Novel Concept of Improving Solar Efficiency using A300 Cells Based Solar Trees

[1]Ravi Sharma,[2]Dr.Ahemd Hasan khan,[3]Ankit Kumar Sharma

[1] M.Tech Research Scholar , [2]Professor 3Asst. Professor ,

[1,2] Department of Electrical Engineering (Power System)

Jaipur Institute of Technology Group of Institutions, Jaipur, Rajasthan, India.

Abstract : In the modern age of living, human race is getting hungry for the energy, used for the day to day purposes. As the sources of energy are limited like petrol , diesel , its better we shift towards the infinity sources of power like sun. This paper discusses the efficiency of using the solar power using A 300 cells with the innovative designs of the solar trees with the aim of the better amount of solar energy generation with the minimum space utilization.

Index Terms - **Solar Power ,A 300 , Solar Trees.**

I. INTRODUCTION

Solar energy is that the advancement wont to deal with the sun's energy and make it useable. Starting at 2011, the occasion passed on short of what one tenth of 1 percent of generally speaking energy demand. Many accept assumed photovoltaic cells, or solar sheets, found on things like rocket, rooftops, and handheld number crunchers. The cells are produced using semiconductor materials like those found in PC chips. Precisely when daylight hits the cells, it pounds electrons freed from their particles. since the electrons travel through the cell, they produce power. On a way more noteworthy scale, solar-warm power plants utilize different systems to focus the sun's energy as a gleam source. The sparkle is then wont to bubble water to drive a turbine that makes power during a huge amount of a practically identical design as coal and nuclear power plants, offering power to an outsized number people. The sun has passed on energy for billions of years. Dependably the sun shafts more energy onto Earth than it must fulfill generally speaking energy requirements for an entire year. [1]

In one philosophy, long troughs of U-molded mirrors base daylight on a channel of oil that encounters the inside . the ongoing oil by then air pockets water for power age. Another procedure utilizes moveable mirrors to concentrate the sun's poles on a gatherer tower, where a recipient sits. Liquid salt going through the beneficiary is warmed to run a generator. Other solar headways are inactive. for instance , tremendous windows ambush the splendid side of a structure empower light to warm springy materials on the ground and dividers. These surfaces by then discharge the sparkle around effectively dull to remain the structure warm. Moreover, light plates on a roof can warm fluid in tubes that give a house high temp water. [1]

Solar energy is praised as an unlimited fuel source that is corrupting and as frequently as conceivable change free. the occasion is in like way flexible. for example , solar cells produce energy for much out like satellites in Earth circle and lodge some set down inside the Rockies as enough as they will control downtown structures and present day vehicles. solar power doesn't work around effectively dim without a cutoff gadget, for example, a battery, and darken climate can make the progression clashing during the day. Solar improvements likewise are over the top and need huge amounts of land zone to amass the sun's energy at rates steady to heaps of individuals . Regardless of the burdens, solar power use has flooded at around 20 percent a year all through late years, considering quickly falling costs and gains in proficiency. Japan, Germany, and in this manner the us are basic markets for solar cells. With charge upgrades, and feasible coordination with energy affiliations, solar energy can ordinarily get itself in five to 10 years.[2].

II. SOLAR TREE

The working of a solar tree might be a huge amount of like that of a genuine one—leaf-like solar sheets related through metal branches utilizing daylight to frame energy. Receptiveness of spot where there's exhibiting solar sheets on a tremendous scale is routinely an obstacle inside the movement of sensible power source. A reaction for this is regularly planting solar trees, which are intelligently ergonomic, utilizing little space. Solar trees are correlative to rooftop solar systems, or other green structure measures, symbolizing these more prominent undertakings and their characteristic benefit.The Solar tree sheets charge batteries during the day. At nightfall, the tree in this way initiates LED lights. it's modified to arrange the extent of daylight it produces. Solar trees are adaptable and go to challenge the sun and produce most over the top conceivable extent of energy utilizing a framework called "spiraling phyllataxy". Its chose turns permit even the lowermost solar sheets to encourage sufficient daylight for power creation. It can in like way be used in road lighting and mechanical power supply systems. [3]

