CITY OF SIGNAL HILL

RESIDENTIAL GREEN BUILDING PRIMER

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What Is Green Building?

Green Buildings are sited, designed, constructed and operated to enhance the well-being of occupants, and to minimize negative impacts on the community and natural environment.

Green Buildings:

- Provide a healthier and more comfortable environment
- Improve long-term economic performance
- Incorporate energy and water efficient technologies
- Use recycled content materials in their construction
- Reduce construction and demolition waste
- Bring higher resale value
- Are landscaped for water and energy efficiency
- Include renewable energy technologies
- Improve indoor air quality
- Reduce environmental impact
- Are easier to maintain & built to last

With most of us spending more than 80% of our time indoors, Green Building is the healthy, common sense choice for a better life. As it stands now in traditional construction, the quality of our indoor environment is often far more polluted than outdoors due to various building materials, inadequate lighting, and a variety of other variables. According to EPA reports, the air in new homes can be up to ten times more polluted than outside air due to volatile organic compounds (VOCs) and other chemicals used in product manufacturing. Contrarily, homes that follow green building guidelines use healthier paints and building materials, and adhere to stricter gas emission and ventilation requirements improving the quality of a home's indoor environment.

Green building can also indicate that fewer natural resources are required during construction. According to the U.S. Department of Energy's Center for Sustainable Development, buildings consume 40% of the world's total energy, 25% of its wood harvest and 16% of its water. Compared to traditional construction, a green built home takes some of this pressure off the environment.

More important than any statistic however, is the good feeling you have when you know you've done what's right for both your family and your community. Promoting continued health, financial savings, and social responsibility, Green Building is the construction standard for the future, and the smart solution for today.

The Benefits of Green Building - For the Homeowner

Utilizing green building products and practices in homebuilding and remodeling projects results in quality homes and financial savings for you. Even the smallest effort can make a big difference. While particular benefits will vary depending on the specific choices made by the builder and homeowner, and to what extent green building practices are employed, the general benefits are:

Financial Savings

Green building construction standards and products make homes more energy efficient by being well insulated and well sealed. Efficient windows, appliances, lighting and other household equipment also help add to the savings and keep your monthly electricity bills low. Up to 65% lower! And with energy prices rising and non-renewable fuels being depleted, an energy efficient home is asset we can all appreciate for years to come. Water bills are also reduced through low-flow equipment and thoughtful land use.

Homes built following green building standards may also qualify for special "green" financing. Called an Energy Efficient Mortgage (EEM), they can offer you more purchasing power.

More Comfort

Comfortable with year-round sun exposure, comfortable with ambient temperature and lack of drafts, comfortable with your utility bills - 'comfortable' can mean a lot of things. Starting with good energy design, green building helps to ensure that your home is inherently more comfortable. If you're building new, proper orientation of your home can take advantage of the sun's natural heat in the cooler months, while avoiding too much sun in the warmer ones, to save on energy costs. Tight construction also helps keep energy costs and drafts down. For everyone, better insulation and energy efficient windows, appliances, and lighting contribute to a comfortable environment while using less energy.

Healthier Living

Chemicals emitted from building materials can be a potential source of health problems if not properly addressed. For example, cabinets, counter tops, and furniture are often made from pressed wood products such as particleboard or MDF, which are typically manufactured with formaldehyde-based adhesives. This formaldehyde can off-gas into your home for years. Unfortunately for your family's health, formaldehyde is a known human carcinogen according to the World Health Organization; it can also cause watery eyes, headaches, fatigue, and nausea. Paint and floor finishes can also contain formaldehyde and other chemicals that are not healthy to breathe, especially for small children. Green building encourages use of products and materials that reduce or eliminate these sources of indoor pollution. These include a wide range of products such as low-VOC paint, solvent-free adhesives, and water-based wood finishes that not only eliminate many of the suspected and known carcinogens, but often perform better than traditional products.

Benefits of Green Building - (continued)

Carpet can also emit harmful chemicals and be a source of indoor pollution, so green building guidelines encourage using low-emitting carpets and pads and simply reducing the amount of carpeted areas. Installation by tacking rather than gluing also helps reduce toxic emissions. Finally, since carpet fibers can trap dirt and pollution tracked in from outdoors, and can harbor mold growth if in a humid environment or not allowed to completely dry out after getting damp or flooded, hard-surface flooring with area rugs or modular carpet tiles that can easily be taken away for cleaning or drying is encouraged. Alternate flooring options include FSC Certified wood, cork, and bamboo.

