

# A Comparative Study of the Renewable Solar Energy and Other Renewable Energy Sources Evaluation of Globalization

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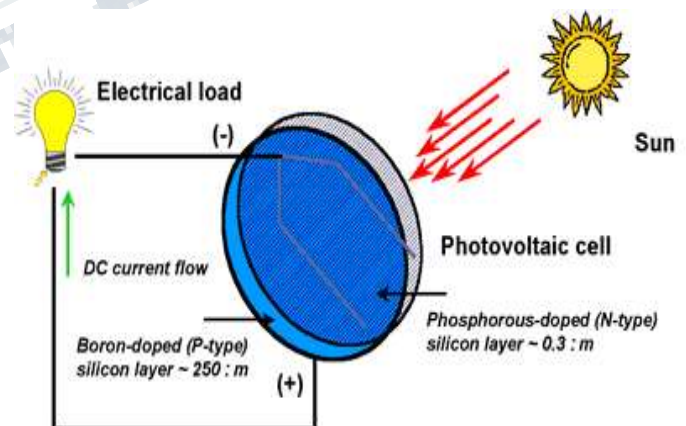
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**Abstract:** Many industries in India are working towards increasing the performance ratio of solar power plants in large scale. To increase the utilization and development of solar energy which is an Eco-friendly atmosphere in the world? The main problem in renewable energy system is the variation in power generation from time to time due to the intermittent nature of the renewable sources. Solar panel should be given to encourage more people to explore renewable then to other renewable energy. In terms of environmental impact, solar power is a much more optimal resource than fossil fuels solar energy harnesses the power from the sun. We can take radiation in the form of light from the sun and convert it into electricity. This is typically done through photovoltaic cells, or PV cells, which are made of semi-conductive materials like silicon. When sunlight is absorbed by the PV cells, photons of light can transfer that energy to electrons, which create energy in the form of an electric current as the electrons flow through the material. Solar energy is classified as a renewable energy source since it is a source of energy that can theoretically regenerate and replenish itself indefinitely. While some argue that nuclear energy should also be classified as renewable, most agree that it is a sustainable energy source. Nuclear power supplies about 4.8% of the world's total energy while solar power supplies less than 1.4%. Nuclear power generates around 10.6% of the electricity used around the world while solar energy supplies less than 6.3%. It looks like we have nuclear energy to thank more for the electricity flowing through our technology. The best way to compare solar energy and fossil fuels without subsidies is to examine global energy prices. Consider this: global coal prices have historically averaged \$0.06 cents per kilowatt-hour (kWh). Until the past decade, no alternative energy resource came close to rivalling that price. Fossil fuel steam averages around \$0.05 cents/kWh and small-scale natural gas can go as low as \$0.03 cents/kWh. It's no wonder that the world was shocked in 2016 when a major commercial solar installation bid the lowest price for PV to date at \$0.029 cents per kWh – effectively leveling the playing field between solar and fossil fuels' cheapest offerings.

## 1. INTRODUCTION

Solar power is the conversion of sun radiation into electricity through the use of solar photovoltaic cells. This conversion takes place in the solar cell by photovoltaic effect. As said by many experts that the amount of solar energy reaching the earth is more than 10000 times the current energy consumption by man. Also, the power created by solar is sufficient for one year for the entire planet, if we could convert the 100 percent of the solar energy into electricity in one hour. There are several applications that use solar power; here is the information on the generation of electricity through PV cells. The solar power generation is the most efficient route for power generation because it takes a minimum number of steps (for producing electricity) than that of other generation methods. There are two ways of converting sunlight into electricity. In one method, solar energy is used simply as a source of heat. This heat is further used to produce the steam, which drives the steam turbine. This method of power generation is called solar thermal power generation.



### THERMAL POWER GENERATION

In the second method, solar energy is directly converted into electricity using PV (or solar) cells as mentioned above. The PV cell is made with silicon semiconductor material. Solar energy is available freely and conveniently in nature and it needs no mains supply. Solar generation plant can be installed in a few months while the conventional power plants take several years to

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Engineering (IJEREEE)  
Vol 4, Issue 4, April 2018**

build an electricity generation plant. Solar power is clean energy as it produces no air or water pollution. Also, there are no moving parts to create noise pollution. Unlike fossil fuels, no toxic emissions are released into the atmosphere during solar energy power generation. Solar power has less running cost that means once the capital investment is made, there is no need for continuous purchase of fossil fuels as the solar energy is effectively free in nature.

