Solar Panel cell and Its Importance

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ABSTRACT

A solar panel is a set of solar photovoltaic modules electricity connected and mounted on supporting structure. A solar panel array absorbs heat radiations from the sun and it convert into the electricity directly by using solar panel. We save energy created traditional ways like fossil fuels and nuclear energy. The 122 PW of sunlight reaching the earth surface is plentiful and almost 10,000 times more than 13 TW equivalent of the average power consumed in 2005 by humans. This abundance leads to the suggestion that it will not to be long before solar energy is to become the world's primary energy source.

Solar power is pollution free during use. When use the solar power to produce electricity means heat consume by solar cell courses decrease heat in the environment. This tells that is a one solution on crisis of global warming.There are number of applications are available i.e power solutions, in buildings, in transport, standalone devices, rural electrifications, solar roadways, Photovoltaic devices, Plug in solar, Telecommunication and signaling spacecraft applications As of 2011, the coast of PV has fallen well below that of nuclear power and is set to fall further average ratail price of solar cell as monitored by solar buzz group fell from $3.50/watt to $2.43/watt for large scale installations, price below $ 1.00/watt so.

Keyword - *Use Solar Panel In Life*

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USE SOLAR PANEL IN LIFE

INTRODUCTION:-

WHAT IS SOLAR PANEL:-

A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting

structure. A photovoltaic module is a packaged, connected assembly of solar cells. The solar module can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 320 watts. The efficiency of a module determines the area of a module given the same rated output - an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and or solar tracker and interconnection wiring
There are two types of the module and they are :-

1. Crystalline Silicon Modules
2. Thin Film Mod

The Problem and Aim: -

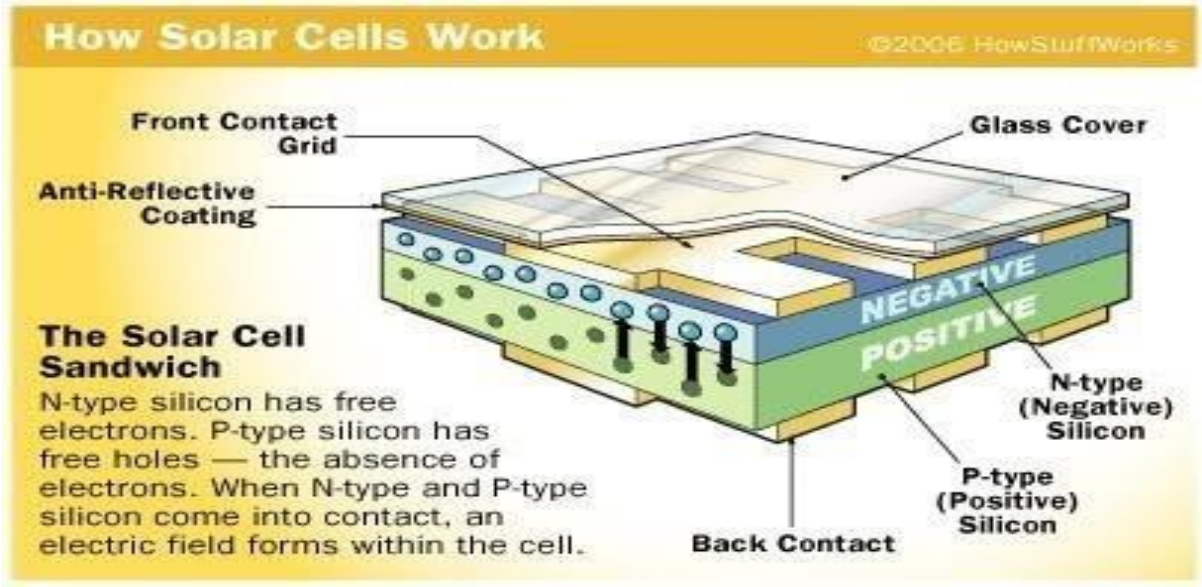
The big problem in my village is load shading, and maximum people use electrical equipments for cooking, boiling the water for bath and for entertainment purpose like watching TV, Listening Songs and largely for the irrigation purpose means some important parts of life is dependent on the electricity. It is quite possible that we can't get electricity for a month then such activities got stopped and we don't have alternate option to overcome from the problems. Suddenly idea flashed in my mind to utilize solar energy for those purposes. Solar energy is renewable energy and as time goes on solar technology generally get cheaper and other non-renewable sources getting expensive so increase dependency on solar energy is aim of this paper.

