Petroleum Products,* 1933.

Crude Oil and Lease Condensate, Production. • 1949 forward: 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. • 1949 forward: 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. • 1949 forward: 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. • 1949 forward: 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 Value of Various Fuels, adopted January 3, 1950.*

Ethane. • 1959 forward: 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. • 1979-1983: 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." EIA use of this term ceased in 1983.

Isobutane. • 1949 forward: 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. • 1952 forward: EIA adopted the Bureau of Mines thermal conversion factor of 5.670 million Btu per barrel as published for "Jet Fuel, Commercial" by the Texas Eastern Transmission Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* 1968.

Jet Fuel, Naphtha Type. • 1952 forward: EIA adopted the Bureau of Mines thermal conversion factor of 5.355 million Btu per barrel as published for "Jet Fuel, Military" by the Texas Eastern Transmission

Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* 1968.

Kerosene. • 1949 forward: 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. • 1949 forward: 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. • 1949 forward: 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. • 1949 forward: EIA adopted the Bureau of Mines thermal conversion factor of 5.253 million Btu per barrel as published for "Gasoline, Motor Fuel" by the Texas Eastern Transmission Corporation in the report *Competition and Growth in American Energy Markets 1947-1985,* 1968.

Natural Gasoline. • 1949-1983: 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. EIA use of this term ceased in 1983.*

Natural Gas Plant Liquids, Production. • 1949 forward: 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.

Pentanes Plus. • 1984 forward: 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 400 degrees F or Less. • 1962 forward: Assumed by EIA to be 5.248 million Btu per barrel, equal to the thermal conversion factor for special naphtha. See "Special Naphtha."

Petrochemical Feedstock, Over 400 degrees F. • 1962 forward: 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 Feedstock, Still Gas. • 1962 forward: 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. • 1949 forward: 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 Value of Various Fuels, adopted January 3, 1950.* Bureau of Mines calculated this factor by dividing the 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, Consumption by All Users. • 1949 forward: 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. • 1949-1959: 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. • 1960-1985: Calculated from the State Energy Data System as documented in the *State Energy Data Report, Consumption Estimates, 1960-1985.* •1986: Estimated by EIA.

Petroleum Products, Consumption by Industrial Users. • 1949 forward: 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. For 1960 and forward, 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 . • 1949 forward: 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. For 1960 and forward, 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. • 1949 forward: Calculated annually by EIA as the average of the thermal conversion factor for all petroleum products consumed in the transporta-

tion sector, weighted by the estimated quantity of each petroleum product consumed in the transportation sector. For 1960 and forward, 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. • 1949 forward: 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. • 1949 forward: 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. • 1949-1983: Estimated to be 5.418 million Btu per barrel by EIA from data provided by McClanahan Consultants, Inc., Houston, Texas. EIA use of this term ceased in 1983.

Propane. • 1949 forward: 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. • 1949 forward: 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. • 1949 forward: 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. • 1965 forward: 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. • 1949 forward: 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. • 1949 forward: 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. • 1979-1983: 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. EIA use of this term ceased in 1983.*

Wax. • 1949 forward: 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.*

NATURAL GAS

Natural Gas, Consumption by All Users. • 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. • 1980-1985: Calculated annually by EIA by dividing the total heat content of natural gas consumed by the total quantity of natural gas consumed. Heat content and quantity consumed are from Form EIA-176. • 1986: Estimated to be the same as 1985.

Natural Gas, Consumption by Electric Utilities. • 1949-1972: Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See "Natural Gas, Consumption by All Users." • 1973-1985: Calculated annually by EIA by dividing the total heat content of natural gas received at electric utilities by the total quantity received at electric utilities. The heat contents and receipts are from FERC Form 423 and predecessor forms. • 1986: Estimated to be the same as 1985.

Natural Gas, Consumption by Non-Electric Utility Users. • 1949-1972: Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See "Natural Gas, Consumption by All Users." • 1973-1985: Calculated annually by EIA by subtracting the heat content of natural gas consumed at electric utilities from the heat content of total natural gas consumed and dividing the result by the quantity of non-utility natural gas consumption (total consumption less electric utility consumption). • 1986: Estimated to be the same as 1985.

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, Consumption by All Users." • 1973-1985: Calculated annually by EIA by dividing the heat content of exported natural gas by the quantity of natural gas exported, both reported on FPC Form-14. • 1986: Estimated to be the same as 1985.

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, Consumption by All Users." • 1973-1985: Calculated annually by EIA by dividing the heat content of imported natural gas by the quantity of natural gas imported, both reported on FPC Form-14. • 1986: Estimated to be the same as 1985.

Natural Gas, Production (Dry). • 1949 forward: Assumed by EIA to be equal to the thermal conversion factor for the consumption of dry natural gas. See "Natural Gas, Consumption by All Users."

Natural Gas, Production (Wet). • 1949-1985: 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. • 1986: Estimated to be the same as 1985.

COAL AND COAL COKE

All Coal, Consumption by All Users. • 1949 forward: 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.

All Coal, Consumption by Electric Utilities Only. • 1949 forward: 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.

All Coal, Consumption by Non-Electric Utility Users. • 1949 forward: Calculated annually by EIA by dividing the sum of the heat content of bituminous coal and lignite and anthracite consumed by nonelectric utility users by the sum of their respective tonnages.

All Coal, Exports. • 1949 forward: 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.

All Coal, Imports. • 1949 forward: 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.

All Coal, Production. • 1949 forward: 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.

Anthracite, Consumption by All Users. • 1949 forward: Calculated annually by EIA by dividing the sum of the heat content of anthracite consumed by electric utilities and non-electric utilities 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 FERC Form 423 and predecessor forms.

Anthracite, Consumption by Non-Electric Utility Users. • 1949 forward: 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 non-electric utility anthracite consumption less the quantity of anthracite stock changes, losses, and unaccounted for.

Anthracite, Imports and Exports. • 1949 forward: 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. • 1949 forward: 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, Consumption by All Users. • 1949 forward: 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: • 1949 forward: 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 FPC Form-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 FERC Form 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 district (reported on EIA Form 6 and predecessor Bureau of Mines Form 6-1419-Q) contained a heat value equal to bituminous coal and lignite received at electric utilities from each of the same coal-producing districts (reported on FERC Form 423). The average Btu value of coal by coal-producing district was applied to the volume of deliveries to other industrial users from each coal-producing district, and the sum total of the heat content was divided by the total volume of deliveries.

