HISTORICAL EVOLUTION IN THE ENERGY RESOURCES

SOLAR ENERGY

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1. INTRODUCTION

The solar energy is based in the exploitation of the solar radiation which reach the Earth´s surface and then it is transformed in electricity.

Solar energy is considered a renewable energy source. The sun radiates an enormous amount of energy, more energy in one second than the world has used since time began. Like a big gas ball, the sun is made up mostly of hydrogen and helium gas. The sun makes energy, solar energy, in its inner core in a process called nuclear fusion. It takes the sun´s energy just a little over eight minutes to travel the 93 million miles to Earth. And although only a small part of the radiant energy that the sun emits into space reaches the Earth, it is considered more than enough to supply all our energy needs.

2. TYPES OF SOLAR ENERGY

Solar energy technologies use the sun's energy and light to provide heat, light, hot water, electricity, and even cooling, for homes, businesses, and industry. Heating with solar energy is not easy. Capturing sunlight and putting it to work is difficult because the solar energy that reaches the Earth is spread out over a large area. The sun does not deliver that much energy to any one place at any one time. The amount of solar energy an area receives depends on the time of day, the season of the year, the cloudiness of the sky, and how close you are to the Earth's equator

A solar collector is one way to collect heat from the sun. The light that is absorbed by a solar collector changes into heat. It lets light in, but doesn´t let all the heat out. This is also why greenhouses work so well and stay warm year-round. A greenhouse or solar collector: —

- allows sunlight in through the glass (or plastic); —
- absorbs the sunlight and changes it into heat; and
- traps most of the heat inside.

There are a variety of technologies that have been developed to take advantage of solar energy.

2.1. Solar Energy Technologies

a) Photovoltaic Systems

Producing electricity directly from sunlight.

Photovoltaic comes from the words *photo* meaning light and *volt*, a measurement of electricity. Sometimes photovoltaic cells are called PV cells or solar cells for short.

b) Solar Thermal Electricity

Like solar cells, solar thermal systems, also called concentrated solar power (CSP), use solar energy to produce electricity, but in a different way. In this case, the sunlight is focused onto a receiver than heats a liquid. Solar thermal energy has great potential for the future.

c) Solar Hot Water

Heating water with solar energy.

The third home energy cost is heating water for bathing, dishwashing, and clothes washing. A solar water heater works a lot like solar space heating. In our hemisphere, a solar collector is mounted on the south side of a roof where it can capture sunlight. The sunlight heats water in a tank. The hot water is piped to faucets throughout a house, just as it would be with an ordinary water heater Solar Electricity
Using the sun's heat to produce electricity.

d) Solar Passive Heating and Day lighting

Using solar energy to heat and light buildings.

Space heating means heating the space inside a building. There are two general types of solar space heating systems: passive and active. Hybrid systems are a combination of passive and active systems.

- **Passive Solar Homes**

In a passive solar home, the whole house operates as a solar collector.

A passive solar home converts solar energy into heat. Sunlight passes through a home's windows and is absorbed in the walls and floors. To control the amount of heat in a passive solar home, the doors and windows are closed or opened to keep heated air in or to let it out. At night, special heavy curtains or shades are pulled over the windows to keep the daytime heat inside the house. In the summer, awnings or roof overhangs help to cool the house by shading the windows from the high summer sun.

Many homeowners install equipment (such as fans to help circulate air) to get more out of their passive solar homes. When special equipment is added to a passive solar home, the result is called a hybrid system

- **Active solar homes**

Unlike a passive solar home, an active solar home uses mechanical equipment and an outside source of energy to help heat the house when solar energy is not enough. Active solar systems use special solar collectors that look like boxes covered with glass. Dark-colored metal plates inside the boxes absorb the sunlight and change it into heat. (Black absorbs more sunlight than any other color.) Air or a liquid flows through the collectors and is warmed by this heat. The warmed air or liquid is then distributed to the rest of the house just as it would be with an ordinary furnace system. Solar collectors are usually placed high on a roof where they can collect the most sunlight. They are also put on the south side of the roof in a location where no tall trees or tall buildings will shade them.

