

The Consumers' Dilemma

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Abstract

The green-building movement that originated in the late 1900s has grown significantly in recognition amongst consumers and the building community over the last decade. Each day, professionals throughout the world are conducting research, performing experiments, and creating products that conserve the world's natural resources more efficiently. Consumers are being provided the opportunity to conserve the world's natural resources, improve their physical health, and reduce their monthly and annual financial expenses. Why do consumers refrain from investing in these products then? Consumers question whether or not the benefits from implementing green-certified products within their home and work environments will outweigh the increased price they have to pay. Consumers are unaware of the ways they can integrate green-building practices inexpensively. They can incorporate green-building practices by implementing integrated, sustainable, and universal design principles. They can clearly convey their visions to design professionals. They can sacrifice the quantity of products they own to allow the opportunity to invest in high-quality products, and they can consider their impact on the environment around them.

The Consumers' Dilemma

Over the last decade, the green building movement, promoted by The United States Green Building Council (USGBC), has gained great momentum in both recognition and application in the design and construction processes of residential and commercial buildings throughout the world. Each day, consumers are increasing their knowledge of products that, when incorporated within their homes and work environments, will conserve the world's natural resources, improve their health, and reduce their monthly and annual financial expenses. Despite the benefits green products provide, consumers refrain from investing in these products. Greg Kats, author of the article "Green Building Costs and Financial Benefits" in 2003, states:

To date there has been a widespread perception that green buildings— though more attractive from an environmental and health perspective— are substantially more costly than conventional design and may not be justified from a cost benefits perspective. This perception has been the single largest obstacle to the more widespread adoption of green design. (2003, p. 2)

It is true that green products do cost more than conventional products, but the benefits far outweigh conventional products.

Terminology

For proper understanding of the green-building movement, several terms will be defined. These terms include, *green building*, *integrated design*, *universal design*, and *biodegradability*. According to David and Johnson Gibson, "green building is ultimately about the relationship of a house and its occupants to the world around them. It's a

process of design and construction that fosters the conservation of energy and other natural resources and promotes a healthy environment” (Deal, 2010, p. 12).

In contrast to green building, universal design is defined as “products or environments that are created so as to be more usable for and equally usable by everyone” (Danford, 2003, p. 91). When incorporated within residential homes and work environments, universal design provides consumers, of all ages, with mobility and accessibility to every area within the building. Furthermore, universal design aims to “accommodate diversity and ongoing changes in human function” (Mack, 2004, p. 47) by considering the limitations an individual may obtain during the stages of life. For example, a universally designed home may incorporate wider doorways and hallways. By incorporating these design elements, designers are providing those, who are wheelchair bound, with accessibility and mobility within their home while reducing the waste of renovating to accommodate barrier free design.

Integrated design, on the other hand, is defined as the “process by which all of the design variables that affect one another are considered together and resolved in optimal fashions. It could also be called holistic design in that it looks at the entire building as a whole, and emphasis is on integrating the different aspects of the building design” (Lewis, 2004, 522). It greatly encourages all participants of a project to gather in the pre-design phase to discuss the project’s direction and set performance goals, while being considerate of each other’s opinions and thoughts. For example, a newly married couple desires to build a new home. To build a home of efficiency, it is important that the couple schedule an appointment with their architect to discuss the vision they have for their home. During the consultation, professionals are provided with the opportunity to

obtain knowledge of the client's vision, the needs and wants of the client, the prospective budget, the client's lifestyle, and the materials and products the client desires to see incorporated into the home. Knowledge of the client's vision enables professionals to customize the building's design to entail exactly what the client envisions. By doing so, resources can be conserved, building efficiency can be improved, and the financial expenses consumers pay monthly and annually can be reduced.

Lastly, products that are classified as biodegradable "should be substantiated by competent and reliable scientific evidence that the entire product or package will completely break down and return to nature, i.e., decompose into elements found in nature within a reasonable amount of time after customary disposal" ("State you claim," 1992, p. 10).

The Green Building Movement

In October 1973, the green building movement originated when Arab countries supplying large quantities of oil to the United States and to other Western countries placed an embargo on all oil exports. The oil embargo, or tax, made the prices consumers pay for oil to increase significantly. The costs in 1973, according to the article "Sorry Out of Gas: Architecture's Response to the 1973 Oil Crisis," were expected to "quadruple in four months" (Chodikoff, 2008, p. IC). Oil supply was perceived as a scarce resource and, as a result, motivated professionals began to discover and produce alternative products that satisfied the need oil fulfilled at affordable prices. Motivated by the potential reward of financial savings, professionals continuously researched, experimented, observed, and produced products and materials that utilized the world's natural resources more efficiently during the 1970s, the 1980s, the 1990s.

