



DPHA
Decorative Plumbing
& Hardware Association

Education Program

September 2009

Greening the Bath



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Introduction: Greening the Bath

The Decorative Plumbing & Hardware Association (DPHA) Education Program is a series of topic-specific manuals to introduce products, their performance capabilities, their distinctive qualities and sales techniques to showroom sales staffs, manufacturer representatives, manufacturer customer service representatives and others new to the decorative plumbing and hardware industry. Each manual represents a basic sales and product training guide for a particular product or suite of products. Baseline product information is presented, enabling showroom staff and others to quickly become familiar with basic operating requirements, terminology and sales skills. Education is an ongoing process. The DPHA Education Program is a first step in the quest for knowledge in a dynamic and innovative industry.

This chapter addresses the broad topic of greening the bath. Specific concepts, materials, application processes and terminology used to green the bath are presented in an easy-to-understand format. Included are suggested questions that sales professionals need to ask customers to help obtain a better understanding of buyers' needs and preferences and manufacturers and representatives to verify their claims of environmental efficiency. The concepts, products and technologies discussed may change over time. Do not

rely on this publication as the definitive source. Obtain specific guidance from professionals in your showroom or from manufacturers and manufacturer representatives who are familiar with the most current offerings and technical specifications.

Do not rush through the material. This is not a speed contest. Each area should be carefully studied before moving onto the next section. Read this manual in a place and at a time with minimal distractions.

At the end of the manual is a Chapter Review. The review includes a series of multiple-choice questions, matching questions and critical thinking questions designed to evaluate your knowledge and the amount of information retained. If there is an area that you don't understand, review that area of the chapter again and ask questions of showroom owners and managers. Feel free to contact manufacturers and manufacturer representatives to obtain additional guidance. DPHA was created to capitalize on the collective knowledge, experience and expertise of showrooms, manufacturers and manufacturer representatives. The DPHA Education Program is an essential service DPHA provides to the industry and the profession.

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Overview

We all know that green products and technology are not only popular, but also important to what we do, to the clients that we work with and to our lifestyles. The Environmental Protection Agency's (EPA) ENERGY STAR program states, "About \$4 billion is spent annually for energy costs to run drinking water and wastewater utilities. If the sector could reduce energy use by just 10% through cost-effective investments in energy efficiency, collectively it would save about \$400 million annually."

Simply put, wasted water equals wasted energy. Because of rising energy costs, environmental conservation and sustainability have become more important for the building and renovation industry. To save money and improve plumbing energy efficiency, the easiest thing to do is to reduce the amount of water used. This results in lower energy costs, because less water needs to be pumped, heated, processed and disposed of. Lower energy consumption translates into greater cost savings for the user and less damage to our environment.

There is no doubt that most consumers favor saving water when possible provided that water-saving fixtures and strategies do not compromise their desired experience. The green revolution may not have arrived at your showroom as of yet, but rest assured it is coming. In 2008, the U.S. market for green building

materials generated \$57 billion in sales, according to a study from the Freedonia Group, Inc. Green building materials, including those used in the bath and kitchen are expected to expand by 7.2% annually to more than \$80 billion by 2013. The study also found the highest growth areas for green products are water-efficient plumbing fixtures and fittings, energy-efficient lighting and Forest Stewardship Council (FSC)-certified lumber and wood panels. All three of these product groups are found in a decorative plumbing and hardware showroom.

If you still are skeptical about the potential of green, look at Toyota. Toyota first introduced its hybrid Prius in 2001. For the longest time and even in the present day, there is a debate that the Prius has not made a profit because of the reported \$1 billion in research and development costs to create the fuel cells that make the Prius green.

Toyota believed so much in the market potential of environmentally superior vehicles that it was willing to invest a billion dollars to develop green technology and to have a loss leader in its line – the Prius – in order to become the recognized market leader in hybrid vehicles. *Los Angeles Times* writer Ken Bensinger reports, "When it debuted in March (2009), Honda Motor Corp.'s retooled Insight hybrid looked to be the first serious challenger to

the Prius, Toyota Motor Corp.'s ecological wunder-car." He adds: "Throughout the country, Americans bought 2,079 Insights in [March through] June...Since March, [to June] Toyota has sold 40,398 of the gas-sippers." It would be hard to argue that Toyota is not going to receive an enviable long-term return on its investment.

Toyota is not the only corporate giant that believes demand for green products will skyrocket. Wal-Mart, the world's largest retailer, unveiled in August 2009 a Sustainability Index that will rate suppliers based on environmental and social criteria. Wal-Mart wants to use the Index to create a universally adopted environmental rating system for the retail industry. In addition, as part of its commitment to the environment, the \$400 billion company has required its suppliers to place an environmental label on every piece of merchandise sold at Wal-Mart Stores. This label will disclose the environmental cost of producing products that appear on Wal-Mart shelves.

There's another reason that green will become a more significant part of the merchandise mix in showrooms. Generation Y or the millennium generation is the next wave of your customer base. Generation Y, comprising 85 million U.S. citizens born between 1977 and 1996, is larger than the current baby boom generation and are going to be the primary beneficiaries of their parent's wealth.

Understanding Generation Y's preferences and desires will be key to develop effective marketing strategies to attract this huge slice of the populace to your showroom. According to a 2008 study by the Aspen Institute, Generation Y members want to make a contribution to society. They are green and use social media such as YouTube, Facebook, Twitter, Craigslist and eBay to communicate and network. This generation expects the businesses that they patronize to follow suit. Understanding the next generation of customers and their desire for green products are keys to future success.

Green is a hot topic with clients and manufacturers. However, many bath professionals have not become authorities on what all this green stuff means and how they can or need to incorporate it into their businesses. The demand to create ecologically responsible and healthy baths will become more mainstream and cover all segments of the industry. This manual discusses how to green a bathroom and how our industry is responding to the anticipated demand for green products. Acquiring the knowledge and learning a new language to converse authoritatively about green will help to maintain a competitive edge.

Currently, sales professionals need to have a firm understanding of the style, finish options and performance capabilities of products featured in their showrooms. Moving forward this knowledge set will

have to include familiarity with manufacturing processes, whether or not manufacturers have obtained third-party certifications of their products and operations to support claims of environmental efficiency, the composition of the product and how well it contributes to human and environmental health and well being. You will need to be able to answer questions that relate to how a product can help contribute to obtaining points toward the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification, whether or not the wood in the vanity that your customer covets is made from sustainably harvested wood certified by the Forest Stewardship Council (FSC) or if the recycled content claimed by a manufacturer has been confirmed by Scientific Certification Systems (SCS) or another recognized independent third party.

It is a misconception that you have to sacrifice design or performance to have a green bathroom. Nothing could be further from the truth. Decorative plumbing and hardware manufacturers also recognize the tremendous market potential represented by environmentally efficient products and have responded by producing plumbing fixtures that use less water and energy. Decorative door and cabinet hardware manufacturers increasingly are producing products made from recycled content that do not compromise the look or ability to deliver superlative and luxury experiences in the home.

Greening the bath is an exciting opportunity for showroom professionals that want to stay ahead of the curve, to help customers not only build a bath of their dreams, but also one that limits the impact on the environment. Developing an expertise to appeal to a growing demand will serve decorative plumbing and hardware professionals well for many years to come. This is a great subject. Have fun!

Chapter Objectives

1. Define what green means to the bath.
2. Explain how different products sold in a showroom can contribute to a green bath.
3. Describe how to tell compelling stories to green a bath.
4. Identify different certification and rating systems and how they operate.
5. Define appropriate terminology.
6. Provide questions and tools to help evaluate knowledge obtained.

What is a Green Bath?

A green bath is one that has been designed to use significantly less energy and water than conventional baths, is filled with fresh air and natural daylight, is constructed with environmentally responsible materials that don't compromise durability and performance, is easy to care for and promotes a healthy environment.

The five components necessary to create a green bathroom are:

- Smart design
- Water efficiency
- Material efficiency
- Energy efficiency
- Healthy environment

Smart Design

Smart design involves maximizing the efficiency and operation of the space that accounts for local environmental conditions such as weather patterns. Warm and cold climates have different ventilating, heating and air conditioning needs. Smart design requires specifying products that are energy- and water-efficient and promote a healthy environment. For a green bathroom, this may involve placing the HVAC and plumbing infrastructure in interior walls to reduce the amount of heat loss as water and air travel from the water heater and furnace to vents, faucets and fixtures. As a result, the bathroom uses less energy to heat water and air and less



Smart design involves maximizing the efficient operation of space. This bath features water-efficient fixtures, skylights providing natural light and a space-saving design.

water is required to be mixed to achieve desired temperatures.

Placing the plumbing all in one location also helps to reduce heat loss and lower energy costs. Designs that incorporate radiant heating systems installed in the floor of the bath can slash heating costs by as much as 50% over conventional gas or electric forced air heating.

The high moisture levels in a bathroom create a perfect breeding ground for mold and mildew, as well as rot and other moisture damage. Though code in most areas requires either a window or a bathroom fan, customers are unlikely to open a window when it's six degrees outside so a bathroom fan needs to be installed and used. Smart design specifies fans and ventilation that are energy-efficient, quiet

and properly vented to ensure that moisture is effectively eliminated from the bath.

Smart design maximizes the use of natural light. The correct placement and installation of windows, skylights and solar tubes will add light to a bathroom to minimize the use of lighting and electricity while also offering health benefits. To further increase energy efficiency and savings, encourage customers to ask their contractors to consider double-paned, low e-glass windows, skylights and/or solar tubes. Low-emissivity glass (e-glass) features coatings that reduce the amount of heat that flows from an enclosed space to outside and from outside into the space. Different types of coatings are available for different climates. There are coatings designed to help retain heat for areas that have a heating season and coatings for climates where air-conditioning dominates. Having an abundance of natural light eliminates the need for many lighting fixtures thereby reducing electricity consumption. The warm rays from the sun can help heat the bathroom instead of relying on heat from the furnace.

Smart design also may include incorporating a grey water system that cleans and reuses water from showers, sinks, tubs, dishwashers and washing machines (not toilet, and kitchen sink water known as black water) for other purposes such as flushing toilets and landscape irrigation.



Smart design involves maximizing the use of natural light accomplished in this bath by using large windows and skylights.

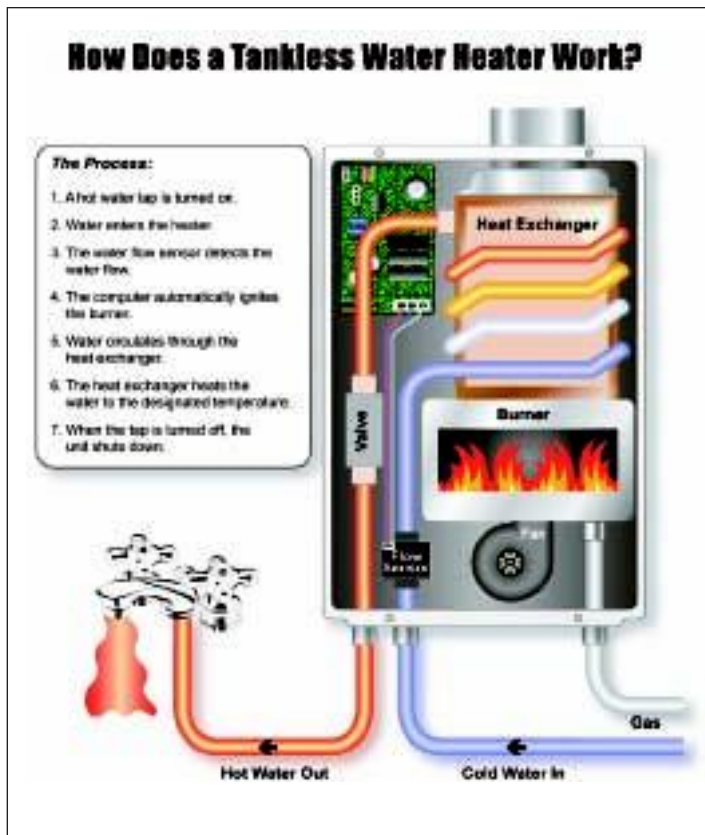
Grey water accounts for 60% of the water outflow produced in a home.

A grey water system involves installing two drainage systems. One is used for grey water and the other is used for black water. Grey water does not drain to a sewer or septic tank. Instead, it is diverted through a treatment process and then channeled to a holding tank. When needed, the water is pumped from the holding tank to a toilet or sprinkler systems for irrigation or for other grey water applications. These systems typically feature a three-way diverter, a method to treat water (e.g. sand filter), a holding tank, pump and an irrigation or leaching system. The installation cost can add between \$500 and \$2,500 to the cost of the job but a grey water system can save a family of four approximately 10,000 gallons of water a year. A word of caution: grey water systems may not meet code in certain areas of the country so check with

your local jurisdictions to ensure that a grey water system meets local requirements.

