BUILDING DESIGN & CONSTRUCTION®

Progress Report on Sustainability

The Green Building Movement, One Year Later

A year ago, we described sustainable development as "the most vibrant and powerful force to impact the building design and construction field in more than a decade."

Nothing has happened since to diminish the validity of that statement. If anything, the green building movement is moving at an even faster pace than a year ago. Its impact on the design and construction industry that we serve cannot be underestimated.

This Progress Report follows up on the recommendations made in our 2003 White Paper; reviews the latest developments in the U.S. Green Building Council's "LEED" certification program; provides exclusive data on our readers' involvement in sustainability; examines several key building types (notably education and healthcare facilities) that are crucial to the market we serve; and analyzes key trends and public-policy issues related to sustainable buildings.

The editors conclude this Progress Report with a new "Action Plan" containing what we believe to be constructive recommendations for advancing green building.

Directory of Sponsors

The Carpet & Rug Institute

The Construction Specifications Institute

Duro-Last Roofing, Inc.

The Hardwood Council
American Hardwood Information Center

Lafarge North America Inc.

Lonseal, Inc.

North American Insulation
Manufacturers Association

Turner Construction Company

U.S. Department of Energy
Building Technologies Program
Energy Efficiency & Renewable Energy

U.S. General Services Administration
Public Buildings Service

The Vinyl Institute

Wood Promotion Network

A Year of Progress for Sustainable Development

No sooner was the soy/vegetable ink dry on the 100% post-consumer recycled paper of last year's "White Paper on Sustainability: A Report on the Green Building Movement," than it was clear to the editors of this publication how much more we wanted to say about sustainable development.

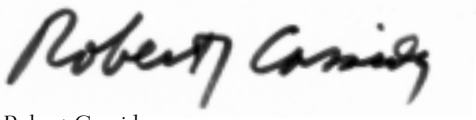
The year 2004 witnessed many new milestones in the green-building movement: the successful launch of several new programs under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) green rating system; the formation of a Federal Green Building Council at the senior governmental staff level; the march of thousands of architects and engineers eager to take the exam to become LEED Accredited Professionals; and, most telling of all, the design and construction of hundreds of new and renovated green buildings.

Even as we were reviewing the impact of these new developments, the editors also wanted to take a look back at the recommendations we made in last year's nine-point "Action Plan." We wanted to know: Had any progress been made toward scientific assessments of the health and social benefits of sustainable design — greater worker productivity, improved job satisfaction, reduced absenteeism — as we had recommended? Was any analysis being done to measure the effectiveness of state and local laws related to sustainable design? Was the real estate community being given more solid "proof" that green buildings were more valuable than conventional buildings — that they could command higher rents, or lease more quickly due to market demand for green buildings? Was any research being conducted on life cycle analysis, the "holy grail" of green product certification?

We also wanted to examine how sustainability was being applied to certain building types of significant importance to our 76,011 readers — notably, schools and university structures (which account for 26% of the $321 billion nonresidential construction in the U.S.), healthcare facilities (a $36 billion business for our readers), and single- and multifamily homes (a $398 billion market), which consume huge amounts of energy and water and require special attention from architects, homebuilders, and real estate developers.

The editors offer this Progress Report to our readers and the design and construction industry at large with the understanding, gained from recent experience, that it represents only a snapshot in the streaming video that is the green-building movement.

Sustainably yours,



Robert Cassidy
Editor-in-Chief
rcassidy@reedbusiness.com

P.S. Mark your calendar for 1 p.m. Wednesday, November 10, for a one-hour discussion of the 2004 Progress Report "Action Plan" in Room A106 of the Oregon Convention Center. See you in Portland!

Editorial Ethics Policy

Building Design & Construction and its parent company, Reed Business Information, subscribe to the editorial ethics guidelines of American Business Media and the American Society of Magazine Editors. All Sponsors of this report signed and complied with an Editorial Ethics Compliance Agreement, which states, in part, "The chief editor of any magazine must have final authority over the editorial content, words and pictures that appear in the publication."

Progress Report Executive Summary

This Progress Report on Sustainability follows our 2003 "White Paper on Sustainability" with analysis of new developments in the green-building movement; detailed reviews of sustainability in hospitals, schools, and homes; and suggested guidelines for state and local green-building laws and regulations.

The Progress Report concludes with an "Action Plan" for stakeholders in the green-building movement to consider.

1. **Sign a Memorandum of Understanding at the senior Federal staff level promoting "best practices" in green building for Federal departments and agencies.** The MOU would encourage departments and agencies to consider (but would not mandate) best practices in sustainable design and construction for Federal projects. The MOU would provide a common set of green-building performance objectives throughout the government.

2. **Place "green building" on the President's Management Agenda for Federal property management.** "Federal property management" has recently been added to the list of government-wide initiatives against which the Office of Management and Budget grades the performance of Federal departments and agencies. The coming year offers an opportunity for sustainability criteria to be included in this initiative.

3. **Issue an Executive Order promoting sustainable design and green building.** Current Federal policy related to green building is scattered among numerous executive orders, departmental policy statements, and Federal laws. An Executive Order of the President would crystallize the government's role in green building.

4. **Convene a White House Conference on Green Building.** Such a conference would bring together those who have embraced the sustainability movement with those who thus far have shied away from full participation — real estate brokers, property insurers, appraisers, REITs, speculative developers, and the mainstream construction industry.

5. **Develop model guidelines for green-building legislative, regulatory, and incentive programs at the state and local level.** The editors continue to stress the need for a high-level, sophisticated review of existing green-building laws and regulations to lay out what's working and what needs fixing; from that review, model guidelines could be developed to give states, counties, and cities a wide variety of options to meet their specific needs.

6. **Eliminate code restrictions and other regulations that unduly limit sustainable design, especially for healthcare facilities.** States and local jurisdictions should review their codes and regulations to determine where they are hampering green building efforts. In healthcare, national, state, and local healthcare regulators should review current accreditation and regulatory standards and consider how to revise them to accommodate innovative green hospital design and construction.

7. **Fund and execute studies of human health and performance in green buildings and high-performance schools.** We continue to support research that compares the health and human performance benefits of green buildings against those of conventional buildings. Further, because schools are so important to our society, we recommend approval of a National Research Council "advisory study" to determine if there are probable linkages between high-performance schools and improved student health and scholastic performance.

8. **Promote a national program to reduce construction and demolition waste by 50% in five years.** The construction industry should develop a nationwide program to cut in half the amount of C&D waste going into landfills by 2010.

9. **For the green-homes sector, both the National Association of Home Builders and the USGBC need to put the needs of the customer first.** Homebuyers would prefer to have energy efficiency and good environmental design, but not if it jacks up the price beyond an affordable level. NAHB members need to recognize that the green-building movement is here to stay, and that they would be wise to more fully embrace it before they get regulated into doing so. The USGBC has to be aware that the residential market is extremely competitive, price-conscious, and variable around the country. Any national green-homes program will have to straddle the line between environmental sustainability and affordability.

10. **Reopen the trade association membership issue to permit trade associations to join as provisional members, progressing to full membership in a stated period of time.** Provisional membership has worked in the past for the USGBC, and it can work in this case.

Contents

BD&C Readers' Involvement In Sustainability on the Rise

Methodology

In September 2004, Reed Research Group surveyed a scientifically drawn sample of 10,000 recipients of *BD&C* via the Internet to determine their opinions, perceptions, and actions related to sustainability.