Despite professionals' interest in the green building movement, it was not until 1992 that the green building movement grew in popularity. In 1992, the green/sustainable communities located within the United States desired to promote the benefits of green building to Americans through "The Greening of the White House." This program improved the "energy efficiency and environmental performance of the White House complex by identifying opportunities to reduce waste, lower energy use, and make an appropriate use of renewable resources, all while improving the indoor air quality and building comfort" ("Green Building," p. 2). The White House was renovated to limit the amount of energy lost through the roof, windows, and walls; incorporate energy-saving light bulbs and energy efficient appliances; maximize that use of natural light; recycle waste; lease vehicles that utilized cleaner burning fuels; and limit the amount of water and pesticides used to care for landscaping. Two years since the completion of the project, more than \$150,000 per year was saved in March 2006. The significant savings the White House experienced resulted from reduced energy and water costs, landscaping expenses, and expenditures associated with solid waste. Furthermore, since 1996, a total of \$300,000 has been saved annually by additional renovation projects. Due to the success of the White House project, government buildings as well as commercial and residential buildings began to follow suit, and now the green-building movement is becoming "one of the fastest growing building and design concepts" (p. 3).

USGBC: The United States Green Building Council

In addition to green/sustainable communities, the United States Green Building Council promotes "the design and construction of buildings that are environmentally responsible, profitable, and healthy places to live and work" (p. 3). Each day, the USGBC

seeks to increase consumer awareness and knowledge of newly designed green products, while revealing the benefits that result from them. The USGBC believes that furthering consumer knowledge of green products will encourage consumer consumption and market transformation towards greener construction.

LEED: Leadership in Energy and Environmental Design

The USGBC partnered with the American Society of Testing and Materials to develop a rating system from which buildings can receive green, or sustainability, certification points. Between 1990 and 1995, the USGBC and the ASTM worked alongside one another to formulate a successful rating system. To the USGBC's disappointment, the ASTM moved too slowly. Therefore, in 1995, the USGBC became motivated to create a rating system. In 2000, the USGBC introduced LEED to consumers and professionals within the construction and design communities ("White Paper on Sustainability," 2006, p. 7).

LEED simplifies the process of "greening" commercial buildings by providing an intricate guideline on how to design, construct, and certify them. Furthermore, LEED, since 2007, has provided consumers with an explicit national guideline for residential homes. Green certification for residential homes requires that building inspectors specializing in green design verify how many green building features have been implemented. Once the total amount of features have been calculated by the inspector, the residential home will qualify for a certain level of green certification. In addition to the guidelines for commercial and residential buildings, LEED began to offer a green building certification guideline to builders in 2008. Green-building certification is awarded "after 24 hours of course work and requires builders to maintain regular

additional continuing education credits” (Schmidt, 2008, p. A27).

Within LEED, there are four levels of green-building certification. These levels include: certified, silver-certified, gold-certified, and platinum- certified. Of these levels, the highest level is platinum-certified and the lowest level is certified. In order for consumers to receive certification at each level, green- building practices must be implemented, and professionals certified in green building must observe and document them. Furthermore, to increase consumer understanding of what is expected, green building practices have been divided into six categories including: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation and Design Process (Gowri, 2004, pp. 58-60).

The Six Categories of LEED

The category of Sustainable Sites encourages professionals designing and constructing buildings to incorporate building materials that are readily available from pre-existing structures. By reusing materials from pre-existing structures, natural resources can be conserved because they are not essential to the construction of the new home. For example, if clients desire to construct a new home on a piece of property where a home already resides, this category stresses that materials from the pre-existing building are utilized to construct the new home. This is not to say though, that all pre-existing materials must be used. Clients may dislike the materials used in the older home. On the other hand, if the clients do like the pre-existing materials, they are limiting the finances they spend to purchase new materials by integrating them because pre-existing materials are free. In addition to LEED emphasizing the importance of utilizing reusable materials in building construction, LEED encourages that newly-constructed buildings be

developed near established communities. By building newer homes in locations that have been developed, natural resources are conserved because natural habitats are remaining undisturbed. Lastly, within the category of Sustainable Sites, LEED encourages professionals to implement efficient waste management systems during the construction phase. Waste management systems, also referred to as the process of recycling, divert substantial quantities of materials resulting from construction, demolition, and land-clearing procedures to recycling or salvage facilities, as opposed to landfills. When materials arrive at salvaging facilities, they are separated according to the type of material by image processing systems. Williamson and Leitner state: "Identifying and sorting domestic, office, and industrial materials more reliably and automatically cuts both the financial and environmental costs of processing these materials" (2008, p. 48). Furthermore, when consumers incorporate recyclable materials within residential and commercial buildings, LEED acknowledges these investments by awarding green-building certification points to them. Recyclable materials limit natural resource consumption because products constructed of reusable materials can be reconstructed into new materials in the future. No longer are new materials being continuously sought after to produce new products.