Material and Methods :-

Sr. No	**Name**	**Module (Medium)**	**Electricity Used (per month) Before**	**Electricity y Used (per month) After**
1	Sent Hilda Bording Miri	Solar water	280	115
2	Dahale Giridhari Murlidhar Miri	Solar water Heater (250 lit-19 pipe)	170	90
3	Deshmukh Vikas Navnath Miri	Solar water heater (200 lit- 20 pipes)	170	80

Details :-

How solar cells work diagram :-



EFFICIENCIES:-

Depending on construction, photovoltaic modules can produce electricity from a range of frequencies of light, but usually cannot cover the entire solar range (specifically, ultraviolet, infrared and low or diffused light). Hence much of the incident sunlight energy is wasted by solar modules, and they can give far higher efficiencies if illuminated with monochromatic light. Therefore, another design concept is to split the light into different wavelength ranges and direct the beams onto different cells tuned to those ranges. This has been projected to be capable of raising efficiency by 50%.Currently the best achieved sunlight conversion rate (solar module efficiency) is around 19.8% in new commercial products typically lower than the efficiencies of their cells in isolation. The most efficient mass-produced solar modules have energy density

values of up to 16.22 W/ft2 (175 W/m2). A research by Imperial College, London has shown that the efficiency of a solar panel can be improved by studding the light-receiving semiconductor surface with aluminum nanocylinders similar to the ridges on Lego blocks. the scattered light then travels along a longer path in the semiconductor which meant that more photons could be absorbed and converted into current. Although these nanocylinders were used previously in which aluminum was preceded by gold and silver, the light scattering occurred in the near infrared region and visible light was absorbed strongly. Aluminum was found to have absorbed ultraviolet part of the spectrum and the visible and near infrared parts of the spectrum were found to be scattered by the aluminum surface. This, the research argued, could bring down the cost significantly and improve the efficiency as aluminum is more abundant and less costly than gold and silver. The research also noted that the increase in current makes thinner film solar panels technically feasible without "compromising power conversion efficiencies, thus reducing material consumption

PHOTOVOLTAICS:-



Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. Materials presently used for photovoltaics include monocrystallin silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium gallium selenide/sulfide. Due to the increased demand for renewable energy sources, the manufacturing of solar cells and photovoltaic arrays has advanced considerably in recent years.

Solar photovoltaics is a sustainable energy source. By the end of 2011, a total of 71.1 GW had been installed, sufficient to generate 85 TWh/year. And by end of 2012, the 100 GW installed capacity milestone was achieved. Solar photovoltaics is now, after hydro and wind power, the third most important renewable energy source in terms of globally installed capacity. More than 100 countries use solar PV. Installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building (either building-integrated photovoltaics or simply rooftop).

Driven by advances in technology and increases in manufacturing scale and sophistication, the cost of photovoltaics has declined steadily since the first solar cells were manufactured, and the levelised cost of electricity (LCOE) from PV is competitive with conventional electricity sources in an expanding list of geographic regions. Net metering and financial incentives, such as preferential feed-in tariffs for solar-

generated electricity, have supported solar PV installations in many countries. With current technology, photovoltaics recoup the energy needed to manufacture them in 3 to 4 years. Anticipated

technology would reduce time needed to recoup the energy to 1 to 2 years.[1]

SOLAR CELLS:-

Photovoltaics are best known as a method for generating electric power by using solar cells to convert energy from the sun into a flow of electrons. The photovoltaic effect refers to photons of light exciting electrons into a higher state of energy, allowing them to act as charge carriers for an electric current.

The photovoltaic effect was first observed by Alexandre-Edmond Becquerel in 1839. The term photovoltaic denotes the unbiased operating mode of a photodiode in which current through the device is entirely due to the transduced light energy. Virtually all photovoltaic devices are some type of photodiode

Solar cells produce direct current electricity from sun light which can be used to power equipment or to recharge a battery. The first practical application of photovoltaics was to power orbiting satellites and other spacecraft, but today the majority of photovoltaic modules are used for grid connected power generation. In this case an inverter is required to convert the DC to AC. There is a smaller market for off- grid power for remote dwellings, boats, recreational vehicles, electric cars, roadside emergency telephones, remote sensing, and cathodic protection of pipelines

Cells require protection from the environment and are usually packaged tightly behind a glass sheet. When more power is required than a single cell can deliver, cells are electrically connected together to form photovoltaic modules, or solar panels. A single module is enough to power an emergency telephone, but for a house or a power plant the modules must be arranged in multiples as array