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 district (reported on EIA Form 6 and predecessor Bureau of Mines Form 6-1419-Q) contained a heat value equal to bituminous coal and lignite received at electric utilities from each of the same coal-producing districts (reported on FERC Form 423). The average Btu value of coal by coal-producing district was applied to the volume of deliveries to residential and commercial users from each coal-producing district, and the sum total of the heat value was divided by the total volume of deliveries.

Bituminous Coal and Lignite, Consumption by Transportation Users: • 1949 forward: 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. • 1949 forward: EIA estimated the average thermal conversion factor to be 25.000 million Btu per short ton.

Bituminous Coal and Lignite, Production. • 1949 forward: 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 the consumption sector. Producers' stock changes and unaccounted for were assumed to have the same conversion factor as consumption by all users.

Coal Coke, Imports and Exports. • 1949 forward: EIA adopted the Bureau of Mines estimate of 24.800 million Btu per short ton.

ELECTRICITY

Fossil Fuel Steam-Electric Power 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 sources. EIA has selected a rate

that is equal to the prevailing average annual heat rate factor for fossil fueled steam-electric power plants in the United States. By using this factor it is possible to evaluate fossil fuel requirements for replacing these sources during periods of interruption such as a drought. The heat content of a kilowatthour of electricity produced, regardless of the generation process, is 3,412 Btu per kilowatthour. • 1949–1955: This is the weighted average annual heat rate for fossil fueled steam-electric 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 1985: This is the weighted average annual heat rate for fossil-fueled steam-electric plants in the United States as published by EIA in *Historical Plant Cost and Annual Production Expenses for Selected Electric Plants.* • 1986: Estimated to be the same as 1985.

Geothermal Energy Power Plant Generation. • 1960–1981: Calculated annually by EIA by weighting the average annual heat rates of operating geothermal units by the installed nameplate capacities as reported on FPC Form-12. • 1982 forward: Estimated annually by EIA based on an informal survey of relevant plants.

Nuclear Power Plant Generation. • 1957-1981: Calculated annually by EIA by dividing the total heat content consumed in reactors at nuclear plants by the total (net) electricity generated by nuclear plants as reported on FERC Form-1, EIA-412 and predecessor forms. • 1982-1985: This is the weighted average annual heat rate for nuclear steam-electric plants in the United States as published by EIA in *Historical Plant Cost and Annual Production Expenses for Selected Electric Plants.* • 1986: Estimated to be the same as 1985.

Appendix B. Energy Units in Perspective

Using Appendix B

The three 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 (especially the equivalents in Table B3) shown here 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, Table B1 shows that 8 gallons of motor gasoline is equal to roughly one-fifth of a barrel of crude oil.[1] Using information from Table B2, the reader can calculate that the 8 gallons of motor gasoline was, on average, a six-and-a-half-day supply per capita in 1987. Table B3 indicates that 8 gallons of motor gasoline equals about 10 therms of natural gas or approximately 1 million British thermal units (see Glossary).

[1]However, due to the nature of the refining process, one-fifth of a barrel of crude oil would yield less than 8 gallons of motor gasoline.

Table B1. Physical Conversion Factors for Energy Units

Type of Unit	Factor
Weight	2,000 pounds/short ton
	1.102 short tons/metric ton
	1.120 short tons/long ton
Volume	0.028 cubic meters/cubic foot
	35.315 cubic feet/cubic meter
	42 U.S. gallons/U.S. barrel
	128 cubic feet/cord
Weight and Volume	0.136 metric tons/U.S. barrel[1]
	0.150 short tons/U.S. barrel[1]
	7.33 U.S. barrels/metric ton[1]
	6.65 U.S. barrels/short ton[1]
	1.25 short tons/cord[2]

[1]For crude oil (average gravity).
[2]For dry hardwood (average).

Table B2. U.S. Daily Per Capita Consumption of Energy by Type, 1973, 1979, and 1987

Type of Energy	1973	1979	1987	Percent Change 1973–1979	Percent Change 1979–1987
Gallons					
Petroleum Products	3.4	3.5	2.9	0.7	-17.5
Motor Gasoline	1.3	1.3	1.2	-0.8	-5.8
Cubic Feet					
Natural Gas (dry)	286	247	184	-13.6	-25.5
Pounds					
Coal	14.6	16.6	18.8	13.8	13.3
Kilowatthours					
Hydroelectricity	3.5	3.4	2.8	-3.2	-17.7
Nuclear Electricity	1.1	3.1	5.1	187.7	64.5
Electricity (all)	22.0	25.0	28.0	14.0	9.4
Thousand Btu					
Industrial Energy[1]	408	398	306	-3.0	-16.7
Total Energy	963	963	855	0.0	-3.7

[1]Includes electric losses distributed.

Table B5. Energy Equivalents

Energy Unit		Equivalent[1]
1 Btu of Energy	1	match tip
	250	calories (International Steam Table)
	0.25	kilocalories (food calories)
1,000 Btu of Energy	2	5-ounce glasses of table wine
	250	kilocalories (food calories)
	0.80	peanut butter and jelly sandwiches
1 Million Btu of Energy	90	pounds of coal
	120	pounds of oven-dried hardwood
	8	gallons of motor gasoline—enough to move the average U.S. passenger car about 146 miles (1986)
	10	therms of dry natural gas
	11	gallons of propane
	1.2	days of U.S. energy consumption per capita (1984)
	2	months of the dietary intake of a laborer
1 Quadrillion[2] 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
	470	thousand barrels of crude oil per day for 1 year
	27	days of U.S. petroleum imports
	26	days of U.S. motor gasoline use
	28	hours of world energy use (1986)
1 Barrel of Crude Oil	15	days of U.S. petroleum consumption (1987)
	5.6	thousand cubic feet of dry natural gas
	0.26	short tons (520 pounds) of coal
	1,700	kilowatthours of electricity
1 Short Ton of Coal	106	days of U.S. coal consumption per capita (1987)
	3.8	barrels of crude oil
	21	thousand cubic feet of dry natural gas
	6,500	kilowatthours of electricity
1,000 Cubic Feet of Natural Gas	5.3	days of natural gas use per capita (1987)
	0.18	barrels (7.4 gallons) of crude oil
	0.047	short tons (93 pounds) of coal
	300	kilowatthours of electricity
1,000 Kilowatthours (kWh) of Electricity	36	days of U.S. electricity use per capita
	0.59	barrels of crude oil[3]
	0.15	short tons (310 pounds) of coal[3]
	3,300	cubic feet of dry natural gas[3]

[1]Equivalents are approximate.
[2]One quadrillion equals 1,000,000,000,000,000.
[3]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 kWh: 1.8 barrels of 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 1987 data where applicable, unless otherwise noted.