In addition, LEED will award green-building certification points to those buildings that integrate water-efficient appliances and high-efficiency plumbing fixtures within their designs. Within the category of Water Management, it is vital that consumers and professionals educate themselves on the water and energy efficiency levels that products possess. Consumers can go about retrieving this information by reading the EnergyGuide labels and the Energy Star Labels on each appliance and fixture.

Established in 1992 by the United States Environmental Protection Agency, “developed the ENERGYSTAR© program to promote and identify products that were energy efficient and safe for the environment” (Hoban, 2010, p. 34). At first, the only products that received the ENERGY STAR seal included computers and monitors. Currently though, since the Department of Energy and the EPA partnered in 1996, the ENERGY STAR seal can be located on light bulbs, appliances, building materials, and everything in between. By products receiving this seal, consumers are being informed of its energy efficiency level. According to Hoban, author of the article “Energy: Let the label be your guide,” appliances that receive the ENERGY STAR seal are “at least 30% more efficient than standard products” (2010, p. 34). Due to the significant improvement in energy efficiency, it is highly advised that consumers desiring to purchase appliances pay close attention to which appliances have an ENERGY STAR seal and which do not. Furthermore, consumers should compare the appliances’ features to determine which appliances offer the best services to meet their needs.

In the category of Energy and Atmosphere, LEED awards green-building certification points to residential and commercial buildings that generate their electrical energy on site. Encouraged methods to perform this task are geothermal energy systems and solar energy systems. Solar panels reduce monthly and annual financial expenses by utilizing sunlight. When sunlight is absorbed, it is then converted into electricity that is utilized to power consumer’s homes and work environments. Solar-power systems, which manufacturers claim last 25 to 30 years, have been observed to reduce consumers’ electrical expenses. For example, Dan Mullin, a homeowner in Washington, D.C., has “cut his electricity bill by two-thirds, and when those savings cover the \$10,000 up-front

cost for his system in ten to 12 years, his solar electricity will be free”(Frick, 2007, p. 70). Despite the benefits solar energy brings, consumers are still hesitant to invest in these products. Consumers do not realize that the “key to making a PV system pay off is whether your state offers a hefty financial incentive (more than half the U.S. population is covered by such subsidies)” (p. 70). To illustrate the extent to which subsidies cover the costs of solar-power systems one should look at this example. Between the geothermal energy system and installation the total comes to \$40,000. By rebates, credits and tax breaks, some states are able to pay half that cost. Furthermore, the federal government will chip in “30% of the cost, up to \$2,000. Taken together, those subsidies drop the total to \$18,000” (p. 70). If consumers cannot afford solar paneling for their roofs, other products that utilize solar energy are available. Consumers can invest in solar water-heating systems and solar-powered attic fans. Solar water-heating systems utilize dark-panel collector boxes that range from 40 to 80 square feet to trap solar heat and preheat cold water. After water has been heated, it then flows to an existing hot-water tank or special tank. It has been documented that these products can “provide less than 50% of the energy needed to heat hot water for a typical household” (p. 71). Several geographical locations offer savings higher than 50%. In Phoenix, Arizona, “the yield is 80%” (p. 71). The price at which solar water-heating systems are marketed is between \$2,000 to \$8,000. In addition to solar water-heating systems, solar-powered attic fans provide consumers with the opportunity to reduce their electrical bill by reducing expenses related to air conditioners. Priced at \$500, these systems have been observed to pay themselves off “in as few as two to three summers” (p. 71).

