

CITY OF NEWPORT BEACH
GREEN BUILDING GUIDELINES



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Newport Beach Statistics

Latitude (City Hall)	33° 37' 08"N
Longitude (City Hall)	117° 55' 41"W
California Title 24 Climate Zone	6
Sunset Magazine's Climate Zone	24
Population (2001 census)	79,843
Land Area	14 sq. miles
Water Area	10.4 sq. miles

Introduction

Welcome to the **City of Newport Beach Green Building Guidelines** (Guidelines) for new and existing buildings. While directed primarily at residential buildings, many of the ideas can be effectively applied to commercial buildings as well. These Guidelines are based off the 2008 California Green Building Standards Code (CGBSC), which sets targets for energy efficiency, water consumption, diversion of construction waste from landfills, improvement of indoor air quality, and the conservation of natural resources. Many items in these Guidelines are simple, inexpensive, and easy to accomplish. Others require a greater up-front investment – but all contribute to healthier, more energy- and water-efficient buildings.

How to Use the Guidelines

The guidelines are organized in the following sections:

- Planning and Design
- Energy Efficiency
- Water Efficiency & Conservation
- Material Conservation & Resource Efficiency
- Environmental Quality

At the beginning of each section, the referenced CGBSC Chapter is given with an overview of the provisions. Subcategories within each section list specific strategies and benefits. Near the end of these Guidelines, you will find a list of local and national-level resources for the strategies mentioned in this document. The Resources section lists manufacturers, distributors, installers, and other companies and organizations that can assist you in executing these green strategies for your project.

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I. Planning and Design – based on Chapter 4 of the 2008 CGBSC

The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore, and enhance the environmental quality of the site and respect the integrity of adjacent properties.

A. Site Design

1. Highly-Developed Building Envelope

Description:

Utilize passive solar concepts that develop energy conservation and savings beyond Title 24 Standards. Orient building(s) to take advantage of eastern-facing morning heat gain and reduce afternoon heat gain.

Application:

Applicable to all new construction, remodels, and additions.

Benefit:

Energy, sustainability, and resource protection that will alleviate pressure on natural resources and relieve our dependence upon foreign resources.

Reference:

____ LEED POINTS

2. Protect Native Soil

Description:

Typically, a building site is cleared of vegetation and the topsoil is removed. After building, sod is laid on subsoil, beginning a cycle of high water and chemical dependency. Coordinate construction with a landscape professional to protect the soil, which is a valuable, living resource.

Application:

Design for minimum building & hardscape footprints and minimal grading. Retain native vegetation where appropriate, particularly on bluffs. Delineate and limit the construction footprint; restrict heavy equipment that compacts soil, including cars, to areas that will be paved or built over. When grading is unavoidable, identify areas to be paved as a place to store native topsoil during construction. Amend soil with compost and re-spread topsoil after construction.

Benefit:

Preserving native soils, along with nurturing the health of disturbed soils, can significantly reduce storm runoff, reduce fertilizer and pesticide reliance, improve water quality and conserve irrigation water.

Reference:

- California Green Building Standards Code §404
- State of California Best Management Practices Handbook

____ LEED POINTS

3. Minimize Disruption of Existing Plants and Trees

Description:

Through careful planning and construction practices, valuable trees and plants can be preserved in existing developments.

Application:

Complete a landscape survey to determine the feasibility of preserving or relocating mature trees and shrubs. Fence off trees and shrubs for protection from equipment.

Benefit:

Preserving existing, mature landscape features helps prevent soil erosion, maintains existing sources of natural cooling (e.g. shade from a mature tree), diverts waste from landfills, and keeps the unique character of the community.

Reference:

- California Green Building Standards Code §404
- State of California Best Management Practices Handbook

____ LEED POINTS

4. Implement Construction Site Stormwater Practices

Description:

Stormwater runoff is part of a natural hydrologic process. However, land development and construction activities can significantly alter natural drainage patterns and pollute stormwater runoff.

Application:

Identify all storm drains, drainage swales and creeks located on or near the construction site, and make sure all subcontractors are aware of their locations to prevent pollutants from entering them. Train employees not to dump anything down storm drains. Protect all storm drain inlets using filter fabric cloth to prevent sediments from entering the storm drainage system during construction activities. Keep materials out of the rain, and prevent runoff pollution at the source. Store hazardous waste in drums and covered bins and contract a company for proper disposal.

If a Water Quality Management Plan (WQMP) was approved in conjunction with the construction project, a copy should be kept onsite throughout construction. Ensure subcontractors and employees are aware of the WQMP's requirements as many of them are conditions of approval and/or occupancy.

Benefit:

Properly managing water on site saves money in avoided engineering costs downstream. Keeping pollutants out of the storm drains minimizes erosion and water pollution and protects local creeks, bays, reservoirs, and oceans.

Reference:

- California Green Building Standards Code §406.2
- State of California Best Management Practices Handbook

____ LEED POINTS

5. Protect Water Quality with Landscape Design Features

Description:

Designing landscapes to allow irrigation and stormwater to soak into the soil recharges groundwater systems and filters out pollutants.

Application:

Permeable paving allows water to percolate into the soil. Where appropriate, use at walkways, patios, and driveways. Some products can be poured, like concrete, whereas others can be pre-shaped or installed like conventional pavers. Design infiltration basins, swales and berms to keep water on site.

Benefit:

Allowing stormwater percolation reduces the volume of polluted water that flows into bays, rivers, or the ocean, while replenishing soil moisture and local aquifers. Additional benefits include reduction in irrigation requirements, non-source pollution as well as lower risk of flooding.

Reference:

- California Green Building Standards Code §604
- State of California Best Management Practices Handbook

____ LEED POINTS

6. Design Resource-Efficient Landscapes and Gardens

Description:

Conventional landscapes have high inputs of water and chemicals and are often over planted or planted without regard for climate and soil conditions. This results in excess water and fuel consumption, water pollution and waste generation.

Application:

Specify plants that are appropriate for the climate and soil; select slow-growing, drought-tolerant, preferably California-native plants. Design with perennials instead of annuals. Proper use of deciduous & evergreen trees can reduce energy needs.

Compost is nature's way of recycling. Turn fruit, vegetable and yard trimmings into a first rate soil conditioner. Use compost to replace store-bought soil conditioners.

Give plants plenty of room to mature, reducing the need for pruning. Avoid invasive species and hedges that require constant shearing. Limit turf to the smallest area that will meet recreational needs. Recycle yard trimmings by grass-cycling, mulching and composting.

Benefit:

Composting saves money by lowering garbage bills, increases the ability of soil to hold water, improves soil health & fertility, reduces water needs and helps extend the life of our landfills. Situate trees to reduce building heating and cooling energy.

Reference:

- California Green Building Standards Code §406 and §604
- California Invasive Plant Council (www.cal-ipc.org)
- California Native Plant Society (www.cnps.org)

____ LEED POINTS

K. Renewable Energy & Roofing

1. Proper and Conscientious Installation of Renewable Energy Equipment

Description:

In order for a homeowner to take advantage of solar and other renewable energy equipment, they must be correctly installed and oriented specific to the house and site.

Application:

- Proper Orientation When Utilizing Domestic Hot Water (DHW) or photovoltaic array (PVA) panels.
- Respect Adjacent Buildings and Landscaping to Insure Solar Access

Benefit:

Equipment is utilized to its fullest potential to ensure optimal performance and thus minimize energy consumption from public utilities as much as possible. State and federal tax credits may also be available.

Reference:

- California Green Building Standards Code §511

____ LEED POINTS

2. Pre-Plumb for Solar Domestic Hot Water (DHW) System

Description:

Insulated $\Phi^{3/4}$ " copper pipes are installed from the attic to a hot water closet or mechanical room for future solar installation. This option allows the homeowner to install an active solar system at a later date if they desire.

Application:

Provide south-facing roof area for collectors and access for piping to a mechanical room. Optimal exposure can still be achieved up to 15° in either direction of due south.

Benefit:

Solar DHW systems can pay back in as little as seven years and reduce the use of gas or electricity for water heating.

Reference:

- California Green Building Standards Code §508
- California Title 24 Standards

____ LEED POINTS

3. Pre-Wire for Future Photovoltaic Array (PVA) Installation

Description:

Running wires from the roof to the electric service entrance/circuit breaker panel can save costly installation of photovoltaic panels at a future date.

Application:

Install electrical conduits, per electrical code, from the south and west facing roofs to a junction box near the panel (don't wire the panel). East and west facing roofs can work if the south is unavailable or shaded.

Benefit:

Photovoltaic arrays and DHW systems will continue to drop in price over the next few years. State and federal tax credits may also be available.

Reference:

- California Green Building Standards Code §511

____ LEED POINTS

L. Natural Heating & Cooling

1. Orient Building/ Glazing to Take Advantage of Heat Gain and Loss

Description:

Taking into account the buildings location and orientation on a site from the conceptual design phase allows the Design Professional to take advantage of how the elements will affect the heat gain and loss of the proposed structure.

Application:

Studying wind patterns, calculating sun angles for all four seasons, and exploring any microclimates due to neighboring structures or landforms are some of the factors that can influence the situating of a new structure.

Benefit:

Proper situating and orienting of a building can decrease the need for energy consumption or frequent maintenance.

Reference:

- California Green Building Standards Code §504.5
- California Title 24 Standards

____ LEED POINTS

M. Indoor Air Quality & Finishes

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II. Energy Efficiency – based on Chapter 5 of the 2008 CGBSC

The provisions of this chapter shall outline, but not be limited to, means of achieving enhanced building energy efficiency using either a performance approach or a prescriptive approach.

A. Site

1. Proper Building Orientation

Description:

Maximize east & south facing windows. Minimize west & north windows.

Application:

East- & South-facing windows promote beneficial passive heat gain. West-facing windows can be a potential source of too much heat gain, while north-facing windows can be a potential source of too much heat loss.

Benefit:

Proper orientation of windows helps to reduce electrical and gas consumption for lighting and heating/cooling.

Reference:

- California Title 24 Standards

____ LEED POINTS

B. Foundation

1. Foundation Insulation prior to Backfill

Description:

All foundations, including slab floors, can be insulated to minimize heat loss.

Application:

Insulate foundation with extruded polystyrene insulation of at least R-4 (1" or greater).

Benefit:

Insulating the foundation minimizes heat loss from the floors and basement, reduces energy loss and therefore reduces utility bills.

Reference:

- California Title 24 Standards

____ LEED POINTS

2. Rigid Foam Insulated Concrete Forms (ICFs)

Description:

Rigid foam forming systems hold concrete in place during curing and remain in place afterwards to serve as thermal insulation for concrete walls.

Application:

Use rigid foam forming systems wherever an insulated foundation is desirable.

Benefit:

Unlike untreated lumber, ICFs are not subject to rot and result in a better insulated foundation.

Reference:

____ LEED POINTS

C. Structure

1. Design Energy Heels on Roof Trusses 6" or More

Description:

Energy heels raise the height of the truss at exterior wall top plates to accommodate increased insulation at the perimeter of the house.

Application:

Install where conventional trusses are used for an addition. An energy heel needs to be specified when ordering roof trusses. The increased height may require modifications to exterior soffit and trim details.

Benefit:

The perimeter intersection between walls and roof framing is often an area of increased heat loss since conventional trusses reduce insulation to less than the required depth. Raising the heels allows for full insulation around the house, saving energy dollars.

Reference:

- California Title 24 Standards

____ LEED POINTS

3. Structural Insulated Panels (SIPs) for Walls and Roof

Description:

Structural Insulated Panels (SIPs) are high-performance, load-bearing panels that consist of a core of foam insulation with oriented strand board (OSB) on either side. SIPs can be used for floors, walls and roofs in residential buildings. They are generally R-4 per inch.

Application:

Use SIPs for structural exterior walls and roofs in place of stick framing. SIPs can be designed to meet seismic Zone 4 requirements. Note: It's important to seal the joints well, to avoid water penetration.

Benefit:

SIPs are more energy-efficient, provide excellent soundproofing and reduce infiltration relative to frame construction. They can be erected quickly, allowing for faster construction. They save wood by eliminating much of the conventional framing lumber.

Reference:

____ LEED POINTS

D. Exterior Finish

1. Natural Exterior Finishes

Description:

Most natural finishes do not off-gas volatile organic compounds (VOCs) and require little or no maintenance.

Application:

Utilize natural stone veneers or manufactured masonry units.

Benefit:

Natural finishes are usually very low maintenance and add R-value to an exterior wall system, which helps resist high outdoor temperatures and be less susceptible to drastic temperature swings.

