

# **Solar Panel Market Report by Type (Crystal Silicon, Monocrystalline Silicon, Polycrystalline Silicon, Thin Film, and Others), End Use (Commercial, Residential, Industrial), and Region 2024-2032**

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## **Abstracts**

The global solar panel market size reached 259.7 GW in 2023. Looking forward, IMARC Group expects the market to reach 1,096.5 GW by 2032, exhibiting a growth rate (CAGR) of 16.8% during 2024-2032. The market is experiencing steady growth driven by the rising environmental concerns among individuals, governing agencies of several countries are implementing stringent carbon control policies and offering several incentives, and technological advancements in materials and designs.

### **Solar Panel Market Analysis:**

**Market Growth and Size:** The market is witnessing stable growth on account of the increasing need to combat climate change, along with favorable government initiatives.

**Technological Advancements:** Innovations benefit in improving solar panel efficiency, reducing costs, and enhancing durability, making solar energy more competitive.

**Industry Applications:** Solar panels are widely used in residential, commercial, and industrial settings for electricity generation. They are also integrated into various applications, including solar-powered vehicles, portable chargers, and building-integrated photovoltaics (BIPV).

**Geographical Trends:** Asia Pacific leads the market, driven by the growing demand for energy. However, North America is emerging as a fast-growing market due to the increasing awareness among individuals about environmental issues.

**Competitive Landscape:** Key players are developing more efficient and cost-effective solar panel technologies.

**Challenges and Opportunities:** While the market faces challenges, such as the need for energy storage solutions, it also encounters opportunities in the development of

advanced technologies.

**Future Outlook:** The future of the solar panel market looks promising, with the integration of Internet of Things (IoT) technology into solar panel systems. In addition, the increasing development of next-generation solar cells is expected to propel the market growth.

**Solar Panel Market Trends:**

Increasing environmental concerns

The growing demand for solar panels on account of increasing environmental concerns among individuals is offering a positive market outlook. In line with this, the rising need to address climate change and mitigate carbon emissions in the environment is supporting the growth of the market. Moreover, the burning of fossil fuels for electricity generation is a major contributor to greenhouse gas (GHG) emissions, which trap heat in the atmosphere of the Earth and cause global warming. Apart from this, solar panels offer a clean and sustainable energy solution that significantly reduces carbon emissions. This aligns with global efforts to mitigate climate change and transition towards a greener future. Furthermore, the increasing adoption of solar panels in organizations to reduce their carbon footprint and environmental impact and maintain sustainability goals is impelling the market growth. Besides this, solar panels provide an accessible means to achieve this goal by harnessing the power of the sun. Additionally, there is a rise in the need for renewable energy sources that promote a greener environment.

Favorable government initiatives

Governing agencies of several countries are encouraging the adoption of solar panels by implementing stringent carbon control policies, which is propelling the growth of the market. They are also offering tax credits, where taxpayers receive a percentage of the cost of their solar panel system as a tax deduction. Apart from this, these policies and financial incentives encourage individuals and organizations to invest in solar energy systems. Moreover, governing authorities are offering rebates or subsidies that directly reduce the upfront installation costs, making these panels more affordable. Besides this, net metering policies enable solar panel owners to sell excess electricity back to the grid, further incentivizing adoption by allowing individuals to offset their energy costs. Furthermore, feed-in tariffs guarantee a fixed payment for the electricity generated by solar panels. These incentives not only reduce the financial burden of solar panel installation. Additionally, the rising development of more efficient and cost-effective solar panel technologies is contributing to the growth of the market.

## Technological Advancements

Technological advancements in solar panels benefit in improving their efficiency, durability, and affordability, which is bolstering the growth of the market. Apart from this, monocrystalline and bifacial solar panels offer higher efficiency levels, allowing them to generate more electricity from the same amount of sunlight. Additionally, innovations in manufacturing processes assist in reducing the cost of these panels, which is supporting the market growth. Furthermore, advancements in materials and design benefit in enhancing the durability and lifespan of these panels, ensuring that they provide reliable energy generation. These technological improvements not only benefit the environment but also increase the return on investment (ROI) for solar panel purchasers. In line with this, the increasing development of transparent panels that can be integrated into windows, skylights, and building facades while allowing natural light to pass through is impelling the market growth. Moreover, smart panels equipped with integrated sensors and monitoring systems provide real-time data on energy production and system health. Artificial intelligence (AI) and machine learning (ML) algorithms are employed in panels to optimize their performance by predicting energy generation, improving tracking systems, and reducing maintenance costs.

