

Solar Cells Market Size - By Material (Crystalline, Thin Film), By Technology (Monocrystalline, Polycrystalline, Cadmium Telluride, Amorphous Silicon, Copper Indium Gallium Diselenide), By Product (BSF, PERC/PERL/PERT/TOPCON, HJT, IBC & MWT), By Mounting, 2025 – 2034

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Solar Cells Market Size

The global solar cells market size was valued at USD 33.5 billion in 2024 and is anticipated to grow at a CAGR of 9.3% from 2025 to 2034. The shifts in technology, the reduction in costs, and an increase in awareness of sustainable practices is likely to change the product's demand.

Improved solar cells have been developed and are being used worldwide for greater energy efficiency from sunlight. The expansion and development of the solar energy systems will benefit from mandates and norms promoting renewable energy goals along with net metering, and renewable portfolio standard policies. To cite an instance, First Solar inaugurated a new research and development facility in 2024



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Premium Report Details

Base Year: 2024

Companies covered: 21

Tables & Figures: 20

Countries covered: 11

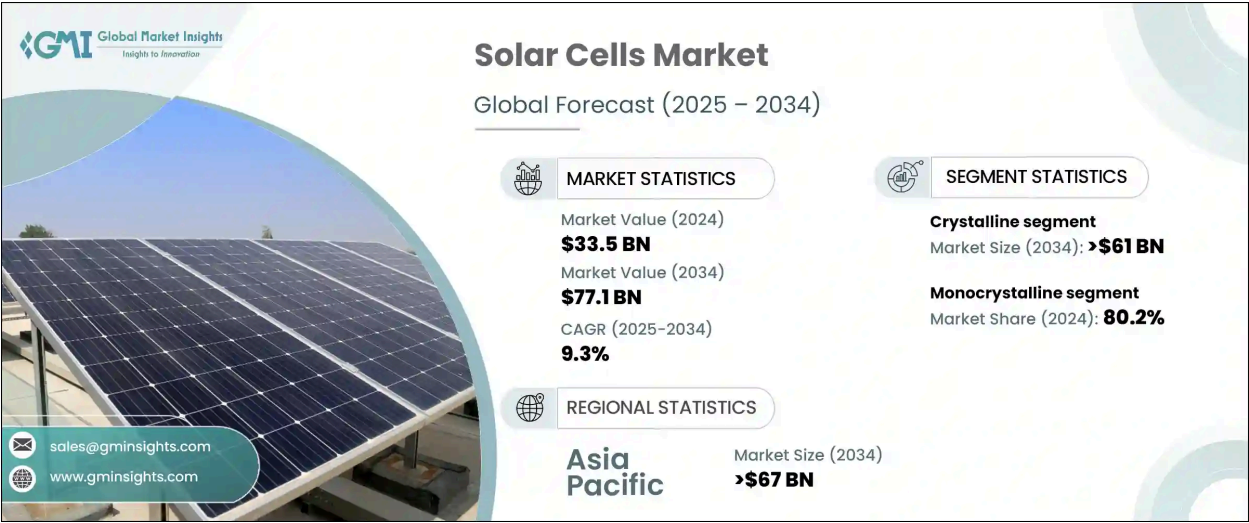
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with a coverage area of over 1.3 million square feet and has a state-of-the-art manufacturing pilot line for advanced equipment.

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The reductions in costs improve manufacturing procedures, competition, and the growth of solar energy economies will support solar cells market landscape. For instance, Qcells’ M10 sized solar cell has a newly attainable scaled obtainable maximum theoretical efficiency record of 28.6% for full area production using an 80% monocrystalline efficiency wafer. This will further reduce the cost of solar energy, supporting the land footprint required for solar projects making the technology more accessible, affordable, and sustainable.