3. TYPES OF SOLAR PANELS

They are formed by a group of cells. Each panel has 36 cells connected in series. Their length is between 1,2 -1,5 m long and 0,7 - 0,8 m wide. The electricity of direct current of the panel is 12 volts. They have 24 batteries. They have a converter to transform the direct current in alternate current.

There are three types:

- Thermodynamic solar panels
- Thermal solar panels
- Photovoltaic solar panels

Thermodynamic solar panels: they are the most popular solution, due to the highest efficiency, the best price and the greatest versatility.

Thermal solar panels: they are the simplest. Solar thermal systems use a solar collector with a mirrored surface to focus sunlight onto a receiver that heats a liquid. The super-heated liquid is used to make steam to produce electricity in the same way that coal plants do.

Photovoltaic solar panels: they were a revolution when they were invented. Their use in the first buildings made to think that it was the new possibility to generate the enough energy. They are made with solar cells. Solar cells are made up of silicon, the same substance that makes up sand. Silicon is the second most common substance on Earth. Solar cells can supply energy to anything that is powered by batteries or electrical power. Electricity is produced when sunlight strikes the solar cell, causing the electrons to move around. The action of the electrons starts an electric current. The conversion of sunlight into electricity takes place silently and instantly. There are no mechanical parts to wear out. Compared to other ways of making electricity, photovoltaic systems are expensive.

4. HOW A PHOTOVOLTAIC CELL WORKS

Photovoltaics is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current results that can be used as electricity.

Solar cells are made of the same kinds of semiconductor materials, such as silicon, used in the microelectronics industry. For solar cells, a thin semiconductor wafer is specially treated to form an electric field, positive on one side and negative on the other. When light energy strikes the solar cell, electrons are knocked loose from the atoms in the semiconductor material. If electrical conductors are attached to the positive and negative sides, forming an electrical circuit, the electrons can be captured in the form of an electric current -- that is, electricity. This electricity can then be used to power a load, such as a light or a tool.

5. FAVORABLE CONDITIONS

- Orientation: South - We think that solar panels facing south maximize energy production. It seems logical and therefore most solar panels in the world in the northern hemisphere are oriented in that direction.

But a recent study of Pecan Street Research Institute says that there is a mistake. 50 homes in the Austin area in Texas who have installed solar panels were analyzed. Most of these homes only have panels facing south, while the minority has panels also oriented to the west.

The surprising result of the study: West oriented panels produce up to 50 percent more energy during peak demand hours energy than facing south. Indeed, throughout the day paneled houses facing west produce 2 percent more energy than they have them facing south.

- Inclination: 35º. People tend to apply a simple rule, using the tilt angle equal to the latitude of the place where the facility is located . This rule allows a simple average of the angle of inclination of the panels, which could benefit from an acceptable average performance throughout the period of the year.

- Suitable climate

- According to Azimut (indicates how they affect sunlight on the surface), solar radiation may be direct or diffuse.

- The Sun produces more energy between 10 a.m. and the 4 p.m.

6. ADVANTAGES AND DISADVANTAGES

Advantages

- It does not pollute.
- It is an inexhaustible source of energy.
- It is ideal for areas where electric tended does not arrive.
- Solar uptake systems have low maintenance.
- The price does not change with the time unlike the fossil fuels that they increase.
- The only investment is the initial cost of the infrastructure.
- It does not need to occupy any additional space because it can establish in roofs and buildings.
- It reduces the dependence of other countries for the supply of energy of the population.
- It promotes the creation of employment.

Disadvantages

- The level of radiation of this energy changes.
- Big extensions of area are needed when it is decided to use the solar energy for a great part of the population.
- It needs a great economic investment.
- The places where there is major radiation, are desert and remote places, there the energy does not take advantage to develop the agricultural, industrial activity ...

7. HISTORY OF SOLAR ENERGY

People have harnessed solar energy for centuries. As early as the 7th century B.C., people used simple magnifying glasses to concentrate the light of the sun into beams so hot they would cause wood to catch fire.

