

Solar Panels

In 2022, China accounted for 77.8 percent of the global photovoltaic (PV) module production. The country representing the second-largest share of PV production was Vietnam, accounting for just 6.4 percent.

<https://www.statista.com/statistics/668749/regional-distribution-of-solar-pv-module-manufacturing/#:~:text=China%20dominates%20the%20solar%20industry,leader%20in%20installed%20PV%20capacity>.

Step 1: Sand

It all starts with the raw material, which in our case is sand. Most solar panels are made of silicon, which is the main component in natural beach sand.

Silicon is abundantly available, making it the second most available element on Earth.

However, converting sand into high grade silicon comes at a high cost and is an energy intensive process. High-purity silicon is produced from quartz sand in an arc furnace at very high temperatures. And that's just the beginning.....

<https://www.greenmatch.co.uk/blog/2014/12/how-are-solar-panels-made>

China is the world's largest silicon producer, with a production volume estimated at six million metric tons in 2022. The second largest producer of this metalloid in the world was Russia, which produced 640,000 metric tons in the same year. The total global production of silicon in 2022 was an estimated 8.8 million metric tons.

<https://www.statista.com/statistics/268108/world-silicon-production-by-country/#:~:text=China%20is%20the%20world's%20largest,tons%20in%20the%20same%20year>.

The transport of solar panels and all the components associated with this type of renewable energy can be done by road, by truck or rail, by air or by container ship.

(Most of which are not carbon neutral, by any means!)

<https://logisber.com/en/blog/how-can-solar-panels-be-transported-internationally>

But the solar panels generating that power don't last forever. The industry standard life span is about 25 to 30 years, and that means that some panels installed at the early end of the current boom aren't long from being retired. And each passing year, more will be pulled from service — glass and metal photovoltaic modules that soon will start adding up to millions, and then tens of millions of metric tons of material.

"It's not too far off that those are going to be coming off line, and we're going to have a waste management issue," said Garvin Heath, a senior scientist at the National Renewable Energy Laboratory and a solar power expert. "It's fair to say that it's starting to become more widely recognized as an issue that we're going to need to start working on pretty soon."

The solution many are looking to, is recycling. But the ability to handle the coming flow of PV modules is not yet sufficient. "There's some infrastructure," Heath said. "I wouldn't say it's especially well established at this point."

Part of the problem is that solar panels are complicated to recycle. They're made of many materials, some hazardous, and assembled with adhesives and sealants that make breaking them apart challenging.

<https://www.greenbiz.com/article/what-will-happen-solar-panels-after-their-useful-lives-are-over>

The solar panel product (or workmanship) warranty covers materials, faults, defects, and poor workmanship in the solar panel. The warranty period is usually ten years. For example, a new panel has a fault and is not producing any power, or a new solar panel has a frame that is loose – these should both be covered under warranty.

Now you can probably see how these two warranties may intersect and it becomes grey very quickly. It is hard to guarantee performance in year 15 when the manufacturer can blame materials and workmanship after the initial ten-year product warranty period.

So if you hear a solar installer tell you “the solar panels last for 25 years” they are referring to the solar panel performance warranty, which is more clever marketing than a guarantee outside of the initial ten year period.

After this initial ten-year period, it is more likely that a panel will suffer from issues such as weather damage, delamination or water ingress.

<https://www.pvindustries.com.au/faq/how-long-do-solar-panels-last/>

Although much is said that solar energy is completely safe for the environment, the truth is that each solar panel is made of chemical materials such as arsenic and cadmium, in a process that generates many toxic byproducts such as hexafluoride. Sulfur and silicon tetrachloride. These products are not only dangerous for the environment, but also for humans and domestic and wild animals.

<https://qoraxenergy.com/what-are-the-dangers-of-solar-panels/>

In 2017, CSIRO analysis estimated it would cost the country a trillion dollars to convert to renewable; today the current estimate is much lower at \$500 billion.

While this appears to be good news, there are hidden costs that need to be addressed.

Environmental consultant, David Hines from Land and Water Management, Queensland says, the production process needs more consideration.

His concern is that some of the components are manufactured overseas in 'low cost countries'. In those countries, the production systems will almost all use fossil fuels.

“If we produce these solar panels in countries where policies are not as stringent, or fully enforced as here, the pollution impact is significant and, materials used are toxic from processing to dealing with waste.”

Studies have shown the heavy metals in solar panels namely lead and cadmium, can leach out of the cells and get into groundwater, as well as affect plants.

These metals also have a record for detrimental effects on human health. Lead is commonly known to impair brain development in children, and cadmium is a carcinogen.

In 2016, the International Renewable Energy Agency (IRENA) estimated there were about 250,000 metric tonnes of solar panel waste in the world at the end of that year.

IRENA projected this amount [of solar panel waste] could reach 78 million metric tonnes by 2050.

Hines is advocating for more stringent assessments in countries producing renewable technology.

“We need to be sure that we are not exporting pollution overseas.

“The idea that solar panels, or electric cars, reduce the atmospheric carbon and are 'emissions free' is a case in point.

“When solar panels are installed en masse over land, they have been shown to leak toxic materials, with long term affects.”

<https://ia.acs.org.au/article/2023/the-dark-side-of-renewable-technology.html>