

U.S. Energy Flow Trends—2002

Gina V. Kaiper

June 2004

U.S. Department of Energy

Lawrence
Livermore
National
Laboratory

Disclaimer

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor the University of California nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or the University of California, and shall not be used for advertising or product endorsement purposes.

This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

This report has been reproduced
directly from the best available copy.

Available to DOE and DOE contractors from the
Office of Scientific and Technical Information
P.O. Box 62, Oak Ridge, TN 37831
Prices available from (423) 576-8401
<http://apollo.osti.gov/bridge/>

Available to the public from the
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Rd.,
Springfield, VA 22161
<http://www.ntis.gov/>

OR

Lawrence Livermore National Laboratory
Technical Information Department's Digital Library
<http://www.llnl.gov/tid/Library.html>

UCRL-TR-129990-02

U.S. Energy Flow Trends—2002

Gina V. Kaiper

June 2004

This work was performed under the auspices of the U.S. Department of Energy by the University of California,
Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

Contents

	Page
Notes on the U.S. Energy Flow Chart for 2002	1
Background	1
Data Sources	1
Description of End-Use Sectors	4
Energy Content	4
Conversion Efficiency Factors	5
Balancing Numbers	5
Electricity Generation	6
Nonfuel Use	6
Notes on Primary Resources	7
Biomass/Other	7
Coal	7
Hydroelectric Power	7
Natural Gas	7
Nuclear Energy	7
Petroleum and Natural Gas Plant Liquids (NGPL)	8
Other Ways to View This Data	9
U.S. Carbon Emissions from Energy Consumption, 2002	11
Comparison of 1990, 2001, and 2002 Energy Consumption	13
Primary Resource Consumption by End-Use Sector	13
Energy Production and Imports	13
Resource Consumption	13
Factors Affecting Consumption	13
Appendix: Selected Tables from <i>Annual Energy Review 2002</i>	17
References and Web Locations	31

Tables

	Page
1. Primary resource consumption by sector, 1990, 2001, and 2002	14
2. U.S. energy production and net imports, 1990, 2001, and 2002	14
3. U.S. energy consumption by resource, 1990, 2001, and 2002	15
4. Factors affecting total U.S. energy consumption, 1990, 2000, and 2001	15

Figures

1. U.S. Energy Flow Trends—2002, Net Primary Resource Consumption ~97 Quads	2
2. U.S. Energy Flow Trends—2002, Net Primary Resource Consumption ~103 Exajoules	3
3. The U.S. Consumed ~97 Quads of Energy in 2002	9
4. 2002 Energy Consumption by End-Use Sector	9
5. 2002 Energy Consumption by Resource	10
6. Total U.S. Electricity Generation by Resource, 2002	10
7. U.S. 2002 Carbon Emissions from Energy Consumption—5682 MtCO ₂	12

Notes on the U.S. Energy Flow Chart for 2002

Background

Figure 1 shows U.S. energy flow trends for 2002, with about 97 quads of net primary resource consumption. Lawrence Livermore National Laboratory (LLNL) has prepared similar flow charts of U.S. energy consumption since 1972. The chart traces the flow of individual fuels and compares these on the basis of a common energy unit of quadrillion British thermal units (Btu). A quadrillion, or “quad,” is 10^{15} . One Btu is the quantity of heat needed to raise the temperature of 1 pound of water by 1°F at or near 39.2°F.

The width of each colored line across this chart is in proportion to the number of quads conveyed. (Exception: lines showing extremely small amounts have been made wide enough to be clearly visible.)

In most cases, the numbers used in this chart have been rounded to the nearest tenth of a quad, although the original data was published in hundredths or thousandths of a quad. As a consequence of independent rounding, some of the summary numbers may not appear to be a precise total of their various components.

Figure 1 shows U.S. energy consumption in quads to conform with data from the U.S. Department of Energy’s Energy Information Administration (EIA), and Figure 2 expresses U.S. energy consumption in exajoules. A joule is the metric unit for heat. One Btu equals 1,055.06 joules; and one quadrillion Btu’s equals 1.055 exajoules (an exajoule is 10^{18} joules).

Data Sources

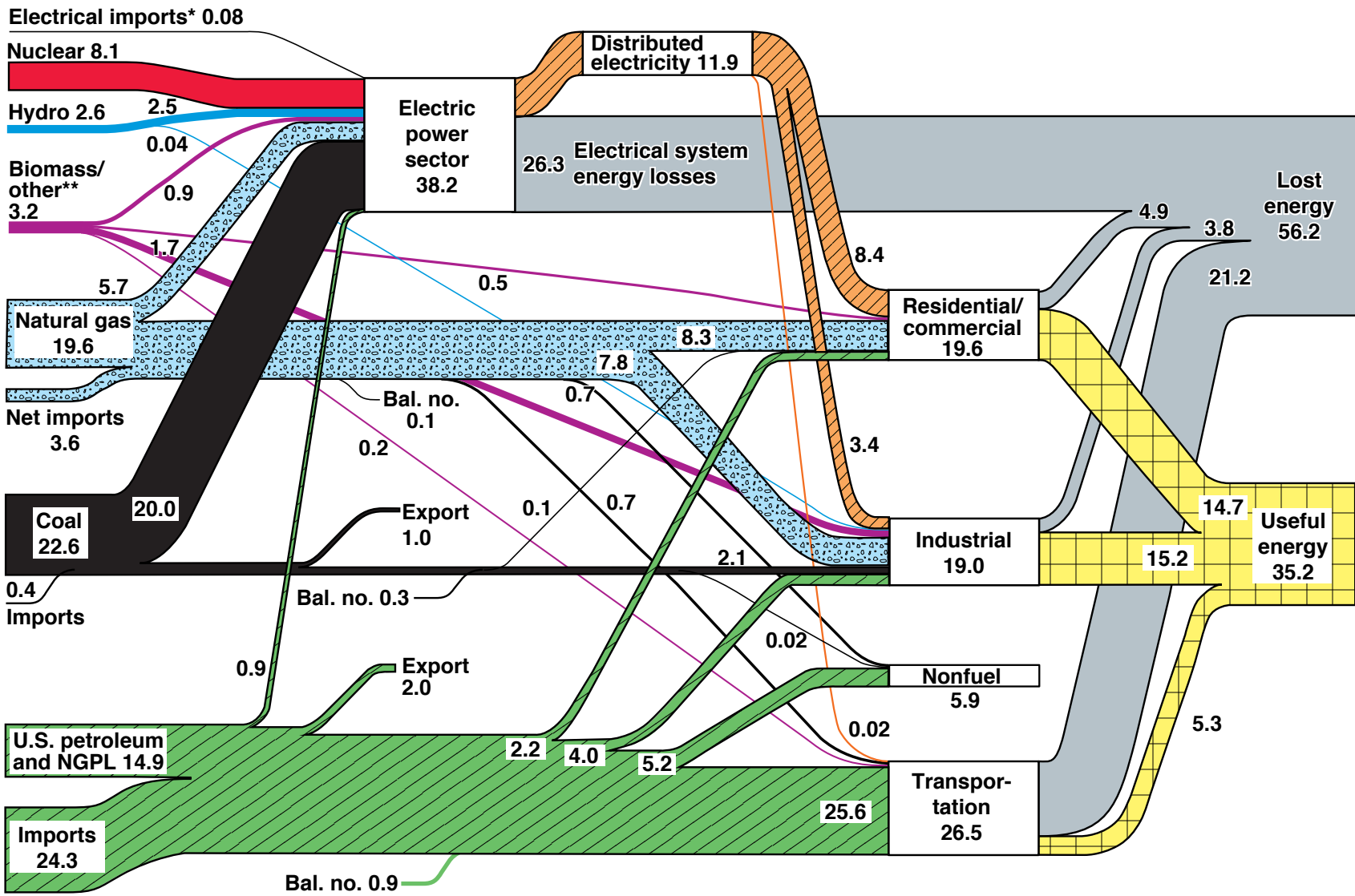
The chart incorporates production and end-use data compiled by the Energy Information Administration, as published in the EIA’s *Annual Energy Review 2002* [DOE/EIA-0384(2002), Washington, D.C., October 2003]. EIA’s report is available on the Web at <http://www.eia.doe.gov/bookshelf/consumer.html>. For ease of reference, some of the key tables from the EIA report are included as an appendix to this document.

Most of the 2002 data in the *Annual Energy Review 2002* (AER2002) is marked as preliminary, and these data are used in LLNL’s energy flow chart for 2002. However, EIA continually clarifies and revises its data and publishes updates in its *Monthly Energy Review* and in subsequent editions of the *Annual Energy Review*. Thus LLNL’s U.S. Energy Flow chart for 2001, which was prepared in August 2003, does not entirely correspond to the revised 2001 data given in AER2002. For example, LLNL’s 2001 chart shows ~97 quads (unrounded, 96.95 quads) of primary resource consumption, but AER2002 lists 96.32 quads as the revised 2001 total.

In AER2002, summary data on energy production, imports, exports, and consumption are provided in Table 1.1, “Energy Overview, 1949–2002” (p. 5 of AER2002 and included in the appendix of this document). This table shows that 97.35 quads of energy were consumed in the United States in 2002.

Figure 1. U.S. Energy Flow Trends – 2002

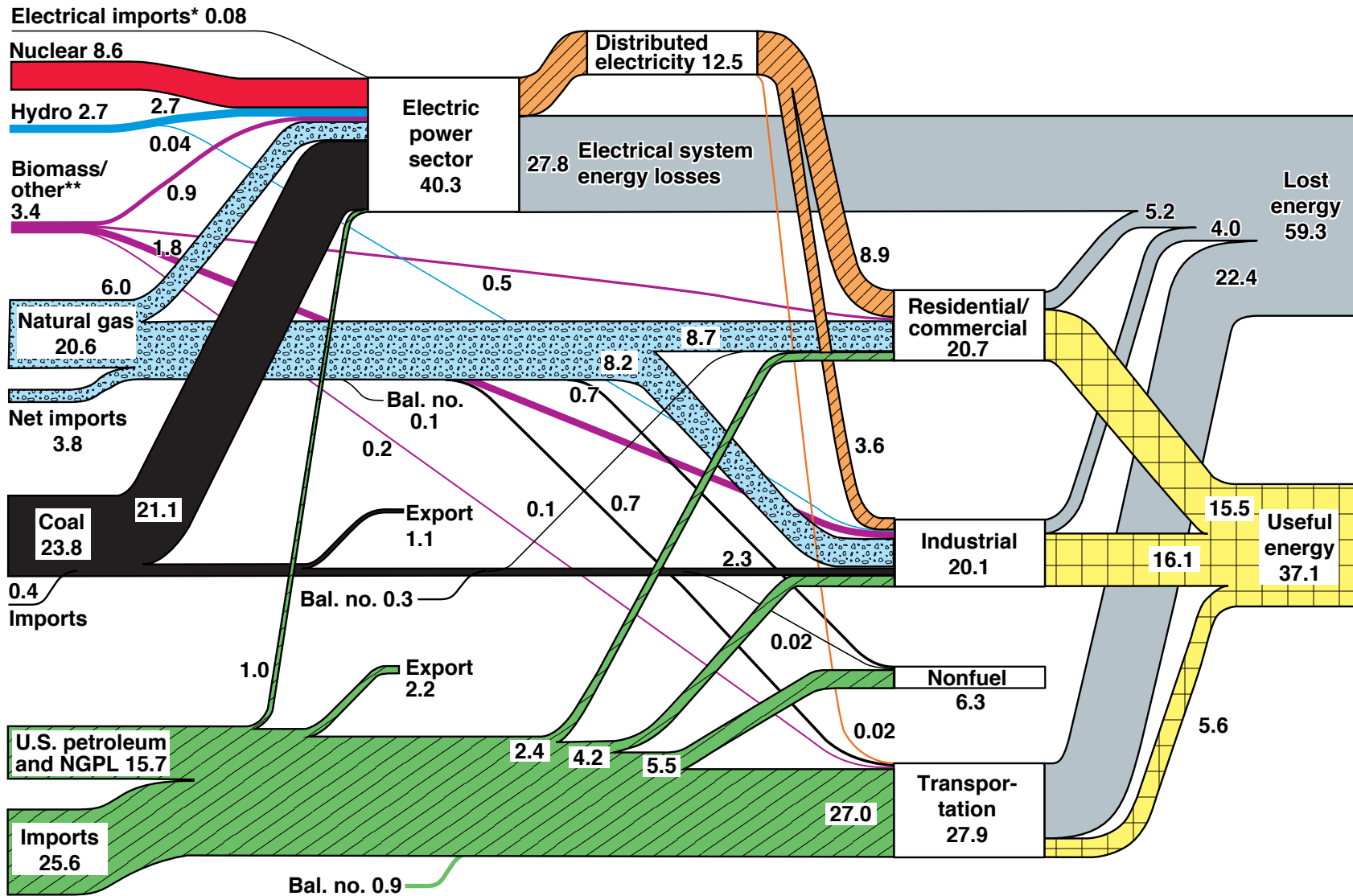
Net Primary Resource Consumption ~97 Quads



Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2002*.
 *Net fossil-fuel electrical imports.
 **Biomass/other includes wood, waste, alcohol, geothermal, solar, and wind.

Figure 2. U.S. Energy Flow Trends – 2002

Net Primary Resource Consumption ~103 Exajoules



Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2002*.

*Net fossil-fuel electrical imports.

**Biomass/other includes wood, waste, alcohol, geothermal, solar, and wind.

June 2004
Lawrence Livermore
National Laboratory
<http://eed.llnl.gov/flow>

AER2002's Table 1.2, "Energy Production by Source, 1949–2002" (p. 7), gives additional details about the 70.946 quads of energy produced within the United States in 2002. Table 1.3, "Energy Consumption by Source, 1949–2002" (p. 9), indicates the amounts of various fossil fuels and renewable energy sources consumed, as well as nuclear energy. Table 1.4, "Energy Imports, Exports, and Net Imports, 1949–2002" (p. 11), shows that the United States had net energy imports of 25.38 quads in 2002. This represents 26.1% of total energy consumed, compared to 27.4% in 2001 (using the revised numbers in AER02). Petroleum accounted for 87.8% of net U.S. energy imports in 2002.

AER2002's Table 2.1.a, "Energy Consumption by Sector, 1949–2002" (p. 38), gives the amounts and types of energy consumed by four end-use sectors—residential, commercial, industrial, and transportation—and by the electric power sector. Tables 2.1.b–f (pp. 39–43) give the consumption of resources for each individual sector. LLNL's chart combines the residential and the commercial sectors into a single unit: residential/commercial.

Definition of End-Use Sectors

The **Residential/Commercial** sector includes private and institutional residences; business establishments not engaged in transportation or manufacturing; commercial establishments; religious and nonprofit organizations; health, social, and educational institutions; and federal, state, and local governments. Electricity used for public street and highway lighting is also included.

The **Industrial** sector includes manufacturing industries (the largest part of the sector), mining, construction, agriculture, fisheries, and forestry. Establishments range from large steel mills to small farms. In LLNL's energy flow chart, fossil fuels used by industry in a nonfuel capacity are treated as a separate data stream; however, most

of the AER2002 tables incorporate nonfuel consumption in the data for the industrial sector.

The **Transportation** sector includes all types of public and private vehicles that transport people and commodities. This sector also includes the energy used to transport natural gas in pipelines. In fact, about 98% of the natural gas consumed by the transportation sector is for the operation of pipelines, primarily in compressors (AER2002, Table 6.5, p. 189).

Energy Content

The energy flow chart shows all energy streams in terms of a common energy unit: quadrillion Btu. The EIA typically uses conversion factors that represent the gross heat content of the fuel, which is the total amount of heat released when fuel is burned if the water in the combustion products is condensed (i.e., the "higher heating value"). Higher heating value is the fuel value basis on which fuel is priced. It is achieved in many power plants but not in transportation.

Appendix A of AER2002 (pp. 337–346) gives the thermal conversion factors used in that report. These factors are computed annually from the best available data, weighted as appropriate. EIA's estimate of heat content for a fuel depends on the source, type, year of production, and the sector using the fuel. For example, in 2002 the relatively small amount of coal consumed by the residential/commercial sector had an average heat content of approximately 24.836 million Btu per short ton of coal, but the coal used to generate electricity had an average heat content of approximately 20.479 million Btu per short ton. (AER2002, Table A5, p. 341).

Some conversion factors, useful for estimation, include:

<i>Fuel</i>	<i>Energy content (Btu)</i>
Short ton of coal	21,400,000
Barrel (42 gallons) of crude oil	5,800,000
Cubic foot of natural gas (at standard conditions)	1,027
Kilowatt-hour of electricity	3,412

Conversion Efficiency Factors

For the sake of consistency with LLNL's previous energy flow charts, the U.S. chart for 2002 assumes the same conversion efficiencies for the residential/commercial, industrial, and transportation sectors as in previous years. The conversion efficiencies are used to determine the proportion of "useful" to "lost" (or "rejected") energy. The uncertainties in these conversion estimates are large.

For electricity generation, the electrical system energy losses are assumed by the EIA to be about two-thirds of the energy consumed. LLNL's energy flow chart for 2002 shows electrical system energy losses of 26.3 quads, which is the sum of the amounts shown for the individual sectors in AER2002's Tables 2.1.b–e (i.e., 9.604 quads for residential, 9.149 quads for commercial, 7.526 quads for industrial, and 0.039 quads for transportation).

According to AER2002 (Note, p. 68), "Electrical system energy losses are calculated as the difference between total primary consumption by the electric power sector... and the total energy content of the retail sales of electricity.... 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. The loss is a thermodynamically necessary feature of the steam-electric cycle.... Overall, approximately 67 percent of total

energy input is lost in conversion; of electricity generated, approximately 5 percent is lost in plant use and 9 percent is lost in transmission and distribution."

The conversion efficiency factors for the residential/commercial and the industrial sectors are based on engineering estimates for the conversion efficiency of devices such as process heaters and boilers.

For the residential/commercial sector, we again assume an efficiency of 75%. This is a weighted average between space heating at approximately 60% efficiency and motors and other electrical uses at about 90% efficiency.

For the industrial sector, we continue to assume a conversion efficiency of 80%.

For transportation, we continue to assume a generous 20% efficiency, which corresponds to the approximate average efficiency of internal combustion engines as measured on Federal Driving Schedules (i.e., the amount of energy that actually reaches the drive train of a vehicle, compared to the amount of energy consumed). Note that the peak efficiencies of 33–35% for spark-ignited engines and 41–45% for diesel engines are not representative of conversion efficiencies over the Federal Driving Schedules.

Balancing Numbers

Three "balancing numbers" are indicated on the chart: –0.085 for natural gas, 0.864 for coal, and 0.304 for petroleum. When these three balancing numbers are added together, there is a 1.083 quad difference between the left-hand (or "production") side of the chart and the right-hand (or "consumption") side. This 1.083 quad difference corresponds approximately to the "adjustments" of 1.02 quad shown in AER2002 on Table 1.1.

Electricity Generation

LLNL's 1999 and 2000 energy flow charts lumped together the electricity generated by "utility" and "nonutility" generators, although the EIA produced separate estimates for each category.

Starting with 2001, however, the EIA changed how it estimates and groups data on the fuel consumed in electricity generation. EIA now organizes electric power and fuel use data into two new categories: electricity-only plants and combined-heat-and-power (CHP) plants, which were formerly known as cogeneration facilities.

EIA assigns CHP plants to the end-use sector that they report as their major line of business. Thus, a CHP plant that primarily operates to sell electricity is in the electric power sector; a CHP plant that is part of a hospital is in the commercial sector; and a CHP plant that is part of a paper mill is assigned to the industrial sector. The fuels consumed by these CHP plants are assigned to the corresponding sectors.

