

Kelly Pickerel is Editor in Chief of Solar Power World and has been involved with publishing in the solar industry since 2011. She joined the SPW staff in 2014 and enjoys working on contractor profiles and hearing about new projects. Her areas of focus include solar panel manufacturing, energy storage, the Contractors Corner podcast and the development of Solar Power World's annual Top Solar Contractors list. Kelly graduated from Kent State University with a degree in magazine journalism and lives in Northeast Ohio. This article was originally printed in Solar Power World and on solarpowerworldonline.com.

The Latest on Solar Roofs, Solar Shingles and Solar Tiles

By Kelly Pickerel

There are many words used to describe unconventional solar PV technologies used on rooftops. Within the “building-applied” category — basically anything that isn’t traditional solar panels attached to racks — terms like solar roofs, solar shingles and solar tiles are becoming more common, especially after Elon Musk and Tesla announced their solar roof idea in 2016. While the Tesla solar roof has yet to show successful application besides a few pilot installations, there are plenty of building-applied solar products on the market right now for homeowners looking for something different than the status solar quo.

Rackless solar systems

There are two building-applied solar veterans that make what they call solar shingles but may be better described as small, rectangular solar panels that are installed without traditional racking systems. CertainTeed’s Apollo II solar shingles are installed alongside asphalt shingles. The 63-W monocrystalline solar panels are about 46 in. long and 17 in. wide — bigger than asphalt shingles but smaller than traditional solar panels. SunTegra has two building-

applied products, also using monocrystalline solar panels that are bigger than the surrounding shingles. The SunTegra Shingle is about 52 in. long and 20 in. wide and rates at 110 W. The SunTegra Tile is also about 52 in. long but 14 in. wide and produces 70 W. The CertainTeed and SunTegra products are attached to the roofing deck for a sleek solar look not often achieved by elevated racks.

Roofing manufacturer GAF has a solar system that similarly attaches to the deck. GAF's DecoTech system installs full-sized solar panels without traditional racking in the middle of a roof, while normal asphalt shingles are still used along the perimeter. The GAF system offers low-profile aesthetics with a more traditional solar power output.

Dow was a leader in "solar shingles" until it dropped out of the business in 2016. The original Dow Powerhouse product used CIGS thin-film solar cells mounted to the roof decking, with traditional roofing shingles or tiles around the perimeter. One of the larger problems with Dow's design was that the thin-film solar cells got very hot with little ventilation that close to the roof, so power output decreased. In 2017, national solar installer RGS Energy bought the Powerhouse brand from

Dow and began marketing improved solar shingles, this time made with monocrystalline solar cells. The 41-in. long, 13-in. wide Powerhouse 3.0 solar panels have been rated at about 55 W. RGS Energy just recently announced it was ditching its residential installation arm to focus exclusively on Powerhouse solar shingle sales.

One company that is still trying the CIGS thin-film route is flexible panel manufacturer Sunflare. The company brought prototype four-cell solar shingles to Solar Power International 2018 and expects to have a finalized product by 2021 (as confirmed to *Solar Power World*). It's unclear by looking at the prototype shingles whether the product would be installed with traditional roofing shingles or as a full roof, but Sunflare said it will focus on new roof installations.



CertainTeed's Apollo II solar shingles

Credit: CertainTeed and Solar Power World



Credit: GAF and Solar Power World

GAF's DecoTech product.



Credit: Sunflare and Solar Power World

Sunflare's prototype solar shingles on display at SPI 2018.

Solar shingles and tiles

When solar shingles and solar tiles are sized to look like traditional roofing products, the result can be a more uniformly designed solarized roof. Luma Solar designs custom solar roofs, using 54-in. long and 15-in. wide, 65-W polycrystalline solar panels (or 75-W monocrystalline panels) connected together for the entire roof span. Similarly sized metal panels are used along the roof perimeter or where solar cells can't perform. The Luma solar shingles blend in with the non-solar metal panels for a uniform look.