In contrast to solar power, geothermal heating systems utilize heat generated at 30

feet beneath the earth's surface to provide heat to residential and commercial buildings above ground. The depth at which geothermal heating systems generate heat is crucial to the systems success for consumers. The article "Web-based Data Logger Chosen to Verify Performance of New Geothermal System" states: "The top 500 ft. of the earth stores heat from solar radiation. While the temperature at the top 30 feet changes with the seasons, below 30 ft. ground temperature is fairly stable, staying at the average yearly temperature of the air" (2010, p. 20). Recognizing the potential benefits geothermal energy has to offer, "the Chewonki Foundation, a Wincasset, Maine-based nonprofit educational institution and winner of the 2009 GreatNonprofits Green Choice Award," has recently "installed a geothermal unit to help heat the largest building on its campus, the Center for Environmental Education" (p. 20). The geothermal unit installed will utilize the heat collected from deep-water wells to heat the radiant floors within the facility. Geothermal units have been projected to bring to those that invest in them financial benefits. Tom Twist, sustainability educator for Chewonki, says: "We've projected the system will function at one-third the cost of a traditional oil heat system and can be expected to pay for itself in three to five years" (p. 20).

LEED awards green-certification points to buildings that have optimal delivery and mixing of fresh air, limit the amount of indoor air contaminants, and maximize natural daylight and view opportunities. The category of Indoor Environment seeks to improve the atmosphere that individuals are exposed to daily by increasing fresh air, limiting pollutants, and encouraging natural lighting. Through doing so, human health will be improved (p. 58).

Lastly, LEED will award green-building certification points to buildings that have

been designed to incorporate green practices beyond what LEED Rating systems address. LEED encourages professionals to continuously tap into their creativity to produce products that are innovative, efficient, and affordable to consumers. By doing so, professionals are continuously supplying consumers with efficient products to select from, while offering products of ever-increasing efficiency (p. 58).

Each category of LEED when integrated, provides consumers with the maximum opportunity to improve their financial standings through water and energy efficiency, improve their physical well-being, and conserve the world's natural resources.

Benefits of Green Design

In contrast to conventional buildings, green buildings have been observed to provide benefits to consumers that, according to Kats, include “energy and water savings, reduced waste, improved indoor environment quality, greater employee comfort/productivity, reduced employee health costs and lower operations and maintenance costs” (2003, p. 3). Of these benefits, the two that will be discussed first include energy and water savings, and health and productivity levels.

Energy, the significant contributor to the overall cost of a building's operation, can be greatly reduced by the implementation of energy-efficient products and green-design practices. When proper energy-efficiency practices are integrated, green buildings have been observed and documented to use “30% less energy than conventional buildings— a reduction, for a 100,000 ft² state office building, worth \$60,000 per year, with a 20-year present value of expected energy savings at a 5% real discount rate worth about three quarters of a million dollars” (4). Furthermore, certified green buildings have been observed to use 28% less energy overall, silver-certified buildings have been

observed to use 30% less energy overall, gold-certified buildings have been observed to use 48% less energy overall, and average green-certified buildings have been observed to use 36% less energy overall. From these statistics, green buildings show that they do, in fact, provide consumers with financial savings that could not have been achieved otherwise.

In addition to green buildings providing consumers with the ability to reduce financial expenses related to energy consumption, LEED rated green-certified buildings strive to “reduce the pollutants that cause sickness and increase health care costs; improve quality of lighting and increase use of day-lighting; and increase tenant control and comfort” (p. 6). Poor indoor environmental quality (IEQ) in commercial buildings has been estimated to cost up to “hundreds of billions of dollars per year. This is not surprising as people spend 90% of their time indoors, and the concentration of pollutants indoors is typically higher than outdoors, sometimes by as much as 10 or even 100 times” (p. 5). Therefore, due to humans’ significant exposure to indoor air pollutants and harmful substances on a daily basis, it is vital that professionals act to limit them. Green buildings reduce the integration of toxic materials by investing in low-emitting adhesives, sealants, paints, carpets, composite woods, and indoor chemical and pollutant source control. Furthermore, green buildings incorporate better lighting quality within their designs, utilize natural light and shading, and encourage occupants within both homes and at work with greater control of light levels. When calculating the precise percentage of how human health is improved through better indoor air quality, it is difficult to do so because many factors affect this numerical value. Despite this limitation, green design has “increased ventilation control, increased temperature control, increased lighting

control and increased day-lighting-have been positively and significantly correlated with increased productivity” (p. 6). In summation, according to Figure 3 within the article “Green Building Costs and Financial Benefits,” “the total financial benefits of green buildings are over ten times the average initial investment required to design and construct a green building” (p. 12).

