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MATERIAL WORLD

As manmade carbon emissions pass dangerous new levels, the production of high-intensity materials such as concrete and steel threaten to make matters much worse. What can the building industry do to lighten the Earth's load?

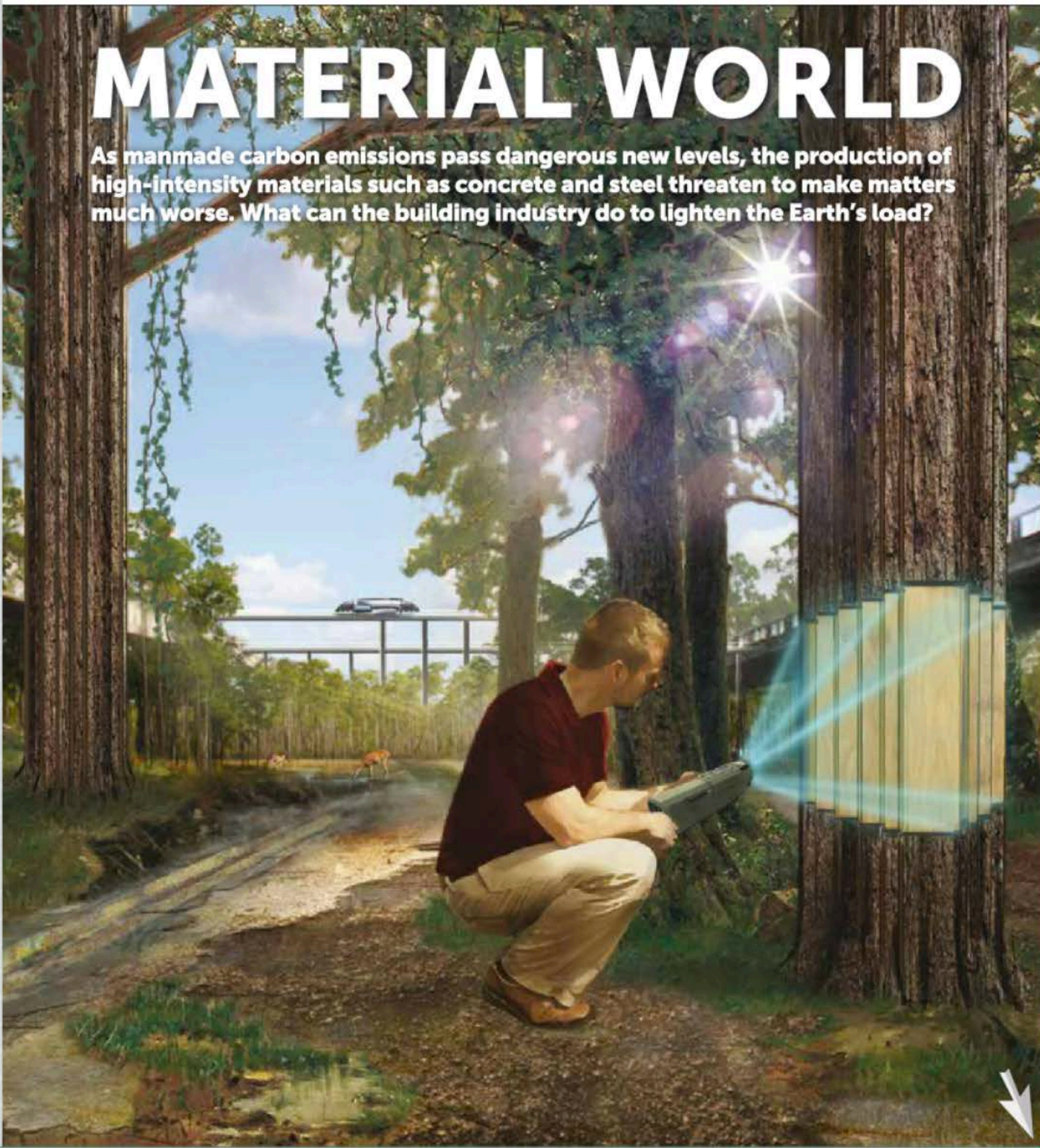




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HERE'S A SAMPLE OF WHAT'S INSIDE:

"The SIPs come in four-foot panels, and the SIPs manufacturer builds in the headers for windows and doors and pre-drills electrical openings. When you put it together, a lot of the work has already been done. It even cuts down on the time that some of the subcontractors put in." (p. 32)

ON THE COVER MATERIAL WORLD

Artist: Kip Ayers

Visit us at www.greenbuildermedia.com for up-to-date news analysis, case studies, new green projects, code and reg updates, thought-provoking blogs, cutting-edge products and much more.

