

Why Not Cover Ugly Parking Lots With Solar Panels?

In France, a plan to cover swaths of asphalt with photovoltaics will bring renewable energy even closer to urban areas where it's needed.

[William Ralston](#) Jan 23, 2023 7:00 AM

Photograph: DAMIEN MEYER/Getty Images

A backlash against industrial-size solar farms is brewing. At least 75 big solar projects were [vetoed](#) across the United States last year, compared to [19](#) in 2021. And between January 2021 and July 2022, planning permission for 23 new solar farms was [rejected](#) across England, Wales, and Scotland, when only four projects were refused between 2017 and 2020—representing the highest rejection rate in five years. Decarbonization, to some extent, risks getting bogged down by planning objections. People very often [don't want solar farms](#) in their backyard.

France, though, appears to have a solution: transforming its parking lots into solar farms nationwide. The French Senate has approved [a bill](#) requiring new and existing lots with more than 80 spaces to be at least half covered with canopies of solar panels that sit over the parking spaces. Assuming the bill comes into effect later this year, parking lots with more than 400 spaces must be compliant by 2026; smaller ones with 80 to 400 spaces will be given until 2028.

Because they're in abundance and cover large areas, parking lots are obvious candidates for doubling up as solar arrays. But that's only part of the potential benefit. It makes sense aesthetically and logistically too—mass parking tends to be right next to energy-hungry urban areas, and it's hard to

make a vast asphalt lot any uglier. It's a "no-brainer solution to providing clean electricity without wasting space," says Joshua Pearce, professor of electrical and computer engineering at the University of Western Ontario.

Solar panels need a lot of space to generate meaningful electricity, so the popular strategy up until now has been to spread vast quantities of photovoltaics across sparsely populated, undeveloped regions. Land there is cheaper, there are fewer locals nearby to object, and panels in such setups are easier to manage. There is a cost though: Rural solar farms crowd out other land uses, including agriculture, and can have deleterious impacts on local ecosystems. The 2,300-acre Aratina Solar Project being built near Boron, California, for instance, will [destroy](#) 4,276 western Joshua trees during construction.

Transmitting rurally generated electricity to urban settings also requires cabling infrastructure, which is expensive, ugly, and inefficient. Even in properly maintained grids, energy is lost when transmitting electricity over long distances, and these losses rise as temperatures increase. "With climate change, you're looking at wasting electricity," Pearce says.

So there's real appeal to installing photovoltaics closer to urban areas—if you can do so without encountering resistance. And a promising strategy is to look for spaces in urban spaces themselves. From rooftops and vacant lands to industrial sites and [airports](#), there are spaces in and around every town and city that could in theory house solar panels. A 2015 [study](#) concluded that within California's cities and other developed areas, there's sufficient solar development potential to power the state three to five times over.

Germany, meanwhile, has [introduced](#) tax breaks for anyone using rooftop photovoltaics. "In order to address the climate crisis, we need to install all the solar we can, and some of this needs to be multifunctional, meaning not simply using the land for producing power," says Alex Nathanson, founder of Solar Power for Artists, a design studio and education platform for solar power.

But it's hard to think of an urban area better to use than the parking lot. Besides being unpleasant on the eye, they're normally pretty large, meaning they have great energy-generating potential.

According to a 2021 [study](#) Pearce coauthored, installing solar panels over the parking lots of the 3,751 Walmart supercenters spread across the US alone could generate the same amount of electricity to that of around a dozen coal-fired power plants. (Even if you account for the part-time nature of solar power, Pearce believes you could permanently shut down two, maybe even three such plants in sunnier regions if covering these Walmart lots.) In France, the government believes solar canopies could generate up to 11 gigawatts of renewable energy, or the equivalent power of 10 nuclear reactors. That's [around 8 percent](#) of the country's entire electrical output.

Installing solar canopies could be helpful for drivers too. They'll provide shade in sunny, warm weather, potentially reducing the need for air conditioning when people jump into their cars, while in winter they'll provide shelter from rain and snow. If the vehicles parked beneath them are electric, the energy generated could also be directly delivered to these cars. At present, most commuters charge their electric vehicles at home, outside of regular working hours. The freedom to charge when shopping or at work could allow them to bypass peak prices.

Hooking up parked EVs to photovoltaic canopies could even help balance the grid. Because the traditional grid doesn't have energy storage capacity, the power fed into it must match the power being consumed—too much power on the grid is a problem. With solar, especially during peak sunshine hours, this can mean that production has to be switched off. But if you could store excess energy in EV batteries on site, you could maximize the potential of solar power during times of peak generation.

"During the day they can store energy," says Nathanson of parked EVs.

"During peak power consumption times, around early evening, they can feed power back to the grid." Using so many independent pieces of equipment in

conjunction with the grid—and making sure no one ends up short of energy—would require a fair amount of smart automation. It would also need [bidirectional charging equipment](#), which at the moment isn't widely used. But the potential to be smarter with solar is there.

Not every parking lot can be transformed into a power plant, though. With some there might be too much shade, perhaps because of tall buildings nearby. In countries toward the north of the globe, where the sun sits lower on the horizon, long shadows will be a bigger issue, particularly in winter. In other lots, panels might reflect sunlight into nearby buildings or, worse, roads, warns Dylan Ryan, lecturer in mechanical and energy engineering at Edinburgh Napier University in Scotland. "Are we going to be throwing sunlight into the eyes of the people who work across the street?"

The biggest concern, though, is cost: Installing a solar panel above a parking space costs [several times](#) more than installing one on the ground or on a rooftop because of the need to build the supporting structure. (These costs are likely to be bigger in, say, the United Kingdom than southern Europe, because parking lots there don't already have sunshades.) One of the lingering questions over France's proposal is how parking lot operators will pay for these installations. Without subsidies, Pearce says, it's hard to envisage too many operators installing nonmandatory solar canopies, because of the required investment.

Of course, parking lot operators could claw back their upfront investment by charging customers to plug in their EVs, or they could use the electricity themselves in whatever business their parking lot is serving. Or the electricity could just be sold back to the grid. "Whether you're just selling the electricity to the grid, or you're just using the electricity in your business, you are going to be paying less for electricity overall," says Pearce.

None of this is to say that solar farms belong only in urban areas. But there's a clear benefit to having more solar energy generated closer to where people are—and a clear need to find a way to do this that doesn't get tripped up by

Nimbyism. Using parking lots for solar farms gets around this problem, and on these grounds, France's legislation is a huge, though aggressive, step in the right direction. "You're taking advantage of what's essentially free real estate," says Ryan.