

Eco-Friendly Building Products

by Charles Wardell

Here are some products and materials that can help you put "green" building theory to practice

One of the first lessons learned by the new eco-builder is that it takes work to find acceptable products. With almost every new product being hyped as environmentally friendly these days, "green" is becoming about as useful a label as "low fat."

One problem is that green is a relative term: Every building product takes some toll on the environment. Furthermore, a product may score high on one criterion, yet low on another. For example, polyurethane foam saves enormous amounts of energy in housing, but environmentalists say that the blowing agents used to make it harm the Earth's atmosphere. How about treated wood? Some contend that the manufacturing process pollutes the environment. Wood treaters counter that 360,000 acres of forest are cut down each year to replace untreated wood destroyed by decay and termites.

Another problem is that there's no definitive meaning of the term "green," and no widely accepted way to measure and quantify it. "It's pretty subjective," admits Andrew St. John, editor of the Boston Society of Architects' *Sourcebook for Sustainable Design* and a nationally known expert on the subject. Still, he and others have sought to nail down this elusive term by cataloging products that merit the green label. Two of the best information sources are St. John's own *Sourcebook* and the *Guide to Resource Efficient Building Elements*, published by the Center for Resourceful Building Technology (CRBT) in Missoula, Mont. Both publications cut through the advertising hype to present straightforward listings of environmentally responsible products and materials.

One group, Scientific Certification Systems (SCS), has gone a step further and offers third-party certification for manufacturers' environmental claims (see "The Green Report Card," page 48). SCS also has a Forest Conservation Program, under which it evaluates specific logging operations for the sustainability of their harvest practices.

From efforts like the *Sourcebook* and the *Guide* is emerging a working definition of what an environmentally friendly product is. Both guides use a similar set of criteria to make the call. Key criteria are

- **Resource Efficiency**

This is at the top of the list. It includes building materials made from recycled products or from "waste materials" such as low-grade wood fiber or fly ash. So, for example, manufactured products made from chips are preferred over large-dimension framing lumber.

- **Long-Term Durability**

All other things being equal, a product that lasts twice as long is easier on the environment.

- **Embodied Energy**

This is the energy that's consumed manufacturing and transporting a material to the job site. The less embodied energy, the better. For example, locally produced materials are preferred to those shipped across the country.

- **Environmental Damage**

This also looks at the manufacturing process, assessing harm to the environment and the amount of waste generated.

- **Energy Efficiency**

Any product that saves energy means the homeowner will burn less fossil fuels.

- **Toxicity**

This is one area where some experts disagree. Some think that a product's potential health effects should be part of the equation, while others are concerned that too many products could be disqualified based on the objections of a small number of people.

The environmental status of wood, itself, has become a controversial topic, as many seek a middle ground between environmentalist organizations that would stop all logging, and industry organizations that still promote the use of large timbers. Steve Loken, *Guide* editor and president of CRBT, sees wood use as relatively friendly to the environment — if it's used responsibly. By that he means the replacement of solid timbers with engineered members made from the fiber of small trees, a trend that began after the Second World War with the growing use of plywood sheathing.

Regardless of your stance on environmentalism, however, the fact is that green has gone mainstream. "More and more of the Fortune 500 companies are promoting their products as environmentally responsible," notes Alex Wilson, who publishes the bimonthly *Environmental Building News*. Many of these companies have recognized what many eco-builders already know, says Wilson: that a certain level of eco-consciousness is just good business.

On the following pages are a sampling of what's available to the environmentally concerned builder. Some of these products are new, while others have been around for a while. They represent only a fraction of what's on the market, but should get you started on the road to selecting the green products that make sense for your business.

Structure

Engineered Lumber

Framing can account for up to 70% of the 11,000 board feet of lumber used in the average home, so framing is where builders can do the most to reduce their environmental impact. And that's just what's been happening. With fewer acres of old-growth trees available for harvest, there's been a movement in the trenches towards alternative framing systems, including foam-core panels, steel studs, and various engineered lumber products. For the most part, these products have been well-received; the reason is that they're usually of higher quality than the twisted framing lumber that's been showing up on many job sites lately.



