

# Utilization of Solar Energy to Generate Electricity

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**ABSTRACT:** *Everyone know that solar energy produced with the help of sunlight which is non-vanishing renewable process of energy and also ecofriendly. Sunlight energy received by the earth from the sun in an hour can fulfil the energy demand of world's population for one year. In present time electricity becoming the important part of the human life because each and every person wants the electricity. The solar energy is produce as per the requirements of industrial, residential and commercial. The solar energy is very sufficient and efficient because it will help to free the environment with the pollution. In this paper, author have studied about a solar energy produce from the sunlight and how solar energy is becoming an important part of people day to day life. In future, every solar powers system would be installed, reductions the quantity of the fossil fuels required to generate electricity, which is turn decreases the pollutant causative to the global warming.*

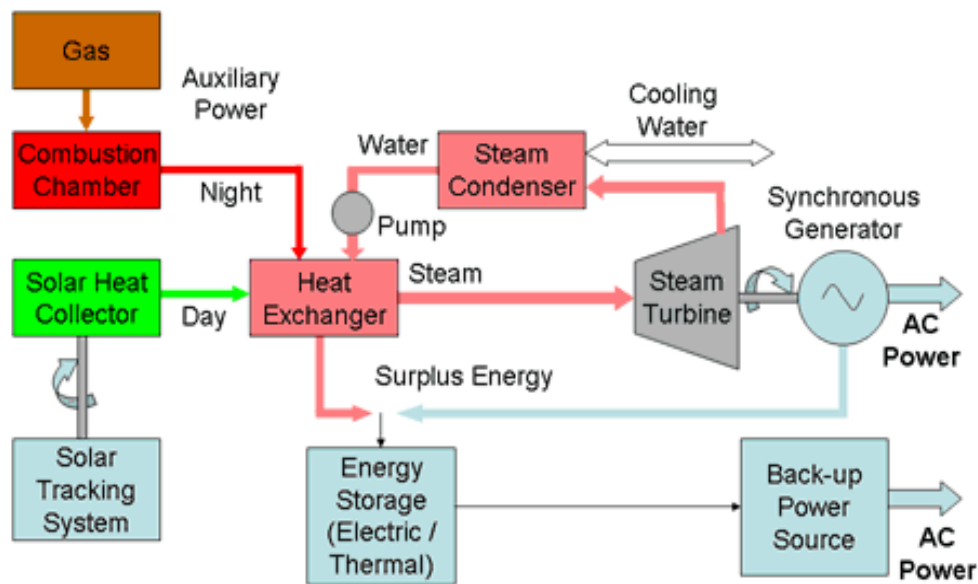
**KEYWORDS:** *Energy, Electricity, Renewable Energy, Solar Panel, Solar Thermal.*

## INTRODUCTION

As the price of fossil fuel fluctuates, renewable energy is increasingly gaining popularity as a source of energy. It is also important for engineering & the technology students to recognize and appreciate the innovations related with the renewable energy at the educational level. The most plentiful source of electricity is solar energy. It is usable both directly and indirectly as solar isolation and wind energy. The sun emits electromagnetic radiation, which is a source of energy. It has a capacity of 178 billion megawatts, which is roughly 20,000 times the global demand[1]. Few solar energy allows water to evaporate, resulting in rainfall and the formation of rivers, among other things. Some of them are used in the photosynthesis, and which is indispensable for a life on the earth to exist. Man has attempted to harness this limitless source of energy since the dawn of time. However, until now, only a small portion of this energy has been tapped. Many studies have been carried out in order to improve methods for improving the performance of solar panels[2].

Although the solar panel can still keep a sun's perpendicular profile, solar tracking makes it possible to generate more energy. Solar panel monitoring systems have been in development for many years. As the sun moves through the sky all day, solar panels track their location and remain upright to the solar energy of the Sun benefit from this thing. The quantity of power consumed by the device would be maximized as a result of this. In general, there are three methods for increasing Photovoltaic system performance. The first method is to improve solar cell generation efficiency; the second is to use an energy conversion systems with maximum power point tracking (MPPT) is control algorithm; and third method is to use a solar tracking systems to get the most solar energy from the sun.

