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Energy: Useful Facts and Numbers

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Summary

Energy supplies and prices are a major economic factor in the United States, and energy markets are volatile and unpredictable. For both these reasons, energy policy is of frequent interest to the Congress. This report presents a statistical view of the supply and consumption of various forms of energy. Both long-term trends and short-term variations are given.

After an introductory overview of aggregate energy consumption, the report presents detailed analysis of trends and statistics regarding specific energy sources: oil, electricity, natural gas, and coal. A section on trends in energy efficiency is also presented.

This report will be frequently updated with the latest available figures.

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Energy: Useful Facts and Numbers

Introduction

Tracking changes in energy activity is complicated by variations in different energy markets, most of which operate independently. Since aggregate indicators of total energy production and consumption do not adequately reflect these complexities, this compendium focuses on the details of individual activities. Primary among these are oil, particularly gasoline for transportation, and electricity generation and consumption. Natural gas is also an important energy source, particularly in industry and electricity generation. Coal is used almost entirely for electricity generation, nuclear and hydropower completely so.

Solar power and other renewable sources (except hydropower) continue to offer more potential than actual energy production. Conservation and energy efficiency have shown significant gains over the past three decades, however, and offer encouraging potential to relieve some of the dependence on imports that has caused economic difficulties in the past.

To give a general view of energy consumption trends, **Table 1** shows consumption by economic sector – residential, commercial, transportation, and industry – from 1950 to the present. To supplement this overview, some of the trends are highlighted by graphs in **Figures 1 and 2**.

In viewing these figures, a note on units of energy may be helpful. Each source has its own unit of energy. Oil, for instance, is measured in million barrels per day (mbd), coal in million tons per year, natural gas in trillion cubic feet (TCF) per year. To aggregate various types of energy in a single table, a common measure, British Thermal Unit (Btu) is often used. In **Table 1**, energy consumption by sector is given in units of quadrillion Btus per year, or "quads," while per capita consumption is given in million Btus (Mbtu) per year. One quad corresponds to one TCF of natural gas, or approximately 40 billion tons of coal. One million barrels per day of oil is approximately 2 quads per year.

From **Table 1** it can be seen that total U.S. energy consumption almost tripled in the half century from 1950 to 2000, with the industrial sector, the heaviest energy user, growing at the slowest rate. When population increase is accounted for, the growth in energy consumption during the period was about 50%. As **Figure 1** illustrates, much of the growth in per capita energy consumption took place before 1970.

Table 1 does not include consumption of energy by the electricity sector, because it is both a producer and a consumer of energy. For the residential, commercial, industrial and transportation sectors, the consumption figures given are

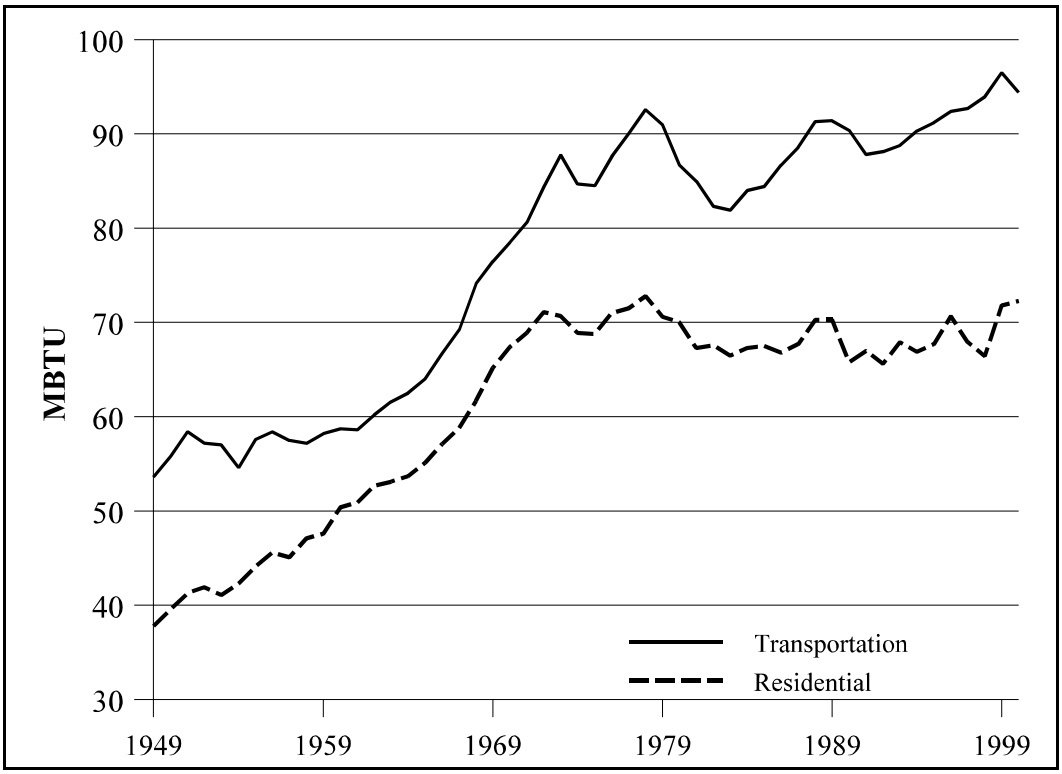
the sum of the resources such as oil and gas that are directly consumed, plus the total energy used to produce the electricity each sector consumed. As **Figure 2** demonstrates, a major trend during the 50-year period was the electrification of the residential and commercial sectors, and also of industry to a lesser extent. By the end of the century, electricity represented 75% of residential energy consumption, 65% of commercial energy consumption, and close to 40% of industrial energy consumption.

Table 1. U.S. Energy Consumption, 1950-2000

	Energy Consumption by Sector (Quads)					Population (million)	Consumption Per Capita (MBtu)		
Year	Resid.	Comm.	Indus.	Trans.	Total		Resid.	Trans.	Total
1950	6.0	3.9	16.2	8.5	34.6	152.3	39.6	55.8	227.5
1955	7.7	3.9	19.5	9.6	40.2	165.9	44.1	57.6	242.5
1960	9.1	4.6	20.8	10.6	45.1	180.7	50.4	58.7	249.7
1965	10.7	5.8	25.1	12.4	54.0	194.3	55.1	64.0	278.0
1970	13.8	8.3	29.6	16.1	67.9	205.1	67.4	78.5	330.9
1975	14.9	9.5	29.4	18.2	72.0	216.0	68.8	84.5	333.6
1980	15.9	10.6	32.2	19.7	78.4	227.2	70.0	86.7	345.2
1985	16.1	11.6	29.1	20.1	76.8	237.9	67.5	84.4	322.7
1990	16.4	12.8	32.4	22.5	84.3	249.5	65.8	90.4	338.1
1995	17.8	13.8	34.9	24.0	90.9	262.8	67.7	91.2	346.0
1996	18.7	14.3	35.9	24.5	93.9	265.2	70.7	92.4	354.2
1997	18.2	14.8	36.2	24.8	94.3	267.8	67.9	92.7	352.3
1998	18.0	14.9	35.9	25.4	94.6	270.2	66.4	93.9	350.1
1999	19.6	16.3	38.0	26.3	96.9	272.7	71.8	96.5	355.2
2000	20.4	17.0	38.8	26.6	98.5	282.1	72.3	94.4	349.1

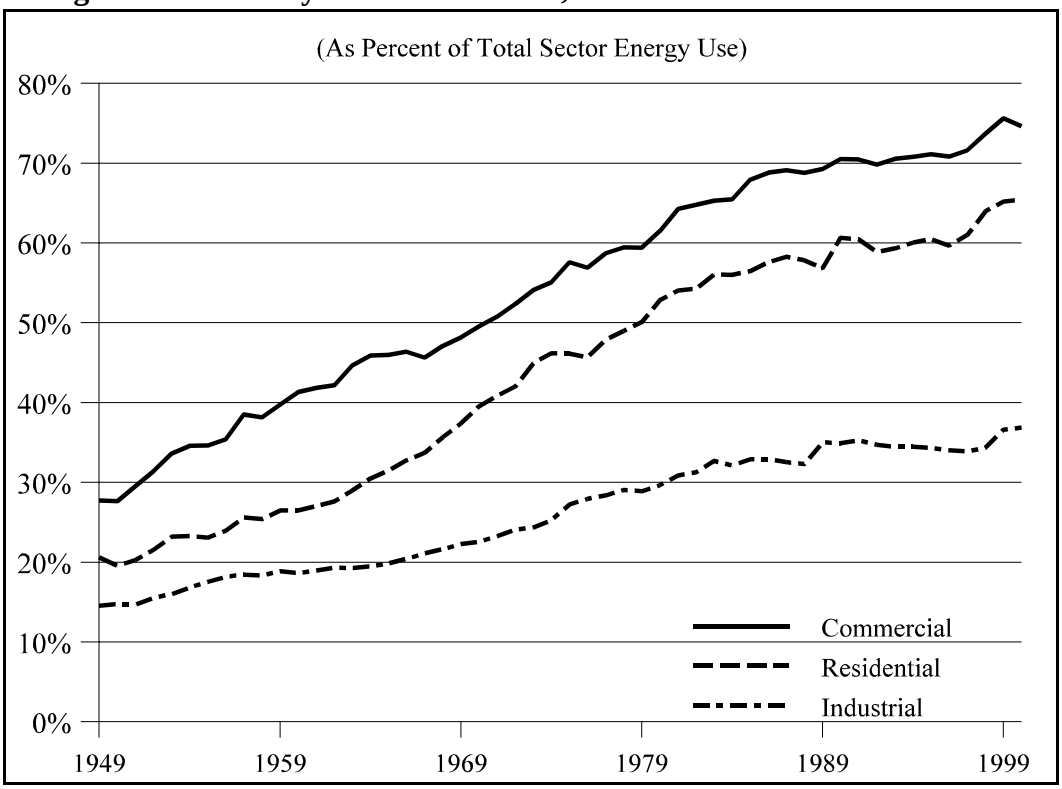
Source: CRS; Energy Information Administration (EIA), *Annual Energy Review*, 2001, Table 2.1a

Figure 1. Per Capita Energy Consumption in Transportation and Residential Sectors



Source: Energy Information Administration (EIA), *Annual Energy Review*, 2001, Table 2.1a.