TrusJoist engineered wood

One of the most common engineered products is OSB (oriented strandboard), which is used both for sheathing and for facing foam-core panels. In addition to being made from small, fast-growing aspen trees (which are unsuitable for other structural uses), the American Plywood Association (APA) says that OSB uses 85% to 90% of the log.

Engineered beams and header materials include laminated veneer lumber, parallel strand lumber, laminated strand lumber, and the increasingly popular wood I-beam. The latter consists of an LVL or OSB web sandwiched between two LVL or solid

wood chords.

Contact: Alpine Structures Inc., 317 Providence Rd., Oxford, NC 27565; 800/672-2326.

Boise Cascade, P.O. Box 2400, White City, OR 97503; 800/232-0788.

Georgia Pacific, 133 Peachtree St. N.E., Atlanta, GA 30303; 800/447-2882.

Louisiana Pacific, 111 S.W. 5th Ave., Portland, OR 97204; 800/999-9105.

Superior Wood Systems, P.O. Box 1208, Superior, WI 54880; 715/392-1822.

TrusJoist MacMillan, 9777 West Chinden Blvd., P.O. Box 60, Boise, ID 83707; 800/628-3997.

Recycled Panels

One of the oldest lines of recycled products is manufactured by Homasote, which has been in business since 1909. Its products include insulating sheathing, structural subflooring, roof decking, wall paneling, sound-control board, and carpet underlayment. The base material for most of these products is a high-density, structural fiberboard made from recycled newsprint. It contains no formaldehyde, so offgassing isn't a problem. The company also makes a Class A fire-rated, insulating fiberboard that's impregnated with fire-retardant chemicals.

Contact: Homasote Co., P.O. Box 7240, W. Trenton, NJ 08628; 800/257-9491.

Studs From Scraps

Finger-jointed lumber is made by gluing short scraps of wood into standard-length studs. Manufacturers claim that the strength of the phenol



Finger-jointed studs

resin they use (it's the same glue that's used in glulams) and the large bonding area provided by the finger joint make the joints as strong as the wood itself. Finger-jointed lumber reportedly has the advantage of being more stable than solid studs: The shorter pieces offset stress, warping, and twisting. The product is accepted by all

model building codes.

Contact: Champion International, 2215 North 30th St., Third Floor, Puyallup, WA 98371; 206/879-4200.

Standard Structures Inc., P.O. Box K, Santa Rosa, CA 95402; 707/544-2982.

Exteriors

Recycled Vinyl

Environmentally, traditional vinyl siding is a mixed blessing. Though it reduces the demand for wood, the manufacturing process is highly polluting. At least one manufacturer has introduced a 50% recycled



Weatherstone vinyl siding

product that helps ease the problem somewhat. Weatherstone vinyl siding is made with a process that co-extrudes a topcoat of virgin PVC with a base coat of waste vinyl.

Contact: Wolverine Technologies, Building Products Division, 17199 Laurel Park Dr. North, Suite 201, Livonia, MI 48152; 800/521-9020.

Plastic Wood

Over 20 companies now make recycled plastic lumber. Because of the range of processes and materials used, however, their products vary quite a bit in quality. This has made it hard for plastic lumber to get code approvals for structural use. And because a plastic board is almost always weaker than a wood one, it spans shorter distances. Plastic also costs about twice as much as wood.



Timbrex decking

One of the more interesting products is *Timbrex*, which uses a proprietary process to bind recycled wood fibers and recycled thermoplastics. The manufacturer claims that Timbrex resists damage from water, soil acidity, and insect infestation better than treated wood. It can be planed, routed, sanded, or turned on a lathe, and is appropriate for docks, decks, picnic tables, fencing, and benches. The cost is about double that of pressure-treated wood.

Contact: Mobil Chemical Co., Composite Products Division, P.O. Box 5445, Norwalk, CT 06856; 203/831-4205.