Other smart design measures may include specifying a tankless water heater (or several tankless water heaters) or on-demand hot water circulation pump. A tankless water heater provides hot water on demand. Conventional water heaters operate by heating the water in a tank and maintaining it at a specific temperature so it is ready at any time. In other words, the water tank needs to operate 24/7 to maintain a preset temperature (typically 120 degrees). A tankless water heater provides hot water instantly by flash heating the water and delivering it at a rate of 2 to 5 gallons per minute. When water is shut off, the tankless heater ceases to heat the water. By contrast, a conventional hot water heater needs to keep heating water even after the valve has been shut off to maintain a constant temperature. Another reason why tankless water heaters are greener than conventional counterparts is their long life. They can last 20 years or more. Because they do not have a tank, they do not retain corrosive agents and impurities that often cause conventional water heaters to fail.

Tankless water heaters are smaller. Therefore, they can't produce the same amount of hot water as conventional water heaters. If your client is interested in a



tankless water heater system, suggest that they place a heater in each bath and in other areas where they would be needed throughout the home. The additional expense can be recovered in reduced energy and water costs and lower replacement costs.



Circulation pump

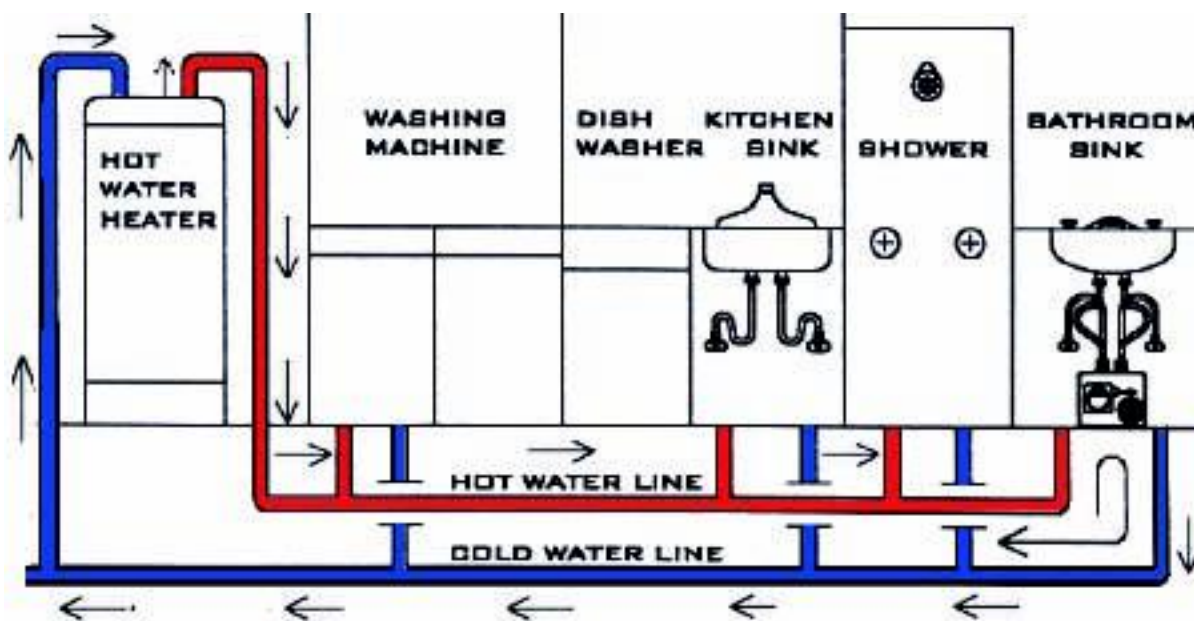
An on-demand hot water circulation pump also sends hot



Tankless water heater

water to showerheads and faucets almost instantaneously and reduces the amount of energy needed to heat water, because there is no standby heat loss commonplace in conventional water heaters. A hot water circulation pump can reduce hot

water heating costs by 25 to 50% because it eliminates the need to have to run water to reach the desired temperature. The pump rapidly pulls hot water from a water heater while simultaneously sending cooled water from the hot water lines back to the water heater to be reheated. The reason why most customers select an on-demand hot water circulating pump is the convenience of faster hot water. Now you have another reason to recommend hot water pumps. In addition to the luxury of having hot water on demand, hot water pumps conserve water and reduce the amount of energy used by the hot water system. One study found that an on-demand, hot water pump saved a family of four 10,000 gallons of water a year. There also may be rebates and tax credits available for installing hot water pumps and other water- and energy-conserving products and systems. Check with your local



On demand hot water circulation system with pump installed underneath the bathroom sink

government authorities and utilities regularly to determine if there are tax incentives or rebated available for using energy- and water-efficient products. Imagine the reaction you would receive from your client if you advised them of rebate dollars that they can receive by purchasing beautiful products with exceptional performance and are good for the environment. This information and expertise are not available on the Internet or from buying clubs.

There is no formula or a template that an architect, designer or homeowner uses for smart environmental design. It requires maximizing the efficiency of the space and using materials, plumbing fixtures, wallcoverings, floorcoverings, lighting, windows, HVAC systems, furniture and other items needed to build a home that have the least impact on the environment during construction, during usage and after the useful life of the home has ended.

Water Efficiency

One of the simplest things a homeowner can do is to check pipes, toilets and faucets for leaks. Believe it or not, the average American uses 100 gallons of water per day. A leaking faucet that drips one drop per second will waste 2,500 gallons of water per year.

Since 1994, federal standards have required toilets, showerheads and faucets

to be more water-efficient. Green bathrooms take federal and local standards to the next level by requiring fixtures to conserve more water than Uncle Sam requires. Conservation does not mean compromised performance. Fixtures found in a decorative plumbing and hardware showroom not only offer environmental benefits, but also provide customers with a broad range of styles, finishes and performance capabilities.

Plumbing and bathroom fixtures available in the showroom that can contribute to more efficient water usage include:

- Lavatory faucets
- Electronic faucets
- High-efficiency and dual-flush toilets
- Steam systems
- Low-flow showerheads
- Low-flow body sprays
- Tubs
- Urinals

Lavatory Faucets

Conventional faucets typically have water flow rates of 2.2



gallons per minute. According to the EPA, if everyone in America installed a bathroom faucet or aerator that reduced water flow to 1.5 gallons per minute, we would save 60 billion gallons of water a year.

EPA created its WaterSense program to promote water efficiency and to make it easy for consumers to differentiate the performance capabilities of different products. Products that carry the WaterSense label must perform as well as or better than their competitors. Second, WaterSense-labeled products must use at least 20% less water than their conventional counterparts. Achieving both goals communicates to consumers that saving water is easy and doesn't require changing their lifestyle.

WaterSense is a voluntary program. EPA develops specifications for water-efficient products through a public process. Manufacturers that claim to have complied with EPA's specifications must have the product tested by an independent third party. If the product meets minimum requirements, the manufacturer is rewarded with the right to put the WaterSense label on that product.

A WaterSense-certified lavatory faucet must have a flow rate of 1.5 gallons per minute or less at 60 psi. The reason why more efficient faucets work as well as conventional counterparts is that manufacturers have designed aerators to deliver the same effect as a 2.2 gallons per minute faucet even though the faucet is producing water flow rates of 1.5 gallons per minute or less. As a result, homeowners don't have to run the water longer to rinse after brushing their teeth!



When manufacturers claim that their faucets are environmentally efficient, ask if they carry the WaterSense label (www.epa.gov/WaterSense) or if they have a third-party certification that confirms their performance claims. Having this type of support will enable you to tell a more compelling story to customers that want environmentally efficient fixtures in their homes.

The average American uses 100 gallons of water a day. A leaking faucet that drips one drop per second will waste 2,500 gallons of water a year.

Telling Compelling Stories

Story 1

Mr. and Mrs. Smith go to a Washington, DC showroom. They have just moved to town in the change of presidential administrations. They have purchased a home and plan to renovate the master bath. Mrs. Smith is attracted to the more ornate and traditional fixtures in the showroom. When asked about the style of their new home, Mrs. Smith responds that she has purchased a center-hall colonial. Mr. Smith is completely uninterested. When his wife points to a Georgian lavatory faucet set and asks for his opinion, Mr. Smith replies, "I really don't care what faucet you select as long as I don't have to push the thing in the drain six feet in the air to shave." The light bulb goes off and you turn to Mrs. Smith and say, "I have an idea that will meet your style preference and make sure that Mr. Smith is happy as well. I believe you could be best served by selecting a gorgeous, finely detailed Georgian-styled faucet with a low-flow aerator. The aerator uses an innovative technological approach that mixes air with water to reduce the water flow without compromising performance. Most faucets flow at a rate of 2.2 gallons of water per minute. The faucet I am proposing flows at 1.5 gallons per minute. Mr. Smith can turn on the water to shave and not have to put the pop-up plug six feet in the air. The fact is most water used in lavatory sinks is wasted. Almost all of our faucets are equipped with ceramic

disk cartridges that are virtually leak proof. They are also referred to as quarter turn or positive stop faucets because from



the off to the full on position, they only turn 90 degrees. Most people turn them full on to brush their teeth, wash their face or shave. As a result, a gush of water comes from the spout, most of which goes down the drain. It is just a complete waste of water and your money. A low-flow faucet simply reduces the amount of water but not the water pressure. The air helps to assure that the water flow feels the same as a conventional faucet. What's neat about many of the more efficient faucets that we have is that they have been certified as meeting the requirements of EPA's WaterSense program. As a nation, EPA says that if we switched from conventional to low-flow faucets we would save 60 billion gallons of water in a year. These faucets are not only gorgeous, but they are also green. Would you like to see a few different types?"

Electronic Faucets

Electronic faucets have been popular in commercial arenas for some time due to their money-saving, water-saving, energy-saving and health benefits. With no handles, there is no means of spreading dirt or harmful bacteria from one user to the next. Electronic faucets also are popular choices for universal design. The lack of handles makes it easier for children, the physically impaired and the elderly to turn water on and off.

Most electronic faucets employ proximity sensors that detect motion and those sensors turn the faucet on and off. As the user's hands trip the sensor, it starts the water flow. When hands are moved away from the sensor, the water flow stops. Most electronic faucets manufactured for residential applications are powered by AA batteries, but some models come with adapters that enable them to be hard-wired to a standard 120-volt outlet. A couple of manufacturers even make models that are solar powered, featuring a storage cell that transforms sunlight or artificial light into electrical energy. In fact, one manufacturer offers a self-powered model that uses a small internal turbine to generate its own electricity whenever the water runs. Now that's a compelling story!

Electronic faucets are both energy- and water-efficient and estimated to reduce water consumption by 30 to 40% com-



Single-hole electronic faucet

pared to the standard manual on-off faucet and that does not include the amount of water saved by the automatic shut-off mechanism. Electronic faucets only discharge the amount of water that the user needs. Most electronic faucets automatically stop water flow within 10 to 60 seconds and there are even models with low-flow aerators, providing additional benefits.

Some electronic faucets have received negative press because of their inability to regulate temperature. The water temperature on these models is determined by the temperature of the water in the supply lines. Once the temperature in the supply line is set, the temperature can't be altered. Additionally, you can't turn on this type of faucet to produce only hot or only cold water. More advanced electronic faucets include mixing valves and temperature control settings that allow for water temperature to be adjusted at the spout.

Telling Compelling Stories

Story 2

Mrs. Arthur Titus comes to your show-room looking for ideas to renovate her guest bath. She informs you that her mom is moving into her home so she could better take care of her. She could not bear the thought of placing her in an assisted living facility. During your conversation, Mrs. Titus relates that her mom is not as mobile as she used to be and has been slowed by arthritis. When you ask about the style of her home, Mrs. Titus informs you that she leans toward modern to contemporary. Suddenly, the light bulb flashes and you turn to Mrs. Titus and say, "Would you like to have a faucet that is easier for your mom to use?" Her interest is piqued. "We have a selection of electronic faucets that will fit your needs perfectly. They are really very cool. They operate by using sensors. When the sensor detects motion underneath the spout, water begins to flow. When hands are removed and there is nothing for the sensor to detect, water is shut off. Not only are they fun to operate, you can preset the temperature to avoid the possibility of scalding water coming



Electronic faucet

from the faucet or water that is too cold. I'm sure you have seen electronic faucets in airport washrooms and other commercial facilities. Our electronic faucets are completely different. We have models that will complement the style and décor of your home. We even have one that was named innovative product of the year by the Decorative Plumbing and Hardware Association. And you know what else? Our electronic faucets are green. They use less water, are safer to use and look great. Are you interested in looking at a few?"

