

WALLBOARD, FIBERBOARD AND FLOORING

American companies occupy more than 12 billion square feet of commercial office space, where more than 27 million people work. Hundreds of millions of square feet of office space change hands annually as tenants vacate, renovate or construct new space. These moves often result in office renovations, creating waste and requiring the purchase and installation of new materials. This Choose Green Report focuses on wallboard, fiberboard and flooring – materials that are selected during the improvement or buildout phase of commercial office buildings.

This report will arm tenants with the facts about these materials' environmental impacts, costs, durability and maintenance, and allow you to make informed choices. Remember: even if the entire shell of a building is already constructed, tenants can choose environmentally responsible wall board, flooring, finishes and furnishings, and can work to ensure that old materials are reused or recycled responsibly.

Many building managers and contractors install only traditional oil-based flooring, increasing the extraction, refining and transport of petroleum products. This can lead to additional air and water pollution, indoor air pollution, occupational hazards for workers, and additional landfill burdens at the end of the products' useful life.

Construction and demolition waste occupies almost as much space in U.S. landfills as household garbage.



Similarly, the continued use of plywood and formaldehyde-based fiberboard has caused environmental impacts like forest clear-cutting, water pollution, loss of biodiversity, and indoor air pollution. Fortunately, alternatives are available.

Green Seal recommends several products based on specific environmental attributes such as recycled content, energy and water efficiencies in production and use, and use of renewable or sustainable raw materials. Each product class has a separate table. Some of these products are fairly new to the market, while others have become commonplace. We have endeavored to locate products with a reduced environmental impact that will be available to the majority of our partners.

What is a “green” building material?

“Green” building materials exhibit as many of the following characteristics as possible:

■ **Recycled and Recyclable.** High use of post-consumer material is best. Products that reuse in-factory waste (pre-consumer) may also be noteworthy if no post-consumer choices are yet available. Some companies design their products to be recycled into another product at their end of their useful life, bringing the manufacturing loop closer to full circle.

■ **Energy and Water-Efficient to Produce and Use.** Some manufacturers have improved process energy efficiency and water reclamation within their production facilities. Also, products that are simpler to maintain can end up being more energy and water-efficient over their useful life.

■ **Made from Renewable or Sustainably Harvested Materials.** Products utilizing natural fibers

like wool, waste agricultural products, waste sawdust, or certified timber exemplify this category.

■ **Minimally Air or Water Polluting to Manufacture.** Products that require minimal processing or are made in a factory with extensive, closely monitored pollution controls. This criterion generally favors materials that are usable in something close to their natural state.

■ **Low Toxins or Low Allergenic.** Such products have very low emissions of the Volatile Organic Compounds (VOCs) that often afflict chemically sensitive individuals. Such products inherently resist the buildup of mold and other allergens.

■ **Durable.** Even the most environmentally benign materials can be a bad choice if they are flimsy or poorly made. This criterion takes account of objective performance and durability test results, along with warranty and service coverage.

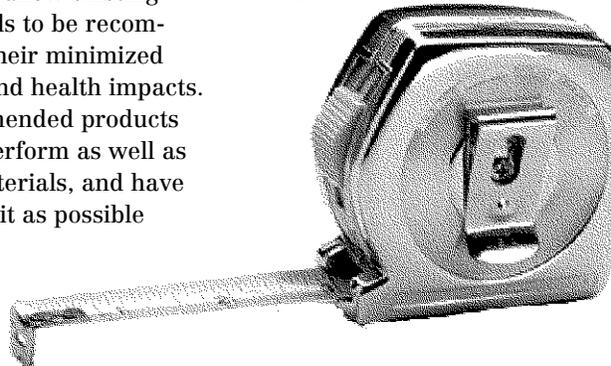
■ **Manufactured Close to the Point of Final Use.** Such products minimize the energy use, packaging and expense associated with long distance shipping. Some recommended products are made from urban waste, allowing the factory to be close to both its raw materials and its market.