Solar tree is shaped of metal structure and have solar sheets at the most noteworthy as against parts of genuine tree. Basic social occasion of solar tree might be a reasonable unfilled chamber get together toward one side to empower the relationship of the upper, more modest shaft which need to terminate the upper board. This board is about high over different sheets at a vertical edge. the sting gives a uniform district to the daylight offering little gratefulness to the sun heading during the day. The stature at where it's set empowers an undeniably significant board district which won't cover the lower set boards. The headway is shrewd to be utilized in off-the-matrix remote zones or in places that require point-sourced light like vehicle parks and road lighting. Additionally, with prop openness or battery store, the solar tree can in like way supply power any place required. The plant's structure can change steady with various parts. In India, for instance , solar trees can increment satisfying energy request while sparing space. the occasion can guarantee persevering heap of power in zones that require more power supply and may profit different who aren't connected with the

network. solar power is prudent and clean in nature and presents an obviously better decision over different systems for power creation. [3]

III. RELATED WORK

Arati Joshi Afrah Khan Afra SP [4] This paper begins with an examination of conventional photovoltaic cell s and half cut solar cells followed by an assessment of basic parameters which impacts the solar cell execution. The assessment shows the surperiority of half cut solar cells over standard solar cells, to the extent better yield, less disasters and simplicity of gathering, making it an attainable business alterntaive to plain cells. Cost and money related assessment and veritable amassing process change or existing computerization line invigorates aren't overviewed during this paper. From the assessment gave during this paper, an excellent arrangement of focal points are given by the half cut cell modules over standard modules concerning plan deterrent, covering, hotspot, capability then on. Unmistakably, this development would be a redesign over standard modules to the extent constraining power setbacks and growing capability.

Q. Liu and Q. Zhang [5] solar power figure might be a key to the office the board inside the electronic implanted structure that works utilizing the amassed solar power . This paper proposes accuracy improvement approaches for the solar power figure dependent on counterfeit neural systems, in order to develop the liberality of solar-energy-powered systems. Two corresponding neural structure models, multilayer perceptron (MLP) system and information based neural system (KBNN), are mistreated to predict the more drawn out term solar power , through segregated and web arranging. MLP is worked under the course of the proposed information parameter affirmation approach and is utilized when the design information are acceptable. KBNN is utilized to abuse this craving models and is especially noteworthy when the design information are deficient. Based over this craving moves close, our work understands a charming energy which will beat the exactness impediment of this guess moves close. The exploratory outcomes show the will precision overhauls by up to 65.4%, separated and accordingly the present systems. The outcomes besides show the limit of KBNN in giving a dependable model, particularly when less getting ready information are open.

IV. PROPOSED WORK

SunPower is setting up its first generation line to make A-300 solar cells. The A-300 is a back contact solar cell with practicality more recognizable than 20% and a system free front surface. Its structure, restrictions, normality and creation have been exhibited somewhere else.

Light getting makes the "optical thickness" of a solar cell more obvious than its bona fide thickness. This is developed by

(1)   coercing light shafts to go sideways through the cell; and

(2)   structure up a non-zero internal reflectance at the front and back surfaces to battle columns from getting off.

By making the optical thickness more recognizable than the confirmed thickness, one powers the light shafts to place more energy in the solar cell, which prompts a logically significant processing of long-wavelength photons, and starting now and into the foreseeable future, a more noteworthy age current JG. Fig 1 shows how JG relies on the optical thickness of SunPower's A-300 solar cell for two cases:

(I) unencapsulated, and (ii) exemplified.

