What is solar energy?

Solar is one form of renewable energy. Solar power can be used in two different ways as a heat source and as an electricity source.

Energy is classified as renewable and non-renewable. Renewable means it can be replenished quickly or can be supplied almost continuously like energy from the sun, wind, water waves, tides and biomass. Non-renewable resources are those that are used faster before they can be replenished such as the fossil fuels coal, oil and natural gas.

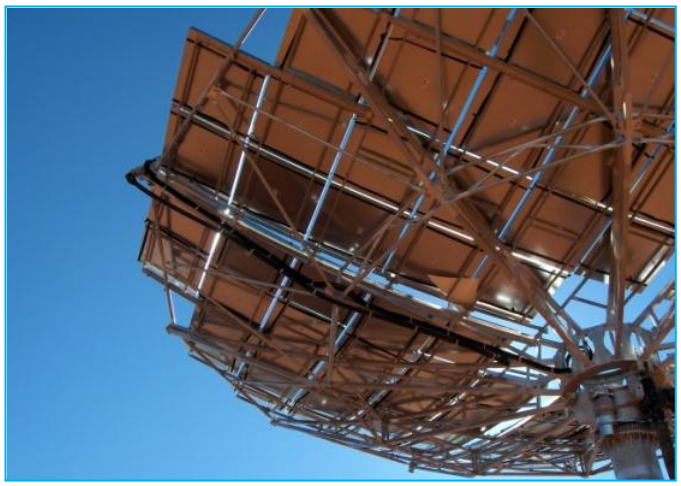
Solar is one form of renewable energy. Solar power can be used in two different ways as a heat source and as an electricity source.

Solar Thermal

The sun's heat energy can be captured by a number of different collectors and turned into hot water. This type of power is called solar thermal.

Flat plate collectors are the most common form of solar thermal power used for instance in home hot water systems. These flat plate collectors are like greenhouses that trap and use the sun's heat to raise the temperature of water up to about 70 degrees Celsius.

Because dark colours absorb more heat than light colours, the collector surfaces are usually painted black to absorb as much heat from the sun as possible. This helps water circulating through the panel to reach a higher temperature. Some collectors have a special surface, which reduces the amount of heat re-radiated from the collector. These produce even hotter water.



Dish underside

Windorah Solar Farm

Parabolic dishes are concave-shaped discs, which remain constantly focused on the sun with the aid of sun-tracking devices. The curve of each dish concentrates the sun's rays to a small central point, thus reducing heat losses and enabling water (or other fluid) passing through that point to be heated to a high temperature. If the temperature is high enough this water can be turned into steam to drive turbines to make electricity.

Photovoltaic Systems

Photovoltaic is another form of solar energy. A solar cell or photovoltaic (PV) cell is a 'semiconductor' device which is able to convert sunlight directly into electricity. The panels are made from special materials which produce a small electric current when exposed to light.

Solar Gas

The solar gas process stores solar thermal energy for later use. Energy from the sun is used to heat natural gas and water to around 900 degrees Celsius at which temperature they react to form solar gas. This gas has a 25 per cent higher energy value than the original natural gas. As energy can be stored indefinitely in solar gas this technology enables solar energy to be stored for use during cloudy weather or night time.[1]

Solar Energy in Australia

A small percentage of solar energy, approximately 0.1%, is used in Australia, as well as globally. The majority of solar energy produced in Australia uses solar thermal technology primarily for heating water. Around half is used for water heating in homes while the rest is used for space heating in homes or commercially and for heating swimming pools.[2]

The annual solar radiation falling on Australia is approximately 58 million petajoules[3] with the solar energy resources located in the northwest and centre of Australia. These areas in the main do not have access to the national electricity grid.

Solar thermal technologies can also operate in hybrid systems with fossil fuel power plants while photovoltaic systems are suited to areas that do not have access to the grid and where the electricity costs from other sources are high.

Windorah Solar Farm

Windorah Solar Farm[3] is Queensland's first solar farm and located in the town of Windorah which has a population of 100. The farm consists of five concentrated photovoltaic dishes producing 175 kilowatt hours of electricity. This can produce enough energy to power 60 homes and businesses. The dishes contain 112 square mirrors each measuring 1.1 metres across. They sit atop 13 metre masts and can rotate 360° .

When the solar power runs low the existing diesel power station provides the electricity required.

Advantages	Disadvantages
Energy source is free with minimal greenhouse gases produced in the making of solar equipment.	Solar equipment can be expensive.
Solar units can be placed on buildings leaving land free for other uses.	Solar energy can be an unreliable energy source. It cannot be used at night and is less effective on cloudy days.
Solar technology requires little maintenance.	Leaves and dust can affect the effectiveness of solar panels.
Solar technology is suitable for remote locations that do not have grid access.	Solar energy can be stored in batteries which add additional costs to the investment.

Links

Google Earth energy map - Shows location of renewable energy installations in Australia.

Western Power Plug In Kids fact sheet

Energy Careers

Energy Skills Queensland

Ergon Energy Careers

Stanwell Energy Careers

[1] Source: Queensland Government Energy Futures
[2] Source Australian Energy Resource Assessment , Geoscience Australia 2010
[3] Ibid
[4] Owned and operated by Ergon Energy.

Queensland Resources Council acknowledges Ergon Energy for the supply of images in this fact sheet.

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