Cement Cladding

In case you're wondering what happened to asbestos siding, it's now called fiber-cement; they simply replaced the asbestos with cellulose. Fiber-cement roofing and siding is a mixture of portland cement, cellulose fiber, silica, and other additives. It gets excellent fire ratings and has good long-term durability.

Manufacturers tout fiber-cement's environmental benefits, in particular the fact that it eases demand on wood species like cedar and cypress that are used to make clear, vertical-grain siding. Environmentalists give it mixed reviews. Although *Environmental Building News* cites its high embodied energy as well as the extensive



James Hardie fiber-cement siding

transportation needed to get it to most sites, CRBT's Loken chose fiber-cement roofing and siding for his eco-friendly ReCraft house, citing its long-term durability. Be aware that fiber-cement roofing can be relatively pricey — up to eight times more expensive than composition shingles. However, it does have a Class A fire rating, and manufacturers say that it's virtually impervious to rot, termites, vermin, and damage from ultraviolet light.

Contact: FibreCem Corp., P.O. Box 411368, Charlotte, NC 28241; 800/346-6147.

James Hardie Building Products, 10901 Elm Ave., Fontana, CA 92337; 800/942-7343.

Suprador Mfg. Corp., P.O. Box 908, Rye, NY 10580; 800/223-1948.

Engineered Trim and Siding

Most exterior trim is made from wood, often clear pine or cedar. A more resource-efficient alternative



Comply lap siding

is provided by the various engineered trim products, most of which are manufactured using wood fiber from small-diameter trees. Engineered trim also has the advantage of greater dimensional stability than solid wood.

Comply lap siding consists of three veneers of Douglas fir and two layers of reconstituted wood fiber. It represents a more efficient use of wood fiber than standard plywood because it uses a greater percentage of the log. It can be installed directly over 24-inch on-center framing, is moisture-resistant, and is guaranteed not to delaminate.

Contact: Oregon Strand Board, 34363 Lake Creek Dr., Brownsville, OR 97327; 503/466-5177.

PrimeTrim is a high-resin, all-wood-fiber composite that's cured at high temperatures. It's like hard-board but with extra waxes, resins, and oils added for enhanced weather resistance. It installs like wood trim, but weighs 15 to 20 percent more. It comes in nominal widths of 4, 5, 6, 8, 10, and 12 inches, and with a smooth or textured surface. Two coats of an oven-baked primer are applied to the face and both edges.

Contact: Georgia-Pacific, 133 Peachtree St. N.E., Atlanta, GA 30303; 404/521-4000.

Inner-Seal is available as trim or siding. It mates an OSB substrate to a protective, resin-impregnated overlay. It arrives at the jobsite primed and ready to paint.

Contact: Louisiana Pacific, 111 S.W. Fifth Ave., Portland, OR 97204; 800/999-9105.

TrimCraft wood trim is made by pressing wood fiber from waste products into a dense material. Uses include exterior corners, soffits and fascia, as well as door and window trim. It comes with a moisture-resistant, factory-applied primer.

Contact: Temple-Inland Forest Products, P.O. Drawer N, Diboll, TX 75941; 800/231-6060.

Interiors

Oak Veneer Moldings

Oak-Over moldings combine the look of red oak with the stability of engineered lumber. They consist



Oak-Over trim

of an oak veneer laminated over a finger-jointed softwood substrate that won't twist or warp like solid wood. They come in 14-foot lengths and can be nailed without predrilling. The same company also makes door stiles, moldings, jams, and window trim.

Contact: CoverAge Lumber, 1881 S.W. Front Ave., Portland, OR 97201; 800/547-1038.

Kindly Solvents

The **Klean-Green** line of products includes everything from Brush Cleaner to toluene/xylene substitutes and turpentine. The company claims that their products meet the



Klean-Green solvents

strictest air quality regulations. Add 5% to 7% to the price of competing products.

Contact: Klean-Strip Division of W.M. Barr & Co. Inc., P.O. Box 1879, Memphis, TN 38101; 800/235-3546.