Eligibility to enter a drawing for an Apple iPOD was offered as an incentive. In total, 524 respondents completed the survey, compared to 498 in 2003.

A year ago, the editors of *BD&C* asserted, "Sustainable development is the most vibrant and powerful force to impact the building design and construction field in more than a decade." A survey of our own readers showed that four out of five professional firms were either already experienced in sustainable design or wanted to become more involved in it.

But how had opinions and attitudes toward green building changed over the last year? Were our readers, who are broadly representative of the $358 billion nonresidential construction market, more involved in green building today than they were a year ago? Could we find hard data that would help us plot the green market's latest direction?

These were among the questions the editors posed to Reed Research Group in commissioning a survey of a representative sample of *BD&C* readers

Where respondents work

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

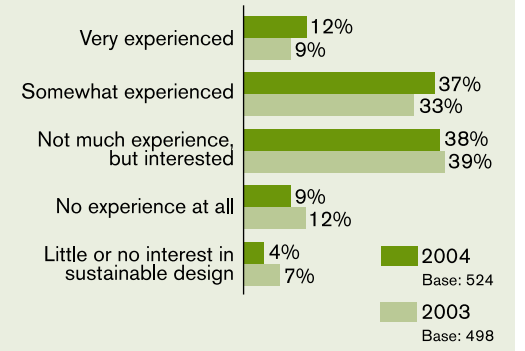
What kind of work their firms perform

	2004	2003
Commercial	71%	74%
Institutional	69%	69%
Industrial	50%	54%
Multifamily housing	42%	39%
Single-family housing	36%	33%
Other	11%	11%
	Base: 524	Base: 494

BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Respondents to *BD&C's* 2004 White Paper Survey closely parallel those in the 2003 White Paper Survey in professional/business category and project activity. The exception is a significantly higher percentage of respondents from architectural firms in the 2004 survey. Fewer respondents were from firms of 500 or more employees (22% in 2004 vs. 27% in 2003), but roughly the same percentage had 10 or more years tenure with their firms (44% in 2004, 45% in 2003).

How experienced is your firm in sustainable design ?



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

A significantly greater percentage of respondents said their firms were very or at least somewhat experienced in sustainable design (49% in 2004 vs. 42% in 2003), while responses for firms that had no experience or little or no interest in sustainable design dropped commensurately (13% in 2004 vs. 19% in 2003).

Major survey findings

According to survey respondents:

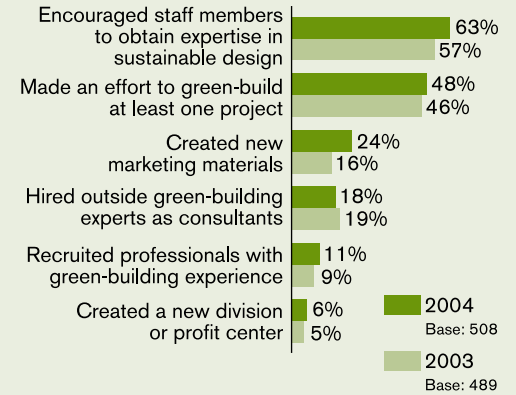
- The number of firms and organizations with experience in green building has risen appreciably in the last year alone.
- Growth in LEED Accredited Professionals has exploded, nearly quadrupling in the last year.
- Major segments of the design and construction industry seem to be only vaguely aware of new LEED programs that could dramatically impact their businesses.
- "Initial cost" continues to be the single greatest obstacle to gaining acceptance of green building.
- Despite the obstacles, significantly more firms are encouraging clients to consider sustainability for their buildings.
- Demand for independent validation of the costs and benefits of green building remains strong.
- The number of firms and organizations that intend to be "significantly more involved" in green building in the next few years has risen noticeably since 2003.

for this report. With a single exception, the 2004 survey was identical to what we asked in 2003, thus allowing us to make year-to-year comparisons of the responses.

Perhaps the clearest indicator of green-building fever was the record number of architects, engineers, and contractors taking the USGBC test to become LEED Accredited Professionals. On a percentage basis, four times as many respondents (16%) said they themselves had become "LAPs" as were reported last year (4%). Some of them were probably among the thousands of professionals who took the test this past summer to avoid having to take a tougher LAP exam that went into effect this past September.

Another "hard" data point concerned LEED registration activity. In 2004, 19% of respondents said their firms had succeeded in registering at least one

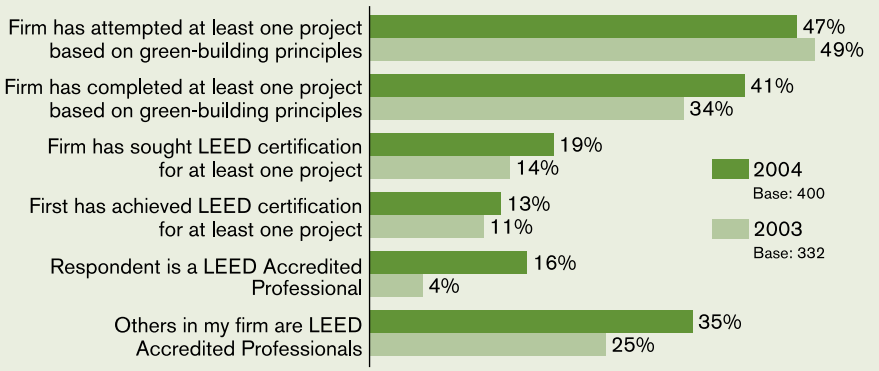
Firms doing more marketing to green-building sector



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Survey responses showed a significant increase in the number of firms reportedly creating new marketing materials geared to the green-building sector (24% in 2004 vs. 16% in 2003). And while most other outreach activities stayed roughly equivalent, there was a slight increase in demand for staff expertise – again, a reflection of interest in LEED accreditation.

Firms show major gains in green-building activity



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Year-to-year results show a measurable boost in firms completing green-building projects (41% in 2004 vs. 34% in 2003) and projects where LEED certification was sought (19% in 2004 vs. 14% in 2003). Perhaps more significant are figures for LEED Accredited Professionals among respondents and others at their firms, reflecting the huge growth in LAPs in the last year.

'Green know-how' not necessarily attracting many more new clients

	2004	2003
Sustainable design experience has helped attract new clients or projects	36%	32%
	Base: 468	Base: 423

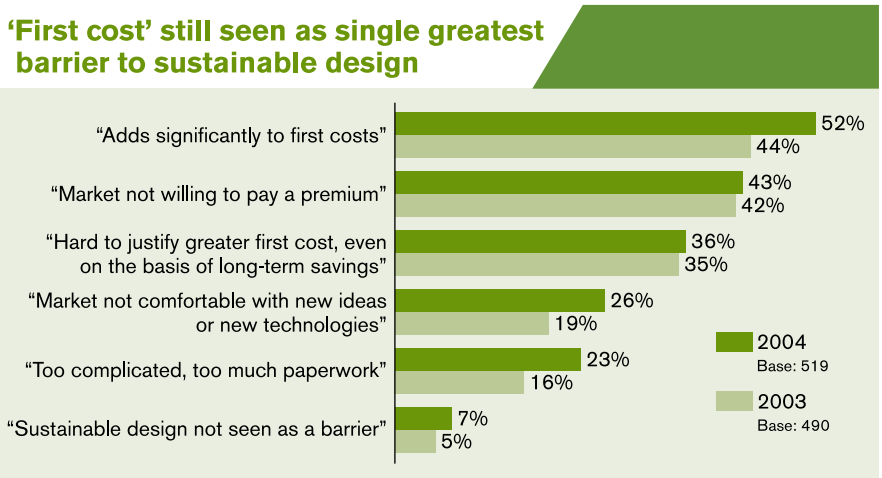
If so, how much?