Figure 2. Electricity Use: Commercial, Residential & Industrial Sectors



Source: Energy Information Administration (EIA), *Annual Energy Review*, 2001, Table 2.1a.

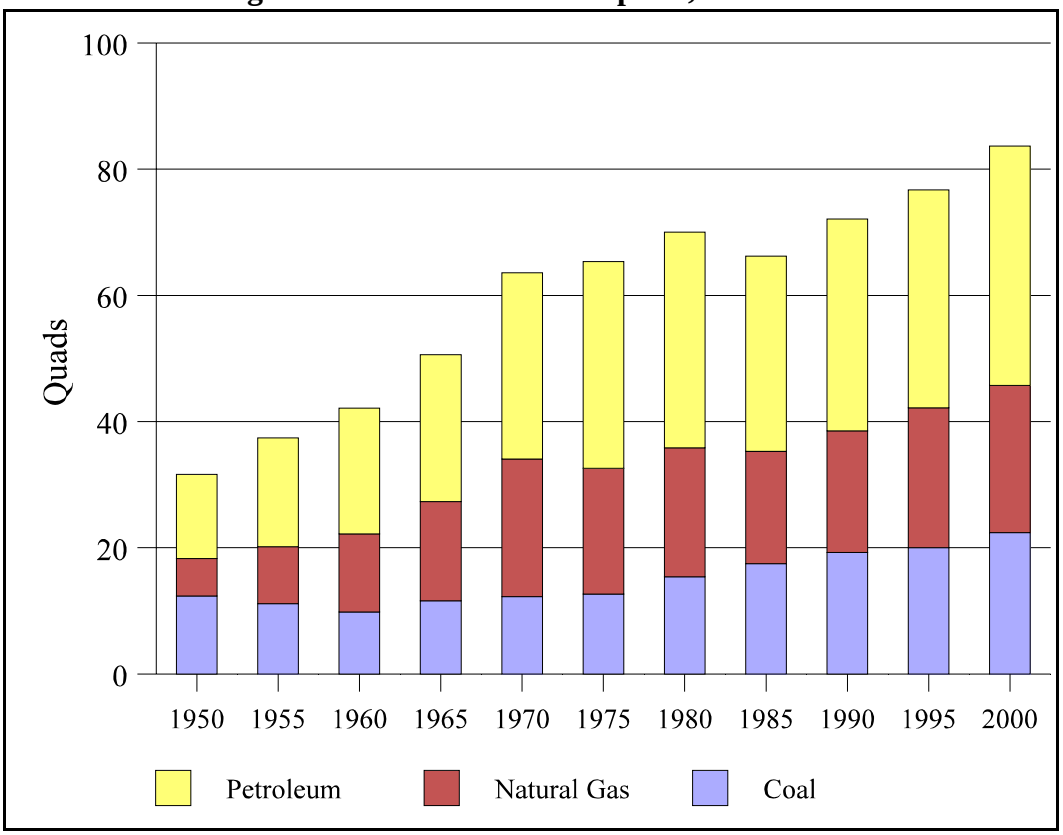
Consumption of major energy resources – petroleum, natural gas, and coal – is presented in **Table 2**, and shown graphically in **Figure 3**. The historical trends show that petroleum has been and continues to be the major source of energy, rising from about 38% in 1950 to 45% in 1975, then declining to about 40% in response to the energy crisis of the 1970's. Natural gas followed a similar pattern at a lower level, increasing its share of total energy from just 6% in 1950 to over 30% in 1970, then declining to about 20%. Coal, still a major energy source in 1950 at 35%, declined to about 20% a decade later and remained at about that level for the rest of the century.

Table 2. Energy Consumption in Quads and Percent of Total

	Petroleum		Natural Gas		Coal		Other		Total
1950	13.3	38.4%	6.0	17.3%	12.3	35.5%	3.0	8.7%	34.6
1955	17.3	43.0%	9.0	22.4%	11.2	27.9%	2.7	6.7%	40.2
1960	19.9	44.1%	12.4	27.5%	9.8	21.7%	3.0	6.7%	45.1
1965	23.2	43.0%	15.8	29.3%	11.6	21.5%	3.4	6.3%	54.0
1970	29.5	43.4%	21.8	32.1%	12.3	18.1%	4.3	6.3%	67.9
1975	32.7	45.4%	19.9	27.6%	12.7	17.6%	6.7	9.3%	72.0
1980	34.2	43.6%	20.4	26.0%	15.4	19.6%	8.4	10.7%	78.4
1985	30.9	40.2%	17.8	23.2%	17.5	22.8%	10.6	13.8%	76.8
1990	33.6	39.9%	19.3	22.9%	19.3	22.9%	12.1	14.4%	84.3
1995	34.6	38.1%	22.2	24.4%	20.0	22.0%	14.1	15.5%	90.9
2000	38.0	38.6%	23.3	23.7%	22.4	22.7%	14.8	15.0%	98.5

Source: Energy Information Administration (EIA), *Annual Energy Review*, 2001, Table 1.3 & *Monthly Energy Review*, Dec. 2002, Tables 2.2-2.6.

Figure 3. Fossil Fuel Consumption, 1950-2000



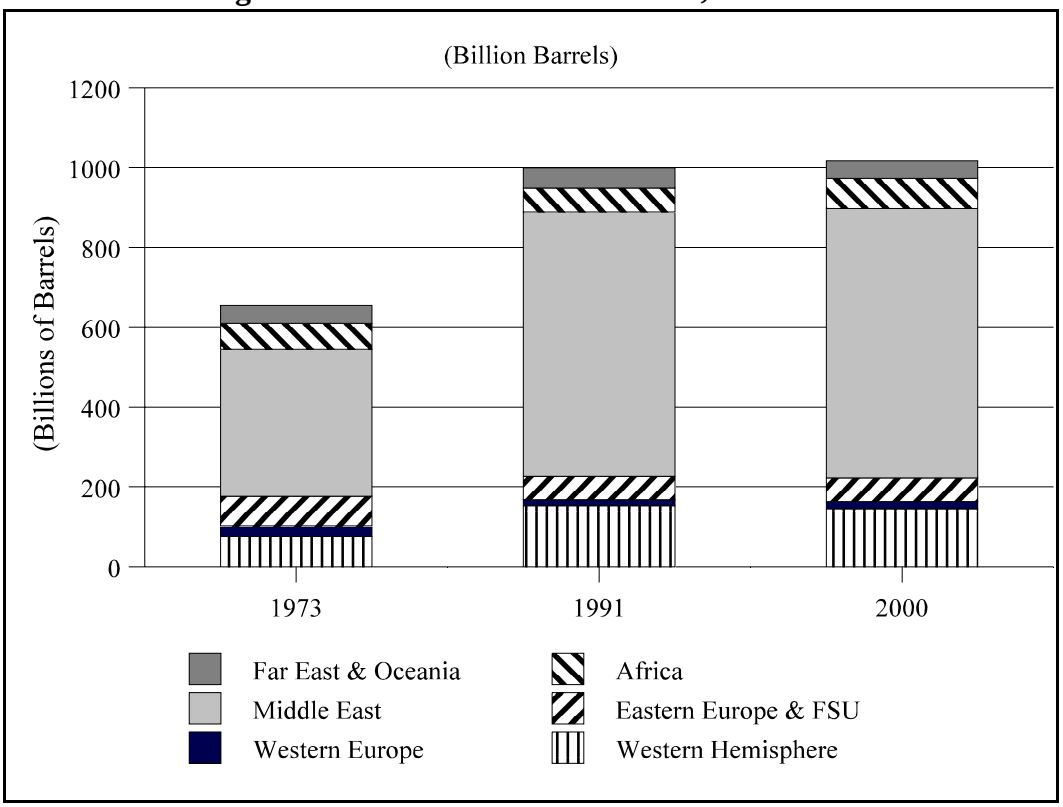
Source: Energy Information Administration (EIA), *Annual Energy Review*, 2001, Table 1.3.

Oil

Almost 40% of the energy consumed in the United States is supplied by petroleum, and that proportion has remained approximately the same since 1950, as the data in the previous section show. Also unchanged is the almost total dependence of the transportation sector on petroleum, mostly gasoline.

The perception that the world is on the verge of running out of oil, widespread during the 1970's, has changed, however. The rapid price increases at that time, aided by improved exploration and production technology, stimulated a global search for oil, and resulted in the discovery of large amounts of new reserves. Indeed, as concerns about tightening supply and continually increasing prices were at a peak, proven reserves actually increased by about 50% between 1973 and 1990. Some of the increase was in the Western Hemisphere, mostly in Mexico, but most was located in the region that already dominated the world oil market, the Middle East. With prices essentially steady during the 1990s, the search for oil slowed, but additions to reserves during the decade exceeded the amount of oil pumped out of the ground, as shown in **Figure 4**.

Figure 4. World Crude Oil Reserves, 1973-2000



Source: EIA, *International Energy Annual*, 1990, & 2000, Table 32.

Petroleum Consumption, Supply and Imports

Table 3. Petroleum Use by Sector, 1950-2000
(million barrels per day)

	Residential - Commercial	Industrial	Electricity	Transportation	Total
1950	1.1	1.8	0.2	3.4	6.4
1955	1.3	2.4	0.2	4.5	8.5
1960	1.7	2.7	0.2	5.1	9.8
1965	1.9	3.2	0.3	6.0	11.5
1970	2.2	3.8	0.9	7.8	14.7
1975	1.9	4.0	1.4	9.0	16.3
1980	1.5	4.8	1.2	9.5	17.1
1985	1.3	4.1	0.5	9.9	15.7
1990	1.1	4.3	0.6	11.0	17.0
1995	1.1	4.6	0.3	11.7	17.7
2000	1.2	4.9	0.5	13.1	19.7

Source: EIA, *Monthly Energy Review*, Dec. 2002, Tables 2.2-2.6.
Source: EIA, *Annual Energy Review* 2001, Tables 5.12a-d.

