

## FLOORING

### Introduction

**Wood** – Long a traditional flooring material in this country and around the world, the popularity of wood flooring has in recent years regained some of its past popularity. High durability and ease of maintenance are some of the reasons, as well as that wood floors offer a warmth, character, and rich, natural beauty that complements any style and increase a home's resale value. There are limitless choices in species, colors and patterns to choose from, and most wood flooring can be refinished numerous times. In addition, engineered wood flooring has significantly impacted the marketplace due to its low cost and ease of installation.

**Bamboo** – Bamboo offers the same benefits as wood although, botanically, it is not a wood. Bamboo is a grass and has a short growth cycle of approximately five years. As a result, bamboo flooring is considered a rapidly renewable and sustainable product and by replacing wood in flooring specifications helps preserve old-growth forests. Bamboo is long-lasting, harder than red oak, and naturally beautiful.

**Linoleum** – Natural linoleum flooring is manufactured from renewable, natural raw materials (cork, wood flour, linseed oil, pine rosin, jute, and limestone). Qualities include its durability, ease of maintenance, and attractive appearance in a vibrant color palette. Once predominant, natural linoleum has been largely displaced by petroleum-based vinyl (polyvinyl chloride) flooring, which is often mistakenly referred to as linoleum. Vinyl is cheaper to make than natural linoleum but much less durable, not to mention it involves the use and release of toxic compounds in its manufacture. Natural linoleum won't melt like vinyl and is hygienic, naturally anti-static, and highly resistant to indentation marks.

**Cork** – Cork is a natural, sustainably-harvested, product from the bark of the cork oak tree found in the Mediterranean region. Cork can be harvested every nine years without harm to the these trees, which are known to live well over a

hundred years. The unique cellular structure of cork gives this flooring excellent impermeability, resilience, thermal insulation, sound absorbency, fire retardation, and distinctive, natural appearance.

**Concrete** – Concrete flooring is inexpensive, durable, easy to maintain, and tremendously versatile. Concrete has a natural appeal that can be enhanced by staining, scoring, or texturing. Finished exposed concrete can resemble tile, slate, or brick, or emit the look, texture, and feel of quarried stone such as marble or granite. Concrete floors have excellent thermal mass properties as well, and so can be an important component of a passive design strategy to moderate internal temperature fluctuations and decrease heating and/or cooling loads.

**Tile** – Ceramic tile is a beautiful, inert material used for durable finishes. While it is energy-intensive to produce, the environmental impacts are offset by its longevity. Ceramic tiles are available in a wide variety of colors, sizes and textures and require minimal maintenance. Recycled-content ceramic tiles are friendlier to the environment through use of up to 100% recycled glass, and are often more durable and moisture- and stain-resistant. Tile has thermal mass properties near to that of concrete, and thus many of the same potential thermal comfort advantages.

**Wool** – Wool carpet has excellent durability and notable safety features. Due to its high moisture and nitrogen content, wool is naturally flame resistant; it is difficult to ignite and has low flame spread and heat-release properties. Moisture content also reduces static electricity. Wool carpet is non-toxic, non-allergenic, and deters the bacterial growth that is a common problem with carpets in general.

**Natural Grasses** – Woven mats and rolls of natural grasses such as sisal, seagrass, jute, and coir offer durable, low-maintenance, natural and non-toxic flooring alternatives. Moisture content also reduces static electricity.

**Carpet** – Carpet is typically the last choice on the list of green flooring alternatives, but it still has a strong marketplace presence due its beneficial aspects of sound reduction, comfort, and low cost. In recent years the carpet industry



has made significant strides to improve the availability of green options in their products and product lines. Greener products include carpet fabricated with up to 100% of its fibers from recycled soda bottles. Shorter napped carpet will be easier to clean and hold less dirt, dust, and allergens. One major manufacturer also sells carpet tiles that can be easily cleaned, replaced, and reclaimed to be broken down and remade into new carpet. Look for carpet that is certified under the Carpet and Rug Institute's "Green Label" or "Green Label Plus" testing programs. The presence of these seals indicates that products have been independently tested and found to exceed specific compliance levels for harmful volatile organic compound (VOC) emissions that degrade indoor air quality.