Reference:

____ LEED POINTS

E. Plumbing

1. Water Heater Insulation

Description:

Water heater jacket insulation is an insulated wrapper that goes around the hot water tank and is secured in place.

Application:

Install on existing hot water heaters. For new water heaters, many now come with the option of a manufacturer-installed blanket or internal insulation, or if applying in the field - make sure that installation will not void warranty.

Benefit:

Jacket insulation reduces heat loss by about 10% and more on older water heaters.

Reference:

- California Title 24 Standards

____ LEED POINTS

2. Hot and Cold Water Pipe Insulation

Description:

Insulating water pipes reduces heat loss or gain in the pipes while the water is standing.

Application:

Insulate hot water pipes in all runs through conditioned and unconditioned spaces: basements, crawl spaces, attics, etc. At a minimum, insulate both hot and cold pipes at least 6 feet from the hot water heater to prevent convective circulation from the heater through the pipes.

Benefit:

Insulated pipes save energy and water. The water does not need to run as long to get hot water to a distant faucet, thereby reducing hot water heating costs.

Reference:

____ LEED POINTS

3. Tankless Water Heaters

Description:

Tankless water heaters (flash or on-demand heaters) heat water as needed rather than having a tank in which hot water is stored. Their capacity to provide hot water is virtually unlimited. Water quality is an important factor in reducing maintenance costs – check with the manufacturer.

Application:

Install tankless water heater as close to the point of use as possible. The device should have a variable-set thermostat and be appropriately sized. Gas tankless water heaters typically have more capacity than electric tank less heaters.

Benefit:

Conventional water heaters lose 15% of their energy through standing tank losses, whereas tankless heaters use energy only for immediate hot water needs. Tankless water heaters often are quicker and more reliable.

Reference:

____ LEED POINTS

F. Electrical

1. Compact Fluorescent Lamps (CFLs) and Standard Fluorescent Bulbs to Replace Incandescent

Description:

CFLs screw in like conventional bulbs but consume up to one-fourth of the electricity used by incandescent bulbs to produce an equivalent amount of light. Standard fluorescent bulbs are even more efficient but are not dimmable.

Application:

Install CFLs in place of standard incandescent bulbs. CFLs are not recommended for fixtures that are turned on and off many times per day, i.e. a busy bathroom. Choose a CFL that is one-fourth the wattage of incandescent bulb. Install fixtures that are designed for standard fluorescent bulbs.

Benefit:

Compact and standard fluorescent bulbs are a profitable investment, saving several times their purchase price through reduced electricity bills and fewer replacement bulbs because they last at least eight times longer.

Reference:

- California Green Building Standards Code §509
- California Title 24 Standards

____ LEED POINTS

2. Install Insulation-Compatible Air-Tight (IC-AT) Recessed Lighting Fixtures with Compact Fluorescent Lamps (CFLs)

Description:

Conventional recessed fixtures allow heat to be exhausted into the attic space. Air-tight IC fixtures are sealed, allowing insulation to be blown on top to keep the heat in.

Application:

Use IC-AT fixtures with CFLs wherever recessed cans are specified.

Benefit:

Typical recessed fixtures are not energy efficient because they use incandescent lamps, generate significant heat, and allow conditioned air to infiltrate out of the house. IC-AT fixtures eliminate the air leakage, while compact fluorescent lamps stay cool and use less energy.

Reference:

- California Green Building Standards Code §509

____ LEED POINTS

3. Lighting Control Systems

Description:

Lighting controls use dimmers, sensors, and timers to turn lights off in unused areas or during time when lighting is not needed.

Application:

Install lighting controls either at specific locations or as a whole-house system. Lighting controls are especially applicable for exterior uses. Dimmable CFLs are available at a premium.

Benefit:

Lighting controls reduce energy use by having the lights on for shorter periods of time.

Reference:

- California Title 24 Standards

____ LEED POINTS

4. High-Efficiency Ceiling Fans with CFLs

Description:

Ceiling fans improve interior comfort by circulating cold and warm air. They can be adjusted to either draw warm air upward during summer months or push it downward during the winter.

Application:

Preferable locations are bedrooms and living rooms where occupants spend time. Ceiling fans must be supported adequately between ceiling joists.

Benefit:

Ceiling fans can reduce the need for air conditioning and CFLs reduce energy consumption.

Reference:

____ LEED POINTS

G. Appliances

1. Energy Star Appliances

Description:

Energy star appliances use water and energy more efficiently.

Application:

Select appliances with the Energy Star label.

Benefit:

Water-efficient appliances are also energy-efficient because most energy consumed by dishwashers and washing machines is used to heat water. Some Energy Star appliances can use 10-25% less energy than comparable models. Some local utility companies have rebate programs for purchasers of Energy Star appliances.

Reference:

- California Green Building Standards Code §510

____ LEED POINTS

H. Insulation

1. Wall and Ceiling Insulation That Exceed Title 24 Requirements

Description:

Insulation in exterior walls and ceilings can reduce the demand for air conditioning and heating and make homes more comfortable.

Application:

i. Wall Insulation

Insulate walls of existing wood frame houses to the capacity of the wall cavity, exceeding the Title 24 Standard for your climate zone by 20%. Wall cavities with existing insulation can be blown full of new cellulose or fiberglass to increase the density, thereby increasing the R-value. Exterior walls can be wrapped with a minimum of 1" (R-4) rigid foam to increase R-value if total exterior refinish is being performed.

ii. Ceiling Insulation

Increase ceiling insulation in existing structure to exceed Title 24 Standard for your climate zone by 20%, when possible. Installation is generally intended to be in ceilings below attic space, with appropriate gable or soffit ventilation. If existing cathedral or flat ceilings are already insulated, and re-roofing is being done at the same time, add additional rigid foam insulation on top of the existing roof sheathing. Special products are available that come pre-vented for new roofing.

Benefit:

Increased wall and ceiling insulation improves comfort, decreases heating and cooling requirements, saves money, and makes the home quieter.

Reference:

____ LEED POINTS

2. Floor Insulation over Crawl Spaces

Description:

Insulate and seal floors over unconditioned crawl spaces with R-19 or greater.

Application:

Seal all penetrations through the floor, including electrical, plumbing and ductwork, with expanding foam to prevent migration of air, moisture, and mold spores. Install insulation with vapor barrier towards the floor (warm side). Protect underside of fiberglass with inexpensive sheathing or wire mesh materials that act as a barrier to vermin.

Benefit:

Improves comfort by insulating the floor, protects indoor air quality from moisture that can grow in damp crawl spaces.

Reference:

____ LEED POINTS

3. Advanced Infiltration Reduction Practices

Description:

Expandable foam and caulk are used to prevent infiltration where wood connections are made or framing is drilled to provide for plumbing and electrical runs.

Application:

These methods are especially important where wood connections are made or framing is drilled to provide plumbing and electrical runs.

Benefit:

Reduction in infiltration increases comfort and reduces energy bills.

Reference:

- California Green Building Standards Code §505

____ LEED POINTS

I. Windows:

1. Energy-Efficient Windows

Windows play a big role in the energy efficiency of a home. In the summer, they can allow unwanted heat into the house, and in the winter, windows can account for as much as 25% of a building's heat loss. When selecting energy-efficient windows look for models with the following features:

i. Double-Paned Windows

Description:

Double or dual glazing insulates almost twice as well as single glazing.

Application:

Install double-paned windows whenever possible.

Benefit:

High quality double-paned windows make the whole house quieter and more comfortable during all seasons, while saving energy and money and provide needed daylighting.

Reference:

- California Title 24 Standards

____ LEED POINTS

ii. Low-Emissivity (Low-E) Windows

Description:

Low-E coatings, virtually unnoticeable to the eye, are installed inside the air space of a double-paned window. The low-E coatings help prevent heat from

escaping through the glass in winter and block heat from entering the home during summer.

Application:

Install low-E, double-paned windows whenever possible.

Benefit:

Low-E windows reflect heat, making the home more comfortable in cold weather and on hot summer days. The cost premium of 10-15% for low-E glass typically pays for itself in a few years. Low-E, double-paned glass coating increases glass R-value to 3 compared to R-1 for single-glazed windows.

Reference:

- California Title 24 Standards

____ LEED POINTS

iii. Low-Conductivity Frames

Description:

Most window frames and sashes are made of wood, vinyl, fiberglass or aluminum. Wood, Wood by-products, vinyl and fiberglass generally insulate better than aluminum frames.

Application:

Consider specifying wood windows as standard window packages. If other products are used try to specify thermal breaks between the exterior and interior sash.

Benefit:

Wood windows create greater comfort and better energy efficiency and are an environmentally preferable material.

Reference:

- California Title 24 Standards

____ LEED POINTS

2. High Performance Window Films

Description:

Tints, reflective coatings, and spectrally selective coatings can be applied to windows in either new construction or retrofit applications. There are special coatings that can cut heat gain, reduce UV radiation, and provide shade.

Application:

Reflective film should only be used on single-glazed windows. Look for a Solar Heat Gain Coefficient (SHGC) of less than the code requirement of 0.4. Consider using on all east and west facing windows. Films can be applied to windows prior to or after installation, which make them an excellent retrofit solution.

Benefit:

Low SHGC window film reduces overheating, improves comfort and can significantly lower the need for additional cooling. Films can also cut glare and reduce the fading caused by UV rays.

Reference:

- California Title 24 Standards

____ LEED POINTS

J. HVAC

1. Greater Than 12 Seer Air Conditioning with a Thermostatic Expansion Valve (TXV)

Description:

Air conditioning equipment is one of the greatest loads on power grids. SEER (Seasonal Energy Efficiency Ratio) measures cooling system efficiency at low temperatures while EER (Energy Efficiency Ratio) is a high temperature

performance rating. The higher the SEER/ EER number the less power is required to provide comfort. This assures that the air conditioning system operates at high efficiency during the full range of summer temperatures. TXV is a refrigerant regulation device that can help ensure that the air conditioning system operates at maximum efficiency over a wide range of conditions.

Application:

Higher SEER air conditioning (A/C) units are installed like any other A/C equipment. Some A/C equipment comes with a factory installed TXV and others accept a TXV that can be bolted on. Zoned A/C systems allow 2 to 4 zones to be conditioned at different temperatures so only the spaces being used are cooled. These require thermostats in each zone.

Benefit:

High SEER units save money and energy and reduce peak load problems for utilities. High EER systems not only save money and energy but offer more cooling when you need it most, on very hot days. Installing air conditioning systems with a TXV lowers utility bills and saves energy.

Reference:

- California Title 24 Standards

____ LEED POINTS

2. 90% AFUE (Annual Fuel Utilization Efficiency) or Greater Furnace

Description:

High efficiency furnaces convert gas to heat with greater efficiency.

Application:

Install high efficiency furnace in place of conventional furnace. Installing the proper size of furnace for the home is just as important as its efficiency. Check with your local utility company for rebate information.

Benefit:

A properly sized, high efficiency furnace costs less to operate. It saves natural resources, reduces air emissions and helps create a cleaner environment.

Reference:

- California Title 24 Standards

____ LEED POINTS

3. New Ductwork within Conditioned Space

Description:

Ducts in exterior walls, attics and in un-insulated spaces lose a significant amount of heated or cooled air capacity.

Application:

All ductwork for heating or cooling should be run through conditioned space inside the insulated envelope. Ducts run through attic space can be buried under new loose fill insulation.

Benefit:

Locating ducts in the conditioned space significantly reduces energy loss and improves occupant comfort.

Reference:

____ LEED POINTS

4. Solar Attic Fans

Description:

Solar attic fans remove heat from attic spaces in summer and clear condensation in the winter.

Application:

Solar attic fans are powered by the sun and are most effective when placed on the southern side of the roof and centered between the roof rafters. Avoid installing under overhanging trees or other structures creating shade.

Benefit:

In the summer, attics can reach up to 150°F. That heat migrates into the home and increases the temperature inside. A solar attic fan removes much of this hot air and reduces the burden on the air conditioning system.

Reference:

____ LEED POINTS

5. Attic Ventilation Systems

Description:

Soffit/eave ventilation and gable/continuous ridge ventilation allow excess heat and moisture to escape from attic spaces by natural convection.

Application:

Install equal amounts of ventilation between the soffits/eaves and the gables/ridges. The code requirement of 1 square foot of net free area of venting for every 150 square feet of attic floor area should be doubled. Keep insulation from blocking the soffit/eave vents.

Benefit:

Attics can reach up to 150° F on a hot summer day. That heat migrates into the house, exchanging air with the living space. Eave and soffit venting and continuous ridge venting increases comfort, reduces air conditioning costs and reduces problems associated with excess attic moisture.