Consumption of petroleum by sector reflects a variety of trends. In the residential and commercial sectors petroleum consumption grew steadily from 1950 to 1970, while accounting for about 15% of total petroleum consumption. After the price surge in the 1970s, consumption in those sectors declined, falling to about 6% of total petroleum consumption in 2000. Usage in the electric power sector followed a similar but more abrupt pattern. Until 1970 only about 3% of petroleum went to power generation. In the late 1960's efforts to improve air quality by reducing emissions led utilities to convert a number of coal-fired powerplants to burn oil, and many new plants were designed to burn oil or natural gas. Utilities found themselves committed to increasing dependence on oil just at the time of shortages and high prices; in 1975 almost 9% of oil consumption went for power production. Consumption then fell sharply as alternate sources became available, declining to about 2% of total consumption in 2000.

Industrial consumption of petroleum, which includes such large consumers as refineries and petrochemical industries, has remained about 25% of total consumption throughout the last half-century. As other sectors' share fell, transportation, which was a little more than half of total consumption prior to 1975, climbed to almost two-thirds by 2000.

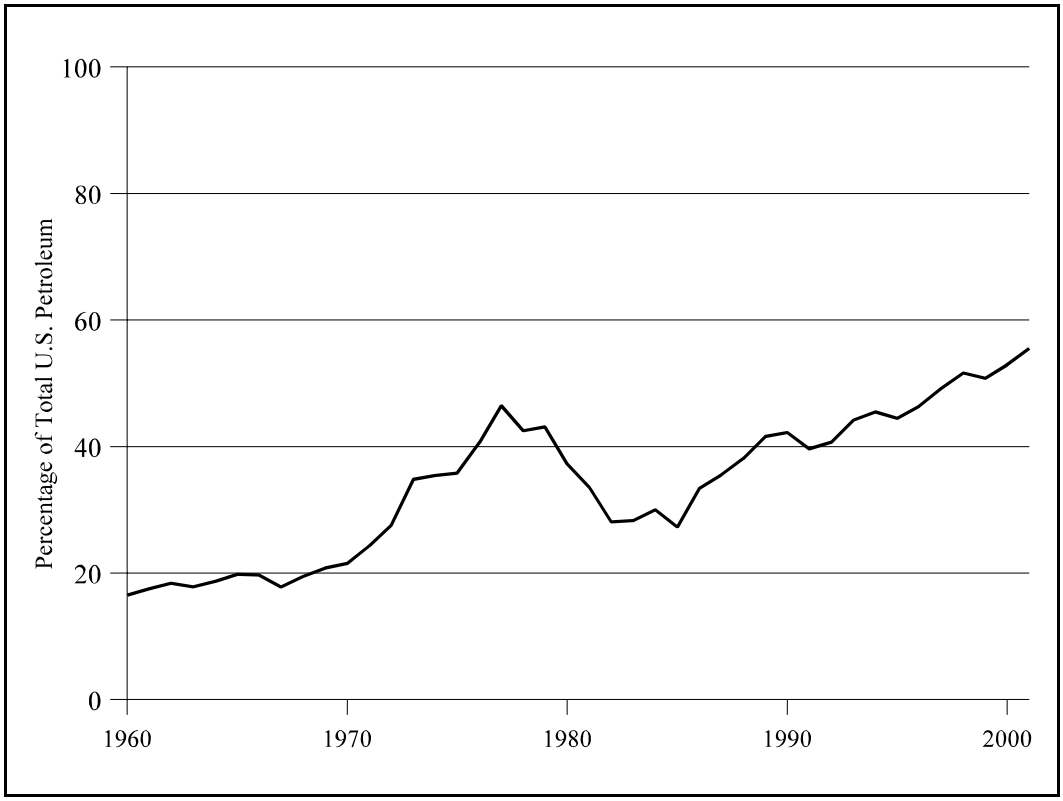
Table 4. U.S. Crude Oil Production, 1955-2000
(mbd)

	48 States	Alaska	Total
1955	6.8	--	6.8
1960	7.0	--	7.0
1965	7.8	--	7.8
1970	9.4	0.2	9.6
1975	8.2	0.2	8.4
1980	7.0	1.6	8.6
1985	7.1	1.8	9.0
1990	5.6	1.8	7.4
1995	5.1	1.5	6.6
2000	4.9	1.0	5.8

Source: EIA, *Annual Energy Review*, 2001, Table 5.2.

While petroleum consumption increased throughout the last half century (except for a temporary decline following the price surge of the 1970s), U.S. domestic production peaked in 1970. The result, as shown in **Figure 5**, was greater dependence on imported petroleum, which rose from less than 20% in 1960 to more than 50% by 2000.

Figure 5. U.S. Dependence on Imported Petroleum, 1960-2001



Source: EIA, *Monthly Energy Review*, Dec. '02, Table 1.8 & *Annual Energy Review*, 1986, Table 51.

Petroleum and Transportation

Table 5. Transportation Use of Petroleum, 1950-2001
(mbd)

Year	Aviation	Diesel Fuel	Motor Gasoline	Other	Total
1950	0.1	0.2	2.4	0.7	3.4
1955	0.3	0.4	3.2	0.6	4.5
1960	0.5	0.4	3.7	0.5	5.1
1965	0.7	0.5	4.4	0.4	6.0
1970	1.0	0.7	5.6	0.5	7.8
1975	1.0	1.0	6.5	0.5	9.0
1980	1.1	1.3	6.5	0.7	9.6
1985	1.2	1.5	6.7	0.5	9.9
1990	1.5	1.8	7.1	0.6	11.0
1995	1.5	2.0	7.7	0.5	11.7
2000	1.7	2.5	8.4	0.5	13.1

Source: EIA, *Annual Energy Review*, 2001, Table 5.12c.

Since the transportation sector is so heavily dependent on petroleum, and uses so much of it, **Table 5** presents a more detailed breakdown of the various types of petroleum used.

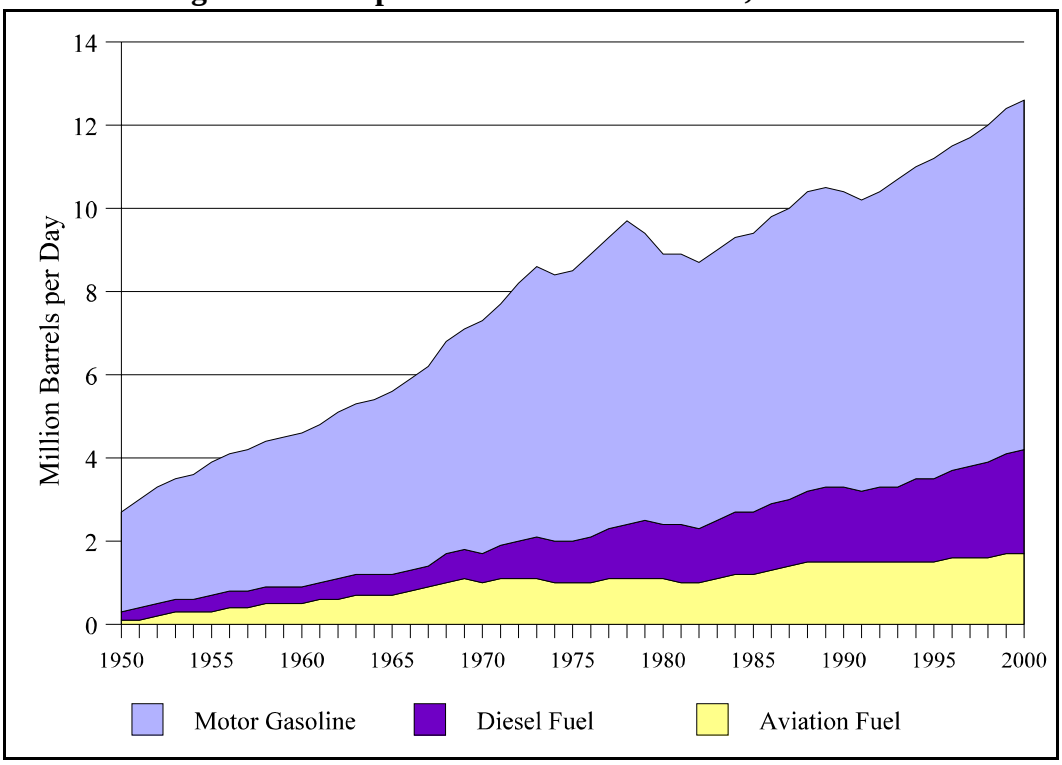
Aviation fuel includes both aviation gasoline and kerosene jet fuel. In 1950 aviation was almost entirely gasoline powered; by 2000 it was 99% jet fuel. The growth in flying is illustrated by the fact that aviation fuel was only 3% of petroleum consumption in 1950, but had grown to 12% in 1965 and maintained that share for the rest of the century.

Diesel fuel consumption showed a similar dramatic increase. About 6% of total petroleum consumption in 1950, it rose to 11% by 1975 and to 13% by 2000. Diesel fuel is used by a number of transportation sectors. Part of the increase involved the change of railroads from coal-fired steam to diesel and diesel-electric power. Diesel fuel is used also in the marine transportation sector, and some private automobiles are diesel-powered. The major part of diesel fuel consumption in transportation is by large commercial trucks. Total diesel fuel consumption increased from about 200,000 barrels per day in 1950 to 2.5 million barrels per day in 2000.

Most of the petroleum consumed in the transportation sector is motor gasoline. In 1950 it was 71% of total sector consumption, and by 2000, despite the increase in aviation fuel and diesel, it was 64%. In that half century, gasoline consumption increased by a factor of 3.5. Most motor gasoline is consumed by private vehicles, although commercial small trucks and some large ones are significant users.

Of the other petroleum products consumed in the transportation sector, the largest is residual fuel oil, most of which is used in large marine transport. Consumption of residual fuel oil in the transportation sector was about 500,000 barrels in 1950, and declined gradually to about 400,000 in 2000.

Figure 6. Transportation Use of Petroleum, 1950-2000



Source: EIA, *Annual Energy Review*, 2001, Table 5.12c.

