Solar energy 



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| solarhouse | “Solar” is the Latin word for “sun” – and it’s a powerful source of energy. In fact, the sunlight that shines on the Earth in just one hour could meet world energy demand for an entire year!We can use solar power in two different ways: as a heat source, and as an energy source. People have used the sun as a heat source for thousands of years. Families in ancient Greece built their homes to get the most sunlight during the cold winter months. | solarsun |



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| **Where does solar come from?** The sun has produced energy for billions of years. Solar energy is the solar radiation that reaches the earth. Solar energy can be converted directly or indirectly into other forms of energy, such as heat and electricity. The major drawbacks (problems, or issues to overcome) of solar energy are: (1) the intermittent and variable manner in which it arrives at the earth's surface and, (2) the large area required to collect it at a useful rate. |

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Solar energy is used for heating water for domestic use, space heating of buildings, drying agricultural products, and generating electrical energy.

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In the 1830s, the British astronomer John Herschel used a solar collector box to cook food during an expedition to Africa. Now, people are trying to use the sun's energy for lots of things.

Electric utilities are are trying photovoltaics, a process by which solar energy is converted directly to electricity. Electricity can be produced directly from solar energy using photovoltaic devices or indirectly from steam generators using solar thermal collectors to heat a working fluid.

    



Photovoltaic energy

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| Photovoltaic (fo-to-vol-ta-ik) systems are solar systems that produce electricity directly from sunlight. The term "photo" comes from the Greek "phos," meaning light. "Voltaic" is named for Alessandro Volta (1745-1827), a pioneer in the study of electricity for whom the term "volt" was named. Photovoltaics, then, means "light electricity." Photovoltaic systems produce clean, reliable electricity without consuming any fossil fuels. They are being used in a wide variety of applications, from providing power for watches, highway signs, and space stations, to providing for a household's electrical needs. |
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| photovoltaic |

 | What is the difference between "solar energy" and "photovoltaics?Photovoltaics is one form of solar energy. The term solar energy can refer to something as simple the energy gathered in your parked, sealed car (your solar collector) and converted into heat. Solar energy is often used to heat houses directly through passive means (sun enters window, room warms). Solar energy is also often used to heat water (a solar collector is mounted in direct sunlight, which warms a heat transfer fluid, which in turn heats the water in your hot water tank).Photovoltaics refers specifically to the practice of converting the sun's energy directly into electricity using photovoltaic cells. Photovoltaic cells are often referred to as PV cells or solar cells.  |
| Photovoltaic energy is the conversion of sunlight into electricity through a photovoltaic (PVs) cell, commonly called a solar cell.  A photovoltaic cell is a nonmechanical device usually made from silicon alloys. Sunlight is composed of photons, or particles of solar energy.  These photons contain various amounts of energy corresponding to the different wavelengths of the solar spectrum.  When photons strike a photovoltaic cell, they may be reflected, pass right through, or be absorbed.  Only the absorbed photons provide energy to generate electricity.  When enough sunlight (energy) is absorbed by the material (a semiconductor), electrons are dislodged from the material's atoms.  Special treatment of the material surface during manufacturing makes the front surface of the cell more receptive to free electrons, so the electrons naturally migrate to the surface. |
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| http://www.kids.esdb.bg/images/solar_clip_image002_0000.jpgThe environmental impact of a photovoltaic system is minimal, requiring no water for system cooling and generating no by-products.  Photovoltaic cells, like batteries, generate direct current (DC) which is generally used for small loads (electronic equipment).  When DC from photovoltaic cells is used for commercial applications or sold to electric utilities using the electric grid, it must be converted to alternating current (AC) using inverters, solid state devices that convert DC power to AC.  Historically, pvs have been used at remote sites to provide electricity.  However, a market for distributed generation from PVs may be developing with the unbundling of transmission and distribution costs due to electric deregulation.  The siting of numerous small-scale generators in electric distribution feeders could improve the economics and reliability of the distribution system. |
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| Solar Thermal Heat - Solar Thermal Energy  |
| Solar thermal energy refers to harnessing the sun's light to produce heat. Heat results when photons, packets of light energy, strike the atoms composing a substance (water, your body, asphalt), exciting them. Solar thermal technologies include passive solar systems for heating (or cooling!) buildings; flat plate solar collectors, often used for providing households with hot water; and solar concentrator power systems.  | http://www.kids.esdb.bg/images/sunhouse.jpg |
| These systems, also known as solar thermal power plants, use the sun's heat to create steam, which then turns a turbine and produces electricity. (Fossil fuel burning power plants also produce electricity by first creating steam in order to turn a turbine.)http://www.kids.esdb.bg/images/solar_clip_image002_0003.jpgThe major applications of solar thermal energy at present are heating swimming pools, heating water for domestic use, and space heating of buildings.  For these purposes, the general practice is to use flat-plate solar-energy collectors with a fixed orientation (position). Where space heating is the main consideration, the highest efficiency with a fixed flat-plate collector is obtained if it faces approximately south and slopes at an angle to the horizon equal to the latitude plus about 15 degrees. Solar collectors fall into two general categories:  nonconcentrating and concentrating. In the nonconcentrating type, the collector area (i.e. the area that intercepts the solar radiation) is the same as the absorber area (i.e., the area absorbing the radiation). In concentrating collectors, the area intercepting the solar radiation is greater, sometimes hundreds of times greater, than the absorber area. Where temperatures below about 200o F are sufficient, such as for space heating, flat-plate collectors of the nonconcentrating type are generally used.  |

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