These criteria allow existing building materials to be recommended due to their minimized environmental and health impacts. We have recommended products that appear to perform as well as conventional materials, and have tried to be explicit as possible

Manufacturer	Product/Description
G-P Gypsum Corporation 800-225-6119	Gyproc gypsum board, 4' x 8'
US Gypsum 312-606-4000	Sheetrock® gypsum board
Louisiana Pacific 800-441-2500	Fiberbond, fiber-reinforced gypsum panels
Agriboard Industries 515-472-0363	Interior wall panels. Can be used for floors and roofs.

about the environmental benefits of choosing these particular materials.

As with traditional building materials, green materials range from inexpensive commodities to expensive custom products. However the use of these products in conjunction with good design, may improve worker productivity, job satisfaction and worker health and thus be very lucrative, even if they increase initial construction costs.



The **Choose Green Report** is published monthly for Green Seal Environmental Partners. To become an Environmental Partner, or to receive a sample copy of this newsletter, contact Green Seal at (202) 331-7337 x 31.

Editor, *E. Jay Murphy*
Contributors, *Chris Calwell and Lynn Simon*
Environmental Partners Program Director,
Alexis Annis
Design, *Cutting Edge Graphics and 1050 A.D., Inc.*

This report was written with the support of the W. Alton Jones Foundation and the Cabot Family Charitable Trust.

Printed on Green Seal-certified
Mohawk Satin Cool White Recycled paper,
25% postconsumer content

Copyright © 1996, Green Seal, Inc.
www.greenseal.org



Recommended Wallboard Products

Recycled/ Recyclable	Energy/Water Efficient	Renewable/ Sustainably Harvested	Air/Water Pollution	Nontoxic/ Allergenic	Durable	Where Manufactured
100% PC paper backing. 5-20% recycled gypsum, some PC.	Company has invested in energy-efficient equip	Moving in direction of using byproduct gypsum and increased PC content.	Air discharge CO2 and water. Dust collection systems in place.	Inert. Installers need dust mask.	Highly durable.	Throughout US and Canada
100% PC paper backing. Some byproduct gypsum content.	Heat-recovery systems and cogen facilities in place.	Largest user of synthetic* gypsum. 100% synthetic board available.	Plant effluent reused.	Inert. Installers need dust mask.	Highly durable.	More than 30 plants in North America.
Uses gypsum, perlite, 100% PC cellulose fiber.	Uses less water. Cogen facilities in place.	No use of virgin fibers.		Installers need dust mask.	Durable, superior impact resistance.	Nova Scotia
100% wheat or rice straw core. Skin is OSB.	Company claims wall R = 28.4, Ceiling/roof R = 39.6.	By-product of agricultural industry.		No offgassing.	Excellent load bearing performance. Fire resistant.	Electra, TX

PC = postconsumer OSB = Oriented strandboard

*Synthetic gypsum is produced as a byproduct of other industrial processes, principally in fertilizer production and flue gas degassification.

© 1996, Green Seal, Inc. Use of this chart for commercial purposes is prohibited. Information in this table was confirmed by the manufacturer.

How to Choose a Green Building Material

Green office spaces and working environments never happen by accident. Building managers and contractors primarily select building materials on the basis of familiarity, first cost and ease of installation. The process of choosing green building materials is facilitated by selecting a building where the owner, property manager and contractor will permit you to take an active role in materials selection and space design. Tenants can express a preference in materials choices, and have a significant impact on final indoor air quality and worker satisfaction.

Using green building materials involves setting individual

priorities — cost, postconsumer content, maintenance, aesthetics, etc. There are no perfect materials, but there are improved materials and expanded choices. Be sure to match your needs to the materials' performance. You may want to test a sample of the product in a likely application before making your final selection.

Wallboard

We focussed on wallboard and fiberboard within the category of composite boards and panels. These products are most commonly used to build interior walls, partitions and cabinetry in commercial office spaces. Plywood is not addressed because it can usually be replaced with materials that do not place pressure on old growth timber, such as oriented strand board (OSB) or chipboard.

