

**Metro Parks**

# **FACT SHEETS**



*Metro Parks' Fact Sheets open your way to the natural and cultural history to be found and enjoyed in our 14 parks.*

For more information, contact: Metro Parks, 1069 West Main St., Westerville, OH 43081 Tel: 614.891.0700 [www.metroparks.net](http://www.metroparks.net)

# Solar Energy

## **What can the sun do for you?**

- Heat your house
- Grow plants
- Cook your food
- Dry your clothes
- Provide electricity to your home, school or office
- And more!

## **How does the sun do all this for you?**

Energy produced by the sun, called solar energy, is the source of nearly all energy used today. Even fossil fuels, such as coal and oil, owe their beginnings to once living plants and animals that needed the sun for life. The sun's energy can be tapped indirectly as wind, hydroelectric power, and fossil fuels, or directly as solar energy. We rely on collecting and using solar energy to keep us healthy and happy!

A variety of technologies are used to collect, store and concentrate solar power. All types of solar energy can be broken into two main categories, passive and active. Passive energy is perhaps the least expensive and most readily available to the average home or building owner. Active solar power uses hardware to capture sunlight and transform it into other useful forms of energy. These forms are more complex and require more planning. All solar energy has amazing benefits both to home and business owners and to the environment. Solar energy is abundant, clean, widespread, and renewable, which makes it a wonderful energy source for the future.

## **Passive Solar Power**

### **What is passive solar power?**

It is a means of capturing, storing and using heat from the sun without the use of moving parts. It is managing natural sunlight in such a way that it maintains a desired temperature inside a building.

### **Why use passive solar power?**

Using passive solar power can reduce economic and environmental costs. Houses with a passive solar design and efficient insulation have been proven to save as much as 99% of energy used for space heating and cooling.

### **How can I use passive solar power?**

There are four main ways to use passive solar power to heat your home or building.

1. Direct gain is designing a building with a large south-facing window and then using materials in the sunlit floors and walls that absorb and store the sun's heat.
2. Trombe walls are thick, south-facing walls that are painted black and made of a material that absorbs heat. A pane of glass or plastic glazing is placed a few inches in front of the wall to hold in heat. The wall heats up slowly during the day and gradually cools during the night.
3. Sunspaces are built on the south side of a building and are much like a greenhouse. When sunlight passes through the glass or glazing it warms the building.
4. Daylighting is simply the use of natural sunlight to warm up the inside of a building.

### **How long have people been using passive solar power?**

Remains of early Greek buildings show that their architects were experts in passive solar design.

### **What can I do to cool my home or building in the summer?**

Overhangs can be designed to shade windows, sunspaces can be closed off from the rest of the building and fresh-air ventilation can be used.

### **Where can I use passive solar power?**

Passive solar power can be used anywhere there is sufficient sunlight.

## **Active Solar Power**

### **What is active solar power?**

Active solar energy requires hardware to capture, concentrate, store and convert the solar power into other useful forms of energy. There are two main ways to use active solar power: solar collectors and concentrated solar energy.

### **What is a solar collector?**

A closed car on a sunny day is like a solar collector. The sunlight comes in through the car's windows and is absorbed by the seats, doors, and floor of the car. The absorbed energy changes into heat. A solar collector does the same thing, capturing and storing sunlight to be converted into electricity.

### **What is a PV cell?**

One of the most common types of solar collector is a photovoltaic (PV) cell. PV literally means, electricity from sunlight. These PV cells, also called solar cells, capture sunlight and convert it into electricity. Simple PV cells provide power for many small objects such as calculators and wristwatches. More complicated systems provide power for communication satellites, water pumps, and the lights and appliances in some people's homes and businesses.

### **How does a PV cell work?**

A PV cell is made of layers of silicon, the main ingredient in sand. Each piece of silicon has a different chemical added. When sunlight hits the PV cell, the chemicals make electricity. Depending on the energy needs, PV cells are combined into larger units known as modules, which can then be combined with other modules to form arrays. The flexibility of the arrays and modules allow PV cells to meet a variety of electrical needs, no matter how large or small.

### **Can I use active solar power in my home?**

Homeowners can install PV cells to provide a majority of their home's electricity. In Ohio, homeowners can remain hooked-in to local electric utilities for periods of low sunlight. Active solar power may require a substantial initial investment, but the savings on monthly utility bills often offsets initial costs.

## **Kids' investigation to try at home!**

### **Solar to Heat**

Why is it better to wear white on a hot sunny day? Try this experiment at home to see which color absorbs more heat.

**Step 1:** Put three thermometers in a sunny place.

**Step 2:** Cover the bulb of one with black paper. Cover the bulb of one with white paper. Leave the third bulb alone.

**Step 3:** Try to predict which thermometer will get hottest.

**Step 4:** Watch the thermometers for three minutes.

**Step 5:** Look at the temperatures to see which was the hottest.

**Step 6:** Was your prediction correct?

**What happened?** The thermometers measure the heat surrounding the bulb. When sunlight hits an object, like the thermometers, some of the radiant energy is reflected and some is absorbed and changed into heat. Some colors absorb more sunlight than others. Did the bulb covered with black get the hottest? Try this experiment with more colors to see which colors absorb the most heat!

## **Solar Balloon**

Radiant energy often turns into heat when it hits objects. Black objects absorb more radiant energy than white objects. When air gets hotter, it rises. A solar balloon works because the black plastic absorbs radiant energy and turns it into heat. The air inside gets hotter.

**Step 1:** On a very sunny day, take the solar balloon outside and tie one end closed with a piece of plastic string. Open the other end and walk into the wind until it fills with air. When the balloon is filled with air, tie off the other end with string.

**Step 2:** Tie long pieces of string to both ends. Have two people hold the ends of the string and place the balloon in the sun.

**Step 3:** Observe the balloon as the air inside becomes hotter.

**Step 4:** Explain your observations.

## **FIND OUT MORE**

### **Resources For Children:**

World About Us: Solar Power — Margaret Spence, Gloucester Press, 1993.

Energy Forever? Solar Power — Ian Graham, Raintree Streck-Vaughn Publishers, 1999.

### **Resources For Adults:**

The Complete Idiot's Guide to Solar Power For Your Home — Dan Ramsey, Alpha Books, 2003.

### **Websites:**

[http://www.nrel.gov/clean\\_energy/teach\\_passive.html](http://www.nrel.gov/clean_energy/teach_passive.html) (teachers' pages and kids' activities)

<http://www.eeexchange.org/solar/frameset.htm> (interactive graphics)

[http://www.nrdc.org/greensquad/library/energy\\_solar.html](http://www.nrdc.org/greensquad/library/energy_solar.html) (fact sheets)

<http://www.eere.energy.gov> (general information and kids' pages)

<http://www.need.org> (teachers' pages and kids' activities)

<http://www.ohioenergy.org> (the Ohio Energy Project)

<http://www.greenenergyohio.org> (Green Energy Ohio)

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