Petroleum Prices: Historical Trends

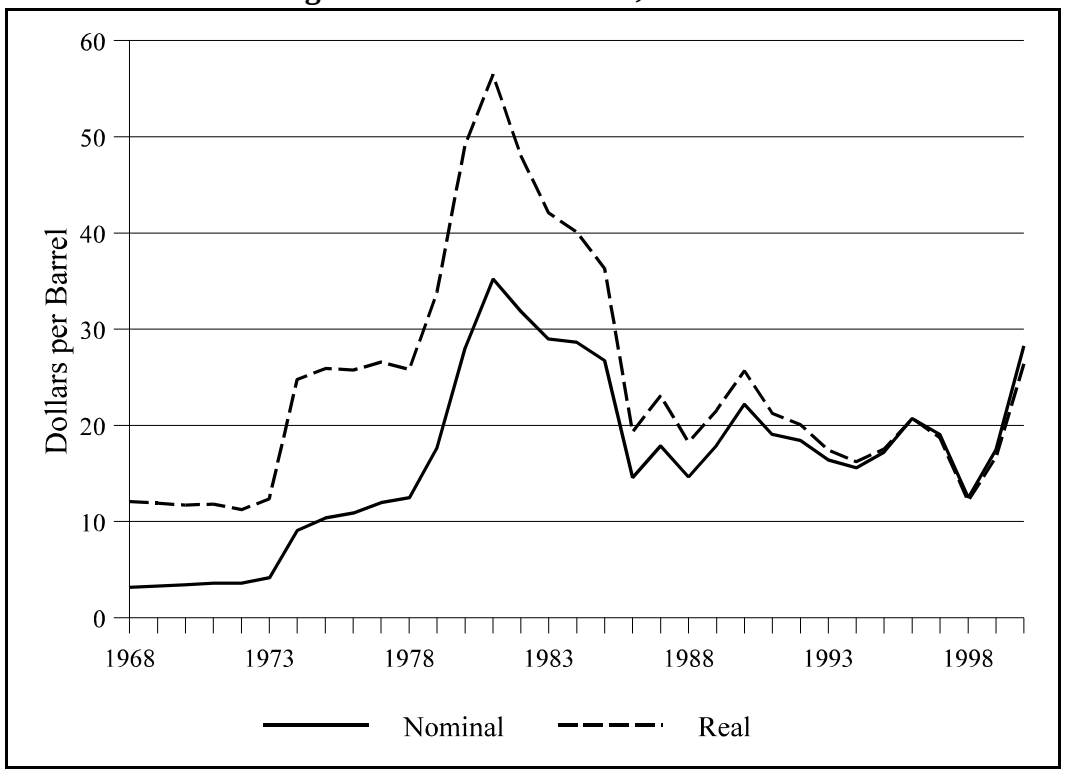
Most commodity prices are typically volatile. Because oil is widely consumed, and is so important at all levels of the economy, its price is closely watched and analyzed. Especially since the 1970s, when a generally stable market dominated by a few large oil companies was broken by the Organization of Petroleum Exporting Countries (OPEC) cartel and a relatively open world market came into being, the price of crude oil has been particularly volatile, as illustrated in **Table 6** and **Figure 7**.

Table 6. Crude Oil Prices, 1968-2000

Year	Nominal Dollars	Constant 1996 Dollars
1968	3.17	12.05
1969	3.29	11.92
1970	3.40	11.70
1975	10.38	25.93
1980	28.07	49.21
1985	26.75	36.30
1986	14.55	19.32
1990	22.22	25.68
1995	17.23	17.56
1996	20.71	20.71
1997	19.04	18.68
1998	12.52	12.13
1999	17.51	16.73
2000	28.26	26.40

Note: Composite of domestic and imported prices
Source: EIA, *Annual Energy Review*, 2001, Table 5.19.

Figure 7. Crude Oil Prices, 1968-2000

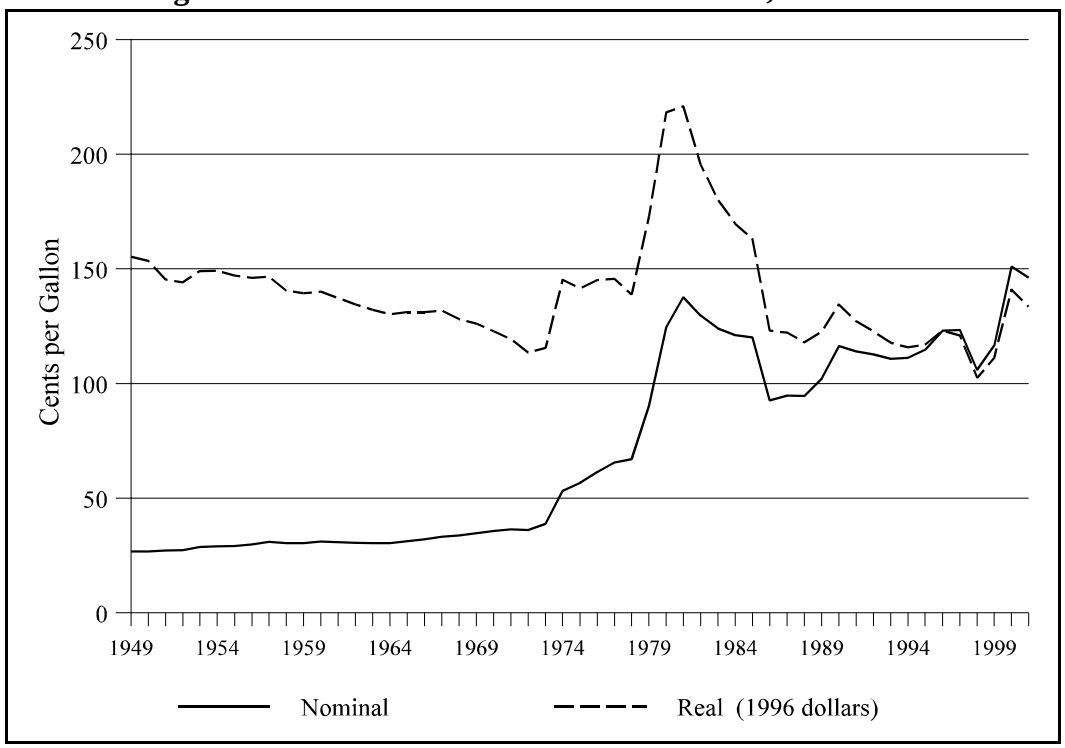


Source: EIA, *Annual Energy Review*, 2001, Table 5.19.

At the consumer level, prices of products such as motor gasoline and heating oil have reacted to price and supply disruptions in ways that have been modulated by various government and industry policies and international events. A significant and

not often noted fact is that, like many commodities, the long-term trend in gasoline prices, adjusted for inflation, has been down. As shown in **Figure 8**, the real price of gasoline in 1998 was significantly lower than in 1949, and even the increases of the last several years have not driven it much higher than the earlier level.

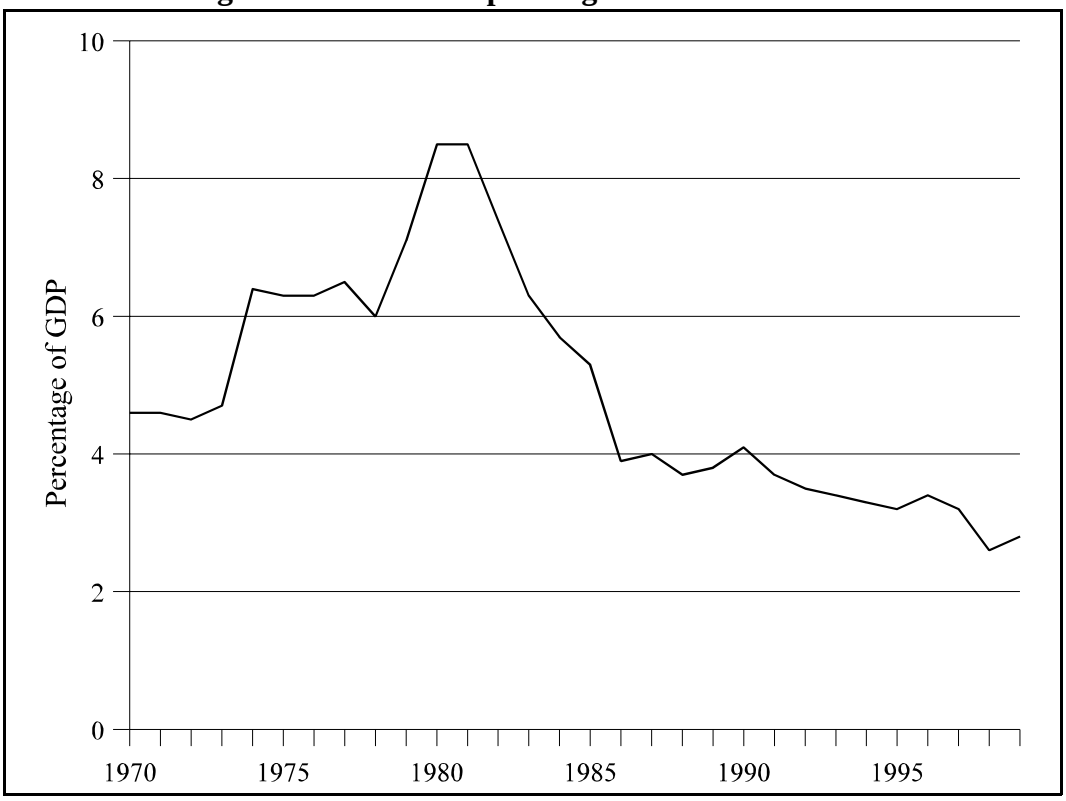
Figure 8. Price Per Gallon of Motor Gasoline, 1949-2001



Source: EIA, *Annual Energy Review*, 2001, Table 5.22.

The effect of this trend is shown in **Figure 9**, which illustrates the proportion of the gross national product (GNP) dedicated to consumer spending on oil. The price surges in the 1970s pushed this ratio from about 4.5% before the Arab oil embargo to about 8.5% following the 1978 crisis in Iran, but since then it has declined to less than 3%.