The most common type of wallboard is gypsum board, also called dry wall, gyp board or Sheetrock®. This inexpensive product has been used for decades, is made from abundant mined gypsum, and provides the required interior wall fire resistance. This report recommends gypsum-based products with modest environmental improvements such as incorporating synthetic or byproduct gypsum, high postconsumer paper content, and new materials that use agricultural waste products to substantially reduce or even supplant gypsum.

We also recommend one type of fiber gypsum, which incorporates postconsumer wood fibers for reinforcement and uses no paper facings. This product avoids the environmental disadvantages of

continued on page 4

Wallboard
continued from page 3

paper production altogether. All of the recommended products in this classification are competitively priced with conventional gypsum board.

Fiberboard

As large diameter trees have become more scarce and expensive, various fiberboards

have displaced large dimension solid wood boards in construction. The most common fiberboard is medium density fiberboard or particle board, which often serves as a structural panel in shelving, cabinets, or beneath floors. Particle board has typically been manufactured with a substantial amount of bonding agents, which release formaldehyde into buildings and contribute heavily to indoor air pollution. The EPA plans to issue a preliminary toxicity report in early 1997 considering

VOC emissions and other issues associated with plywood and particle board.

Our report recommends new products that have basically eliminated the problem of formaldehyde emissions degrading indoor air quality, while creating a market for wood pulp or paper that



Recommended Fiberboard Products

Manufacturer (projects where used)	Product/Description	Recycled/Recyclable	Energy/Water Efficient	Renewable/Sustainably Harvested	Air/Water Pollution	Nontoxic/Allergenic
Homasote 800-257-9491 (T)	Fiberboard (several types)	100% PC recycled paper.	Water completely recycled in factory.	Supply of material exceeds demand.		No formaldehyde or asbestos added. Minimizes offgassing.
Naturall Fibre Boards, LC 913-392-9922	Particle board (water resistant, subflooring, exterior sheathing).	Product is 97% wheat straw, 3% inert polymer.	Uses less energy and water than traditional particle board.	Wheat straw typically burned or baled for bedding.	40% of trimmings back into process; 60% composted locally.	Formaldehyde free. Alternative product for chemically sensitive.
Meditite 800-676-3339 (W,S,T)	Meditite medium density fiberboard, several types.	Uses shavings, sawdust, trim, woodchips. Some PC content.	Energy recovery in plant from waste.	Made from urban wood waste and forestry residuals.		No formaldehyde added in manufacture.
Rodman Industries 715-735-9500	Resincore custom particle board w/ phenolic resin.	100% preconsumer recycled sawdust from mills.	Energy recovery from plant waste.			Virtually formaldehyde free. Homogenous throughout, can be sanded.
Gridcore Systems International 214-265-8494 (S,W)	Gridcore® panel honeycombed core substrate.	100% PC cellulose fiber. Can incorporate agricultural fiber, plastics. Recyclable.	Recycle all water in making of honeycombs.	Supply of material exceeds demand.	Company claims no air or water pollution.	Formaldehyde free. No binders or additives, no offgassing.
Phenix Biocomposites 800-324-8187 (N)	Environ wall panels, flooring, tables, etc. Natural granite appearance.	45% newsprint, 45% soybean flour, 10% nontoxic colorants. Biodegradable.	Process does not emit toxic waste or fumes.	Uses soybean oil production byproduct.		

* Projects where these materials were used:

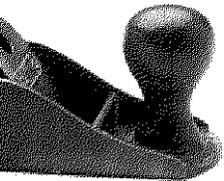
T = Thoreau Center for Sustainability, San Francisco, CA
S = Southern California Gas Energy Resource Center, Downey, CA

W = WMX Technologies, Inc. government affairs office, Washington, DC
N = Natural Resources Defense Council offices, Washington, DC

© 1996, Green Seal, Inc. Use of this chart for commercial purposes is prohibited. Information in this table was confirmed by the manufacturer.

would otherwise be discarded. Likewise, some new materials use agricultural waste products instead of wood particles, further reducing environmental impacts.