The photoelectric effect was first noted by a French physicist, Edmund Bequerel, in 1839, who found that certain materials would produce small amounts of electric current when exposed to light. In 1905, Albert Einstein described the nature of light and the photoelectric effect on which photovoltaic technology is based, for which he later won a Nobel prize in physics. The first photovoltaic module was built by Bell Laboratories in 1954. It was billed as a solar battery and was mostly just a curiosity as it was too expensive to gain widespread use. In the 1960s, the space industry began to make the first serious use of the technology to provide power aboard spacecraft. Through the space programs, the technology advanced, its reliability was established, and the cost began to decline. During the energy crisis in the 1970s, photovoltaic technology gained recognition as a source of power for non-space applications. One important development was a remarkably efficient solar boiler invented by Charles Greeley Abbott, an American astrophysicist, in 1936.

The solar water heater gained popularity at this time in America (Florida, California, and the Southwest). The solar industry started in the early 1920s and was in full swing just before World War II. This growth lasted until the mid-1950s when low-cost natural gas became the primary fuel for heating homes.

The public and world governments remained largely indifferent to the possibilities of solar energy until the oil shortages of the 1970s. Today, people use solar energy to heat buildings and water and to generate electricity.

8. SOLAR ENERGY IN PUERTOLLANO

Puertollano develops a plan of energetic innovation from 2003, betting for the alternative energies.

For his execution, there have been defined new zones of managerial development in Puertollano: the Parque Empresarial La Nava (shaped by three phases), more than 2.500.000 m2 of soil destined for companies catalogued like not pollutant. We find projects as Silicio Solar, producer of wafers for solar panels, and Solaria, Energy and Environment, world modal in the production of solar panels.

In addition, there develop other industrial parks that will receive energetic projects of relevancy. As Renovalia, next to El Villar, who will install the major photovoltaic plant of the world, and the company Iberdrola, who will locate his solar thermoelectric plant in Valconejero.

Puertollano has turned into the city of the future. The city offers the opportunity of which you start your way in her, since it is one of the cities better communicated of Spain.

- Because it possesses the most innovative zones of managerial development.
- Because they have bet firmly for the investigation.
- Because they are in full economic and demographic expansion:
    - **Economic**: from the putting in march of the campaign of managerial promotion To invest in Puertollano, more than 50 plots have been awarded to different companies.
    - **Demographic:** every day they are more those who feel attracted by the city. And it is that, for the fourth year in a row, Puertollano has

experienced an important demographic growth.

Puertollano is an industrial excellent city for: ·

- Companies dedicated to the production of alternative energies (Biomass, Solar, Photovoltaic and Thermal) and new respectful fuels with the environment.
- Silicio Solar, it is the first Spanish plant which transforms silicon wafers
- Solaria, producer of photovoltaic panels.

In La Nava III there will establish themselves two centers of investigation of international reference:

- Center of Investigation of development of Photovoltaic energy
- Native of Experimentation of Technologies of Hydrogen and Fuel cells.

With the solar power, Puertollano has experienced a managerial takeoff without comparison. And it is that today, Puertollano is the International City of the New Energies.

9. REFERENCES

- VV.AA., *Ciencias de la Tierra y Medioambientales*, ed. Anaya, Madrid, 2009
- http://energia-renovable.eu/tipos-de-paneles-solares/
- http://science.nasa.gov/science-news/science-at-nasa/2002/solarcells/
- http://www.cleanlineenergy.com/learn/teachers/renewable-energy
- http://www.energiasolar365.com/preguntas/que-inclinacion-deben-tener-las-placas-solares
- http://www.cultivarsalud.com/general/sostenibilidad/paneles-solares-inclinaciones-optimas-y-optimizacion/
- http://www.labrujulaverde.com/2013/11/la-mayoria-de-paneles-solares-estan-orientados-en-la-direccion-equivocada
- http://erenovable.com/energias-renovables-ventajas-y-desventajas/
- http://www.puertollano.es/opencms/opencms/sites/pto/contenidos/Ciudad/InvertirEnPuertollano/Por_que_invertir?lang=es&perfil=&tema=/Ciudad/Invertir_en_Puertollano/&desplegar=1