FREQUENTLY ASKED QUESTIONS (FAQS)

How much carbon dioxide is produced per kilowatthour of U.S. electricity generation?

In 2020, total U.S. electricity generation by the electric power industry of 4.01 trillion kilowatthours (kWh) from all energy sources resulted in the emission of 1.55 billion metric tons—1.71 billion short tons—of carbon dioxide (CO_2). This equaled about 0.85 pounds of CO_2 emissions per kWh.

Emissions from electricity generation vary by type of fuel/energy source and by type and efficiency of electric power plants. The amount of CO_2 produced per kWh during any period of time will vary according to the sources of electricity supplied to the electric power grid during that time. Therefore, electricity-related CO_2 emissions and CO_2 emission factors will vary hourly, daily, monthly, and annually. The U.S. Energy Information Administration (EIA) publishes CO_2 emissions estimates related to electricity generation on a monthly and annual basis.

In 2020, power plants that burned coal, natural gas, and petroleum fuels were the source of about 62% of total U.S. electricity generation, but they accounted for 99% of U.S. electricity-related CO_2 emissions. The other 1% of CO_2 emissions were from other fuels and gases derived from fossil fuels and some types of geothermal power plants. EIA considers electricity generation from biomass, hydro, solar, and wind to be carbon neutral.

The table below presents data on electricity generation and CO_2 emissions from electric utility and independent power producer power plants (excluding combined heat and power plants), and a CO_2 emission factor (pounds of CO_2/kWh) for coal, natural gas, and petroleum. Actual CO_2 emissions per KWh from specific power plants may vary considerably from the factors in the table.

U.S. electric utility and independent power electricity generation and resulting CO_2 emissions by fuel in 2020

	Electricity generation	CO_2 emissions		
	million kWh	million metric tons	million short tons	pounds per kWh
Coal	757,763	767	845	2.23
Natural gas	1,402,438	576	635	0.91
Petroleum	13,665	13	15	2.13

Electricity generation is net electricity generation.
Includes electricity-only power plants. Combined heat and power plants are excluded because some of their CO_2 emissions are from fuel consumption for heating purposes.

State-level emissions and emissions factors

EIA publishes annual CO_2 emissions and average annual CO_2 emissions factors related to total electricity generation by the electric power industry in the United States and in each state in the State Electricity Profiles. In each profile, Table 1 has the CO_2 emissions and emission factor for the most recent year available, and Table 7 has historical annual emissions and emissions factors back to 1990. To find Table 7, see the link under Table 1 for Full data tables 1-17. The factors are in pounds of CO_2 per megawatthour (MWh). Divide the factors by 1,000 to convert the factor to pounds per kWh.

State-level emissions and electricity generation by type of fuel

There are more state-level data on electricity-related CO_2 emissions and electricity generation by type of electricity producer and by fuel/energy source in state-level electricity data files (xls).

- U.S. Electric Power Industry Estimated Emissions by State includes estimates for CO_2 emissions by type of energy source in metric tons. You can convert metric tons to short tons by multiplying the number of metric tons by 1.1. Multiply the result by 2,000 to convert to pounds.
- Net Generation by State by Type of Producer by Energy Source data are in MWh. Multiply by 1,000 to convert to kWh.

Learn more:
How much coal, natural gas, or petroleum is used to generate a kilowatthour of electricity?
What are the greenhouse gas and air pollutant emissions factors for fuels and electricity?
What is the efficiency of different types of power plants?
Does EIA have data on each power plant in the United States?
Where greenhouse gases come from

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Other FAQs about Environment

- How do I convert between short tons and metric tons?
- How much carbon dioxide is produced when different fuels are burned?
- How much carbon dioxide is produced per kilowatthour of U.S. electricity generation?
- What are U.S. energy-related carbon dioxide emissions by source and sector?
- What are the greenhouse gas and air pollutant emissions factors for fuels and electricity?
- How much of U.S. carbon dioxide emissions are associated with electricity generation?
- What are the energy-related carbon dioxide emissions from fossil fuels for the United States and the world?
- What are greenhouse gases and how do they affect the climate?
- Why do carbon dioxide emissions weigh more than the original fuel?
- Is ozone a greenhouse gas?
- How much carbon dioxide is produced from U.S. gasoline and diesel fuel consumption?
- Does EIA have forecasts or projections for energy production, consumption, and prices for individual states?

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