International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

ELECTRICITY GENERATION BY SOLAR PV CELL

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ABSTRACT

The Purpose of this work is to Aware People about solar plates or photovoltaic cell and gave the right information about it which is available in the simplest form this can be seen in the terms of topic which are given below.

1. INTRODUCTION

Energy comes in different forms. Light is a form of energy. So is heat. So is electricity. Often, one form of energy can be turned into another. This fact is very important because it explains how we get electricity, which we use in so many ways. Electricity is used to light streets and buildings, to run computers and TVs, and to run many other machines and appliances at home, at school, and at work. One way to get electricity is to burn a fuel like oil or coal. This makes heat. The heat then makes water boil and turn into steam. The steam runs a machine called a turbine that produces electricity. Often, this electricity then goes into a public power system that sends it out, through wires, to homes, schools, and businesses over a wide area. This method for making electricity is popular. But it has some problems. Our planet has only a limited supply of oil and coal. They are not renewable fuels. Once they are used, they are gone forever. Also, they give off gases when they are burned. These gases may make the air dirty, or polluted, and some of them may change Earth's climate. Free and Clean Energy Another way to make electricity uses sunlight. Sunshine is free and never gets used up. Also, there is a lot of it. The sunlight that hits the Earth in an hour has more energy than the people of the world use in a year. A little device called a solar cell can make electricity right from sunlight ("solar" means having to do with the Sun). A solar cell doesn't give off any gases. It doesn't even make any noise. A solar panel is a group of solar cells that work together. The use of solar cells is growing fast in the United States and many other countries. Solar cells and solar panels have lots of uses. They are in everyday things like calculators, watches, and fl ash lights. There are solar-powered toys, radios, and MP3 players. There are solar-powered cell phones and pagers. Using solar power with devices like these means you never have to worry about batteries. Solar panels are sometimes used to make the electricity to light up road signs and bus stops. They may make the electricity that makes roadside emergency phones or parking meters work. Even some ATMs (machines that let you get money from or put money into your bank account) have solar panels. Power for Buildings The ceiling lights and all kinds of machines and appliances used at home, school, and work get their electricity from the wires running through the building. Usually, this electricity comes to the building from the public power system, or grid. But solar panels can also be used along with power from the grid. People sometimes put solar panels on their homes. Large buildings may have them as well. They make it possible to use less of the grid's costly electricity. In addition, they are a backup in case of a power failure, or blackout. In some areas the grid itself gets some power from solar panels.

2. ENERGY FROM SUNSHINE

The Sun constantly gives off energy. The energy is carried through space as electromagnetic radiation. There are several types of electromagnetic radiation. Light is one type. Radio waves are another. Electromagnetic radiation travels like waves in water. Like water waves, it is a series of ups and downs. One way various types of electromagnetic waves differ is in their wavelength. This is the distance between two ups (or two downs) in a row. The wavelengths of radio waves are longer than those of light. Among types of light, red has a longer wavelength than blue. How Solar Cells Use Light Only part of the energy sent toward Earth by the Sun actually makes it to Earth's surface. Some solar energy gets bounced back into space. Some gets absorbed by the air. Most of the solar energy that does make it to Earth's surface is in the form of visible light. Solar cells can use the energy of this light to make electricity. But they don't work equally well with all forms of light. Different types of solar cells use different wavelengths. This means a cell can use only some of the solar energy that it receives..

3. UNDERSTANDING ELECTRICITY

People often think of electricity as something that flows. In fact, that is pretty much right. Electricity is a stream of tiny particles called electrons. The stream is called an electric current. There are two kinds of current. One is DC. This is direct current. It always flows in the same direction. Batteries and solar cells make DC. The other kind of current is AC. This is alternating current. It reverses direction many times a second. The grid has AC. Most home electrical devices use AC. Measuring Electricity Electric power is the rate at which electric energy is used. It is measured in watts. A 100-watt light bulb is more powerful than a 60-watt bulb. It uses more electricity. (When people talk about large numbers of watts, they use larger units: a kilowatt is 1,000 watts; a megawatt is 1 million watts.) Another important unit is the watt-hour. It measures the electric energy produced or

used during a period of time. It equals 1 watt of power over a period of one hour. A similar but larger unit is the kilowatt-hour. This is 1,000 watts over an hour. A 100-watt light bulb that stays on for 10 hours uses 1,000 watthours of electric energy. This amount is the same as 1 kilowatt-hour..