EDITOR'S NOTE

The Inside Scoop

FIELD REPORT

News About Sustainability Issues and Green Products

SUPER SHELTERS

These eight alternatives to conventional stick-frame construction put energy efficiency, sustainable materials and building health front and center.

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THE CELESTIA PROJECT

Chapter 7: Managing Resources

By Matt Power, Editor-in-Chief Visuals by Kip Ayers

This month's chapter looks at the environmental impacts of the most intense building materials. Can we rethink the raw materials of construction in time to head off climate change?

PRODUCT SPOTLIGHT: SIDE BY SIDE

Join us as we compare sustainable cladding options, from wood, masonry and stucco to fiber cement and the latest in composite technology.

CODEWATCH

The Latest on Green-Related Construction Rules and Regulations

OVER THERE

International Sustainability: Lessons from Abroad

FROM THE TAILGATE

New Offerings for the Sustainable Minded

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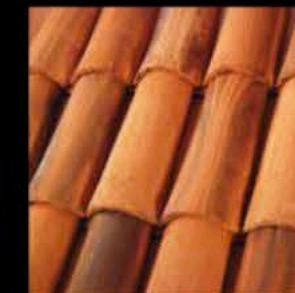
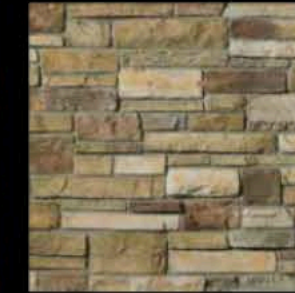
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Boral Roofing leads the industry in environmentally sustainable clay and concrete roofing products. Boral Roofing is the nation's largest clay and concrete roof tile manufacturer. Included in our comprehensive portfolio of products are the only line of clay roof tile certified Cradle to Cradle®, cool roof reflective colors, clay tiles containing recycled content of up to 59%, Energy Star certification, and the revolutionary new concrete "Smog Eating Tile" with BoralPure® technology.

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Cultured Stone® by Boral® has been at the forefront of innovation for over half a century. Proudly made in the USA, with over 100 colors and 20 textures that capture the beauty of natural stone, Cultured Stone® is an industry leader in manufactured stone veneer. Cultured Stone® is in a class by itself when it comes to building and thinking Green. We were the first manufactured stone veneer to receive an NAHB Green Building Product Certification and the only product to receive the GREENGUARD Children & Schools certification.

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For more information visit www.BoralAmerica.com



One of Many Plans. House plans from Enertia feature a "double shell," including a south-facing sunspace sandwiched between two walls.

Energy Independence

THE "DOUBLE-SHELL" DESIGN DEVELOPED BY ENERTIA BUILDING SYSTEMS UTILIZES SOLID TIMBER WALLS, THERMAL CONVECTION AND GEOTHERMAL HEATING AND COOLING TO CREATE BUILDINGS THAT DON'T RELY ON FOSSIL FUEL ENERGY.

Enertia Double-Shell Building System Sample Project

Name: Aquarius 1-3640 (with optional garage)

Location: Western Connecticut

Size: 2,078 square feet, not including basement/lower level

Year Completed: 2012

www.enertia.com

E NERTIA BUILDING SYSTEMS offers numerous floor plans and models, with customizable interiors. What they all have in common is Enertia's unique double-shell building system, which utilizes the heat-storing capacity of solid wood walls and the constant temperature of the soil to turn the house into a "heat pump."

Enertia's double shell mimics the earth's atmosphere and its ability to capture and store heat. The temperature differential between the basement and attic creates a dynamic thermal current in the home's outer shell. In the winter, cooler basement air is heated in the "sunspace" (a sunroom on the south side of the home) and circulates around the inner shell, storing the heat in its walls, ceilings and floors. In the summer, when the angle of the sun is higher in the sky and strikes the roof, hot air is released through an attic vent or through the east and west gables. This causes cool air to be drawn in from the basement's northern

continued on next page



House as Heat Pump. Enertia homes utilize the principles of geothermal heating and cooling to keep them comfortable through the seasons. The outer shell functions as a buffer zone and secondary living space.

windows, effectively cooling the house.

