Green Building Tips

Helpful Design & Building Guidelines

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Comprehensive Sustainable Architecture, Interiors and Consulting

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Keep in mind that every region should employ different "Green Building" strategies. Strategies should reflect the region's climate, material availability, and building practices. An igloo would make sense on the north slope of Alaska but would NOT be a green building in Texas.... For houses in many parts of the country where air-conditioning is used in addition to heating, the primary culprits are INFILTRATION of outside air, improper solar ORIENTATION, and internal loads that produce excess HUMIDITY and HEAT in the summer. Keep in mind that a house is a SYSTEM - often one component (such as a power attic fan) can affect another seemingly unrelated feature (such as mold growth under a bathroom vanity). Furthermore, buildings are built differently than they were just a quarter a century ago. Three important aspects that have radically changed the operation of a typical building are: The extensive use of insulation; the development of tighter buildings; the popular use (and over sizing) of forced-air heating and cooling systems. These items have significantly added to the comfort of our homes and buildings – yet have also made them much more susceptible to problems if not done correctly! A high performance house is like a high performance car – will need more attention and operator skill!

USEFUL AND OBJECTIVE RESOURCES

» GREEN BUILDING NEWSLETTER:
Environmental Building News
www.BuildingGreen.com

» HOME RATING:
NAHB Model Green Home Building Guidelines
www.nahbrc.org

» GREEN BUILDER COLLEGE CONTINUING EDUCATION:
www.greenbuildercollege.com/crslib.php

» CLIMATE CHANGE
AND ASSORTED GREEN BUILDING INFORMATION:
www.architecture2030.org
www.soloso.aia.org

» ENERGY CONSERVATION
& RENEWABLE ENERGY INCENTIVE PROGRAMS:
www.energystar.gov
www.dsireusa.org

ORIENTATION: VERY BASIC BUT EXTREMELY IMPORTANT & OFTEN OVER LOOKED

» **Look for streets in a subdivision that run east-west** because then the building lots will have either a north or south facing front or rear elevation. Houses typically have the majority of their windows in the front and back, and fewer on the sides. The more windows that face south, the better. (See below.)

» **Orient building to minimize summer hot afternoon solar gain and allow for some winter solar heat gain.** Long sides to face south & north. Sunny solar heat collecting "sunrooms" or "green houses" need to face south.

» **Orient to take advantage of the prevailing breezes** during the Spring, Summer, & Fall. In many parts of the US and Texas the nice prevailing breezes come from the South/ South East.

INFILTRATION

» **You've got to contain the air in your house before you can condition it!** Building a tight house is good – contrary to some myths. Outside air is not always as "fresh" or as healthy as one might think – especially if it is humid or contains a lot of dust, molds and pollens. We think it is better to control your sources that make for air-pollution inside the house than to dilute the air.

» A **commercial grade building wrap** that is well taped makes for a good weather barrier system. Remember, you want to create a raincoat underneath the wall cladding because houses aren't perfect and cracks will occur that will let things in that you still want to keep out of the house.

INFILTRATION CONTINUED

» **Go easy on the amount of recessed cans** (even the so called "airtight" ones) that puncture the thermal envelope of the building. They are counter productive to reducing infiltration of outside air. Try to restrict unnecessary light switches and electrical boxes on exterior walls - they too, puncture the thermal envelope.
» **Spray polyurethane foam insulation is especially effective in reducing infiltration and vapor (humidity) flow**
» **Ventilating an attic can cause moisture and humidity problems in areas of high humidity** - and lead to higher energy bills. Sealing the attic and ventilating a continuous air space immediately below the roof decking, not the attic, is better.

UNWANTED SOLAR GAIN: PASSIVE STRATEGIES

» **Proper window orientation** that maximizes wintertime solar heat gain in the morning and minimizes exposure to the afternoon sun during the summertime can have a very significant effect on comfort and energy use.
» **Dark roofs absorb heat** (not good in the Summer) and will require use of a radiant barrier.
» **Ample roof overhangs** are good - and will make for less building maintenance, longer lasting buildings, and happier clients. Shade all the East, South, and especially West facing windows from the Summer sun. "Low E" windows are **NOT** a substitute for proper shading and solar control.
» **A radiant barrier on the underside of the roof, will substantially reduce heat gain through the** roof - reducing summertime A/C bills, enhancing occupant comfort, and extending the weeks in a year a home can be comfortable without using mechanical air-conditioning. Radiant barriers do NOT lead to the deterioration roof shingles.

LIGHTING

» **Become familiar with the new types of fluorescent lamps** - especially the "T5" and "T8" type and the new "wide spiral" compact fluorescents. The light quality is superior and you can get a wide range of color correctness. Fluorescents put out very little heat and last longer than incandescent and halogen lamps. (Approx 70% of the energy comes out in the form of light.) 2700K to 3000K lamps approximate the light color of traditional incandescent bulbs.
» **Halogen and Xenon lamps** DO put out more lumens per watt compared to a standard incandescent - but still produce a lot of glare and heat that the air conditioner will have to fight. (90% of the energy used is heat, 10% is light.) So go easy on using them in a home for anything other than occasional use accent lighting.
» **Go easy on the use of recessed cans**. Fluorescent ones are better but the cans still make for punctures in the building's "thermal envelope" – even the so-called "air tight" ones.
» **Proper natural day lighting**, especially indirect daylight from high windows, can make for substantial energy savings and an enhanced indoor environment. (Clerestory windows do this well; and if operable, can be used to naturally siphon heat out of the space below in the Spring & Fall.)

HVAC (HEATING, VENTILATING & AIR CONDITIONING)

» **Proper sizing of the air-conditioning system is critical**. Over capacity can cause mold growth within the ducts and other places within the building or house - leading to poor indoor air quality and occupant health problems. With proper windows & shading, most houses should require no more than 1 ton of cooling capacity for every 650 square feet of living area; 800 sq. ft./ton is now very attainable and should be the goal of a well designed & built residence.
» **Leaky ducts rob energy efficiency and are unhealthy**. They are a bigger problem than low-efficiency air conditioners. Supply duct leakage can cause depressurization of a home, inviting outside air & humidity into the home from unknown and unwanted sources, leading to serious indoor air quality problems and possibly mold.

HEALTH, INDOOR AIR QUALITY & HOMEOWNER EDUCATION

» **Attached Garages** can cause air-quality problems because we typically store a lot of nasty stuff in them that "off gas".
» **Avoid chemical treatments for insects, termites, etc.** They don't last, lead to occupant health problems, and pollute the underlying ground water. Use steel screen mesh barriers in and around the foundation for termite control.
» **Use low VOC** (Volatile Organic Compounds) latex paints on the interior. Avoid high sheen or glossy wall paint on the interior surface of exterior walls where it could create a vapor barrier on the wrong side of the wall.
» **Educate your homeowner about the importance of controlling indoor air quality and humidity levels**. Turn on the exhaust fan when cooking, using the dishwasher, doing laundry with a conventional top loading washing machine, taking a bath or shower, etc. A common sense approach to living within the home can have a big impact! Don't use toxic cleaners, such as many oven cleaners, on a day when the house is all "buttoned up" and can't be aired out. Same goes for interior painting and decorating projects.

LANDSCAPING & WATER CONSERVATION

» **Water is heavy and is expensive to move throughout a municipal water system.** The energy used treating and distributing water is usually the single greatest consumer of electricity in a typical American city. Basic water conservation measures inside the house and on the exterior landscaping can reduce municipal water treatment energy use by thirty percent or more in most southern US cities.