From …U.S. Energy Information Administration.

Electricity explained.

Electricity in the United States

LINK: *https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php*
Last updated by EIA: March 18, 2021

Electricity in the United States is produced (generated) with diverse energy sources and technologies

The United States uses many different energy sources and technologies to generate electricity. The sources and technologies have changed over time, and some are used more than others.

The three major categories of energy for electricity generation are fossil fuels (coal, natural gas, and petroleum), nuclear energy, and renewable energy sources. Most electricity is generated with steam turbines using fossil fuels, nuclear, biomass, geothermal, and solar thermal energy. Other major electricity generation technologies include gas turbines, hydro turbines, wind turbines, and solar photovoltaics.

All U.S. Energy Sources.

Fossil fuels are the largest sources of energy for electricity generation. A snapshot of the mix is shown in the graphic immediately below.

Natural gas was the largest source—about 40%—of U.S. electricity generation in 2020. Natural gas is used in steam turbines and gas turbines to generate electricity.

Coal was the third-largest energy source for U.S. electricity generation in 2020—about 19%. Nearly all coal-fired power plants use steam turbines. A few coal-fired power plants convert coal to a gas for use in a gas turbine to generate electricity.

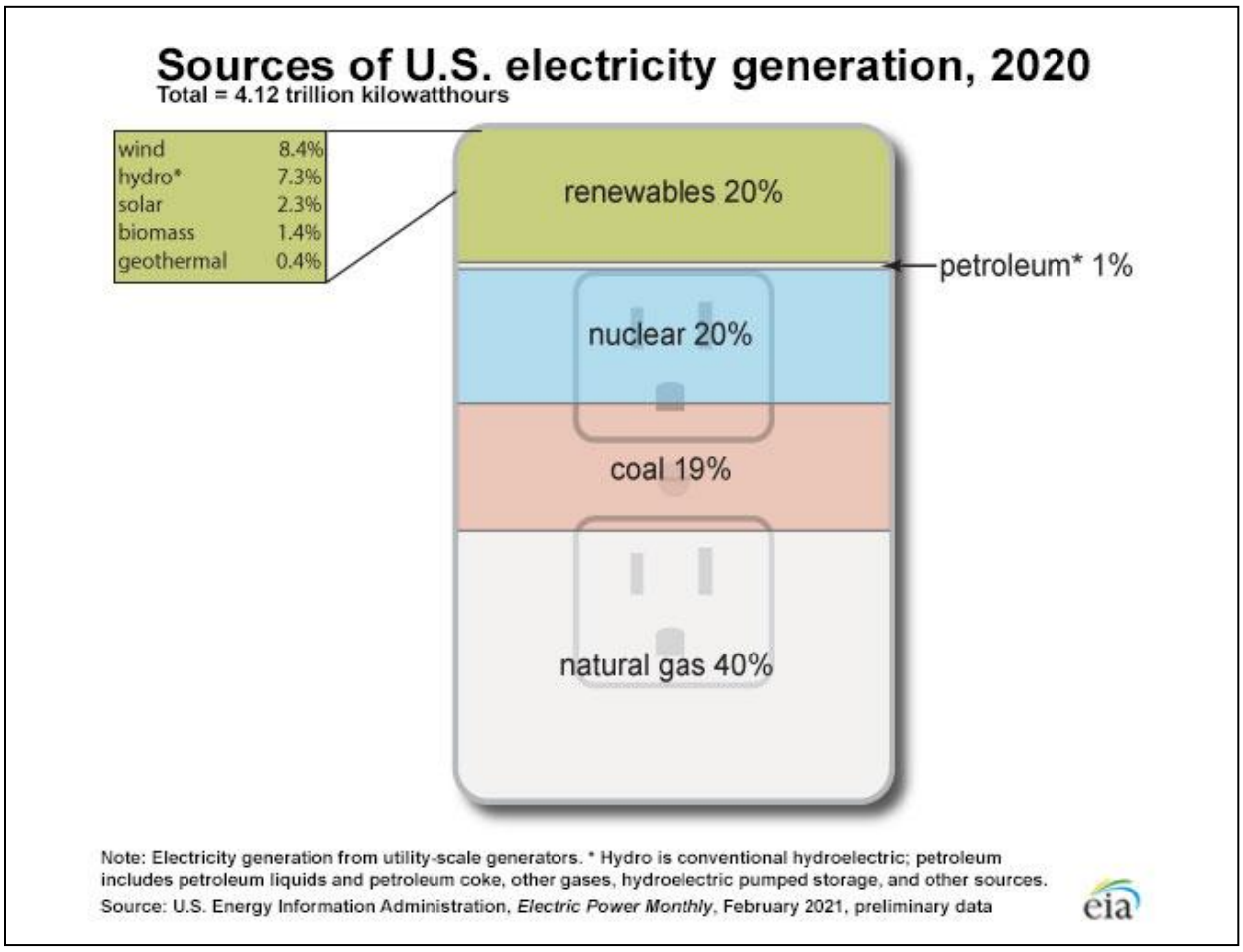
Petroleum was the source of less than 1% of U.S. electricity generation in 2020. Residual fuel oil and petroleum coke are used in steam turbines. Distillate—or diesel—fuel oil is used in diesel-engine generators. Residual fuel oil and distillates can also be burned in gas turbines.

