BUILDING MATERIALS

SCOTTSDALE GREEN BUILDING PROGRAM

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Interior Finish Options

Healthy and Environmentally Responsible Home

Walls and built-in components

1. Consider materials made with recycled content (e.g. – agri-fiber boards, drywall with industrial by-product gypsum).

   Agri-fiber boards are made from fibrous residue of the agricultural process. Wheat, rice, rye grass, soybean straw, cornstalks, hemp, rice hulls, flax shives, sunflower stalks, and seed hulls are just some of the agricultural fibers finding their way into building and furniture materials. Recycled-content drywall contains "synthetic" gypsum, a waste by-product of flue gas scrubbers, and reduces the demand of virgin gypsum mined from the ocean floor.

Paints and Finishes

1. Consider paints, coatings and primers that contain zero VOC (volatile organic compound) or meet the Green Seal limits (Std. GS-11) of 150 grams/liter for non-flat paints and 50 grams/liter for flat paints.

   Volatile Organic Compounds [VOC] are a class of chemical compounds that can cause short or long-term health problems. Low or zero VOC paints and coatings improve indoor air quality and occupant health..

2. Consider paints and finishes without acetone, formaldehyde or ethylene glycol (EG).

   Ethylene Glycol (EG) is a solvent used in many latex paints and has been listed as a hazardous substance and toxic air contaminant under many federal and state regulations.

3. Consider wood finishes, floor coatings, stain, sealers, and shellacs that don't exceed the following VOC (volatile organic compound) limits:

   Clear wood finishes: varnish 350 g/L (grams/liter); lacquer 550 g/L
   Floor coatings: 100 g/L
   Sealers: waterproofing sealers 250 g/L; sanding Sealers 275 g/L; all other sealers 200 g/L
   Stains: 250 g/L
   Shellacs: clear 730 g/L; pigmented 550 g/L

   Low VOC finish products reduce out-gassing and improve indoor air quality and occupant health.

4. Consider recycled paints and finishes with min. 20% recycled content.

   Paints and finishes made from recycled content reduce the waste in landfills.

Adhesives

1. Consider adhesives and grout with a maximum VOC (volatile organic compound) content of 150 grams/liter for installation of materials (i.e. - drywall, paneling, carpet pad, wood flooring, trim, ceramic or VCT tile, cove base, etc.)

   Low toxic interior finish products such as solvent-free adhesives, mastics, and sealants reduce out-gassing of VOCs and other toxic substances, which in turn improves indoor air quality and occupant health.

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Flooring Options

Healthy and Environmentally Responsible Home

Carpeting

1. Secure all wall-to-wall carpeting and padding with tacks and/or tape (in lieu of glue).

   Tacking carpet/taping pad down instead of gluing will avoid the use of toxic glues and eliminate VOC (volatile organic compound) out gassing, thus improving indoor air quality and occupant heath.

2. Consider carpeting and padding certified under the Carpet and Rug Institute's Green Label program.

   Products with low VOC emissions improve the quality of indoor air and occupant heath.

3. Consider natural fiber carpet or rugs (domestic cotton, wool, jute, sisal).

   Natural fiber carpet is good use of renewable resources. It does not off gas like synthetic carpet.

4. Consider carpeting with recycled content material (e.g. – carpet fibers, carpet padding).

   Recycled content flooring saves material that would have gone into a landfill, saving natural resources.

Resilient and Hard Flooring

1. Consider flooring made from a rapidly renewable material (e.g. – bamboo, cork, linoleum or other materials that are regenerated within a 10-year cycle).

   Bamboo flooring is a good use of natural resources because it is fast growing, durable, and flexible. Cork flooring comes from stripping the bark off cork oak, which regenerates itself. The cork tiles are moisture, rot, and mold resistant, providing a floor that can last over 30 years. Natural linoleum is made from natural and abundant materials (linseed oil, cork powder, wood floor, limestone residue) and is extremely durable. Low toxic adhesive or backing minimizes the amount of toxic out gassing, thereby improving indoor air quality.