Appendix C. GNP Dollars and Deflators

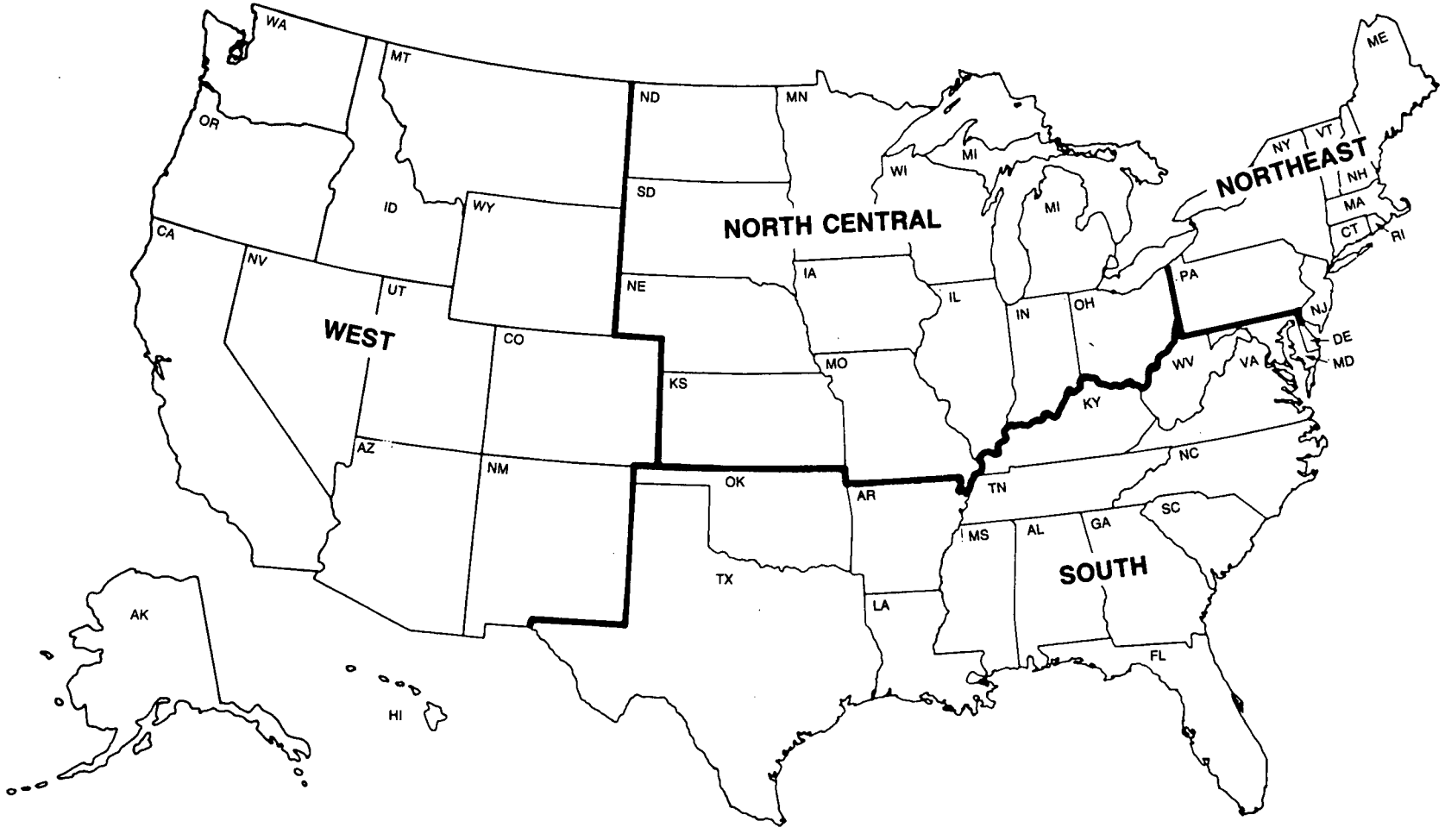
Table C1. GNP[1] Dollars and Implicit Price Deflators, 1949–1987

Years 1949–1969	GNP (billion 1982 dollars)	Deflator (1982=100)	Years 1970–1987	GNP (billion 1982 dollars)	Deflator (1982=100)
1949	1,109.0	23.5			
1950	1,203.7	23.9	1970	2,416.2	42.0
1951	1,328.2	25.1	1971	2,484.8	44.4
1952	1,380.0	25.5	1972	2,608.5	46.5
1953	1,435.3	25.9	1973	2,744.1	49.5
1954	1,416.2	26.3	1974	2,729.3	54.0
1955	1,494.9	27.2	1975	2,695.0	59.3
1956	1,525.6	28.1	1976	2,826.7	63.1
1957	1,551.1	29.1	1977	2,958.6	67.3
1958	1,539.2	29.7	1978	3,115.2	72.2
1959	1,629.1	30.4	1979	3,192.4	78.6
1960	1,665.3	30.9	1980	3,187.1	85.7
1961	1,708.7	31.2	1981	3,248.8	94.0
1962	1,799.4	31.9	1982	3,166.0	100.0
1963	1,873.3	32.4	1983	3,279.1	103.9
1964	1,973.3	32.9	1984	3,501.4	107.7
1965	2,087.6	33.8	1985	3,607.5	111.2
1966	2,208.3	35.0	1986	3,713.3	114.1
1967	2,271.4	35.9	1987	3,820.3	117.5
1968	2,365.6	37.7			
1969	2,423.3	39.8			

[1]GNP=Gross national product (see Glossary).

Sources: **GNP in 1982 Dollars:** •1949 through 1982—Bureau of Economic Analysis, *Survey of Current Business*, February 1986, Table 4. •1983 through 1985—Bureau of Economic Analysis, *Survey of Current Business*, July 1987, Table 1.2. •1986 and 1987—Bureau of Economic Analysis, *Survey of Current Business*, February 1988, Table 1.2. **Implicit Price Deflators (1982=100):** •1949 through 1982—Bureau of Economic Analysis, *National Income and Product Accounts for the United States, 1929–1982*, September 1986, Table 7.4. •1983 through 1985—Bureau of Economic Analysis, *Survey of Current Business*, July 1987, Table 7.4. •1986 and 1987—Bureau of Economic Analysis, *Survey of Current Business*, February 1988, Table 7.4

Appendix D. U.S. Census Region Map



Source: Department of Commerce, Bureau of the Census.