Nuclear energy provides one-fifth of U.S. electricity.

Nuclear energy was the source of about 20% of U.S. electricity generation in 2020. Nuclear power plants use steam turbines to produce electricity from nuclear fission.

Renewable energy sources provide an increasing share of U.S. electricity.

Many renewable energy sources are used to generate electricity and were the source of about 20% of total U.S. electricity generation in 2020. The use of coal is declining.



The mix in 2020 shown above has changed dramatically since 1950. The graphic below shows these trend lines in static form. Click on this link to see a dynamic graph of how this mix of all sources of energy has changed 1950 to 2020:
https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php

Renewable Energy Sources.

Hydropower plants produced about 7.3% of total U.S. electricity generation and about 37% of electricity generation from renewable energy in 2020.[1] Hydropower plants use flowing water to spin a turbine connected to a generator.

Wind energy was the source of about 8.4% of total U.S. electricity generation and about 43% of electricity generation from renewable energy in 2020. Wind turbines convert wind energy into electricity.

Biomass was the source of about 1.4% of total U.S. electricity generation in 2020. Biomass is burned directly in steam-electric power plants, or it can be converted to a gas that can be burned in steam generators, gas turbines, or internal combustion engine generators.

Renewable Energy Sources
2009

- **hydroelectric:** 7.3% [273.45 billion kwhrs]
- **biomass:** 1.4% [54.49 billion kwhrs]
- **geothermal:** 0.5% [15.01 billion kwhrs]
- **wind:** 8.4% [73.89 billion kwhrs]
- **solar:** 2.3% [0.89 billion kwhrs]

Source: EIA.gov

Solar energy provided about 2.3% of total U.S. electricity in 2020. Photovoltaic (PV) and solar-thermal power are the two main types of solar electricity generation technologies. PV conversion produces electricity directly from sunlight in a photovoltaic cell. Most solar-thermal power systems use steam turbines to generate electricity.

Geothermal power plants produced about 0.5% of total U.S. electricity generation in 2020. Geothermal power plants use steam turbines to generate electricity.

[1] Includes conventional hydropower plants.

The mix of renewable sources and the change in each over time is shown in static form in the graphic below. Click on this link to see a dynamic graph of sources of renewable energy that better depict this change over time:
https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php

CharacterTown.org Conclusions.