Integrated Design

The advantages of green building can be reached only if the building is viewed as one large system, rather than as individual parts. When professionals view buildings in this manner, the design becomes integrated. Integrated design encourages all participants involved in a project to work as a team. Together the owners, tenants, architects, engineers, and contractors achieve the project’s goals by continuously assessing the project’s direction and performance. During the pre-design and construction phases, routine checks are made. By completing this task, ID ensures that performance targets pertaining to energy efficiency, indoor-air quality, material efficiencies, quality and comfort of the indoor environment, ecological protection, storm-water management and quality, water conservation and financial performance are being met. If professionals neglect their duty to check the project’s direction and progress, the occurrence of mistakes become increasingly more likely. Cole says: “There is a saying that 90 percent of the mistakes made in a building project happen on the first day. Integrated design brings owners, tenants, architects, engineers, and contractors together to the table on this first day to ensure that green building solutions are found instead” (p. 21).

If professionals neglect to follow the rules of integrated design, the likelihood that future design improvements will be required and encouraged increases. With each

renovation, and upgrade, finances that could have been conserved are consumed.

According to Deal, "The U.S. Green Building Council's (USGBC) research suggests that 25% of LEED certified buildings do not save as much energy as their design predicted" (2010, p. 12). LEED suggests that the limitation of energy conservation results from "not clearly documenting the end goal to incorporate energy modeling to uncoordinated design to poor workmanship, to improper operation and maintenance, and to contractors exemption requirements in their bids" (p. 12).

Green Design is Intelligent Design

Green building, as mentioned above, enables consumers to reduce monthly and annual financial expenses, participate in the preservation of the world's natural resources, and improve their human health. In addition to those benefits mentioned above, green-building design also encourages consumers to design and construct buildings intelligently. Green design emphasizes that professionals and clients view the building they are seeking to design and construct as one large system within which all components work together to achieve common performance goals. These components include the site, foundation, framing, roof, electrical, ventilation- heating and cooling, door and window systems, insulation, plumbing, and even the landscaping details. Each subsystem satisfies its own function that in turn contributes to the building's energy efficiency, consumers' financial savings, the building's impact on the environment surrounding it, and the human health of its occupants (Cole, 2004, p. 21). Due to the significance of each subsystem, consumers must intelligently decide the location and position of the building, the materials used in the buildings' exterior and interior construction, and the appliances and fixtures that will be purchased.

Site

When deciding the placement and direction of a building on site, it is important to consider the environment's climate and the direction from which the sun rises and sets. The owner and architect of the Green Design Studio in Yarmouth, Maine, Christopher Briley says: "I'm amazed at how many homes are oriented toward the road without giving a single thought to the sun" (p. A27). According to the Rocky Mountain Institute located in Boulder, Colorado, simply pointing a house in the right direction can shave 30% off monthly utility bills" (p.A27). By this statistic, Rocky Mountain Institute is informing consumers that they can implement green design practices within their homes inexpensively. Green design does not have to cost thousands of dollars after all. Note though that benefits resulting from a building's position on site can only be experienced if consumers position their building according to the climate around it. In colder climates, the longest walls and largest windows should face south; whereas, in warmer climates buildings should position themselves in a manner that maximizes natural shading.

Insulation

Once professionals have decided the building's location and direction on site, they must decide the proper way to insulate the building. When insulating a green building, the primary goal professionals strive to accomplish is to make each space within the home or work environment airtight. How green buildings go about achieving this is within the buildings framework. Green buildings apply significant quantities of caulk to seal the interior spaces located between stacked wall studs and ensure that "hard-drying urethane foam gets squeezed into every nook and cranny that could produce a draft" (p. A27). This process differs significantly to those implemented within conventional

buildings. In conventional buildings, the insulation is limited to the inside of the frame.

As a result, “up to twenty percent of the house isn’t really insulated at all” (p. A27).

When consumers invest in efficient insulating practices, they provide themselves with the opportunity to reduce their monthly and annual bills. The article “Bringing Green Homes within Reach: Healthier Housing for More People” mentions that “by creating an airtight building envelope, homeowners can lower heating and cooling costs by 50% or more” (p. A28) at a relatively inexpensive price. Kat has learned that the premium price consumers pay on average for sustainable design is no more than \$3-5 per square foot. The increased value covers additional insulation, double- or triple-glazed windows, high-efficiency appliances, and further green-building practices. Besides reducing financial expenses on a monthly and annual basis, consumers investing in green products are providing themselves with the opportunity to improve the human health. Green buildings are built to be airtight. According to Hellier, they “block drafts where moist air gets into the wall cavity and condenses at dew points inside the wall” (p. A27). Moist air, if left unnoticed for long periods of time, can ultimately lead to mold growth, which is a contributor to an unhealthy living environment.