	2004	2003
Significant amount of new business	11%	6%
Some new business	40%	43%
Minor amount of new business	49%	52%
	Base: 164	Base: 126

BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

There was a slight uptick in the percentage of respondents who said that "being green" had helped their firms get new business (36% in 2004 vs. 32% in 2003); of these, more reported a "significant" amount of such activity (11% in 2004 vs. 6% in 2003). However, the small sample size of this group (18 in 2004) should be taken into account.

'First cost' still seen as single greatest barrier to sustainable design



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Despite recent studies reporting that green buildings need not necessarily cost much more to construct than "conventional" buildings, a growing percentage of BD&C survey respondents said clients and prospects objected to any cost premium (52% in 2004 vs. 44% in 2003). Perception of client concerns over "new ideas" and "paperwork" also went up from last year's results.

project for LEED certification, up from 14% in 2003. The percentage of firms that had achieved LEED certification for a project was 13% in 2004, up from 11% the year before. Many firms (41%) had also completed sustainable projects outside the LEED program, versus 34% in 2003.

At the same time, this year's results raised a couple of red flags. For example, while the survey showed a growing number of architecture and engineering firms having beefed up their "green" marketing efforts, only 36% of respondents felt that having sustainable design experience at their firms had brought in new business (versus 32% in 2003), and most of the new business was described as minor.

Respondents' familiarity with LEED programs varies with the age of the program

	Very familiar	Somewhat familiar	Have heard of it	Never heard of it	Mean
LEED for New Construction	20%	39%	31%	9%	2.70
LEED for Existing Buildings	6%	39%	40%	16%	2.35
LEED for Commercial Interiors	4%	27%	40%	29%	2.05
LEED for Core & Shell	3%	23%	39%	35%	1.94
LEED for Homes	2%	21%	41%	37%	1.87
Base: 524					

BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

On a scale of 4 ("Very familiar") to 1 ("Never heard of it"), respondents were most familiar with LEED's first program, New Construction. The majority of respondents were not even somewhat familiar with newer LEED "products" (the USGBC's term).

Life cycle analysis again tops the list of respondents' concerns

	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	4.27	4.22
Owners should receive tax and/or other financial incentives for building sustainable buildings	4.14	3.86
Green buildings are healthier for occupants than conventional buildings	3.95	3.68
Green buildings significantly reduce energy costs	3.92	3.76
State and local building code authorities should adopt sustainability standards for new construction	3.77	3.57
The Federal government should devote more funding and support to green-building technology	3.76	3.41
Building a structure using sustainable design improves the overall quality and design of the building	3.59	3.32
The green-building movement in the U.S. and Canada lags behind that of other countries	3.56	3.49
Green buildings enhance worker productivity and job satisfaction	3.53	3.22
LEED certification places too much emphasis on gaining points and not enough on overall design considerations	3.52	3.54
Green buildings save money by reusing and recycling materials	3.40	3.34
My firm or organization will be left behind if it does not become active in green building and sustainable design	3.38	3.03
Green buildings enhance occupying firms' recruitment and retention of employees	3.19	2.99
The current LEED certification system is too restrictive	3.18	3.31
Green buildings can reduce lawsuits and liability claims against building owners	3.11	2.95
"Natural" building materials are superior to man-made or synthetic products and building materials	2.79	2.69
Green buildings cost no more to build than conventional buildings	2.63	2.74
Base range: 492-509		

BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Life cycle analysis of building products (4.27 in 2004, 4.22 in 2003) and support for tax or other incentives to owners of green buildings (4.14 in 2004, 3.86 in 2003) top the list of respondents' concerns for the second year in a row. Respondent opinions were remarkably consistent from 2003 to 2004. A mean score of 3.00 (on a scale of 5) would be considered neutral.

More firms trying to persuade clients, colleagues to 'go green'

	2004	2003
Respondent has tried to persuade clients or others in the organization to attempt a green project	54%	42%
	Base: 519	Base: 486

If yes, what happened?

	2004	2003
Incorporated LEED elements in a projectbut did not register it	40%	37%
Working on a sustainable design project	36%	35%
Looked at sustainable design principles, but withdrew due to costs or uncertainty	34%	40%
Completed a sustainable design project	28%	20%
	Base: 277	Base: 205

If no, why not?

	2004	2003
"Perceived lack of interest by client or firm's own management"	44%	41%
"Not required"	35%	41%
"Insufficient budget"	31%	29%
"Not sure of payoff"	26%	30%
"Insufficient staff"	17%	16%
	Base: 231	Base: 260

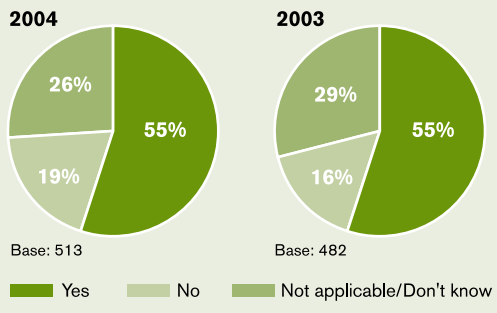
BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

A significantly greater percentage of respondents had tried to convince clients or others at their firms to at least attempt a green-building project (54% in 2004 vs. 42% in 2003). Of those who were successful, a greater percentage went on to actually complete such a project (28% in 2004 vs. 20% in 2003). At the same time, fewer respondents reported projects being withdrawn due to perceived costs or uncertainty of green building (34% in 2004 vs. 40% in 2003)

The other red flag had to do with respondents' lack of knowledge regarding new LEED programs. While most respondents (59%) were at least somewhat familiar with LEED for New Construction, their knowledge of other programs dropped off precipitously. Only 45% were familiar with LEED for Existing Buildings, 31% with LEED for Commercial Interiors, and 26% with LEED for Core & Shell.

On a brighter note, 24% of respondents said their firms would be "significantly" more active in green building in the next few years, compared to 16% a year ago. Perhaps this group would agree with one respondent who stated that green building "should be the norm rather than the exception."

Do you have trouble sourcing green products?



If you do, why?

	2004	2003
"Green" not always clearly defined	76%	81%
Don't know what's really green	48%	46%
Don't know where to look	41%	39%
Can't get certain green products	26%	22%
Don't trust green labels	20%	13%
	Base: 280	Base: 262

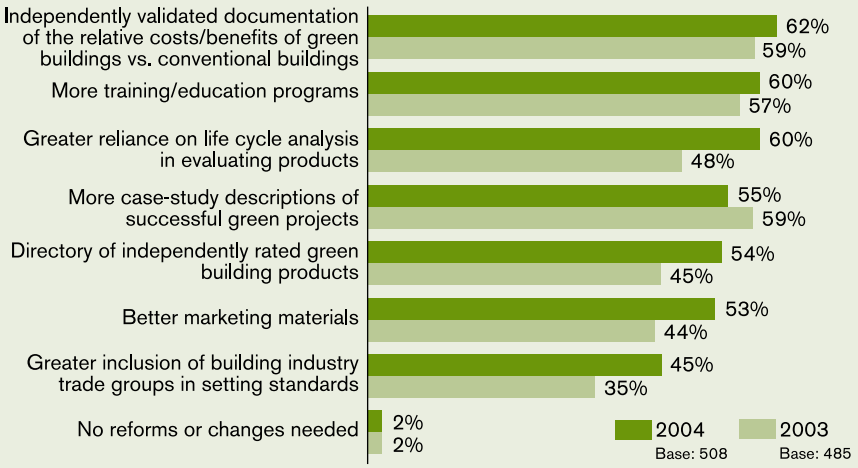
If not, why not?

