

Green, Greener, Greenest

What Makes a Building Green?

A green building, also known as a sustainable building, is a structure designed, built, renovated, operated, and/or reused in an ecological and resource-efficient manner. Green buildings use energy, water, and other resources more efficiently and are designed to meet objectives such as protecting occupant health, improving employee productivity, and reducing impacts on the environment.

Why make your building the greenest possible?

Environmental benefits occur for the users of the building, the environs of the building, and globally, with reduced greenhouse gas emissions. Buildings account for one-sixth of the world's fresh water withdrawals, one-quarter of its wood harvest, and two-fifths of its material and energy flows. Building "green" is an opportunity to use our resources efficiently while creating buildings that improve human health, build a better environment, and provide cost savings. Benefits increase as the building becomes greener. Developers ask, can they afford financially to maximize green features? The converse is to ask whether the human community afford not to maximize green features?

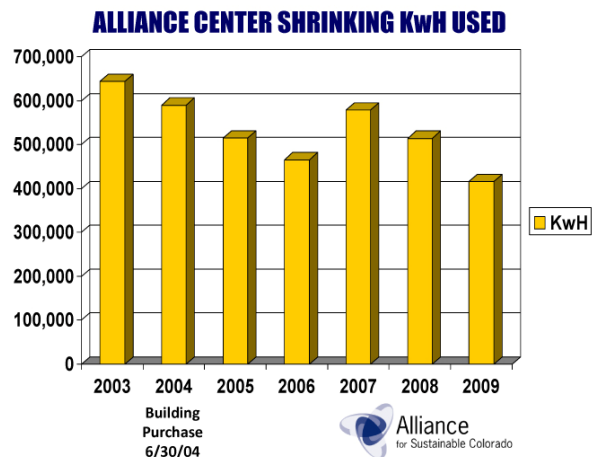
Green buildings may – and may not – cost more initially, but they save money through lower operating costs over their lives. Take the example of lighting and air conditioning. Let's say that energy efficient lighting costs more than conventional lighting. However, energy efficient lighting most often generates less heat (and with thoughtful choice, higher quality light closer to natural daylight). Over an entire building, reducing heat from lighting can enable installation of a smaller air cooling system, which should cost less. In this, albeit simplified example, the higher cost for lighting is offset by the lower cost for space cooling – on day one. Every day thereafter money is saved because both the energy efficient lighting and energy efficient space cooling systems use less energy and require less maintenance because they last longer. Choosing high efficiency motors, equipment, and appliances all generate financial returns through energy savings. An integrated systems approach, rather than a collection of individual systems, is essentially beneficial.

One goal of this paper is to change the paradigm: paying more in order to install green features should not be considered as costs, but as investments. When one makes an investment, there's a return. If the reader takes only one point from this paper, let it be that additional expenditures to make a building greener are investments, not costs. On average, green buildings save 30% of energy, 35% of carbon emissions, 30-50% of water use, and 50-90% of waste costs (source Capital E), while increasing worker productivity. Green buildings command a higher price when sold. Following are examples of investments in green technologies and products made by the Alliance for Sustainable Colorado (the Alliance) in its Multi-Tenant Nonprofit Alliance Center.

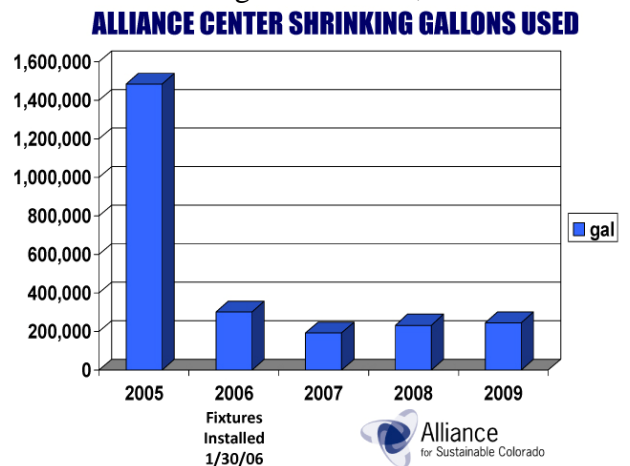
The Alliance Center, 1536 Wynkoop Street, Denver

In 2004 the 38,000 sq ft. Alliance Center, built in 1907, was renovated with many cost-effective sustainable performance green design features and technologies. The Center has earned two US Green Building Council LEED (Leadership in Energy and Environmental Design) certifications, Existing Buildings Gold and Commercial Interiors Silver. As a result, the Alliance Center now uses nearly 30% less energy, saving approximately \$18,500 or \$.50 per sq ft. annually. Most important for the Alliance Center, a mission driven building promoting development of policies and implementation of practices of sustainability, the greenness of the Alliance Center attracts developers, contractors, engineers, architects, designers, policy makers, government officials, elected representatives, students and people interested to learn from what the Alliance has done. When they take self-guided and guided tours, they learn about the work of the tenants.

