

# A Review Paper on Solar Tree

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**Abstract:** About from 7-8 years we all are listening that the natural sources will lost in coming 50-60 years .The time is flying away and the time limit of the natural sources is decreasing. In this era we all are talking about the renewable energy. One of the renewable energy sources is sun light. In this paper we are going to talk about solar trees which are beneficial than the simple solar panels. These solar trees can be used anywhere like industries, for domestic purpose etc. These are very beneficial where the population is very high and the supply of natural sources is less according the population.

## INTRODUCTION

In the world the utilization of energy is increasing day by day and therefore we required the renewable energy sources which are pollution free and easily available like sun light. Sun light is utilized by solar panels but when we required an array of panels the land requirement also increases which arises as a problem. For solution of this problem and for getting more energy we use solar trees. In these trees basically there are solar panels which are arranged in Fibonacci series for getting more energy and the requirement of the land is less. Because of less requirement these are easily installed and these can be used in straight lighting, home supplies and in industries etc. The sun light easily available so these are very beneficial there is no worry of availability of sun light in future because till the end of the world this is also available.

Meaning of the TREE in Solar Trees

T= Tree generating

R= Renewable

E= Energy and

E= Electricity



Fig.1: Solar Tree

The reason why we call these trees as Solar Trees: The original trees are utilize the sun light and the minerals like water and making their own food and this process is called Photosynthesis. Like original trees the solar trees utilize sun energy and produce the energy which is used by the people of the society. These working phenomena are same that's why we called these as solar trees.

History of Solar Trees: In 1998 these are introduced first time as solar artwork on roads and public places. Then this technology is adopted as solar trees. In Europe these are used from many years. In 2006 in Europe the energy consumption is 10%. 2000 billion kWh is used from solar trees and 2900 million ton carbon is eliminated. In October 2016 solar trees are used in Vienna, Austria. These are also used in Graz, Austria.

Solar power: According the calculations made by scientists the sun gives  $3.7 \times 10^{26}$  watts of energy into the space and on the earth total amount of this energy is  $5 \times 10^{10}$  parts is reached. The energy grabbed by earth is  $1.7 \times 10^{17}$  watts and we can't utilize whole the energy till now. We utilized only small part of this energy. The radiation reached to the earth are of EM waves of wavelength of about 0.25-3 microns which can be utilized in many ways and also in solar cells and in solar trees by photovoltaic conversion.

In this conversion we use solar panels which are made of solar cells by semiconductor materials. When the sun light falls on the semiconductor which is of NPN type. In this the N type has majority charges as electrons and the P type having the minority charge carriers as electrons. When light falls on the solar cells the photons reaches at the junction and enables the electrons to break the junctions and the energy is produced. This is called photoelectric effect. Because of the flow of electrons the electricity is produced in form of dc which is converted in ac by inverters.

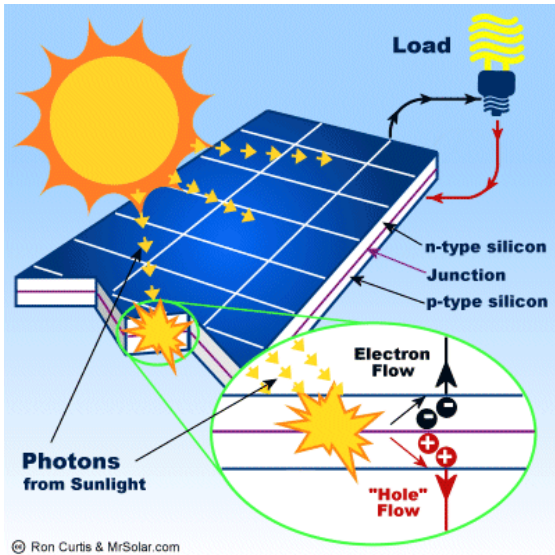


Fig.2: Solar Power Conversion

The solar energy is also converted by using nanowire solar cells. These cells are made of semiconductor material Indium phosphide – generally used as substrate of epitaxial InGaAs. This works like an antenna that uses sun light and produce the energy. Nanowire crystals having the cylindrical structure with diameter of 10,000 part of a human wire. The nanowires are developed for quantum computers. Their efficiency of utilizing the sun’s radiation is more than the simple solar panels. The diameter of the nanowires are less than the wavelength of the rays of the sun it causes the resonance around the nanowire because of this the energy of sun is more concentrated and the more energy is produced or converted through the nanowire.