Finally, ventilation is key to keeping and maintaining indoor air quality for healthier living. Green building practices encourage well-sealed duct systems, sealed combustion gas appliances, and a balanced or slightly positive pressure ventilation system, which work together to improve indoor air quality and keep you comfortable and healthy.

Adequate ventilation is especially important in green building as it prevents mold and other potentially dangerous allergens from forming. With tighter construction of the exterior envelope, ventilation is required to allow excess moisture to escape so it doesn't get trapped in your home's living space and building cavities, causing health problems for your family and moisture damage to the building components.

Less Maintenance and Higher Durability

Current building codes establish minimum construction standards that protect your safety. Green building supplements building codes by using premium materials that are more durable and construction practices that often exceed building code requirements. Together, these qualities enhance your home's performance and reduce maintenance and replacement costs, thereby raising its overall value.

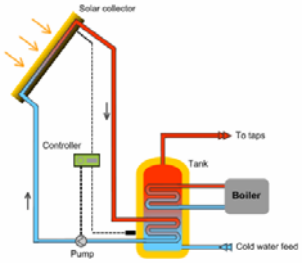
Examples of such long-lasting materials and their applications include decking made from recycled plastic and wood fibers, durable tile or linoleum for floors, 50-year roofing materials, and fiber-cement siding. These outperform their traditional counterparts by reducing maintenance and replacement costs.

Knowing You're Being Good to the Environment

Green building products and practices offer you the assurance that you are following environmentally friendly guidelines that help preserve our natural resources. A socially responsible step worthy of recognition, building green makes a strong statement about your dedication to the community and the environment.

Farther reaching than your home itself, green building promotes the use of local products and materials that help stimulate local businesses and a diverse economy. This keeps your dollars working in your neighborhood and reduces energy consumption because there are less transportation costs. Materials like engineered wood products are encouraged because they efficiently make use of waste wood pieces, reducing environmental impacts of the wood industry. Recycled-content products productively use materials that would otherwise need to be hauled to landfills, and also reduce costs and impacts of producing products from virgin materials.

BUILDING A GREENER TOMORROW



Go **GREEN** when you decide to remodel or build your new home! Did you know that where you live has an even bigger impact on the environment than the car you drive? Our buildings account for over 65% of our electrical consumption, 30% of U.S. green house gas emissions, 12% of potable water usage and 40% of raw materials use. By employing some very simple green building practices in your next project, you can create a home that is healthier, more energy efficient, comfortable and environmentally responsible.

The City of Signal Hill is committed to promoting a more livable and sustainable community and encourages all homeowners and developers to employ green building practices in their projects. The following is a brief guide* of simple measures you can take to help make a difference for you, your children, and the environment.

* This guide is based on the Santa Monica Residential Green Building Guide

Construction and Demolition Waste

Objectives: Increase reuse of used building materials and reduce the amount of virgin building materials unnecessarily wasted or sent to the landfill.

Material/Measure	Description	Reference
Salvage useful materials	During demolition, identify and salvage building materials that can be reused. Reduce waste by diverting cabinetry, windows, doors, fixtures, wood floors, dimensional lumber, etc. from landfills. Avoid removing existing trees and plants and integrate them into new design.	www.thereusepeople.com www.restoreoc.org

Building Orientation

Objectives: Proper building orientation is the first step in improving home energy performance. Orient the home and place windows to enable natural lighting, summertime shading, wintertime passive heating, and natural ventilation. By doing this you can decrease the need for electric lighting, save energy and create a more comfortable indoor environment.

Material/Measure	Description	Reference
Orient along east-west axis for maximum solar exposure	The long axis of the home should face east-west to maximize solar exposure. Many lots in Signal Hill already have this orientation.	www.daylighting.org
Window placement	Place windows strategically to enable cooling by natural ventilation while also admitting daylight and enabling passive solar heating.	www.greenbuildings.santa-monica.org [guidelines/envelope and space planning]

Lighting

Objectives: Improve the energy efficiency of household lighting.

Material/Measure	Description	Reference
Compact fluorescent bulbs	These are direct replacements for standard incandescent bulbs. They use 75% less energy and last up to 13 times longer and remove up to 450 lbs of CO2 over the life of the bulb.	www.energystar.gov [lighting]
Skylights and solar tubes	These are great for introducing natural light into spaces like kitchens, hallways, and large walk-in closets. Some operable skylights also serve to ventilate a home by allowing rising hot air to escape.	www.daylighting.org [what/why]

Heating and Cooling

Objectives: Maintain a healthy and comfortable home while reducing the energy used for heating and cooling.

