

What You Need to Know About Coal Power

Gemma Alexander

This article is the fifth in a [six-part series](#) that explores how we get our electricity and what we need to know about how renewable — and non-renewable — electric power is generated.

[Electricity](#) use is a major component of Americans' ecological footprint. But we tend to pay it less attention than other areas, like recycling and plastic use, where it feels like we have more control.

After all, we can't shop for electrical utilities the way we do internet providers. Yet it's important to understand where your energy comes from and how it affects your ecological footprint.

Coal Power

Coal is the most iconic source of power for many people. In actual practice, reliance on coal [varies widely](#) throughout the United States. A few areas, like Long Island and parts of Hawaii and Alaska, are completely coal-free. However, parts of the Midwest draw more than half of their electricity — up to 71 percent — from coal plants.

Despite tremendous growth in [renewable energy](#) over the past decade, fossil fuels — natural gas and coal — still provide the majority of electricity in the United States. Even with coal production at a [40-year low](#), it is still our second-largest source of electricity, [producing 27 percent](#) of the nation's power overall.

Coal has a [long history](#) of use. Originally, coal was a direct energy source, found on or near the earth's surface. It was burned in fireplaces in ancient Rome and in Hopi ovens in what would eventually become the American Southwest.

During the [industrial revolution](#), coal was used to power large furnaces and steam engines, necessitating deeper and more dangerous coal mines. Coal production jumped from 10 million tons in 1800 to 250 million tons in 1900. [Employment](#) in the coal industry peaked in 1924 and, with the exceptions of WWII and the 1973 energy crisis, has dropped continuously ever since.

Today, American coal mines employ roughly 75,000 people.



Coal-fired power plants burn pulverized coal to produce energy. Image: Adobe Stock

How Coal Power Works

[Coal](#) is a combustible sedimentary rock-like material made mostly of carbon and hydrocarbons. Like fossils, each piece of coal began as living plants or animals and was transformed by natural forces. Coal forms when peat bogs are covered by layers of rock and dirt,

resulting in tremendous pressure and heat. Over hundreds of millions of years, these forces transform the organic material into coal.

There are four primary types of coal, which form under different amounts of pressure. They are identified by carbon content. From highest to lowest carbon they are anthracite, bituminous, subbituminous, and lignite. Higher coal content equals greater stored energy, but all four kinds of coal can be used to generate electricity.

In a coal-fired power plant, coal is pulverized and the resulting coal powder is burned in a furnace. The heat generated in the furnace converts water into steam. The steam rotates a turbine, which spins a generator to produce electricity. Except for the heat source, a coal power plant operates the same way as a [nuclear power plant](#) or any other thermal power station.

Environmental Impacts of Coal Production

Although all thermal power stations generate electricity the same way, the heat source gives them each a unique environmental impact. For coal, those impacts are significant. Coal is a nonrenewable, nonsustainable energy source because once it is extracted and burned, it cannot be replaced on a human time scale.

The extraction of coal causes serious environmental damage. The image of Appalachian coal miners tunneling underground is more historical than accurate to today's practices. In Appalachia, surface mining, most notably [mountaintop removal](#), is now more common than underground mining. The [environmental impact](#) of Appalachian coal mining is almost inconceivable; the topography of mined areas is completely altered, with mountainous slopes literally flattened and valleys filled with 600 feet of rubble, contaminating surface water and shifting its hydrology and pH.

However, Appalachia is no longer the center of U.S. coal mining. Despite recent [shutdowns](#), the [largest producer](#) of coal in the U.S. is Wyoming. The mines there are surface mines (also known as strip mines). Some of this mining takes place on [federal lands](#).



Open-pit coal mine near Gillette, Wyoming. Photo: Carol M. Highsmith [Public domain], [Wikimedia Commons](#)

Environmental Impacts of Coal Power

Burning coal produces [more than 80](#) toxic [pollutants](#) that generate smog and acid rain and can cause respiratory illness. Mercury and other heavy metals are also released. Fly ash and bottom ash (which are also created by [waste incineration](#)) are potentially dangerous byproducts as well, although these are now captured for storage rather than released through smokestacks.

The [Clean Air](#) and [Clean Water Acts](#) have both been effective in requiring coal power plants to improve environmental performance by using low-sulfur coal and scrubbing flue gas. But coal is still far from clean. Many power plants still do not use the pollution controls called for in environmental legislation. Accurate data on power plant emissions is not readily available ([yet](#)).

[One study](#) concluded that air pollution from electricity generation leads to about 16,000 premature deaths each year in the continental U.S., with 91 percent of those attributable to coal-fired power plants. According to the industry's own data, groundwater near [nearly every coal plant](#) in the U.S. has unsafe levels of coal ash-related pollutants such as arsenic and heavy metals.

Climate Change

Once considered harmless, [carbon dioxide](#) is now understood to be the primary greenhouse gas emitted by human activity. Combustion of coal in the United States generated [1.32 million metric tons of CO₂](#) in 2017. Together with natural gas, coal power is responsible for [one-third](#) of the nation's carbon emissions.

Although sometimes used to describe coal plants that meet the standards of the Clean Air and Water Acts, the term [clean coal](#) generally refers to coal plants that capture carbon dioxide emissions for burial underground rather than releasing them into the air where they contribute to climate change. There is only one such plant in operation in the U.S. so far.

Fortunately, many energy companies like [Pacific Gas and Electric Company](#) and [Puget Sound Energy](#) allow customers to opt into community renewable programs that provide a greener energy mix. Contact your local utility provider to find out if such a program is available where you live.

No matter what your energy source, the most sustainable choice is to use less of it. If you aren't sure where you could improve, start with a [home energy audit](#) and [prioritize changes](#) based on the results. Many local utility companies also have [efficiency programs](#) to help customers reduce their energy use.

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