The sensor sanities the intensity of the sun & converts into a directly proportional power to intensity. Solar panel rotates by a rotating solar panel using step engine and microcontroller depending on the sun position[3]. Solar systems currently have fixed solar panel whose generating proficiency is less. The purpose of this paper is bring solar tracking in the prevailing fixed solar panel, which means that one keep maximum output constant. Thus, people can improve the conversion efficacy of the solar energy generation using this tracking system. For this purpose, people uses peripheral interface controller for sun tracking. Figure 1 shows the electric power produced from the solar energy.



**Figure 1: Electric Power Produced From The Solar Energy. In Which It Will Contain The Gas, Combustion Chamber, Solar Heat, Solar Tracking System [Electropaedia].**

In present years because of the decrease in renewable energy sources, the cost of solar energy devices per watt is increasing in recent years. In the coming years, it will definitely become economical and grow as a better cost and application technology. An average everyday earth receives sunlight around (1377W). Through use of smaller photovoltaic solar cells allows direct converting of solar light and other conventional power-generators are the key benefit of solar energy.

A significant amount of research has been done to cartel the sun's energy procedure with solar cells or panel or some module development with high conversion. The biggest advantage of solar power is that it is available in large quantities to ordinary people, in comparison to the prices of different fossil fuels and oils over the last ten years. In addition to the traditional power production technology, solar energy also requires considerably lower labour expenditures. However, renewable energy is of significant interest because of an increase in the environmental concern.

As fossil fuels are continuously decreasing, this alternative power source is continually gaining greater popularity. The energy comes from the sun, from wind, from rain and so on. Solar energy provides great potential for converting to electricity, among non-conventional renewable energy sources. To increase efficiency into desirable need is to maximise the power output of a solar system. The panels must be kept aligned with the sun to maximise the power output. The proposed system ensures that the solar power conversion to electricity is optimized by correctly adjusting the panel to the position of the sun.

Solar energy system requirement, growing energy demand, the constant decrease of existing fuels and growing concern about pollution of the environment have driven man to explore new energy technologies with clean, renewable resources like wind energy, solar power, etc. Solar energy offers great conversion possibilities into electricity among non-conventional renewable energy sources, which is able to provide an important portion of our world's energy required. Solar energy will permitted, virtually unfinished and does not involve polluting residues or emissions of green gas.

Energy is the most important and universal amount of the work of humans and nature of all kinds. Especially in various forms, it is the gift of nature to humanity. Energy consumption is directly commensurate with human progress. With increasing population, living standards of humanity are also improving, developing countries are industrializing, and the global energy demand is increasing day-by-day. However, the universal applicability of fossil fuels and the extensive use of fossil fuels, especially global warming, acid rain, urban and strongly imply that using unconventional, environment-friendly, renewable energy is a key source of fossil fuels[4]. The procedure of generating electricity from other form of energy is the procedure of generating electricity of today's time.

British physicist Michael Faraday found out the fundamental concepts of the development of energy in the 1820s and early 1830s. His fundamental approach is still in use today. Electricity is produced by the passage of a wire loop or copper disc between magnet poles. The energy produced from electromechanical generators in a plant is generally operated mainly by chemical or nuclear-combustion heat motors and by other means, such as flowing wind and water, by kinetic energy. There are fundamental approaches for transforming other

sources of energy into electricity: A thermocouple, thermopiles and thermionic conversion system is used to transform temperature discrepancies directly to electricity.

An asphalt plant is an electricity plant where steam drives the main motor. The water is boiled, turned into the steam and it rotates into an electricity generator steam turbine. Steam is concentrated in the condenser and transferred to the location where it was heated after flowing by the turbine. The disparity in architecture of a thermal power plants is due to the various fuels. As these installations turn different kinds of heat energy into electricity. Fossil fuelled thermal power plant account for a noteworthy portion of human CO<sub>2</sub> emissions; attempts to minimise these outputs are varied and widespread. Since waves can be large or tiny, human may not be able to produce energy all the time. Since very few people have attempted to produce electricity in this manner, the equipment is costly.

