

GREEN GLOSSARY

Page	Feature/Definition
2	<p>Air Purification Systems Air purification systems reduce the risk to health from impurities and contaminants in the air.</p>
6	<p>Built Green Certification Built Green Santa Barbara is an environmental building program initiated by the Santa Barbara Contractors Association that distinguishes and promotes resource efficient development, design, and construction. Green building practices go beyond energy and water conservation to incorporate environmentally sensitive site planning, resource efficient building materials and superior indoor environmental quality.</p>
10	<p>Drought Tolerant Species Plants that have relatively low water requirements, or plants that are well adapted to an arid climate are often described as drought resistant or drought tolerant. Such plants are usually considered good candidates for xeriscaping, derived from the Greek word "xeros", meaning "dry" and combined with "landscape." Xeriscape means gardening with less than average water than is typically used in one's region.</p>
11	<p>Energy Star Appliances Energy Star is an international standard for energy efficient consumer products. First created as a United States government program in 1992, Australia, Canada, Japan, New Zealand, Taiwan and the European Union have adopted the program. The Energy Star logo appears on many computer products and peripherals, kitchen appliances, buildings and other products.</p>
13	<p>Greywater System The Uniform Plumbing Code (Appendix G) defines graywater (also spelled greywater) "as untreated household wastewater which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers."</p>
15	<p>High R-Value Insulation (walls vs. ceilings) Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow from a warm area to a cooler area. A usual rating is from R-7 to R-50. The higher the R-value, the greater the insulating effectiveness. The R-value of thermal insulation depends on the type of material, its thickness, and its density.</p>
16	<p>LEED LEED is a third party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings.</p>
17	<p>Low Flow Fixtures Low Flow Fixtures, including toilets, sink faucets and shower heads, decrease the amount of water consumed, compared to conventional fixtures.</p>
18	<p>Natural Fiber Carpeting These are either produced from the animals or plants. The fiber with which it is produced known as protein or vegetable fibers. These types of carpets once wet remain wet for a long time and can shrink or spoil after a wash.</p>
19	<p>Permeable Driveway Permeable Driveway is a term used to describe paving methods for roads, parking lots and walkways that allow the movement of water and air through the paving material.</p>
20	<p>Radiant Heat Flooring In a radiant setup, the warmth is supplied by hot-water tubes or electric wires buried underneath the floor. As the invisible waves of thermal radiation rise from below, they warm up any objects they strike, which radiate that captured heat in turn. Though the air temperature remains relatively constant, you stay comfortable because the surrounding surfaces aren't stealing warmth from your body.</p>
21	<p>Solar Hot Water Solar Hot Water refers to water heated by solar energy. Solar heating systems are generally composed of solar thermal collectors, a fluid system to move the heat from the collector to its point of usage, and a reservoir or tank for heat storage and subsequent use.</p>
22	<p>Solar PV System Photovoltaics, or PV for short, are panels that convert sunlight directly into electricity.</p>
23	<p>Tankless Water Heater Tankless water heaters, also called Instantaneous or On-Demand water heaters, provide hot water only as needed.</p>

Air Purification Systems:

DEFINITION:

Air purification systems reduce the risk to health from impurities and contaminants in the air. Dust, pollen, pet dander, mold spores, and dust mite feces can act as allergens, triggering allergies in sensitive people. Smoke particles and volatile organic (VOCs) from building products and components can also pose a risk to health. Exposure to various components such as VOCs increases the likelihood of experiencing symptoms of “sick building syndrome”.

Air purifiers are used to reduce the concentration of these airborne contaminants and are especially useful for people who suffer from allergies and asthma. They also reduce the need for frequent household cleaning. Air purifiers use a small amount of electrical energy, causing a small amount of expense and environmental effect.

There are several types of air filtration systems, including Hepa Air Filtration, Activated Carbon Air Filtration, Air Ionizer, Photocatalytic Oxidation Systems / Germicidal UV Lamp, and Ozone Generator.

Certain technologies have little effect in removing solid particles from the air. UV purifiers or ozone air purifiers without a separate and/or a Hepa air filter will not be able to remove dust and other allergens from the air, the most common types of airborne pollutants people want removed. Ionizers without a filter can remove solid particles, but do not actually collect much of the particulate. Hepa air filters capture allergens and other particulate, removing them from the environment, while preventing them from re-entering the air.

Hepa and other air purification technologies are generally ineffective at the removal of chemicals, gases, and smoke created by household cleaners, construction materials, cigarettes, etc. Activated carbon air filters are the most absorbent type of filter for chemicals, while Hepa air filters have little or no effect on these pollutants. Photocatalytic oxidation systems are used to remove VOCs.

For removal of odors, the most effective air purification technologies are ozone purification and activated carbon air filtration. Ozone is a highly reactive and powerful oxidant capable of destroying odor-causing bacteria, while activated carbon is the most absorbent type of filter for removing chemical odor-causing agents.

Ozone and negative ions have some ability to destroy certain micro-organisms, but UV (ultraviolet) light is the most effective at destroying the greatest variety of micro-organisms. UV light destroys viruses, germs, bacteria, and fungi (such as mold) in order to help prevent illness and disease.

The most effective way, and sometimes the most economical way to purify the air throughout the house is through the use of multiple portable air purifiers. Some companies claim their portable air purifier will purify an entire home. However, this may not be an accurate claim due to the fact that portable air purifiers cannot normally purify more than one room or open area at a time. Even an air purifier that uses negative ions (ionizer) and ozone purification cannot effectively circulate the ions and ozone throughout an entire home.

The other option for purifying the air throughout a home is with an in-duct air cleaner. In-duct air purifiers are generally not as effective as a portable unit on a room-to-room basis. Plus, it is difficult to find an in-duct air purifier that can offer multiple technologies. The main limitation to using multiple air purifiers in a home or office is cost. Most room air purifiers cost \$200 or more per unit, making it cost-prohibitive to use multiple units for most people.