This has not affected the basic appearance of LLNL's flow charts. Note that on LLNL's 2002 chart, the thermal energy (i.e., useful heat) produced by the CHP plants in the electric power sector is not separated from the electric power generated. (More extensive details about electricity generation are given in AER2002, Section 8, pp. 217–251.)

Nonfuel Use

The data on fossil fuel consumption for nonfuel use is from AER2002, Table 1.15, "Fossil Fuel Consumption for Nonfuel Use, 1980–2002" (p. 33). Petroleum products account for 5.24 quads of nonfuel use and include asphalt and road oil, liquefied petroleum

gases, pentanes plus, lubricants, petrochemical feedstocks, special naphthas, and other products.

Nonfuel consumption in 2002 accounted for 6.1% of the primary energy resources consumed in the United States; however, because these resources were not used for energy purposes, LLNL's energy flow chart does not assign "lost" and "useful" designations.

Notes on Primary Resources

Biomass/Other

By far the largest portion in this category comes from “wood, waste, and alcohol,” which accounted for 2.756 quads of energy produced and consumed in 2002. Geothermal energy accounted for 0.304 quads; solar for 0.064 quads; and wind for 0.106 quads. (AER2002, Tables 1.2 and 1.3).

Coal

In 2002, the 22.554 quads of coal produced domestically represented 31.8% of all the energy produced within the United States (AER2002, Table 1.2). The electric power sector used 91.6% of the coal consumed in the United States in 2002 (AER2002, Tables 1.3 and 2.1f), with coal fueling 50.9% of the United States’ generation of electricity (AER2002, Table 2.2a, p. 45).

In 2002, 55% of U.S. coal production occurred west of the Mississippi, and 45% occurred east of the Mississippi; in 1990, by contrast, 38.8% was mined west of the Mississippi, and 61.2% was east of the river. Surface mining accounted for 67.4% of the coal produced in 2002, with underground mines accounting for 32.6%. (AER2002, Table 7.3, p. 205)

The approximate heat content of coal consumed by the different end-use sectors is given in AER2002, Table A5 (p. 341).

Hydroelectric Power

This involves the production of power from falling water, a renewable resource; almost all of this energy goes for the generation of electricity. The amount of hydroelectric power produced varies from year to year, depending on precipitation.

Natural Gas

In AER2002, details about natural gas production and consumption are included in Diagram 3, “Natural Gas Flow, 2002” (p. 179), and Table 6.1, “Natural Gas Overview, 1949–2002” (p. 181). The approximate heat content of natural gas is given in Table A4 (p. 340).

Net imports of natural gas in 2002 amounted to 3.58 quads. This accounted for about 15.6% of the natural gas consumed in the United States (AER2002, Table 6.3, p. 185), which is slightly lower than the 2001 proportion of 16.2%. About 94.2% of the gross natural gas imports came from Canada.

Of the natural gas withdrawn from U.S. wells in 2002, about 21% came from offshore locations (AER2002, Table 6.4, p 187).

Nuclear Energy

This is generated by the 104 operable nuclear generating units in the United States. Nuclear energy accounted for 20.6% of electricity net generation in the United States in 2002 (AER2002, Table 2.2a).

In 2002 the nuclear power industry operated with a capacity factor of 90.4%, the highest ever. (Capacity factors measure actual power generation as a share of maximum possible output.) For comparison, the capacity factor was 89.4% in 2001 and 66% in 1990 (AER2002, Table 9.2, p. 257).

Although EIA counts nuclear electric power as U.S. production, a significant proportion of the uranium used in fuel assemblies for U.S.

civilian nuclear power reactors is now of foreign origin. During 2002, owners and operators of U.S. civilian nuclear power reactors purchased 52,709 thousand pounds of U_3O_8 equivalent, with 88.2% of that uranium being of foreign origin. Also in 2002, the uranium in fuel assemblies loaded into U.S. civilian nuclear power reactors was 81.4% of foreign origin. In 2002, Canada was the top supplier of uranium to the United States (17,153 thousand pounds of U_3O_8 equivalent), followed by Australia (10,857 thousand pounds), Russia (6,334 thousand pounds), the United States (6,206 thousand pounds), Kazakhstan (5,410 thousand pounds), Uzbekistan (3,546 thousand pounds), and Namibia (1,082 thousand pounds). This information on uranium is from EIA's *Uranium Industry Annual 2002* [DOE/EIA-0478(2002), Washington, D.C., May 2003, Tables 11, 12, and 27.]

Petroleum and Natural Gas Plant Liquids (NGPL)

This category includes both crude oil and natural gas plant liquids (i.e., hydrocarbons in natural gas that have been separated as liquids). In AER2002, details about petroleum are found in Diagram 2 (p. 125) and Table 5.1 (p. 127). The approximate heat content of various petroleum products and of crude oil and NGPL can be found in AER2002, Tables A1, A2, and A3 (pp. 337–339).

Petroleum, at 38.183 quads, accounted for 39.2% of the United States' 2002 energy consumption, slightly less than 2001's 39.8% (AER02, Table 1.3). Motor gasoline was 45% of the total petroleum products supplied in 2002 (AER2002, Figure 5.11, p. 146).

The net petroleum imports of 22.28 quads accounted for 58.4% of U.S. petroleum consumption in 2002; by comparison, in 1990 the net petroleum imports of 15.29 quads accounted for only about 45.6% of consumption (AER2002, Tables 1.3 and 1.4). During that same interval (1990 to 2002), total U.S. energy consumption increased 15.1% (84.60 quads to 97.35 quads), and petroleum consumption increased 13.8% (33.553 quads to 38.183 quads). (AER2002, Tables 1.1 and 1.3)

In 2002, Persian Gulf nations accounted for 19.8% of U.S. petroleum imports. These nations include Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and United Arab Emirates. The largest single supplier of U.S. petroleum imports was Canada (1,939 thousand barrels/day or 17.1% of total petroleum imports); second was Saudi Arabia (1,553 thousand barrels/day or 13.7%); third was Mexico (1,532 thousand barrels/day or 13.5%); and fourth was Venezuela (1,383 thousand barrels/day or 12.2%). (AER01, Table 5.4, p. 133)

Other Ways to View This Data

The U.S. Consumed ~97 Quads of Energy in 2002

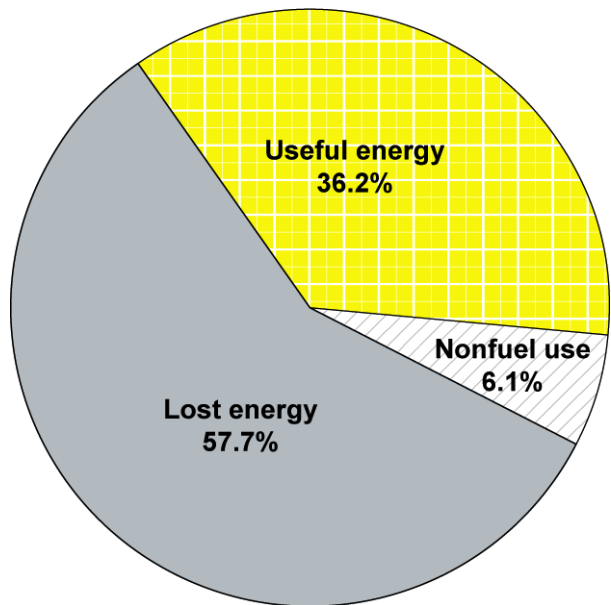
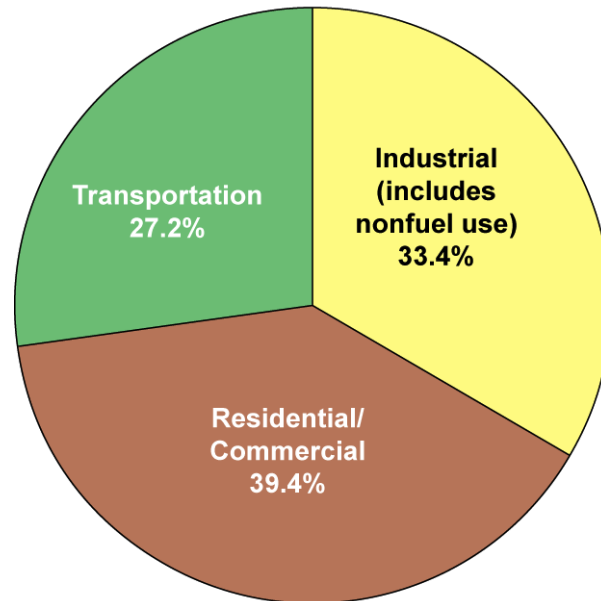


Figure 3. In 2002 the United States consumed about 97 quads of energy. As shown in the U.S. energy flow chart (Figure 1), 36.2% of that energy total was “useful,” while 57.7% of energy content was lost in the conversion process.

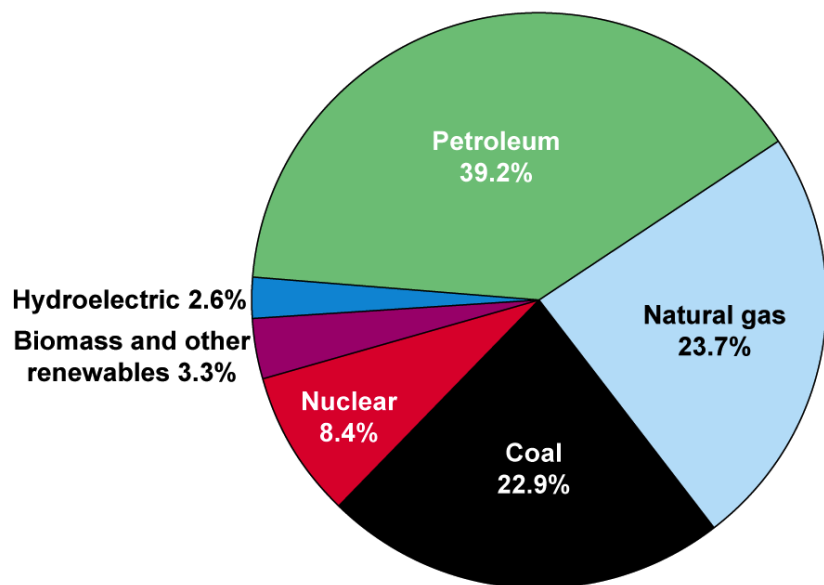
2002 Energy Consumption by End-Use Sector
(Includes electrical system energy losses)



Source: AER2002

Figure 4. U.S. energy consumption by end-use sector. Distributed electricity and related electrical system energy losses are included in each sector.

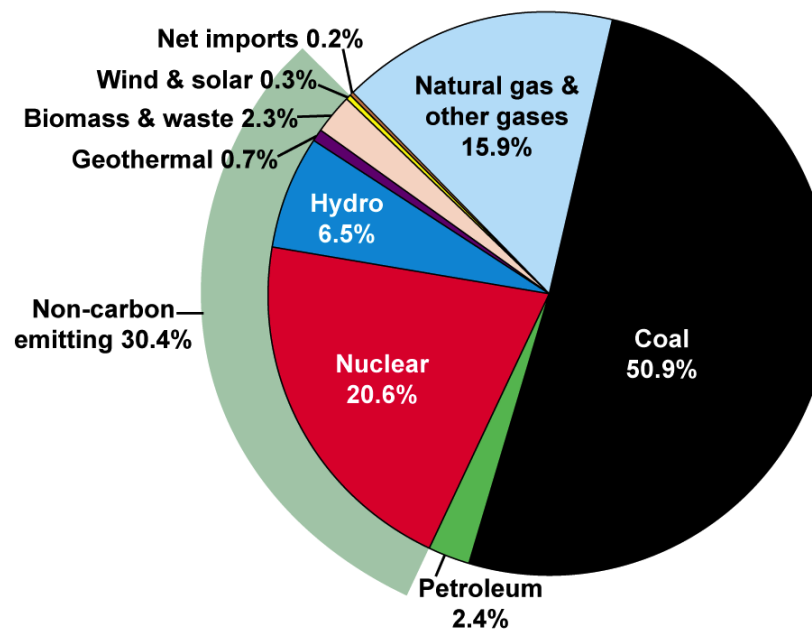
2002 Energy Consumption by Resource



Source: AER2002, Table 1.3

Figure 5. In 2002, petroleum supplied 39.2% of U.S. energy consumption, followed by natural gas (23.7%) and coal (22.9%). Together, these three fossil fuels supplied 85.7% of the United States' energy.

Total U.S. Electricity Generation by Resource, 2002



Source: AER2002, Table 2.2a

Figure 6. Coal supplied more than half (50.9%) of the energy used to generate electricity in the United States in 2002. Nuclear energy accounted for 20.6%. Non-carbon-emitting sources (i.e., nuclear and renewable energy, including hydroelectricity) together accounted for 30.4% of the electricity generated.

U.S. Carbon Emissions from Energy Consumption, 2002

Paralleling the U.S. Energy flow chart, LLNL also produces a chart showing U.S. carbon dioxide emissions from energy consumption. Figure 7, the 2002 chart, depicts these emissions by type of fossil fuel and by the same end-use sectors as shown on the energy flow chart for 2002.

The numbers for this chart are from EIA's publication, *Emissions of Greenhouse Gases in the United States 2002* [DOE/EIA-0573(2002), Washington, D.C., published October 2003 and available on the Web at http://www.eia.doe.gov/env/env_pub.html .]

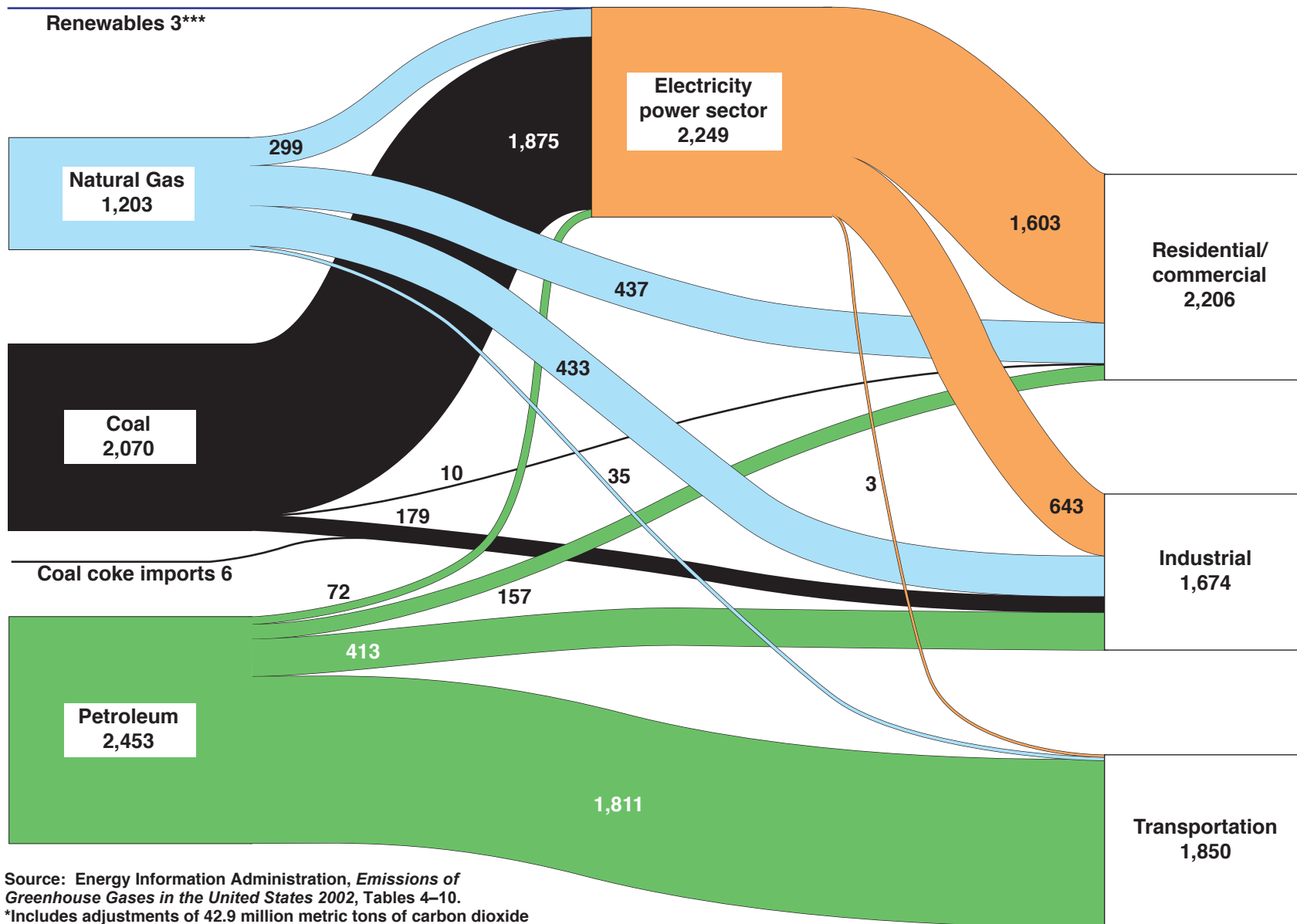
Carbon dioxide (CO₂) is one of the “greenhouse gases” that trap absorbed radiation in the Earth's atmosphere. Other greenhouse gases include nitrous oxide, methane, and various engineered gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. EIA's report (GHG2002) quantifies all the U.S. emissions of greenhouse gases caused by human activity. The numbers on this chart are from Chapter 2, pages 17–32, of GHG2002.

Carbon dioxide is a colorless, nonpoisonous gas that is a normal part of the Earth's atmosphere. However, carbon dioxide is also a product of the combustion of fossil fuels (coal, petroleum, and natural gas), and thus U.S. carbon dioxide emissions correlate to the amount of fossil fuels used for energy consumption. In 2002, energy-related carbon dioxide accounted for 82.8% of all the anthropogenic U.S. greenhouse gas emissions, based on global warming potential (GHG2002, Figure ES1, p. x). The non-energy-related carbon

dioxide emissions came from cement production, industrial processes, and other sources.

Following EIA's current conventions, this chart shows these emissions in terms of million metric tons of carbon dioxide, based on the molecular weight of the gas. (Note that LLNL's previous versions of this chart showed emissions in million metric tons of carbon, following the measuring practice then used by the EIA.) Carbon dioxide mass is converted to carbon mass by multiplying by 12/44.

Fig. 7. U.S. 2002 Carbon Dioxide Emissions from Energy Consumption — 5,682* Million Metric Tons of CO₂**



Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2002*, Tables 4–10.

*Includes adjustments of 42.9 million metric tons of carbon dioxide from U.S. territories, less 90.2 MtCO₂ from international and military bunker fuels.

**Previous versions of this chart showed emissions in metric tons of carbon, not of CO₂.

***Municipal solid waste and geothermal energy.

Note: Numbers may not equal sum of components because of independent rounding.

Comparison of 1990, 2001, and 2002 Energy Consumption

The tables below include data for 1990, 2001, and 2002 and also show the percentage change from 1990 to 2002. The numbers in the tables below are from AER2002. They may not correspond precisely to LLNL's U.S. energy flow chart for 2001, which was based on *Annual Energy Review 2001*.

Primary Resource Consumption by End-Use Sector

As Table 1 shows, from 1990 to 2002 U.S. energy consumption increased 15.1%. During that period, energy consumption by the electric power industry increased 24.6% and by the transportation sector increased 18.7%. Table 1 does not allocate electric power to the other end-use sectors, as does LLNL's energy flow chart (Figure 1.)

Energy Production and Imports

From 1990 to 2002, as Table 2 indicates, the amount of energy produced in the United States has remained almost constant (increasing only 0.3%), while the net imports of energy have increased 80.5%. In 2002, net imports provided 26.1% of the energy that the United States consumed; in 1990 imports were only 16.6% of the total consumption.

