



## Green Built Home

### DESIGN

\* **Smaller is better:** Optimize use of interior space through careful design so that the overall building size--and resource use in constructing and operating it--are kept to a minimum.

\* **Design an energy-efficient building:** Use high levels of insulation, high-performance windows, and tight construction. In southern climates, choose glazings with low solar heat gain.

\* **Design buildings to use renewable energy:** Passive solar heating, daylighting, and natural cooling can be incorporated cost-effectively into most buildings. Also consider solar water heating and photovoltaics--or design buildings for future solar installations.

\* **Optimize material use:** Minimize waste by designing for standard ceiling heights and building dimensions. Avoid waste from structural over-design (use optimum-value engineering/advanced framing). Simplify building geometry.

\* **Design water-efficient, low-maintenance landscaping:** Conventional lawns have a high impact because of water use, pesticide use, and pollution generated from mowing. Landscape with drought-resistant native plants and perennial groundcovers.

\* **Make it easy for occupants to recycle waste:** Make provisions for storage and processing of recyclables: recycling bins near the kitchen, undersink compost receptacles, and the like.

\* **Look into the feasibility of graywater:** Water from sinks, showers, or clothes washers (graywater) can be recycled for irrigation in some areas. If current codes prevent graywater recycling, consider designing the plumbing for easy future adaptation.

\* **Design for durability:** To spread the environmental impacts of building over as long a period as possible, the structure must be durable. A building with a durable style ("timeless architecture") will be more likely to realize a long life.

\* **Design for future reuse and adaptability:** Make the structure adaptable to other uses, and choose materials and components that can be reused or recycled.

\* **Avoid potential health hazards: radon, mold, pesticides:** Follow recommended practices to minimize radon entry into the building and provide for future mitigation if necessary. Provide detailing that will avoid moisture problems, which could cause mold and mildew growth. Design insect-resistant detailing that will require minimal use of pesticides.

## SITING & LAND USE

- \* **Renovate older buildings:** Conscientiously renovating existing buildings is the most sustainable construction.
- \* **Create community:** Development patterns can either inhibit or contribute to the establishment of strong communities and neighborhoods. Creation of cohesive communities should be a high priority.
- \* **Encourage in-fill and mixed-use development:** In-fill development that increases density is inherently better than building on undeveloped (greenfield) sites. Mixed-use development, in which residential and commercial uses are intermingled, can reduce automobile use and help to create healthy communities.
- \* **Minimize automobile dependence:** Locate buildings to provide access to public transportation, bicycle paths, and walking access to basic services. Commuting can also be reduced by working at home--consider home office needs with layout and wiring.
- \* **Value site resources:** Early in the siting process carry out a careful site evaluation: solar access, soils, vegetation, water resources, important natural areas, etc., and let this information guide the design.
- \* **Locate buildings to minimize environmental impact:** Cluster buildings or build attached units to preserve open space and wildlife habitats, avoid especially sensitive areas including wetlands, and keep roads and service lines short. Leave the most pristine areas untouched, and look for areas that have been previously damaged to build on. Seek to restore damaged ecosystems.
- \* **Provide responsible on-site water management:** Design landscapes to absorb rainwater runoff (stormwater) rather than having to carry it off-site in storm sewers. In arid areas, rooftop water catchment systems should be considered for collecting rainwater and using it for landscape irrigation.
- \* **Situate buildings to benefit from existing vegetation:** Trees on the east and west sides of a building can dramatically reduce cooling loads. Hedge rows and shrubbery can block cold winter winds or help channel cool summer breezes into buildings.

## MATERIALS

\* **Avoid ozone-depleting chemicals in mechanical equipment and insulation:** CFCs have been phased out, but their primary replacements--HCFCs--also damage the ozone layer and should be avoided where possible. Avoid foam insulation made with HCFCs. Reclaim CFCs when servicing or disposing of equipment.

\* **Use durable products and materials:** Because manufacturing is very energy-intensive, a product that lasts longer or requires less maintenance usually saves energy. Durable products also contribute less to our solid waste problems.

\* **Choose low-maintenance building materials:** Where possible, select building materials that will require little maintenance (painting, retreatment, waterproofing, etc.), or whose maintenance will have minimal environmental impact.

