



# TAKING SIDES

There's no shortage of cladding options for green homes. Here's what to weigh when making your selections. By Katy Tomasulo

Like many building product categories, choosing siding for a green-built home is far from cut-and-dried. Among mainstream cladding materials, each product comes with its own set of features and benefits, both from a sustainability perspective and from the attributes of price, installation, appropriateness for climate, and aesthetics. As such, while certain products have emerged as leaders in the green-building industry, no option is perfect. Perhaps this is to be expected, considering we rely on cladding materials to protect homes from the worst Mother Nature can throw at them—and still look good doing it.

“There is no silver bullet,” confirms Vladimir Kochkin, division director at the NAHB Research Center. “And that’s true for almost any product or material.”

Unfortunately, there’s also no category-wide certification program to use as an overall guide, although some manufacturers have obtained third-party verifications for attributes like recycled content and air quality. And most claddings qualify for points under LEED for Homes and the National Green Building Standard.

The first decision for choosing a siding material must come down to what’s suitable for and allowable in your market and location. Following

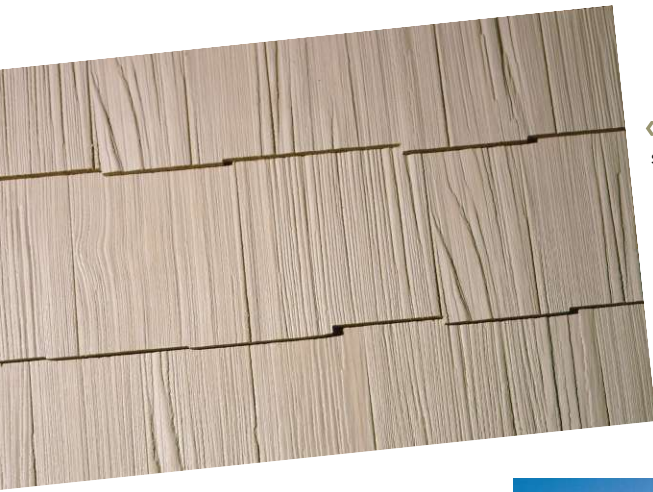
that, here’s a breakdown of how the major types of residential cladding compare on common attributes for green-built homes.

## FIBER CEMENT

Fiber cement has become a go-to product for many green builders, who appreciate its durability and a look that replicates wood but with lower maintenance. Made with cement, sand, and cellulose fiber, the non-combustible material is resistant to rot and termites, according to ToolBase, carries warranties as long as 50 years, and costs less than wood and stucco.

“What [builders like] first is the durability,”

**CALSTAR.** Made with fly ash, water, and sand and manufactured with a vibro-compaction process and cured for less time and at a lower temperature, CalStar bricks generate 85% less CO<sub>2</sub> and use 85% less energy in production than traditional fired clay, the company says. The bricks incorporate 40% recycled content. A range of colors is available. 510.793.9500. [www.calstarproducts.com](http://www.calstarproducts.com). Circle 390.



◀ **COLLINS.** TruWood engineered wood siding comes in a range of styles, including ½-inch Cottage Lap, ½-inch panel, and ½-inch cedar shake lap. The product is SCS certified for a minimum of 25% recycled content and is available FSC certified. It is designed to eliminate splitting, cracking, and checking, the company says, and comes pre-primed. 800.329.1219. [www.collinsco.com](http://www.collinsco.com). Circle 391.

▶ **WESTERN RED CEDAR LUMBER ASSOCIATION.** Available in a range of patterns and grades, Western red cedar is naturally resistant to decay and insects and can be left untreated for a natural patina or painted or stained. Wood from SFI-, FSC-, and CSA-certified forests can be specified. The product is stable and will remain straight and lie flat. 866.778.9096. [www.wrcla.org](http://www.wrcla.org). Circle 392.



says Prashant Panchal, director of marketing for James Hardie. “Secondly, it’s what the product is made of . . . None of these elements are toxic.”

One environmental drawback to fiber cement is its high embodied energy during manufacture. Our friends at *Environmental Building News* also caution that some of the cellulose content may come long distances, so be sure to get documentation on origins.

Fiber-cement planks with recycled content in the form of fly ash are available, such as those from CertainTeed. And though fly ash has recently come under the EPA’s microscope for concerns over hazards in disposal, “beneficial reuse” applications—such as encapsulated in concrete or brick—are exempt.

Because of silica dust, installers should cut outdoors and wear a respirator. Upon tear-down, fiber cement can’t be remanufactured, but it can be ground up for use as fill.

Manufacturers and green experts recommend pre-finishing, which provides an emissions-controlled environment; it also better ensures a quality application and may be required for some warranties.