Petroleum accounts for the majority of U.S. energy imports and is of special concern because much of that petroleum comes from volatile regions of the world. However, natural gas imports are actually increasing more than three times as fast as petroleum imports. Most of that natural gas comes from Canada.

Resource Consumption

Variations in resource consumption can be caused by differences in supply, cost, and weather. For example, the amount of rainfall in certain regions of the United States affects the amount of hydroelectricity that can be produced. Colder winters increase the demand on fuels for space heating, while hotter summers lead to greater consumption of electricity for air conditioning and thus of the resources used in electricity generation. As Table 3 indicates, from 1990 to 2002 the consumption of nuclear energy grew at a faster rate (33.4%) than any other resource, followed by natural gas (16.9%).

Factors Affecting Consumption

As Table 4 shows, per-capita energy use in 2002 (that is, 338 million Btu per person) was almost the same as in 1990—340 million Btu. Between 1990 and 2002, however, the U.S. population increased 15.9%—and, in parallel, total energy consumption increased 15.1%.

Although the U.S. Gross Domestic Product (GDP) increased 40.7% from 1990 to 2002 (in chained 1996 dollars), the amount of energy consumed per dollar of GDP dropped 18.2%. Economic fluctuations particularly impact energy use in the industrial sector and also in the transportation sector.

**Table 1. Primary resource consumption by sector*,
1990, 2001, and 2002**

	1990 (quads)	2001 (quads)	2002 (quads)	% change 1990–2002
Residential/ Commercial	10.45	11.0	11.13	6.5
Industrial (incl. nonfuel)	21.209	21.808	21.573	1.7
Transportation	22.305	26.213	26.465	18.7
Electric power industry*	30.647	37.306	38.177	24.6
Total consumption	84.605	96.322	97.351	15.1

Source: AER2002, T. 2.1.a

*Electric power generation and electrical system energy losses are grouped under Electric Power Industry and not assigned to the other sectors.

**Table 2. U.S. energy production and net imports,
1990, 2001, and 2002**

	1990 (quads)	2001 (quads)	2002 (quads)	% change 1990–2002
U.S. production	70.729	71.372	70.946	0.3
Net energy imports	14.06	26.39	25.38	80.5
Net petroleum imports	15.29	23.36	22.28	45.7
Net natural gas imports	1.46	3.69	3.58	145.2

Source: AER2002, T. 1.2 and 1.4

Table 3. U.S. energy consumption by resource, 1990, 2001, and 2002

	1990 (quads)	2001 (quads)	2002 (quads)	% change 1990–2002
Biomass/other	3.087	3.122	3.23	4.6
Hydro	3.01	2.111	2.579	-14.3
Nuclear	6.104	8.028	8.145	33.4
Natural gas	19.730	22.869	23.062	16.9
Coal*	19.178	21.929	22.246	16.0
Petroleum & NGPL	33.553	38.333	38.183	13.8

Source: AER2002, T. 1.3 *Includes coal coke net imports

Table 4. Factors affecting total U.S. energy consumption, 1990, 2001, and 2002

	1990	2001	2002	% change 1990–2002
Total U.S. energy consumption (quads)	84.605	96.322	97.351	15.1
U.S. population (million people)	248.8	285.3	288.4	15.9
Energy consumption per person (million Btu)	340	338	338	-00.6
GDP (billion chained 1996 dollars)	6,707.9	9,214.5	9,439.9	40.7
Energy consumption per \$ of GDP (1000 Btu per chained 1996 dollar)	12.61	10.45	10.31	-18.2

Source: AER2002, Tables 1.5 and E1

Appendix
Selected Tables from
Energy Information Administration's
Annual Energy Review 2002

- Table 1.1 Energy Overview, 1949–2002
- Table 1.2 Energy Production by Source, 1949–2002
- Table 1.3 Energy Consumption by Source, 1949–2002
- Table 1.4 Energy Imports, Exports, and Net Imports, 1949–2002
- Table 1.15 Fossil Fuel Consumption for Nonfuel Use, 1980–2002
- Table 2.1a Energy Consumption by Sector, 1949–2002
- Table 2.1b Residential Sector Energy Consumption, 1949–2002
- Table 2.1c Commercial Sector Energy Consumption, 1949–2002
- Table 2.1d Industrial Sector Energy Consumption, 1949–2002
- Table 2.1e Transportation Sector Energy Consumption, 1949–2002
- Table 2.1f Electric Power Sector Energy Consumption, 1949–2002
- Table 2.2a Consumption for Electricity Generation: Total (All Sectors), 1949–2002
- Table D1 Population and U.S. Gross Domestic Product, 1949–2002

Table 1.1 Energy Overview, 1949-2002
(Quadrillion Btu)

Year	Production				Imports		Exports		Adjustments ⁷	Consumption			
	Fossil Fuels ¹	Nuclear Electric Power	Renewable Energy ²	Total ³	Petroleum ⁴	Total ⁵	Coal	Total ⁶		Fossil Fuels ⁸	Nuclear Electric Power	Renewable Energy ²	Total ^{9,10}
1949	28.75	0	2.97	31.72	1.43	R1.45	0.88	1.59	0.40	29.00	0	R2.97	R31.98
1950	32.56	0	2.98	35.54	1.89	R1.91	0.79	1.47	-1.37	31.63	0	R2.98	R34.62
1951	35.79	0	2.96	38.75	1.87	R1.89	1.68	2.62	-1.05	34.01	0	R2.96	R36.97
1952	34.98	0	2.94	37.92	2.11	R2.15	1.40	2.37	-0.95	33.80	0	R2.94	R36.75
1953	35.35	0	2.83	38.18	2.28	R2.31	0.98	1.87	-0.96	34.83	0	R2.83	R37.66
1954	33.76	0	2.75	36.52	2.32	R2.35	0.91	1.70	-0.53	33.88	0	R2.75	R36.64
1955	37.36	0	2.78	40.15	2.75	R2.79	1.46	2.29	-0.44	37.41	0	R2.78	R40.21
1956	39.77	0	2.85	42.62	3.17	R3.21	1.98	2.95	-1.13	38.89	0	R2.85	R41.75
1957	40.13	(s)	2.85	42.98	3.46	R3.53	2.17	R3.44	-1.29	38.93	(s)	R2.85	R41.79
1958	37.22	(s)	2.92	40.13	3.72	R3.88	1.42	R2.05	-0.32	38.72	(s)	R2.92	R41.65
1959	39.05	(s)	2.90	41.95	3.91	R4.08	1.05	R1.53	-1.03	40.55	(s)	R2.90	R43.47
1960	39.87	0.01	2.93	42.80	4.00	R4.19	1.02	1.48	-0.43	42.14	0.01	R2.93	R45.09
1961	40.31	0.02	2.95	43.28	4.19	R4.44	0.98	1.38	-0.60	42.76	0.02	R2.95	R45.74
1962	41.73	0.03	3.12	44.88	4.56	R4.99	1.08	R1.47	-0.57	44.68	0.03	3.12	47.83
1963	44.04	0.04	3.10	47.17	4.65	R5.09	1.36	R1.84	-0.78	46.51	0.04	3.10	49.65
1964	45.79	0.04	3.23	49.06	4.96	R5.45	1.34	R1.81	-0.87	48.54	0.04	R3.23	R51.82
1965	47.23	0.04	3.40	50.68	5.40	R5.89	1.38	R1.83	-0.72	50.58	0.04	3.40	54.02
1966	50.04	0.06	3.43	53.53	5.63	R6.15	1.35	R1.83	-0.83	53.51	0.06	R3.43	57.02
1967	52.60	0.09	3.69	56.38	5.56	R6.16	1.35	R2.12	-1.52	55.13	0.09	3.69	58.91
1968	54.31	0.14	3.78	58.23	6.21	R6.91	1.38	R2.00	-0.71	58.50	0.14	R3.78	R62.42
1969	56.29	0.15	4.10	60.54	6.90	R7.68	1.53	R2.13	-0.47	61.36	0.15	R4.10	R65.62
1970	59.19	0.24	4.08	63.50	7.47	R8.34	1.94	R2.63	-1.37	63.52	0.24	R4.08	R67.84
1971	58.04	0.41	4.27	62.72	8.54	R9.53	1.55	R2.15	-0.82	64.60	0.41	R4.27	R69.29
1972	58.94	0.58	4.40	63.92	10.30	R11.39	1.53	R2.12	-0.48	67.70	0.58	R4.40	R72.70
1973	58.24	0.91	4.43	63.58	13.47	R14.61	1.43	R2.03	-0.46	70.32	0.91	R4.43	R75.71
1974	56.33	1.27	4.77	62.37	13.13	R14.30	1.62	R2.20	-0.48	67.91	1.27	R4.77	R73.99
1975	54.73	1.90	4.72	61.36	12.95	R14.03	1.76	R2.32	-1.07	65.35	1.90	R4.72	R72.00
1976	54.72	2.11	4.77	61.60	15.67	R16.76	1.60	R2.17	-0.18	69.10	2.11	R4.77	R76.01
1977	55.10	2.70	4.25	62.05	18.76	R19.95	1.44	R2.05	-1.95	70.99	2.70	R4.25	R78.00
1978	55.07	3.02	5.04	63.14	17.82	R19.11	1.08	R1.92	-0.34	71.86	3.02	R5.04	R79.99
1979	58.01	2.78	5.17	65.95	17.93	R19.46	1.75	R2.86	-1.65	72.89	2.78	R5.17	R80.90
1980	59.01	2.74	5.49	67.24	14.66	R15.80	2.42	R3.69	-1.05	69.98	2.74	R5.49	R78.29
1981	58.53	3.01	5.47	67.01	12.64	R13.72	2.94	R4.31	-0.08	67.75	3.01	R5.47	R76.33
1982	57.46	3.13	5.99	66.57	10.78	R11.86	2.79	R4.61	-0.59	64.04	3.13	R5.99	R73.23
1983	54.42	3.20	6.49	64.11	10.65	R11.75	2.04	R3.69	0.90	63.29	3.20	R6.49	R73.07
1984	58.85	3.55	6.43	68.83	11.43	R12.47	2.15	R3.79	-0.82	66.62	3.55	R6.43	R76.69
1985	57.54	4.08	6.03	67.65	10.61	R11.78	2.44	R4.20	1.19	66.22	4.08	R6.03	R76.42
1986	56.58	4.38	6.13	67.09	13.20	R14.15	2.25	R4.02	-0.50	66.15	4.38	R6.13	R76.72
1987	57.17	4.75	5.69	67.61	14.16	R15.40	2.09	R3.81	-0.04	68.63	4.75	R5.69	R79.16
1988	57.87	5.59	5.49	68.95	15.75	R17.30	2.50	R4.37	0.89	71.66	5.59	R5.49	R82.77
1989	57.47	5.60	R6.29	R69.36	17.16	R18.77	2.64	R4.66	R1.42	R73.02	5.60	R6.29	R84.89
1990	R58.53	6.10	R6.13	70.73	17.12	R18.82	2.77	R4.75	R-0.19	R72.46	6.10	R6.13	R84.60
1991	57.83	6.42	R6.16	R70.36	16.35	R18.33	2.85	R5.14	0.97	R72.00	6.42	R6.16	R84.52
1992	57.59	6.48	5.91	69.93	16.97	R19.37	2.68	R4.94	1.50	R73.52	6.48	R5.91	R85.87
1993	55.74	6.41	6.16	68.26	18.51	R21.27	1.96	R4.26	2.30	R75.05	6.41	R6.16	R87.58
1994	57.95	6.69	6.06	70.68	19.24	R22.39	1.88	R4.06	0.24	R76.48	6.69	R6.06	R89.25
1995	R57.44	7.08	6.67	R71.16	18.88	R22.26	2.32	R4.51	R2.32	R77.49	7.08	R6.67	R91.22
1996	R58.28	7.09	7.14	R72.47	20.29	R23.70	2.37	R4.63	R2.68	R79.98	7.09	R7.14	R94.22
1997	58.76	6.60	7.08	72.39	21.74	R25.22	2.19	R4.51	1.64	R81.09	6.60	R7.08	R94.73
1998	59.20	7.07	6.56	72.79	22.91	R26.58	2.09	R4.30	0.08	R81.59	7.07	R6.56	R95.15
1999	57.51	7.61	R6.60	R71.65	23.13	R27.25	1.53	R3.71	1.58	R82.65	7.61	R6.60	R96.77
2000	R57.25	7.86	R6.16	R71.22	24.53	R28.97	1.53	R4.01	R2.76	R85.00	7.86	R6.16	R98.94
2001	R58.11	8.03	R5.32	R71.37	R25.40	R30.15	1.27	R3.76	R-1.44	R83.13	8.03	R5.32	R96.32
2002 ^P	56.99	8.15	5.90	70.95	24.31	29.04	1.03	3.65	1.02	83.49	8.15	5.90	97.35

¹ Coal, natural gas (dry), crude oil, and natural gas plant liquids.

² End-use consumption and electricity net generation.

³ Also includes hydroelectric pumped storage.

⁴ Crude oil and petroleum products. Includes imports into the Strategic Petroleum Reserve.

⁵ Also includes natural gas, coal, coal coke, and electricity.

⁶ Also includes natural gas, petroleum, coal coke, and electricity.

⁷ A balancing item. Includes stock changes, losses, gains, miscellaneous blending components, and unaccounted-for supply.

⁸ Coal, coal coke net imports, natural gas, and petroleum.

⁹ Also includes hydroelectric pumped storage and electricity net imports.

¹⁰ Alcohol (ethanol blended into motor gasoline) is included in consumption values for both "Fossil Fuels" and "Renewable Energy," but is counted only once in total energy consumption.

R=Revised. P=Preliminary. (s)=Less than 0.005 quadrillion Btu.

Notes: • See Note 1 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 1.2, 1.3, and 1.4.

Table 1.2 Energy Production by Source, 1949-2002
(Quadrillion Btu)

Year	Fossil Fuels					Nuclear Electric Power	Hydro-electric Pumped Storage ³	Renewable Energy ¹						Total
	Coal	Natural Gas (Dry)	Crude Oil ²	Natural Gas Plant Liquids	Total			Conventional Hydroelectric Power	Wood, Waste, Alcohol ⁴	Geothermal	Solar	Wind	Total	
1949	11.974	5.377	10.683	0.714	28.748	0	(⁵)	1.425	1.549	NA	NA	NA	2.974	31.722
1950	14.060	6.233	11.447	0.823	32.563	0	(⁵)	1.415	1.562	NA	NA	NA	2.978	35.540
1951	14.419	7.416	13.037	0.920	35.792	0	(⁵)	1.424	1.535	NA	NA	NA	2.958	38.751
1952	12.734	7.964	13.281	0.998	34.977	0	(⁵)	1.466	1.474	NA	NA	NA	2.940	37.917
1953	12.278	8.339	13.671	1.062	35.349	0	(⁵)	1.413	1.419	NA	NA	NA	2.831	38.181
1954	10.542	8.682	13.427	1.113	33.764	0	(⁵)	1.360	1.394	NA	NA	NA	2.754	36.518
1955	12.370	9.345	14.410	1.240	37.364	0	(⁵)	1.360	1.424	NA	NA	NA	2.784	40.148
1956	13.306	10.002	15.180	1.283	39.771	0	(⁵)	1.435	1.416	NA	NA	NA	2.851	42.622
1957	13.061	10.605	15.178	1.289	40.133	(s)	(⁵)	1.516	1.334	NA	NA	NA	2.849	42.983
1958	10.783	10.942	14.204	1.287	37.216	0.002	(⁵)	1.592	1.323	NA	NA	NA	2.915	40.133
1959	10.778	11.952	14.933	1.383	39.045	0.002	(⁵)	1.548	1.353	NA	NA	NA	2.901	41.949
1960	10.817	12.656	14.935	1.461	39.869	0.006	(⁵)	1.608	1.320	0.001	NA	NA	2.929	42.804
1961	10.447	13.105	15.206	1.549	40.307	0.020	(⁵)	1.656	1.295	0.002	NA	NA	2.953	43.280
1962	10.901	13.717	15.522	1.593	41.732	0.026	(⁵)	1.816	1.300	0.002	NA	NA	3.119	44.877
1963	11.849	14.513	15.966	1.709	44.037	0.038	(⁵)	1.771	1.323	0.004	NA	NA	3.098	47.174
1964	12.524	15.298	16.164	1.803	45.789	0.040	(⁵)	1.886	1.337	0.005	NA	NA	3.228	49.056
1965	13.055	15.775	16.521	1.883	47.235	0.043	(⁵)	2.059	1.335	0.004	NA	NA	3.398	50.676
1966	13.468	17.011	17.561	1.996	50.035	0.064	(⁵)	2.062	1.369	0.004	NA	NA	3.435	53.534
1967	13.825	17.943	18.651	2.177	52.597	0.088	(⁵)	2.347	1.340	0.007	NA	NA	3.694	56.379
1968	13.609	19.068	19.308	2.321	54.306	0.142	(⁵)	2.349	1.419	0.009	NA	NA	3.778	58.225
1969	13.863	20.446	19.556	2.420	56.286	0.154	(⁵)	2.648	1.440	0.013	NA	NA	4.102	60.541
1970	14.607	21.666	20.401	2.512	59.186	0.239	(⁵)	2.634	1.431	0.011	NA	NA	4.076	63.501
1971	13.186	22.280	20.033	2.544	58.042	0.413	(⁵)	2.824	1.432	0.012	NA	NA	4.268	62.723
1972	14.092	22.208	20.041	2.598	58.938	0.584	(⁵)	2.864	1.503	0.031	NA	NA	4.398	63.920
1973	13.992	22.187	19.493	2.569	58.241	0.910	(⁵)	2.861	1.529	0.043	NA	NA	4.433	63.585
1974	14.074	21.210	18.575	2.471	56.331	1.272	(⁵)	3.177	1.540	0.053	NA	NA	4.769	62.372
1975	14.989	19.640	17.729	2.374	54.733	1.900	(⁵)	3.155	1.499	0.070	NA	NA	4.723	61.357
1976	15.654	19.480	17.262	2.327	54.723	2.111	(⁵)	2.976	1.713	0.078	NA	NA	4.768	61.602
1977	15.755	19.565	17.454	2.327	55.101	2.702	(⁵)	2.333	1.838	0.077	NA	NA	4.249	62.052
1978	14.910	19.485	18.434	2.245	55.074	3.024	(⁵)	2.937	2.038	0.064	NA	NA	5.039	63.137
1979	17.540	20.076	18.104	2.286	58.006	2.776	(⁵)	2.931	2.152	0.084	NA	NA	5.166	65.948
1980	18.598	19.908	18.249	2.254	59.008	2.739	(⁵)	2.900	2.485	0.110	NA	NA	5.494	67.241
1981	18.377	19.699	18.146	2.307	58.529	3.008	(⁵)	2.758	2.590	0.123	NA	NA	5.471	67.007
1982	18.639	18.319	18.309	2.191	57.458	3.131	(⁵)	3.266	2.615	0.105	NA	NA	5.985	66.574
1983	17.247	16.593	18.392	2.184	54.416	3.203	(⁵)	3.527	2.831	0.129	NA	(s)	6.488	64.106
1984	19.719	18.008	18.848	2.274	58.849	3.553	(⁵)	3.386	2.880	0.165	(s)	(s)	6.431	68.832
1985	19.325	16.980	18.992	2.241	57.539	4.076	(⁵)	2.970	2.864	0.198	(s)	(s)	6.033	67.647
1986	19.509	16.541	18.376	2.149	56.575	4.380	(⁵)	3.071	2.841	0.219	(s)	(s)	6.132	67.087
1987	20.141	17.136	17.675	2.215	57.167	4.754	(⁵)	2.635	2.823	0.229	(s)	(s)	5.687	67.608
1988	20.738	17.599	17.279	2.260	57.875	5.587	(⁵)	2.334	2.937	0.217	(s)	(s)	5.489	68.951
1989	21.346	17.847	16.117	2.158	57.468	5.602	(⁵)	R ² 2.837	3.062	R ⁰ 0.317	0.055	R ⁰ 0.022	R ⁶ 2.294	R ⁶⁹ 364
1990	22.456	R ¹⁸ 326	15.571	2.175	R ⁵⁸ 529	6.104	-0.036	R ³ 0.046	R ² 6.662	R ⁰ 0.336	0.060	R ⁰ 0.029	R ⁶ 1.133	R ⁷⁰ 729
1991	21.594	18.229	15.701	2.306	57.829	6.422	-0.047	R ³ 0.016	2.702	R ⁰ 0.346	0.063	R ⁰ 0.031	R ⁶ 1.58	R ⁷⁰ 362
1992	21.629	18.375	15.223	2.363	57.590	6.479	-0.043	2.617	2.847	0.349	0.064	0.030	5.907	69.933
1993	20.249	18.584	14.494	2.408	55.736	6.410	-0.042	2.892	2.804	0.364	0.066	0.031	6.157	68.262
1994	22.111	19.348	14.103	2.391	57.952	6.694	-0.035	2.683	2.939	0.338	0.069	0.036	6.065	70.676
1995	22.029	R ¹⁹ 082	13.887	2.442	R ⁵⁷ 440	7.075	-0.028	3.205	3.068	0.294	0.070	0.033	6.669	R ⁷¹ 156
1996	22.684	R ¹⁹ 344	13.723	2.530	R ⁵⁸ 281	7.087	-0.032	3.590	3.127	0.316	0.071	0.033	7.137	R ⁷² 472
1997	23.211	19.394	13.658	2.495	58.758	6.597	-0.041	3.640	3.006	0.325	0.070	0.034	7.075	72.389
1998	23.935	19.613	13.235	2.420	59.204	7.068	-0.046	3.297	2.835	0.328	0.070	0.031	6.561	72.787
1999	23.186	19.341	12.451	2.528	57.505	7.610	-0.062	3.268	R ² 885	0.331	0.069	0.046	R ⁶ 599	R ⁷¹ 652
2000	22.623	R ¹⁹ 662	12.358	2.611	R ⁵⁷ 254	7.862	-0.057	2.811	R ² 907	0.317	0.066	0.057	R ⁶ 158	R ⁷¹ 218
2001	R ²³ 053	R ²⁰ 227	R ¹² 282	R ² 547	R ⁵⁸ 109	8.028	-0.090	R ² 201	R ² 678	R ⁰ 311	R ⁰ 065	R ⁰ 068	R ⁵ 324	R ⁷¹ 372
2002 ^P	22.554	19.561	12.314	2.561	56.990	8.145	-0.089	2.668	2.756	0.304	0.064	0.106	5.899	70.946

¹ End-use consumption and electricity net generation.

