



High-Performance Roofing Systems at Little or No Additional Cost

Innovations make roofing tiles more affordable and cost-efficient than ever, even when adding solar to the mix. Here's how.

By Dawn Yankeelov, contributing editor



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Since the beginning of human civilization, a roof was seen as just a weather barrier needing periodic replacement so occupants dwelling beneath it could stay warm, dry and sheltered.

For the past 80 years, roofs in the United States have mostly been capped off by shingles. Every 25 years or so, owners would have to begin contemplating a replacement, but until then, the operating philosophy was that which has come to dominate so much of our thinking in the face of repairs, maintenance and upkeep: Out of sight, out of mind. And until just recently, high-performance roofing wasn't even mentioned, at least not broadly.

Now, however, innovations are available that can elevate the roof to the status of "primary consideration for the land developer, the architect, the builder and all along the value chain to the occupant." The roof is now as important to the design of the structure as the foundation.

What's more, integrating photovoltaic (BIVP) solar with roofing tiles offers much more than a basic weather barrier. Performance factors such as 'hurricane roof' and 'insulating roof' expand what it means to have a roof over your head. Including solar for new construction is made more economical

due to a model rolled out by [3 IN ROOF Inc.](#) The solar-tile model resists 200 mph-plus winds. Structural polyurethane foam as the core of the tile and adhesive polyurethane foam at the points of adhesion to the roof deck gives the solar tile impressive form and function. It looks like a traditional tile, but adds far greater value to the performance and longevity of the roof. In addition, it installs with far less labor and material than traditional concrete or clay tile and traditional solar panel installations.

A high-performance roof entails advances in SPF material molded in the form of a traditional roof-tile, coated with a Portland cement-based geopolymers (for longevity like Roman cement). The tile is secured to a fully adhered granulated weather barrier with strong foam adhesive that enables these tiles to remain affixed even under the pressure of hurricane and tornado force winds. Those same tiles can be fitted with integrated solar modules that even match the color of the tile! Solar tiles are 50 percent costlier than ones without solar.

But, since the tiles block incoming solar radiation from heating up the attic, both pay for themselves over time. The installed non-solar tile system costs no more than traditional roofing tiles and will even lower the cost to build the structure since the lighter load of a 3 IN 1 ROOF means less labor and fewer materials are needed, from footer excavation to truss design.

Manufacturers that monitor early green technology adoption are seeing strong and growing interest, not only as a result of consumers who increasingly ask about hurricane and hail protection, but also from architects, developers, builders who seek to differentiate from competitors while simultaneously delivering buildings that are more energy efficient and resilient and good looking. These early adopters are defining construction methods and materials that make it profitable to design and build for sustainability.

Non-Solar Option

Flex appeal. One area of high-performance developed by the 3 IN ROOF tile system addresses the aging and degradation that normal roofing products endure as a result of endless day and night cycles of heating and cooling.

Overtime, just as a paper clip weakens when it is bent and unbent multiple times, the bond between shingles will loosen as shingles age, flex and curl allowing precipitation to invade during wind-driven rains. Furthermore, the resulting gaps make it easier for wind to grab the shingles, rip them from the roof and launch them into the air like flying razors. These issues are also true for traditional tile systems. In contrast, both the 2 IN 1 and the 3 IN 1 ROOF product never lose their bonds, thanks to a patented, patented utility design, chemical compounds and easy installation methods.

These products stay put even in the face of 200 mph-plus winds and can withstand numerous repeated Class 4 hail strikes in the same exact spot without sustaining damage to the weather barrier that's well protected from the product's 2" foam embodiment.

Foam on the range.

Recommended adhesive foam allows for a no-nail/no-screw install process that bonds the product permanently to the weather barrier. In production, two-component custom polyurethanes are used. The 2" average thickness

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—Carmen Bellavia, CEO, 3 IN 1 ROOF

lends an R-14 external insulating barrier that tie in with standard construction practice throughout the remainder of the structure's envelope. Its dense 3-lb foam is rigid, water resistant and blocks all solar gain from heating up the attic space.

#3 IN 1 ROOF recommends a 2" layer of 2-lb SPF foam be sprayed on the inside of the roof's slope, throughout the attic as a sealant. Such a roof installed on new construction eliminates the need to vent the attic and therefore enables the attic to be thermal regulated (like the rest of the structure). This high-performance roof produces the ultimate high-performance attic!

Weather watch. A self-adhesive, SBS (styrene-butadiene-styrene)-modified bitumen granular cap sheet allows for a fully adhered weather barrier and a superior grip for the adhesive. No mechanical fasteners are required for field tiles, so the waterproof underlayment is not punctured. Because the foam dries quickly, roofers are able to walk on these tiles mere minutes after they are set in place, without having to deal with chalk lines and layout measurements which are no longer even needed.

Funding. The resulting energy-saving product—good for up to 38 percent BTU savings in some areas—was simulated by the Florida Solar Energy Center. Texas A&M University and the California Energy Commission tested and validated use of insulating foam as part of the roof's composition. Since these

are energy saving roofs all 2 IN 1 and 3 IN 1 ROOFs are eligible for funding by governmental PACE programs offering no money down financing. Regardless, the product more than pays for itself over its 50-year lifetime and the solar modular upgrades—a bit costlier on the front end—will pay for the entire solar roof system in just under 19 years.

Fire fitness. Another benefit—one potentially of life and death—ties to the fire-resistance offered by many tile products, including the 3 IN 1 system.

