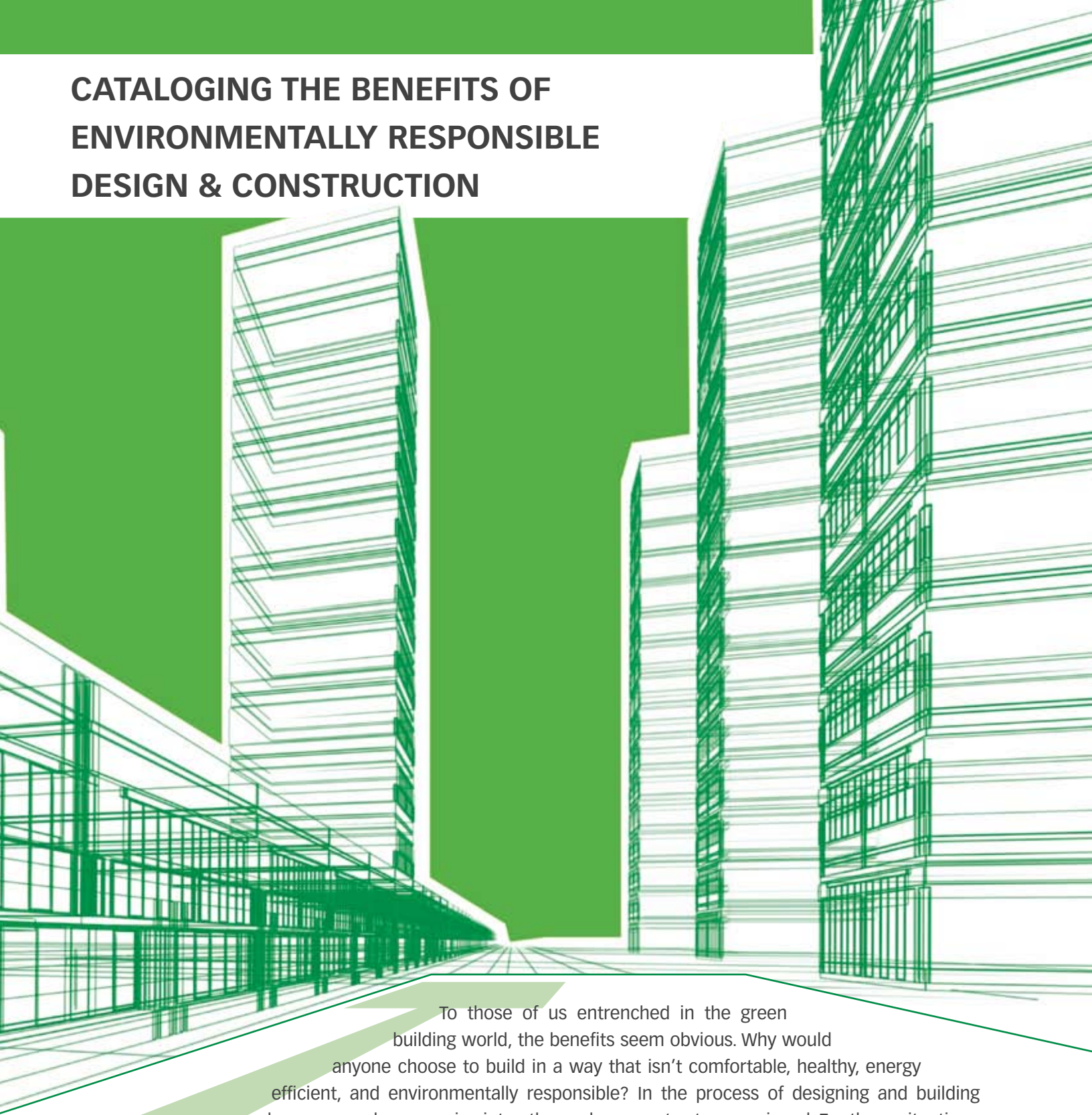
Making the Case for GREEN Building

By Alex Wilson

CATALOGING THE BENEFITS OF ENVIRONMENTALLY RESPONSIBLE DESIGN & CONSTRUCTION



To those of us entrenched in the green building world, the benefits seem obvious. Why would anyone choose to build in a way that isn't comfortable, healthy, energy efficient, and environmentally responsible? In the process of designing and building green, however, we keep running into others who are not yet as convinced. For those situations, it is useful to be able to spell out the benefits.

Even within a single college or university project, different team members often have different reasons for promoting a green agenda. Architects may promote environmental measures because they feel it is the professionally responsible thing to do. The facilities manager who will take care of a building may recognize inherent durability, maintenance, and energy cost advantages. Students and faculty may insist on clean energy technologies and the smallest possible carbon footprint. And the administration may look strictly at bottom-line financial benefits of green.

There are lots of reasons for building green. This article examines a spectrum of reasons and benefits. Even if many of these items are already familiar, this list may provide some new insights and help you convince "the powers that be" on your campus to pursue an even deeper shade of green.

Why would anyone choose to build in a way that isn't comfortable, healthy, energy efficient, and environmentally responsible?

