

Green Buildings and the Bottom Line

Fourth in a Series of Annual Reports on the Green Building Movement

The 'New Reality' of Green Building From Environmental Cause to Financial Opportunity

Three years ago, when we published our first White Paper on Sustainability, we could not have predicted with any degree of certainty whether the green building movement would survive.

We can now safely report that green building is alive and well and active in virtually every major city in America.

Green building has, however, changed dramatically in recent years. What started out as a charismatic environmental crusade has matured into an established sector of the U.S. construction industry.

Green building's early adherents have proven that they can build high-quality, high-performance structures in a professional, businesslike way. Their passion has not diminished, but it has become more firmly grounded in the realities of the marketplace.

This "new reality" has begun to attract the attention of the financial community. Investors are asking: Do green buildings command premium rents? Do they lease up faster than "conventional" buildings? Are they more valuable than other real estate investments? What is the market potential for green buildings in the future?

In the following pages, we will examine the bottom-line issues of green building across a wide range of building types.

We conclude with 10 constructive recommendations—an "Action Plan"—for consideration by stakeholders in the green building movement.

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Lafarge believes that sustainability can be a competitive advantage. This long-term perspective includes the need for economic, social and environmental consideration in our daily business decisions. We believe this approach will help us achieve our objectives to be the preferred supplier, community partner, employer and investment.

Lafarge, through its North American partnership with Habitat for Humanity International (HFHI), has supported Habitat for years to provide decent, affordable housing. The partnership recognizes that — as a whole — our contributions make us the largest supplier of cement, concrete, aggregates, and gypsum products to the world's premier building materials charity.

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Lafarge is exploring ways to contribute to sustainable building. Our membership in the U.S. Green Building Council (USGBC) demonstrates the company's interest in partnering with "leaders from across the industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work."

Our products play a decisive role in sustainable architecture and construction. They are contributing a sustainable component to a growing number of LEED® (Leadership in Energy and Environmental Design) projects across North America. Lafarge's employees are also entering the USGBC's LEED Professional Accreditation program, earning the designation of LEED Accredited Professional, to better serve the environmental needs of the design and building community.



Jean-Marc Lechêne
President, Cement in North America



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Green Buildings and the Bottom Line

Executive Summary

The green building movement has begun to shift from a predominantly environmental emphasis to one that more fully embraces the business and financial demands of the real estate market.

As green building continues to flourish, it has begun to attract a new group of participants, the money people. This group comes to green building with a much different set of expectations than that of the pioneers. Without the active participation of the financial interests, however, the green building movement will stagnate.

In this White Paper, the editors review the financial and economic dimensions of green building across 10 building types of highest interest to our 75,150 subscribers.

We conclude with a 10-point "Action Plan" for consideration by stakeholders in the green building arena.

1. State and local government pension funds and so-called socially responsible investors should be encouraged to allocate a portion of their portfolios to appropriate green real estate investments.

State and local government pension funds have an estimated market capitalization of \$2.7 trillion; socially responsible funds total \$2.3 trillion in assets under management. If green building could attract even a small percentage of the combined \$5 trillion of assets in these sources, it would constitute a huge infusion of capital.

2. Construction union pension funds and union-based insurance companies should consider allocating a share of their assets into green buildings.

Taft-Hartley pension funds control \$420 billion, or about 6%, of all pension fund assets, and they are heavily concentrated in the construction trade. Union-based insurance companies control billions in assets. Devoting even a portion of these assets to green real estate would be a boon to the movement.

3. Research should be conducted on best practices for measuring the investment criteria of green real estate.

The issue of whether green buildings cost significantly more to build than conventional buildings has been put to rest. However, lenders and investors still have many questions about green building finances that require more data and better measurement tools for quantifying the investment benefits of green buildings.

4. The major risk-rating agencies, along with investment banks, commercial banks, and private equity fund managers, need to be brought into the green building fold.

Fitch, Moody's, and Standard & Poors must begin to evaluate the reduction in risk to banks and other investors

as a result of green buildings' lower energy consumption, reduced operating costs, and improved IAQ.

5. State and local governments seeking to promote private-sector green building in their localities should use the carrot, not the stick, as a motivator.

Forward-looking governments have created incentives to encourage green building, through fast-track permitting, density bonuses, and other mechanisms that provide measurable value to developers, property owners, and Building Teams.

6. Cities that mandate LEED certification for private-sector projects should provide an appeals process for non-certified projects that meet the performance standard.

A growing number of cities require LEED certification for private developments—a phenomenon we have labeled "LEED creep." Regulation of this type is counterproductive to the goal of encouraging green building.

7. Building code officials, the International Code Council, and construction trade unions need to work together to overcome obstacles to green building posed by current building codes and regulations and to optimize the use of new green technologies.

Waterless urinals are the touchstone in the clash between code officials and construction unions on one side, and owners and developers of green buildings on the other. The need to "harmonize" codes and practices with the enhanced performance of new technology is a major issue in green building.

8. Building owners need to invest in commissioning their properties and sponsoring post-occupancy and O&M evaluations of their buildings.

Some building owners realize a payback of less than nine months through commissioning, yet only a small percentage of buildings are ever commissioned.

9. Researchers should continue to study worker and student performance, employee and student health, hospital patient outcomes, and other human factors related to green buildings.

The health and human benefits that accrue from green buildings may be more significant than the out-of-pocket benefits, some would argue. Fresh research on certified green buildings is needed to determine how these "soft" benefits impact the bottom line.

10. The legal profession needs to examine potential liability issues resulting from developers and owners failing to build to green standards.

Will the time come when green building certification will be seen as a *minimum standard*? This is a question legal scholars must begin to take seriously.

Contents

Chapter 1
The New Reality
of Green Building..... 4

Chapter 2
Where the AEC Industry Stands
on Sustainability..... 6

COMMERCIAL MARKET

Chapter 3
Financing Green
Office Buildings 10

Chapter 4
Selling Green to
Retail Markets 18

Chapter 5
Hotels: A Budding
Green Market 24

Chapter 6
Restaurants on
an Energy Diet 26

Chapter 7
The Modern
Green Home 28

INDUSTRIAL MARKET

Chapter 8
Greening the
Industrial Sector 34

INSTITUTIONAL MARKET

Chapter 9
Higher Education
Goes Green..... 36

Chapter 10
Greener Days Ahead
for K-12..... 42

Chapter 11
Healthcare's Case
for Green 46

Chapter 12
The Greening of Government... 50

White Paper Action Plan 58
Resources and Advisors..... 62

1. The New Reality of Green Building

A dramatic shift has been taking place in the green building movement in the last couple of years. As recently as three or four years ago, the feasibility of designing and constructing projects under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating program was in doubt. Except for a cadre of early adopters (representing perhaps 10-15% of architecture, engineering, and construction firms¹), most AEC professionals were skeptical about three crucial issues:

- 1 Whether green buildings could achieve the energy and environmental goals called for under LEED and other building rating programs.*
- 2 Whether the building products and materials needed to meet those goals would be available, at what cost, and at what quality and performance levels.
- 3 Whether green buildings would cost more to build than comparable "conventional" buildings, and, if so, how much more.

In recent years, all three of these concerns have largely been put to rest. As to the first, more and more Building Teams have moved up the learning curve and are routinely producing sustainable projects with energy savings in the 20-30% range compared to industry standards. Performance gains for site planning, water conservation, indoor environmental quality, and materials and product selection are also becoming the norm.

Today, most Building Teams with a reasonable degree of experience in sustainable design and construction should be able to achieve a basic rating under LEED, Green Globes, or Energy Star for most routine projects—say, a mid-rise office building, a K-4 school, or a university classroom building.

Turning to the second area of concern, one reason why it's easier to build green is that more "environmentally preferable" products and materials have become available in the last few years. If anything, building product manufacturers have been falling over themselves to come up with green product lines—for paints, finishes, carpet, windows, furniture, roofing, glass, plumbing fixtures, lighting, and cladding.

As a result, Building Teams should easily be able to

specify 90-95% of the basic green products and materials they need for their jobs, usually at prices competitive with conventional products.

That leaves the issue of "first cost."

The launch of LEED for New Construction in 2000 was accompanied by dire predictions in some quarters of the construction industry that LEED buildings could cost 20-25% more than conventional buildings. Federal agencies, state and local governments, and private owners and developers were justifiably horrified that Building Teams would jack up their bids to meet LEED requirements, wreaking havoc on project budgets.

To a great extent, these fears have been calmed by a series of groundbreaking research studies:

■ In late 2003, Greg Kats and others released a study showing that the average construction premium for a sample of 33 LEED buildings across the country was 1.84%. For the eight LEED Certified buildings in the study, the premium was only 0.66%; for 18 LEED Silver buildings, 2.11%; for six LEED Golds, 1.82%; for one LEED Platinum, 6.50%.² The "Kats Study" was widely reported in the professional media and went far to allay fears of double-digit cost overruns for green buildings.

■ A year later, Lisa Fay Matthiessen and Peter Morris, of real estate consultant Davis Langdon, used their firm's proprietary database of construction projects to compare the cost of 45 buildings seeking LEED certification against 93 conventional buildings. They concluded that "many projects achieve sustainable design within their initial budget, or with very small supplemental funding." Further, "the costs per square foot for buildings seeking LEED certification fall into the existing range of costs for buildings of similar program type."³

■ Later in 2004, the U.S. General Services Administration (the agency that builds or leases millions of square feet for federal offices, courthouses, and special facilities) reported that the anticipated construction premium for new federal courthouses would range from a *negative* 0.4% for a "low-cost" LEED Certified facility, to a high of 8.1% for a "high-cost" LEED Gold courthouse. The added cost for renovating a government office building would range from 1.4% (for a LEED Certified project with minimal façade work) to 8.2% (for a LEED Gold with minimum façade work). The GSA also cited additional "soft" costs ranging from \$0.41-0.80/sf for LEED-related requirements that went beyond GSA's standard project scope.⁴

Equally calming was a growing body of evidence that

*Note to readers: Except where noted, the term "green buildings" will be used interchangeably to refer to high-performance buildings in general or specifically to those certified by LEED, Green Globes, or Energy Star.

more-experienced Building Teams, using integrated design and off-the-shelf solutions—such as low-e glazing, “cool” or vegetated roofs, energy-conserving lighting, dual-flush toilets, low-demand landscaping, and gray-water irrigation—could readily bring in even the most sophisticated projects at a cost owners and developers could be happy with.

As a result, showcase green projects for influential corporate owners—blue-ribbon companies like ABN AMRO, Bank of America, Ford Motor Company, General Motors, Honda, PNC Financial Services, Reuters, Starbucks, Swiss Re, Toyota, and Whole Foods—were coming in at, near, and sometimes even below cost projections.

So, with those three obstacles for the most part out of the way, what happened in the last year or two to signal a “new reality” for the green building movement?

What happened is that the financial sector of the real estate industry, heretofore a casual bystander, suddenly woke up to green building—not necessarily because its members had miraculously developed an insatiable urge to save the planet, but because they had begun to see a viable new investment opportunity.

In a market that has been flooded with cash, and amid a growing body of evidence that green buildings might in fact have some quantifiable advantages over “conventional” buildings, developers, property investors, building owners, brokers, appraisers, lenders, banks, property insurers, real estate investment trusts, and pension funds started to open their eyes—and their pocketbooks—to the green building movement.

This shift in theme for the green building movement, from environmental cause to financial opportunity, is the focus of this White Paper.

Some key questions to be addressed in this White Paper ...

- Are green buildings more profitable—and therefore more valuable—than conventional buildings?
- Do green buildings “lease up” more quickly—or at a higher rate per square foot—than other buildings?
- Do green buildings have reduced liability risk?
- Should green buildings enjoy lower insurance rates?
- Do green buildings create marketing or public relations opportunities for developers and owners?
- Are green buildings a factor in employee recruitment and retention for tenants?
- Are green buildings healthier for occupants than conventional buildings?

... and how the ‘New Reality’ applies to specific building types

- **Office buildings:** Do green office buildings maximize profits for their developers? Do they enhance employee job performance? Do green buildings lease up faster?
- **Retail shopping:** Do daylighting and better indoor air quality add to sales per square foot?
- **Hotels:** Are green hotels healthier for guests? Will guests pay more for that benefit?
- **Restaurants:** Do green restaurants enhance diner satisfaction? Do they save energy?
- **Housing:** Do green homes sell faster and at a higher price?
- **Industrial buildings:** Do green factories enhance worker productivity? Reduce sick leave?
- **Healthcare:** Do green hospitals result in better patient outcomes?
- **Universities:** Do green campuses serve as a draw for the best and brightest students?
- **Schools:** Do student test scores go up in green schools? Does improved indoor environmental quality reduce the incidence or effect of asthma or allergies?
- **Government:** Should cities require certification for private-sector projects?

¹In 2003, only 9% of BD+C White Paper Survey respondents rated their firms “very experienced” in sustainable projects, and only 11% had actually certified a green project. *BD+C White Paper on Sustainability (2003)*, p. 15.

²*The Costs and Financial Benefits of Green Buildings: A Report to California’s Sustainable Building Task Force*,” Greg Kats, Leon Alevantis, Adam Berman, Evan Mills, and Jeff Perlman, October 2003. http://eetd.lbl.gov/emills/PUBS/PDF/Green_Buildings.pdf

³*Costing Green: A Comprehensive Cost Database and Budgeting Methodology*,” Lisa Fay Matthiessen and Peter Morris, Davis Langdon, September 2004. www.davislangdon-usa.com/pdf/USA/2004CostingGreen.pdf

⁴*GSA LEED Cost Study: Final Report*,” Steven Winter Associates Inc., October 2004. www.wbdg.org/cdb/GSAMAN/gsaleed.pdf

2. Where the AEC Industry Stands on Sustainability

Methodology

In August 2006, *Building Design+Construction* contracted Research Results, Fitchburg, Mass., to conduct a survey of a scientifically drawn sample of 10,000 recipients of *BD+C* via the Internet to determine their opinions, perceptions, and actions relative to sustainability. With the exception of one additional question, the 2006 survey duplicated previous *BD+C* White Paper Surveys conducted in 2003 and 2004.

Eligibility to enter a drawing for a \$250 gift certificate was offered as an incentive (Christina Zucco, of Builders Design, Charlotte, N.C., was the winner). In total, 872 respondents completed the survey, compared to 524 in 2004 and 498 in 2003.

The 75,150 architects, contractors, engineers, building owners, and developers who receive *Building Design+Construction* work at firms that design and build 80-85% of the annual \$501 billion in commercial, industrial, institutional, and multifamily construction in the U.S. Judging by the responses to the 2006 White Paper Survey, their interest and involvement in green building is definitely on the rise.

AEC firms' involvement in green building may have reached a Gladwellian "tipping point" in the last year or two, based on a key finding of this year's survey. For the first time, a majority of respondents (59%) said that their firms had become either "somewhat experienced" (45%) or "very experienced" (14%) in sustainable proj-

ects. This is a statistically significant gain over 2004 (49%) and 2003 (42%). Moreover, those who said their firms had "little or no interest in sustainable design" had dropped to a minuscule 2% (chart 2.3).

The dramatic increase in AEC activity in sustainability was underscored by a verbatim comment from respondent David Hensley, of PGAV Architects, Westwood, Kan. "The green building segment in the built environment is not a passing trend: It is the beginning of a change that will need to occur worldwide," he said.

Where respondents work 2.1

	2006	2004	2003
Architectural firm	26%	30%	23%
Architectural/engineering firm	12%	11%	12%
Engineering firm	14%	10%	11%
General contractor	9%	7%	6%
Government agency	7%	7%	9%
Design/build firm	6%	6%	7%
Owner/developer	5%	5%	5%
Consultant	2%	3%	3%
Facility manager	3%	3%	4%
Engineering/architectural firm	5%	3%	5%
Manufacturer/product vendor	3%	3%	5%
University/academia	1%	2%	2%
Project management	1%	2%	1%
Other	5%	4%	4%
	Base: 872	Base: 523	Base: 495

What kinds of work does your firm perform? 2.2

	2006	2004	2003
Commercial	75%	71%	74%
Institutional	71%	69%	69%
Industrial	53%	50%	54%
Multifamily housing	43%	42%	39%
Single-family housing	36%	36%	33%
Other	9%	11%	11%
	Base: 872	Base: 523	Base: 495

BD+C White Paper Surveys, 09/03, 09/04, 09/06
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Respondents to *BD+C*'s 2006 White Paper Survey came from a wide variety of sectors of the U.S./Canada commercial building industry. There is remarkable similarity in both professional demographics and type of work their organizations perform between the 2006 respondents and their counterparts in 2003 and 2004. Respondents from firms of 500 or more employees comprised 23% of the total, compared to 22% in 2004 and 27% in 2003. Forty-one percent had 10 or more years' tenure with their firms, vs. 44% in 2004 and 45% in 2003. Thirty percent of respondents said their firms belonged to the U.S. Green Building Council; another 13% said their organization planned to join the USGBC in the next 12 months.

Principal findings of the survey

- A majority of respondents (59%) said their firms were either "very" (14%) or "somewhat" (45%) experienced in green building, a significant increase from 2004 (49%) and 2003 (42%).
- A fifth of respondents (20%) reported that their firm had achieved green certification for at least one project; 36% said they had completed at least one project based on sustainable principles.
- A solid majority (57%) of those surveyed said "first cost" was still an obstacle to convincing owner and developers to "go green," even when the long-term savings of sustainable design were made clear. Fifty-six percent of respondents said they thought clients saw green buildings as adding "significantly" to first costs.
- As in 2003 and 2004, respondents felt strongly (4.40 on a scale of 5) that green products and building materials should be evaluated on the basis of life cycle analysis, long-term durability, and maintenance, not just environmental impact and energy savings.
- Three-fourths of respondents (75%) said that they wanted more information on the relative costs and benefits of green buildings vs. conventional buildings, based on independently validated documentation.

“The pending energy crisis and the need for alternative, environmentally safe energy sources go hand in hand with the green building movement.”

Tangible evidence of the upward trend in green building activity comes from the finding that the majority of respondents (53%) stated that their firms had “made an effort to green-build at least one project,” while nearly a quarter of respondents (24%) reported that their firms had attempted to certify a green project. More to the point, 20% said their firms had in fact certified at least one project—up significantly from 13% in 2004 and 11% in 2003 (chart 2.4).

However, the upward curve in green building activity may not necessarily have translated into a great deal of new business for AEC firms. While a healthy 39% of respondents said that having green building expertise had brought in new clients for their firms, only 11% of these same respondents felt it had been a “significant” amount of new business; most (53%) reported that it had resulted in only “some” new business (chart 2.6). At the same time, however, expertise in sustainability was seen as helpful in client retention by 42% of respondents.

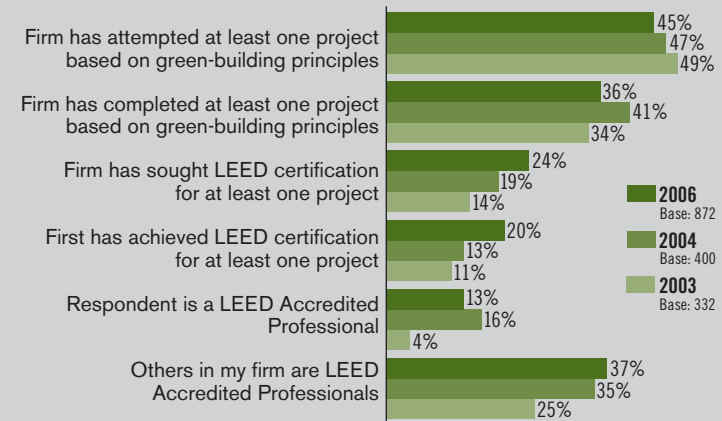
This inability to convert general client interest in sustainability into a more substantial amount of work may be linked to client concerns over the up-front cost of green buildings. Despite numerous studies showing that green buildings can be constructed at little or no dollar premium, the fear of added “first costs” remains strong among property owners and developers. The majority (57%) of survey respondents said it was “hard to justify greater first cost, even on the basis of long-term savings”—well up from 2004 (36%) and 2003 (35%). A

nearly equal percentage (56%) stated that clients saw building green as adding “significantly” to first costs, while 52% said the real estate market is “not willing to pay a premium” for green buildings (chart 2.7).

“Building owners and developers are primarily interested in up-front cost and don’t know if they will own

With regard to green building, which of the following apply to you and/or your firm?

2.4

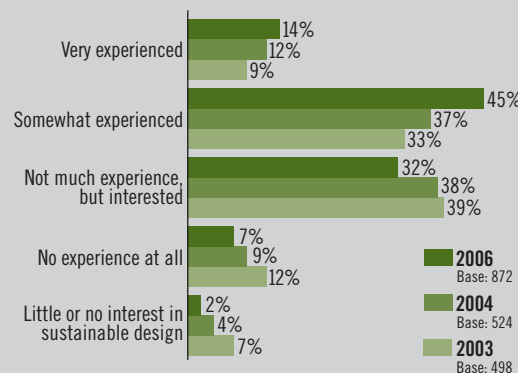


BD+C White Paper Surveys, 09/03, 09/04, 09/06
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The percentage of respondents who stated that their firms had sought project certification increased significantly in the last three years, from 14% in 2003 and 19% in 2004, to 24% in 2006. Likewise, the percentage of firms said to have achieved project certification was also significantly higher, 20% in 2006 compared to 11% in 2003 and 13% in 2004.

How experienced is your firm in sustainable design?

2.3

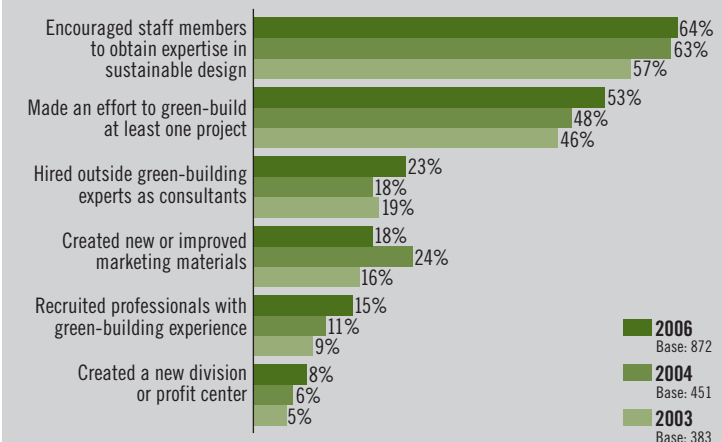


BD+C White Paper Surveys, 09/03, 09/04, 09/06
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Respondents who said their firms were “very” or “somewhat” experienced in sustainable projects grew significantly to 59%, compared to 49% in 2004 and 42% in 2003. Responses for firms that had no experience or little or no interest in sustainable projects continued to decline (9% in 2006, 13% in 2004, 19% in 2003).

How has your firm responded to the market for sustainable design?

2.5



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According to respondents, only a small minority of firms (8%) have created special divisions or profit centers devoted to sustainability. A greater percentage of firms (15%) were reported to have actively recruited professionals with sustainability experience—a finding reinforced by anecdotal reports to BD+C editors. Otherwise, green-building marketing and personnel activities have remained fairly consistent over the last three years.

a building more than five years, so what do they care how long something will last?" said respondent Jim Harrington, of Harrington & Associates Architects, Tucson.

Another key finding, based on a growing body of evi-

dence from all three White Paper Surveys, is that the AEC community is desperate for more and better information on green building. More than two-thirds (68%) said they wanted training and education in sustainability, while nearly that many (66%) asked for more case studies of successful green projects. Three-fourths of respondents (75%) called for "independently validated documentation" of the value of green buildings compared to conventional buildings, up from 62% in '04 and 59% in '03. "Measurable, independent evaluation of the value of green buildings is missing. The bottom line is the issue," said Daniel L. Pohnert, of Jones Edmunds, Titusville, Fla.

Looking ahead, there is good reason to believe that the AEC industry will engage more fully in the sustainability movement. Thirty percent of respondents said they

Has acquiring sustainable building expertise helped your firm attract new clients or projects?

2.6

	2006	2004	2003
Yes	39%	36%	32%
	Base: 856	Base: 468	Base: 423

If so, how much?

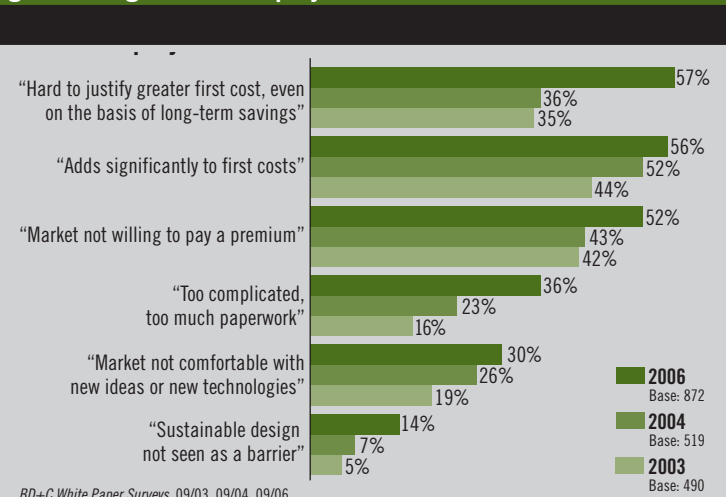
Significant amount of new business	11%	11%	6%
Some new business	53%	40%	43%
Minor amount of new business	36%	49%	52%
	Base: 337	Base: 164	Base: 126

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The percentage of respondents who said that "being green" had helped their firms get new business was up slightly—39% in 2006, 36% in 2004, 32% in 2003—but apparently some firms are benefiting from sustainability expertise. Of those who reported gains from greenness, the majority (53%) said their firms got "some" new business, but that figure was up significantly from 2004 (40%) and 2003 (43%). In response to a separate question, 42% of respondents said sustainable design expertise had helped their firms retain existing clients, while 39% said such expertise had helped their firms differentiate themselves from others.

What are building owners and developers saying about barriers to incorporating sustainable or green design into their projects?

2.7



This question generated perhaps the greatest movement in respondent opinion over the period 2003 to 2006. The reported perception of owners and developers that green building is "hard to justify" on the basis of first cost, even when long-term savings are accounted for, jumped significantly, to 57%, from 36% in 2004 and 35% in 2003. Other financial measures—perceived additional first costs (56%) and lack of will by the market to pay more for green buildings (52%)—scored high. But owner/developer concerns about red tape and paperwork also moved up significantly (36% in 2006, from 23% in 2004 and 16% in 2003). However, it should be noted that a growing minority of respondents (14%) stated that their customer base did not view sustainability as an obstacle. This result is consistent with other findings of the study and anecdotal evidence.

Have you tried to persuade clients or your organization to attempt a green building project?

2.8

	2006	2004	2003
Yes	66%	54%	42%
	Base: 872	Base: 519	Base: 486

If yes, what happened?

Incorporated sustainable elements in a project but did not register it	54%	40%	37%
Looked at sustainable design principles, but withdrew due to costs or uncertainty	39%	34%	40%
Working on a sustainable design project	35%	36%	35%
Completed a sustainable design project	21%	28%	20%
	Base: 571	Base: 277	Base: 205

If no, why not?

"Not required"	45%	35%	41%
"Perceived lack of interest by client or firm's own management"	39%	44%	41%
"Not sure of payoff"	33%	26%	30%
"Insufficient budget"	32%	31%	29%
"Insufficient staff"	10%	17%	16%
	Base: 301	Base: 231	Base: 260

BD+C White Paper Surveys, 09/03, 09/04, 09/06
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Almost two-thirds of respondents (66%) said they had tried to convince their clients or firms to do a green project, up significantly from 2004 (54%) and 2003 (42%). However, the percentage of these respondents who reported completing a sustainable design project declined significantly from 2004's 28%, to 21% in '06. This may be accounted for by the sharp rise in respondents—to 54% in 2006, vs. 40% in '04 and 37% in '03—who said they had "incorporated sustainable elements" in a project but hadn't registered it. Forty-five percent of those who said they had not tried to persuade their clients or firms to "try green" cited the lack of a requirement for green building as the reason given by their clients or firms.

expected their firms to be “significantly more active” in green building two to three years down the line, while nearly a majority (47%) said their organization would be at least “somewhat” more active. Another group (18%) said they expected their firms’ activity to be “about the same as today (chart 2.9).”

As construction administrator Robert Dafler, RA, CCS, CSI, of Three Architecture Inc., Dallas, put it, “I predict within the next five years, ‘greenstreaming’ will become mainstream and de rigueur for any A/E group wanting to practice across the globe.”

In fact, only a small percentage of respondents said they thought their firms would be “less active” (1%) or “not active at all” (3%) in green building—the latter figure down from 6% in '04 and 12% in '03 (chart 2.9).