	2004	2003
Green products are readily available	60%	60%
Certification labels provide sufficient guidance	56%	50%
Green-labeled products are well known	39%	34%
	Base: 95	Base: 70

BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

The majority of respondents (55%) in 2004 said they had trouble finding green products, exactly the same percentage as in 2003. Among this group, slightly more expressed distrust of green labels (20% in 2004 vs. 13% in 2003). Other data were reasonably consistent from 2003 to 2004.

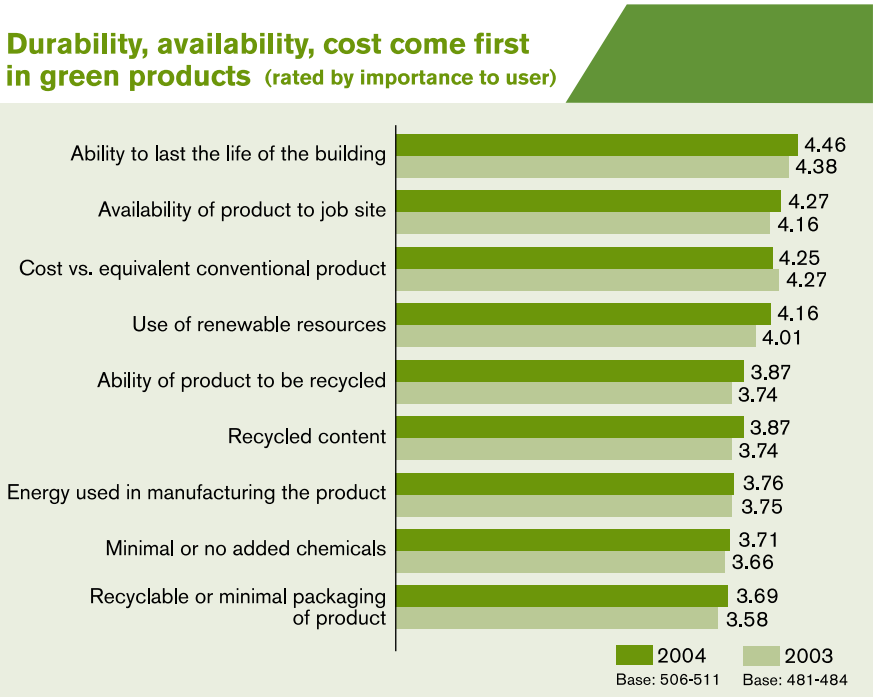
Respondents want 'proof' of the costs and benefits of green buildings



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

For the second year in a row, respondents stated that the missing ingredient that would have an effect in promoting sustainable design was independent analysis of the relative costs and benefits of green buildings vs. conventional buildings.

Durability, availability, cost come first in green products (rated by importance to user)



BD&C White Paper Surveys, 09/04 & 09/03
Source: Reed Research Group

Respondents once again rated durability as the most important attribute of building products, with availability and cost changing places from 2003 to 2004. Once again, results were noticeably consistent from year to year.

Green Building on the Move in '04

LEED-EB Certified projects

Platinum
Joe Serna, Jr.-Cal/EPA HQ Building
Sacramento, Calif.
Thomas Properties Group

Gold
JohnsonDiversey Global HQ
Sturtevant, Wis.
JohnsonDiversey

Brengel Technology Center
Milwaukee, Wis.
Johnson Controls, Inc.

Swinerton Builders Corporate & Regional HQ
San Francisco, Calif.
Swinerton Inc.

Main Building
Moss Landing, Calif.
Moss Landing Marine Laboratories

King Street Center
Seattle, Wash.
King County, Wash.

Silver
National Geographic Society HQ Complex
Washington, D.C.
National Geographic Society

Janssen Pharmaceutica HQ Building
Titusville, N.J.
Janssen Pharmaceutica

Certified
Microsoft Buildings 30, 31 and 32
Redmond, Wash.
Microsoft Corp.

Source: U.S. Green Building Council, 10/04

New LEED Programs

Two thousand four has been a remarkable year for the green-building movement. The past year has witnessed the birth of three new entities in the U.S Green Building Council's Leadership in Energy and Environmental Design program. In addition to LEED for New Construction (NC), which has been in place for four years, 2004 has seen the launch of LEED for Existing Buildings (EB) and Commercial Interiors (CI), with yet a fourth program, LEED for Core & Shell (CS), well into the pilot phase. The successful development of these complex green-rating systems is a tribute to the hard work of their respective committees and the USGBC leadership.

The Council's numbers for the last year have been nothing short of remarkable: 5,157 members, up 37% in one year; 162 LEED-certified projects (including NC, EB, CI, and CS); and 1,614 registered projects totaling 194 million square feet of space. An astounding 18,942 architects, engineers, contractors, and environmentalists have become LEED Accredited Professionals. Forty-one chapters and six affiliates are in place, with four "organizing groups" on the road to chapter status. (*Building Design & Construction* is a national and Chicago Chapter member of the USGBC.) Australia has licensed the rights to LEED, and there are LEED projects in more than a dozen foreign countries, including India, China, and Brazil. The Council even upgraded a floor of its Washington, D.C., office to LEED-CI Certified level.

To manage this growth, the USGBC brought in its founding chair, S. Richard (Rick) Fedrizzi, to replace Christine Ervin as president and CEO. With 25 years' experience at United Technologies' Carrier Corporation, Fedrizzi brings much-needed business acumen to the organization. His plans call for hiring a chief operating officer to handle day-to-day matters, beefing up the staff to 50, installing advanced information systems, and shaping the Council's chapters to form an integrated network.

Fedrizzi has also been making overtures to the business community, to the point of holding meetings with trade associations that have been critical of the USGBC. "We need to grow our strategic relationships, and, more than anything, get to know who our friends and critics are, and turn our critics into friends," he told *BD&C*.

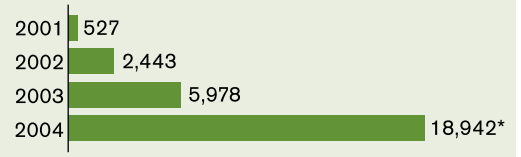
Who belongs to the USGBC?