Experimental Method: Photovoltaic 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 by the photovoltaic effect. Solar cells produce direct current electricity from sunlight which can be used to power equipment or to recharge a battery. The first practical application of photovoltaic 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. Best performance, terrestrial PV systems aim to maximize the time they face the sun. Solar trackers achieve this by moving PV panels to follow the sun. The increase can be by as much as 20% in winter and by as much as 50% in summer. Static mounted systems can be optimized by analysis of the sun path. Panels are often set to latitude tilt, an angle equal to the latitude, but performance can be improved by adjusting the angle for summer or winter. Generally, as with other semiconductor devices, temperatures above room temperature reduce the performance of photovoltaic. A number of solar panels may also be mounted vertically above each other in a tower, if the zenith distance of the Sun is greater than zero, and the tower can be turned horizontally as a whole and each panel additionally around a horizontal axis. In such a tower the panels can follow the Sun exactly. Such a device may be described as a ladder mounted on a turnable disk. Each step of that ladder is the middle axis of a rectangular solar panel. In case the zenith distance of the Sun reaches zero, the "ladder" may be rotated to the north or the south to avoid a solar panel producing a shadow on a lower solar panel. Instead of an exactly vertical tower one can choose a tower with an axis directed to the polar star, meaning that it is parallel to the rotation axis of the Earth. In this case the angle between the axis and the Sun

is always larger than 66 degrees. During a day it is only necessary to turn the panels around this axis to follow the Sun. Installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building

Efficiency

Main article: Solar cell efficiency

Solar cell Efficiency (Maximum):-

$$\eta_{max} = \frac{P_{max}}{E * A_c} \times 100 \%$$

$P_{max}$  = Maximum Power Output (in W)

E = incident radiation flux (in W/m<sup>2</sup>)

$A_c$  = Area of Collector (in m<sup>2</sup>)

Best Research-Cell Efficiencies. Electrical efficiency (also called conversion efficiency) is a contributing factor in the selection of a photovoltaic system. However, the most efficient solar panels are typically the most expensive, and may not be commercially available. Therefore, selection is also driven by cost efficiency and other factors.

Month, 2010	Exported Units*(KWh)
February	118,890
March	152,715
April	147,785
May	132,410
June	144,605
July	128,600
August	115,820
September	141,980
October	129,320
November	197,645
December	195,065
Total Till Dec. 2017	1,604,835

**ANDHRA PRADESH MULLS FLOA-TING SOLAR POWER PLANT AT MUDASARLOVA**

The project will have a power generation capacity of 2,000 kilowatt peak (KWp), nearly 20 times the capacity of the recently-launched floating solar plant in Kayamkulam, Kerala. Besides being environment-

**International Journal of Engineering Research in Electrical and Electronic  
Engineering (IJEREEE)  
Vol 4, Issue 4, April 2018**

friendly, the project reduces demand for land and makes use of the unutilized surface area of the reservoir. The solar panels will also help in reducing evaporation from the reservoir to some extent.

Mudasarlova reservoir is situated near Arilova Health City between Kailasakonda, Kambalakonda and Simhachalam hills. About one million gallons per day (MGD) of drinking water is drawn from the reservoir and supplied to about 6,000 households in the city. But since it is near residential colonies, garbage is often dumped into the reservoir.

According to experts, floating solar panels have been found to be more efficient than land based ones, but the challenge is in designing a system to make the panels withstand all weather conditions.

***FREE ELECTRICITY CONNECTIONS RELEASED TO 2.63 CRORE BPL HOUSE-HOLDS UNDER DDUGJY; A TOTAL OF 6,015 VILLAGES WERE ELECTRIFIED IN 2016-2017***

DEEN DAYAL UPADHYAY GRAM JYOTI YOJANA (DDUGJY)

S.NO	STATE	2016-2017
1	Arunachal Pradesh	175
2	Assam	1,218
3	Bihar	556
4	Chhattisgarh	294
5	Himachal Pradesh	27
6	J & K	5
7	Jharkhand	1,104
8	Karnataka	14
9	Madhya Pradesh	159
10	Manipur	121
11	Meghalaya	681
12	Mizoram	24
13	Nagaland	76
14	Odisha	1,092
15	Rajasthan	263
16	Tripura	17
17	Uttar Pradesh	162
18	Uttarakhand	18
19	West Bengal	9
	<b>TOTAL</b>	<b>6,015</b>

**HERE'S WHY GOVT MAY FALL SHORT OF 40 GW TARGET FOR SOLAR ROOFTOP POWER BY 2022**

Implementation of rooftop solar is taking place at a much slower pace and it seems unlikely that the government would achieve its 40GW target by 2022. Prime Minister Narendra Modi had committed India to ensure that its energy demands would be met with 175 GW of renewable energy by 2022. Of this, 100 GW would be solar powered. 40 GW of this energy would be through solar powered rooftops.