Figure 9. Consumer Spending on Oil as % of GDP

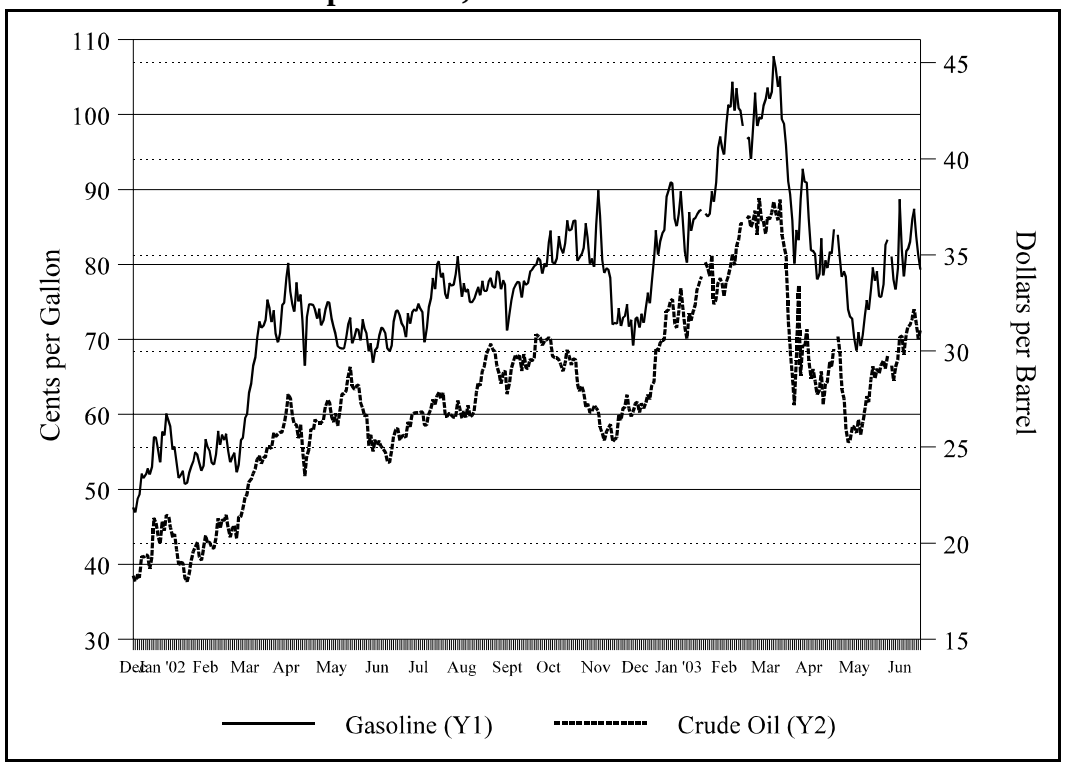


Source: EIA, *Annual Energy Review*, 2001, Table 3.4.

Short-Term Petroleum Prices

Before the 1970s much of the oil market operated on long-term contracts, and relatively little was sold at current or spot prices. Since then markets for crude oil and major products such as gasoline and home heating oil have become dominant. Because of the widespread importance of oil in the economy, prices of these commodities are of interest to many sectors besides those directly involved in trading. The price volatility of these markets is shown in the short-term graphs below. **Figure 10** presents spot prices for crude oil and gasoline, and **Figure 11** shows heating oil prices.

Figure 10. Daily Crude Oil and Wholesale Gasoline Spot Prices, Dec. 2001-June 2003



Source: EIA, *Weekly Petroleum Status Report*, June 4, 2003, Table 13.

Figure 11. Daily Wholesale Heating Oil Spot Prices, Dec. 2001-June 2003

Source: EIA, *Weekly Petroleum Status Report*, June 4, 2003, Table 13.

The values shown in these figures are wholesale prices excluding taxes, which vary for different states. **Table 7** lists the gasoline and diesel fuel tax rates imposed by each state per gallon of motor fuel, exclusive of local taxes, various environmental taxes and fees, and license and inspection fees." The federal tax on gasoline is currently 18.4 cents per gallon.

Table 7. State and Local Retail Gasoline Taxes

Cents per Gallon Tax				
State	Gasoline	note	Diesel	note
Alabama	16¢		17¢	
Alaska	8¢		8¢	
Arizona	18¢		18¢	
Arkansas	21.5¢		22.5¢	
California	18¢	1	18¢	1
Colorado	22¢		20.5¢	
Connecticut	25¢		26¢	
Delaware	23¢		22¢	
District of Columbia	20¢		20¢	
Florida	13.9¢	2	26.4¢	2
Georgia	7.5¢	3	7.5¢	3
Hawaii				
Hawaii County	24.8¢	4	24.8¢	
Honolulu County	32.5¢	4	32.5¢	
Kauai County	29¢	4	29¢	
Maui County	29¢	4	29¢	
Idaho	25¢		25¢	
Illinois	19¢	5	21.5¢	5
Indiana	15¢	6	16¢	
Iowa	20.1¢		22.5¢	
Kansas	23¢	7	25¢	7
Kentucky	15¢	8	12¢	8
Louisiana	20¢		20¢	
Maine	22¢		23¢	
Maryland	23.5¢		24.25¢	
Massachusetts	21¢		21¢	
Michigan	19¢		15¢	9
Minnesota	20¢		20¢	

Notes:

1. California: The tax rates could be increased if the federal fuel tax rate is reduced and federal financial allocations to California for highway and exclusive public mass transit guideway purposes are reduced or eliminated correspondingly.
2. Florida: Rates include an additional fuel tax adjusted annually for inflation.
3. Georgia: An additional tax is levied at the rate of 3% of the retail sale price.
4. Hawaii: Rates are combined state and county rates. The state rate is 16¢ per gallon.
5. Illinois: The rates imposed represent the basic motor fuel tax rate and the additional tax on diesel fuel used to operate motor vehicles in the state. An additional, variable rate applies to interstate motor carriers. Until 1/1/13, an additional tax of 0.3¢ per gallon is imposed on receivers of motor fuel, aviation fuels, home heating oil and kerosene, but excluding liquefied petroleum gases.
6. Indiana: Effective January 1, 2003, the gasoline tax increases to 18¢ per gallon.
7. Kansas: Effective July 1, 2003, until July 1, 2020, the gasoline tax rate will be 24¢ per gallon and the diesel fuel tax rate will be 26¢ per gallon.
8. Kentucky: The tax is imposed at 9% of average wholesale price plus a supplemental highway user motor fuel tax computed to reflect decreases in the average wholesale price of gasoline.
9. Michigan: 9¢ per gallon when used in commercial vehicles. 21¢ per gallon for motor carrier fuel.

Source: CCH-EXP, STATE-TAX-GUIDE ¶40-100, Table of Rates, Dec. 2002.

Table 7. State and Local Retail Gasoline Taxes (continued)

Cents per Gallon Tax				
State	Gasoline	note	Diesel	note
Mississippi	18¢		18¢	
Missouri	17¢		17¢	
Montana	27¢		27¢	
Nebraska	24.5¢	10	24.5¢	10
Nevada	23¢	11	27¢	11
New Hampshire	18¢		18¢	
New Jersey	10.5¢		13.5¢	
New Mexico	17¢	12	18¢	
New York	8¢	13	8¢	13
North Carolina	22.1¢	14	22.1¢	14
North Dakota	21¢		21¢	
Ohio	22¢		22¢	
Oklahoma	16¢		13¢	
Oregon	24¢		24¢	
Pennsylvania	26.6¢		31.8¢	
Rhode Island	30¢		30¢	
South Carolina	16¢		16¢	
South Dakota	22¢		22¢	
Tennessee	21.4¢	15	18.4¢	15
Texas	20¢		20¢	
Utah	24.5¢	16	24.5¢	16
Vermont	20¢		25¢	17
Virginia	17.5¢		16¢	
Washington	23¢		23¢	
West Virginia	20.5¢	18	20.5¢	18
Wisconsin	28.1¢		28.1¢	
Wyoming	14¢		14¢	

Notes:

10. Nebraska: The figure includes an additional tax based on the statewide average cost of fuel plus a second additional tax of 2¢ per gallon and an "ethanol tax adjustment."

11. Nevada: The motor fuel tax rate includes a 1¢-per-gallon mandated county tax and a 1.75¢ -per-gallon tax that is levied by all counties. An additional tax will be levied if the federal tax on fuel is reduced or discontinued. The amount of the additional tax will be equal to the federal tax reduction, but not to exceed 4¢ per gallon.

12. New Mexico: Rate decreased to 16¢ per gallon, effective July 1, 2003, or the July 1 or January 1 immediately following an earlier date on which the obligations for payment of principal and interest on the series 1993 state highway debentures have been defeased.

13. New York: Does not include the excise tax, petroleum business tax, petroleum testing fee, spill tax, and pre-paid sales tax.

14. North Carolina: Includes an additional tax based on average wholesale price of motor fuel.

15. Tennessee: Plus an optional 1¢-per-gallon special tax imposed by certain counties.

16. Utah: An environmental surcharge of one-half cent per gallon is imposed on all petroleum sold.

17. Vermont: Licensed users pay diesel fuel tax rate for vehicles of less than 26,001 lbs. and 25¢ per gallon on diesel fuel for vehicles weighing 26,001 lbs. or more.

