

# What Is Alternative Energy?

## THINGS TO EXPLORE

- Identify alternative energy sources.
- Explain why alternative energy sources are important to us.
- Design, build, and test a photovoltaic battery charger.

## TechnoTerms

alternative energy  
biomass  
geothermal energy  
photovoltaic cell  
solar cell

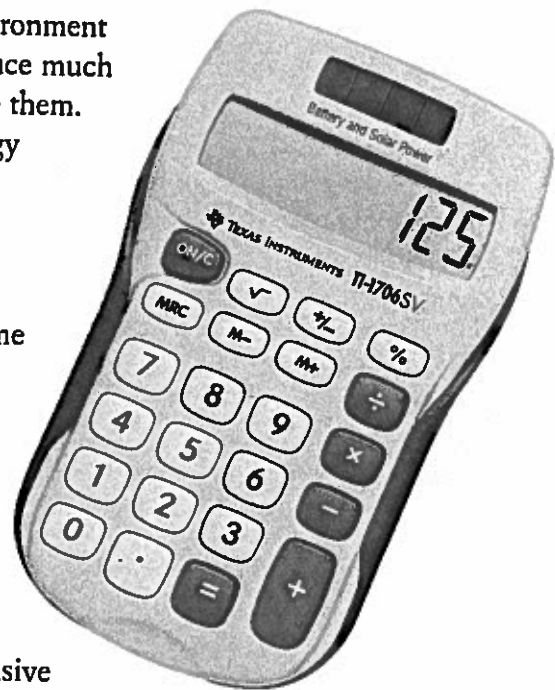
Besides trying to conserve our current energy sources, we need to look at **alternative energy** sources. They are also called *renewable resources* because we will not run out of them. They are constantly renewed through natural processes caused by the sun's energy. Alternative energy sources are important to you. Can you name some of them?

Solar energy, wind energy, biomass, tidal energy, and geothermal energy are examples of alternative energy sources. They provide energy with far less damage to the environment than nuclear or fossil fuel sources. They do not produce much waste or pollution. We need to find more ways to use them. They may replace or be added to nonrenewable energy supplies to do work for us.

## Solar Energy

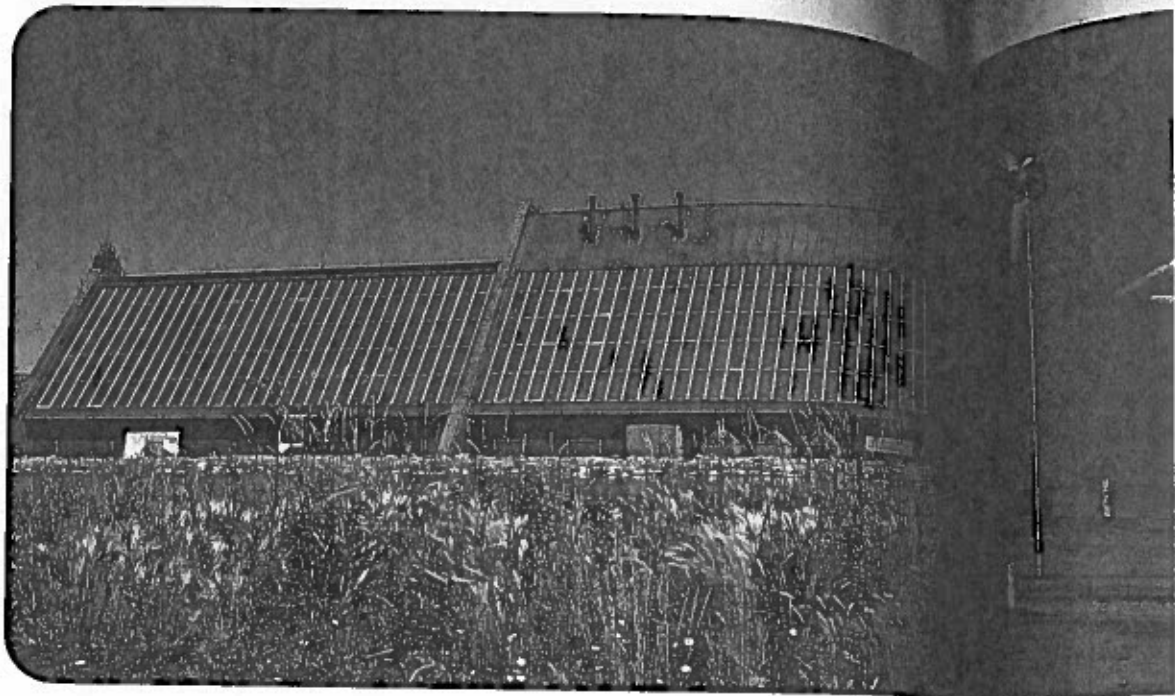
The sun provides the Earth with lots of energy, some of which can be used for heating purposes and to produce electricity.