Lavatory Faucet Water Usage Guide

Minimum federal standards:	2.2 gallons per minute
WaterSense certified lavatory faucets:	1.5 gallons per minute or less
Electronic faucets:	1.3-1.5 gallons per minute

Water-Saving Toilets

Whether the motivation is environmental responsibility, saving money or meeting building codes, installing a more efficient toilet is an effective and easy way to help green the master bath, powder room, kid's bath or any other bath in the home. In 1994, Uncle Sam passed legislation that requires toilets to use no more than 1.6 gallons per flush. When the new toilets that met federal guidelines hit the market, they did not work very well. Having a toilet that uses less water but clogs and overflows is not in anyone's best interest and does not contribute to environmental efficiency. The bad press received by the first generation of low-flow toilets 15 years ago has virtually been negated by technological advances. Today, most 1.6 gallon toilets flush as well as the old 3 gallon plus models.



High efficiency toilet

Toilet technologies found in decorative plumbing and hardware showrooms include dual-flush, single-flush, gravity-fed and pressure-assisted toilets (see DPHA Education Program *Toilets and Bidets*). Regardless of the process or amount of water used, the key to any toilet is how well it removes waste with a single flush. To assess waste-removal performance, testing employs a protocol known as Maximum Performance. This protocol is supported by 22 U.S. and Canadian water utilities as well as toilet manufacturers and government agencies. The latest MaP Testing Report evaluated the performance and water-saving capabilities of more than 1,000 toilet models. Copies of the report are available from www.cuwcc.org/MaPTesting.aspx.

Dual-flush Toilets

Dual-flush toilets have been popular in Europe for sometime, but just have started to obtain a foothold in the United States. For a green bathroom, they may offer the perfect combination of form and function. EPA reports that the average family uses 280 gallons of water per day and toilets account for 27% of family water usage. Replacing an existing 1.6 gallon per flush toilet with a dual-flush toilet will save 28 gallons of water per day per family or more than 10,000 gallons of water per family per year.

Dual-flush toilets have two flush mechanisms. One is for liquid waste that uses

anywhere from .6 to .8 gallons of water per flush and the other is for solid waste that requires 1.2 to 1.6 gallons of water per flush depending on the model.

High-Efficiency Toilets

A High-Efficiency Toilet (HET) uses less than 1.6 gallons of water per flush. To be certified as a high-efficiency toilet by WaterSense, the toilet must use 1.28 gallons per flush or less, saving 20% more water than its 1.6 gallon per flush counterparts. There are even some models that use 1.1 gallons per flush. According to EPA, an average person in their lifetime flushes the toilet nearly 140,000 times. Installing a WaterSense HET saves 4,000 gallons of water per year. For the average family of four, this translates to approximately 333,000 gallons of water saved while they are on planet Earth.

Steam Systems

The health benefits of steam bathing have been known since the days of the ancient Greeks. A steam bath may reduce stress and relax tired or overworked muscles. Many sports therapists recommend steam to rehabilitate injuries and mitigate stiffness and pain. Steam may help rejuvenate skin by increasing blood flow and opening pores to assist the body in reducing impurities and toxins. For those with respiratory problems, steam may make it easier to breathe. Steam simply makes



High-efficiency wall-mount toilet

sense if you are looking for a brief escape from the complexities of daily living.

Today, almost every bathroom can be converted into an in-home spa by adding a steam system to a shower. Steam systems not only help promote healthy lifestyles, but they also are environmen-

continued on page 22



Telling Compelling Stories

Story 3

Courtney Maddox comes to the showroom looking to replace her toilet. She simply is tired of calling the plumber every other month to stop it from running and listening to her 16-year-old son tell her she is wasting water. During your conversation, you discover that the reason why her son complains is that it is his toilet that runs. The light bulb flashes and you ask if Courtney would be interested in a dual-flush model. Not having a clue of what a dual-flush toilet is, Courtney asks, "What is a dual-flush toilet and how does it differ from a regular toilet?" You explain, "A dual-flush toilet has two buttons to remove waste. One is for liquid and the other eliminates solid waste. They have been very popular in Europe, but recently we have started to sell more and more of them, especially to customers who want to use more green products. The beauty of the water-efficient products and fixtures in our showroom is that they use less water without compromising style or performance. The dual-flush toilet uses less than one gallon of water to remove liquid waste and the standard 1.6 gallons of



dual-flush toilet

water for solid waste. Everything goes down the drain similar to a conventional toilet but with less impact on the environment. Using dual-flush toilets saves the average family 28 gallons of water per day or more than 10,000 gallons of water a year." Courtney smiles, places the order and says, "My son will be so proud of me."

Toilet Water Usage Guide

Minimum federal standards:	1.6 gallons per minute
Dual-flush toilets:	1.2-1.6 gallons per minute for solid waste and .6-.8 gpm for liquid water
WaterSense certified toilets	1.28 gallons per flush or less

tally friendly. A typical 20-minute steam bath consumes 2 gallons or less of water. By comparison, a whirlpool tub uses 50 to 120 gallons or more of water per bath. A regular shower with a 2.5 gallon per minute showerhead would use 50 gallons of water for a 20 minute shower and 75 gallons for a 30 minute shower. The average seven minute shower uses 17.5 gallons of water. In addition to water savings, steam showers require very little energy for their operations. The estimated cost is 25 cents for a 20-minute steam bath. Additional energy savings are achieved by steam requiring less water to dispose of than a bath or shower.

Low-Flow Showerheads and Handshowers

Showers account for approximately 25% of the water use in a home. Reducing the amount of water needed to shower without sacrificing the experience helps to green the bath.

Early low-flow showerheads simply blocked some of the water flow. This solution was okay for saving water but took the joy out of showering beneath a robust blast of water. Newer low-flow and efficient showerheads and handshowers are different. Manufacturers have met the challenge to both conserve water and offer a satisfying shower by engineering the movement of water, sending it through special openings that control droplet size, focus the stream, and —in some cases—



Low-flow showerheads and handshowers

increase the blast by mixing water with air to create water turbulence or pulsing. Low-flow showerheads and handshowers with flow rates of 1.2 to 1.75 gallons per minute can reduce water consumption by 30 to 50% compared to the water used by standard showerheads that have flow rates of 2.5 gallons per minute.

Low-Flow Bodysprays

A controversial issue for a green bath is having multiple output devices in a high-end shower and still being eco-friendly. Manufacturers are addressing this issue by developing low-flow body sprays that deliver the same experience as their conventional counterparts. A standard body spray delivers 2.0 gallons of water per minute. Similar to low-flow showerheads, low-flow body sprays combine air with



Low-flow body spray

efficient models.

Tubs

As a rule, tubs and jetted and air spas are not water efficient. Models with in-line heaters help to conserve water by eliminating the need to add more warm water as the tub cools down. Acrylic tubs offer better insulation and greater ability to retain heat than tubs made from other materials. Acrylic tubs also require less warm water to be added during a bath to maintain water temperature. Cast iron tubs can be manufactured from recycled and re-



water to use only 1.0 gallons of water per minute while providing the same experience as the less

claimed materials that make them more environmentally friendly.

The environmental benefits of tubs can be found mainly in the manufacturing processes used to create them. These processes will be discussed in the material resources section.

Urinals

Urinals, once the exclusive domain of public restrooms, are becoming more commonplace in home applications.

There are several manufacturers of high-end ceramic fixtures

that include urinals in their product line. A urinal can not only be water-efficient but it also can be decorative.



Dry urinal

There are two types of urinals available to homeowners looking to green their bath or to simply feature something different in their homes. One is a water-flush urinal. The Energy Policy Act of 1992 mandated that urinals use no more than 1 gallon of water per flush which is far less than the 1.6 gallon per flush toilet or even a 1.28

gallon per flush high-efficiency toilet but more than the dual-flush toilets.

To save more water, clients may be interested in a waterless urinal. Most units incorporate a liquid sealer (which masks unpleasant odors) and use a density differential between the sealant and the liquid waste. The sealant is less dense than the water or urine, which passes through the sealant. The sealant creates a barrier between the liquid waste and urinal bowl.

Note: waterless urinals may not comply with local plumbing codes. Before recommending or specifying a urinal, check to ensure that it will be code-compliant.

There are several different types of dry urinals. Liquid-seal urinals feature two different designs: cartridge and integrated drain trap. The cartridge design uses various types of disposable cartridge inserts that fit into a custom-designed urinal base. The cartridge might simply slide into the base or it might require a special tool for insertion and removal. The cartridge typically contains half a liter of water (approximately 17 ounces) and is topped with a liquid sealant. This cartridge collects sediment and directs the flow of liquid waste to the drain while blocking odors.

The integrated-trap design does not use a cartridge. Instead, it uses a liquid sealant that separates the waste from the urinal bowl through a fixed basin trap or a trap built into the urinal body.



This dry urinal uses a biodegradable sealing liquid to mask odors.

Another type of waterless urinal does not require a liquid seal to operate. This urinal uses a flexible silicone diaphragm or an elastomeric expanding check valve. Typically housed in a removable cartridge, the diaphragm or check valve allows liquid waste to pass through and then seals it, preventing sewer gases from entering the bathroom.

There also are special cleaning considerations to address with waterless urinals. Most urinals are cleaned with water. Waterless urinals are cleaned most often by spraying the surface with tap water and wiping it clean.

Material Efficiency

What makes a product green? There is no exact answer. There are a number of formulas, guidelines and protocols, but there is no quantifiable definition of a green product or green bath. This has led to a significant amount of roundabout marketing among manufacturers and others that want to hitch their wagon to the increased consumer demand for environmental efficiency. This is commonly referred to as “greenwash”

Many manufacturers that want to ride the green wave will be purposely vague in the description of their products. An example is the use of recycled content. If a product claims to have recycled content, the key is to determine how much content is actually recycled and what is the nature of the content that has been recycled. If the product only contains 1% recycled content, it's not very green. In the decorative plumbing and hardware industry, a number of companies are manufacturing products with up to 99% recycled material; that is a true green product.

To protect American consumers from false environmental claims, governmental and standard-setting organizations have attempted to discourage greenwashing. The U.S. Federal Trade Commission has developed guidelines for proper use of environmental claims. The International Organization for Standardization (ISO), in ISO 14024, (www.iso.org/iso/iso_14000_essentials),

establishes parameters for proper use of environmental information. In addition, there are a number of third-party certification agencies that test products independently and certify them. EcoLogo^{CM}, Scientific Certification Systems (SCS), GreenSpec, GREENGUARD and Green Seal offer certification and labeling programs that verify environmental performance claims. If a product has an EcoLogo^{CM}, SCS, ENERGY STAR or WaterSense label it means that it has been certified by a qualified and independent third party.

Other certifications may not be as reliable. That is why it is important for showroom professionals to understand the basis for the certification and the credibility of the certifying entity. When looking at certifications, you need to determine which aspects of the product have been certified. It may be only recycled content, VOC emissions or something else. There are a number of materials that are partially green. They may be more harmful to the environment, negating the benefit of their green attributes.

If you have never researched a rating system or certification, a good starting point is to develop your own performance criteria for products and then determine if the items you feature in your showroom meet them. This is a great team-building exercise for showrooms not only to create performance standards that you expect products to meet, but also to familiarize

the entire team with what is green and what is not. Establishing environmental performance requirements in-house allows showroom professionals to identify the environmental attributes that are most important and can generate the greatest returns for a specific application. Once priorities are established, look for products and materials that have been certified by independent third-party agencies.

In an ideal world, green would be determined by conducting an environmental life-cycle analysis. This involves determining the environmental impact of a product in all stages of its life-cycle. However, life-cycle assessments often result in apples-to-oranges comparisons. In the manufacturing of a high-efficiency toilet, you would be required to compare the resource requirements to make and transport the toilet from factories to showrooms to end users, to the manufacturing impact, to the effect the end product has on indoor air quality, to the cost of operating the product during its useful life and the impact of disposing of the product when it no longer works.

In evaluating the greenness of different products sold in a decorative plumbing and hardware showroom, there are several criteria to consider. The first is the amount and type of recycled content used to manufacture the product. Second is to evaluate the impact the product has on conserving natural resources. This occurs by having the ability to either reuse exist-

Showroom Green Product Evaluation Criteria

1. Amount of recycled content used to manufacture product.
2. Type of recycled content used to manufacture the product.
3. Impact product has on natural resources.
4. Environmental efficiency of the manufacturing process.
5. Environmental impact of packaging product.
6. Environmental impact of transporting the product.
7. Recyclability of product at the end of its useful life.

ing products or by undertaking processes that make the manufacturing process environmentally preferable. Evaluating greenness involves trade-offs. Many products used in homebuilding and commercial construction may not be manufactured in a green process, however, they can be used in a manner that helps reduce their overall environmental impact. The resources and energy required to manufacture a high-efficiency faucet may not be particularly green, however, the fixture's ability to deliver 1.5 gallons of water per minute or less versus the standard 2.2 gallons per minute makes the product green. Similarly, the resource requirements for producing solid brass door hardware may not be green, but

locks and locksets become environmentally preferable if they are made from more than 90% recycled content. Greening a bathroom requires specifying products for a specific design that has the least impact on the overall environment and maximizes the efficiency of the space. The impact a product has on the overall environment is very much determined by how it is manufactured, the quality and type of material that is used in the manufacturing process, how it is packaged and transported and how it can be disposed of at the end of its useful life.