As James M. Wright, AIA, of Page Southerland Page, Arlington, Va., put it, “Given some time, green building hopefully will become a footnote in the architectural history books, as eventually such practices will become the norm for most building site selection, design, construction, and operation.”

That bright future will not come about, however, without the hard work of AEC professionals. “The real challenge that lies ahead of us all is committing to designing, building, operating, and maintaining facilities in a truly sustainable way,” said respondent Jim Kirby, of Perkins+Will. Relatively simple solutions like choosing building materials with high amounts of recycled content get “a lot of air time,” said Kirby, “but when you compare that to achieving a building that is restorative, regenerative, and self supporting, you can see how far we still have to go.”

But it is not enough to leave the task to the nation’s architects, engineers, and contractors. Property owners, school boards, universities, hospital officials, corporate leaders, and real estate developers must also take up what one respondent called “this critical issue.”

“We need to educate our clients,” said Valerie Amor,

of Cartaya & Associates Architects, Fort Lauderdale, Fla. “They must consider that what is being built is not only a physical structure, but an environment that affects both the users and the environment as a whole.”

'Evaluating green building products,' 'green tax incentives' top the list of respondents' concerns

2.10

	2006	2004	2003
Green products/building materials should be evaluated on the basis of life cycle analysis, long-term durability, and maintenance, not just environmental impact and energy savings	4.40	4.27	4.22
Owners should receive tax and/or other financial incentives for building sustainable buildings	4.27	4.14	3.86
Green buildings are healthier for occupants than conventional buildings	4.13	3.95	3.68
Green buildings significantly reduce energy costs	4.13	3.92	3.76
State and local building code authorities should adopt sustainability standards for new construction	4.08	3.77	3.57
The Federal government should devote more funding and support to green-building technology	3.98	3.76	3.41
LEED certification places too much emphasis on gaining points and not enough on overall design considerations	3.82	3.52	3.54
Building a structure using sustainable design improves the overall quality and design of the building	3.74	3.59	3.32
Green buildings enhance worker productivity and job satisfaction	3.76	3.53	3.22
Green buildings save money by reusing and recycling materials	3.67	3.40	3.34
My firm or organization will be left behind if it does not become active in green building and sustainable design	3.65	3.38	3.03
The green-building movement in the U.S. and Canada lags behind that of other countries	3.62	3.56	3.49
Green buildings enhance occupying firms' recruitment and retention of employees	3.52	3.19	2.99
Green buildings have a higher market value than conventional buildings of the same type and command lease or sales premiums	3.50	3.12	3.04
The current LEED certification system is too restrictive	3.42	3.18	3.31
Green buildings can reduce lawsuits and liability claims against building owners	3.20	3.11	2.95
The Green Globes rating system is a viable alternative to LEED*	3.14		
“Natural” building materials are superior to man-made or synthetic products and building materials	3.12	2.79	2.69
Green buildings cost no more to build than conventional buildings	3.00	2.63	2.74
	Base: 872	Base: 523	Base: 495

BD+C White Paper Surveys, 09/03, 09/04, 09/06
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For the third consecutive time, life cycle analysis, durability, and maintenance of building products topped the list of respondent concerns—4.40 in 2006, 4.27 in 2004, 4.22 in 2003—while support for tax or other incentives to owners of green buildings came in second once again (4.27 in 2006, 4.14 in 2004, 3.86 in 2003). Due to sample size, most differences from year to year are not statistically significant; overall results are largely consistent from year to year. Note: A mean score of 3.00 (on a scale of 5) would be considered neutral. *New question in 2006.

How active will your firm be in 2-3 years?

2.9

	2006	2004	2003
Significantly more active	30%	24%	16%
Somewhat more active	47%	46%	44%
About the same as today	18%	21%	26%
Less active	1%	2%	2%
Not active at all in green building	3%	6%	12%
	Base: 863	Base: 508	Base: 489

BD+C White Paper Surveys, 09/03, 09/04, 09/06
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The percentage of respondents who saw their firms or organizations becoming significantly more active in sustainability continues upward: 30% in 2006, compared to 24% in 2004 and 16% in 2003. Very few respondents (3%) said their firms would essentially ignore the green building movement.

3. Financing Green Office Buildings

The “new reality” of the sustainability movement has been brought into sharp focus by a number of newsworthy events over the last year or so—some occurring in just the past few weeks—that signal a dramatic shift in activity toward green building by the financial community:

1. In September, Hines, a major Houston-based developer of high-rise office buildings, established a \$120 million fund with CalPERS, the biggest public employee pension fund in the country, to build and finance \$500 million in LEED-rated green buildings. First projects: Tower 333 in Bellevue, Wash., and another West Coast high-rise that will take up half the \$120 million.

2. Thomas Properties Group, a full-service real estate developer based in Philadelphia and California, is partnering with CalSTERS, the California teachers’ pension fund, on a \$500 million fund to develop new green buildings or rehabilitate old ones to LEED-level standards.

3. Liberty Property Trust, a \$6.5 billion REIT based in Philadelphia, has decided to LEED certify its office-building projects—70% of its portfolio—with 14 LEED-registered projects in the pipeline. Its One Crescent Drive project (LEED Platinum) at the Philadelphia Navy Yard and PPL Plaza in Allentown, Pa.

(LEED Gold), have each commanded rents 25-50% higher than the market.

4. In October Firemen’s Fund received regulatory approval to begin offering a 5% discount for property insurance on commercial buildings certified by LEED or Green Globes. In the event of a total loss for such an insured property, the Novato, Calif.-based insurer will pay to rebuild the structure to LEED or Green Globes standards.

5. Citigroup has committed to review 89 of its 14,000 U.S. facilities under the EPA Energy Star building program. The financial services company has set a goal of LEED Silver for all new office buildings and service centers, starting with a 500,000-sf LEED Silver office building in Long Island City, N.Y., for 1,200 employees.

6. Wells Fargo issued a 10-point environmental program in July 2005 that includes a focus on energy-efficient mortgage products and environmentally friendly construction and development. The plan provides \$250 million in financing for smart-growth and green-building developments.

7. Mega-size financial institutions are “walking the walk.” Bank of America is currently in construction on one of the most breathtaking LEED Platinum buildings in the country—Bank of America at One Bryant Park—at a showcase location in midtown Manhattan. Wachovia recently committed to LEED certification for its corporate and investment banking division in Charlotte, N.C., to be completed in 2008.

8. Commercial real estate investment funds, union pension funds, and “socially responsible” funds are sweeping green buildings into their portfolios. Multi-Employer Property Trust, a commingled fund with \$6 billion under management, has been involved in several LEED-certified buildings with the Brewery Blocks mixed-use development in Portland, Ore., and is currently working on a green high-rise project in Seattle. “We’re in it up to our elbows,” says Landon Butler, of Landon Butler Associates, Washington, D.C., a member of MEPT’s policy board.

9. There is a growing awareness of the intangible benefits of green buildings by the real estate community. These include health benefits of occupants and tenants, employee productivity gains, lower absenteeism and sick leave, and better recruitment and retention of employees by tenants—as well as reduced future risk and liability.

“I’ve seen a transformation in the marketplace in the last three years,” says Peter Garver, director of development for Corporate Office Properties Trust, Columbia, Md., a REIT that does spec office development, primarily in the mid-Atlantic region. “Three years ago, our big

Tax/financial incentives favored	3.1
	2006
Owners should receive tax and/or other financial incentives for building sustainable buildings	4.27
Green buildings have a marketing or public relations advantage over comparable conventional buildings	3.93
Green buildings should be appraised at a higher value than comparable conventional buildings	3.61
Green buildings are intrinsically more valuable than comparable conventional buildings	3.61
Green buildings enhance occupying firms’ recruitment and retention of employees	3.52
Green buildings command a higher rate of return than comparable conventional buildings	3.45
Green buildings should have lower property insurance rates than comparable conventional buildings	3.33
Green buildings are more profitable than comparable conventional buildings	3.24
<i>BD+C White Paper Surveys, 09/03, 09/04, 09/06</i>	
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Respondents to this set of questions (new to the White Paper survey) gave highest marks—4.27 on a scale of 1 (“Strongly disagree”) to 5 (“Strongly agree”)—to giving owners tax or financial incentives for greening buildings, with “marketing or public relations advantage” (3.93) also rating high. A mean score of 3.00 (on the 5-point scale) would be considered neutral.

prospects—Booz Allen, Unisys, General Dynamics, AT&T, Wachovia, Boeing—couldn't care less about what we were doing in green." Now, he says, "they're aware of it, and they're starting to ask about it."

Credit the U.S. Green Building Council's LEED green rating program for playing a major role in changing the minds of hard-nosed investors. "The biggest change is the establishment of standards we can all point to," says Dan Rashin, SVP at Houston-based developer Hines. "In the '80s we had 'smart buildings,' but no one knew what that meant. LEED allows us to have a standard which the consumer can recognize. It's a stamp of approval."

To catch up on what's been happening in the green office sector, let's examine some of the specific questions raised at the beginning of this White Paper.

Are green buildings more profitable—and therefore more valuable—than conventional buildings?

"From a market valuation, you're starting to see things turn a little bit, but the basis is still cash flow divided by cap rate gives the market value," says Steven Lane, EVP with Citigroup. "The deal still has to pencil out"—that is, the numbers have to show a profit.

Lee Smith, president of Hartland Asset Management, Scarsdale, N.Y., a real estate investment fund for Taft-Hartley investors, says value is in the eye of the beholder. "People will tell you 'green' increases the reputation of your building and the health of tenants, and I don't say that's not true," says Smith, who is in the midst of raising a fund for renewable energy investments. "But we've gone past that stage, and now they're being sold on economic value."

One of the more talked-about studies of green building's bottom line is "Green Value: Green Buildings, Growing Assets" (2005), from the Canadian branch of the Royal Institute of Chartered Surveyors.¹ The RICS team, led by Chris Corps, MRICS, president of Asset Strategies Ltd., Victoria, B.C., and Philip Smith, VP of Analytics at Cushman & Wakefield LePage, Toronto, subjected 12 green projects in North America and six in the U.K. to detailed scrutiny.

The team started with the "null hypothesis" that "there is no relationship between the market value of a real estate asset and its green features and related performance." The study disproved this hypothesis—that is, the RICS team did indeed find value, not necessarily in energy savings (less than 1% of operating costs), but in business productivity.

The main beneficiaries of green building, they found, are the occupants and their businesses, who stand to gain "potentially enormous" health and productivity benefits from green building. "However, contrary to some claims, this does not necessarily translate into

higher asset value," they write. "If developers, owners, and valuers can understand how to tap this benefit, the commercial advantage that they would gain would become the most significant aspect of Green Value."

"Green buildings are not being valued properly," says Corps. "Value is not cost savings. A low-flush toilet is a cost avoidance, but that's not revenue. To say that the savings in energy [and other green features] have a direct correlation in value is emphatically wrong."

"In the study, one thing that was very evident was that the distribution of benefits was not equitable," says Smith. "It's one thing to say green buildings are good, that there are financial benefits, but it's also critical to look at who's getting the benefit."

Smith says "everyone fusses about occupancy cost, but that's only a small percentage of a company's total overhead. By far, the biggest is employee cost, 86% or so, so a 1% improvement in employee costs is much bigger [than a 1% improvement in operating costs]. So we're focusing on the wrong thing."

It should be emphasized that the RICS team strongly supports green building. "There is no longer a reason not to do green," says Corps. "The value is there. Just get on with it."

Do green buildings "lease up" more quickly—or at a higher rate per square foot—than other buildings?

Answer: Yes and no. "Are there rental premiums? No, but we're seeing abbreviated absorption periods for these projects," says Theddi Wright Chappell, LEED AP, FRICS, and member of the Appraisal Institute, who is managing director of advisory services for Pacific Security Capital, Beaverton, Ore.

¹www.rics.org/NR/rdonlyres/93B20864-E89E-4641-AB11-028387737058/0/GreenValueReport.pdf

Wanted: 'Responsible property investors'

Another huge asset base that's looking closely at green real estate is the "socially responsible investment," or SRI, community. The Social Investment Forum identified \$2.29 trillion in SRI assets under management (for 2005) in the U.S. That's hardly chump change.

"The SRI industry is desperately looking to get into socially responsible real estate investment," says Gary Pivo, PhD, an SRI scholar at the University of Arizona. Entities such as Calvert Group, an \$11 billion SRI mutual fund in Bethesda, Md., and New York's Domini Social Equity Fund (\$1.2 billion) are looking for guidance in "responsible" real estate investing, says Pivo. "LEED and Energy Star are helpful, but they don't address the social issues."

Pivo and David Wood, of the Center for Corporate Citizenship at Boston College (www.bccccc.net), have established the Responsible Property Investing Project to address this issue. "We're trying to lower the diligence efforts so that they can compare one [green] project with another, so that SR investors can understand what they're getting over the long term," says Wood. The group's first effort: a survey of the SRI policies of publicly traded homebuilder companies.

The real difficulty comes in trying to separate the “green” attributes of any building from the other factors that go into a real estate transaction. “I suspect we got a premium price within the Pearl District,” says Bob Ratliff, SVP of capital markets for Kennedy Associates, an advisor to the Multi-Employer Property Trust, referring to the Brewery Blocks LEED project in Portland, Ore. “We promoted the green elements of the building, so maybe that was important to our clients.”

Take the case of 111 South Wacker, a LEED Gold building in Chicago. According to Dan Jenkins, a principal with the developer, John Buck Company, LEED certification was not a sought after feature in the Class A+ market in 2002, when it was being leased. Nor did any lenders express much interest in LEED. When it was sold in 2006 for \$400/sf, the new owner placed no incremental value on the building as a result of LEED certification. However, Jenkins noted that prospective tenants for more recent office projects have been inquiring about green design—“but they haven’t said they’re going to pay more for it.”

“I don’t think you can say that a tenant is willing to pay 25 cents more for this or that,” says Hines’s Dan Rashin. Pointing to a LEED-CS project in Atlanta, he says, “We got a very good rent there, but it’s hard to separate the green from all the other amenities. There are plenty of tenants out there who couldn’t care at all about LEED. But if they’re going to Class A, they

might be looking for it.”

Liberty Trust’s Gattuso says that was the case for the Comcast Center, now under construction in Philadelphia. “We brought in a JV partner from overseas, and their interest was not only that we had a major tenant [Comcast], but there was the environmental component [LEED certification]. There’s no question that the combination of the lease and sustainable design interested them.” Gattuso says the valuation they attributed to the building was almost 90% higher than the next highest transaction price in Philadelphia.

Donald J. Reed, a chartered financial analyst with Ecos Corporation, says that “some people on the [sustainability] advocacy side think that greenness trumps all sorts of other things, like location, but that’s only true for a small group of business buyers.” Reed does add that “if you’ve got checkmarks in all the right categories, that’s going to affect the price premium” for the better.

“In today’s hot market, you’re not seeing tenants saying, ‘I will not be in that building if it is not high-performance,’ says Brenna Walraven, executive director of national property management for USAA Real Estate Co., Irvine, Calif., and chair-elect of BOMA. “It’s still location, location, location, plus other factors. In a white-hot capital market, am I going to get a premium for LEED? No, because that’s the market. But I think that’s going to change, and you’re going to see that in a down market.”

²“Sustainability and Health Are Integral Goals for the Built Environment,” Vivian Loftness, FAIA, Volker Hartkopf, PhD, and Lam Khee Poh, PhD, principal authors, *Healthy Buildings 2006*, Lisbon, Portugal, 4-8 June 2006.

³“Building the Green Way,” Charles Lockwood, Harvard Business Review, June 2006.

Do green buildings enhance employee health and performance?

Do green office buildings benefit employee health and performance? Common sense would suggest that having a work space with good lighting, proper ventilation and air exchange, effective temperature control, and other optimized IEQ attributes would benefit workers’ health and productivity. But by how much? And can the benefits even be measured?

Researchers at Carnegie Mellon University led by Vivian Loftness, FAIA, and Volker Hartkopf, PhD, have screened literally hundreds of studies related to the health and human benefits of green buildings. Among their findings:

- Seven case studies demonstrating that high-performance ventilation systems cut respiratory illnesses (including asthma and allergies) by 10-90%.
- Thirteen studies that suggest individual productivity gains from HVAC improvements; 14 studies that link temperature control to performance gains of 0.2-7%.
- A 74% reduction in the incidence of headaches from replacing noisy magnetic ballasts with noise-free electronic ballasts in fluorescent lamps.
- Twelve studies that indicate that improved lighting design enhances individual productivity between 0.7-23%.²

At Genzyme Center, the biotech firm’s LEED Platinum headquarters in Cambridge, Mass., 58% of the 920 employees reported that they were more productive than they had been in the old headquarters. Employee sick leave was also reported as 5% less there than at other nearby Genzyme facilities. The same *Harvard Business Review* article reports a 14% drop in absenteeism for Toyota Motor Sales USA at its LEED Platinum office in Torrance, Calif.³

PNC Financial Services’ Gary Jay Saulson says that health and performance results at the company’s PNC Firstside Center (LEED Platinum) have “been sustained” to his satisfaction. “It’s an operations facility, and our volumes went up—more pieces of paper, more checks processed,” he said. “Our sick days are down, and turnover is less than in our other buildings, where we have people doing the same thing.”

Performance measurement becomes even more nettlesome in today’s knowledge-based business environment. As the Carnegie Mellon researchers note (in the CMU report “Building Investment Decision Support [BIDS],” p. 6), “[M]easuring productivity of the knowledge worker is very difficult. . . . While speed and accuracy may be easily tracked in skilled/manual jobs or even rule-based jobs such as call centers, knowledge-based work requires different measurement techniques to capture effectiveness at multiple tasks—both individual and collaborative.”

Are tenants in green buildings willing to pay more for the privilege? “We’re not counting on it,” says Diana Laing, CFO of Thomas Properties Group, Los Angeles. As part of its \$500 million project with CALSTERS, TPG is renovating “undermanaged” older buildings (20-30 years old) in “great locations.”

The strategy: Improve the indoor environmental quality, conserve energy, and make the buildings sustainable. Laing says the REIT can devote \$20/sf for sustainable improvements and still generate “superior returns” by being able to pocket \$2/sf on a typical \$12/sf gross lease.

Others see increasing anecdotal evidence of green buildings leasing well. “Why green?” asks Leanne Tobias, founder of Malachite LLC, Bethesda, Md., and an advisor to this White Paper. “To lease faster. To lease to the top tier of the Class A market. And to get the most positive tenant retention. If you can do well in Class A, you’ll do better with green [Class A].”

Do green buildings have reduced liability risk?

“Mold is the new asbestos,” says Peter Garver, of Corporate Office Properties Trust. “Twenty percent of our properties are leased to the government, another 30% to defense contractors, and they’re all concerned about mold.”

Three years ago, partly to reduce its exposure to mold liability, the REIT’s management decided to go green for all projects. COPT has 19 buildings regis-

tered with LEED for Core & Shell. Its first LEED Gold building won the inaugural Green Development Award from the National Association of Industrial & Office Properties.

Green buildings may also constitute a hedge against a downturn in the real estate market. “Right now, there’s a flood of capital in the market, but when that money goes away, the green buildings will rise to the top,” says Dan Winters, principal with Evolution Partners and a special advisor to this White Paper.

Another potential liability is obsolescence—that a building that is not built to high green standards will be outclassed by other properties at some time in the future. That argument strikes a chord with Kevin Fitzpatrick, who is responsible for 53 million sf of real estate for AIG: “I don’t think I would build a new building right now that’s not green, because in five years I may be at a competitive disadvantage.”

Thomas Properties Group’s Diana Laing echoes that comment. “New development that’s not green doesn’t make any sense,” she says. “The capability is there, we can do it, so why would you not?”

Should green buildings enjoy lower insurance rates?

That’s already starting to happen. Firemen’s Fund is the first U.S. insurance company to offer a discount on green buildings—both LEED- and Green Globes-certified. Another unusual aspect of its new program is that, in losses of more than \$10,000, the insured can

⁴“Occupant Satisfaction with Indoor Environmental Quality in Green Buildings,” S. Abbaszadeh, L. Zagreus, D. Lehrer, and C. Huizenga, *Proceedings of Healthy Buildings 2006, Lisbon, Portugal, Vol. III, 365-370.*

Performance improvement from individual factors—ventilation, temperature, daylighting, etc.—may be as much as 3-5% each, says Syracuse University’s Ed Bogucz, PhD, director of the Center of Excellence in Environmental and Energy Systems, but “multiple factors may produce impacts in the 15-20% range.”

Sometimes the research on green offices produces unexpected results. A team at the Center for the Built Environment (CBE) at the University of California, Berkeley, surveyed occupants of 215 buildings using the CBE’s online survey tool. They found that, on average, green design strategies had been effective in improving occupant satisfaction with air quality and thermal comfort. But when it came to lighting (possibly related to daylighting problems) and acoustical quality (noise around cubicles), green buildings exhibited no significant improvement over non-green buildings.⁴

It is argued that since 85% or so of the cost of running an office-based business is the cost of people, any small improvement in performance would reap huge benefits. Alex Wilson, writing in *Environmental Building News* (“Productivity and Green Buildings,” October 2004, p. 15), stated the case that “a mere 1% improvement in productivity can dwarf potential bottom-line benefits from energy savings, water savings, and reduced maintenance.” But what does a “1% improvement in productivity” mean in practical terms? Does it mean that, in a 480-minute work day, employees will put in an extra five minutes? So many factors contribute to employee productivity that it’s difficult to determine how much to assign to the office environment’s greenness.

Leanne Tobias, founder of Malachite LLC, Bethesda, Md., and a special advisor to this White Paper, says the greatest “soft” benefit from green office buildings comes down to tenant comfort, which is the result of a number of factors, not all of them necessarily a result of sustainability improvements.

Jack Cottrell, CEO of Workstage LLC, Grand Rapids, Mich., says, “I don’t use the term ‘green.’ I talk about the performance of the facility. If this whole [office] industry understood that facilities are designed to make users happier about going to work, we’d be a lot better off.”

Perhaps the bottom line on the health and human performance benefits of green buildings comes to this: a) if we know from personal and anecdotal experience that having a thermally comfortable, well-lit, properly ventilated work space, preferably with daylight and a view of nature, is likely to have a positive effect on our well-being and morale, and therefore would inspire greater work performance; and b) if sustainable physical elements, such as adequate air exchange, produce any positive benefits in employee health and well-being; and c) if we can build green offices to a high standard (LEED Silver or two Green Globes) at little or no extra cost, then d) *why wouldn’t we do so?*

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Our industry creates products and services that make life better for people – both today and tomorrow. The benefits of our industry are accompanied by enduring commitments to a sustainable world.

Of the many sustainable aspects the industry is focused on, diverting post-consumer carpet from landfills holds a high priority. The Carpet America Recovery Effort (CARE) was formed through a consortium of industry and government officials to seek out solutions and foster creative thinking in an effort to deal with the recovery of valuable materials and energy contained in post-consumer carpet. Today, with oil and natural gas prices continuing to escalate, interest has never been higher in finding new avenues for which to reclaim raw materials from our product.

CARE has connected the dots and it is succeeding at its mission. Relationships are developing and strengthening that will continue to drive the mission; not because we say so, but because market forces demand it. In the past year we have seen a step-change in carpet reclamation. In 2005 reported recycling and diversion of post-consumer carpet doubled from 2004. A total of 225 million pounds of post-consumer carpet was reported to be diverted from landfill in 2005, with 194 million pounds being recycled. Compared to 2004, this represents a 108 percent increase in diversion and a 97 percent increase in recycling. All totaled, almost a half billion pounds of carpet has been diverted from landfills since CARE's inception in 2002. Further, we expect the 2006 number to again double that of 2005. That's huge progress.

The number of inquiries and new entrants into this nascent industry has taken a quantum jump. We are at the cusp of several new and significant developments that will make 2006 even more exciting than 2005 was. Sponsorships of CARE have jumped, participation in CARE programs has jumped and the effort is tracking very nicely against designated mileposts in our journey to 40% diversion by 2012.

Ours is a very competitive industry, yet it demonstrates extraordinary unity and common ground when it comes to that journey toward a sustainable world. Another example of this commitment is the new green sustainable carpet ANSI draft standard, NSF 140. The first carpet products to be certified against this standard are now available in the marketplace. To learn more about NSF 140 and find certified products go to www.scs-certified.com/sustainablechoice.

This is not an about an industry making a product, but rather an industry making a difference. Sustainability has been incorporated across our industry not only as a business strategy, but also as a corporate responsibility. While others may talk about the "Sustainability Tsunami" sweeping the globe, CRI and CARE is making fundamental progress and making a difference.

We can all be justifiably proud that CRI member companies, along with our partners, are finding solutions that work: new products, new technologies, changed minds, and changed approaches that provide improved service, better information, and wider choices with drastically reduced impact on the environment.

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Robert Peoples, Ph.D.
Director of Sustainability, Carpet and Rug Institute
Executive Director, Carpet America Recovery Effort



hire a commissioning agent to do a test and balance of the building's HVAC system—even if the HVAC was not damaged.

Stephen Bushnell, the insurer's product director, says his company has been keeping close watch on the green building movement for about three years. "We saw that there was going to be a market for this type of product, due to the growing volume of green buildings," says Bushnell.

Globally, more than 190 examples of new green-based products and services from dozens of insurers in 16 countries (half in the U.S.) have been documented by Ceres, a Boston-based environmental research organization.⁵ In addition to the Firemen's Fund initiative, Lloyds of London is offering insurance in the event of under-achievement for predicted energy savings or renewable energy technology performance.

Do green buildings create marketing or public relations opportunities for developers and owners?

You betcha. Ask the Durst Organization, which has gotten incredible amounts of free ink in *The New York Times* and other media outlets (including this publication) for its Bank of America at One Bryant Park tower.

Exploiting the marketing and public relations aspects of green building is probably the most cost-effective tool developers and building owners have at their disposal. White Paper survey respondents (chart 3.1) also rated it high (3.93/5).

But don't expect the PR gravy train to last forever. "There will be a point at some time in the future when green buildings will generate less attention because they will be more the norm," said Chris Wedding, LEED AP and sustainable design associate, Cherokee Investment Partners, Raleigh, N.C.

⁵*"From Risk to Opportunity: How Insurers Can Proactively and Profitably Manage Climate Change,"* Evan Mills, PhD, and Eugene Lecomte, Ceres, August 2006.

⁶*"The Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States,"* Evan Mills et al., Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., and Energy Systems Laboratory—Texas A&M University, 15 December 2004. <http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html>

⁷*"Thinking Inside the Box: The Case for Post-Occupancy Evaluation,"* Sandra Mandler, BD+C, November 2006, p.30. www.bdcnetwork.com/article/CA6389273.html

Commissioning, POEs and O&M studies: Missed opportunities

Only about 1% of buildings are commissioned, according to the U.S. Energy Department. Yet commissioning typically results in the discovery of 28 discrepancies, according to B. Alan Whitson, RPA, a real property administrator and special advisor to this White Paper.

Building owners may be wary about the up-front cost of commissioning, but the return on investment can be significant. For example, the Durst Organization has been retro-commissioning its properties in New York for the past decade. "In some of our older buildings, we were faced with having to replace the electrical service, but with recommissioning, we reduced energy consumption 25-30%, so we didn't have to replace the electrical," said co-president Jody Durst.

Software maker Adobe Systems has been recommissioning its buildings in California for the past five years. "We've gone from 100 [service] calls a month for two buildings, to 30-35 calls a month for three buildings, with an 18% increase in building population," says George Denise, GM of facilities for Cushman & Wakefield, which manages the properties for Adobe.

To put some solid numbers on benefits of commissioning, Evan Mills, PhD, and colleagues at Lawrence Berkeley National Laboratory, Portland Energy Conservation, and Texas A&M University (Energy Systems Laboratory) reviewed published and unpublished data on 224 buildings in 21 states, representing 30.4 million sf of commissioned space—73% in existing buildings, 27% in new ones. Total commissioning costs for these buildings were \$17 million (2003 dollars), an average \$0.55/sf.⁶ Among their findings:

- An average 11 deficiencies were found in existing buildings, 28 in new buildings. HVAC systems represented the bulk of the problems.
- For existing buildings, median commissioning costs were \$0.27/sf; energy savings came to a median 15% (18% average); payback times were less than nine months (0.7 years).
- For new buildings, commissioning costs were \$1.00/sf (0.6% of total construction costs), yielding a median payback of 4.8 years.
- Reduced change orders and other non-energy benefits accounted for \$0.18/sf savings in existing buildings and \$1.24/sf for new construction—"comparable to the entire cost of commissioning," the researchers note.

The authors conclude that "commissioning is one of the most cost-effective means of improving energy efficiency in commercial buildings." While not a panacea, they admit, it is "one of the most cost-effective and far-reaching means of improving the energy efficiency of buildings."

