



# SOLAR HEATS UP

## Demand Surges as Prices Fall

by Jim Motavalli

**N**ow is a good time to buy a solar system and get off the grid. Solar photovoltaic prices have fallen 67 percent in the last five years, reports Alexandra Hobson with the Solar Energy Industries Association (SEIA).

It's a boom period for solar—a record 14.8 gigawatts were installed last year in the U.S. Solar represented 39 percent of all new electric capacity added to the grid in 2016, surpassing natural gas (29 percent) and wind (26 percent). In the first quarter of this year, solar and wind together comprised more than half of all new U.S. power generation.

The Solar Investment Tax Credit was extended for five years at the end of 2015, so homeowners and businesses can qualify to deduct 30 percent of the installed cost from their federal taxes. Also, there's no upper limit on the prices for the qualifying panels.

There are 1.3 million solar systems in the U.S. now, with a new one added every 84 seconds. Some 260,000 people currently work in the industry, double the figure of 2012. California is the leader in installed capacity, followed by North Carolina, Arizona, Nevada, New Jersey, Massachusetts and Utah.

### Technical Breakthroughs

In 2016, the average residential solar system produced seven kilowatts, at an average installed cost of \$3.06 per

watt, according to Hobson. A system costing just over \$21,000 before taking the income tax credit yields a final net cost of \$15,000. "It's a perfect marriage for residential customers," says Bill Ellard, an energy economist with the American Solar Energy Society (ASES). "The systems will produce electricity for about five cents per kilowatt-hour year-round compared to the average electric price of 10.34 cents per kilowatt hour tracked in March 2017."

New solar panel designs coming online mean even greater savings. Panels with built-in micro-inverters are cutting home installation costs for large central units (although their long-term, all-weather durability isn't clear yet). A breakthrough at Japan's Kobe University means single solar cells could achieve 50 percent efficiency, up from the 30 percent formerly accepted as the upper limit.

Ugly panel frames may also be a thing of the past. More aesthetically pleasing frameless panels are expected this year from big players like SolarWorld, Canadian Solar and Trina Solar, with adapted mounting hardware. Producers like Prism Solar and DSM Advanced Surfaces are also working on frameless clear panels, with cells bound between panes of glass. These attractive clear panels are highly resistant to fire and corrosion.

Tesla, which recently acquired SolarCity, is marketing tempered glass photovoltaic shingles that integrate with tile roofing materials to make the

installation nearly undetectable. Tesla claims they're three times as strong as standard roof shingles and guarantees them for the life of the house.

### Solar Works for Many Now

For an average household electric load of 600 kilowatt-hours per month, for example, a daily dose of five hours of direct sunlight and four-kilowatt system will likely meet demand. For households with higher usage, especially in the South and West, bigger installations are the norm. "Solar system sizes have been growing fairly steadily as the price has come down," Hobson notes.

Thanks to Google Earth, solar installers usually know if a property has the right conditions; avoiding the fee for an onsite inspection. Houses with a southern orientation within 40 degrees of direct southern exposure are golden. Those with flat roofs work well because the panels can be tilted for maximum effect. Adjustable panels can also be adapted to the best angle per season. Panels can't be in shade for a significant part of the day.

Rooftop installers can work around vent pipes, skylights and chimneys. If major obstructions are a problem, ASESA suggests a ground-mounted array or solar pergola, a freestanding wooden frame to mount panels.

Solar systems heat swimming pools, too, offering huge operational savings over conventional heaters. They start at around \$3,500 and average \$5,500, compared to an average \$2,664 for a fossil-fuel heater, reports *HomeAdvisor.com*.

Determine if a state has net metering laws, which make it easy to sell excess power from a whole-home system back to the grid. Check for local tax subsidies on top of the federal 30 percent. The beauty of solar is that once the system is in place, operating costs are negligible. The lifespan of today's panels is two decades and the payback is just two to three years.

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