

Green Building Ideas

Introduction

Green buildings are healthy for their occupants and the environment. They are also economical buildings, boasting reduced energy, water, and maintenance costs. However, constructing or renovating homes in such an environmentally responsible manner requires significant planning, as well as educating and encouraging architects and builders to prioritize greener materials and construction methods. While resistance from such building professionals can seem formidable, getting them on board is both achievable and vital to the mainstream integration of green building concepts.

There are hundreds of green building techniques and products one can integrate into a home. Green building starts with a “whole system” approach that takes into account natural processes and the interaction and integration of various building design and material components. From this starting point, the most important consideration is to balance economic and time input costs with the economic, personal, and environmental benefits. This fact sheet outlines some basic concepts and ideas important to creating a green home.

Planning and Scope

The Right Property

For new construction, take great care and time to select a lot that takes the most efficient and cost-effective advantage of the site and region's existing characteristics. The benefits of sun, prevailing winds, soil, water, views, and community services should be considered early on for their benefits as well as their potential negative effects. During the property search, hire a building professional to visit the potential sites and give experienced advice on the probable costs of building green on one versus another. Tens of thousands of dollars and many years of aggravation can easily be saved by paying for relatively inexpensive consulting time during this phase of the project. For example, a septic system could cost \$5,000 or \$50,000, depending solely on the lot. The same is true

for a foundation, but once property is purchased such choices are unavailable. Ideally, the best view should be to the south. Overhangs are readily designed for good solar control on the south side of a house, since the sun's path is high in summer and low in winter. There is limited control on the east and west sides, summer or winter. North views, which will never get direct sun and are exposed to colder northern winds, are fine in climates not too cold and windy in the winter.

The Right Building Team

Choose an architect, builder, and subcontractors based on their training and experience with, or at least openness to, green techniques. Having such qualified, aware partners involved in the project is vital to ending up with a home that meets and exceeds your expectations (see *Choosing a Green Building Professional* fact sheet).

Quality vs. Size

Build or buy a house that is reasonably sized for its occupants and use. Consider the financial and personal resources that will be required to furnish, clean, maintain, heat and cool, and insure the house. Think ahead and spend sufficient time in the planning, layout, and design phases. Smart, creative decisions here can make a smaller house feel larger while poor ones can make a large house seem cramped. More size does not necessarily mean more service to or satisfaction for the occupants. A somewhat smaller home can allow for including additional or higher quality features in place of surplus square footage.

Design and Construction

Work with Your Climate

Specifically design shading for where it is needed in the summer using trees, covered porches, roof overhangs, and window awnings. Let the sun shine in directly where useful for winter heating, specifically through south-facing glass. Install low-E (emissivity) windows to reduce the potential for summertime overheating and retain heat indoors during winter (see *Windows* fact sheet). Except for extremely cold climates, long rectangular floor plans with the short ends facing east and west will typically



make most efficient use of and control for the natural climate. Such designs will best endure the always low sun angles from the east and west, which are longest in duration and most direct during the summer. Proper glazing and overhang design on the southern exposure will provide significant daylight without unwanted heat gain, allowing for reduced electric lighting and incorporation of passive solar temperature moderation utilizing such features as exposed thermal mass walls or floors. Rectangular shapes also often work best for cross ventilation utilizing prevailing west-east winds. For cold, upper latitude climates, a squarer, compact floor plan is more efficient as it provides the lowest exterior wall to floor area ratio. Less exterior wall means less area to protect and insulate against the elements. Two-story homes can be a good way to get the same desired floor area from a smaller footprint, and they work well for incorporating natural ventilation strategies.

The Envelope

Where feasible use a high quality “total fill” type of insulation that completely fills wall voids (see *Insulation and Air Sealing* fact sheet). Foam, caulk or seal with weather-stripping every penetration and crack to avoid air infiltration that could compromise energy efficiency, comfort, and indoor air quality. Professionally measure a home’s overall seal with a “blower door test.” A worthy goal are air changes of <0.40 per hour.

Roofing

Do not skimp on the roof, for failures in it can drastically affect all that lies below. Modern, better-sealed home envelopes do not allow for drying as did the drafty structures of the past. The best way to promote long building life, especially for wood construction, is to keep it dry. Install a tile, metal or 40-year composition shingle roof that will ease concerns about deterioration and leaks while adding to the home’s value. Tile and metal can be used safely for rainwater collection, and may also qualify for reduced homeowner insurance due to their fire-resistance properties.