#### 1. Utilizing Wind Energy:

One of the two main physical concepts for extracting energy from the wind is the application of either lift or drag power (or through the amalgamation of two). Drag forces, which are the forces perceived by a person (or object) exposed to the current, are the most apparent means of propulsion. Lift forces are the most effective means of impulsion, but they are less known than drag forces because they are more subtle. Contrary to popular belief, there are a number of disadvantages to in using this method. The wind's intensity is not constant, ranging from zero to storm power. Wind turbines are noisy and they do not generate the same amount of energy all of the time. Pollution is emitted during the manufacturing of wind turbines. As a result, some pollution is generated by wind power. To provide enough electricity to entire communities, large wind farms are needed.

#### 2. The Use of Nuclear Power:

Charged particles are created and accelerated (examples: beta voltaic or alpha particle emission). Immersing the uranium rod in water keeps them cold. When they are taken out of the water, a nuclear reaction occurs, resulting in heat. Raising and lowering the rods regulates the amount of heat required.

Many individuals and conservation groups are worried about the nuclear fuel it needs. A limited number of nuclear power plants have experienced significant accidents. In 1986, a nuclear power plant accident in Chernobyl, Ukraine, resulted in the deaths of 30 people and the evacuation of over 100,000 peoples. There are thoughtful concerns that needs to be addressed about the disposal of radioactive unused produced by nuclear power. The cost of storage and controlling nuclear waste for thousands of years is very huge[3].

#### 3. Using Solar Energy:

The photoelectric effect converts light into the electrical energy, seen in solar cells. Since the solar array will stay aligned to the sun, solar monitoring allows for further energy production. To improve performance, a solar system's power production should be maximized. It is necessary to keep solar panels aligned with the sun in order to optimise power production. As a result, a way to monitor the sun is needed. Rather than purchasing more solar panels, this is a much more cost-effective option. When a monitoring device is used instead of a immobile range, it is assessed that the harvest from the solar panel can be amplified by 30 to 60%. Solar energy's benefits include: The sun's energy and heat are both free and limitless. Solar energy does not pollute the environment.

Solar energy produces no hazardous waste or greenhouse gases. The solar power is ideal for generating electricity in remote parts or where the price of expanding the energy grid is costly. Solar energy is adaptable from the hand-held calculator, clocks, and the solar-powered garden light to water heater, vehicles, homes, and satellites, it can be used for both low-power and high-power applications. Solar energy systems are often commonly used for generation purposes due to their easy design and low maintenance cost.

#### 4. Producing Electricity with the Solar Power Plants:

The solar power plant are a different way to use solar energy to produce electricity. They work in a similar way to traditional power plant, but instead of fossil fuels, they use concentrated sunlight to produce heat to the boil water and drive vapor turbines. Figure 2 shows the solar power plants which is used to produce the electricity.

