

# What You Need to Know About Renewable Energy

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After a century of growth — and destruction — powered by fossil fuels, most of us realize that we need to wean ourselves off this limited and polluting energy source. Despite the politicization of the issue, the energy industry is grudgingly recognizing that fossil fuels are not only environmentally unsustainable, but [economically unsustainable](#). With that realization, we are slowly shifting toward cleaner, renewable sources.

Renewable energy is generated from sources that naturally replenish themselves, like the sun and wind. The [most widely used](#) renewable energy sources in the U.S. in 2016 were:

Hydroelectric:	2.415 quadrillion Btu
Wind:	2.042 quadrillion Btu
Wood biomass:	1.980 quadrillion Btu
Ethanol:	1.144 quadrillion Btu
Solar:	0.624 quadrillion Btu

In 2018, these and other renewable energy sources provided about 10 percent of the United States' energy needs. It may not seem like very much, but this is the most renewable electric generation since the 1910s, when most homes were heated with wood. Biomass is renewable, but it [may not be sustainable](#). Ethanol is primarily used for vehicle fuel, rather than electricity. That may change in the future with [new scientific developments](#).

Hydroelectric power is the largest source of renewable energy in the U.S., with large-scale dams operated by the federal government. We'll look at hydroelectricity separately in a later article. In this article, we'll look at how we get electricity from the sustainable, renewable sources of wind and solar.

## How Wind Power Works

Wind [generates electricity](#) by turning the blades of a turbine, which spins magnets, generating voltage in a coil of wire. Wind power is one of the fastest growing energy industries in America, having [more than tripled](#) in the past decade. It now comes in a [close second](#) to hydro power for electricity production.

Wind power evokes images of individual windmills on isolated farms. [Distributed wind systems](#) like this do exist. But wind became America's second largest renewable electricity source thanks to larger utility-scale and offshore wind farms. Utility-scale and offshore wind farms generate from 100 kilowatts to several megawatts of

electricity which is distributed through the utility grid as a part of the overall power mix [electricity 101 link pending]. Offshore wind farms are located in open water where larger turbines can be used to produce even more power. In some states (perhaps ironically including oil-rich Oklahoma and Texas) more than 20 percent of electricity is provided by wind.

## Environmental Impacts of Wind Energy

A zero-impact energy source has yet to be discovered. But wind power is among the greenest options because it is truly renewable and nonpolluting. Relative to other power sources, wind farms have a much smaller footprint, and even much of the land they do take up remains covered in vegetation.

The biggest environmental concern about wind farms is impact to wildlife, particularly to birds and bats. Attempts to quantify those impacts are complicated. Turbine technology, as well as siting requirements, have changed rapidly, meaning that the impact will vary with each installation. [Estimates indicate](#) that wind farms kill orders of magnitude fewer birds in North America than [domesticated cats](#) do. And the scale is even more skewed when compared to the damage to bird populations [due to climate change](#) from other energy sources.

That said, the localized impact from wind turbines is significant and could result in the destruction of specific bird or bat populations. The industry has [made progress](#) in making wind farms safer, designing safer turbines and bird avoidance systems. In many places, siting standards have been improved to avoid significant wildlife populations. The U.S. Department of Energy funds research through the [Wind Energy Technologies Office](#) to better understand and mitigate the negative impacts of wind power.

## How Solar Energy Works

Solar installations have grown [35 percent in the last decade](#), cutting the [cost of solar panels](#) almost in half. [Photovoltaic cells](#) in solar panels contain semiconductor silicon, which converts the energy in sunlight into direct current (DC) energy. Inverters change the DC current into alternating current (AC), which is used in the home or fed into batteries or the larger electrical grid. Solar panels can form [distributed energy](#) systems (either off-grid or connected to it), [community solar](#) farms, or [utility-scale solar](#) installations.

## Environmental Impacts of Solar Power

Operating solar panels do not [produce pollutants](#). Large solar farms do have a development footprint, but it may be less than other land uses. Solar farms may use fresh water for washing and cooling the panels, which can be in scarce supply in areas best suited to solar power. Depending on the system, this use is estimated to be between [20 gallons per megawatt hour](#) and [650 gallons per megawatt-hour](#). However, this is compared to an estimated [12 million gallons](#) of water per hour for some coal plants. (In fact, thermoelectric power plants [consume more water](#) than any other use in the U.S.)

The most significant environmental concern caused by solar energy is the manufacture of the photovoltaic cells and batteries, which requires a number of toxic chemicals. Unfortunately, the solar industry is [no less opaque](#) than other energy

sectors when it comes to evaluating how well they are managing their waste. With a life span of roughly 25 years, there is not yet enough volume in exhausted solar panels to support robust recycling programs, but 80 percent of the materials in used panels is recyclable. The industry must address these environmental issues before solar can claim to be completely sustainable. However, when compared with conventional energy sources, solar is still one of the greenest energy sources available.

## What Can You Do?

If you have suitable wind or solar conditions, converting your home to renewable energy is the most sustainable choice. However, few of us have both the natural and economic resources for a distributed electricity system. Fortunately, many of us do have the option to participate in community renewable programs like the ones offered by [Pacific Gas and Electric Company](#) or [Puget Sound Energy](#). Contact your local utility provider to find out if a similar program is available where you live.

No matter what energy source you use, 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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