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U.S. ENERGY FACTS EXPLAINED



CONSUMPTION & PRODUCTION

The United States uses a mix of energy sources

The United States uses and produces many different types and sources of energy, which can be grouped into general categories such as [primary](#) and secondary, [renewable](#) and nonrenewable, and [fossil fuels](#).

Primary energy sources include fossil fuels ([petroleum](#), [natural gas](#), and [coal](#)), [nuclear energy](#), and [renewable sources](#) of energy. [Electricity](#) is a secondary energy source that is generated (produced) from primary energy sources.

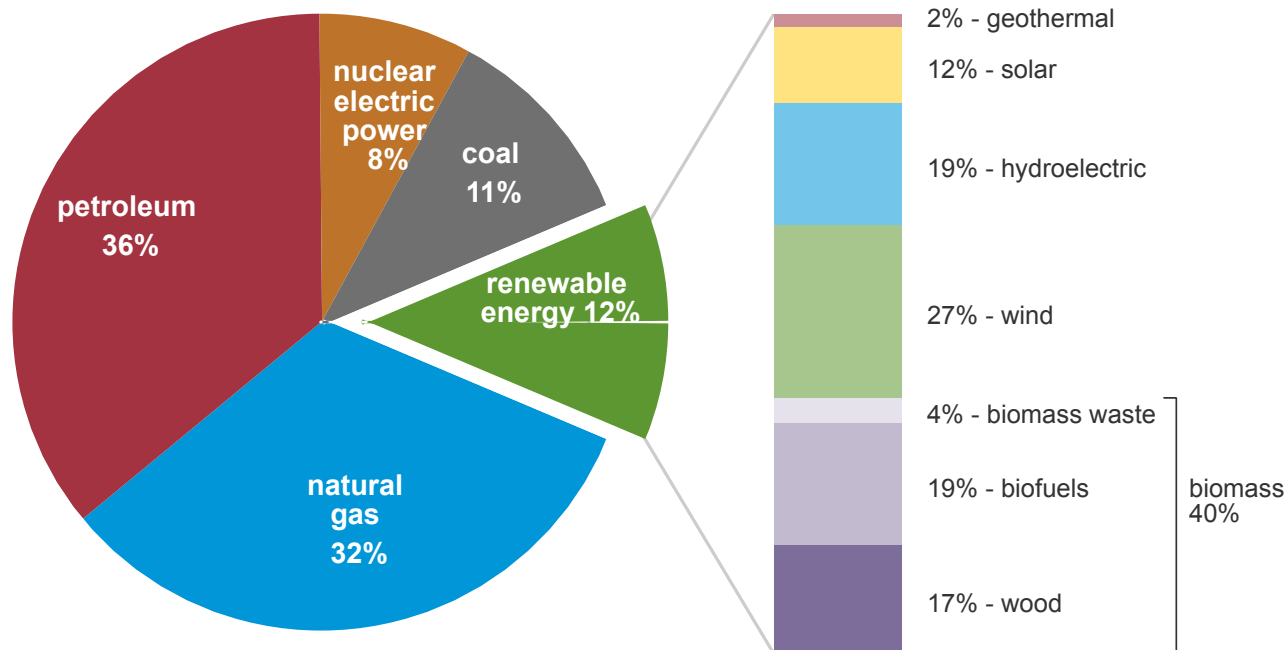
Energy sources are measured in different physical [units](#): liquid fuels in barrels or gallons, natural gas in cubic feet, coal in short tons, and electricity in kilowatts and kilowatthours. In the United States, [British thermal units \(Btu\)](#), a measure of heat energy, is commonly used for comparing different types of energy to each other. In 2021, total U.S. primary energy consumption was equal to about 97,331,601,000,000,000 Btu, or about 97 quadrillion Btu.

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U.S. primary energy consumption by energy source, 2021

total = 97.33 quadrillion British thermal units (Btu)

total = 12.16 quadrillion Btu



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2022, preliminary data

Note: Sum of components may not equal 100% because of independent rounding.