## WOOD

Many consider wood the ultimate sustainable material and renewable resource, and therefore one of the greenest cladding choices. Its long history as an exterior finish has established a built-in appeal to many buyers that can boost resale values.

Western red cedar, which comes to mind first for many, is naturally durable and, with proper maintenance, a long-lasting option. According to Paul Mackie, western field manager for the Western Red Cedar Lumber Association (WRCLA), cedar also is lightweight in transport.

In separate third-party life-cycle assessments (LCAs) conducted by the WRCLA and the Vinyl Siding Institute, cedar finished ahead of all cladding in both studies—fiber cement, vinyl, and brick or brick and stucco. In the WRCLA study, cedar received top marks in five of the seven criteria; the two categories in which it didn’t perform as well—smog and eutrophication—the WRCLA attributes to paint, noting that higher-quality paints and



◀ **CERTAINTEED.** The company’s CedarBoards D6 insulated vinyl siding is made with 60% recycled content that includes post-consumer vinyl siding. The foam backing boosts a wall’s R-value, enabling an Energy Star rating for the panels, and provides rigidity and impact resistance. The TrueTexture rough cedar finish is molded from real cedar boards. Eighteen colors are available. 800.233.8990. [www.certainteed.com](http://www.certainteed.com). Circle 393.

▶ **BORAL BRICKS.** The company’s bricks are made with clay and shale and are manufactured near the source. Options include traditional face brick in a range of colors and 17th Century Brick, which is formed in a handcrafted, sand-dusted wooden mold so that no two are exactly alike. Shown here is Indian River face brick. 800.526.7255. [www.boralbricks.com](http://www.boralbricks.com). Circle 394.



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› **LP.** The SFI-certified trees (primarily aspen) used to manufacture SmartSide engineered wood siding are small and readily renewable, the maker says, harvested every seven to 10 years. The entire tree is used in manufacture, with the bark used to power the plant. SmartSide is bound with a low-emitting, urea formaldehyde-free MDI resin and is treated with EPA-registered zinc borate. It comes pre-primed and can be pre-finished or finished on site. 888.820.0325. [www.lpcorp.com](http://www.lpcorp.com). Circle 395.



◀ **JAMES HARDIE.** The re-engineered HardieShingle fiber-cement siding line offers an authentic-looking wood-grain appearance in a straight-edge panel, a staggered-edge panel, and individual shingles in five widths. The siding is available primed or with ColorPlus pre-finishing. Under the company's HardieZone system, each panel is engineered to meet the needs of the region in which it is installed. 888.542.7343. [www.jameshardie.com](http://www.jameshardie.com). Circle 396.

› **ELDORADO STONE.** Made with cement with lightweight aggregates, the company's manufactured stone is lighter weight and lower cost than natural stone and has a lower waste factor. Color is provided by natural iron oxides. Some of the products contain recycled content in the form of fly ash. They have an average R-value of 0.41 per inch. A range of regional and national profiles is available; Cut Coarse Stone is shown here. 800.925.1491. [www.eldorado-stone.com](http://www.eldorado-stone.com). Circle 397.



stains or new waterborne products are one way to help offset this.

Cedar siding is resistant to moisture and insects and doesn't have to be treated; left unstained, it will develop a patina and will need to be cleaned with a mild oxygen bleach solution. To retain its original color, staining and maintenance will be required. Prefinished products are often available.

Still, with cost premiums and annual limits on availability, cedar isn't always a feasible choice. What's more, supplying materials outside the Pacific Northwest means shipping long distances.

Among the other wood options are redwood, cypress, Eastern white cedar, Douglas fir, and pine. For the most sustainable selections, look for local sources and products with third-party certifications such as FSC, SFI, and CSA.

Phil Kaplan, AIA, principal at Kaplan Thompson Architects in Portland, Maine, uses locally sourced Eastern white cedar or white pine for some of his projects (along with fiber cement and metal). The cedar does not require treatment (although it can be stained or painted); without treatment, the color starts uneven, but evens out over time, Kaplan says. Pine is a less expensive option, but does require treatment.

Builder Michael Chandler has found tulip poplar an affordable, extremely local option in his North Carolina market. He also has utilized BarkHouse siding, in which the bark of trees bound for furniture manufacturing is stripped and crafted into shingles.

Resource-efficient engineered products also are available; be sure to research the chemical content of binders, treatments, and finishes.

## VINYL

Vinyl is by far the most hotly debated cladding material among green building professionals, caught between its detractors and its defenders. On the one hand, vinyl siding is often selected for its affordability, low maintenance, and durability, with a 40- to 50-year life expectancy. And it is lightweight in transport. On the other hand, it's made from PVC, an ingredient many green advocates question.