Recycled Content

There are three main types of products made from recycled content.

- Post-consumer products
- Post-industrial products
- Agricultural waste

Post-Consumer Recycled Content

Products made from post-consumer recycled content are considered particularly green because the material used to make them started their lives as consumer products. Instead of disposing of them in a landfill, the materials are recycled and used for other purposes. Products featured in showrooms that may be manufactured with post-consumer recycled content include recycled stainless steel in kitchen and lavatory sinks and steam units and recycled brass in plumbing fixtures,



This 16 gauge sink is made from 100% post-consumer recycled stainless steel

locks and accessories. Other products that may include post-consumer recycled content include countertops, sinks and tiles made from recycled glass, concrete and other materials.

Materials made from recycled content help to reduce waste, require less energy to manufacture and are generally equal if not superior to products made from virgin materials.

Common products featured in your decorative plumbing and hardware showroom that may contain recycled content include:

- Stainless steel kitchen and lavatory faucets, sinks, toilets and countertops
- Stainless steel steam units
- Copper sinks and tubs
- Acrylic tubs
- Door hardware
- Cabinet hardware
- Accessories
- Faucets

- Shower systems
- Supply lines
- Glass tiles, sinks and countertops
- Ceramic tile
- Water filtration units and cartridges

Pre-Consumer/Post-Industrial Recycled Content

Products made from pre-consumer recycled content also known as post-industrial recycled content contain industrial byproducts such as scrap, trimmings and other materials generated by manufacturing processes that were never used in the consumer market. Examples include recycling brass scraps to make plumbing fixtures and door and cabinet hardware or fly ash to make concrete countertops. Pre-consumer recycled content also may involve using PVC scrap from pipe to make roof shingles and recycling glass for countertops, sinks, walls, tiles and flooring.

Agricultural Waste

This involves mainly using straw or bamboo to make furniture, sinks, flooring and tiles.

Products that Conserve Natural Resources

Using recycled building materials in the bath or kitchen, or products made from recycled building materials conserves natural resources. Materials that could be reused during a renovation or for new



This sink and pedestal are green because they are made from bamboo

construction include old lumber, trim and door and window casings.

Products that conserve natural resources also include those that require less materials than conventional counterparts, or products that have longer useful lives that won't need to be replaced as often. There could be an argument that PVD finishes contribute to environmental efficiency because PVD is marketed as a lifetime finish and involves no toxic or ozone-depleting chemicals. Ceramic disk cartridges also conserve natural resources, because they last longer than other types of cartridges and deter or eliminate the possibility of water leaks in fixtures. Thermostatic valves' greenness comes from their ability to pre-

set water temperature, eliminating the need to waste water while mixing hot and cold water to achieve a desired temperature. Some of the processes and materials used for bathroom and kitchen products have high environmental costs while others are sustainable. They might be easy to produce or don't use a lot of pesticides, energy or natural resources in the production process. Other examples of bath products that conserve natural resources are vanities and bath furniture made from wood products certified by the Forest Stewardship Council (FSC) (www.fscus.org).

Some products used in a bathroom or kitchen are considered green because of the low impact the manufacturing process has on the environment, because they serve as alternatives to other products that are made from more environmentally harmful chemicals or generate a lot of pollution and require a lot of energy to make. These substitute products may not be particularly green, but relative to those that they are replacing, they may be considered the lesser of two evils. For example, incandescent lighting might be considered greener than some lighting that contains high levels of mercury.

Products such as slate and natural stone sinks, vanities, tubs and tile are considered green because of the relatively low amount of energy required or harmful chemicals needed to manufacture them.



Sustainable wood vanity

Manufacturing Processes

Manufacturing processes can contribute to a product's greenness. Green manufacturing involves taking a multidisciplinary approach to reduce energy and materials used to produce products. DPH manufacturers can promote environmental efficiency by:



Products made from natural stone are considered green because of the relatively low amount of energy needed to make them.

- Releasing a limited amount of volatile organic compounds (VOCs) into the atmosphere during the manufacturing process,
- Producing products that release a limited amount of VOCs in the atmosphere when used in the home,
- Using machinery and processes that uses less nonrenewable energy and virgin natural resources,
- Limiting the amount of solid waste produced by the manufacturing process,
- Recycling and reusing waste generated in production processes, such as reusing acrylic sheets to make tubs or recycling nickel and bronze scraps from casting and machining processes used to make plumbing fixtures and door and cabinet hardware (Preconsumer recycled content)
- Limiting the amount of material used in packaging,
- Recycling packaging materials,
- Using recycled products in the manufacturing process (Post-consumer recycled content),
- Minimizing mistakes that cause products to be reproduced or returned and reshipped,
- Reducing transportation costs,
- Operating a LEED- or ISO-certified manufacturing facility, and
- Employing sustainable business practices.

What Are Volatile Organic Compounds (VOCs)?

Most VOCs are man-made chemicals that are used in manufacturing processes or are released when a product is put into service. When released into the environment VOCs can contaminate water supplies and the air. VOCs are often regulated because they pose a threat to human health and safety. Short-term high levels of VOC exposure can cause eye irritation, headaches, nausea, dizziness and worsened asthma symptoms. Long-term risks of even lower level exposures include cancer, liver damage and central nervous system defects.

Walking the Walk or Talking the Talk

There are a number of manufacturers that may want to talk the talk, but can they provide evidence that they are walking the walk? If manufacturers or their representatives claim that they use green manufacturing practices, ask them to describe what they are and how they benefit the environment. Question if their practices have been certified or evaluated by an independent third party or if they meet ISO requirements. ISO 14000 standards (www.iso.org/iso/iso_14000_essentials) address various aspects of environmental performance. ISO 14000 is a voluntary en-

environmental management and procedural standard that addresses various aspects of environmental performance, from six vantage points:

- environmental management systems (ISO 14001),
- environmental performance evaluations,
- environmental auditing,
- life-cycle assessments,
- environmental labeling (ISO 14004),
- environmental aspects in production standards.

Decorative plumbing and hardware manufacturers whose environmental management systems meet ISO 14001 have identified and controlled the environmen-



*Towel warmers use only 60 - 150 watts of power to dry a towel.
The average tumble dryer uses 3000 watts.*



This door hardware is made from 100% art-grade recycled bronze.

tal impact of their activities, products and services. Meeting this standard requires manufacturers to have policies and systems in place that demonstrate a continual effort to improve environmental performance and mandate that the company develop and implement a systematic approach to establishing and meeting environmental objectives and targets. It is an internal statement that says management is in control of its operations.

To become ISO 14001-certified, companies can either self-declare or undergo a third-party audit that attests to the manufacturer's claims of meeting the standard. While some have criticized the ability of companies to self-certify, generally most manufacturers would not risk falsifying their claims of compliance. The risks are too great, because false claims would

cause the manufacturer to lose all credibility with the consuming public.

Companies that claim to have met ISO 14000 standards make a powerful statement that they are green in almost everything that they do.

Energy Efficiency

Energy-efficient products used in the bath may include the following products that may or may not be sold in your showroom. However, you should be aware of all of the products that contribute to a green bath in order to establish and maintain credibility with your customer:

- Windows that reduce the possibility of water damage and air infiltration, such as double-paned, low E-windows.
- Skylights or solar tubes that allow for daylighting and eliminate the need or dramatically reduce the need for electric lights in the bathroom.
- Makeup and shaving mirrors and lighting fixtures that use LED or compact fluorescent lamps.
- Retrofitting incandescent lighting to LED or compact fluorescent can reduce energy consumption by as much as 40%.
- Tankless water heaters or on-demand pumps and systems that

Avoiding Greenwash: Questions to Ask to Verify Environmental Claims

- How much recycled content is used to manufacture your product?
- What type of recycled content is used to manufacture your product?
- Has the recycled content been certified by an independent third party such as Scientific Certification Systems?
- Has the product received the WaterSense or ENERGY STAR seal?
- What makes your manufacturing processes green?
- Have your green manufacturing processes been verified by an independent third party?
- Is your manufacturing facility ISO 14001-certified? If yes, is it self-certified or certified by an independent third party?
- How can your product contribute to LEED points for LEED Home certification?
- Please relate compelling stories that we can tell to relate the environmental benefits offered by your products.

provide hot water instantly to showers and faucets. Tankless heaters can reduce energy cost by 25 to 50%.

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Telling Compelling Stories

Story 4

Mr. and Mrs. James Jones are building their dream home and have brought in their interior designer William Baldwin to select products. Billy is well known in the design community. He is very demanding with an ego to match. Billy informs you that he is only interested in LEED-certified products. You assure Billy that you will recommend only products that can contribute to earning LEED points. In browsing through the door hardware section, you point to locks and say, this line of product is among the finest door hardware made in the world and it is environmentally efficient. The locks are made from 50% post-consumer recycled brass that has been certified by Scientific Certification Systems. The manufacturer uses in its production process locks that have reached the end of their useful life. Instead of disposing of the material in a landfill, the metal is salvaged and reused to make new products. In addition, the factory in which they have been produced has been certified as meeting the requirements of the International Standard Or-



ganization Standard 14001. This standard requires the manufacturer to have policies and systems in place that demonstrate a continual effort to improve environmental performance and use environmentally friendly processes. In our showroom, we have products that are certified and produced in certified facilities that contribute to LEED points. The advantage of coming to our showroom is that you don't have to compromise performance or style to select environmentally efficient products that work as well as they look.

- Towel warmers. The average tumble dryer can use up to 3,000 watts of electricity while the average towel warmer uses only 60 to 150 watts.
- Radiant floor heating systems can save up to 50% of the heating expenses in a bath.
- Energy-efficient ventilation fans that meet or exceed EPA ENERGY STAR requirements.

Whether your customer favors mood lighting for a “candle lit” soak in the tub or task lighting in front of a vanity for preparing for a night on the town, task-specific lighting wired to independent switches allows customers to achieve the perfect lighting level for any situation and reduces energy consumption because you can turn off lights that are not needed.



LED lights in makeup mirrors reduce energy consumption by as much as 40% of that used by incandescent lights.



Radiant floor heating systems can save up to 50% of the heating expenses in a bath.

Remember that saving water saves energy because it dramatically reduces the amount of energy required to pump water from a source to a purification facility, process the water and pump it to the home and then take the water away and process it as waste. This is in addition to the energy to produce hot water in the home.

Healthy Environments

There are a number of products that contribute to a healthy environment in the bath and promote health and well being. These include:

- Products that do not release or limit the release of harmful chemicals and substances into the air.
- Products that inhibit the introduction, development or spread of indoor contaminants or remove pollutants from the space.
- Products that warn occupants of health hazards in the home.

- Products that improve natural light.
- Products that control noise.
- Products that promote health and well being.

Products that do not release or limit the release of harmful chemicals and substances into the bath include:

- Low-VOC paints, caulks and adhesives.
- Bath furniture with low-VOC finishes.
- Plumbing fixtures with low-VOC finishes.
- Bath tubs that use low-VOC resins and fiberglass in the production process.
- Other bath products and fixtures that reduce VOC emissions into the atmosphere during manufacturing or when placed into service.

Medium Density Fiberboard (MDF) and Particle Board

Some bath furniture in a showroom may be constructed from Medium Density Fiberboard (MDF) or particle board. MDF is made from whole wood fibers and bundles of fiber mixed with glue to form a panel. Particle board is made from larger particles or flakes of wood mixed with glue to form a panel.

A contentious issue associated with MDF and particle board is the use of urea formaldehyde resins in the manufacturing process. Urea formaldehyde is a known carcinogen, respiratory irritant and a haz-



ENERGY STAR-rated ventilation fan

ardous component of smog. USGBC's LEED program specifically bars use of urea formaldehyde in any composite wood. If the bath furniture featured in your showroom is made from MDF or particle board, ask your manufacturers and representatives the type of materials that have been used as a binder. Pieces that contain urea formaldehyde are not appropriate for a green bath, because they emit hazardous VOCs into the air. MDF can contain as much as two to four times the amount of urea formaldehyde as particle board.