The recommended products are very durable and versatile, and work well in several commercial office applications. Prices for these recommended products vary widely, depending on the size and location of the project.



Durable	Where Manufactured
2-3 times strength of typical light density fiberboard.	West Trenton, NJ
Comparable to conventional materials.	Minneapolis, KS
Comparable to conventional materials.	Medford, OR
Stronger, more water & heat resistant than traditional particle board.	Marinette, WI
Unique structure gives it great strength, similar to plywood.	Long Beach, CA
Harder than oak. Finishes like wood.	St. Peter, MN

Flooring

Recommended flooring materials encompass traditional choices like carpeting, wood flooring, and ceramic tile, and more unusual choices like synthetic tiles, colored/textured concrete slabs, plant based flooring like linoleum, and so forth. These products vary widely not only in initial cost, but also in maintenance requirements, contribution to indoor air quality, performance, and recycled material content.

With the exception of colored/textured concrete (where labor costs are included), all prices listed in the chart are for material only. Installation and finishing labor can add \$5 to \$10 per square foot, or more. Many of the products listed here also require additional installation materials. Prices will vary based on job size and location.

Finally, not all the products listed here are available in large quantities or on short lead times.

continued on page 6

To Build or To Renovate: That is the Question

Demolishing a building shell to build a new one represents a huge solid waste burden. Older buildings are also more likely to be located in neighborhoods with good public transit access and services within walking distance. NRDC and the Audubon Society both decided to retrofit existing New York City structures rather than build new ones. Reusing older buildings afforded them desirable characteristics not typically found in new buildings — operable windows, for example. Contractors are now also able to recycle a large portion of renovation debris.

The primary reason to favor a new building may be to take advantage of upgrades not always available in older buildings — centralized recycling chutes, state of the art lighting and controls, assured absence of asbestos fibers and toxic glues, the latest ventilation and window technology, etc. When choosing your space, consider the factors most important to you and your business.

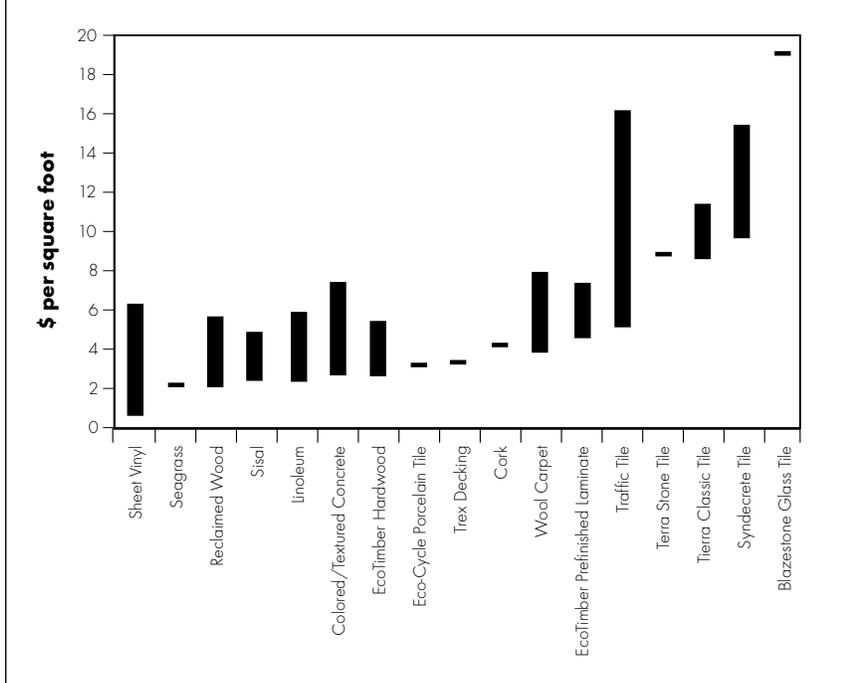
Progressive Building Codes and Standards

The U.S. Green Building Council is finalizing an environmental building rating system, “Leadership in Energy and Environmental Design” (LEED™), to certify green commercial building design. Certification requires the building to satisfy several defined criteria, including siting considerations, energy and waste management, indoor air quality management, building material selection and water conservation.