Solar Cells Market Report Attributes

Key Takeaway	Details
Market Size & Growth	
Base Year	2024
Market Size in 2024	USD 33.5 Billion
Forecast Period 2025 – 2034 CAGR	9.3%
Market Size in 2034	USD 77.1 Billion
Key Market Trends	
Growth Drivers	• Americas & Europe ◦ Stringent Solar PV targets ◦ Growing demand for sustainable resources over conventional fuels • Asia Pacific ◦ Favorable government initiatives ◦ Growing deployment of large-scale solar PV projects • Middle East & Africa ◦ Increasing investments across utility scale projects

Key Takeaway	Details
Pitfalls & Challenges	◦ Rising decentralized and off grid solar installations • Longer payback period • Availability of other clean energy alternatives

What are the growth opportunities in this market? Download Free PDF

Increasing shift toward off-grid solar applications, especially in rural and remote areas, growing adoption of residential solar power systems and integration of solar power with battery storage systems will augment the business landscape. To cite an example, in 2025, TransGrid Energy finalized funding of USD 705 Million to fund the construction of two utility-scale, stand-alone battery storage facilities in Arizona.

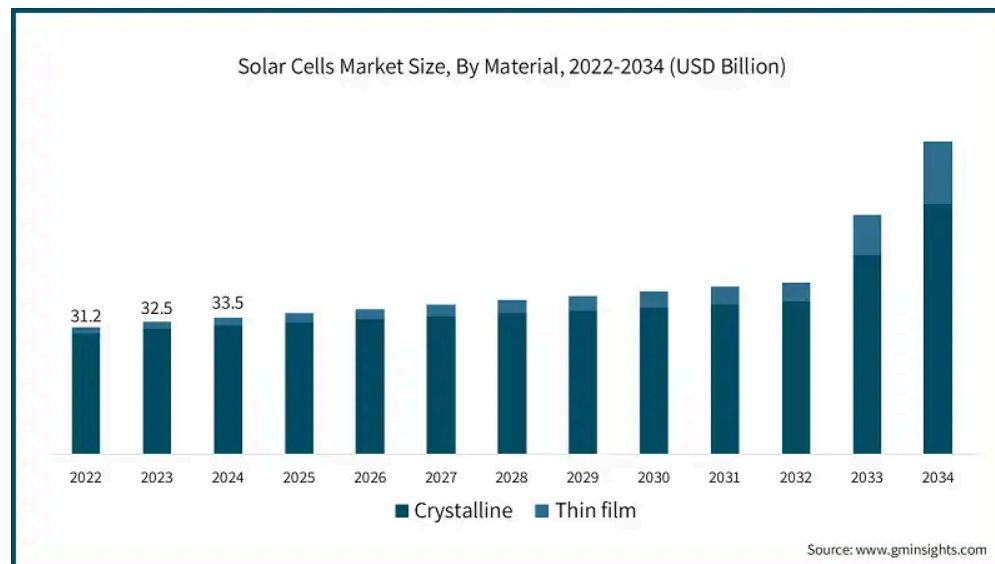
Solar Cells Market Trends

- Large corporations are increasingly adopting solar power to reduce operational costs and meet sustainability goals, thereby complementing the market growth. Solar panels are being used in agriculture for powering irrigation systems, greenhouses, and other farm operations, contributing to the sector's energy independence. To cite an instance, Qcells and Puget Sound Energy, in 2024, collaborated on a 142 MW solar PV project, to power more than 30,000 homes annually.
- The growth in community solar projects enable several people or households to participate in a common solar investment, fostering demand from those who cannot install panels on their property. Increased focus on dismantling, recycling

and reusing solar panels and associated materials to mitigate the ecological consequences of solar energy systems are propelling the solar cells market expansion.

- Ongoing integration into building designs, as rooftop installations and building materials, such as solar windows or facades, will foster the business scenario. In addition, significant investment from both public and private sectors is set to strengthen the product adoption. Further, in 2025, JinkoSolar, announced a breakthrough in the development of its N-type TOPCon-based perovskite tandem solar cell achieving a conversion efficiency of 33.84%.