**Solar cells**, or **photovoltaic cells**, make electricity directly from sunlight. Solar cells were developed to use on satellites in the 1950s, and they were very expensive then. Do you have a solar-powered calculator? Solar cells are now much cheaper to make, and calculators that contain them are inexpensive and powerful.



▲ Solar-powered calculators change light energy into electricity.

**Fig. 13-7.** This building uses the sun's energy for heating. Solar collectors are built into the roof. Look for solar collectors on homes in your neighborhood. How many can you find?



## TechnoFact

**HERE COMES THE SUN** Did you know that if we could figure out a way to better use energy from the sun, all our energy problems would be solved? The average amount of solar radiation striking the Earth over a year's time is equal to 178,000 terawatts ( $10^{12}$  watts)!

Another direct use of solar energy is using solar collectors to heat water. The hot water is then used to heat homes. Fig. 13-7. Some solar collectors produce temperatures high enough to be used in industry and for generating electricity. Active solar heating is much more effective in sunny climates.

## Wind Energy

Wind is one of the most promising alternative energy sources. Many countries, especially those that get a lot of wind, are developing wind power technology.

The most important use of wind energy is to produce electricity. The wind turns a turbine shaft that is hooked to a generator. The turbine depends on a steady supply of wind averaging 10 miles per hour or more. Medium-sized wind-driven turbines have been the most efficient so far. In some places, batteries are used to store the energy for times when the wind isn't blowing. More than 20,000 wind turbines are now producing electricity around the world.

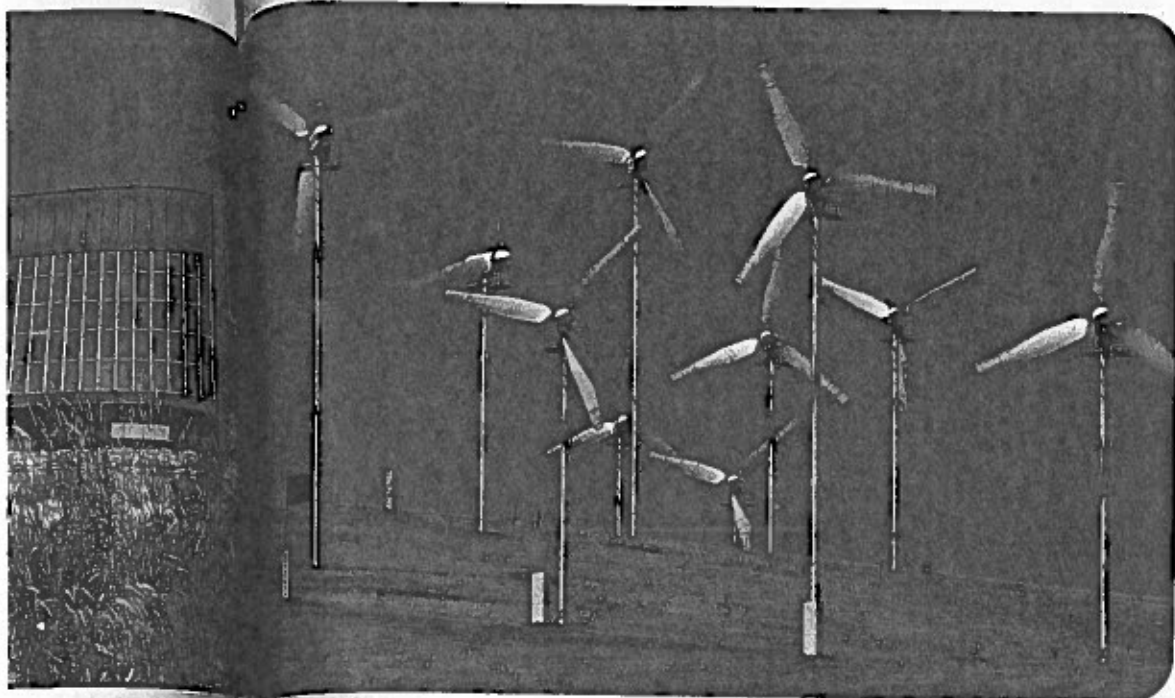
Wind energy can generate electricity at the same price as fossil fuels and nuclear power, but it is safer and doesn't cause pollution. "Wind farms," or collections of wind generators, in California have the power of two nuclear power plants but cost half as much as conventional power stations to operate. Fig. 13-8.