² Includes lease condensate.

³ Pumped storage facility production minus energy used for pumping.

⁴ Alcohol is ethanol blended into motor gasoline.

⁵ Included in "Conventional Hydroelectric Power."

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.0005 quadrillion Btu.

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

Sources: Tables 5.1, 6.1, 7.1, 8.2a, 10.2a, 10.2b, and A2-A6.

Table 1.3 Energy Consumption by Source, 1949-2002
(Quadrillion Btu)

Year	Fossil Fuels					Nuclear Electric Power	Hydro-electric Pumped Storage ⁴	Renewable Energy ¹					Electricity Net Imports	Total ⁵	
	Coal	Coal Coke Net Imports	Natural Gas ²	Petroleum ³	Total			Conventional Hydroelectric Power	Wood, Waste, Alcohol ⁵	Geothermal	Solar	Wind			Total
1949	11.981	-0.007	5.145	11.883	29.002	0	(6)	R1.425	1.549	NA	NA	NA	R2.974	0.005	R31.982
1950	12.347	0.001	5.968	13.315	31.632	0	(6)	R1.415	1.562	NA	NA	NA	R2.978	0.006	R34.616
1951	12.553	-0.021	7.049	14.428	34.008	0	(6)	R1.424	1.535	NA	NA	NA	R2.958	0.007	R36.974
1952	11.306	-0.012	7.550	14.956	33.800	0	(6)	R1.466	1.474	NA	NA	NA	R2.940	0.008	R36.748
1953	11.373	-0.009	7.907	15.556	34.826	0	(6)	R1.413	1.419	NA	NA	NA	R2.831	0.007	R37.664
1954	9.715	-0.007	8.330	15.839	33.877	0	(6)	R1.360	1.394	NA	NA	NA	R2.754	0.008	R36.639
1955	11.167	-0.010	8.998	17.255	37.410	0	(6)	R1.360	1.424	NA	NA	NA	R2.784	0.014	R40.208
1956	11.350	-0.013	9.614	17.937	38.888	0	(6)	R1.435	1.416	NA	NA	NA	R2.851	0.016	R41.754
1957	10.821	-0.017	10.191	17.932	38.926	(s)	(6)	R1.516	1.334	NA	NA	NA	R2.849	0.012	R41.787
1958	9.533	-0.007	10.663	18.527	38.717	0.002	(6)	R1.592	1.323	NA	NA	NA	R2.915	0.011	R41.645
1959	9.518	-0.008	11.717	19.323	40.550	0.002	(6)	R1.548	1.353	NA	NA	NA	R2.901	0.012	R43.466
1960	9.838	-0.006	12.385	19.919	42.137	0.006	(6)	R1.608	1.320	0.001	NA	NA	R2.929	0.015	R45.087
1961	9.623	-0.008	12.926	20.216	42.758	0.020	(6)	R1.656	1.295	0.002	NA	NA	R2.953	0.008	R45.739
1962	9.906	-0.006	13.731	21.049	44.681	0.026	(6)	R1.816	1.300	0.002	NA	NA	R3.119	0.002	R47.828
1963	10.413	-0.007	14.403	21.701	46.509	0.038	(6)	R1.771	1.323	0.004	NA	NA	R3.098	(s)	R49.646
1964	10.964	-0.010	15.288	22.301	48.543	0.040	(6)	R1.886	1.337	0.005	NA	NA	R3.228	0.007	R51.817
1965	11.581	-0.018	15.769	23.246	50.577	0.043	(6)	R2.059	1.335	0.004	NA	NA	R3.398	(s)	R54.017
1966	12.143	-0.025	16.995	24.401	53.514	0.064	(6)	R2.062	1.369	0.004	NA	NA	R3.435	0.004	R57.017
1967	11.914	-0.015	17.945	25.284	55.127	0.088	(6)	R2.347	1.340	0.007	NA	NA	R3.694	-0.001	R58.908
1968	12.331	-0.017	19.210	26.979	58.502	0.142	(6)	R2.349	1.419	0.009	NA	NA	R3.778	-0.002	R62.419
1969	12.382	-0.036	20.678	28.338	61.362	0.154	(6)	R2.648	1.440	0.013	NA	NA	R4.102	0.004	R65.621
1970	12.265	-0.058	21.795	29.521	63.522	0.239	(6)	R2.634	1.431	0.011	NA	NA	R4.076	0.007	R67.844
1971	11.598	-0.033	22.469	30.561	64.596	0.413	(6)	R2.824	1.432	0.012	NA	NA	R4.268	0.012	R69.289
1972	12.077	-0.026	22.698	32.947	67.696	0.584	(6)	R2.864	1.503	0.031	NA	NA	R4.398	0.026	R72.704
1973	12.971	-0.007	22.512	34.840	70.316	0.910	(6)	R2.861	1.529	0.043	NA	NA	R4.433	0.049	R75.708
1974	12.663	0.056	21.732	33.455	67.906	1.272	(6)	R3.177	1.540	0.053	NA	NA	R4.769	0.043	R73.991
1975	12.663	0.014	19.948	32.731	65.355	1.900	(6)	R3.155	1.499	0.070	NA	NA	R4.723	0.021	R71.999
1976	13.584	(s)	20.345	35.175	69.104	2.111	(6)	R2.976	1.713	0.078	NA	NA	R4.768	0.029	R76.012
1977	13.922	0.015	19.931	37.122	70.989	2.702	(6)	R2.333	1.838	0.077	NA	NA	R4.249	0.059	R78.000
1978	13.766	0.125	20.000	37.965	71.856	3.024	(6)	R2.937	2.038	0.064	NA	NA	R5.039	0.067	R79.986
1979	15.040	0.063	20.666	37.123	72.892	2.776	(6)	R2.931	2.152	0.084	NA	NA	R5.166	0.069	R80.903
1980	15.423	-0.035	20.394	34.202	69.984	2.739	(6)	R2.900	2.485	0.110	NA	NA	R5.494	0.071	R78.289
1981	15.908	-0.016	19.928	31.931	67.750	3.008	(6)	R2.758	2.590	0.123	NA	NA	R5.471	0.113	R76.335
1982	15.322	-0.022	18.505	30.232	64.037	3.131	(6)	R3.266	2.615	0.105	NA	NA	R5.985	0.100	R73.234
1983	15.894	-0.016	17.357	30.054	63.290	3.203	(6)	R3.527	2.831	0.129	NA	(s)	R6.488	0.121	R73.066
1984	17.071	-0.011	18.507	31.051	66.617	3.553	(6)	R3.386	2.880	0.165	(s)	(s)	R6.431	0.135	R76.693
1985	17.478	-0.013	17.834	30.922	66.221	4.076	(6)	R2.970	2.864	0.198	(s)	(s)	R6.033	0.140	R76.417
1986	17.260	-0.017	16.708	32.196	66.148	4.380	(6)	R3.071	2.841	0.219	(s)	(s)	R6.132	0.122	R76.722
1987	18.008	0.009	17.744	32.865	68.626	4.754	(6)	R2.635	2.823	0.229	(s)	(s)	R5.687	0.158	R79.156
1988	18.846	0.040	18.552	34.222	71.660	5.587	(6)	R2.334	2.937	0.217	(s)	(s)	R5.489	0.108	R82.774
1989	R19.070	0.030	19.712	34.211	R73.023	5.602	(6)	R2.837	3.062	0.317	0.055	R0.022	R6.294	0.037	R84.886
1990	R19.173	0.005	R19.730	33.553	R72.460	6.104	-0.036	R3.046	R2.662	R0.336	0.060	R0.029	R6.133	0.008	R84.605
1991	18.992	0.010	20.149	32.845	R71.996	6.422	-0.047	R3.016	2.702	R0.346	0.063	R0.031	R6.158	0.067	R84.522
1992	19.122	0.035	20.835	33.527	R73.519	6.479	-0.043	R2.617	2.847	R0.349	0.064	0.030	R5.907	0.087	R85.866
1993	19.835	0.027	21.351	33.841	R75.055	6.410	-0.042	R2.892	2.804	R0.364	0.066	0.031	R6.157	0.095	R87.579
1994	19.909	0.058	21.842	34.670	R76.480	6.694	-0.035	R2.683	2.939	R0.338	0.069	0.036	R6.065	0.153	R89.248
1995	20.089	0.061	22.784	34.553	R77.488	7.075	-0.028	R3.205	3.068	R0.294	0.070	0.033	R6.669	0.134	R91.221
1996	21.002	R0.023	R23.197	35.757	R79.978	7.087	-0.032	R3.590	3.127	R0.316	0.071	0.033	R7.137	0.137	R94.224
1997	21.445	R0.046	R23.329	36.266	R81.086	6.597	-0.041	R3.640	3.006	0.325	0.070	0.034	R7.075	0.116	R94.727
1998	21.656	R0.067	R22.936	36.934	R81.592	7.068	-0.046	R3.297	2.835	R0.328	0.070	0.031	R6.561	0.088	R95.146
1999	21.623	R0.058	R23.010	37.960	R82.650	7.610	-0.062	R3.268	R2.885	R0.331	0.069	0.046	R6.599	0.099	R96.774
2000	22.580	R0.065	R23.953	38.404	R85.001	7.862	-0.057	R2.811	R2.907	0.317	0.066	0.057	R6.158	0.116	R98.942
2001	R21.897	R0.032	R22.869	R38.333	R83.131	8.028	-0.090	R2.201	R2.678	R0.311	R0.065	R0.068	R5.324	0.075	R96.322
2002 ^P	22.184	0.062	23.062	38.183	83.491	8.145	-0.089	2.668	2.756	0.304	0.064	0.106	5.899	0.078	97.351

¹ End-use consumption and electricity net generation.

² Includes supplemental gaseous fuels.

³ Petroleum products supplied, including natural gas plant liquids and crude oil burned as fuel.

⁴ Pumped storage facility production minus energy used for pumping.

⁵ Alcohol (ethanol blended into motor gasoline) is included in both "Petroleum" and "Alcohol," but is counted only once in total energy consumption.

⁶ Included in "Conventional Hydroelectric Power."

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.0005 and greater than -0.0005 quadrillion Btu.

Notes: • See Note 1 at end of section. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 5.1, 6.1, 7.1, 7.7, 8.1, 8.2a, 10.1, and A2-A6.

Table 1.4 Energy Imports, Exports, and Net Imports, 1949-2002
(Quadrillion Btu)

Year	Imports					Exports					Net Imports				
	Coal	Natural Gas	Petroleum ¹	Other ²	Total	Coal	Natural Gas	Petroleum	Other ²	Total	Coal	Natural Gas	Petroleum ¹	Other ²	Total
1949	0.01	0.00	1.43	R0.01	R1.45	0.88	0.02	0.68	R0.01	1.59	-0.87	-0.02	0.75	(s)	R-0.14
1950	0.01	0.00	1.89	R0.02	R1.91	0.79	0.03	0.64	0.01	1.47	-0.78	-0.03	1.24	R0.01	R0.45
1951	0.01	0.00	1.87	R0.01	R1.89	1.68	0.03	0.89	0.03	2.62	-1.67	-0.03	0.98	-0.01	R-0.73
1952	0.01	0.01	2.11	R0.02	R2.15	1.40	0.03	0.91	0.02	2.37	-1.40	-0.02	1.20	(s)	R-0.22
1953	0.01	0.01	2.28	R0.01	R2.31	0.98	0.03	0.84	R0.01	1.87	-0.97	-0.02	1.44	(s)	R0.45
1954	0.01	0.01	2.32	R0.01	R2.35	0.91	0.03	0.75	0.01	1.70	-0.91	-0.02	1.58	(s)	R0.65
1955	0.01	0.01	2.75	R0.02	R2.79	1.46	0.03	0.77	R0.01	2.29	-1.46	-0.02	1.98	(s)	R0.50
1956	0.01	0.01	3.17	R0.02	R3.21	1.98	0.04	0.91	0.02	2.95	-1.98	-0.03	2.26	(s)	R0.26
1957	0.01	0.04	3.46	R0.02	R3.53	2.17	0.04	1.20	R0.02	R3.44	-2.16	(s)	2.26	R-0.01	R0.09
1958	0.01	0.14	3.72	R0.02	R3.88	1.42	0.04	0.58	R0.01	R2.05	-1.41	0.10	3.14	(s)	R1.83
1959	0.01	0.14	3.91	R0.02	R4.08	1.05	0.02	0.45	R0.01	R1.53	-1.04	0.12	3.46	(s)	R2.54
1960	0.01	0.16	4.00	R0.02	R4.19	1.02	0.01	0.43	R0.01	1.48	-1.02	0.15	3.57	R0.01	R2.71
1961	(s)	0.23	4.19	R0.01	R4.44	0.98	0.01	0.37	R0.01	1.38	-0.98	0.22	3.82	(s)	R3.06
1962	0.01	0.42	4.56	R0.01	R4.99	1.08	0.02	0.36	R0.01	R1.47	-1.08	0.40	4.20	(s)	R3.52
1963	0.01	0.42	4.65	R0.01	R5.09	1.36	0.02	0.44	R0.02	R1.84	-1.35	0.40	4.21	-0.01	3.25
1964	0.01	0.46	4.96	R0.02	R5.45	1.34	0.02	0.43	R0.03	R1.81	-1.33	0.44	4.53	(s)	R3.63
1965	(s)	0.47	5.40	R0.01	R5.89	1.38	0.03	0.39	R0.03	R1.83	-1.37	0.44	5.01	-0.02	4.06
1966	(s)	0.50	5.63	R0.02	R6.15	1.35	0.03	0.41	R0.04	R1.83	-1.35	0.47	5.21	R-0.02	4.32
1967	0.01	0.58	5.56	R0.02	R6.16	1.35	0.08	0.65	R0.03	R2.12	-1.35	0.50	4.91	-0.02	4.04
1968	0.01	0.67	6.21	R0.01	R6.91	1.38	0.10	0.49	R0.03	R2.00	-1.37	0.58	5.73	-0.02	R4.91
1969	(s)	0.75	6.90	R0.02	R7.68	1.53	0.05	0.49	R0.05	R2.13	-1.53	0.70	6.42	R-0.03	R5.55
1970	(s)	0.85	7.47	R0.02	R8.34	1.94	0.07	0.55	R0.08	R2.63	-1.93	0.77	6.92	R-0.05	R5.71
1971	(s)	0.96	8.54	R0.03	R9.53	1.55	0.08	0.47	R0.05	R2.15	-1.54	0.88	8.07	R-0.02	R7.38
1972	(s)	1.05	10.30	R0.04	R11.39	1.53	0.08	0.47	R0.04	R2.12	-1.53	0.97	9.83	(s)	R9.27
1973	(s)	1.06	13.47	R0.08	R14.61	1.43	0.08	0.49	R0.04	R2.03	-1.42	0.98	12.98	R0.04	R12.58
1974	0.05	0.99	13.13	R0.14	R14.30	1.62	0.08	0.46	R0.04	R2.20	-1.57	0.91	12.66	R0.10	R12.10
1975	0.02	0.98	12.95	R0.08	R14.03	1.76	0.07	0.44	R0.05	R2.32	-1.74	0.90	12.51	R0.03	R11.71
1976	0.03	0.99	15.67	R0.07	R16.76	1.60	0.07	0.47	R0.04	R2.17	-1.57	0.92	15.20	R0.03	R14.59
1977	0.04	1.04	18.76	R0.11	R19.95	1.44	0.06	0.51	R0.04	R2.05	-1.40	0.98	18.24	R0.07	R17.90
1978	0.07	0.99	17.82	R0.21	R19.11	1.08	0.05	0.77	R0.02	R1.92	-1.00	0.94	17.06	R0.19	R17.19
1979	0.05	1.30	17.93	R0.18	R19.46	1.75	0.06	1.00	R0.04	R2.86	-1.70	1.24	16.93	R0.13	R16.60
1980	0.03	1.01	14.66	R0.10	R15.80	2.42	0.05	1.16	R0.07	R3.69	-2.39	0.96	13.50	R0.04	R12.10
1981	0.03	0.92	12.64	R0.14	R13.72	2.94	0.06	1.26	R0.04	R4.31	-2.92	0.86	11.38	R0.10	R9.41
1982	0.02	0.95	10.78	R0.12	R11.86	2.79	0.05	1.73	R0.04	R4.61	-2.77	0.90	9.05	R0.08	R7.25
1983	0.03	0.94	10.65	R0.13	R11.75	2.04	0.06	1.57	R0.03	R3.69	-2.01	0.89	9.08	R0.10	R8.06
1984	0.03	0.85	11.43	R0.16	R12.47	2.15	0.06	1.54	R0.03	R3.79	-2.12	0.79	9.89	R0.12	R8.68
1985	0.05	0.95	10.61	R0.17	R11.78	2.44	0.06	1.66	R0.04	R4.20	-2.39	0.90	8.95	R0.13	R7.58
1986	0.06	0.75	13.20	R0.15	R14.15	2.25	0.06	1.67	R0.04	R4.02	-2.19	0.69	11.53	R0.11	R10.13
1987	0.04	0.99	14.16	R0.20	R15.40	2.09	0.05	1.63	R0.03	R3.81	-2.05	0.94	12.53	R0.17	R11.59
1988	0.05	1.30	15.75	R0.20	R17.30	2.50	0.07	1.74	R0.05	R4.37	-2.45	1.22	14.01	R0.15	R12.93
1989	0.07	1.39	17.16	R0.15	R18.77	2.64	0.11	1.84	R0.08	R4.66	-2.57	1.28	15.33	R0.07	R14.11
1990	0.07	1.55	17.12	R0.08	R18.82	2.77	0.09	1.82	R0.07	R4.75	-2.70	1.46	15.29	R0.01	R14.06
1991	0.08	1.80	16.35	R0.10	R18.33	2.85	0.13	2.13	R0.03	R5.14	-2.77	1.67	14.22	R0.08	R13.19
1992	0.10	2.16	16.97	R0.15	R19.37	2.68	0.22	2.01	R0.03	R4.94	-2.59	1.94	14.96	R0.12	R14.44
1993	0.20	2.40	18.51	R0.16	R21.27	1.96	0.14	2.12	R0.04	R4.26	-1.76	2.25	16.40	R0.12	R17.01
1994	0.22	2.68	19.24	R0.24	R22.39	1.88	0.16	1.99	R0.03	R4.06	-1.66	2.52	17.26	R0.21	R18.33
1995	0.24	2.90	18.88	R0.24	R22.26	2.32	0.16	1.99	R0.05	R4.51	-2.08	2.74	16.89	R0.19	R17.75
1996	0.20	3.00	20.29	R0.21	R23.70	2.37	0.16	2.06	R0.05	R4.63	-2.17	2.85	18.23	R0.16	R19.07
1997	0.19	3.06	21.74	R0.22	R25.22	2.19	0.16	2.10	R0.06	R4.51	-2.01	2.90	19.64	R0.16	R20.70
1998	0.22	3.22	22.91	R0.23	R26.58	2.09	0.16	1.97	R0.07	R4.30	-1.87	3.06	20.94	R0.16	R22.28
1999	0.23	3.66	23.13	R0.23	R27.25	1.53	0.16	1.95	R0.07	R3.71	-1.30	3.50	21.18	R0.16	R23.54
2000	0.31	3.87	24.53	R0.26	R28.97	1.53	0.25	2.15	R0.08	R4.01	-1.21	3.62	22.38	R0.18	R24.97
2001	0.49	R4.07	R25.40	R0.19	R30.15	1.27	R0.38	R2.04	R0.08	R3.76	-0.77	R3.69	R23.36	R0.11	R26.39
2002 ^P	0.42	4.10	24.31	0.20	29.04	1.03	0.52	2.04	0.06	3.65	-0.61	3.58	22.28	0.14	25.38