Post-occupancy evaluations can help property owners, developers, and AEC firms determine how buildings are functioning for tenants or occupants.

A/E firm HOK conducted POEs on nine green buildings they had designed. The team learned that daylighting had resulted in light spill and glare. Open office design in some cases led to problems associated with acoustics and visual privacy. The chief result of the POE study, however, was that it educated the designers and building owners in how to make green design work better for the ultimate client, the building occupant.⁷

POEs provide a "feedback loop" for Building Teams to learn what's working, says leading green architect Peter Busby, AIA, of Busby Perkins+Will.

Similarly, building owners are beginning to look at operations and maintenance assessments. The U.S. EPA is launching such an effort for its energy-gobbling research labs, according to Bucky Green, chief of EPA's sustainable facilities branch.

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At the Green Building Initiative (GBI), we know that cost minimization is a compelling reason to design and build green. To that end, energy-efficient, healthier and environmentally sustainable structures have the potential to deliver significant savings and still not cost substantially more.

Green buildings can reduce operating costs, create, expand, and shape markets for green products and services, improve occupant productivity and optimize life-cycle economic performance. However, many structures that are designed to be green fail to perform as intended. There are many reasons for this, including operation and maintenance, changes in occupancy and tenant energy habits.

The solution to this problem lies in developing an increased focus on actual building performance and planning for continual improvements of the building's operations year after year.

With our user-friendly and process-oriented tools, the GBI is uniquely positioned to help bridge the gap between design, construction and operational performance. The GBI is pleased to announce the release of an existing buildings module to complement the Green Globes™ environmental assessment and rating system for New Construction. Known as Green Globes for Continual Improvement of Existing Buildings, this online system offers a practical and cost-effective way to assess and improve the ongoing performance of commercial and industrial buildings.

Like Green Globes for New Construction, the Continual Improvement of Existing Buildings module is already widely used in Canada as the basis for BOMA Canada's Go Green Plus program. The system can help to assess and benchmark the performance of multiple buildings within a portfolio, develop comprehensive action plans for improvement, and foster increased environmental awareness among facility managers and occupants while supporting operational staff in their efforts to reduce costs.

At the GBI, our goal is to make green building the norm instead of the exception—something we believe cannot be achieved unless people can trust that the time and effort they put into creating high performance designs will lead to superior performing structures.

If you'd like to help us achieve this goal by pilot testing the new module beginning in January 2007, please e-mail us at cipilot@thegeb.org or visit the commercial section of our Web site at www.thegeb.org.



Ward Hubbell
Executive Director

Are green buildings a factor in employee recruitment and retention for tenants?

Employees at 30 The Bond, the five-star Green Star (Australia's green rating program) headquarters of Lend Lease in Sydney, rated "physical space" and "health and safety" as their top two concerns in a post-occupancy survey, says Maria Atkinson, global head of sustainability. She adds, however, that "they see green space as an indicator of an employer who cares. That will start to be a drawing card" in the future.

Randy Knox III, director of real estate and facilities for Adobe Systems, says his company's greening efforts—they use both Energy Star and LEED for Existing Buildings, recently earning LEED-EB Platinum for one tower—have had "a strong positive impact" on employee morale. "I get stopped in the hall by employees who tell me that they appreciate working for a company that takes this seriously," he says.

Sally R. Wilson, director of advisory services for CB Richard Ellis in Washington, D.C., says her high-end legal and corporate clients see an advantage in having green office space. "We have to show the end value, for branding, recruiting, and differentiating the firm," says the broker. LEED certification, she says, is "becoming an easier sell to the majority of clients who are looking to go into a higher-quality building." Recently, she found LEED-certified space in the District for Toyota Motor America's government relations office.

Putting financial benefits first

Developers cannot forget the basic facts of real estate. Wachovia's Bill Green says, "If you see two buildings,

and one has good views and one has good indoor air quality, the one with the good views will always win."

Citigroup's Steven Lane advises green building advocates to tone down the environmental and social arguments and play up the economic rationale. "Triple bottom line? Yes. But first and foremost, the deal has to make business sense."

Liberty Property Trust's Gattuso couldn't agree more. "Don't fall into the nomenclature of the environmentalists—in certain circles, that goes over like a lead balloon. You have to be adroit when you're talking to a customer who has to answer to a board. Talk about 'high performance'—no one wants anything less."

That's good advice for those who see the green building as primarily an environmental movement with a modified social program thrown in: Take a hard look at the other third of the Triple Bottom Line, the economic side. The fastest way to achieve the U.S. Green Building Council's goal of "market transformation," some would argue, is by proving the financial value of green buildings. In the words of the authors of "Single Bottom Line Sustainability," "Creating value ... drives change in business faster than anything else."⁸

As the green building movement moves into a more mature phase of its young existence, its proponents might do well to emphasize the "single bottom line"—the economic component—for a while, at least to keep the money people from being scared off. "If I go hugging a tree, I'm going to have people walk out of the room," says USAA Realty's Brenna Walraven. "I'm not in a charity business. If a deal makes sense from a financial perspective, then it's right for me. I'm not going to do it at the expense of the financial aspects."

⁸"Single Bottom Line Sustainability: How a Value Centered Approach to Corporate Sustainability Can Pay Off for Shareholders and Society," Paul Gilding, Murray Hogarth, and Don Reed, CEA, Ecos Corporation, August 2002.

C&D waste diversion: Cash from trash

Construction and demolition waste accounts for 25% of municipal solid waste in the U.S. The sad truth is that most of this dumping is unnecessary. A number of leading contractors (notably Consigli, Shawmut, Skanska, Swinerton, and Turner) have proven that 50% diversion of C&D waste can be done routinely; many of their projects exceed 90%. The USGBC's Tom Hicks says 80% of LEED-certified projects divert at least 50% of their C&D waste.

C&D waste diversion creates value. "On one project, even though the contractor moaned about it, we just went ahead," said Toyota Motor Sales USA's Sanford Smith, AIA. "We saved \$37,000."

The Associated General Contractors of America has taken a few baby steps in the right direction with its Environmental Management Systems program. The AGC says the concept of "beneficial reuse" is gaining currency for recycling debris from highway construction. But the AGC says C&D waste is part of individual EMS plans and will not put a figure on what percentage of C&D waste it will encourage its members to recycle.

It's not entirely the fault of the contractors. In many localities, there are no nearby recycling facilities. Some states have policies that restrict recycling of certain construction materials. But where it can be done, C&D waste recycling is at least cost-neutral, as Building Teams have proven. "We have a 60-acre site just for C&D waste, and we've created a market for recycling in Las Vegas," said Nellie Reid, LEED AP and Western sustainable design leader at Gensler, referring to the \$5 billion CityCenter project.

The U.S. Environmental Protection Agency has drafted a report on C&D waste and expects to release it in early 2007. We encourage the EPA to recommend ways to motivate the construction industry, Associated General Contractors of America, the National Demolition Association, and the Construction Materials Recycling Association to set a goal of 50% diversion of construction and demolition waste from landfill by 2010.

4. Selling Green to Retail Markets

Every year, more than 21,000 new retail stores are built in the U.S. Together, they constitute nearly a fourth (23%) of all new building projects (excluding single-family homes), making retail the single biggest sector of the construction economy in terms of number of units.¹ Retail stores, malls, supermarkets, home supply centers, department stores, big boxes, apparel boutiques, banks, and beauty salons are the modern-day “factories” that propel the biggest consumer economy the world has ever known.

Yet, as of September 2006, only about 185 retail projects had been registered with the U.S. Green Building Council’s LEED program, and fewer than 50 have been certified under any sustainability standard. Why, then, are so few retailers using sustainable design and building practices?

To begin to answer that question, it is important to understand the typical retailer’s near-obsession with branding, which in terms of store design translates to uniformity. Chain retailers are not looking for brilliant one-offs in their stores. They want their latest grand-opening store to mesh with the fabric of their brand, which means every new store must be absolutely consistent with the look and feel of its predecessors. Retail stores must also be designed to maximize cost per square foot, so anything that adds even the tiniest cost will be sure to receive meticulous scrutiny.

In short, any major change to a retailer’s long-held store design concepts—and “green” certainly qualifies as such a disruption—will be viewed skeptically as a departure from established branding by chain executives and franchisees.

Given this cautionary framework, it is all the more remarkable that retail has been one of the most progressive sectors of the U.S. construction market in embracing sustainable design practices over the last five years. The industry’s “modified” triple bottom line of higher profits (from greater economic efficiency), optimal experience for the customer, and stronger community presence has led retail and supermarket giants such as Wal-Mart,

Target, Lowe’s, Home Depot, Starbucks, Albertson’s, and others to invest both financially and intellectually in green design and construction.

To take one somewhat surprising example: Unbeknownst to its millions of customers, Wal-Mart has been quietly engaged in energy-conservation efforts for much of the past decade. Its daylighting and lighting controls technology is so subtle that most shoppers don’t even notice it. Its building information systems are so sophisticated that if a refrigerator door is open for more than 15 minutes at any one of its 6,500 stores anywhere on the planet, the store manager will get a phone call from the Bentonville, Ark., headquarters, with a gentle reminder: “Shut the door!”

Maximizing the multiplier effect

One encumbrance to more widespread adoption of sustainability in retail stores is the LEED certification process itself. The current system, with a few exceptions, demands that each building in a chain’s rollout be registered separately at a cost of \$2,200-2,800 each, even if the branch buildings are virtually the same size and configuration.

The LEED Application Guide for Retail, released last April, focuses only on new construction and major retrofits and was never intended to be a rating tool for retail buildings; rather, it interprets the provisions of LEED-NC 2.2 as applied to retail buildings.² The actual rating entity, LEED for Retail, is currently in the pilot stage. The USGBC plans for a draft version of LEED for Retail to be available for comment late this year, with a final version ready by June.

Meanwhile, USGBC’s Retail Development Committee (RDC), made up of executives from Toyota and other retail firms, and several design and construction firms, have been working for the past three years to develop a streamlined process for “volume-build” projects that fall under the USGBC’s Portfolio Program Pilot.

“Most of the people who do multiple buildings, whether they’re coffee shops, banks, or whatever, are interested

Organizations that publicly agreed to assist the USGBC with the development process of scaling LEED to a multiple building or enterprise level:

Bank of America
Citigroup
Emory University
HSBC, N.A.
Sustainable Office
State of California, Department of General Services
Syracuse University
Thomas Properties Group
Toyota Motor Sales, U.S.A.
USAA Real Estate Company

Source: U.S. Green Building Council

¹According to the USGBC, “Greening of Retail,” *Display & Design Ideas*, August 2005. www.ddimagazine.com/displayanddesignideas/reports_analysis/article_display.jsp?vnu_content_id=1000981431

²LEED-NC-AGR Application Guide for Retail Green Building Rating System for New Construction and Major Renovations. www.usgbc.org/ShowFile.aspx?DocumentID=845

in using the volume-build approach,” said Brendan Owens, the USGBC’s RDC staff liaison and LEED program technical support manager. “In the pilot, we’re testing the flexibility of the draft system because each retailer’s volume is different and their project delivery is different.”

Undoubtedly the biggest success story to come out of the pilot program is PNC Financial Services, the nation’s fifth-largest bank and financial services provider, headquartered in Pittsburgh. Its first sustainable branch, based on a prototype designed by the New York office of architecture firm Gensler, was completed in May 2005.

Under the LEED pilot program, the company was able to certify the original prototype and a second prototype at regular cost; seven variations of Gensler’s original design—to accommodate for smaller sites, side entrances, climatic differences in the Northeast and Midwest (where PNC operates), and a flipped building orientation—were also certified for the rest of the roll-out at no additional cost. The prototype was specifically designed to deliver 30–33 LEED points. To maintain the rigor of LEED certification, every tenth branch will be audited by the USGBC for contractor compliance to PNC’s agreed-upon delivery methods and the design of its first two certified branches.

The design, which has already been used in 27 of the \$1.4 million branches across the country, reduces construction time by 4–6 weeks and costs \$100,000 less to build than a traditional branch. Energy costs at the new branches have been cut by 40%. PNC plans to build 73 more over the next two years.

“We’ve done everything we can that makes economic sense and to build a building that’s sustainable, efficient to operate, and a good place to work,” said Gary Saulson, PNC’s senior vice president and director of real estate. Without bulk certification, he said, PNC would have to reconsider the economics of certifying all its planned green branches.

In a variation of the volume-build concept, Citigroup intends to have all new office buildings attain LEED Silver status and to put 89 of its 14,000 U.S.-based properties through the Energy Star rating system “to see how they stack up,” according to Stephen Lane, EVP with Citigroup Realty Services. And the nation’s first LEED-certified auto dealership, Pat Lobb Toyota, opened last August in McKinney, Texas. Toyota would like to be able to roll out more green dealerships, according to Sanford Smith, AIA, the auto maker’s corporate manager of real estate and facilities.

The multiplier effect from certifying branch roll-outs could result in hundreds, if not thousands, of new green retail buildings being certified each year. Seattle-based Starbucks has built its own prototype store, a 1,400-sf green branch in Lakewood, Wash., with 18 design permutations for different climates and site situations, all part of the company’s \$10 billion new construction program. “We have to make sure LEED for Retail fits big box and small and in between,” said Fulton (Tony) Gale, FAIA, the coffee vendor’s corporate architect and a member of the Retail Development Committee. Gale was recently elected to the USGBC board.

Retailers can affect vast markets because of their

³Wal-Mart <http://walmart-stores.com/Aurora/index.html>

Wal-Mart: surprising leader in retail green

Wal-Mart, the \$312 billion retail giant, has set a goal of reducing energy use and greenhouse gas emissions in its current 6,500 stores by 20% in the next seven years. The retailer also plans to make new stores 30% more energy efficient in the next four years.

The world’s largest retailer will achieve those goals by replacing outdated store lighting with LEDs, installing high-efficiency HVAC systems, and eliminating the use non-CFC refrigerants, according to Don Moseley, Wal-Mart director of special projects. The LED retrofit alone already has cut Wal-Mart’s lighting costs in half, according to Charles Zimmerman, Wal-Mart’s VP of new format development.

Over the last 10 years, 2,100 stores have installed white, light-reflective cool roofs and prototypical skylights that are synchronized with light monitoring devices.³ When the natural light produced by the skylights reaches a certain level, electronic fixtures within the store are dimmed to compensate, which saves energy. Moseley said the effort has reduced overhead energy costs.

Wal-Mart also has used its clout to give preferential shelf space to laundry detergent with less packaging. The company has installed heating modules in the cabs of its trucking fleet (the world’s largest) so that drivers don’t have to leave the engine idling during 10-hour sleep breaks.

Wal-Mart has contracted Oak Ridge (Tenn.) National Laboratory to commission its two experimental stores in Aurora, Colo., and McKinney, Texas, to see just how much the green technologies save. So far, the experimental store in Texas, which opened last June, has shown a 10% decrease in energy consumption.

As a matter of company policy, Wal-Mart has chosen not to seek LEED or any other certification for its stores, even the two experimental ones, which likely would have earned a LEED Certified rating. Apparently, the retailer is more than willing to make improvements that result in energy savings and a better customer experience, but it does not want to be locked into a precedent-setting situation.

Green programs of retail industry leaders

Some of the retail industry's best green building programs.

Albertson's

Based in Boise, Idaho. Division of SuperValu grocery/pharmacy chain: 560 locations in the West, Mountain, and East Coast regions.

- Opened the second LEED-certified grocery store in the U.S. in Worcester, Mass., in 2005. Features: energy-efficient HVAC systems and controls, refrigeration leak detection technology, porous pavement.
- Considering LEED Platinum certification for several new stores, according to corporate architect James Brennan. Looking at three sites for LEED-NC stores: West Coast, East Coast, and Mountain States.
- Saved one billion kilowatt-hours of electricity since 2000 by building energy-efficient new stores and retrofitting old ones. Retrofit program: upgrading lighting to T8 fluorescents, installing motion sensors, inserting anti-condensate heater controls in the glass doors of grocery cases.
- Testing LEDs in frozen-food cases in its Boise flagship store.

Lowe's

Second-largest retail hardware chain in the U.S. Based in Mooresville, N.C. Operates 1,225 stores in 49 states (all but Vermont). Opening stores in Canada in 2007.

- Opened LEED Gold store in Austin, Texas, January 2006. Store uses only 80,000 gallons/year for irrigation, vs. 1.7 million gallons/year in a typical Lowe's store.
- Uses Forest Stewardship Council wood products for doors, moldings, shelving, and lumber in all stores. Also using low-VOC adhesives and glues.
- Saves \$137,000 a year from computer modeling for thermal energy systems in its stores.
- Top 10 among retail stores in EPA green partner program.

Giant Eagle

Operates 216 grocery stores western Pennsylvania, Ohio, West Virginia, and Maryland. Headquartered in Pittsburgh, privately owned; \$5.5 billion in annual sales.

- Built the nation's first LEED-certified supermarket, Brunswick, Ohio, June 2003. Green features: 30% less energy consumption than comparable supermarkets; 50% of the store's electrical energy from wind generation; 50 skylights; lighting sensors adjust the amount of electric light needed to balance light from the skylights; water-conserving equipment saves 100,000 gallons per year.
- Considering LEED Silver for a renovation project on an existing store in Pittsburgh.
- 80% of company-owned stores certified by Energy Star. Energy Star Awards for energy efficiency in 2004, 2005, and 2006.
- Purchases electricity from wind farms in southwestern Pennsylvania.

Target

Headquartered in Minneapolis. Sixth-largest retailer in the U.S., 1,494 stores. Ranked 29th on the Fortune 500.

- Two stores in Chicago, one in Allen Park, Mich., registered with LEED. Green features: rainwater-capture cisterns (gray water used to irrigate landscaping and flush sewer system), low-flow restroom fixtures (30% water savings), and high-efficiency HVAC systems (30% better than most city codes).
- Member of the LEED Retail Development Committee.
- T8 and T12 fluorescent lamps used in all new Target stores.
- Motion-sensor lighting in stockrooms.
- Energy use for lighting, refrigeration equipment, heating and cooling monitored for maximum efficiency in all stores.
- Energy purchased from renewable sources (when economically feasible).
- Three Los Angeles stores draw 20% of electricity from rooftop solar-panel systems.

Ikea

World's largest retailer of low-cost furniture; 234 stores in 34 countries; 2005 sales: \$18 billion.

- U.S. locations must aim for 90% reclamation of store waste by the end of 2009 (current average: 67%).
- New stores must be built to company-certified green building standard.

Whole Foods Market

Based in Austin, Texas; world's leading retailer of natural and organic foods; 187 stores in North America and the U.K.

- Fiber-optic lighting in fish and deli cases at Austin flagship store enhances presentation of perishable foods, saves energy.
- January 2006: landmark purchase of renewable energy credits from wind farms to offset 100% of the electricity used in all of its stores, facilities, bake houses, distribution centers, regional offices, and national headquarters in the U.S. and Canada. Largest purchase of renewable energy credits by any company to date.

Sources: Albertson's, Lowe's, Giant Eagle, Target Corp., Whole Foods Market.

"Greening of Retail," *Display & Design Ideas*, August 2005. www.ddimagazine.com/displayanddesignideas/reports_analysis/article_display.jsp?vnu_content_id=1000981431

LEED-NC-AGR Application Guide for Retail Green Building Rating System for New Construction and Major Renovations, U.S. Green Building Council. www.usgbc.org/ShowFile.aspx?DocumentID=845
Wal-Mart, <http://walmartstores.com/Aurora/index.html>

bulk purchasing power. Furthering the exponential impact of volume construction, the demand for green products and services should both increase. Enabling new retail markets to achieve LEED certification is critical to bringing sustainable building into the mainstream.

But how will the Retail Development Committee resolve certain knotty issues, such as how the USGBC, or any certifying authority, will be able to verify whether every single new branch in a retail chain rollout is meeting the certification requirements, without even more audits and construction

site visits? Is it truly possible to develop an audit system for volume certification that is both rigorous and feasible?

The USGBC's Owens acknowledges that there is a bit of a tug-of-war going on between the retail members of the committee and USGBC staff. "The market pushes in one direction, and we're pushing in another, because we want LEED certification to actually mean something," said Owens. "The answer lies somewhere between having something that's easy to do and having something with a significant amount of rigor."

Daylighting stores increases retail stores

The Heschong Mahone study of daylighting's impact on retail sales presents strong evidence that a major retailer experienced higher sales volume in daylit stores than in similar non-daylit stores. Statistical models were used to examine the relationship between average monthly sales and the presence of daylight in the stores, while simultaneously controlling for more traditional explanatory variables such as the size and age of the store, the amount of parking, and other factors. Researchers were allowed to study 73 store locations in California from 1999-2001.

The key findings relative to retail operations:

- The dollar value of energy savings from daylighting is far outweighed by the increase in sales due to daylighting. The profit from increased sales associated with daylighting is at least 19 times more (and possibly as much as 100 times more) than the return from energy savings.
- The chain studied was found to be saving about \$.24 per sf per year due to the use of photocontrols, which could potentially increase to up to \$.66 per sf per year with an optimized daylighting system.
- Daylight was found to be as accurate a predictor of sales as other more traditional measures of retail potential, such as parking area, number of competitors, and neighborhood demographics.
- Average daily sales went up 40% with daylighting.

Non-daylit stores had sales of \$2.00/sf; daylit stores could be expected to have sales of \$2.61-2.98/sf (see figure 4.1).

- Employees of daylit stores reported slightly higher satisfaction with the lighting quality than those in non-daylit stores.
- Studies such as the Heschong Mahone Group and Pacific Gas & Electric's study of skylights and daylighting in retail stores have shown evidence of higher sales and enhanced consumer experience. Other results from the EPA's Green Lights and Energy Star programs have shown energy and maintenance cost savings over relatively short first-cost buy back periods.

Source: "Windows and Doors: A study of worker performance and the indoor environment," Heschong Mahone Group Inc., 2003. www.h-m-g.com/projects/daylighting/projects-PIER.htm

Sales per sf per year

4.1



Source: Heschong Mahone Group Inc., 2003

Branching out at PNC

PNC Financial Services' LEED-certified prototype is an example of several trends in retail construction. The building was designed by architecture firm Gensler to be open and welcoming, with lots of glass and natural light, but that design also allows it to be constructed quickly and cheaply in even the worst weather. To account for the 100 different microclimates that PNC branches will be built in through 2009, the Gensler team planned 9,600 combinations of site factors in the prototype design, including eight different floor plans, four different orientations, and three different climate zones.

The branches can be built in 4-6 weeks because PNC purchased building materials in bulk at the outset of the rollout last summer. The masonry and epoxy walls for each branch are constructed in a factory in Detroit and shipped to the building sites, where they are installed in one piece. The low-e glass windows are modular one-piece units manufactured by Visionwall in Edmonton, Alb. The windows go in first, then the wall sections are built around the windows; the roof goes up much faster than in a regular construction project. That allows contractors to work under the roof and finish the projects in almost any weather. Bulk purchasing saves on construction site waste and construction time.

"The sooner we get open, the quicker we make money," said Gary Saulson, director of corporate real state for PNC Financial Group. "Building it faster also freezes out the competition in a new, developing area. We're going to be open earlier, and we'll capture those new customers."

Each 3,650-sf branch costs \$1.3-\$1.4 million, about \$100,000 less than a comparable building. Each saves between 25% and 35% in operational expenses. "We don't do anything that doesn't have a payback of seven years or less," Saulson said.

One-third of the LEED credits a branch can receive (up to 17 points) come from the general contractor's work. Seattle-based Paladino and Co., an environmental consultant, created a green building program that all contractors and subs working on the PNC branches take before they start the project, to make sure they get as many of those 17 LEED points as possible.

The end result is a recognizable icon that reinforces PNC's brand by showcasing its commitment to green design. Visual displays explain to customers the branch's energy savings and other sustainable features, such as optimization of building envelope and MEP systems and interior green products.

"For shareholders, there's tremendous payback," Saulson said. "From a marketing standpoint, we've been the first green building in every community we've built in," which almost always results in free local media coverage. It's like money in the bank.



PNC Bank's green prototype in East Bradford, Pa., is a 3,650-sf branch that was constructed in the shortened 4-6 week construction period of all of PNC's volume LEED certified green branches.

For more about the PNC green branch see this presentation given by Saulson, Doug Gensler, and environmental consultant Tom Paladino at this year's AIA Convention & Design Exposition: www.aiaconvention.com/emark/images/other/FR64%20BINDER.pdf

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**NORTH AMERICAN INSULATION
MANUFACTURERS ASSOCIATION**

The North American Insulation Manufacturers Association (NAIMA) is a trade association representing the manufacturers of fiber glass, rock and slag wool insulations produced in North America. NAIMA's industry role centers on promoting energy efficiency, sustainable development and environmental preservation through the use of fiber glass, rock and slag wool insulations, while encouraging safe production and use of these products and proper installation procedures.

NAIMA members believe the creation of green building guidelines should be governed by principles representing the multi-dimensional, dynamic nature of sustainability. Among the attributes widely recognized as pivotal — energy efficiency delivering reduced fuel consumption, cleaner atmosphere, and improved public health.

The association maintains a large literature library with information on proper installation techniques, scientific research, safe work practices, and proven facts about our members' products. Many publications are free online at www.naima.org. We also have information on Federal and local tax incentives for energy efficient commercial and residential construction at www.simplyinsulate.com.

Fiber Glass, Rock and Slag Wool Insulations: Fostering Sustainability and Green Building

NAIMA and its members have long promoted the need for energy efficiency and sustainable design, which serve as the building blocks for today's green building movement. Our industry takes seriously its role as product and environmental stewards, and members have made many adjustments to products and manufacturing processes over our 70-year history to address environmental needs as well.

With the green building movement progressing toward the mainstream, the construction industry is rushing to promote "green" products with all the excitement that comes with building a new market. History shows us, however, that while we must move forward with innovation and excitement, we must also take care to be responsible market stewards. "Green" product manufacturers should be careful to provide defensible proof that these products perform as stated.

As the movement matures, it will be crucial to its success that products included in green building guidelines and advocated by environmentalists meet the rigorous standards of sustainability and environmental protection. While we welcome new products that spur innovation, NAIMA wants also to see the industry take the proper steps to ensure products labeled as "green" will withstand the test of time. Our industry remains committed to providing replicable scientific data supporting our product claims, and commits to conduct marketing efforts in line with both the letter and spirit of the Green Building Marketing Guidelines from the Federal Trade Commission. We call on both new and established companies involved in this movement to make the same pledge.

Through our joint efforts, we can ensure that Green Building is more than just a good idea, but a new approach to building that will become the industry standard.



Kenneth D. Mentzer
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5. Hotels: A Budding Green Market

Hospitality remains a building sector without a true green identity, mostly because the industry has been unable to define what constitutes a green hotel.

Some in the business define green hotels as facilities that emphasize infrastructure improvements—a tight building envelope, or energy- and water-saving features—while others base their definition on operations, such as providing hypoallergenic rooms.

While the hotel industry at large is struggling to define how sustainable design and construction applies to its sector, a small group of innovators has laid sufficient groundwork to suggest that there may be a sound business case for greening at least a piece of the hospitality industry. More recently, a second wave of innovators has been advancing the concept of green hotels, and there's been a trickle of consumer interest in the idea of healthier hotel rooms. Given the industry's track record on sustainability thus far, however, it is clear that any transformation will be evolutionary at best.

Trimming the hotel light bill

Not surprisingly, the motivating force for sustainability in the hotel market is the potential energy savings. That's where the industry, with its more than 54,000 U.S. facilities, can anticipate significant and almost immediate returns. Hotels are energy hogs, and energy consumption is eating away at the industry's bottom line. The hotel sector spends \$3.7 billion a year on energy, according to the American Hotel & Lodging Association, with electricity contributing to 60-70% of hotel utility

costs. Guest lighting alone accounts for 30-40% of hotel electricity consumption.

Experts at the EPA's Energy Star for Hospitality program note that a 10% reduction in energy use (aided, of course, by the use of EPA Energy Star-rated appliances) would save the industry \$370 million a year, which translates to \$83 per room per year. Cutting electricity use 10% industrywide would save \$285 million annually, or \$64 per room each year.

The hospitality industry has had some small victories in trimming energy costs. One tried-and-true way involves replacing incandescent light fixtures with compact fluorescents, which saved Philadelphia's Sheraton Rittenhouse Square 78% in energy costs, with a payback period of just two years. Guest room lighting systems that operate with a room key and systems that automatically turn down HVAC systems and lighting in empty rooms can cut energy costs by 40%, according to one automatic systems manufacturer. Westmont Hospitality Group, which has used such techniques in several of its Comfort Inn and Holiday Inn properties, reportedly saved \$2.2 million a year on its energy bills and cut its carbon dioxide emissions by 12,500 metric tons. (The EPA says that the hospitality industry is the nation's fifth-largest contributor to CO₂ emissions.)