Coinciding with insulation, doors and windows significantly affect a building’s ability to retain air. Therefore, doors and windows are continuously being re-designed to improve efficiency because doing so provides the ability for consumers to save finances. To ensure optimal efficiency of doors and windows, Energy Star-rating systems have been provided for reference. To meet Energy Star-requirements, green doors and windows must have reflective coatings, provide good “R-value,” and maintain aesthetic appeal to consumers.

Material Selection

Professionals that are designing and constructing green buildings will invest in products that are composed of recyclable materials, have high levels of efficiency, and reduce consumer exposure to toxic substances. For consumers and professionals to distinguish between conventional products and green-building products, they must identify the products that possess green-building certification labels. The seven green-building certification labels are the ENERGY STAR label, the Environmental Protection Agency and the Department of Energy label, the GREEN SEAL label, the UL Environment label, the Design for the Environment label, the USDA Organic label, the Certified Cradle to Cradle label, and the GREENGUARD label.

The ENERGY STAR label, issued by the Environmental Protection Agency and the Department of Energy, is applied to appliances, building supplies, and consumer electronics that meet green-certification requirements. The GREEN SEAL label, issued by a nonprofit environmental-certification organization, is applied to eco-friendly paints, cleaning and paper products, hotels and other services. The UL Environment label, issued by UL Environment, is applied to consumer electronics, lighting, and appliances. The Design for the Environment label, issued by The Environmental Protection Agency, is applied to detergents, window cleaners, degreasers, and car-washing products. The USDA Organic label, issued by the U.S. Department of Agriculture's Natural Organic Program, is applied to raw, fresh, and processed foods. The Certified Cradle to Cradle label, issued by the consultants at McDonough Braungart Design Chemistry, is applied to cosmetics, personal-care products, diapers, and shipping supplies. Lastly, the GREENGUARD label, issued by The GreenGuard Environmental Institute, is applied

to furniture, flooring, paint, doors, and windows. Each of the labels above informs readers on why it has received green certification. For example, consumer goods that have received the USDA Organic label are “made with chemicals that are the safest for humans and the environment as determined by the EPA” (Jones, 2010, p. 49).

Before green builders, architects, and interior designers purchase these products for their clients, they must acknowledge the consumer's current lifestyle while considering future lifestyle alterations. Building design and products that acknowledge the change in consumers' needs over time are known to be universal.

Universally designed products enhance safety; they possess high-levels of energy efficiency; they are ergonomic; they simplify product operations; they meet the needs of everyone; and they satisfy the daily needs of individuals during all stages of life.

When consumers are researching products in the market that fulfill their individual needs, several products to remain aware of are “sturdy grab bars, enhanced lighting for aging eyes, and reduced trip hazards, such as no-step entries and walkways, and close attention to transition from carpet to hard surface flooring” (p. 47).

Furthermore, when seeking to invest in products that are ergonomic, consumers should keep their eyes open for front-loading washers and dryers. These products enable the elderly, as well as those that suffer from back injuries to use machines easily. They are easy to unload, load, reach, and operate. An excellent example to further illustrate ergonomic qualities is a universally designed kitchen. These styles of kitchens “make meal preparations safer and easier, with minimal distances to traverse” (p. 47). In addition to universally designed products enhancing safety and possessing ergonomic qualities, universal design is inclusive. Products that have been designed universally

provide services that meet the needs of individuals of differing ages, sizes, and abilities through their adaptability and flexibility. If those benefits were not enough, universal design “affords the ability to age in place in family neighborhoods, as well as, retirement communities” (p. 47).

Several vendors that market universal products to consumers are Kohler, Comfort Design, Best Bath, LASCO, Moen, Frigidaire, and Whirlpool. Each manufacturer offers consumers with different products that improve the quality of life individual's experience. Kohler markets comfort height toilets; Comfort Design, Best Bath, and LASCO produce universally-designed grab bars, molded seats, and thresholds that are low, flexible, and movable; Moen produces grab bars that coordinate with the designs of its coordinating high-end faucets in overall finish; Frigidaire has created a line of side-opening ovens for ease of use; and Whirlpool markets front-loading, front-controls, raised-pedestal Duct washers and dryers to reduce stress on the back. Universally designed products go further than those mentioned above. Therefore, it is crucial that consumers continuously educate themselves. Each day, professionals are researching, designing, manufacturing, and marketing products that are more efficient, ergonomic, and environmentally friendly than the previous ones.

Furthermore, it is important to note that universal design goes beyond the appliances and fixtures selected. It influences how professionals design the actual building. Design elements that incorporate universal-design principles include the following qualities. They are “open, spacious, and user-friendly” (Mack, 2004, p. 46). These qualities permit the occupants residing within these building to have ease of accessibility and mobility. Those contained to a wheelchair have access to each room and

space, children have freedom to play, and occupants, in general, can easily access all areas within their homes. In addition, these floor plans enable designs to appear larger and more spacious than they actually are.