Every air purification technology has its strengths and weaknesses. An air purifier that offers multiple technologies is generally best because it combines the advantages of different technologies.

Hepa Air Filtration:

Hepa air filters are the most efficient type of air filter available. They are 99.97% effective at removing particles as small as 0.3 microns. Hepa air filters were developed by the Atomic Energy Commission during the second World War to remove radio active dust from their plants, and are recommended by the U.S. Dept. of Homeland Security.

Air filters serve as a breeding ground for micro-organisms. The fabrics within an air filter allow micro-organisms attached to trapped dust particles to reproduce and/or breed. For this reason, it is imperative that an air purifier with a Hepa filter have a sanitizing device located next to the filter. Otherwise, the growing populations of microbes will be circulated into

the air. A UV lamp, ionizer, or ozone generator can be used for this purpose, although a germicidal UV lamp is most effective at destroying micro-organisms.

Hepa air Filter Strengths:

Removal of dust, pollens, mold spores, dust mites, and other allergens.
Removal of many bacteria.
Solid particles captured are not released into the air again.

Hepa Air Filter Weaknesses:

Difficult time removing airborne particles from across the room, since they must be drawn through the filter.
Do not remove chemical fumes, gases, cigarette smoke or odors.
Do not capture ultra-fine particles, viruses or germs.
Micro-organisms captured in filter can breed and/or reproduce, resulting in increased micro-organism populations.

Technologies that Compliment Hepa Air Filters:

Ionizer to cause finer particles to magnetically attach together, making them easier to capture, and to better remove airborne particles from across the room, since ions can be circulated.
Activated Carbon Air Filter to capture the chemicals, fumes, and cigarette smoke that Hepa filters cannot.
Germicidal UV Lamp to destroy viruses and germs that are not captured by Hepa air filters, and that also prevent micro-organisms trapped in the Hepa filter from breeding and/or reproducing.
Ozone Generator to remove odors that are unaffected by Hepa air filters. Should be able to be turned completely off.

Activated Carbon Air Filtration:

Activated carbon air filters consist of a vast system of pores of molecular size. These pores are highly absorbent, forming a strong chemical bond / attraction to odorous, gaseous, and liquid contaminants. Activated carbon is a highly porous material that can absorb volatile chemicals on a molecular basis, but it does not remove larger particles. Activated carbon can be used at room temperature and has a long history of commercial use. It is normally used in conjunction with other filter technology, especially with HEPA.

Activated Carbon Air Filter Strengths:

The most absorbent filter available, making it highly effective at capturing chemical fumes, gases, cigarette smoke, and odors.
Does not release captured contaminants back into the air.

Activated Carbon Air Filter Weaknesses:

Does not effectively remove dust and other allergens.
Does not effectively capture micro-organisms.
Has a difficult time removing contaminants from across the room, since they must travel through the filter.

Technologies that Compliment Activated Carbon Air Purifiers:

Hepa Air Filter to capture allergens and other particles that activated carbon cannot.
Ionizer to remove chemicals from across the room.
Germicidal UV Lamp to destroy micro-organisms not affected by the activated carbon filter.

Air Ionizer:

An air ionizer creates negative ions, which change the polarity of airborne particles, causing them to magnetically attract together. As a result, they become too large to remain airborne, and fall out of the air. The most effective ionizers use a stainless steel "needlepoint" to produce negative ions.

Negative ions have a short life (typically about 30 seconds), and can cover an area of up to about 500 sq. ft. Ozone can travel farther before breaking down to oxygen, but ozone is not effective against most common and important indoor air pollutants (except for odors).

Air Ionizer Strengths:

Removal of particles from the air, including ultra-fine particles as small as 0.01 microns.
Neutralization of viruses, bacteria, cigarette smoke and chemical fumes.
Can circulate throughout the room to remove airborne particles that are across the room from where the air purifier sits.

Air Ionizer Weaknesses:

Does not collect many or most of the airborne particles removed from the air.
Does not remove odors.
Does not kill germs, fungi (although it does remove them from the air), and not all viruses.
Does not remove all chemicals.

Technologies that Compliment Air Ionizers:

Hepa Air Filter to collect ionized particles.
Ozone Generator to remove odors. Should be able to be turned completely off.
Germicidal UV Lamp to kill germs, viruses, and fungi.
Activated Carbon Air Filter to effectively capture chemical fumes.

Photocatalytic oxidation / Germicidal UV Lamp:

Photocatalytic oxidation (PCO) systems are able to completely oxidize and degrade organic contaminants. For example, Volatile Organic Compounds found in low concentrations (within a few hundred ppm or less) are the most likely to be completely oxidized. However, the system must run for a relatively long time to completely oxidize contaminants. PCO uses short-wave ultraviolet light (UVC), commonly used for sterilization, to kill 99.9% of bacteria and viruses. Independent research confirms its effectiveness against molds, bacteria, and viruses.

UVC in-duct units can be mounted to an existing forced-air HVAC system. PCO is not a filtering technology, as it does not trap or remove particles. It is sometimes coupled with other filtering technologies for air purification. To remove VOCs present in larger concentrations, a system that combines photocatalytic oxidation and some other form of air purification may be necessary. UV sterilization bulbs must be replaced about once a year, and manufacturers may require periodic replacement as a condition of warranty. Photocatalytic Oxidation systems often have high commercial costs.

Ultraviolet (UV) lamps effectively destroy micro-organisms that pass by the bulb, including germs, viruses, bacteria, and fungi (such as mold). UV Light radiation is recommended by the Centers of Disease Control to prevent illness and disease.

UV Lamp Strengths:

Ability to destroy micro-organisms, such as germs, viruses, bacteria, and fungi (including mold).
Helps prevent illness and disease.

UV Lamp Weaknesses:

No affect on particulate, including most allergens.
No affect on chemical fumes, gases, or cigarette smoke.
No affect on odors, unless designed to produce ozone, which may not be desired under all circumstances. Some UV lamps are designed not to produce ozone.

