

Photovoltaic Materials Market Report by Type (Polycrystalline Silicon, Monocrystalline Silicon, Cadmium Telluride, Copper Indium Gallium Selenide (CIGS), and Others), Material (Front Sheet, Encapsulant, Back Sheet, and Others), Application (Utility, Residential, Non-residential), and Region 2024-2032

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Abstracts

The global photovoltaic materials market size reached US\$ 33.9 Billion in 2023. Looking forward, IMARC Group expects the market to reach US\$ 78.0 Billion by 2032, exhibiting a growth rate (CAGR) of 9.4% during 2024-2032. The rising environmental concerns and climate change, implementation of favorable government policies, rapid technological advancements, increasing investment in the development of advanced photovoltaic materials and surging energy demands across the globe are some of the major factors propelling the market.

Photovoltaic materials are substances that convert sunlight directly into electricity through the photovoltaic effect. It includes crystalline silicon, thin-film, and multi-junction cells. They are widely used in solar panels, solar farms, spacecraft power systems, portable chargers, solar-powered vehicles, calculators, watches, highway emergency phones, remote monitoring, and solar-powered water pumps. Photovoltaic materials are renowned for their energy efficiency, reduction of electricity bills, and independence from grid outages. They aid in lowering greenhouse gas emissions, contributing to energy sustainability, and assisting in the decentralization of power generation.

The surge in global energy demand driven by rapid industrialization and urbanization is propelling the market growth. Furthermore, the widespread product utilization owing to

its affordability and wide-ranging applications in residential and commercial solar installations is contributing to the market growth. Additionally, the escalating adoption of electric vehicles (EVs) is facilitating the demand for robust charging infrastructure comprising renewable energy solutions, such as photovoltaic materials. Moreover, the rising product utilization to generate localized powers, reduce transmission losses, and increase energy efficiency owing to the shifting trends towards decentralized power generation is strengthening the market growth. Other factors, including a growing focus on energy security, increasing investment in the development of advanced photovoltaic materials, and rising partnerships between governments and private firms to expand renewable energy infrastructure, are anticipated to drive the market growth.

Photovoltaic Materials Market Trends/Drivers:

The rising environmental concerns and climate change

The increasing urgency to address environmental issues and mitigate climate change's effects plays a pivotal role in the growing demand for photovoltaic materials. There's an accelerating shift towards cleaner, more sustainable energy sources. Solar energy, harnessed through photovoltaic materials, offers a zero-emission solution that significantly reduces the carbon footprint. Moreover, compared to conventional energy sources, solar energy does not entail harmful byproducts or contribute to environmental degradation. Consequently, nations worldwide are ramping up their renewable energy targets and incorporating solar energy into their plans, which in turn is facilitating the product demand. Furthermore, photovoltaic technologies' adaptability to a wide range of applications, from residential rooftop panels to large solar farms, makes them an accessible and practical choice for many, further boosting the market.

The implementation of supportive government policies

Government support in the form of favorable policies, incentives, and subsidies for renewable energy plays a key role in driving the photovoltaic materials market. This support is in response to global commitments to reduce greenhouse gas emissions, with solar power recognized as a significant part of the solution. Many governments across the globe are offering financial incentives to promote the installation of solar energy. For instance, feed-in tariffs, tax credits, and grants reduce the overall cost of solar installations, making solar energy more affordable and attractive. Net metering policies, allowing owners of photovoltaic systems to sell excess power back to the grid, add another financial benefit. Furthermore, several governments mandate renewable energy quotas for utilities, promoting investment in solar energy infrastructure.

Collectively, these efforts stimulate demand for photovoltaic materials.

Rapid technological advancements

Continuous technological advancements and intensive research and development (R&D) activities are also major factors driving the photovoltaic materials market. In line with this, rapid technological innovations offer more efficient, durable, and versatile photovoltaic materials that are widely used in a broader array of applications and environments is favoring the market growth. Moreover, the advent of perovskite solar cells, with their high efficiency and flexibility, opens new possibilities for solar energy usage. Advances in manufacturing processes are also reducing the cost of producing photovoltaic materials, making solar power more competitive with traditional energy sources. Additionally, research and development (R&D) activities are focused on developing materials that can harness more of the solar spectrum, further improving efficiency. Technological breakthroughs continue to enhance photovoltaic materials' capabilities and cost-effectiveness, which in turn is anticipated to drive the market growth.

Photovoltaic Materials Industry Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the global photovoltaic materials market report, along with forecasts at the global, regional and country levels from 2024-2032. Our report has categorized the market based on type, material and application.

Breakup by Type:

- Polycrystalline Silicon
- Monocrystalline Silicon
- Cadmium Telluride
- Copper Indium Gallium Selenide (CIGS)
- Others

Polycrystalline silicon dominates the market

The report has provided a detailed breakup and analysis of the market based on the type. This includes polycrystalline silicon, monocrystalline silicon, cadmium telluride, copper indium gallium selenide (CIGS), and others. According to the report, polycrystalline silicon represented the largest market segment.

Polycrystalline silicon is dominating the market due to a combination of performance characteristics, manufacturing advantages, and cost-effectiveness. It exhibits excellent light-absorption characteristics, making it highly efficient in transforming sunlight into electricity. Furthermore, its high purity ensures fewer impurities, resulting in better performance and a longer lifespan, making it a preferred choice for long-term installations. Additionally, polycrystalline silicon is produced by melting silicon and pouring it into a square mold, which is less wasteful than the process used to make monocrystalline cells. This straightforward and less wasteful manufacturing process results in a lower cost per watt, a critical factor for many end-users. Moreover, it offers a competitive price-performance ratio, making it an affordable choice for large-scale installations without compromising efficiency. This balance between cost and performance makes it particularly attractive for projects with strict budget constraints.