Appendix E. Explanatory Notes

1. Electricity Generation. Data on the generation of electricity in the United States represents gross electricity output measured at the generator terminals, minus power plant use (net electricity generated). Nuclear electricity generation data identified by individual countries in this report are gross electricity output. See Tables 2, 82, 83, 84, 111, and 112.

2. Consumption of Primary Energy by End-Use Sector. Sector data are derived from the end-use sector table of each energy commodity. The "Other" sector in the Electric Utility Sales table is allocated to the Residential and Commercial Sector, except for the railways' portion of "Other," which is allocated to the Transportation Sector. See Table 4.

3. Financial Reporting System (FRS) Companies. The 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 22 companies included in the FRS for the 1986 reporting year are the following:

Amerada Hess Corporation
American Petrofina Incorporated
Amoco Corporation
Ashland Oil Inc.
Atlantic Richfield Company
Burlington Northern Inc.
Chevron Corporation (formerly Standard Oil Company of California)
Coastal Corporation
E.I. du Pont de Nemours and Company (Du Pont)
Exxon Corporation
Kerr-McGee Corporation
Mobil Corporation
Occidental Petroleum Corporation
Phillips Petroleum Company
Shell Oil Company
Standard Oil Company (of Ohio)
Sun Company
Tenneco Inc.
Texaco Inc.
Unocal Corporation (formerly Union Oil Company of California)
Union Pacific Corporation
USX Corporation (formerly United States Steel Corporation)

Prior to 1983, the reporting group included 26 companies. Conoco and Marathon were replaced by Du Pont and the United States Steel Corporation, due to the merger of the former companies with the latter companies, respectively, beginning in 1982. Although Occidental acquired Cities Service in 1982, separate financial reports were available for 1982, so each company continued to be treated as a separate FRS company until 1983. In 1984 three more intragroup mergers occurred: (1) Chevron acquired Gulf Oil, (2) Mobil acquired Superior Oil, and (3) Texaco acquired Getty Oil. Since financial reports for 1984 were available for the three acquired companies, they are treated as separate companies through 1984. See Tables 32, 33, 34, 35, and 41.

4. Well Completions. For the years 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. See Tables 38 and 39.

5. Reclassified. 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. See Tables 53, 56, and 58.

6. Gross Input to Distillation Units (GIDU). The methods for deriving GIDU in this report are as follows: 1949 through 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 through 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 through 1980 GIDU is published annual data. 1981 and forward GIDU is the sum of reported monthly data. See Table 54.

7. Petroleum Products Supplied. 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, 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. End-use 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. See Explanatory Notes 5 and 8 and Tables 56, 57, and 58.

8. Joint Petroleum Reporting System. 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. See Tables 53, 56, and 58.

9. Crude Oil Wellhead Prices. Derived as follows: 1949 through 1973—weighted average wellhead 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 and forward—weighted averages of all first purchasers' purchases. See Table 61.

10. Refiner Acquisition Cost of Crude Oil. This cost was estimated for 1968 through 1973. The cost of domestic crude oil was derived by adding estimated transportation costs to the reported average wellhead 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. See Tables 63 and 114.

11. Natural Gas Consumption. Natural gas consumption statistics are compiled from a survey of natural gas production, transmission, and distribution companies and electric utility companies. Consumption by end-use 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 end-use 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. See Tables 70 and 73.

12. Natural Gas Prices by National 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 (Section NGPA 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 (Section NGPA 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). See Table 72.

13. Coal Consumption. 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 end-use sector 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. See Table 76.

14. Electricity Statistics. Prior to 1985, electricity 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 only data for those organizations that generate electricity primarily for public use. See Tables 82 through 89.

15. Electrical System Energy Losses. Electrical system energy losses are calculated 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 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 nonutilities and from Canada and Mexico, although they are included in electricity sales. See Table 85.

16. Electricity Sales. Data on the sales of electric utility electricity represent gross electricity output 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 to Government, railways, street lighting authorities, and sales not elsewhere included. See Table 87.

17. Net Summer Capability. Net summer capabilities were first collected on Form EIA-860 for the 1984 data year. Units not assigned a net summer capability rating by the utility were given an estimated rating using a statistical relationship between installed nameplate capacity and net summer capability for each prime mover. To estimate net summer capability from 1949 through 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 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. See Tables 88 and 93.

18. Operable Reactors. Prior to 1973, the number of "End of Year Operable Reactors" includes reactors 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 electric-

ity to the commercial grid. A third DOE plant, which does not distribute electricity to the grid, is excluded. For 1973 and forward, the number of reactors includes units issued full-power or operating licenses and generally does not include units in long-term shut-down status. See Table 93.

19. 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 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 (anthracite, subanthracite, bituminous, subbituminous, lignite, 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 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. See Tables 101 and 102.

20. Primary Stocks of Petroleum—OECD. 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. See Table 106.

Glossary

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 molecules in the series vary in chain length and are composed of a hydrocarbon plus a hydroxyl group (CH_3–(CH_2)n–OH). Alcohol includes methanol and ethanol.

Anthracite: A hard, black, lustrous coal containing a high percentage of fixed carbon and a low percentage of volatile matter. It is often referred to as hard coal. It includes meta-anthracite and semianthracite and conforms to ASTM Specification D388 for anthracite.

API: The trade association American Petroleum Institute.

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 low API gravity means a heavy, more dense product.

Apparent Consumption, Natural Gas (international): The total of an individual nation's marketed natural gas production plus imports less exports.

Asphalt: A dark-brown-to-black cement-like material containing bitumens as the predominant constituents, 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 acronym for the American Society for Testing and Materials.

Aviation Gasoline Blending Components: Finished components in the gasoline range that will be used for blending or compounding into finished aviation gasoline.

Aviation Gasoline, Finished: All special grades of gasoline for use in aviation reciprocating engines, as given in ASTM Specification D910. Excludes blending components that will be used in blending or compounding into finished aviation gasoline.

Base 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.