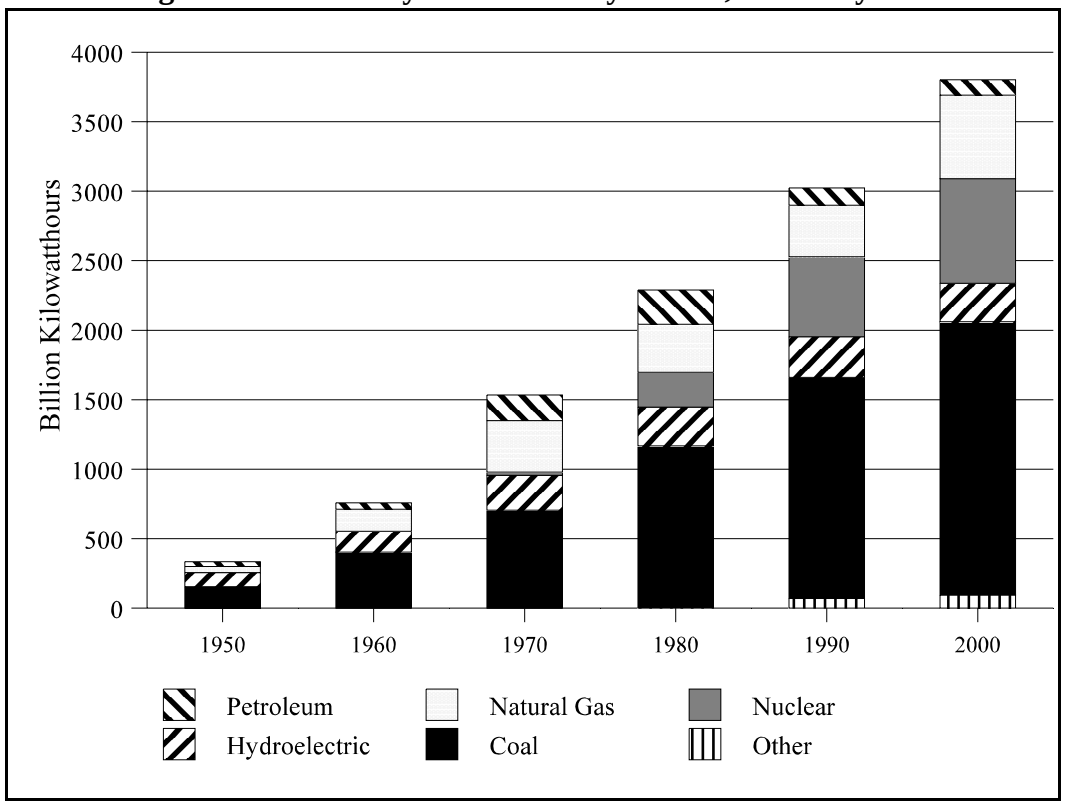
18. West Virginia: Tax rate reduced to 15.5¢ per gallon on August 1, 2007.

Source: CCH-EXP, STATE-TAX-GUIDE ¶40-100, Table of Rates, Dec. 2002.

Electricity

While overall energy consumption in the United States increased three-fold between 1950 and 2000, electricity consumption increased even more rapidly. Annual power generation at the end of the century was ten times what it was in 1950. **Figure 12** illustrates the trend.

Figure 12. Electricity Generation by Source, selected years.



Source: EIA, *Annual Energy Review*, 2001, Table 8.2a.

Throughout this period, coal was used to generate about half the rapidly increasing amount of electricity consumed. Petroleum became briefly important as a source of power generation in the late 1960s because it resulted in lower emissions of air pollutants, but the price surges of the 1970s reversed that trend, and by 2000 only 3% of power generation was oil-fired.

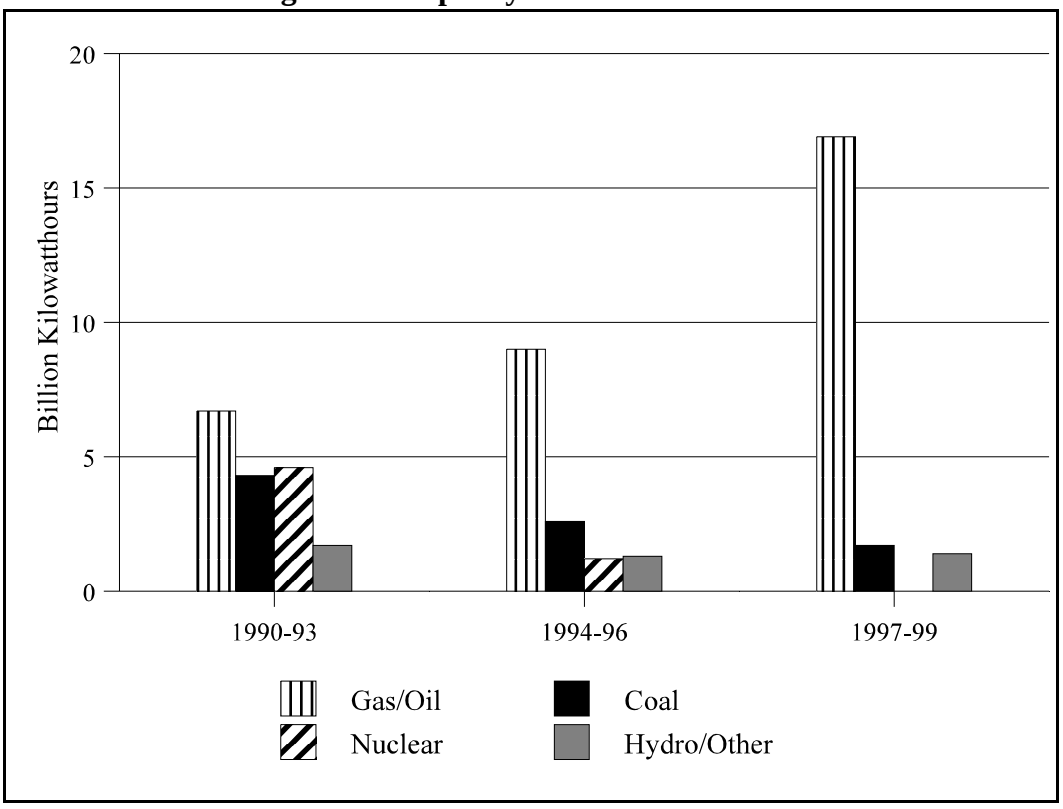
Natural gas generation has a more complicated history. Consumption by the electric power industry increased gradually as access by pipeline became more widespread. With the price surge in oil in the 1970s, demand for gas also increased, but interstate prices were regulated, and gas availability declined. In addition, federal energy policy viewed generation of electricity by gas to be a wasteful use of a diminishing resource. The Fuel Use Act of 1978 prohibited new power generators from using gas and set a timetable for shutting down existing gas-fired plants. Gas prices were later deregulated, resulting in increased production, and the Fuel Use Act was repealed, but in the meantime generation of electricity from gas fell from 24% in 1970 to 12% in 1985. In the 1990s gas became more popular, and by 2000 was

supplying 16% of total electric generation. Most capacity additions during the late 1990s were gas fired. The increased demand contributed to high prices in 2000 that were felt particularly in California.

Nuclear power started coming on line in significant amounts in the late 1960s, and by 1975, in the midst of the oil crisis, was supplying 9% of total generation. However, increases in capital costs, construction delays, and public opposition to nuclear power following the Three Mile Island accident in 1979 curtailed expansion of the technology, and many construction projects were cancelled. Continuation of some construction increased the nuclear share of generation to 20% in 1990, where it remains currently, but no new plants are currently under construction or on order.

Construction of major hydroelectric projects has also essentially ceased, and hydropower's share of electricity generation has gradually declined from 30% in 1950 to 15% in 1975 and less than 10% in 2000. However, hydropower remains highly important on a regional basis, as **Table 8** illustrates.

Figure 13. Capacity Additions 1990-1999



Source: EIA, *Inventory of Electric Power Plants*, 1990, *Inventory of Electric Utility Power Plants*, 2000, & *Inventory of Nonutility Electric Power Plants*, 2000, Table 2.

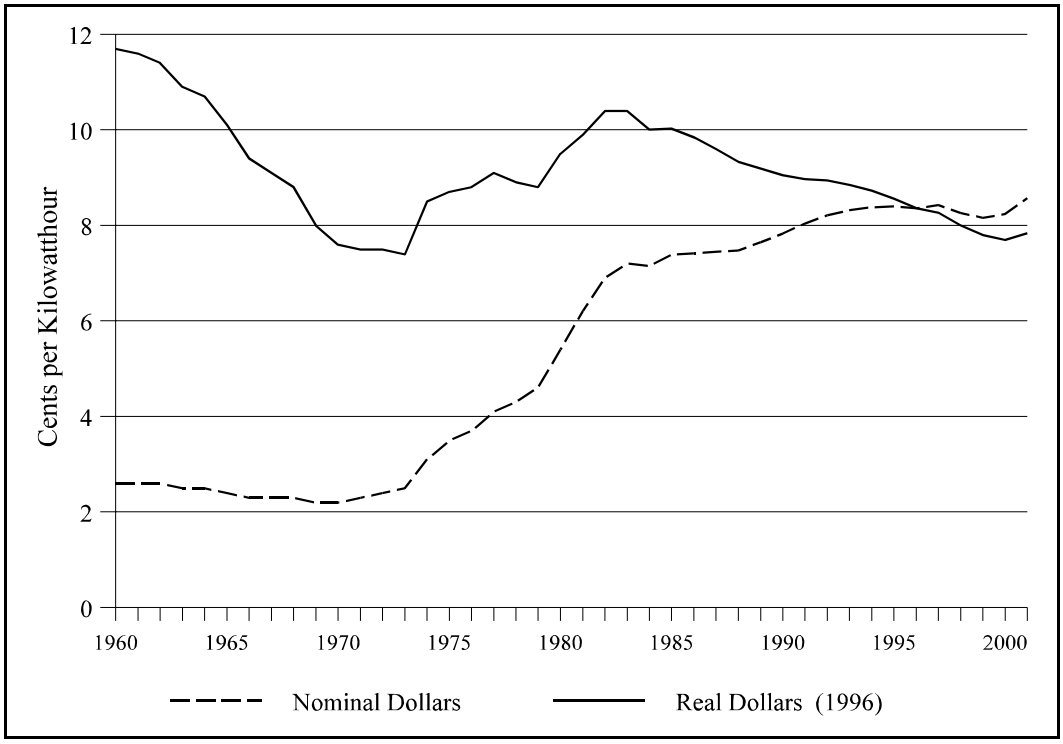
Table 8. Electricity Generation by Region and Fuel, 2000

Region	Total Generation (billion kwh)	Percent Generated by:					
		Coal	Petro-leum	Natural Gas	Nuclear	Hydro	Renew-able
New England	112.8	18.3	16.3	20.1	30.4	6.3	8.6
Middle Atlantic	401.7	38.7	4.9	14.9	33.3	6.5	1.8
East North Central	617.3	71.7	0.6	4.2	22.1	0.6	0.8
West North Central	284.5	75.7	0.6	2.8	15.8	4.1	1.0
South Atlantic	754.8	57.1	5.9	7.6	26.1	1.1	2.3
East South Central	350.6	69.4	1.1	4.2	19.4	3.9	2.0
West South Central	569.1	39.2	0.9	45.9	11.4	1.0	1.5
Mountain	325.0	67.3	0.3	10.7	9.3	11.6	0.7
Pacific Contiguous	367.3	4.3	0.8	33.6	11.9	43.0	6.4
Pacific Noncontiguous	16.8	13.0	50.0	25.7	0.0	6.6	4.6
U.S. Total	3,799.9	51.8	2.9	16.1	19.8	7.2	2.2

Source: EIA, *Electric Power Annual,* 2000, Tables A7- A13.