Reference:

____ LEED POINTS

6. Whole House Fans

Description:

Whole house fans can cool a house without using an air conditioner by exhausting warm, indoor air and bringing in large volumes of fresh, cool, outdoor air at night.

Application:

The fan must be mounted in a hallway ceiling on the top floor. An insulated, airtight seal is necessary to prevent air leakage through the fan in winter. Fans should be sized to produce between 4-5 air changes per hour and should have two speeds: low speed for continuous ventilation and high speed. PLEASE NOTE: Keep a window open when fan is running to avoid back drafting of carbon monoxide from gas appliance flues.

Benefit:

An average whole house fan uses one-tenth the electricity of an air conditioning unit. Moving large volumes of air can achieve indoor comfort at higher temperatures without air conditioning.

Reference:

- California Green Building Standards Code §506.1.1

____ LEED POINTS

7. Zoned, Hydronic Radiant Heating

Description:

Hydronic heating forces hot water through radiators located in different areas or zones throughout the house. It is typically installed as baseboards or in floors.

Application:

Use hydronic, radiant heating instead of forced air heating. The system must be designed before construction starts.

Benefit:

Hydronic heating is more comfortable and saves energy by heating only the zone that requires heat.

Reference:

____ LEED POINTS

8. Air Retarding Building Wraps

Description:

Building wraps minimize air and moisture infiltration at the building envelope, while still allowing enough transference to let the building "breathe" to avoid pressurization issues.

Application:

Install building wraps that meet or exceed ASTM E 1677-95 (2000) criteria, per the manufacturer's instruction. Obtain certification of the installation from the manufacturer if such a program exists.

Benefit:

The less transference of air and moisture at the building envelope, the less susceptible the interior environment will be to fluctuations or extremes in the exterior environment, thus decreasing a building's occupants' reliance on mechanical needs for indoor comfort. This leads to lower utility bills.

Reference:

____ LEED POINTS

K. Renewable Energy & Roofing

1. Solar Domestic Hot Water (DHW) System

Description:

Solar DHW heating systems use solar collector panels to absorb heat from the sun. The hot water is stored for use at a later time. Water pre-heated by a solar system can also supplement use of a standard water heater.

Application:

Provide sufficient south-facing roof area for collectors, and allow space in a hot water closet for the additional hot water storage tank.

Benefit:

Solar hot water systems can pay back in as little as seven years and reduce the use of gas or electricity for water heating.

Reference:

____ LEED POINTS

2. Photovoltaic Array (PVA)

Description:

PVA panels contain hundreds of small cells that collect the sun's energy and convert it into electricity. Excess electricity can be sent back into the utility grid.

Application:

Typical PVA installations include flat roof, sloped roof, building integrated PVA and ground mount. Items to consider when installing PVA includes: sunlight-minimum of 4 hours required during peak period (8 a.m. - 4 p.m.) With no shade; orientation-anything but north; angle-flat to 60 degrees; adequate roof area-depending on type of PVA selected (monocrystal, polycrystal or amorphous).

Benefit:

PVA panels can be used as a means to decrease reliance on conventional power plants that contribute to air pollution.

Reference:

____ LEED POINTS

5. Solar (PVA) Walkway Lights

Description:

Solar walkway or exterior lighting use photovoltaic array cells (PVA) to create electricity during the day and store it in batteries for night time use.

Application:

Lights can be placed anywhere without the need to run wires as long as they receive sunlight during the day.

Benefit:

PVA lighting is cost effective and reduces the need for grid-provided electricity.

Reference:

____ LEED POINTS

L. Natural Heating & Cooling

1. Passive Solar Heating

Description:

Passive solar systems provide heat to the structure through south and east facing windows in conjunction with internal thermal mass.

Application:

The house must incorporate windows that face within 30 degrees of due south and have the ability to store excess heat in massive elements such as a slab floor or stone fireplace.

Benefit:

Passive solar design can reduce heating requirements by 30-50%, saving energy and money.

Reference:

____ LEED POINTS

2. Overhangs or Awnings over South and West Facing Exterior Surfaces

Description:

Properly sized overhangs or awnings on south facing windows and walls are important components of passive solar heating and natural cooling. Overhangs and awnings help keep the heat of the sun from entering the home during summer, but allow heat to enter in the winter. These shade control devices can be oversized roof overhangs, wood trellises/ arbors with deciduous plants, or adjustable or demountable awnings made of fabric or metal.

Application:

The overhang or awning design should keep out summer sun by shading the entire window during the hottest month(s) of the year. Size overhangs or awnings above south windows so that winter sunlight is allowed into the space, where it can be absorbed by thermal mass and re-radiated as heat. Also consider shading devices on the west and east facing windows to protect from morning and afternoon heat, especially in hotter climates.

Benefit:

Overhangs, awnings and trellises are an integral part of making passive solar heating and natural cooling work. Removable/retractable fabric awnings offer a

low cost solution to reduce heat gain, lower energy bills, and make the home more comfortable in the summer.

Reference:

____ LEED POINTS

3. Deciduous Shade Trees on the West and South Sides

Description:

During summer months, the sun shines on the south and west sides of the home causing the home to heat up which in turn makes air conditioners work their hardest. Landscaping minimizes exposure to the west and south windows in summer, while allowing some heat gain during the winter. The additional cooling demanded by low-angle sun penetration of west windows in late summer afternoons create the most significant summer peak utility costs.

Application:

Plant shade trees on the west and south sides of the home to provide shade and summer cooling. The most important areas to shade are windows and paved areas. Keep trees an appropriate distance from the home or utilities to avoid introduction of pests and root/branch intrusions as trees mature.

Benefit:

Planting shade trees can reduce summer air conditioning costs by 25% to 40%. Trees provide numerous additional benefits to the environment including cleansing the air, creating habitats for birds and play places for children as well as adding aesthetic beauty to the neighborhood. Through shade and evapotranspiration, trees can create a microclimate that is up to 15 degrees cooler than the surrounding area.

Reference:

____ LEED POINTS

III. Water Efficiency & Conservation – based on Chapter 6 of the 2008 CGBSC

The provisions of this chapter shall establish, but not be limited to, the means of conserving water used indoors, outdoors, and in wastewater conveyance.

A. Site

1. High-Efficiency Irrigation Systems

Description:

New irrigation technologies apply water to the soil at the plant root zones at the rate the soil can absorb it, significantly reducing water waste from overspray.

Application:

Install low-flow drip, sub-surface drip, or low-flow sprinklers in place of standard sprinkler systems for all landscape applications. Base watering levels on moisture sensors or weather based controllers. Use captured rainwater. Group plants by water requirements.

Benefit:

High-efficiency irrigation systems dramatically reduce landscape water use, and help to prevent disease & weed growth in gardens, yards, and other planted areas.

Reference:

- California Green Building Standards Code §604

____ LEED POINTS

2. On-site Water Catchment/ Retention

Description:

Rainwater is channeled through gutters and downspouts to an above- ground cistern or underground gravel dry well. Stored water is used for landscape irrigation.

Application:

Install wherever there is guttered roof runoff and room for the cistern.

Benefit:

Water catchment reduces the need to use drinking water for irrigation of lawns and gardens.

Reference:

- California Green Building Standards Code §604.5

____ LEED POINTS

3. Graywater Systems

Description:

Graywater is wastewater from sinks, showers, and washing machines that is not contaminated by human waste.

Application:

Graywater plumbing separates the waste pipes from sinks, showers, and washing machines from the toilet waste. Graywater drains are run to a holding tank similar to a septic tank, which, in turn, is used to water plants, lawns, and gardens. Check with the building department for requirements.

Benefit:

Graywater utilization cuts down on the use of potable water for outside irrigation and lawn watering. It is essentially recycling water at home.

Reference:

- California Green Building Standards Code §604.4

____ LEED POINTS

E. Plumbing

1. Flow Reducers in Faucets and Showers

Description:

Flow reducers fit into the aerator at the tip of the faucet and reduce the rate of water flow through the faucet. Low-flow showerheads replace standard showerheads.

Application:

Specify low-flow water conservation devices:

- Kitchen faucets ≤ 1.8 gpm
- Bathroom faucets ≤ 1.5 gpm
- Showerheads ≤ 2.0 gpm

Limit showerheads to one fixture per shower.

Benefit:

Flow reducers can cut water usage of faucets and showers by as much as 40% with little noticeable effect.

Reference:

- California Green Building Standards Code Table 603.1 and Table 603.2

____ LEED POINTS

2. Dual-Flush or Ultra-Low-Flush Toilets

Description:

New high-efficiency toilets use 1.6 gallons per flush (GPF) or less. Some manufacturers offer dual flush toilets that allow for half flushes (0.8 GPF) when a full flush is not needed.

Application:

Ensure the model actually uses no more than 1.6 GPF and performs well.

Benefit:

Ultra-Low-Flush toilets reduce the amount of water usage.

Reference:

- California Green Building Standards Code §603.2

____ LEED POINTS

3. On-Demand Hot Water Circulation Pump

Description:

An on-demand hot water circulation pump can send hot water to fixtures in seconds; without wasting water while waiting for it to get hot. It uses a pump to rapidly move water from a water heater to fixtures. It stops when water reaches a pre-set temperature.

Application:

Install the pump at the furthest faucet from the water heater. Only one pump is needed to supply hot water to any fixture and can easily be installed.

Benefit:

Both water and energy are saved since less time is wasted waiting for the water to reach the desired temperature. Hot water arrives at the fixture 5 times faster on average.

Reference:

- California Green Building Standards Code §508

____ LEED POINTS

G. Appliances

1. Energy Star Dishwashers and Washing Machines

Description:

Energy star appliances use water and energy more efficiently.

Application:

Select appliances with the Energy Star label.

Benefit:

- Water-efficient dishwashers use 25% less energy than comparable models.
- Horizontal axis, aka front loading, washing machines use up to 40% less water and 50% less energy than conventional top loading washers.
- Some utility companies have rebate programs for Residents who purchase Energy Star appliances.

Reference:

- US EPA – Energy Star Program (www.energystar.gov)
- Southern California Edison
(www.sce.com/PowerandEnvironment/BetteringEnergyEfficiencyPowerSources)

____ LEED POINTS

IV. Material Conservation & Resource Efficiency – based on Chapter 7 of the 2008 CGBSC

The provisions of this chapter shall outline, but not be limited to, means of achieving material conservation and resource efficiency through reuse of existing building stock and materials; use of recycled, regional, rapidly renewable, and certified wood materials; and employment of techniques to reduce pollution through recycling of materials and reduction of building pollutants prior to occupancy.

A. Site

1. Recycle Job Site Construction and Demolition Waste

Description:

Construction waste generally consists of wood, drywall, metals, concrete, dirt, and cardboard- materials that can be reused or recycled if prepared properly.

Application:

Identify the types and quantities of materials generated at the job site and recycled at least 60% of the construction and demolition (C&D) debris. Contact local recycling facilities and haulers to identify terms and conditions required for recycling materials. Separating waste at the site is the most effective way to ensure high recycling rates. Allocate space for recycling bins and containers.

Benefit:

Recycling reduces pressure on landfills, saves money by reducing tipping fees, and provides raw materials for future building products.

Reference:

- California Green Building Standards Code §708

____ LEED POINTS

2. Salvage & Donate Reusable Building Materials

Description:

Salvaged materials such as flooring, wood, windows, doors, appliances, cabinets, fixtures, and other reusable and/or uninstalled materials can be donated to organizations.

Application:

When remodeling, consider salvage and deconstruction, by selectively and carefully removing materials for reuse. Many firms are non-profits and will provide itemized donation receipts. Materials should be clean and in good, working condition.

Benefit:

Salvaging reusable building materials decreases disposal costs, saves natural resources, reduces landfill deposits, and can help local charitable organizations. Donations may be tax deductible.

Reference:

- California Green Building Standards Code §705.3 & §705.4

____ LEED POINTS

3. Reuse Materials or Use Recycled Content Materials

Description:

Plastic or composite lumber makes a very durable landscape edging, broken concrete can make an attractive retaining wall or path, and ground glass cullet can be used for walkways.

Application:

Use salvaged or recycled-content materials for hardscape (patios, decks, walkways and driveways) and other landscape structures.

Benefit:

The durability of plastic or composite lumber is greater than wood as neither can rot, crack or splinter. Salvaging or buying recycled-content landscaping products conserves natural resources and strengthens markets for recycled materials.

