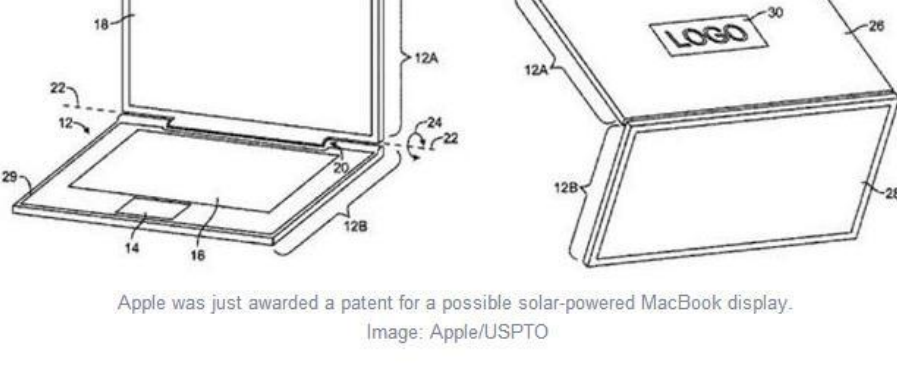


10 ways alternative energy is about to change the way tech gets powered

By Lyndsey Gilpin January 30, 2014, 5:52 AM PST // [lyndseygilpin](#)

Solar-powered laptops, edible battery power, spray-on solar panels, mini windmills: This may be a game-changing year for clean technology.



Apple was just awarded a patent for a possible solar-powered MacBook display.

Image: Apple/USPTO

Instead of rummaging through the house for your third lost iPhone charger, imagine simply placing the device on your windowsill for some juice. This week, [rumors are flying about Apple's possible solar-powered devices](#), including solar-panel displays for MacBooks and potentially for the elusive iPhone 6.

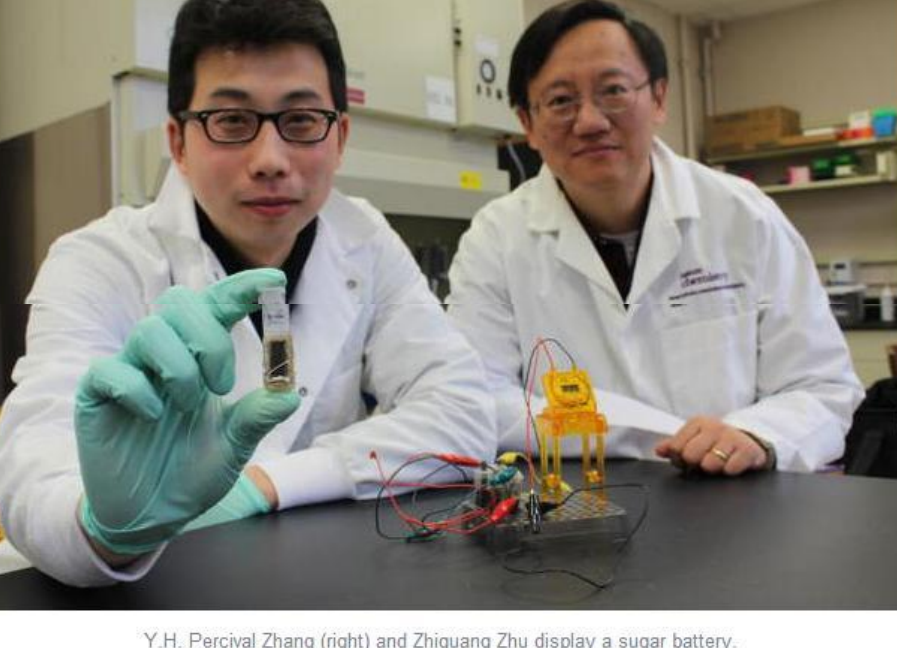
It got us thinking: what other ways are alternative energy sources changing the way we use technology? We found some fascinating ones: you may eventually be able to fuel anything from smartphones to homes with sugar, wind, trash, or even body movement. According to the [U.S. Energy Information Administration](#), alternative energy solutions will grow by about 3 percent in 2014, and will account for up to 28 percent of electricity growth by 2040. The 10 most interesting ways we are harnessing alternative energy are listed below:

1. Apple's solar-powered next-gen devices

On Tuesday, Apple was awarded a patent named "Electronic device display module," a two-sided display for the lid of a MacBook that is made of smart glass, or electrochromic glass, which allows the opacity to be altered to allow light through. The iPhone 6 is rumored to have a sapphire glass solar-charging screen. The idea of using solar energy isn't new to Apple; it owns two solar farms and one fuel-cell farm near its data center in North Carolina. But the company has [filed eight solar patents](#) in recent history and also [hired a thin films engineer](#) with experience in the solar industry.

2. Sugar-powered batteries

There's some sweet news for alternative energy. A Virginia Tech research team, led by Percival Zhang, has [created a sugar-powered battery](#). It is the first of its kind to maximize the energy output of sugar as a fuel source. Zhang said it has 10 times the energy of the lithium-ion batteries found in cell phones. The sugar battery is about the size of a AA-battery with .5 volts right now, but the team plans to prototype and unveil a cell phone charger relatively soon. It should be made commercially in three years, and Zhang hopes to charge other small devices such as clocks before working seriously to power small car batteries.



Y.H. Percival Zhang (right) and Zhiguang Zhu display a sugar battery.

Image: Virginia Tech College of Agriculture and Life Sciences

3. Solar-panel paint

"Every four minutes, another American home or business goes solar," President Obama declared in his State of the Union address earlier this week. It's true: solar technology is becoming more accessible and less expensive. According to the [Solar Energy Industries Association](#), the average price of a solar panel has declined 60 percent since 2011, and new technology is making them even easier to use. [New Energy Technologies](#) developed a coating for see-through glass called SolarWindow, made from the world's smallest organic solar cells, which are about a quarter of the size of a grain of rice. The University of Sheffield and University of Cambridge [have also created solar cells](#) that can be sprayed onto various surfaces including windows, car roofs, and buildings. The overarching idea is to produce low-cost solar technology so it will become more widespread, especially in developing countries.

4. Heartbeats harvested as power

People with pacemakers and medical stimulators must undergo surgery when the batteries run out, but that may one day change. A team at the University of Illinois at Urbana-Champaign [created a patch](#) that uses the body's own motion to recharge medical implants. It's a metal nanoribbon inside flexible plastic comparable to Saran wrap, according to lead developer John Rogers. As the device--which has been tested on livestock for a few hours--bends with the moving organs, it generates up to eight volts of electricity.

5. Footsteps to fuel electricity

We covered energy inside the body, but physical movement can also be harvested as power. Riverdale Country School in New York City is the first school in the United States to install tiles that convert kinetic energy into electricity through a mechanical system rather than piezoelectric technology. The tiles, which are connected to a LED board that displays the amount of energy, power a phone-charging station solely through students' footsteps. U.K.-based [Pavegen](#) helped develop the tiles, which can work indoors and outdoors, but work best where there is a high footfall rate such as transportation hubs or schools.



Students at Simon Langton School in the U.K. walk on Pavegen tiles.