ENVIRONMENTAL BENEFITS

Reduced Global Warming Impacts

To the extent that green buildings use less energy and generate less carbon dioxide through their operation, require less transportation energy for their occupants, or avoid release of other greenhouse gases (such as HCFC and HCFC refrigerants and foam insulation blowing agents), they contribute less to global warming—clearly one of the greatest environmental threats we face today. It is important to recognize that climate change impacts are global in nature—what we do in one part of the United States affects the world's climate, and, conversely, anything we do to reduce greenhouse gas emissions results in global benefits.

Reduced Contributions to Air Pollution

Burning fossil fuels to operate buildings and to transport people to and from those buildings causes local and regional air pollution—so any measures that reduce this energy use will help control air pollution. Some building materials also contribute to air pollution (smog) through the release of volatile organic compounds (VOCs). With green building and the selection of green building materials, air pollution sources should be minimized.

Reduced Energy Production Impacts

Fossil fuels require mining, drilling, processing, and transporting before arriving at their end use—whether in a power plant, building, or automobile. These processes may destroy the land, impact negatively on wilderness areas, and may result in air and water pollution. The production of nuclear fuel used in nuclear power plants has similar impacts. Energy production impacts are reduced when buildings use less energy from conventional sources.

Reduced Impacts of Transporting Materials

The greater the distance building materials and products need to be shipped (and the distance raw materials have to be shipped in the manufacturing of these finished goods), the greater the energy use and environmental impacts. With green building, there is often an effort to select more local materials.

Minimized Ozone Depletion

Green buildings minimize the use (and release) of ozone-depleting substances. This involves replacing CFC-based chillers, specifying non-HCFC mechanical equipment and avoiding foam insulation produced with

HCFC blowing agents. With renovation of existing buildings, measures can be taken to capture and destroy ozone-depleting refrigerants and blowing agents.

Reduced Water Pollution

Buildings contribute to water pollution in a number of ways: stormwater runoff that carries contaminants into nearby surface waters, effluent from manufacturing plants that produces the products used in constructing a building, and the wastewater generated by a building that either introduces residual pollutants into surface water after treatment or more directly contributes pollutants to the groundwater with onsite wastewater treatment. With green building, efforts are made to minimize these impacts and select products that carry minimal "upstream" or "downstream" water-pollution impacts.

Reduced Water Consumption

Many resource experts are more worried about freshwater supply than energy supply over the coming decades. Through a combination of indoor and outdoor water conservation strategies, many green buildings are using less than a quarter as much water as conventional buildings. In addition to conserving water, some green buildings collect water off their rooftops or separate and treat building wastewater in order to provide nonpotable water for use in landscape irrigation or toilet flushing.

Increased Environmental Awareness

Green buildings can be learning laboratories for all who use them, especially if educational or interpretive materials are provided to teach occupants and visitors about the building's green features. Green buildings that offer a direct connection with the natural environment may also nurture a more wholesome relationship with that environment among populations that are increasingly isolated from it.

FIRST-COST SAVINGS

Reduced Infrastructure Costs

Substantial first-cost savings can often be achieved with green building through differences in how infrastructure is handled. For example, innovative stormwater infiltration systems can reduce or eliminate the need for storm sewers and stormwater detention ponds; narrower streets to slow traffic

can reduce paved area; and clustering buildings on a site can reduce the amount of paved area and the length of sewers and utility lines. Highly energy efficient new buildings may make campus power plants, heating or chilled water loops, or substation expansions unnecessary.

Reduced Material Use and Construction Waste

Designing smaller, more compact buildings can save a substantial amount of materials. Because construction waste volume is generally proportional to building size, smaller buildings also generate less construction waste. Reducing material use and construction waste through optimizing building dimensions (designing on a two-foot module, for example) and separating and recycling waste can also dramatically reduce construction waste and disposal costs.

Savings from Downsizing Mechanical Equipment

By improving the energy performance of a building envelope, it is often possible to downsize mechanical equipment as well as perimeter heating systems. Once loads have been reduced significantly, whole new approaches to heating and cooling sometimes become available—for example, using radiant systems rather than air distribution for heating and cooling and separating ventilation air from comfort air. In some cases, by going even further with improved envelope energy performance, it is possible to totally eliminate heating or cooling equipment—and in the process pay for much or all of the envelope improvements.

REDUCED OPERATING COSTS

Lower Energy Costs

Green buildings commonly use less than half as much energy as their conventional counterparts and some green buildings consume less than a quarter as much energy—or even operate on a net zero-energy basis (using renewable energy to generate as much energy as they consume). Much of this benefit often comes from an improved building envelope and more energy efficient equipment, though improved space coupled with a smaller building size can also play a role. Increasing concerns about climate change and rising energy costs will make energy savings an even greater driver of green building.

Lower Water Costs

Green building water (indoor and outdoor) conservation strategies not only significantly reduce water consumption but also reduce water and sewer costs.