Breakup by Material:

- Front Sheet
- Encapsulant
- Back Sheet
- Others

Encapsulant dominates the market

The report has provided a detailed breakup and analysis of the market based on the material. This includes front sheet, encapsulant, back sheet, and others. According to the report, encapsulant represented the largest market segment.

Encapsulant materials are dominating the market due to their indispensable role in the protection and longevity of solar cells. They serve as a barrier against moisture, dust, and corrosive elements, all of which can affect the cells' efficiency and lifespan. This protection is critical for the photovoltaic modules to maintain their performance over decades, as required in many solar installations. Moreover, encapsulants ensure the mechanical integrity of photovoltaic modules. They provide structural stability, helping to protect the delicate internal components from physical shocks or vibrations. Additionally, they contribute to load distribution across the module during times of high wind or snow pressure, minimizing potential damage. Apart from this, high-quality encapsulant materials exhibit excellent optical properties, allowing maximum light to reach the photovoltaic cell, thus optimizing its power generation capability.

Breakup by Application:

Utility
Residential
Non-residential

Utility dominates the market

The report has provided a detailed breakup and analysis of the market based on application. This includes utility, residential, and non-residential. According to the report, utility represented the largest market segment.

The utility sector is dominating the market due to the sheer scale of energy production in the utility sector, which lends itself to the extensive use of photovoltaic materials. Along with this, utility-scale solar farms cover large areas of land, incorporating thousands, or even millions, of individual photovoltaic cells. This large-scale usage naturally drives a significant demand for photovoltaic materials. Furthermore, solar power aligns closely with the aims of many utility companies and governments to diversify energy sources and reduce greenhouse gas emissions. Photovoltaic technology offers a renewable, clean source of electricity that can be harnessed on a large scale, making it a practical choice for the utility sector. Besides this, the cost-effectiveness of solar power is increasingly competitive with conventional sources of electricity, especially on a utility scale.

Breakup by Region:

North America
United States
Canada
Asia-Pacific
China
Japan
India
South Korea
Australia
Indonesia
Others
Europe
Germany
France

United Kingdom
Italy
Spain
Russia
Others
Latin America
Brazil
Mexico
Others
Middle East and Africa

Asia Pacific exhibits a clear dominance in the market, accounting for the largest photovoltaic materials market share

The report has also provided a comprehensive analysis of all the major regional markets, which includes North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia, and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, Asia Pacific represented the largest market segment.

The Asia Pacific region is dominating the market as it has a strong presence of some of the largest manufacturers of photovoltaic materials globally, which leads to the increasing production of solar cells and modules. Furthermore, the region has advanced manufacturing capacities and infrastructures and supportive governmental policies that favor the growth of the solar industry. Moreover, the burgeoning energy demand due to rapid industrialization and urbanization in the regional countries is contributing to the market growth. As these countries aim to meet this demand sustainably, they are turning increasingly to renewable energy sources, particularly solar power. This trend has resulted in substantial investments in solar power installations, driving the demand for photovoltaic materials. Besides this, the geographical advantage of the Asia Pacific region, as it receives high solar irradiance, making solar power a practical and efficient energy solution, is acting as another growth-inducing factor.

Competitive Landscape:

The top companies are investing heavily in research and development (R&D) to improve the efficiency, durability, and cost-effectiveness of photovoltaic materials. They are exploring new materials and technologies, such as perovskite and organic solar cells, that could potentially revolutionize the solar industry. Furthermore, leading

companies are expanding their production capacities by expanding existing facilities and constructing new manufacturing plants to meet the rising demand for photovoltaic materials. Apart from this, the increasing global focus on sustainability has prompted key market players to improve the environmental footprint of their operations. This includes initiatives to reduce energy consumption and waste in the production process and develop recycling programs for end-of-life solar panels. Moreover, leading companies are entering into strategic partnerships and collaborations with other industry players, research institutions, and governments to pool resources and expertise for joint research projects, product development, and market expansion.

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

American Elements

COVEME s.p.a.

DuPont de Nemours Inc.

Ferrotec Holdings Corporation

Honeywell International Inc.

KYOCERA Corporation

Merck KGaA

Mitsubishi Materials Corporation

Novald GmbH (Samsung SDI Co. Ltd.)

Targray

Tata Power Solar Systems Limited (Tata Power Company Limited)

Wacker Chemie AG.

Recent Developments:

In January 2021, COVEME s.p.a announced that it is pushing for a greener solar industry by designing eco-friendly photovoltaic (PV) modules.

In May 2023, DuPont de Nemours Inc. announced that it will introduce its latest Tedlar frontsheet materials at SNEC International Photovoltaic Power Generation and Smart Energy Exhibition for potential partners and end users in the photovoltaic industry.

In May 2020, Honeywell International Inc. announced that it is expanding its solar photovoltaic protection products.

Key Questions Answered in This Report

1. What was the size of the global photovoltaic materials market in 2023?

2. What is the expected growth rate of the global photovoltaic materials market during 2024-2032?
3. What are the key factors driving the global photovoltaic materials market?
4. What has been the impact of COVID-19 on the global photovoltaic materials market?
5. What is the breakup of the global photovoltaic materials market based on the type?
6. What is the breakup of the global photovoltaic materials market based on the material?
7. What is the breakup of the global photovoltaic materials market based on application?
8. What are the key regions in the global photovoltaic materials market?
9. Who are the key players/companies in the global photovoltaic materials market?

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