Material/Measure	Description	Reference
Window shading	Install shades, plant trees or orient windows to block direct sunlight from windows in summertime to reduce indoor temperatures and the need for air conditioning.	www.recycleworks.org [greenbuilding/ windows & doors]
Insulation	Use greater than minimum required amount of insulation in walls and ceiling. Upgrade to R-19 insulation in walls and R-30 in ceiling will result in a well insulated home.	www.sce.com
Efficient AC system	Install an Energy Star high-efficiency system	www.energystar.gov
Other ventilation	Install whole-house fan, ceiling fans, and attic ventilation to reduce the need for air conditioning.	

Appliances

Objectives: Select high-quality appliances that are more energy efficient.

Material/Measure	Description	Reference
Energy Star Appliances	All major brands have Energy Star options that reduce energy usage over comparable models while providing equal or superior performance.	www.energystar.gov [products/appliances]
Horizontal-axis clothes washer	Horizontal-axis washers are more effective at cleaning, gentler on clothes, use 40% less water, 50% less energy, and leave clothes drier requiring less time and energy to dry clothes. Most are also "Energy Star" rated.	www.energystar.gov [products/appliances/ clothes washers]

Plumbing/Domestic Hot Water

Objectives: Improve energy efficiency of water heating, improve water quality, and reduce indoor water consumption.

Material/Measure	Description	Reference
Water efficient fixtures/ toilets	Install low-flow shower heads and faucets and ultra low-flow toilets to reduce water consumption and amount of energy used to heat water. Required by CA code.	www.h2ouse.org [home tour/bath/toilet]
Insulate water heater and hot water pipes	Reduces energy wasted through heat loss.	www.socalgas.com [energy efficiency/ conservation tips]
Tankless hot water heater	Install a high-efficiency tankless water. These heaters use less energy, take less space, and provide endless hot water.	www.homerepair.about.com [plumbing repair/ tankless water heater]
Water filters	Water filters remove chlorine, soften water, and improve water flavor.	
Dual-flush toilets	Reduce water use by allowing users to choose a full or half flush depending on need.	www.buildinggreen.com [green products/ plumbing/residential toilets]
Solar hot water heater	Pre-plumb or install solar hot water heater. This can reduce or eliminate the need to use a gas or electric hot water heater.	www.eere.energy.gov [solar energy technologies/solar heating]

Building Shell

Objectives: Increase use of renewable, recycled, and sustainable materials while constructing an energy efficient and durable building shell.

Material/Measure	Description	Reference
Weather stripping	Weather stripping in either new construction or retrofit is the most cost-effective means of reducing heating and cooling costs.	www.socalgas.com [energy efficiency/ conservation tips/caulking & insulation]
Durable, environmentally preferable exterior siding	Select a durable siding. If using wood shingles or other wood siding, look for FSC certified wood or use hardboard. Otherwise, consider fiber-cement siding for durability and termite resistance. Vinyl siding is not a good environmental choice as it is a petroleum based product.	www.buildinggreen.com [green products/ exterior finish & trim]

Building Shell (continued)

Objectives: Increase use of renewable, recycled, and sustainable materials while constructing an energy efficient and durable building shell.

Material/Measure	Description	Reference
Alternative or more sustainable framing	Consider alternatives like recycled light gauge steel framing, FSC Certified lumber, or engineered/finger jointed studs for framing. Other alternatives are insulated concrete forms (IFCs) and structural insulated panels (SIPs) that are energy efficient and use less lumber. Oriented Strand Board (OSB) for exterior sheathing and subfloor is more environmentally responsible than plywood.	www.buildinggreen.com [green products/ structural systems & components]
Energy efficient windows made with environmentally preferable materials	Use low-e dual paned windows for superior energy performance. Look for the Energy Star label. Select FSC certified wood or recycled aluminum with thermal breaks for window frames. Higher costs can be offset with smaller mechanical systems and lower heating and cooling costs.	www.buildinggreen.com [green products/ windows]
Roof/Radiant Barrier	Select light color "cool roof' materials to reflect heat from the sun. This keeps the indoors cooler and reduces air conditioning needs. Install a radiant barrier in the attic to reduce indoor air temperatures and the need for air conditioning.	www.coolroofs.org [resources]
Solar Electric Panels	Solar panels are most often installed on rooftops and now can be integrated seamlessly into a roof. Rebates can help to decrease the cost of these systems.	www.gosolarcalifornia.ca.gov

Interior and Finishes

Objectives: Select low VOC content, formaldehyde-free, and more sustainable materials.