Solar Cells Market Analysis

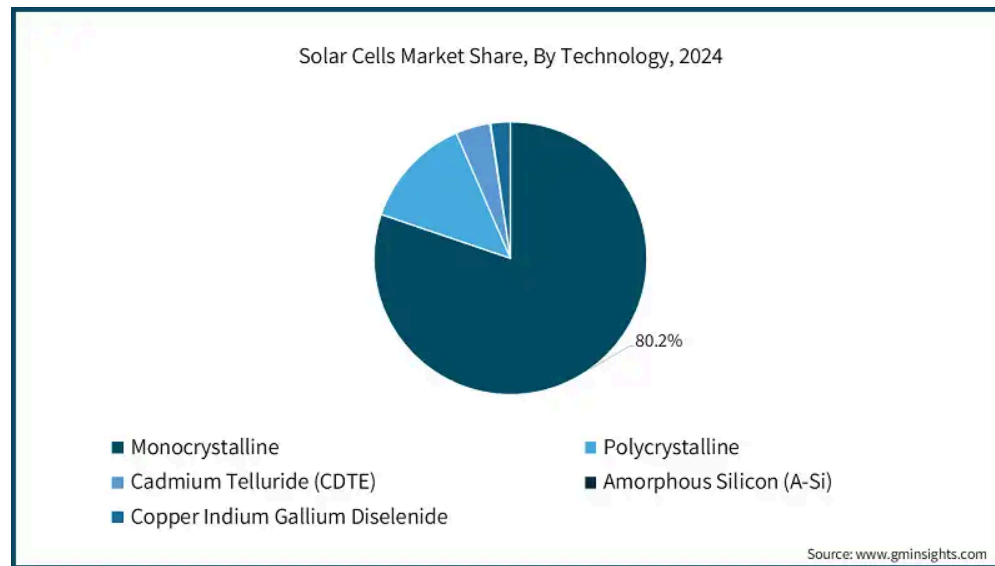


Learn more about the key segments shaping this market



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- The solar cells industry accounted for USD 31.2 billion, USD 32.5 billion and USD 33.5 billion in 2022, 2023 and 2024 respectively. The crystalline segment is anticipated to reach over USD 61 billion by 2034 on account of high efficiency and low costs.
- The technology is well established leading to reliable, efficient, and cost-effective products. Further, advancements in monocrystalline technology increasing efficiency rates often exceeding 20% for the marketed panels, result in further acceptance of the product in optimized areas. Moreover, introduction of PERC technology has further improved the efficiency of crystalline solar cells by enhancing light absorption and reducing electron recombination, thereby enhancing the business situation.
- The thin film segment is expected to grow at more than 23.5% CAGR through 2034 based on the continuing r&d efforts to improve the efficiency in CIGS and CdTe materials. The current energy storage needs combined with active collaborations between universities, research institutions, and private companies are facilitating innovations in thin film technology performance enhancement with cost effective solutions.