	2003	2004
Professional firms	2256	3385
Contractors, builders	410	675
Product manufacturers	244	392
Nonprofit organizations	134	204
State and local governments	118	151
Universities, research institutes	96	167
Building owners, real estate firms	35	88
Federal agencies	25	21
Utilities	19	31
Corporate and retail	22	27
Financial, insurance firms	3	6
Total	**3376**	**5147**

Source: U.S. Green Building Council, October 2004

LEED Accredited Professionals

(cumulative annual total)

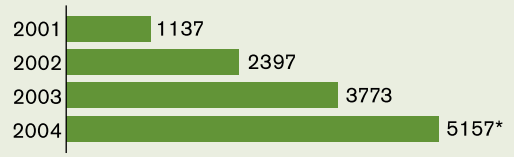


*As of 10/04

Source: U.S. Green Building Council, October 2004

USGBC membership

(cumulative annual total)

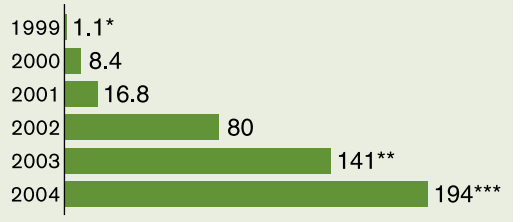


*As of 10/04

Source: U.S. Green Building Council, October 2004

How LEED has grown

Square footage under LEED registration (in millions)



*Does not include LEED-NC 1.0 pilot program
**Does not include LEED-CI and -EB pilot programs (as of 09/03)
***Does not include LEED-EB, -CI, and -CS pilot programs (as of 10/04)

Source: U.S. Green Building Council, October 2004

We offered an in-depth review of LEED-NC in our 2003 "White Paper on Sustainability" (available free at: www.bdcmag.com). Now for a look at the three new programs.[1]

LEED for Existing Buildings

The pilot program for LEED-EB was launched in January 2002, with 99 projects representing 31.5 million square feet of space taking part. Since then, nine projects have been certified, and, on October 22, the balloted version of the "product" (the USGBC's term for LEED programs) was released.

The first thing to keep in mind about LEED-EB is that 75% or more of the lifetime costs of a building go into operations and maintenance. Existing buildings (including homes) consume nearly 40% of the nation's energy; add 40% to its atmospheric emissions; consume 68% of its electricity, 12% of its fresh water, and 88% of its potable water; account for 40% of municipal solid waste; and use 40% of all wood and raw materials in U.S. construction.[2]

The other thing to remember is that there are nearly 100 times as many existing commercial, industrial, and institutional buildings than are built every year. Theoretically, then, greening *existing* buildings could have a couple of orders of magnitude greater impact on energy consumption and the environment than could be achieved greening *new* buildings.

That's why LEED-EB is aimed chiefly at upgrading the O&M aspects of buildings. "You need to pay attention to operating the building over time if you want to achieve its full potential," says committee chair Michael Arny. Thus, LEED-EB provides a way to recertify buildings that were first certified under either LEED-NC or LEED-EB. It also requires that buildings that have not been certified under LEED-NC be at least two years old before they can register with the program. LEED-EB even offers a point (EA Credit 3.1) for providing 24 hours of training a year for O&M staff.

Many credits in LEED-EB emulate those in LEED-NC, but the key difference is EB's emphasis on O&M. For example, a project can earn a point for each 30% of annual purchases of cleaning products that meet various green standards, such as Green Seal GS-37 (MR Credits 4.1-4.3). In fact, says Arny, there are a number of "low-cost" points available for cleaning and maintenance materials. "A lot of what's involved in operating a building in a sustainable way is not about capital expenditures, it's about paying attention to procedures and purchases," he says.

A unique component of LEED-EB has to do with documentation of productivity benefits. IEQ Credit 4.1 offers a point for documenting absenteeism and healthcare costs; IEQ Credit 4.2 does the same for recording "other" worker productivity measures, such as error reduction. The data will be analyzed to help determine if green buildings really do create more productive work environments.

Similarly, EA Credit 6.1 rewards owners for tracking changes in building operating costs. "We're working on gathering financial data on all the projects, so that we can come up with the costs and benefits for each

[1] *For exact details of prerequisites and credits, view the complete documents at www.usgbc.org/leed.*

[2] *Paul von Paumgartten, Johnson Controls Inc., presentation at CoreNet, Chicago, March 2004.*

LEED-EB's 'Innovation Laboratory'

One of the more salutary aspects of LEED for Existing Buildings, according to committee chair Michael Arny, is the way it encourages building owners and facility managers to work together to improve their buildings. "It's not just an extra, but a tool for solving problems," says Arny.

Nowhere is that better illustrated than in LEED-EB's poster child, the Platinum-rated Joe Sarna Jr. Cal/EPA Headquarters, Sacramento. This 25-story, 950,000-sf building, headquarters to California's Environmental Protection Agency, has become a learning laboratory for good facilities practices.

Water shortage in your state? Install waterless urinals, eventually saving a million gallons of potable water a year. Too much trash going into landfills, at $50 a ton? Divert 203 tons of material and save $10,000 a year, eliminate plastic trash liners in office spaces ($65,000 savings in purchases per year), and use reusable cloth bags in centrally located recycling bins ($27,000 savings in purchases annually).

Food waste? Give volunteer employees their very own vermicomposting stations – yes, worm bins – right at their desks. A little peat moss, a spritz of water, plenty of waste food, and 30,000 juicy worms (including those in the building's café) keep 10 tons of organic waste out of landfills. The by-product worm manure is used to enrich the soil around the building.

The cleverest O&M innovation – switching to daytime janitorial service – cost almost nothing to implement. Craig Sheehy, VP of facilities for Thomas Properties Group, which manages the building, noticed that it was "lit up like a Christmas tree" every night for cleaning, so he switched the janitors' hours. From 11 a.m. to 5 p.m., they remove recyclables, do light dusting, and sweep the floors, using push sweepers instead of noisy vacuum cleaners. From 5-6 p.m., they remove wet garbage. From 6-8 p.m., they clean the restrooms and utility areas, under reduced lighting.

Occupant complaints about janitorial services, which Sheehy says cost $50 each to resolve, are down 70%. "Your tenants become your janitorial supervisors," says Sheehy, who estimates savings from the program of $100,000 a year.

"Three years ago, my boss told me to cool it on this green thing," says Sheehy. Today, he says, the company, which owns or manages eight million sf of space, has come around 180 degrees. "We're putting green initiatives into all our properties."

[3] *As defined by the Center for Resource Solutions Green-e product certification requirements. Green power may be procured from a Green-e certified power marketer or accredited utility program, or through Green-e Tradable Renewable Certificates. At least 25% of any off-site green power or Green Certificates used to earn this credit must be from sources constructed after 1997.*

[4] *As contained in "Building Air Quality: A Guide for Building Owners and Facility Managers," EPA Ref. No. 402-F-91-102, December 1991. Available at: www.epa.gov/iaq/largebldgs/graphics/iaq.pdf.*

credit and prerequisite, not just for the overall project," says Arny. Such information would reinforce the "business case" for green building. "We'll be able to show that LEED-EB is saving owners money," says Arny.

Another potentially radical benefit of LEED-EB could be the creation of "green leases," whereby tenants would have a means of negotiating with building owners as to the environmental quality of their rental spaces. "With performance-based rentals, you'd have a tool to define the quality of the environment you're getting" in the lease, says Arny.

LEED-EB could also draw a whole new set of players to green building — facility managers. As companies begin to grasp the economic and environmental impact of their buildings (usually a firm's biggest capital asset), senior management will start to see the value of having facility managers who are skilled in green building. Arny predicts that, in a few years, facility managers will make up the majority of those involved in green building and the USGBC.

LEED for Commercial Interiors

LEED-CI is intended for organizations that want to "green" their tenant space or commercial interiors. So, a law firm with two floors in an office building, or a retail store in a shopping mall, might fit out its space according to LEED-CI. It can be applied to new buildings, old buildings, or buildings where tenants are remodeling. Since LEED-CI is devoted to tenant interior fit-outs, some credits found in other LEED programs, such as reducing water usage for irrigation, are not relevant.