##### 4.1. Mirrors:

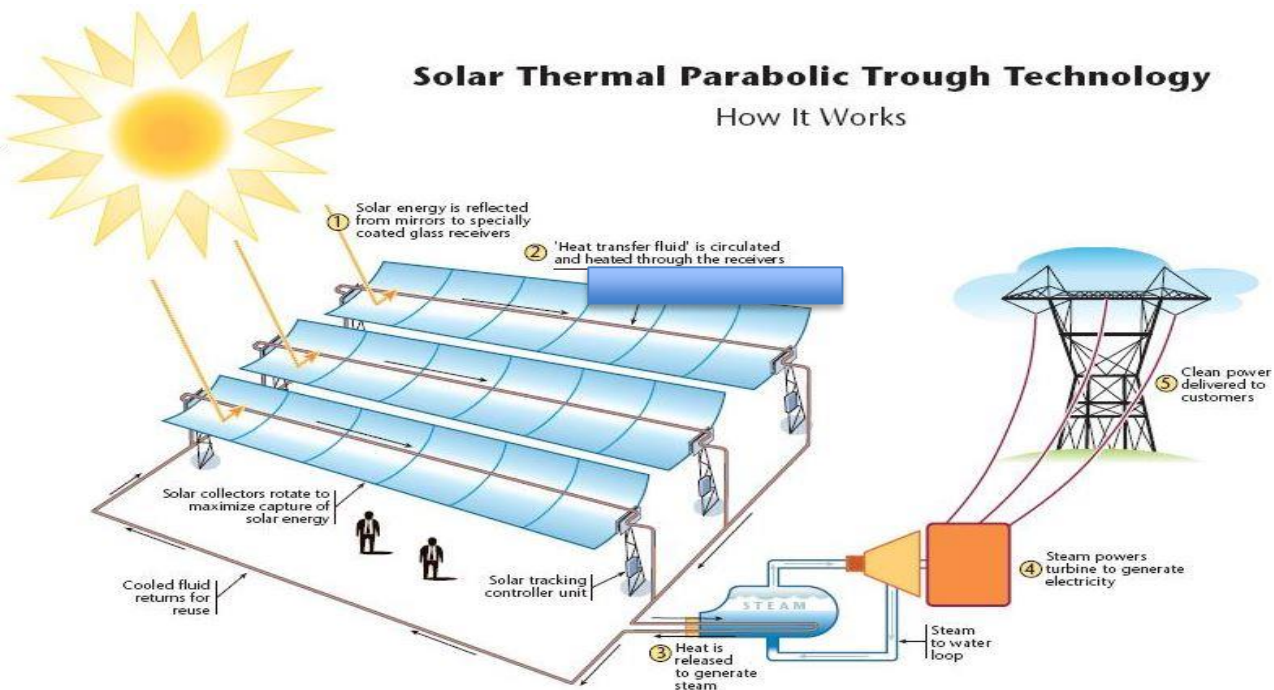
The solar fields is made up of specially built solar collectors that capture and concentrate sunlight using mirrors. The light is focused onto a focal point by the rounded surface of the mirror. The condensed light then produces heat, or thermal energy.

#### 4.2.Heat:

Fluid carries pipes that run across the center point. The temperature of the fluid increases with the sun. In the tubing, the heated fluid passes to a steam engine to transfer the heat to water.

#### 4.3.Steam Turbine:

The steam power causes the engine to rotate. The engine rotates converts electricity to the generator. This power is sent in the generator to the electricity grid for public use.



**Figure 2: Solar Power Plants which Is Used To Produce The Electricity. The thermal parabolic trough technology is containing Large U-shaped the parabolic focusing mirrors [Ecodeaz].**

### DISCUSSION

Any photon of sunlight on earth provides electricity. The sun works more for our planet than just lighting the day. Deep inside the sun nucleus, nuclear fusion reactions release tremendous amounts of energy, which radiates as light and heat from the outside of the sun and through space. Solar thermal or Photovoltaic collectors may be used for the absorption and transformation of solar energy into usable energy. Solar energy is a limited proportion of the world's overall energy use but more people in more fields would be able to profit from reducing the expense of installing solar panels. Sun is a clean, green power source that will play an important role for world energy in the future..

