



## **Solar Power Tree – A Effective Energy Source**

*<sup>1</sup>Mr. Sachin Shivaji Kadam, <sup>2</sup>Milind Baburao Patil, <sup>3</sup>Dr. Pandurang Ananda Kirdat*

<sup>1</sup>Lecturer, Science and Humanities Department, Bharati Vidyapeeth Institute of Technology, Navi Mumbai

<sup>2</sup>Lecturer, Science and Humanities Department, Bharati Vidyapeeth Institute of Technology, Navi Mumbai

<sup>3</sup>Lecturer, Science and Humanities Department, Bharati Vidyapeeth Institute of Technology, Navi Mumbai

---

### **ABSTRACT :**

This paper reveals the efficiency and importance of solar energy for future generation. This paper deals how “Solar Power Tree” efficiently converts naturally available sunlight into energy. The artificial “Solar Power Tree” uses the sunlight through the day time to maximize energy output. Solar power tree uses photovoltaic effect technique for the conversion of sunlight into electricity.” Solar Power Tree” actually a metallic structure resembling to a natural tree having branches. The “Solar Power Tree” composes panels and modules. The panels are connected in series and parallel. To maximize voltage, the panels are connected in series, while to increase current density panels are connected parallel. These panels accumulate available sunlight (solar energy) and converts into electrical one. The produced electrical energy can be used for various purposes such as domestic and commercial.

**Keywords :** Photovoltaic cell, semiconductor, panels, battery etc.

---

### **Introduction :**

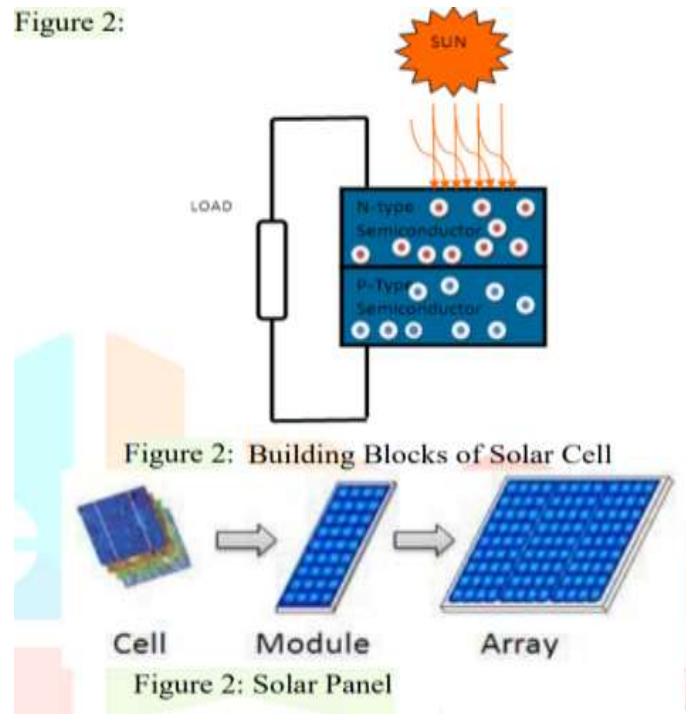
Now a days, in all over the world, the rate of population increasing rapidly. With increasing population demand for energy is less as compared to energy demand.[1]The non-renewable energy sources (fossil fuels and nuclear reactors) generally main sources of power generation. However, these sources pollute the environment mostly.[2]Climate change is one of the major issue that we all are facing, that adversely affects on economy development. To overcome this challenge, the best alternative source is to increase the use of renewable or non-conventional sources. The renewable energy sources plays an important role in pollution free environment and also it is the major alternative. Among all these solar power tree is the best option to generate energy without any environmental impact. We generates the power from sunlight by using solar panel. Most of the generations done using traditional systems. However, in traditional systems, land requirement increases and in civilized areas it is not easily available which creates a problem. So, the solution on this problem is a “Solar Power Tree”. A “Solar Power Tree” is a structure resembling natural tree with branches on which multiple solar panels are mounted in series and parallel. This simplest system is more efficient and effective one to fulfill the energy demand.