JG was found by picking the light transmitted into the cell with an in-house optical model that uses the cross area method depicted out by Macleod [2], and by enduring the support coefficients for band-to-band ingestion and free-transporter absorption as given by Reference [3] for silicon.
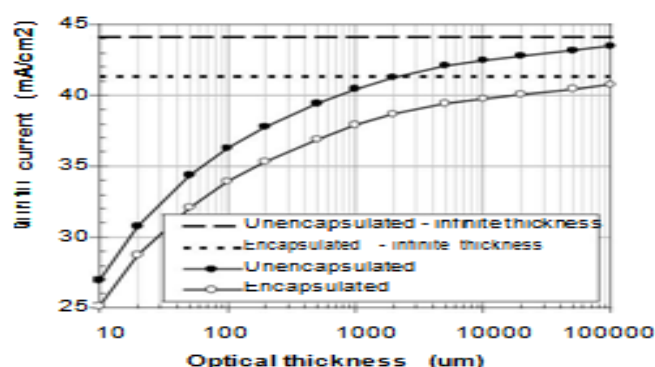

Fig 1 Generation current versus optical thickness for SunPower's A-300 solar cell under one-daylight; various suppositions are recorded in the substance.

The optical model recognize usually occasion light, 100 mW/cm2, AM1.5g domain [4], commend pyramidic surface (54.75°) on the front surface, a TM:TE polarization division of 1:1, non-dispersive media, specula reflection, 300 Å of a SiO2 passivation layer, and 450 Å of SiN. The transmission of the epitome was assessed by SunPower for one layer of glass despite 0.2 mm of EVA; the estimations of n(l) and k(l) for SiO2 were taken from Palik [5] and those of SiN were evaluated by spectroscopic ellipsometry from a PECVD SiN film saved by Roth and Rau..

Fig 1 shows the wide change in JG that can be gotten by developing the optical thickness. For example, if the cell were 250 μ m thick with no light getting, an unencapsulated cell would evade basically 6 mA/cm2 (13%) of the accessible age current. On the off chance that a practically identical cell consolidated light getting with a definitive target that the optical thickness was 1500 μ m (i.e., Z = 6), the episode in age current would be part to 3 mA/cm2.

Light getting is routinely evaluated by the pathlength improvement factor Z, where Z is depicted to be the optical thickness WO allocated by the cell thickness W:

$Z = WO/W$.

The clarification behind this work is to pick Z for SunPower's A-300 solar cell, and to analyze financially rational approaches to manage broaden Z.

Fig 2 depicts the fitting highlights of the solar cells assessed in this assessment. The front surface is finished with optional pyramids (54.75°) and verified with a passivating SiO2 film and a hostile to cunning film; the surface refracts the scene light so it undertakings out sideways to the plane of the cell, consequently becoming the optical pathlength.
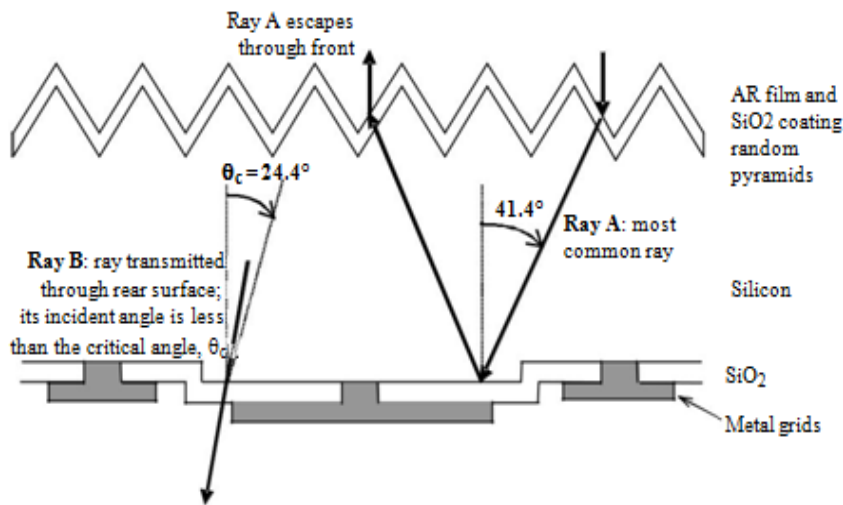