There are five **energy-use sectors**, and the amounts—in quadrillion Btu (or *quads*)—of their primary energy consumption in 2021 were:

36.75
quads
electric power

26.87
quads
transportation

22.55
quads
industrial

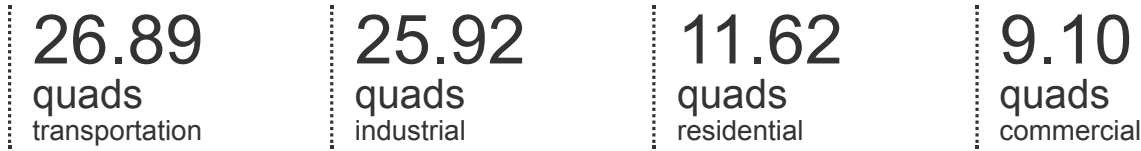
6.58
quads
residential

4.58
quads
commercial

In 2021, the **electric power sector** accounted for about 96% of total U.S. utility-scale electricity generation, nearly all of which was sold to the other sectors.¹

The transportation, industrial, commercial, and residential sectors are called *end-use sectors* because they consume primary energy and electricity produced by the electric power sector.

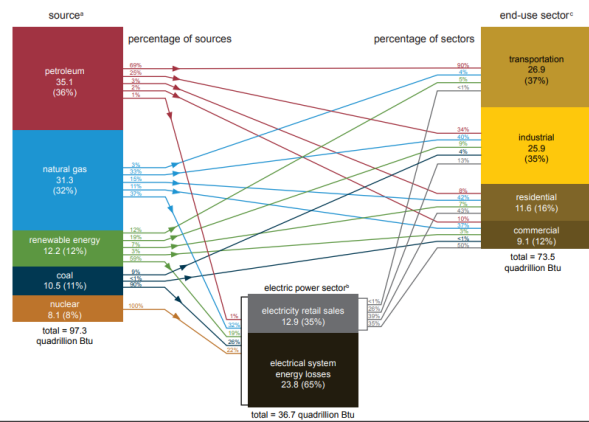
Primary energy use plus the energy content of electricity purchased from the electric power sector by each end-use sector in 2021 was:



Total energy consumption by the end-use sectors includes their primary energy use, purchased electricity, and electrical system energy losses (**energy conversion and other losses** associated with the generation, transmission, and distribution of purchased electricity) and other energy losses.

The sources of energy used by each sector vary widely. For example, in 2021, petroleum provided approximately 90% of the transportation sector's energy consumption, but only 1% of the electric power sector's primary energy use. The chart below shows the types and amounts of primary energy sources consumed in the United States, the amounts of primary energy used by the electric power sector and the energy end-use sectors, and the retail sales of electricity by the electric power sector to the energy end-use sectors.

U.S. energy consumption by source and sector, 2021
quadrillion British thermal units (Btu)



