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FORTHCOMING SCOPE OF SOLAR ENERGY

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ABSTRACT

Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems. The Solar Energy is produced by the Sunlight is a non-vanishing renewable source of energy which is free from eco-friendly. Every hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed Electricity every hour. This Solar Energy is generated by as per applications like industrial, commercial, and residential. It cans easily energy drawn from direct sunlight. So it is very efficiency & free environment pollution for surrounding. In this article, we have reviewed about the Solar Energy from Sunlight and discussed about their future trends and aspects. The article also tries to discussed working, solar panel types; emphasize the various applications and methods to promote the benefits of solar energy.

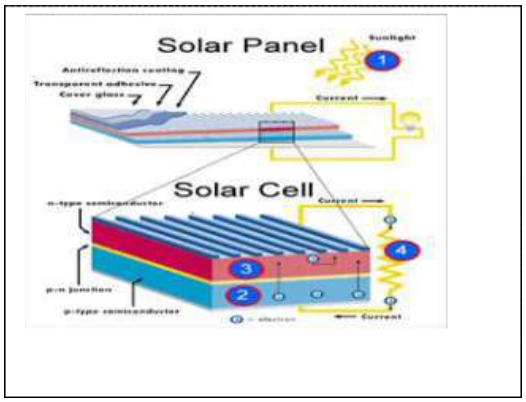
KEYWORDS: ***Energy ,photovoltaic cell, power plant, solar tower.***

I.INTRODUCTION

Nowadays, due to the decreasing amount of renewable energy resources, the last ten years become more important for per watt cost of solar energy device. It is definitely set to become economical in the coming years and growing as better technology in terms of both cost and applications. Everyday earth receives sunlight above (1366W approx.) This is an unlimited source of energy which is available at no cost. The major benefit of solar energy over other conventional power generators is that the sunlight can be directly converted into solar energy with the use of smallest photovoltaic (PV) solar cells. There have been a large amount of research activities to combine the Sun's energy process by developing solar cells/panels/module with high converting form. the most advantages of solar energy is that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oils in the past ten years. Moreover, solar energy requires considerably lower manpower expenses over conventional energy production technology.

upon these cells, they knock the electrons off the silicon. The negatively-charged free electrons are preferentially attracted to one side of the silicon cell, which creates an electric voltage that can be

collected and channeled. This current is gathered by wiring the individual solar panels together in series to form a solar photovoltaic array. Depending on the size of the installation, multiple strings of solar photovoltaic array cables terminate in one electrical box, called a fused array combiner. Contained within the combiner box are fuses designed to protect the individual module cables, as well as the connections that deliver power to the inverter. The electricity produced at this stage is DC (direct current) and must be converted to AC (alternating current) suitable for use in your home or business.



III.Energy Derivations from Solar Energy

Solar energy can be converted to thermal (or heat) energy and used to:

Heat water – for use in homes, buildings, or swimming pools.

Heat spaces – inside greenhouses, homes, and other buildings.

Solar energy can be converted to electricity in two ways:

3.1. Photovoltaic Cell: : Photovoltaic is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current results that can be used as electricity. The photoelectric effect was first noted by a French physicist, Edmund Bequerel, in 1839, who found that certain materials would produce small amounts of electric current when exposed to light. In 1905, Albert Einstein described the nature of light and the photoelectric effect on which photovoltaic technology is based, for which he later won a Nobel Prize in physics. The first photovoltaic module was built by Bell Laboratories in 1954. It was billed as a solar battery and was mostly just a curiosity as it was too expensive to gain widespread use. In the 1960s,

the space industry began to make the first serious use of the technology to provide power aboard spacecraft. Through the space programs, the technology advanced, its reliability was established, and the cost began to decline. During the energy crisis in the 1970s, photovoltaic technology gained recognition as a source of power for non-space application

Working principal of photo voltic cells:-

Conversion of light energy in electrical energy is based on a phenomenon called photovoltaic effect. When semiconductor materials are exposed to light, the some of the photons of light ray are absorbed by the semiconductor crystal which causes a significant number of free electrons in the crystal. This is the basic reason for producing electricity due to photovoltaic effect

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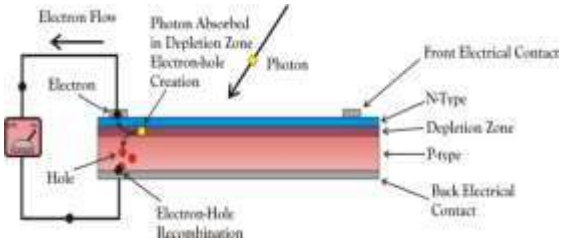

Photovoltaic cell is the basic unit of the system where the photovoltaic effect is utilised to produce electricity from light energy. Silicon is the most widely used semiconductor material for constructing the photovoltaic cell. The silicon atom has four valence electrons. In a solid crystal, each silicon atom The same thing happens when light falls on a silicon crystal. If the intensity of incident light is high enough, sufficient numbers of photons are absorbed by the crystal and these photons, in turn, excite some of the electrons of covalent bonds. These excited electrons then get sufficient energy to migrate from valence band to conduction band. As the energy level of these electrons is in the conduction band, they leave from the covalent bond leaving a hole in the bond behind each removed electron. These are called free electrons move randomly inside the crystal structure of the silicon. These free electrons and holes have a vital role in creating electricity in **photovoltaic cell**. These electrons and holes are hence called **light-generated electrons and holes** respectively. These light generated electrons and holes cannot produce electricity in the silicon crystal alone. There should be some additional mechanism to do that.