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

² Coal coke and small amounts of electricity transmitted across U.S. borders with Canada and Mexico.
R=Revised. P=Preliminary. (s)=Less than 0.005 quadrillion Btu and greater than -0.005 quadrillion Btu.
Notes: • See Note 1 at end of section. • Includes trade between the United States (50 States and the

District of Columbia) and its territories and possessions. • Totals or net import items may not equal sum of components due to independent rounding.

Sources: Tables 5.1, 6.1, 7.1, 7.7, 8.1, 10.2b, and A2-A6.

Table 1.5 Energy Consumption, Expenditures, and Emissions Indicators, 1949-2002

Year	Energy Consumption	Energy Consumption per Person	Energy Expenditures	Energy Expenditures per Person	Gross Domestic Product (GDP)	Energy Expenditures as Share of GDP	Gross Domestic Product (GDP)	Energy Consumption per Dollar of GDP	Greenhouse Gas Emissions ¹ per Dollar of GDP	Carbon Dioxide Emissions ² per Dollar of GDP
	Quadrillion Btu	Million Btu	Million Nominal Dollars	Nominal Dollars	Billion Nominal Dollars	Percent	Billion Chained (1996) Dollars	Thousand Btu per Chained (1996) Dollar	Metric Tons Carbon Dioxide Equivalent per Million Chained (1996) Dollars	Metric Tons Carbon Dioxide per Million Chained (1996) Dollars
1949	R31.98	215	NA	NA	267.7	NA	1,550.9	R20.62	NA	NA
1950	R34.62	229	NA	NA	294.3	NA	1,686.6	R20.52	NA	NA
1951	R36.97	240	NA	NA	339.5	NA	1,815.1	R20.37	NA	NA
1952	R36.75	235	NA	NA	358.6	NA	1,887.3	R19.47	NA	NA
1953	R37.66	237	NA	NA	379.9	NA	1,973.9	R19.08	NA	NA
1954	R36.64	226	NA	NA	381.1	NA	1,960.5	R18.69	NA	NA
1955	R40.21	244	NA	NA	415.2	NA	2,099.5	R19.15	NA	NA
1956	R41.75	R248	NA	NA	438.0	NA	2,141.1	R19.50	NA	NA
1957	R41.79	244	NA	NA	461.5	NA	2,183.9	R19.13	NA	NA
1958	R41.65	239	NA	NA	467.9	NA	2,162.8	R19.26	NA	NA
1959	R43.47	R245	NA	NA	507.4	NA	2,319.0	R18.74	NA	NA
1960	R45.09	R251	NA	NA	527.4	NA	2,376.7	R18.97	NA	NA
1961	R45.74	250	NA	NA	545.7	NA	2,432.0	18.81	NA	NA
1962	47.83	258	NA	NA	586.5	NA	2,578.9	18.55	NA	NA
1963	49.65	263	NA	NA	618.7	NA	2,690.4	18.45	NA	NA
1964	R51.82	271	NA	NA	664.4	NA	2,846.5	R18.20	NA	NA
1965	54.02	279	NA	NA	720.1	NA	3,028.5	17.84	NA	NA
1966	57.02	292	NA	NA	789.3	NA	3,227.5	17.67	NA	NA
1967	58.91	298	NA	NA	834.1	NA	3,308.3	17.81	NA	NA
1968	R62.42	313	NA	NA	911.5	NA	3,466.1	18.01	NA	NA
1969	R65.62	326	NA	NA	985.3	NA	3,571.4	R18.37	NA	NA
1970	R67.84	334	R82,898	408	1,039.7	8.0	3,578.0	R18.96	NA	NA
1971	R69.29	335	R90,051	435	1,128.6	8.0	3,697.7	R18.74	NA	NA
1972	R72.70	R347	R98,088	469	1,240.4	7.9	3,898.4	R18.65	NA	NA
1973	R75.71	R358	R111,910	R529	1,385.5	8.1	4,123.4	R18.36	NA	NA
1974	R73.99	347	R153,350	719	1,501.0	10.2	4,099.0	R18.05	NA	NA
1975	R72.00	334	R171,802	797	1,635.2	10.5	4,084.4	R17.63	NA	NA
1976	R76.01	R349	R193,852	891	1,823.9	10.6	4,311.7	R17.63	NA	NA
1977	R78.00	355	R220,391	1,003	2,031.4	R10.8	4,511.8	R17.29	NA	NA
1978	R79.99	R360	R239,175	1,077	2,295.9	10.4	4,760.6	R16.80	NA	NA
1979	R80.90	R360	R297,518	1,325	2,566.4	11.6	4,912.1	R16.47	NA	NA
1980	R78.29	346	R374,319	1,652	2,795.6	13.4	4,900.9	R15.97	1,136	964
1981	R76.33	R333	R427,697	1,864	3,131.3	13.7	5,021.0	R15.20	1,088	916
1982	R73.23	R316	R426,109	R1,839	3,259.2	13.1	4,919.3	R14.89	1,052	887
1983	R73.07	R313	R417,047	1,784	3,534.9	11.8	5,132.3	R14.24	1,004	845
1984	R76.69	R325	R434,379	1,842	3,932.7	11.0	5,505.2	R13.93	986	830
1985	R76.42	R321	R437,271	1,838	4,213.0	10.4	5,717.1	R13.37	969	797
1986	R76.72	R319	R382,741	1,594	4,452.9	8.6	5,912.4	R12.98	937	773
1987	R79.16	R327	R395,730	1,633	4,742.5	8.3	6,113.3	R12.95	932	772
1988	R82.77	339	R409,572	1,675	5,108.3	8.0	6,368.4	R13.00	929	776
1989	R84.89	344	R436,752	R1,770	5,489.1	8.0	6,591.8	12.88	914	761
1990	R84.60	340	R472,214	R1,898	5,803.2	8.1	6,707.9	12.61	920	743
1991	R84.52	R334	R470,095	R1,858	5,986.2	R7.9	6,676.4	R12.66	919	740
1992	R85.87	335	R475,298	R1,853	6,318.9	7.5	6,880.0	R12.48	908	732
1993	R87.58	R337	R492,816	R1,896	6,642.3	7.4	7,062.6	R12.40	898	725
1994	R89.25	R339	R506,553	R1,925	7,054.3	7.2	7,347.7	R12.15	878	708
1995	R91.22	R343	R516,207	R1,939	7,400.5	7.0	7,543.8	R12.09	863	697
1996	R94.22	R350	R562,600	R2,088	7,813.2	7.2	7,813.2	R12.06	854	697
1997	R94.73	R347	R569,011	R2,087	8,318.4	6.8	8,159.5	R11.61	825	676
1998	R95.15	R345	R527,028	R1,911	8,781.5	6.0	8,508.9	R11.18	794	652
1999	R96.77	R347	R560,161	R2,007	R9,274.3	6.0	R8,859.0	R10.92	770	633
2000	R98.94	R352	703,188	2,499	R9,824.6	7.2	R9,191.4	R10.76	761	630
2001	R96.32	R338	NA	NA	R10,082.2	NA	R9,214.5	R10.45	749	620
2002 ^P	97.35	338	NA	NA	10,446.2	NA	9,439.9	10.31	NA	NA

¹ Greenhouse gas emissions from anthropogenic sources. See Table 12.1.

² Carbon dioxide emissions from the combustion of petroleum, natural gas, coal, and coal coke net imports; and from geothermal power generation.

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

Note: See "Chained Dollars" in the Glossary.

Sources: **Energy Consumption:** Table 1.3. **Energy Expenditures:** Table 3.4. **Gross Domestic Product:** Table D1. **Population Data:** Table D1. **Greenhouse Gas Emissions:** Table 12.1. **Carbon Dioxide Emissions:** Table 12.2. **Other Columns:** Calculated by EIA.

Table 1.15 Fossil Fuel Consumption for Nonfuel Use, 1980-2002

Year	Petroleum Products									Natural Gas	Coal	Total	Percent of Total Energy Consumption
	Asphalt and Road Oil	Liquefied Petroleum Gases	Pentanes Plus	Lubricants	Petro-chemical Feedstocks	Petroleum Coke	Special Naphthas	Other ¹	Total				
Physical Units ²													
1980	145	230	(³)	58	253	24	37	58	805	639	2.4	—	—
1981	125	229	(³)	56	216	29	27	54	736	507	2.1	—	—
1982	125	256	(³)	51	157	23	25	48	686	438	1.4	—	—
1983	136	264	(³)	53	151	10	30	45	689	441	1.2	—	—
1984	150	247	10	57	145	16	40	41	705	495	1.5	—	—
1985	156	265	13	53	144	15	30	41	718	500	1.1	—	—
1986	164	248	17	52	169	14	25	38	727	496	0.7	—	—
1987	170	303	12	59	170	24	28	36	802	578	0.8	—	—
1988	171	319	21	57	173	25	22	40	827	554	0.7	—	—
1989	165	332	17	58	172	23	20	39	827	563	0.6	—	—
1990	176	344	18	60	199	30	20	39	R886	572	0.6	—	—
1991	162	394	10	53	200	R25	17	44	R906	573	0.6	—	—
1992	166	397	13	54	214	R38	20	35	R938	594	1.2	—	—
1993	174	389	60	55	216	R21	20	33	R969	596	0.9	—	—
1994	176	437	56	58	222	R23	15	35	R1,022	673	0.9	—	—
1995	178	450	66	57	215	R22	13	R34	R1,035	R648	0.9	—	—
1996	177	470	69	55	217	R25	14	R34	R1,061	R659	0.9	—	—
1997	184	473	65	58	250	R20	14	R35	R1,100	R682	0.9	—	—
1998	190	R494	R44	61	252	R35	20	R39	R1,137	R762	0.8	—	—
1999	200	R520	R57	62	238	R47	28	R37	R1,188	R671	0.8	—	—
2000	192	R507	R51	61	243	R23	19	R38	R1,133	R689	0.8	—	—
2001	190	R465	R44	56	R214	R34	R15	R39	R1,057	R650	R0.7	—	—
2002 ^P	187	487	37	55	225	38	19	40	1,087	659	0.8	—	—
Quadrillion Btu													
1980	0.96	0.78	(³)	0.35	1.43	0.14	0.19	0.34	4.19	0.65	0.08	4.92	6.3
1981	0.83	0.77	(³)	0.34	1.21	0.17	0.14	0.31	3.78	0.52	0.07	4.37	5.7
1982	0.83	0.87	(³)	0.31	0.88	0.14	0.13	0.28	3.44	0.45	0.04	3.93	5.4
1983	0.90	0.89	(³)	0.32	0.85	0.06	0.16	0.26	3.45	0.45	0.04	3.94	5.4
1984	0.99	0.84	0.05	0.35	0.82	0.09	0.21	0.24	3.58	0.51	0.05	4.14	5.4
1985	1.03	0.90	0.06	0.32	0.82	0.09	0.16	0.24	3.63	0.52	0.03	4.18	R5.5
1986	1.09	0.85	0.08	0.31	0.95	0.08	0.13	0.22	3.72	0.51	0.02	4.25	5.5
1987	1.13	1.06	0.06	0.36	0.96	0.14	0.14	0.21	4.06	0.60	0.03	4.69	5.9
1988	1.14	1.11	0.10	0.34	0.97	0.15	0.11	0.23	4.16	0.57	0.02	4.75	5.7
1989	1.10	1.18	0.08	0.35	0.96	0.14	0.11	0.23	4.14	0.58	0.02	4.74	5.6
1990	1.17	1.20	0.08	0.36	1.12	0.18	0.11	0.23	R4.45	0.59	0.02	R5.06	6.0
1991	1.08	1.38	0.04	0.32	1.15	R0.15	0.09	0.26	R4.47	0.59	0.02	R5.08	6.0
1992	1.10	1.39	0.06	0.33	1.20	R0.23	0.10	0.20	R4.63	0.61	0.04	R5.28	6.1
1993	1.15	1.35	0.28	0.34	1.22	R0.12	0.10	0.20	R4.76	0.61	0.03	R5.40	6.2
1994	1.17	1.55	0.26	0.35	1.26	R0.14	0.08	0.20	R5.01	0.69	0.03	R5.73	6.4
1995	1.18	1.59	0.30	0.35	1.21	R0.13	0.07	0.20	R5.03	R0.67	0.03	R5.73	6.3
1996	1.18	1.65	0.32	0.34	1.21	R0.15	0.07	R0.20	R5.11	R0.68	0.03	R5.82	6.2
1997	1.22	1.67	0.30	0.35	1.40	R0.12	0.07	R0.21	R5.34	0.70	0.03	R6.07	R6.4
1998	1.26	R1.74	R0.20	0.37	1.40	R0.21	0.11	R0.23	5.54	R0.79	0.03	R6.36	R6.7
1999	1.32	R1.82	R0.26	0.37	1.33	R0.28	0.15	R0.22	R5.76	R0.69	0.03	R6.48	R6.7
2000	1.28	R1.75	R0.24	0.37	1.35	R0.14	0.10	R0.22	R5.44	R0.71	0.03	R6.18	R6.2
2001	1.26	R1.62	R0.20	0.34	R1.19	R0.21	0.08	R0.23	R5.12	R0.67	0.02	R5.81	R6.0
2002 ^P	1.24	1.69	0.17	0.33	1.24	0.23	0.10	0.23	5.24	0.68	0.02	5.94	6.1

¹ Distillate fuel oil, residual fuel oil, waxes, and miscellaneous products.

² Petroleum - million barrels; natural gas - billion cubic feet; and coal - million short tons.

³ Included in liquefied petroleum gases.

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

Notes: • Estimates of consumption for nonfuel use shown in this table are included in total energy consumption (see Table 1.3). • See Note 2 at end of section for a discussion of "Nonfuel Use." • Because of changes in methodology, data series may be revised annually. • Estimates of nonfuel use in this table are considered industrial uses with the exception of approximately half of the lubricants which are considered transportation use. See Energy Information Administration (EIA), *Emissions of Greenhouse Gases in the United States 2001* (November 2002), Table 11 and Appendix A, on the Web Page, for a discussion of the estimates in the table. • Totals may not equal sum of components due to independent

rounding.

Web Page: <http://www.eia.doe.gov/environment.html>.

Sources: **Petroleum Products:** • 1980—EIA, Energy Data Reports, *Petroleum Statement, Annual and Sales of Liquefied Petroleum Gases and Ethane in 1980*. • 1981 forward—EIA, *Petroleum Supply Annual*, annual reports, and unpublished data. **Natural Gas:** • 1980—Bureau of the Census, 1980 Survey of Manufactures, *Hydrocarbon, Coal, and Coke Materials Consumed*. • 1981 forward—U.S. Department of Commerce. **Coal:** • 1960-1995—U.S. International Trade Commission, *Synthetic Organic Chemicals, United States Production and Sales, 1995* (January 1997). • 1996 forward—Estimated because the data series has been discontinued. **Percent of Total Energy Consumption:** Derived by dividing total by total consumption on Table 1.3.