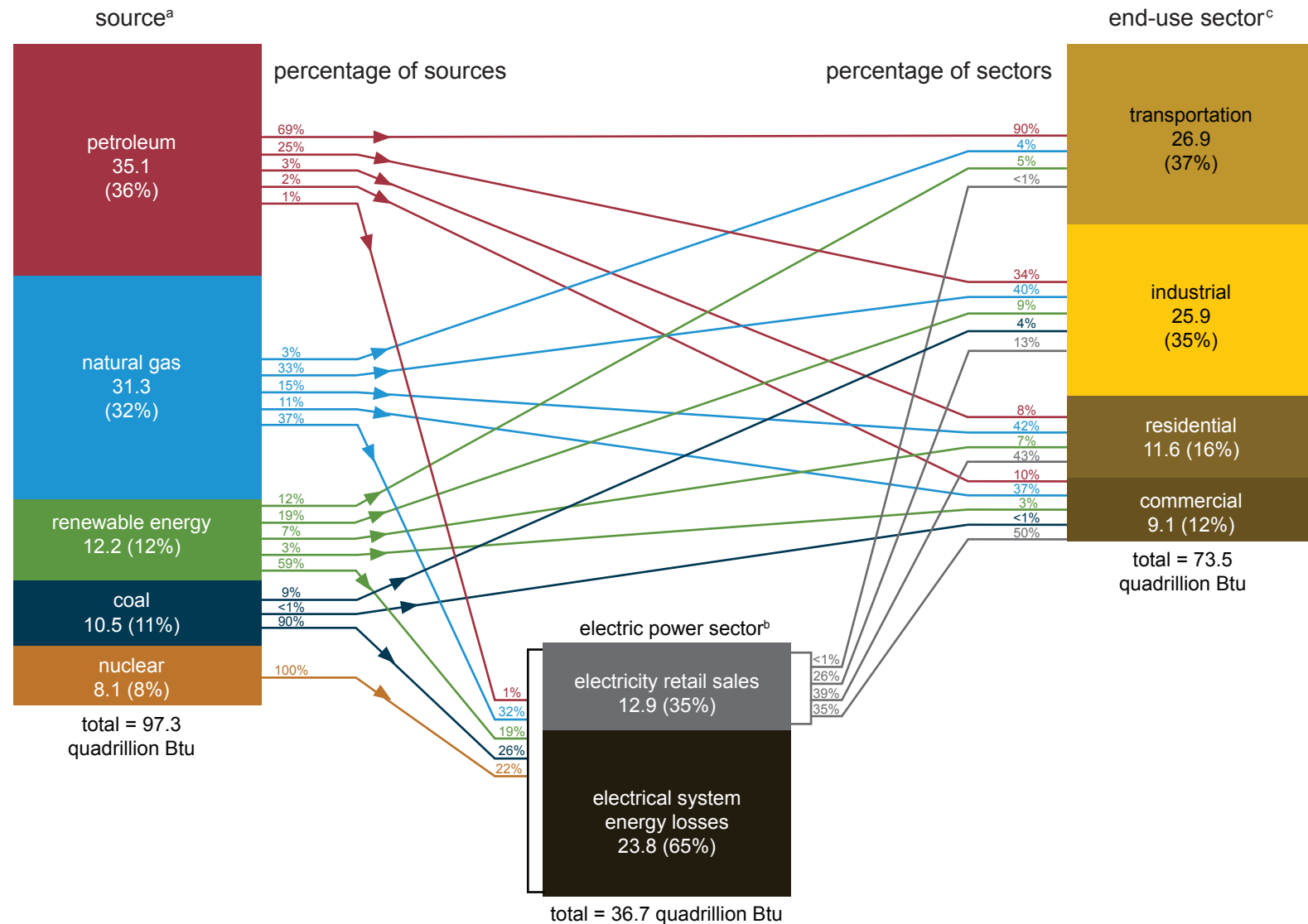
Sources: U.S. Energy Information Administration (EIA), *Monthly Energy Review* (April 2022), Tables 1-3 and 2-1-2.6.
 Note: Sum of components may not equal total due to independent rounding. All source and end-use sector consumption data include other energy losses from energy use, transformation, and distribution not separately identified. See "Extended Chart Notes" on next page.
 * Primary energy consumption. Each energy source is measured in different physical units and converted to common British thermal units (Btu). See EIA's *Monthly Energy Review* (MER), Appendix A. Noncombustible renewable energy sources are converted to Btu using the "Fossil Fuel Equivalency Approach", see MER Appendix E.
 ** The electric power sector includes electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Energy consumed by these plants reflects the approximate heat rates for electricity in MER Appendix A. The total includes the heat content of are electricity net imports, not shown separately. Electrical system energy losses calculated as the primary energy consumed by the electric power sector minus the heat content of electricity retail sales. See Note 1, "Electrical System Energy Losses," at the end of MER Section 2.
 * End-use sector consumption of primary energy and electricity retail sales, excluding electrical system energy losses from electricity retail sales. Industrial and commercial sectors consumption includes primary energy consumption by CHP and electricity-only plants contained within the sector.

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The chart below shows U.S. annual primary energy consumption from 1950 through 2021.

U.S. energy consumption by source and sector, 2021

quadrillion British thermal units (Btu)



Sources: U.S. Energy Information Administration (EIA), *Monthly Energy Review* (April 2022), Tables 1.3 and 2.1-2.6.

Note: Sum of components may not equal total due to independent rounding. All source and end-use sector consumption data include other energy losses from energy use, transformation, and distribution not separately identified. See "Extended Chart Notes" on next page.

^a Primary energy consumption. Each energy source is measured in different physical units and converted to common British thermal units (Btu). See EIA's *Monthly Energy Review* (MER), [Appendix A](#). Noncombustible renewable energy sources are converted to Btu using the "Fossil Fuel Equivalency Approach", see [MER Appendix E](#).