Hotels also take a big hit on water: the average hotel guest uses 218 gallons of water a day, according to the California Integrated Waste Management Board. Installing water-efficient fixtures can reduce water bills by 25-30%, according to the board.

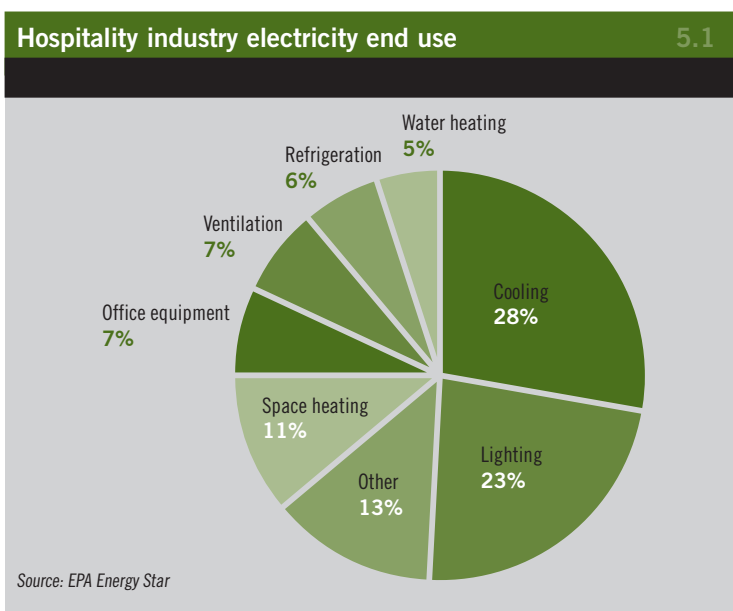
As for renewable or alternative energy sources, most chains are finding that, based on current technology, these sources are too pricey compared to conventional sources. Wind energy, for example, can cost 8% more than what the local utility charges. Hotels utilizing wind energy typically purchase small amounts, enough to produce about 5% of a hotel's energy, mostly for supplemental energy or emergency backup.

According to industry reports, a few Starwood properties are bravely experimenting with 250kW and 500kW fuel cell energy systems (subsidized by local utility incentives) that can support up to 25% of the hotel's energy needs.

Health-conscious travelers want green rooms

If cutting energy costs is the hot button du jour for green hotels, look for consumer interest in healthy hotel accommodations to be the next trend.

Until recently, most hotel operators saw little evidence of consumer demand for green hotels, according to industry experts consulted by BD+C. Now, with con-



sumers exposed to green concepts at places like Starbucks, Whole Foods, and Wal-Mart, green is beginning to resonate with them, in great part due to health-related concerns.

Consider these facts: more than 70 million Americans suffer from allergies, 12 million from asthma, and 10 million from environment-related illnesses or chemical sensitivity, according to Pure Solutions, a Buffalo, N.Y., firm that supplies the hospitality industry with allergy-free guest rooms. (The firm currently contracts with 19 hotels and most recently signed a deal with the new NYLO Hotel brand to incorporate at least one floor of Pure Rooms in each new hotel.) Then consider that 58% of travelers surveyed by the Study Research Institute at Cornell University said they would be willing to pay slightly more for an allergy-free room. When the price premium was removed, 83% of travelers with allergies and 81% of non-sufferers said they would prefer an allergy-free room.

Based on these statistics alone, it would appear that the hotel industry may be missing an opportunity here. Hotels offering a perceived health benefit—the EPA says indoor air can be 70-100% more contaminated than outside air—may be able to obtain a 5-10% rate premium from guests. Improved air quality in hotel rooms can be achieved at fairly reasonable costs through the use of environmentally safe cleaning products (even for swimming pools); green housekeeping policies; organic bedding; and low-VOC upholstery, furniture, and carpeting.

While the Cornell study showed that a majority (58%) of those surveyed would be willing to pay extra for such a room, it may be difficult at first to charge a “green premium.” One solution, experts say, may be to “bury” the green experience into the room rate, just as trendy boutique inns like the W charge a premium for the “experience” of staying in a hip environment.

Aside from the health-conscious, there are 43 million travelers who say they prefer to do business with companies that share their concern about the environment, according to the Travel Industry Association of America.

There are also indications that corporations are looking at sustainability in their lodging choices. For example, Marriott International reports that 40% of its corporate clients ask about environmental issues in their RFPs for corporate rates. Green hotels are also being placed on lists of recommended places to stay for traveling government employees.

In what is becoming an increasingly crowded hospitality market, green hotels will need to create awareness of their sustainment efforts to generate word-of-mouth referrals from satisfied guests. They will need to play up the use of environmentally preferred products, such as bamboo flooring, recycled stone tile, and post-consum-

er recycled paper for menus and stationery. Starwood’s new “aloft” brand announced its “See Green” program in September, which promotes indigenous landscaping, shampoo and soap dispensers that eliminate all those little bottles, and even reserved parking spaces for guests driving hybrid vehicles. The aloft team is also in talks with a number of car companies to provide a hybrid “house car” at each location.

Is there a payoff for free publicity and goodwill? Industry experts say it can translate into extra bookings and may help green hotels to become profitable in less than the industry average of three years.

Guidelines for establishing an energy management program are available on the Energy Star Web site as part of the Energy Star for Hospitality program. (www.energystar.gov)

Allergy-free room demand

5.2

31	Percentage of surveyed travelers who have allergy issues themselves or traveled with people who did.
83	Percentage of all surveyed travelers with allergy issues who reported a preference for an allergy-treated room.
81	Percentage of all surveyed travelers without allergy issues who reported a preference for an allergy-treated room.
59	Percentage of all surveyed travelers who said they would pick a particular hotel because of allergy-free rooms.
90	Percentage of surveyed business travelers who expressed an interest in allergy-free hotel rooms.
82	Percentage of surveyed pleasure travelers who expressed an interest in allergy-free hotel rooms.

Source: Cornell Survey Research Institute. View the complete Cornell Survey Research Institute study at www.pureroom.com/PDFs/CornellSurvReport.pdf

Certifying the ‘Green Hotel’

A few Building Teams have followed LEED guidelines in designing and constructing hotel projects, but there is no formal LEED program for the hospitality industry, nor is one on the horizon. Only a handful of hotels have been certified through LEED.

To date, sustainability certification has not been a big selling point for the hospitality industry. The benefits of LEED are not yet on the radar screens of most developers and operators, some of whom worry that the program’s requirements could add to costs. But the same experts also expect that sometime in the future, perhaps 10 years down the road, certification under LEED or a more hotel-specific rating program could become the market standard. With hotels averaging a life span of 50 years, owners and operators will not want to be stuck with a non-certified inn competing in a market where green certification of one kind or other is valued.

For sustainability to take off in the hospitality sector, an industry leader—or maverick—will have to step up and push for a certification system that speaks to the unique needs of the hotel industry. Without a clear definition of what makes a hotel green, hoteliers will have no idea how to get there.

Hotel certification systems

5.3

Audubon Green Leaf	www.terrachoice.ca/hotelwebsite/indexcanada.htm
Ecotel	www.concepthospitality.com/ecotel/ECOTEL.htm
Energy Star	www.energystar.gov
Good Earthkeeping	www.ahla.com/good_earth_overview.asp
Green Globes	www.greenglobes.com
Green Seal	www.greenseal.org
LEED	www.usgbc.org

6. Restaurants on an Energy Diet

The potential to dramatically cut energy costs and run much more efficient operations are the keys to the \$511 billion restaurant and foodservice industry's efforts to go green. Restaurant operations consume almost two and a half times more energy per sf than any other commercial building type, according to the Consortium for Energy Efficiency (CEE), a nonprofit coalition of utility companies that promotes the use of energy-efficient products.

After food and labor, energy is the leading expense incurred by restaurants, accounting for 3-5% of overall costs, according to Charlie Souhrada, director of the North American Association of Food Equipment Manufacturers, a trade group that advocates for efficient commercial kitchen equipment. Cooking and refrigeration alone account for half of a restaurant's total energy usage.

As recently as April 2004, restaurant operators assigned a low priority to energy costs, with only 1% of the industry listing it as a top concern, according to the National Restaurant Association. Two years later, skyrocketing energy costs were listed as one of the industry's top three concerns. This realization came late to the foodservice industry, which is the main reason why its sustainability efforts are still nascent.¹

The business case for greening the restaurant sector is being championed primarily by various trade associations, equipment manufacturers, consultants, and utility companies aligned with the industry, rather than by foodservice operators themselves, although a few pioneers, including McDonald's Inc., are cautiously leading the way.

And while it is still in its infancy, the green restaurant movement is not without controversy. The USGBC has incorporated quick service restaurants (QSRs) into its LEED for Retail pilot program, much to the disappointment of some foodservice operators who feel their industry's unique concerns—specifically energy loads—are sufficient to mandate their own LEED program.

Two approaches to energy innovation

McDonald's restaurants' annual energy costs total more \$1 billion, so it makes sense that the Oak Brook, Ill.-based corporation would be on the front lines of the green restaurant movement. McDonald's regularly updates its standard building specifications based on a continuous exploration of sustainment practices. (Its earliest efforts were known as T.E.E.M, The Energy Efficient McDonald's.) All new green features must be integral to the restaurant's design and transparent to customers, and not all innovations make it into the corporation's

final design specifications.

McDonald's has had its greatest success reducing energy consumption via lighting and ventilation improvements, rather than with appliances. Installing two-stage dimmable ballasts (100%/50% brightness) produced annual savings of 10-25%, depending on restaurant size and location. Occupancy sensors that control lighting in walk-in refrigerators reduced energy use by 80%, with a payback of less than one year. High-efficiency HVAC saved 4,800kW hours per year, thanks in part to spectrally selective window glazing, which helped cut heat gain.

In the dining area itself, two five-ton units (11 SEER rating) replaced two standard 7.5-ton units (9.0 SEER). Ten-ton kitchen units were upgraded from 9 EER to 10 EER. The payback period: one to two years. McDonald's is currently developing an energy-usage tracking and benchmarking tool so that individual stores can measure their energy reduction progress.

In the Northwest, the upscale QSR chain Burgerville is exploring the use of renewable energy sources in its units. In October 2005, parent company The Holland Inc. committed to 100% use of purchased wind energy at all 39 outlets—the largest use of wind power by a QSR chain in the nation. The shift to wind power will eliminate 17.4 million pounds of CO₂ from the atmosphere, the equivalent of taking 1,700 cars off the road.

The company is paying a premium of about 10% over traditional energy sources (the current market price for conventional electricity is \$0.07 per kilowatt hour vs. \$0.075 per kWh for wind energy, according to the EPA). So far, it has not jacked up menu prices.

Although the commitment to wind felt like a gamble at first, according to COO Jeff Harvey, the company saw renewable energy as having a much greater potential to stabilize costs than reliance on fossil fuel sources. In locations where the local utility does not supply wind-based energy, the company purchased renewable energy credits (RECs) or tradable renewable certificates (TRCs) from utilities that do supply them.

In the year since the policy was enacted, the company has seen growth in its metrics of 12% or more, compared to 2% for the industry standard—the highest level of growth the company has experienced in 10 years.

Where do restaurants fit in LEED?

Many in the restaurant industry feel that the U.S. Green Building Council erred by incorporating restaurants within its new LEED-NC for Retail pilot program, which lumps QSRs in with grocery stores, home centers, department stores, retail big boxes, clothing

¹"Restaurant Industry: 2006 and Beyond," National Restaurant Association, May 2006. www.restaurant.org/studygroups/meg/presentations/brendanflanagan_spring06.pdf

stores, banks and financial institutions, and beauty salons. They claim that it is difficult to qualify QSRs for LEED certification due to their intense energy loads, which are much higher than these other building types normally carry.

According to Richard Young, senior engineer and director of education for Fisher-Nickel, an engineering consulting firm specializing in the foodservice industry, modeling a restaurant's energy use (a LEED prerequisite) is difficult because of the multiple processes operating within the restaurant environment at any given time. Depending on the time of day and the season of the year, it is possible to produce vastly different energy-use results. The physical structure of most restaurants creates anomalies, too, because the energy intensity in the kitchen is about five times higher than in the rest of the restaurant, says Young.

The consensus among restaurant industry leaders is that certifying a restaurant under LEED for Retail is doable but burdensome. Basically every restaurant can name parts of LEED-NC for Retail that work against them, according to Dallas-based Brinker International, which has 1,662 restaurants under various banners (Chili's Grill & Bar, Maggiano's Little Italy, Romano's Macaroni Grill, and On The Border Mexican Grill & Cantina). The company builds at least 100 new restaurants per year and favors having a unique LEED program for the foodservice industry.

Certification, restaurateurs like Brinker say, is not something they'll go after for every new unit in their chains. But seeking LEED certification on a piecemeal basis is pointless, says Fisher-Nickel's Young, who would prefer to see "volume certification" based on prototype designs. (See Chapter 4 for more on LEED's "Portfolio Program Pilot.")

There have been scattered cases of restaurants achieving LEED certification. A McDonald's in Savan-

nah, Ga., just earned LEED Gold, making it the first LEED-certified McDonald's, but this was earned under LEED for Core & Shell. Designed by Adams + Associates Architecture, Mooresville, N.C., and developed by Melaver Inc., Savannah, Ga., the McDonald's features large windows that spread daylight to 75% of the restaurant, plus bike racks, parking for hybrid vehicles, porous pavement, and a white roof. Other units in Chicago and near the company's headquarters in Oak Brook, Ill., have green elements (the Chicago store has a vegetated roof), but were not LEED registered.

Earning a LEED Core & Shell rating is great, says Young, but with the average McDonald's claiming a 20-year lifespan, he thinks it's much more important to reduce process loads than to install bike racks.

The LEED-NC for Retail Committee sees it differently, however, and is trying to create a rating program that can accommodate performance standards that make sense for restaurants, says Brendan Owens, project manager, U.S. Green Building Council. He says the committee recognizes that need for flexibility so the program doesn't become specific to certain market sectors, and they're working on an appropriate energy-use baseline to take into account the needs of all constituents. Anecdotally, he's hearing that the program is reducing energy usage. Thus far, however, Chipotle is one of the few QSRs contributing to the LEED for Retail pilot program.

Meanwhile, the National Restaurant Association (www.restaurant.org) has launched its "Roadmap to Sustainable Restaurant Operations" to promote environmentally sound business practices to the NRA's 375,000 member restaurants. Among the program's goals: identify practices that conserve energy, water, and other natural resources; increase recycling; and encourage the use of sustainable materials and alternative energy sources.

Estimated savings, estimated installed costs, and payback periods for various technologies

6.1

Technology	Estimated savings (\$)	Estimated incremental installed cost (\$)	Payback period (years)
Controllable ballasts	702	620	0.9
Low-temperature occupancy sensors	327	340	1.0
Two-speed exhaust fan*	230	400	1.7
Energy management system*	3,254	12,000	3.7
High-efficiency A/C*	480	600	1.4
Kitchen evaporative cooling*	648	1,200	1.9
Evaporative pre-coolers on A/C units*	76	1,000	13.2
Spectrally selective glazing**	3,950	6,000	1.5

*Energy savings for these technologies depend on the location and weather of demonstration project.

**Savings for spectrally selective glazing include \$450 for energy savings and \$3,500 for reduced capital cost of air conditioning units.

Source: "Designing an Energy-Efficient Quick Service Restaurant," ASHRAE White Paper

7. The Modern Green Home

Two thousand seven could be a turning point for the green home market. The growth in green home building should ramp up 30% over the 2006 level, with more than two-thirds of residential builders constructing green homes, according to a study by McGraw-Hill, produced in conjunction with the National Association of Home Builders.

In 2007, 66% of small builders (fewer than 10 units a year) and 59% of larger builders (10 or more units a year) will make green homes account for at least 15% of their projects. Already 90% of builders report participating in some green-building activities. Fifty local home builder association (HBA) programs are active throughout the country.

Also in 2007, LEED for Homes will join the NAHB Model Green Home Building Guidelines as a national certification program for green homes.

All of this comes in response to growing demand from consumers for homes that are more efficient and provide healthier living environments. In coming years, builders that deliver such homes will be better positioned to succeed in a soft housing market.

Homebuyers and the cost of green

According to the NAHB, the home buying public has an unprecedented level of awareness of environmental issues; thus, forward-thinking builders and developers can use the public's awareness to their advantage.

The majority of buildings (56%) report that buyers are willing to pay more for a green home, but 79% say

they still worry about a buyer's reluctance to pay more. As many as 82% of builders cite higher first costs as an obstacle to building greener homes (chart 7.1).

With the current downturn in the housing market, builders are even more concerned about adding costs that might not be absorbed by the home buyer. Many are wondering if now is the time to go green.

While the survey of homebuilders reports that, on average, the cost of green home construction was perceived to be 8.7% higher than traditional home construction costs, 37% of respondents said green construction would add 5% or less. Another 33% cite a green premium in the 6-10% range.

However, the NAHB cautions its members against short-term thinking in this department. By 2010, the homebuilder organization states, green construction should account for 5-10% of all new homes. For the residential market, that translates to \$19-\$38 billion worth of construction.

One of the largest sustainable residential projects in the country is Noisette, a 3,000-acre development in North Charleston, S.C., with 4,000 new homes, 5,000 rehabbed homes, and five million sf of retail, industrial, and commercial space.

John L. Knott, Jr., president and CEO of Noisette Company, says that building sustainable and green homes need not cost more in terms of total development budget. Additional costs in the design and planning stages may add 1% to the total budget, but that cost can usually be offset by significant reductions in site and infrastructure costs, often leading to superior building performance, efficiency, and durability. Knott also says that homes designed from the outset with an eye toward sustainability can realize operating and maintenance cost reductions of 50% or more.

Home buyers may not necessarily understand or care about "sustainability," or "green" homes, says Knott, but they do appreciate long-term durability, a healthier living environment, and reduced energy costs. (The EPA says the average American family spends \$1,291 a year on home energy; the NAHB says it's more like \$1,600.)

In fact, consumer demand is viewed as the most important reason (55%) why the residential market is getting so much greener (chart 7.2). Of those surveyed builders who are working on green homes, 88% said they are being pushed to do so by consumers seeking out more efficient, healthier homes.

Builders in the survey cited energy efficiency (82%) and indoor air quality (66%) as the two areas home seekers value most. To maximize profit from green homes, builders need to consider upgrading insulation, HVAC

Top 5 obstacles to green homebuilding 7.1

1. Higher first costs	82%
2. Consumer reluctance to pay	79%
3. Lack of education about concepts	72%
4. Codes and regulations	72%
5. Lack of awareness about products	70%

Source: McGraw-Hill/NAHB Residential Green Building SmartMarket Report, 2006

Five factors that trigger green homebuilding 7.2

Consumer demand	55%
Codes and regulations	48%
Energy cost increases	46%
Competitive advantage	40%
Superior performance	38%

Source: McGraw-Hill/NAHB Residential Green Building SmartMarket Report, 2006

systems, windows, and doors in their projects (and also specify energy-efficient, Energy Star appliances).

One note of caution: Buyer preference for different green elements varies based on geographic differences. The best tactic seems to be to offer a basic, appealing, well-constructed home (homes perceived as weird or too complex will repel buyers) and allow buyers to add green options as their interests and budgets allow.

That's the tack taken by McStain Neighborhoods of Denver, which puts up about 400 homes a year. The firm follows guidelines established by the Built Green Colorado program. All of its homes start off green but can be made even greener with buyer options, including reclaimed flooring, solar electric systems, and recirculating hot water.

Company president/CEO Eric Wittenberg says McStain green homes have a resale value about 4-11% higher than traditional homes. To maximize resale value, the builder provides owners with a "green kit" that helps them explain the benefits of their green homes to potential buyers.

NAHB's Green Home Guidelines

Local home builder associations are reporting significantly increased builder interest in green homes driven, they say, by consumer demand. In 2005, the NAHB,

NAHB Model Green Home Building Guidelines		7.3		
Minimum points, by category, for each level				
	Bronze	Silver	Gold	
Lot Design, Preparation, and Development	8	10	12	
Resource Efficiency	44	60	77	
Energy Efficiency	37	62	100	
Water Efficiency	6	13	19	
Indoor Environmental Quality	32	54	72	
Operations, Maintenance, and Homeowner Education	7	7	9	
Global Impact	3	5	6	
Additional Points from Sections of Your Choice	100	100	100	
Total	237	311	395	

Source: NAHB Model Green Home Building Guidelines

which represents more than 225,000 residential construction members, including nearly 75,000 home builders, released its Model Green Home Building Guidelines (www.nahbrc.org/greenguidelines) for HBAs that don't yet have their own programs but are looking to create them.

The guidelines borrow heavily from established home builder programs, such as Built Green Colorado, EarthCraft Home (Atlanta), and Green Building Program (Frisco, Texas), and were developed by a group of more than 60 stakeholders—not only builders, but also envi-

NAHB Model Home Building Guidelines' principles

7.4

Lot Design, Preparation and Development

Resource-efficient site design and development practices can reduce housing impacts on the environment and lower energy usage. Basic example: properly orienting homes for passive solar heating and cooling.

Resource Efficiency

Resource-efficient practices (e.g., using engineered wood instead of traditional lumber) can be integrated into the design process to create homes with excellent building performance.

Energy Efficiency

Reducing energy use is weighted heavily in the guidelines—not only for the operation of the home (HVAC systems, appliances), but also through the construction process and the materials going into the home.

Water Efficiency

Indoor daily water use in U.S. homes: 80-100 gallons per person. Conservation practices (e.g., on-demand water heaters, water-efficient dishwashers) can reduce it by nearly 20 gallons.

Indoor Air Quality

After energy efficiency, homebuyers are most concerned with indoor air quality, particularly in regions where allergens and pollen levels are high. Likely to be one of the most critical in contributing to increased consumer demand for green homes.

Operations, Maintenance, and Homeowner Education

Poor maintenance can kill the benefits derived from green features. Builders who educate homeowners in O&M not only make their customers happier, help increase the demand for green homes.

Global Impact

The guidelines cite the use of low-VOC paints and other environmentally preferable products.

Site Planning and Land Development

Appropriate site planning and land development will improve communities and may contribute to increased economic development.

Sources: NAHB Model Home Green Building Guidelines; McGraw-Hill/NAHB Residential Green Building SmartMarket Report.

The Hardwood Council

AMERICAN HARDWOODS — A NATURAL CHOICE FOR GREEN BUILDING

Hardwood floors, cabinets, furniture and trim have brought warmth and beauty to the built environment for centuries. Today, they are an important part of green design and building.

For more than a decade, The Hardwood Council has been an information resource for architects, designers and builders on all aspects of American hardwoods and hardwood products. The Council offers:

- Sustainable Solutions Hardwood Sample Boxes – 20 American hardwood samples; the brochure, *Sustainable American Hardwoods*; and interactive CD-ROM.
- CEUs – Architects and interior designers can earn AIA- and IIDA-approved continuing education credits on American hardwood topics.
- White papers – Conversations about sustainability and our surroundings with leading architects, designers, authors and engineers.
- Student Initiatives – Educating future professionals with the tools for smart specification of American hardwoods.

Our comprehensive website, www.hardwoodcouncil.com, provides practical information in all areas of American hardwood sustainability, specification, design values, installation, finishing and maintenance. The on-line species guide provides everything you need to know about the major American hardwoods, including characteristics, grades, strength and mechanical properties. Even hardwood sourcing is available through Buyers' Guides on our members' sites.

With their sustainability, local availability, non-toxic durability and aesthetics, American hardwoods are the natural choice for green building.



Susan M. Regan
The Hardwood Council
www.hardwoodcouncil.com

ronmentalists and government officials. The guidelines are still under review, with a final checklist available in early 2007.

Locals HBAs manage the programs and can tailor them to local conditions and market demand. Points are awarded in seven categories: lot design, preparation, and development; resource efficiency; energy efficiency; water efficiency; IEQ; operations, maintenance, and homeowner education; global impact; and site planning and land development (chart 7.4). There are three certification levels: Bronze, Silver, and Gold (chart 7.3).

Emily English, the NAHB's green building program manager, says she has some anecdotal evidence that builders adhering to the guidelines are experiencing fast-track permitting, lower permitting fees, insurance breaks, and access to land and building sites they wouldn't have had access to without having committed to using the green guidelines.

The NAHB Model Green Home Building Guidelines program is national in scope but is applied at the local level and is aimed at the mainstream building market, according to English. HBA programs do not require third-party certification.

LEED for Homes gets a trial run

Following the LEED-NC model, LEED for Homes (www.usgbc.org/leed/homes) theoretically is targeted at the top 25% of the residential market—the market leaders, innovators, and risk takers—including multifamily properties. (Multifamily buildings of more than three stories may also qualify for LEED-NC certification.) Currently, LEED for Homes involves 85 custom builders, 15 affordable home builders, 10 production builders. Still in its pilot phase, LEED for Homes should emerge as a fully chartered program in 2007.

That so many custom builders are involved in the LEED for Homes pilot program is a strong indication

that high-end consumers are willing to pay for green benefits. Custom builders (and their clients) are also less likely to be put off by LEED certification costs, ranging from \$500 to \$2,000 per home, according to the USGBC. Those costs could deter many production builders from seeking LEED certification, especially if homebuyers don't recognize the LEED name and therefore aren't willing to absorb its costs.

In addition to the homebuilders themselves, 11 LEED for Homes providers (chart 7.5) were selected for the pilot program based on their record of assisting builders to go green. These 11 providers will work with builders to deliver LEED homes during the pilot phase; they will also arrange for performance tests and, once points are verified, will issue ratings certificates.

LEED for Homes awards points in

LEED Platinum, just barely

There is one LEED Platinum residential project, a 2,500-sf home in Santa Monica, Calif., designed by Los Angeles architect Ray Kappe, FAIA, and developed by LivingHomes, a manufacturer of modern prefab homes.

Reaching the Platinum level—by a whisker, at 91 points (chart 7.6)—required intense strategizing when it came to finalizing the design, the finishes and fixtures, and the environmental systems, says LivingHomes founder and CEO Steve Glenn. At \$250/sf for total construction costs, the green features added about 20% to the budget, but should save \$1,500 a year on utility costs.

Right now, says Glenn, there isn't strong enough market demand for a LEED Platinum-rated home to add a price premium. Instead, Glenn is relying on a traditional pricing strategy: he's adding up his costs, adding his profit margin, and hoping a buyer will find the house worth its \$1 million-plus asking price.

LivingHomes LEED Platinum home			7.6
Category	Points available	Points attained	
Location and Linkages	10	10	
Sustainable Sites	14	14	
Water Efficiency	12	15	
Indoor Environmental Quality	14	9	
Materials and Resources	24	8	
Energy and Atmosphere	29	32.5*	
Homeowner Awareness	1	1	
Innovation and Design Process	4	1.5	
Total	108	91	

**Awarded bonus points*

LEED for Homes providers

Location	Organization	Contact	7.5
Arizona (Scottsdale, Metro Phoenix)	City of Scottsdale Green Building Program	Anthony Floyd, 480-312-4202	
California (Statewide)	Davis Energy Group Inc.	Mary Westcott, 530-753-1100, ext. 11	
Florida (Statewide)	Florida Solar Energy Center/University of Central Florida	Eric Martin, 321-638-1450	
Georgia (Statewide, Ala., S.C., Va.)	Southface Energy Institute	Laura Uhde, 404-872-3549, ext. 129	
Michigan (Central, western)	The Alliance for Environmental Sustainability	Michael Holcomb, 616-241-5537	
New Jersey (Statewide, parts of Eastern Pa.)	McGrann Associates	Rebecca Lynch, 856-813-1474	
Northeast Team (Conn., Mass., Maine, N.H., N.Y., R.I., Vt.)	Vermont Energy Investment Corporation	Richard Faesy, 802-453-5100, ext. 19	
Oklahoma (Central U.S.)	Guaranteed Watt Saver Systems Inc.	Donney Dorton, 405-946-0206	
Oregon (Statewide, southern Wash.)	Earth Advantage Inc.	Randy Hansell, 503-968-7160, ext. 16	
Pennsylvania (Parts of Eastern Pa., Del.)	Energy Coordinating Agency of Philadelphia	Liz Robinson, 215-988-0929	
Texas (Statewide)	Contacts-Consultants & Architects Metropolitan Partnership for Energy	Chip Henderson, 210-824-8758 L. Michael Lopez, 210-224-7278	

ECO-EFFICIENCY

It's a management strategy of doing more with less, according to the World Business Council for Sustainable Development.

It means protecting the environment while also optimizing the use of financial resources — then applying those savings to additional environmental improvements.

