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Solar Panel Recycling Market by Type (Monocrystalline, Polycrystalline, Thin Film), Process (Thermal, Chemical, Mechanical, Laser, Combination), Shelf Life (Early Loss, Normal Loss), Material (Metal, Glass, Plastic, Silicone) - Global Forecast to 2029

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Abstracts

The solar panel recycling market is projected to reach USD 931 million by 2029, at a CAGR of 19.3% from USD 385 million in 2024. The solar panel recycling market is primarily adriven by the increasing adoption of solar energy and the resulting rise in end-of-life solar panels. With the expansion of the solar industry, there is a growing volume of retired solar panels that need to be managed sustainably. Additionally, government initiatives and regulations promoting renewable energy and waste management are fueling the demand for solar panel recycling.

Moreover, the increasing value of recycled materials, such as metals like aluminum and copper, due to market demand for sustainable resources is a significant driver for the solar panel recycling market. As industries worldwide seek to reduce their environmental footprint and meet sustainability goals, the demand for recycled materials is rising driving the growth of the solar panel recycling market.

“Monocrystalline type, is expected to be the fastest growing segment for solar panel recycling market during the forecast period, in terms of value.”

Monocrystalline solar panels are experiencing rapid growth in the solar panel recycling market due to several factors. Firstly, monocrystalline panels are becoming increasingly popular in solar installations due to their higher efficiency and better performance compared to other types of panels. As a result, the overall volume of monocrystalline panels being installed is increasing, leading to a corresponding rise in the number of

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end-of-life monocrystalline panels requiring recycling. Additionally, advancements in recycling technologies have made it more feasible to recover valuable materials from monocrystalline panels efficiently. This includes the extraction of materials such as silicon, aluminum, and glass, which are valuable for reuse in the manufacturing of new panels or other products. The combination of growing market demand for monocrystalline panels and improved recycling capabilities is driving the rapid growth of monocrystalline solar panel recycling making it the fastest growing type segment.

“Early Loss is expected to be the fastest growing shelf life segment for solar panel recycling market during the forecast period, in terms of value.”

Early loss is anticipated to be the fastest-growing shelf life segment in the solar panel recycling market due to several factors. Firstly, as solar technology evolves, older panels are being replaced by more efficient and durable models at a faster rate. This means that the early loss segment, which includes panels that have reached the end of their life prematurely due to various factors such as manufacturing defects or damage, is expected to grow rapidly.

Furthermore, the increasing adoption of solar energy across various industries and regions has led to a surge in the installation of solar panels. As a result, a significant portion of the installed base consists of panels that are relatively new and may experience early loss due to unforeseen circumstances or technical issues. This trend is expected to continue as the solar industry expands, driving the growth of the early loss segment in the solar panel recycling market.

Additionally, heightened awareness of environmental sustainability and the circular economy is prompting stakeholders to address the disposal and recycling of early loss panels more proactively. This emphasis on responsible end-of-life management further contributes to the accelerated growth of the early loss segment in the solar panel recycling market.

“Mechanical is expected to be the fastest growing process segment for solar panel recycling market during the forecast period, in terms of value.”

Mechanical recycling is anticipated to be the fastest-growing process segment in the solar panel recycling market due to several key factors. Firstly, mechanical recycling offers a cost-effective and efficient method for recovering valuable materials from end-of-life solar panels. Unlike chemical or thermal processes, mechanical recycling does not

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require complex equipment or high energy consumption, making it more accessible and economically viable for recycling facilities.

Additionally, mechanical recycling is inherently less resource-intensive and environmentally friendly compared to other recycling methods. It involves the separation and sorting of materials such as glass, aluminum, and silicon, which can then be reused in the manufacturing of new solar panels or other products.

Furthermore, advancements in mechanical recycling technologies and techniques have improved the efficiency and effectiveness of the process, further driving its adoption and growth in the market. Innovations such as automated sorting systems and robotic dismantling equipment enable recycling facilities to process larger volumes of solar panels more quickly and accurately, thereby meeting the increasing demand for solar panel recycling services.

“Metal is expected to be the fastest growing material segment for solar panel recycling market during the forecast period, in terms of value.”