^b The electric power sector includes electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Energy consumed by these plants reflects the approximate heat rates for electricity in [MER Appendix A](#). The total includes the heat content of are electricity net imports, not shown separately. Electrical system energy losses calculated as the primary energy consumed by the electric power sector minus the heat content of electricity retail sales. See Note 1, "Electrical System Energy Losses," at the end of [MER Section 2](#).

^c End-use sector consumption of primary energy and electricity retail sales, excluding electrical system energy losses from electricity retail sales. Industrial and commercial sectors consumption includes primary energy consumption by CHP and electricity-only plants contained within the sector.

Extended Chart Notes

The U.S. Energy Information Administration (EIA) *U.S. energy consumption by source and sector* chart illustrates energy that is consumed (used) in the United States. The data are from EIA's [Monthly Energy Review](#) (MER) and include the relatively small amount of electricity net imports, not shown separately. The chart does not show energy production, nor the losses associated with energy production.

Source:

Energy sources are measured in different physical units: liquid fuels in barrels or gallons, natural gas in cubic feet, coal in short tons, and electricity in kilowatthours. EIA converts each source into common British thermal units (Btu) to allow comparison among different types of energy. See [MER Appendices A and E](#) for further explanation.

Petroleum: Equal to petroleum products supplied, minus biofuels. Petroleum products are obtained from the processing of crude oil, natural gas, and other hydrocarbon compounds. Products include unfinished oils, hydrocarbon gas liquids, aviation gasoline, motor gasoline, jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products. Excludes biofuels blended with petroleum products.

Natural gas: A gaseous mixture of hydrocarbon compounds, primarily methane, formed deep beneath the earth's surface over millions of years from the remains of plants and animals, chemicals, heat, and pressure. Excludes supplemental gaseous fuels.

Coal: A combustible black or brownish-black sedimentary rock with a high amount of carbon and hydrocarbons formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time. Includes the relatively small amount of coal coke net imports.

Renewable energy: Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy includes biomass (wood, biomass waste, and biofuels), conventional hydroelectric power, geothermal, solar, and wind energy.

Nuclear: Electricity generated by the use of the thermal energy released from the fission of nuclear fuel in a reactor.

Electric power sector:

Electricity retail sales: Electricity sales to ultimate customers. The amount of electricity sold to customers purchasing electricity for their own use and not for resale.

Electrical system energy losses: The amount of energy lost during the generation, transmission, and distribution of electricity, including plant and unaccounted-for uses. Electrical system energy losses are calculated as the difference between total primary consumption by the electric power sector (see MER Table 2.6) and the total energy content of electricity retail sales (MER Tables 7.6 and A6).

Most electrical system energy losses occur in the generation of electricity at electric power plants, which use primary energy to turn electric generators. This conversion loss is a thermodynamically necessary feature of steam-electric and combustion (gas) turbines. Other losses include power plant use of electricity, transmission and distribution of electricity from power plants to end-use consumers, heat produced from combined-heat-and-power (CHP)

plants, and unaccounted-for electricity. See the endnotes of [MER Section 2](#) for further explanation.

Another part of electrical system energy losses is a result of imputing fossil energy equivalent inputs for noncombustible renewable energy sources (hydroelectric, geothermal, solar thermal, photovoltaic, and wind energy). See [MER Appendix E](#) for further explanation.

End-use sector:

Total energy consumption by end-use sectors in this chart exclude electrical system energy losses and differ from the totals published in MER Table 2.1, which allocates electrical system energy losses proportionally to the amount of electricity retail sales to each end-use sector.

Transportation: Includes energy used by automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse forklifts) are classified in the sector of their primary use. Also includes natural gas used in the operation of natural gas pipelines.

Industrial: Includes energy consumed for manufacturing (NAICS codes 31-33); agriculture, forestry, fishing, and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); construction (NAICS code 23); and combined-heat-and-power (CHP) generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities.

Residential: Includes energy used for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances in the living quarters of private households.

Commercial: Includes energy consumed by businesses; federal, state, and local governments; other private and public organizations, such as religious, social, or fraternal groups; institutional living quarters; sewage treatment facilities; and CHP generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.