Ventilation Fans and Water Filtration

Ventilation fans and water filtration devices are green because they inhibit the introduction, development or spread of indoor contaminants, and they remove indoor pollutants. Ventilation fans remove moisture in the bath that otherwise would create a perfect breeding ground for mold and mildew. They also eliminate pollen, dust mites and pet dander and reduce the likelihood of rot and moisture damage.

Water filtration devices and systems provide healthier, better tasting water that is safer for bathing, cooking and drinking, especially among individuals who have a sensitivity to chemicals.

Products that warn occupants of hazards in the home also are considered green. These include smoke detectors, carbon monoxide detectors, lead paint test kits and indoor air quality test kits.

Products that improve natural light help to promote a healthy environment. These include large windows, skylights, solar tubes and other components that allow natural light to stream into the bath and kitchen. There is a growing body of evidence that natural daylight is beneficial to human health and well being.

Bath Products that Promote Health and Well Being

There are many products in the showroom that promote health and a healthy lifestyle. Creating an in-home spa or master bath in a space that promotes relaxation and stress reduction contributes to health and well being. Fixtures offered in the showroom that assist in creating healthy environments include:

- Soaking tubs, jetted tubs, air tubs and combination tubs offering, aromatherapy, chromotherapy and sound therapy,



This tub is made from material that is recyclable and retains heat to reduce energy costs

- Shower systems offering offering aromatherapy, chromotherapy and sound therapy,
- Steam baths, and
- Saunas.

Government Regulation to Promote Healthy Environments

The states of California, and Vermont recently passed legislation in the interest of promoting healthy environments that mandate the lead in the material that delivers consumable water from a fixture cannot exceed 0.25%. The laws which take effect in both states January 1, 2010 only affect water delivery devices that are intended to provide water for cooking or drinking. It does not apply to showers, tubs, garden hoses and the like. Nor does the legislation impose mandates on the pipes that deliver water to home or the pipes within the home.

The immediate impact of this legislation on showrooms is twofold. We know that there are jobs that can easily take more

than a year from first consultation to actual final installation. If you are working on a job such as this in California or Vermont, please check with the specified manufacturers to make sure the subject products will be compliant and ready to ship when the job will need them while keeping in mind timelines related to the overall project. For example, a wall-mounted lavatory faucet uses a rough valve that will likely be installed long before the spout and handles. Both the rough valve and the spout, however, must meet the 0.25% requirement.

Another major effect of California and Vermont's legislation is the impact of precedence. Rumors have it that the commonwealth of Massachusetts and state of Washington and are prepared to bring similar proposals to their legislatures with other states not far behind. The effect will undoubtedly mirror that of the 1.6 gallon per flush water closet requirement. As history shows, once these issues gain a foothold in a large market they eventually become common practice.

Second, California is the 10th largest market in the world. It is safe to assume that many manufacturers will be shipping 0.25% lead compliant products not only to California but also throughout the entire United States to avoid inventory segregation issues and in recognition of the momentum of this precedence.

Telling Compelling Stories

Green products provide another opportunity to tell new and different compelling stories. For the past two decades, showrooms have been able to attract consumer interest based on their unique and novel merchandise mix. Customers would walk into a showroom and be wowed by the style, design and technological advances of high-performing shower systems, intricately detailed door hardware and magnificent bath furniture. Guess what? Your architects, designers and homeowners have been looking at beautiful product since the early 80's. The market has come to expect expertly designed and beautiful merchandise. The challenge to tell new compelling stories is further complicated by an anticipated paradigm shift in consumer values that is occurring now and will continue. Unity Marketing founder and president Pam Danziger claims in a recent trend report, *The Luxury Market After the Recession*, there is the potential for "a dramatic shift in affluent consumer consciousness away from conspicuous consumption toward a more thoughtful, reserved, careful way of shopping and buying." Danziger adds, "Affluent consumers are defining, reassessing, and reevaluating their lives and lifestyles... Marketers will need to realign their brands with the new values that more thoughtful, careful and selective affluent shoppers hold."

Green presents that opportunity to align your showroom with new thoughtful consumer values. Showrooms can add green to their arsenal of compelling stories by acquiring the knowledge and learning the nomenclature to converse authoritatively about green. Currently, sales professionals need to understand product styles, finish options and performance capabilities. Green comes with a language all its own that you will have to learn in order to meet the demands of a new and growing customer base.

Not every customer will care if a towel bar is made from 99% post-consumer recycled brass or if a showerhead flows at 1.2 gallons of water is less. Some will. Others will say, “Hey, that’s great.” Green may not be the reason a customer selects a product. However, it gives you another arrow in your storytelling quiver that you can use to engage customers, demonstrate your expertise and establish a bond that helps build trust and serves to eliminate price as an objection.

Environmental Benefits of Showroom Products

Green is not often the first thing that comes to mind when presenting products in the showroom to designers, architects, installers, contractors and end users. However, here are many green attributes in showroom products that appeal to clients by contributing to smart design, water efficiency, energy efficiency and material efficiency or promote a healthier environment. The following is a list of attributes that make products in the showroom green. Before presenting them to a customer, please verify the accuracy of claims with the manufacturer.

Aerators can limit water flow to 1.5 gallon per minute or less. Standard aerators generate 2.2 gallons per minute.

Bamboo sinks and furniture are lightweight and water resistant. Crafted from the laminated exterior of a bamboo shoot, bamboo is harvested without the use of pesticides and fertilizers. Unlike hardwoods such as teak and mahogany, which can take up to 100 years to replenish, bamboo can be cut without killing the entire plant and only takes approximately five years to grow back.

Bath furniture can be made from reharvested FSC-certified wood, sustainable products such as bamboo, cork and wheat straw and can be finished with low-VOC finishes.

Bathroom lighting fixtures can be made from recycled content and use compact fluorescent or LED lights that use less energy than incandescent lamps.

Bidets eliminate the need to dispose of toilet tissue.

Cabinet hardware can be manufactured using low-VOC finishes and recycled content. Cabinet hardware made from brass, stainless steel and glass is recyclable.

Ceramic disk cartridges promote water efficiency because they rarely leak. Faucets leaking at the rate of one drop per second waste 2,700 gallons of water per year which adds to the cost of water and sewer utilities, or strains a septic system.

Copper sinks and vessels can be made from recycled content and can be recycled at the end of their useful lives.

Door hardware can be manufactured using low-VOC finishes and recycled content. Locks and locksets made from brass or stainless steel are recyclable.

Dual-flush toilets can reduce water consumption by up to 40% of 1.6 gallon per flush toilets.

Electronic faucets can be made from recycled brass or stainless steel and finished using a low-VOC finish. Electronic faucets are estimated to cut water consumption by 30% not including the amount saved due to the automatic shut-off mechanism. They also promote healthy lifestyles because they are easy for children, the elderly and physically impaired to use and can be set to eliminate the possibility of scalding. Brass and stainless steel can be recycled at the end of the faucet's useful life.

Flooring can be made from bamboo, cork, wheat straw, reclaimed wood, FSC-certified wood, natural linoleum, recycled tiles, recycled glass, slate and eco-terrazzo.

Grey water systems reuse waste water from sinks, showers, washing machines, dishwashers, tubs and other fixtures, excluding toilets, bidets and the kitchen sink for irrigation and toilet flushing. Grey water systems can save a family of four up to 10,000 gallons of water a year.

Glass vessels can be made from recycled glass and can be recycled at the end of their useful life.

High-efficiency toilets flush at 1.28 gallons of water per flush or less. Conventional toilets flush at 1.6 gallons per flush.

Instant hot and colds eliminate the need to run water to achieve a desired temperature, saving energy needed to boil water on a stove or microwave or making ice or using energy to deliver colder water. Can be finished using a low-VOC finish.

Lavatory faucets made from recycled brass or stainless steel that are WaterSense-certified to flow at 1.5 gallons of water per minute or less. Conventional faucets flow at 2.2 gallons of water per minute. Brass and stainless steel can be recycled at the end of the faucet's useful life. Can be finished using a low-VOC finish.

Low-flow bodysprays use half of the water of a conventional bodyspray, 1 gallon of water per minute versus 2 gallons of water per minute.

Low-flow showerheads and handshowers produce 1.75 gallons of water per minute versus the standard of 2.5 gallons per minute. Showerheads and handshowers can be made from recycled brass or recycled stainless steel. Can be finished using a low-VOC finish.

Makeup and shaving mirrors can be made from recycled content and use LED lights which require less energy than incandescents and last 22 times as long.

On-demand hot water circulation pumps save water and energy by providing hot water to a fixture almost instantaneously. One study found that a family of four can save up to 10,000 gallons of water a year by eliminating the need to constantly heat water to achieve a desired temperature. Additional savings may be available through rebates and tax incentive programs offered by local utilities and municipal, state and the federal government.

Radiant heating systems in the bath can reduce heating costs by up to 50%.

Steam units can be manufactured from recycled stainless steel, require less water than a conventional shower (less than 2 gallons versus 17.5 gallons for an average 7 minute shower).

Stainless steel sinks can be made from recycled stainless steel and can be recycled. Can be finished using a low-VOC finish.

Stone sinks, tubs, vanities and tile are environmentally preferable because of the relatively low amount of energy required to manufacture them and there are no harmful chemicals required during the manufacturing process.

Tankless water heaters can cut utility costs for hot water by 25 to 50% depending on the type. Tax credits and rebates also may be available for tankless water heaters.

Thermostatic valves reduce the amount of water that has to be mixed to reach desired temperature. They use less energy and water than conventional valves. They also contribute to a healthier environment by virtually eliminating the possibility of scalding bathers.

Tiles can be made from recycled glass, ceramic, porcelain or other materials.

Towel bars, hooks, toilet roll holders and other accessories can be manufactured using recycled content– brass and stainless steel – and can be recycled. Can be finished using a low-VOC finish.

Towel warmers can be manufactured from recycled content and save energy. The average tumble dryer can use up to 3,000W of electricity while the average towel warmer uses only 60 to 150 watts. Heating the towel kills bacteria reducing the number of times the towel needs to be washed. Most of the contents of a towel warmer can be recycled.

Tubs can be made from recycled material. Cast iron and acrylic retain heat, reducing the amount of hot water needed for a luxurious bath.

Urinals use 1.28 gallons of water per flush compared to 1.6 gallons for a conventional toilet. There are urinals that are waterless.

Vanities and countertops can be manufactured from bamboo, cork, reclaimed wood, FSC-certified wood, NuCrete, recycled tiles, recycled glass, slate and eco-terrazzo tile to name a few.

Ventilation fans promote a healthy environment by keeping fresh air circulating through the bath. They can be ENERGY STAR rated.

Rating Systems and Certification Bodies

The following is a list of rating systems and certification bodies that establish or verify green criteria for green buildings and green products.

LEED

The Leadership in Energy and Environmental Design (LEED) (www.usgbc.org) is a third-party certification program for the design, construction and operation of green buildings. Developed by the U.S. Green Building Council (USGBC), there are LEED rating systems for different types of buildings, including single-family homes. The discussion of LEED in this manual is limited to single-family homes. To achieve the lowest level of LEED certification, the home would have to obtain a minimum of 45 LEED points, 60 points for the silver rating, 75 points for the gold rating and 90 points for platinum. Overall there are 136 points available in the following eight performance categories:

1. Innovation and Design Process
2. Location and Linkages (is the home placed in a socially and environmentally responsible way in relation to the larger community)
3. Sustainable Sites (minimizes the project's impact on the environment)



4. Water Efficiency
5. Energy and Atmosphere (particularly in the building envelope and heating and cooling design)
6. Materials and Resources (including environmentally preferable materials and minimization of waste during construction)
7. Indoor Air Quality (reducing exposure to pollutants)
8. Awareness and Education (educating occupants how to operate and maintain the green features of the home)

Products featured in a decorative plumbing and hardware showroom that can contribute to LEED points include plumbing fixtures, ENERGY STAR-rated appliances, light fixtures and ventilation fans and

products made from sustainable materials and recycled content. LEED for homes offers a total of six points for efficient use of indoor water. High-efficiency fixtures and fittings can garner up to three points. LEED will award two points if the average flow rate of all lavatory faucets is 1.5 gallons per water or less per minute, two points if the average flow rate for all showers is 1.75 gallons of water or less per stall and two additional points if the average flow rate for all toilets is 1.1 gallons per flush.

USGBC provides a half point if kitchen and bathroom counters and cabinets contain a minimum of 25% post-consumer recycled content (with some exceptions) or 50% of preconsumer recycled content, or are made from FSC-certified wood or reclaimed wood. Composite materials cannot contain added urea formaldehyde resins.

Scientific Certification Systems (SCS)

SCS (www.scs-certified.com) is an independent third-party certification agency that offers scientific, standards-based product certification for green building products. SCS has certified hundreds of companies and



thousands of products for indoor air quality, recycled content and FSC chain-of-custody.