Table 2.1a Energy Consumption by Sector, 1949-2002
(Trillion Btu)

Year	End-Use Sectors								Electric Power Sector ³	Adjustments ⁴	Total
	Residential		Commercial ¹		Industrial ²		Transportation				
	Primary	Total	Primary	Total	Primary	Total	Primary	Total	Primary		
1949	4,475	R5,614	2,661	R3,661	12,627	R14,717	7,880	R7,990	R4,339	(s)	R31,982
1950	4,848	R6,007	2,824	R3,883	13,881	R16,233	8,384	8,493	R4,679	(s)	R34,616
1951	R5,124	R6,400	R2,727	R3,863	15,118	R17,669	8,934	R9,042	R5,071	(s)	R36,974
1952	5,179	R6,581	2,662	R3,862	14,662	R17,302	8,907	R9,003	R5,338	(s)	R36,748
1953	R5,075	R6,581	R2,500	R3,759	15,328	R18,201	9,031	R9,123	R5,730	(s)	R37,664
1954	5,286	R6,870	2,445	R3,720	14,306	R17,146	8,823	8,903	R5,780	(s)	R36,639
1955	5,633	R7,303	2,548	R3,882	16,091	R19,472	9,475	9,551	R6,461	(s)	R40,208
1956	R5,866	R7,690	R2,592	R4,008	16,562	R20,196	9,791	9,860	R6,942	(s)	R41,754
1957	5,772	R7,740	2,434	R3,946	16,513	R20,205	9,837	9,897	R7,231	(s)	R41,787
1958	R6,155	R8,230	R2,541	R4,103	15,798	R19,307	9,953	10,005	R7,198	(s)	R41,645
1959	6,224	R8,447	2,630	R4,353	16,519	R20,316	10,298	R10,349	R7,794	(s)	R43,466
1960	6,689	R9,078	2,702	R4,589	16,977	R20,823	10,560	10,597	R8,158	(s)	R45,087
1961	6,815	R9,325	2,744	R4,707	16,993	R20,937	10,735	10,770	R8,453	(s)	R45,739
1962	R7,122	R9,825	R2,901	R5,014	17,590	R21,768	11,186	11,221	R9,029	(s)	R47,828
1963	7,135	R10,034	2,897	5,227	18,366	22,730	11,621	11,655	9,627	(s)	R49,646
1964	7,161	R10,291	2,949	R5,439	19,427	R24,090	11,965	11,998	R10,316	(s)	R51,817
1965	R7,328	R10,689	R3,150	R5,820	20,124	R25,075	12,400	12,434	R11,014	(s)	R54,017
1966	7,549	R11,218	3,384	R6,299	21,030	R26,397	13,069	13,102	R11,985	(s)	R57,017
1967	7,741	R11,670	3,738	R6,871	21,013	R26,616	13,718	13,752	R12,698	(s)	R58,908
1968	R7,963	R12,368	R3,866	R7,297	21,872	R27,888	14,831	14,866	R13,887	(s)	R62,419
1969	8,277	R13,205	4,046	R7,795	22,654	R29,114	15,471	15,506	R15,174	(s)	R65,621
1970	8,353	R13,798	4,196	R8,307	22,975	R29,641	16,061	16,098	R16,259	(s)	R67,844
1971	R8,457	R14,278	R4,283	R8,681	22,732	R29,601	16,693	16,729	R17,124	(s)	R69,289
1972	8,655	R14,891	4,369	R9,145	23,532	R30,953	17,681	17,716	R18,466	(s)	R72,704
1973	8,250	R14,930	4,381	R9,507	24,741	R32,653	18,576	18,612	R19,753	7	R75,708
1974	7,928	R14,683	4,221	R9,363	23,816	R31,819	18,086	18,119	R19,933	7	R73,991
1975	8,006	R14,842	4,023	R9,466	21,454	R29,447	18,209	18,244	R20,307	1	R71,999
1976	8,408	R15,441	4,333	R10,035	22,685	R31,430	19,065	19,099	R21,513	8	R76,012
1977	8,207	R15,689	4,217	R10,177	23,193	R32,307	19,784	19,820	R22,591	7	R78,000
1978	8,272	R16,156	4,269	R10,481	23,276	R32,733	20,580	20,615	R23,587	2	R79,986
1979	7,934	R15,842	4,333	R10,627	24,211	R33,962	20,436	20,471	R23,987	2	R80,903
1980	7,504	R15,848	4,097	R10,594	22,673	R32,152	19,658	19,696	R24,359	-1	R78,289
1981	7,103	R15,353	3,831	R10,638	21,404	R30,836	19,469	19,506	R24,525	3	R76,335
1982	7,163	R15,577	3,859	R10,880	19,113	R27,704	19,032	19,069	R24,063	4	R73,234
1983	6,834	R15,459	3,827	R10,952	18,598	R27,511	19,098	19,141	R24,705	3	R73,066
1984	R7,123	R15,908	R4,043	R11,517	R20,219	R29,654	R19,565	R19,612	R25,741	3	R76,693
1985	R7,086	16,023	R3,714	R11,471	R19,473	R28,891	R19,990	R20,037	R26,158	-4	R76,417
1986	R6,912	R16,026	R3,674	R11,628	R19,092	R28,334	R20,681	R20,730	R26,359	3	R76,722
1987	R6,972	R16,359	R3,752	R11,965	R19,960	R29,433	R21,352	R21,402	R27,124	-3	R79,156
1988	R7,377	R17,197	R3,974	R12,597	R20,868	R30,728	R22,198	R22,250	R28,354	3	R82,774
1989	R7,614	R17,893	R3,981	R13,185	R20,883	R31,390	R22,355	R22,409	R30,044	R9	R84,886
1990	R6,604	R17,043	R3,850	R13,321	R21,209	R31,891	R22,305	R22,358	R30,647	-9	R84,605
1991	R6,791	R17,514	R3,896	R13,494	R20,843	R31,467	R21,994	R22,047	R30,999	1	R84,522
1992	R6,999	R17,456	R3,941	R13,438	R21,770	R32,637	R22,282	R22,335	R30,873	(s)	R85,866
1993	R7,185	R18,312	R3,923	R13,819	R21,759	R32,689	R22,716	R22,770	R32,006	-10	R87,579
1994	R7,036	R18,223	R3,970	R14,099	R22,384	R33,565	R23,312	R23,367	R32,551	-6	R89,248
1995	R7,049	R18,679	R4,054	R14,687	R22,706	R34,003	R23,793	R23,849	R33,616	3	R91,221
1996	R7,555	R19,642	R4,226	R15,170	R23,428	R34,969	R24,384	R24,439	R34,626	4	R94,224
1997	R7,068	R19,047	4,248	R15,679	R23,684	R35,243	R24,697	R24,752	R35,024	6	R94,727
1998	R6,454	R19,044	R3,963	R15,972	R23,166	R34,876	R25,203	R25,258	R36,363	-3	R95,146
1999	R6,831	R19,654	R4,008	R16,371	R22,938	R34,791	R25,894	R25,951	R37,097	6	R96,774
2000	R7,204	R20,511	R4,259	R17,196	R22,805	R34,681	R26,492	R26,552	R38,181	2	R98,942
2001	R6,942	R20,256	R4,053	R17,309	R21,808	R32,483	R26,213	R26,275	R37,306	(s)	R96,322
2002 ^P	7,006	20,937	4,125	17,397	21,573	32,490	26,465	26,522	38,177	5	97,351

¹ Commercial sector, including commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Note 1 at end of Section 8.

² Industrial sector, including industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Note 1 at end of Section 8.

³ Electricity-only and combined-heat-and-power (CHP) plants within the NAICS 22 category whose primary business is to sell electricity, or electricity and heat, to the public. Through 1988, data are for electric utilities only; beginning in 1989, data are for electric utilities and independent power producers.

⁴ A balancing item. The sum of primary consumption in the five energy-use sectors equals the sum of

total consumption in the four end-use sectors. However, total energy consumption does not equal the sum of the sectoral components due to the use of sector-specific conversion factors for natural gas and coal.

R=Revised. P=Preliminary. (s)=Less than 0.5 trillion Btu.

Notes: • Primary consumption includes coal, natural gas, petroleum, nuclear electric power, hydroelectric power, wood, waste, alcohol fuels, geothermal, solar, wind, coal coke net imports, and electricity net imports. • Total consumption includes primary consumption, electricity retail sales, and electrical system energy losses. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 2.1b-2.1f.

Table 2.1b Residential Sector Energy Consumption, 1949-2002
(Trillion Btu)

Year	Primary Consumption								Total Primary	Electricity Retail Sales ⁴	Electrical System Energy Losses ⁵	Total
	Fossil Fuels				Renewable Energy							
	Coal	Natural Gas ¹	Petroleum	Total	Wood	Geothermal ²	Solar ³	Total				
1949	1,272	1,027	1,121	3,420	1,055	NA	NA	1,055	4,475	228	R911	R5,614
1950	1,261	1,240	1,340	3,842	1,006	NA	NA	1,006	4,848	246	R913	R6,007
1951	R1,159	1,526	1,481	R4,166	958	NA	NA	958	R5,124	284	R992	R6,400
1952	1,079	1,679	1,522	4,279	899	NA	NA	899	5,179	319	R1,083	R6,581
1953	R966	1,744	1,533	R4,243	832	NA	NA	832	R5,075	355	R1,151	R6,581
1954	858	1,961	1,667	4,486	800	NA	NA	800	5,286	397	R1,187	R6,870
1955	867	2,198	1,792	4,858	775	NA	NA	775	5,633	438	R1,232	R7,303
1956	R839	2,409	1,880	R5,128	739	NA	NA	739	R5,866	490	R1,334	R7,690
1957	654	2,588	1,828	5,070	702	NA	NA	702	5,772	535	R1,433	R7,740
1958	R663	2,809	1,994	R5,467	688	NA	NA	688	R6,155	578	R1,497	R8,230
1959	573	3,015	1,989	5,577	647	NA	NA	647	6,224	630	R1,594	R8,447
1960	585	3,212	2,265	6,062	627	NA	NA	627	6,689	687	R1,701	R9,078
1961	534	3,362	2,332	6,228	587	NA	NA	587	6,815	732	R1,779	R9,325
1962	R521	3,600	2,441	R6,562	560	NA	NA	560	R7,122	794	R1,909	R9,825
1963	438	3,700	2,459	6,598	537	NA	NA	537	7,135	856	2,044	R10,034
1964	379	3,908	2,375	6,662	499	NA	NA	499	7,161	928	R2,202	R10,291
1965	R352	4,028	2,481	R6,860	468	NA	NA	468	R7,328	993	R2,368	R10,689
1966	349	4,275	2,471	7,094	455	NA	NA	455	7,549	1,081	R2,588	R11,218
1967	299	4,451	2,557	7,307	434	NA	NA	434	7,741	1,160	R2,769	R11,670
1968	R264	4,588	2,685	R7,538	426	NA	NA	426	R7,963	1,302	R3,103	R12,368
1969	248	4,875	2,739	7,862	415	NA	NA	415	8,277	1,456	R3,473	R13,205
1970	209	4,987	2,755	7,952	401	NA	NA	401	8,353	1,591	R3,854	R13,798
1971	R172	5,126	2,777	R8,075	382	NA	NA	382	R8,457	1,704	R4,116	R14,278
1972	116	5,264	2,895	8,276	380	NA	NA	380	8,655	1,838	R4,397	R14,891
1973	94	4,977	2,825	7,896	354	NA	NA	354	8,250	1,976	R4,703	R14,930
1974	82	4,901	2,573	7,557	371	NA	NA	371	7,928	1,973	R4,783	R14,683
1975	63	5,023	2,495	7,580	425	NA	NA	425	8,006	2,007	R4,829	R14,842
1976	59	5,147	2,720	7,927	482	NA	NA	482	8,408	2,069	R4,963	R15,441
1977	57	4,913	2,695	7,666	542	NA	NA	542	8,207	2,202	R5,280	R15,689
1978	49	4,981	2,620	7,651	622	NA	NA	622	8,272	2,301	R5,582	R16,156
1979	37	5,055	2,114	7,206	728	NA	NA	728	7,934	2,330	R5,578	R15,842
1980	31	4,866	1,748	6,645	859	NA	NA	859	7,504	2,448	R5,897	R15,848
1981	30	4,660	1,543	6,234	869	NA	NA	869	7,103	2,464	R5,786	R15,353
1982	32	4,753	1,441	6,226	937	NA	NA	937	7,163	2,489	R5,925	R15,577
1983	31	4,516	1,362	5,909	925	NA	NA	925	6,834	2,562	R6,063	R15,459
1984	R40	4,692	R1,468	R6,200	923	NA	NA	923	R7,123	2,662	R6,123	R15,908
1985	R39	4,571	R1,578	R6,187	899	NA	NA	899	R7,086	2,709	R6,227	16,023
1986	R40	4,439	R1,556	R6,036	876	NA	NA	876	R6,912	2,795	R6,320	R16,026
1987	R37	4,449	R1,634	R6,120	852	NA	NA	852	R6,972	2,902	R6,485	R16,359
1988	R37	4,765	R1,690	R6,492	885	NA	NA	885	R7,377	3,046	R6,774	R17,197
1989	R31	4,929	R1,679	R6,639	918	5	53	976	R7,614	3,090	R7,189	R17,893
1990	R31	4,523	R1,407	R5,961	581	6	56	642	R6,604	3,153	R7,287	R17,043
1991	R25	4,697	R1,392	R6,114	613	6	58	677	R6,791	3,260	R7,463	R17,514
1992	R26	4,835	R1,427	R6,288	645	6	60	711	R6,999	3,193	R7,263	R17,456
1993	R26	5,095	R1,448	R6,569	548	7	62	616	R7,185	3,394	R7,733	R18,312
1994	21	4,988	R1,420	R6,429	537	6	64	607	R7,036	3,441	R7,746	R18,223
1995	17	4,981	R1,383	R6,382	596	7	65	667	R7,049	3,557	R8,073	R18,679
1996	17	5,383	R1,488	6,888	595	7	65	667	R7,555	3,694	R8,393	R19,642
1997	16	5,118	R1,428	R6,562	433	8	65	506	R7,068	3,671	R8,308	R19,047
1998	12	4,669	R1,314	R5,995	387	8	65	459	R6,454	3,856	R8,733	R19,044
1999	14	4,858	R1,473	R6,345	414	9	64	486	R6,831	3,906	R8,917	R19,654
2000	11	R5,126	R1,563	R6,701	433	9	61	503	R7,204	4,069	R9,238	R20,511
2001	R12	R4,915	R1,539	R6,465	407	9	R60	R476	R6,942	R4,103	R9,211	R20,256
2002 ^P	12	5,057	1,519	6,587	350	10	58	419	7,006	4,327	9,604	20,937

¹ Includes supplemental gaseous fuels.

² Geothermal heat pump and direct use energy.

³ Solar thermal direct use and photovoltaic electricity generation. Includes small amounts of commercial sector use.

⁴ Electricity retail sales to ultimate customers reported by electric utilities and other energy service providers.

⁵ Total losses are calculated as the primary energy consumed by the electric power sector minus the energy content of electricity retail sales. Total losses are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See note at end of section.

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

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

Sources: Tables 2.1f, 5.12a, 6.5, 7.3, 8.5, 10.2a, A1, and A3-A6.

Table 2.1c Commercial Sector Energy Consumption, 1949-2002
(Trillion Btu)

Year	Primary Consumption									Total Primary	Electricity Retail Sales ⁴	Electrical System Energy Losses ⁵	Total
	Fossil Fuels				Renewable Energy								
	Coal	Natural Gas ¹	Petroleum	Total	Hydropower ²	Wood	Waste	Geothermal ³	Total				
1949	1,554	360	727	2,641	NA	20	NA	NA	20	2,661	200	R800	R3,661
1950	1,542	401	862	2,805	NA	19	NA	NA	19	2,824	225	R834	R3,883
1951	R1,307	481	922	R2,709	NA	18	NA	NA	18	R2,727	252	R883	R3,863
1952	1,169	534	942	2,645	NA	17	NA	NA	17	2,662	273	R927	R3,862
1953	R966	549	970	R2,485	NA	16	NA	NA	16	R2,500	297	R962	R3,759
1954	825	605	1,000	2,430	NA	15	NA	NA	15	2,445	319	R956	R3,720
1955	801	651	1,081	2,533	NA	15	NA	NA	15	2,548	350	R984	R3,882
1956	R715	742	1,122	R2,578	NA	14	NA	NA	14	R2,592	380	R1,036	R4,008
1957	535	803	1,083	2,421	NA	13	NA	NA	13	2,434	411	R1,101	R3,946
1958	R501	902	1,125	R2,528	NA	13	NA	NA	13	R2,541	435	R1,127	R4,103
1959	415	1,009	1,194	2,618	NA	12	NA	NA	12	2,630	488	R1,235	R4,353
1960	407	1,056	1,228	2,690	NA	12	NA	NA	12	2,702	543	R1,344	R4,589
1961	371	1,115	1,247	2,733	NA	11	NA	NA	11	2,744	572	R1,391	R4,707
1962	R362	1,249	1,280	R2,890	NA	11	NA	NA	11	R2,901	621	R1,492	R5,014
1963	317	1,307	1,262	2,887	NA	10	NA	NA	10	2,897	688	R1,642	5,227
1964	274	1,419	1,247	2,940	NA	9	NA	NA	9	2,949	738	R1,752	R5,439
1965	R265	1,490	1,386	R3,142	NA	9	NA	NA	9	R3,150	789	1,880	R5,820
1966	263	1,676	1,436	3,375	NA	9	NA	NA	9	3,384	859	R2,056	R6,299
1967	225	2,022	1,483	3,730	NA	8	NA	NA	8	3,738	925	2,207	R6,871
1968	R208	2,140	1,510	R3,858	NA	8	NA	NA	8	R3,866	1,014	R2,417	R7,297
1969	195	2,323	1,520	4,038	NA	8	NA	NA	8	4,046	1,108	R2,642	R7,795
1970	165	2,473	1,551	4,189	NA	8	NA	NA	8	4,196	1,201	R2,910	R8,307
1971	R179	2,587	1,510	R4,276	NA	7	NA	NA	7	R4,283	1,288	R3,111	R8,681
1972	153	2,678	1,530	4,362	NA	7	NA	NA	7	4,369	1,408	R3,368	R9,145
1973	160	2,649	1,565	4,374	NA	7	NA	NA	7	4,381	1,517	R3,609	R9,507
1974	175	2,617	1,423	4,214	NA	7	NA	NA	7	4,221	1,501	R3,640	R9,363
1975	147	2,558	1,310	4,015	NA	8	NA	NA	8	4,023	1,598	R3,845	R9,466
1976	144	2,718	1,461	4,323	NA	9	NA	NA	9	4,333	1,678	R4,025	R10,035
1977	148	2,548	1,511	4,207	NA	10	NA	NA	10	4,217	1,754	R4,206	R10,177
1978	165	2,643	1,450	4,257	NA	12	NA	NA	12	4,269	1,813	R4,398	R10,481
1979	149	2,836	1,334	4,319	NA	14	NA	NA	14	4,333	1,854	R4,439	R10,627
1980	115	2,674	1,287	4,076	NA	21	NA	NA	21	4,097	1,906	R4,591	R10,594
1981	137	2,583	1,090	3,810	NA	21	NA	NA	21	3,831	2,033	R4,774	R10,638
1982	155	2,673	1,008	3,837	NA	22	NA	NA	22	3,859	2,077	R4,944	R10,880
1983	162	2,508	1,136	3,805	NA	22	NA	NA	22	3,827	2,116	R5,008	R10,952
1984	R169	2,600	R1,252	R4,021	NA	22	NA	NA	22	R4,043	2,264	R5,209	R11,517
1985	R137	2,508	R1,045	R3,690	NA	24	NA	NA	24	R3,714	2,351	R5,405	R11,471
1986	R135	2,386	R1,126	R3,647	NA	27	NA	NA	27	R3,674	2,439	R5,515	R11,628
1987	R125	2,505	R1,093	R3,723	NA	29	NA	NA	29	R3,752	2,539	R5,674	R11,965
1988	R131	2,748	R1,063	R3,942	NA	32	NA	NA	32	R3,974	2,675	R5,948	R12,597
1989	R115	2,802	R1,002	R3,919	1	36	22	3	61	R3,981	2,767	R6,437	R13,185
1990	R124	2,701	R953	R3,779	1	39	28	3	71	R3,850	2,860	R6,611	R13,321
1991	R116	2,813	R895	R3,824	1	41	26	3	72	R3,896	2,918	R6,681	R13,494
1992	R117	2,890	R854	R3,860	1	44	32	3	81	R3,941	2,900	R6,596	R13,438
1993	R117	2,942	R780	R3,839	1	46	33	3	84	R3,923	3,019	R6,877	R13,819
1994	118	2,979	R787	R3,885	1	46	35	4	86	R3,970	3,116	R7,013	R14,099
1995	117	3,113	R732	R3,962	1	46	40	5	92	R4,054	3,252	R7,381	R14,687
1996	122	3,244	R751	R4,116	1	50	53	5	110	R4,226	3,344	R7,599	R15,170
1997	129	3,302	R704	4,135	1	49	58	6	113	4,248	3,503	R7,928	R15,679
1998	93	3,098	R661	R3,853	1	48	54	7	111	R3,963	3,678	R8,330	R15,972
1999	103	3,130	R661	R3,894	1	52	54	7	114	R4,008	3,766	R8,597	R16,371
2000	92	3,301	R756	R4,150	1	53	47	8	109	R4,259	3,956	R8,982	R17,196
2001	R97	R3,126	R742	R3,964	1	R41	R39	8	R89	R4,053	R4,085	R9,170	R17,309
2002 ^P	97	3,204	727	4,028	1	41	47	9	98	4,125	4,122	9,149	17,397

¹ Includes supplemental gaseous fuels.

² Conventional hydroelectric power.

³ Geothermal heat pump and direct use energy.