Photovoltaic power capacity is measured as maximum power output under standardized test conditions (STC) in "Wp" (Watts peak). The actual power output at a particular point in time may be less than or greater than this standardized, or "rated," value, depending on geographical location, time of day, weather conditions, and other factors. Solar photovoltaic array capacity factors are typically under 25%, which is lower than many other industrial sources of electricity.[1]

A significant market has emerged in off-grid locations for solar-power-charged storage-battery based solutions. These often provide the only electricity available. The first commercial installation of this kind was in 1966 on Ogami Island in Japan to transition Ogami Lighthouse from gas torch to fully self- sufficient electrical power[1][3]

Advanced Applications:- 1. Power Stations :-

Solar park in Germany

Many solar photovoltaic power stations have been built, mainly in Europe. As of July 2012, the largest photovoltaic (PV) power plants in the world are the Agua Caliente Solar Project (USA, 247 MW), Charanka Solar Park (India, 214 MW), Golmud Solar Park (China, 200 MW), Perovo Solar Park (Ukraine 100 MW), Sarnia Photovoltaic Power Plant(Canada, 97 MW), Brandenburg-Briest Solarpark (Germany 91 MW), Solarpark Finow Tower (Germany 84.7 MW), Montalto di Castro Photovoltaic Power Station (Italy, 84.2 MW),Eggebek Solar Park (Germany 83.6 MW),

1. **In Building**

Photovoltic wall at Terrassa In Spain

Photovoltaic arrays are often associated with buildings: either integrated into them, mounted on them or mounted nearby on the ground.[1][6]

1. In Transport

1. In Transport

Winner Of South African Solar Challenge

PV has traditionally been used for electric power in space. PV is rarely used to provide motive power in transport applications, but is being used increasingly to provide auxiliary power in boats and cars. Some automobiles are fitted with solar powered air conditioning to limit interior temperatures on hot days. A self-contained solar vehicle would have limited power and utility, but a solar- charged electric vehicle allows use of solar power for transportation.

Solar-powered cars, boats and airplanes have been demonstrated, with the most practical and likely of these being solar cars.[1][7]

2. Rural Electrification

Unlike the past decade, which saw solar solutions purchased mainly by international donors, it is now the locals who are increasingly opening their wallets to make the switch from their traditional energy means. That is because solar products prices in recent years have declined to become cheaper than kerosene and batteries. In Cambodia, for example, villagers can buy a

solar lantern at US$25 and use it for years without any extra costs, where their previous spending on kerosene for lighting was about $2.5 per month, or per year. In Kenya a solar kit that provides bright light or powers a radio or cell phone costs underat retail stores. By switching to this kit Kenyans can save $120 per year on kerosene lighting, radio batteries and cell phone recharging fees. Developing countries where many villages are often more than five kilometers away from grid power are increasingly using photovoltaics. In remote locations in India a rural lighting program has been providing solar powered LED lighting to replace kerosene lamps. The solar powered lamps were sold at about the cost of a few months' supply of kerosene. Cuba is working to provide solar power for areas that are off grid. These are areas where the social costs and benefits offer an excellent case for going solar, though the lack of profitability has relegated such endeavors to humanitarian efforts. However, solar rural electrification projects have been difficult to sustain due to unfavorable economics, lack of technical support, and a legacy of ulterior motives of north-to-south technology transfer

Advantages: -

1. Sunlight in earth is plentiful and almost 10000 times more than average power consumed in whole earth
2. Availability of sunlight is easy and at any location
3. It is Renewable energy means it is not going to extinct in future

4. Pollution Free

Disadvantages:-

1. Coast of installation is comparatively higher
2. Its available during day time only so storage devices are required
3. During the rainy season and cloudy days solar energy is useless
4. Its non-traditional type of energy so people hesitate to use

End Use	Energy Source	Applications	Efficiency
Cooking	LPG	Stove	0.60
	Kerosene	Stove	0.50
	Electricity	Hot Plates	0.85
Cooking/Heating	LPG	Stove	0.60
	Kerosene	Stove	0.50
	Electricity	Geyser	0.50
		Fire Wood Boiler	0.20
	Coal	Boiler	0.60
	Oil	Boiler	0.80
Space Cooling	Electricity	Fan/Cooler/Ac	0.85
Space Heating	Electricity	Room Heater	0.35
Lightening	Kerosene	Lamp	0.01
	Electricity	Indecent Bulb	0.01

Conclusion: -

As we study above data, it is conclude that solar energy is efficient than any other traditional energy and it is easily available everywhere also dependency of various sector on solar energy increasing and we want to save environment then we must use Solar Panel

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