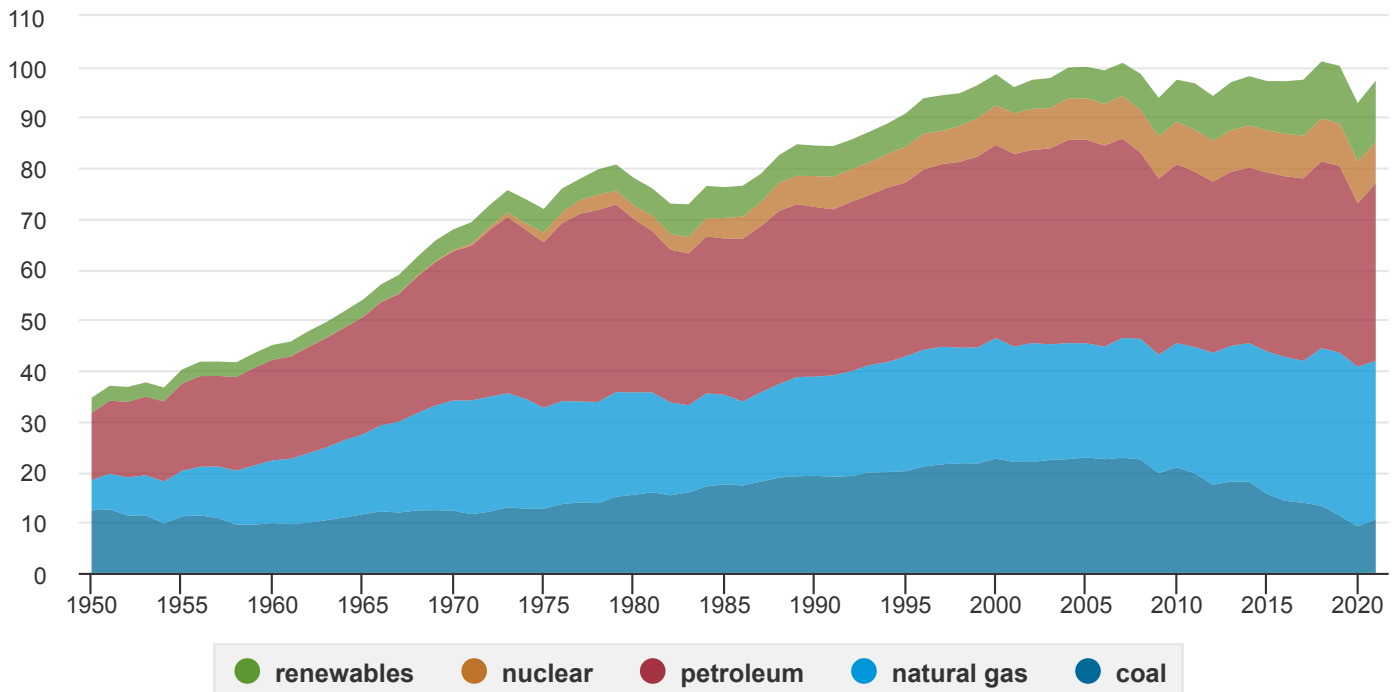
Other energy losses:

Similar to electrical system energy losses, there are also other energy losses in energy production, distribution, and consumption. However, these losses are not shown separately in the chart because data are not available for EIA to estimate these losses.

All uses of primary energy have efficiency losses, in the form of heat, when energy is converted to do useful work. Examples include when motor gasoline is burned to move vehicles, when natural gas is burned to heat homes, or in any other use of combusted fuels. There are also losses in the transformation of one form of energy to another form of energy. For example, there are transformation losses in the process of refining crude oil into usable petroleum products, processing natural gas into marketable dry gas, and in the process of transforming energy from the sun into usable energy by solar panels. The [Lawrence Livermore National Laboratory](#) publishes estimates of primary energy losses by end-use sector by applying an end use efficiency factor to EIA's MER consumption data.

U.S. primary energy consumption by major sources, 1950-2021

quadrillion British thermal units



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3, April 2022, preliminary data for 2021



Note: Petroleum is petroleum products excluding biofuels, which are included in renewables.

