



# SOLAR POWER & TECHNOLOGY: THE VISION OF 100 GW

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## Abstract

In India, thermal power plants suffer from issues like fuel scarcity, availability of site and other environmental concerns due to which India is lagging in its energy requirements which leads to the making a trench between demand & supply of energy. To overcome this issue, GoI is focusing on exploration of renewable energy resources, which leads in bridging the demand supply gap along with eco-friendly addition in power generation capacity. The latest development in Indian renewable energy sector shows a dynamic growth in solar power capacity addition & achieving a tariff, which is competitive to that of thermal power plants. This research would make a way for achieving the milestone & future of prospect of solar power technologies in India.

**Keywords:** SECI (Solar Energy Corporation of India), CPWD (Central Public Works Department), VGF (Viability Gap Funding), BIPV (Building Integrated Photo Voltaics), PV (Photo Voltaics), CSP (Concentrated Solar Power), T&D (Transmission & Distribution), MW (Mega Watt), GW (Giga Watt)

## Introduction

Renewable energy, undoubtedly, is the future of India's target of achieving 227 GW (earlier 175 GW) of renewable energy capacity by 2022 might appear ambitious, but it is crucial as it will have a positive impact on the country's economic growth, energy security and the fight against climate change. As of August 2020, of the 175 GW interim target, 89 GW is already operational, 25 GW is under installation, 28 GW is under bidding, and remaining 32 GW is under planning. 227 GW target includes 113 GW of solar, 66 GW of wind, 10 GW of bio mass, 5 GW of small hydro & 31GW from floating solar and offshore wind power. The above data clearly shows that out of all renewable energy resources available, harnessing of solar energy is most promising & targeted area of Govt. of India. Solar energy has started to light lives of tens of millions of India's energy-poor citizens. It is one of the low carbon energy technologies with the potential to grow to a very large scale. The Govt. of Indian had an initial target of 20 GW capacity for 2022, which was achieved four years ahead of schedule. In 2015 the target was raised to 100 GW of solar power capacity installation (including 40 GW from rooftop solar) by 2022, targeting an investment of US\$100 billion. As on 31.08.2020 India has established nearly 42 solar parks to make the availability of land to the promoters of solar plants. Now days, due to various initiative taken by Govt. of India, solar power tariff is coming down from Rs. 10 per unit in 2011 to Rs. 3 per unit in 2019.

## Govt. framework for solar power

Government push and support in the form of programmes and initiatives are needed to enable an increase in solar power

at a subsidized solar energy cost. Below are some major initiatives taken by the government in the solar sector to push more and more individuals and companies globally to go solar:

### 1. Jawaharlal Nehru National Solar Mission

Govt. of India launched Jawaharlal Nehru National Solar Mission in January 2010 with the target of solar power installation capacity of 20 GW by 2022, which was increased to 100 GW in 2015. The aim of JNNSM is not limited to offering large-scale grid-connected power but also transform India's rural economy. The quick spread of solar lighting systems, water pumps, and other solar power-based applications will change India's rural economy. The mission is to expand and establish India as a global leader in solar energy sector.

### 2. Solar Rooftop Scheme

Nodal agency of execution for solar rooftop is SECI (Solar Energy Corporation of India), to which 200 MW of projects has been allocated, out of which 45 MW of capacity have already been commissioned. Addition to this, special schemes including 73 MW for warehouses and 50 MW for the CPWD (Central Public Works Department) have been launched. SECI floated a tender which is the largest global one of its kind offering 30% subsidy to the residential sector, private not for profit education organizations, social sector, and the health institutions. The tender is a part of MNRE's initiative to generate momentum for achieving the target of 40GW of rooftop solar power generation by 2022.

### 3. Government Yojana Solar Energy Subsidy Scheme

This Scheme aims to provide financial assistance and capital subsidy to the applicant to the extent of 50 percent, 75 percent and 90 percent on the basis of basic cost of the solar energy plant and capacity of the solar power plant. The scheme is mainly formulated to encourage the power loom by utilizing solar energy.