Because of the massive structure, the temperatures in the inner shell—including its walls, ceiling and floor—remain relatively constant, despite abrupt changes in outdoor temperatures. The

outer shell, which includes the basement, attic and sunspace, fluctuates more, depending on weather conditions. In sunny climates, such as Colorado and Utah, homes do not require an HVAC system. In climates with less winter sun, a back-up radiant

Enertia Double-Shell Building Systems at a Glance

Pros:

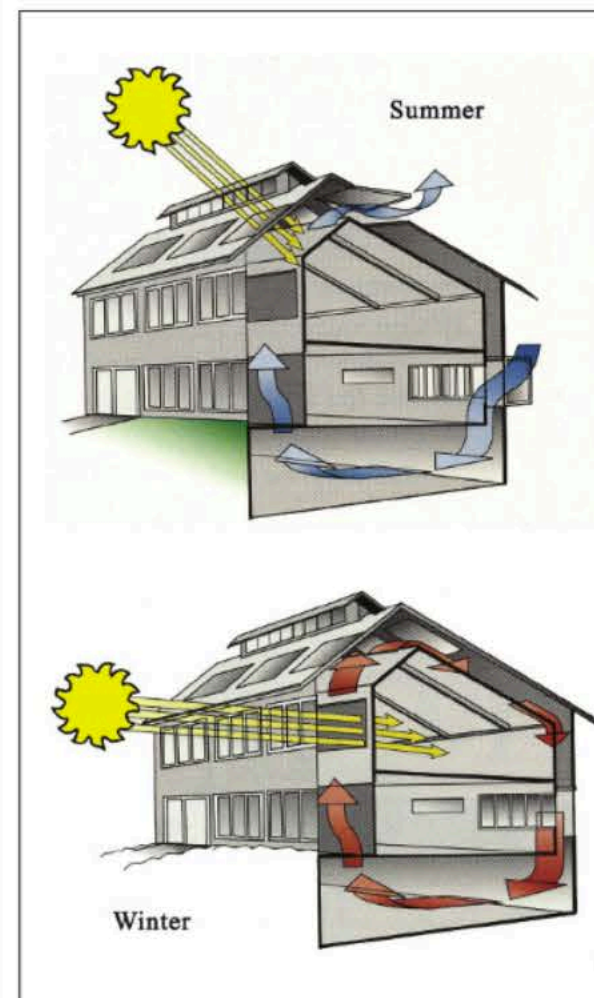
- Fast, economical construction method.
- Wood is pre-cut at the factory, minimizing waste.
- Heating and cooling costs are significantly reduced.
- Passive heating and cooling do not depend on electricity or fuel.
- Homes are constructed using natural, rapidly renewable resources.

- Homes offer superior comfort with natural lighting, draft-free construction and constant temperatures.
- Homes “breathe,” helping ensure high indoor air quality.
- Homes are sturdy, long lasting and stormproof.

Cons:

- Specialized materials are required that are not stocked at lumber yards.

- Solid wood construction is wood-intensive.
- The double-shell design boosts the price by 10 to 15 percent (this can be partially offset when an HVAC system isn’t needed).
- The design must be finalized before construction, and can’t be easily altered during construction.



Working with the Earth. The convective loop moves heat away from the sunspace, distributing it. In summer, heat rises through the roof vents, causing cooler air to be drawn into basement windows on the north facade.

floor heating system is recommended.

Enertia homes use rapidly renewable southern yellow pine for its solid wood walls. The tongue-and-groove wall elements are made by glue-laminating four pieces of wood, which are pre-cut in a factory. There, electric boxes are milled into the wall elements, along with pre-drilled holes for wires. Plumbing lines are in the 2” x 4” partition walls. Extra insulation is added in extremely cold climates.

“The wall elements are numbered, and they go together like *Lincoln Logs*,” explains Michael Sykes, founder of Enertia Building Systems. “People without any building skills can build a home, just using an electric drill. If you have the time, it can save a lot of money. The timbers are 100 percent renewable, and they are put together with screws—so they could be repurposed forever.”

Key to Resilience: Strength

THOUGH MOST HOMES have been designed to withstand vertical loads, many have not been built to deal with the lateral and uplifting forces caused by earthquakes and

high winds. These forces can cause structures to rack or twist, or to slide off of or lift up from their foundations.

Many homes built before 1985 are in need of a “seismic retrofit;” homes built on hillsides and with raised foundations are especially vulnerable. Creating a continuous load path by strengthening connections between foundations and walls,

between floors and roofs can help wood-framed structures resist seismic forces. This can be done through a combination of metal connectors such as foundation bolts and plates, anchors, connectors, custom-made angle iron struts and strap ties. Bracing cripple walls with plywood and installing reinforced shearwalls in strategic locations can also help a home resist racking and overturning forces.



Strong Identity. Simpson Strong-Tie offers a range of products for strengthening connections and walls, including the *Strong-Wall Shearwalls* pictured here. www.strongtie.com