

Six surprising places solar power is taking off

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From rooftops and roads to farmers' fields and the open sea, solar power can already be captured almost anywhere. The next frontier? Harnessing the sun's energy in space to power life on Earth.

1. Electricity from roads and parking lots

A lot of space for [solar panels](#) already exists above roads and parking lots, as well as along noise barriers and on hard road shoulders. But its potential in these places has remained largely untapped. That's slowly changing, partly because modules are becoming cheaper and more flexible.



The world's largest solar roof above a Chinese highway also reduces noise for people living nearbyImage: Long Wei/Avalon/Photoshot/picture alliance

In southern Europe, for example, supermarkets are increasingly covering their parking lots with solar panels, providing shoppers with both a shady parking space and somewhere to charge their electric car. The electricity can also be used in the supermarket to power things like freezers and fridges.

Solar [power](#) is also being harvested on roadsides by placing modules on noise barriers or hard shoulders. In Germany and China, the first solar roofs over roads are already in place. As an added benefit, they also happen to reduce traffic [noise](#).

The tops of buses and trucks are also being kitted out with solar modules to generate [electricity](#) for heating and cooling.

The next step is integrating solar cells directly into the car body. This allows electric cars to generate part of their own power — and prototypes are already being tested.

2. Solar energy from railway tracks

In 2025, Switzerland began testing its first [solar power](#) system installed on railway tracks. One day, the electricity generated on the track could also be used by the trains traveling along them.

The modules are laid using a special machine, can be easily dismantled if necessary and don't interfere with operations.

According to the operator Sun-Ways, covering all 5,000 kilometers (3,107 miles) of railway track in [Switzerland](#) with solar modules could generate around 1 terawatt hour of electricity per year. That would cover some 44% of the Swiss railway's electricity needs.

3. Facades with invisible solar cells

Installing solar cells on roofs and smaller modules on [balcony railings](#) is now a widespread practice. But it's also possible to integrate solar cells into walls and facades. Solar glass facades come in many colors and are much less noticeable than conventional solar modules.

But their efficiency depends on their location. In Central Europe, for example, facades facing south, east and west produce 30% to 60% less electricity than comparable systems on roofs.

Still, glass facades that generate power last for many decades and save on painting.

Rooftop solar options are also becoming more varied. Instead of regular panels, building owners can opt for roof tiles with integrated solar cells, for instance.

Germany could meet its entire electricity needs if photovoltaics were installed on all of its suitable roofs and facades, according to calculations by the Leibniz Institute of Ecological Urban and Regional Development.

4. Double harvest: Electricity above, agriculture below

Farmers can reap a double harvest by deploying solar systems in fields. Modules on stilts generate electricity above, while crops grow below. In sunny regions, the shade is especially welcome — it reduces plant evaporation and helps save water.

[China](#) is also using this combination to help green parts of the Gobi Desert. Solar farms produce power in large quantities, while vegetation growing beneath helps halt desertification and restore soil fertility.

Marrying solar [power generation and agriculture](#) is just as cost-effective as generating electricity on large roof areas — and it's profitable for farmers.

The global potential for generating solar energy on farmland is enormous. In Germany alone, around 80% of the country's electricity demand could be met by combining solar power generation with growing crops on agricultural land.

5. Floating solar parks on lakes, seas and rivers

Solar energy isn't just limited to land — it's now making waves at sea. Floating solar panels and stilt-mounted structures are turning ponds, lakes and even oceans into clean power generators.

The world's largest offshore solar power plant was completed last year off the coast of Dongying, China. Capable of producing 1 gigawatt of electricity, it rivals the output of a modern nuclear power plant.



Offshore solar parks like this one near Shandong in China can also be combined with fish farms below. *Image: Tang Ke/Avalon/Photoshot/picture alliance*

Many of the world's lakes and reservoirs hold untapped potential for solar power. In Germany, for instance, studies suggest that around 7% of the country's electricity needs could be met by installing solar panels on flooded open-cast mines, gravel pits and reservoirs. That's according to a [study by scientists at Fraunhofer ISE](#).

6. Photovoltaics from space?

Solar modules have been powering [satellites](#) since the 1950s. Today, the International Space Station and other spacecraft also rely on electricity from the sun.

But for decades, scientists have dreamed not only of harnessing solar power in [space](#), but of beaming it back down to Earth.

One idea is to place giant solar sails in orbit that capture sunlight, convert it into microwaves and beam the energy down to humans. On the ground, enormous antennas spanning several kilometers would receive the microwaves and turn them back into electricity.

However, this extraordinary solar technology is still at a very early stage. It's incredibly expensive, and would leave behind millions of tons of [space debris](#).

Some countries, including the US, China and Japan, are conducting [pilot projects](#) and research into extraterrestrial electricity. But whether it will ever make sense to use solar energy generated in space here on Earth remains uncertain.

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