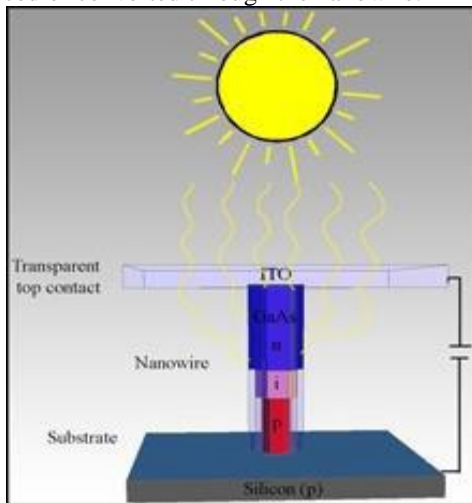


Fig.3: Solar Power Conversion Using Nanowire Technology

Working of Solar Tree: Fluctuations which are comes in output are eliminated by the day night cycle and the weather shifts. The solar panels charged during the day. The LED’s of solar tree in the panels are automatically on in the night and gets off in the morning. This automated process is done by the sensors which are used in the solar panels. The storage of energy is a basic problem in these trees.

Spiralling Phyllataxy Technique: By using this technique the solar panels are arranged in the solar tree. By this technique all the lower panels grab the same amount of the solar energy like the upper panels. Because the lower panels are covered by the shadow of upper panels and the lower ones can’t grab the same energy that’s why this technology is used. Basically the term Phyllataxy is used in Botany. The meaning of Phyllataxy is arrangement of leaves. The meaning of spiral is Alternate. The leaves arranged in alternate, opposite and whorled manner when the leaves are growing from the same node.

This technique increases the efficiency of these trees. Why better than traditional system: Solar trees are better than the traditional system because they requires less land about 1% of the land while the simple solar arrays required more land. For example if we produce 2MW energy from array of solar panels the 10-12 area of the land is required but by using the solar tree we require only 1% means only 0.10-0.12 area of the land that’s why these are better option for future.

In flat solar panels the produced energy is 100% and in the Fibonacci series trees it is about 120% which is more and the time required is 50% less than the flat solar panels. The series and parallel combination of flat panels gives only 2.31 watts while the solar tree gives 8.28kWh energy.

Comparison with Real Tree: From the figures we can see that the solar trees works like the trees or more than trees.

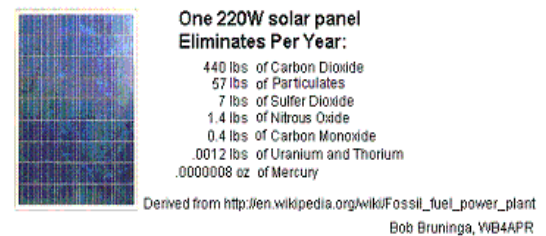
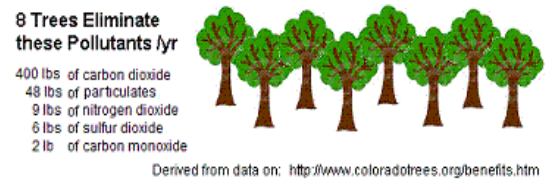


Fig.4: Comparison with Real Tree

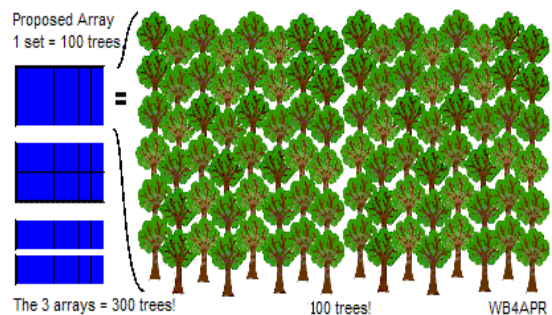


Fig.:5 Comparisons with Real Tree

These also are pollution free and eliminate the gases like CO<sub>2</sub> and other pollutants which are responsible for pollution.

Future of Solar Tree in world and in India: According all above facts we can conclude that the solar trees are need of the future because these are renewable sources of energy and in coming time these are became very popular because the requirement of land is less and sun light available till the future.

In India the scientists of Central Mechanical Engineering Institute of Research (CSIR–CMERI) made a solar tree which can enlighten 5 houses at a time by using only 4 square feet of the land. In India there is too much population and the land is less and the requirement of energy is high so the solar trees are as an alternative solution of these problems.

#### Need of Solar Trees:

These are required because

1. These uses less land.
2. The energy is more than the flat solar panels.
3. It can utilize wind energy by using biomimcry technology.

#### Advantages of Solar Trees:

1. Pollution free
2. Solution of future related energy problems
3. People can save money
4. Less land required
5. Future energy source

#### Applications of Solar Trees:

1. In house supplies
2. In industrial supplies
3. Decorative sculptures
4. In deserts

#### REFERENCES:

- [1] International Journal of Engineering Sciences & Research Technology (IJESRT)
- [2] IJEEE-EFES-P106.pdf : The benefits and applications of solar tree with natural beauty of trees
- [3] IJSETR-VOL-4-ISSUE-6-1982- 1985.pdf : Economy Electrification Using Solar Tree
- [4] IJSRP-p2490.pdf : Idea to design a solar tree using nanowire technology