

TYPES OF RENEWABLE ENERGY

What Are The Types Of Renewable Energy?

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Renewable energy uses energy sources that are continually replenished by nature—the sun, the wind, water, the Earth's heat, and plants. Renewable energy technologies turn these fuels into usable forms of energy—most often electricity, but also heat, chemicals, or mechanical power.

Why Use Renewable Energy?

Today we primarily use fossil fuels to heat and power our homes and fuel our cars. It's convenient to use coal, oil, and natural gas for meeting our energy needs, but we have a limited supply of these fuels on the Earth. We're using them much more rapidly than they are being created. Eventually, they will run out.

And because of safety concerns and waste disposal problems, the United States will retire much of its nuclear capacity by 2020. In the meantime, the nation's energy needs are expected to grow by 33 percent during the next 20 years. Renewable energy can help fill the gap.

Even if we had an unlimited supply of fossil fuels, using renewable energy is better for the environment.

We often call renewable energy technologies "clean" or "green" because they produce few if any pollutants. Burning fossil fuels, however, sends greenhouse gases into the atmosphere, trapping the sun's heat and contributing to global warming. Climate scientists generally agree that the Earth's average temperature has risen in the past century. If this trend continues, sea levels will rise, and scientists predict that floods,

heat waves, droughts, and other extreme weather conditions could occur more often.

Other pollutants are released into the air, soil, and water when fossil fuels are burned. These pollutants take a dramatic toll on the environment—and on humans. Air pollution contributes to diseases like asthma. Acid rain from sulfur dioxide and nitrogen oxides harms plants and fish. Nitrogen oxides also

contribute to smog.

Renewable energy will also help us develop energy independence and security. The United States imports more than 50 percent of its oil, up from 34 percent in 1973. Replacing some of our petroleum with fuels made from plant matter, for example, could save money and strengthen our energy security.

Renewable energy is plentiful, and the technologies are improving all the time. There are many ways to use renewable energy. Most of us already use renewable energy in our daily lives.

Bioenergy

Bioenergy is the energy derived from biomass (organic matter), such as plants. If you've ever burned wood in a fireplace or campfire, you've used bioenergy. But we don't get all of our biomass resources directly from trees or other plants. Many industries, such as those involved in construction or the processing of agricultural products, can create large quantities of unused or residual biomass, which can serve as a bioenergy source.

Biofuels

Biomass can be converted directly into liquid fuels, called biofuels. Because biofuels are easy to transport and possess high energy density, they are favored to fuel vehicles and sometimes stationary power generation. The most common biofuel is ethanol, an alcohol made from the fermentation of biomass high in carbohydrates.

The current largest source of ethanol is corn. Some cities use ethanol as a gasoline additive to help meet air quality standards for amounts to 50,000 times the energy of all oil and gas resources in the world. In the United States, most geothermal reservoirs are located in the western states, **Alaska**, and Hawaii. GHPs, however, can be used almost anywhere.

Biobased Products

Biomass—corn, wheat, soybeans, wood, and residues—can also be used to produce chemicals and materials that we normally obtain from petroleum. Industry has already begun to use cornstarch to produce commodity plastics, such as shrinkwrap, plastic eating utensils, and even car bumpers.

Commercial development is underway to make thermoset plastics, like electrical switch plate covers, from wood residues.

Geothermal Energy

The Earth's core, 4,000 miles below the surface, can reach temperatures of 9000° F.

This heat—geothermal energy—flows outward from the core, heating the surrounding area, which can form underground reservoirs of hot water and steam. These reservoirs can be tapped for a variety of uses, such as to **generate electricity** or heat buildings. By using geothermal heat pumps (GHPs), we can even take advantage of the shallow ground's stable temperature for heating and cooling buildings.

Solar Energy

Solar technologies tap directly into the infinite power of the sun and use that energy to produce heat, light, and power.

Wind Energy

For hundreds of years, people have used windmills to harness the wind's energy. Today's wind turbines, which operate differently from windmills, are a much more efficient technology.

Wind turbine technology may look simple: the wind spins turbine blades around a central hub; the hub is connected to a shaft, which powers a generator to make electricity.

However, turbines are highly sophisticated power systems that capture the wind's energy by means of new blade designs or airfoils. Modern, mechanical drive systems, combined with advanced generators, convert that energy into electricity.

Ocean Energy

The ocean can produce two types of energy: thermal energy from the sun's heat, and mechanical energy from the tides and waves.

Ocean thermal energy can be used for many applications, including electricity generation. Electricity conversion systems use either the warm surface water or boil the seawater to turn a turbine, which activates a generator.

Hydrogen

Hydrogen is high in energy, yet its use as a fuel produces water as the only emission. Hydrogen is the universe's most abundant element and also its simplest. A hydrogen atom consists of only one proton and one electron.

Despite its abundance and simplicity, it doesn't occur naturally as a gas on the Earth.

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