Reference:

- California Green Building Standards Code §705

____ LEED POINTS

B. Foundations

1. Fly-Ash (Recycled Material) In Concrete

Description:

Fly-ash is a by-product of coal burning power plants and can be an inexpensive substitute for a portion of Portland cement used in concrete

Application:

Typically, 15%-25% of cement can be replaced with fly-ash in residential concrete mixes; however, installers should know that it has slightly different curing characteristics than standard concrete.

Benefit:

Fly-ash increases the strength and durability of the concrete. Using fly-ash also reduces the amount of cement needed, thereby decreasing the overall environmental impacts of cement production.

Reference:

- California Green Building Standards Code §705.5.3.2

____ LEED POINTS

2. Form Board Reuse

Description:

Form boards are often 2x10 or larger solid sawn lumber typically cut from old-growth trees.

Application:

Forms are used whenever concrete is poured. By carefully removing and separating the forms, they can be reused several times. Special forms are available that are designed for re-use. Form boards can also be used as structural members if they are recovered from the form carefully.

Benefit:

Reuse of forms saves money and conserves resources. Solid sawn lumber is becoming increasingly expensive and scarce.

Reference:

- California Green Building Standards Code §705.3

____ LEED POINTS

3. Aluminum Forms

Description:

Aluminum forms come in all sizes and shapes and produce a smooth finished surface on the concrete. They can be used repeatedly.

Application:

Aluminum forms can be used in most applications to replace wood forms.

Benefit:

Because they can be reused many times, aluminum forms reduce wood use and, despite higher initial cost, pay for themselves quickly.

Reference:

____ LEED POINTS

4. Recycled-Content Aggregate

Description:

Concrete and rubble can be crushed and used for backfill and drainage purposes at the base of foundations.

Application:

Use recycled materials for backfill.

Benefit:

Using recycled instead of virgin materials saves money and natural resources.

Reference:

- California Green Building Standards Code §705.5

____ LEED POINTS

C. Structure

1. Substitute Solid Sawn Lumber with Engineered Lumber

Description:

Solid sawn lumber in sizes of 2x10 or greater typically comes from old-growth forests. Engineered lumber products, on the other hand, come from small-diameter and fast growing plantation trees. These products include glue-lams, laminated veneer lumber, wood I-joists, parallel strand lumber, and other manufactured wood fiber structural materials.

Application:

- i. Floor joist 2x10 and larger lumber are typically used for floor and ceiling joists and some seismic applications. Large size lumber can be replaced with engineered lumber in most applications unless required by seismic codes.
- ii. Non-load bearing header solid sawn 4x6 are often used for headers when smaller dimension lumber would suffice, such as double 2x6, unless solid 4x6 are required by seismic codes.
- iii. Structural headers and beams of engineered lumber should be used whenever structural members are required. They substitute for 4x12 in most interior applications such as the structural framing of floors, walls, and roofs.

Benefit:

Reducing demand for large dimensional lumber decreases pressure to cut down old-growth forests. Engineered lumber uses wood fiber more efficiently than conventional lumber, resulting in stronger and higher quality homes.

Reference:

____ LEED POINTS

2. Use Forest Stewardship Council (FSC) Certified Wood for Framing

Description:

FSC certification assures that the forest from which the wood is produced is managed in a sustainable and socially responsible manner.

Application:

Use FSC wood where solid wood framing is required.

Benefit:

FSC certification guarantees that forests are managed in a way that will assure the long-term availability of precious woods while protecting old-growth forests.

Reference:

- California Green Building Standards Code §705.2.1

____ LEED POINTS

3. Use Wood I-joists for Floors and Ceilings

Description:

Wood I-joists are engineered to use only the wood fiber necessary for the structural function required. They typically use oriented strand board (OSB) for the web and either laminated veneer lumber or solid sawn lumber for the chords (top and bottom pieces).

Application:

Replace solid sawn lumber with wood I-joists for floor and ceiling joists. Often they can be used at 19.2" centers to save material. Specify wood I joists with MDI resin whenever possible.

Benefit:

Wood I-joists use 50% less wood fiber to perform the same structural function as similar sized solid sawn lumber and will never twist, warp, or split. They are stronger and lighter than 2x10's or 2x12's, and can span greater distances. MDI resin reduces the amount of formaldehyde used in the adhesive and improves indoor air quality.

Reference:

____ LEED POINTS

4. Use Steel Interior Web Trusses

Description:

Steel web trusses use wood or laminated veneer top and bottom chords that are connected by steel webbing for structural integrity.

Application:

Use primarily for long-span floor joists.

Benefit:

Web trusses eliminate waste since they are made to order. They reduce the pressure on old growth forests by replacing 2x10's and 2x12's traditionally used for floor joists.

Reference:

____ LEED POINTS

5. Use Engineered Studs for Vertical Applications

Description:

Engineered studs are laminates, like plywood, that are used in vertical structural applications.

Application:

Use for interior or exterior wall applications except where prohibited by seismic codes. They are particularly appropriate for rooms with tall cathedral ceilings.

Benefit:

Engineered studs are straighter than conventional studs and will not deform, twist, split or warp. They save wood by using small laminated pieces.

Reference:

____ LEED POINTS

6. Advanced Framing Techniques Applications

Description:

Advanced framing involves using wood to its maximum structural potential.

Application:

Advanced framing includes: framing exterior and interior walls 24" on center, 2 stud corners, ladder blocking at wall partitions, stacking trusses over studs and other wood saving strategies.

Benefit:

Advanced framing saves up to 20% on wood and framing labor costs and makes the home more energy efficient by allowing for a higher percentage of the wall to be insulated, reducing frame conduction heat loss.

Reference:

____ LEED POINTS

7. Reclaimed Lumber

Description:

High quality dimensional lumber in long lengths can often be salvaged from old buildings that are being deconstructed or salvaged.

Application:

Use reclaimed lumber for non-structural applications, in place of new material.

Benefit:

Reclaimed lumber from deconstructed buildings reduces resource consumption and landfill deposits. Reclaimed lumber is often of higher quality than new lumber.

Reference:

____ LEED POINTS

8. Recycled-Content Steel Studs for Interior Framing

Description:

Steel studs can be either standalone or provide furring over wood stud framing. Steel contains high recycled-content (up to 95%), which typically increases in proportion to the steel's thickness.

Application:

For use in interior walls.

Benefit:

Steel reduces the need for wood and provides strong interior walls.

Reference:

____ LEED POINTS

D. Exterior Finish

1. Forest Stewardship Council (FSC) Certified Wood Decking

Description:

Certified, sustainable harvested lumber comes from forest managed in an environmentally and socially responsible manner.

Application:

Use FSC certified lumber for all exterior decking applications or as structural deck members in conjunction with recycled content decking.

Benefit:

FSC certification guarantees that forests are managed in a way that will assure the long-term availability of precious woods while preserving old-growth forests.

Reference:

- California Green Building Standards Code §705.2.1

____ LEED POINTS

2. House Wrap

Description:

House wrap protects the sheathing from moisture and allows vapor from inside to escape and provides an effective air infiltration barrier.

Application:

Install house wrap according to manufacturer specifications over all sheathing before exterior finish is installed. To provide an effective drainage plane for water, it needs to be lapped and edges should be taped with manufacturer's tape, and all flashing elements need to be properly installed in shingle fashion. Special products have been developed for wrapping window and door openings and for stucco applications.

Benefit:

House wrap provides a continuous drainage plane that diverts water away from openings and protects the home from mold. It can also help reduce moisture build up in stud cavities by allowing water vapor to migrate through the material.

Reference:

- California Green Building Standards Code §707

____ LEED POINTS

3. Alternative Siding Products - Recycled Content Siding

Description:

Recycled content siding is often called hardboard. Hardboard includes varying amounts of recycled content materials and looks and performs like wood siding.

Application:

Use hardboard where wood siding is installed.

Benefit:

Siding that has been manufactured with recycled wood fiber will not crack, split or warp and holds paint longer than solid wood siding, therefore reducing maintenance costs and resources.

Reference:

- California Green Building Standards Code §705.4

____ LEED POINTS

4. Alternative Siding Products – Fiber-Cement Exterior Siding

Description:

Fiber-cement siding is composed of cement, sand and cellulose fibers. It is currently available in shingles, planks or 4x8, 4x9, or 4x10 sheets. It is usually textured to look like wood siding or stucco finish.

Application:

Replace conventional wood siding or stucco finishes with fiber-cement siding.

This product can be cut with a carbide-tipped saw blade, snapper shears or with a guillotine cutter. Dust protection and control are required when cutting with a circular saw.

Benefit:

Fiber-cement siding is more durable than wood, termite resistant, noncombustible and warranted to last 50 years. Using fiber-cement siding reduces the demand for old-growth redwood or cedar siding. It may also reduce homeowner's insurance rates due to fire resistance.

Reference:

- California Green Building Standards Code §705.4

____ LEED POINTS

H. Insulation

1. Alternative Insulation Materials

Description:

Advanced insulation materials such as spray foam, recycled cotton and others are alternatives to conventional products.

Application:

Varies per product type. Cotton comes in both batt and loose fill while spray foam is spray applied and expands in place.

Benefit:

Cotton uses recycled-content fabric (such as blue jeans trimmings) while spray foam provides superior air infiltration resistance. Both types have no added formaldehyde.

Reference:

- California Green Building Standards Code §705 and §804.4.4

____ LEED POINTS

2. Formaldehyde-Free Fiberglass Insulation

Description:

Many fiberglass insulation products include recycled glass, formaldehyde-free binders, no asphalt adhesives or colored dyes.

Application:

When using fiberglass insulation, specify recycled-content and no formaldehyde. This type of fiberglass insulation is installed exactly as traditional fiberglass.

Benefit:

Formaldehyde-free binders reduce indoor air quality problems and insulation contains up to 30% recycled glass.

Reference:

- California Green Building Standards Code §804.4.6

____ LEED POINTS

K. Renewable Energy & Roofing

1. Safe and Durable Roofing Materials

Description:

40-50 year asphalt composition, tile, slate, fiber-cement and metal are examples of safe and durable roofing materials. Avoid cedar and wood shake shingles.

Application:

Applicable anytime roofing material is specified.

Benefit:

A durable and safe roof is cost effective and reduces landfill deposits. Some products may also reduce your homeowner insurance rates.

Reference:

____ LEED POINTS

M. Indoor Air Quality & Finishes

1. Forest Stewardship Council (FSC) Certified Wood Products

Description:

FSC certified materials (e.g. trim, doors, and shelving) come from forests that are managed in accordance with sustainable forest practices. It is particularly important to specify certified wood instead of clear, knot-free trim as the latter material is typically harvested from non-sustainable, old-growth forests.

Application:

Use FSC certified materials in any application that normally uses conventional stain-grade materials.

Benefit:

Sustainable forest certification assures that the forest from which the trim is produced is managed in a way that will assure the long-term availability of these precious woods while protecting ancient, old growth forests.

Reference:

- California Green Building Standards Code §705.2.1

____ LEED POINTS

2. Finger-Jointed or Recycled Content Trim

Description:

Finger-jointed trim is manufactured from short pieces of clear wood glued together to create finished trim. Recycled content trim is made from recycled polystyrene/plastics.

Application:

Use finger-jointed or recycled content trim in any application where trim is to be painted.

Benefit:

Finger-jointed or recycled-content trim is straighter and more stable than conventional clear wood, and uses materials more efficiently.

Reference:

- California Green Building Standards Code §705.4

____ LEED POINTS

3. Salvaged Building Materials for Interior Finish

Description:

Salvaged building materials are selectively and carefully removed from buildings for reuse. Many salvaged materials are superior to the products available today such as old-growth non-structural beams, flooring and interior trim.

Application:

Use salvaged building materials the same way conventional materials are used. Please note that salvaged painted wood items often contain lead based paint.

Benefit:

Using salvaged building materials keeps valuable resources out of landfills, reduces pressures on the landfills as well as offering the homeowner inexpensive and unique materials for the home.

Reference:

- California Green Building Standards Code §705.3

____ LEED POINTS

N. Flooring

1. Forest Stewardship Council (FSC) Certified Wood Flooring

Description:

Certified wood flooring comes from forests that are managed in accordance with sustainable forest practices. Certified wood flooring products are available in a wide variety of domestic and exotic species.

Application:

Use FSC certified wood in place of conventional hardwood flooring.

Benefit:

Sustainable forest certification assures that the forest from which the flooring is produced is managed in a way that will assure the long-term availability of these precious woods while protecting ancient, old-growth forests.

Reference:

- California Green Building Standards Code §705.2.1

____ LEED POINTS

2. Rapidly Renewable Flooring Materials

Description:

Bamboo and cork flooring are alternatives to hardwood flooring. Bamboo is a fast growing grass that can be harvested in three to five years. Cork is a natural flooring material that is obtained from the outer bark of the cork oak tree that is regenerated every 10 years.

