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Home$ense

Greening Your Home: Save Money While You Save the Environment

by Tove Anderson and Sandra Eremic

The recent rise in the price of petroleum is causing many people to reconsider their choice of automobile, and to give greater weight to fuel economy as a criterion for vehicle selection. People tend to be less aware, however, that the choices they make with respect to their home can have an equal or greater impact on both the environment and their wallet. Buildings consume about 40 percent of the total energy consumed in the United States, and that figure does not include the energy consumed to construct them or to produce the materials and products incorporated into them. Also, different raw materials or products can have vastly different environmental consequences for their harvesting or extraction, manufacture, assembly, and transportation. Natural resources and energy are consumed and waste products are generated—some of them toxic—long before the finished materials, equipment, or products arrive on your building site or in your home. Whether you are building a new home or simply making changes to an existing one, nearly every decision you make is likely to involve a choice between two or more alternatives with significantly different environmental impacts. "Life cycle analysis" is the term used by environmentalists, architects, and other design professionals to assess the total resources and energy required to create and maintain building materials, equipment, and products throughout their useful life, and to compare the life expectancy, maintenance costs, and environmental impact of comparable materials, equipment, and products. Not only can life cycle analysis and the resulting environmentally conscious decisions help foster a healthier environment for you and your family, they can also save you money in the long run and improve your quality of life.

As a homeowner, the research needed to conduct life cycle analysis for every decision you make may exceed your limits of time and patience. But nearly all residential design and maintenance choices can be organized into four broad categories: material/product selection, energy efficiency, indoor air quality, and water consumption/conservation. If you consider each of these, as appropriate, in every home design and maintenance choice you make, you will be more likely to make an environmentally conscious choice.

Choosing Green Materials and Products

As green building products become more popular, they become easier and easier to find. Many are available in hardware, lumber and home supply stores side by side with conventional building products, just as many supermarkets now feature organic food choices side by side with conventional food products. Unlike organic food, however, you may be surprised to discover that some green building products cost the same or less than conventional building products. This is because less energy is consumed and less waste is generated in their manufacture, which lowers their

cost. And each time you select a green product, you help increase demand for that product and lower the demand for the less environmentally sound alternative. The following are among the things you should consider in building material/product selection:

Alternatives to wood. While wood is a natural, renewal resource, timber cutting itself is harmful to the natural environment, and a tremendous amount of energy is consumed to harvest, dry, mill, and otherwise prepare wood for use in construction. Also, some highly popular species of wood are harvested from highly environmentally sensitive areas, or are being harvested faster than they are being replaced. Consider alternatives to wood-based particleboard or oriented strand board such as wheatboard, which is made from recycled agricultural byproducts and has the added advantage of being suitable for use in wet areas where particleboard is not. For flooring, consider using fast-growing and easily-harvested bamboo (which is actually not wood at all, but a type of grass) instead of hardwoods such as oak, maple, or cherry. Other "green" flooring products include linoleum and ceramic floors containing recycled content.

Reclaimed materials. Heart pine and other centuries-old wood that are reclaimed from river and lake bottoms (wood that is fully submerged does not rot) or from abandoned mill buildings scheduled for demolition are now widely available. Every board foot of reclaimed lumber is a board foot that does not have to be harvested from a forest, with all the attendant consumption of energy and environmental damage of harvesting. Other materials and products that are now widely reclaimed from old buildings include wood and marble fireplace mantels, floor tile, traditional wood moldings, lighting fixtures, plumbing fixtures, kitchen cabinets, doors and windows, and door and window hardware. Any time you incorporate reclaimed materials and products, you accomplish two things for the environment: you save the energy and material resources that would be consumed to make a new product, and you reduce the volume of material that would otherwise go to a landfill. Advertisements for reclaimed materials and products can often be found in *Old House Journal* and other popular home design magazines.

Recycled content. Whenever possible, choose products or materials with the highest possible recycled material content. Recycled materials require less energy to produce then new materials, and have zero impact on the natural environment for extraction or harvesting.

Buy local. A considerable portion of the total energy consumed and cost of building materials and products is due to transportation. Whenever possible, use products and materials native to your locality or region, or that are manufactured locally. Philippine mahogany must be transported over six thousand miles from forest to your home, while the transportation distance for American oak may be less than a hundred miles. Local products have the added benefit of supporting your local economy.

Look for the seal. When purchasing wood for any purpose (kitchen cabinets, flooring, decking, wood trim), use only wood that is certified as having been harvested in accordance with responsible forestry management principles. Proper management replenishes and maintains the resource.