By integrating universally-designed appliances, fixtures, and practices early in the design process, natural resources and finances can be conserved because the occurrence of homes being remodeled is reduced. Homes from the beginning of the design process are being designed with the future in mind and are considering the potential limitations consumers may face later in life.

The most important investment consumers will make regards the materials they select for the interior of both their homes and work environments. According to the article “Bringing Green Homes within Reach: Healthier Housing for More People,” indoor air is “typically 2-5 times more polluted than outdoor air, owing to the presence of asthma-inducing agents, such as mold and toxic chemicals in carpets, paints, and other synthetic materials” (p. A26). To prevent the health complications consumers may be diagnosed with, green design aims to greatly reduce the quantity of toxins consumers are exposed to on a daily basis within their homes and work environments. Green buildings limit consumer’s exposure to indoor carcinogens. An example of an indoor carcinogen includes formaldehyde. Formaldehyde can be found in manufactured wood products, which include sheathing and particleboard. Furthermore, green products aim to reduce consumer’s exposure to volatile organic compounds (VOCs) found within finishes like paints and toners.

Green-Product Manufacturing Companies

Companies that market products with low toxicity, high energy-efficiency levels,

and environmentally-friendly materials include: Smith & Fong Plyboo, Goodwin Heart Pine Company, Burlington Contract Fabrics, Pioneer Millworks, Hunter Douglas Contract, Hunter Douglas, Matthews Fan Company/ WPT Design, Tucker Robbins, Caroma Dual Flush, Aged Woods, Mitchell Gold & Bob Williams, Legare Furniture, Ikea, Green Floors, Flor, Branch Home's, Alpaca Made, Green Feet, Milk Paints, AFM Safecoat Paints, and Bio Shield. Each of the companies mentioned offer different eco-friendly products to consumers.

Green-certified Flooring Companies

Companies that offer green flooring to consumers are Smith & Fong Plyboo, Goodwin Heart Pine Company, Pioneer Millworks, Aged Woods Inc., Green Floors, and Flor. Smith & Fong plyboo offers quality bamboo plywood, paneling, veneers, and floorings. Goodwin Heart Pine Company offers extremely rare heart pine flooring that is harder, prettier, and nearly indestructible when compared to other wood products. Pioneer Millworks offers wood flooring that is constructed from reclaimed wood in older buildings. Aged Woods Inc. established in 1985, offers consumers reclaimed wood flooring, beams, and siding. Green Floors offers Treasure Island, Replay and Annual carpet styles at \$1-\$3 per square foot. Lastly, Flor offers 60-plus colors and styles of modular rug tiles that possess low VOC levels, and are entirely recyclable at \$7 and up per 19.7-inch square tile.

Green-certified Interior Décor Companies

Companies that offer consumers green-certified fabrics, window shades, and other household items include: Burlington Contract Fabrics, Hunter Douglas Contract, Hunter Douglas, Matthew Fan Company/ WPT Design, Caroma, Branch Home's, Alpaca Made,

and Green Feet. Burlington Contract Fabrics offers Environ Fabrics to consumers. These fabrics are produced from reclaimed or recycled materials, and are designed to exceed the industry's standards for quality and performance. They also meet the green-certified standards for fabric quality, luster, hand, and appearance. Hunter Douglas Contract offers GreenScreen, which is a PVC free shading fabric. Hunter Douglas offers triple honeycomb shades that are the "most energy-efficient nationally branded window coverings available" ("Product Showcase: Eco-Friendly," 2004, p. 210). These shades are offered to consumers at \$171 and up, per shade. The significant energy-efficiency levels result from their unique honeycomb-like construction. The honeycomb-like construction "traps air in not one or two, but three layers of honeycomb cells, insulating against heat gain in summer and heat loss in the winter" (2004, p. 210). If proper window treatments are not applied, electricity bills on a monthly and annual basis can significantly increase. In Carrie N Culpepper's article, "Out with the old, in with the green," Lerner states: "In colder seasons, heat loss from windows can account for 10 to 25 percent of your heating bill" (2007, p. 55). Smith & Noble offers honeycomb shades that come in eight different styles for \$57 and up, per shade. Matthews Fan Company/WPT Design offers uniquely designed ventilation and lighting products for residential and commercial buildings. Caroma offers a Dual Flush toilet that reduces the occurrences of blockages and significantly conserves water. The features that enable these benefits to be obtained include the toilets 4" trap way and the two button "dual flush" option. Branch Home's offers beech wood microfiber towels that are lightweight, absorbent, and colored by nontoxic dyes for \$12-\$64 each. Alpaca Made offers solid colored blankets that are produced from animals at \$115 and up, per blanket. Finally, Green Feet offers a hemp

shower curtain that resists mold and mildew and dries quickly at \$85 per shower curtain.