LOOKING BACK Edmond Becquerel of France first noticed that light can cause materials to make electricity. This was in 1839. Other scientists later studied the ties between light, matter, and electricity. One of them was Albert Einstein. In 1905 he explained how atoms take in electromagnetic radiation (such as light) and then give off electrons. This process is called the photoelectric effect. Einstein won the Nobel Prize in 1921 for his work on it. The First Solar Cells Russell Ohl was the first person to come up with a solar cell like the ones used today. He worked at Bell Laboratories in New Jersey. His cell was made of silicon (silicon is found in sand and in many types of rock). He called the cell a "light-sensitive electric device." He fi led for a patent on it in 1941. Five years later, he got the patent. In 1954, Bell Labs made the first practical solar cell. It was the first one to make enough electricity to run ordinary electrical devices. Still, early cells didn't make much electricity. Also, they were very costly. Their first important use was in space satellites, starting in 1958. As cells became cheaper, they were used in other ways. The first power station able to make 1 megawatt of electricity with solar panels opened in Hesperia, California, in 1982.

4. INSIDE A SOLAR CELL

Solar cells come in various sizes. Some are tinier than a stamp. Some are 5 inches (12 centimeters) across. The cells are made of a type of material known as a semiconductor. Often, they are made of silicon. Semiconductors can conduct, or carry, electricity. They don't do this as well as metals, however. That is why they are called "semi." Because they only "semi" conduct electricity, they can be used to control electric current. On their top and bottom they typically have metal contacts through which current can fl ow. A typical simple cell has two layers of silicon. One is known as n-type. The other is p-type. The layers are different from each other. How Solar Cells Make Electricity The process of making electricity begins when the silicon atoms absorb some light. The light's energy knocks some electrons out of the atoms. The electrons flow between the two layers. The fl ow makes an electric current. The current can leave the cell through the metal contacts and be used. When light hits a solar cell, much of its energy is wasted. Some light bounces off or passes through the cell. Some is turned into heat. Only light with the right wavelengths, or colors, is absorbed and then turned into electricity.

A single simple solar cell makes only a little electricity. For most purposes more is needed. For this reason, cells are often linked together in groups known as solar modules. A solar module has a frame that holds the cells. Some modules are several feet long and wide. They usually can produce up to a few hundred watts of electricity. If more power is needed, modules can be joined together to form a large solar array. Modules are sometimes called solar panels. Arrays are also sometimes called solar panels. Whatever you call a group of solar cells, the fact remains: the more cells you link together, the more electricity you make. With enough modules, huge amounts of power are possible. A good example is a new power plant being built at Moura in Portugal. The fi rst phase of the project has 262,080 solar modules, each with 48 cells. They will produce up to 46 megawatts of electricity. More Power Many experts think even bigger power plants using solar panels will be built in the coming years. Someday there may be solar plants able to make as much as 500 megawatts of power. That is about what a typical coal power plant produces today. Solar panels work best when they directly face the Sun. For this reason, the panels are often put on "trackers." The trackers turn the panels so that they follow the Sun as it moves across the sky.

