Energy Efficiency Building Using Solar Energy

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Abstract **- Energy Efficient Building is the building or renovating of structures to maximize the use of natural renewable and limitless source of solar energy. Using this solar energy reduces the cost of electricity, we consume provided by hydropower and powerplants. We can decrease the pressure on the power plants which produces electricity by coal and, also on hydropower which produces electricity with water. Solar power is good renewable, clean and free source of energy of power production. In this work, our main objective is to do comparison between the solar power and conventional grid power.**

Index Terms **- Solar panels, Site Selection, Solar Power, Energy Efficiency in building, Comparison of Power.**

IINTRODUCTION

In the early days the humans are to be used the conventional power generated by the coal, petroleum, water, etc., to run their building. But these power generation resources are release the very harmful gases which leads to effect the environment and the conventional power generating resources will extinct in short span. So, we can overcome from all those resources with the solar power. Solar power is one of the best mechanisms to generate the power without harmful to the environment. Solar power is the energy from the sun that is converted into thermal or electrical energy. The main source of solar energy is sun. Solar power is set to play a more and more vast part in future energy system of India. Solar power is a free, renewable resource. So, no matter how much of it is used today, there will be still the same supply in the future. Solar power is also a supply of clean, non-polluting electricity. Unlike conventional power plants, solar plant life emits no pollution or green residence gases. The private sectors are also preferring the solar power to produce large amount of the electricity. Electric energy is very important to all the companies and every common man. In coming decades, the cost of the fossil fuel will increase. So, the renewable sources like solar energies are plays a major role in sustainable development in buildings.

II. SOLAR PANELS

There are different types of solar panels are used:
According to the first generation of solar panels Monocrystalline Solar Panels, Polycrystalline Solar Panels. According to the second generation of solar panels, Amorphous Silicon Solar Cell, Thin-Film Solar Cells. According to the third generation of solar panels Biohybrid Solar Cell, Concentrated PV Cell, Cadmium Telluride Solar Cell.

MONOCRYSTALLINE SOLAR PANELS:
Monocrystalline solar panels are single silicon panels and most effective type of solar panels. The efficiency rate is above 20%. Monocrystalline panel have a high-power output, occupy less space and last the longest. Monocrystalline panels are expensive as compared to polycrystalline. The advantage of this panels is less affected by the high temperatures. This panels can recognize from uniform dark look and rounded edges.

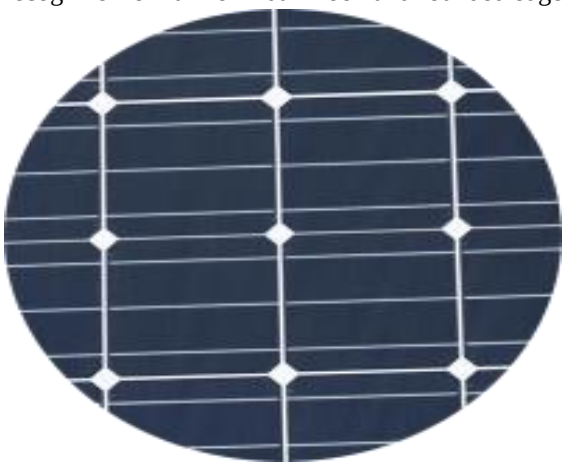

Fig.1

POLYCRYSTALLINE SOLAR PANELS:

Polycrystalline solar panels are multi silicon panels they have low silicon levels. The efficiency rate is around 15%. This panels are cheaper than the monocrystalline panels and has shorter span. This panels are affected by high temperature. This type of solar panels has square, it has blue speckled look.

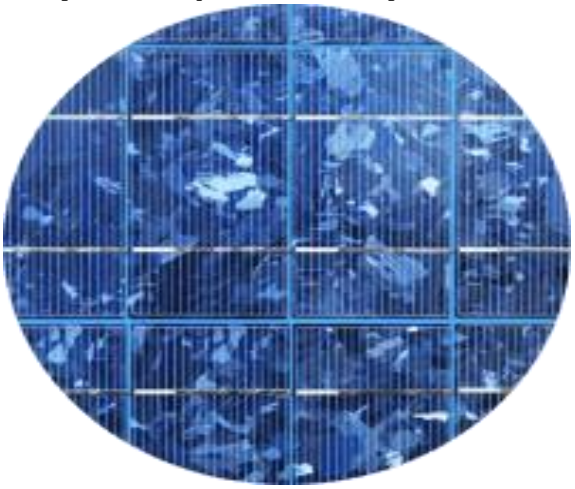

Fig.2

THIN-FILM SOLAR CELLS:

Thin film is very cheap. If someone want to go for cheaper one, then they can prefer thin film. This panels are made by placing one or more films of photovoltaic material. They are flexible and they are less affected by the high temperature. This type of solar panels are suitable for those who plans in large area, because it takes a large area. This type of panels are not suitable for residential purpose and they have less warranty because their life span is less.