Material/Measure	Description	Reference
Interior wall framing	Use light gauge steel framing with recycled content or FSC-certified lumber to frame interior walls.	www.buildinggreen.com [green products/ structural systems & components]
Low or no- VOC paints and finishes	Use paints and finishes with low or no volatile organic compounds to improve indoor air quality.	www.buildinggreen.com [green products/ interior finish & trim/paints & coatings/interior paints]
Recycled content tile	If selecting tile for countertops and bathrooms, look for recycled content. Glass or traditional ceramic tiles are also available with recycled content.	www.sandhillind.com
Formaldehyde-free hardwood plywood	Formaldehyde is a known cancer-causing toxin used in many plywoods. California recently passed a law to begin phasing out plywoods and composite woods manufactured with formaldehyde. Use alternatives to improve indoor air quality.	www.buildinggreen.com [green products/ interior finish & trim]
Recycling Center	During design, designate space for placing recycling receptacles. Under the cabinet bins in the kitchen make recycling convenient.	www.thebincompany.com
Furnishings	Look for furnishings made with natural fiber or recycled content. Purchase furnishings made with FSC-certified wood or formaldehyde-free wood products. Avoid exotic tropical hardwoods from non FSC sources and synthetic foams containing PBDEs, fire retardants that may cause cancer.	www.eco-furniture.com

Flooring

Objectives: Select flooring materials that are non-toxic, renewable, and/or recycled/recyclable.

Material/Measure	Description	Reference
Certified/Salvaged wood	Select FSC Certified wood from sustainably managed forests or wood that has been salvaged.	www.fsc.org
Concrete floor	Bare concrete floors are durable, healthy, and eliminate the need for additional flooring materials. They can be stained or polished and provide good thermal mass.	
Renewable floor coverings	Alternatives like bamboo, palm wood, cork and natural linoleum are renewable alternatives to hardwoods and are equally durable and attractive. Use low VOC adhesives during installation.	www.buildinggreen.com [green products/ flooring & floor coverings]
Natural fiber carpet	Select a carpet with natural fibers such as wool, sisal, jute, sea grass, etc. These natural fibers are renewable.	www.buildinggreen.com [green products/ flooring & floor coverings]
Recyclable/recycled carpet	Select a carpet that has recycled content or has been designed for easy recycling.	www.buildinggreen.com [green products/ flooring & floor coverings]
Recycled content tile	Look for tiles with recycled content. Glass or traditional ceramic tiles are available with recycled content.	www.buildinggreen.com [green products/ flooring & floor coverings]

Landscaping

Objectives: Create a well-designed hardscape and landscape that reduces the amount of water used for irrigation and reduces the amount of impermeable paved areas leading to runoff that ultimately carries garbage, oil and other debris into the ocean.

Material/Measure	Description	Reference
Permeable/alternative paving	Permeable paving systems allow rainwater to percolate into the soil rather than running off into the street. This decreases the amount of polluted stormwater and replenishes the local aquifer.	
Native/Drought Tolerant plants	Native plants and drought tolerant plants reduce the amount of water required for irrigation and provide habitat for native birds and butterflies. These plants also do not require expensive chemical fertilizers.	www.theodorepayne.org
Weather-based irrigation controls	Automatic irrigation controls with smart features can moderate irrigation levels based on weather and season, saving significant amounts of water.	www.bewaterwise.com [garden spot/setting up a smart sprinkler controller]
Drip irrigation	Drip irrigation reduces wasteful overspray and evaporation and can deliver low flow rates for low-water plants.	

Outdoor Decks

Objectives: Make decks from certified wood or products that substitute for wood and treated lumber that does not contain highly toxic substances.

Material/Measure	Description	Reference
Decking	Use composite lumber made of 100% recycled plastic or of plastic/wood composite for decking material. If you must use wood for the deck, select FSC certified wood.	
Treated lumber	Traditional treated lumber is being phased out due to its toxicity and is being replaced by less harmful ACQ treated lumber. Also look for composite lumber options such as Polywood.	www.polywood.com