**THIS COULD DUE TO TWO MAJOR HEADWINDS IN THE SECTOR, PRIMARILY:**

**Challenges in Net metering implementation:** Net Metering is the system by which customers who generate their own electricity from solar power can feed their unused electricity back into the grid and be compensated for that. However, the heavily subsidized solar tariff rates would imply that while they would be selling this unused reservoir of electricity at a loss, which would further discourage customers from net-metering. Also, distribution companies are also wary of implementing the Net-Metering for their own reasons.

**FINANCIAL IMPLEMENTATION:** Union Minister Piyush Goyal had started that India would need to invest an estimated of Rs 6000 crore to achieve the 100 GW target. This amounts to Rs 6 crore per megawatt. With particular reference to rooftop based solar grid, the CARE report says an allocation of Rs 5000 crore was approved for the implementation of grid-connected rooftop system over a period of five years up to 2019-2020 under National Solar Mission (NSM). This move was expected to support the installation of 4,200 MW solar rooftop systems in the country between 2016-20. Nonetheless, this still falls short of the initial target of 40 GW of rooftop solar power that was outlined. The report also stated that the provision of rooftop solar and 10% renewable energy is now mandatory under Mission Statement and Guidelines for development of smart cities.

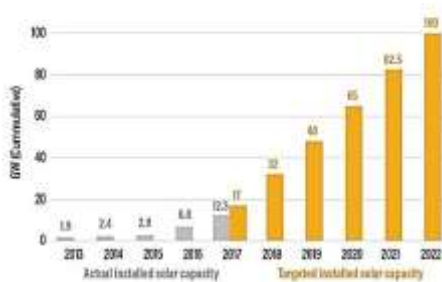
**II. RESULT**

The electrical efficiency of a PV cell is a physical property which represents how much electrical power a cell can produce for a given insolation. The basic

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Vol 4, Issue 4, April 2018**

expression for maximum efficiency of a photovoltaic cell is given by the ratio of output power to the incident solar power (radiation flux times area) The most efficient type of solar cell to date is a multi-junction concentrator solar cell with an efficiency of 46.0% produced by Fraunhofer ISE in December 2014. The highest efficiencies achieved without concentration include a material by Sharp Corporation at 35.8% using a proprietary triple-junction manufacturing technology in 2009,[28] and Boeing Spectro lab (40.7% also using a triple-layer design). The US company Sun Power produces cells that have an efficiency of 21.5%, well above the market average of 12–18%.

India's Year-on-Year Targets to Reach 100 GW Solar Goal



Assumptions used in RETScreen for crystalline and amorphous silicon modules  
 The average irradiation is in kWh/m<sup>2</sup>, and the electrical output is in Mega Watt Hour.

Sl. No.	City	Average Radiation	Ambient Temp	Crystalline output	CUF	Thin film output	CUF	Optimum Tilt
1	Srinagar	4.10	13.6	1,337.97	15.27	1,373.51	15.68	34.1
2	Delhi	5.09	25.1	1,611.9	18.40	1,708.4	19.50	28.6
3	Jodhpur	5.52	26.1	1,732.40	19.78	1,845.10	21.06	26.3
4	Jaipur	5.52	26.1	1,741.10	19.88	1,854.40	21.17	26.8
5	Varanasi	4.88	25.1	1,521.90	17.37	1,609.20	18.37	25.3
6	Patna	4.83	25.3	1,509.80	17.24	1,596.40	18.22	25.6
7	Shillong	4.54	16.5	1,510.05	17.24	1,556.50	17.77	25.6
8	Ahmednagar	5.35	27.5	1,643.20	18.76	1,753.80	20.02	23.1

### III. CONCLUSION

It is the most important source of energy for life forms. It is a renewable source of energy unlike non-renewable sources such as fossil fuels. Solar energy technologies use the sun's energy to light homes, produce hot water, heat ovens and electricity.

### IV. ACKNOWLEDGEMENT

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