

Sustainable Building Materials & Methods Include:

Foundation:

Concrete: containing recycled waste (slag, flyash, aggregate) can be used with conventional concrete to replace % of Portland cement in conventional concrete mix.

Autoclaved cellular concrete (ACC): lightweight, precast product typically in blocks or panels. Solid & create wall systems with high thermal resistance & high strength to weight ratio. Can be worked with regular tools.

Insulated concrete forms (ICF's): Rigid foam blocks or panels, lightweight, interlocking, can be used as permanent concrete forms for both foundations & above grade walls. High thermal resistance. Can reduce total amount of concrete needed.

Non-asphalt based damp proofing: Synthetic rubber & cement-based damp proofing products do not contaminate soil & ground water. Polyethylene-based damp proofing typically contain a significant % of post-consumer recycled materials.

No-vent crawlspaces: Check local codes & financing underwriter (including VA/FHA) restrictions. Airtight insulation with rigid insulation & spray foam can reduce amount of total insulation required. Vapor retarder needed on crawlspace floor such as polyethylene with gravel.

Frost-protected shallow foundations (FPSF): uses rigid polystyrene, slab-edge insulation to reduce heat loss & holds heat from house under footings.

Basements: efficient, cost effective way to create additional space for living, wiring, and mechanicals, as well as insulating.

Framing Efficiency:

Efficient framing techniques require fewer materials & generate less waste during construction. Rough framing accounts for about 25% of total cost of typical home construction.

Optimal value engineering (OVE): uses engineering principles to minimize material usage while meeting model building code structural performance requirements.

Engineered lumber: offers consistent performance, predictable quality, & superior structural characteristics, while reducing construction waste. Consists of small pieces of wood combined with adhesives under heat & pressure to produce practical & economical alternatives to solid wood framing in headers, beams, & joists.

Light gauge steel framing: contains a minimum of 25% recycled material & is 100% recyclable. Typically it produces less scrap & waste, is lightweight & easy to transport to site, stable & supports indoor air quality, noncombustible, inorganic, consistent & not vulnerable to termites & mold. The installation learning curve with construction crews not familiar with it can take time however.

Structural insulated panels for walls & roofs (SIPs): Produced in large panels & designed to take the place of traditional framing. Tight construction & uniformity of insulation layer create energy efficiency.

Initial savings in framing & energy-detailing labor may be off-set by learning curve costs & higher material costs.

FSC-certified lumber (Forest Stewardship Council) This certification system requires an independent evaluation to be performed on a forest company's practices & forest management standards. Selecting lumber & other forest products that carry the trademark whenever possible supports responsible forestry & provides forest owners with an incentive to maintain & improve forest management practices.

Siding/Exterior Surfaces :

Fiber-cement siding & exterior trim: Is durable, impact resistant, moisture resistant, & termite resistant. It inhibits mold growth, is noncombustible & easy to install & finish.
Requires care when sawing, however & masks should be used to avoid inhaling the dust & particles.

Recycled-content siding: Alternatives to wood include aluminum, wood fiber, & vinyl. Aluminum has high recycled content & is itself recyclable, but has high embodied energy. Engineered & composite wood siding is a combination of post-industrial wood fiber & resin. Coating & pre-finishing the siding enhances weather resistance & durability, When choosing a vinyl siding, look for recycled products using post-industrial scrap in the manufacturing process.
Attention should also be given to the over all quality of the product and local climatic conditions.

Recycled plastic lumber: Is produced in a wide variety of sizes & colors for use in decks, fences, landscaping, countertops, & exterior furniture. Most are made from 90-100% post-consumer plastics such as HDPE & LDPE, while composite products are made from post-consumer plastics & waste wood fibers.

Plaster/stucco finishes: with cement, lime, gypsum, or clay binders. Particularly used in “straw bale” construction. Choice of type of “mix” governed by aesthetics, function, character of neighborhood, site and structural concerns.

Engineered wood trim: Is available in finger-jointed & glued stock fabricated from several species of wood, such as pine & red wood. These are made from smaller pieces of wood allowing the use of smaller, sustainably harvested trees, & are available pre-primed, offering durability & saving labor.

Patios vs. decks: Patios are usually more environmentally friendly than decks, requiring fewer materials & resources to construct. When built out of bricks or traditional masonry, patios are more durable & weather resistant & typically require less maintenance.
For decks consider the following options: recycled plastic or recycled wood lumber, polymer composite lumber, reclaimed, decay-resistant woods (such as reclaimed redwood) or sustainably harvested, decay-resistant woods such as cedar.

Roofing:

Light colored roofing: Can increase solar reflectance values, reducing cooling requirements by as much as 20%.
Higher solar reflectance can be achieved by light colored materials such as tiles, metal, shingles & white-reflective membranes & coatings.

Recycled-content organic asphalt shingles: Contain recycled waste paper &/or use reclaimed mineral slag in their aggregate surface and have characteristics similar to those of fiberglass asphalt shingles: they are lightweight & come with warranties of up to 30 years.

Tile & slate: Are very durable & long-lasting, easy to maintain & have good fire ratings. Larger structural systems may be required too support the weight.
Concrete tile has similar durability characteristics at a lower cost.