Technologies that Compliment UV Air Purifiers:

Hepa Air Filters and *Air Ionizers* to remove and capture solid particles, including dust and other allergens, which are not affected by UV lamps.
Activated Carbon Air Filter to remove chemical fumes which are not affected by UV lamps.

Programmable Ozone Generator to increase odor elimination capability, which can be completely turned off if not needed, allowing the use of a non-ozone producing UV lamp.

Ozone Generator:

Ozone is a highly reactive oxidant that destroys certain bacteria and chemicals, including odor-causing bacteria and chemical agents. Ozone is highly effective against strong odors, but is not always needed or wanted under normal circumstances. Ozone is great for environments where strong odors exist, but can be overbearing when they are not present, since ozone has its own scent. Therefore, it is important to be able to control the ozone output, or even to be able to turn the ozone completely.

Ozone Strengths:

Highly effective against odors, including cigarette smoke odors.
Helps to destroy certain chemicals and bacteria.

Ozone Weaknesses:

The smell of it can be bothersome to some.
Can cause irritation of the eyes, nose, and throat if occurring in high enough concentrations.
No affect on solid particles, such as allergens.
Does not neutralize most chemicals.

Technologies that Compliment Ozone Air Purifiers:

Hepa Air Filter and *Ionizer* to remove solid particles from the air.
Germicidal UV Lamp to remove micro-organisms not affected by ozone.
Activated Carbon Air Filter to remove chemicals not neutralized by ozone.
Ozone Controls in order to adjust the ozone level to the desired concentration, or even to turn completely off if it is not needed or wanted.

COST & SAVINGS & BENEFITS:

Price and Replacement Costs:

Price Can Be Deceiving. In the air purifier market, there are inexpensive air purifiers that are very effective, and extremely expensive air purifiers that do not clean the air very well at all. Cost is not necessarily the way to determine the best air purifier for your situation. Consider the application and goals of the air filtration system in choosing the best one for you.

Know the Replacement Costs. It is also important to verify replacement costs before buying an air purifier, so you understand the total lifetime cost. Some air filters cost a couple hundred dollars a year in replacement filters. A reasonable cost for a Hepa / Activated Carbon filter cartridge is about \$35 per replacement, and a UV lamp about \$15 per replacement, which will last 1-2 years and 1 year respectively.

Electricity Consumption:

Many air filters consume heavy amounts of power, adding upwards of \$200 a year or more to your electricity bill. It is important to verify the wattage used by an air purifier. Anything over 100 watts, can add over \$100 a year to your electricity bill.

Noise:

Air filtration units with a high wattage rating may be capable of drawing large volumes of air through the unit, but they are also very noisy. As a result, you trade in air pollution for noise pollution.

The noise level of a purifier can be obtained easily through a customer service department and is usually reported in decibels (dB). The noise levels for most purifiers are low compared to many other home appliances and are not expected

to cause hearing loss. However, purifiers are expected to operate over long periods of time, and therefore, even a moderate level of noise can be disturbing to some people.

Selecting an Air Purification System:

When selecting air purifiers, consumers are influenced by several factors besides cleaning ability. These include possible hazardous gaseous by-products, noise level, frequency of filter replacement, electrical consumption, and visual appeal. Ozone production is typical for ionizing purifiers and has received much attention recently. Although a high concentration of ozone is potentially dangerous, most ionizers produce low amounts of ozone (<0.05 ppm). Frequency of filter replacement and electrical consumption are the major operation costs for any purifier. There are many different types of filters; some can be cleaned by water, by hand or by vacuum cleaner, while others need to be replaced every few months or years. Some purifiers are certified as energy star and are energy efficient.

REAL WORLD EXPERIENCE:

Reference needed.

FOR MORE INFORMATION:

<http://www.ce.utexas.edu/prof/Siegel/>

<http://www.allergybuyersclubshopping.com/airpurifiers.html>



Definition:

Built Green Santa Barbara is an environmental building program initiated by the Santa Barbara Contractors Association that distinguishes and promotes resource efficient development, design, and construction. Green building practices go beyond energy and water conservation to incorporate environmentally sensitive site planning, resource efficient building materials and superior indoor environmental quality.

Cost & Savings & Benefits:

Buyers save money because energy efficient homes and buildings generate lower utility bills and maintenance costs. Now, it may also be possible to qualify for a higher loan amount and buy a better home for a lower monthly cost. Examples of other first cost or operational savings are below.

Dollar Saving Features of Built Green

- Advanced Framing Technique - provides more insulation while saving lumber costs by 10% or more.
- Passive Solar Sitting and Design - uses nature's energy, not the utility's, to supplement heating and lighting.
- Radiant Floor Heating - generating an ambient temperature of 65 degrees can provide the same comfort as a forced air system generating an ambient temperature of 72 degrees, shaving 20% to 40% off heating bills.
- Compact Fluorescent Lighting - uses one-quarter to one-third as much electricity as incandescent and last 10 times longer.
- Front Loading (Horizontal-Axis) Clothes Washers - use one-third as much water as conventional washers, reducing water and energy use by two-thirds. They are also quieter and cause less wear on fabrics.
- Native Landscaping - reduces water consumption as much as 50%, requires less maintenance and little or no chemical treatments.
- Water-conserving Showerheads and Faucets - can cut hot water use in half, saving a family of four 14,000 gallons of water a year and the energy required to heat it.

Top Ten Reasons

Contractors in California already build to some of the toughest energy, air quality, storm water management, and water efficiency standards in the nation. Based on choices by the builder and homeowner, Built Green™ goes beyond even these standards to give you added value, added peace of mind. Following, in no particular order, are ten reasons to buy a Built Green home.

More Money in the Piggy Bank

A Built Green home typically saves money on operating costs because of more efficient energy use with such features as extra insulation, more efficient water heaters, lighting and appliances, and the use of natural day lighting techniques. Many Built Green features save money on construction costs up-front.

