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PROJECT ON: SOLAR THERMAL POWER PLANT

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|  | **A solar power plant** is a system that generates electricity by using solar panels to convert sunlight into useful electricity. [**A solar power plant usually has the following components**](https://www.bing.com/ck/a?!&&p=f52b8f70c2cf53bcJmltdHM9MTY5NjU1MDQwMCZpZ3VpZD0yOTI3Y2QzOC0zMzE0LTZkOTAtMTczZS1kZDA5MzJiOTZjNzAmaW5zaWQ9NTc3OA&ptn=3&hsh=3&fclid=2927cd38-3314-6d90-173e-dd0932b96c70&psq=about+solar+power+plant+in+brief+&u=a1aHR0cHM6Ly9pbnRlcmVzdGluZ2VuZ2luZWVyaW5nLmNvbS9pbm5vdmF0aW9uL2hvdy1kb2VzLWEtc29sYXItcG93ZXItcGxhbnQtd29yaw&ntb=1)**:**   * Solar panels that produce direct current (DC) electricity from sunlight * Inverters that transform the DC into alternating current (AC) electricity * A monitoring system that controls and manages the plant * A connection to an external power grid that distributes the electricity * Step-up transformers that increase the voltage of the electricity if the plant generates more than 500 kW. |

**What is Solar Power Plant?**

The solar power plant is also known as the Photovoltaic (PV) power plant. It is a large-scale PV plant designed to produce bulk electrical power from solar radiation. The solar power plant uses solar energy to produce electrical power. Therefore, it is a conventional power plant.

Solar energy can be used directly to produce [electrical energy](https://www.electricaltechnology.org/2020/12/electrical-energy.html) using solar PV panels. Or there is another way to produce electrical energy that is concentrated solar energy. In this type of plant, the radiation energy of solar first converted into heat (thermal energy) and this heat is used to drive a conventional generator. This method is difficult and not efficient to produce electrical power on a large scale.

Hence, to produce electrical power on a large scale, solar PV panels are used. In this article, we will explain details about solar PV plants and PV panels. Below is the layout plan of photovoltaic power plant.

Solar energy offers many benefits:

Solar energy offers clean power. It doesn't present the risk of a nuclear spill, but it is in fact a release of radiation, only some of which is visible light. It can be scaled to any size or complexity, from warming a room through a window to powering a utility grid.

The Union of Concerned Scientists lists numerous benefits, beginning with solar energy being inexhaustible and free. The attractiveness of solar power production varies with the economics of investing in equipment, and cost competition from fossil fuels. Scientific American estimates the cost of solar power falling below the current average power cost by 2018 or 2020.

## **Common Ways to Harvest Solar Energy**

Solar radiant heat is easily captured by simple glass greenhouses, and through residential windows. "Concentrated" solar energy uses huge arrays of mirrors to focus sunlight on a central tower, which heats water to generate steam that can be used to generate electricity.

Photovoltaic (PV) cells convert sunlight directly to electricity through the photoelectric effect. NASA describes how the silicon semiconductors in the cells capture energy from sunlight's photons, which dislodge electrons in the semiconductor, creating a current. Groups of cells form modules, and modules combine into larger arrays. These can be configured to produce any combination of voltage and current.

**How does solar energy prevent pollution?**

Solar energy could play a significant part in reducing pollution on a global scale. A [**recent paper**](http://blogs.edf.org/energyexchange/2017/12/13/rooftop-solar-and-evs-save-water-and-cut-pollution-and-data-can-help-us-go-further/#:~:text=Because%20solar%20panels%20consume%20no,pollution%20associated%20with%20grid%20electricity) published in Energy Economics revealed that residential solar panels use less water and create less air pollution than using the central-grid power, because the electricity generated by the panels does not need to come through a [**coal-powered**](https://www.greenmatters.com/p/britain-18-days-without-coal-powered-electricity) power plant. Without the necessity for burning fossil fuels, the power created by solar panels comes with no smog or toxic runoff.

According to the United States [**Environmental Protection Agency**](https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#:~:text=Electricity%20production%20(26.9%20percent%20of,mostly%20coal%20and%20natural%20gas.) (EPA), 31 percent of [**greenhouse gases**](https://www.greenmatters.com/p/what-is-the-greenhouse-effect) in the U.S. come from electricity production. In addition, approximately 63 percent of our electricity comes from burning fossil fuels, like coal and natural gas.

Solar energy requires no water to create power or [**water pollution**](https://www.greenmatters.com/p/what-can-we-do-to-prevent-air-pollution), even after the energy has been made ready for homes and businesses. This is opposed to conventional electric power plants, which use insane amounts of water and pollute whatever they don’t utilize. [**Further data from the EPA**](https://www.epa.gov/sites/production/files/2015-10/documents/steam-electric-envir_10-20-15.pdf) has stated that thermoelectric power plants contribute to 50 percent to 60 percent of all toxic pollutants discharged into surface waters.

### Major Solar Power Plants in India –

**Bhadla Solar Park**

1. Bhadla Solar Park is the world’s largest solar park located in India which is spread over a total area of 14,000 acres in Bhadla, Phalodi tehsil, Jodhpur district, Rajasthan, India.
2. The region has been described as “almost unlivable” due its climate. Average temperatures in Bhadla hover between 46 and 48 degrees Celsius. Hot winds and sand storms occur frequently. Bhadla is a sandy, dry and arid region with an area of about 45 km2.
3. The Solar park has a total capacity of 2,245 MW.
4. When its full capacity is operational, the park will become the world’s largest fully commissioned PV project, with investment rising to Rs 10,000 crore (US$1.3 billion).

