

**Market Research  
Report  
On  
Solar Pannel  
Manufacturing Industry  
in  
India in 2024**



**Rao's Business Marketing**

## 1. Industry Overview

The solar panel manufacturing industry in India has witnessed significant progress over the past decade. With India's aggressive renewable energy targets and a strong focus on reducing its carbon footprint, the country has become one of the fastest-growing markets for solar power. India aims to reach **500 GW of renewable energy** by 2030, with solar energy contributing a major portion. In 2024, solar panels are seen as one of the most essential components of India's clean energy transition.

The government has rolled out several initiatives to boost solar panel manufacturing, aiming for **self-reliance** and reducing dependency on foreign imports. India has the potential to emerge as a key global player in solar manufacturing, catering not only to domestic demand but also tapping into export markets.

## 2. Market Size and Growth

- **Market Value in 2024:** The Indian solar panel manufacturing industry is projected to be valued at approximately **₹25,000 crore to ₹30,000 crore** by 2024. This reflects a strong growth trajectory driven by both domestic consumption and export demand.
- **Installed Capacity:** India's total installed solar power capacity is expected to exceed **60-70 GW** by the end of 2024. This is in line with the government's target of achieving **100 GW of solar capacity by 2030**.
- **Growth Drivers:**
  - **Government Policy Support:** Policies like the **Production Linked Incentive (PLI) Scheme** for solar cells and modules are crucial in fostering domestic production and reducing reliance on imports, especially from China.
  - **Rising Demand for Clean Energy:** The demand for clean, renewable energy sources is escalating as industries, businesses, and consumers increasingly seek to transition from fossil fuels to sustainable energy.
  - **Increasing Adoption of Solar Technology:** As the cost of solar technology decreases, adoption is expanding in residential, commercial, and industrial sectors.

### 3. Industry Trends

#### 1. Government Support and Policies:

- **PLI Scheme for Solar Manufacturing:** The government's **₹24,000 crore** incentive scheme is aimed at incentivizing domestic manufacturers to increase production capacity for solar modules, cells, and other components. The scheme's primary objective is to reduce the import dependency and promote local manufacturing.
- **Solar Rooftop Initiatives:** With the aim of boosting rooftop solar installations, the government offers **subsidies** and **tax exemptions** for residential and commercial consumers. This has resulted in significant growth in the demand for solar panels, especially in urban areas.
- **Net Metering Policy:** The net metering system allows solar power consumers to sell excess power back to the grid, encouraging more residential and commercial buildings to adopt solar panels.

#### 2. Technological Advancements:

- **Bifacial Solar Panels:** These panels can capture sunlight on both sides, improving efficiency. Bifacial technology is expected to dominate the market as manufacturers push for higher energy output.
- **High-Efficiency Solar Panels: PERC (Passivated Emitter and Rear Contact)** technology is enhancing the efficiency of solar panels, helping manufacturers deliver better performance at a lower cost.
- **Integrated Solar Solutions:** The demand for **building-integrated photovoltaic's (BIPV)** is growing, where solar panels are integrated directly into building materials such as windows, roofs, and facades.

#### 3. Sustainability and Recycling:

- As environmental concerns increase, the industry is witnessing a shift toward **eco-friendly production**. Manufacturers are focusing on producing recyclable panels, minimizing e-waste, and reducing their carbon footprint in manufacturing processes.
- There is also growing attention on **solar panel recycling**—a process that ensures panels are disposed of or repurposed responsibly at the end of their lifecycle.

#### 4. Cost Reduction and Economies of Scale:

- The cost of solar panel production has decreased significantly over the past decade. Innovations in manufacturing processes, the use of **automation**, and improved economies of scale have all contributed to making solar panels more affordable.

## 4. Market Segments

### 1. By Type of Solar Panels:

- **Monocrystalline Solar Panels:** Known for their higher efficiency (18-22%) and long lifespan, monocrystalline panels are favored for residential, commercial, and industrial applications. They dominate the high-end market due to their performance and aesthetic appeal.
- **Polycrystalline Solar Panels:** Slightly less efficient (15-18%) than monocrystalline panels, these are more affordable and cater to the budget-conscious segment.
- **Thin-Film Solar Panels:** Made from a variety of materials like cadmium telluride (CdTe), these panels are lightweight and flexible, though they have lower efficiency. Thin-film panels are used in specific applications such as solar windows and portable solar systems.