Fig.3s

AMORPHOUS SILICON SOLAR CELL:

The amorphous solar cell is different types of solar panels, this panels are mainly used in pocket calculators. This type of solar panel uses as a triple layered technology. It is better than the thin film. This panels are low in cost.

BIOHYBRID SOLAR CELL:

This type of solar panels are still in research phase. This panels are based on new technology. Most of the materials used in the panels are traditional method, by combining the multiple layers of photosystem 1. The conventional from chemical to electrical is easier.

CADMIUM TELLURIDE SOLAR CELL:

The photovoltaic technique uses cadmium telluride. It has low cost in production and has shorter payback time. The disadvantage of this panels are toxic when their life span is completed.

CONCENTRATED PV CELL:

The efficiency rate of this panels is 41% which is higher than all the panels. To become more efficient this panels required solar tracking and cooling system.

III. SITE SELECTION TO INSTALL SOLAR PANELS

The first task to solar developers is to locate the site to install the panels. The site should be clear with the shadows of other tall buildings. The sun light in the area should be clear and the panels should be placed in the opposite direction to the sun with the angle that sunlight to be fall on it. The surface should be levelled to install the panels. And in case of, if the panels are installed on the ground surface, should be take care of drainage system. Should take care of the availability of labor in site.

IV. SOLAR POWER

Solar power is the energy from the sun that is converted into thermal or electrical energy. The main source of solar energy is sun. The particles of sunlight photons convert into the electricity which is direct current. On-Grid Solar power system works in a way that produced electric power that used to run the home appliances. If the solar power is not produced the sufficient power, then the grid supplies the power to run the home appliances. The solar connects with the

MCB bord. In MCB bord both the points will be connected the solar point and the grid point. The grid power will be blocked at the MCB bord, when it required it allows to supply the grid power. The excess power produced from the solar is supplied the grid. This system works in two-ways the supply of electricity can flow from the grid to which it is connected to the user's home and from the user's home to the grid. This feature makes the on-grid solar system affordable and highly useful. The net meter is bidirectional meter, it will track the data of input and the output of electricity. This meter is connected with the solar panels and to the grid department, then gives the final reading. The electric power billing will be taken by the same department there will be no third party involved in the billing process.

V. ENERGY EFFICIENCY IN BUILDING

The energy efficient buildings are important to control the global warming. By reducing the variety of natural resources, land, raw materials, and energy we use for creating buildings, we can considerably minimize the range of greenhouse gasses being released into the environment. Energy efficiency building saves the money for the commercial buildings because they use the lot of energy to run the buildings, that makes them very expensive to run their business. To decrease their payments to by the energy they themselves creating energy for the utility purpose. They can expand their business by saving the money to the energy producers. The component that all industrial and office buildings are involved with is their return on investment or ROI. By developing electricity efficient buildings, constructing owners are making sure the constructing has a longer lifespan and requires much less serious repairs over time. As a result, the building will have a great deal higher ROI, which means should you ever decide to sell your building, you will be able to get top-dollar due to the investment in making it an energy efficient location. The government is also encouraging the businesses and the building owners with many programs to invest in the green energy building. Greenhouse gases have been confirmed that they are very harmful to the environment, and all of us is looking for approaches to limit the amount of greenhouse gases they put into the atmosphere. One way to do that is to limit the amount of carbon output and air pollution your constructing creates. Energy efficient building design and appliances all help to limit these things, and by obtaining a green certificate, you are making it clear you are committed to the limitation and elimination of your greenhouse gas contribution, giving you a more favorable appearance in the eyes and mind of a more green-conscious era.

VI. COMPARISION BETWEEN SOLAR POWER AND CONVENTIOAL POWER

Table.1 power consumption in summer and winter by using grid department.