Wood Chip Wallpaper

Most people wouldn't raise an eyebrow over wallpaper made from recycled paper, but **CoverAge** goes a step further. The paintable, textured wallpaper is made by mixing recycled paper with waste-wood chips. No formaldehyde is used in the manufacture. According to *Environmental*



CoverAge wallpaper

Building News, the German equivalent of the FDA rated the material "edible with no harmful effects."

CoverAge hangs like wallpaper. One side is factory-primed to reduce paint absorption. The product is most appropriate for covering cracked plaster in a remodel. The suggested retail price is 14¢ to 18¢ per square foot.

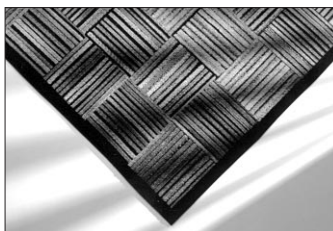
Contact: CoverAge Inc., P.O. Box 8498, Warwick, RI 02886; 401/738-1197.

Retread Floors

With over 200 million car tires thrown away each year, it's not surprising that someone eventually would see them as a valuable raw material. These days, tires are being recycled into floor tiles and pavers. They're used to floor everything from kitchens and patios to exercise rooms. Most rubber floor tiles are special-order commercial items, but floor mats are made especially for residential use.

Contact: Dodge Regupol, P.O. Box 989, Lancaster, PA 17608; 800/322-1923.

Durable Mat Co., 75 North Pleasant St., Norwalk, OH 44857; 800/537-1603.



Flexco rubber flooring

Flexco Co., P.O. Box 553, Tusculumbia, AL 35674; 800/633-3151.

Mats Inc., P.O. Box 916, Braintree, MA 02185; 800/628-7462.

Beyond Wine Bottles

Cork tiles are made from the bark of the cork oak tree, which replenishes its outer bark every nine years (stripping the bark is logging's version of shearing sheep). It has good fire-resistance and acoustic properties, and is nontoxic. Though natural-colored cork tiles may vary in appearance, they can also be purchased with a dark tint.

Contact: Dodge-Regupol Inc., P.O. Box 989, Lancaster, PA 17608; 800/322-1923.

Hendrickson Flooring, 6761 Sebastopol Ave., Sebastopol, CA 95472; 707/829-3959.

IpoCork, 1280 Roberts Blvd., Ste. 403, Kennesaw, GA 30144; 800/828-2675.

The Genuine Item

What most people call now call "linoleum" is actually petroleum-based PVC vinyl. *Natural Linoleum*, on the other hand, is made from

The Green Report Card

PRODUCT & PACKAGING:

TYPE OF BURDEN AMT.*

RESOURCE DEPLETION

WATER	35 kg
WOOD	230 g
COAL, OIL, GAS (non-fuel)	0.4 g
MINERALS	120 g

ENERGY USE

TOTAL ENERGY USED	23 MJ
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AIR POLLUTION

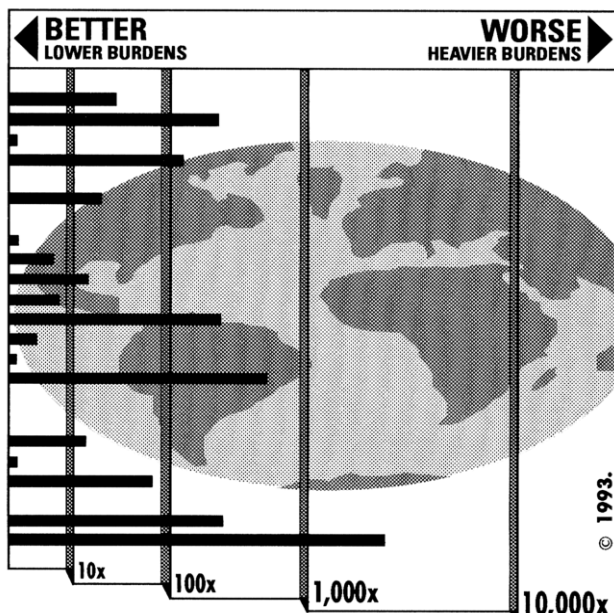
CARBON DIOXIDE	1.2 kg
CARBON MONOXIDE	6 g
SULFUR OXIDES	19 g
NITROGEN OXIDES	7 g
HYDROCARBONS	240 g
PARTICULATES	3 g
UNCLASSIFIED	0.008 g
HAZARDOUS	500 mg
OZONE LAYER DEPLETERS	0 mg

