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Sustainable solar panel selection

As solar panels increase rapidly in number, the industry faces the dual challenge of meeting immediate energy needs while safeguarding against future environmental impacts. There needs to be a shift towards innovative solutions blending efficiency, longevity, and sustainable manufacturing. Homeowners, eager to mitigate climate change play a pivotal role by choosing responsibly made solar panels. However, amidst the promise of cleaner energy, it's vital to acknowledge the ecological footprint inherent in panel production. REC Group explores the pressing need for the solar industry to navigate these complexities, ensuring a greener future for generations to come.

When it comes to reducing their environmental footprint, homeowners often believe they've made a significant contribution through energy conservation by investing in rooftop solar panels. This choice not only helps reduce their reliance on grid electricity but also aligns with the broader goal of decreasing global emissions.

The energy supply sector is currently the largest contributor to global greenhouse gas emissions. It is responsible for approximately 35% of total emissions with residential and commercial buildings consuming over half of all electricity.¹ As such, the energy sector has a crucial role in reaching net zero emission targets.

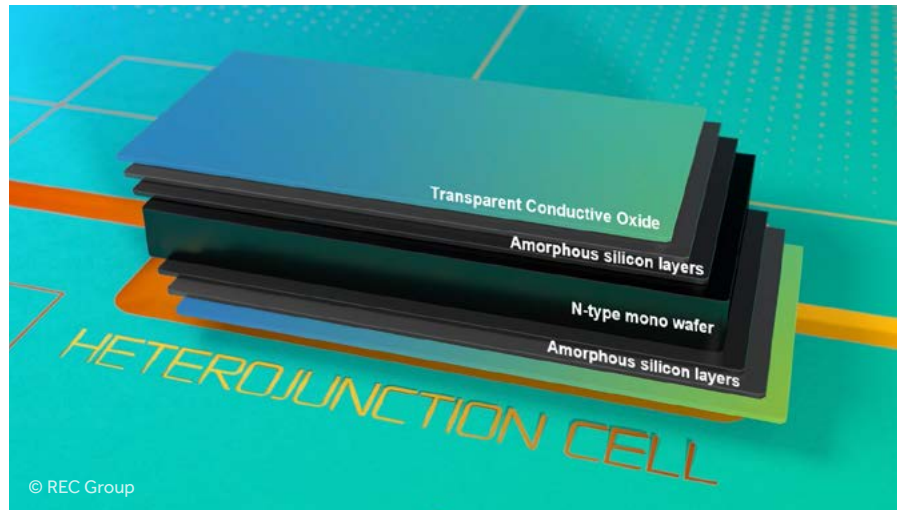
A study by REC Group has found that in order for solar energy to make a contribution towards limiting the global temperature increase to 1.5°C, we will need to install about 500 to 600 GW of new solar photovoltaic (PV) capacity on average per year for a decade. This is the equivalent of more than a billion solar panels every year.

As we race towards installing more solar panels to harvest energy, the industry needs to ensure that the panels do not pose a problem in the future while it provides a solution today. The industry needs to consider how it can meet the challenges of the future through new product innovations that combine the development of higher efficiency solar panels with long-lasting performance and sustainable manufacturing practices.

Homeowners who want to play their part in mitigating climate change can choose responsibly made solar panels that will not only create a positive impact but also lower their environmental footprint. Despite the fact that clean energy sources like solar panels can reduce a household's carbon footprint, it's crucial to recognize that the production of goods and services used in a household also consumes resources such as energy and water, including the manufacturing of solar panels.

Making more clean solar power more efficiently

To optimize resource conservation, it is imperative that we maximize the energy harvested from solar panels. Power density is a key metric for homeowners and businesses who want to make the most of their rooftop and optimize their contribution to the environment. Power density measures the amount of energy or power generated for each square meter of a solar panel and the higher the power density, the more powerful a solar panel is. Technologically advanced solar panels that are available on the market today should have an efficiency of more than 22% or 220 W per square meter.



By choosing to install higher efficiency solar panels, less are needed to create a rooftop solar system. This reduces the number of resources needed without sacrificing on the amount of energy harvested.

Advanced technologies to unlock the full potential of a roof

Not all solar panels deliver the same level of power density and some of the technologies that are currently available include PERC, TOPCon and the most advanced solar panel technology available, Heterojunction solar cell technology (HJT).

HJT unlocks the greatest potential for energy harvesting. Unlike TOPCon, which uses a single material for its solar cells, HJT cells combine the best of both

worlds by using crystalline silicon and amorphous thin-film silicon. When used together, these materials create a more efficient way for sun light to be captured and electrons to be transferred. This results in a higher energy conversion rate potential which generates more solar energy for homeowners and businesses.

REC has been a pioneer of HJT, which has a demonstrated track record in power density. It has been developing and manufacturing solar panels based on HJT since 2019. Not only has REC made a strong commitment towards developing HJT, it has also released five significant innovations in solar panels globally in the last five years, using its Alpha HJT technology.