Summer used essentials	Winter used essentials
Air conditioner 3.13 units/day	Geyser 2 units/day
Cooler 0.12 units/day	Refrigerator 0.36 units/day
Refrigerator 0.36 units/day	water purifier 0.6 units/day
water purifier 0.6 units/day	2 Fans (5hrs) 0.75 units/day
2 Fans (10 hrs) 1.5 units/day	4 Lights 0.3 units/day
4 Lights 0.3 units/day	Tube light 0.176 units/day
Tube light 0.176 units/day	Computer 1 units/day
Computer 1 unit/day	5 cell phone 0.075 units/day
5 cell phone 0.075 units/day	Laptop 0.451 units/day
Laptop 0.451 units/day	water pump motor 2.237 units/day
water pump motor 2.237 units/day	2 air extractor 0.16 units/day
2 air extractors 0.16 units/day	(4 time in a month)vacuum cleaner 4.6 units/day
(4 times in a month)vacuum cleaner 4.6 units/week	(10 times in a month)micro oven 16 units/day
(10 times in a month) micro oven 16units/month	hair dryer 0.5 units/day
hair dryer 0.5 units/day	TV 0.96 units/day
TV 0.96 units/day	Iron box 2 units/day
Iron box 2 units/day	Electric cooker 2.1 units/day
Electric cooker 2.1 units/day	Wi-Fi router 0.316 units/day
Wi-Fi router 0.316 units/day	
Total units per month is 500.15 units	Total units per month is 440.15 units

The one-unit price of electricity in Telangana.

1. Category 1(between - 0to 100)
   0-50 Units - ₹1.45 consumer charges : 25₹
   51-100 units - ₹ 2.60 consumer charges : 30₹
2. Category 2(between - 100 to 200)
   0-100 Units - ₹3.30 consumer charges : ₹50
   101-200 units - ₹ 4.30 consumer charges : 50₹
3. Category 3(more than 200 units)
   0-200 Units - ₹5 consumer charges : ₹60
   201-300 units - ₹ 7.20 consumer charges : ₹60
   301-400 units - ₹ 8.50 consumer charges : ₹80
   401-800 units - ₹ 9 consumer charges : ₹80
   Above 800 Units - ₹ 9.5 consumer charges : ₹80

According to the table.1 the energy consumed in summer month is 500.15 units and it cost 3471.35 Rupees.

500.15 units in 30 days.
Category 3
0-200 Units - ₹5
201-300 units - ₹ 7.20
301-400 units - ₹ 8.50
401-800 units - ₹ 9
Above 800 Units - ₹ 9.5
Breaking of Charges
200 * 5=1000
100 * 7.20=720
100 * 8.50=850
100.15*9=901.35
total
3471.35

In winter the total energy consumed in one month is 440.15 units and it costs 2913.35 Rupees.

440.15 units in 30 days.
Category 3
0-200 Units - ₹5
201-300 units - ₹ 7.20
301-400 units - ₹ 8.50
401-800 units - ₹ 9
Above 800 Units - ₹ 9.5
Breaking of Charges
200 * 5=1000
100 * 7.20=720
100 * 8.50=850
40.15*9=361.34999999999997
total
2931.35

To produce the above-mentioned units by using solar power it required 4kw capacity power. 1kw capacity power required 3 solar panels. Each panel capacity is in between 330 to 340watts. On an average 1kw solar module produce 4 units per day. It will increase in the summers due to more light. So, 1kw solar panels generates the 120 units per month.

1kw x 4 units = 4 units per day
4units x 30 days = 120 units per month
4kw x 4 units = 16 units per day
16 units x 30 days = 480 units per day.

In winters, if compare both solar and conventional power. Solar is produced 480 units and the building consumed power from the grid department in the winter is 440.15 units. Here sill we have the more 39.85 units. Those units will be carry forward to the next month. In case of summer the more units will increase than the normal days. Per day, number of units will increase to at least to 1unit. As per our assumption the solar panels in summer generates the more 30 units per month, it means total number of units generated by solar is 510 units. The building is used power from the grid department is 500.15 units. Here, still we have 9.85 units which will be carry forward to the next month.

VII. CONCLUSION

Solar energy is pollution free and ecofriendly. Solar energy can also decrease the power problems. By using solar we can also decrease the presser on the conventional power. The initial cost of solar panel is high, but they are worthy. And invested money will get back in 4 to 5 years by supplying the excess power generated by the solar panels.

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