WATER POLLUTION

TOTAL SOLIDS	15 g
OXYGEN DEPLETERS	0.1 g
TOXIC	77 mg

SOLID WASTE

UNCLASSIFIED	260 g
HAZARDOUS	2,600 mg



*PLASTI-KOTE® HIGH SOLIDS SOLVENT-BASED BLACK SPRAY PAINT
PER 122 GRAMS OF PAINT SOLIDS

REPRINTED WITH THE PERMISSION OF SCIENTIFIC CERTIFICATION SYSTEMS

For builders serious about judging the environmental impact of the products they use, help is on the way. An organization called Scientific Certification Systems (SCS), based in Oakland, Calif., now offers manufacturers an "Environmental Report Card," which quantifies the environmental impact of a product over its lifetime.

SCS has been evaluating food claims, such as "pesticide-free" since 1984, and started certifying environmental claims in 1989. Their report cards, sanctioned by the

International Standards Organization, detail the natural resources and energy used, and the pollution created during the production, transportation, use, and ultimate disposal of the product.

To arrive at its ratings, SCS reviews laboratory data, visits manufacturing plants, and arranges for testing when necessary. SCS will also certify single criteria such as VOC content or recycled material content. For instance, when Manville started advertising its fiberglass insulation with recycled

glass, it turned to SCS to certify that claim.

The cradle-to-grave analysis of a specially formulated spray paint is shown above. SCS report cards on western lumber products, pressure-treated lumber, and other building products are in the works. But because of the time and expense involved (several thousand dollars per product minimum), it will be a long time before green labels at the lumberyard are as common as food labels at the grocery store.

— C.W.

jute, linseed oil, and pine resin. According to Environmental Outfitters, a Manhattan-based firm that sells environmentally-friendly building products, natural linoleum has been in use since the 1860s, originating in Scotland. Linoleum is not only environmentally friendlier in content, it's also tougher. Linoleum is often referred to as a "40-year floor" — like concrete, it gets harder as it ages because the linseed oil continues to oxidize. It's available in sheets and tiles.

Contact: Forbo Industries, Humboldt Industrial Park, Hazelton, PA 18201; 717/459-0771.

Kitchen and Bath

Compost for Busy People

The *Kitch'n Komposter* is for people who like the idea of recycling food scraps into garden compost but who don't like the idea of a compost pile. The Komposter is attached to the wastewater line beneath the sink, right after the garbage disposal. The

homeowner flips a switch to send the disposal's output to the Komposter, where a spin chamber extracts any water. What's left is the gardening equivalent of freeze-dried coffee — instant compost that you can put right into your soil. The device costs \$139 and is easy to install.

Contact: Carbco Industries, 240 Michigan St., Lockport, NY 14094; 716/434-0316.

Water Recycler

If you're losing sleep over the several thousand gallons or so that go down the drain each year while you're waiting for hot water to reach the faucet (the average for a household of four),



Divert It watersaver

then check out *Divert It*. It mounts beneath the sink and is activated by a push-button valve mounted next to the faucet. A pressurized tank captures and stores this otherwise wasted water. The water is then used for flushing the toilet. The *Divert It* can be installed beneath a sink and sells for about \$225.

Contact: 21st Century Water Systems, 1314 Main St., Morro Bay, CA 93442; 800/369-4444.

Sitework and Foundations

Cleaner Sewage

The average septic system removes only 30% of the nitrogen-rich organic matter — most in the form of ammonia — present in raw sewage. The rest is left to threaten marine life and drinking water supplies. But if a recent European import called the *Bioclere* catches on, these levels could be lowered dramatically.

