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Why Isn't Every Parking Lot Covered With Solar Panels?

Solar panel parking lot covers are a win for drivers and the environment. Here's why they're so rare.

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6 min read



Solar panels and parking lots can be a good combination.
Steve Proehl/Getty Images

If you park in one of several commuter lots on Michigan State University's campus, you'll likely score a premium parking spot. That's because each parking lot is sheltered from the sun, snow and rain by solar panels. They're mounted above the lot on steel structures tall enough for tailgaters in RVs to park beneath. Besides providing a more pleasant parking experience, the university gets cheaper, cleaner solar energy from the solar panels.

It's a green world
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commuting student at Michigan State for two years and gladly took advantage of the covered parking.

So why don't all parking lots have solar panels over them? We need to rapidly transition away from fossil fuels to avoid the worst effects of global warming. And, as extreme weather becomes more common, shade and shelter from downpours would be a welcome development for drivers.

Each solar panel installation has a different energy and financial evaluation. Rooftop and ground-mounted solar panels produce differently based on their latitude and the angle they're installed at. Parking lot owners may forego solar panels for reasons including cost and inconvenience. However, some solar experts think increased interest in sustainability (90% of Americans wanted more solar farms in 2020, according to Pew) could mean more solar parking lots are headed our way.

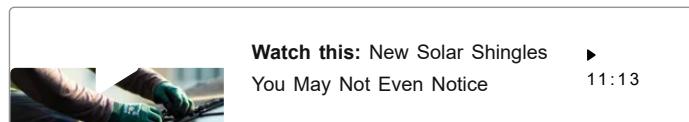
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The high upfront costs of solar

For many homeowners, installing solar panels will save them money in the long run. The same is true for large institutions.

Michigan State estimated the parking lot panels (located over five lots) would save \$10 million over 25 years. The university gets the electricity from the panels under a power purchase agreement, which means it doesn't own the panels but agrees to purchase the power. It saves by getting the power for a lower price than from an alternative source.



While the economics of a power purchase agreement are a bit diff-

costs,

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"A carport is roughly 40% more expensive compared to a ground mount system," said Tim Powers, a research and policy associate for Inovateus Solar, the company that built Michigan State's system. It costs more because of extra materials (it takes taller, stronger structures to get solar panels that far off the ground), extra labor (it takes longer to build) and extra engineering costs, he said.

If the only motivation is getting solar for the cheapest possible price, carports aren't the way to go. But there are other reasons an institution might adopt solar in their parking lots.

Michigan State's carports have won national and state awards, and account for 5% of the energy consumption on campus -- a step towards the university's sustainability goals and a nice round of good publicity. Several people I interviewed for this story suggested it might make the university more attractive to incoming students, though empirical evidence of the impact of a school's sustainability on a student choosing it is harder to find.

Recent research suggested that while 65% of consumers (not necessarily students) said they were interested in buying sustainable or green products, only 26% actually did so. While shopping habits and college choice might seem like apples and oranges, carport solar panels and green consumerism could be a perfect match where you get your literal apples and oranges.

Electric cars on the rise

The threat of climate change requires reducing greenhouse gas emissions rapidly. While many of the problems require systemic solutions, individuals are adopting green technology, like rooftop solar panels and electric cars, at accelerating rates. On top of the green benefits, both solar panels and electric vehicles are likely to save money over time. It's possible that stores with big parking lots could take economic advantage of both.

For example, a solar carport covering an average Walmart parking lot would have a capacity of about 3.1 megawatts, said Joshua Pearce, a professor of electrical and computer engineering at Western University in London, Ontario.

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Pearce modeled the viability of solar carports at big box stores, choosing Walmart for its ubiquity. The chain has also made public commitments to sustainability and is one of the leading corporations in solar capacity installed. Walmart says it has 600 onsite renewable energy installations, but didn't share information about planned or installed parking lot solar canopies. It has reportedly installed at least seven throughout California.

While it's hard to say if someone would opt for one retailer over another because of the environmental messaging of a large, visible solar array, would they if it meant parking out of the sun, snow or rain?

Pearce has a hunch they might, though his research hasn't looked at this question directly. He thinks stores might attract even more customers by providing discounted or free electric vehicle charging to shoppers.

An average Walmart parking lot could support about 100 electric vehicle chargers if covered in solar panels, Pearce's research found.

"I believe that if you're given free parking underneath the canopy that can charge your electric vehicle, you'll spend a little bit more time in the store because you're going to wait for it to get charged," he said. "Even if you only buy one thing, that will be a net profit for the store."

Pearce is looking to investigate this hunch in the near future by seeing what happens when charging is actually provided. Do nonelectric vehicles park there? Do people spend longer in the store?

In a future with free electric charging at Walmart (or another big-box store), shoppers could return home not just with their shopping haul but with more charge in their vehicle than when they left. According to a study by Pearce and a colleague, 90% of Americans live within 15 miles of a Walmart, and a one-hour shopping trip could provide a car with 20 miles of charge.

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A person plugs in an electric vehicle with solar panels in the background.



Solar panels and electric vehicle charging could be a useful pairing.

Simon Skafar/Getty Images

"This means that for many shoppers with an EV, the trip to Walmart and back would potentially have zero automobile-related energy costs," the researchers wrote.

While a world in which stores charge their customers' electric vehicles for free and make more money in the process sounds great, it's still hypothetical at this point.

There are hurdles to overcome, especially in retrofitting an existing parking lot with a solar canopy. It involves closing off parts of the parking lot while construction occurs, which potentially makes a store a more inconvenient choice, at least for a time.

Pearce echoed what Powers from Inovateus said: Accounting just for installation cost, right now it makes more sense to install on the store's roof than a solar farm on open ground.

"But then, if I don't want to take additional land, maybe I'm land constrained for some reason, then the parking lot is the way to go," Pearce said.

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"We see doing the carports in the parking lots as a great dual-use story," said Tyler Kanczuzewski, vice president of sustainability for Inovateus. Dual-use refers to the practice of using land for two things, for example, solar power and growing crops.

According to a study published in Nature, large-scale solar in the US is largely sited outside of cities. Fifty one percent of it is installed in deserts, 33% is on farmland and 2.5% is in urban areas.

Cars parked beneath a solar canopy.



Solar panels provide shade and power on a hot sunny day.

Bilanol/Getty Images

Land use decisions are often fraught. Putting solar in deserts raises cultural and ecological concerns. Rural solar farms have stirred debates. Michigan State's installation kept 45 acres of agricultural land in production, a fact Michigan State called out in promoting one of the several awards it won for the array.

Parking lots, on the other hand, are mainly good for one thing -- parking -- and solar canopies arguably improve that experience.

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"It's hard to project," Kanczuzewski said. While they're more common in the Southwest, installing solar over parking lots isn't terribly common in the Midwest where Inovateus does most of its business. By solar capacity, 95% of Inovateus's installations are ground-mounted utility projects. By number of projects, 65% are ground-mounted, 30% are rooftop and about 5% (just three projects total) are over parking lots.

"They're not a terribly common option," Powers said.

They could be a particularly sustainable one, though.

"I think it's super sustainable," Kanczuzewski said. "Rather than taking up new land or additional property, why not take an existing space and do solar?"

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