Maximizing Your Energy Efficiency

Some of the following items apply to solely to construction, but many can be implemented whether you are building a new house, renovating an existing one, or simply trying to improve the energy efficiency of your current home:

Block air infiltration. Seal all cracks around doors and windows, and around all penetrations in floors and walls between interior, conditioned space and exterior or unconditioned space. The amount of heating and cooling energy that is lost through even small cracks is enormous. Sealing these openings dramatically reduces heating and cooling costs. It is among the easiest and least expensive things you can do and produces the greatest return on your investment.

Replace incandescent light bulbs with compact fluorescent bulbs. The color of the light emitted by most compact fluorescent bulbs is much improved over earlier fluorescent tubes, and now approximates the spectrum of natural sunlight. In addition to providing much better light, the bulbs last much longer and use only a fraction of the energy of a comparable incandescent bulb.

Buy energy efficient appliances. Appliances that carry the Energy Star label meet strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy. Many Energy Star appliances consume 25 to 40 percent less energy than their conventional counterparts. Ovens and ranges cannot qualify for the Energy Star label, but gas models with electronic ignition (instead of pilot lights, which burn continuously) consume 30 percent less energy than electric ones. Self-cleaning ovens have greater insulation, which results in lower energy use. Just don't bother using the self-cleaning feature, which basically turns your oven into an expensive, energy-consuming incinerator. If you choose to purchase an electric oven or range, select a model with halogen or induction elements, which consume far less energy that conventional resistance-coil elements.

Go tankless. A tankless or "on demand" water heater saves energy because it does not have to maintain a supply of hot water during the long periods between use. Tankless heaters also provide you with an unlimited supply of hot water when you actually need it, unlike water heaters with tanks, which may be incapable of providing continuous hot water once the initial tankful has been depleted.

Install insulated glass. Always install double-pane, low-emissivity (low "e") windows and doors, preferably products that carry the Energy Star label.

Insulate. It goes without saying that a new house should be thoroughly insulated, but installing insulation in an existing house can be a daunting task. Fortunately, the easiest thing to do is also the most beneficial. Heat rises; if you can do nothing else, install insulation (or add more insulation) in your attic, being careful to vent the unheated attic space properly to prevent any warm, moist air that escapes your heated space from condensing in the attic. If you can, insulate all exterior walls and hot water lines. When building new, locate all water lines in an interior and not an exterior wall.

Shade your house. A large shade tree on the south side of your house can have as much cooling benefit as a powerful air conditioner. Awnings, porches, and arbors are equally effective. Interior blinds help, too, but are less effective than exterior shading because the radiant heat of the sun has already penetrated the house.

Improving Indoor Air Quality

Studies have shown that the indoor air quality in many homes can be many times *worse* than the surrounding outdoor air quality. Fortunately, the air quality in your home is something over which you can exert a great deal of control. Here are a few things to consider to maintain or improve the air quality in your home:

Fresh air. One of the negative consequences of a "tight" building envelope with little air infiltration is that the indoor air is not

sufficiently replenished with fresh outdoor air, which is essential to maintaining healthy indoor air quality. The best heating and cooling systems use fresh air on the intake side, passing it through a heat exchanger (similar to the radiator in your car) so that the warm air being exhausted heats the cold incoming air.

Volatile organic compounds. Many building materials or products emit volatile organic compounds (VOCs) during the manufacturing process, and continue to emit these VOCs for months or even years. The "new car" (or new shower curtain, or new carpet) smell is actually harmful to you and your family. Whenever you can, select building materials and products that are manufactured with low or no VOCs. Polyester fabric shower curtains, for example, are a washable alternative to vinyl and have much lower VOC emissions. Alkyd (oil-based) paints emit such high volumes of VOCs that the U.S. Environmental Protection Agency has banned their sale in the metropolitan Washington area. Use latex (water-based) paints instead, which are much lower in VOCs. Clean up can also be done with water rather than highly noxious paint thinners. Whenever you can, select a material or product that is not manufactured with adhesives that emit VOCs. For example, a stain and scratch resistant solid surface countertop that is mechanically fastened to cabinet framing is far preferable to (and more durable) than a laminate material that is adhered to a particleboard subsurface. Recycled glass ceramic tile, lightweight cast concrete, and recycled plastic are all excellent choices for durable, nontoxic, and resource-efficient countertops.

Formaldehyde. Avoid manufactured wood products that contain formaldehyde, which can continue to "off gas" for many years. You can find manufactured wood products such as particleboard or oriented strand board that are formaldehyde-free very easily if you take the time to look for them.