WaterSense

WaterSense (www.epa.gov/WaterSense) is a voluntary program run by the U.S. Environmental Protection Agency (EPA) to promote water efficiency and enhance the



market for water-efficient products, programs and practices.

Products that carry the WaterSense label meet water efficiency standards and performance criteria. A product cannot display the WaterSense label unless an independent third-party tests, confirms and certifies that the product meets EPA specifications.

WaterSense Criteria

Lav Faucets 1.5 gallons per minute or less.

High Efficiency Toilets 1.28 gallons per minute or less.

EPA as of September 2009 is developing WaterSense criteria for showerheads and flushing urinals.

ENERGY STAR

ENERGY STAR (www.energystar.gov) is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that promotes the use of energy-efficient products and practices. ENERGY STAR claims that energy-efficient choices can save families 33% of their energy bills without sacrificing features, style or comfort. ENERGY STAR develops and implements energy performance standards for household products that include battery chargers, clothes washers, dehumidifiers, dishwashers, refrigerators, freezers, room air conditioners, room air cleaners, air source heat pumps, boilers, central air conditioning systems, ceiling fans, ventilation fans, furnaces, geothermal heat pumps, insulation, programmable thermostats, room air conditioners, water heaters, roof products, windows, doors and skylights, home electronic goods (televisions, DVDs, etc.), office equipment (computers, monitors, copiers, fax machines, mailing equipment, printers, scanners, water coolers, power adapters, digital duplicators, enterprise servers), lighting (compact fluorescents, light fixtures and decorative light strings). In addition there are ENERGY STAR performance criteria for manufacturing process, home construction and operation, commercial office building opera-



tions, schools, multifamily communities and retail among others.

ENERGY STAR Products Used in and for the Bath

Water Heaters

ENERGY STAR claims that the average household spends \$400 to \$600 per year to heat water, making it the second largest energy expenditure behind heating and cooling.

High efficiency water heaters improve performance by approximately 7.5%. Tankless water heaters for the whole home reduce water heating costs by 30%.

Ventilating Fans

ENERGY STAR-rated ventilating fans use 70% less energy on average than standard models and have quieter operations.

Lighting

Compact fluorescents (CFLs) use 75% less energy and last 10 times longer than incandescent bulbs. CFLs do contain a small amount of mercury and there are special requirements for recycling the bulbs when they burn out. This small amount of effort required to recycle CFLs is more than offset by the energy that they save. ENERGY STAR claims that if every home in America replaced one incandescent light with an ENERGY STAR qualified CFL, we would save enough energy to

light more than 3 million American homes and reduce greenhouse gas emissions equivalent to that of 800,000 cars.

LED lights use 75% less energy than incandescent fixtures and last for 22 years based on three hours a day of use. LEDs also generate less heat than fluorescents and are easily recyclable.

EcoLogo

<http://www.terrachoice-certified.com/en/index.asp>

Established in 1988 by the government of Canada, the program compares products/services with others in the same category, develops rigorous and scientifically relevant criteria that reflect the lifecycle of the product and awards the EcoLogo (www.terrachoice-certified.com) when products are tested by an independent third party as meeting the standards the Program has established. Standards for products in the showroom to carry the EcoLogo label are as follows:



Showerheads

- Comply with CSA Standard CA/CSA-B125, Plumbing Fittings.
- Maximum flow rate of 2.5 gallons per minute at 80 psi.

- Offer a performance warranty of at least three years.
- Be accompanied by consumer education providing guidance to ensure maximum water and energy savings and guidance that reflects the possibility of temperature fluctuations if used without a pressure-balanced or thermostatic valve.

Bath Fixtures

- Comply with CSA Standard CAN/CSA-B45.0, General Requirements for Plumbing Fixtures.
- Vitreous china plumbing fixtures must comply with CSA Standard CAN/CSA-B45.1.
- Enameled cast-iron plumbing fixtures must comply with CSA Standard CAN/CSA-B45.2.
- Porcelain-enameled steel plumbing fixtures must comply with CSA Standard CAN/CSA-B45.3; stainless steel plumbing fixtures must comply with CSA Standard CAN/CSA-B45.4; plastic plumbing fixtures must comply with CSA Standard CAN/CSA-B45.5;
- use 1.6 US gallon) or less water per flushing cycle.
- Be accompanied by detailed consumer education instructions outlining proper installation and maintenance to prevent leakage and ensure maximum water savings.
- Offer a product performance warranty of at least three years.

Lavatory and Kitchen Faucets and Aerators

- Comply with the requirements of CAN/CSA-B125, Plumbing Fittings.
- Have a maximum flow rate of 1.7 gallons per minute at 60 psi.
- Offer consumer education instructions outlining usage directions to ensure maximum water and energy savings.
- Offer a minimum three-year warranty.

The Forest Stewardship Council (FSC)

FSC
(www.fscus.org)
develops standards for responsible management of forests around



the world. Its standards ensure forestry is practiced in an environmentally responsible, socially beneficial and economically viable way. FSC accredits independent organizations that certify landowners who own forests and companies that sell timber or forest products to show that they have met FSC standards. These organizations also verify that products bearing the FSC logo are made from specific proportions of wood from a certified well-managed forest. This means that these organizations actually track wood products from forest to store shelves to make sure they contain the proportion of wood from FSC-certified forests that their labels say that they do. Buildings can earn

LEED points if they're made of FSC-certified wood.



GreenSpec

GreenSpec (www.GreenSpec.com) is a directory of more than 2,000 environmentally preferable products used in the construction industry. The editors of the directory conduct their own research and vet the product's environmental performance against GreenSpec's criteria. There is no cost to be listed as a GreenSpec product nor does the directory accept paid advertising. Criteria for GreenSpec products are as follows:

Toilets

Use 1.28 gallons of water per flush or less and evacuate at least 350 grams of solid waste per flush as tested under the Maximum Performance protocol.

Lavatories and Sinks

GreenSpec-listed products contain recycled content or contribute to innovative wastewater treatment practices such as grey water separation.

Lavatory Faucets

GreenSpec-listed lav faucets must have flow rates of 1.5 gallons per minute or less.

Kitchen Faucets

GreenSpec-listed kitchen faucets must have flow rates of 2.5 gallons per minute or less and should be installed with foot or other controls to prevent long periods of running.

Urinals

GreenSpec-listed products are low-water use urinals.

Showerheads

Must flow at a rate of 1.75 gallons per minute or less.

Green Seal

Green Seal (www.greenseal.org) develops environmental leadership standards for specific product categories and certifies products and services that meet them.

Green Seal has developed standards for institutional and industrial cleaners, commercial and institutional cleaning services, paints and coatings, lodging standards and restaurant and food service operations.



GREENGUARD



The mission of GREENGUARD (www.greenguard.org) is to improve public health and quality of life through programs that improve indoor air (www.greenguard.org). GREENGUARD offers three certification programs:

1. Indoor Air Quality: certifies the emissions of interior building materials, furnishings and finish systems.
2. Building Construction: certifies newly constructed multifamily and commercial properties that follow best practices for preventing mold during the design, construction and ongoing operations.
3. GREENGUARD Children and Schools: certifies low-emitting interior building materials, furnishings and finish systems used in educational office and other sensitive environments.

Standard Terminology

This glossary defines the often daunting terminology associated with green building. Most of the definitions were revised by Ashok Raiji, P.E., a principal at ARUP. The original glossary is found in the book *Big & Green: Toward Sustainable Architecture in the 21st Century*, published in 2002 by Princeton Architectural Press in connection with a pioneering exhibition of the same name at the National Building Museum in Washington, DC.

Active Solar: A solar application, which uses electrical or mechanical equipment (typically pumps and/or fans) to assist in the collection and storage of solar energy for the purpose of heating, cooling (buildings, liquids, or gases), or making electricity.

Agricultural Waste: Using straw or bamboo or other agricultural products to make furniture, sinks, flooring and tiles.

Bakeout: A process used to remove volatile organic compounds (VOCs) in a building by operating a building's HVAC systems at elevated temperatures using 100% outside air after all the furniture and finishes (carpeting, ceiling tiles, etc.) have been installed.

Biomass: An energy resource derived from organic matter such as wood, agricultural waste and other living cell material.

Bioremediation: The use of natural biological processes (microbes, bacteria, plants, etc.) to restore contaminated land back to productive use.

Black Water: Water containing human waste from toilets and urinals. Black water contains pathogens that must be neutralized before the water can be safely

reused. Typically black water, after neutralization, is used for non-potable uses such as flushing or irrigation.

BREEAM: Building Research Establishment Environmental Assessment Method (BREEAM) is a comprehensive tool for analyzing and improving the environmental performance of buildings through design and operations. This methodology has been developed by the UK-based Building Research Establishment.

Building Envelope: Elements (walls, windows, roofs, skylights, etc.) and materials (insulation, vapor barriers, siding, etc.) that enclose a building. The building envelope is a thermal barrier between the indoor and outdoor environment and is a key factor in the sustainability of a building. A well-designed building envelope will minimize energy consumption for cooling and heating as well as promote the influx of natural light.

Carbon Dioxide (CO₂): Carbon Dioxide is a colorless, odorless gas that naturally exists in the earth's atmosphere. The major source of man-made CO₂ emissions is from the combustion of fossil fuels. Carbon dioxide is the primary greenhouse gas and is known to contribute to global

warming and climate change. Atmospheric concentrations of CO₂ have been increasing at a rate of about 0.5% per year and are now approximately 30% above pre-industrial levels.

Carbon Neutral: A scenario where the net discharge of carbon dioxide into the atmosphere is zero. Carbon neutrality can be achieved by planting enough trees so that CO₂ emissions as a result of combustion would be offset by CO₂ absorption by the plants. In the presence of water and light, trees convert CO₂ into sugar and oxygen through the process of photosynthesis. The average tree absorbs 10 kg (22 lbs.) of CO₂ per year. Carbon neutral is also referred to as “net zero carbon.”

Carbon Footprint: A measure of the amount of carbon dioxide emitted through the combustion of fossil fuels. A carbon footprint is often expressed as tons of carbon dioxide or tons of carbon emitted, usually on an annual basis.

Climate Neutral: No net production of greenhouse gases (see also Carbon Neutral).

Cogeneration: A process in which power is produced by a gas-fired engine and generator set. Heat produced as part of this process is used as heating and/or cooling media. A cogeneration plant is often referred to as a combined heat and power plant.

Commissioning: A process that occurs prior to building occupancy during which the performance of the building systems is checked and adjusted if necessary, in

order to ensure that the systems are operating as intended by the design and that the owner’s operational needs are met.

Daylighting: The use of natural light to supplement or replace artificial lighting.

Displacement Ventilation: A method of space conditioning where conditioned air is supplied at or near the floor. Since the air is supplied at very low velocities, a cool layer of air collects in the occupied zone resulting in comfortable conditions for the occupants. Buoyant forces remove heat generated by occupants and equipment, as well as odors and pollutants, all of which stratify under the ceiling and are extracted from the space by return or exhaust fans. Displacement ventilation systems were originally used in industrial facilities and subsequently in office buildings, auditoria, performing arts centers and spaces with large interior volumes. These systems are effective in improving indoor air quality as well as providing energy savings when compared to a conventional fully mixed system.

Dual Flush Toilets: Dual-flush toilets have two flush mechanisms. One is for liquid waste that uses anywhere from .6 to .8 gallons of water per flush and the other is for solid waste that requires 1.2 to 1.6 gallons of water per flush depending on the model.

Eco-friendly: Little or no impact on the native eco-system.

Eco-Logo: Established in 1988 by the government of Canada, the program compares products/services with others in the same category, develops rigorous and sci-

entifically relevant criteria that reflect the lifecycle of the product and awards the EcoLogo when products are tested by an independent third party as meeting the standards the program has established.

Ecological Footprint: The area of land and water needed to produce resources to entirely sustain a human population and absorb its waste products with prevailing technology. The concept of an ecological footprint is used as a resource management and community-planning tool.

Electronic Faucets: Electronic faucets save money, water and energy and promote healthy environments. Electronic faucets are estimated to reduce water consumption by 30 to 40% compared to the standard manual on-off faucet, because they only discharge the amount of water that the user needs. Most electronic faucets employ proximity sensors that detect motion and those sensors turn the faucet on and off. As the user's hands trip the sensor, it starts the water flow. When hands are moved away from the sensor, the water flow stops. With no handles, there is no means of spreading dirt or harmful bacteria from one user to the next. Electronic faucets also are popular choices for universal design. The lack of handles makes it easier for children, the physically impaired and the elderly to turn water on and off.

Embodied Energy: Total energy used to create a product, including the energy used in mining or harvesting, processing, fabricating, and transporting the product.

Energy Efficiency: Ratio of energy output of a conversion process or of a system to its energy input.