Green-certified Furniture Companies

Companies that offer furniture produced from environmentally-friendly materials include: Mitchell Gold & Bob Williams, Legare Furniture, and Ikea. Mitchell Gold & Bob Williams offer huge selections of sofas, chairs, and accessories that are manufactured by sustainably harvested wood and eco-friendly upholstery and foam at \$800 and up. Legare Furniture offers modern-looking TV stands, desks and shelves that are constructed from FSC-certified plywood at \$44-\$599 per piece. Ikea offers furniture selections that are manufactured from harvested wood and nontoxic materials.

Green-certified Paint and Toner Companies

Companies that offer green-certified paints and toners include: Milk Paints', AFM Safecoat Paints, and BioShield. Milk Paints offers soft, saturated matte hues that are manufactured from milk and clay at \$46 per gallon . These paints are extremely durable for walls and furniture and are safe enough for hospitals and children's toys. AFM Safecoat Paints offers paints that have zero- and very-low-VOC levels for both interior and exterior surfaces at \$14 per 32-oz can . Paints offered by AMF Safecoat paints are also nontoxic and safe for consumers with allergies. Lastly, BioShield zero-VOC offers tones that are specifically for kids with allergies at \$40 per gallon (pp. 55-56).

Each day, electricity used to power residential and commercial buildings contributes to the total cost consumers pay monthly and annually. To reduce electrical costs for consumers, green buildings aim to reduce electrical expenses by encouraging consumers to invest in compact fluorescent lamps, or CFLs. Hellier, promoter of compact fluorescent light bulbs, states compact fluorescent lamps, "cost 3-4 times more than

incandescent bulbs, but they use a fraction of the energy and can last ten times longer” (p. A28). Even though the upfront cost of green- certified light bulbs is greater than that of conventional light bulbs, the benefits that result from green-certified light bulbs far outweigh the premium price.

If consumers find themselves incapable of investing in green products, they can still invest in green design practices inexpensively. According to Steve Kaelble, green design is a “broad philosophy that encompasses not only the products you use, but also, which you choose, the attitude with which you approach them, the people who participate, and even the size and design of your home” (2009, 52). Essentially, the efficiency of a home or work environment depends significantly on the products and size of the design one chooses. Consumers that reduce the size of their home to accommodate that which is necessary over that which is desired provide themselves with the opportunity to conserve finances monthly and annually. The finances that are conserved can be invested in products of quality. In the article “Green Building: It’s a Way of Life,” Kaelble encourages consumers to invest in products of quality because they will require limited maintenance and repairs, will not have to be replaced as frequently, and they will possess greater longevity than those of lesser quality. As a result, the finances that would have been expended to fix and replace these products are conserved. Furthermore, by consumers reducing the square footage of their homes, they are providing themselves with the opportunity to customize their home to incorporate all the special details they desire without compromising their vision. Susan Susanka, author of “The Not So Big House,” states “the Not So Big House isn’t just a small house. Rather, it’s a smaller house, filled with special details and designed to accommodate the lifestyles of its

occupants” (5). The Not So Big House is one of efficiency, intricate detail, customization, practicality, resourcefulness, and above all, beauty.

Conclusion

Do the benefits that result from green-certified products outweigh the premium price consumers pay? A review of the literature suggest that the benefits that result from green-building practices far outweigh their upfront costs. Green-building practices provide consumers with the ability to conserve finances on a monthly and annual basis. They improve the water and energy efficiency levels of residential and commercial buildings. They conserve the worlds natural resources. They advocate excellent stewardship of the environment around them. They provide consumers with the ability to improve their physical well-being. They limit the usage of indoor pollutants within residential and commercial buildings. They motivate professionals to continuously research ways to improve product efficiency. They encourage consumers to acknowledge their needs and wants. They encourage consumers to continuously educate themselves on the newest green products available to them, and they motivate consumers to design homes and work environments that meet their current needs and those that come in the future. From observing the benefits listed above, it can be stated with confidence that the benefits that reap from green building practices far outweigh the upfront costs consumers have to pay and, furthermore, conventional products pale in comparison to those products that have received green certification.

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