

Unit 2: Solar Technology

Reading comprehension:

Direct Solar Power

Solar power technologies use the sun's energy or heat to provide a variety of services to businesses and consumers. These include electricity, heat, light, hot water, and even cooling production. Different systems are used dependent upon whether the energy capture is relatively direct or indirect. Indirect solar involves more than one step between sunlight and energy production, this would include systems in which the energy is created or stored through another medium, e.g., solar power in which molten salt is heated, and the medium creates steam which then powers a turbine to generate electricity. A direct system involves only one step, which could be a solar cell that generates electricity. This article focuses on one direct method.

Photovoltaic (PV) solar power generates electricity from a solar cell and is often considered the typical form of solar power . The earliest uses were to power small low-energy devices, first used in space exploration with NASA and then on consumer products such as calculators, watches, etc and were only relevant for such purposes. The initial barriers to wider use of photovoltaics were production costs, power output and longevity (the period of use before the product needs to be replaced). All three issues have been addressed as research and development has steadily improved performance. More power is able to be produced from the same size solar panel with longer longevity. The price of PV panels decreased from approximately \$3.80/watt in 2008 to \$1.00/watt by mid-2012 (McKinsey and Company, Solar power: Darkest before dawn, 2012). This was due to scale efficiency, improved manufacturing design and competition.

The solar panels (the more panels used, the greater the amount of generated energy) convert sunlight into direct current (DC) electricity. DC is often used to transport electricity over long distances. However, almost all consumers use alternating current (AC) for their daily needs and the DC is converted into AC through an inverter and then is distributed throughout the home via the fusebox. This makes PV power directly useable for consumers. As the PV system may produce too little or too much DC, it is usually connected to the electric utility grid. This requires an electric meter that can record electricity both as consumed or produced (called net metering). If the PV home owner does not wish to connect to the grid, power can be stored in some form of battery (as most PV electricity receives higher power rates, it is normally popular to connect one's system to the grid).