Application of photovoltaic systems are:
Utility Interactive Applications:
In utility interactive (or grid-connected) PV systems, PV modules are connected to inverters that convert the DC produced by the PV modules to AC. This electricity can then power household appliances or can be sold directly to the grid. As a building receives this energy, it is distributed to appliances and lighting, or other devices where needed. Since PV systems are restricted to function only exposed to the sun, a backup system is frequently required to ensure continuous supply of electricity irrespective of the weather conditions. These systems are most commonly used in houses or commercial buildings to offset electricity cost. A well designed PV system with a proper storage facility can be an attractive prospect for displacing power during the peak hours.

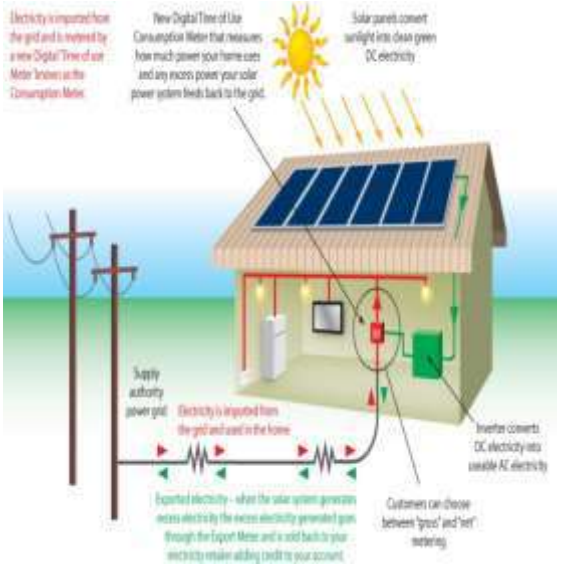

FIG. 1- Schematics of utility interactive application.
Lighting: With the invention of LED (light emitting diode) technology as low power lighting sources, PV systems find an ideal application in remote or mobile lighting systems. PV systems combined with battery storage *facilities* are mostly used to provide lighting for billboards, highway in formation signs, public-use facilities, parking lots, vacation cabins, lighting for train.

FIG :- A street light powered by PV.

Communications:

Signals required by communication systems need amplification after intervals. Various relay towers are stationed to boost High grounds are mostly favoured as the sites for repeater stations. Th far from power lines. To reduce the difficulty and systems are being installed as a viable alternative. FIG. 6 Repeater Example of a bill board powered by solar panels. Signals required by communication systems need amplification after Various relay towers are stationed to boost radio, television, and High grounds are mostly favoured as the sites for repeater stations. These far from power lines. To reduce the difficulty and cost associated with generators systems are being installed as a viable alternative. epeater at an elevated location can be powered by PV. . Signals required by communication systems need amplification after particular distance adio, television, and phone signals. e sites are generally with generators, PV

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SOLAR THERMAL TECHNOLOGIES

Solar thermal technologies capture the heat energy from the sun and use it for heating and/or the production of electricity. This is different

fromphotovoltaic solar panels, which directly convert the sun's radiation to electricity

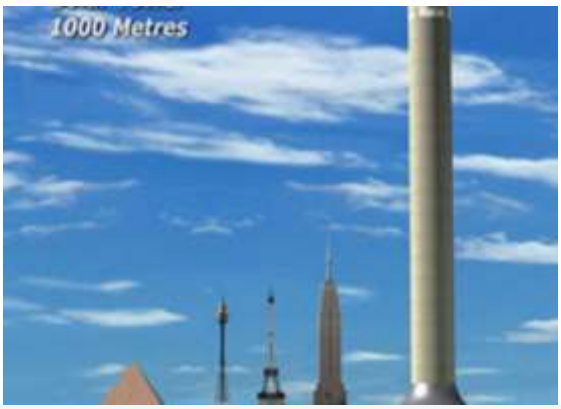
There are two main types of solar thermal system for energy production – active and passive. Active systems require moving parts like fans or pumps to circulate heat-carrying fluids. Passive systems have no mechanical components and rely on design features only to capture heat (e.g. greenhouses). The technologies are also grouped by temperature - low, medium or high.

- Low-temperature (<100°C) applications typically use solar thermal energy for hot water or space heating (Boyle, 2004). Active systems often consist of a roof-mounted flat plate collector through which liquid circulates. The collector absorbs heat from the sun and the liquid carries it to the desired destination, for example a swimming pool or home heating system. Passive heating systems involve intelligent building design practices, which cut back on the need for heating or cooling systems by better capturing or reflecting solar energy.
- Medium-temperature (100-250°C) applications are not common. An example would be a solar oven, which uses a specially-shaped reflector to focus the sun's rays on a central cooking pot[3]. Similar systems could be used for industrial processes, but are not widely used.
- High-temperature (250°C >) solar thermal systems use groups of mirrors to concentrate solar energy onto a central collector[1]. These concentrated solar power (CSP) systems can reach temperatures high enough to produce steam, which then turns a turbine, driving a generator to produce electricity.