---

### **I] Solar Energy Concept :**

Solar power is harvested using solar photovoltaic (PV) technology that converts sunlight (solar radiations) into electricity by using semiconductor materials. When the sun hits the semiconductor material within the PV cell, electrons are freed. The freed/running electrons results in electric current. Invertor converts DC into AC for further use. Figure 1 and 2.

Figure 2:



## II] Solar Power Tree Design :

The Solar Power Tree is made of a metal structure and has solar panels at the top instead of branches of a real tree. The main body of the solar tree is a simple hollow tube closed at one end to enable the attachment of the upper panel.

**Components of Solar Power Tree :** A Solar Power Tree consists of the following components :

- i. A metallic pillar
- ii. Multiple solar panels
- iii. Battery
- iv. Metallic stem and branches

**1. A Metallic Pillar :** A metallic pillar provides structural integrity to the solar Power Tree to be built and thus makes the Solar Power Tree to withstand in any climatic conditions.

**2. Multiple Solar Panels :** A solar panel is a series of interconnected cells made of silicon semiconductor material. To harness maximum power output, multiple solar panels are used.

**3. Battery :** Battery packs are used to store the produced electrical energy in the form of chemical energy from the solar panels for further use. The rechargeable batteries of lead, Li-ion etc. are commonly used.

**4. Metallic stem and branches :** plays a role in supporting the mounted solar panels. The different positions and angles of branches and stem help in capturing more available solar energy.

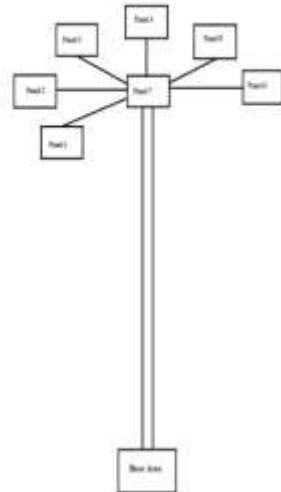


Fig. 3 Solar Power Tree

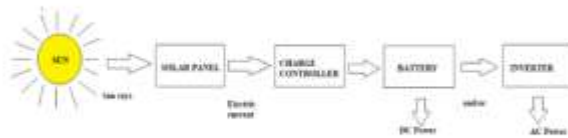


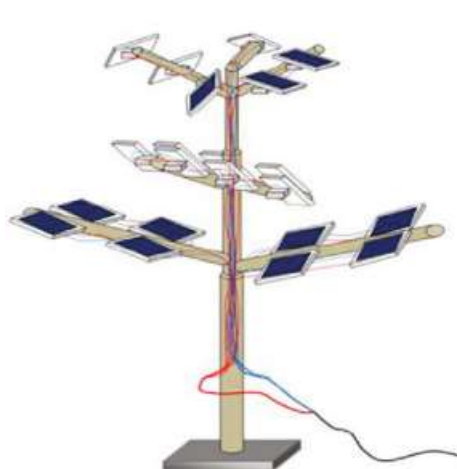
Fig. 3 Block Diagram of Solar Tree

### III] Working Principle of Solar Power Tree :

The working of “Solar Power Tree” is much like that of a real one-leaf like solar panel connected through metal branches. The “Solar Power Tree” works based on the phenomenon of photovoltaic effect. When the sunlight falls onto the solar cells, the silicon material absorbs sun energy in the form of bundles and the photons (small packets of UV energy) liberates electrons. The freed electrons (current) without delay generates electric current. The sensors are used to get Off/On the LED’s during day and night respectively.[3][4]

### IV] Different Arrangements of Solar Power Tree :

The concept of “Solar Power Tree” or the different arrangements of solar panels can be done on trees like coconut, palm etc. Many design feature rotating panels that can automatically move throughout day in a particular angles in order to capture the greatest amount of sunlight.





#### V] Applications :

- golf courses and resorts.
- urban and rural areas.
- recreational parks, city parks.
- penthouses, balconies, verandas, private gardens.
- on highways.
- deforested areas.
- street lighting.
- for domestic supply.
- for industrial power supply.
- for continuous power supply.
- Wireless data transmission etc.