- **Coal is still king** as a fuel to generate electricity even as it is being replaced by other sources, mostly by natural gas at the present time [see the EIA graph below]. The transition to gas and then renewables need to accelerate.
- **Renewables are increasing** as sources of electricity generation. Solar and wind power are getting most of the press, with wind power being the biggest renewable source.
- **Hydro-electric plants are sleepers** in the national conversation; they are a consistently large component of the renewable pallet, see graphic below. Geothermal plants provide a negligible amount of power, but the technique is interesting in remote locations.
- **Nuclear power still struggles** although Small Modular Reactors [SMRs] are a future source to watch with hope that fears will be overcome with performance. Fears may subside as large nuclear plants are replaced with smaller, more manageable facilities. In 2020, conventional nuclear power provided 20% of electricity generated.
- **Fossil fuels power cars, trucks, ships and airplanes;** still the biggest source of energy consumed in the U.S. Electric vehicles may solve that problem, but then we will need to provide additional electricity.
- **The global situation is quite different** with China using coal and Germany backing away from nuclear.

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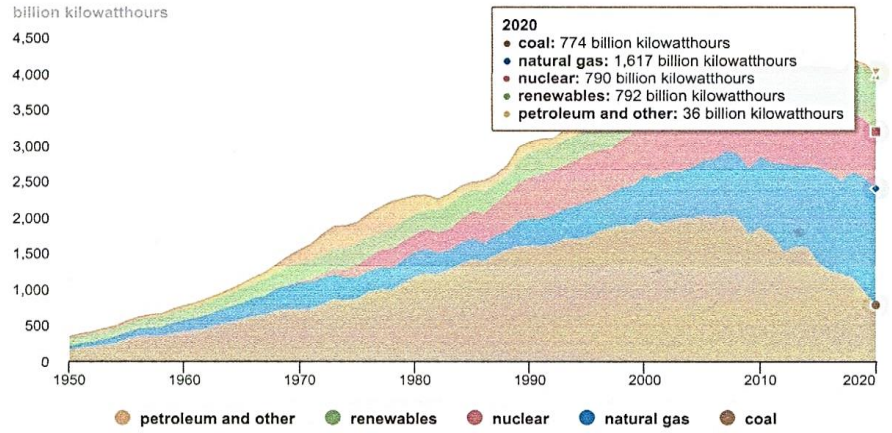
U.S. electricity generation by major energy source, 1950-2020



Note: Electricity generation from utility-scale facilities.
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 7.2a, January 2021 and *Electric Power Monthly*, February 2021, preliminary data for 2020

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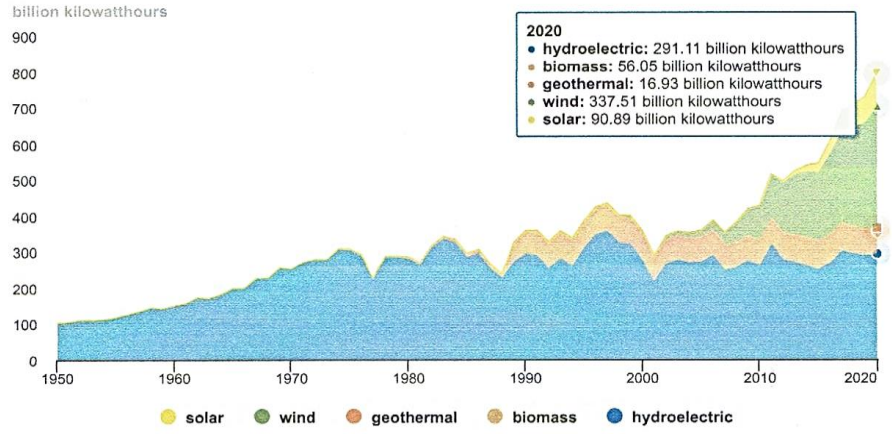
U.S. electricity generation from renewable energy sources, 1950-2020



Note: Electricity generation from utility-scale facilities. Hydroelectric is conventional hydropower.
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 7.2a, January 2021 and *Electric Power Monthly*, February 2021, preliminary data for 2020