After more than five years of development, LEED-CI was, at this writing, about to win final balloting approval from USGBC members. More than 90 projects, comprising 6.47 million sf of space, participated in the pilot program, with 16 earning various levels of certification. "The most wonderful part of this process is the pilot experience, because it tells you what works and what doesn't," says LEED-CI committee chair Penny S. Bonda, FASID.

LEED-CI targets the selection of sustainable tenant space, efficient water usage by tenants, optimized energy performance (especially lighting and lighting controls), materials for interior building systems and furnishings (notably furniture, carpet, and flooring), and indoor environmental quality (with an emphasis on controlling VOCs).

LEED-CI seems to have attracted a new cohort of LEED users. According to interior designer Keith Winn, project manager for LEED-CI, about 70% of the 90 or so projects in the LEED-CI pilot program were first-time users of LEED. These included construction, A/E, and M/E firms that were applying LEED-CI to their own buildings. "It's not something we anticipated," he says. Building product manufacturers — makers of carpets, furniture, mechanical equipment, etc. — constituted another group. A third category included retail operations like Whole Foods, Kinko's, Bank of America, and Enterprise Rent-A-Car that, according to Winn, might have been giving LEED-CI a tryout to see if it fit into their respective corporate values.

Another unexpected (if less gratifying) result of the pilot program was the relative dearth of projects from major retail and office centers, notably New York City and Chicago. "It's disappointing that there hasn't been more activity in big cities" where tenant fit-out is strong, says Winn.

The committee was also surprised, after careful review of more than 20 submittals, at the wide disparity among engineering firms in their knowledge and understanding of ASHRAE standards for energy and indoor environmental quality. "They just haven't had a lot of experience with [ASHRAE]," says Winn. "Maybe it's not a requirement on their [non-LEED] projects, so they're not up to date with what's required or how to document it. That was an eye-opener."

Interest in controlling water usage was also less than expected. Although there are only two credits for reducing water use (WE Credits 3.1 and 3.2) and they are relatively easy to achieve, many of the pilot projects

Minimum points required to reach various LEED levels

Status	LEED-NC	LEED-EB	LEED-CI	LEED-CS
Certified	26	32	21	24
Silver	33	40	27	30
Gold	39	48	32	36
Platinum	52	64	42	48

Source: U.S. Green Building Council

Point system under LEED programs

Credit Category	LEED-NC	LEED-EB	LEED-CI	LEED-CS
Sustainable Sites	14	14	7	15
Water Efficiency	5	5	2	5
Energy & Atmosphere	17	23	12	16
Materials & Resources	13	16	14	11
Indoor Environmental Quality	15	22	17	13
Innovation and Design Process	5	-	5	5
Innovation in Upgrades, Operations & Maintenance	-	5	-	-
Total possible points	**69**	**85**	**57**	**65**

Source: U.S. Green Building Council

LEED-EB checklist

Category/possible points	Summary
Sustainable Sites 14	Building must be more than two years old or certified under LEED-NC. Exterior management plan must be in place (plantings, pest control, fertilizer use, etc.) Offers points for adopting high development density and providing: public transport access; bicycle storage; alternative transportation (hybrid or electric vehicles); car pooling and telecommuting incentives; reduced site disturbance over 50% or 75% of site (using native or adapted vegetation). Reduce annual stormwater falling on site by 25% or 50%). Reduce heat island effect by: providing shading on 30% of non-roof impervious surfaces on the site; placing 50% of parking underground; or using open-grid paving on 50% of parking area. Install a vegetated roof covering 50% of roof area or an Energy Star-compliant roof over 75% of roof area. Control light pollution.
Water Efficiency 5	Reduce fixture potable water usage through automatic water control systems; where possible, install water-conserving fixtures that meet Energy Policy Act of 1992 fixture requirements. Keep pollutants out of building discharge water (per EPA National Pollution Discharge Elimination System Clean Water Act). Cut potable water usage for irrigation by 50% or 95%. Reduce potable water use for sewage conveyance by 50%, or treat 100% of wastewater on site to tertiary standards. Reduce potable water use from fixtures by 10% or 20% from a pre-set baseline.
Energy & Atmosphere 23	Building must have a comprehensive operation plan (heating/cooling, humidity control, lighting, safety, building automation controls) and commissioning plan, or a 1- to 5-year plan for continuous improvement of these aspects of basic commissioning requirements. Building must have achieved an Energy Star score of 60. No CFCs may be used in HVAC or refrigeration systems. Offers up to 10 points for achieving Energy Star scores from 63 to 99. Offers up to 4 points for producing 5-30% of on-site renewable energy, or for using 25-100% off-site renewable energy certificates.[3] Provide 24 hours/year of training for building O&M staff, and develop a "best practices" equipment preventive maintenance program. Monitor indoor comfort in occupied spaces (temperature, humidity, and carbon dioxide). HVAC, refrigeration, or fire-suppression systems may not contain HCFCs or halons; or emissions or leakage of refrigerants must be reduced. Offers up to 3 points for installing various metering controls (e.g., lighting, cooling load, boiler efficiency, etc.). Document and report emission reductions (carbon dioxide, mercury, VOCs, etc.) and retire 10% of the reported reductions through a third-party certification program. Document building operating costs for the previous 5 years (or length of occupancy) and track changes in such costs over the performance period; also document the costs and financial impacts of LEED-EB implementation.
Materials & Resources 16	A waste stream baseline audit (paper, glass, plastics, cardboard, and metals) must be conducted, and a procurement policy put in place to reduce the waste stream. Set aside an area for separating, collecting, and storing materials for recycling. Reduce the amount of mercury brought into the building through mercury-containing light bulbs. Points available for reducing construction, demolition, and renovation waste by 50% or 75%. Up to 5 points for developing a sustainable purchasing program (paper, office equipment, furniture, furnishings, and building materials). One point for each 45% of total annual purchases for low-VOC adhesives, sealants, and paints, CRI Green Label carpet or carpet cushion, and composite panels or agrifiber products with no added urea-formaldehyde resins. One point for each 30% of total annual purchases of Green Seal GS-37 cleaning products and disposable janitorial paper products and trash bags. Up to 3 points for diverting or recycling 30%, 40%, or 50% of "occupant waste stream" (paper, glass, plastic, etc.); 95% of used batteries and 95% of used fluorescent lamps must also be collected and recycled. One point for a program to reduce the amount of mercury brought in through light bulb purchases.
Indoor Environment Quality 22	Building must meet ASHRAE 62.1-2004 outdoor air ventilation rate, or supply 10 CFM/person, and meet EPA or SMACNA IAQ guidelines for HVAC system maintenance. Smoking in the building must be prohibited, or measures taken to keep cigarette smoke out of nonsmoking areas. Asbestos must be removed or encapsulated. Potential exposure of occupants to PCBs (or PBC by-products in case of fire) must be managed. Ventilation systems to be monitored, including installing carbon dioxide sensors. One point for increasing outdoor air ventilation rates to occupied spaces by 30% above ASHRAE 62.1-2004 requirements, or providing natural ventilation under CISBE Good Practice Guide 237. Implement an IAQ management plan for the construction and occupancy phases under SNACMA guidelines. One point for documenting the history of absenteeism and healthcare cost impacts for occupants for the past 5 years (or length of occupancy) and track changes in both factors; another for documenting "productivity impacts" (work performed, errors made) for the previous 5 years (or length of occupancy). Utilize filters to reduce exposure to hazardous particle contaminants. Isolate high-volume copying, printing, or fax stations. One point each for providing lighting controls and individual temperature and ventilation controls for 50% of occupants or such areas as classrooms or conference spaces. Comply with ASHRAE 55-2004 (human thermal comfort) and provide a permanent monitoring system to ensure building performance. One point each for daylighting 50% or 75% of "critical visual" workspaces. One point each for achieving "views" from 45% or 90% of occupied spaces, provided a space "churn" plan is in effect. Develop an IEQ management program based on EPA recommendations.[4] Promote "green cleaning," by using grills, grates, and mats at entryways to keep down dirt and particles; by isolating janitorial closets and other hazards (e.g., chemical mixing) from the rest of the building; and by adopting low-environmental-impact cleaning, pest control, and cleaning equipment policies.
Innovation in Upgrades, Operations & Maintenance 5	Provide exceptional performance above the requirements set by LEED-EB. Have a LEED Accredited Professional on the project team.