Application:

Use these alternative flooring materials in place of conventional hardwood. Make sure that a durable finish is used on this product.

Benefit:

Fast growing, rapidly renewable floor substitutes are attractive and reduce pressure on hardwood forests. Bamboo is as durable as wood; cork is naturally fire and moisture resistant as well as sound absorbing.

Reference:

- California Green Building Standards Code §705.2.2

____ LEED POINTS

3. Recycled Content Ceramic Tiles

Description:

Recycled content ceramic tiles can contain up to 70% recycled glass. Originally developed for high traffic commercial conditions, recycled content tiles are very durable and wear well in residential applications.

Application:

Install recycled content tiles wherever conventional tiles are specified.

Benefit:

Some recycled-content ceramic tile is very dense which significantly reduces the amount of moisture and stains that are absorbed into the tile, making it more durable and easier to maintain.

Reference:

- California Green Building Standards Code §705.4

____ LEED POINTS

4. Recycled-Content carpet with Low-VOCs

Description:

Recycled content carpet is made from recycled plastic bottles, recycled nylon/wool or recycled cotton. Recycled content carpet does not differ in appearance or performance and the price is comparable to conventional carpet. The Carpet and Rug Institute (CRI) has a Green Label Indoor Air Quality Test Program which labels the VOC (volatile organic compounds) content of carpeting. Natural fiber carpets and rugs made from wool, sisal, etc. are rapidly renewable and naturally low in VOCs.

Application:

Use recycled content carpet in all applications where conventional carpet is specified. Choose carpet that meets or exceeds the CRI Green Label or Green Label Plus requirements.

Benefit:

Recycled content carpet saves resources and diverts waste from landfills. Approximately 40 two-liter soda bottles are recycled per square yard of carpeting. Recycled carpet is often more resilient and colorfast than carpet made from virgin fibers.

Reference:

- California Green Building Standards Code §705.4 and §804.4.3

____ LEED POINTS

5. Exposed Concrete as Finished Floor

Description:

For slab-on-grade additions, the concrete can be polished, finished with expansion joints in various patterns or stained with pigments to make an attractive finish floor. This approach is especially appropriate for radiant, in-floor heating systems.

Application:

Use this approach for finished basements or additions on slab construction. Finish must be designed and constructed when slab is being poured.

Benefit:

When using the slab as a floor finish, it eliminates the need to use other flooring materials. It is durable and easy to clean and can be used to hold piping for active radiant floor heating or as a thermal mass for passive solar heating.

Reference:

____ LEED POINTS

V. Environmental Quality – based on Chapter 8 of the 2008 CGBSC

The provisions of this chapter shall outline, but not be limited to, means of reducing the quantity of air and water contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants, and neighbors.

D. Exterior Finish

1. Treated Wood That Does Not Contain Chromium Or Arsenic For Decking And Sill Plates

Description:

Alkaline copper quaternary (ACQ) is an alternative wood treatment that does not contain chromium – a heavy metal – and arsenic, which are detrimental to human health.

Application:

Use non-chromium/arsenic treated wood for any application that specifies treated lumber including decking, fencing, sill plates, and site furnishings. Use appropriate precaution when working with and disposing of treated lumber.

Benefit:

ACQ and CA-B (copper azole) use copper as its main component, and are less hazardous alternatives to lumber treatments containing chromium and arsenic.

Reference:

____ LEED POINTS

E. Plumbing

1. Chlorine Filters on Showerheads

Description:

Water filters on showerheads reduce chemicals and particulates from the water stream.

Application:

Install the water filter between the pipe and the existing showerhead when whole-house water treatment system is not used.

Benefit:

Chlorine is absorbed 6 times faster through the skin than through the digestive system. It has been shown that chlorine absorption can have adverse health effects on some people and especially children.

Reference:

____ LEED POINTS

2. Water Filtration Units at Faucets

Description:

City water quality meets, or exceeds, state standards – but Homeowners can add water filtration under the counter at individual fixtures (“point of use”) or for the whole house. These systems further reduce chlorine and many other chemicals, particulates, and microorganisms.

Application:

Whole house filters and water softening systems are for drinking water and plumbing (not for hose bibs or toilets). Install filtration system between the cold water line and the main drinking water faucets in the house.

Benefit:

Agricultural run-off, chemical leaching and microorganisms increasingly contaminate public water systems across the country. House filtration systems reduce the health threat of these contaminants.

Reference:

____ LEED POINTS

J. HVAC

1. Vent Range Hood to the Outside

Description:

Steams, gases, smoke and other combustion by-products (such as unburned hydrocarbons) can result from cooking. Stovetop range hoods expel these by-products to the outside.

Application:

Range hoods are particularly important for gas stoves and can be installed most easily where stoves are adjacent to exterior walls.

Benefit:

Range hoods improve indoor air quality; prevent overheating and excess moisture build-up.

Reference:

____ LEED POINTS

2. Air Conditioning with Non-HCFC Refrigerants

Description:

"R-22" is a hydrochlorofluorocarbon (HCFC) refrigerant used in residential heating and cooling systems. "R-22" contains ozone-destroying chemicals. In 2010, under the Clean Air Act, HVAC manufacturers can no longer produce new air conditioners using "R-22".

Application:

Some new AC units already use the alternative to "R-22" refrigerant, "R-410a," such as the trade brand, Puron®. Additional care should be taken when handling refrigerants, always select a reputable dealer who employs service technicians that have achieved Environmental Protection Agency (EPA) certification to handle refrigerants.

Benefit:

Using alternatives to HCFC refrigerants reduces depletion of the ozone layer in case of leakage during replacement.

Reference:

____ LEED POINTS

3. High-Efficiency Filters

Description:

High efficiency filters remove 70% or more of dust and particulates from the air. HEPA filters remove over 90% of dust and particulates from the air.

Application:

Filters are installed in the return air stream at the air handler, which should be sized to handle the reduced air pressure caused by the filter. Some units have an air conditioning setting for the fan that will handle the retrofit filter.

Benefit:

The EPA has identified microparticulates as a leading cause of respiratory discomfort. By removing these particles, the filter makes the living space healthier.

Reference:

____ LEED POINTS

4. Separate Garage Exhaust Fan

Description:

According to the US Environmental Protection Agency (EPA), an attached garage is the single most significant contributor to poor air quality. Car exhaust contains many known carcinogens and can migrate into living spaces through doors and cracks in walls and ceiling adjacent to the garage.

Application:

Install exhaust fan on the opposite wall from the door to the house. It can be wired to an electric garage door or put on a timer to run for 15 minutes after door has been opened or closed.

Benefit:

An exhaust fan creates a healthier indoor environment by reducing the potential hazard of car exhaust from entering the house.

Reference:

- California Green Building Standards Code §804.5

____ LEED POINTS

5. Clean All Ducts Prior to Occupancy

Description:

Debris and dust from construction can cause allergic reactions in occupants.

Application:

Cover or seal all ductwork in work space during construction. Clean or vacuum all ductwork before occupancy to eliminate dust. Clean ducts before carpet is laid and finishes are applied.

Benefit:

Children are especially sensitive to microparticulates like drywall dust. Cleaning and vacuuming ductwork reduces dust around the house after occupancy.

Reference:

____ LEED POINTS

M. Indoor Air Quality & Finishes

1. Whole House Vacuum System

Description:

Whole house vacuums exhaust the dust from the house outside rather than collecting it in a bag that may not filter the dust effectively.

Application:

Whole house vacuum systems must be vented outdoors, not into a garage, and not to any area where air may be taken back into the house.

Benefit:

Whole house vacuums expel the dust outside the house whereas most vacuum cleaners do not filter the dust effectively and merely redistribute the dust that is most harmful to the respiratory system. This can aggravate asthma and other respiratory problems.

Reference:

____ LEED POINTS

2. Low/No-VOC and Formaldehyde-Free Paint

Description:

Most paint releases volatile organic compounds (VOCs), a major indoor air pollutant, into the home. Once outside, VOCs react with other pollutants, producing ground-level ozone that also affects human health. Often low/no-

VOC products are manufactured without mercury or mercury compounds, or pigments of lead, cadmium, chromium, or their oxides.

Application:

Paint with low/no-VOCs is available from most major manufacturers and is applied like traditional paint products. High washability should be specified for bathrooms, kitchens and children's bedrooms. Every finish and most colors are available in low/no-VOC paints.

Benefit:

Low/No-VOC paint reduces the emissions of VOCs into the home, improving indoor air quality and reducing the formation of urban smog.

Reference:

- California Green Building Standards Code §804.4.2

____ LEED POINTS

3. Low VOC, Water-Based Wood Finishes

Description:

Conventional solvent-based wood finishes can off-gas for months, and can be harmful to children. Off-gassing means the solvents are continuously released into the air, which contributes to poor indoor air quality. Low VOC finishes, such as water-borne urethane and acrylic, are lower in toxic compounds compared to conventional solvent-based finishes while providing similar durability.

Application:

Low VOC wood finishes can be used in most applications where solvent-based finishes are typically used. If solvent-based wood finishes must be used, they should be left to off-gas for 3 to 4 weeks prior to occupancy.

Benefit:

Using low VOC wood finishes reduces off-gassing into the home, improving indoor air quality, and reducing the formation of urban smog.

Reference:

- California Green Building Standards Code §804.4.2

____ LEED POINTS

4. Solvent-Free Adhesives

Description:

Unlike solvent-based adhesives that off-gas toxic compounds for months, solvent-free adhesives reduce toxic gases such as aromatic hydrocarbons or solvents that contribute to air pollution.

Application:

Use solvent-free products in place of standard adhesives for all interior applications such as installation of flooring, countertops, wall coverings, paneling and tub/shower enclosures.

Benefit:

Solvent-free adhesives are often stronger, emit fewer pollutants, and reduce the potential harmful impacts on the health of the occupants and installers.

Reference:

- California Green Building Standards Code §804.4.1

____ LEED POINTS

5. Formaldehyde-Free Engineered Sheet Materials

Description:

Engineered sheet goods such as particleboard and medium-density fiberboard (MDF) typically use adhesives that contain urea formaldehyde, a suspected

human carcinogen. The formaldehyde is continuously released for years after installation, which contributes to poor indoor air quality. Better alternatives include MDF & Medite II® without formaldehyde binders as well as sheet goods made from agricultural waste, such as straw-based particleboard manufactured with non-formaldehyde binders.

Application:

Whenever possible, eliminate new particleboard and formaldehyde based MDF inside the home by using solid wood for stair treads, certified exterior grade plywood, formaldehyde-free MDF, or straw-based MDF for shelving, Medite II® for cabinets and substrate for countertops.

Benefit:

Elimination of engineered sheet goods containing urea-formaldehyde reduces exposure to residents, particularly children, who are most susceptible. Some boards made from agricultural waste are superior to wood-based particleboard in moisture resistance and structural properties, and provide for the reuse of a former waste product.

Reference:

- California Green Building Standards Code §804.4.4

____ LEED POINTS

6. Exterior Grade Plywood for Interior Uses

Description:

Exterior plywood uses phenolic resins that off-gas much less than interior plywood. Interior plywood typically uses urea-formaldehyde glue which off-gasses into the house.

Application:

Substitute interior plywood with exterior plywood for custom cabinets and shelving.

Benefit:

Formaldehyde is a suspected human carcinogen and should be avoided whenever possible.

Reference:

- California Green Building Standards Code §804.4.4

____ LEED POINTS

7. Exposed Particleboard or MDF

Description:

Using less-toxic, low permeability paint or sealer to seal exposed particleboard or MDF will reduce the release of harmful gasses and is the next best solution to elimination of particleboard.

Application:

Whenever formaldehyde-based MDF or particleboard is used, seal all exposed edges of cabinets, undersides of countertops, stairs, shelving, etc., with at least two coats of less-toxic, low-permeability paint or sealer prior to installation.

Benefit:

Sealing all exposed particleboard reduces exposure of harmful emissions to residents, particularly children, who are most susceptible.

Reference:

- California Green Building Standards Code §804.4

____ LEED POINTS

N. Flooring

1. Natural Linoleum in Place of Vinyl Flooring

Description:

Natural linoleum is manufactured from natural materials such as cork and linseed oil. Unlike vinyl, linoleum does not contain petroleum-based products or chlorinated chemicals such as PVC, which may be a source of VOC off-gassing. There is also concern of byproducts such as cancer-causing dioxins, which may be produced during the manufacturing of vinyl.

Application:

Use natural linoleum in place of vinyl flooring.