Sources of power generation vary greatly by region. Hydropower in the Pacific Coast states, for instance, supplies 43% of total generation, and natural gas 34%. In 2000, the combination of a drought-caused shortage of hydropower, a tightening of gas supply, and California's new electric regulatory scheme and market manipulation caused very sharp increases in electricity prices in that region. Other regions are heavily dependent on coal generation: the North Central and East South Central states, as well as the Mountain states, generate more than 65% of their electricity from coal, while other regions such as New England and the Pacific Coast use relatively little coal. The West South Central region generates 46% of its electricity from gas. New England in the 1970s and 1980s was heavily dependent on oil-generated power; in 2000, despite an increased use of natural gas, oil produced 16% of New England's power, far greater than the national average of 3%.

Figure 14. Price of Retail Residential Electricity, 1960-2001



Source: EIA, *Annual Energy Review*, 2001, Table 8.6.

Other Conventional Energy Resources

Natural Gas

Table 9. Natural Gas Consumption by Sector, 1950-2001

	Total Consumption (tcf)	Percent Consumed by:		
		Residential-Commercial	Industrial	Electric
1950	5.77	27.5%	59.4%	10.9%
1955	8.69	31.7%	52.2%	13.3%
1960	11.97	34.5%	48.2%	14.4%
1965	15.28	35.0%	46.5%	15.2%
1970	21.14	34.2%	43.8%	18.6%
1975	19.54	38.0%	42.8%	16.2%
1980	19.88	37.0%	41.2%	18.5%
1985	17.28	39.7%	39.7%	17.6%
1990	19.16	36.6%	43.1%	16.9%
1995	22.21	35.5%	42.3%	19.1%
1996	22.61	37.2%	42.8%	16.8%
1997	22.74	36.1%	42.7%	17.9%
1998	22.24	33.8%	42.7%	20.6%
1999	22.40	34.7%	40.9%	21.5%
2000	23.46	35.0%	40.0%	22.2%
2001	22.64	35.6%	38.4%	22.2%

Source: EIA, *Annual Energy Review*, 2001.

Consumption of natural gas was about four times as great in 2000 as it was in 1950. Throughout the period, consumption in the residential and commercial sector grew at about the same rate as total consumption, in the range of 30% to 40% of the total. Consumption for electric power generation increased from about 10% in 1950 to more than 20% at the end of the century.

Coal

Table 10. Coal Consumption by Sector, 1950-2000

	Total Consumption (Million Tons)	Percent Consumed by:			
		Residential-Commercial	Industrial	Transportation	Electric
1950	494.1	23.2%	45.5%	12.8%	18.6%
1955	447.0	15.3%	48.7%	3.8%	32.2%
1960	398.1	10.3%	44.6%	0.8%	44.4%
1965	472.0	5.4%	42.6%	0.1%	51.9%
1970	523.2	3.1%	35.7%	0.1%	61.2%
1975	562.6	1.7%	26.2%	--	72.2%
1980	702.7	0.9%	18.1%	--	81.0%
1985	818.0	1.0%	14.2%	--	84.8%
1990	902.9	0.7%	12.8%	--	86.5%
1995	962.1	0.6%	11.0%	--	88.4%
2000	1084.1	0.4%	8.7%	--	90.9%

Source: EIA, *Annual Energy Review*, 2001.

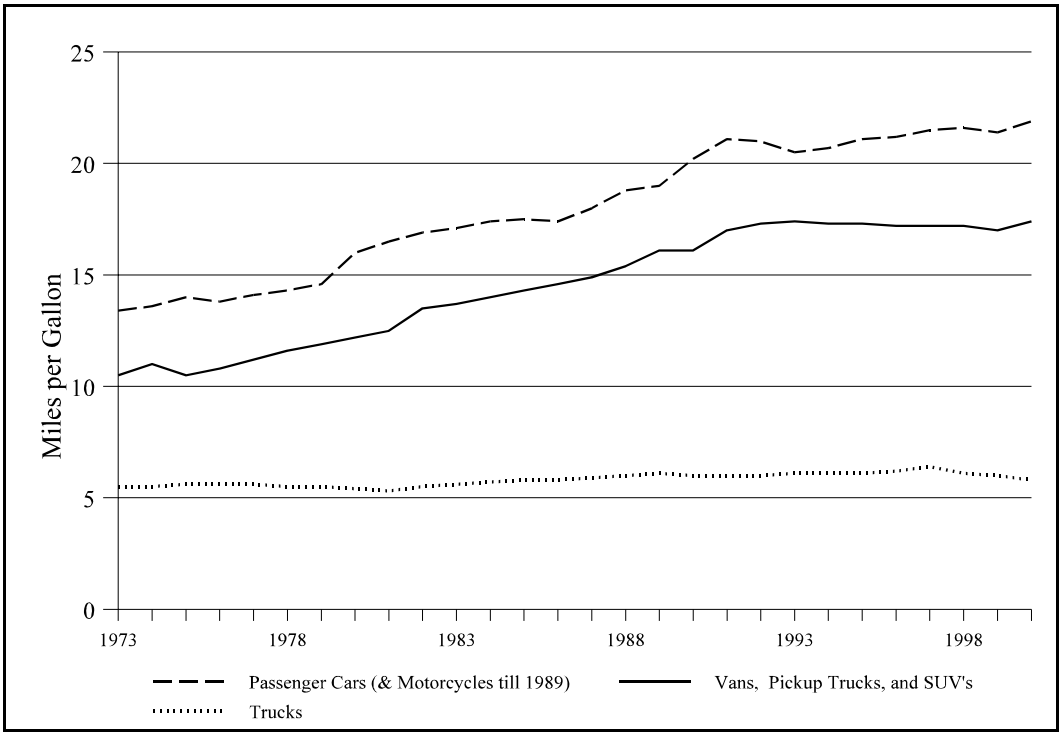
Consumption of coal about doubled in the half century from 1950 to 2000, but during that period coal as an energy source changed from a widely used resource to a single-use fuel for generating electricity. In 1950 the residential and commercial sector consumed almost a quarter of total coal consumed; by 1980 less than 1% of coal went to that sector. In transportation, steam locomotives (and some coal-fired marine transportation) consumed 13% of coal; by 1970 they were all replaced with diesel-burning or electric engines. Industry consumed 46% of coal in 1950; in 2000 less than 10% of coal was consumed by that sector. Meanwhile, the electric power sector, which consumed less than 20% of the half-billion tons of coal burned in 1950, used more than 90% of the billion tons consumed in 2000.

Conservation and Energy Efficiency

Vehicle Fuel Economy

Energy efficiency has been a popular goal of policy makers in responding to the repeated energy crises of recent decades, and efforts to reduce the energy intensity of a broad spectrum of economic activities have been made both at the government and private level. Because of the transportation sector's near total dependence on vulnerable oil supplies, improving the efficiency of motor vehicles has been of particular interest. (For an analysis of legislative policies to improve vehicle fuel economy, see CRS Issue Brief IB90122, *Automobile and Light Truck Fuel Economy: The CAFE Standards*.) **Figure 15** illustrates the trends in this effort for passenger cars and for light trucks, vans and sport utility vehicles, as well as the general lack of improvement in heavy trucks.

Figure 15. Motor Vehicle Fuel Rates, 1973-2000



Source: EIA, *Monthly Energy Review*, Feb. 2003, Table 1.10.

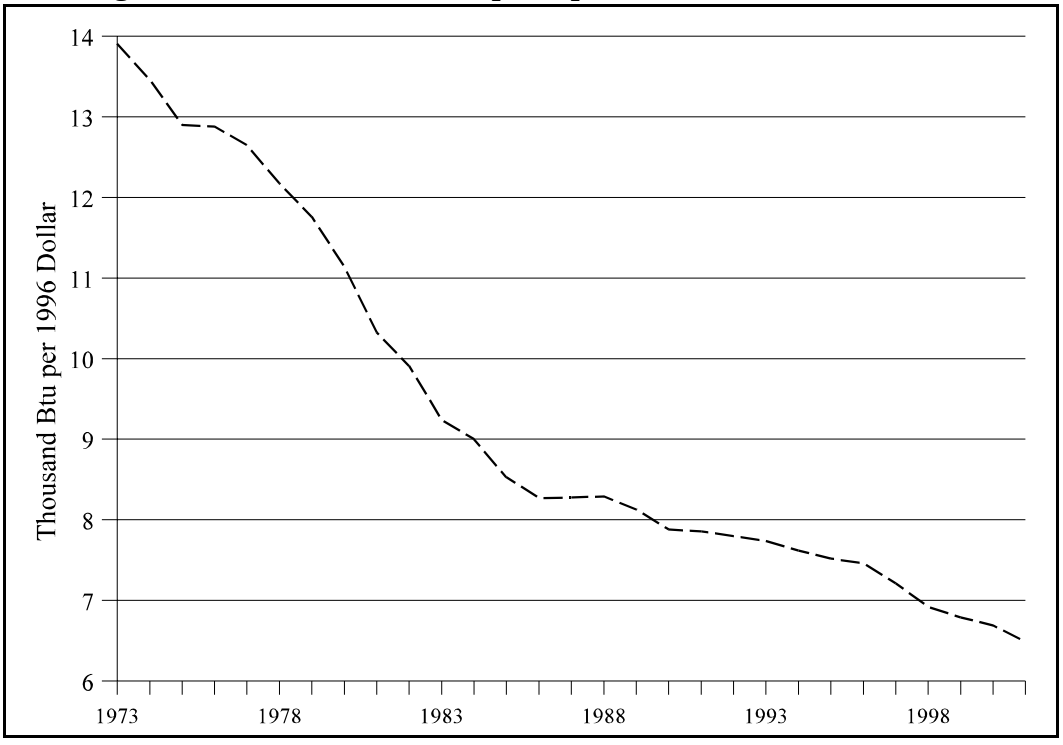
Further analysis by the Environmental Protection Agency (EPA) indicates that light vehicle fuel economy has declined on average between 1988 and 2003. This is largely because of increased weight, higher performance, and a higher proportion of sports utility vehicles and light trucks sold. In 2003, SUVs, pickups and vans comprised 48 percent of all sales, more than twice their market share in 1983. (The EPA study is available online at www.epa.gov/otaq/fetrends.htm.)