Bituminous Coal: A coal that is high in carbonaceous matter having a volatility greater than anthracite and a calorific value greater than subbituminous coal. In the United States, it is often referred to as soft coal. It conforms to ASTM Specification D388 for bituminous coal and is used primarily for electricity generation, coke production, and space heating.

British Thermal Unit (Btu): The amount of energy required to raise the temperature of 1 pound of water 1 °F at or near 39.2 °F. One Btu is equivalent to about 252 International Steam Table calories. An average Btu content of fuel is a heat value per unit quantity of fuel as determined from tests of fuel samples.

Butane: A normally gaseous, paraffinic hydrocarbon (C_4H_{10}) extracted from natural gas or refinery gas streams. It includes isobutane (branch-chain) and normal butane (straight-chain) and is covered by ASTM Specification 1835 and Natural Gas Processors Specifications for commercial butane. It is used primarily for blending into high-octane gasoline, for residential and commercial heating, and for industrial purposes, especially the manufacture of chemicals and synthetic rubber.

Butylene: A normally gaseous, olefinic hydrocarbon (C_4H_8) recovered from refinery processes. Quantities are included with "normal butane" data.

Capacity Factors at Electric Utilities: Annual capacity factors are averages of the monthly values for that year. The monthly capacity factors are computed as the actual monthly generation divided by the maximum possible generation for that month. The maximum possible generation is the number of hours in the month multiplied by the net monthly maximum dependable capacity. This fraction is then multiplied by 100 to obtain a percentage.

Class A Electric Utility: An electric utility having annual electric operating revenues of $2.5 million or more during the previous calendar year. Through 1979, electric utility data are for all Class A electric utilities. From 1980 through 1983, electric utility data are for selected Class A electric utilities (those having annual electric operating revenues of $100 million or more during the previous calendar year).

Class B Electric Utility: A utility having annual electric operating revenues of $1.0 million or more but less than $2.5 million. (Class B utilities are not included in data for 1980 through 1983.)

Coal: Includes all ranks of coal—anthracite, bituminous coal, subbituminous coal, and lignite—conforming to ASTM Specification D388.

Coal Coke: The strong, porous residue, consisting of carbon and mineral ash, that is formed when the volatile constituents of bituminous coal are driven off by heat in the absence of or in a limited supply of air. It is used primarily in blast furnaces for smelting ores, especially iron ore.

Cogenerators: Generally, industrial, commercial, or other manufactures that use steam, heat, or resultant energy for the dual use of processing materials and generating electricity.

Commercial Building: A structure that is totally enclosed by walls that extend from the foundation to the roof and that is used solely or, if residential, used partially for commercial purposes. Also included are buildings used for both commercial and industrial purposes or both commercial and agricultural purposes if the major activity is commercial. Excluded are buildings used solely for residential purposes, buildings used primarily for industrial or agricultural activity, and U.S. government buildings on military bases or reservation. In addition to retail stores and office buildings, commercial buildings include, but are not limited to, schools, churches, gymnasiums, libraries, museums, hospitals, clinics, warehouses, restaurants, lodgings, and jails.

Commercial Sector: Nonmanufacturing business establishments, including hotels, motels, restaurants, wholesale businesses, retail stores, laundries, and other service enterprises; health, social, and educational institutions; and Federal, State, and local governments. Street lights, pumps, bridges, and public services are also included. (For allocation of individual fuels to end-use sectors, see the Explanatory Notes.)

Constant Dollars: A price, expenditure, or value that has been adjusted to account for inflation. Amounts expressed in constant dollars reflect buying power relative to a base year.

Cost, Insurance, and Freight (C.I.F.): A term used in sales price contracts for both domestic and export sales. In general, the sales price includes the cost of the goods, the freight charges to a named destination, and the insurance charges on the goods shipped. The seller may waive insurance and choose to assume responsibility for any loss or damage. Regarding domestic coal sales, the sales price includes all charges for delivering the coal to the electric power utility excluding demurrage at the plant and unloading charges. Federal Power Commission Form 423, on which these data are collected, refers to this price as "f.o.b. plant" price.

Crude Oil Average Domestic First Purchase Price: The average price at which all domestic crude oil is purchased. Prior to February 1976, the price represented an estimate of the average of posted prices; after February 1976, the price represents an average of actual first purchase prices. This price is frequently called the wellhead price.

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. Liquids produced at natural gas processing plants and mixed with crude oil are excluded where identifiable.

Crude Oil Refinery Input: Total crude oil (including lease condensate) input to crude oil distillation units and other processing units.

Crude Oil Stocks: Stocks of crude oil and lease condensate held at refineries, in pipelines, at pipeline terminals, and on leases.

Current Dollars: A price, expenditure, or value that represents the price actually paid for a product or service at the time of the transaction.

Demonstrated Reserve Base of Coal: Known in-place coals of all rank that are technically and economically minable at the time of evaluation. It includes measured and indicated coal resources. It is estimated that at least one-half of the in-place coals can be recovered. (See **Indicated Resources, Coal** and **Measured Resources, Coal.**)

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: Light fuel oils distilled during the refining process and 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. Included are products known as No. 1, No. 2, and No. 4 fuel oils, and No. 1, No. 2, and No. 4 diesel fuels, conforming to ASTM Specifications D396 or D975, respectively. No. 1 fuel oil is a light distillate fuel oil used in vaporizing pot-type burners. No. 2 fuel oil is used in atomizing-type burners for domestic heating or for moderate capacity commercial-industrial burner units. No. 4 fuel oil is a blend of distillate fuel oil and residual fuel oil that is used in commercial burner installations not equipped with preheating facilities; it is used extensively in industrial plants. Diesel fuel oils are used in compression-ignition engines.

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 elements in the crude oil into fractions with different boiling ranges. Fractionation consists of continuously vaporizing and condensing the components to separate higher boiling point material from lower boiling point material. The selected boiling ranges are set by the processing scheme, the properties of the crude oil, and the product specifications.

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.

Electric Utility: A corporation, person, agency, authority, or other entity that owns or operates facilities for the generation, transmission, distribution, or sale of electricity, primarily for use by the public.

Electric Utility Sector: Privately and publicly owned establishments that generate electricity primarily for use by the public.

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 Energy Consumption: 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. It is also the sum of fossil fuel consumption in the residential, commercial, industrial, and transportation end-use sectors plus electric utility sales to these sectors and generation of hydroelectric power by non-electric utilities.