## Green Building Benefits

### Indoor Air Quality

In recent years, conventional flooring such as carpet and vinyl have become controversial due to their potential for chemical offgassing, the pollution created during manufacture, the amount of old carpet filling up landfills, the difficulty in maintenance and cleaning, and their tendency to harbor and encourage mold, dust, bacteria and other allergy-causing organisms. As more is learned about the personal health and environmental hazards of carpet and vinyl in their production, use, and disposal, green flooring alternatives are becoming increasingly popular.

Carpet can and often does absorb substances tracked in on shoes that have been exposed to the numerous outdoor chemicals encountered in daily life, including road oil, anti-freeze, dirt, pesticides, and herbicides. Outdoors, ultraviolet sunlight breaks down some of these chemicals. Once in indoor carpet, however, there is nothing to remove them. The VOCs emitted from vinyl flooring or carpet installation adhesives are also regarded as health threats, if not individually then at least on a cumulative level.

To improve indoor air quality, consider reducing the amount of carpeting or vinyl in your home. Greener material options include wood, bamboo, linoleum, cork, concrete, ceramic tile, wool, and

natural grasses (described previously). Using throw or area rugs on hard floor surfaces allows you to gain the aesthetic benefits of carpet without the adverse air quality implications.

### Resource Conservation

Materials like bamboo, cork, wool, and grasses that can be harvested in as little as one to nine years of growth are considered rapidly renewable resources. Such options possess significant environmental advantages over finite raw materials or those with long renewable cycles such as wood. The raw materials needed to make natural linoleum are minimally processed and commonly available. Because of its ingredients linoleum is also considered a rapidly renewable and abundant natural resource product. Due to their durability, green flooring materials have a longer use period than carpet or vinyl, reducing the demand for materials to be extracted, produced, and landfilled.

Conventional carpet is made from a variety of chemicals derived from petroleum, a non-renewable resource, and poses significant environmental hazards due to air and water pollution potential during the manufacturing process. Carpet and vinyl also pose a significant environmental burden from a waste perspective--they have a fairly short lifespan, are not typically recycled, and in landfills take up significant space compared to other wastes.

### Affordability

The higher initial cost for most green flooring options compared to conventional carpet and vinyl tiles deserves a second look. When durability and ease of maintenance are considered, green flooring can prove more economical. A quick comparison between carpeting and hardwood floors shows that carpeting lasts between seven and ten years while hardwood floors easily last 30 or more (see following table). During a 30-year period carpeting requires at least three or four installations. Given this data, over 30 years hardwood flooring actually costs significantly less (and is less time and trouble-intensive) than carpeting.

### Green vs. Conventional

Wood Flooring	Carpeting
Durable (30+ year lifespan)	Less durable (7-10 year lifespan)
Hard surface does not hold particulates	Fibers act as "sink" for dirt and odors
Low/No emissions, depending on finish	Fibers and backing offgas VOCs
Refinishable and reusable	Typically landfilled. Few options for recycling.
Made of renewable resources	Made of non-renewable resources
Installed cost: higher first costs, lower life-cycle costs	Installed cost: lower but more frequent first costs (short lifespan)
O&M cost: lower	O&M cost: higher
Bamboo Flooring	Hardwood Flooring
Fiber matures in 4-7 years	Fiber matures in 40-120 years
Reduces the need for virgin forest lumber	Typically comes from old-growth forests
Hardness ranges from that of red oak to hard maple	Hardness ranges from soft to very hard, depending on species/age
Installed cost and maintenance similar to hardwood	Installed cost and maintenance similar to bamboo
Finished Concrete	Conventional Covering
Uses existing foundation	Requires a covering
Durable and moisture- and stain-resistant	Requires maintenance
Staining/sealing and O&M costs are low.	Installation and O&M costs are higher.