Energy Consumption and GDP

A frequent point of concern in formulating energy policy is the relationship between economic growth and energy use. It seems obvious that greater economic activity would bring with it increased energy consumption, although many other factors affecting consumption make the short term relationship highly variable. Over a longer period, for some energy-related activities, however, the relationship with economic growth has been essentially level. For the period from 1973 to 2001, for instance, consumption of electricity remained close to 0.45 kwh per constant dollar of GDP. Similarly, the number of miles driven by all vehicles was close to 3 miles per constant dollar of GDP throughout the same period.

In the case of oil and gas, however, a remarkable drop took place in the ratio of consumption to economic growth following the price spikes and supply disruptions, as illustrated in **Figure 16.** Consumption of oil and gas declined from 14,000 Btus per constant dollar of GDP in 1973 to a little more than 8,000 in 1985, and continued to decline at a slower rate for the rest of the century.

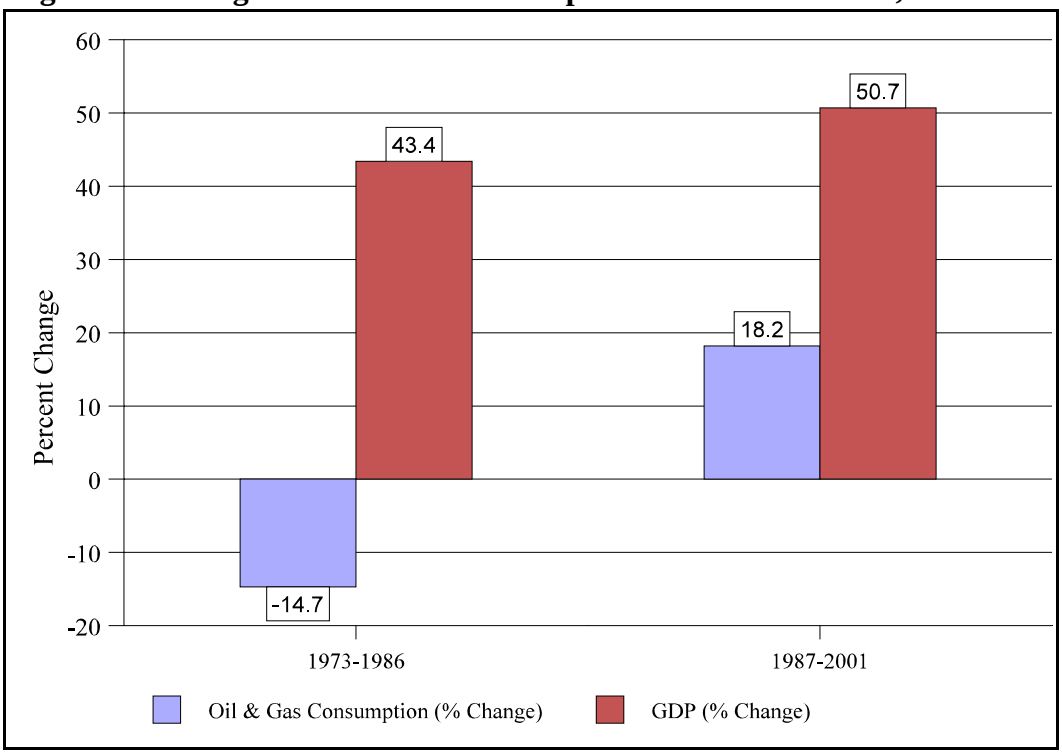
Figure 16. Oil & Gas Consumption per Dollar of GDP, 1973-2001



Source: EIA, *Monthly Energy Review*, Feb. 2003, Table 1.9.

During the earlier period, oil and gas consumption actually declined 15% while GDP, despite many economic problems with inflation and slow growth, was increasing by 44%. (See **Figure 17**.) During the period 1986 to 2001, oil and gas consumption increased by about 23%, while GDP increased 51%.

Figure 17. Change in Oil & Gas Consumption & Growth in GDP, 1973-2001



Source: EIA, *Monthly Energy Review*, Feb. 2003, Table 1.9.

Major Statistical Resources

Links to Sources

Most of the tables and figures in this report are derived from data bases maintained by the Department of Energy's Energy Information Administration (EIA). If other or more detailed information is desired, the agency's web site presents the complete text of its many statistical reports in PDF format, and also as spreadsheet files in the format of the program Excel. Some of the more important EIA publications are described below. Other sources used in this report are also listed.

Energy Information Administration. [http://www.eia.doe.gov]
"The agency's responsibility is to provide timely, high-quality information and to perform objective, credible analyses. ... EIA collects, evaluates, assembles, analyzes, and disseminates data and information relevant to energy resources, reserves, production, demand, technology, and related economic and statistical information."

Annual Energy Review [http://www.eia.doe.gov/aer/contents.html]
"The *Annual Energy Review (AER)* presents the Energy Information Administration's historical energy statistics. For many series, statistics are given for every year from 1949 through 2001. The statistics cover all major energy activities, including consumption, production, trade, stocks [inventories], and prices, for all major energy commodities, including fossil fuels, electricity, and renewable energy sources."

Monthly Energy Review [http://www.eia.doe.gov/mer/contents.html]
The *Monthly Energy Review* (MER) presents an overview of the EIA's recent monthly energy statistics. The statistics cover the major activities of U.S. production, consumption, trade, stocks (inventories) and prices for petroleum, natural gas, coal electricity, and nuclear energy.

International Energy Annual [http://www.eia.doe.gov/iea/contents.html]
The *International Energy Annual* presents information and trends on world energy production and consumption for petroleum, natural gas, coal, and electricity. This report is published to keep the public and other interested parties fully informed of primary energy supplies on a global basis.

Weekly Petroleum Status Report
[http://www.eia.doe.gov/oil_gas/petroleum/data_publications/weekly_petroleum_status_report/wpsr.html] The *Weekly Petroleum Status Report* (WPSR) provides data on supply and selected prices of crude oil and principal petroleum products in the context of historical data and forecasts. Updated every Wednesday morning.

Electric Power Annual
[http://www.eia.doe.gov/cneaf/electricity/epav1/epav1_sum.html]
The *Electric Power Annual* provides a statistical review of the domestic electric power industry for the most recent year including information on; industry capability, generation, fossil-fuel consumption, and stocks. Data on retail sales of electricity and average revenue per kilowatt-hour are also presented.

Inventory of Electric Utility Power Plants
[http://www.eia.doe.gov/cneaf/electricity/ipp/ipp_sum.html]
Inventory of Non-Utility Electric Power Plants
[http://www.eia.doe.gov/cneaf/electricity/ipp/ipp_sum2.html]
The *Inventories* provide annual statistics on generating units operated by electric utilities and nonutilities, respectively, in the United States. They also provide a 5-year outlook for generating unit additions and generating unit retirements.

EIA Quick Stats Pages [http://www.eia.doe.gov/neic/quickstats.html]
Coal, Electricity, Natural Gas, Nuclear & Petroleum each have a quick stats page containing a list of 15-20 frequently asked for statistics, often hot-linked to their source documents, and a link to the EIA home page for that subject. This link appears on EIA home page in the top left-hand column.

Other Sources.

Nuclear Regulatory Commission Information Digest
[http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/]
Updated annually, this official NRC publication (NUREG-1350) includes general statistics on U.S. and worldwide nuclear power production, U.S. nuclear reactors, and radioactive waste.

American Petroleum Institute (API)
[http://api-ec.api.org/newsplashpage/index.cfm]
The primary trade association of the oil and natural gas industry representing more than 400 members. Research, programs, and publications on public policy, technical standards, industry statistics, and regulations.

Bloomberg.Com, Market Data: Commodities, Energy Prices
[http://www.bloomberg.com/energy/index.html]
Displays four tables:

- *Petroleum ($/bbl)* for crude oil. The generally accepted price for crude oil is "WTI Cushing $" which is listed fourth in the table.
- *Petroleum (¢/gal)* for heating oil and gasoline.
- *Natural Gas ($/MMBtu)*
- *Electricity ($/megawatt hour)*

This site is updated two to three times per day.

AAA's Daily Fuel Gauge Report [http://www.fuelgaugereport.com/index.asp]
At-the-pump retail fuel prices for gasoline and diesel fuel. Gives average price for today, yesterday, a month ago and a year ago. for wholesale & crude oil. Also displays line chart showing the averages for the previous 12 months. National, state, and metropolitan data.

International Energy Agency [http://www.iea.org]
The International Energy Agency is an autonomous body within the Organization for Economic Co-operation and Development (OECD). It gathers and analyzes statistics and "disseminates information on the world energy market and seeks to promote stable international trade in energy."

A subscription is required to access most of the information on this Website, although a limited amount of information is available to nonsubscribers. Members of Congress and their staff should contact CRS for a copy of anything that requires a subscription.