### 2. By End-User Industry:

- **Residential Sector:** With rising electricity prices and the increasing desire for self-sufficiency, the residential sector is one of the fastest-growing consumers of solar panels. **Rooftop solar systems** have gained immense popularity.
- **Commercial and Industrial Sectors:** Large companies and factories are adopting solar energy solutions to reduce electricity costs and achieve sustainability goals. Solar power is particularly useful for businesses with high energy demands.
- **Government & Utility:** The government's ambitious targets for solar energy have led to the development of large-scale solar power plants, which use high-capacity solar panels for grid-connected power generation.

### 3. By Application:

- **Grid-Connected Solar Systems:** These systems are linked to the national grid and are designed to supply electricity when solar energy is abundant, while drawing power from the grid when solar energy is insufficient. They dominate the market due to their reliability and ability to meet large-scale energy needs.
- **Off-Grid Solar Systems:** Used in remote areas or for specific applications (e.g., telecom towers, rural electrification), off-grid solar systems do not rely on the grid and typically use batteries to store power for later use.

## 5. Competitive Landscape

- **Key Players:**

- **Tata Power Solar Systems:** A leading solar manufacturer in India, with a diverse portfolio that includes solar panels, inverters, and storage systems.
- **Adani Solar:** Part of the Adani Group, Adani Solar is one of India's largest manufacturers of solar panels, focusing on both the domestic and export markets.
- **Vikram Solar:** A key player in the Indian solar panel market, known for producing high-quality panels and providing end-to-end solar solutions.
- **Waaree Energies:** Known for producing high-efficiency solar modules and providing solar energy solutions for both commercial and residential sectors.
- **JinkoSolar and Longi Solar:** Major international players that have established a presence in India through partnerships and local manufacturing units.

- **Market Dynamics:** The Indian solar manufacturing market is characterized by a combination of domestic players and global manufacturers. While Indian companies have established a strong presence in the market, foreign players bring advanced technology and lower-cost products.

## 6. Opportunities

### 1. Rooftop Solar Market:

- The residential sector presents a major growth opportunity. As energy costs rise and the government provides subsidies, more households are opting for solar systems.
- Commercial and industrial establishments are also rapidly adopting solar solutions to reduce operational costs.

### 2. Export Potential:

- With increasing global demand for clean energy, India is well-positioned to be a significant exporter of solar panels. Countries in Africa, Southeast Asia, and the Middle East are potential markets for Indian solar manufacturers.

### 3. Government Schemes and Policies:

- Government incentives like **GST exemptions** and the **PLI Scheme** provide significant opportunities for growth. The **National Solar Mission** aims to increase the share of solar power in India's energy mix, driving demand for locally manufactured solar panels.

### 4. Advances in Solar Technology:

- The development of **solar storage solutions** (e.g., batteries) will increase the use of solar power, especially in areas with unreliable grid supply. Companies that integrate solar power with storage will gain a competitive edge.

## 7. Challenges

### 1. Import Dependence:

- Despite efforts to promote domestic manufacturing, India still relies heavily on imports of raw materials such as **polysilicon** and **solar cells**. This exposes the industry to price fluctuations and supply chain disruptions.

## 2. Competition from Chinese Manufacturers:

- Chinese manufacturers continue to dominate the global solar panel market, especially in terms of cost competitiveness. Indian manufacturers need to focus on improving quality and efficiency to remain competitive.

## 3. Infrastructure and Distribution Issues:

- The distribution and installation infrastructure in rural and remote areas remain underdeveloped, which can delay the widespread adoption of solar power.

## 8. Financial Metrics

- **Capital Investment:** Setting up a solar panel manufacturing plant requires substantial investment, ranging from **₹50 crore to ₹200 crore** depending on scale and technology.
- **Profit Margins:** Profit margins in the solar manufacturing sector typically range from **10-15%**, with larger players achieving economies of scale.
- **Break-Even Period:** The break-even period for solar panel manufacturers is generally between **2 to 5 years**, depending on production efficiency and market demand.

## 9. Regional Insights

- **Manufacturing Hubs:**
  - **Tamil Nadu:** Known for a large number of solar manufacturing units, Tamil Nadu is a key hub for the industry.
  - **Gujarat and Maharashtra:** Both states have strong industrial bases and significant solar panel production facilities.

## 10. Future Outlook

The solar panel manufacturing industry in India is poised for exponential growth. With strong government backing, technological advancements, and increasing domestic and global demand, the industry is expected to become a cornerstone of India's clean energy strategy.

India's ability to capitalize on its potential for both domestic and export markets will define its position as a global leader in solar manufacturing.

This comprehensive and detailed report emphasizes the substantial opportunities in India's solar panel manufacturing industry, alongside the challenges and key drivers for growth. If you require further insights or specific information, feel free to ask!