Natural Ventilation

Design window placement for good cross ventilation and to take full advantage of prevailing (typical) breezes. Locate windows on

two sides of a room whenever possible. Use ceiling fans to move air and consider a whole house fan as well. Informed design can utilize the physics behind passive solar cooling, also called the “stack effect.” Warm, lighter air naturally rises, and when it is exhausted at high interior points where it collects, via a fan or operable windows/skylights, fresh/cool air is drawn in through open windows or vents at or near ground level. Benefits of incorporating this occupant-controlled, cost-effective, non-energy intensive home enhancement include improved occupant comfort and indoor air quality, not to mention the downgrading or potential elimination of mechanical cooling capacity requirements. Such a result can provide real, significant first and long-term cost avoidance.

Thermal Comfort

Select a high-efficiency air conditioner and furnace (13 SEER, 90% AFUE). Have the HVAC contractor determine the correctly-sized equipment using the Air Conditioning Contractors of America (ACCA) Manual J calculation method and the house’s specific design, construction, and orientation characteristics (see *HVAC* fact sheet). If equipment is oversized it will be noisier, costlier, and not operate long enough per cycle to run at maximum efficiency. It also will not dehumidify the air to its potential. Ensure that HVAC ducts are sealed with mastic rather than duct tape and that runs are as short and straight as possible. Average ducts, even newly installed, leak 30% of their capacity—install ducts within the conditioned space wherever feasible and have them professionally leak-tested. California’s 2005 energy code (Title 24) provides a performance compliance credit for very low leakage rates of 6% or less, but aim for at least 10% or lower. Install a pleated-media filter (rated at MERV 6-12) to both help the HVAC equipment last longer and improve indoor air quality.

Indoor Air Quality

Install hard surface flooring such as wood, cork, concrete, tile, or linoleum wherever possible in place of carpet (see *Flooring* fact sheet). Such choices are more durable and easy to clean, and do not offgas chemicals nor readily harbor mold, dust, dust mites, or other allergens or



contaminants. Avoid vinyl products as well due to their short lifespan and offgassing characteristics. Use low or no-VOC interior paints and finishes (under 50 g/L). Exhaust odors and humidity with fans in the bathrooms and kitchen, ideally controlled automatically by a humidistat. Continually introduce fresh air into the home with operable windows or skylights, a whole house fan, or mechanical ventilation. (see *Indoor Air Quality* fact sheet)

Products and Resources

Appliances

Select ENERGY STAR[®] labeled products such as refrigerators, dishwashers, clothes washers/dryers, fans, air conditioners, dehumidifiers, home electronics, office equipment, etc. (see *Appliances* fact sheet)

Lighting

Use compact fluorescent lights, motion sensors, daylight sensors, and dimmers wherever possible to reduce energy use. Use only the IC-AT type of recessed can light. Research the many different types of available light fixtures and lamps, including how and for what purpose to use them. (see *Lighting* fact sheet).

Exteriors

Use durable siding materials such as fiber-cement siding to eliminate rot, reduce the need for painting, and increase fire resistance. Use wood/plastic composite decking materials to reduce demand for redwood and the need for annual resealing as well as increased fire resistance. Be sure to verify to verify the material content of such decking, as some products utilize virgin rather than recycled materials.

Water and Landscape

Use properly designed drip or controlled irrigation systems and, wherever feasible, native or well-adapted vegetation that requires little or no watering. Plant trees and shrubs for shading, cooling, oxygen, wind protection, noise reduction, and privacy. Place plants away from the home's foundation and with space to grow to maturity without affecting the home's structural integrity. Select turf varieties that require the

least amount of water and are appropriate for the sun they will receive. Ensure that landscaping has plenty of topsoil and organic mulch. Consider a rainwater collection system to provide an alternate water source for garden irrigation while reducing run-off. In addition to reducing water use, the above practices will lessen the need for chemical fertilizers and pesticides that can harm occupants or their pets, or run off and pollute waterways.

Reduce, Reuse, Recycle

Consider reusing building materials in a future project, maybe even those that are now just cluttering up the house or yard. Support recycling by both doing so individually and selecting materials high in recycled content such as engineered lumber, high-volume fly ash concrete, recycled tile, cotton or cellulose insulation, and recycled-content and/or recyclable carpet.

For More Information

- Build It Green's **Fact Sheets** provide additional and more-detailed information related to most of the above topics: www.builditgreen.org
- Search Build It Green's **AccessGreen Directory** to find local suppliers and services: www.builditgreen.org
- For more information about Build It Green, visit our web site at www.BuildItGreen.org or call us at 510-845-0472



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