Energy-Weighted Industrial Output: The weighted sum of real output for all two-digit Standard Industrial Classification (S.I.C.) manufacturing industries plus agriculture, construction, and mining. The weight for each industry is the ratio between the quantity of end-use energy consumption and the value of real output. The base year for these weights is either 1981 or 1982, depending on data availability.

Ethane: A normally gaseous, paraffinic hydrocarbon (C_2H_6) extracted from natural gas or refinery gas streams. It is used primarily as petrochemical feedstock for production of chemicals and plastic materials.

Ethylene: A normally gaseous, olefinic hydrocarbon (C_2H_4) recovered from refinery processes. Quantities are included with "ethane" data.

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, 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. (free alongside ship): The f.a.s. price is based on the purchase price (the actual transaction value of merchandise at the foreign port of export) and generally includes all charges incurred in placing the merchandise alongside the carrier at the foreign port.

Federally Administered Lands: Includes all public lands (Federal), Indian lands, Naval Petroleum Reserve, National Petroleum Reserve (Alaska), Outer Continental Shelf, and acquired lands (lands formerly held by the Department of Agriculture and now under the jurisdiction of the Department of the Interior). Beginning on October 1, 1984, the National Petroleum Reserve was transferred to Alaskan Natives.

F.o.b. (free on board): The f.o.b. price includes all charges incurred in delivering merchandise and placing it on board the carrier. In general, the seller assumes responsibility and all costs up to the specific point of delivery; the buyer assumes responsibility and costs thereafter.

Forward Costs: All operating and capital costs (in current dollars) still to be incurred in the production of uranium from estimated resources. Excluded are previous expenditures (such as property and mill acquisition), taxes, profit, and the cost of money. Experience has shown that forward costs are generally lower than market prices.

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.

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.

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 (as used at electric utilities): Hot water or steam, extracted from geothermal reservoirs in the earth's crust, which is supplied to steam turbines at electric utilities that drive generators to produce electricity.

Gross Input to Distillation Units: The volume of crude oil, lease condensate, natural gas plant liquids, unfinished oils, liquefied refinery gases, slop oils, and other liquid hydrocarbons that are processed through crude oil distillation units.

Gross National Product (GNP): The total value of goods and services produced by the Nation's economy, before deduction of depreciation charges and other allowances for capital consumption. It includes the total purchases of goods and services by private consumers and government, gross private domestic capital investment, and net foreign trade.

Gross National Product (GNP) Implicit Price Deflator: The implicit price deflator, published by the Department of Commerce, Bureau of Economic Analysis, is used to convert current-dollars figures to constant-dollar figures.

Household: A group of 12 or fewer persons who occupy the same housing unit (see **Housing Unit**) as their usual or permanent place of residence. Persons include babies, lodgers, boarders, and persons who live in the housing unit but are traveling or in a hospital. Excluded are persons who are away from home as college students or members of the Armed Services.

Housing Unit: A structure or part of a structure in which a household (see **Household**) lives or could live, with access to the outside of the building either directly or through a common hall. Housing units do not include group quarters, such as prisons, hospitals, dormitories, nursing homes, fraternity/sorority houses, or convents, in which 10 or more unrelated persons live. Hotel and motel rooms, mobile homes, and trailers are considered housing units if permanently occupied by a household.

Hydroelectric Power: Electricity generated by an electric power plant whose turbines are driven by falling water.

Imports: Receipts of goods into the 50 States and the District of Columbia from foreign countries, Puerto Rico, the Virgin Islands, and other U.S. possessions and territories. (See **Petroleum Imports.**)

Indicated Resources, Coal: Coal resources for which estimates for the rank, quality, and quantity have been computed partly from sample analyses and measurements and partly from reasonable geologic projections. (See **Demonstrated Reserve Base of Coal.**)

Industrial Sector: Manufacturing, construction, mining, agriculture, fishing, and forestry establishments. (For allocation of individual fuels to end-use sectors, see the Explanatory Notes.)

International Bunkers: Fuel loaded on vessels and aircraft engaged in international commerce for use as fuel by the vessel or aircraft.

Isobutane: See **Butane.**

Jet Fuel: Includes both naphtha-type and kerosene-type jet fuel meeting standards for use in aircraft turbine engines or meeting ASTM Specification D1655. Although most jet fuel is used in aircraft, some is used for other purposes, such as fuel for turbines to produce electricity.

Kerosene: A petroleum middle distillate having burning properties suitable for use as an illuminant when burned in wick lamps. Included are No. 1-K and No. 2-K recognized in ASTM Specification D3699 and grades of kerosene called range oil having properties similar to No. 1 fuel oil. Kerosene is used primarily in space heaters, cooking stoves, and water heaters.

Landed Cost of Crude Oil Imports: The price of imported crude oil at the port of discharge. It includes the purchase price at the foreign port plus charges for transporting and insuring the crude oil from the purchase point to the port of discharge. It does not include import tariffs or fees, wharfage charges, or demurrage costs. Coverage includes the United States and its territories.

Lease and Plant Fuel: Natural gas used in lease operations, as gas processing plant fuel, and as net used for gas lift.

Lease Condensate: A natural gas liquid recovered from gas-well gas (associated and nonassociated) in lease separators or natural gas field facilities. Lease condensate consists primarily of pentanes and heavier hydrocarbons. Generally, it is blended with crude oil for refining.

Lignite: A brownish-black coal of low rank with high inherent moisture and volatile matter. It is also referred to as brown coal. It conforms to ASTM Specification D388 for lignite and is used almost exclusively for electric power generation.

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 minus 260 °F at atmospheric pressure.

Liquefied Petroleum Gases (LPG): Ethane, propane, normal butane, ethane-propane mixtures, propane-butane mixtures, and isobutane produced at natural gas processing plants, including plants that fractionate raw natural gas plant liquids. LPG also includes liquefied refinery gases (ethylene, propylene, butylene, and isobutylene produced from crude oil at refineries).

Liquefied Refinery Gases (LRG): Ethylene, propylene, butylene, and isobutylene produced from crude oil at refineries. (See **Liquefied Petroleum Gases.**)

Low-Temperature Solar Collector: A collector that generally operates in the temperature range below 110 °F. Typically, it has no glazing or insulation and is made of plastic or rubber, although some are made of metal. (See **Solar Thermal Collector.**)

Lubricants: Substances used to reduce friction between bearing surfaces. Petroleum lubricants may be produced either from distillates or residues. Other substances may be added to impart or improve certain required properties. Lubricants include all grades of lubricating oils from spindle oil to cylinder oil and those used in greases. The three categories include bright stock lubricants, neutral lubricants, and other lubricants (lubricating oil base stock used in finished lubricating oils and greases, including black, coastal, and red oils).