According to vinyl siding advocates, next to its durability, vinyl's key environmental



◀ **ECOSTUCCO.** Made with limestone, EcoStucco requires about 40% less CO<sub>2</sub> to produce than Portland cement-based stucco, the manufacturer says. The lime plaster can be used with most substrates, including blue board, concrete, and masonry. The product comes in 216 standard colors made with natural pigments and five textures. 415.455.9896. [www.ecostucco.com](http://www.ecostucco.com). Circle 398.

attribute is its ultimate recyclability. “Vinyl siding can be recycled into vinyl siding many times,” says Tad Radzinski, president of design and development firm Sustainable Solutions and a consultant to the Vinyl Siding Institute (VSI). After teardown, vinyl siding can be remanufactured, with no separation required between manufacturers. Though no significant national reclamation program exists yet, some companies (CertainTeed, for example) are beginning to implement programs.

In the life-cycle assessment the Vinyl Siding Institute commissioned Sustainable Solutions to conduct using BEES, vinyl performed better than brick and stucco, although it finished after cedar (the LCA did not include fiber cement because that data was not available in BEES at that time). A life-cycle assessment performed by a third party for the Western Red Cedar Lumber Association, which did include fiber cement, found similar results and also ranked vinyl ahead of fiber cement.

The chief concern about vinyl siding within green building circles and among health advocates centers on PVC’s chemical makeup. The Healthy Building Network, for example, labels PVC an “environmental health disaster” and states that PVC poses hazards in manufacturing, its life, and disposal, and releases gases and dioxins if burned by accident or as waste. And the Living Building Challenge, seen as the country’s most stringent green building certification program, includes PVC in its “Red List,” making it one of 14 product ingredients restricted from use.

Jery Huntley, president and CEO of the VSI, says that once the siding is manufactured, the chlorine is locked into the product more tightly than when it was salt. “Vinyl siding is safe,” she asserts. “It does not release chemicals into the atmosphere. The products of vinyl combustion are no more hazardous than those produced by burning many other common materials, both synthetic and natural.”

Huntley says the LCA shows vinyl having lower environmental impacts compared to many other exterior claddings, including lower levels of toxic chemicals released into the environment. “Vinyl siding does not off-gas or emit chemicals during its lifetime,” she says. “During its lifetime, it doesn’t require painting, staining, or caulking. This further reduces

emissions over the life cycle that could occur from the release of harmful solvents and other VOCs into the environment from painting and staining.”

The latest trend within the category has been the introduction of insulated panels, which have a layer of EPS foam adhered to the back. The foam reduces thermal bridging and, according to the NAHB Research Center, can add an additional R-value of up to 4.5. The backing also adds rigidity and impact resistance.

The foam backing does bring another virgin material to the manufacturing process, but it can be recycled upon teardown after it’s separated from the vinyl panel.

VSI offers a certification program that independently verifies that products meet or exceed the industry standard for quality, ASTM D3679, which covers impact, thickness, and weatherability; it was recently upgraded to require no lead or cadmium content after some products were imported with those elements.

## BRICK

Like wood, brick attracts home buyers for its aesthetic, low maintenance, and resale value.

Clay brick, which makes up 90% to 95% of the market, says Shelley Ross, director of marketing at Boral Bricks, combines the natural materials of clay, shale, and water. Raw material extraction, manufacturing, and distribution are commonly very local. In most cases, she says, the clay is mined within a mile or two of the brick plant and then sold locally, an important consideration because the material is heavy in transport.

Brick is fired at 2,000 degrees F for several days, equating to high embodied energy in manufacture. Still, manufacturers argue that brick’s long life—with expectancies of 100 to 200 years or more—makes up for the energy used in manufacturing. It’s also durable, impervious to rot and mold, and requires no painting or staining and little maintenance.

And new options are emerging. CalStar, for example, offers bricks in which fly ash, water, and sand are vibro-compacted and then cured at lower temperatures and for less time than traditional brick.

Upon teardown, bricks typically can be re-sold and re-used. They also can be



▲ **TAPCO.** Foundry vinyl cedar shake siding features a rough-sawn look and staggered butt ends and varied widths for a cedar appearance. It comes in 7- and 10-inch exposures and is available with Fullback, a foam backer that adds a 3.96 R-value. The company participates in EcoScorecard, which allows contractors to see how products qualify under green project rating systems. 800.771.4486. [www.foundrysiding.com](http://www.foundrysiding.com). Circle 399.