## Biomass

**Biomass** matter. Its wastes, are Almost has biomass t light.

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Biom methane exist tha



**Fig. 13-8.** Wind "farms" like this one in California use windmills to capture wind energy. What were early windmills used for?

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solar heating

### **Biomass**

**Biomass** is living or dead plant or animal matter. Its main sources are wood, crops, animal wastes, and organic materials found in garbage. Almost half of the world's population depends on biomass to supply energy for cooking, heating, and light.

The energy in biomass can be released and used in many different ways. Garbage can be burned to produce lots of heat. Most poorer nations get much of their energy from burning wood or from animal waste when wood is scarce or expensive.

Biomass can be used to produce biofuels such as methane, methanol, and ethanol. Processes also exist that can change it into petroleum. Fig. 13-9.



**Fig. 13-9.** Ethanol is a type of alcohol produced from corn or other biomass. Check the pumps at a local gas station. Does the station sell gasoline mixed with ethanol? If so, what is the percentage of ethanol contained in the mixture?

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half as much





## Tidal Energy

Ocean tides have mechanical energy that can be changed to a form you can use. Turbines can produce electricity from the rising and falling tides. The water is first trapped and then released through the turbine. The energy available depends on the difference between the heights of high and low tides.

Special generators can also change the energy in waves into electric power. This source of energy has lots of potential. But high waves and strong winds pose problems that scientists must first solve.

## Geothermal Energy

Geothermal energy is heat from beneath the Earth's crust. Fig. 13-10. When it is brought up to the surface as steam or hot water, it can be used directly to heat water. It can also be used to drive generators or steam turbines. The geothermal resources in the upper three miles of the Earth's crust are estimated to contain more energy than all the world's natural gas and crude-oil reserves. Until now we have used only a small percentage of this energy.

You can see that many energy resources are available to us. We will have to start using some alternative energy supplies because the nonrenewable ones are running out. Could you live with less energy? Most of us can, because we waste so much. We need to find more efficient ways to use and conserve our energy sources and, at the same time, to keep looking for new sources.

**Fig. 13-10.** This geyser is at Yellowstone National Park in Wyoming. Geysers are hot springs that erupt into columns of steam and hot water. Find out if geothermal energy is used at Yellowstone and report your findings to the class.

### SECTION 4

### TechCHECK

1. What is alternative energy?
2. List five types of alternative energy.
3. Why do we need to use alternative energy?
4. **Apply Your Knowledge.** Research other devices that are powered by solar cells besides calculators. Share your information with the class.

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Usin

### Real World

Wouldn't it be possible to use solar energy? photovoltaic cells can charge a battery directly into electricity in a battery fo

### Design Bri

Design, but a charger should be used to charge a ni

### Materials

- silicon solar
- silicon diod
- hookup wir
- AA nicad b holder
- 1/16"-acrylic
- aluminum f
- electronic s
- band or scr
- drill press
- digital mult
- strip heater
- 1 1/2-volt I welding ro pulleys, frc dissection (optional)

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

\*\*\*\*\*Read p. 301-304 in Text Book

1. Define Alternative Energy
2. Explain how the illustrations help you understand the reading selection?
3. Describe each type of alternative Energy and list an example of each:

Alt. Energy Type	Description	Example
SOLAR		
WIND		
BIOMASS		
TIDAL		
GEOTHERMAL		

4. Which Alternative energy types have you heard of before?

5. What types of Alt. Energy do you think could be used in Dorchester County? Explain how?

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6. Why do we need to use Alternative Energy?

\*\*\*\*\* Now research the 5 types of Alt. Energy. List the web site and describe the new information you found:

Alt. Energy Type	Web Site	New Information
SOLAR		
WIND		
BIOMASS		
TIDAL		
GEOTHERMAL		