Learn more about the key segments shaping this market

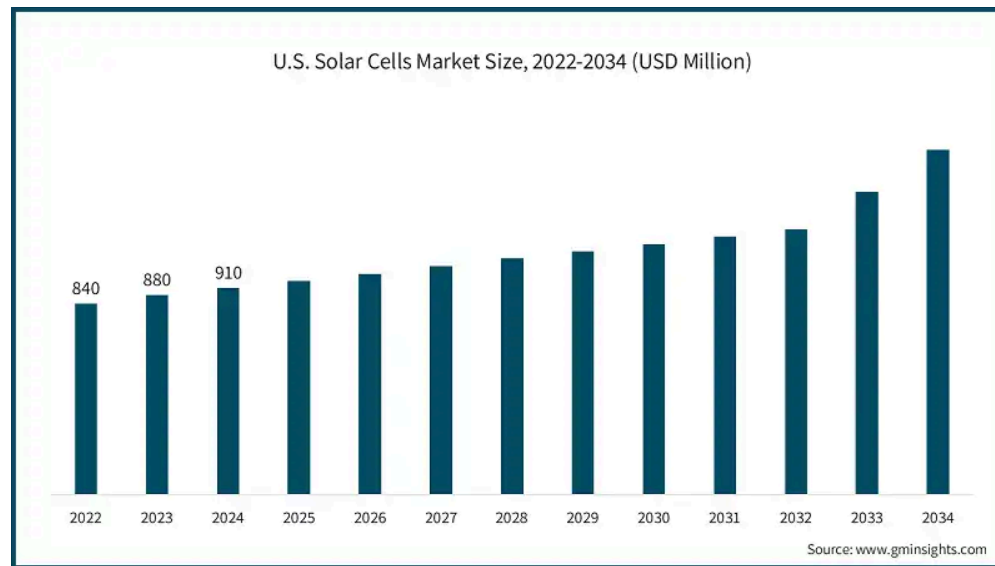


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- Based on technology, the market is segmented into monocrystalline, polycrystalline, CdTe, A-Si and CIGS. In 2024, monocrystalline segment accounted for 80.2% share of the solar cells market, due to its high relative efficiency as a type of silicon based solar cell which typically ranges from 18 percent to more than 22 percent. The introduction of new technologies like Passivated Emitter and Rear Cell (PERC) technology, heterojunction technology (HJT), and N type silicon have simultaneously improved the efficiency and performance of the technology as well.
- The polycrystalline segment is set to grow at a CAGR of over 6% through 2034, owing to their cost effectiveness and increasing adoption across the emerging markets. When combined with large-scale installations, these cells make a viable

option for achieving large power outputs at a reduced cost. Further, shifting focus on hybrid solar cells or bifacial modules will augment the market growth.

- CDTE technology is particularly well-suited for large-scale solar farms. Many utility companies are investing in the systems owing to their cost advantages and efficiency, enabling them to provide competitively priced renewable energy, which will complement the business landscape. For instance, First Solar, in 2024, introduced its new USD 1.1 billion vertically integrated solar manufacturing facility in the U.S.
- Key features including their flexibility, lightweight properties, and relatively low production costs will impact the A-Si market growth. Ongoing integration of amorphous silicon with other materials, such as crystalline silicon, improve overall efficiency while still maintaining the cost advantages will drive the business scenario.
- CIGS will contribute to the market size owing to advancements in thin film technology, enhancing the efficiency of BIPV systems, making them more attractive for commercial and residential applications. Further, laboratory efficiencies for the cells have exceeded 23%, thereby competing with silicon-based solar cells, driving the market growth.



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- The U.S. solar cells market size suppressed USD 840 million, USD 880 million and USD 910 million in 2022, 2023 and 2024 respectively. This is highly attributed to the increasing use of solar plants in the region. For example, California in 2023 produced over a quarter of its electricity from solar.
- The solar cells market for Asia Pacific is projected to surpass USD 67 billion by 2034, fueled by strong governmental policies and incentives along with the attention placed on high-efficiency solar technology. The increasing uptake in developing economies fueled by the need for dependable power generation will enhance the business landscape. For citation, in 2024, a textile manufacturer in India recently installed a plant that features solar power production with LONGi's high efficiency Hi-MO 5 solar modules.
- Countries including Thailand, Vietnam, and the Philippines are experiencing rapid growth in solar adoption. Ongoing rural electrification projects across Southeast

Asia providing power to off-grid communities along with growing large-scale solar farms and hybrid projects combining solar with wind and battery storage will complement the industry landscape.

- Europe market is anticipated to grow more than 2.5% CAGR through 2034, on account of large scale utilization across niche markets comprising small-scale solar devices and portable solar chargers. In addition, ongoing initiatives aimed at promoting recycling and sustainability are leading to innovations in thin film technology, particularly in recycling cadmium and tellurium from CdTe cells, will drive the industry outlook. To cite an example, in September 2024, REC Group launched its latest high-efficiency solar panel, REC Alpha Pure-RX, with an increased power density of 226 W/m² or 21 W/ft².

Solar Cells Market Share

- The top 5 players operating in the industry are Canadian Solar, Jinko Solar, Hanwha Q Cells, Vikram Solar, and Longi. Solar cells industry is marked by an intricate and fluid competitive structure which is influenced by innovation, demand, and shifts in government policy.
- The industry is made up of diverse participants ranging from large multinational corporations and up-and-coming players to niche producers focus on solar panels. To respond to the consumer and regulatory demands, there is an increased emphasis on sustainable manufacturing and even the recyclability of solar panels. Such emphasis is becoming a competitive edge in many parts of the world where there are tight environmental controls.

Solar Cells Market Companies

- Canadian Solar holds first on ranking being the biggest solar module producer with more than 60GW of solar modules shipped and has a market cap of 125 GW.

The company operates in 23 abroad countries and has over 26 manufacturing facilities and branches and net revenues of USD 1.5 Billion in Q3 of 2024. Further, it recently opened its new headquarters in Ontario, Canada, enabling an innovation ecosystem across the region.