Vinyl windows are a good example:

1. They're known for their thermal efficiency, reducing unwanted heat loss or gain and yielding significant dollar savings. (And, vinyl is more than half derived from common salt, meaning less fossil fuel is used to make vinyl than to make many other synthetic materials.)
2. They're very affordable. Dollar savings from using vinyl windows can be used to purchase more insulation and other environmental enhancements.

It's a win-win strategy for green buildings.

The Vinyl Institute is the U.S. trade association for the vinyl plastic industry. VI advocates the responsible manufacture of vinyl resins, lifecycle management of vinyl products, and promotion of the value of vinyl to society.

For more information, please visit www.vinylindesign.com or www.vinylnewsservice.net, or phone 877-234-9749.



seven categories: Location and Linkages (LL), Sustainable Sites (SS), Water Efficiency (WE), Indoor Environmental Quality (IEQ), Materials and Resources (MR), Energy and Atmosphere (EA), Homeowner Awareness (HA), Innovation and Design Process (ID).

LEED homes can be rated at four levels (chart 7.7): Certified (30-49 points), Silver (50-69), Gold (70-89), and Platinum (90-108). So far, 180 single-family homes and 400 multifamily units have earned LEED ratings, according to the USGBC.

When it comes to third-party endorsements, buyers tend to put more value on locally recognized programs (generally those associated with local home building associations) rather than LEED. McStain's Wittenberg advises other builders to choose a program that consumers value. His company is participating in the LEED pilot, but Wittenberg says he is reserving judgment on whether to move ahead with LEED certification because home buyers don't recognize the LEED name yet.

Building affordable green housing

In the affordable green rental housing market, the driving forces have been socially motivated community groups and builders.

New York City-based Jonathan Rose Companies, in partnership with the nonprofit Harlem Congregations for Community Improvement Inc., is developing the 80,000-sf, 85-unit David and Joyce Dickens Garden project in Harlem, N.Y., to be a model of green affordable housing.

The firm set two main goals: design a building that

operates for at least 25% less than a typical multifamily building, to keep O&M costs in line for the long run; and focus on IAQ, because residents in affordable housing tend to have high levels of asthma, along with other illness, according Paul Freitag, director of the development studio at Jonathan Rose.

To do this within a tight \$19 million budget, the firm sought out grant money to be able to perform energy modeling and add certain green "extras"—a green roof and a rainwater collection system. The Home Depot Foundation and the Enterprise Foundation each ponied up \$50,000. (The Enterprise Foundation, along with the Natural Resources Defense Council, Global Green USA, the AIA, the American Planning Association, and other corporate, financial, and philanthropic institutions, has created a partnership called Green Communities [www.greencommunitiesonline.com], a \$555 million initiative to create more than 8,500 affordable homes by 2010.)

The building's energy efficiency was dramatically increased by right-sizing the boilers and placing them on the roof; this eliminates the stack effect, where air is drawn up through the chimney, further reducing efficiency.

Individually ventilated apartments significantly improved the building's IAQ and energy efficiency at almost no additional cost, thanks to the use of precast concrete plank construction for the floors and roof. These planks have voids to reduce their weight; in this case, the voids were used for the ventilation and exhaust system without requiring additional ductwork.

LEED for Homes project checklist		7.7
Category		Points available
Location and Linkages		10
Site selection, infrastructure, community resources, and compact development		
Sustainable Sites		14
Site stewardship, landscaping, shading of hardscapes, surface water management, and non-toxic pest control		
Water Efficiency		12
Water reuse, irrigation system, and indoor water use		
Indoor Environmental Quality		14
Energy Star with Indoor Air Package, combustion venting, humidity control, outdoor air ventilation, local exhaust, supply air distribution, supply air filtering, contaminant control, radon protection, and vehicle emissions protection		
Materials and Resources		24
Home size, material efficient framing, local sources, durability plan, environmentally preferred products, and waste management		
Energy and Atmosphere		29
Energy Star home, insulation, air filtration, windows, duct tightness, space heating and cooling, water heating, lighting, appliances, renewable energy, and refrigerant management		
Homeowner Awareness		1
Homeowner education		
Innovation and Design Process		4
Innovative design		
Total possible points		108

8. Greening the Industrial Sector

The green building movement has had some difficulty penetrating the industrial sector. Only about 5% of projects registered with the USGBC's LEED program are classified as industrial. Actual certification of major manufacturing plants is so rare that when it does happen, it makes quite a splash in the media.

This has certainly been true for the major automotive brands (DaimlerChrysler excepted), each of which has been trying to outdo the others in greening its industrial facilities:

- Ford Motor Company's Rouge truck plant in Dearborn, Mich., incorporates porous pavement in the parking lot, gray water recycling, and skylights to bring natural light into the plant. Its most noteworthy feature, though, is its 10.4-acre vegetated roof, which its designer, William McDonough, FAIA, claims is the largest in the world. While Ford earned LEED Gold for the adjoining visitor center, it did not seek certification for the plant itself.

- Last July, Honda gained LEED Gold for a 14,400-sf central plant facility in Raymond, Ohio. Indoor air is cooled with a high-efficiency ice-chiller, and the emergency generator runs on low-emission bio-diesel.

- Toyota's \$17 million distribution facility in Portland, Ore., where vehicles being shipped from Asia are unloaded, earned LEED Gold, while coming in 10% under budget. Bioswales cool and filter all water from the facility before being discharged into the Willamette River. Daylighting and natural ventilation reduce energy demand by 33%.

- Not to be outdone, in August, General Motors unveiled its \$1.5 billion, 2.4 million-sf plant in exurban Lansing, Mich. Among its green features: 1.5 million sf of white reflective roofing; task lighting that reduces energy consumption by 20%; rainwater collection systems, waterless urinals, and low-flow plumbing fixtures that will save 4.1 million gallons of water a year; and a 75-acre plant and wildlife habitat. The *Detroit News* dubbed it "the world's greenest auto plant."

Inside the factory walls

One recent study that sheds light on the gnarly issues involved in making industrial facilities sustainable was conducted by scholars at the University of Pittsburgh. They focused on Castcon Stone Inc., a family-owned firm in Saxonburg, Pa., that produces custom precast stone products.¹

In 2001, Castcon decided to ramp up the busi-

ness and build a more up-to-date plant to replace its cramped, 17,000-sf facility, where gas-propelled forklifts threw dust and pollutants into the air, endangering the health of the 40 employees.

Two years later, the company moved to a new \$5 million, 47,000-sf facility in a brownfield enterprise zone in Saxonburg. The architect, Perkins Eastman, specified energy-efficient lighting, low-e glass, heating/lighting occupancy sensors, daylighting, low-VOC carpeting and furniture, a stormwater retention system, and an HVAC system with heat-recovery wheels. High-efficiency gas ceiling-mounted heaters were installed to improve indoor air quality. With these and other attributes, the project was in line for LEED Silver certification. It also won a Building Team Award from this publication.²

From employee surveys, interviews with management, and site visits, the University of Pittsburgh researchers found that the new facility had achieved a 25% improvement in manufacturing productivity and a 30% decrease in energy usage per square foot compared to the old plant. Their chief conclusion: "Considering all aspects, the economic analysis showed that the company made the correct decision to build a new green facility."

The researchers also investigated worker productivity, although they expressed concern that "productivity is usually one of the hardest concepts to measure due to data requirements or lack of well-defined metrics, especially for white-collar employees." They found that productivity for blue-collar workers was enhanced by the air temperature, relative humidity, and work area size. Office workers said they were positively affected by outside views.

Employees in general agreed that indoor environmental quality was superior to the old facility. Health problems—headaches, coughs, eye/nose/throat irritation, blurring vision—were all lower after the move. But these findings were complicated by the fact that dirty, noisy forklifts had been replaced by an overhead crane system to move the concrete products, which greatly reduced the amount of dust and pollution inside the new plant.

Absenteeism and sick leave were also studied. There was no statistically significant difference in absenteeism after the move, with three exceptions: excused absences for office staff, physician-excused absences for production workers, and worker compensation absences for production workers, all of which were significantly lower after the move.

¹"The Economic Benefits of Green Buildings: A Comprehensive Case Study," Robert Ries, Nuri Mehmet Gokhan, Melissa M. Bilec, and Kim LaScola Nedy, *The Engineering Economist*, Vol. 51, No. 3, July-September 2006, 259-295.

²"Castcon Stone, Inc.," Building Design+Construction, May 2005. www.BDCnetwork.com/article/CA600190.html

Sorting through the data haze

The Castcon study provides valuable insight on many of the “human” benefits of green buildings, but it also reveals how difficult it is to get a clear picture from so many interrelated factors. For example, was eliminating the forklifts, which clearly had the biggest effect on IEQ in the new plant, a “green” solution, or just common sense? “They really changed their whole workflow, which improved productivity, but part of the productivity gain was also due to the sustainability of the building, and you can’t easily determine what percent to allocate to each of those factors,” said Robert Ries, PhD, RA, one of the principal researchers. Productivity may even have gone up simply because business picked up, and everyone worked harder.

Similarly, were the findings on absenteeism and sick leave skewed by management’s decision to institute a drug-testing program, which may have encouraged certain high-absence employees to quit before the drug testing went into effect? Impossible to determine. Another complication: After the move, the owners offered a hefty bonus for perfect attendance: in the first six months, 22 employees—roughly half—earned bonuses. So which factor had the greater impact on employee health and attendance: the new bonus program, or the improved indoor air quality, daylighting, and so on?

After sorting through these issues, the University of Pittsburgh researchers still believe that Castcon did the right thing to build green. “We did get very positive feedback that there was an impact due to the greening,”

said Kim LaScola Needy, PhD, PE, CFPIM, the other principal researcher. “As you look at this case from a longer-term perspective, we expect the greening to result in a constant level of improvement.”

Industrial sector needs a bump

Industrial construction clearly is not making great headway in the green building arena. Manufacturing is competitively challenged from overseas, so it’s hard to get management or other stakeholders to get excited about a concept that probably seems extraneous to the day-to-day struggle to keep one step ahead of the rest of the world.

If the Castcon example is any measure, however, much can be learned about how to improve productivity and competitiveness through the exercise of designing and constructing a green industrial facility. Castcon’s management used the new facility as a catalyst for change: replacing outdated technology with modern systems, which increased productivity and improved the quality of the workplace; instituting employee programs (drug testing, attendance bonuses) that had positive benefits for both employees and the company; improving working conditions through daylighting and outside views, which helped boost employee morale.

Considering that industrial workers spend half their waking lives inside their factory walls, U.S. manufacturing companies would do well to consider reaping the potential bottom-line benefits from greening their facilities.

Green Globes certifies two industrial projects

Although the U.S. Green Building Council’s LEED rating system gets the lion’s share of publicity in the U.S., the Green Globes online rating system, based on BOMA Canada’s “Go Green Plus” program, is slowly gaining the attention of AEC firms and property owners.

Green Globes awards up to 1,000 points in seven areas: project management (50), site (115), energy (380), water (85), resources (100), emissions (70), and indoor environment (200). Projects can be certified at four levels: one Green Globe (at least 35% of total points), two (55%), three (70%), or four (85%).

Two recent industrial projects have each been awarded two Green Globes:

- RenewAire LLC, a 37,000-sf office/manufacturing facility, in Madison, Wis., achieved an overall rating of 66%. The building was purchased and renovated for \$3.5 million, or \$94/sf, of which \$23/sf was attributed to sustainability costs.
- The Summit County (Colo.) Recovery Facility, a 19,000-sf recycling plant, was cited for excellence in heat recovery, daylighting, and the use of recycled materials.

Note: Green Globes is licensed in the U.S. to the Green Building Initiative, a sponsor of this White Paper.

9. Higher Education Goes Green

The nation's 4,216 accredited universities and colleges have tremendous potential to reduce their consumption of the world's resources. These institutions control nearly a million acres of land and operate hundreds of thousands of classroom buildings, laboratories, residence halls, foodservice facilities, retail stores, and hospitals. Many have political clout in their communities, states, and regions. Most importantly, these institutions are responsible for educating 15 million students every year, thus affording them the opportunity to mold and educate tomorrow's leaders in the ethic of sustainability.

The role of the university in environmental stewardship was first staked out 16 years ago at a conference in Talloires, France, where 22 university presidents and chancellors from around the world convened to voice their concerns about the state of the environment and to discuss the role of the world's institutions of higher education in creating a sustainable future. They left with a 10-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations, and outreach at colleges and universities.¹

The Talloires Declaration set forth a movement toward sustainability in higher education that, after two decades, is finally inching into the mainstream. Some 325 institutions in more than 40 countries, including more than 100 U.S. colleges and universi-

ties, have signed the declaration.

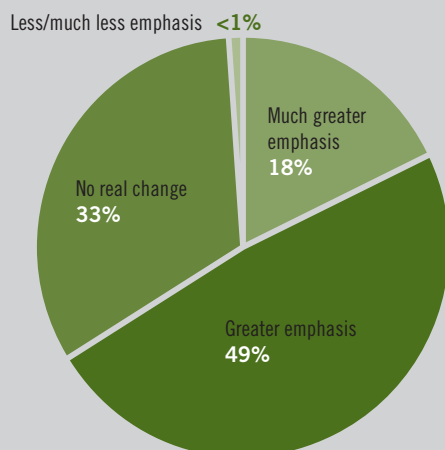
In the U.S., hundreds of universities are implementing some form of sustainable practice or program. According to a survey of 472 high-level staff members at U.S. universities and colleges conducted by Martin Akel & Associates in May-June 2006, two-thirds (67%) of senior university professionals are placing greater or much greater emphasis on environmentally responsible approaches today compared to three or four years ago. More than three-quarters (78%) said they would be at least somewhat likely to consider LEED certification for future construction and renovation projects, and 85% said they take sustainability into account when specifying new products and equipment.²

Moreover, membership in associations such as the University Leaders for a Sustainable Future and the Association for the Advancement of Sustainability in Higher Education is at an all-time high, as is participation in campus sustainability conferences and programs like National Wildlife Federation's Campus Ecology, Society for College and University Planning's Campus Sustainability Day, and Ball State University's Greening of the Campus.

At last count, 665 institutions were actively involved in one or more of these programs, according to AASHE executive director Judy Walton. "This is just one indication of who's doing green," says Walton. "There are probably another 100 to 200 schools out there that we just haven't heard about yet."

Are you placing greater emphasis on the use of environmentally responsible/green approaches today compared to 3-4 years ago?

9.1



Source: Martin Akel & Associates, May-June 2006

The business case for green campuses

The possibility of controlling operating outlays—especially energy costs—is by far the biggest factor driving colleges and universities to initiate green campus programs.³ There are several reasons for this. First, the vast majority of buildings on American campuses are at least 20 years old and are equipped with outdated, inefficient building systems. In addition, many schools are in the midst of aggressive expansion programs that often include energy-gobbling structures like student residences and lab facilities.

Finally, several factors—the sheer growth in student numbers, the popularity of energy-consuming tools like laptops and iPods (not to mention microwave ovens and mini-fridges), and the proliferation of the 24/7 campus lifestyle—all threaten to push up the consumption of energy and water and the generation of waste on campus.

Leaders in campus sustainability are tackling these issues head-on.

¹"The Talloires Declaration," October 1990. www.ulsf.org/pdf/TD.pdf

²"Institutions of Higher Education: A Study of Facilities and Environmental Considerations," Martin Akel & Associates on behalf of University Business magazine and E&I Purchasing Cooperative, June 2006. www.universitybusiness.com/uploaded/pdfs/biedgreenfacilitiesstudyecnm.pdf

³"The State of Sustainability in Higher Education: A Survey of the Boston Consortium," Archiberra, Babson College, Massachusetts Institute of Technology, July 2006. www.architects.org/emplibrary/Watts_2004_summary.pdf

For example, California State University–Chico, Colorado State University, and the University of Oregon all have managed to *reduce* overall energy or water consumption despite significant campus expansions. Water conservation measures in place at Colorado State University have helped decrease potable water use by 22% (108 million gallons) since 1990, even with an added 5,000 students and 1.4 million sf of buildings. As a result, CSU avoided having to pay in excess of \$2 million for upgrades to sanitary wastewater lines on campus that were once at capacity.⁴

But environmental stewardship in academia goes well beyond controlling costs. Many in higher education see sustainability education as a natural extension of their pedagogical role. Universities are incorporating sustainability into their mission statements; some are creating programs in eco-literacy and environmental studies. Green buildings often figure prominently in these programs, serving as hands-on laboratories for experimentation in and observation of sustainable design and construction principles.

There are even those who argue that green campuses may actually help schools attract top students, faculty, and staff; this assertion, however, is not borne out by the data. In fact, of the university professionals surveyed by Martin Akel & Associates, just 12% said they use “eco-friendliness” to promote their institutions to prospective students or faculty.

Overcoming obstacles to sustainability

Despite signs of significant progress toward green, higher education has a long way to go. Only one in six schools (16%) maintains an office of sustainability, according to the Martin Akel survey. Moreover, colleges and universities account for just 3% of the 6,925 members of the U.S. Green Building Council. Fewer than 180 institutions have certified or even registered a building under LEED.

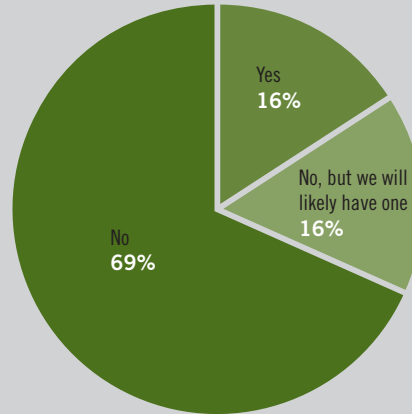
What is preventing the great majority of the nation’s colleges and universities from greening their campuses?

The barriers to developing a sustainability initiative are many: lack of staff time or expertise; perceived complexity; institutional inertia; lack of clear policies; and the need to gain buy-in from numerous stakeholders and independent departments.

The single greatest barrier to sustainability in universities, though, is money, or the lack thereof. Leaders in the green campus movement point out that budget systems at most institutions favor new construction over renovation. Many universities also are burdened with lengthy, cumbersome financing processes. And because construction budgets are kept separate from operations and maintenance budgets, it

Does your institution maintain an office of sustainability?

9.2



Source: Martin Akel & Associates, May-June 2006

How involved are the following groups in environmental concerns and initiatives on your campus?

9.3

Involvement	Very	Significant	Moderate	None
Facilities/physical plant management/staff	24%	37%	32%	7%
Administrators/managers/trustees	14%	27%	43%	15%
Faculty	5%	22%	52%	21.1
Students	8%	25%	44%	24%
Local community members	2%	7%	35%	57%

Source: Martin Akel & Associates, May-June 2006

becomes difficult to “sell” green projects that exceed the norm on the basis that they will pay off through lower O&M costs.

Despite the obstacles, institutions are finding ways to overcome these financial restrictions through alternative funding mechanisms.

Harvard University’s revolving loan fund for green projects has been a huge success. More than \$7.5 million has been invested in 105 energy, water, and waste conservation projects, with an average return on investment of 34% and a payback of less than four years. Sustainable projects are evaluated on a case-by-case basis; those that meet established payback (less than five years) and environmental impact criteria are funded through interest-free loans from a pool of \$3 million established by the university. Loans are then paid back incrementally using the associated utility or operations savings. All principal payments are paid directly back into the loan pool to fund other projects.⁵

The revolving loan fund is not a panacea, however. Because it requires a reasonable payback period, the program is typically limited to utility-related upgrades,

⁴“The Hidden Economics of Campus Sustainability,” John P. Morris, Facilities Manager magazine, May/June 2005. www.appa.org/files/FMArticles/5605FM_econ.pdf

⁵Harvard Green Campus Initiative, www.greencampus.harvard.edu. See also “Harvard’s Leith Sharp: ‘You can green your campus,’” Building Design+Construction, August 2006, p. 64. www.BDCnetwork.com/article/CA6361819.html

such as irrigation controls or energy-efficient building systems; it may not be suitable for funding projects with long payback periods, such as large photovoltaic installations or wind power.

The Harvard program has become a model for other universities, including the University of Connecticut and California State University–Monterey Bay. But many schools have had to turn to more unusual means to raise the capital they need to get sustainability programs going.

One fund-raising technique that is gaining popularity on campus is the student-enacted tuition hike. At UC-Santa Barbara, UC-Chico, and the University of Oregon, environmental grant programs are funded entirely through student-voted fee increases. These programs serve a dual purpose: first, they provide a steady stream of revenue (upwards of \$200,000/year at some schools) to pay for green features; second, they empower student-run organizations to take charge of greening their campuses.

Student-funded grant programs have been quite successful—Oregon’s April 2005 student ballot measure, for example, passed by an 80% majority—because the burden on individual students is minimal—just a few dollars per semester. In some cases, the funds were put toward highly visible or experimental initiatives that likely would have had no hope of getting through the university bureaucracy, such as green student residence competitions, solar and wind power installations, and composting systems.

Of course, student-funded programs cannot generate the kinds of dollars required to make substantial upgrades to the aging, inefficient buildings on most college campuses. Even though the long-term payoff in energy and water consumption that can be achieved simply by replacing inefficient lighting systems, chillers, boilers, pumps, and motors can be significant, such comprehensive retrofit programs can run into the tens of millions of dollars, money that most universities don’t have at their immediate disposal.

To fund major retrofits, some universities are turning to *performance contracting*. This model requires little or no upfront cash from the institution. Instead, the upgrades are financed, designed, built, and managed by a third-party energy service contractor, known as an “ESCO.” The ESCO puts together a fixed-sum contract with a specific payback period (up to 20 years) based on the project’s scope and potential utility savings. The ESCO takes on the burden of managing the energy costs of the project and makes its money from the energy savings it achieves for the institution. Once the term of the contract has been fulfilled, the university assumes operation and maintenance of the system and accrues the utility savings directly.⁶

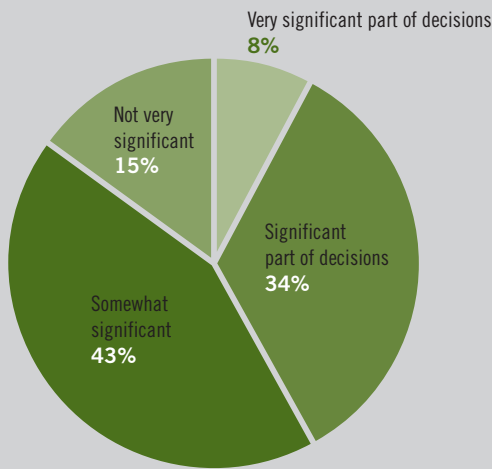
Although it could be argued that it would be cheaper in the long run for institutions to buy and run the systems themselves, many cash-strapped colleges and universities are turning to performance contracting as a way to get their utility systems upgraded quickly, without having to go the capital improvements route.

Other less common funding concepts that have potential include:

- Tax-exempt lease-purchase agreements. Here,

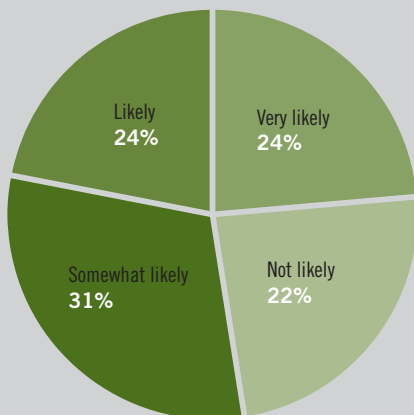
⁶“Innovative Financing Solutions: Finding Money For Your Energy Efficiency Projects,” U.S. Environmental Protection Agency, November 2004. www.energystar.gov/ia/business/COO-CFO_Paper_final.pdf

To which degree do you take 'sustainability' into account when deciding upon products, equipment and systems? 9.4



Source: Martin Akel & Associates, May-June 2006

Would you consider applying for LEED certification for future construction and renovation projects? 9.5



Source: Martin Akel & Associates, May-June 2006

Highlights of the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects

9.6

Sustainable Sites

Site Selection (SS Credit 1)

Selection of a site for multiple buildings—especially one that is developed over a long period of time—will require effective site layout and planning to be sure all buildings meet the requirements.

Development Density & Community Connectivity (SS Credit 2)

Typical programmatic requirements for a campus, such as common green spaces and outdoor recreation spaces, will decrease average density. Yet they provide important functions and quality of life to a campus. Therefore, these types of required, programmed, low-density outdoor land uses can be added to the list of exceptions in LEED-NC.

Site Development—Maximize Open Space (SS Credit 5.2)

Open space does not have to be contiguous to the buildings to which it is accredited. Open space may be aggregated and set aside as a larger plot of land. The land must be in a natural state or returned to a natural state; quads and playing fields do not count toward attaining this credit.

Water Efficiency

Water Efficient Landscaping (WE Credit 1)

If there are multiple buildings in the project scope, enter aggregate data. While consistency in site boundaries is required, the initial flexibility in site boundary selection and building clustering options allows for enhanced opportunities for sharing captured or reusable water.

Innovative Wastewater Technologies (WE Credit 2)

When the site has more than one building, a weighted average of the site buildings, based on square footage, must be used to meet the requirements of the credit. Opportunities of scale may also allow more effective use of rain harvesting techniques or innovative and economical waste treatment technologies for the buildings on the site. Options include packaged biological nutrient removal systems, constructed wetlands, and high-efficiency filtration systems.

Water Use Reduction (WE Credit 3)

Because of the varying occupant numbers in some types of campus buildings (including students, staff, and visitors) an alternative method of calculating this credit may be used. Rather than basing the calculations on the number of occupants, water use may be based on the total number of each type of applicable fixture in the building and the estimated number of uses for each of these. Eyewash fountains, emergency showers, water coolers, and water fountains can be excluded from the calculation.

Energy & Atmosphere

Fundamental Commissioning of the Building Energy Systems (EA Prerequisite 1)

Each building in a project must independently meet the requirements of this prerequisite.

In the campus setting, other elements and site features associated with a building project, such as fountains, irrigation system, wheelchair lifts, "help phones," and exterior lighting systems that are not part of a building should also be considered for the commissioning process.

Fundamental Refrigeration Management (EA Prerequisite 3)

Each building in the project must meet this prerequisite. If the buildings are connected to a central chilled-water system, that system must either be CFC-free or a commitment to phasing out CFC-based refrigerants must be in place, with a firm timeline of five years from completion of the project.

Optimize Energy Performance (EA Credit 1)

Application of more-efficient combined heat and power systems and energy storage systems may be applied more effectively in the campus environment. Since the buildings are rated based upon the energy (and its cost) that crosses the building boundary, more-efficient central energy systems and thermal storage should be used as the basis of energy cost reductions in the calculation of the building's energy performance.

On-Site Renewable Energy (EA Credit 2)

A group of buildings may be evaluated on a group average, based on square footage, or each building may receive its own rating. For multiple-building submittals, campus features such as solar-powered pole lights can be applied toward this credit.

Materials & Resources

Construction Waste Management (MR Credit 2)

If there are multiple buildings in the project scope, enter aggregate data. Document salvage that occurs prior to the building's being turned over to contractors for demolition, including offering materials to academic programs on campus, such as fine arts or architectural studios.

Innovation & Design Process

Innovation in Design (ID Credit 1.1 – 1.4)

An innovation credit is warranted if activities or programs are applied to the campus as a whole, thus delivering correspondingly larger environmental benefit. Each credit should be carefully assessed and treated fairly, respective of overall site issues (e.g., pervious surfaces) versus individual building issues (e.g., roofing).

Source: USGBC

equipment and systems are leased, with payments stemming from the operations budget. At the end of the lease, the university assumes ownership of the installed systems.

- Third-party financing for renewable energy. An ESCO pays for the installation and management of photovoltaic systems, then sells the power back to the university at a long-term fixed rate (also available as a performance contract).

- Environmental “sin” taxes. Revenue for green initiatives is generated from higher fees for “environmentally detrimental” activities, such as automobile usage (higher fees for parking and vehicle stickers) and photocopying.

Creating a framework for green

While the funding shortfall is the key problem for greening-the-campus advocates, they also cite the lack of a rating system that defines what a sustainable campus is and how to achieve it, à la LEED or Energy Star or Green Globes.

In October 2005, however, the green-campus movement took a small step forward with the publication of the USGBC’s application guide for campus building projects.⁷ The guide analyzes the intent of each credit in LEED-NC 2.1 and 2.2 and interprets them for campus projects. The guide identifies opportunities to reduce the environmental impact across multiple buildings and their associated infrastructure. (See Figure 9.6.)

While it’s a step in the right direction, the application guide was never intended to be a comprehensive benchmarking tool for universities. For one thing, most of the opportunities addressed in the document apply primarily to projects that involve constructing multiple buildings in unison or planned phases—an approach that is more common with corporate, government, and military institutions than with universities. Moreover, the guide covers only new construction: the vast majority of campuses need to put the emphasis on renovating their old buildings.