**Pavagada Solar Park**

1. Pavagada Solar Park is a solar park covering an area of 53 square kilometres (13,000 acres) in Pavagadataluk, Tumkur district, Karnataka.
2. The Solar Power park has a capacity of 2,050 MW and is the World’s second largest photovoltaic solar park after 2245 MW Bhadla Solar Park in Rajasthan.
3. It was completed in 2019.

**Kurnool Ultra Mega Solar Park**

1. Kurnool Ultra Mega Solar Park is a solar park spread over a total area of 5,932.32 acres in Panyammandal of Kurnool district, Andhra Pradesh, with a capacity of 1,000 MW.
2. The park was built at an investment of around ₹7,000 crore (US$980 million) by solar power developers and the Central and State governments.
3. It was commissioned on 29 March 2017 and owned by Andhra Pradesh Solar Power Corporation Private Limited (APSPCL).

**NP Kunta Ultra Mega Solar Park**

1. The NP Kunta Ultra Mega Solar Park, also known as Ananthapuram Ultra Mega Solar Park, is a solar park spread over a total area of 7,924.76 acres in Nambulapulakuntamandal in the Ananthapur district of the Indian state of Andhra Pradesh.
2. It was commissioned in May 2016, and is owned by Andhra Pradesh Solar Power Corporation Private Limited (APSPCL).

**Rewa Ultra Mega Solar**

1. Rewa Ultra Mega Solar is the first solar project in the country to break the grid parity barrier. It is one of the largest solar power plants in India and Asia’s Largest Single site solar plant.
2. Rewa Ultra Mega Solar Limited (RUMSL), the implementing agency of the project, is a joint venture between the Madhya Pradesh UrjaVikash Nigam Limited (MPUVNL) and the Solar Energy Corporation of India (SECI).
3. Rewa is the first project in India to be supplying power to an inter-state open access customer, viz., Delhi Metro. This is also the first project in India where solar power would be used for railway traction.
4. The project got the World Bank Group’s President’s Award for excellence for its transaction structure.

**Charanka Solar Park**

1. Gujarat Solar Park-1 (also called Charanka Solar Park) is currently in the process of development on a 2,000-hectare (4,900-acre) plot of land near Charanka village in Patan district, northern Gujarat.

**Kamuthi Solar Power Project**

1. Kamuthi Solar Power Project is a photovoltaic power station spread over an area of 2,500 acres in Kamuthi, Ramanathapuram district, 90 km from Madurai, in the state of Tamil Nadu, India.

**Kadapa Ultra Mega Solar Park**

1. Kadapa Ultra Mega Solar Park is a solar park spread over a total area of 5,927.76 acres in the Mylavarammandal of Kadapa district, Andhra Pradesh.The project is being implemented by the Andhra Pradesh Solar Power Corporation Private Limited (APSPCL), a joint venture of Solar Energy Corporation of India (SECI), Andhra Pradesh Power Generation Corporation and the New & Renewable Energy Development Corporation of Andhra Pradesh Ltd.

### Ultra Mega Solar Power Projects

1. Ultra Mega Solar Power Projects, also known as Ultra Mega Solar Parks, are a series of solar power projects planned by the Ministry of New and Renewable Energy of the Union Government of India.
2. In December 2014, the Government of India introduced a scheme to establish at least 25 solar parks and Ultra Mega Solar Power Projects, adding over 20 GW of installed solar power capacity. The Central Government provides financial support for the construction of these solar projects.

What are the environmental and social impacts of solar thermal power plants in India?

Solar thermal power plants use concentrated sunlight to generate heat and electricity. They are seen as a promising renewable energy source for India, which has abundant solar potential and growing energy demand. But what are the environmental and social impacts of these plants? How do they affect the local communities, ecosystems, and climate? In this article, we will explore some of the benefits and challenges of solar thermal power plants in India.Solar thermal power plants can also have social and cultural implications for the local communities. On the positive side, they can provide employment opportunities, income generation, skill development, and social services. They can also enhance the access to electricity and improve the quality of life. On the negative side, they can cause land conflicts, displacement, resettlement, compensation, and consultation issues. They can also affect the cultural and religious values, traditions, and practices of the local people. Therefore, it is important to involve the stakeholders and ensure their participation, consent, and benefit-sharing.The development of solar thermal power plants in India depends largely on the policy and regulatory framework that supports or hinders their implemrenewable energy, including 100 GW of solar power by 2022.Advantages of solar thermal power

One of the main advantages of solar thermal power plants is that they can [**reduce greenhouse gas emissions**](https://www.linkedin.com/advice/0/how-can-waste-hierarchy-reduce-greenhouse-gas?trk=article-ssr-frontend-x-article_little-text-block) and air pollution. Unlike fossil fuels, they do not emit carbon dioxide, nitrogen oxides, sulfur dioxide, or particulate matter. They can also help India diversify its energy mix and reduce its dependence on imported coal, oil, and gas. Solar thermal power plants can also create jobs and stimulate economic development in rural areas, where most of the suitable sites are located.

## Disadvantages of solar thermal power

However, solar thermal power plants also have some disadvantages that need to be addressed. One of them is the high water consumption. Solar thermal power plants use water to cool the steam turbines, clean the mirrors or lenses, and generate steam in some cases. Water is a scarce and precious resource in many parts of India, especially in arid and semi-arid regions. Solar thermal power plants can compete with agriculture, industry, and domestic use for water access and quality. They can also affect the hydrological cycle and the aquatic ecosystems.