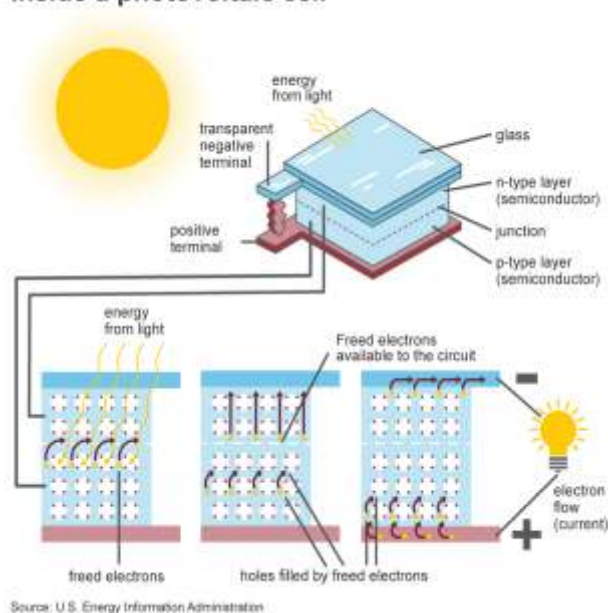
### 4. VGF (Viability Gap Funding) Scheme

The implementing agency of Viability Gap Funding scheme is SECI. In the past few years, SECI has made multiple project allocations under the VGF mechanism. VGF support will be provided for setting up of grid-connected solar PV projects of a minimum 2000 MW capacity by solar power developers on build own operate basis. The first 750 MW allocation has already been executed of which 680 MW capacity has been installed and commissioned.

### 5. Solar Park Scheme

Solar park scheme is launched by MNRE to set up of solar parks across several states, each with a capacity of almost 500 MW. Under this scheme financial support is being offered by the Govt. of India to establish solar parks and also facilitate the creation of infrastructure required for setting up new solar power projects in terms of allocation of land, transmission, access to roads etc. These solar parks will be developed in collaboration with the respective State Governments. The implementation agency for this scheme is SECI on behalf of Government of India.

#### Inside a photovoltaic cell



The figure shown below shows the pictorial representation of CSP:

### Solar power technologies

Due to an ever increasing demand of clean energy, a sharp rise in the utilization of naturally available solar energy has been observed. Currently, there are several possible solar energy technological developments. There are two main types of solar technology:

- Solar photovoltaics (PV)
- concentrated solar power (CSP)

In Solar PV technology, sunlight is used to generate electric power, and in CSP technology, the sun's heat uses to generate thermal energy that powers heaters or turbines.



With these two forms of solar energy comes a wide range of opportunities for technical innovation. But there are also several exciting new solar panel technologies either in the pipeline or already on the market. These promising technologies will revolutionize the way we think about not just solar, but energy production in general. Solar no longer requires large areas of land or roof space, nor does it need to look boring. The latest technologies include:

- Building integrated photovoltaics technology which blends into building architecture in the form of roofs, facades, canopies, curtain walls. Unlike traditional solar PV panels, BIPV can be aesthetically appealing rather than a compromise to a building's design.
- Floating solar farms technology, in which photovoltaic panels are placed on reservoirs and other water bodies, where they offer even greater efficiency. "Floatovoltaics" are photovoltaic solar power systems created for floating on reservoirs, dams, and other water bodies.
- Solar skins are a novel PV technology to integrate custom designs into solar panel systems. The solar skin technology is similar to the ad wraps displayed on bus windows.
- Solar fabric technology is a technology, developed for textiles, which synchronizes solar modules with textiles/fabrics. Solar fabricated household clothing can help in saving on solar panel mounting and installation costs.

Solar cell manufacturing companies are also working specifically on the US Army project with a vision to create solar-powered robotic tents.

### **Conclusion**

As India has a mission objective of establishing India as a global leader in solar energy by creating the policy conditions for solar technology diffusion across the country as quickly as possible. So National Solar Mission with interim target installation 100 GW grid-connected solar power plants by the year 2022. This is line with India's Intended Nationally Determined Contributions (INDCs) target to achieve about 40 percent cumulative power installed capacity from non-fossil fuel based energy resources and to reduce the emission intensity of its GDP by 33 to 35 percent from 2005 level by 2030. Govt. is also opting various measures like declaration of trajectory for Renewable Purchase Obligation (RPO) including Solar, Waiver of Inter State Transmission System

(ISTS) charges and losses for inter-state sale of solar and wind power for projects to be commissioned up to March 2022. By focusing on solar park, solar ponds, solar thermal & BIPS technology adoption aligned with government initiatives for solar power development, India would easily achieve its targeted installed capacity of 100 GW by 2022.

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