Metal roofing: Made from steel, aluminum, or copper, it is durable & low maintenance. It comes in many sizes & shapes including panels, shingles, shakes, & tiles. Some contain up to 100% recycled material, and many can be recycled.
Avoid metal roofing where lead is used in the alloy or coating.

Fiber-cement composite roofing: Is durable, fire-proof, & absorbs relatively low amounts of moisture, making it a good choice for wet or humid areas. Can be readily used on standard roof structures. Fiber cement composite shakes or slates are not recommended in freeze/thaw climates.

“Green”, “living” roofs: covered with sod or turf laid over good quality waterproof membranes can be planted and landscaped as roof top gardens. Bearing capacities of support walls must be adequate.

Insulation:

Cellulose insulation: Considered a “green” insulation, it is commonly made from up to 75-80% post-consumer newspapers & telephone books with low or non-toxic fire retardants & binders, and has a range of R 3.2 to R 3.7 per inch.

Can be dry-blown or poured as loose fill into enclosed cavities, & wet-sprayed into open wall or ceiling cavities.

“Straw bale” insulation: Long considered an “alternative” building material, suitable mostly for use in the Southwest and by dedicated owner builders, now with new techniques and good design, usable in wet, cold climates.,

CFC-free spray foam insulation: Has superior air sealing, moisture resistance, & insulating properties to fiberglass. Choose products with a lower ozone-depleting blowing agent such as HCFCs (hydrochlorofluorocarbons), HFCs (hydrofluorocarbons) or better yet, CO₂, pentane & isobutene.

Formaldehyde-free recycled-content fiberglass: Select products with phenol-formaldehyde-free binders to prevent VOC off-gassing & at least 29-25% recycled glass content, including both post-industrial glass cullet & post-consumer bottle glass.

Be aware that it is an irritant & should always be installed using proper protective gear.

Air sealing, duct work and other strategies to assure indoor air quality are essential.

Advanced air sealing: Otherwise known as weatherization, consists of sealing all holes & penetrations leading to unconditioned spaces & the outside. Goal is to prevent air leakage & convection losses. Look for low VOC compounds.

Windows:

Look for the window U-factor or the NFRC-certified rating or label describing the thermal properties of the frame & glazing, the window Solar Heat Gain Factor (SHGF) or Shading Coefficient (SC), Visible Transmittance (VT), and Air Leakage (AL).

Window frames:

There are a wide array of environmentally friendly window frames & glazing products, including:

Traditional wood is a good choice. Look for domestic &/or certified wood.

Fiberglass and/or clad perform as well as or better than wood but can be hard to recycle.

Metal frames are not typically recommended for energy efficiency reasons except in very mild climates and look for metal frames with a thermal break.

High-performance window glazing:

At a minimum select double-pane windows to reduce heat loss or gain.

Other high-performance glazing options increasing thermal performance include low-emissivity (low-e) films, argon or krypton gas between panes for lowered conductivity & increased R-value, and a “Heat Mirror”, a clear film used between panes.

Light pipes:

Transmit natural daylight into interior & otherwise dark spaces through highly reflective, insulated cylinders. They are channeled to a light diffuser in the ceiling which provides natural daylight, conserves energy, increases comfort, & enhances indoor environments. They are inexpensive & roof-mounted, require no special re-framing and can be angled around obstacles.

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Finishes:

Low-or no-VOC (volatile organic compound) interior latex paints: Have lower odors & emissions when wet or newly dried.

Low-VOC, water-based wood finishes: Are water-based, formaldehyde-free, non-inflammable, low-odor, and low-VOC.

Natural paints: Are made from milk protein, plant or mineral-based compounds & can be a viable alternative to conventional paints. Not necessarily low-VOC, however, as some are organic & solvent based & contain isoaliphatic hydrocarbons, & some use citrus oil solvents which dry quickly but may cause allergies or irritations in environmentally sensitive individuals.

Recycled-content &/or formaldehyde-free interior panels: Used for millwork, cabinets & paneling. Includes formaldehyde-free medium density fiberboard (MDF), panels made from post-consumer & post-industrial corrugated boxes & newspapers, and panels from agricultural waste such as wheat, straw, and soy.

Plaster finishes: (See above under Siding/Exterior Surfaces) Plaster with cement, lime, gypsum and clay binders are available for both exterior and interior finishes. Note: When straw bale insulation is used, careful consideration must be made that the vapor diffusion qualities of both interior and exterior surfacing materials are coordinated.

“Cob”: earthen” wall finishes, can be described as a “heavy” straw-clay mix. An advantage is that it has almost unlimited sculptural potential, absorbs sound well and functions effectively as thermal mass. It however has low insulating capacity, takes a long time to dry and careful consideration is recommended for load bearing capacities of the floor it rests on.

Flooring:

Look for one or more of the following characteristics:

- They produce low emissions,
- Are made from rapidly renewable and/or natural resources,
- Contain recycled content,
- Are recyclable,
- Require little maintenance and/or do not require toxic cleaners to maintain.
- Are matched to the different activities that will take place on them.
- Appropriate acoustic properties,
- Heat storage capacity (if passive solar or radiant floor heating is desired)
- Light absorptivity versus reflection,
- Resilience for high traffic areas.



“Creating ‘green’”...