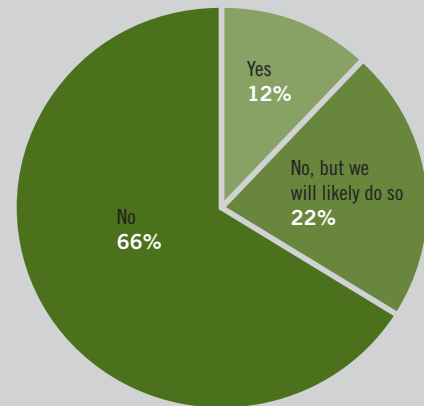
Finally, many leaders in campus sustainability would like to see a more comprehensive approach to sustainability, one that incorporates everything from facilities to curriculum to food service to community outreach. Such a system may soon be in the works.

In early October, members of the Higher Education Associations Sustainability Consortium, an industry group comprised of 13 university trade organizations, green lighted the development of a LEED-type rating system tailored specifically for university campuses.

The HEASC proposal was drafted by staff members at AASHE, which ultimately will be charged with hosting and maintaining the rating system. The proposed

Does your institution currently use 'eco-friendly' as part of its marketing efforts to students, faculty, alumni or the local community?

9.7



Source: Martin Akel & Associates, May-June 2006

system includes four modules—curriculum, operations, research, and governance/institutionalization—each with a checklist of specific measures and weighted point values.

Due out in 2008, the rating system will apply to U.S. and Canadian schools. At first it will be a self-certification checklist, but it is anticipated that eventually it will permit third-party verification.

According to the HEASC, such a widely accepted rating system would:

- Help move the higher education system forward on sustainability, much as LEED has done for sustainable design of buildings.

- Provide campuses with a road map for moving in a more sustainable direction, with a common set of benchmarks and goals.

- Provide consistency over time in assessing progress toward sustainability.

- Enable meaningful comparisons across institutions.

- Provide incentives for institutions to advance sustainability in all campus sectors.

Despite overwhelming agreement to move ahead with the plan, some HEASC members have already expressed concerns about the nascent rating system: How would it evaluate an institution’s commitment to social justice? How would it weigh behavioral changes among students, faculty, and staff, or measure the success of environmental curricula?

These and other issues will surely be debated vigorously before HEASC’s rating system becomes accepted as the benchmark for sustainability in the university sector.

⁷LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects, U.S. Green Building Council, October 2005. www.usgbc.org/ShowFile.aspx?DocumentID=1097



Defining Rooftop Sustainability

In the commercial roofing industry, reflectivity has been the dominant discussion point for several years, and the Duro-Last® Cool Zone® roofing system has set the standard for single-ply roof reflectivity and the resulting energy savings. Now the term “sustainability” is receiving a lot of attention, and once again, Duro-Last is raising the bar.

What does sustainability really mean for building owners, facility managers, architects, and other specifiers? For a roofing system to be considered sustainable, it must deliver the Five E's of high-performance roofing:

- Energy – With energy costs continuing to rise, it's more important than ever to select a roof that can reduce energy use and improve a building's efficiency in any climate.
- Environment – High-performance roofing minimizes the impact on the Earth's environment throughout the roof's life, while also helping to maintain a healthy, productive environment inside the building.
- Endurance – A high-performance roof meets or exceeds performance requirements for long life: all-weather reliability; chemical, fire, and puncture resistance; and ease of maintenance and repair.
- Economics – A high-performance roof has to make economic sense, not just at the time of purchase, but also in the long run. A true economic comparison analyzes the cost of a roof throughout its life-cycle.
- Engineering – Utilizing the right materials, design, and manufacturing process is the key enabler of the other four E's, resulting in a complete, integrated roofing system that can be installed quickly and easily and performs reliably over the long run.

Sustainable roofing is one of those rare cases where there does not have to be a tradeoff between “green” and performance, or “green” and cost. Sustainable roofing systems cost less over time because they reduce energy bills, minimize environmental impact, require less maintenance, and keep the weather outside, where it belongs. Case in point: the Cool Zone roofing system is a protective, performance-enhancing umbrella that protects buildings from the elements, reduces energy requirements, enables uninterrupted facility operations, and contributes to the health and productivity of the building occupants.

When you consider the Five E's, alone and together, sustainable roofing takes on a new meaning, and one very good definition emerges: the Duro-Last Cool Zone roofing system.

To learn more about the Five E's of high performance roofing, I invite you to visit our website at <http://www.duro-last.com/coolzone/>. Also, feel free to contact me with questions or comments at 800-248-0280, or tholling@duro-last.com.

A handwritten signature in black ink, appearing to read 'Thomas G. Hollingsworth'.

Thomas G. Hollingsworth
President
Duro-Last Roofing, Inc.

10. Greener Days Ahead for K-12

¹"2005-2008 K-12 School Market for Design & Construction Firms," ZweigWhite Research, Natick, Mass., June 2005. www.zweigwhite.com/cgi-local/SoftCart.exe/bookstore/line-min-tel.asp?Laa0019820

²"Estimating Undergraduate Enrollment in Postsecondary Education Using National Center for Education Statistics Data," National Center for Educational Statistics, March 2005. <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005063>

³"Coming Up Short: 35th Annual M&O Cost Study," American School and University, Agron, J. April 2006. http://asumag.com/mag/university_challenging_times/

Every school day more than 50 million children and six million adults enter our public schools. Of the nation's 95,000 public elementary, middle, and high schools, nearly half—45%—were built between 1950 and 1969, according to market research firm ZweigWhite, Natick, Mass.¹ Yet even as the stock of K-12 schools ages and declines, school enrollments keep climbing and will continue to do so through 2012, according to the National Center for Education Statistics.²

The expansion of the national student population, coupled with longer operating hours and more after-hours and community-based programs at K-12 schools, is pushing the consumption of energy in schools ever higher. A recent study by *American School*

and *University* estimated that the median U.S. school district spends \$492,163 a year for utilities and \$94,000 a year for custodial maintenance, equipment, and supplies. Gas and electricity account for more than 82% of the total utility spending for school districts.³

To get control over these costs, some school administrators have begun to turn to sustainable design and construction for their new and renovated facilities. Sustainable features employed by the first wave of green schools have proven to be able not only to reduce the annual utility and operations costs by an average 30%, but also to perhaps contribute to the creation of healthier and more productive environments for students, teachers, and staff.

Nonetheless, many school boards still only look at

Analysis of 30 green school buildings for cost premium, energy savings, and water savings

10.1

School buildings	State	Year completed	LEED level	Cost premium	Energy savings	Water savings
Canby Middle School	Ore.	2006	Gold	0.00%	47%	20%
Williamstown Elementary School	Mass.	2002		0.00%	31%	
Woodward Academy Classroom	Ga.	2002	Silver	0.00%	31%	23%
Ash Creek Intermediate School	Ore.	2002	Certified	0.00%	30%	20%
Woodward Academy Dining	Ga.	2003	Certified	0.10%	23%	25%
Clackamas	Ore.	2002	Silver	0.30%	38%	39%
Wrightsville Elementary School	Pa.	2003	Silver	0.40%	30%	23%
The Dalles Middle School	Ore.	2002	Silver	0.50%	50%	20%
C-TEC	Ohio	2006	Silver	0.53%	23%	45%
Summerfield Elementary School	N.J.	2006	Gold	0.78%	32%	35%
Blackstone Valley Tech*	Mass.	2005		0.91%	32%	12%
Newton South High School	Mass.	2006	Certified	0.99%	30%	20%
Ashland High School*	Mass.	2005		1.91%	29%	
Crocker Farm School	Mass.	2001		1.07%	32%	62%
Clearview Elementary	Pa.	2002	Gold	1.30%	59%	39%
Melrose Middle School	Mass.	2007		1.36%	20%	20%
Whitman-Hanson	Mass.	2005		1.50%	35%	38%
Twin Valley Elementary	Pa.	2004	Silver	1.50%	49%	42%
Third Creek Elementary	N.C.	2002	Gold	1.52%	26%	63%
Model Green School	Ill.	2004	Silver	2.02%	29%	35%
Dedham*	Mass.	2006		2.89%	29%	78%
Prairie Crossing Charter School	Ill.	2004	Silver	3.00%	48%	16%
Washington Middle School	Wash.	2006	Gold	3.03%	25%	40%
Woburn High School	Mass.	2006		3.07%	30%	50%
Capuano	Mass.	2003	Certified	3.60%	41%	30%
Danvers*	Mass.	2005		3.79%	23%	7%
Berkshire Hills*	Mass.	2004		3.99%	34%	0%
Punahou School	Hawaii	2004	Gold	6.27%	43%	50%
Lincoln Heights Elementary School	Wash.	2006	Silver		30%	20%
Willow School Phase 1	N.J.	2003	Gold		25%	34%
AVERAGE				1.65%	33.40%	32.10%

Source: Capital-E Group, "The Costs and Benefits of Greening America's Schools," 2006.

Data supplied by the architects except for *—from Doug Sacra, HMFH Architects, November 2005.

capital budgets for financing new buildings and major renovations, without necessarily considering long-term operations and maintenance savings. Meanwhile, facilities professionals, who have to live within those O&M budgets, often find themselves left out of the discussion.

A 2005 survey by Turner Green Building of 665 senior executives involved in K-12 design and construction found that an overwhelming 74% cited “higher construction costs” as the biggest obstacle to green educational facilities⁴ (chart 10.3). The Turner survey also found that most school districts do not take into account the long-term costs of a project. Only half the executives involved with K-12 facilities said that school districts typically considered such costs over time. Only 7% said that total life cycle costs were given more emphasis in planning than initial project costs.

Earlier surveys taken among members of the Association of School Business Officials, the Council of Educational Facility Planners International, and the National School Boards Association indicated that an increased interest and attendant confidence in the ability to successfully implement green design strategies is offset by the reality of tight budgets and a host of competing priorities that vary with urban, suburban, and rural school districts.⁵

Fears among school officials that green schools would run up extra construction costs have been somewhat mitigated by empirical evidence. The nation’s first LEED-certified middle school, completed in December 2004, was the 1,000-student, \$24 million, 180,000-sf Homewood Middle School near Birmingham, Ala. Designed by local architecture firm Giattina Fisher Aycock, the school achieves 38% energy savings and 40% water savings over the building it replaced. Ninety-five percent of its interior space is daylight.

“Small cooling fans, fewer conduit runs, smaller diameter cabling, all of these add up,” said Chris Giattina, principal-in-charge of the project. “We found that at about the 30% savings range, many of the initial extra costs just disappear.”

Recent research supports this finding. A study by the Capital E Group that looked at 30 LEED-certified green schools in nine states found that the typical “green premium” for a school building, based on the average national school construction cost of \$150/sf, is 1-2%, with an average premium of 1.65%, or about \$3 per sf. Four of the schools in the study cost no more to build than conventional design, while one school, the LEED-Gold Punahou School in Hawaii, cost 6.3% more (table 10.1).⁶

“The range of premium did not show much fluctuation except for outliers like the LEED-Gold school in Hawaii,” said Greg Kats, the Capital E principal who

Financial benefits of green		10.2
Schools		(\$/sf)
Energy		\$9
Emissions		\$1
Water and wastewater		\$1
Increased earnings		\$49
Asthma reduction		\$3
Cold and flu reduction		\$5
Teacher retention		\$4
Employment impact		\$2
Total		\$74
Cost of greening		\$3
Net financial benefit		\$71

Source: “The Costs and Benefits of Greening America’s Schools,” Kats, 2006.

authored the study. “We did see a lot of variance in the energy and water savings. The averages were both around 33%, but we did see some individual schools with 78% water savings and one with 59% energy savings.”

Offsetting the \$3/sf premium for building green schools are other long-term benefits of green schools amounting to \$71/sf, according to the study. Kats calculates a value of \$9/sf in energy savings and \$1/sf for

⁴“2005 Market Barometer,” Turner Construction, June 2005. www.turnerconstruction.com/greenbuildings

⁵“Estimating Undergraduate Enrollment in Postsecondary Education Using National Center for Education Statistics Data,” National Center for Educational Statistics, March 2005. <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005063>

⁶“The Costs and Benefits of Greening America’s Schools,” Greg Kats, Capital E. Group, September 2006. www.cap-e.com

Obstacles to the construction of green educational facilities		10.3
Percent of executives rating factor as very or extremely significant obstacle		
High construction costs		74%
Lack of awareness of benefits		67%
Short-term budget horizons		57%
LEED documentation/cost		55%
Difficulty in quantifying benefits		53%
Payback too long		50%
More complex construction		31%
Increased operating costs		23%

Source: Turner Construction K-12 Market Barometer, 2005

Groups influencing the decision to build green K-12 facilities		10.4
Percent of executives rating group as very or extremely important		
Superintendent		77%
Board of education		76%
Private architects, engineers, consultants		60%
District business/financial staff		56%
District facilities staff		44%
State government		31%
Parents, residents		27%
Town/county government		19%
Teachers		16%
Nonprofit organizations		10%

Source: Turner Construction K-12 Market Barometer, 2005

water and wastewater conservation, which seem reasonable and probably would be accepted by even skeptical school officials considering a budget for a green school. He adds another \$1/sf for reduced emissions—again, reasonable—for a total \$11/sf of environmental benefits.

In setting a value for the health benefits of green schools, Kats cites various studies to indicate that a sustainably designed school would result in a benefit of \$3/sf from reduced incidence or exacerbation of asthma and \$5/sf for cold and flu reduction. Even if these are discounted by half (to \$4/sf total), they would still outweigh the average \$3/sf construction cost premium.

Kats reaches farther out on a limb in assigning \$4/sf in benefits for teacher retention, although some dollar value in staff recruitment and retention might be attributable to a school's sustainable qualities; whether it is \$4 or some other figure is debatable. Two dollars per

square foot is also ascribed for “employment impact,” having to do with job creation in the community. Well, maybe.

By far the biggest benefit, \$49/sf, supposedly comes “increased [lifetime] earnings” of the students attending green schools. Presumably as a result of this enhanced environment, these students will achieve higher test scores than their counterparts elsewhere, go on to college (and better ones at that) at a greater rate, and ultimately make more money over the course of the first 20 years of employment. Believing this, however, may require too great a stretch of the imagination for the average school board member.

Even with its shortcomings, the Kats school study makes a strong case that greening a school need not result in excessive additional cost—in practice, with an experienced Building Team, there should be no cost premium—and that there are probably enough ad-

⁷“*Windows and Classrooms: A Study of Student Performance and the Indoor Environment*,” Heschong Mahone Group, 2003. <http://222.b-m-g.com/projects/daylighting/summaries%20on%20daylighting.htm>

⁸“*Green Schools: Attributes for Health and Learning*,” National Research Council of the National Academies, September 2006 (draft). www.nap.edu.

Do green schools aid student health and performance?

Do high-performance schools have a positive impact on the health of students, teachers, and staff? Do green schools enhance student learning, as well as teacher performance?

These questions have been haunting design professionals and school officials since the earliest days of the green building movement. Unfortunately, there has not been a great deal of solid scientific evidence to resolve these questions.

Some of the earliest research on one aspect of design and student performance—lighting and daylighting—was done by the Heschong Mahone Group, a California-based consulting firm for building energy efficiency. In 1999, researchers led by HMG principal Lisa Heschong found that students in classrooms with the most daylight showed an improvement in learning rates of as much as 26% in reading and 20% in math compared to students in classrooms with the least amount of daylight. They also did as much as 25% better on standardized tests.

In 2003, HMG performed another daylighting study that confirmed the 1999 results and also took into account other IEQ factors, such as ventilation, surface coverings, views of outdoors, and indoor air quality. The 2003 study also found that views of the outdoors, particularly views of nature or human activity, support better outcomes of student learning.⁷

For the last few years, the Heschong Mahone studies have been pretty much the only documentation that Building Teams have been able to use in making the case to school districts to green their schools—which is why we advocated, in our 2004 “Progress Report on Sustainability,” for the National Research Council to conduct a study examining any linkages between green schools and student test scores, reduction in asthma, and other benefits.

We can now report that the NRC is about to issue such a study, entitled “Green Schools: Attributes for Health and Learning.”⁸ A blue-ribbon committee of 14 scholars (chaired by John D. Spengler of the Harvard School of Public Health, with Vivian E. Loftness of Carnegie Mellon University as vice chair) reviewed hundreds of peer-reviewed scientific papers to determine the effects of green schools on student and teacher health, learning, and productivity.

The researchers faced “significant challenges” in compiling the \$330,000, 164-page report (in final draft as this White Paper was going to press), notably the lack of a clear definition of what constitutes a green school, variations in current green school guidelines, and the difficulty of measuring educational and productivity outcomes, particularly since school officials are loathe to permit research on students or teachers.

The NRC committee developed numerous recommendations for encouraging green school construction, among them:

- Building system performance: Place greater emphasis on building systems, their interrelationships, and overall performance.
- Moisture and mold: Control excess moisture, dampness, and mold to safeguard the health of children and adults in schools and protect the building's structural integrity. Research should be conducted on the moisture resistance and durability of materials used in school construction.
- HVAC: Ensure that, at minimum, ventilation rates in schools meet current ASHRAE standards; give consideration to planning for ventilation systems that can be easily adapted to meet evolving standards for ventilation rates, temperature, and humidity control.
- Lighting: Encourage the design of lighting systems based on task, school room configuration, layout, and surface finishes.

ditional “soft” benefits related to health, human resources, and community values that it would be foolish not to choose green (chart 10.2). That alone makes this most recent Kats study another valuable contribution to the literature of green building.

LA schools: an example to the nation

As of this past September, 231 K-12 projects were registered with the U.S. Green Building Council’s LEED program, and many more unregistered projects with sustainable components were in design or under construction.

Perhaps the biggest success story by far is the Los Angeles Unified School District’s Collaborative for High Performance Schools (CHPS, known as “Chips”), which has delivered 57 green schools in the last four years, with 10 more in the works.

The LAUSD is gigantic—947 campuses and centers to accommodate K-12 enrollment of roughly 720,000, with another 160,000 adult, occupational, and other students. Yet until just a few years ago, there had been practically no construction for a quarter century, with no major expansion since the end of World War II. The exploding enrollment that necessitated 1997’s California Proposition BB and a succession of state and local bond issues required a plan to accommodate 150,000 additional students.

In 2001, architects, engineers, environmental scientists, project managers, and energy professionals were able to persuade the LAUSD board to voluntarily enact a CHPS rating system that would consider key environmental factors:

- Maximum efficient use of daylighting
- Optimizing thermal, visual, and acoustic comfort
- Reduction of heat islands through shading and lighter paving materials
- Improved management of stormwater runoff
- Incorporation of high-performance HVAC systems
- Use of the greatest possible recycling in both construction and demolition of all new school buildings planned for the district.

CHPS uses a pass/fail system: passing is 32 out of 81 points on a sustainability scorecard. Massachusetts has modeled its green school certification system on CHPS. Maryland, Pennsylvania, and New Jersey have passed laws encouraging school districts to pursue sustainable design through financial incentives for implementation of LEED principles.

The LAUSD will build 150 new buildings by 2010, the majority of which will meet the CHPS program standards. CHPS goals exceed California’s mandated energy-efficiency guidelines under Title

24 by at least 10%; in fact, the new schools are expected to save 30-40% in energy costs.

LEED for Schools on the way

The USGBC has completed its first round of public comment on a new LEED for Schools rating system and will conduct a second round in late November.⁹ It is expected to be released to the public (without going through a formal pilot period) on February 1, 2007, according to Lindsay Baker, LEED for Schools program coordinator with the USGBC.

While the draft rating system of LEED for Schools is based primarily on LEED-NC, it goes beyond LEED-NC in addressing such issues as classroom acoustics, master planning, daylighting, and mold prevention. LEED for Schools covers new construction and major renovations. Baker said the USGBC is confident that its system will be appropriate for the schools market.

“We want to help school districts across the country better understand the business case for building green and to help them implement those goals through a third-party certification program,” said the USGBC’s Baker.

⁹“LEED for Schools for New Construction and Major Renovations Draft for Public Comment,” USGBC, August 2006. www.usgbc.org/ShowFile.aspx?DocumentID=1752.

Five attributes of a green school

In “Green Schools: Attributes for Health and Learning,” the National Research Council described a number of attributes of a green school that support student and teacher health, learning, and productivity.

- 1 **Dryness:** Excessive moisture, which has been associated with adverse health effects, particularly asthma and respiratory diseases, is not present.
- 2 **Good IAQ and thermal comfort:** Ventilation rates, air pollutants, humidity levels, and temperature ranges, which have been linked to human health, learning, and productivity, are effectively controlled.
- 3 **Quietness:** Acoustical quality, which has been shown to affect student learning and the development of language skills, meets ANSI standard 12.60, “Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools.”
- 4 **Well-maintained systems:** Building systems are commissioned to ensure that they perform as intended, and their performance is monitored over time. Routine preventive maintenance is implemented throughout the school’s service life.
- 5 **Cleanliness:** Surfaces are disinfected to interrupt the transmission of infectious diseases; measures are implemented to help control indoor pollutants that have been associated with asthma and other respiratory diseases.

For a detailed breakdown of the latest LEED for Schools draft visit www.bdcnetwork.com/article/CA6388989.html.

Source: “Green Schools: Attributes for Health and Learning,” National Research Council, September 2006 (draft).

11. Healthcare's Case for Green

Once considered the lost sheep of the sustainable design movement, the \$35 billion healthcare construction industry has made significant strides toward the greening of hospitals and other healthcare facilities during the past few years.

As many as 225 healthcare construction projects, representing more than 40 million sf of hospital space, are being designed and built with some level of sustainability. In August, the U.S. Green Building Council certified its sixth LEED-rated healthcare facility (there was just one in 2004), and as many as 132 healthcare construction projects are currently registered with the USGBC for LEED certification, more than triple the amount in 2004. The first LEED Gold hospital was certified this year, proving that, despite healthcare's complicated and costly construction model, hospital buildings can meet the highest standards of sustainability.

Another sign of progress is the overwhelming success of the Green Guide for Health Care (GGHC), a self-certifying, LEED-type system that covers both construction and operations. Since its launch in October 2004, GGHC has registered 105 pilot projects and gained more than 9,500 active users (see chart 11.1).

Still, the unfortunate reality is that the healthcare industry lags far behind most other major building sectors when it comes to green buildings. Hospitals make up less than

3% of the total number LEED-registered projects; the healthcare sector is outpaced by other institutional sectors, such as university projects (7%) and schools (5%).

The business case for green hospitals

Perhaps no other building type has more to gain from applying sustainable practices than do hospitals.

Each year, more than two million people admitted to hospitals become sick (or sicker) as a result of their stay, adding \$4.5 billion in excess costs to the healthcare system. Even worse, 90,000 of those patients will die from sepsis, pneumonia, and other nosocomial infections, according to the Centers for Disease Control and Prevention.

As healthcare organizations come to grips with the ghastly rate of hospital-borne infection, many are applying the principles of sustainable design to help ensure the wellness and safety of patients and staff. The use of antimicrobial surfaces and ultraviolet germicidal irradiation are just two of many approaches being employed to maintain infection-resistant environments.

From an operational perspective, the average healthcare facility uses 2.1 times more energy/sf than the typical commercial office building, and is second only to fast-food restaurants in energy consumption/sf.¹ These facilities must operate 24/7/365 and are packed with energy- and water-gobbling equipment and systems. Moreover, hospitals are predominantly owner-occupied and are designed for 50-year lifespans.

Hospitals that are investing in reducing energy and water consumption, as well as in cutting waste, are experiencing almost immediate paybacks. Institutions that have applied even the most basic, economical utility conservation measures, such as lighting refits, HVAC upgrades, and low-flow water fixtures, report annual utility savings of \$100,000 or more. When translated into a hospital's budget at current average operational profit margins, those cost savings are the equivalent of nearly \$3 million in new revenue.²

In the dog-eat-dog world of healthcare, sustainability is also about staying competitive and creating a market differentiator in an often overcrowded marketplace. In its first two months of operation, Providence Health Systems' new LEED Gold-rated medical center near Portland, Ore., has received a 99% patient-satisfaction rating (PHS average: 70%), with patients specifically citing abundant daylight, fresh indoor air, and upbeat hospital staff as positives. "Those people say they would recommend our facility to their family and friends," says Larry Bowe, CEO of PHS. "I love to hear that."

For an industry that has notoriously high turnover

¹"Commercial Buildings Energy Consumption Survey," Energy Information Administration, 2003. www.eia.doe.gov/emeu/cbecs

²"Greening Health Care Facilities: A CEO's Perspective," Green Guide for Health Care Newsletter, May 2006. www.ggbc.org

³"Value-Driven Design and Construction: Enriching Community Benefits Through Green Hospitals," Robin Guenther, Gail Vittori, Cynthia Atwood, September 2006. www.healthdesign.org/research/reports/documents/CHD_GuentherVittoriAtwood_edit_v2.pdf

Breakdown of Green Guide for Health Care pilot projects 11.1				
Project Type				
	Number of pilots	Average project size	Average construction credits	Average operations credits
Acute care	63	394,400	29	16
Medical office building	17	99,000	33	18
Retirement	8	125,500	33	14
Specialty hospital	17	165,200	34	26
Construction Type				
Addition	14	111,700	22	18
Combination	23	272,000	34	16
New	56	330,300	33	18
Operations	1	507,000	0	17
Renovation	11	375,000	28	24
Size				
0-19,999 sf	11	—	29	25
20,000-49,999 sf	9	—	28	19
50,000-99,999 sf	19	—	39	19
100,000-499,000 sf	40	—	29	15
500,000-999,999sf	11	—	27	15
1,000,000+ sf	5	—	38	18

Source: Green Guide for Health Care, September 2006

rates, recruitment and retention are a compelling measurable financial benefit of sustainability. Bowe says PHS's new facility played a key role in recruiting more than 20 physicians to the area—a task that proved difficult for PHS in the past. “The green features are not the sole reason they came, but they are certainly part of the benefits package,” says Bowe.

Other progressive institutions report similar success on the recruitment front. Dell Children's Medical Center, Austin, Texas; St. Mary's Health Center, Grand Rapids, Mich.; and the BC Cancer Agency, Vancouver, all attribute improved recruitment of nurses and physicians to their new or planned green facilities.³

Overcoming the cost objection

First cost remains a major concern for healthcare organizations and a significant roadblock for implementing green strategies.

Hospitals and other healthcare facilities are inherently expensive structures, ranging from \$200/sf to more than \$700/sf in some areas, so there's often little wiggle room in capital budgets. At a time when as many as one-third of hospitals in the U.S. are losing money every year and with the cost of healthcare at an all-time high, many in the hospital executive suite are concerned about any spending that has the slightest appearance of frivolity.

Even when presented with reasonable payback periods, some hospital administrators balk at energy- and water-conservation measures because utilities typically represent a small percentage of a hospital's total operating costs (less than 1% in some cases).

Finally, some senior leaders believe that any additional funds would be better spent on new equipment or the latest technology, which would go a long way toward keeping their staff (and patients) happy. Or they'd rather spend any “extra” cash on recruitment and retention efforts.

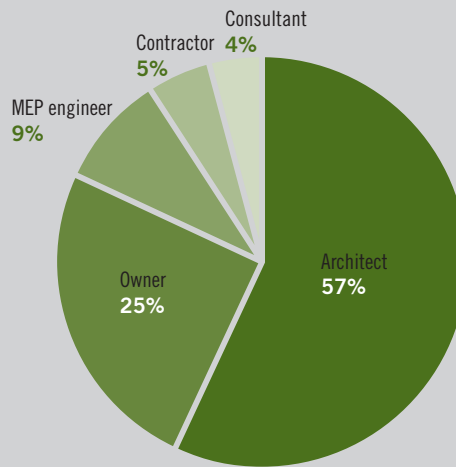
Earlier this year, Health Care Without Harm, a global industry group comprised of 443 healthcare organizations, set out to quantify first costs and other hurdles associated with sustainable design in healthcare facilities. HCWH commissioned cost-planning consultant Davis Langdon to conduct a study on the first costs associated with implementing the construction section of GGHC for new construction projects.

The final report is expected to be released this month, but preliminary findings conclude that about 40% of the Green Guide's 96 points can be implemented with little (less than 1% of total cost) or no additional cost if the Building Team employs an integrated design approach to project delivery.⁴ The report is expected to help dispel the general perception among healthcare organizations that going green means higher cost.