NAIMA

North American Insulation Manufacturers Association

The North American Insulation Manufacturers Association (NAIMA) is a trade association representing nearly all 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 member's products. Many publications are free online at www.naima.org.

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 still in its infancy, 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 defendable 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 inline 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 becomes the industry standard.

Kenneth D. Mentzer, President, CEO
North American Insulation Manufacturers Association (NAIMA)
web: www.naima.org
ph: 703-684-0084

steered clear of them, except in areas of the country with water shortages. "The public's awareness of creating water efficiency in buildings is just not there yet," says Winn. He expected tenants to demand water-efficient toilets and faucet controls, but it turned out that many tenants saw these features as benefiting owners more than themselves.

Calculating how to provide views for 90% of seated occupants (EQ Credit 8.3) proved nettlesome as well. "We didn't want to be onerous, but what is a 'view'?" asks Winn. The idea should be to provide, at minimum, a sense of the time of day and outside conditions (the season, the weather, human activity, nature). The criteria in the pilot version of LEED-CI were rather vague, leading the committee to adopt more specific criteria and measurements involving glazing-to-floor area ratio, horizontal view angle, and height of glass above the floor.

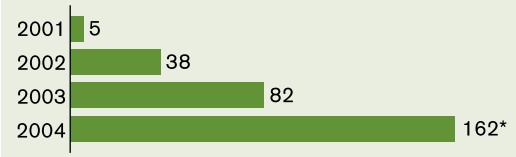
LEED-CI also reflects the growing interest in "New Urbanism." SS Credit 2, formerly known as "Development Density," was renamed "Urban Redevelopment" to encourage tenants to select space in established, "walkable" communities or in neighborhoods with pedestrian access to at least 10 of 20 identified "basic services": banks, grocery stores, daycare centers, post offices, schools, hair salons, etc.

The program went through numerous changes on its way to the balloted version shown in the accompanying chart. For example, the pilot program revealed that the original requirement for EQ Credit 4.3 for low-emitting carpets was "too easy" to achieve, according to Bonda, so it was "beefed up" to reference the Carpet & Rug Institute's Green Label Plus standard. Similarly, Fundamental Commissioning (EA Prerequisite 1) received a "major revision" to reflect probable changes in LEED 2.2 (see pp. 52-53). A half-point for roofs that reduce heat island effect (SS Credit 1) was changed to conform to the Cool Roof Rating Council's Solar Reflectance Index, and the value for steep-sloped roofs was also corrected.

On the other hand, a half-point credit for eliminating ozone-depleting materials (SS Credit 1) was dropped pending a review by the LEED Steering Committee of a technical report on the environmental impact of HVAC refrigerants.

LEED-CI chair Bonda says the committee started out five years ago with hopes of making some fairly radical changes in LEED, including greater emphasis on life cycle analysis and performance standards. "We were going to change the world," she says. But reality stepped in, and the committee had to pull back from its ambitious agenda, pending approval of revisions to the basic LEED format anticipated in LEED 2.2 and 3.0.

LEED-certified projects
(cumulative annual total)



*As of 10/04 (LEED-NC, 137; LEED-EB, 9; LEED-CI, 16)

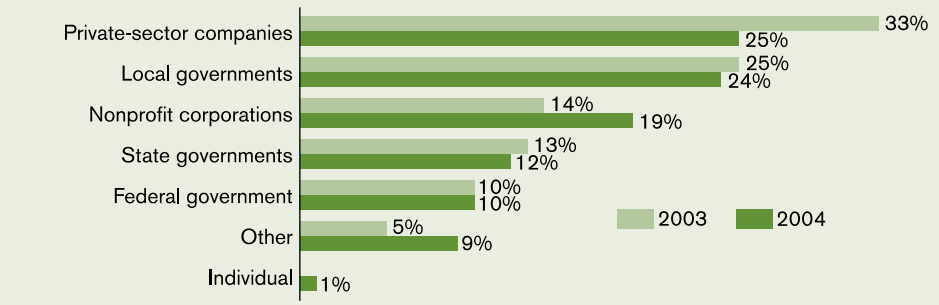
Source: U.S. Green Building Council, October 2004

LEED-NC construction project statistics

Total certified projects	137
Total registered projects	1614
States with registered projects	50
Countries with registered projects	15
Gross sf of registered projects	**193,673,209**

Source: U.S. Green Building Council, October 2004

Who is doing LEED projects?
Registration of LEED projects by ownership category



Source: U.S. Green Building Council, October 2004

LEED-CI Certified projects

Platinum
Interface Showroom Office
Atlanta, Ga.
Interface, Inc.

Gold
AIA Honolulu Chapter Office
Honolulu, Hawaii
American Institute of Architects

Sugen Inc. Building 3
South San Francisco, Calif.
Sugen, Inc.

Coro Center Terminal Building
Pittsburgh, Pa.
Coro Center for Civic Leadership

Chong Partners Architecture
San Francisco, Calif.
Chong Partners Architecture

REI Portland
Portland, Ore.
Recreational Equipment, Inc.

DPR Office Interiors
Sacramento, Calif.
DPR Construction, Inc.

Silver
Earthjustice National HQ and Oakland Regional Office
Oakland, Calif.
Earthjustice

Environmental Defense Washington, D.C., Office
Washington, D.C.
Environmental Defense

Warner Bros. Building 151
Burbank, Calif.
Warner Bros.

WorkingBuildings' Corporate Offices
Atlanta, Ga.
WorkingBuildings, LLC

Certified
HOK San Francisco
San Francisco, Calif.
Hellmuth Obata + Kassabaum, Inc.

Puget Sound Energy Corporate HQ
Bellevue, Wash.
Puget Sound Energy Co.

InterGen Office
Burlington, Mass.
InterGen

DLR Group Office Building
Phoenix, Ariz.
DLR Group

Zimmer Gunsul Frasca Office
Seattle, Wash.
Zimmer Gunsul Frasca Partnership

Source: U.S. Green Building Council, 10/04

"LEED walks a fine line between being doable and being not doable," she says. "You want to raise the bar, but you don't want to make it so difficult that people just give up." Given the success of the LEED-CI program thus far, that prospect seems unlikely.