5. SOME MISCONCEPTIONS ABOUT SOLAR PANELS

Panels on homes and other buildings Solar panels for buildings are no different from other panels. They must be able to receive enough sunlight to be useful. Often, they are put on a roof that faces the Sun and is not shaded. Sometimes they are simply built on the ground. Solar panels come in various colors and designs. They may be put on a wall or roof and blend right in, so you don't even notice them. Roof shingles and tiles can be made using thin-fi lm panels. Usually solar panels and a few wires cannot by themselves supply electricity to a building. More equipment is needed. Solar cells make DC electricity. This is fi ne for some electronic devices. But home appliances and lights usually run on AC. Houses are generally wired for AC. To change the DC to AC, a device called an inverter is needed. Storing Electricity Also, if the building is not connected to the public power grid, there has to be some way of storing electricity for use when it is too dark for the solar panels to work. Usually, batteries are used to store the electricity. Batteries can be helpful even in buildings that are connected to the grid. They can serve as a backup if the grid suffers a power loss

Concerns about solar panels Along with strong points, solar panels have some weak points. For one thing, they work best when the Sun shines brightly. When the sky is cloudy, they make less electricity. In the United States, southern states tend to get more sunshine than, say, cloudy Washington in the Northwest. In order to make the same amount of electricity, a house in Washington will probably need more panels than a house in Arizona. One problem is the same everywhere. When it's dark, solar panels don't work at all. If a solar-powered home isn't linked to the grid, it needs to have batteries or some other way to store electricity for use at night. The Price of Solar Panels While sunshine is free, solar panels are not. Getting a solar system for a building costs money. In many cases today, the total cost may turn out to be so high that it's cheaper to get power from the grid. This may change in the future, though, as the cost of electricity made by power plants using oil goes up. Also, as more solar panels are used, the price of the panels may come down. Solar power plants that are able to make large amounts of electricity need large amounts of land—and also lots of solar panels that are costly today..

6. GOOD THINGS ABOUT SOLAR PANELS

Solar panels have a lot of strong points. The silicon used in most of them is a very common material. Sand is made up mostly of silicon. Solar panels are reliable. The "fuel" they use—sunshine—is free. It is a renewable resource that will last nearly forever. Scientists expect the Sun to keep shining for billions of years. Also, solar panels can make electricity right at the place where it is used. This removes the need for wires or cables to carry electricity from a distant power plant. When they are used, solar panels have almost no effect on the environment. They are quiet. They don't release dirty or harmful gases into the air. They don't cause water pollution. They don't create hazardous waste. Cleaner Power Plants Power plants using solar panels have several advantages. They can usually be built more quickly than oil, coal, or nuclear power plants. If more power is needed,

they are easier to expand than other types of power plants. Oil and coal power plants use huge amounts of fuel. This fuel can be expensive, and burning it causes pollution. The process of carrying the fuel to power plants can also cause environmental problems. For solar panel power plants, these problems do not exist..

7. SOLAR CELLS GET BETTER AND BETTER

When experts compare solar cells, one thing they look at is how costly a cell is. If it costs too much, nobody will buy it. One problem with the fi rst solar cells was that they usually cost more than other power sources. That is why the first important use of solar cells was in space satellites. There were no cheaper ways to make electricity in space in the 1950s. Another thing experts look at is a cell's "efficiency" This tells how good a cell is at using sunlight. A high- efficiency cell turns more of the sunlight's energy into electric energy than a low- efficiency cell. Ever since solar cells were invented, scientists have worked to make them cheaper and more efficient. There has been a lot of progress. The first solar cells had an efficiency of less than 4 percent. Today cells cost a lot less, and many have an efficiency of 15 percent or more. Some experimental cells do even better. Making Better Solar Cells Scientists continue to hunt for ways to make better cells. They are trying new materials, such as plastics. They are also looking for ways solar cells and panels can be more useful. For instance, they have come up with a "photo capacitor." This is a solar device that both makes electricity and stores it for later use. Experimental models were not good for practical use. But if the device can be improved, it might someday eliminate the need to have batteries to store solar electricity, at least in some cases.

ACKNOWLEDGMENT

Through this paper some misconceptions around solar panels might have solved we try best to provide the information in the best simplest form of text so everyone can understand.

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