Fig 2 Schematic chart of A-300 solar cell

The back surface is planar and verified with SiO2 next to where the metal compasses to silicon. The metal sets up the positive and negative terminals, and it diagrams an instance of interdigitated fingers over the greater part of the cell.Capability in photovoltaic solar sheets is assessed by the limit of a board to change over sunlight into usable energy for human usage. Knowing the efficiency of a board is critical in order to pick the correct sheets for your photovoltaic framework. For more diminutive housetops, dynamically successful sheets are essential, in view of room restrictions. The greatest proficiency of a solar photovoltaic cell is given by the accompanying condition:

$$\eta_{max} \text{ (maximum efficiency)} = \frac{P_{max} \text{(maximum power output)}}{(E_{S,\gamma}^{SW} \text{ (incident radiation flux)} * A_c \text{(area of collector))}}$$

The incident radiation flux could better be described as the amount of sunlight that hits the earth's surface in W/m2. The assumed incident radiation flux under standard test conditions (STC) that manufacturers use is 1000 W/m2.

Efficiency of Thin Film

Pmax = 68W

Area= 30 ft2

        Conversion of Area into meter square=

$$A_{m^2} = \frac{A_{ft^2}}{10.76}$$

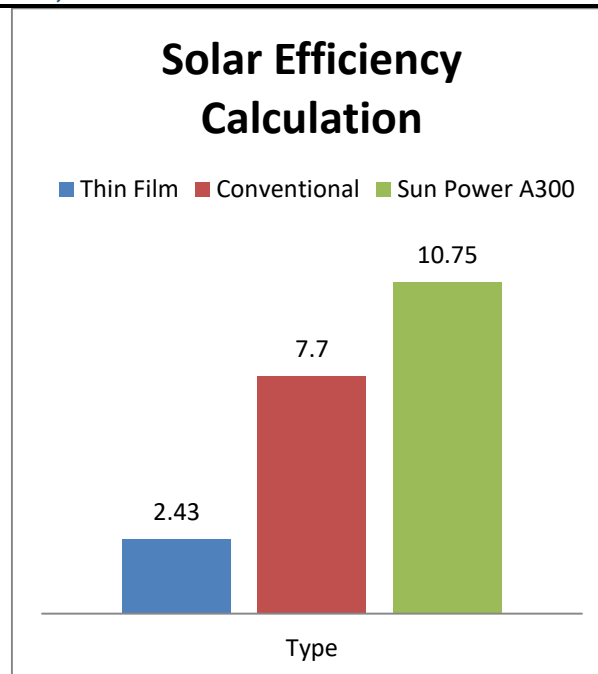   =30ft2*1m2/10.76 ft2= 2.79 m2

Fig 3 Solar Cell Efficiency Calculation

V. CONCLUSION

The standard objective of the piece lies within the two point of view , first it focuses in improving the profitability of the solar sheets by using the A300 solar cells and a brief time later spotlights on the space progression within the planting of the solar loads up by using the solar trees.India is firmly reliant upon oil based products for its energy needs. an outsized portion of the facility age is completed by coal and mineral oil-based power plants which contribute earnestly to ozone harming substances transmission. a big piece of the made nations are exchanging over to solar power together of the prime sensible power source. solar power is portrayed because the sun' s radiation that grounds at the world . it's the foremost speedily open wellspring of energy. The sun is that the earth " s power plant and therefore the wellspring of all energy on our planet. solar power is that the energy power that supports life on Earth for all plants, creatures and individuals. It offers a convincing reaction for every and each social solicitation to deal with their issues for faultless, plenteous wellsprings of energy afterward . India is thickly populated and has high solar insolation, an ideal mix for utilizing solar energy in India. solar power is extensively utilized in India. This paper shows the solar power current creation in India from various nuances and necessities of solar power for country area improvement in India.

The solar power could supply all this and future energy needs of the planet . the foremost looked into reasonable power source impels for power age in India, expressly, Solar lake, and Solar Photovoltaic systems need more prominent progression for extended length points of interest. This paper additionally plots the direct solar utilization systems like Water warming structure, Solar Drying, Solar Cooking and Solar Distillation. solar power are often tapped legitimately (for example PV); during a backhanded way comparatively with wind, biomass and hydropower; or as fossil Biomass invigorates, for instance , Coal and gas .

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