### Green vs. Conventional

Linoleum or Cork	Vinyl Flooring
Made of natural materials	Made of synthetic materials
Low offgassing from natural oils	High offgassing from petroleum distillates
Renewable and biodegradable	Production and incineration creates dioxin
Naturally anti-static, doesn't melt	No such properties
Installed cost: comparable to high-end vinyl, but lasts 30+ years	Installed cost: lower than linoleum but has shorter life span
O&M cost: lower than vinyl due to inherent durability no need for sealers or waxes	O&M cost: considerably higher than linoleum, requires frequent waxing to maintain appearance
Recycled-Content Ceramic Tiles	Conventional Ceramic Tiles
Reuses a waste material	Uses virgin materials
Durable and moisture- and stain-resistant	Durable and moisture- and stain-resistant
Installation and O&M cost is the same. Material cost varies with manufacturers.	Installation and O&M cost is the same. Material cost varies with manufacturers.
Green Carpeting	Conventional Carpeting
Made of recycled synthetic materials	Made of synthetic materials
CRI-tested for lower VOC emissions (look for the "Green" or "Green Plus" labels)	Fibers and backing offgas VOCs
Uses no-VOC adhesive	Uses high-VOC adhesive
O&M: Carpet tiles reduce amount of carpet replaced	O&M: Rolls require complete replacement
Short nap holds fewer particulates	High nap holds more particulates



## Green vs. Conventional

Wool or Natural Grasses	Carpeting
Made of natural materials	Made of synthetic materials
No offgassing	Fibers and backing offgas VOCs
Renewable and biodegradable	Production and incineration create dioxin
Naturally anti-static, doesn't melt	No such properties
Installed cost: comparable to high-end carpet, but lasts 30+ years	Installed cost: lower to similar compared to green options
O&M cost: comparable	O&M cost: comparable

### Installation

Bamboo is typically factory pre-finished (although it can be site-finished in similar fashion to hardwood). Be aware that on-site finishing will result in more VOC emissions into the home.

Cork and linoleum sheets/tiles should be installed by an experienced professional. It is very important that the cork or linoleum acclimate to the room for at least one week prior to installation. A no-VOC, water-based adhesive should be used to attach the tiles or sheets to the subfloor.

To achieve a smooth-surfaced final product, an exposed concrete floor must be finished with care during "the pour" and be well protected/covered during construction to avoid unwanted stains and scratches. Scoring, staining, and sealing can be done either at the start or near the end of construction. Installation should typically be done by a professional, but a thoughtful tradesperson or homeowner with some training can also be successful.

Recycled tile is installed in the same fashion as conventional tile.

Wool and natural grasses are installed with tack strips or other physical attachments at the edges as with conventional carpet. Adhesives are not typically used.

Green carpet is installed in the same fashion as conventional carpet except that it uses no-VOC rather than high-VOC adhesives, or no adhesives in the case of tiles (which stay in place by friction of the rubber backing).

All flooring options (except carpet and vinyl) should be acclimated outside of the packaging in the room for a week before installation to get the humidity and temperature to equalize in the material. No flooring material should be installed in basements or other locations where there is potential for moisture to rise up from the concrete subfloor.

### Operation and Maintenance

Hard-surface flooring requires the least amount of maintenance (simple sweeping and occasional mopping with mild detergents) and is usually very stain resistant.

Bamboo flooring can be sanded and refinished like any other solid wood flooring. Cork and linoleum have a tremendous amount of "memory," recover well from compression and can last as long as most hardwood floors. If the flooring gets scratched, simply buff the spot and re-apply a light coat of water-based polyurethane.

Ceramic tiles offer a very hard, scratch-resistant surface requiring minimal maintenance. Tiles with integral color disguise chips that occur during use.

Concrete flooring is probably the easiest to maintain, requiring just normal sweeping and mopping with a mild soap and water. Moisture and water will not damage concrete flooring and it is always easy to cover if tastes change.

Carpet and vinyl are the most maintenance-intensive flooring options, with vacuuming and shampooing required for carpet and waxing required for vinyl.

### Bay Area Suppliers

Flooring materials are available from a vast array of retailers and wholesalers throughout the region and on the internet. Be sure to carefully research materials and trained/experienced



installers. Problems with flooring result almost exclusively from low-quality installation.

- Search Build It Green's **Materials Database** to find local suppliers and services: [www.builditgreen.org](http://www.builditgreen.org)

### For More Information

- Build It Green's website provides additional and more-detailed information in its Fact Sheet section related to specific flooring options: [www.builditgreen.org](http://www.builditgreen.org)

- **Building Green** is an independent company that publishes *Environmental Building News* and is committed to providing accurate, unbiased information in order to improve environmental performance and reducing building impacts: [www.buildinggreen.com](http://www.buildinggreen.com)

- **Green Seal** has a good fact sheet on carpets: [www.greenseal.org/resources/reports/CGR\\_carpet.pdf](http://www.greenseal.org/resources/reports/CGR_carpet.pdf)

### Disclaimer

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