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Solar Windows? New Tech Could Change How You Power Your Home

Transparent solar technology offers new ways to use electricity around your home and could automate new and existing window functions.

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Feb. 24, 2023 4:01 a.m. PT 5 min read



Could your windows let in the light and use it to make electricity?
Getty Images

Technology has changed a lot about your home. Your [thermostat could be smart](#), your doors might be [unlocked by a phone](#), and your refrigerator may have a [touchscreen on it](#).

But your windows are still just glass panes in a frame. Improved, maybe, but still basically like the ones your grandparents had.

That might be about to change. In the not-too-distant future, they could generate and distribute electricity.

Emerging technologies could soon [turn ordinary-looking windows into transparent solar panels](#). While you can't go to the hardware store and pick up a renewable energy-generating window pane just yet, those days aren't too far away.

But don't expect to power your whole home or charge your EV with just a few new windows. Transparent solar technology is significantly less efficient than the opaque photovoltaic panels that go on rooftops.

"I don't actually see in the next 10 years that we will think of [solar] windows as an alternative to rooftop photovoltaic," [Vivian Loftness](#), a professor at Carnegie Mellon's Wilton E. Scott Institute for Energy Innovation, told CNET. Loftness, the former head of the university's School of Architecture, has decades of experience in environmental design and sustainability.

"I don't think their potential is going to be close to anything near what we can get out of a roof," she added.

Those limitations don't mean solar windows won't be worthwhile. They could potentially power devices adjacent to the window, like electric blinds, or run operations uncommon in homes today, like changing the window tint on command.

Here's what you should know about this emerging transparent solar technology and how it could present homeowners with new choices for how to use this additional power.

Best Solar Companies of 2023



How do solar windows work?

In a solar window, a transparent coating or material gathers some of the energy from the light passing through the window and stores it as electricity. Unlike solar panels, it allows some of the light spectrum -- visible light -- to pass through, while collecting energy from the infrared and ultraviolet light we cannot see.

"There's no question that we can embed in the glass something that collects enough energy that it migrates to the edge of the frame, and somewhere in the frame is a collector that is connected to a micro battery," Loftness said.

[Ubiquitous Energy](#), one of the companies developing solar windows, uses a special glass coating applied during the normal manufacturing process of windows to capture ultraviolet and infrared light energy. The company says these windows are completely transparent, allowing the visible spectrum to pass through.

Other forms of solar window technology are also in development. Researchers at the University of Michigan have come up with another way of capturing the sun's rays using plastic, semi-transparent light absorbers sandwiched between two panes of glass.

These projects show us that solar window technology is feasible, and is part of a broader push for technology to electrify all parts of homes and buildings, Loftness said.

Solar windows for the home

You won't necessarily need a grid-connected rooftop solar system, a battery or even an electrician to find some benefits from solar windows.



An electrical port on the window frame could allow you to charge your phone, laptop or other devices using the captured energy. Automation -- blinds powered by a motor -- could provide further benefits to your home, like allowing more light in when it's cold to warm up the space, Loftness said.

One opportunity of a solar window is similar to that of the small photovoltaic strip on a handheld calculator, Loftness said. It might not produce a lot of power, but enough to power the operations of the window itself.

It also presents opportunities for more advanced window technology, such as [electrochromic glass](#), which essentially makes windows dimmable.

Solar windows won't be cheap, because windows and solar solutions aren't cheap, though they should be long lasting, Loftness said. Windows might last 50 years. A single, high-quality traditional window might cost \$1,000 after you consider installation, Loftness said. Replacing every window in a house will cost that many times over.

But if you're in the market for replacing windows anyway, paying an extra 30% to 40% might make sense, especially if the [30% federal tax credit](#) for installing solar panels applies to these windows.

"If the electrification of those windows could be a modest cost premium on top of a high-quality window, we should absolutely be doing this," Loftness said.

Read more

- [4 Cheaper Solar Energy Options to Use at Home](#)
- [Solar Cheat Sheet: Your Complete Guide to Getting Solar Panels at Home](#)
- [Community Solar: Get Solar Power for Your Home Without Rooftop Panels](#)
- [Best Portable Solar Panels for 2023](#)
- [Best Solar Generators for 2023](#)

Solar windows could make sense for you if you're already planning to replace your windows and you want to either supplement your existing solar system or automate your windows and electrify what's around them. Solar windows might better fit new homes, where they can be installed and wired into the electrical system from the start. Just don't expect them to eliminate your power bill or replace your rooftop panels anytime soon.

Solar windows vs. solar panels

Solar windows can work as a complement to, rooftop solar panels. They can be wired to your main electrical box, potentially connected to a [battery backup system](#), and help you shrink or eliminate your electric bill.

Connecting solar windows to the rest of your house could pose some hurdles, however. Traditional windows do not require electrical work. On top of the cost of new windows, you can expect to pay an electrician to do some unconventional work.

"It's much harder to take all of these little points of electricity and find a way to connect it to a big battery or the grid," Loftness said.

In terms of efficiency, expect them to trail high-quality rooftop PV units. While the typical rooftop panel has an [efficiency rate of about 19%](#), the Michigan researchers have achieved efficiencies of about 10% with semi-transparent units. Ubiquitous Energy says its windows will be about [one-fifth the efficiency](#) of top rooftop panels. They might not generate the same money-saving return of rooftop panels, but could be worth consideration if you're already installing new windows.



Will you one day get power from solar panels and solar windows?
onurdongel/Getty Images

Can you buy solar windows?

Not yet. At the moment, the closest commercially available options are windows with traditional PV strips mounted on them, which can power the window's functions.

Ubiquitous Energy expects to be able to have solar windows for sale in 2025 or 2026, CEO Susan Stone told CNET. The company is currently raising money for its first production line; it will take about two years to have windows in showrooms.

The price of those windows is yet to be determined, Stone said.

The University of Michigan researchers are in the process of finding ways to bring their technology market, the university said in a July 2022 [news release](#).

What about larger buildings?

Unless you live in a glass house, solar windows aren't likely to generate enough electricity to power your [refrigerator](#) and [heat pump](#). But what if you own an office building? That's a market primed for transparent solar technology.

"You see tall office buildings, we see vertical solar farms," Stone said. "Our vision is for every piece of glass to be energy-producing."

A skyscraper full of office workers might have a pretty small roof, with little space for a rooftop array, but it has plenty of glass. Solar windows could be the renewable energy source needed to run the fax machines and breakroom fridges of the future.