Major Electric Utility: A utility that, in the last three 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.

Measured Resources, Coal: Coal resources for which estimates of the quality and quantity have been computed within a margin of error of less than 20 percent, by analyzing measurements taken from closely spaced, geologically well-known sample sites. (See **Demonstrated Reserve Base of Coal.**)

Medium-Temperature Solar Collector: A collector that generally operates in the temperature range of 140 °F to 180 °F but may 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. (See **Solar Thermal Collector.**)

Metallurgical Coal: A high-quality bituminous coal suitable for making coal coke.

Metropolitan Area: A group of households located within a Metropolitan Statistical Area (MSA) as defined in the 1980 Census. Except in New England, an MSA is a county or group of contiguous counties that

contain at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. The contiguous counties are included in an MSA if, according to certain criteria, 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: Includes all finished petroleum products not classified elsewhere, e.g., petrolatum, absorption oils, ramjet fuel, petroleum rocket fuels, synthetic natural gas feedstocks, specialty oils, and medicinal oils.

Motor Gasoline Blending Components: Finished components in the gasoline range that will be used for blending or compounding into finished motor gasoline. Pool gasoline (gasoline needing no processing other than blending) is included in this category.

Motor Gasoline, Finished: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, that have been blended to form a fuel suitable for use in spark-ignition engines and conforming to ASTM Specification D439. Included are finished leaded gasoline, finished unleaded gasoline, and gasohol. Excluded are blendstock that has not been blended into finished motor gasoline and alcohol that has not been blended into gasohol.

Motor Gasoline, Leaded Premium: A gasoline having an antiknock index of 93 with the use of lead additives or which contains more than 0.05 grams of lead per gallon or more than 0.005 grams of phosphorus per gallon. Includes gasohol.

Motor Gasoline, Leaded Regular: A gasoline having an antiknock index of 89 with the use of lead additives or which contains more than 0.05 grams of lead per gallon or more than 0.005 grams of phosphorus per gallon.

Motor Gasoline, Total: Includes finished leaded motor gasoline (premium and regular), finished unleaded motor gasoline (premium and regular), motor gasoline blending components, and gasohol.

Motor Gasoline, Unleaded Premium: A gasoline having an antiknock index of 90 containing not more than 0.05 grams of lead per gallon and not more than 0.005 grams of phosphorus per gallon. Includes gasohol.

Motor Gasoline, Unleaded Regular: A gasoline having an antiknock index of 87 containing not more than 0.05 grams of lead per gallon and not more than 0.005 grams of phosphorus per gallon.

Naphtha: A generic term applied to a petroleum fraction with an approximate boiling range of between 122 °F and 400 °F.

Native Gas: Gas in place at the time that a reservoir was converted to use as an underground storage reservoir. Excludes quantities of gas added or injected.

Natural Gas: A mixture of hydrocarbons and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in underground reservoirs.

Natural Gas, Dry Production: Derived by subtracting extraction loss from "marketed production." It represents the amount of domestic gas production that is available to be marketed and consumed as a gas.

Natural Gas, End-Use Average Price: Average price per specified unit, including all taxes, at the point of consumption.

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 produced at natural gas processing plants) and lease condensate (primarily pentanes plus produced from natural gas at lease separators and field facilities). (See **Natural Gas Plant Liquids** and **Lease Condensate.**)

Natural Gas, Marketed Production: This quantity is derived. It is gross withdrawals of natural gas from production reservoirs, less gas used for reservoir repressuring, quantities vented and flared, and nonhydrocarbon gases removed in treating and processing operations.

Natural Gas Plant Liquids (NGPL): Those natural gas liquids that are recovered from natural gas processing plants, and in some situations, from natural gas field facilities, as well as those that are extracted by fractionators. Natural gas plant liquids are defined according to the published specifications of the ASTM and the Gas Processors Association and are classified 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. Geological Survey. 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.

Net Electricity Generation: 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.

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 (see **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 test at the time of summer peak demand.

Net Working Interest: A company's working interest, not including any basic royalty or overriding royalty interests. (See **Working Interest.**)

Nonhydrocarbon Gases: Typical nonhydrocarbon gases which may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide, and nitrogen.

Nonmetropolitan Area: Households not located within Metropolitan Statistical Areas as defined in the 1980 Census.

Nontraceables: Those revenues, costs, assets, and liabilities that cannot be directly attributed to a type of business or that cannot be assigned to a type of business by use of a reasonable allocation method developed on the basis of operating-level realities.

Normal Butane: See **Butane.**

Nuclear Energy: 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.

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 Refineries: Operable refineries include those that were in one of the following three categories at the beginning of the year: (1) in operation; (2) not in operation and not under active repair but capable of being placed into operation within 30 days; or (3) not in operation but under active repair that can 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: Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States and its territories (Guam, Puerto Rico, and the Virgin Islands).

Organization of the Petroleum Exporting Countries (OPEC): Current members: Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela. Data for Saudi Arabia and Kuwait include their shares from the Partitioned Zone (formerly Neutral Zone).

Other Hydrocarbons (petroleum data): Other materials processed at refineries. Includes coal tar derivatives, hydrogen, gilsonite, and natural gas received by the refinery for reforming into hydrogen.

Pentanes Plus: A mixture of hydrocarbons, mostly pentanes and heavier, extracted from natural gas. This product 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 "naphtha less than 400 °F end-point" and "other oils over 400 °F end-point."

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 solid residue that is the final product of the condensation process in cracking. It consists of aromatic hydrocarbons very poor in hydrogen. Calcination of petroleum coke can yield almost pure carbon or artificial graphite suitable for production of carbon or graphite electrodes, structural graphite, motor brushes, dry cells, and similar products. This product is reported as marketable or catalyst coke.

Petroleum Imports: Imports of petroleum into the 50 States and the District of Columbia from foreign countries, 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: Petroleum products are 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, naphtha less than 400 °F end-point, other oils over 400 °F end-point, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Petroleum Products Supplied: See Explanatory Note 5.