Energy Efficiency - Passive design strategies can dramatically affect building energy performance, including building shape and orientation, and passive solar. Studies have shown that the use of natural lighting has a positive impact on productivity and well-being. By investing in increased natural daylighting, more energy efficient fluorescent lamps, motion detectors, self-dimming / limitable ballasts, “heat mirror” window tinting, tap temperature water fountains, direct digital control of space heating and cooling, and replacing some office equipment and building motors with more energy efficient alternatives, the Alliance has reduced energy consumption in the Alliance Center by nearly 30% *despite twice the number of people now working in the building and ten times the number of visitors.* In one instance, the Alliance invested \$17,500 to replace 40 Watt T-12 fluorescent bulbs with 32 Watt T-8s, and replace two low efficiency magnetic ballasts powering each light fixture with one high efficiency electronic ballast. Through an Xcel DSM (Demand Side Management) program, the Alliance received a rebate of \$3,500. This investment in lighting was originally calculated to pay back in 2.65 years – and then electrical rates were increased by 30%, shortening the payback period. The Alliance is currently evaluating 25 Watt lamps, which are calculated to pay back in one year.



Water Efficiency – The Alliance replaced 3-gallon per flush toilets with 1-gallon models, a 66.6% saving, and 37.5% below the current plumbing code limit of 1.6 gallons. One gallon flush urinals were replaced with water free fixtures. Conventional faucets and showerheads were replaced with low flow units. The Alliance also received rebates from Denver Water that helped defray the costs of the extra efficient toilets. The result: on an investment of \$22,000 at retail costs, water use has plummeted 84% *despite twice the number of people now working in the building and ten times the number of visitors.* The Center is reaping the benefits of saving over \$5,000 per year in water and related sewer charges, with an originally calculated payback of 4.4 years, which did not take into account water rates rising an average of 7% per year.



With full system integrated design, particularly in new construction, additional resource efficient features can be included. Examples are raised floors, more efficient in distributing heated and cooled air, and gray water systems, which reuse water for flushing toilets and irrigating landscaping. In addition, behavioral changes to consume fewer resources can be encouraged by metering electrical use by floor or suite and metering water use in-building separately from exterior use.

Materials Efficiency – Construction materials and products were selected for the Alliance Center considering characteristics such as reused and recycled content, sustainably harvested materials, high recyclability, durability, longevity, and local production. By reducing the quantity of new construction materials consumed through reuse of deconstructed materials and the recycling of demolished materials, we will reduce the waste stream to landfills. Using recycled-content in office paper and paper towels, refilling printer cartridges and making herculean efforts to avoid use of disposables help develop markets for recycled materials diverted from landfills. In the Alliance

Center, water is served in pitchers with glasses. Ceramic plates and metal flatware are provided, eschewing water in plastic bottles and the waste of plastic cups, plastic eating utensils and paper plates. The default choice of using disposables for convenience must be changed. Jeremy Rifkin has challenged audiences to consider “convenience” a dirty word. Thoughtful choices in product selection and sustainable practices promote resource conservation and efficiency, and save costs, both financial and environmental.

Health, Happiness and Productivity – To maximize indoor air quality, construction materials like wall board, carpet, paints, stains, adhesives, sealants, floor coverings, countertops and even doors were all chosen with consideration for minimizing toxic emissions, such as volatile organic compounds (VOCs) and formaldehyde, which have detrimental impacts on occupants' health and productivity. Green cleaning products are used. “Walk off mats” at entry doorways to the Center reduce the quantity of pesticides, chemicals, petroleum by-products, allergens and dirt tracked into the building on people’s shoes. Together with regular monitoring and changing of air filters and prohibition of smoking in and within 50 feet of the building, the indoor air quality in the Alliance Center is very good. One tenant, who habitually had respiratory problems every winter was asked by her doctor why she hadn’t been in to see him in 2008. She replied, “It must be the building I’m working in.” The Alliance also replaced badly functioning chilled water fountains with new unrefrigerated models. The Alliance Center is now saving about \$200/year in electrical costs by not making the water too cold and unhealthy. Some benefits, such as improving occupant health, comfort, productivity, and reducing pollution and landfill waste are not easily quantified. Consequently, they are often not adequately esteemed in design decisions and building operations.

The Challenge of Split Interest – An endemic problem with non-owner occupied building is split interests between the owner/landlord and the tenants: who has the incentive to invest in efficiencies depends on who pays the operating costs. A developer may offer a building for sale and skimp on investing in green features to make the purchase price more affordable to a greater number of potential buyers. Similarly, a building owner may pass operating costs along to tenants, and therefore be unwilling to invest in green features since, like the developer, the return on the investments will obtain to someone else. From the tenants’ perspective, they might want to invest in energy efficient features, which would reduce their occupancy costs, but likely only when there is a near immediate pay back and unanimous participation. Tenants have no interest in investing in capital improvements that they won’t own and are considered costly gifts to the landlord. Bridging the divide of split interest with clever innovations is critical, utilizing such tools as green leases that account for a landlord’s capital improvement in energy and water efficiency being amortized as operating costs paid by tenants, who will therefore pay less for utility charges. To overcome split interest, financial benefits must be received by both sides.

See for Yourself – The Alliance Center has been designed to educate. For a virtual tour, please visit www.sustainablecolorado.org. For a self-guided tour come to 1536 Wynkoop Street in Denver or schedule a guided tour by email tour@sustainablecolorado.org or phone (303) 572-1536.

For More Information:

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