Greater Durability and Fewer Repairs

An important, yet often overlooked, feature of green buildings is durability. Durable buildings cost less to operate because repairs and replacement of failed building components are less common. Although durable building materials and equipment may cost more up front, their life-cycle costs are often lower than conventional products because they last longer and require fewer repairs. Green (vegetated) roofs, for example, can significantly increase the durability of the roof membrane by protecting it from exposure to ultraviolet (UV) light and thermal shock.

Reduced Cleaning and Maintenance

Some green building strategies, materials, and products require less maintenance or reduce the

need for cleaning. Track-off entryway grates and carpeting keep a building cleaner by capturing dirt before it enters the building—and thus reduce the costs of cleaning. A natural landscape created with native plants generally requires significantly less maintenance than conventional turf and shrubbery.

Many green buildings have lower water demands and produce less wastewater than conventional buildings, thus reducing demand on municipal services as well as campus infrastructure.

Reduced Costs of Churn

Reconfiguring office spaces and relocating office workers (churn) is a huge cost for many companies, agencies, and schools. Certain green building strategies, principally raised access floors and modular wiring, can dramatically reduce this expense.

OTHER ECONOMIC BENEFITS

Positive Public Image

A stellar green building or a commitment to healthy, environmentally responsible buildings generally can bolster the public image of a college, university, or school.

Easier Recruiting and Better Retention

Recruiting quality students, faculty, and staff can be a challenge for any institution. Green buildings enhance a campus image, drawing the attention of prospective students and faculty. Also, the quality of the space in which prospective students, faculty, and staff will be learning and working in, including such features as daylighting, views to the outdoors, and indoor air quality, can have a significant impact on drawing the best and keeping them there.

Reduced Liability Risk

Lawsuits over mold in buildings and sick-building syndrome are increasingly common. Green buildings that have been designed with state-of-the-art knowledge about building science and moisture control pose a much lower risk of lawsuits related to these problems.

HEALTH AND PRODUCTIVITY BENEFITS

Improved Health

By virtue of the materials used—moisture-control detailing, pollution- and contamination-rejection strategies, and ventilation strategies—green buildings are healthier buildings. Americans spend 85 to 95 percent of their time indoors, so the quality of the indoor environment is extremely important.

Enhanced Comfort

Measures that reduce drafts, minimize floor-to-ceiling temperature stratification, and control noise improve comfort in buildings. The controllability of individual workspaces—a feature in many green buildings—addresses the fact that different people have different needs when it comes to temperature, ventilation, and light levels. Individuals often

benefit psychologically just from knowing that they have this control over their workspace environment.

Reduced Absenteeism

Keeping workers healthier—through control of contaminants and displacement ventilation strategies (as achieved when raised access floors are used for conditioned air supply)—can significantly reduce work lost to illness.

Improved Worker Productivity

The economic benefits of boosting productivity are tremendous, with salaries and benefits costing on average $318 per square foot per year in a U.S. office building (according to data collected from Carnegie Mellon University), compared with $50 for technology, $16 for the mortgage or lease, $2.35 for energy, and $1 for churn. Just a 1 percent increase in productivity, for example, will more than offset the total energy costs in the average building. Studies by Carnegie Mellon University have shown productivity increases in green buildings ranging from 0.4 to 18 percent.

COMMUNITY BENEFITS

Reduced Demand on Municipal Services

Many green buildings have lower water demands and produce less wastewater than conventional buildings, thus reducing demand on municipal services as well as campus infrastructure. In areas where droughts are frequent or where municipal water utilities are already pushed to capacity, this benefit that green buildings offer can be significant. With Oakes Hall at the Vermont Law School, a moratorium on new hook-ups to the town's wastewater treatment plant drove an aggressive water conservation agenda, which included composting toilets in the four-story classroom building.

Reduced Erosion and Stormwater Runoff

Some of the most localized environmental impacts of buildings are the erosion that occurs during construction and the increase in stormwater runoff that results from added impervious surface. By incorporating green roofs, rooftop rainwater harvesting systems, porous pavement, and other practices to

provide for onsite stormwater infiltration, the environmental impacts of stormwater runoff can be significantly reduced.

Creating "Community"

Development patterns that have been common during the last half of the twentieth century have contributed to a loss of community in many areas. Green development, when implemented on a campus or community scale, can help to reverse these trends and return to people-focused neighborhoods in which residents interact with their neighbors.

WHAT GREEN BUILDING WILL BE

Given the many benefits of green building, it is not surprising that these practices are becoming more and more common on college and university campuses—as well as throughout the building industry. Educational institutions have long been leaders in green building, perhaps due to their awareness of environmental concerns facing the world. What is new, however, is the understanding of all the *other* benefits of green building, the ones that go beyond environmental protection. On campuses today, green building is being advanced as much by the bottom-line driven fiscal managers as the environmentally focused science faculties.

As motivation for building green expands beyond the early environmental advocates, the uptake is mushrooming, but there are also some risks. Demand for green design services in some areas is outpacing the available knowledge base, and mistakes are being made. It is critically important for facilities departments at colleges and universities to develop their own expertise in green building so that they can effectively evaluate solutions proposed by design teams. Investment in knowledge is key to the long-term success of green campus buildings.

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