Less 'New' Odors and Better Indoor Air

Using low-VOC and low-toxic interior paints and finishes can reduce toxins, thereby increasing indoor air quality in a home. Carpeting can be tacked rather than glued with adhesives that can off-gas over time. Mechanical ventilation can be improved by installing a 'positive' system that exhausts indoor air at a slightly slower rate than fresh air is brought inside. Improving indoor air can be especially helpful for residents with sensitivities to allergens.

Saves Old-Growth Forests

Rapidly renewable materials such as bamboo, wheatgrass, cork and strawboard can be managed, grown and harvested in a sustainable way, and can effectively replace lumber from old-growth trees. Engineered lumber uses smaller pieces of fast-growing wood to obtain the same sizes and higher strengths as lumber milled from large old-growth forests. Plastic

lumber made from recycled plastic jugs can also be used for decking, sills and siding -- replacing what are traditionally wood products.

Water Conservation

Water conservation can be achieved by installing drought tolerant plants and less lawn in landscaped areas. Porous paving can be used in driveways and walkways to allow rainwater to seep into the ground instead of running off. Strict erosion control methods are used to help reduce sedimentation into streams, and natural features of a site can be protected. All of these measures benefit the Ocean and sea life.

Less Time Spent For Maintenance and Repairs

It takes less work and resources to maintain certain materials in a home. For example, siding, decking and trim made from plastic lumber needs little or no painting. Durable materials such as stone, tile and slate last longer and therefore need replacement less often.

Reduced Draft Inside The Home

A home can be sealed against the outside elements with advanced caulking that goes beyond basic practice. Typically, exterior walls are caulked around windows and door-frames, and on interior walls where they intersect with exterior ceilings. Air sealing can be checked for effectiveness with an optional 'blower door' test.

Healthier Yard With Homegrown Topsoil

During construction of a house or development, the topsoil that is removed for grading can be stockpiled and, later, reapplied to the site for healthier soils. Soil amendments can be added, such as compost, to further promote good soil for plantings that will have a better establishment.

Reduces Dependence On Fossil Fuels & Promotes Cleaner Air

By promoting the use of local materials, transportation and other costs can be reduced. By including pedestrian access and access to mass transit, projects can encourage the decreased use of automobiles, thereby reducing our foreign oil consumption and helping maintain cleaner air outdoors.

Less Trash

Built Green builders and remodelers post jobsite recycling plans and recycle as much as possible of scrap building materials such as lumber, wall board, concrete, cardboard and packaging. They can also incorporate many materials that contain recycled content or have been salvaged. This helps reduce the amount of material going to our already overburdened landfills.

Promotes Businesses Committed To 'Green'

The member companies of Built Green include contractors, builders and sub-contractors who are willing to not only build green but to go to the extra effort and cost to have their projects certified as Built Green; architects who can design a green home with you every step of the way; and our local governments that are committed to protecting the quality of life for all of us!

Real World Experience (how can it be applied):

Green Building is Here

At a March 26 press conference during the National Green Building Conference in St. Louis, MO builders heard that sustainable building products and techniques are advancing quickly into the mainstream. Based on a survey of NAHB home builders conducted last year by McGraw-Hill Construction, between 40% and 50% of the homes built in 2010 are expected to be green, containing at least three of five green building elements. That represents a major upsurge of activity in the green market. Last year, according to McGraw-Hill estimates, an estimated 2% — or \$7.4 billion — of the residential construction market was green.

"It is interesting that people are really starting to commit to building green homes, moving away from just adding energy-efficient appliances," said Harvey M. Bernstein, McGraw-Hill Construction's vice president of industry analytics, alliances and strategic initiatives. "Though it's still a small number, builders are already getting it when it comes to the value of green homes, and it appears home owners are too."

A new home buyer survey by the company has found a high degree of customer satisfaction with green homes. Sixty-three percent of the green home buyers in the poll said that their green purchases were motivated by the lower operating and maintenance costs that come with energy- and resource-efficient homes.

Eighty-five percent of the green home buyers said they were more satisfied with their new green homes than with their previous, more traditionally built homes. The public interest in sustainability extends into the existing market, with the survey finding that about 40% of home owners who had recently completed remodeling or renovation work on their properties had used green products or materials. Ninety-two percent of the builder members participating in the McGraw-Hill research said that they are moving toward green building because it's "the right thing to do."

Weblink for additional information:

<http://www.builtgreensb.onlinehostservice.com/home.html>

http://www.builtgreensb.onlinehostservice.com/f/Built_Green_SB_Remodeler_Checklist.pdf

DROUGHT TOLERANT LANDSCAPING

Definition:

Plants that have relatively low water requirements, or plants that are well adapted to an arid climate are often described as drought resistant or drought tolerant.

Such plants are usually considered good candidates for xeriscaping, derived from the Greek word "xeros", meaning "dry" and combined with "landscape." Xeriscape means gardening with less than average water than is typically used in one's region.

Benefits:

The cost benefits are obvious, in that this type of landscaping requires far less water, and hence substantially lowers a property's water bill. Usually these plants are inherently tougher and withstand pests better than plants which require more water.

1. Running a sprinkler for 1 hour consumes more than 264 gallons of water.
2. Between 60-70% of our *treated* drinking water is used to water lawns. The average irrigated home lawn consumes more than 10,000 gallons of water each summer.
3. Growing native plants can save 50% of the water typically used to maintain outdoor plants.

Application:

Xeriscaping is easily applied in our region. In fact, many native species are also drought tolerant, and because they are native, do exceptionally well with minimal maintenance. For a list of drought tolerant plants, visit:

http://www.laspilitas.com/garden/Drought_resistant_plants_for_a_santa_barbara_garden.html.

Energy Star Appliances

Energy Star is an international standard for [energy efficient consumer](#) products. First created as a United States government program in 1992, Australia, Canada, Japan, New Zealand, Taiwan and the European Union have adopted the program. The Energy Star logo appears on many computer products and peripherals, kitchen appliances, buildings and other products.

