

# Electricity from the Sun



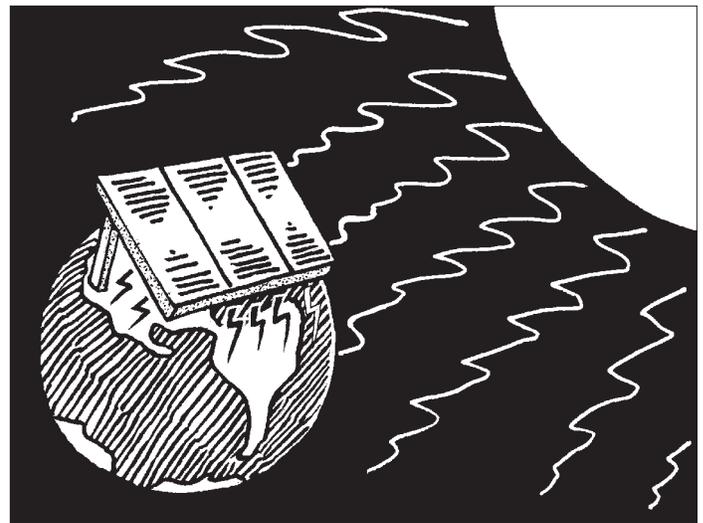
**RENEWABLE ENERGY**  
THE INFINITE POWER  
OF TEXAS

## HIGHLIGHTS

- Earth is a huge solar collector
- Winds and wind turbines
- Plants store sunlight
- Falling water, heat and light into watts

## USING THE SUN'S ENERGY

Sunlight helps all living things grow. Energy from sunlight is called solar energy. Solar energy makes it possible for plants, animals and people to live on Earth. The Earth is basically a huge solar energy collector because it collects the energy from the sun. This energy comes in different forms. One form is from direct sunlight used by plants to grow. Another form of energy heats the air that causes wind. Water is evaporated when sunlight falls on the oceans. Then when the evaporated water cools in the air, it falls back to Earth as rain and becomes rivers and lakes. All of these forms of energy are used indirectly as wind, biomass and hydroelectric power, and directly as solar energy. Solar energy is called thermal energy and photovoltaic energy.



**SUNLIGHT POWERS THE EARTH** *The Earth is like a huge solar collector that turns sunlight into natural forces such as wind, rain and growing plants.*

Our supply of solar energy can never be used up and is readily available. Therefore solar energy is a type of renewable energy. It is not like fossil fuels, such as coal, oil and natural gas, which are also called non-renewable energy. Solar energy is a clean energy source that does not create pollution that can be harmful to all living things. If you use solar energy, you may not have to depend on anyone for your energy needs.

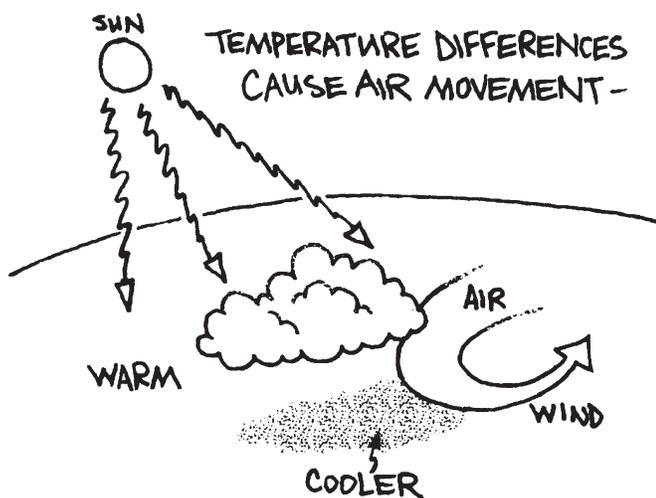
There is a great amount of power in the solar energy that arrives on Earth. This powerful energy is measured in units called watts per square meter. The amount of

power from the sun that reaches the earth at noon on a clear day is about 1,000 Watts per square meter. This would be the same as a 100-Watt light bulb completely focused on a surface the size of a large notebook.