- DuPont provides sustainable solar solutions, with over 200 scientists contributing to the innovation and technological advancement. The company provides Solamet, to continually improve the solar cell efficiency and reduce costs. It further generated an overall revenue of USD 22.3 Billion in 2024.
- Hanwha Q Cells offers integrated energy solutions and dominates the North American market. They have four R&D facilities and factories, and their sales network includes more than sixty locations. They pioneered PERC QUANTUM Solar Cells, and recently serviced a portfolio of approximately 446 megawatts of solar PV projects in Colorado and Virginia.
- Jinko Solar is a dominant name in the PV market, receiving over 8 thousand orders per year and shipping more than three hundred energy units in modules to two hundred countries. The company has more than 35 service centers and By the end of 2024, the company's monocrystalline silicon wafer, cell and module design capacity will reach 120GW, 95GW and 130GW respectively, with the N-type capacity leading the industry in scale.

Eminent players operating in the solar cells market are:

- Canadian Solar
- DuPont
- Hevel
- Hanwha Q Cells
- Jinko Solar

- JINERGY
- JA SOLAR Technology
- Meyer Burger
- MOTECH Industries
- RENESOLA
- REC Solar Holdings
- Silfab Solar
- Singulus Technologies
- SunPower Corporation
- Sunport Power
- AIKO
- Tongwei
- United Renewable Energy
- Vikram Solar
- Wuxi Suntech Power
- Yingli Solar

Solar Cells Industry News:

- In February 2024, the research team of Ulsan National Institute of Science and Technology developed the world's most efficient quantum dot (QD) solar cell, marking a significant leap towards the commercialization of next-generation solar cells. This approach enables the synthesis of organic cation-based perovskite quantum dots (PQDs), ensuring exceptional stability while suppressing internal defects in the photoactive layer of solar cells.

- In May 2022, Jinko solar entered in an agreement with Aldo Solar to distribute N-type ultra-efficiency modules. The distribution agreement signed in Brazil, will correspond to 600 MW in the distributed generation market. The company will provide the new N-Type ultra-efficiency photovoltaic Tiger Neo modules. The modules represent state-of-the-art innovation in the solar industry, offering cost effectiveness to all the customers.
- In December 2022, MIT engineers developed ultralight fabric solar cells which can easily and quickly turn any surface into a power source. The flexible solar cells are durable, much thinner than a human hair, and are glued to a lightweight and strong fabric making them easy to install on a fixed surface. Further, the technology can be easily integrated into built environments with minimal installation needs.
- In December 2022, First Solar made an agreement with National Grid Renewables to provide 1.6 GW DC of Series 7 thin film module, to be delivered during the years 2026 and 2027. This contract highlights First Solar's pledge to further utilize solar technology in coming projects, placing the two firms in a strong position in the market.

This solar cells market research report includes an in-depth coverage of the industry with estimates & forecast in terms of volume and revenue in “(USD Million & MW)” from 2021 to 2034, for the following segments:

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Market, By Material

- Crystalline
 - N Material

- P Material
- Thin Film

Market, By Technology

- Monocrystalline
- Polycrystalline
- Cadmium Telluride (CDTE)
- Amorphous Silicon (A-Si)
- Copper Indium Gallium Diselenide

Market, By Product

- BSF
- PERC/PERL/PERT/TOPCON
- HJT
- IBC & MWT
- Others

The above information has been provided for the following regions and countries:

- **North America**
 - U.S
- **Europe**
 - Germany
 - Spain
 - France

- Netherlands
- **Asia Pacific**
 - China
 - Malaysia
 - South Korea
 - Japan
 - Taiwan
 - India
- **Rest of World**

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Frequently Asked Question(FAQ) :

[How big is the solar cells market?](#)



The solar cells market was valued at USD 33.5 billion in 2024 and is expected to reach around 77.1 billion by 2034, growing at 9.3% CAGR through 2034.

[What will be the size of crystalline segment in the solar cells industry?](#)

[Who are the key players in solar cells market?](#)

[How much market size is expected from Asia Pacific solar cells market by 2034?](#)

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- Solar Cells Market Trends
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