The city of Austin, Texas operates a Commercial Green Building Program that assists owners and designers in the development of sustainable building practices. Austin has developed a *Green Building Checklist* that serves as a guide for building industry professionals throughout the design and construction process.

Alameda County, California has developed a GreenSpec covering methods of construction and material selection in a specification format. It includes criteria for resource depletion, solid waste reduction, air and water pollution, energy efficiency and habitat destruction.

Typical Flooring Prices



Flooring continued from page 5

Many are hand made or custom fabricated, limiting availability and delivery times. Several of these recommended materials are manufactured by small operations, where your purchase can have a large effect on their viability, and can contribute to bringing alternative products to market.

■ **Traffic Level.** For areas of very high traffic, you may have more alternatives to carpeting than you think (for information about carpet choices, consult Green Seal's *Carpets Choose Green Report*). Suppliers offer extremely durable alternatives, including all-natural linoleum, ceramic, glass and concrete tiles, reclaimed hardwood flooring, and even colored concrete slabs.

■ **Maintenance.** If a particular flooring requires constant reapplication of stains, sealants or other finishes, the environmental benefits associated with its recycled or sustainably harvested

content may quickly be erased. This consideration has made virtually maintenance-free materials such as ceramic tiles, concrete composite tiles, colored concrete slabs and wood composite decking increasingly popular.

■ **Installation Process/Indoor Air Quality.** Many of the recommended products can be installed with little or no adhesive, because they serve as structural elements or because they can be mechanically attached, protecting both worker health and resultant indoor air quality. Low VOC adhesives are readily available.

NOTES ON FLOORING PRODUCTS CHART

PC = Postconsumer

Other flooring notes:

Several of these recommended floorings can be mechanically fastened or installed using low VOC adhesives.

The tile manufacturers with whom we spoke warranty their product for defects prior to installation.

Manufacturer Product/Description

Bedrock Industries
206-283-7625
Blazestone recycled glass tile.

Crossville Ceramics
615-484-2110
Eco-Cycle porcelain tile

Terra-Green Technologies
317-935-4760
Traffic Tile, Terra Stone, Terra Classic glass/ceramic tile.

Forbo Industries, Inc.
800-342-0604
Marmoleum or Artoleum linoleum tiles or rolls.

Syndesis
310-829-9932
Syndecrete® pre-cast lightweight concrete flooring.

EcoTimber International
510-549-3000
Hardwood, prefinished laminate, solid strip and plank flooring.

Jefferson Recycled Woodworks
916-964-2740
Reclaimed/remanufactured flooring.

Naturlich
707-824-0914
Natural floor coverings: cork, wool carpets, linoleum, woven plant fibers.

Bomanite Corporation
209-673-2411
Patene Arctectura surfacing on existing concrete slabs. Other products add color/texture as concrete poured.

Mobil Chemical Company
800-846-2739
Trex decking boards and railings.