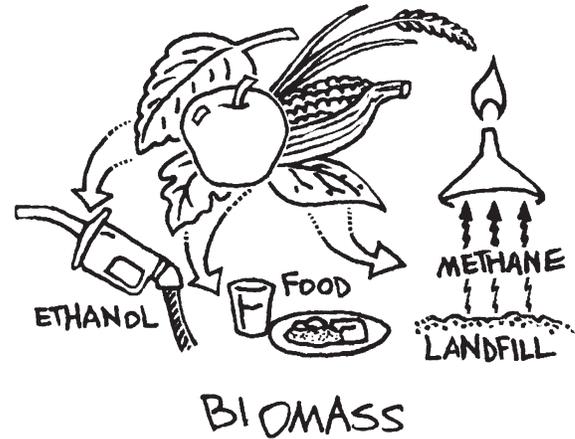
## WIND ENERGY

Wind is created because the solar energy from the sun heats the Earth's surface and the atmosphere unevenly. This causes different temperatures within the atmosphere around our planet. Temperature differences cause the sections of air in the atmosphere to move in different directions around the planet. Warm air rises and cold air falls. The Earth's rotation also helps air to move around the planet.

Windmills use wind energy to pump water. But this energy can also be used to power our homes, businesses and other electric needs. Modern wind turbines use the kinetic energy of the wind to produce electrical power. Texas has become one of the leaders in wind energy in the United States. Texas has the second largest wind energy potential of any state with over 135,000 megawatts



**WIND IS CAUSED BY THE SUN** Uneven solar heating of the Earth's land, water and atmosphere causes air to move around as wind.



## BIOMASS

**BIOMASS IS STORED SOLAR ENERGY** Energy stored in plants can be used for many useful purposes such as fuels, food, clothing and paper. Biomass can change form naturally like when old newspapers or food scraps turn into methane at a landfill.

(MW) of potential. By 2003, Texas had developed almost 1,300 MW of power from wind energy. This adds to the goal of having 5,880 MW by 2015.

## BIOMASS ENERGY

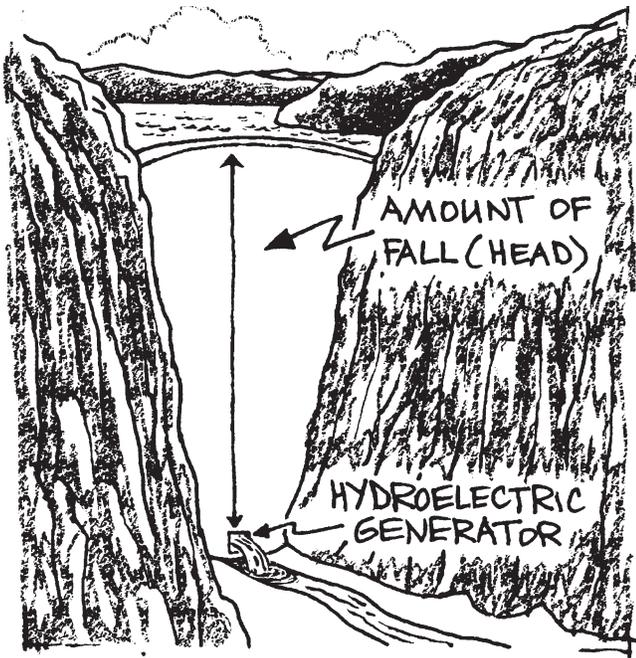
Biomass is solar energy that has been stored as plant and animal material. When you eat vegetables, you are consuming the sun's energy the plant stored as it grew. Your body uses the vegetables' biomass to give you energy to work and play.

When corn is used to make biomass energy, cleaner-burning fuels can be produced, such as ethanol.

At landfills, where most of the waste is biomass, a gas called methane is naturally produced. Methane gas can be used to generate electricity.

## HYDROELECTRIC ENERGY

Water is the foundation of life on the Earth. There is always a supply of water on Earth



**MOVING WATER PRODUCES POWER** Water flowing through a dam runs through a turbine to make electricity. Tall dams produce more power than short dams since the water falls farther.

because it is always flowing from our oceans, rivers and lakes to our atmosphere and back down to Earth as rain. When water falls from a high point to a low point—like a waterfall—there is a lot of power involved. This power can be collected to make electricity. Power that is created by water is called hydroelectric. Some of the largest power plants in the world are hydroelectric power plants.