Benefit:

Linoleum is low-toxic, easy to repair, durable, and stain resistant. Linoleum can last up to 40 years whereas vinyl lasts typically 7-10 years.

Reference:

____ LEED POINTS

Resources

Material Recovery

Available at:	
CR&R 31641 Ortega Highway PO Box 1100 San Juan Capistrano, Ca 92683 T (877) 728 0446 F (949) 728 3470 www.crrwasteservices.com	Madison Materials Public Disposal Facility 1035 East 4th Street Santa Ana, Ca 92701 T (714) 664-0159 www.waredisposal.com/transfer
Tony's Architectural Salvage 123 N. Olive Orange, Ca US 92866 T (714) 538-1900 www.tonysarchitecturalsalvage.com	Habitat for Humanity - ReStore 2200 S. Ritchey Street Santa Ana, Ca 92705 T (714) 434-6200 x.217 www.restoreoc.org
Dan Copp Crushing Corp. (Concrete) 1300 N. Hancock Anaheim, Ca 92807 T (714) 777-6400	Ewles Materials (Concrete) 16081 Construction Circle Irvine, Ca 92606 T (949) 552-600 www.ewlesmaterials.com
Rainbow Disposal Co. Inc. 17121 Nichols St Huntington Beach, Ca 92467 T (714) 847-3581 www.rainbowdisposal.com	SA Recycling- Santa Ana (Steel) 2002-2006 W. 5th St. Santa Ana, Ca 92703 T (714) 630-8901 www.sarecycling.com
Habitat for Humanity - DeConstruct Services T (714) 434-6200 x.500 www.restoreoc.org/deconstruct	

Landscape - California Friendly

Distributors/ Installers:	
Las Pilitas Nursery 3232 Las Pilitas Rd Santa Margarita, Ca 93453 T (805) 438-5992 F (805) 438-5993 www.laspilitas.com	Theodore Payne Foundation 10459 Tuxford St. Sun Valley, Ca 91352 T (818) 768-1802 www.theodorepayne.org
Native Sons, Inc. 379 West El Campo Road Arroyo Grande, Ca 93420 T (805) 481-5996 F (805) 489-1991 www.nativeson.com	Rancho Santa Ana Botanic Garden 1500 North College Avenue Claremont, Ca 91711 T (909) 625-8767 F (909) 626-7670 www.rsabg.org
Native Grow Nursery 30900 Rancho Viejo Road Suite 100 San Juan Capistrano, Ca 92675 T (949) 489-2700 www.nativegrow.com	Tree of Life Nursery 33201 Ortega Highway, San Juan Capistrano, Ca 92675 T (949) 728-0685 www.californianativeplants.com

Landscape

Distributors:	
Native Landscape, Inc. 9746 Tamarack Lane Escondido, Ca 92029 T (760) 735-8700 www.nativelandscapeinc.com	Tierra Verde Industries 7982 Irvine Blvd Irvine, Ca 92618 T (949) 551-0363 www.cwlm.com
Roger's Garden 2301 San Joaquin Hills Rd Corona del Mar, Ca 92625 T (949) 640-5800 Toll Free @ 1.800.647.2356 www.rogersgardens.com	Armstrong Garden Centers 2123 Newport Blvd Costa Mesa, Ca 92627 www.armstronggarden.com

Landscape Recycling

Available at:	
Brea Green Recycling 1983 Valencia Ave Brea, Ca 92823 T (714) 529-0100	Aguinaga Fertilizer 16355 Construction Circle West Irvine, Ca 92618 T (949) 786-9558
Baker Canyon Green Recycling 27910 Baker Canyon Road, Silverado Ca 92676 T (714) 649-9050	CR Transfer 11232 Knott Ave., Stanton, Ca 90680 T (714) 891-2776
CVT Recycling 1071 N Blue Gum St., Anaheim, Ca 92806 T (714) 238-3301	Sunset Environmental, Inc. (Waste Management) 16122 Construction Circle West Irvine, Ca 92606 T (949) 552-8784 www.wm.com

Carpet

Available at:	
Los Angeles Fiber / Reliance Carpet Cushion 5190 Santa Fe Avenue, Vernon, Ca 90058 T (323) 589-5637 www.lafiber.com	

Wood Products

Forest Stewardship Council (FSC) Lumber

Available at:	
The Home Depot 2300 S Harbor Blvd Costa Mesa, Ca 92626 T (949) 646-4220 T (800) 553-3199 www.HomeDepot.com	Royal Plywood 14171 E. Park Place Cerritos, Ca 90703 T (562) 404-2989 F (562) 404-6224 www.royalplywood.com

Kelly-Wright Hardwoods 4890 E La Palma Ave Anaheim, Ca 92807 T (714) 632-9930 www.kelly-wright.com	California Panel & Veneer Company 14055 Artesia Boulevard Cerritos, Ca 90703 T (562) 926-5834 www.calpanel.com
Hayward Lumber (Nearest Lumber Yard) 421 Laguna St. Santa Barbara, Ca 93101 T (805) 963-1881 www.haywardlumber.com	Jones Lumber Company 10711 S. Alameda St. P.O. Box 40 Lynwood, Ca 90262 T (310) 537-3862 T (714) 972-0196 www.joneslumber.com
Forest Plywood - La Mirada 14711 Artesia Blvd. La Mirada, CA 90638 T (714) 523-1721 www.forestplywood.com	Big Creek Lumber Co. 3564 Highway 1 Davenport, Ca 95017 T (831) 423-4156 www.fscus.org

Engineered Lumber

Available at:	
Lowe's 8175 Warner Ave Huntington Beach, Ca 92647 www.Lowes.com	Arizona Structural Laminators, LLC (Glulam) 2000 West Central Avenue Eagar, Az 85925 T (928) 333-5501
All-Coast Forest Product, Inc. 13880 Monte Vista Ave. Chino, Ca 91708 T (800) 864-6881 F (909) 628-6154 www.all-coast.com	Georgia-Pacific Building Products 133 Peachtree Street NE Atlanta, Ga 30303 T (800) 839-2588 T (404) 652-4000 www.gp.com/build

Salvaged Lumber

Available at:	
Black's Farmwood P.O. Box 2836 San Rafael, Ca 94912 T (877) 321-WOOD F (415) 454-8393 www.blackfarmwood.com	Crossroads Recycled Lumber PO Box 928, 57839 Road 225 North Fork, Ca 93643 T (888) 842-3201 F (559) 877-3646 www.crossroadslumber.com
Old Growth Timbers PO Box 157 Petrolia, Ca 95558 T (707) 629-3506 T (707) 498-1732 www.oldgrowthtimbers.com	Heritage Salvage 1473 Petaluma Blvd South Petaluma, Ca 94952 T (707) 762-6277 www.heritagesalvage.com
Mendocino Specialty Lumber Arcata, Ca 95521 T (707) 726-0339 F (707) 726-0319 www.oldgrowth.com	

TimberSIL® Glass Wood

Manufacturer:	
TimberSIL Products 5415C Backlick Road Springfield, Va 22151 T (703) 941-5171 www.timbersilwood.com	
Available at:	
TimberSILwood Distribution California 475 Industrial Way Placentia, Ca 92870 T (866) 966-3551 T (714) 223-1804 F (714) 223-1842 www.woodwontburn.com	

Hardwood Plywood

Available at:	
California Panel & Veneer Company 14055 Artesia Boulevard Cerritos, Ca 90703 T (562) 926-5834 www.calpanel.com	Weber Plywood and Lumber Company, Inc. 15501 Mosher Street Tustin, Ca 92680 T (714) 259-1100 www.weberply.com

Europly

Manufacturer:	
Columbia Forest Products T 800-547-1791 www.ColumbiaForestProducts.com	
Available at:	
Weber Plywood and Lumber Company, Inc. 15501 Mosher Street Tustin, Ca 92680 T (714) 259-1100 www.weberply.com	Kelly-Wright Hardwoods 4890 E La Palma Ave Anaheim, Ca 92807 T (714) 632-9930 www.kelly-wright.com
Forest Plywood - La Mirada 14711 Artesia Blvd. La Mirada, Ca 90638 T (714) 523-1721 www.forestplywood.com	California Panel & Veneer Company 14055 Artesia Boulevard Cerritos, Ca 90703 T (562) 926-5834 www.calpanel.com

Plastic & Composite Lumber

Manufacturer:	
The PLL Company 12550 E. Carson St. #20 Hawaiian Gardens, Ca 90716 T (310) 320-1945 www.thepllcompany.com	

TimberTech Limited T (800) 307-7780 www.timbertech.com	Trex Company T (800) 289-8739 www.trex.com
Available at:	
Orange Coast Lumber 2727 S Main St Santa Ana, Ca 92707 T (714) 556-1774 www.oclumber.com	Ganahl Lumber 1275 S. Bristol Ave. Costa Mesa, Ca 92626 T (714) 556-1500 www.ganahl.com

Boards & Panels

Manufacturer:	
SierraPine Ltd. T (800) 676-3339 www.sierrapine.com	
Available at:	
National Wood Products 314 West Freedom Ave Orange, Ca 92865 T (714) 998-0300 F (714) 998-8525 www.nationalwood.com	California Panel & Veneer 14055 Artesia Blvd. Cerritos, Ca 90701 T (800) 451-1745 T (562) 926-5834 F (562) 404-2806 www.calpanel.com
Royal Plywood Company 14171 East Park Place Cerritos, Ca 90637 T (562) 404-2989 F (562) 404-6224 www.royalplywood.com	Ganahl Lumber Company 1220 East Ball Road Anaheim, Ca 92805-5993 T (714) 239-2101 F (714) 239-2109 www.ganahl.com
Strata Forest Products 2600 S. Susan Street Santa Ana, Ca 92704 T (714) 751-0800 F (714) 432-9610 www.strataforest.com	Weber Plywood & Lumber Co. 15501 Mosher Street Tustin, Ca 92680 T (714) 259-1100 F (714) 259-8054 www.weberply.com

Roofing & Siding

Manufacturers:	
James Hardi Building Products 26300 La Alameda, Suite 400 Mission Viejo, Ca 92691 T (888) J-HARDIE www.jameshardie.com	CertainTeed Corporation P.O. Box 860 Valley Forge, Pa 19482 T (800) 233-8990 www.certainteed.com
MaxTile Inc. 849 East Sandhill Ave, Carson, Ca 90746 T (310) 217-0316 www.maxitile.com	

Available at:	
Ganahl Lumber 1275 S Bristol Street Costa Mesa, Ca 92626 T (714) 556-1500 F (714) 545-4261 www.ganahl.com	Reliable Wholesale Lumber 7600 Redondo Circle Huntington Beach, Ca 92648 T (714) 848-8222 F (714) 848-1804 www.rwli.net
Orange Coast Hardware & Lumber 2727 S Main Street Santa Ana, Ca 92707 T (714) 556-1774 F (714) 556-4015 www.oclumber.com	Home Depot www.homedepot.com

Roofing

Available at:	
Roofing Supply Group 2734 S Susan Street Santa Ana, Ca T (714) 557-2930 www.roofingsupplygroup.com	ABC Supply Co. Inc. 16830 South Harbor Boulevard Santa Ana, Ca T (714) 418-0517 www.abc-supply.com
SG Wholesale Roofing Supplies 1000 East 6th Street Santa Ana, Ca T (714) 568-1900 www.sgroof.com	A L L Roofing & Building Materials 111 S. Minnie Street Santa Ana, Ca T (714) 647-9792
Pacific Supply Co 675 N. Batavia Orange, Ca T (714) 633.6330 www.pacificsupplyco.com	Allied Building Products 111 South Minnie Street Santa Ana, Ca 92701 T (714) 647-9792 F (714) 647-0650 www.alliedbuilding.com
Ford Wholesale CO Inc 825 Park Center Drive Suite 200 Santa Ana, Ca 92705 T (714) 973-1546 www.fordwholesale.com	South Coast Shingle 28032 Forbes Road Laguna Niguel, Ca 92677 T (800) 580-7626 T (949) 347-7444 F (949) 347-7438 www.southcoastshingle.com

Recycled Content / FSC Exterior Siding

Manufacturer:	
The Collins Companies T (800) 329-1219 www.collinswood.com	
Available at:	
The Home Depot www.homedepot.com	Western Woods, Inc. P.O. Box 4402 Chico, Ca 95927 T (800) 822-8157 www.westernwoodsinc.com

Tankless Water Heaters

Manufacturers:	
Bosch http://www.boschhotwater.com/	Stiebel Eltron http://www.stiebel-eltron-usa.com/
Takagi www.takagi.com	Eemax www.eemaxinc.com
Rheem www.rheemtanklessonline.com	Paloma www.palomawaterheaters.com
Noritz www.noritz.com	Rinnai www.rinnai.us