⁴ Electricity retail sales to ultimate customers reported by electric utilities and other energy service providers.

⁵ Total losses are calculated as the primary energy consumed by the electric power sector minus the energy content of electricity retail sales. Total losses are allocated to the end-use sectors in proportion to

each sector's share of total electricity retail sales. See note at end of section.

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

Notes: • The commercial sector includes commercial combined-heat-and-power (CHP) and commercial electricity-only plants. See Note 1 at end of Section 8. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 2.1f, 5.12a, 6.5, 7.3, 8.5, 10.2a, A1, and A3-A6.

Table 2.1d Industrial Sector Energy Consumption, 1949-2002
(Trillion Btu)

Year	Primary Consumption										Electricity Retail Sales ⁴	Electrical System Energy Losses ⁵	Total	
	Fossil Fuels					Renewable Energy								
	Coal	Coal Coke Net Imports	Natural Gas ¹	Petroleum	Total	Hydropower ²	Wood	Waste	Geothermal ³	Total				Total Primary
1949	5,433	-7	3,188	3,468	12,083	76	468	NA	NA	544	12,627	418	R1,672	R14,717
1950	5,781	1	3,546	3,951	13,279	69	532	NA	NA	602	13,881	500	R1,852	R16,233
1951	6,202	-21	4,052	4,270	14,502	63	553	NA	NA	616	15,118	567	R1,984	R17,669
1952	5,517	-12	4,181	4,363	14,049	62	552	NA	NA	613	14,662	601	R2,039	R17,302
1953	5,931	-9	4,304	4,480	14,706	57	566	NA	NA	622	15,328	678	R2,195	R18,201
1954	4,730	-7	4,319	4,632	13,674	56	576	NA	NA	632	14,306	711	R2,129	R17,146
1955	5,620	-10	4,701	5,111	15,421	38	631	NA	NA	669	16,091	887	R2,495	R19,472
1956	5,667	-13	4,874	5,336	15,864	37	661	NA	NA	698	16,562	976	R2,658	R20,196
1957	5,536	-17	5,107	5,235	15,861	36	616	NA	NA	652	16,513	1,003	R2,689	R20,205
1958	4,533	-7	5,208	5,408	15,141	37	620	NA	NA	657	15,798	978	R2,531	R19,307
1959	4,413	-8	5,647	5,739	15,790	37	692	NA	NA	729	16,519	1,075	R2,722	R20,316
1960	4,543	-6	5,973	5,747	16,258	39	680	NA	NA	719	16,977	1,107	R2,739	R20,823
1961	4,345	-8	6,170	5,755	16,262	36	695	NA	NA	731	16,993	1,149	R2,794	R20,937
1962	4,385	-6	6,451	5,996	16,826	36	728	NA	NA	764	17,590	1,228	R2,950	R21,768
1963	4,590	-7	6,748	6,227	17,557	34	775	NA	NA	809	18,366	1,288	R3,076	22,730
1964	4,915	-10	7,114	6,548	18,566	34	827	NA	NA	861	19,427	1,382	R3,281	R24,090
1965	5,127	-18	7,339	6,789	19,236	33	855	NA	NA	888	20,124	1,463	R3,488	R25,075
1966	5,215	-25	7,795	7,110	20,095	33	902	NA	NA	935	21,030	1,582	R3,786	R26,397
1967	4,934	-15	8,043	7,120	20,082	36	895	NA	NA	930	21,013	1,655	R3,948	R26,616
1968	4,855	-17	8,626	7,391	20,855	35	982	NA	NA	1,017	21,872	1,778	R4,238	R27,888
1969	4,712	-36	9,234	7,696	21,605	34	1,014	NA	NA	1,048	22,654	1,909	R4,552	R29,114
1970	4,656	-58	9,536	7,787	21,922	34	1,019	NA	NA	1,053	22,975	1,948	R4,719	R29,641
1971	3,944	-33	9,892	7,856	21,659	34	1,040	NA	NA	1,074	22,732	2,011	R4,857	R29,601
1972	3,993	-26	9,884	8,534	22,385	34	1,113	NA	NA	1,147	23,532	2,187	R5,233	R30,953
1973	4,057	-7	10,388	9,104	23,541	35	1,165	NA	NA	1,200	24,741	2,341	R5,571	R32,653
1974	3,870	56	10,004	8,694	22,624	33	1,159	NA	NA	1,192	23,816	2,337	R5,666	R31,819
1975	3,667	14	8,532	8,146	20,359	32	1,063	NA	NA	1,096	21,454	2,346	R5,647	R29,447
1976	3,661	(s)	8,762	9,010	21,432	33	1,220	NA	NA	1,253	22,685	2,573	R6,171	R31,430
1977	3,454	15	8,635	9,774	21,879	33	1,281	NA	NA	1,314	23,193	2,682	R6,432	R32,307
1978	3,314	125	8,539	9,867	21,845	32	1,400	NA	NA	1,432	23,276	2,761	R6,696	R32,733
1979	3,593	63	8,549	10,568	22,773	34	1,405	NA	NA	1,439	24,211	2,873	R6,878	R33,962
1980	3,155	-35	8,395	9,525	21,040	33	1,600	NA	NA	1,633	22,673	2,781	R6,698	R32,152
1981	3,157	-16	8,257	8,285	19,682	33	1,602	87	NA	1,722	21,404	2,817	R6,615	R30,836
1982	2,552	-22	7,121	7,795	17,446	33	1,516	118	NA	1,667	19,113	2,542	R6,050	R27,704
1983	2,490	-16	6,826	7,420	16,720	33	1,690	155	NA	1,879	18,598	2,648	R6,265	R27,511
1984	2,842	-11	7,448	R8,025	R18,303	33	1,679	204	NA	1,916	R20,219	2,859	R6,576	R29,654
1985	2,760	-13	7,080	R7,738	R17,565	33	1,645	230	NA	1,908	R19,473	2,855	R6,563	R28,891
1986	2,641	-17	6,690	R7,880	R17,194	33	1,610	256	NA	1,899	R19,092	2,834	R6,408	R28,334
1987	2,673	9	7,323	R8,065	R18,069	33	1,576	282	NA	1,891	R19,960	2,928	R6,545	R29,433
1988	2,828	40	7,696	R8,339	R18,902	33	1,625	308	NA	1,965	R20,868	3,059	R6,801	R30,728
1989	2,787	30	8,131	R8,120	R19,068	R28	1,584	200	2	R1,814	R20,883	3,158	R7,349	R31,390
1990	2,756	5	8,502	R8,278	R19,542	R31	R1,442	R192	2	R1,667	R21,209	3,226	R7,457	R31,891
1991	2,601	10	8,619	R7,987	R19,216	R30	1,410	185	2	R1,626	R20,843	3,230	R7,394	R31,467
1992	2,515	35	8,967	R8,581	R20,098	31	1,461	179	2	1,672	R21,770	3,319	R7,548	R32,637
1993	2,496	27	9,120	R8,418	R20,062	30	1,484	181	2	1,697	R21,759	3,334	R7,596	R32,689
1994	2,510	58	9,172	R8,801	R20,540	62	1,580	199	3	1,844	R22,384	3,439	R7,742	R33,565
1995	2,488	61	9,637	R8,614	R20,801	55	1,652	195	3	1,905	R22,706	3,455	R7,842	R34,003
1996	2,434	R23	9,947	R9,053	R21,457	61	1,683	224	3	1,971	R23,428	3,527	R8,014	R34,969
1997	2,395	R46	9,976	R9,290	R21,708	58	1,731	184	3	1,976	R23,684	3,542	R8,017	R35,243
1998	2,335	R67	9,806	R9,116	R21,324	55	1,603	180	3	1,841	R23,166	3,587	R8,124	R34,876
1999	2,227	R58	9,415	R9,396	R21,095	49	R1,620	171	4	R1,843	R22,938	3,611	R8,242	R34,791
2000	2,256	R65	R9,535	R9,120	R20,977	42	1,636	R145	4	R1,828	R22,805	3,631	R8,245	R34,681
2001	R2,230	R32	R8,697	R9,220	R20,178	R32	R1,443	R150	5	R1,630	R21,808	R3,290	R7,385	R32,483
2002 ^P	2,092	62	8,468	9,228	19,850	41	1,506	172	5	1,724	21,573	3,391	7,526	32,490

¹ Includes supplemental gaseous fuels.

² Conventional hydroelectric power.

³ Geothermal heat pump and direct use energy.

⁴ Electricity retail sales to ultimate customers reported by electric utilities and other energy service providers.

⁵ Total losses are calculated as the primary energy consumed by the electric power sector minus the energy content of electricity retail sales. Total losses are allocated to the end-use sectors in proportion to

each sector's share of total electricity retail sales. See note at end of section.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than +0.5 trillion Btu and greater than -0.5 trillion Btu.

Notes: • The industrial sector includes industrial combined-heat-and-power (CHP) and industrial electricity-only plants. See Note 1 at end of Section 8. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 2.1f, 5.12b, 6.5, 7.3, 8.5, 10.2a, A1, and A3-A6.

Table 2.1e Transportation Sector Energy Consumption, 1949-2002
(Trillion Btu)

Year	Primary Consumption					Total Primary ²	Electricity Retail Sales ³	Electrical System Energy Losses ⁴	Total ²
	Fossil Fuels			Total	Renewable Energy				
	Coal	Natural Gas ¹	Petroleum		Alcohol Fuels ²				
1949	1,727	NA	6,152	7,880	NA	7,880	22	R88	R7,990
1950	1,564	130	6,690	8,384	NA	8,384	23	86	8,493
1951	1,379	199	7,356	8,934	NA	8,934	24	R84	R9,042
1952	984	214	7,709	8,907	NA	8,907	22	74	R9,003
1953	733	238	8,059	9,031	NA	9,031	22	71	R9,123
1954	461	239	8,123	8,823	NA	8,823	20	60	8,903
1955	421	254	8,800	9,475	NA	9,475	20	56	9,551
1956	340	306	9,145	9,791	NA	9,791	19	51	9,860
1957	241	310	9,286	9,837	NA	9,837	16	R43	9,897
1958	115	323	9,514	9,953	NA	9,953	15	38	10,005
1959	88	362	9,849	10,298	NA	10,298	14	R36	R10,349
1960	75	359	10,126	10,560	NA	10,560	10	26	10,597
1961	19	391	10,325	10,735	NA	10,735	10	25	10,770
1962	17	396	10,773	11,186	NA	11,186	10	24	11,221
1963	16	437	11,168	11,621	NA	11,621	10	24	11,655
1964	17	450	11,498	11,965	NA	11,965	10	24	11,998
1965	16	517	11,868	12,400	NA	12,400	10	24	12,434
1966	15	553	12,501	13,069	NA	13,069	10	23	13,102
1967	11	594	13,113	13,718	NA	13,718	10	24	13,752
1968	10	609	14,212	14,831	NA	14,831	10	24	14,866
1969	7	651	14,813	15,471	NA	15,471	10	25	15,506
1970	7	745	15,310	16,061	NA	16,061	11	26	16,098
1971	5	766	15,923	16,693	NA	16,693	10	25	16,729
1972	4	787	16,891	17,681	NA	17,681	10	25	17,716
1973	3	743	17,831	18,576	NA	18,576	11	25	18,612
1974	2	685	17,399	18,086	NA	18,086	10	24	18,119
1975	1	595	17,614	18,209	NA	18,209	10	24	18,244
1976	(s)	559	18,506	19,065	NA	19,065	10	24	19,099
1977	(s)	543	19,241	19,784	NA	19,784	10	25	19,820
1978	(s)	539	20,041	20,580	NA	20,580	10	R24	20,615
1979	(s)	612	19,825	20,436	NA	20,436	10	24	20,471
1980	(s)	650	19,008	19,658	NA	19,658	11	27	19,696
1981	(s)	658	18,811	19,469	7	19,469	11	26	19,506
1982	(s)	612	18,420	19,032	19	19,032	11	R26	19,069
1983	(s)	505	18,593	19,098	35	19,098	13	30	19,141
1984	(s)	545	R19,020	R19,565	43	R19,565	14	33	R19,612
1985	(s)	519	R19,471	R19,990	52	R19,990	14	33	R20,037
1986	(s)	499	R20,182	R20,681	60	R20,681	15	R34	R20,730
1987	(s)	535	R20,816	R21,352	69	R21,352	16	35	R21,402
1988	(s)	632	R21,567	R22,198	70	R22,198	16	R35	R22,250
1989	(s)	649	R21,706	R22,355	71	R22,355	16	38	R22,409
1990	(s)	680	R21,625	R22,305	63	R22,305	16	37	R22,358
1991	(s)	620	R21,373	R21,994	73	R21,994	16	37	R22,047
1992	(s)	608	R21,674	R22,282	83	R22,282	16	37	R22,335
1993	(s)	R645	R22,072	R22,716	97	R22,716	16	37	R22,770
1994	(s)	R709	R22,603	R23,312	109	R23,312	17	R38	R23,367
1995	(s)	R724	R23,069	R23,793	117	R23,793	17	39	R23,849
1996	(s)	R737	R23,647	R24,384	84	R24,384	17	R38	R24,439
1997	(s)	R780	R23,917	R24,697	106	R24,697	17	38	R24,752
1998	(s)	R666	R24,537	R25,203	117	R25,203	17	R38	R25,258
1999	(s)	R675	R25,218	R25,894	122	R25,894	17	40	R25,951
2000	(s)	672	R25,820	R26,492	139	R26,492	18	42	R26,552
2001	(s)	R657	R25,556	R26,213	147	R26,213	R19	R43	R26,275
2002 ^P	(s)	663	25,801	26,465	174	26,465	18	39	26,522

¹ Natural gas consumed in the operation of pipelines (primarily in compressors) and small amounts consumed as vehicle fuel. See Table 6.5.

² Alcohol (ethanol blended into motor gasoline) is included in both "Petroleum" and "Alcohol Fuels," but is counted only once in both total primary consumption and total consumption.

³ Electricity retail sales to ultimate customers reported by electric utilities and other energy service providers.

⁴ Total losses are calculated as the primary energy consumed by the electric power sector minus the

energy content of electricity retail sales. Total losses are allocated to the end-use sectors in proportion to each sector's share of total electricity retail sales. See note at end of section.

⁵ Since 1978, the small amounts of coal consumed for transportation are reported as industrial sector consumption.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 trillion Btu.

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

Sources: Tables 2.1f, 5.12c, 6.5, 7.3, 8.5, 10.2a, A1, and A3-A6.

Table 2.1f Electric Power Sector Energy Consumption, 1949-2002
(Trillion Btu)

Year	Primary Consumption														Electricity Net Imports	Total Primary
	Fossil Fuels				Nuclear Electric Power	Hydro-electric Pumped Storage ²	Renewable Energy									
	Coal	Natural Gas ¹	Petroleum	Total			Conventional Hydroelectric Power	Wood	Waste	Geothermal	Solar	Wind	Total			
1949	1,995	569	415	2,979	0	(3)	1,349	6	NA	NA	NA	NA	1,355	5	R4,339	
1950	2,199	651	472	3,322	0	(3)	1,346	5	NA	NA	NA	NA	1,351	6	R4,679	
1951	2,507	791	400	3,697	0	(3)	1,361	5	NA	NA	NA	NA	1,366	7	R5,071	
1952	2,557	942	420	3,920	0	(3)	1,404	6	NA	NA	NA	NA	1,411	8	R5,338	
1953	2,777	1,070	514	4,362	0	(3)	1,356	5	NA	NA	NA	NA	1,361	7	R5,730	
1954	2,841	1,206	417	4,464	0	(3)	1,304	3	NA	NA	NA	NA	1,307	8	R5,780	
1955	3,458	1,194	471	5,123	0	(3)	1,322	3	NA	NA	NA	NA	1,325	14	R6,461	
1956	3,790	1,283	455	5,527	0	(3)	1,398	2	NA	NA	NA	NA	1,400	16	R6,942	
1957	3,855	1,383	498	5,737	(s)	(3)	1,480	2	NA	NA	NA	NA	1,482	12	R7,231	
1958	3,721	1,421	486	5,628	2	(3)	1,555	2	NA	NA	NA	NA	1,557	11	R7,198	
1959	4,029	1,686	552	6,267	2	(3)	1,511	2	NA	NA	NA	NA	1,513	12	R7,794	
1960	4,228	1,785	553	6,565	6	(3)	1,569	2	NA	1	NA	NA	1,571	15	R8,158	
1961	4,355	1,889	557	6,801	20	(3)	1,621	1	NA	2	NA	NA	1,624	8	R8,453	
1962	4,622	2,035	560	7,217	26	(3)	1,780	1	NA	2	NA	NA	1,784	2	R9,029	
1963	5,050	2,211	585	7,846	38	(3)	1,737	1	NA	4	NA	NA	1,743	(s)	9,627	
1964	5,380	2,397	634	8,411	40	(3)	1,853	2	NA	5	NA	NA	1,859	7	R10,316	
1965	5,821	2,395	722	8,938	43	(3)	2,026	3	NA	4	NA	NA	2,033	(s)	R11,014	
1966	6,302	2,696	883	9,881	64	(3)	2,028	3	NA	4	NA	NA	2,036	4	R11,985	
1967	6,445	2,834	1,011	10,290	88	(3)	2,311	3	NA	7	NA	NA	2,321	-1	R12,698	
1968	6,994	3,245	1,181	11,421	142	(3)	2,313	4	NA	9	NA	NA	2,327	-2	R13,887	
1969	7,219	3,596	1,571	12,386	154	(3)	2,614	3	NA	13	NA	NA	2,630	4	R15,174	
1970	7,227	4,054	2,117	13,399	239	(3)	2,600	1	2	11	NA	NA	2,615	7	R16,259	
1971	7,299	4,099	2,495	13,893	413	(3)	2,790	1	2	12	NA	NA	2,806	12	R17,124	
1972	7,811	4,084	3,097	14,992	584	(3)	2,829	1	2	31	NA	NA	2,864	26	R18,466	
1973	8,658	3,748	3,515	15,921	910	(3)	2,827	1	2	43	NA	NA	2,873	49	R19,753	
1974	8,534	3,519	3,365	15,418	1,272	(3)	3,143	1	2	53	NA	NA	3,199	43	R19,933	
1975	8,786	3,240	3,166	15,191	1,900	(3)	3,122	(s)	2	70	NA	NA	3,194	21	R20,307	
1976	9,720	3,152	3,477	16,349	2,111	(3)	2,943	1	2	78	NA	NA	3,024	29	R21,513	
1977	10,262	3,284	3,901	17,446	2,702	(3)	2,301	3	2	77	NA	NA	2,383	59	R22,591	
1978	10,238	3,297	3,987	17,522	3,024	(3)	2,905	2	1	64	NA	NA	2,973	67	R23,587	
1979	11,260	3,613	3,283	18,156	2,776	(3)	2,897	3	2	84	NA	NA	2,986	69	R23,987	
1980	12,123	3,810	2,634	18,567	2,739	(3)	2,867	3	2	110	NA	NA	2,982	71	R24,359	
1981	12,583	3,768	2,202	18,553	3,008	(3)	2,725	3	1	123	NA	NA	2,852	113	R24,525	
1982	12,582	3,342	1,568	17,491	3,131	(3)	3,233	2	1	105	NA	NA	3,341	100	R24,063	
1983	13,213	2,998	1,544	17,754	3,203	(3)	3,494	2	2	129	NA	(s)	3,627	121	R24,705	
1984	14,019	3,220	1,286	18,526	3,553	(3)	3,353	5	4	165	(s)	(s)	3,527	135	R25,741	
1985	14,542	3,160	1,090	18,792	4,076	(3)	2,937	8	7	198	(s)	(s)	3,150	140	R26,158	
1986	14,444	2,691	1,452	18,586	4,380	(3)	3,038	5	7	219	(s)	(s)	3,270	122	R26,359	
1987	15,173	2,935	1,257	19,365	4,754	(3)	2,602	8	7	229	(s)	(s)	2,846	158	R27,124	
1988	15,850	2,709	1,563	20,123	5,587	(3)	2,302	10	8	217	(s)	(s)	2,536	108	R28,354	
1989 ⁴	R16,137	3,192	1,703	R21,032	5,602	(3)	R2,808	100	132	R308	3	R22	R3,372	37	R30,044	
1990	R16,261	R3,332	R1,289	R20,883	6,104	-36	R3,014	R129	R188	R326	4	R29	R3,689	8	R30,647	
1991	16,250	3,399	1,198	R20,847	6,422	-47	R2,985	126	229	R335	5	R31	R3,710	67	R30,999	
1992	16,466	3,534	991	R20,990	6,479	-43	2,586	140	262	338	4	30	3,360	87	R30,873	
1993	17,196	3,560	1,124	R21,880	6,410	-42	2,861	150	265	351	5	31	3,662	95	R32,006	
1994	17,261	4,000	1,059	R22,320	6,694	-35	2,620	152	282	325	5	36	3,420	153	R32,551	
1995	17,466	4,325	755	R22,546	7,075	-28	3,149	125	296	280	5	33	3,889	134	R33,616	
1996	18,429	3,883	817	R23,129	7,087	-32	3,528	138	300	300	5	33	4,305	137	R34,626	
1997	18,905	4,146	927	R23,977	6,597	-41	3,581	137	309	309	5	34	4,375	116	R35,024	
1998	19,216	4,698	1,306	R25,220	7,068	-46	3,241	137	308	311	5	31	4,032	88	R36,363	
1999	19,279	4,926	1,211	R25,416	7,610	-62	3,218	138	315	312	5	46	4,034	99	R37,097	
2000	20,220	5,316	1,144	R26,680	7,862	-57	2,768	134	318	296	5	57	3,579	116	R38,181	
2001	R19,558	R5,476	R1,277	R26,310	8,028	-90	R2,169	R126	R289	R289	R6	R68	R2,982	75	R37,306	
2002 ^P	19,985	5,664	908	26,557	8,145	-89	2,626	135	331	281	6	106	3,485	78	38,177	

¹ Includes supplemental gaseous fuels.