The amount of power that is made from falling water depends on the amount of water falling and how far it falls. In simple terms, one gallon of water falling one foot per second can light up a 10-Watt light bulb.

## SUNLIGHT AND THERMAL ENERGY

Solar energy can be used to heat your home. This can be done best if you have

lots of windows that face south and are shaded correctly. The window glass should be covered with a material called glazing that prevents too much heat from coming in during the summer and prevents heat from escaping in the winter.

Much of your hot water needs can be met with a simple solar water heating system.

Sunlight can also be used to make electricity. One way the sun can make electricity is through a heat process called thermal. At the University of Texas at El Paso, there is a pond of water about half the length of a football field that soaks up the sun's energy and makes heat, which is changed into electricity with special machines. It is called a solar pond. This solar pond can make about 60 kilowatts of electricity for the University. A food cannery nearby uses the heat made by the solar pond.

## SUNLIGHT AND PHOTOVOLTAICS

Another way the sun can make electricity is through a process called photovoltaics or PV. "Photo" refers to light and "voltaic" to voltage. A thin silicon cell, four inches across, can produce about one watt of electrical power in full sunlight. Solar powered homes, water pumps, school crossing signs and calculators are a few common examples of how PV is used today in Texas.

Our future is bright for using renewable energy in Texas and around the world. Using renewable energy can supply electricity and create local jobs. And it's good for the Earth.

One day, it will be up to you, our future homeowners, politicians, scientists and decision-makers, to make sure our energy needs are met with renewable energy.

*Resources can supply electricity and create local jobs. And it's good for the earth.*

*Governments, electric companies, and people like you who choose to pursue a renewable/sustainable energy future now will be the ones who can offer Texas the experience, know-how and leadership for helping meet our energy needs in the 21st Century.*

## RESOURCES

### FREE TEXAS RENEWABLE ENERGY INFORMATION

For more information on how you can put Texas' abundant renewable energy resources to use in your home or business, visit our Web site at [www.InfinitePower.org](http://www.InfinitePower.org) or call us at 1-800-531-5441 ext 31796. Ask about our free Teacher Resource Guides and CD available to teachers and home schoolers.

### ON THE WORLD WIDE WEB:

Bioenergy – Environmental and Energy Study Institute  
[www.eesi.org/programs/agriculture/Biofuels.htm](http://www.eesi.org/programs/agriculture/Biofuels.htm)

West Texas A&M Texas wind research  
[www.windenergy.org](http://www.windenergy.org)

American Solar Energy Society  
[www.ases.org](http://www.ases.org)

## HELPFUL ORGANIZATIONS

Comprehensive educational source for renewables:  
**RENEWABLE ENERGY POLICY PROJECT & CENTER FOR RENEWABLE ENERGY AND SUSTAINABLE TECHNOLOGY (CREST)**  
777 North Capitol Street, NE. #805  
Washington, D.C. 20002  
(202) 289-5370  
[www.repp.org/](http://www.repp.org/)

Solar energy education:  
**TEXAS SOLAR ENERGY SOCIETY**  
P.O. Box 1447  
Austin, Tx 78767-1447  
(800) 465-5049  
[www.txses.org](http://www.txses.org)

Great source for wind energy information:  
**AMERICAN WIND ENERGY ASSOCIATION**  
122 C Street, N.W.  
Washington, D.C. 20001  
(202) 383-2505  
[www.awea.org](http://www.awea.org)

Trade association for Texas renewable companies:  
**TEXAS RENEWABLE ENERGY INDUSTRIES ASSOCIATION**  
P.O. Box 16469  
Austin, TX 78761-6469  
(512) 345-5446  
[www.treia.org](http://www.treia.org)

For solar energy generation information and graphs:  
**TEXAS SOLAR FOR SCHOOL**  
[www.soltrex.com](http://www.soltrex.com)



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# InfinitePower.org

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