Recommended Flooring Products

Recycled/ Recyclable	Energy/Water Efficient	Renewable/ Sustainably Harvested	Air/Water Pollution	Nontoxic/ Allergenic	Durable	Where Manufactured
Made from PC and post-industrial glass.	Uses less energy than creating virgin glass.			Inert.	More durable than ceramic.	Seattle, WA (No new orders until 1997)
Made from 95% plant tile scrap.	Energy-intensive to fire.			Inert.	Harder than granite and marble.	Crossville, TN
55 to 70% recycled glass content.	Factory reclaims waste heat, recycles water. Less firing time than traditional ceramics.		Company states that it uses no toxic materials and generates no toxic waste.	Inert.	Traffic tile has low staining/maintenance needs. Low porosity.	Richmond, IN
Biodegradable. Plant scrap reused in production.	Requires little energy to manufacture.	Made from linseed oil, flax, pine rosin, wood flour, jute, lime-stone, and cork.	Contains no petroleum products.	Pigments contain no lead or cadmium.	Very durable. Naturally resistant to fire. Bactericidal properties.	Europe
Uses fly ash and polypropylene carpet fiber. Can incorporate aggregates supplied by clients or recovered PC recyclables.	Closed loop polishing water process.	Low embodied energy. Materials sourced locally, over 40% recycled content.	Factory recovers dust, forms, waste paper for reuse. 100% recovery of polystyrene.	Inert. No emissions.	Extremely long life and highly durable. Simple maintenance.	Santa Monica, CA
	Minimal energy use in sawing. Most energy used in transport from tropics.	About 75% of wood sold certified as sustainable by Smartwood or SCS.	Considered in certification process.		Very durable, can be reused.	Canada and Mexico
Wood salvaged from old homes, factories, industrial buildings, etc.	Modest energy use for transport.	Supply currently exceeds demand.		Accepts natural oils or water-based sealants.	Typically old growth, tighter grain and stronger than currently harvested wood. Reuseable.	Pacific Northwest, California, Upper Midwest, Southeast
Recycled content pads.	Natural products, most energy use occurs in shipping.	Sheep's wool and plant fibers both close to sustainable harvested.		Specializes in products and adhesives for the chemically sensitive.	Intended for residential and light-duty commercial applications.	Northern California, Imports from New Zealand or Europe
Some products use 15-20% fly ash.	Can reduce energy/water use by refinishing existing concrete, instead of adding new decorative flooring.	Uses metallic salts for coloring. Concrete constituents are mined.		Inert. If interior installation sealed with acrylic, may need ventilation for short time.	Does not burn, rot or harbor insects. Low maintenance.	Certified local contractors in most cities.
50% recycled plastic, 50% sawdust. Recyclable.		Supply of raw materials exceeds demand.		Non-toxic.	Impervious to sun and water. 10 year warranty.	Connecticut.

© 1996, Green Seal, Inc. Use of this chart for commercial purposes is prohibited. Information in this table was confirmed by the manufacturer.



1730 RHODE ISLAND AVE., NW
 SUITE 1050
 WASHINGTON, D.C. 20036-3101

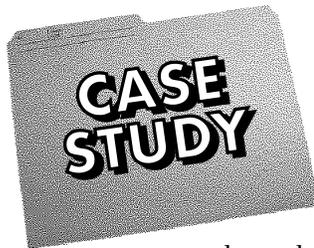
NON-PROFIT ORG.
 US POSTAGE
PAID
 WASHINGTON, DC
 PERMIT NO. 5515

IN THIS ISSUE

- Wallboard, Fiberboard and Flooring*
- *“Green” Building Materials*
 - *Recommended Wallboard*
 - *Recommended Fiberboard*
 - *Recommended Flooring*
 - *Build or Renovate?*
 - *Progressive Codes and Standards*

**Successful
 Green Building
 Materials
 Case Studies**

The Washington, DC, offices of both WMX Technologies, Inc., and the Natural Resources Defense Council have incorporated environmental consciousness into their workspace design and material selection. The lessons they learned are absolutely invaluable to others choosing to follow their path. From ultra-energy efficient lighting to natural linoleum flooring, carpeting made from recycled plastics to work surfaces made using recycled newspaper, these organizations selected and installed materials with lower environmental impacts, while performing up to typical commercial office requirements.



As an added benefit, both WMX and NRDC found that their construction process was less hazardous for the contractors and inhabitable sooner

because of the use of non-toxic, low VOC adhesives, paints, and stains. Rather than having to wait for their spaces to “air out,” both were able to move in right away. Written materials or tours of these spaces are available for interested parties.

ADDITIONAL RESOURCES

Guide to Resource Efficient Building Elements, 6th Edition, Center for Resourceful Building Technology, 406-549-7678.

Sustainable Building Technical Manual: Green Building Design, Construction, and Operations, Public Technology Inc., 1996, obtainable through PTI or Green Building Council. 202-429-2081

Environmental Resource Guide, AIA, edited by Joseph Demkin, available through John Wiley & Sons, Inc., 212-850-6000