



## Solar Energy and India's Net-Zero Target

This article is based on [“Solar energy can help India achieve net zero ”](#) which was published in Hindustan Times on 07/11/2022. It discusses how solar energy can help India achieve its Net-Zero target.

**For Prelims:** Clean Energy, Solar waste, International Solar Alliance National Solar Mission, PM-KUSUM, One Sun One World One Grid (OSOWOG), Atmanirbhar Bharat, Net-Zero Emission Target.

**For Mains:** Solar Energy and Development in India, Challenges Related to Solar Energy, Government Schemes to Enhance Solar Energy Production in India.

The world is on the cusp of a [Solar Revolution](#). Not only is solar the world's **most abundant and clean energy source**, with its widespread acceptance, it has become the common energy imperative to drive [international climate action](#).

Many countries are in line to solar acceptance, with India leading the way, **giving it the scale and affordability that global climate action asks for**. Solar energy is playing a key role not **only in the developing world to tackle energy access and energy security**, but also in developed countries to **facilitate [energy transition](#)**.

Despite technological superiority over other energy technologies, solar energy is facing an important challenge as the **global photovoltaic (PV) manufacturing supply chain is concentrated in a handful of countries**, which resulted in **recent price surges** because of the choking of **existing limited supply chains**.

### How can Solar Energy Facilitate Development in India?

- **Job Generation:** The Solar Sector has immense potential to create new jobs, **1 GW of Solar manufacturing facility generates approximately 4000 direct and indirect jobs**.
  - In addition solar deployment, operation and maintenance can create additional recurring jobs in the sector.
- **Environmental Development:** India's energy demands are largely fulfilled by [non-renewable sources of energy](#).
  - The **scarcity of these fossil resources** stresses the need for renewable energy sources. Abundance of solar energy can fulfil India's [clean energy demands](#).
- **Energy Security:** India being a **developing economy** needs proper electricity for industrial growth and agriculture.
  - For achieving **self-sufficiency and minimal cost in power generation**, assured regular supply, solar energy can play a vital role.
- **Social development:** The problem of power cuts and unavailability of electricity, especially in rural areas, leads to **improper human development**.

- The use of **solar energy can enable [social development](#)** in even the most remote areas of India.

## What are the Challenges Related to Solar Energy in India?

- **High Dependency on Imports:** India still is largely dependent on foreign countries like China for **solar modules**.
  - **Backward integration in the solar value chain is absent** as India has no capacity for manufacturing solar wafers and polysilicon.
  - In 2021-22, India imported nearly **USD 76.62 billion worth of solar cells and modules from China alone**, accounting for **78.6% of India's total imports that year**.
- **Land Scarcity:** Solar projects that are **ground-mounted require** a vast area for installation. **Per capita land availability in India is very low**, and land is a scarce resource.
  - Installing solar cells near substations may have to compete with other land-based necessities for a small area of land.
- **Losses in Cost and T&D (Transmission and Distribution):** Solar energy is also having problems with **cost competitiveness** and competing against other energy generation technologies.
  - The cost of **T&D losses is approximately 40%**, making generation through solar energy sources highly **unfeasible**.
- **No Solar Waste Management Policy:** Despite ambitious solar installation targets, India does not have a policy for managing its **solar waste**. Solar waste consists of discarded solar panels. It is predicted to grow by **4 to 5 times** within the next ten years.
- **Acceptability Concern:** Despite the fact that solar energy production techniques have been improvised in India, **it has not yet been commercialised**.
  - Topographically and climatically, **sun rays are not uniformly available at any particular place throughout the year**, and people (particularly farmers), have not yet been educated about its advantages and benefits.
- **Low Cost to Benefit Ratio:** Despite significant growth in the installed solar capacity, the **contribution of solar energy to the country's power generation has not grown at the same pace**.
  - In 2019-20, for instance, solar power contributed **only 3.6% (50 billion units)** of India's total power generation of 1390 BU.

## What are the Related Government Schemes to Enhance Solar Energy Production in India?

- [International Solar Alliance](#)
- [National Solar Mission](#)
- [Kisan Urja Suraksha evam Utthaan Mahabhiyan \(PM-KUSUM\)](#)
- [One Sun, One World, One Grid \(OSOWOG\)](#)

## What Should be the Way Forward?

- **Solar Self Reliance:** India needs to **cultivate a strong domestic solar energy market supporting the vision of [Atmanirbhar Bharat](#)**.
  - The best way to support the development of solar PV manufacturing projects is direct support to **upstream actors**, for instance through **Design and Production Linked Incentives**.
- **Bio Solar Cells:** India can also explore the use of **bio solar cells** by generating electricity from **microbial photosynthetic and respiration processes**.
- **Towards Global Solar Manufacturing Hub:** Given its **geographical location and abundance of resources**, India is nicely positioned to become a global hub of solar manufacturing.
  - **India's solar story** will continue to provide important lessons for other developing countries that are looking to **transition to clean energy**.

- With 110 members and signatory countries, the India led **International Solar Alliance is making efforts to bring about this change.**
- **Technology sharing and finance** could also become important aspects of ISA in the future, allowing for meaningful cooperation between countries in the solar energy sector.
- **Catalysing Net Zero Target: Solar Mini Grids and community rooftop solar installations** can enable the solar shift in India. **Localised Solar energy** is the one which could become the cornerstone of the [net-zero India that we are aiming to see in 2070.](#)
- **Reducing T&D Loss:** India can encourage **R&D activities to find more innovative solutions to cut down T&D loss** by establishing research centres and funding gives some relief to solar energy players.
  - In addition, India can collaborate with world-renowned universities for the upgradation of substations and T&D lines to **reduce T&D losses.**

### ***Drishti Mains Question***

“Despite significant growth in the installed solar capacity, the contribution of solar energy to the country’s power generation has not grown at the same pace”. Discuss.

## **UPSC Civil Services Examination Previous Year Question (PYQ)**

### **Prelims**

**Q. Consider the following statements: (2016)**

1. The International Solar Alliance was launched at the United Nations Climate Change Conference in 2015.
2. The Alliance includes all the member countries of the United Nations.

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**Ans: (a)**

### **Mains**

**Q. India has immense potential of solar energy though there are regional variations in its developments. Elaborate (2020)**