# Renewable energy resources

Sources of energy that will never run out are called renewable energy resources. These energy resources are becoming more widely used because they contribute far less to climate change than fossil fuels. All sources of renewable energy have advantages and disadvantages.

## Key facts

- ✓ **Sources of energy that will never run out are called renewable.**
- ✓ **Renewable energy resources contribute far less to climate change than fossil fuels.**
- ✓ **Sources of renewable energy include solar, biofuels, wind, hydroelectric, tidal, wave, and geothermal.**

### Solar energy

A solar power station uses the Sun's energy to generate electricity. At a concentrated solar power plant, mirrors arranged in circles focus sunlight onto a central receiver, where the heat is used to boil water and make steam, which drives a generator. Electricity can also be produced directly using solar cells (photovoltaic cells). Solar power plants and solar cells work best in sunny climates and can't generate electricity at night.

### Biofuels

In some parts of the world, biofuels are used to power cars rather than gasoline or diesel. Biofuels can be made from fast-growing crops like sugar cane. The sugar is fermented to make ethanol, which can be burned in car engines. Although biofuels contribute less to global warming than fossil fuels, their production takes up land that could be used to grow food and has led to deforestation in tropical areas.

### Wind energy

Warmed by the Sun, the air in Earth's atmosphere is continually moving, and this kinetic energy can be captured by wind turbines and used to generate electricity. Wind turbines require suitable weather and must be high above the ground or ocean to work well. Many wind farms are built offshore (in the ocean), where they don't spoil the appearance of natural landscapes.

**Hydroelectricity**
Hydroelectric dams hold back rivers to form artificial lakes. Water from the lake flows through pipes to turbines at the bottom of the dam. The turbines drive generators, which produce electricity. One disadvantage of hydroelectricity is that the natural habitat of the valley is lost when it's flooded to make the lake.

**Wave and tidal energy**
Wave and tidal power stations use the motion of sea water to drive turbines placed in water. Wave power is still experimental. Tidal power stations are difficult and expensive to build but can produce large amounts of electricity at predictable times, though not constantly. One disadvantage is that they can change tidal patterns upstream, affecting the wildlife there.

**Geothermal energy**
At a geothermal power station, cold water is pumped deep underground, where it is heated to make steam by energy from Earth's interior. The steam is then used to drive electricity generators. Geothermal power stations produce very little pollution but work best in volcanically active places.

## Power stations

Most power stations use the same system to generate electricity. Energy from fuels or from the Sun is used to turn water into steam, which flows through pipes and turns spinning fans called turbines. The turbines drive generators, which create electricity. In wind farms, hydroelectric power stations, and wave or tidal power stations, moving water or air turns the turbines directly.