History

The Energy Star program was created in 1992 by the United States Environmental Protection Agency in an attempt to reduce energy consumption and greenhouse gas emission by power plants. The program was developed by John S. Hoffman, inventor of the Green Programs at US EPA, and implemented by Cathy Zoi and Brian Johnson. The program was intended to be part of a series of voluntary programs, such as Green Lights and the Methane Programs, that would demonstrate the potential for profit in reducing greenhouse gases and facilitate further steps to reducing global warming gases.

Initiated as a voluntary labeling program designed to identify and promote energy efficient products, Energy Star began with labels for computer products. In 1995 the program was significantly expanded, introducing labels for residential heating and cooling systems and new homes. As of 2006, more than 40,000 Energy Star products are available in a wide range of items including major appliances, office equipment, lighting, home electronics, and more. In addition, the label can also be found on new homes and commercial and industrial buildings. In 2006, about 12 percent of new housing in the United States was labeled Energy Star.

The EPA estimates that it saved about \$14 billion in energy costs in 2006 alone. The Energy Star program has helped spread the use of [LED traffic lights](#), efficient [fluorescent lighting](#), [power management](#) systems for office equipment, and low standby energy use.

Specifications

Energy Star specifications differ with each item, and are set by either the Environmental Protection Agency or the Department of Energy. The following highlights product and specification information available on the Energy Star website.

Appliances

As of early 2008, average refrigerators need 20% savings over the minimum standard. Dishwashers need at least 41% savings. Most appliances as well as heating and cooling systems have a yellow EnergyGuide label showing the annual cost of operation compared to other models. This label is created through the Department of Energy and often shows if an appliance is ENERGY STAR.

Heating and Cooling Systems

Energy Star Heat pumps, boilers, air conditioning systems, and furnaces are available. In addition, cooling and heating bills can be significantly lowered with ENERGY STAR air sealing and duct sealing. Air sealing reduces the outdoor air that penetrates a building, and duct sealing prevents attic or basement air from entering ducts and lessening the heating/cooling system's efficiency.

Home Electronics

Energy Star televisions use 30% less energy than average. In November 2008, television specifications will be improved to limit on-mode power use, in addition to standby power which is limited by the current specifications. A wider range of

Energy Star televisions will be available. Other Energy Star home electronics include cordless phones, battery chargers, VCRs and external power adapters, most of which use 90% less energy.

Lighting

Energy Star fluorescent lighting uses 75% less energy and lasts up to ten times longer than normal incandescent lights.

Home office

A new Energy Star specification for desktop computers went into effect [20 July 2007](#). The requirements are more stringent than the previous specification and existing equipment designs can no longer use the logo unless re-qualified. The power requirements are for 80% or greater [AC power supply](#) efficiency using the standards defined by 80 Plus Program.

Buildings

Energy Star buildings use at least 15% less energy than standard homes. They usually include properly installed insulation, high performance windows, tight construction and ducts, energy efficient cooling and heating systems, and Energy Star appliances, lighting, and water heaters.

Savings can be from \$200 - \$400 per year.

The best link is www.energystar.gov .

Graywater System

Definition: The Uniform Plumbing Code (Appendix G) defines graywater (also spelled greywater) “as untreated household wastewater which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers.” A graywater system is one that uses graywater for subsurface landscape irrigation. (See Appendix G to Title 24, Part 25, of the California Administrative Code.) A graywater system employs modifications of septic system technology, particularly the location of the drainfield in the root zone of plants, and, importantly, the isolation of blackwater (i.e. toilet discharge) to a separate system.

Costs & Savings & Benefits:

Let’s start with *benefits* first. These include but are not limited to reducing fresh water and chemical use and energy; reducing strain on (and thus increasing the useful life of) septic tanks or water treatment plants; recharging groundwater; promoting plant growth; and reclaiming otherwise wasted nutrients. Graywater contains nitrogen, phosphorus, and potassium—excellent nutrient sources for many plants—but sources of pollution for ground water and bodies of water. (Note: subsurface graywater irrigation is safe for shrubs, flowers, trees but may be harmful to some plants and should not be applied to anything eaten, including root crops.) Thus, the appropriate use of graywater increases the effective water supply in regions where subsurface irrigation is needed and may reduce pollution to lakes, rivers, and ground water. When juxtaposed with other environmental and energy measures to be considered for incorporation in a home, a graywater system may provide only moderate benefits overall.

As for the *costs*: Separate blackwater and graywater lines in the house are required, which, while not difficult in new construction, is considerably more so in existing homes. Graywater systems are more expensive to install than conventional spray and drip irrigation systems because the former typically include a tank, filter, and special emitters. The additional cost of a graywater system is significant when a sewer line is available. Thus, the costs of such a system are satisfactory in limited conditions.

Savings: Graywater is the largest source of residential waste water and may constitute up to 40 gallons per person each day. However, because these systems tend to be expensive to incorporate in existing homes but less so in new construction, consideration should be given to the alternative of using less water in the first place through other measures. A thoughtful cost-benefit analysis to project ultimate savings must incorporate a realistic forecast of the average volume of graywater generated by the household, the ability of the ground to absorb the water, and the specific types of vegetation to be irrigated.

Real World Experience:

A. *Process:* There are seven steps in installing and using a graywater system:

Investigate the permit process [by contacting the local Building Department for information on their permit process—very important]

Prepare a plan

Design the graywater system

Submit the plan for review and approval

Install the system

Arrange for system inspection and approval

Use, monitor, and maintain the system

-- from *Using Graywater in Your Home Landscape Graywater Guide* (1995)

B. Cautionary Tips: Mishandling of graywater can pose health risks because it contains harmful viruses, bacteria, and chemicals. Never allow graywater to drain on the surface ground or on plants that will be used as food, and never store it in ponds, lagoons, or holding tanks for future use. Hair and particulates must always be filtered to prevent bio-mat clogging the leach field.

Weblinks for Additional Information:

www.greenbuilder.com/sourcebook/Greywater.html

www.greywater.com

www.owue.water.ca.gov/docs/Revised

www.santabarbaraca.gov/Resident/Water/Water_Conservation

High R-Value Insulation (walls vs. ceilings)

Definition: What Is an R-Value?