Solar power tower

The **solar power tower**, also known as 'central tower' power plants or 'heliostat' power plants or power towers, is a type of solar furnace using a tower to receive the focused sunlight. It uses an array of flat, movable mirrors (called heliostats) to focus the sun's rays upon a collector tower (the target). Concentrated solar thermal is seen as one viable solution for renewable, pollution-free energy.

Early designs used these focused rays to heat water, and used the resulting steam to power a turbine. Newer designs using liquid sodium have been demonstrated, and systems using molten salts (40% potassium nitrate, 60% sodium nitrate) as the working fluids are now in operation. These working fluids have high heat capacity, which can be used to store the energy before using it to boil water to drive turbines.



Advantages of Solar Energy

1. Renewable Energy Source

Among all the benefits of solar panels, the most important thing is that solar energy is a truly renewable energy source. It can be harnessed in all areas of the world and is available every day. We cannot run out of solar energy, unlike some of the other sources of energy. Solar energy will be accessible as long as we have the sun, therefore sunlight will be available to us for at least 5 billion years when according to scientists the sun is going to die.

2. Reduces Electricity Bills

Since you will be meeting some of your energy needs with the electricity your solar system has generated, your energy bills will drop. How much you save on your bill will be dependent on the size of the solar system and your electricity or heat usage. Moreover, not only will you be saving on the electricity bill, but if you generate more electricity than you use, the surplus will be exported back to the grid and you will receive bonus payments for that amount (considering that your solar panel system is connected to the grid). Savings can further grow if you sell excess electricity at high rates during the day and then buy electricity from the grid during the evening when the rates are lower.

Unfortunately, the Feed in Tariff in the UK is ending on the 31st of March 2019, resulting in less savings on your bill. However, if you act fast enough and submit your application in time, you could still receive the payment benefits for the next 20 years.

Disadvantages of Solar Energy

1. Cost

The initial cost of purchasing a solar system is fairly high. Although the UK government has introduced some schemes for encouraging the adoption of renewable energy sources, for example, the Feed-in Tariff, you still have to cover the upfront costs. This includes paying for solar panels, inverter, batteries, wiring, and for the installation. Nevertheless, solar technologies are constantly developing, so it is safe to assume that prices will go down in the future.

2. Weather Dependent

Although solar energy can still be collected during cloudy and rainy days, the efficiency of the solar system drops. Solar panels are dependent on sunlight to effectively gather solar energy. Therefore, a few cloudy, rainy days can have a noticeable effect on the energy system. You should also take into account that solar energy cannot be collected during the night. On the other hand, if you also require your water heating solution to work at night or during wintertime, thermodynamic panels are an alternative to consider.

3. Solar Energy Storage Is Expensive

Solar energy has to be used right away, or it can be stored in large batteries. These batteries, used in off-the-grid solar systems, can be charged during the day so that the energy is used at night. This is a good solution for using solar energy all day long but it is also quite expensive. In most cases, it is smarter to just use solar energy during the day and take energy from the grid during the night (you can only do this if your system is connected to the grid). Luckily your energy demand is usually higher during the day so you can meet most of it solar panels you will need, as you want to collect as much sunlight as possible. Solar with solar energy.

4. Uses a Lot of Space

The more electricity you want to produce, the more panels require a lot of space and some roofs are not big enough to fit the number of solar panels that you would like to have. An alternative is to install some of the panels in your yard but they need to have access to sunlight. If you don't have the space for all the panels that you wanted, you can opt for installing fewer to still satisfy some of your energy needs.

5. Associated with Pollution

Although pollution related to solar energy systems is far less compared to other sources of energy, solar energy can be associated with pollution. Transportation and installation of solar systems have been associated with the emission of greenhouse gases. There are also some toxic materials and hazardous products used during the manufacturing process of solar photovoltaics, which can indirectly affect the environment. Nevertheless, solar energy pollutes far less than other alternative energy sources.reliable.

CONCLUSION

In the capital city of India, Delhi, citizens can face hours without electricity, but they are the lucky ones. In some parts of India it can be days. The basic weakness of the electric supply industry is nonviability of tariff. In 2001-02, the cost of supply was Rs.3.50 a unit while the realization was only Rs.2.40. Free or highly subsidized supply for agriculture and subsidies to domestic consumers have resulted in uneconomic charges for industrial consumers. This policy has driven many industries to depend more and more on self-generation. A second weakness of the Indian situation is under investment in transmission and distribution relative to generation. This is due to the lack of proper return in the investment of the power stations. This leads to the increase in price/unit and making the cost unreasonable for the common man. The use of solar energy for the production of electricity reduces the price/unit as low as 50 paise. The only problem in this procedure is the high installation charges. So, if our engineers work in such a way so as to reduce that cost and in further developments of the equipment, we can definitely meet the power demand in the future and this will be an ENERGY SOLUTION.

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