Petroleum Stocks, Primary: Stocks of crude oil or petroleum products held in storage at (or in) leases, refineries, natural gas processing plants, pipelines, tankfarms, and bulk terminals that can store at least 50,000 barrels of petroleum products or that can receive petroleum products by tanker, barge, or pipeline. Crude oil that is in transit from Alaska, or that is stored on Federal leases or in the Strategic Petroleum Reserve, is included. Excluded are stocks of foreign origin that are held in bonded warehouse storage.

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.

Plant Condensate: One of the natural gas plant liquids, mostly pentanes and heavier hydrocarbons, recovered and separated as liquids at gas inlet separators or scrubbers in processing plants. Plant condensate is not suitable for blending into finished motor gasoline. It is usually blended with crude oil for distilling or processed at other refinery units.

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. (See **Process Fuel.**) **Primary Stocks:** Stocks of crude oil or petroleum products held in storage at leases, refineries, natural gas processing plants, pipelines, tankfarms, and bulk terminals that can store at least 50,000 barrels or that can receive petroleum products by tanker, barge, or pipeline. Crude oil that is in transit by water from Alaska, or that is stored on Federal leases or in the Strategic Petroleum Reserve is included. Primary stocks exclude stocks of foreign origin that are held in bonded warehouse storage.

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 the total volume of refinery output 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, denser than the input.

Processing Loss: The amount by which the total volume of refinery output is less than the volume of 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.

Propane: A normally gaseous, paraffinic hydrocarbon (C_3H_8). It is extracted from natural gas or refinery gas streams, and includes all products covered by Gas Processors Association Specifications for

commercial propane and HD-5 propane and ASTM Specification D1835. Propane is used primarily for residential and commercial heating and cooling, and also as a fuel for transportation. Industrial uses of propane include use as a petrochemical feedstock.

Propylene: A normally gaseous, olefinic hydrocarbon (C_3H_6) recovered from refinery processes. Quantities are included with "propane" data.

Proved Reserves, Crude Oil: The estimated quantities of all liquids statistically 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, 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 crude oil and natural gas reservoirs under existing economic and operating conditions.

Proved Reserves, Natural Gas Liquids: Estimates include: (1) reserves of liquids that are expected to be recovered from associated and nonassociated gas produced from gas wells and processed through lease separators, and (2) reserves of liquids expected to be recovered from associated-dissolved and nonassociated gas when processed in field facilities or gas processing plants. Estimates of proved reserves of natural gas liquids are based on (1) proved reserves of natural gas at the time of estimation, and (2) rates at which liquids can be recovered from natural gas by using processing equipment of the type currently installed or planned at the time of estimation.

Refiner Acquisition Cost of Crude Oil: The average price paid by refiners for crude oil booked into their refineries in accordance with accounting procedures generally accepted and consistently and historically applied by the refiners concerned. (Also see Explanatory Note 8.)

Refinery Input: The total amount of crude oil and lease condensate input to crude oil distillation units and other refinery processing units.

Refinery Output: The total amount of petroleum products produced at a refinery. Includes petroleum consumed by the refinery.

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, geothermal, wind, photovoltaic, and solar thermal energy.

Reservoir Repressuring: The injection of natural gas into oil and gas reservoir formations for pressure maintenance and cycling.

Residential Sector: Private household establishments, which consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. (For allocation of individual fuels to end-use sectors, see the Explanatory Notes.)

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 975. 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 and electricity generation. Imports of residual fuel oil include imported crude oil burned as fuel.

Residue Gas: Natural gas from which natural gas processing plant liquid products and, in some cases, nonhydrocarbon components have been extracted.

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 contractual arrangement that gives the owner of the interest the right to a fractional share of production, or proceeds therefrom, that does not contain rights and obligations of operating a mineral property, and that is normally free and clear of exploration, development, and operating costs, except production taxes.

Rural Area: A place that had a population of less than 2,500 as of the 1970 Census.

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.

Special Naphthas: All finished products within the gasoline range, specially refined to a specified flash point and boiling range, for use as paint thinners, cleaners, and solvents, including commercial hexane conforming with ASTM Specification D1836, and cleaning solvent conforming to ASTM Specification D484. Excluded are naphthas to be blended or marketed as motor gasoline or aviation gasoline, or to be used as petrochemical and synthetic natural gas (SNG) feedstock.

Special Solar Collector: 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). (See **Solar Thermal Collector.**)

Spot 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.

Startup Test Phase of Nuclear Power Plant: A nuclear power plant that has been licensed by the Nuclear Regulatory Commission to operate, but is in the initial testing phase during which 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.

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 Property: 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 for subbituminous coal, and is used almost exclusively for electric power generation.

Supplemental Gaseous Fuels: Consist primarily of synthetic natural gas, propane-air, and refinery (still) gas. May also include coke oven gas, biomass gas, manufactured gas, and air injected for Btu stabilization.

Synthetic Natural Gas (SNG): A product resulting from the manufacture, conversion, or reforming of hydrocarbons that may be easily substituted for, or interchanged with, pipeline-quality natural gas.

Transportation Sector: 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.

Unaccounted for Crude Oil: Represents the arithmetic difference between the indicated demand for crude oil and the total disposition of crude oil. Indicated demand is the sum of crude oil production and imports less changes in crude oil stocks. Total 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.

Undiscovered Recoverable Resources (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: Includes all oils requiring further refinery processing, except those requiring only mechanical blending.

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 Resources: Uranium resource estimates are divided into three separate categories reflecting different levels of confidence in the quantities estimated. They are reasonably 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 to occur, mostly on the basis of direct geological evidence, in extensions of well-explored deposits, in deposits in which geological continuity has been well established, as well as deposits believed to exist in well-defined geological trends or areas of mineralization with known deposits. Such deposits in this category can be discovered and delineated and the uranium subsequently recovered, all within a given cost range. Speculative resources refers to uranium in addition to estimated additional resources that is 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 Census.

Vented and Flared: Vented natural gas is gas that is released into the air; flared natural gas is gas that is burned in flares.

Waxes: Solid or semi-solid 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. Includes all marketable waxes, whether crude scale or fully refined. Waxes are used primarily as industrial coatings for surface protection.

Well: A hole drilled 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 or core tests, or service wells.

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 (see **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. Included are round wood (cord wood), limb wood, wood chips, bark, sawdust, forest residues, charcoal, pulp waste, and spent pulping liquor.

Working Gas: The volume of gas in an underground storage reservoir above the designed level of the base. 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 season.

Working Interest: An interest in a mineral property that entitles the owner of that interest to all or a share of mineral production from the property, usually subject to a royalty.

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