Insulation is rated in terms of thermal resistance, called R-value, which indicates the resistance to heat flow from a warm area to a cooler area. A usual rating is from R-7 to R-50. ***The higher the R-value, the greater the insulating effectiveness.*** The R-value of thermal insulation depends on the type of material, its thickness, and its density. In calculating the R-value of a multi-layered installation, the R-values of the individual layers are added. The effectiveness of an insulated ceiling, wall or floor depends on how and where the insulation is installed.

Local building codes often specify R-values but these may be minimum values for comfort, rather than for optimal energy efficiency. To ensure a reliable R-value rating, always look for insulation that has been certified by [ENERGY STAR](#), [GreenGuard™](#), [Green Seal](#), or another reputable green product certification program.

Benefits of High R:

- Maximizes comfort by maintaining even heating and cooling.
- Decreases energy use for heating and cooling, which decreases utility bills.
- Uses less energy, which decreases pollution and greenhouse gas emissions associated with energy production and consumption.
- Tax breaks and incentives are now being offered by the Federal Government for energy saving improvements.

Costs: These vary greatly, from a hundred to several thousand dollars, depending on the size and type of area you are insulating (attic, walls, ceilings or floors, garage, etc.) Also depends on if you are adding to existing insulation or creating a new structure. Choice of materials like Fiberglass or recycled denim effect cost as well. Climate & regional factors will determine how much installation is necessary.

Savings: "[The Rocky Mountain Institute](#) estimates that upgrading insulation in just the attic of the typical American home will reduce that home's CO₂ emissions by 2,142 pounds per year and save more than \$116 per year in heating costs. The Institute also estimates that the payback period for improved insulation is five years for homes heated with gas or oil, or that use air conditioning. The payback is shorter for homes heated with an electric furnace or baseboard heating. Because proper insulation has a significant impact on a home's energy efficiency, it can result in the need for smaller heating and cooling units.'

Real World Experience: The Johnson family of Lake Tahoe, Ca, added installation to their 5 year old water heater, to the fiberglass bedding in the attic, and to the ceilings in all four bedrooms, for a cost of \$400.00, using recycled materials. They discovered that their gas heating bill was reduced by \$25.00 on average, and rooms stayed warmer and more temperate for hours after the heater was turned off.

Weblinks for more Info:

http://www.ornl.gov/sci/roofs+walls/insulation/ins_02.html

<http://www.greenyourhome.com>

http://www.ornl.gov/sci/roofs+walls/insulation/ins_02.html

Leadership in Energy and Environmental Design (LEED) Certification

Definition: LEED is a third party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

COST & SAVINGS & BENEFITS

COST FOR SINGLE-FAMILY HOUSING		COST FOR MULTI-FAMILY HOUSING		VOLUME PRICING
REGISTRATION	CERTIFICATION	REGISTRATION	CERTIFICATION	PROPOSED
USGBC MEMBER	\$150	\$250	\$450	\$0.035 PER SQUARE FOOT
NON-MEMBER	\$250	\$350	\$600	\$0.045 PER SQUARE FOOT

Partners in the EPA's ENERGY STAR program average 30% to 40% return on investment to retrofit older buildings with high-efficiency lighting, for example.

The benefits of a LEED home include economic benefits such as lower energy and water bills; environmental benefits like reduced greenhouse gas emissions; and health benefits such as reduced exposure to mold, mildew and other indoor toxins.

LEED-certified homes may also be eligible for financial benefits such as lower fees for financing and lower insurance rates.

REAL WORLD EXPERIENCE

Carsten Crossings Oakgrove Model
Rocklin, California

The 144-home Carsten Crossings subdivision in Rocklin, California, is the country's first to be built with a commitment to certifying all its homes under the LEED® Green Building Rating System. The three- to five-bedroom homes range from 2,168 to 2,755 square feet, with the four-bedroom, 2,543-square-foot Oakgrove model falling right about in the middle.

\$1,400 yearly savings on utilities

75% minimum construction waste diverted from landfill, by weight

65% lower utility bills

FOR MORE INFORMATION

<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>

Low Flow Fixtures

Definition: Low Flow Fixtures, including toilets, sink faucets and shower heads, decrease the amount of water consumed, compared to conventional fixtures. In 1995 the National Energy Policy Act mandated that toilets use no more than 1.6 gallons of water per flush.

Different types of low-flow toilets use various technologies aimed at making the toilet more functional. Some toilets have large drain passages, redesigned bowls and tanks for easier wash down. Others supplement the gravity system with water supply line pressure, compressed air, or a vacuum pump.

Costs: Low Flow Fixtures are comparable to conventional fixtures, though shower heads & decorative faucets may be a bit more expensive. Some consumers worry that water pressure will be too weak, but in recent years improved technology has solved most former problems.

Benefits: Water economy and subsequent financial savings are considerable. Low-flow toilets use a maximum of 1.6 gallons of water per flush compared with about 3.5 gallons of water used by a standard toilet. Low-flow shower heads use about 2½ gallons of water per minute compared to between four and five gallons per minute used by conventional heads. Low-flow faucet aerators can cut the water usage of faucets by as much as 40% from 4 gallons per minute to 2½.