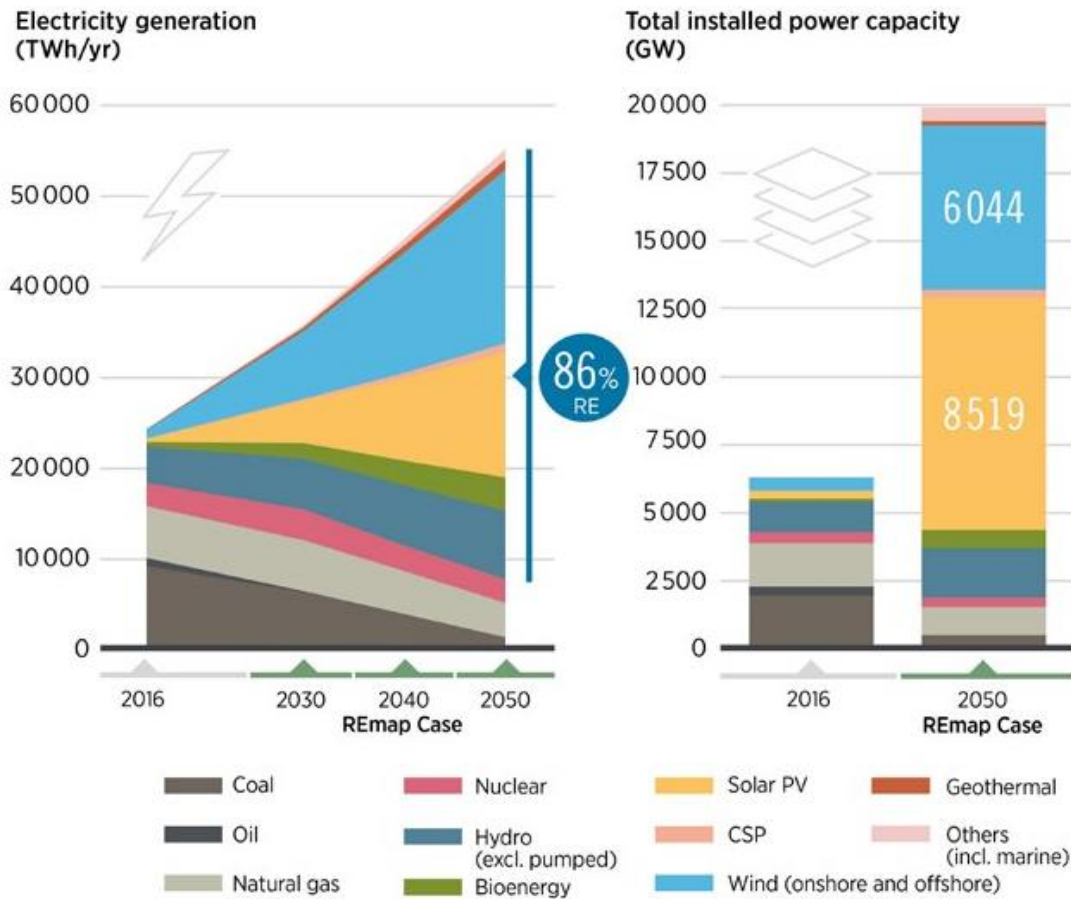
#### 1. Harnessing the Solar Energy for a Usable Power:

The sun's energy can be used in a variability of ways. Photovoltaic and solar thermal capture the two most popular methods to harness solar energy. Solar thermal capturing is mostly used for large-scale electric generation in utilities, while for smaller power schemes, photovoltaics is much more general (like residential solar panel installation). In addition to power generation, low-temperature versions of the solar thermal project may also be utilized for cooling and heating. Solar energy is one of the most rapidly expanding and cheapest resources of electricity in all over the world, and in the coming years will continue to spread exponentially. As solar panel technology advances, the economic benefits are growing, which contribute in the environmental benefits of selecting a safe, sustainable source of energy.