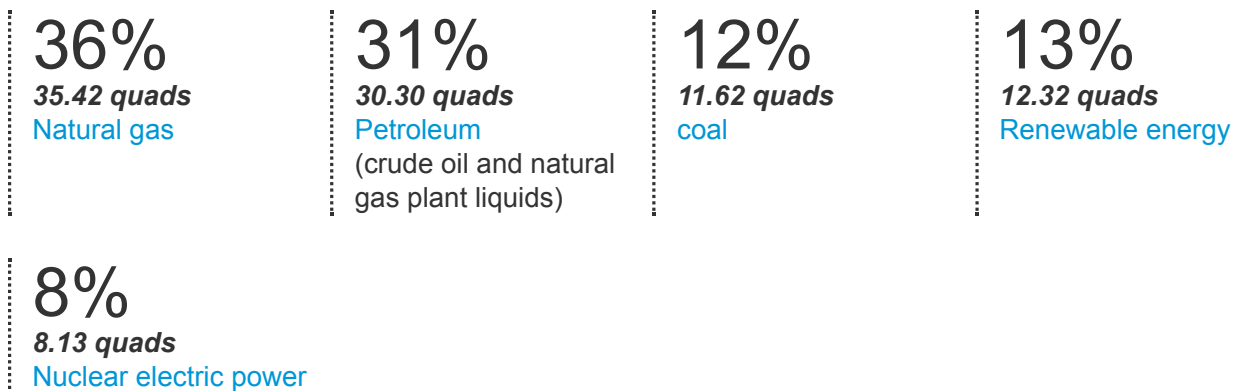
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Domestic energy production has been greater than U.S. energy consumption since 2019

In 2019, U.S. total annual energy production was greater than total annual consumption for the first time since 1957. Production also exceeded consumption in 2020 and in 2021. In 2021, production equaled 97.78 quads and consumption equaled 97.33 quads.

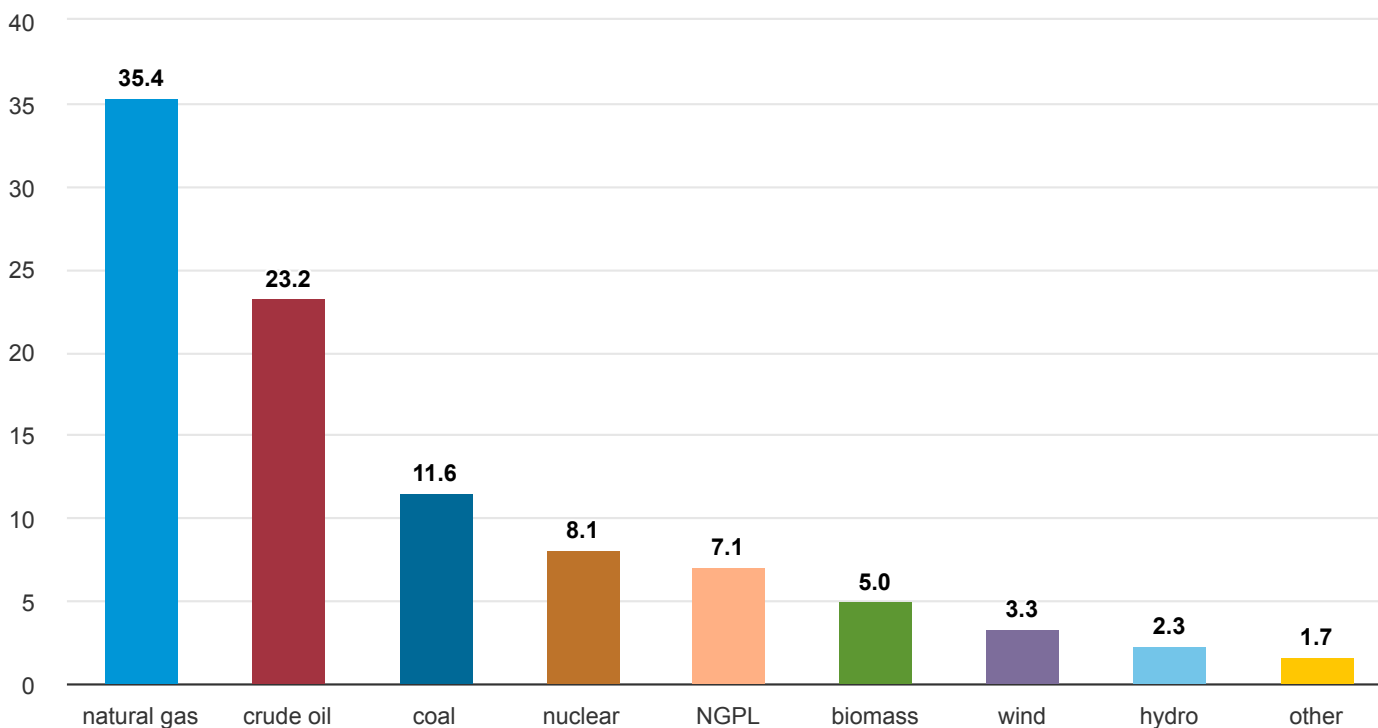
Fossil fuels—petroleum, natural gas, and coal—accounted for about 79% of total U.S. primary energy production in 2021.