Real World Examples:

- | | | | |
|----|--|----------|--|
| 14 | US EPA National Computer Center | Durham | Water-efficient fixtures are incorporated throughout the facility, including flow-restricting nozzles and automated shutoff, as well as hot and cold water delivery systems with automatic temperature controls. The bathrooms are outfitted with sensor-operated, metered faucets, saving water and the energy required to heat it. For more details about this technology/strategy and project, including photos, a video, detailed documents, and specifications, see http://www.epa.gov/rtp/new-bldg/environmental/environmental.htm |
| 15 | NCSU Solar House | Wake | Low-flow fixtures are used in the Solar House to conserve water, energy, and money. Low-flow fixtures are particularly useful when using a solar domestic hot water heater. |
| 16 | EcoDorm at Warren Wilson College | Buncombe | All showers and faucets are low flow fixtures. |
| 17 | Eno Commons Cohousing Neighborhood | Durham | Homes were approached as “whole systems.” All fixtures were low-flow from beginning. |
| 18 | Saver & White Residence | Dare | Low flow toilets, shower heads, front loading clothes washer, as well as Kenmore high efficiency dishwasher were used to reduce water usage. Additionally, all plumbing is centrally located to reduce waste through long runs of pipe. |

Website for further reference:

http://www1.eere.energy.gov/femp/water/water_faqs.html

<http://www.epa.gov/WaterSense/>

<http://www.terrylove.com/crtoilet.htm>

http://apps1.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050

Natural Fiber Carpet

How is this?



Natural Fiber Carpet

These are either produced from the animals or plants. The fiber with which it is produced known as protein or vegetable fibers. These types of carpets once wet remain wet for a long time and can shrink or spoil after a wash.

Wool

Woolen carpets are the product of the lambs' hair and they are the oldest carpets available and they are known as the best of the carpet material. The wool stretch capacity is up to 40% and it can be rough used in the sense it can be bend front and back without any damage. They are the most expensive

kind of carpets but they are still the best.

Silk

The Insect fiber or silk is produced by silkworms. The silk carpet are very strong and do not have any static charge in them even at a low temperature.

Cellulose fiber

The cellulose is a plant fiber is produced by plants and is woven.

Cotton

Cotton again is a vegetable fiber which is produced from the cotton plant. The primary use for this fiber is yarns woven in carpet or rugs. Cotton carpets are strong and mostly used in hot climates and they become stronger when put in water. As with the cotton it takes a long time to dry when wet and they can easily stain.

Jute

The fiber of jute is produced by the jute plant

Which grows in India and Pakistan and also South America, Jute is normally weaved and it is the cheapest material and apart from carpets they are used in other industry. Jute fibers are also the shrinking type when wet. It is not very strong and tends to breakage.

It becomes wet and is also subject to dry rot.

Sisal

This the product of a plant of sisal from the leaves of the

Agaves plant. Sisal is very strong and used for making rugs, rope, and even carpets. The fiber is very difficult to clean and like cotton also subjects to shrinkage.

Rayon

Rayon is a man-made fiber or known as synthetic fiber which is product of cellulose fiber of wood or cotton. The fiber is thus treated chemically and it helps it into a synthetic fiber.

Permeable Driveway

Definition: Permeable Driveway is a term used to describe paving methods for roads, parking lots and walkways that allow the movement of water and air through the paving material. Whether porous asphalt, porous concrete, paving stones, bricks or plastic grid systems all these materials allow precipitation to percolate through areas that would traditionally be impervious and instead infiltrates the storm water. Permeable pavement allows rainwater to filter into the ground while providing a durable surface for vehicles to drive on. While gravel driveways and other porous materials are a common form of this, other types composed of interlocking concrete blocks or plastic cell networks can allow vegetation to poke through

COST & SAVINGS & BENEFITS

Product	Manufacturer	Cost (Square Foot)
Asphalt	Various	\$0.50 - \$1.00
Geoweb®	Presto Products, Inc.	\$1.00 - \$2.00
Grasspave™, Gravelpave™	Invisible Structures, Inc	\$1.00 - \$2.00
Grassy™	Pavers RK Manufacturing	\$1.00 - \$2.00
Geoblock®	Presto Products, Inc	\$2.00 - \$3.00
Turfstone	Westcon Pavers	\$2.00 - \$3.00
UNI-Eco-stone	Uni-Group USA	\$2.00 - \$3.00
Checkerblock	Hastings Pavement Co.	\$3.00 - \$4.00

Permeable systems can cost more to lay than asphalt or poured concrete and, depending on the material, may require more maintenance. But the results are more aesthetically pleasing, more environmentally responsible, and may save money in the long run. By allowing rainwater to soak into the ground, permeable systems slow run-off and flooding the sewer systems. Allowing grass and plants to grow improves air quality and reduces the heat island effect.

REAL WORLD EXPERIENCE

Country Lanes

Vancouver, British Columbia

The City of Vancouver took an existing asphalt lane and using several permeable paving materials (permeable pavers, gravel driving strips, structural grass and swales) created what they are calling a “Country Lane.” The intent was to improve natural infiltration, reduce the amount of surface water entering the sewer system and improve the overall aesthetics of the lane.

FOR MORE INFORMATION

[Country Lanes Project](#)

[Heat island effect](#)

[National Pollutant Discharge Elimination System](#)

[Center for Watershed Protection](#)

Radiant Floor Heat

SOME FACTS ABOUT RADIANT FLOOR HEATING...

In a radiant setup, the warmth is supplied by hot-water tubes or electric wires buried underneath the floor. As the invisible waves of thermal radiation rise from below, they warm up any objects they strike, which radiate that captured heat in turn. Though the air temperature remains relatively constant, you stay comfortable because the surrounding surfaces aren't stealing warmth from your body.

Q. Is radiant more efficient? A. If you mean will it cost less in fuel cost? The answer is not always.

If the house is small to medium sized **and** very well insulated or uses some of the advanced construction methods you will not save with radiant heat.

If the house design is not adjusted to the requirements of radiant heat.

If you use a non-modulating or cast iron boiler you will increase your fuel costs considerably over forced air.

The radiant heated house must be insulated differently to be efficient. A heated floor can lose as much down as up.

Buying the wrong equipment can shorten the useful life of very expensive equipment or damage your home.

Improper or lack of insulation under a slab can cost much more than forced air heating.