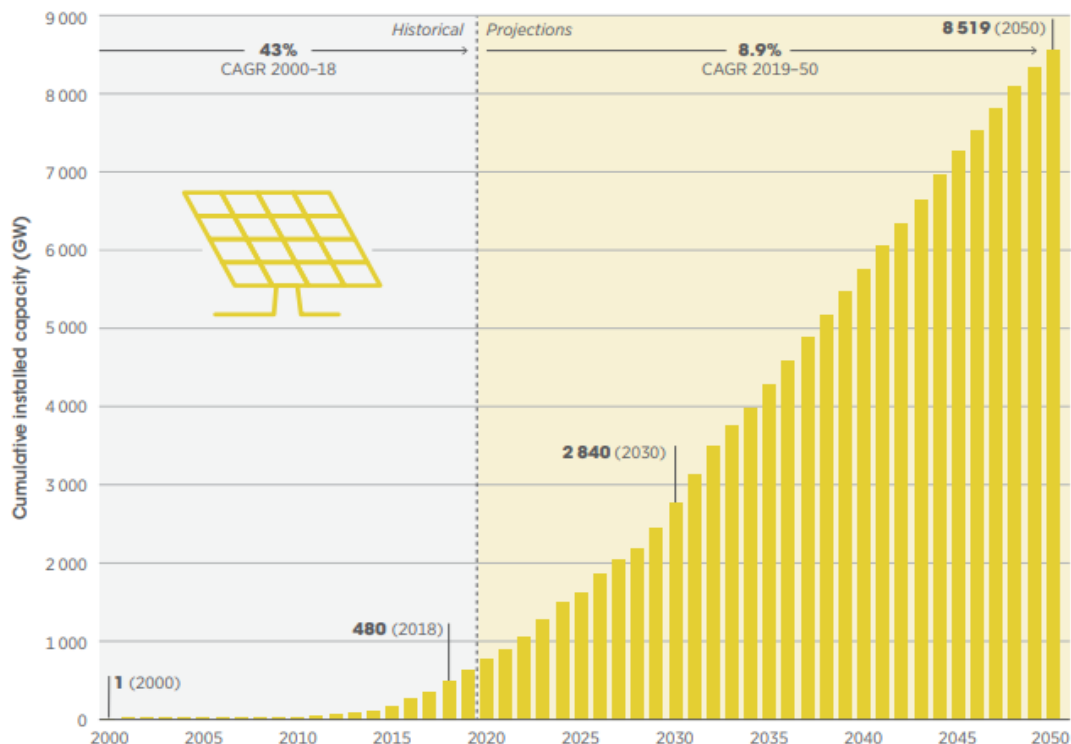
#### 2. Photovoltaic(PV) Solar Energy:

A (PV) solar systems is a popular way for stuff owner to take benefit of the solar energy. Solar panels in solar PV systems transform sunlight straight into power, which can be used right away, stowed in the solar battery and directed to electric grid for bill credits. The photovoltaic effect is a mechanism that converts solar energy into usable electricity in solar panels. As a semi-conductor material (usually silicone) is affected by sunlight, it shakes electrons out and makes them travel and creates an electrical current that can be captured via cables. DC power must be converted with the aid of a solar inverter into alternating current (AC) electricity. Because of the use of electricity from the American grid and most electrical equipment in the home, this transformation is necessary.

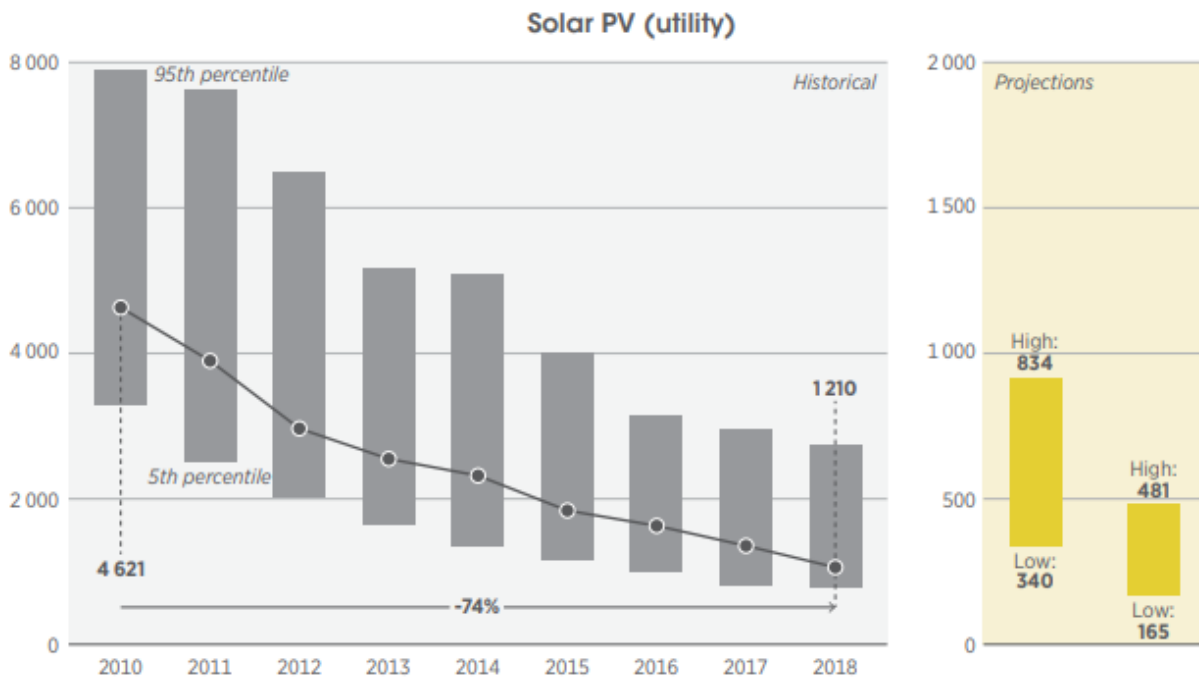
Photovoltaic can consume solar energy on a wide range of scales and the installation of solar panel is an intelligent way to protect money on electricity while plummeting your fossil-fuel dependence. The photovoltaic solar generation can help major companies and electricity companies by installing a wide range of power generation panels that will provide energy to the grid or power supply. Figure 3 shows the solar photovoltaic have the biggest installed capacity of the solar energy expansion by 2050. Figure 4 shown the comparison between the 2018 levels, that cumulative the solar photovoltaic capacity is expected