The *Bioclere* is a filtering device that's installed between a traditional septic tank and the leach field. It uses

a combination of aerobic and anaerobic bacteria (aerobic bacteria need oxygen to live, while anaerobic bacteria require an absence of oxygen) to reduce the ammonia to a harmless gas. The unit consists of two concentric cylinders topped by a large filter. Effluent from the septic tank pours into the inner cylinder, where a submersible pump lifts it to the top of the filter. The filter bed's randomly-packed plastic shapes serve as a home for the aerobic bacteria, which transform the ammonia into another form of nitrate. The next stop is the outer cylinder, where anaerobic bacteria convert the nitrates into nitrogen gas, the major component of the air we breathe.

A 500-gallon-per-day system (enough for a 2 to 3 bedroom house) costs between \$3,500 and \$4,200. Acceptance by health officials varies from state to state and from county to county, but tests so far have been encouraging. Groundwater samples taken near a Cape Cod, Mass., home last year showed a nitrogen concentration of 80 parts per million. A few months after a Bioclere was installed, the count dropped to just 13.

Contact: Ekofinn International, Campus Business Center, 33743 Ninth Ave. South, Building D, Federal Way, WA 98003; 206/661-6128.



Bioclere septic filter

Wood-Fiber Cement Blocks



Faswall blocks

The notion of a "cement" block made from 80% wood fiber goes against many builders' instincts. After all, conventional wisdom says that wood and concrete don't mix. Not only does wood rot when it stays wet for long periods, but the sugars, tannins, and oils it contains may keep it from bonding with the concrete.

Faswall blocks are made by a process that mineral-coats recycled wood chips so that they bind with the cement as readily as any other aggregate. The coating also makes them unappetizing to termites and immune to rot, although the manufacturer suggests that the blocks be coated with a waterproofing sealer and the foundation wall surrounded by a high-quality drainage system. Though they can be used above-grade, their most obvious use is as a concrete form for foundation walls. When filled with concrete, a 9-inch wide Faswall block has an R-value of about 10. As a bonus, they can be cut and shaped with common carpenter's hand tools.

The blocks are now being manufactured in South Carolina and Iowa, but the manufacturer is in the process of licensing additional plants.

Contact: Insul Holz-Beton International Inc., P.O. Box 88, Windsor, SC 29856; 803/642-9346.

Fly-Ash Concrete

The Portland Cement Association puts the U.S. consumption of cement at between 75 and 90 million tons per year. But a lot of environmentalists dislike cement because of the large amount of energy used in its manufacture. In fact, the Environmental Research Group at the University of British Columbia estimates that it takes 3,200 to 3,500 pounds of raw material to make a ton (2,000 pounds) of cement.

Since cement is the binding agent in concrete, however, it's not going away anytime soon. The next best thing is to make it more benign. One solution is to replace 15% or 20% of the cement with fly ash, a waste product from coal-fired power plants. This reduces the need to mine other raw materials, thus lowering the cement's embodied energy. Fly ash concrete flows and binds together better than standard concrete. And though it costs more, it also has a higher compressive strength for a comparable mix (for example, 3,400 versus 3,000 psi).

Availability and price will depend on the region of the country where you live.

Contact: Bayou Ash Inc., P.O. Box 66377, Baton Rouge, LA 70896; 800/462-2968.

Gifford-Hill & Co. Inc., 2515 McKinney Ave., 10th Floor, Dallas, TX 75201; 214/754-5546.

Lafarge Corp., P.O. Box 324, Dallas, TX 75221; 214/934-7360.

Midwest Fly Ash & Materials Inc., P.O. Box 3557, Sioux City, IA 51102; 712/252-4049.

Nebraska Ash Co., P.O. Box 80268, Lincoln, NE 68501; 402/476-0127.

Western Ash Co., P.O. Box 5184, Englewood, CO 80155; 800/255-0663. ■

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