The percentage shares and amounts (in quads) of total U.S. primary energy production by major sources in 2021 were:



U.S. primary energy production by major sources, 2021

quadrillion British thermal units



 Data source: U.S. Energy Information Administration, *Monthly Energy Review*, April 2022, preliminary data
 Note: NGPL is natural gas plant liquids; other is geothermal and solar; hydro is conventional hydroelectric.

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The mix of U.S. energy consumption and production has changed over time

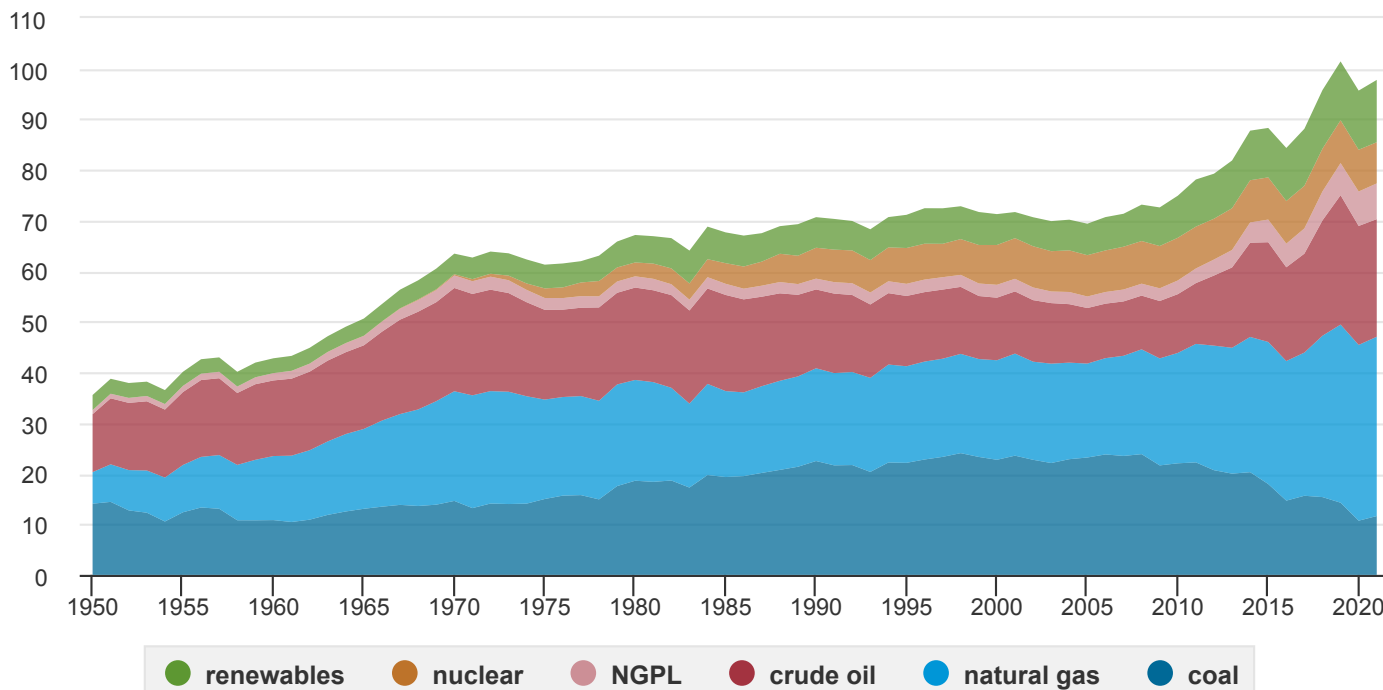
Fossil fuels have dominated the U.S. energy mix for more than 100 years, but the mix has changed over time.