## Solar Panel Industry Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the market, along with forecasts at the global and regional levels for 2024-2032. Our report has categorized the market based on type and end use.

## Breakup by Type:

Crystal Silicon

Monocrystalline Silicon

Polycrystalline Silicon

Thin Film

Others

Crystal silicon accounts for the majority of the market share

The report has provided a detailed breakup and analysis of the market based on the type. This includes crystal silicon, monocrystalline silicon, polycrystalline silicon, thin film, and others. According to the report, crystal silicon represented the largest segment.

Crystal silicon panels are made from single or multiple crystalline structures of silicon that are semiconductor material and can convert sunlight into electricity through the photovoltaic effect. In addition, the electricity generated by the solar cells is in the form of direct current (DC), which can be used to power various electrical devices or stored in batteries for later use. Apart from this, the surface of the solar panel is covered with numerous silicon solar cells. When sunlight strikes these cells, it excites electrons in the silicon, creating an electric current.

Monocrystalline silicon panels are made from a single crystal structure of silicon. This manufacturing process results in high-efficiency solar cells. Monocrystalline panels are known for their sleek appearance and high space-efficiency, making them suitable for situations with limited space. In addition, they are often recognized by their black or dark-blue color. Furthermore, they can generate more electricity in a smaller area as compared to other panel types. Moreover, they are known for their durability and longevity and require minimal maintenance.

Polycrystalline silicon panels are made from multiple silicon fragments melted together. They are more cost-effective to produce and are characterized by their blue appearance. In line with this, the rising employment of polycrystalline silicon panels in residential spaces due to their affordability is impelling the market growth. Furthermore, polycrystalline panels are known for their durability and long lifespan with minimal maintenance requirements.

Thin film panels are made from various materials, including amorphous silicon (a-Si), cadmium telluride (CdTe), and copper indium gallium selenide (CIGS). Thin film panels are known for their flexibility and lightweight. They are suitable for large-scale installations, building-integrated photovoltaics (BIPV), and portable solar devices. In addition, their flexibility allows them to be used on curved or irregular surfaces. Furthermore, thin-film panels tend to perform better in low-light conditions as compared to crystalline silicon panels.

Breakup by End Use:

- Commercial
- Residential
- Industrial

Commercial holds the largest market share

A detailed breakup and analysis of the market based on the end use have also been provided in the report. This includes commercial, residential, and industrial. According to the report, commercial accounted for the largest market share.

Commercial includes businesses, offices, schools, and institutions. Commercial installations are often larger than residential and are used to power commercial buildings and facilities. The rising adoption of solar panels in the commercial sector due to their affordability is contributing to the growth of the market. Furthermore, companies are adopting these panels to reduce carbon footprints and demonstrate their corporate social responsibility.

Solar panels in residential settings are usually used to generate electricity for the household. In addition, the growing adoption of solar panels in the residential sector to reduce energy bills and contribute to environmental sustainability is offering a positive market outlook. Besides this, people are increasingly preferring these panels due to various incentives and net metering solutions provided by governing agencies of various countries.

The industrial sector includes large-scale operations, factories, manufacturing plants, and industrial facilities. The increasing installations of solar panels in industrial settings to meet the high energy demands of industrial processes. Organizations in the industrial sector are adopting solar panels to reduce energy costs, enhance energy security, and align with sustainability goals.

Breakup by Region:

Asia Pacific

North America

Europe

Latin America

Middle East and Africa

Asia Pacific leads the market, accounting for the largest solar panel market share

The market research report has also provided a comprehensive analysis of all the major regional markets, which include Asia Pacific, North America, Europe, Latin America, and the Middle East and Africa. According to the report, Asia Pacific accounted for the largest market share due to the rising energy demand in various sectors. In line with this, governing agencies in the region are recognizing the importance of sustainable

energy sources to meet energy demand while reducing greenhouse gas (GHG) emissions. They are also providing incentives for solar energy projects, which is impelling the market growth. Furthermore, Asia Pacific benefits from abundant sunlight in many of its regions, making solar energy an efficient choice for electricity generation.

