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Solar Concentrators for Difference Purpose and Application.

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Abstract

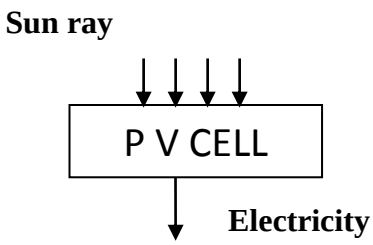
The Renewable energy exploitation is a viable solution to remedy the various energy crises knowing that renewable energy is a source of environmental credibility, as it does not cause any pollution or any emission harmful to the environment, Among the most important renewable energy sources, solar energy is most important type as it can be exploited thermally by adopting various solar collectors. Solar Concentrators are devices that work on the basic principle of focusing on the Sun, Generally intense sunlight results in higher temperatures which increases the ratio at which heat can be efficiently converted into electricity, Due to concentration on a smaller area the much heat loss is reduced. The Solar concentrator is a solar thermal energy concentration system because its use reduces the consumption of fossil fuels harmful to climate change. Solar thermal concentrators are effective alternatives to fossil generators for thermal energy as they many important uses such as the solar electricity production of solar electricity in power plants industrial & domestic water heating and I have many other industrial uses.

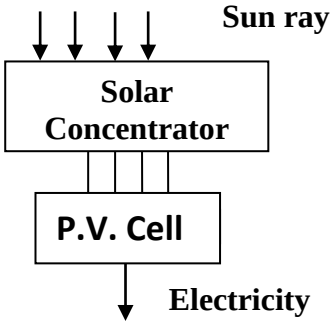
Introduction

And in an effort to preserve the environment from pollution and harmful emission the necessity of finding clean alternative energy sources has become a very important priority and a goal in the primary for the advancement of sustainable development and global energy transformation. Therefore, in order to achieve global energy sufficiency with environmentally friendly foundations renewable energy is the most important alternative sources. Solar energy is the most important source of renewable energy, where it can be exploited thermally and photo voltaically by using multiple solar collectors. The performance of solar collectors can be improved by dispersing nano particles within the working because the dispersed nano particles inside the working improve the thermal transfer coefficient of the base. There are several techniques for using solar energy thermally, the most important of which is the use of thermodynamics systems with solar concentrators that are considered the most important in the world as these systems generate solar energy using concentrators to focus a large amount of beam radiation on a small area in order to exploit the heat

flux intensity latter in several industrial applications such as electricity production, heating water , water desalination and purificaton cooling and air conditioning system, Industrial uses and Agricultural applications, Thermodynamics Systems with solar contentrators depend on the use of a set of reflective mirrors that direct the beam radiation towards on absorbs tube then the heat is transferred to the working fluid by convection. To achieve this reflective mirrors must follow the movement of the sun daily from sunrise to sunset in order to focus direct solar radiation on a point and linear focus and then a convective heat exchange occurs between the receiver interior wall and the fluid that moves in side.The strong global demand for energy for multiple needs in many field Solar Energy is one of the alternative energies that has vast potential. It is essential that the earth receives approximately 1000w/m^2 amount of solar irration in a day.

Taking into accound the power obtained from all renewable resources the solar energy alone has the capability to meet the current energy demand. There are two ways to produce electricity from the sun, first is by using the concentrating solar thermal system. This is done by focusing the heat from the sun to produce stream. The stream will drove a generator to produce electricity. This type of configuration is normally employed in solar power plants. The other way of generating electricity is through a photovoltaic cell. This technology will converts the sun light directly into electricity.





Solar Concentrators

Solar energy concentration allows to obtain very practical temperature suitable for use in many domestic and industrial fields where the concentrated solar technology is of great interest as it is an efficient and adequate way to meet the ever-growing demand for solar electricity on a global scale. The solar concentrators receive beam radiation using a perfectly reflective surface and a tracking system then direct it to reduced surface receiver by refractions through prims.

Classification of Solar Concentrator

There are a number of methods by which the flux radiation on receivers can be increased, some of them have been discussed here.

1. Tracking Concentrators –

a. One axis Tracking
b. Two axis Tracking

2. Non Tracking Concentrations –

a. Flate Receiver with booster mirror
b. Tabor – Zeimer Circular Cylinder
c. Compound Parabolic Concentration

All the technologies used to concentrated solar power are based on the two modes of point and linear concentration, so there are four mainly developed technologies which are represented as follows-

1. Heliostats field collators
2. Parabotic dish collators
3. Linear Fresnel solar reflectors
4. Parabolic through collators

Heliostat Field Collectors (HFCs)

The heliostat field collectors consists of thousands of reflective mirrors equipped with a sun tracking system in two axes of rotation to focus the beam radiation on the central receiver placed at the top of the tower. This type thermal power plant displays to the energy production mode as well as the working fluid used they are-

- Atmospheric air system
- Hybrid Pressurized air system
- It has a high conversion efficiently

Parabolic dish Collector (PDCs)

They are small solar energy conversion units compared to other the typical PDC system sizes are generally between 5kw and 25kw The largest Parabolic dish collector has been designed with a reflective surface of 489m^2 & a focal length of 13.4 meter in Australia. The major advantage of PDCs technology are

- Possibility of installation on all types of ground without flateness constrait of the ground.
- Strong adaption to stand alone and ISO lated application.
- Modularity of the system & possibility of integrating thermal storage with high efficient.

Parabolic through Collectors

A Parabolic through collector (PTC) is a linear forces solar collector basically composed of a parabolic through shaped concentrator that reflects direct – solar radiation onto a receiver absorber tube located in the focal line of the parabola. The large collector aperture area concentrates reflected direct solar radiation onto the smaller outer surface of the receiver tube heating the fluid that circulates through it. The solar radiation is thus transformed into thermal energy in the form of sensible or latent heat of fluid. The thermal energy can then be used to feed either industrial process demanding thermal energy.

Linear Solar Contractors

Many Countries such as Spain & Germany have widely exploited this technology of acceptable price, Knowledge that its efficiency is relatively law.

One of the most important uses of solar concentrators is to produce thermal electricity as shown in table.

Solar Collector	Capacity (mw)	Power Plant Performance (%)	Cost
HFC	From 10 to 100	From 10 to 23	High
PDC	0.01 to 1	16 to 30	Very high
LFR	5 to 250	7 to 13	Low
PTC	10 to 100	10 to 15	Low

Conclusion

Generally advanced technologies, mass production scale economies and improved operation will allow a reduction in the cost of using solar concentrators in several areas at a competitive level such as the cost of electricity which produces thermally. Solar concentrators could bring down the total cost of the solar cell, thus making the solar technology cheaper and affordable but at the same time does not compromise the overall performance of the solar technology.

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