Coal consumption in the United States peaked in 2007 at about 1.13 billion short tons and **coal production** peaked in 2008 at about 1.17 billion short tons. Both declined in nearly every year since those peak years mainly because of less U.S. coal demand for electricity generation. In terms of the total energy content of coal, annual U.S. coal consumption peaked in 2005 at about 22.80 quads and production peaked in 1998 at about 24.0 quads. The energy content of total annual coal consumption and production generally declined since those years because of decreases in demand for coal, and because of increases in the share of lower heat content coal use by the electric power sector. In 2021, coal consumption was about 546 million short tons, equal to about 10.55 quads and about 11% of U.S. energy consumption. Coal production in 2021 was 578 million short tons and equal to about 11.62 quads.

Natural gas production (dry gas) reached a record high of 34.15 trillion cubic feet (Tcf) or 93.57 billion cubic feet per day (Bcf/day) in 2021. **Natural gas consumption** in 2021 was about 82.97 Bcf/day, equal to 31.34 quads and about 32% of total U.S. energy consumption. U.S. annual dry natural gas production has exceeded U.S. annual natural gas consumption in both volume and heat content since 2017. More efficient drilling and production techniques have resulted in increases in natural gas production from shale and tight geologic formations. The production increases generally contributed to a decline in natural gas prices through 2020, which in turn contributed to increases in natural gas use by the electric power and industrial sectors.

U.S. primary energy production by major sources, 1950-2021

quadrillion British thermal units



Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.2, April 2022, preliminary data for 2021

Note: NGPL is natural gas plant liquids.



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Annual crude oil production generally decreased between 1970 and 2008. In 2009, the trend reversed and production began to rise, and in 2019, U.S. crude oil production reached a record high of 12.29 million barrels per day. More cost-effective drilling and production technologies helped to drive annual production increases in 2017 through 2019, especially in Texas and North Dakota. U.S. petroleum demand decreased in 2020 and 2021 largely as a result of the response to the COVID-19 pandemic, which contributed to declined in U.S. oil production in 2020 and 2021.

Natural gas plant liquids (NGPLs) are extracted from natural gas before the natural gas is put into pipelines for transmission to consumers. Annual NGPLs production has generally increased since 2005, coinciding with increases in natural gas production, and reached a record high of nearly 5.40 million barrels per day in 2021. NGPLs are the largest source of U.S. **hydrocarbon gas liquids (HGLs)** production. Annual increases in HGLs production since 2008 have contributed to lower HGLs prices and to increased U.S. HGLs consumption (and exports).

Nuclear energy production in commercial nuclear power plants in the United States began in 1957, grew each year through 1990, and generally leveled off after 2000. Even though there were fewer operating nuclear reactors in 2021 than in 2000, the amount of nuclear energy production in 2021 was about 778 billion kilowatthours (kWh), equal to about 8.13 quads. A combination of increased electric generation capacity upgrades and shorter refueling and maintenance cycles at nuclear

power plants have helped to compensate for reductions in the numbers of nuclear reactors and to maintain a relatively consistent level of annual U.S. nuclear electricity generation for the past 20 years.

[Renewable energy production and consumption](#) both reached record highs of about 12.32 and 12.16 quads, respectively, in 2021, driven mainly by record-high solar and wind energy production. Hydroelectric power production in 2021 was about 9% lower than in 2020 and about 19% lower than the 50-year average. Total biomass production and consumption in 2021 were both higher than in 2020, but lower than the record highs in 2018. Geothermal energy use in 2021 was about 1.5% higher than in 2020, but lower than the record high in 2014.

¹Utility-scale electricity generation includes generation from power plants with at least one megawatt of electric generation capacity. The industrial and commercial sectors produced about 4% of utility-scale electricity generation in 2020. There are estimates for distributed (small-scale) solar electricity generation in *Monthly Energy Review* [Table 10.6](#). A small amount of electricity is imported from and exported to Canada and Mexico.

Last updated: June 10, 2022, with data from April 2022 editions of source reports; data for 2021 are preliminary