North America stands as another key region in the market, driven by the increasing adoption of renewable energy sources. Apart from this, the rising awareness among individuals about environmental issues is bolstering the market growth. Furthermore, the rising desire for energy independence among individuals is contributing to the growth of the market. In line with this, advancements in solar technology and manufacturing capabilities in North America benefit in increasing efficiency and reducing the costs of these panels. Besides this, North America has an advanced infrastructure for renewable energy integration, including grid modernization and energy storage solutions. This ensures the efficient utilization of solar-generated electricity and enhances the reliability of solar power systems.

Europe maintains a strong presence in the market, with the increasing focus on maintaining sustainability goals. In addition, Europe has a well-developed solar infrastructure, including a strong manufacturing base and extensive distribution networks. This infrastructure ensures a steady supply of high-quality solar panels and related components, making them readily available to individuals and industries. Besides this, the integration of solar panels into architectural designs is bolstering the growth of the market in the region.

Latin America exhibits growing potential in the solar panel market on account of the rising focus on diversifying the energy mix. In line with this, favorable regulatory frameworks for solar energy in the region are propelling the growth of the market.

The Middle East and Africa region shows a developing market for solar panel, primarily driven by the increasing development of solar infrastructure, including transmission and distribution networks. Apart from this, the region has abundant sunlight, making it ideal for solar energy production.

**Leading Key Players in the Solar Panel Industry:**

Key players are developing more efficient and cost-effective solar panel technologies. They are focusing on innovating materials, manufacturing processes, and energy storage solutions to enhance the overall system performance. In line with this, manufacturers are expanding their production facilities to meet the increasing demand for cleaner energy worldwide. They are building automated and efficient manufacturing

lines to scale up production and reduce costs. Moreover, companies are incorporating sustainability features in solar panel designs, such as recyclable materials and reduced environmental impact. Apart from this, they are developing and integrating energy storage solutions, such as batteries, to enhance the reliability of solar power systems. They are also working on reducing the overall cost of these panels through economies of scale, improved manufacturing processes, and supply chain optimizations.

The market research report has provided a comprehensive analysis of the competitive landscape. Detailed profiles of all major companies have also been provided. Some of the key players in the market include:

Jinko Solar  
Trina Solar  
Canadian Solar  
JA Solar  
Hanwha Q-CELLS  
GCL-SI  
LONGi Solar  
Risen Energy  
Shunfeng  
Yingli Green

(Please note that this is only a partial list of the key players, and the complete list is provided in the report.)

#### Latest News:

October 30, 2023: Canadian Solar announced that it is establishing a 5 GW Solar PV cell production facility at the River Ridge Commerce Center in Jeffersonville, Indiana. The solar cells produced at this facility will be used at the previously announced 5 GW module assembly plant in Mesquite, Texas.

September 11, 2023: Trina Solar, a global leader in smart solar products and solutions, announced it will build a more than 1 million square foot solar photovoltaic (PV) manufacturing facility in Wilmer, Texas. When completed, the facility will provide 1,500 local jobs, produce 5 GW of modules and source polysilicon from the United States and Europe.

January, 2023: JA Solar announced via the Arizona Commerce Authority that it intends to open a 2-GW solar panel assembly plant in Phoenix. In addition, the company will invest \$60 million in a new manufacturing site and create 600 jobs. The site will produce solar panels for residential, commercial, and utility-scale.

## Key Questions Answered in This Report

1. What was the size of the global solar panel market in 2023?
2. What is the expected growth rate of the global solar panel market during 2024-2032?
3. What are the key factors driving the global solar panel market?
4. What has been the impact of COVID-19 on the global solar panel market?
5. What is the breakup of the global solar panel market based on the type?
6. What is the breakup of the global solar panel market based on the end use?
7. What are the key regions in the global solar panel market?
8. Who are the key players/companies in the global solar panel market?



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