2. Consider flooring with recycled content (e.g. – tile made with recycled glass) and/or salvaged (e.g., reclaimed wood) flooring.

   Recycled content and salvaged flooring conserves natural resources by reducing ever-increasing demand for virgin materials. Use of these materials also diverts viable resources from the land fill.

3. Consider stone and/or tile flooring that is quarried, processed and/or made within 500 miles of site.

   Stone and tile are durable materials that when quarried locally, reduces costs and pollution related to transportation from other areas.. Flagstone is an example of a regional stone.

4. Consider wood flooring that is FSC (Forest Stewardship Council) or SFI (Sustainable Forest Initiative) certified.

   The use of wood from sustainable managed forests protects regional biodiversity, soil erosion and water quality, and also saves old growth forests by using trees from second-generation forests and tree farms. A sustainable-managed forest prohibits clear cutting practices and plants a new tree for every one used in production.

5. Consider finished concrete flooring (polished, colored/stained, textured/scored).

   Concrete used as a finished floor surface is durable and eliminates the use of additional flooring materials, such as carpet which can have a negative impact on indoor air quality.

6. Maximize use of hard and resilient flooring.

   Hard flooring can drastically improve indoor air quality by 1) eliminating out gassing that occurs from many synthetic carpets, and 2) reducing the growth of molds and the entrapment of other contaminants in carpets. Hard flooring is also easier to maintain, stays cooler during summer, and is a cost-effective alternative to carpeted surfaces.

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Cabinetry and Trim Options

Healthy and Environmentally Responsible Kitchen

Cabinet Options

1. Avoid using tropical woods.

   Tropical hardwoods are harvested from endangered rainforests.

2. Consider casework for cabinets (base/upper cabinets; counter substrate; built-ins) that contains no-added urea formaldehyde, made of materials from a certified sustainable source (Forest Stewardship Council [FSC] or Sustainable Forest Initiative [SFI]) and/or made of materials other than wood (e.g. – metal, glass).

   Cabinets made from formaldehyde free particleboard or MDF eliminate the volatile organic compounds [VOC] that outgas into the home, resulting in healthier indoor air quality. The use of wood from sustainable managed forests protects regional biodiversity, soil erosion and water quality, and also saves old growth forests by using trees from second-generation forests and tree farms. A sustainable-managed forest prohibits clear cutting practices and plants a new tree for every one used in production.

3. All exposed substrate materials containing formaldehyde should be sealed with water-based formaldehyde blocking sealer (inside cabinets, underside of countertops, edges).

   Water based formaldehyde blocking finish improves indoor air quality by blocking the out-gassing of VOCs and other noxious substances.

4. Use pre-finished cabinets or finish on-site with finish product that contains a max. volatile organic compound (VOC) content of 350 grams/liter.

   Pre-finished cabinets or on-site application of least toxic finish will lower the amount of VOCs released into the home, minimizing the amount of indoor air pollutant.

Countertop Options

1. Consider recycled-content countertop that incorporates glass, plastics, metals, and/or paper.

   Recycled content counter tops conserve virgin resources and reduce waste in landfills.

2. Consider concrete or regionally (within 500 miles) quarried or processed countertops (e.g. – concrete, stone, tile).

   Use of regional materials supports the local economy and reduces costs and pollution related to transportation from other areas.

Trim

1. Use interior trim that is finger-jointed, composite wood, domestic hardwood or from a certified sustainable source (Forest Stewardship Council – [FSC] or Sustainable Forest Initiative – [SFI]).

   Finger-jointed lumber reduces waste by using remnants from the milling process. Composite lumber uses recycled wood and plastics. These resource efficient materials reduce the demand on virgin materials.