ENERGY STAR: ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that promotes the use of and standards for energy-efficient products and practices.

Environmental Lifecycle Analysis: Determining the environmental impact of a product in all stages of its life-cycle.

First Cost: The total cost of acquiring and installing the item in question. In the context of a building first cost would include land acquisition costs in addition to the cost of construction.

Fly Ash: The fine ash waste collected from flue gases from coal burning power plants, smelters, and waste incinerators. Fly ash can be used as a cement substitute in concrete, thereby reducing embodied energy of the concrete.

Forest Stewardship Council (FSC): FSC develops standards for responsible management of forests around the world. Its standards ensure forestry is practiced in an environmentally responsible, socially beneficial and economically viable way. FSC accredits independent organizations that certify landowners who own forests and companies that sell timber or forest products to show that they have met FSC standards. These organizations also verify that products bearing the FSC logo are made from specific proportions of wood from a certified well-managed forest.

Fossil Fuels: Fuels found in the Earth's strata that are derived from the fossilized remains of animal and plant matter over millions of years. Fossil fuels include oil, natural gas, shale, and coal. Fossil fuels are considered to be non-renewable since they are consumed faster than their natural production.

Fritted Glass: A special type of glass that utilizes ceramic-enamel coatings in a visible pattern (dots, lines, etc.) to control solar heat gain. The pattern is created by opaque or transparent glass fused to the substrate glass material under high temperatures. The substrate is heat strengthened or tempered to prevent breakage due to thermal stresses.

Fuel Cell: An electrochemical device in which hydrogen is combined with oxygen to produce electricity with heat and water vapor as byproducts. Natural gas is often used as the source of hydrogen with air as the source of oxygen. Since electricity is produced by a chemical reaction and not by combustion, fuel cells are considered to be green power producers. Fuel cell technology is quite old, dating back to the early days of the space program. Commercial use of fuel cells has been sporadic, however, the use of fuel cells in automobiles and buildings is expected to increase in the next decade.

Gas-Fired Absorption Chiller: Mechanical equipment that is used to generate chilled water for cooling of buildings. Conventional chillers use electricity as the energy source, whereas gas-fired absorption chillers use clean burning natural gas.

While conventional chillers have a compressor and use refrigerants to produce cooling, absorption chillers contain an absorber, generator, pump and heat exchanger, and do not use ozone-depleting substances. The absorption cycle utilizes environmentally friendly working fluids, namely water (refrigerant) and lithium bromide (absorbent). Some absorption chillers use ammonia as the refrigerant and water as the absorbent.

Global Warming: An increase in the global mean temperature of the Earth that is (or is thought to be) a result of increased emissions of greenhouse gases that are trapped within the earth's atmosphere. Global warming is believed to have adverse consequences such as climate change and a rise in sea levels. The scientific community is in general agreement that the Earth's surface has warmed by about 1°F in the past 140 years.

Gray Water: Wastewater from sinks, showers, kitchens, washers, etc. Unlike black water, gray water does not contain human waste. Typically gray water, after purification, is used for nonpotable uses such as flushing, irrigation, etc.

Green: A term that is widely used to describe a building and site that is designed in an environmentally sensitive manner, i.e. with minimal impact to the environment.

Green Building: A building that minimizes impact on the environment through resource (energy, water, etc.) conservation and contributes to the health of its occupants. Comfortable, aesthetically pleasing and healthful environments characterize green buildings.

GREENGUARD: GREENGUARD offers certification programs for indoor air quality. Three different programs are offered to certify emissions of interior building materials, furnishings and finish systems; certify newly constructed multifamily and commercial properties that follow best practices for preventing mold during the design, construction and ongoing operations and certify low-emitting interior building materials, furnishings and finish systems used in educational office and other sensitive environments.

Greenhouse Effect: Greenhouse gases in the earth's atmosphere permit solar radiation to pass through but prevent most of the reflected infrared radiation from the earth's surface and lower atmosphere from escaping into outer space. This process occurs naturally and has kept the earth's average surface temperature at approximately 60°F. Life on earth would not be possible without the natural greenhouse effect, but environmental scientists are concerned about the increased emissions of greenhouse gases from human activities, leading to climate change and its consequential adverse effects.

Greenhouse Gases: Any gas that absorbs infrared radiation in the earth's atmosphere. Common greenhouse gases

include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrogen oxides (NO_x), ozone (O₃), chlorofluorocarbons (CFCs), halogenated fluorocarbons (HCFCs), perfluorinated carbons (PFCs), hydrofluoro-carbons (HFCs) and sulfur hexafluoride (SF₆). Carbon dioxide, methane and nitrogen oxides are of particular concern due to their long residence time in the atmosphere.

Green Power: Electricity generated from renewable energy sources (solar, wind, biomass, geothermal, and hydroelectric).

Green Seal: Green Seal develops environmental leadership standards for specific product categories and certifies products and services that meet them. Green Seal has developed standards for institutional and industrial cleaners, commercial and institutional cleaning services, paints and coatings, lodging standards and restaurant and food service operations.

GreenSpec: GreenSpec is a directory of more than 2,000 environmentally preferable products used in the construction industry.

Grid: A network of power transmission and distribution facilities used to provide electricity to users (homes, businesses, industry). Large power plants, wind power generating facilities as well as small power producers (such as photovoltaic farms) feed electrical power into the grid for distribution to users. Electrical grids in the USA are both publicly and privately owned.

Heat Island Effect: A phenomenon that occurs in developed areas where natural land cover is replaced with paving, buildings, roads, parking lots, etc. result in an increase in outdoor temperatures. The heat island effect can be mitigated by vegetation, green roofs and light colored materials that reflect heat. Urban heat islands can be as much as 10°F hotter than the surrounding undeveloped areas.

High-Efficient Toilet (HET): High-Efficiency Toilets (HET) uses less than 1.6 gallons of water per flush. To be certified as a high-efficiency toilet by WaterSense, the toilet must use 1.28 gallons per flush or less, saving 20% more water than its 1.6 gallon per flush counterparts. There are even some models that use 1.1 gallons per flush.

Indoor Air Quality (IAQ): Indoor air that contains no known contaminants at harmful concentrations and with which a substantial majority of the people exposed to the air do not express dissatisfaction. Good indoor air quality inside a building results from:

- Introducing an appropriate amount of outside air into the building through the HVAC systems
- locating outside air intakes so that the outside air introduced into the HVAC systems is of the best possible quality
- proper filtration
- proper air distribution
- proper removal of indoor pollutants
- proper commissioning of the building and its building systems.

Insolation: The amount of sunlight (direct, diffuse and reflected) reaching an area exposed to the sky.

Intelligent Materials: Materials that are able to adapt to their environment by altering their properties. Example of intelligent materials include liquid crystal glass which changes from transparent to opaque upon application of a current, and thermochromic glazing that changes transparency in response to ambient temperatures.

ISO 14000: The International Standard Organization's voluntary environmental management and procedural standard that addresses various aspects of environmental performance, from six vantage points:

- environmental management systems (ISO 14001),
- environmental performance evaluations,
- environmental auditing,
- life-cycle assessments,
- environmental labeling (ISO 14004),
- environmental aspects in production standards.

ISO 14024: The International Standard Organization's standard establishing parameters for proper use and transmission of environmental information.

Kyoto Protocol: In December 1997, the United Nations Framework Convention on Climate Change was held in Kyoto, Japan that resulted in 160 countries signing legally binding agreement, the Kyoto Protocol, was adopted by the countries in attendance, under which the industrialized

nations agreed to reduce their greenhouse gas emissions by an average of 5.2% below 1990 emissions levels by 2010. The USA pledged a 7% reduction. Subsequent to the Kyoto meetings, the US Congress did not ratify the agreement.

LEED: An acronym for Leadership in Energy and Environmental Design. LEED is a point-based rating system developed by the US Green Building Council that evaluates the environmental performance from a “whole building” perspective over its life cycle, providing a definitive standard for what constitutes a green building.

Light Shelf: A horizontal device positioned (usually above eye level) to reflect daylight onto the ceiling and beyond. The light shelf may project into the room, beyond the exterior wall plane or both. The upper surface of the shelf is highly reflective, i.e. having 80% or greater reflectance. Light shelves are also effective shading devices for windows located below them.

Low-e Glass - Low-e (Low emissivity): glass has an invisible thin-film metallic or oxide coating which allows the passage of short-wave solar energy into a building but prevents long-wave energy produced by heating systems and lighting from escaping outside.

Low-Flow Bodyspray: Low-flow body sprays combine air with water to use only 1.0 gallons of water per minute while providing the same experience as the less efficient models that require 2.0 gallons of water per minute to provide the same performance.

Low-Flow Showerheads and Handshowers: Low-flow showerheads and handshowers with flow rates of 1.2 to 1.75 gallons per minute can reduce water consumption by 30 to 50% compared to the water used by standard showerheads that have flow rates of 2.5 gallons per minute. They offer the same performance capabilities of counterparts that require more water by engineering the movement of water, sending it through special openings that control droplet size, focus the stream, and —in some cases— increase the blast by mixing water with air to create water turbulence or pulsing.

Maximum Performance: A testing protocol that evaluates a toilet’s ability to remove waste from a toilet with a single flush by using as little water as possible.

Medium Density Fiberboard (MDF): MDF is made from whole wood fibers and bundles of fiber mixed with glue to form a panel. A contentious issue associated with MDF is the use of urea formaldehyde resins in the manufacturing process. Urea formaldehyde is a known carcinogen, respiratory irritant and a hazardous component of smog.

Microclimate: Localized climate conditions within an urban area or building.

Net-Zero: Requiring no additional energy input from outside sources.

Nitrogen Oxides (NO_x): Gases consisting of one molecule of nitrogen and varying numbers of oxygen molecules. Nitrogen oxides are byproducts of combustion processes and are commonly found in the automobile exhaust and emissions from fossil fuel-fired power plants. NO_x is a greenhouse gas and is an ingredient of acid rain and smog.

Non-renewable Energy Resources: Energy resources that cannot be restored or replenished by natural processes and therefore are depleted through use. Commonly used non-renewable energy resources include coal, oil, natural gas, and uranium.

On Demand Water Circulation Pump: An on-demand water circulation pump sends hot water to showerheads and faucets almost instantaneously and reduces the amount of energy needed to heat water, because there is no standby heat loss commonplace in conventional water heaters. A hot water circulation pump can reduce hot water heating costs by 25 to 50% because it eliminates the need to have to run water to reach the desired temperature. The pump rapidly pulls hot water from a water heater while simultaneously sending cooled water from the hot water lines back to the water heater to be reheated.

Orientation: The position of a building relative to the points of a compass. Energy consumption in a building can be reduced by proper orientation of the building's window areas.

Ozone (O₃): Ozone is a greenhouse gas present in the stratosphere and the troposphere. In the stratosphere, ozone provides a protective layer shielding the earth from harmful ultraviolet radiation. In the lower atmosphere ozone is a pollutant that causes respiratory problems and is an ingredient of smog.

Passive Solar: The use of natural heat transfer processes to collect, distribute, and store useable heat without the help of mechanical devices (pumps or fans). Passive solar systems have few moving parts. Trombe Walls and the use of the thermal mass of building structure to store energy are examples of passive solar systems.

Particle Board: Particle board is made from larger particles or flakes of wood mixed with glue to form a panel used to manufacture some vanities and bath furniture. Some manufacturers use urea formaldehyde resins as a binder. Urea formaldehyde is a known carcinogen, respiratory irritant and a hazardous component of smog.

Photovoltaic Cell: A device that converts sunlight directly into electricity. Photovoltaic (PV) cells are silicon-based semiconductors and are often referred to as solar cells. PV cells were developed in the mid-1950s and have become cost-effective where it is difficult to extend conventional power lines. PV cells are often used for remote motorist call aid boxes, irrigation systems and navigational lights.

Pre-Consumer Recycled Content:

Products made from pre-consumer recycled content also known as post-industrial recycled content contain industrial byproducts such as scrap, trimmings and other materials generated by manufacturing processes that were never used in the consumer market. Examples include recycling fly ash to make concrete countertops, using PVC scrap from pipe to make roof shingles and recycling glass for countertops, sinks, walls, tiles and flooring.

Post-Consumer Recycled Content:

Products made from post-consumer recycled content are considered particularly green because the material used to make them started their lives as consumer products. Instead of disposing of them in a landfill, the materials are recycled and used for other purposes. Products featured in showrooms that may be manufactured with post-consumer recycled content include recycled stainless steel in kitchen and lavatory sinks and steam units and recycled brass in plumbing fixtures, locks and accessories. Other products that may include post-consumer recycled content include countertops, sinks and tiles made from recycled glass, concrete and other materials.