Long-lasting performance giving peace of mind for owner and the environment

The top branded solar panels in the industry offer a guaranteed power performance of at least 92% at year 25. Other solar panels, mainly based on TOPCon, guarantee only around 89%. This translates into more power within 25 years. By choosing a solar panel that has a long-term performance guarantee, owners can be assured that they are making a positive impact on the environment.

The carbon footprint of a solar panel

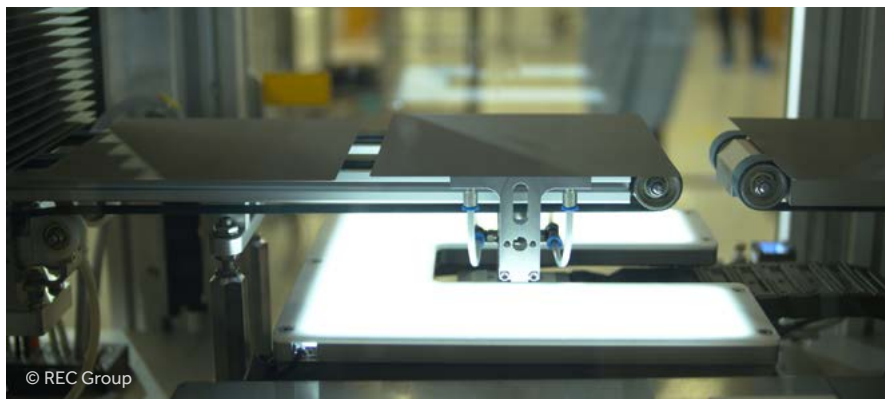
The manufacturing of solar panels is energy intensive. Homeowners and businesses who choose to make a positive environmental contribution need to consider metrics such as the Energy Payback Time and carbon footprint.

Solar panel manufacturers that are concerned about their own energy savings tend to claim an Energy Payback Time of less than one year for the solar panels they produce. As an alternative, they can provide an Environmental Product Declaration (EPD) to validate their footprint.

REC is an example of a solar panel manufacturer that has combined high-efficiency innovations with sustainable manufacturing practices. At its cell and module production site in Singapore, REC has reduced its specific energy consumption (MWh per MW panel production) by 15% in 2022. This has resulted in a total CO₂ emission savings of 2,900 tons in one year.

Water plays a key role in solar panel manufacturing too

With climate change impacting on global rainfall,² water is a globally important resource we must conserve or reuse as far as possible. Next to energy, water also plays a vital role throughout the solar photovoltaic panel supply chain. Starting from the purification of silicon, the base material for solar cells, followed by slicing silicon ingots, large blocks of high-purity crystalline silicon,



into thin wafers and various treatment processes of wafers and solar cells, over to the final module assembly.

In particular, the first steps from above are energy and heat intensive and require intensive water usage for cooling. It is important to note that the water intensity of solar panel manufacturing can vary depending on the technology and manufacturing practices.

We must conserve and reuse water as much as possible

Socially responsible manufacturers, including those in the solar panel manufacturing industry, are actively seeking ways to conserve and recycle water, recognizing its increasing scarcity.

Robust savings programs in the production are driving a more sustainable transition

Continuously driving energy, water, and waste savings programs, REC Group has set ambitious goals for its manufacturing facility in Singapore, a country known for its responsible and sustainable manufacturing practices, where REC produces solar panels that are exported to the world.

The commitment includes reducing water consumption from the production of solar

cells by 5% and for rooftop solar panels by 10% by 2024. In line with Singapore's water scarcity, REC ensures that water used during manufacturing processes is treated and recycled, significantly reducing the overall environmental impact. Besides having measures in place to use water responsibly during its production, actions have been taken to reduce its water consumption.

Through REC's focus on responsible manufacturing, specific water consumption decreased from 761 m³ per MW of solar panels produced in 2021 to 628 m³ per MW in 2022, representing a notable 17.5% reduction. This translates to an annual water saving of approximately 171,487 m³, equivalent to the water usage of close to 3,000 people in Singapore. Future plans involve optimizing wastewater recycling, with projected savings of 131,400 m³ per year upon full implementation.

In addition to responsible water management, REC actively harvests rainwater for use in cooling towers after filtration. By investing in stormwater collection facilities, REC aims to increase rainwater harvesting capabilities, projecting water savings of about 10,000 m³ per year.

Beyond designing solar panels with the environment in mind, implementing responsible manufacturing practices, such as reducing the use of water and energy and minimizing the production of any harmful waste, are key issues that the solar industry needs to address to build a more sustainable future.

Homeowners who want to play their part in mitigating climate change can choose responsibly made solar panels as a tangible way to make a greater positive impact and lower more their environmental footprint.

recgroup.com

¹ un.org/en/actnow/facts-and-figures

² epa.gov/climate-indicators/climate-change-indicators-us-and-global-precipitation#:~:text=Just%20as%20precipitation%20patterns%20vary,areas%20to%20experience%20decreased%20precipitation