Many home fires spread through the roof, but when equipped with either the 2 IN 1 or the deluxe solar version, the roof is not a conductor of flame so fire can't reach the wood decking or spread from one part of the home to the next. This provides exceptional escape time for endangered occupants who may be sound asleep in one room while under the blaze in another.

Wide adoption. Acceptance of the product is partly based on ease of installation on site. According to a story on ProudGreenHome.com, new homes



The 3 IN 1 solar option can be ordered to blend in virtually invisibly with the background roof color.

constructed by Hibbs Homes, a St. Louis builder-focused on high-performance residences that are outfitted with hooks inside attics so that if homeowners opt to anchor energy-efficient modules on their roofs, connection capabilities are in place.

With every order, the 3 IN 1 ROOF system comes complete with solar modules, pre-sized above and below deck wiring, color coded connectors, inverters and detailed schematics so every contractor can quickly become solar installers for added revenue streams and customer satisfaction.

The concept, design, production and implementation was championed by a 30-year roofing and building contractor, Carmen R. Bellavia, now president and CEO of 3 IN 1 ROOF Inc. He currently is in a major launch phase to introduce his 3 IN 1 to new markets. Based on his real-world experience in the field in Northern states as well as Southern, he has always kept the installer and the builder in mind.

“If the product is difficult to install and won't last through thick and thin, then no matter how sexy it is, it will forever just sit on the shelf,” he said.

“My product is for my fraternal brothers both on the job and at the drafting board, it simply makes all our lives easier while increasing profits and adding revenue streams without increasing personnel or overhead. In fact, it reduces both”, he said.

Expert evaluation. “I always tell our customers that in the past 10 years, (solar) hasn't been as cost-effective as you know it's going to be,” said Matt Belcher, vice president and manager of sales for Hibbs.

“We always tell them that at a minimum, let us set you up because once you get in that house, the energy savings you create now is going to help you build equity quicker,” he said. “What better place to invest equity than in technology like this?”

Finally, according to a story in [Orlando Weekly](http://OrlandoWeekly.com), an independent engineering report prepared for the Florida Department of Business & Professional Regulation gave its nod to 3 IN 1 ROOF tiles.

The report said the product is “superior in design, material comparison, and ease of installation in comparison to any traditional roofing tile or special roofing system seen within our 55-plus years of licensed experience.”

Solar Option

Harnessing the sunlight beating down on the roof for energy via solar panels came into the equation in just the past couple of decades. Solar roofing technologies are now leaping forward as innovators with construction background merge “tried and true



Check List

In summary, consumers at all levels of the industry have just a single company to look for a high-performance roofing product that offers all these features:

- 110 lbs./sq. (traditional tile is 1,000 lbs./sq.)
- Light-load system (reduces build-out cost)
- Easy, rapid installation (save time and money on deployment)
- SPF embodiment (saves cost on interior thermal foam)
- Patented design (Won't break under foot)
- Class A fire rating (won't support a flame)
- Lifetime longevity (50-year pro-rated guarantee)
- Assorted color and textures (aesthetic value and curb appeal)
- 200 mph-plus wind rating
- Resists mold and Ultra Violet rays (minimal maintenance and no solar heat gains)
- Compliant with PACE requirements (full funding approval)
- Renewable solar (platform allows solar module replacement)

materials” and real-world experiences into common sense solutions.

A standard solar panel has four main parts, the back-sheet, encapsulated solar cells, glass panel and frame. Solar cells are fragile and glass has proven to be the best barrier. Standard roofing materials like asphalt, aluminum, cement or clay, slate, wood, even plastics are not suitable as the perfect ‘platform’ because they’re not either: rigid enough to prevent flexing and support a solar module, thick enough to house the solar wiring, resistant enough to UV radiation, resistant enough to condensation, strong enough to support the weight of human foot traffic, light enough in weight for code approval on pre-existing structures, or easy enough to install for adoption by the professional roofer and builder.

The 3 IN 1 ROOF tile uniquely serves as both the back sheet and frame or “platform” because it’s molded from dense 3-pound foam embodiment and coated with a UV resistant Geopolymer shell. Encapsulated solar cells and glass panel are set and sealed into the platform for the ultimate integrated solar roofing system! Now add a 200-mph wind resistance factor, a lifetime tile warranty and great curb appeal and you have the best BIPV solution the world has ever seen.

3 IN 1 ROOF is the first and only company to develop, patent and manufacture a code compliant, Class A fire-rated, foam roofing tile and BIPV Platform for high-slope roofing.

Under comparative analysis to every solar option that has (or has not) made it to market, 3 IN 1 ROOF is the only practical platform engineered to deliver superior benefits to each stakeholder within the value chain.

Don't say nope to the slope. High-slope roofing products for commercial buildings and houses are relatively easy to install and the cycle has continued for replacement every 25 years. With the advent of solar energy collection, today's solar panels on high-slope roofs are warranted for about 30 years. But consider that most solar panels in home construction are fairly inefficient. As a direct result of the extreme heat that increases hour by hour in and from every slope roof product, less than 14 percent of the energy that reaches solar panels will be converted to electricity.

“A high-performance roof was rarely thought about until we began to understand the real benefits of foam as a structural and insulating material,” said Chosen T. Cheng, executive vice president for 3 IN 1 ROOF Inc. “Our breakthrough topcoat technology, use of roofing materials already proven for decades in low slope (flat) roofs and the creative problem-solving approach of Mr. Bellavia has made our steep slope product possible.”

About the sponsor. [3 IN 1 ROOF](#) uniquely joins together insulation, protection and solar power in one roofing system — everything you need for a high performance home!