Solar Basics

Solar energy is a potentially infinite form of electrical power production. The generation of solar energy produces very low carbon emissions and greenhouse gases, and virtually no solid waste. Every location on Earth receives sunlight at least part of the year. The amount of solar radiation that reaches any one position on the Earth's surface varies according to these factors: geographic location, time of day, season, local landscape, and local weather patterns. Local weather can limit the amount of sunlight passing through the atmosphere, as some of it is absorbed or reflected by haze, moisture, or clouds for example. Scientists measure the amount of sunlight falling on specific locations which are expressed in average "sun hours per day".

Areas known for productive solar climates are dry and desert like such as Arizona and Nevada which have nearly 7 sun hours per day on average. Tallahassee experiences 40% less with approximately 5 sun hours per day. Although solar in North Florida can still produce energy, its reduced capacity results in a longer return on investment.

There are two main forms of solar energy production; photovoltaic (PV) and solar thermal. Solar panels either convert sunlight into DC power (photovoltaic panels) or are used to heat water/fluid (photo thermal panels).

Photovoltaic (PV)

PV technology uses energy from the sun to make electricity. PV systems can be classified into two general categories: flat-plate systems or concentrator systems. The simplest PV array consists of flat-plate PV panels in a fixed position. The advantages of fixed arrays are that they lack moving parts, there is virtually no need for extra equipment, and they are relatively lightweight. Orientation to the sun is usually at an angle that can not optimize the path of the sun as it travels through the day. Therefore, less energy per unit area of array is collected compared with that from a tracking array.

Conentrator systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam which is focused onto PV. Concentrator systems increase the power output while reducing the size or number of cells needed. A solar cell's efficiency increases under concentrated light. The primary reason for using concentrators is to be able to use less solar cell material in a PV system. PV cells are the most expensive components of a PV system, on a per-area basis. A concentrator makes use of relatively inexpensive materials such as plastic lenses and metal housings to capture the solar energy and focus that energy onto a smaller area, where the solar cell is.

Solar Thermal

Solar thermal is a technology for harnessing the suns energy to transfer heat to water or other liquids. There are three main categories of solar thermal; low, medium, and high-temperature collectors. Low temperature collectors are generally used to heat swimming pools. Medium-temperature collectors are used for creating hot water for residential and commercial use. High temperature collectors concentrate sunlight using mirrors or lenses and are generally used for electric power production.