Insulation Materials – Summary of Environmental and Health Considerations

Type	Installation Method(s)	R/in (RSI/m)	Raw Materials	Pollution from Manufacture	IAQ Impacts	Comments
FIBER INSULATION						
Cellulose	Loose-fill, wall-spray (damp), dense-pack, stabilized	3.0 – 3.7 (21 – 26)	Old newspaper, borates, ammonium sulfate	Vehicle energy use and pollution from newspaper recycling	Fibers and chemicals can be irritants, should be isolated from interior spaces	High recycled content, very low embodied energy
Fiberglass	Batts, loose-fill, semi-rigid board	2.2 – 4.0 (15 – 28)	Silica sand, limestone, boron, recycled glass, PF resin or acrylic resin	Formaldehyde emissions and energy use during manufacture	Fibers can be irritants, should be isolated from interior spaces; formaldehyde a carcinogen; less concern about cancer from respirable fibers	
Mineral wool	Loose-fill, batts, semi-rigid or rigid board	2.8 – 3.7 (19 – 26)	Iron-ore blast furnace slag, natural rock, PF binder	Formaldehyde emissions and energy use during manufacture	Fibers can be irritants, should be isolated from interior spaces; formaldehyde a carcinogen; less concern about cancer from respirable fibers	Rigid board (e.g., Roxul) can be an excellent foundation drainage and insulation material
Cotton	Batts	3.0 – 3.7 (21 – 26)	Cotton and polyester mill scraps (especially denim)	Negligible	Considered very safe	Two producers; also used for flexible duct insulation
Perlite	Loose-fill	2.5 – 3.3 (17 – 23)	Volcanic rock	Negligible	Some nuisance dust	
FOAM INSULATION						
Polyiso-cyanurate	Foil-faced rigid board, nail-base with OSB sheathing	6.0 – 6.5 (42 – 45)	Fossil fuels, some recycled PET, pentane blowing agent, TCPP flame retardant, aluminum facing	Energy use during manufacture	Potential health concerns during manufacture, negligible emissions after installation	Phaseout of HCFC ozone-depleting blowing agents completed
Extruded polystyrene (XPS)	Rigid board	5.0 (35)	Fossil fuels, HCFC 142b blowing agent, HBCD flame retardant	Energy use during manufacture, ozone depletion	Potential release of residual styrene monomer (a carcinogen) and HBCD flame retardant	Last remaining insulation material with ozone-depleting blowing agents
Expanded polystyrene (EPS)	Rigid board	3.6 – 4.4 (25 – 31)	Fossil fuels, pentane blowing agent, HBCD flame retardant	Energy use during manufacture	Potential release of residual styrene monomer (a carcinogen) and HBCD flame retardant	
Closed-cell spray polyurethane	Spray-in cavity-fill or spray-on roofing	5.8 – 6.8 (40 – 47)	Fossil fuels, HCFC-141b (through early 2005) or HFC-245fa blowing agent, nonbrominated flame retardant	Energy use during manufacture, global-warming potential from HFC blowing agent	Quite toxic during installation (respirators or supplied air required); allow several days of airing out prior to occupancy	
Open-cell, low-density polyurethane	Spray-in cavity-fill	3.6 – 3.8 (25 – 27)	Fossil fuels and soybeans, water as blowing agent, nonbrominated flame retardant	Energy use during manufacture	Quite toxic during installation (respirators or supplied air required); allow several days of airing out prior to occupancy	
Air-Krete	Spray-in cavity-fill	3.9 (27)	Magnesium oxide from seawater, ceramic talc	Negligible	Considered very safe	Highly fire-resistant, inert, remains friable
RADIANT BARRIER						
Bubble back	Stapled to framing	Depends on installation	Aluminum, fossil fuels	Energy use during manufacture	Minimal offgassing from plastic	Exaggerated R-value claims have been common.
Foil-faced polyethylene foam	Stapled to framing, requires air space for radiant benefit	Depends on installation	Aluminum, fossil fuels, recycled polyethylene	Energy use during manufacture	Minimal offgassing from polyethylene	Exaggerated R-value claims have been common; recycled content in some.
Foil-faced paperboard sheathing	Stapled to framing, requires air space for radiant benefit	Depends on installation	Aluminum, fossil fuels, recycled paper	Energy use during manufacture	Considered very safe	High recycled content, structural sheathing available (e.g., Thermo-Ply®)
Foil-faced OSB	Most common as attic sheathing	Depends on installation	Wood fiber, formaldehyde binder in OSB, aluminum	Energy use and VOC emissions during manufacture	Formaldehyde emissions	Primary benefit is reduced heat gain.