▲ **STO.** Comprised of StoGuard spray-on waterproofing/air barrier, adhesive, and StoTherm EIFS, StoTherm NExT provides a complete wall system of physically and chemically compatible components. The StoGuard continuous air and moisture barrier is seamless and durable, the maker says, and resists moisture penetration more than five times longer than traditional housewraps. The EIFS consist of a base coat with 17% recycled content, embedded glass-fiber mesh, and a 100% acrylic polymer-based or silicone-enhanced textured finish coat. The company’s Lotusan finish mimics the properties of a lotus leaf to repel water, resist mold, and rinse clean with rainfall. 800.221.2397. [www.stocorp.com](http://www.stocorp.com). Circle 400.



▲ **OWENS CORNING.** Cultured Stone manufactured stone is made with a minimum 35% recycled aggregate as certified by UL Environment; the products also are Greenguard certified. The product is lighter weight and easier to install than natural stone; the variety of styles and textures are created from molds of natural stones. Del Mare LedgeStone in Sangria is shown here. 800.438.7465. [www.culturedstone.com](http://www.culturedstone.com). Circle 401.



▲ **BASF.** Senergy Senturion III water-drainage EIFS features a secondary air/water-resistant barrier and a pre-formed drainage mat that channels incidental moisture to the exterior. The mechanically fastened EPS insulation board provides an additional R-value of 4 per inch. The 100% acrylic reinforced base coat is crack resistant, the company says, and the 100% acrylic finish coat resists fading and abrasion; finish coatings with additional dirt and mildew resistance can be specified. A standard palette of 128 colors, along with unlimited custom colors, is available. 800.221.9255. [www.senergy.basf.com](http://www.senergy.basf.com). Circle 402.

ground up for road base or landscaping, or used as clean fill.

### MANUFACTURED STONE

Made with ground concrete aggregate and water, manufactured stone is a lightweight, lower-cost alternative to natural stone. The products also are durable, offering warranties similar to that of fiber cement.

Like other cement-based products, manufactured stone does have higher embodied energy in production.

Some manufacturers are incorporating recycled content and earning third-party certifications. Cultured Stone, for example, is Greenguard certified and has minimum recycled content of 35%.

At end of life, manufactured stone can be ground up for roadways and sidewalks.

### STUCCO AND EIFS

Most stucco today is made with Portland cement and sand, and, like other cement-based products, the raw materials provide for a high embodied energy compared to non-cement products. At the same time, the surface can be low-maintenance, affordable, and durable; offers versatile design options and a breadth of color choices; and is easily repairable, according to the Stucco Manufacturers Association.

Products such as EcoStucco use limestone instead of Portland cement.

EIFS—exterior insulation finish systems—offer a look similar to stucco but with different components and installation. EIFS consists of rigid insulation board with a base coat (acrylic and cement or all acrylic), imbedded fiberglass mesh, and an acrylic finish coat. With a base coat of about  $\frac{1}{8}$  to  $\frac{3}{16}$  inch thick, EIFS are thinner than traditional stucco and therefore have less cement content, more flexibility, and, combined with the imbedded mesh, greater durability.

Though EIFS utilizes virgin foam board, acrylics, and cement, it offers the benefits of continuous insulation, a feature that some expect will be required in future energy codes. The board can add an additional R-value of up to 4 per inch.

EIFS' primary challenge is overcoming perceptions brought about by envelope

failures in the mid-90s. According to Kent Stumpe, marketing communications manager for BASF, the problems occurred when insulation board was still applied directly to wood-based sheathings; if moisture penetrated the envelope through faulty window installations or exterior joints, the moisture became trapped and led to damaged sheathing.

Because the failures were in installation, the industry has focused on improved training and requiring a drainage plane, as well as introducing drainable EIFS. The category also is now recognized by the IRC.

### OTHER OPTIONS

Aside from the major types of cladding mentioned above, there are plenty of alternatives available that might fit your needs.

Some architects are designing around steel cladding, which typically contains high recycled content and is recyclable, but also comes with high price and embodied energy levels. Companies like Richlite and KlipTech offer attractive cladding products made from recycled paper.

And of course there's an increase in re-use of reclaimed and salvaged wood and masonry products that has spawned growth in local suppliers who specialize in these materials.

### INSTALLATION

No matter which product you choose, how it performs will largely come down to the quality of installation, especially in how windows and other penetrations are prepared and flashed, and how rainscreens and drainage planes are detailed and installed. (For more on rainscreens, see page 17.) Follow manufacturers' instructions and proper building science practices.

As with most specs, selecting the most appropriate cladding will require weighing a number of factors, from durability to price to environmental aspects, requiring you to prioritize which attributes will help you meet your goals.

*Katy Tomasulo is deputy editor for EcoHOME.*

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