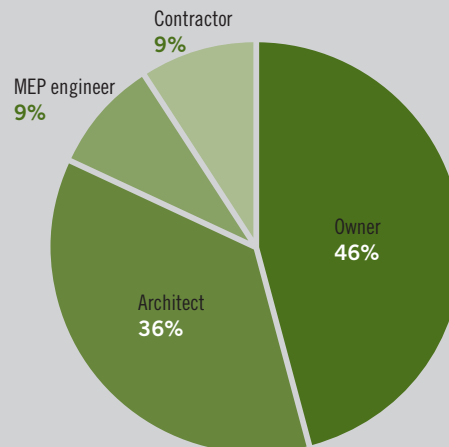
Who's leading GGHC pilot projects?

11.2

New Construction Projects



Renovation Projects



Source: Green Guide for Health Care, September 2006

Davis Langdon evaluated each point based on construction costs, “soft” costs (e.g., design costs), and documentation costs (a requirement of GGHC). According to the early findings, 23 of the 96 points can be achieved without added design and construction costs, 16 points cost less than 1% of total project cost, and only nine credits require “substantial” cost premiums (more than 2% of total project cost) from a construction standpoint.⁵ The general conclusion is that healthcare organizations can achieve a “reasonable level” of sustainability in their buildings with minimal upfront cost using integrated design.

Beyond first cost, the report cites conflicts with the strict code and regulation requirements of healthcare environments as another barrier to implementing the

⁴“The Business Case for Green Buildings,” Healthcare Design Magazine, June 2006. www.healthcaredesignmagazine.com/CleanDesign.htm?ID=5148

⁵“The Business Case for Green Buildings: GGHC Cost Study,” Lisa Fay Matthiessen, Davis Langdon, CleanMed, April 2006. www.cleanmed.org/2006/download/lisa_fay_matthiessen/lfm1.html

⁶“Understanding the Cost Implications of GGHC,” Peter Morris and Lisa Fay Matthiessen of Davis Langdon, presented at the 2006 International Conference and Exhibition on Health Facility Planning Design and Construction, American Society for Healthcare Engineering, February 2006. www.asbe.org/asbe/education/2006pdf/feb27.html

⁷“Factors Causing Variation Between the LEED Pilot and Final Checklists in Green Health-Care Projects,” Priyanka Tyagi, August 2005. www.BDCnetwork.com/article/CA6307296.html

GGHC guidelines. Issues related to infection control, security, maintenance, and regulations were noted as conflicts (actual or perceived) to sustainability. For instance, a number of study participants felt that approaches suggested by GGHC for conserving water, especially related to water used for process equipment, might conflict with infection control goals.

Respondents also noted that the GGHC credit for medical equipment efficiency (EA Credit 7) may be difficult to achieve because of limited options currently available for energy-efficient medical equipment. Most manufacturers don’t even supply information on energy usage, let alone market power-smart devices.

Other general observations, based on Davis Langdon’s research:

- Density requirements are generally easy to achieve because new hospitals are typically built on existing campuses and sited in more densely populated areas to be close to their patient populations.

- Hospitals are not likely to deliberately select a brownfield site just to meet criteria of GGHC (or LEED). The perception by some is that hospital sites need to be healthier and safer.

- The use of low-flow faucets and showerheads is becoming more common, but waterless urinals are still a tough sell (due to pushback from the maintenance staff and a perceived lack of water savings).

- Building places of respite requires a careful design approach, but is not as difficult and costly as initially perceived.

- The general trend is to include views in all patient rooms, as well as at the end of corridors. However, projects are often constrained in size, shape, and orientation by the fact that they take place on existing campuses, which can limit the options for daylight and views.⁶

GGHC has been judicious about addressing these and other concerns in updated versions of the green guide. Version 2.2, expected to be released in early 2007, will include major enhancements to the construction section based on feedback from the pilot projects, according to Adele Houghton, pilot project manager for GGHC. For instance, the new version will outline types of strategies that could be implemented to achieve the credits for Circadian Rhythm (EQ Credit 8.4) and Places of Respite (SS Credit 9)—two under-researched areas that are emerging as important to better patient outcomes.

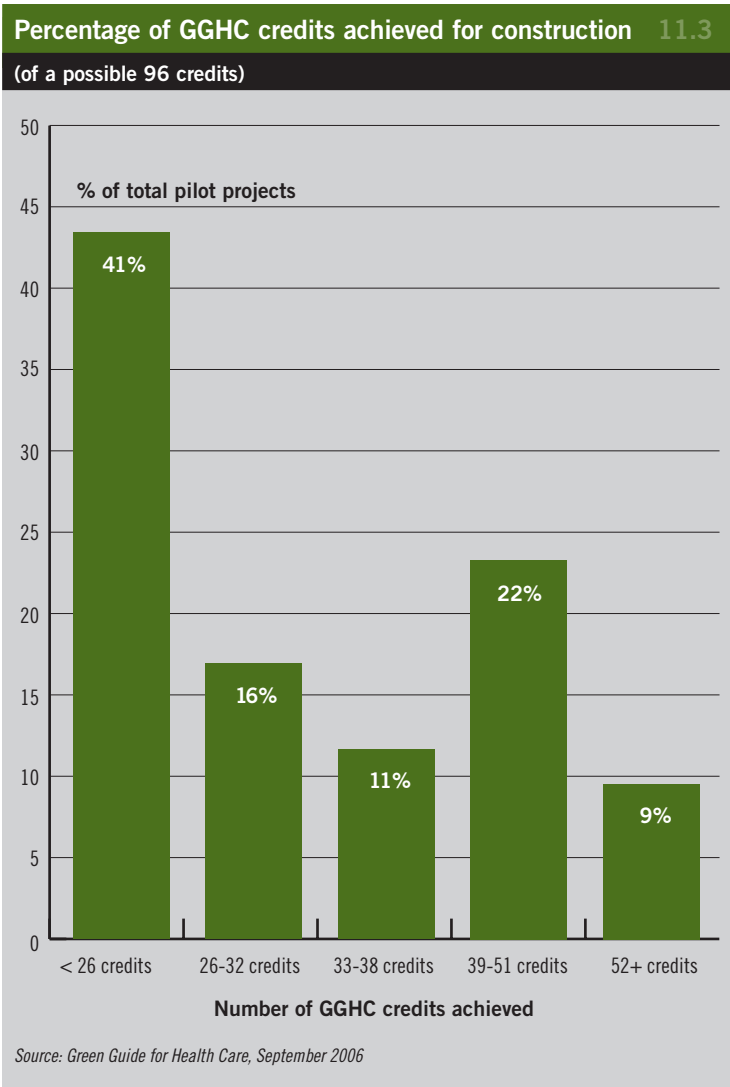
“These credits are not quite as verifiable or justifiable as some of the other credits that were derived from LEED,” says Houghton. “We’re a performance-based tool just like LEED, but you have to give enough benchmarks and protocols to give people an idea of when they’ve met the intent of that credit.”

Looking for a LEED benchmark

Despite the continued success of GGHC, some experts believe that sustainability will not reach critical mass in the healthcare sector until the long-awaited LEED Application Guide for Healthcare is published.

Because GGHC is completely self-certifying and does not actually verify the “greenness” of facilities, the healthcare sector lacks a basic standard for sustainability. Having such a verifiable benchmark and rating system will allow healthcare organizations, states, and municipalities to set environmental standards and mandates for their healthcare buildings, much like what has happened with government buildings, schools, and commercial offices.

The LEED program may fill that void, but hospital-chain owners have long complained that LEED is not healthcare-friendly.⁷ It remains to be seen whether the LEED application guide, due out in mid-2007, can rectify that situation.



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The Alliance chooses to be a neutral source of information and practical solutions for high performance, green buildings. Our efforts support credible research in the field of sustainability, which we believe is critical for the advancement of the built environment. The Alliance also creates strategic partnership with organizations that share our passion for sustainability and our goals to educate and foster best practices.

The members of the Alliance are committed to helping themselves and other organizations construct and operate sustainable facilities so that we as a world business community preserve our future growth opportunities. Our goal is to inform decision-makers at every level that the choices they make in regard to their facilities can be both economically and environmentally sustainable.

Separately, each member organization has the ability to deliver a piece of the sustainable built environment puzzle. Together, we can deliver a comprehensive package of sustainable solutions to a broad base of people in the built environment, helping an ever-growing number of facilities become healthier, safer and more productive workspaces that lessen their impact on the natural environment.

Find out more ways to gain support, prioritize, implement and communicate your sustainable efforts by visiting our Web site at www.greenerfacilities.org

The Alliance for Sustainable Built Environments is proud to be the sustainability education and solutions partner to the International Facility Management Association, a member of the U.S. Green Building Council, and a supporter of the World Green Building Council and the Association of College Unions International.

If you are interested in getting involved with the Alliance or would like support to reach your sustainability goals, please contact us at 866.913.9473 or info@greenerfacilities.org.

Craig Zurawski
Executive Administrator

JOHNSON
CONTROLS



forbo

PHILIPS



JohnsonDiversey



MILLIKEN

12. The Greening of Government

Government at all levels—federal, state, and local—has become increasingly active in green building in the last couple of years, with financial consequences for the AEC industry and the real estate sector.

EPAct: Tax breaks for going green

At the national level, the most significant bottom-line event was the passage of the Energy Policy Act of 2005 (EPAct), which grants tax benefits to building owners, developers, and homeowners for making energy-saving improvements to their properties.

It should be noted that these tax breaks expire at the end of 2007, which will make it difficult for many owners and developers to take advantage of them in time—unless, of course, Congress extends the law. Among the incentives that benefit commercial development:

- The **Energy Efficient Commercial Buildings Tax Deduction** allows a deduction of \$0.30-\$1.80/sf for commercial buildings that reduce total energy and power consumption by 50% or more above ASHRAE 90.1-2001 standards.

- The **Business Energy Tax Credit** provides a credit of up to 30% of expenditures for solar technolo-

gies, fuel cells, and solar-hybrid lighting, and up to 10% of the cost to install microturbines and geothermal systems. Incentives are capped at \$500 per 0.5kW for fuel cells and \$200 per kW for microturbines; no maximum is specified for other technologies. Applies to buildings placed in service from 1 January 2006 through 31 December 2007.

- The **Modified Accelerated Cost-Recovery System** allows commercial and industrial businesses to recover investments in certain technologies, such as photovoltaics, wind power, and fuel cells, through depreciation deductions. Solar, wind, geothermal, fuel cells, microturbines, and solar-hybrid lighting are classified as five-year properties.

White House turns green

On the policy side, 2006 was noteworthy for the convening of the first White House Summit on Federal Sustainable Buildings, held 24-25 January.

The highlight of this event, which was organized by the Office of the Federal Environmental Executive, was the signing of a “memorandum of understanding” by 17 federal agencies and departments. These are the entities that have responsibility for building or managing 85-90% of federal space for offices, embassies, government labs, and other facilities.

The MOU on sustainability provides a set of guidelines by which these federal agencies must interact with regard to “high-performance” and “sustainable” buildings. (The term “green” was not used in the MOU.) It commits the 17 signatory agencies and departments to:

- 1) Employ integrated design and commissioning in major construction and renovation.
- 2) Cut energy costs by 30% vs. ASHRAE 90.1-2004 and provide measurement and verification.
- 3) Protect and conserve water (20% less than under the Energy Policy Act of 1992).
- 4) Enhance IEQ (thermal comfort, moisture control, daylighting, low-emitting materials).
- 5) Reduce the environmental impact of materials (10% post-consumer recycled content, bio-based content, reduce construction waste at least 50%, eliminate ozone-depleting compounds).¹

Also at the Federal Summit, the Office of Management & Budget released the first rigorous “green” metrics required under several Clinton-era Executive Orders. Agencies and departments now get annual “scorecards,” much like an accounting audit, from the OMB on energy, transportation, and environmental performance. They take these ratings seriously.

From a financial perspective, the summit reinforced

¹“Federal Leadership in High Performance and Sustainable Buildings: Memorandum of Understanding,” 24 January 2006. www.BDCnetwork.com/contents/pdfs/bdc012606G-Bmoufinal.pdf.

For more on the White House Summit, go to: www.BDCnetwork.com/article/CA6303233.html?text=white+house

²“Sustainable Building Rating Systems: Summary,” K.M. Fowler and E.M. Rauch, Pacific Northwest National Laboratory (USDOE), July 2006. www.usgbc.org/ShowFile.aspx?DocumentID=1915

³“Green Building Rating Systems: A Comparison of the LEED and Green Globes Systems in the U.S.,” Timothy M. Smith, Miriam Fischlein, Sangwon Sub, and Pat Huelman, University of Minnesota, September 2006.

Federal initiatives

11.1

USDA Forest Service

Requires LEED Silver for all office buildings, visitor centers, research facilities, and climate-controlled warehouses 2,500 gsf or larger.

Department of Interior

Signed Memorandum of Understanding with USGBC and GSA supporting LEED-EB for its buildings and LEED for all partnered projects.

Department of State

Committed to meeting LEED on all new embassies worldwide over next 10 years.

Environmental Protection Agency

New facility construction and building acquisitions of more than 20,000 gsf required to meet LEED Silver. Follows LEED-CI and LEED-EB standards.

General Services Administration

Requires LEED, encourages LEED Silver. Signed Memorandum of Understanding with Interior Department and USGBC supporting LEED for all partnered projects.

U.S. Air Force

Encourages LEED for new and renovated MILCON projects.

Bonus: Developing a training course in sustainability.

U.S. Army

Adopted LEED into its Sustainable Project Rating Tool (SPiRiT); does not require LEED certification but does require Gold SPiRiT. SPiRiT to be phased out in FY 2008, and LEED Silver adopted. Will adopt LEED for Homes upon its release.

U.S. Navy

Requires all applicable projects to meet LEED; certification recommended, not required.

Source: www.usgbc.org

State initiatives

11.2

Arizona

Executive Order 2005-05 (11 February 2005) requires all new state-funded buildings to achieve LEED Silver and incorporate renewable energy.

Arkansas

Act 1770 (July 2005) asks state agencies to pursue green design, and created Legislative Task Force on Sustainable Building Design & Practices for continual review of sustainable design practices.

California

Executive Order S-20-04 (14 December 2004) requires new and renovated state-owned facilities to achieve LEED Silver.

Colorado

Executive Order D005 05 (15 July 2005) requires all state buildings to achieve LEED-EB and LEED-NC. Creates Colorado Greening Government Coordinating Council to develop and implement conservation policies.

Connecticut

Public Act 06-187 takes effect 1 January 2007 requiring new commercial construction and major renovations to meet LEED Silver or equivalent standard.

Florida

State Energy Plan (January 2006) requires all new government buildings to meet LEED certification.

Illinois

State of Illinois Capital Development Board is considering LEED requirements for public projects.

Maine

Executive Order (November 2003) requires new and remodeled state buildings to meet LEED, provided it is cost effective to do so.

Maryland

April 2005 law requires all state capital projects to meet LEED Silver or equivalent.

Bonus: Green tax credits available to commercial developers.

Massachusetts

Considering adopting LEED for state projects and green building tax credits.

Michigan

Executive Order 2005-4 (22, April 2005) requires LEED certification for all state-funded projects with construction costs of \$1 million or more.

New Jersey

Executive Order 24 (July 2002) requires all schools to incorporate LEED guidelines; LEED certification not required.

New Mexico

Executive Order 06-001 (16 January 2006) requires public buildings 15,000 sf or larger to achieve LEED Silver.

New York

Executive Order 111 (June 2001) recommends but does not require state buildings to meet LEED requirements.

Bonus: New York State Energy Research and Development Authority (NYSERDA) offers 10% increase on energy reduction incentives and loans 4% below market interest rates for any building achieving LEED or equivalent rating.

Bonus: Commercial developers incorporating LEED offered tax credits via New York State Green Building Tax Credit Program.

Nevada

AB3 (17 June 2005, 16 August 2006) requires state-funded buildings to achieve LEED certification. Each biennium, at least two occupied public buildings with construction financed by the state will be designated demonstration projects and be required to reach LEED Silver or equivalent.

Bonus: Tax abatement available for commercial developers meeting LEED Silver or equivalent. Tax exemptions offered on products and materials used in buildings meeting LEED Silver.

Oregon

A 35% Business Energy Tax Credit is available to buildings achieving LEED Silver or higher ratings. Applies to LEED-NC, CI, and CS.

Pennsylvania

HB 628 (July 2005) offers financial incentives to public school districts achieving LEED Silver. Department of Environmental Protection and Department of Conservation and Natural Resources buildings require LEED Silver. Energy efficient and renewable energy projects offered grants, loans, and near-equity investments by four state funds.

Rhode Island

Executive Order 05-14 (22 August 2005) requires public building projects to meet LEED Silver.

Washington

ESSB 5509 (8 April 2005) requires all state-funded buildings 5000 sf or larger to achieve LEED Silver. New Energy Life Cycle Cost Analysis Guidelines require all public projects more than 25,000 sf meet LEED Silver or equivalent. Community colleges, Department of General Administration, and other smaller agencies require LEED Silver standards, not certification.

Wisconsin

Executive Order 145 (April 2006) requires Department of Administration to adopt LEED-NC and LEED-EB.

Source: www.usgbc.org

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BUILDING GREEN? BUILD IT RIGHT.

The Construction Specifications Institute (CSI) is the industry organization that uniquely provides the framework for integrating the entire building team. An integrated building team provides the greatest opportunity for success in delivering green building design concepts such as the U.S. Green Building Council's LEED™ rating system.

While LEED promotes a whole-building approach to sustainability by recognizing sustainable performance goals, CSI's certificate and certification programs are widely recognized and accepted throughout the industry as providing invaluable project administrative documentation skills. These skills encompass the preparation, administration, and interpretation of construction documents for the whole building lifecycle from conception to deconstruction. In addition, CSI's certificate and certification programs provide the knowledge and expertise regarding sustainable design criteria that not only results in improved project efficiency, but can also reduce associated liabilities and costs. The CSI certificate and certifications help minimize errors and omissions and increase coordination between drawings and specifications.

The CSI certificate and certifications are:

- CDT (Construction Documents Technologist)
- CCS (Certified Construction Specifier)
- CCCA (Certified Construction Contract Administrator)
- CCPR (Certified Construction Product Representative)

When selecting sustainable building project team professionals, CSI's certificate and certification designations are additional qualifying considerations, along with LEED AP, to assure delivery of integrated whole building design strategies.

CSI has further demonstrated its commitment to sustainability through its formation of the CSI Sustainable Facilities Task Team and the subsequent development of *GreenFormat*™. *GreenFormat* is proposed as an online green product data-reporting guide and format for collecting substantiated sustainable information on construction products. *GreenFormat* is aligned with the other CSI formats such as CSI's *MasterFormat*™ 2004 and *UniFormat*™, which are also included in the tables of the emerging industry foundation classes in *OmniClass*™. *OmniClass* is the proposed electronic bridge to BIM (Building Information Modeling).

As comprehensive sustainability practices evolve, CSI continues to lead the industry in standards and formats that are adapting to the greater needs of both the building team and sustainable design. We invite you to join the on-line sustainability conversation at www.csinet.org/forums.

Sincerely,

A handwritten signature in black ink that reads "Paul R. Bertram, Jr." The signature is written in a cursive style.

Paul R. Bertram, Jr.
Vice President, Construction Specifications Institute

P.S. Visit CSI at Booth #108 to learn more about *GreenFormat*™ and CSI certification programs or visit us online at www.csinet.org.

The logo for GreenFormat features the word "GreenFormat" in a bold, sans-serif font. Above the letter "n" in "Format" is a stylized green leaf with a stem and two smaller leaves, suggesting a natural or sustainable theme.

the federal commitment to sustainability. Developers, AEC firms, real estate brokers, and others wishing to do business with these federal agencies—on a build or lease basis—had better be prepared to deliver green (that is, “high-performance”) facilities.

States and cities on the green front

State and local governments are active players in the green building movement, as the accompanying charts demonstrate. Twenty states require LEED certification or the equivalent for state buildings or projects that benefit from state funding or incentives, according to the latest count from the U.S. Green Building Council.

A number of states offer positive incentives to private-sector developers and owners for green projects. Maryland grants tax incentives. Nevada gives tax abatements for LEED Silver projects. New York and Oregon provide tax credits for energy-conserving projects. Pennsylvania offers grants and loans to commercial developers of certified green buildings.

There’s also tremendous activity at the municipal level throughout the country. While numerous cities either mandate or encourage LEED for city buildings, some of the more progressive ones have created innovative incentive programs that can yield direct bottom-line benefits for green commercial developments.

A number of cities (Chicago and Portland, Ore., among them) offer “fast permitting,” which gives green projects the green light in moving through city hall for permit approval.

Mark Palmer, coordinator of Municipal Green Building for the city of San Francisco, says Renzo Piano’s California Academy of Sciences project sped through nine oversight boards (all unanimously) in two months. “The real success story of this project was the permitting process,” he said.

In October, Chicago approved its first “paperless” green permit, for a 58-unit “safe child” residence. “The electronic plan review saved everyone time and the hassle of reviewing, signing, and stamping multiple sets of drawings—a big plus for all involved in the building permit process,” said Charlene Andreas, RA, LEED AP, of A/E firm Harley Ellis Devereaux, the designer.

Some cities (San Diego is one) offer training programs that help developers, designers, and contractors learn how to work with city staff to green their projects. Gainesville, Fla., is among several cities that reduces permit fees (50% in Gainesville’s case) for green projects.

The more mundane tax write-offs and utility rebates are also welcomed by developers and owners. Usually, though, these have a limited shelf life; once they run out, they do not add to the value of the property.

Municipal/city/county initiatives

11.3

Arizona

Phoenix

New construction must follow LEED guidelines; certification not required.

Scottsdale

Resolution 6644 (23 March 2005) requires all city buildings to achieve LEED Gold. Future renovations and non-occupied city buildings will be required to follow LEED and the city’s Green Building Program.

Tucson

Resolution 20322 (18 April 2006) requires new city construction, additions, and renovations 5,000 sf or larger to achieve LEED Silver.

California

Alameda County

County projects initiated after 1 July 2003 must achieve LEED certification (Administration Code of the County of Alameda Title 4, chapter 4.38).

Berkeley

Resolution 62,284-NS requires municipal buildings 5,000 sf or larger to achieve LEED Silver.

Calabasas

Ordinance 2003-185 (7 January 2004) requires all city and private non-residential buildings between 500 sf and 5,000 sf to meet LEED. All city and private non-residential buildings larger than 5,000 sf must meet LEED Silver.

Long Beach

Municipal construction projects 7,500 sf or larger must achieve LEED certification with an eye toward LEED Silver.

Los Angeles

All public works construction projects 7,500 sf or larger must achieve LEED. All city-funded projects must achieve LEED. New Construction projects for the L.A. Community College District must achieve LEED.

Oakland

All municipal projects with construction costs of \$3 million or more must achieve LEED Silver.

Pasadena

Commercial construction of 25,000 sf or larger, residential buildings at least four stories high, and city buildings 5,000 sf or larger must achieve LEED.

Bonus: Developers exceeding minimum certification qualify for rebates from Pasadena Water and Power.

Bonus: Developers including affordable housing within projects earn a \$1,000 tax rebate per unit.

Pleasanton

Ordinance 1873 (December 2002) requires commercial construction projects 20,000 sf or larger to meet LEED.

Sacramento

Resolution 2004-751 (21 September 2004) requires all city projects to achieve LEED. Projects 5,000 sf or larger are encouraged to seek LEED Silver.

San Diego

Public projects 5,000 sf or larger required to achieve LEED Silver.

Bonus: City’s sustainable building expedite program offers plan review and construction incentives.

Bonus: Private developers achieving LEED are eligible for green training, support, and education.

Bonus: Commercial projects achieving LEED Silver get expedited discretionary processes.

San Francisco

Ordinance 88-04 (18 May 2004) requires all municipal construction and renovations 5,000 sf or larger to achieve LEED Silver, as well as have a LEED Accredited Professional on the design team. All projects must also achieve LEED commissioning credit.

San Jose

Municipal projects 10,000 sf or larger must achieve LEED.

San Mateo County

County buildings 5,000 sf or larger must achieve LEED. Smaller projects are encouraged to meet LEED.

Bonus: County offers information on green building, and is developing a Countywide Green Building Program.

(continued on p. 55)

Source: www.usgbc.org



CFFA

CHEMICAL FABRICS AND FILM ASSOCIATION – VINYL ROOFING DIVISION

The contribution of the built environment to the urban heat island effect is growing in recognition, as is the relationship between reflective roof surfaces and lower energy consumption. Buildings with dark-colored roofs consume more energy for air conditioning than those with white reflective or “cool” roofs — a strain on both operating costs and the electric power grid. Cool vinyl roofs offer both immediate and long-term savings in building energy costs as well as contribute to mitigating the urban heat island effect.

In a 2001 federal study, “Measured Energy Savings and Demand Reduction from a Reflective Roof Membrane on a Large Retail Store in Austin,” the Lawrence Berkeley National Laboratory (LBNL) measured and calculated the reduction in energy demand associated with the surface reflectivity of a vinyl roof on a retail building in Austin, Texas.

Measurements were taken with the original black rubber roofing membrane and then after replacement with a white vinyl roof with the same insulation and HVAC systems in place. Researchers examined weather conditions on the roof, temperatures inside the building and throughout the roof layers, and air conditioning and total building power consumption.

LBNL’s findings were dramatic – the average daily summertime temperature of the black roof surface was 168 degrees F, but once retrofitted with a white reflective surface, it was 125 degrees F. In tandem with that, the reduced surface temperature of the retrofitted vinyl membrane delivered an 11 percent decrease in aggregate air conditioning energy consumption and a corresponding 14 percent drop in peak hour demand.

Without considering any tax benefits or other utility charges, annual energy expenditures were calculated to be reduced by \$7,200 or \$0.07/sq. ft. With the negligible incremental combined labor and material costs between the two systems, the payback on replacing the roof with vinyl vs. rubber was considered instantaneous.

Even in northern climates, net annual energy savings are typical and make white vinyl roofs a worthwhile investment. Cool roofs can have even more impact on energy cost than energy use, cutting consumption during peak power demand when the rates are the highest. This more than offsets any potential minimal increases in heating costs of a reflective roof.

We invite architects, engineers, building owners and roofing contractors to consult our Cool Roof Clearinghouse at www.vinylroofs.org/cool.html to learn more about the inherent energy efficiency of high reflectance-high emittance vinyl.

The members of the Vinyl Roofing Division of the Chemical Fabrics and Film Association

*Canadian General-Tower Limited
Duro-Last Roofing, Inc.
HPG International, Inc.
Sarnafil Inc.
Seaman Corporation*

That's why floor-area bonuses and tax increment financing for green projects look so appealing to developers. With increased floor-area ratio, a developer may be able to add a whole floor to a green project—space that will generate rent and value for the life of the building. Arlington, Va., has been a pacesetter in using FAR bonuses to encourage green building.

With a "green TIF," the city establishes a district where property taxes are abated for long periods (often 20-30 years) for projects that meet LEED or equivalent standards. Although there is a finite time value to the abatement, it is long enough to benefit the long-term property holder, or it can be transferred if the property is sold before the TIF period expires.

Last June, the Chicago City Council approved matching funds up to \$100,000 to put green roofs on downtown buildings. The pilot program will draw \$500,000 from a TIF in the downtown Loop. That could be enough to fund 5-10 vegetated green roofs, according to the Department of Planning and Development.

One area of concern at the municipal level, however, is the growing danger of "LEED creep." It starts with city officials requiring LEED certification for public buildings—perfectly within reason—but before long, private projects that use public funding or needing zoning or building code variances are also put under LEED mandate. Examples of LEED creep:

- Albuquerque, N.M.: A mayoral executive order (28 March 2005) sets LEED Silver for private- (and public-) sector projects using over 50kW electrical demand.

- Boston: A zoning ordinance amendment mandates LEED for all development projects over 50,000 sf.

- Calabasas, Calif.: A city council ordinance requires all nonresidential city and private-sector buildings of 500-5,000 sf to be LEED certified; private buildings more than 5,000 sf must meet LEED Silver.

- Frisco, Texas: City ordinance 04-05-41 requires all non-single-family residential developments over 10,000 sf to submit a LEED checklist.

- Los Angeles: All building projects with funding from the city must be LEED certified.

- Normal, Ill.: LEED certification required in the central business district for private new construction over 7,500 sf at ground level.

- Pasadena, Calif.: City ordinance requires new commercial buildings of 25,000 sf or more and residential construction at least four stories in height to achieve minimum LEED certified.

- Pleasanton, Calif.: Commercial projects over 20,000 sf must follow guidelines to meet LEED certified rating.

- Portland, Ore.: LEED Silver required for all private-sector developments over 10,000 sf that receive

Municipal/city/county initiatives (continued)

11.3

Santa Monica

All new city projects must achieve LEED Silver.