Biological agents. You can help prevent mold from forming in bathrooms by using cement-based ("cementitious") backer board beneath ceramic tile in all wet areas. "Moisture resistant" paper-faced gypsum wallboard, though it is sold as a tile backer board, will eventually absorb moisture and become a breeding ground for mold. You can also look for new fluorescent lights whose light spectrum actually eliminates airborne particulates such as bacteria, mold, smoke, and odors.

Conserving Water

Though water in the metropolitan Washington area is abundant most of the time, conserving water is a good idea whether or not we are experiencing a drought. Clean water that is used needlessly subsequently enters the same waste stream as the wastewater flushed down your toilet. Every additional gallon of clean, potable water that goes down the drain of your kitchen sink, bathtub, shower, or driveway becomes a gallon of wastewater that must be treated before it is released into the environment. Conserving water can also save you money. Many municipalities assess homeowners a "water and sewage user fee" based on the volume of water that they consume. The following are some of the things you can do to lower your water consumption without compromising your quality of life:

Install aerators on showerhead and faucets. Aerators mix air with the water to reduce the amount of water used but still maintain the same water pressure. Many people resist this simple step because they like "good water pressure" and have had bad experiences with poorly-designed "low flow" shower heads. But good-quality aerators are very inexpensive and easy to install on a trial basis; give them a try!

Install low-flush or dual-flush toilets. Low-flush toilets are power-assisted to reduce the volume of water needed for flushing. These systems require electrical receptacles near the toilet. Dual-flush toilets have two push buttons for flushing instead of a single flush lever. One button is for flushing solid waste and releases the full volume of water in the toilet tank. The other is for flushing liquid waste and releases only half the volume of a full flush. Newer gravity-fed (conventional) toilets incorporate a larger flush valve to increase water pressure and reduce the water volume of each flush.

Use native vegetation. Trees and plants that are native to our area have adapted to the climate and the typical amount of annual rainfall and will require far less irrigation or watering than nonnative plants.

Reduce storm water runoff. The more water you can keep from entering the storm water waste stream, the better. Preventing surface water from running off also helps you maintain a higher water table, helping reduce the need for irrigation of trees. Often required in new homes and neighborhoods, responsible storm

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water management is also possible to implement in existing homes as well. For example, you can limit the amount of your "impervious lot coverage" by using crushed rock or pea stone instead of asphalt or concrete for paved areas. You can also install hard but porous paving systems, such as brick or faux-stone concrete pavers with gaps between them that allow water to penetrate into the ground. Some paving systems, known as "grass pavers," are honeycombed to permit grass to grow between the open cells of the paving units. A more ambitious but very effective way to reduce storm water runoff is to install a "green roof," which consists of a layer of soil on top of a waterproof roof membrane on which low maintenance grasses and even hearty, blossoming plants can be planted. Very popular and common in Europe, green roofs are gaining in popularity in the U.S. A green roof is not an appropriate undertaking for a "do it yourselfer," however. Green roofs must be engineered to ensure that the roof structure can support the weight of the soil and organic material, and must be properly designed to be waterproof. But green roofs have terrific environmental benefits. In addition to reducing storm water runoff, green roofs are natural insulators that can dramatically reduce your heating and cooling costs year round while reducing the "heat island" effect that occurs in heavily populated areas. So a green roof can help reduce your neighbors' cooling costs, too!


Courtesy Inscape Studio

Resources for Greening Your Home

A number of high-quality information resources on green building are available on the Web. Here are just a few, with brief descriptions of their most salient features:

Building for Environmental and Economic Sustainability (BEES)
www.bfrl.nist.gov/oae/software/bees.html
A free software program developed by the National Institute of Standards and Technology that helps you select cost-effective, environmentally-preferable building products.

Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies
www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf
Published by the Forest Products Laboratory of the U.S. Forest Service, this directory lists contractors and vendors that reclaim or sell reclaimed wood.

Energy Star
www.energystar.gov
The official, comprehensive directory of appliances and other building products with an Energy Star rating.

Efficient Windows Collaborative
www.efficientwindows.org
Allows you to compare the energy efficiency of various windows for energy cost, and provides detailed information about different window types and technologies.

Green Seal
www.greenseal.org
Provides recommendations on carpet, lighting, particleboard, and a variety of other building products.

Greenguard
www.greenguard.org
Tests indoor air quality and rates various building products.

Greenhome
www.greenhome.com
Lists various building and consumer products for your home that are sustainable, including low VOC products.

Habitat ReStores
www.habitat.org/env/restores.aspx
Habitat for Humanity ReStores are retail outlets where quality used and surplus building materials are sold at a fraction of normal prices.