\* **Choose building materials with low embodied energy:** Heavily processed or manufactured products and materials are usually more energy intensive. As long as durability and performance will not be sacrificed, choose low-embodied-energy materials.

\* **Buy locally produced building materials:** Transportation is costly in both energy use and pollution generation. Look for locally produced materials. Local hardwoods, for example, are preferable to tropical woods.

\* **Use building products made from recycled materials:** Building products made from recycled materials reduce solid waste problems, cut energy consumption in manufacturing, and save on natural resource use. A few examples of materials with recycled content are cellulose insulation, Homasote®, Thermo-ply®, floor tile made from ground glass, and recycled plastic lumber.

\* **Use salvaged building materials when possible:** Reduce landfill pressure and save natural resources by using salvaged materials: lumber, millwork, certain plumbing fixtures, and hardware, for example. Make sure these materials are safe (test for lead paint and asbestos), and don't sacrifice energy efficiency or water efficiency by reusing old windows or toilets.

\* **Seek responsible wood supplies:** Use lumber from independently certified well-managed forests. Avoid lumber products produced from old-growth timber unless they are certified. Engineered wood can be substituted for old-growth Douglas fir, for example. Don't buy tropical hardwoods unless the seller can document that the wood comes from well-managed forests.

\* **Avoid materials that will offgas pollutants:** Solvent-based finishes, adhesives, carpeting, particleboard, and many other building products release formaldehyde and volatile organic compounds (VOCs) into the air. These chemicals can affect workers' and occupants' health as well as contribute to smog and ground-level ozone pollution outside.

\* **Minimize use of pressure-treated lumber:** Use detailing that will prevent soil contact and rot. Where possible, use alternatives such as recycled plastic lumber. Take measures to protect workers when cutting and handling pressure-treated wood. Scraps should never be incinerated.

\* **Minimize packaging waste:** Avoid excessive packaging, such as plastic-wrapped plumbing fixtures or fasteners that aren't available in bulk. Tell your supplier why you are avoiding over-packaged products. Keep in mind, however, that some products must be carefully packaged to prevent damage--and resulting waste.

## EQUIPMENT

- \* **Install high-efficiency heating and cooling equipment:** Well-designed high-efficiency furnaces, boilers, and air conditioners (and distribution systems) not only save the building occupants money, but also produce less pollution during operation. Install equipment with minimal risk of combustion gas spillage, such as sealed-combustion appliances.
- \* **Install high-efficiency lights and appliances:** Fluorescent lighting has improved dramatically in recent years and is now suitable for homes. High-efficiency appliances offer both economic and environmental advantages over their conventional counterparts.
- \* **Install water-efficient equipment:** Water-conserving toilets, showerheads, and faucet aerators not only reduce water use, they also reduce demand on septic systems or sewage treatment plants. Reducing hot water use also saves energy.
- \* **Install mechanical ventilation equipment:** Mechanical ventilation is usually required to ensure safe, healthy indoor air. Heat recovery ventilators should be considered in cold climates because of energy savings, but simpler, less expensive exhaust-only ventilation systems are also adequate.

## JOB SITE & BUSINESS

- \* **Protect trees and topsoil during sitework:** Protect trees from damage during construction by fencing off the "drip line" around them and avoiding major changes to surface grade.
- \* **Avoid use of pesticides and other chemicals that may leach into the groundwater:** Look into less toxic termite treatments, and keep exposed frost walls free from obstructions to discourage insects. When backfilling a foundation or grading around a house, do not bury any construction debris.
- \* **Minimize job-site waste:** Centralize cutting operations to reduce waste and simplify sorting. Set up clearly marked bins for different types of usable waste (wood scraps for kindling, sawdust for compost, etc.). Find out where different materials can be taken for recycling, and educate your crew about recycling procedures. Donate salvaged materials to low-income housing projects, theater groups, etc.
- \* **Make your business operations more environmentally responsible:** Make your office as energy efficient as possible, purchase energy-efficient vehicles, arrange carpools to job sites, and schedule site visits and errands to minimize unnecessary driving. In your office, purchase recycled office paper and supplies, recycle office paper, use coffee mugs instead of disposable cups. On the job, recycle beverage containers.
- \* **Make education a part of your daily practice:** Use the design and construction process to educate clients, employees, subcontractors, and the general public about environmental impacts of buildings and how these impacts can be minimized.