Insulation

Manufacturers:	
DuPont Tyvek http://www2.dupont.com/Tyvek_Weatherization/en_US/	Owens Corning http://insulation.owenscorning.com/
Bonded Logic, Inc. http://www.bondedlogic.com/	ICYNENE http://www.icynene.com/
Green Fiber http://www.greenfiber.com/	CertainTeed http://www.certainteed.com/index.aspx
Johns Mansville http://www.specjm.com/	

Paints / Stains / Finishes

No and Low-VOC

Manufacturers:	
ICI Dulux Paints T (800) 984-5444 www.iciduluxpaints.com	AFM (American Formulating & Manufacturing) T (800) 239-0321 www.afmsafecoat.com
Devoe Paint T (800) 660-8440 www.devoepaint.com	Dunn-Edwards Paints T (800) 337-2468 www.dunnedwards.com
Sherwin Williams (HealthSpec® line) T (800) 474-3794 www.sherwin.com	Frazee Paint T (800) 477-9991 www.frazee.com
Olympic Paint and Stain T (800) 441-9695 www.olympic.com	Green Planet Paints T (520) 394-2571 www.greenplanetpaints.com
Duron Paints and Wallcoverings (Genesis Odor-Free) www.duron.com	Old Fashioned Milk Paint Company T (866) 350-6455 www.milkpaint.com
Benjamin Moore (Pristine® EcoSpec®) T (800) 672-4686 www.benjaminmoore.com	Cloverdale Horizon (Through Rodda Paint Stores) www.cloverdalepaint.com

Low Solvent Adhesives & Caulking

Refer to Carpet and Rug Institute: www.carpet-rug.org/index.cfm

Flooring

Refer to Wood Products FSC Lumber, Engineered, Salvaged, Hardwood, Europly Sections for more information concerning Flooring.

Refer to the following website for Hardwood Manufacturers.
www.floorfacts.com/hardwood-floors.asp

Boa-Franc Head Office and Plant 1

1255-98th Street, Saint-Georges
 Quebec, Canada G5Y 8J5
 T (418) 227-1181
 F (418) 227-1188
www.miragefloors.com

Recycled Content Carpeting, Backing & Padding Resources

Refer to the following website for more information on carpet.
www.floorfacts.com/carpet.asp

Shaw Industries

P.O. Drawer 2128
 Dalton, Ga 30722-2128
 T (800) 441-7429
<http://www.shawinc.com>

Interface Flooring Systems, Inc

P.O. Box 1503
 LaGrange, Ga 30241
 T (800) 336-0225
<http://www.interfaceinc.com>

Image Carpets, Inc.

P.O. Box 5555
 Armuchee, Ga 30105
 T (800) 722-2504
www.imagecarpets.co.uk

Carpet Cushion Associates

1248 Pаметto St.
 Los Angeles, Ca 90013
 T (800) 244-6977
 F (213) 626-5959

Fairmont Corporation (Leggett & Platt)

Ontario, Ca
 T (800) 621-6907
<http://lpurethane.com/residential-products.asp>

Reliance Carpet Cushion

15700 S. Main St.
 Gardena, Ca 90248
 T (800) 522-5252
 T (213) 321-2300
 F(310) 523-1807
www.lafiber.com

Mohawk Carpet

T (303)770-0389
 T (800) 233-3353
<http://www.mohawkcommercial.com>

Bloomsburg Carpet Industries, Inc.

49 West 23rd Street, 4th Floor
 New York, NY 10010-4228
 T (212) 688-7447
 T (949) 262-1478
<http://www.bloomsburgcarpet.com/>

Natural Linoleum Resources

Refer to the following website for more Linoleum Companies:
www.floorfacts.com/laminatfloors.asp

Forbo Flooring North America

8 Maplewood Drive • P.O. Box 667
 Humboldt Industrial Park
 Hazleton, Pa 18202
 T (866) MARMOLEUM
www.themarmoleumstore.com

Armstrong World Industries

T (800) 448-1405
www.armstrongfloors.com

Recycled Content Ceramic Tile Resources

Manufacturers:	
Oceanside Glasstile World Headquarters 2293 Cosmos Court Carlsbad, Ca 92011 T (760) 929-4000 www.glasstile.com	Fireclay Tile Inc. 495 West Julian Street San Jose, Ca 95110 T (408) 275-1182 F (408) 275-1187 www.fireclaytile.com
Coverings Etc. 7610 NE 4th Court Miami, Fl 33138 T (305) 757-6000 F (305) 757-6100 www.coveringsetc.com	Sandhill Industries 6898 S. Supply Way Ste. 100 Boise, Id 83716 T (208) 345-6508 www.sandhillind.com
Terra Green Ceramics 1650 Progress Drive Richmond, In 47374 T (765) 935-4760 F (765) 935-3971 www.terragreenceramics.com	Bedrock Industries 1401 W. Garfield ST. Seattle, Wa 98119 T (877) 283-7625 www.bedrockindustries.com
Aurora Glass 2345 W. Broadway Eugene, Or 97402 T (888) 291-9311 www.auroraglass.org	Wausau Tile Inc. PO Box 1520 Wausau, Wi 54402-1520 T (715) 359-3121 www.wausautile.com
EnviroGLAS 7704 San Jacinto Place, Suite 200 Plano, Tx 75024 T (972) 608-3790 www.enviroglasproducts.com	

ECO Timber and Bamboo Flooring Resources

Refer to the following website for Bamboo Manufacturers www.floorfacts.com/bamboofloors.asp	
Refer to the following website for Cork Flooring Manufacturers www.floorfacts.com/corkfloors.asp	
Manufacturer:	
Teragren LLC 12715 Miller Road NE Suite 301 Bainbridge Island, Wa 98110 T (800) 929-6333 www.teragren.com	

Countertops

Manufacturers:	
EnviroGLAS 7704 San Jacinto Place, Suite 200 Plano, Tx 75024 T (972) 608-3790 www.enviroglasproducts.com	Syndecrete Santa Monica, Ca T (310) 829-9704 www.syndecrete.com

<p>Vetrazzo Ford Point, Suite 1400 1414 Harbour Way South Richmond, Ca 94804 T (510) 234-5550 www.vetrazzo.com</p>	<p>Teragren LLC 12715 Miller Road NE Suite 301 Bainbridge Island, Wa 98110 T (800) 929-6333 www.teragren.com</p>
<p>Shekta Stone 435 W Industrial St. PO Box 38 Le Center, Mn 56057 T (507) 357-4177 www.shetkastone.com</p>	<p>Lithistone 3786 CR 203 Durango, Co T (970) 799-0181 www.lithistone.net</p>
<p>Tiger Mountain Innovations Squak Mountain Stone/ Trinity Glass Products 14221 NE 190th Street, Suite 150 Woodinville, WA 98072 T (800) 776-2167 www.squakmountainstone.com</p>	<p>Klip BioTechnologies, LLC 7314 Canyon Rd. E. Puyallup, WA 98371 T (253) 507-4622 F (253) 507-4623 www.kliptech.com</p>
<p>IceStone, LLC Brooklyn Navy Yard 63 Flushing Avenue, Unit 283, Building 12 Brooklyn, NY 11205 T (718) 624-4900 F (718) 624-4002 www.icestone.biz</p>	<p>Avonite Surfaces 7350 Empire Drive Florence, Ky 41042 T (800) 354-9858 www.avonitesurfaces.com</p>
<p>CaesarStone 6840 Hayvenhurst Ave. Suite 100 Van Nuys, Ca 91406 T (818) 779-0999 www.caesarstoneus.com</p>	

Renewable Energy

Manufacturers:	
<p>Mitsubishi Electric 5201 Great America Parkway, Suite 332, Santa Clara, Ca 95054-1127 T (408) 727-3111 F (408) 727-2689 www.mitsubishielectricsolar.com</p>	<p>Fronius USA LLC 10421 Citation Drive, Suite 1100, Brighton, Mi 48116 T (810) 220-4414 F (810) 220-4424 www.fronius.com</p>
<p>Sharp www.solar.sharpusa.com/solar/home</p>	<p>SMA America, Inc. 4031 Alvis Court Rocklin, Ca 95677 www.sma-america.com</p>
Distributors/ Installers:	
<p>REC Solar, Los Angeles, CA 13012 Saticoy Street, Suite 1 North Hollywood, Ca 91605 T (818) 255-5462 www.recsolar.com</p>	<p>Swan Solar 24512 Bridger Rd. Lake Forest, Ca 92630 P (949) 309-3409 www.swansolar.com</p>

SunPower Systems 1414 Harbour Way South Richmond, Ca 94804 T (510) 540-0550 F (510) 540-0552 www.sunpowercorp.com	HelioPower, Inc 25767 Jefferson Avenue Murrieta, Ca 92562 T (951) 677-7755 F (951) 677-9559 www.heliopower.com
groSolar 601 Old River Road Suite 3 White River Junction, Vt 05001 T (800) 374-4494 www.grosolar.com	SunEarth, Inc. 8425 Almeria Avenue Fontana, Ca 92335 www.sunearthinc.com
Allied Sun Technologies 3647 Royal Meadow Road, Sherman Oaks, Ca 91403 T (888) 765-2799 F (818) 907-6031 www.alliedsun.com	SPG Solar Oceanside, Ca 92054 T (760) 435-0767 F (760) 967-1761 www.spgsolar.com
California Green Designs 18226 Ventura Blvd. Suite 103 Tarzana, Ca 91356 T (818) 705-3474 F (818) 996-7181 www.ca-green.com	Chico Electric 36 W Eaton Road Chico, Ca 95973 T (530) 891-1933 F (530) 891-6749 www.chicoelectric.com
Akeena Solar 22661 Lambert St., Suite 204 Lake Forest, Ca 92630 T (888) 253-3628 T (949) 859-1073 www.akeena.net	Solar Depot 1240 Holm Rd. Petaluma, Ca 94954 T (707) 766-7727 F (707) 766-7722 www.solardepot.com
Insoltech Solar P.O. Box 5132 Laguna Beach, Ca 92652 T (949) 497-6300 F (949) 494-0182 www.insoltechsolar.com	Solar-Tec Systems 33971-A Silver Lantern Dana Point, Ca 92629 T (949) 248-9728 F (949) 248-9729 www.solar-tec.com

Solar Hot Water Systems

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Glossary

- ACQ*, or *Alkaline Copper Quaternary* - (noun) An alternative, non-*arsenic* treatment for wood composed of copper – a fungicide – and a quaternary ammonium compound – an insecticide. ACQ-treated lumber should not be used in conjunction with common steel fasteners – only double-galvanized or stainless steel.
- Active solar system* – (noun) A solar heating or cooling system that operates by mechanical means – such as pumps, motors, or collector panels.
- Advanced framing* – (noun) Also known as Optimal Value Engineering (OVE). A series of techniques designed to use less lumber in framing a house, thereby reducing material cost and use of natural resources, and increasing the level of insulation as a result.
- AFUE*, or *Annual Fuel Utilization Efficiency* – (noun) A thermal efficiency measure of combustion equipment like furnaces and water heaters that attempts to represent the actual, season-long average efficiency of that piece of equipment.
- Arsenic* – (noun) A poisonous chemical that is toxic to insects, bacteria and fungi, which made it an ideal component for preserving (usually pressure-treating) wood in the form of chromated copper arsenate (CCA). Due to its health hazards, though, CCA has been banned and replaced with non-arsenic alternative methods of treating wood (see ACQ & CA-B). Arsenic and its compounds are still used in pesticides, herbicides, insecticides, and metalloid alloys.
- Biodegradable* – (adjective) Able to decompose or break down by a natural process.
- CA-B*, or *Copper Azole* – (noun) Like ACQ, it is an alternate non-arsenic method of preserving & treating wood. A common term associated with CBA is “Wolmanization” in the US.
- Carbon footprint* – (noun) The total amount of carbon dioxide emitted over a given time by an entity or action. Usually expressed in equivalent tons of carbon dioxide (CO₂)
- Cistern* – (noun) A usually above-ground reservoir or tank for holding water, especially for catching and holding rainwater for later use.
- Compact fluorescent lamps*, or *CFLs* – (noun) The technology and efficiency of a *standard fluorescent bulb* (up to 75% less electricity usage than incandescents), with the adapter of an incandescent bulb.
- Composite lumber* – (noun) Family of materials that contain wood in whole or fiber form bound together with a natural or synthetic adhesive.
- Compost* – (noun) A mixture of various decayed or decaying organic substances, usually made by gathering or manure, used as fertilizer.
- Conventional water heater* – (noun) A typically cylindrical tank using natural gas or electricity to heat and store water *domestic hot water* use.
- Crawl space* – (noun) The non-livable and usually unconditioned space under a raised floor structure, usually used to give access to pipes, cables, and other utilities.
- CRI*, or *Carpet and Rug Institute* – (noun) A trade association dedicated to spreading information about carpet and rugs to the public, especially consumers. Its “Green Label” and “Green Label Plus” are certification-type indications on products they consider *low-VOC*.
- DHW*, or *Domestic hot water* – (noun) Water used, or the system designed to heat water, for domestic purposes, principally drinking, food preparation, sanitation and personal hygiene. Systems for DHW include *conventional*, *tankless*, or *solar water heaters* – or a combination thereof.
- Double-paned*, or *Dual-glazed* – (adjective) Refers to Insulating Glass Units (IGUs), which are fenestration products with two hermetically sealed layers of glass, or glazing.