Metal is expected to be the fastest-growing materials segment in the solar panel recycling market for several reasons. Firstly, solar panels contain significant amounts of valuable metals such as aluminum, copper, and silver, which are essential components of the panels' structure and electrical conductors. These metals can be efficiently recovered and recycled through various processes, including mechanical, thermal and others.

Secondly, the increasing demand for metals in various industries is driving the need for recycled metals as a sustainable source of raw materials. As a result, there is a growing market for recycled metals from solar panels, contributing to the rapid growth of this segment.

Moreover, the recycling of metals from solar panels helps alleviate the environmental impact of metal extraction and processing from virgin sources. By recycling metals from end-of-life solar panels, companies can reduce energy consumption, greenhouse gas emissions, and the need for landfill space associated with traditional mining and refining processes.

“Based on region, North America was the second largest market for solar panel recycling market in 2023.”

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North America emerges as the second-largest market for solar panel recycling after Europe due to several key factors. Firstly, there has been a significant increase in solar panel installations across North America in recent years, driven by government incentives, environmental regulations, and growing awareness of renewable energy benefits. As a result, the region is witnessing a corresponding rise in end-of-life solar panels, creating a substantial demand for recycling services.

Moreover, North America boasts a well-developed waste management infrastructure, including recycling facilities and regulatory frameworks, which support the efficient and environmentally responsible disposal of solar panels. This infrastructure facilitates the collection, transportation, and processing of end-of-life panels, contributing to the growth of the solar panel recycling market in the region.

Additionally, increasing environmental consciousness among consumers, businesses, and policymakers in North America is driving the adoption of sustainable practices, including solar panel recycling. With a focus on reducing waste and promoting circular economy principles, there is a growing emphasis on extending the lifespan of solar panels through recycling, further fueling market growth.

The presence of major solar panel recycling players enhances the region's competitiveness in the global solar panel recycling market.

In the process of determining and verifying the market size for several segments and subsegments identified through secondary research, extensive primary interviews were conducted. A breakdown of the profiles of the primary interviewees is as follows:

By Company Type: Tier 1 - 35%, Tier 2 -35%, and Tier 3 - 30%

By Designation: C-Level - 30%, Director Level - 10%, and Others - 60%

By Region: North America - 30%, Europe -20%, Asia Pacific - 30%, Middle East & Africa - 10%, and South America- 10%

The key players in this market are First Solar (US), Reiling GmbH & Co.KG (Germany), The Retrofit Companies, Inc. (US), Rinovasol Global Services B. V. (Netherlands), We Recycle Solar (US), ROSI (France), SILCONTEL LTD (Israel), Etavolt Pte. Ltd. (Singapore), PV Industries Pty Ltd (Australia), SOLARCYCLE, Inc. (US), etc.

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Research Coverage

This report segments the market for the solar panel recycling market on the basis of type, process, material, shelf life and region. It provides estimations for the overall value of the market across various regions. A detailed analysis of key industry players has been conducted to provide insights into their business overviews, products & services, key strategies, new product launches, expansions, and mergers & acquisitions associated with the market for the solar panel recycling market.

Key benefits of buying this report

This research report is focused on various levels of analysis — industry analysis (industry trends), market ranking analysis of top players, and company profiles, which together provide an overall view of the competitive landscape, emerging and high-growth segments of the solar panel recycling market; high-growth regions; and market drivers, restraints, opportunities, and challenges.

The report provides insights on the following pointers:

Analysis of key drivers: The market growth is driven by the increasing value of recycled materials due to market demand along with increasing electronic waste in the landfills and increasing volume of recyclable material.

Market Penetration: Comprehensive information on the solar panel recycling market offered by top players in the global solar panel recycling market.

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product launches in the solar panel recycling market.

Market Development: Comprehensive information about lucrative emerging markets — the report analyzes the markets for the solar panel recycling market across regions.

Market Diversification: Exhaustive information about new products, untapped regions, and recent developments in the global solar panel recycling market.

Competitive Assessment: In-depth assessment of market shares, strategies, products, and manufacturing capabilities of leading players in the solar panel

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recycling market.

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