Sources: Manufacturers' data, *Environmental Building News*

BUILDING MATERIALS COMPARISON CHART

Construction Divisions	Standard Products	Environmental Impact	Toxicity to Indoor Environment
Concrete	Concrete material	Concrete has high embodied energy content	
Metals	Steel studs/framing members	Reduces depletion of old and new growth timber; Can be made from recycled scrap into identical product; Consumes more energy to produce (high embodied energy); Steel production pollutes air, water and soil	Inert; produces no harmful by-products
Wood	Standard wood framing	Depletes old and new growth; Can be recycled into particle- board and other wood products; Pressure-treated woods contain toxic inorganic arsenates (site waste needs to be contained)	Produces no significant harmful by-products
	Plywood	Made from large diameter, old growth peeler logs	Interior grade offgases high emitting levels of urea formaldehyde; Exterior grade offgases low-emitting phenol-formaldehyde; Formaldehyde is a possible carcinogen and is irritating to respiration; Offgassing half-life is +/- 6 months
	Particleboard: Oriented- strand board (OSB) Medium density fiberboard (MDF)	Can be made from recycled wood scraps, sustainable woods, and cellulose fibers	Same characteristics as plywood
	Finish woods	Use of exotic tropical woods depletes rain forests	Produces no harmful by-products
Thermal and Moisture protection	Fiberglass batt insulation	Can be made from recycled glass	Airborne fibers can be irritating to skin, lungs and nasal passages; Offgases formaldehyde
	Rigid insulation	Many types made from non- renewable petrochemicals; Many types also made with CFCs, which are harmful to ozone layer	Gives off toxic fumes when burned; Those made with isocyanurate, polyurethane, and phenolic foam offgas chemical fumes
	Exterior siding/trim	Vinyl siding made from non-renewable petrochemical source; Wood siding and shakes deplete mature slow growth cedar and redwood trees	

	Wood and asphalt roof shingles	Asphalt is derived from non--renewable petrochemicals; Wood shingles, either cedar or redwood, from old growth slow growth tree stands	Many contain fiberglass fibers (mostly harmful to installers); An irritant; Chemical treatment of wood shingles harmful to installers
Doors and Windows	Doors	Some doors made with endangered old growth woods such as teak or mahogany (luan) veneers and solids	Few harmful by-products in wood; finishes may contain offgassing materials
	Windows	Many windows in older structures not energy efficient	Vinyl windows offgas harmful fumes and give off toxic fumes when burned
Finishes	Gypsum board (drywall) wall and ceilings	Many types use predominantly virgin gypsum mineral, depleting resources	Many carcinogens in standard joint compounds
	Flooring	PVC and vinyl tiles made from nonrenewable petrochemicals	PVC and vinyls offgas harmful fumes
	Carpet	Many made from petrochemicals, a nonrenewable resource	Plastic fibers, backing, mastics, and treatments offgas many gasses harmful to respiratory systems (major component of “sick” building syndrome”); All carpets may harbor dust and mites, both respiratory irritants; Plastic gives off toxic fumes when burned
	Paint, finishes and wood treatments	Unused paint etc. can cause groundwater and soil pollution; If disposed of improperly volatile organic compounds (VOCs) can cause smog and ground level ozone pollution	Many enamels, varnishes, and polyurethanes contain VOCs and offgas these causing harmful respiratory reactions
	Adhesives and mastics	Unused containers can cause groundwater and soil pollution if disposed of improperly	Some adhesives and mastics offgas hazardous fumes to installers and occupants; many types of adhesives are flammable and give off toxic fumes when burned
Electrical	Electrical wiring		Electromagnetic fields are created around any electrical source and may cause cancer

Source: Environmental Building News

For more information, please visit Scottsdale’s Green Building website
www.scottsdaleaz.gov/greenbuilding