Q. What should a radiant system cost? A well designed radiant system with a 96% efficient condensing boiler, stainless steel indirect water heater, Pex tubing, brass manifolds, thermostats and all necessary equipment to install it will normally cost less than \$3.00 per Sq. Ft., less than \$2.00 for a slab on grade. The larger the home the less the cost of equipment per Sq. Ft. A 5,000 Sq. Ft home will cost less than \$2.00 per Sq. Ft. even using the very best equipment. A small addition between 400 to 800 Sq. Ft. normally costs about \$400.00 to \$800.00 and can use your present water heater. Water heaters start at less than \$600.00 for an 87% efficient wall hung modulating combination heater.

THE GOOD NEWS...

A radiant floor heating system if designed and installed properly will be the most comfortable, efficient and can often be installed for less than a forced air system. A properly designed radiant system should use the most efficient heat source that is practical. Although locally here in Santa Barbara radiant floor heat is still more the exception than the rule, its popularity is gaining momentum. A call to your favorite plumber can answer most questions.

SOLAR HOT WATER

Solar Hot Water refers to water heated by solar energy. Solar heating systems are generally composed of solar thermal collectors, a fluid system to move the heat from the collector to its point of usage, and a reservoir or tank for heat storage and subsequent use. The systems may be used to heat water for home or business use, for swimming pools, underfloor heating or as an energy input for space heating and cooling and industrial applications.

Residential solar thermal installations can be subdivided into two kinds of systems: compact and pumped systems. Both typically include an auxiliary energy source (electric heating element or connection to a gas or fuel oil central heating system) that is activated when the water in the tank falls below a minimum temperature setting such as 50 °C. Hence, hot water is always available. The combination of solar hot water heating and using the back-up heat from a wood stove chimney to heat water can enable a hot water system to work all year round in northern climates without the supplemental heat requirement of a solar hot water system being met with fossil fuels or electricity.

Solar PV:

Photovoltaics, or PV for short, are panels that convert sunlight directly into electricity. The solar panels convert sun energy into Direct Current (DC). An inverter is used to convert the DC power into Alternating Current (AC) for use in a home or business. PV Panels can either be mounted on roofs or ground mounted arrays (an array is a series of panels connected together). Most systems are “Grid Intertie” systems. This means that the home is still connected to the local power company. During the day, the PV system will usually create more power than the home uses, thus “spinning” the meter backward. During the night, the home uses power from the grid causing the meter to spin forward. This is known as net metering. An “Off Grid” home has the addition of batteries for use at night and is not connected to the local utility.

COST, SAVINGS, AND BENEFITS:

After rebates a home PV system will cost between \$15,000 and \$25,000 depending on the size of the array. The system is usually designed to generate 80 to 90 percent of the electrical needs of a home, and will therefore greatly reduce the home electric bill. Not only is there a savings in money, but solar power is a very clean power source and helps reduce the green house gasses that a power plant would create. An Intertie system has the additional benefit of the home “pushing” power to the grid during the day when the utility company needs it most and then “pulling” it back at night when the utility has an abundance of available power.

REAL WORLD EXPERIENCE:

Vacation Rental in Santa Barbara.

The owners of a home in Santa Barbara used as a vacation rental installed a PV system on the home in 2004 at a cost of \$20,596 after rebates. In 2003, their electric bills averaged \$250 per month. Since the installation of the system, their monthly bills have averaged \$69 per month. With a savings of \$181 per month, the system will be paid for through energy savings in 9.5 years—even faster as rates increase.

TANKLESS WATER HEATING SYSTEMS

Tankless water heaters, also called Instantaneous or On-Demand water heaters, provide hot water only as needed. Energy is saved by not keeping a tank of water warmed up at all times. A home can run on one large tankless water heater, or two smaller ones, depending on the layout of the house. Tankless units are especially well suited for situations that are separate from the main plumbing of the home, such as an outdoor sink area, an outdoor shower or a pool house, etc. They can even be used as boosters to passive solar water heating systems.

Electric tankless water heaters are less efficient than gas systems, so the gas systems are recommended when gas is available. They require a 1/2 inch pipe gas supply, which may require a second main line coming to the house. Gas tankless water heaters also require venting: some can be adapted for indoor installation while others are installed on an exterior wall. Web sites and manufacturers provide charts that help consumers determine the brand and size of unit to install, taking into account the ambient incoming water temperature in the area, household use, how hot you want the water, location of unit, etc.

With proper maintenance, tankless water heaters can last over 20 years. One issue we need to watch for in Santa Barbara is hard water. Mineral buildup can cause tankless water heaters to fail in 3 years or less, and homes need a water softening system or a special filter at the tankless water heater to avoid this.

COST SAVINGS AND ENERGY EFFICIENCY:

Tankless water heaters cost from \$500 to about \$2500, depending on size and brand. When you add the cost of installation, venting, and plumbing improvements (if necessary), the price goes up, and typically a system can cost \$3,000 or more.

Tankless water heating is deemed 25% to 30% more efficient for homes that use 40 gallons of hot water or less per day. If the household uses more than that, efficiency goes down. Also, when hot water moves from any type of water heater to where it is used, a lot of heat as water travels through the pipes. Pipes can be insulated for either tankless or tank water heating systems and energy saved in that manner. The most efficient hot water system would have a tankless heater at every point of use in order to avoid both the loss of heat through the pipes and energy wasted by keeping a tank of water heated.

REAL WORLD EXPERIENCE

New construction and major remodels: On-demand water heating is now installed at many newly-built homes or remodeled homes in the Santa Barbara area. Example: 4004 Via Lucero.

Decision not to retrofit to a tankless system:

1950s San Roque home: Having to install a water softening system and bring in a large gas supply line made it clear that there would not really be any savings for years to come by retrofitting to a tankless system. When you consider the energy to manufacture the unit, add the new plumbing and venting system, manufacture & install/maintain a water softening system, actual savings of energy and dollars is hard to compute and may be insignificant.

A second, smaller water heater on the property serves a bathroom at the far side of the house from the main water heater. This will be replaced with a recirculating pump and designated hot water line from the main water heater. This will save on energy and energy costs by eliminating the second water heater altogether. A small tankless system could be installed in this bathroom, but the recirculating system is more cost effective, simpler technology, and requires no venting.