Dry well - (noun) An underground structure – usually filled with stone or gravel – that disposes of unwanted water, most commonly *stormwater runoff*, by dissipating it into the surrounding soil.

Dual-flush toilet – (noun) Toilets with two different settings, usually 0.8 gallons per flush for liquid removal and 1.6 gallons per flush for “full flush” solid removal.

Ductwork – (noun) The delivery system for conditioned air throughout a building to and from the heating and/or cooling system; usually made of sheet metal, fiberglass, or flexible plastic – and can be round or rectangular in shape.

EER, or Energy Efficiency Ratio – (noun) A rating system for air conditioners that indicates how much heat is removed per hour for each watt of energy used (BTU/hr/W).

Energy heel – (noun) A taller form of a typical truss heel (the end of the truss that sits on the exterior bearing wall), which allows insulation to be installed with less or minimal gaps between the wall and roof planes.

Energy Star - (adjective) A voluntary labeling program for appliances, lighting, small electronics, and more recently – buildings to identify and promote energy-efficient products to help reduce greenhouse emissions; originally developed by the EPA.

Engineered lumber – (noun) Engineered wood, also known as “composite” or “manufactured” wood, includes a range of dimensional lumber made from recycled or reconstituted wood materials, such as laminated wood chips or strands and finger-jointing. These products are engineered to precise design specifications, which are tested to meet national or international standards.

EPA, or Environmental Protection Agency – (noun) A federal agency of the United States charged to regulate chemicals and protect human health by safeguarding the natural environment. Its primary responsibility is to set and enforce national standards under a variety of environmental laws. It also works with industries and local government in voluntary pollution prevention and energy conservation programs, i.e. the *Energy Star* program.

Fiber-cement siding – (noun) A typically exterior finish product produced as boards from a composite of sand, cement, and cellulose fibers.

Flow reducer – (noun) A device that limits your water use – usually installed at an outlet, such as a showerhead or sink faucet.

Fly-ash – (noun) A residue generated in the combustion of coal, and currently recycled to supplement Portland cement in concrete production.

Form board – (noun) A typically plywood board used in formwork for pour-in-place concrete.

Formaldehyde – (noun) A widely-used chemical in building materials and household products, most commonly in wood adhesives. *Urea-formaldehyde* (or UF) is a common interior resin, and phenol-formaldehyde (PF) is a common resin used in exterior wood products.

FSC, or Forest Stewardship Council – (noun) A non-profit organization that certifies various forests around the world exhibiting a certain level of sustainability and management practices based on a specific management criteria – including advanced forestry methods, rapid reforestation, or minimal impact on the environment and local community.

Grass-cycling – (noun) The practice of leaving grass clippings on the lawn when mowing, as a form of *compost*.

Graywater system – (noun) A method of reutilizing waste water from lavatories, showers, baths and sinks for *irrigation* and other non-potable uses.

Hardboard – (noun) Also known as high-density *fiberboard*, it is an *engineered wood* product commonly used in interior cabinetry and furniture. It is similar to

particleboard and *MDF*, but is denser and much stronger and harder due to its composition of highly compressed wood fibers.

Hardscape – (noun) The paved areas, like streets and sidewalks, of a landscaped site.

HCFC, or Hydrochlorofluorocarbon – (noun) An ingredient in some refrigerants for air conditioning units that consists of hydrogen, chlorine, fluorine, and carbon and is considered an ozone-depleting substance.

Heat gain – (noun) The amount of heat introduced to a space or building from all heat producing sources, such as building occupants, lights, and from the environment, mainly solar energy.

HEPA filter, or High Efficiency Particulate Air filter – (noun) A regulated and rated type of *high-efficiency filter* that can remove 99.97% of airborne particles. True HEPA filters have met the specific requirements of the United States Department of Energy. It is commonly found in vacuums and *HVAC* return air registers.

High-efficiency filter – (noun) An air filter that removes at least 70% of airborne particles.

HVAC, or Heating, Ventilating, and Air Conditioning – (noun) A common acronym referring to a building's mechanical heating and cooling system.

I-joist – (noun) An *engineered wood* joist designed to exceed and eliminate much of the shortcomings of conventional wood joists. It is comprised of two main parts, a web usually made of plywood or *OSB*, and a flange made of laminated veneer lumber or finger-jointed solid wood.

IAQ, or Indoor Air Quality – (noun) Refers to the air quality within buildings, especially in regards to the health and comfort of building occupants. The quality of IAQ can be measured by the volume of contaminants, gases, particulates, and other adverse masses in a given amount of air.

Incandescent bulb – (noun) The most common lamp type in most residential buildings – it is increasingly being considered a highly inefficient light source as 10% of the electricity it requires actually produces light, whereas the other 90% is given off as heat.

Insulation – (noun) A material that reduces or prevents the transmission of heat, sound, or electricity; or, the act of protecting something by surrounding it with material that reduces or prevents the transmission of sound, heat, or electricity. The four common or conventional types of insulation are: loose fill, batts and blankets, rigid board, and spray foam.

Irrigation – (noun) A deliberate application of, or system of applying, water to soil for assisting in the maintenance of crops and landscaping. Methods usually include mechanical means of moving, dispensing, and catching water.

LEED, or Leadership in Energy and Environmental Design – (noun) A program developed by the United States Green Building Council (USGBC) as a system for rating new and existing commercial, institutional, and residential buildings. It evaluates the overall environmental performance during the lifecycle of a building and provides a tangible methodology for analyzing the standards of a green building.

Low-emissivity, or Low-e – (adjective) Describes a characteristic of a common coating applied to glass in building fenestration to minimize *heat gain* by reflecting most of the solar energy – thus lowering the heat flow through, say, a window into a building.

Low-VOC – (adjective) A term referring to the reduced amounts of *volatile organic compounds* (VOCs) in finishes and materials. I.e. Low-VOC paints do not *off-gas* as much as conventional paints and contain fewer toxins that are harmful to the environment.

MDF, or Medium Density Fiberboard – (noun) An *engineered wood* product composed of broken down softwood fibers, wax, and resin – used in similar indoor

applications as plywood; may contain *urea-formaldehyde* and responds poorly to prolonged exposure to moisture.

MDI, or Methylene Diphenyl Diisocyanate – (noun) An industrial strength, water-resistive non-formaldehyde adhesive, used in *engineered wood*.

Medite II® – (noun) A proprietary brand of *fiberboard* that is formaldehyde-free and exceeds the physical properties of *MDF*.

Native soil – (noun) The natural conditions of the soils at the building site.

Off-gassing – (noun) The evaporation of volatile chemicals in non-metallic materials at normal atmospheric pressure. Materials such as paints and varnishes, carpet, insulation, cabinetry, and *particleboard* can produce significant *off-gassing*.

OSB, or Oriented Strand Board – (noun) An *engineered wood* product, typically in panel form, composed of layered strands of wood in a specific orientation; can contain low levels of *formaldehyde*.

Overhang – (noun) The portion of a roof eave that extends beyond the plane of the building wall.

Particleboard – (noun) An engineered wood product composed of wood chips, sawmill shavings, or saw dust bound with synthetic resin; considered one of the lightest and weakest type of *fiberboard*.

Passive solar heating – (noun) The method of using sunlight for useful energy without use of active mechanical systems, such as situating a building or designing a program that takes advantage of natural sun exposure and air-movement.

Peak load – (noun) The maximum demand on an energy source at one time – commonly referred to in relation to the use of electricity from the grid.

Percolate – (verb) To drain or seep through a porous material or filter.

Percolation – (noun) The act or state of percolating, particularly – the movement of water through the pores in soil or permeable rock or other solid surface.

Puron® - (noun) A proprietary brand of refrigerant considered to be non-ozone depleting and commonly used in air condensers and other mechanical cooling equipment.

PVA, or Photovoltaic array – (noun) A panel, or system of panels, equipped with cells that convert the energy of the sun to direct current (DC) electricity. A separate controller converts the DC to AC (alternating current) making it usable for most residential applications. Electricity produced this way can be stored in rechargeable batteries. PVAs work only when there is sunlight, but can still produce energy on cloudy days.

Recessed can – (noun) A common type of light fixture installation where a downlight is recessed into the ceiling; may be a source of air leaks between conditioned and unconditioned spaces if not properly insulated and housed.

Reclaimed lumber – (noun) Lumber reclaimed by select deconstruction of a building, which can be used for paneling, flooring, and – if re-graded – for structural applications.

Renewable energy sources – (noun) Energy sources other than fossil fuels (coal, petroleum, or natural gas) such as wind, sun, running water, or geothermal heat.

SEER, or Seasonal Energy Efficiency Ratio – (noun) The ratio of electricity an air conditioning unit consumes compared to energy produced (BTU/W-hr); the higher the SEER, the more efficient a product is considered.

Solar attic fan – (noun) A solar-powered fan that ventilates the accumulated hot air in an attic space.

Solar Heat Gain Coefficient, or SHGC – (noun) A measure of how well a window blocks heat caused by sunlight, it is a ratio of a units ability to directly transmit solar radiation compared to that of an unobstructed opening. Thus, the lower the SHGC, the less solar heat the unit should transmit.

Solar DHW – (noun) The method or system of heating water for domestic use via collector panels that promote absorption of heat from the sun’s rays.

Standard fluorescent bulb – (noun) Usually a tubular lamp that connects to an electric fixture via an electric or magnetic ballast; considered one of the more efficient lamp types.

Steel web truss – (noun) Structural truss member consisting of a structural wood top and bottom chord with tubular steel web members. Lightweight and cost-effective in repetitive applications.

Stick framing – (noun) An alternate term for conventional light frame construction using dimensional lumber.

Stormwater runoff – (noun) Untreated precipitation that has flown over impervious surfaces – like driveways, sidewalks, and streets – picking up debris, chemicals, dirt, and other pollutants before discharging into the local storm sewer system.

Structural Insulated Panels, or SIPs – (noun) Panels made from a thick layer of foam (polystyrene or polyurethane) sandwiched between two layers of oriented strand board (OSB), plywood, or fiber-cement. SIPs are an alternative construction material for walls and roofs.

Sustainability – (noun) A way of planning, producing, and living that balances immediate needs for commerce, living, habitation, food, transportation, and energy use with future needs for these resources and systems as well as the liveliness and support of the natural environment and future generations.

Tankless water heater – (noun) Also known as an instant or on-demand water heater, it is more compact than a conventional one as it does not retain any water internally except for what is in the heat exchanger coil. Because it responds solely to demand, it is considered more energy efficient.

Title 24 – (noun) A section of the California Code of Regulations, or CCR, that specifically deals with the regulations regarding energy consumption in building construction and lifecycles.

Ultra-low-flush toilet – (noun) A toilet that uses 1.6 gallons or less per flush.

Urea-formaldehyde – (noun) A resin used in adhesives, finishes, *MDF*, and molded objects known to *off-gas* potentially hazardous chemicals – decreasing the *IAQ* of a building or space.

Variable-set thermostat – (noun) A thermostat with variable set-points to regulate both heating and cooling while maximizing efficiency.

Volatile Organic Compounds, or VOCs – (noun) Gases, including hazardous chemicals, emitted from certain solids or liquids (also known as *off-gassing*). Concentrations of many VOCs are consistently higher indoors than outdoors.

Water Quality Management Plan, or WQMP – (noun) A plan for managing the quality of stormwater or urban runoff that flows from a site or property after construction is completed. A WQMP describes the Best Management Practices (BMPs) that will be implemented and maintained throughout the life of a site or property by property owners, maintenance contractors, etc. to prevent and minimize water pollution.

Whole house fan - (noun) A strategically located ceiling fan to cause maximum movement of air throughout a house.

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