R-Value: A unit of thermal resistance. A material's R-value is a measure of the effectiveness of the material in stopping the flow of heat through it. The higher a material's R-value, the greater its insulating properties and the slower the heat flow through it.

Rainwater Harvesting: The collection, storage and reuse of rainwater.

Recycling: A series of processes that include collection, separation and processing by which products and raw materials are recovered and reused in lieu of disposal as solid or liquid wastes. Commonly recycled items include cans and bottles, paper and industrial solvents. Recycling can also apply to construction materials and even to buildings themselves.

Regeneration: Renewal of sites or habitats that have become unfit for human, animal, or plant habitation, bringing them back into productive use. The term most commonly refers to urban and industrial land.

Renewable Energy Sources: Energy sources that replenish themselves naturally within a short period of time. Sources of renewable energy include solar energy, hydroelectric power, geothermal energy, wind power, ocean thermal energy, wave power, wind power and fuel wood.

Return On Investment (ROI): An economic indicator that is used to evaluate the effectiveness of an investment. It is calculated as the ratio of the amount gained or lost relative to the amount invested. Simple ROI analyses do not take the time value of money into account. On the other hand, dynamic ROI analyses recognize that the value of money does change over time.

Scientific Certification Systems (SCS):

SCS is an independent third-party certification agency that offers scientific, standards-based product certification for green building products. SCS has certified hundreds of companies and thousands of products for indoor air quality, recycled content and FSC chain-of-custody.

Shading Coefficient: The ratio of solar heat gain through a glazing system to the solar heat gain through a single layer of clear glass.

Sick Building Syndrome: According to the Environmental Protection Agency and National Institute of Occupational Safety and Health, Sick Building Syndrome is defined as “situations in which building occupants experience acute health and/or comfort effects that appear to be linked to time spent in a particular building, but where no specific illness or cause can be identified. The complaints may be localized in a particular room or zone, or may be spread throughout the building.”

Smart Design: Smart design involves maximizing the efficiency and operation of the space that accounts for local environmental conditions such as weather patterns and specifying products that are energy- and water-efficient and promote a healthy environment.

Solar Collector: A device used to absorb heat from the sun. In the context of buildings, the absorbed energy typically heats water, which is then used for space heating and/or domestic hot water.

Solar Tube: A device that brings natural light into a home by refracting, reflecting

and concentrating solar light into a small tube using mirrors and lenses. Solar tubes are easier to install than skylights and require less area on the roof surface.

Spectrally Selective Glazing: Glazing that has a high transmittance of visible light but low transmittance of solar heat gain.

Superwindow: A window with a very low U-value achieved through the use of multiple glazings, low-e coatings, and gas fills. A gas fill is the use of an inert gas, usually argon or krypton, placed between sealed panes of glazing in order to provide resistance to heat flow.

Sustainability: The concept of sustainability can be traced back to President Theodore Roosevelt who stated in 1910, “I recognize the right and duty of this generation to develop and use the natural resources of our land; but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us.” In 1987 the United Nations World Commission on Environment and Development (The Brundtland Commission) defined a sustainable development as one that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” Sustainability has three interdependent dimensions relating to the environment, economics and society—often referred to as the triple bottom line.

Tankless Water Heater: A tankless water heater provides hot water on demand by instantly flash heating water and delivering it at a rate of 2 to 5 gallons per minute.

Tankless water heaters have a longer useful life than conventional water heaters.

Tankless heaters have an average lifespan of 20 years. Because they do not have a tank, they do not retain corrosive agents and impurities that often cause conventional water heaters to fail.

Thermal Mass: A material used to store heat, thereby slowing the temperature variation within a space. Typical thermal mass materials include concrete, brick, masonry, tile and mortar, water and rock.

Triple Bottom Line: According to the World Business Council for Sustainable Development, “Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line, but against [this] triple bottom line.”

Urea Formaldehyde: Urea formaldehyde resins are used to manufacture medium density fiberboard and particle board used to manufacture bath and other furniture. It is a known carcinogen, respiratory irritant and a hazardous component of smog.

Value Engineering: An organized activity in which building systems, equipment, design features and materials are analyzed in order to attain the lowest building lifecycle cost while maintaining the stated functional and performance goals including quality, reliability and safety.

Ventilated Façade: A special type of curtain wall consisting of two glazed facades separated by gap through which ambient air is allowed to flow. The flow of air removes a large amount of solar heat gain that would ordinarily enter the building, resulting in a reduction in space cooling needs and energy consumption. These facades are also known as double facades, double-skin facades and ventilated cavity curtain walls.

Volatile Organic Compounds (VOCs):

Organic compounds that evaporate at room temperatures and are often hazardous to human health, causing poor indoor air quality. Sources of VOCs include solvents and paints. Many materials commonly used in building construction such as carpets, furniture and paints emit VOCs.

Water Flush Urinal: A water-flush urinal uses no more than 1 gallon of water per flush which is far less than the 1.6 gallon per flush toilet or even a 1.28 gallon per flush high-efficiency toilet but more than the dual-flush toilets.

Waterless Urinals: Waterless urinals remove liquid waste without water. Most units incorporate a liquid sealer (which masks unpleasant odors) and use a density differential between the sealant and the liquid waste. The sealant is less dense than the water or urine, which passes through the sealant to create a barrier between the liquid waste and urinal bowl. Note: waterless urinals may not comply with local plumbing codes. Before recommending or specifying a urinal, check to ensure that it will be code-compliant.

WaterSense: A voluntary program created by the Environmental Protection Agency to promote water efficiency that makes it easy for consumers to differentiate the performance capabilities of different products. WaterSense-labeled

products must use at least 20% less water than their conventional counterparts. Performance must be verified by an independent third party in order to feature the WaterSense label.

Wind Turbine: A device that converts the kinetic energy of the wind into mechanical energy that can be used to drive equipment such as pumps. The addition of a generator allows the wind's kinetic energy to be converted into electricity. There are two types of wind turbines, namely horizontal axis turbines - blades rotate about a horizontal axis; and vertical axis turbines - blades rotate about a vertical axis.

Chapter Review

Critical Thinking Questions

1. What are the key elements of a green bath?
2. What products would you recommend for a customer trying to build a LEED-certified home?

Multiple Choice Questions

Smart Design

- Takes advantage of tax credits and other opportunities to lower the cost of construction
- Maximizes the efficiency and operations of the bath accounting for weather and consumer usage patterns
- Is an intelligent program that relies on computer-aided models
- Takes advantage of intelligent building systems and methodologies

2. On-demand hot water circulation pumps

- Provide hot water on demand
- Save money on water and energy costs
- Make the bath more efficient
- Are eligible for tax rebates in some jurisdictions
- All of the above
- None of the above

3. LEED Certification

- Certifies the recycled content of products
- Certifies the energy performance of products
- Certifies the amount of VOCs released into the atmosphere
- Certifies the environmental performance of a home

4. A WaterSense-certified lavatory faucet can deliver no more than

- 2.2 gallons of water per minute
- 2.0 gallons of water per minute
- 1.6 gallons of water per minute
- 1.5 gallons of water per minute

5. If you are told that a product contains recycled content, what do you have to know?

- The amount of recycled content
- Who verified the amount of recycled content
- The recycler
- Whether or not recycling efforts involved a closed loop or open loop system
- The type of recycled content used

6. A WaterSense-certified toilet can deliver no more than

- A dual-flush toilet
- 1.6 gallons of water per minute
- 1.28 gallons of water per minute
- 20% less water than other toilets

7. Post-consumer recycled content is made from

- Material that otherwise would have been sent to a landfill
- Material that could not be used in other manufacturing processes
- Material that can't be recycled for any other purpose
- Material that contain industrial byproducts that otherwise would have been sent to a landfill

8. ISO 14001 Certification is granted to

- Companies that self-certify that they meet all government standards
- Companies that self-certify that they are continually improve environmental performance and meeting environmental goals
- Companies that pay an outside agency to state they are environmentally sustainable
- Companies that perform an external life-cycle analysis of their production processes

9. Specifying WaterSense faucets will reduce the average water usage of every American by

- 10,000 gallons of water a year on average
- 5,600 gallons of water a year on average
- 9,600 gallons of water a year average
- 7,300 gallons of water a year on average

10. Grey water systems

- Recycle all wastewater in the home
- Recycled 60 to 75% of wastewater in the home
- Recycles all water except that used for toilets and the kitchen sink
- Recycles all water except that used for toilets, the kitchen sink and clothes washer

Matching Questions

- | | |
|-------------------------------|---|
| A. FSC | _____ Toilets that flush at 1.28 gallons per flush or less |
| B. Daylighting | _____ Toilets that have separate flush mechanisms for liquid and solid waste |
| C. SCS | _____ Faucets that use sensors to activate water flow |
| D. High Efficiency Toilet | _____ False or exaggerated claims of environmental efficiency |
| E. Volatile Organic Compounds | _____ An independent certifier of sustainable wood products |
| F. Greenwash | _____ Man made chemicals that pose a health risk when released into the environment |
| G. WaterSense | _____ A independent certifier of the amount and type of recycled content in a product |
| H. Electronic Faucets | _____ A voluntary program to promote water efficiency |
| I. Dual-flush Toilet | _____ Use of natural light to supplement or replace natural light |

Critical Thinking Answers

1. What are the key elements of a green bath?

The five key components of a green bath are:

Smart Design
Water Efficiency
Material Efficiency
Energy Efficiency
Healthy Environments

There is no one correct answer to this question. Products sold in decorative plumbing and hardware showrooms can contribute to all five components. Smart design involves maximizing the efficiency and operation of the space, accounting for weather patterns and local climactic conditions. Smart design capitalizes on a showroom's ability to assess customers' needs, desires and demand for more environmentally efficient products and develop a package that meets and exceeds those requirements. Showrooms contribute to smart design by having the ability to identify and package a complete job that assures the customer that the products specified for their job are the most appropriate to meet their needs. Showrooms that advise customers to consider replacing a tub that is never used with a double shower contribute to smart design even if the shower design calls for multiple low-flow showerheads and bodysprays. That shower will use less water than a soaking tub. The shower will make more efficient use of the space. Smart design involves specifying the proper ventilation system that works best with the local weather patterns and recommending tankless water heaters and/or hot water circulation pumps to reduce energy costs and improve the operations of the fixtures in the bath.

Showrooms have the expertise to specify water-efficient products that do not compromise style or performance. Showroom professionals can explain the environmental benefits of high-efficiency and dual-flush toilets, low-flow faucets, showerheads, hand-showers and body sprays, electronic faucets and even urinals.

There are hundreds of products in the showroom made from recycled content that can contribute to a green bath. The key to identifying them is to conduct research, ask manufacturers and representatives if their products are manufactured from recycled

content and if so how much and what type. Probe to determine if the performance claims made by your manufacturers and representatives have been verified by independent third parties.

A number of vanity and furniture manufacturers are producing products made from sustainable wood and are employing environmentally efficient manufacturing processes.

Understanding that saving water saves energy enables showroom professionals to specify products that reduce energy consumption, ranging from makeup mirrors with LED lights and towel warmers to acrylic tubs and ENERGY STAR-rated ventilation fans.

Additionally, creating an environment that contributes to the health and well being of homeowners is part of a green bath. Showrooms offer the products and the expertise to create an in-home spa, a refuge where homeowners can wash away the stresses of the day, relax and take advantage of time that is theirs alone.

The sixth key to a green bath is the ability to tell compelling stories that include the environmental benefits of products featured in a showroom. Not every customer will be interested. However, with all things being equal, the ability to contribute to the health of the planet will be a strong selling point. Including an environmental bent to your story telling is not something that the Internet or a weaker competitor has the ability to do. It provides another competitive advantage.

2. What products would you recommend for a customer trying to build a LEED-certified home?

Again, there is no right or wrong answer:

WaterSense-certified faucets with flow rates of no more than 1.5 gallons per minute finished with low-VOC finishes.

Bath furniture and vanities made from sustainable wood that has been FSC-certified.

Low-flow shower fixtures with low-VOC finishes.

ENERGY STAR-rated ventilation fans.

Sinks and vessels made from at least 25% post-consumer recycled content, including copper sinks, stainless steel sinks and glass sinks.

Tubs made from at least 25% post-consumer recycled content, including copper, stainless steel, acrylic or cast iron.

High-efficiency WaterSense-certified toilets.

Door and cabinet hardware made from at least 25% post-consumer recycled content finished with low-VOC finishes verified by Scientific Certification Systems.

Flooring made from at least 25% post-consumer recycled content.

Tankless water heaters.

A grey water system for use in flushing toilets and landscaping irrigation.

Towel warmers made from recycled content.

Steam systems made from recycled content.

Multiple Choice Answers

Note: For each question there may be more than one right answer. Check all that apply

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