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I History

A Photovoltaic Effect

- 1 First discovered by Edmond Becquerel in 1839
- 2 Edmond Becquerel was a French physicist
- 3 Took over 100 years to make a solar panel

B When Was the First Solar Cell Made

- 1 First cell made in 1941
- 2 Made by Russell Ohl

II Nuclear Fusion

A What Nuclear Fusion Is

- 1 Nuclear Fusion in the sun creates solar energy that is collected by Solar Panels and transformed into energy
- 2 Nuclear Fusion turns hydrogen to helium to generate large amounts of energy
- 3 Every second 620,000,000 metric tons of hydrogen are fused by the sun

B PP chain reaction

- 1 The most common way Nuclear Fusion occurs when two protons of hydrogen atoms “fuse” together to create helium
- 2 This process is also called a proton-proton chain reaction or a PP chain reaction
- 3 Every second 620,000,000 metric tons of hydrogen are fused by the sun

C The CNO cycle

- 1 Nuclear Fusion can also occur by what is called the CNO cycle
- 2 Hydrogen is still turned into Helium
- 3 happens by using Carbon (C) Nitrogen (N) and Oxygen (O)
- 4 the CNO cycle is very rare
- 5 less than 2% of the sun energy is created by the CNO cycle

D Occurrence Of Nuclear Fusion

- 1 Nuclear fusion does not only occur in the sun
- 2 It can also occur in other stars approximately the same size as the sun
- 3 It must be in the region of four million degrees Kelvin and Celsius or seven million degrees Fahrenheit

III Solar Energy

A What Solar Energy Is

- 1 generated from Nuclear Fusion in the Sun
- 2 Renewable energy

B Uses Of Solar Energy

- 1 Process of keeping earth warm, called greenhouse effect
- 2 Photosynthesis, when a producer converts sunlight into nutrients
- 3 Producers include fungi, algae, bacteria, and plants
- 4 Another name for producer is autotroph
- 5 Sun light helped make the fossil fuels

- 6 Approximately 3 billion years ago plants decomposed and shifted down in the earth
- 7 The plants became fossil fuels due to large amounts of pressure and high temperature
- 8 Solar energy kept those plants alive through photosynthesis
- 9 The fossil fuels are petroleum, natural gas, and coal
- 10 Fossil fuels can be extracted for energy, but are nonrenewable
- 11 Nonrenewable means the fuels can't be made again for millions of years
- 12 Solar energy however, is renewable

IV What Are Solar Panels

A Definition

- 1 “a panel exposed to radiation from the sun, used to heat water or, when mounted with solar cells, to produce electricity direct, esp. for powering instruments in satellites” British diction definition

B Types of Solar Panels

- 1 There are three types of solar Panels
 - a Photovoltaic
 - b Thermal
 - c Concentrating

V Photovoltaic Solar Panels

A General Information

- 1 Photovoltaic means “light energy”
- 2 made up of what are called Photovoltaic Cells
- 3 Solar Panels knock electrons free from atoms to generate electricity
- 4 Energy made starts as direct current (DC) and must be transformed into alternating current

B Each Cell

- 1 The main component is the photovoltaic cell
- 2 Each cell is made up of two layers of silicon
- 3 Silicon (Si) is an element that is found in micro-electronics
- 4 Silicon is semi-conducting
- 5 Each cell creates an electric field
- 6 An electric field is when a positive and negative charge are separated
- 7 In-order for this to happen in a cell the top layer of silicon is injected with phosphorus giving it a negative charge
- 8 The bottom layer is infused with boron for a positive charge

C Atomic Level

- 1 Photon-“A quantum of electromagnetic radiation, usually considered as an elementary particle that is its own antiparticle and that has zero rest mass and charge and a spin of one. *Symbol: γ .*” Dictionary.reference.com
- 2 A photon is basically the particles of the sun's energy
- 3 Electron- “Also called negatron. *Physics, Chemistry.* an elementary particle that is a fundamental constituent of matter, having a negative charge of 1.602×10^{-19} coulombs, a mass of 9.108×10^{-31} kilograms, and spin of $\frac{1}{2}$, and

existing independently or as the component outside the nucleus of an atom.”

Dictionary.reference.com

- 4 Electron is basically a particle with a negative charge located in an atom
- 5 Photon knocks an electron free from an atom
- 6 Electric field pushes said electron out of silicon junction

D Other Parts

- 1 Metal plates on the side transfer the electron into energy
- 2 Inverter transforms the DC into an AC

VI Solar Economics and Statistics Of Today's Society

A Price

- 1 Decreased 80% from 2008 -2014

B How Many People Use Solar Energy

- 1 First state to generate over 5% utility-scale power from solar energy-
California
- 2 Solar energy is less than %2 of the U.S. overall generating capacity
- 3 Solar is also 32% of the new generating capacity added to the U.S. in 2014

C Solar Capability

- 1 1 ½ hours of the sun's energy = power to the whole world for 1 year