## VI] Conclusion :

There are many ways to produce electricity. However, to fulfil the demand for increased population, we are producing an easy and safe way of producing an easy and safe way of producing energy without harming the environment. Also, it takes less space to install and no need of cast land. It can be successfully installed in gardens, schools roof, terrace, road sides, highways, streets etc. Thus "Solar Power Tree" is the best solution towards the green energy and this concept is successful work.

## References :

- [1] Factors influencing the societal acceptance of new, renewable and energy efficiency technologies: Meta-analysis of recent European projects; Bettina Brohmanna, Ynke Feenstrab, Eva Heiskanenc, Mike Hodsond, Ruth Mourikb, Gisela Prasade and Rob Raven; Paper presented at European Roundtable for Sustainable Consumption and Production, Basel, June 20-22 2007.
- [2] A REVIEW PAPER ON SOLAR POWER TREE G. S. Karlekar Asst. Professor, Department of Electrical Engg. Ballarpur Institute of Tech., Ballarpur, India, Atique Sheikh, Abhishek Wasekar, Sharad Rakhunde Student, Department of Electrical Engg. Ballarpur Institute of Tech., Ballarpur, India, International Journal of Engineering Applied Sciences and Technology, 2020 Vol. 4, Issue 10, ISSN No. 2455-2143, Pages 106-108 Published Online February 2020 in IJEAST (<http://www.ijeast.com>)
- [3] F. Hyder, K. Sudhakar, and R. Mamat, "Solar PV tree design: A review," Renewable and Sustainable Energy Reviews. 2018.
- [4] S. Dey, M. K. Lakshmanan, and B. Pesala, "Optimal solar tree design for increased flexibility in seasonal energy extraction," Renew. Energy, 2018
- [5] Virginia Polytechnic Institute and State University, "Installation under way for university's first major solar panel system | News | Virginia Tech," Virginia Tech News, 2012.
- [6] A. Sahay, V. K. Sethi, A. C. Tiwari, and M. Pandey, "A review of solar photovoltaic panel cooling systems with special reference to Ground coupled central panel cooling system (GC-CPCS)," Renewable and Sustainable Energy Reviews. 2015.
- [7] F. Hyder, K. Sudhakar, and R. Mamat, "Solar PV tree design: A review," Renewable and Sustainable Energy Reviews. 2018.
- [8] S. Dey, M. K. Lakshmanan, and B. Pesala, "Optimal solar tree design for increased flexibility in seasonal energy extraction," Renew. Energy, 2018.
- [9] R. and C. of D. S. E. Technologies, "Review and Comparison of Different Solar Energy Technologies," GENI, 2012.
- [10] B. Parida, S. Iniyar, and R. Goic, "A review of solar photovoltaic technologies," Renewable and Sustainable Energy Reviews. 2011.
- [11] International Renewable Energy Agency (IRENA), Renewable Power Generation Costs in 2017. 2018. S. Energy et al., "Units and symbols in Solar Energy," Sol. Energy, 2002. 9. W. Cao et al., "Solar tree": Exploring new form factors of organic solar cells," Renew. Energy, 2014.
- [12] Sushma Gupta, Monish Gupta, (2015,3), "The Benefits and Application of Solar tree with Natural Beauty of Tree", Applied science Report, PSCI publications, 117-124.
- [13] Elisavet Dimitrokalia, Jamie Mackrilla, Graham Jonesb, yorck Ramachersb, Rebecca Caina, (2015), "Moving away from flat solar panels to PV Trees: Exploring ideas and people's perceptions", "International Conference on Sustainable Design, Engineering and Construction, Procedia Engineering 1208-1216.
- [14] Baruch P. (1985) A two level system as model for a photovoltaic solar cell. Journal of Applied Physics. 57, 13427-1985.
- [15] Mr. A P R Srinivas (October-2016) "Design and Development of a SOLAR TREE", International Journal of Scientific and Engineering Research, Volume 7, Issue 10, ISSN 2229-5518.
- [16] Deepak M. Patil, Santosh R. Madiwal, "design and development of a solar tree."
- [17] IJSRP-p2490.pdf: Idea to design a solar tree using nanowire technology.