² Pumped storage facility production minus energy used for pumping.

³ Included in "Conventional Hydroelectric Power."

⁴ Through 1988, data are for electric utilities only. Beginning in 1989, data are for electric utilities and independent power producers.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 trillion Btu.

Notes: • See Note 1 at end of Section 1. • Data are for fuels consumed to produce electricity and useful thermal output. • The electric power sector comprises electricity-only and combined-heat-and-power (CHP) plants within the NAICS 22 category whose primary business is to sell electricity, or electricity and heat, to the public. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 5.12d, 6.5, 7.3, 8.1, 10.2b, A1, and A4-A6.

Table 2.2a Consumption for Electricity Generation: Total (All Sectors), 1949-2002
(Trillion Btu)

Year	Fossil Fuels					Nuclear Electric Power	Hydro-electric Pumped Storage ⁵	Renewable Energy							Electricity Net Imports	Total ⁹
	Coal ¹	Petroleum ²	Natural Gas ³	Other Gases ⁴	Total			Conventional Hydroelectric Power	Wood ⁶	Waste ⁷	Geo-thermal	Solar ⁸	Wind	Total		
1949	1,995	415	569	NA	2,979	0	(¹⁰)	1,425	6	NA	NA	NA	NA	1,431	5	R ⁴ ,415
1950	2,199	472	651	NA	3,322	0	(¹⁰)	1,415	5	NA	NA	NA	NA	1,421	6	R ⁴ ,749
1951	2,507	400	791	NA	3,697	0	(¹⁰)	1,424	5	NA	NA	NA	NA	1,429	7	R ⁵ ,134
1952	2,557	420	942	NA	3,920	0	(¹⁰)	1,466	6	NA	NA	NA	NA	1,472	8	R ⁵ ,400
1953	2,777	514	1,070	NA	4,362	0	(¹⁰)	1,413	5	NA	NA	NA	NA	1,418	7	R ⁵ ,787
1954	2,841	417	1,206	NA	4,464	0	(¹⁰)	1,360	3	NA	NA	NA	NA	1,363	8	R ⁵ ,835
1955	3,458	471	1,194	NA	5,123	0	(¹⁰)	1,360	3	NA	NA	NA	NA	1,363	14	R ⁶ ,500
1956	3,790	455	1,283	NA	5,527	0	(¹⁰)	1,435	2	NA	NA	NA	NA	1,436	16	R ⁶ ,979
1957	3,855	498	1,383	NA	5,737	(s)	(¹⁰)	1,516	2	NA	NA	NA	NA	1,518	12	R ⁷ ,267
1958	3,721	486	1,421	NA	5,628	2	(¹⁰)	1,592	2	NA	NA	NA	NA	1,594	11	R ⁷ ,235
1959	4,029	552	1,686	NA	6,267	2	(¹⁰)	1,548	2	NA	NA	NA	NA	1,550	12	R ⁷ ,831
1960	4,228	553	1,785	NA	6,565	6	(¹⁰)	1,608	2	NA	1	NA	NA	1,610	15	R ⁸ ,197
1961	4,355	557	1,889	NA	6,801	20	(¹⁰)	1,656	1	NA	2	NA	NA	1,660	8	R ⁸ ,489
1962	4,622	560	2,035	NA	7,217	26	(¹⁰)	1,816	1	NA	2	NA	NA	1,820	2	R ⁹ ,065
1963	5,050	585	2,211	NA	7,846	38	(¹⁰)	1,771	1	NA	4	NA	NA	1,776	(s)	R ⁹ ,661
1964	5,380	634	2,397	NA	8,411	40	(¹⁰)	1,886	2	NA	5	NA	NA	1,892	7	R ¹⁰ ,350
1965	5,821	722	2,395	NA	8,938	43	(¹⁰)	2,059	3	NA	4	NA	NA	2,066	(s)	R ¹¹ ,047
1966	6,302	883	2,696	NA	9,881	64	(¹⁰)	2,062	3	NA	4	NA	NA	2,069	4	R ¹² ,018
1967	6,445	1,011	2,834	NA	10,290	88	(¹⁰)	2,347	3	NA	7	NA	NA	2,357	-1	R ¹² ,734
1968	6,994	1,181	3,245	NA	11,421	142	(¹⁰)	2,349	4	NA	9	NA	NA	2,362	-2	R ¹³ ,922
1969	7,219	1,571	3,596	NA	12,386	154	(¹⁰)	2,648	3	NA	13	NA	NA	2,665	4	R ¹⁵ ,208
1970	7,227	2,117	4,054	NA	13,399	239	(¹⁰)	2,634	1	2	11	NA	NA	2,649	7	R ¹⁶ ,293
1971	7,299	2,495	4,099	NA	13,893	413	(¹⁰)	2,824	1	2	12	NA	NA	2,839	12	R ¹⁷ ,158
1972	7,811	3,097	4,084	NA	14,992	584	(¹⁰)	2,864	1	2	31	NA	NA	2,899	26	R ¹⁸ ,501
1973	8,658	3,515	3,748	NA	15,921	910	(¹⁰)	2,861	1	2	43	NA	NA	2,907	49	R ¹⁹ ,788
1974	8,534	3,365	3,519	NA	15,418	1,272	(¹⁰)	3,177	1	2	53	NA	NA	3,232	43	R ¹⁹ ,966
1975	8,786	3,166	3,240	NA	15,191	1,900	(¹⁰)	3,155	(s)	2	70	NA	NA	3,227	21	R ²⁰ ,339
1976	9,720	3,477	3,152	NA	16,349	2,111	(¹⁰)	2,976	1	2	78	NA	NA	3,057	29	R ²¹ ,547
1977	10,262	3,901	3,284	NA	17,446	2,702	(¹⁰)	2,333	3	2	77	NA	NA	2,416	59	R ²² ,623
1978	10,238	3,987	3,297	NA	17,522	3,024	(¹⁰)	2,937	2	1	64	NA	NA	3,005	67	R ²³ ,618
1979	11,260	3,283	3,613	NA	18,156	2,776	(¹⁰)	2,931	3	2	84	NA	NA	3,020	69	R ²⁴ ,021
1980	12,123	2,634	3,810	NA	18,567	2,739	(¹⁰)	2,900	3	2	110	NA	NA	3,014	71	R ²⁴ ,392
1981	12,583	2,202	3,768	NA	18,553	3,008	(¹⁰)	2,758	3	1	123	NA	NA	2,885	113	R ²⁴ ,559
1982	12,582	1,568	3,342	NA	17,491	3,131	(¹⁰)	3,266	2	1	105	NA	NA	3,374	100	R ²⁴ ,096
1983	13,213	1,544	2,998	NA	17,754	3,203	(¹⁰)	3,527	2	2	129	NA	(s)	3,661	121	R ²⁴ ,738
1984	14,019	1,286	3,220	NA	18,526	3,553	(¹⁰)	3,386	5	4	165	(s)	(s)	3,560	135	R ²⁵ ,774
1985	14,542	1,090	3,160	NA	18,792	4,076	(¹⁰)	2,970	8	7	198	(s)	(s)	3,183	140	R ²⁶ ,191
1986	14,444	1,452	2,691	NA	18,586	4,380	(¹⁰)	3,071	5	7	219	(s)	(s)	3,303	122	R ²⁶ ,392
1987	15,173	1,257	2,935	NA	19,365	4,754	(¹⁰)	2,635	8	7	229	(s)	(s)	2,879	158	R ²⁷ ,157
1988	15,850	1,563	2,709	NA	20,123	5,587	(¹⁰)	2,334	10	8	217	(s)	(s)	2,569	108	R ²⁸ ,387
1989 ¹¹	R ¹⁶ ,359	R ¹ ,757	3,581	90	R ²¹ ,789	5,602	(¹⁰)	R ² ,837	345	151	R ³⁰⁸	3	R ²²	R ³ ,665	37	R ³¹ ,132
1990	R ¹⁶ ,477	R ¹ ,367	3,752	R ¹¹²	R ²¹ ,708	6,104	-36	R ³ ,046	R ⁴⁴²	R ²¹¹	R ³²⁶	4	R ²⁹	R ⁴ ,058	8	R ³¹ ,878
1991	16,460	1,276	3,861	125	21,723	6,422	-47	R ³ ,016	425	247	R ³³⁵	5	R ³¹	R ⁴ ,058	67	R ³² ,281
1992	16,686	1,076	3,999	141	21,903	6,479	-43	2,617	481	283	338	4	30	3,752	87	R ³² ,218
1993	17,424	1,203	4,027	136	22,790	6,410	-42	2,892	485	288	351	5	31	4,052	95	R ³³ ,339
1994	17,485	1,135	4,476	136	23,233	6,694	-35	2,683	498	301	325	5	36	3,848	153	R ³³ ,933
1995	17,687	813	4,840	133	23,473	7,075	-28	3,205	480	316	280	5	33	4,318	134	R ³⁵ ,015
1996	18,650	888	4,400	159	24,097	7,087	-32	3,590	513	324	300	5	33	4,765	137	R ³⁶ ,091
1997	19,128	985	4,658	119	24,890	6,597	-41	3,640	484	339	309	5	34	4,811	116	R ³⁶ ,410
1998	19,417	1,378	5,205	125	26,124	7,068	-46	3,297	475	332	311	5	31	4,450	88	R ³⁷ ,721
1999	19,467	1,285	5,441	126	26,320	7,610	-62	3,268	490	332	312	5	46	4,452	99	R ³⁸ ,459
2000	R ²⁰ ,443	1,212	5,818	126	R ²⁷ ,599	7,862	-57	2,811	496	330	296	5	57	3,995	116	R ³⁹ ,562
2001	R ¹⁹ ,734	R ¹ ,337	R ⁵ ,982	R ⁹⁷	R ²⁷ ,150	8,028	-90	R ² ,201	R ⁴⁸⁶	R ³⁴⁷	R ²⁸⁹	R ⁶	R ⁶⁸	R ³ ,397	75	R ³⁸ ,602
2002 ^P	20,187	962	6,186	132	27,467	8,145	-89	2,668	556	362	281	6	106	3,978	78	39,628

¹ Anthracite, bituminous coal, subbituminous coal, lignite, waste coal, and synthetic coal.

² Distillate fuel oil, residual fuel oil, petroleum coke, jet fuel, kerosene, other petroleum, and waste oil.

³ Natural gas, including a small amount of supplemental gaseous fuels.

⁴ Blast furnace gas, propane gas, and other manufactured and waste gases derived from fossil fuels.

⁵ Pumped storage facility production minus energy used for pumping.

⁶ Wood, black liquor, and other wood waste.

⁷ Municipal solid waste, landfill gas, sludge waste, tires, agricultural byproducts, and other biomass.

⁸ Solar thermal and photovoltaic energy.

⁹ Includes batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies, which are not separately displayed.

¹⁰ Included in "Conventional Hydroelectric Power."

¹¹ Through 1988, all data except hydroelectric are for electric utilities only; hydroelectric data through 1988 include industrial plants as well as electric utilities. Beginning in 1989, data are for electric utilities, independent power producers, commercial plants, and industrial plants.

R=Revised. P=Preliminary. NA=Not available. (s)=Less than 0.5 trillion Btu.

Notes: • See Note 1 at end of Section 1. • Data are for fuels consumed to produce electricity; they exclude fuels consumed to produce useful thermal output. Consumption for electricity generation at combined-heat-and-power (CHP) plants is estimated. • Totals may not equal sum of components due to independent rounding.

Sources: Tables 2.2b, 2.2c, and 10.2a.

Appendix D

Table D1. Population and U.S. Gross Domestic Product, 1949-2002

Year	Population		U.S. Gross Domestic Product		
	United States ¹	World	Billion Nominal Dollars	Billion Chained (1996) Dollars	Implicit Price Deflator ² (1996 = 1.0000)
	Million People				
1949	148.7		267.7	1,550.9	0.1726
1950	151.3	R2,555.4	294.3	1,686.6	0.1745
1951	154.0	R2,593.1	339.5	1,815.1	0.1871
1952	156.4	R2,635.2	358.6	1,887.3	0.1900
1953	159.0	R2,680.5	379.9	1,973.9	0.1925
1954	161.9	R2,728.5	381.1	1,960.5	0.1944
1955	165.1	R2,780.0	415.2	2,099.5	0.1978
1956	168.1	R2,832.9	438.0	2,141.1	0.2045
1957	171.2	R2,888.8	461.5	2,183.9	0.2113
1958	174.1	R2,945.3	467.9	2,162.8	0.2164
1959	177.1	R2,997.6	507.4	2,319.0	0.2188
1960	179.3	R3,039.7	527.4	2,376.7	0.2219
1961	183.0	R3,080.5	545.7	2,432.0	0.2244
1962	185.7	R3,136.6	586.5	2,578.9	0.2274
1963	188.4	R3,206.1	618.7	2,690.4	0.2300
1964	191.1	R3,277.2	664.4	2,846.5	0.2334
1965	193.5	R3,346.2	720.1	3,028.5	0.2378
1966	195.5	R3,416.5	789.3	3,227.5	0.2446
1967	197.4	R3,486.2	834.1	3,308.3	0.2521
1968	199.3	R3,558.1	911.5	3,466.1	0.2630
1969	201.3	R3,632.8	985.3	3,571.4	0.2759
1970	203.3	R3,708.1	1,039.7	3,578.0	0.2906
1971	206.8	R3,785.7	1,128.6	3,697.7	0.3052
1972	209.3	R3,862.4	1,240.4	3,898.4	0.3182
1973	211.4	R3,938.6	1,385.5	4,123.4	0.3360
1974	213.3	R4,014.2	1,501.0	4,099.0	0.3662
1975	215.5	R4,087.5	1,635.2	4,084.4	0.4003
1976	217.6	R4,159.3	1,823.9	4,311.7	0.4230
1977	219.8	R4,231.6	2,031.4	4,511.8	0.4502
1978	222.1	R4,303.8	2,295.9	4,760.6	0.4823
1979	224.6	R4,378.9	2,566.4	4,912.1	0.5225
1980	226.5	R4,454.6	2,795.6	4,900.9	0.5704
1981	229.5	R4,530.5	3,131.3	5,021.0	0.6237
1982	231.7	R4,610.5	3,259.2	4,919.3	0.6625
1983	233.8	R4,690.6	3,534.9	5,132.3	0.6888
1984	235.8	R4,769.7	3,932.7	5,505.2	0.7144
1985	237.9	R4,850.1	4,213.0	5,717.1	0.7369
1986	240.1	R4,932.3	4,452.9	5,912.4	0.7531
1987	242.3	R5,017.4	4,742.5	6,113.3	0.7758
1988	244.5	R5,103.0	5,108.3	6,368.4	0.8021
1989	246.8	R5,188.7	5,489.1	6,591.8	0.8327
1990	248.8	R5,275.4	5,803.2	6,707.9	0.8651
1991	253.0	R5,359.3	5,986.2	6,676.4	0.8966
1992	256.5	R5,443.2	6,318.9	6,880.0	0.9184
1993	259.9	R5,524.5	6,642.3	7,062.6	0.9405
1994	263.1	R5,604.7	7,054.3	7,347.7	0.9601
1995	266.3	R5,685.3	7,400.5	7,543.8	0.9810
1996	269.4	R5,764.5	7,813.2	7,813.2	1.0000
1997	272.6	R5,844.3	8,318.4	8,159.5	1.0195
1998	275.9	R5,923.1	8,781.5	8,508.9	1.0320
1999	279.0	R6,001.6	R9,274.3	R8,859.0	R1.0469
2000	281.4	R6,078.7	R9,824.6	R9,191.4	R1.0689
2001	R285.3	R6,154.0	R10,082.2	R9,214.5	R1.0942
2002	288.4	6,228.4	10,446.2	9,439.9	1.1066

¹ Resident population of the 50 States and the District of Columbia estimated for July 1 of each year, except for the April 1 decennial census counts.

² See Glossary.

R=Revised. NA=Not available.

Note: See "Chained Dollars" in the Glossary.

Web Pages: • <http://www.census.gov/> • <http://www.bea.doc.gov/>.

Sources: See next page.

Appendix D

Table D1. Sources: U.S. Population: • 1949-1989—Department of Commerce (DOC), U.S. Bureau of the Census, Current Population Reports Series P-25, November 1998. • 1990 forward—DOC, U.S. Bureau of the Census, State Population

Estimates. **World Population:** 1950 forward—DOC, U.S. Bureau of the Census, International Database. **U.S. Gross Domestic Product:** 1949 forward—DOC, Bureau of Economic Analysis, National Income and Product Accounts.

References and Web Locations

The energy production and end-use data in the U.S. energy flow chart were derived from: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2002*, DOE/EIA-0384(2002), Washington, D.C., October 2003. The report is available on the Web at <http://www.eia.doe.gov/bookshelf/consumer.html> .

Additional information on uranium and nuclear energy came from U.S. Department of Energy, Energy Information Administration, *Uranium Industry Annual 2002*, DOE/EIA-0478(2002), Washington, D.C., May 2003. This is available on the Web at <http://www.eia.doe.gov/cneaf/nuclear/page/nupubs.html> .

The carbon emissions data are from U.S. Department of Energy, Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2002*, DOE/EIA-0573(2002), Washington, D.C., October 2003. This report is available on the Web at http://www.eia.doe.gov/env/env_pub.html .

The energy flow charts and reports, carbon dioxide emissions charts, and water flow charts prepared by Lawrence Livermore National Laboratory are available on the Web at <http://eed.llnl.gov/flow/> .

Graphic artist: Helen Magann

University of California
Lawrence Livermore National Laboratory
Technical Information Department
Livermore, CA 94551