Bonus: Financial incentives offered to private developers achieving LEED. Expedited permitting offered to all LEED projects.

Colorado

Boulder

New and renovated city facilities must achieve LEED Silver.

Bonus: Green Points Building Program encourages sustainable home building.

Denver

All public buildings are expected to achieve LEED Silver and meet EPA Energy Star Guidelines.

Fort Collins

Resolution requires new city-owned buildings to achieve LEED Gold, where financially feasible. If incremental costs of achieving LEED Gold relative to LEED Silver have a payback period greater than 10 years, buildings must achieve LEED Silver.

Florida

Gainesville

Ordinance 1835 requires all government county buildings to achieve LEED.

Bonus: County offers fast-track building permits and a 50% reduction in building permit fees to private contractors using LEED.

Sarasota County

County government buildings required to achieve LEED.

Bonus: Fast-track permitting and a 50% reduction in building permit fees offered to private developers achieving LEED. Resolution 2006-174 (22 August 2006) provides fast-track permitting for residential and commercial developments pursuing LEED-ND or FGBC Green Development Standards.

Georgia

Atlanta

City Ordinance 03-0-1693 (December 2003) requires city-funded project 5,000 sf or larger or budgeted at \$2 million or more to achieve LEED Silver. Exempt projects are required to complete a LEED checklist.

Chatham County

Chapter 7 of the county code gives full property state and county tax abatement for any building achieving LEED Gold for five-years, then tapering off 20% each year until expiring after the tenth year.

Tybee Island

All new building must achieve LEED Silver, providing the payback period for that LEED level is five years or less. Instances where the payback period exceeds five years, LEED certification is required.

Hawaii

Honolulu

Beginning FY 2008, all new city facilities 5,000 sf or larger must achieve LEED Silver.

Illinois

Chicago

All city-funded new construction and major renovation projects must achieve LEED certification.

Cook County

All county buildings must achieve LEED certification and must earn at least eight credits in the Energy & Atmosphere category.

Normal

Ordinance 4825 (18 March 2002) requires public and private buildings 7,500 sf or larger within the Central Building District to achieve LEED on the ground level.

Massachusetts

Boston

All city-owned new construction and major renovation projects must achieve LEED Silver. City-supported development must achieve LEED. Article 80 of the Boston Zoning Code is being amended to require any new construction 50,000 sf or larger to be LEED certified.

Acton

Zoning by-law (5 April 2004) gives a density bonus for buildings achieving LEED certification.

(continued on p. 56)

Municipal/city/county initiatives (continued)

11.3

Arlington

Town by-law Title 1, Article 16, Section 4 requires all new buildings, major renovations, and additions to achieve LEED Silver.

Maryland**Baltimore County**

Bill 85-06 gives property tax credits to commercial buildings achieving LEED-NC Silver. Tax credit is for 10 consecutive years.

Bowie

Resolution R-15-03 requires all municipal projects to use LEED guidelines.

Michigan**Grand Rapids**

All new construction and renovations, and building operations must achieve LEED certification.

Bonus: Incentives for commercial developers seeking LEED certification under consideration.

Missouri**Kansas City**

Resolution 041222 requires all new city buildings to be designed to meet LEED Silver.

New Mexico**Albuquerque**

Executive Order (28 March 2005) requires city-funded projects 5,000 sf or larger and/or using 50 KW electrical demand to meet LEED Silver.

Fort Collins

Resolution requires new city-owned buildings to achieve LEED Gold, where financially feasible. If incremental costs of achieving LEED Gold relative to LEED Silver have a payback period greater than 10 years, buildings must achieve LEED Silver.

North Carolina**Chapel Hill**

Ordinance Chapter 5, Article VII requires all new construction and additions 5,000 sf or larger constructed by or for the town to meet LEED Silver. Encourages LEED guidelines for public housing.

Nebraska**Omaha**

New Metropolitan Community College projects and sites must meet LEED.

New Jersey**Cranford**

Ordinance 2005-46 (15 November 2005) requires all township-funded and-owned projects to achieve LEED Silver. The Township also adopted LEED-EB.

Bonus: An incentive program allows redevelopers achieving LEED certification to request incentives, such as a density bonus.

Princeton

Public facilities and publicly-funded projects encouraged to follow LEED.

New York**New York**

Int. 324-A (15 September 2005) requires new construction, additions, and reconstruction of city-owned buildings with construction costs of \$2 million or more to achieve LEED Silver.

Suffolk County

Resolution 1028-2006 (7 February 2006) requires the Department of Public Works projects with construction costs of \$1 million or more to achieve LEED.

Oregon**Eugene**

Resolution 4884 (10 July 2006) requires all city buildings to follow LEED-EB guidelines. New construction and additions of less than 10,000 sf are required to target LEED Silver; buildings 10,000 sf or larger are required to achieve LEED Silver. Projects not able to achieve LEED certification are required to follow LEED-NC.

public funding (including value of fee or tax waivers) totaling \$200,00 or more or 10% of total project cost.

Mayors and city councils—for that matter, govern-

GSA, LEED, and Green Globes

A year ago, Congress instructed the Administrator of the U.S. General Services Administration—the federal government's chief landlord—to report on “the progress and next steps toward recognition of other credible sustainable building rating systems within the GSA sustainable building procurement process.”

In plain language, Congress wanted to know if GSA should be using any green building rating systems other than LEED. For several years, GSA has required LEED certification (preferably LEED Silver) for virtually all its major building projects. Meanwhile, another rating program, Green Globes, had literally come online—it is a Web-based tool—and was challenging LEED.

GSA commissioned the Energy Department's Pacific Northwest National Laboratory (PNNL) to conduct a review of LEED, Green Globes, and three other programs: the British system known as BREEAM (on which both LEED and Green Globes were loosely based), a Japanese program (CASBEE), and GBTool, a complex international system. It was clear from the beginning, though, that the race for the GSA stakes was between LEED and Green Globes.

Last July, the PNNL issued its report.² The researchers found that, although Green Globes was developing tools for renovation, tenant build-out, and O&M applications, they were not fully in place for the GSA to use. They also noted that third-party verification was done online, although regional assessors were in the process of being trained. At the time of the report, Green Globes had rated four buildings, with 63 registered.

As for LEED, the researchers declared it “currently the dominant system” in the U.S., and added that “currently available LEED rating systems address all of the GSA building and project types.” LEED also had certified more than 400 buildings at the time of the report's issuance, with another 3,400 registered. “LEED is not only the U.S. market leader, but is also the most widely used rating system by federal and state agencies, which makes it easy to communicate a building's sustainable design achievements with others.”

However, the PNNL report is noteworthy for its omissions regarding Green Globes, among them:

- Green Globes has been approved as a green rating system by six states (Arkansas, Connecticut, Hawaii, Maryland, Pennsylvania, and Wisconsin) and the federal Department of Health & Human Services.
- Green Globes has certified a number of major projects in the U.S., including the Clinton Presidential Library.

ment entities at all levels—should stick to providing incentives for green buildings. More on this in the Action Plan.

■ Green Globes is based on BOMA Canada’s Go Green Plus rating system, which has certified 100 projects. Considering the relative size of the two countries, Canada’s Go Green Plus is at least comparable in numbers to LEED in the U.S. The PNNL did not consider data from Go Green Plus in its analysis.

■ Firemen’s Fund insurance company is offering the same 5% premium discount on Green Globes-certified buildings that it is giving to LEED-certified buildings.

Moreover, as the PNNL study did note, the Green Building Initiative, which is the developer of Green Globes, is the only entity in the U.S. accredited as a Standards Developing Organization (SDO) by ANSI, the American National Standards Institute. It has a 30-member technical committee that is developing Green Globes as a green building standard through ANSI’s recognized consensus process. Neither LEED nor the U.S. Green Building Council is an ANSI-accredited SDO for green building.

More recently, a study by the University of Minnesota (issued after the PNNL study was released) compared the credits in LEED and Green Globes and found that, with the exception of a “relatively small number of notable differences between systems . . . in total the systems are quite similar.” Further, “nearly 80% of the available points in the Green Globes system are addressed in LEED 2.2 and . . . over 85% of the points specified in LEED 2.2 are address in the Green Globes system.”³

All this was made moot in September, when GSA Administrator Lurita Doan notified Senator Christopher Bond, chair of the responsible Senate Appropriations subcommittee, that GSA was sticking with LEED, which “continues to be the most appropriate and credible sustainable rating system available for evaluation of GSA projects” because LEED: 1) was applicable to all GSA project types; 2) tracks the quantifiable aspects of sustainable design and building performance; 3) is verified by trained professionals; 4) has the most well-defined system for incorporating updates; and 5) is the most widely used rating system in the U.S. market.

The agency did leave an opening that could rectify this situation. In her letter to Bond, the GSA’s Doan stated that “each of the other rating systems has its merits, and we will continue to evaluate them as they develop to determine how they may be applied to GSA projects in the future.”

The GSA should reconsider its position in light of the additional information cited above and utilize Green Globes as an alternative or supplement to LEED, perhaps on an experimental basis for specific projects.

Note: Green Globes is licensed in the U.S. to the Green Building Initiative, a sponsor of this White Paper. The GBI had no editorial role in the preparation of this discussion.

Municipal/city/county initiatives (continued)	11.3
Portland	All public projects must achieve LEED Gold. All existing city-owned and occupied buildings must achieve LEED-EB Silver, with all tenant improvements required to achieve LEED-CI Silver or G/Rated Tenant Improvement Guide certification. Resolution 6262 (22 June 2005) requires private projects 10,000 sf or large that receive public funding more than \$200,000 or accounting for more than 10% of the total project costs to achieve LEED-NC Silver. Bonus: LEED-NC, CS, or CI projects achieving LEED Silver or higher are eligible for Business Energy Tax Credits. Bonus: The city developed its own LEED supplement.
Texas	
Austin	Public projects 5,000 sf or larger require LEED certification.
Dallas	All city buildings larger than 10,000 sf must achieve LEED Silver. The city is exploring ways to encourage LEED buildings in the private sector.
Frisco	Ordinance 01-05-39 (1 May 2001) created the Green Building Program for single-family residences.
Houston	Green Building Resolution 2004-15 (23 June 2004) requires all city-owned facilities 10,000 sf or large to target LEED silver.
San Antonio	Ordinance 2006-06-15-0722 (15 June 2006) approves city’s Scorecard Incentive System authorizing the reduction or waiver of development fees for projects achieving LEED-NC or LEED for Homes.
Utah	
Salt Lake City	City-owned buildings and major renovations 10,000 sf or larger must achieve LEED Silver.
Virginia	
Arlington	All commercial project site plan applications require a LEED Scorecard and a LEED accredited professional must be on the project team. LEED certification not required. All projects must contribute to a green building fund for county-wide education and outreach activities; contributions refunded for buildings achieving LEED. Bonus: Commercial projects and private development achieving LEED Silver allowed to develop sites at a higher density than conventional projects. Bonus: Sponsors voluntary Green Home Choice program. Participants earning enough points receive expedited plan review, site signs, and publicity.
Washington	
Issaquah	Developers following LEED may receive free professional consultations, and project achieving LEED certification receive expedited building permit reviews.
King County	Executive Order FES 9-3 requires new public construction projects to seek LEED, and encourages LEED criteria be followed for building retrofits and tenant improvements.
Seattle	All city-owned projects 5,000 sf or larger required to achieve LEED Silver. Bonus: Economic incentives offered to private developers incorporating LEED.
Washington, D.C.	Department of Parks and Recreation projects must achieve LEED Silver. Office of Property Management’s environmental scorecard goals integrates LEED guidelines for new public buildings and requires capital construction administration be LEED accredited.
Wisconsin	
Madison	Municipal projects budgeted at \$1 million or more and commercial and multifamily projects receiving public funding are required to meet LEED-NC. LEED-EB guidelines are being developed.

Green Building Action Plan 2006

The editors of *Building Design+Construction* respectfully offer a number of what we believe to be constructive recommendations for advancing sustainability. In the course of our research, we sought input from more than 100 stakeholders; however, the following recommendations are solely those of the editors.

We offer the following action items for consideration by our 75,150 subscribers in the \$501 billion U.S. design and construction industry and by legislators, public officials, nongovernmental organizations, the financial and real estate community, trade associations, and federal, state, and local agencies who, through their policy- and decision-making activities, play a key role in shaping the built environment. For each recommendation, we suggest organizations to champion its implementation.

We welcome your response. Please send your comments to Robert Cassidy, Editor-in-Chief: rcassidy@reedbusiness.com.

Government Pension Funds and SRI Funds

1. State and local government pension funds and so-called socially responsible investors should be encouraged to allocate a portion of their portfolios to appropriate green real estate investments.

With an estimated market capitalization of \$2.7 trillion, state and local pension funds wield enormous economic leverage and moral influence. The largest such fund, CalPERS, representing California's public employee retirees, recently set aside \$120 million from its real estate portfolio to invest in green buildings developed by Hines. CalSTERS, the third-largest public employee pension fund in the U.S., is in the process of creating a \$500 million green building portfolio with Thomas Properties Group. Their combined efforts not only will result in billions of dollars going toward sustainable projects, but will set an example for other pension funds, foundations, and private investors.

We further recommend that state and local governments encourage their respective employee pension funds to devote a portion of their investment dollars to green buildings.

Of course, we are not suggesting that states and cities forgo their fiduciary responsibility simply to support what some might consider a good cause. According to Leanne Tobias, founder of Malachite LLC and a special advisor to this White Paper, making investment deci-

sions solely on this basis would be a violation of the federal Employee Retirement Income Security Act, which requires that social objectives be subordinate to return objectives and that social investment objectives not impede the attainment of market return.

State and local government pension fund managers must be prudent in their choice of investments. Since green buildings are proving to be at least comparable to conventional buildings in terms of investment return, however, they would appear to be worthwhile candidates for inclusion in pension portfolios.

The Pension Real Estate Association, a national membership organization of institutional real estate investors, could kick off this effort through an education and research program.

In terms of socially responsible investing, the Social Investment Forum identified \$2.29 trillion in total assets under management in social and environmental investments in 2005. The University of Arizona and the Institute for Responsible Investment at Boston College are collaborating on the Responsible Property Investment Project to encourage this sector to consider green buildings as worthwhile, "socially responsible" investments.

Champions: Pension Real Estate Association; Responsible Property Investment Project; state and local governments and their employee pension funds.

Union-based Funding Sources

2. Construction union pension funds and union-based insurance companies should consider allocating a share of their assets for green buildings.

These pension funds, formally known as joint trustee Taft-Hartley pension funds, represent \$420 billion or 6% of pension fund assets. Commonly known as multi-employer funds, they are concentrated in industries such as construction, where workers often have multiple employers during their careers.

As we have seen, the Multi-Employer Property Trust

has been investing in several green projects. The AFL-CIO Building Investment Trust, a \$2.3 billion pooled real estate pension fund, has helped finance \$3 billion in commercial real estate in the U.S. since 1988; its sister organization, the AFL-CIO Housing Investment Trust, a core-plus, fixed-income investment company with \$3.6 billion in assets, has helped finance more than 75,000 housing units, including One River Terrace, in New York's "green" Battery Park project. But there are 3,500 other Taft-Hartley pension funds that should be

looking at investing in green projects.

In a similar vein, union-based insurance entities should consider financing green projects as part of their real estate allocation. For example, Union Labor Life Insurance Company, founded in 1925 with support from the American Federation of Labor, has a \$2 billion "J for Jobs" commingled pension fund that is a leading provider of construction loans. Projects include hotels, apartments and condos, mixed-use developments, R&D facilities, retail, and office buildings. ULLICO is in the

process of starting a real estate equity fund which will act as an owner/developer of commercial properties nationwide. Perhaps some of those properties could be green.

Here is another opportunity for the Pension Real Estate Association to assert leadership in research and education.

Champions: Construction trade union pension funds; union-based insurance entities; Pension Real Estate Association.

3. In-depth research should be conducted on best practices for measuring the investment criteria of green real estate.

Thanks to research by Capital E Group, Davis Langdon, and Steven Winter Associates, as well as a growing number of case studies,¹ the "first-cost premium" balloon has been burst. But that's only half the battle. Real estate investors are still looking for verifiable data on lease-up schedules, operating costs, top-tier rents, occupancy stabilization, and other financial indicators for green buildings.

While evidence of positive financial benefits of green buildings has been growing steadily, much of it has been anecdotal or limited to individual projects. There needs to be a more organized approach to quantifying and documenting the investment benefits of green real estate.

In the past year, the newly established Green Building Financial Consortium has set as its primary goal the

development of methods, practices, models, and supporting data to enable lenders and investors to make independent evaluations of the value of green buildings.

The consortium's research agenda includes assessing the knowledge base of the costs and benefits of green buildings, examining the current needs of the real estate capital markets with regard to green buildings, and developing value and risk measurement methods and practices for green buildings.²

We support this aggressive research program in the belief that it will provide valuable data and tools for the real estate investment community to use in evaluating the investment potential of green buildings.

Champions: Green Building Finance Consortium, with the Appraisal Institute; BOMA; National Association of Real Estate Investment Trusts; National Council of Real Estate Investment Fiduciaries; the Real Estate Roundtable; RICS; and the Urban Land Institute.

Investment Criteria Research

¹ See *Developing Green: Strategies for Success*, Jerry Yudelson, PE, NAIOP, 2006; "Financing, Leasing, and Investment Considerations," Leanne Tobias, in *Green Office Buildings: A Practical Guide to Development*, Anne B. Frej, ed., Urban Land Institute, 2005; "Green Value: Green Buildings, Growing Assets," RICS, 2005. www.rics.org/greenvalue.

² www.greenbuildingfc.com/Home/ResearchAgenda.aspx

4. The major risk-rating agencies, along with investment banks, commercial banks, and private equity fund managers, need to be brought into the green building picture.

The task of the major risk-rating agencies—Fitch, Moody's, and Standard & Poors—is to assess the risk features (both tangible and intangible) of investments.

Because green buildings are relatively new as investment assets, the rating agencies have not taken the opportunity to evaluate the potential reductions in risk that can be attributed to green buildings—such factors as lower energy consumption (which reduces exposure to future energy price increases), mold prevention, lower operating costs, improved indoor air quality, and benefits resulting from building commissioning.

These factors would contribute to reduced liability risk, lower default risk, less risk posed by future regulation, diminished risk of obsolescence, and other possible risk reductions that would fall under rating agency review.

For some time, there has been an effort within the

green building field (led by Market Transformation to Sustainability and Evolution Partners Real Estate Advisors, both of Washington, D.C.) to form mortgage pools of green-certified buildings on the presumption that such mortgage pools would have lower risk (and therefore higher ratings) than comparable pools of mortgages for conventional buildings. These two entities are currently working with a major investment bank in seeking an opinion letter from one or more of the rating agencies acknowledging the lower risk of green buildings.

As green buildings grow in number and become the focus of more investment pools, the risk-rating agencies will need to understand their unique attributes and benefits in order to make a valid assessment of their value for use by investment banks, commercial banks, and private equity fund managers.

Champions: Rating agencies; Evolution Partners and Market Transformation to Sustainability; investment banks; commercial banks; private equity fund managers.

Risk-rating Agencies

Green Building Incentive Programs

5. State and local governments seeking to promote private-sector green building in their localities should use the carrot, not the stick, as a motivator.

The way to get private developers and property owners excited about green building is not to hammer them with restrictions, but to create incentives that make it easier and more profitable to build green.

Speeded-up permitting, which is like giving hybrid cars access to the HOV lane, has proven to work in a number of cities, such as Scottsdale, Ariz. Chicago is putting its system online, making it even faster and less costly for green developers to get building permits. Faster construction start-up means money in the pocket for green building developers.

According to Jerry Yudelson, PE, a special advisor to this White Paper, fast permitting works best when an ombudsman or facilitator with authority to move projects through the bureaucracy is put in charge.

Cities can also grant density bonuses or added floor-area ratio to green projects based on performance. For example, sustainable developments that reduce storm-water runoff (thus reducing or even obviating the need for additional sewer capacity) could be awarded greater

density or higher FAR. The city saves on capital improvements, and the building owner enjoys an asset (more space to sell or lease) that lasts the life of the property.

Other mechanisms to encourage green building include:

- Waiver of development fees for green projects
- Technical training and support
- Property tax abatements (Nevada grants abatements up to 50% for 10 years for LEED Silver)
- Tax increment financing zones, also known as green building improvement districts

States, counties, and cities should work with the local chapters of professional societies, trade associations, and civic groups to develop green building incentive programs that make sense at the local level and add to the property tax base.

Champions: State and local governments; local chapters of the AIA, the American Planning Association, BOMA, the Construction Specifications Institute, the National Association of Industrial & Office Properties (NAIOP), the Urban Land Institute, and the U.S. Green Building Council.

Performance Review Process

6. Cities that mandate LEED certification for private-sector projects should provide an appeals process for non-certified projects that meet the required performance standards.

We have pointed out the growing danger of "LEED creep" at the local level, whereby mayors and city councils extend a requirement for LEED certification for public buildings to private projects. Nine cities, including Albuquerque, Boston, Los Angeles, and Portland (Ore.), have already made this leap. We think it's counterproductive; instead, local government would do better to provide the kinds of incen-

tives described above to encourage sustainable design and construction.

City governments should be concerned about the end result of the building projects they regulate, not the process by which they got there. Municipal governments that mandate certification for private-sector projects should put in place a structured review mechanism to allow owners or developers to appeal based on the outcome-based performance of their buildings.

Champions: State and local governments with LEED requirements for private-sector projects; BOMA and local building owner associations.

Building Codes and New Technology

7. Building code officials, the International Code Council, and construction trade unions need to work together to overcome obstacles to green building posed by current building codes and regulations and to optimize the use of new green technologies.

As green building takes off, the need to "harmonize" sustainability objectives with local regulatory codes grows increasingly relevant. As Sanford Smith, AIA, corporate manager of real estate and facilities for Toyota Motor Sales USA, put it, "We need broader adoption of green principles in building codes." At the same time, local officials, whose chief concern is to preserve the health, safety, and welfare of the public, worry about going too fast with new concepts and technologies like gray water systems, bioswales, and porous pavement.

Waterless urinals have become the poster child for this issue. The International Plumbing Code and the National Standard Plumbing Code have approved them, but the International Association of Plumbing and Mechanical Officials ruled against them in 2005. Waterless urinals have met resistance at the municipal level from code officials and plumbers' union locals.

Philadelphia has become ground zero for the fight over waterless urinals. In one case, a developer was allowed to install them in a LEED-registered building, but only if all the usual piping supply was also installed by union laborers, presumably in case the waterless urinals failed.

Construction unions certainly are justified in trying to protect the interests of their members, but in the

long run, resisting new technology almost always backfires. Instead of obstructing the use of new technology, construction trades would be wise to embrace it. Union labor has always justified its higher wage scale on the basis of training and education. The advent of green building technology represents a fresh opportunity for well-trained union labor to differentiate its members from non-union workers.

8. Building owners need to invest in commissioning their properties and sponsoring post-occupancy and O&M evaluations of their buildings.

We have seen the payoff for commissioning—a payback period of less than nine months for existing buildings and less than five years for new buildings (almost zero if non-energy benefits like fewer call-backs are factored in). Of course, commissioning is a prerequisite for LEED and Green Globes certification, but there are literally tens of thousands of other buildings that could be saving energy and running more efficiently if they were commissioned.

Similarly, owners, developers, facilities managers, and Building Teams would benefit from post-occupancy and O&M evaluations, to learn how well their buildings are

The U.S. Green Building Council has established a Greening the Codes Committee to work with the International Code Council and other building code authorities to examine such restrictions against new “green” technology.

Champions: Construction trade unions; ICC; state and local code-official associations; USGBC Greening the Codes Committee.

meeting occupants’ needs—and presumably how to remediate any deficiencies. This could result in enhanced tenant satisfaction, improved client retention, higher lease rates, and positive word of mouth—all benefits that could flow to the bottom line.

We recommend that commercial, industrial, and institutional property owners across the board invest in commissioning, post-occupancy evaluations, and operations and maintenance assessments. (BOMA has established the BOMA Energy Efficiency Program, while NAIOP has initiated the Green Development Award.) We recommend that the Building Commissioning Association, Portland, Ore., lead the way on this initiative.

Champions: Building Commissioning Association, with BOMA and NAIOP.

9. Researchers should continue to study worker and student performance, employee and student health, hospital patient outcomes, and other human factors related to green buildings.

We have advocated for such studies before, and we do so again, for two reasons:

1) To provide evidence of the potential *financial value* created by improvements in performance, creativity, health, and other social benefits; that is, to determine if human and health improvements attributable to green buildings result in financial benefits to building owners, companies occupying green buildings, or the occupants themselves. Such studies would be especially valuable for schools and hospitals.

2) To compare results for certified buildings vs. con-

ventional buildings. Most of the published studies of health and human performance in sustainable buildings predate LEED and other certification programs. With more than 600 projects now certified by LEED and other ratings systems, a critical mass of “laboratory specimens” is emerging.

The USGBC has established a blue-ribbon committee of experts to recommend priorities for government funding of research on health and human performance related to green buildings.

Champions: Carnegie Mellon University; Center for the Built Environment, UC Berkeley; Center of Excellence in Environmental and Energy Systems, Syracuse University; Lawrence Berkeley National Laboratory; USGBC.

10. The legal profession needs to examine potential liability issues resulting from developers and owners failing to build to green standards.

Will “green-certified” someday be viewed as a minimum standard for new construction, much as “building to code” is the baseline today? As Thomas Bisacchino, president of the National Association of Industrial & Office Properties, has asked, “Is there going to be a question at some point whether you built to the highest standards?”

Put another way: If developers, owners, and Building

Teams fail to build to green standards, could they be held liable in some future legal action?

To the best of our knowledge, there have been no lawsuits or cases in which these questions were a cause of action. But the question has been raised by a number of experts interviewed for this White Paper. We believe the issue deserves consideration by legal scholars, and we suggest that it be studied in the form of a symposium or scholarly research.

Champions: American Bar Association, Section of Real Property, Probate and Trust Law; a leading law school.

Commissioning and Building Evaluations

Health and Human Performance Research

Liability Issues

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Gensler

This year's White Paper considers the bottom line impacts of sustainable design. This past summer, Gensler partnered with the commercial property magazine *Estates Gazette* to survey property professionals in the U.K. about the implications of underperforming office buildings in that market. We found a growing disconnect between the desire of business tenants for better performing buildings and the reality that many of their existing ones are badly designed, unhealthy to work in, and inefficient and wasteful to operate. (Please go to our website—www.gensler.com—to download a copy of the survey.)

We're committed as a firm to leveraging everything we design and influence in order to increase its sustainability. To get a sense of Gensler's impact, consider that in 2006, we completed some 3,600 projects on five continents—work that ranged from new buildings and settings to whole new urban districts and communities. Gensler partnered with Bank of America, Hearst, and The New York Times Company to help them create the next generation of investment-grade office towers. We've worked with Hines and Maguire Partners to do the same for the spec office building market. This builds on our long involvement with sustainability in the workplace and other settings.

Business tenants are embracing sustainable design for three reasons. First, they see a healthy work setting as part of their "offer"—how they attract the best and brightest talent. Second, they understand the paybacks they can achieve in building performance and, more importantly, in increased workforce productivity. Third, they have a conscience. Protecting the environment has become an integral part of most companies' brands.

That's because healthy lifestyles are what people want today! Consider Las Vegas: every 20 years, the city reinvents itself—this time, "green" isn't just about money. With help from Gensler, Siemens, and other partners, MGM MIRAGE has made sustainability the centerpiece of their \$7 billion Project CityCenter. Their high-end guests and residents expect that kind of leadership, quality, and performance. To be seen as urbane, you have to be sustainable!

The business case for sustainable design has never been stronger—that's the message of the 2006 White Paper. Read it, put it into practice, and help spread the word!



M. Arthur Gensler Jr., FAIA, FIIDA, RIBA, Chairman

Building Design+Construction Green Buildings and the Bottom Line

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'Green Buildings and the Bottom Line' at Greenbuild Conference

Robert Cassidy, Editor-in-Chief of *Building Design+Construction*, will discuss the findings of *BD+C's* fourth annual White Paper on Sustainability, entitled "Green Buildings and the Bottom Line," at 2 p.m., Thursday, November 16, Room 403/404, at the Denver Convention Center, as part of the U.S. Green Building Council's Greenbuild Expo and Conference. Cassidy will also present data from an exclusive three-year survey of *BD+C* readers, as well as a 10-point "Action Plan" for green building activists.

Greenbuild attendees are invited to participate in the one-hour discussion.

White Papers available on BD+C Web site

The entire contents of "Green Buildings and the Bottom Line" and three previous White Papers can be downloaded in .pdf form at: www.BDCnetwork.com.

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