**Figure 3: The Solar Photovoltaic Have The Biggest Installed Capacity of The Solar Energy Expansion By 2050.**



**Figure 4: Comparison Between The 2018 Levels, That Cumulative The Solar Photovoltaic Capacity Is Expected.**



**Figure 5: Illustrates The Speedy Growth of the Solar Photovoltaic, with the Costs.**

Solar PV emerges after a decade of drastic cost decreases as one of the most competitive sources of modern power generation energy. Around 2010 and 2018, there was a 74 percent decrease in gross installed costs. Figure 5 shows the speedy growth of the solar photovoltaic, with the costs.

### 3. Solar Thermal:

Solar heat can be collected directly and used as a second method to utilise solar energy in a variety of ways. Solar thermal power has a broader range of applications than a photovoltaic battery, but is not as useful as photovoltaic for low-scale power generation. The solar thermal energy of low temperatures is used for heating and cooling; solar heat energy of mid-temperature is used to heat water; solar thermal energy of high temperatures is used as an electric power generator. Low-temperature solar thermal energy systems use air heating and cooling to regulate the temperature. Passive solar building design is an example of this form of solar energy utilized. Sunlight is permitted to fill an area in a living room and obscured if the area has to be cooled in properties intended for passive use of solar energy.

### 4. Advantage of Solar Energy:

The simplest way for separate owners to protect money from solar energy is to instil in home solar PV battery. You must shop from the market on the Energy Sage Solar to bargain the right equipment at the right cost. After you register, you can get free solar quotation from qualifying solar installers. Our form of comparing apple to apple allows you to help compare offers and keys metrics like energy requirements and costs per watt.

## CONCLUSION

Many citizens are aware of energy supplies that are not sustainable. The economic benefits of solar power have become increasingly common. With the Battery Backup, even gloomy days and at night, Solar Energy can supply Electricity 24x7. This is often used for a constant power supply inter-grid scheme. Associated to other energy sources such as fossil fuels and oil reserves, it is more beneficial. This is a promising and consistent alternative to satisfy the high demand for oil. Research on solar cells and solar energy is promised to have a future worldwide. In this paper, author explain about the solar panel that how solar panel helps to produce the electricity and how in present time solar panel becomes the important part of the human lives. Furthermore, author also discussed about the solar thermal, usable power by harnessing solar energy and photovoltaic solar energy. In future, the optimum efficiency of solar panels is about 33 percent, which means not most solar energy from the sun goes to waste in the most perfect conditions. This presents a huge challenge to solar systems in order for the energy sector to expand exponentially.

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