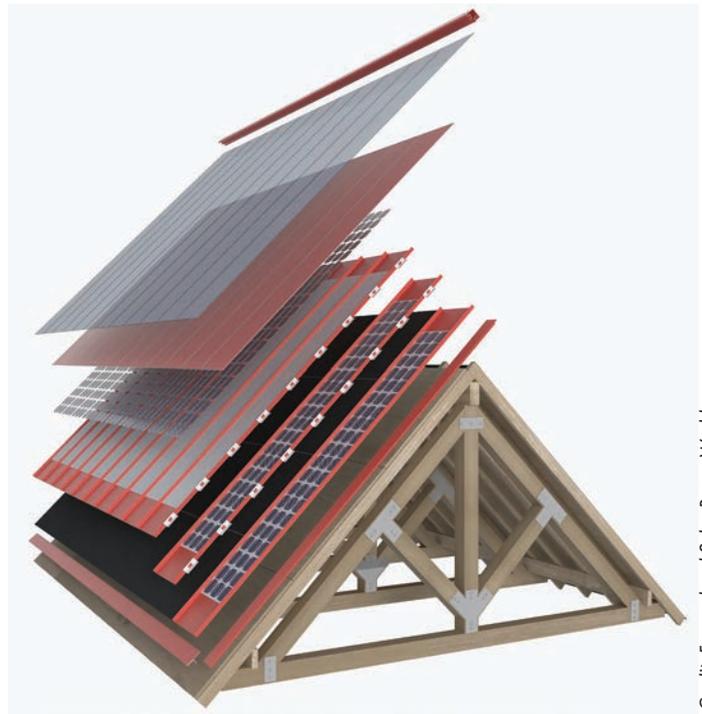
DeSol Power Tiles also has a solar roof but uses individual polypropylene tiles similar in shape to traditional roofing tiles. An entire roof is installed, with some of the tiles having 17-W monocrystalline solar cells embedded. The tiles are screwed to battens on the roof plywood level. The roof looks uniform in design, although the solar tiles are shinier than the solid, polymer tiles. Hanergy

is rolling out two CIGS thin-film solar tile products: the curved HanTile and the flat Thin Film Flat SOLARtile. Both are installed among other non-solar-generating tiles. The HanTile roof installation looks less obviously like solar than the flat tiles.

Tesla's solar roof — if we see more installations soon — is definitely the more aesthetically pleasing solar tile choice. The company is manufacturing solar cells hidden behind tempered glass, and matching non-solar tiles are used along the roofing edge. Tesla's tiles are 14 in. long and about 8.5 in. wide, with an unknown power output. The solar tiles are manufactured in Tesla's Gigafactory in Buffalo, New York, that it also shares with Panasonic. It's assumed that the Solar Roof tiles use crystalline silicon cell technology from Panasonic. Similar to other true solar shingle and tile products, Tesla's solar tiles replace an entire roof, so other, more traditional roofing tiles are not used.

Solar roof

Another Silicon Valley hopeful, Forward has a unique solarized roof product that isn't solar shingles nor just deck-attached solar panels. The company claims to make what it calls "solar roof panels" — long, skinny monocrystalline silicon solar panels that (in the case of Forward's metal roof offering) have optically enhanced glass fronts to camouflage into the roof or (in the case of Forward's tile roof offering) have individual glass tiles over top that concentrate the sun's rays. The solar roof panels, which have traditional aluminum frames, polymer-based backsheets and junction boxes, are about 21.5-in. wide and can be up to 18- to 20-ft long — all custom to the individual



An expanded view of Forward's Metal roof.

Credit: Forward and Solar Power World



A DeSol Power Tiles installation.

Credit: DeSol and Solar Power World

home's roof size, Forward CEO Zach Taylor told Solar Power World. The solar panels can't be seen from the ground, and the roof just looks like a normal metal or tile roof, with the invisible added benefit of solar generation. It is unknown how many actual Forward solar roofs have been completed in the San Francisco Bay Area since installation began in July 2018, and no photos of the roofs are available for

publication. Solar Power World did speak with the company about its solar production methods but cannot confirm if installations have been completed.

One thing is for sure, solar customers who prefer to have integrated roof designs have plenty of options, with more on the way in the near future. ■

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