Image: Pavegen

6. Grid-based power electronics

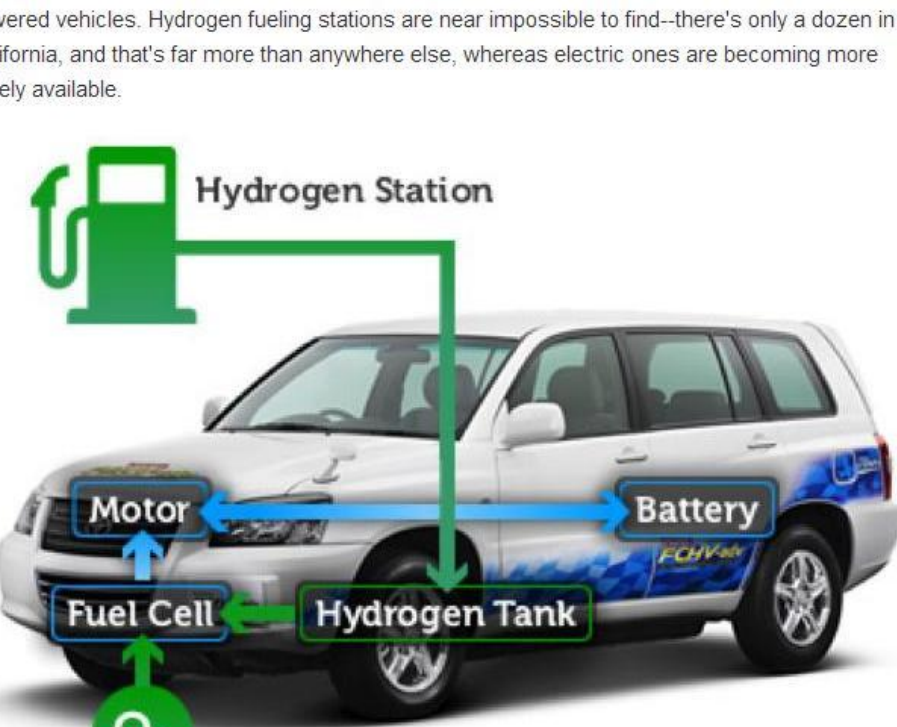
[Gridco Systems](#), a leader in electricity grid infrastructure solutions, just launched its first line of products. The [emPower Solution](#) uses pole-mounted and in-ground devices, which have a 25-year life span, and backend software to monitor the flow of power to homes and buildings. The Massachusetts-based startup has raised more than \$30 million from venture capitalists in four years. Gridco claims it can assist utilities and companies in tightly controlling power on the edge section of the grid, while also maintaining a more consistent flow to wind and solar farms and plants, whose voltages often spike throughout the day.

7. Methane converted to liquid fuel

Humans, animals, landfills, and wastewater plants release entirely too much methane into the atmosphere that isn't being harnessed for productive use. Collecting methane from cattle and piles of garbage is becoming more accepted and accessible, but the gas is expensive to transport and acquired through an energy intensive process. By using bacteria found in nature, [Berkeley researchers](#) are developing an enzyme to more efficiently convert methane into liquid transportation fuel.

8. Hydrogen fuel cell cars

There's some tension brewing in the electric car industry. [Toyota announced](#) it will sell its first hydrogen fuel-cell vehicle in 2015, and [Hyundai said](#) it will release its hydrogen-powered Tucson SUV later this year. The announcements have caused some problems over the stakes in the green car industry since Tesla, Nissan, and Volkswagen are putting their money on electric-powered vehicles. Hydrogen fueling stations are near impossible to find--there's only a dozen in California, and that's far more than anywhere else, whereas electric ones are becoming more widely available.



Toyota plans to sell the fuel cell vehicle in 2015.

Image: Toyota

9. Solar panels on top of cars

Another example of the renewed momentum in solar technology: Ford has developed a model that runs primarily on solar power from panels on the roof. The [C-MAX Solar Energi Concept](#), released at CES, is a project with SunPower Corp. and the Georgia Institute of Technology. A concentrator on the roof acts like a magnifying glass to produce energy. It's marketed as an alternative for those living off-the-grid who want an alternative energy-powered vehicle but can't reach an electric charging station.

10. Micro wind turbines

Researchers at University of Texas Arlington [developed a micro-windmill](#) that they claim can power cell phones and other small devices. The turbines are 1.8 millimeters wide and if hundreds of them are put on a cell phone sleeve, you can power your phone by simply waving it into the air or leaving it near an open window. Before they're on the market, the turbines will be encapsulated by a case to protect them, and the design must be optimized in order to keep it from getting dusty, which will immediately stop the mills. If that can be figured out, the team said the turbines could eventually be mounted on walls or panels to harvest energy for homes.

Also see

- [Apple wins patent for solar-powered MacBook \(CNET\)](#)
- [Where are people likely to buy 'green vehicles'? Here's a breakdown \(ZDNet\)](#)



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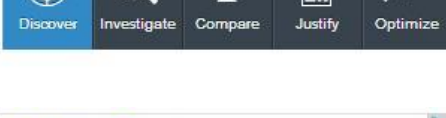
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