LEED for Core & Shell

LEED-CS addresses the design and construction of

LEED-CI checklist

Category/possible points	Summary
Sustainable Sites 7	Project can earn 3 points for locating the tenant space in a LEED Certified building, or up to 3 points in half-point increments (no rounding) by meeting stated requirements for: redeveloping a brownfield site (1/2); controlling stormwater rate and quantity (1/2); treating stormwater on site (1/2); reducing non-roof heat island effect (1/2); installing a vegetated or SRI-rated "cool" roof to reduce heat island effect (1/2); controlling light pollution (1/2); reducing potable water usage for landscape irrigation (1/2); eliminating use of potable water for irrigation, or eliminating irrigation entirely (1/2); limiting use of city water for sewage conveyance by 50%, or treating 100% of wastewater on site to tertiary standards (1/2); reducing water usage 20% and requiring future occupants to comply with on-going water reduction plan (1/2); supplying 5% (1/2) or 10% (1 point) of total energy use through on-site renewable energy systems; and 1/2-point for a building that had "other quantifiable environmental performance" (as defined in other LEED programs) in place at the time of selection. One point each for: contributing to urban density; locating near public transport; providing bicycle storage; and reducing parking areas or providing preferred parking for carpools or vanpools.
Water Efficiency 2	One point each for creating strategies that use 20% or 30% less potable water.
Energy & Atmosphere 12	Project must: meet fundamental commissioning requirements to ensure that energy-related systems are installed, calibrated, and performing as intended; comply with ASHRAE 90.1-2001 (or 2004, when published) or local energy code, whichever is stricter; and use no CFC-based refrigerants in tenant HVAC&R systems. Up to 3 points for reducing lighting power density to 15%, 25%, or 35% below ASHRAE 90.1. One point for installing lighting controls in occupied spaces near windows or under skylights. One point each for installing HVAC systems that comply with the New Building Institute's E-Benchmark or for fitting out tenant space with appropriate zoning and controls. Demonstrate that HVAC system for tenant space performs 15% better (1 point) or 30% better (2 points) than a minimally complying system. Install 70% (1 point) or 90% (2 points) Energy Star-rated appliances, office equipment, electronics, and commercial food service equipment. Perform "enhanced" commissioning. In projects where tenant space is <75% of total building sf, install energy submetering equipment in tenant space (1 point), or separate tenant energy costs from total building energy costs (1 point); where tenant space is 75% or more, install continuous metering equipment for lighting systems, cooling load, and other energy-consuming systems (2 points). Provide 50% of tenant's electricity from renewable sources.
Materials & Resources 14	Requires a dedicated recycling area. Points awarded for: tenant signing a 10-year lease (1); maintaining 40% (1) or 60% (2) of walls, doors, flooring, and ceilings; diverting 50% (1) or 75% (2) of construction and demolition and packaging debris from landfill; salvaging, refurbishing, or reusing 5% (1) or 10% (2) of building construction materials, or doing the same for 30% of total furniture/furnishings budget (1); using 10% (1) or 20% (2) post-consumer + one-half post-industrial recycled content materials; using 20% of construction materials, furniture, and furnishings manufactured within 500 miles (1); using 10% of such materials extracted with 500 miles (1); using 5% of such materials from plants harvested with a 10-year cycle (1); using 50% FSC-certified wood (1).
Indoor Environmental Quality 17	Building must meet minimum indoor air quality (ASHRAE 62-2001, or 62-2004 when it is published) for mechanically or naturally ventilated buildings and for preventing or minimizing tenant exposure to environmental tobacco smoke. Points awarded for: installing permanent monitoring and alarm systems for outdoor air delivery (1); increasing outdoor air ventilation rates to occupied spaces 30% above ASHRAE 62-2001, or meeting CISBE "Good Practice Guide 237" for naturally ventilated spaces (1); having a construction IAQ management plan in place during construction (1) and before occupancy (1); using low-emitting adhesives and sealants (1), low-VOC paints and coatings (1), low-VOC carpet (1), low-emitting composite wood and laminate adhesives (1), and low-emitting furniture and seating (1); minimizing occupant exposure to hazardous particulates, biological contaminants, and chemical pollutants (1); providing lighting controls for 90% of occupants and in all shared spaces (1); providing temperature and ventilation controls for 50% of occupants and in all shared spaces (1); complying with ASHRAE 55-2004 requirements for human thermal comfort (1); providing monitoring systems and a process for corrective action to ensure thermal comfort performance (1); daylighting 75% (1 point) or 90% (2 points) of occupied spaces and providing daylight redirection and glare-control devices; providing views (a direct line of sight to vision glazing) for occupants in 90% of occupied areas (1).
Innovation & Design Process 5	Up to 4 points for exception performance above LEED requirements or for innovative performance in categories not specifically addressed by LEED; one point for having a LEED Accredited Professional on the team.

the core and shell of new buildings, essentially the structure, envelope, and building-level systems, such as central HVAC — in effect, everything that LEED-CI does not take in. LEED-CS primarily serves developers of speculative office, retail, or mixed-use buildings and is designed for buildings where the owner does not control the interior design and fit-out. Most of the credits for LEED-CS follow closely those for LEED for New Construction.

The big breakthrough with LEED-CS is its *pre-certification process*. Pre-certification, which is unique to LEED-CS among all LEED programs, allows a developer to market a building as if it were LEED certified before the building is even built.

The rationale behind pre-certification rests on the assumption that, in most cases, the developer of a speculative core-and-shell building won't even start construction until a major portion of the planned

[5] *See ASHRAE 62-2001, Appendix H, for compilation of Addenda.*

[6] *See "California High Performance Schools (CHPS) Best Practices Manual," Appendix C-A Field Based Thermal Comfort Standard for Naturally Ventilated Buildings, Fig. 2.*

LEED-CS checklist

Category/possible points	Summary
Sustainable Sites 15	Project must have a sediment and erosion-control plan keyed to EPA 832/R-92-005 (September 1992) or to local standards, whichever is stricter. Site must not be: on prime farmland; on land lower than 5 feet above a 100-year flood plain; on a protected habitat; within 100 feet of wetlands; on public parkland. One point each for: channeling development to urban areas; brownfield redevelopment; locating near rail or bus lines; providing bicycle storage and showers for 5% of occupants; providing preferred parking for alternative-fuel vehicles (including hybrids) or for carpools or vanpools; limiting site disturbance or, on previously developed sites, restoring 50% of site area to native/adapted vegetation; reducing the development footprint by 25%; implementing a stormwater management plan and system, including treatment; providing shaded, light-colored, or open-grid paving, underground parking (50% of spaces), and Energy Star-rated "cool" or vegetated roofs; and eliminating or reducing light pollution. Must publish an illustrated document for tenants describing the building's sustainable design and construction features and how tenants can coordinate their space buildout with the building's systems and materials.
Water Efficiency 5	Reduce use of potable water for landscaping by 50%, or use captured rain or recycled site water to reduce potable water use for irrigation by 50%. Or eliminate all permanent landscape irrigation systems. Reduce use of city water by 50% or provide tertiary treatment on site for 100% of wastewater. One point each for using 20% or 30% less water (not including irrigation) compared to Energy Policy Act fixture performance requirements.
Energy & Atmosphere 16	Must engage a commissioning authority and adopt a commissioning plan. Must use best practice commissioning procedures. Must design to comply with ASHRAE/IESNA 90.1-1999 or more stringent local code. Zero use of CFC-based refrigerants in HVAC&R systems. One point each for: reducing design energy costs vs. ASHRAE/IESNA 90.1-1999 by 10%, 20%, 30%, 40%, 50%, or 60%; supplying 1% or 5% of the building's core and shell energy use via on-site renewable systems; using an independent commissioning authority; installing HVAC&R and fire-suppression systems that contain no HCFCs or halons; installing continuous metering equipment for lighting systems, cooling load, boiler efficiencies, and related building systems; and providing 50% of electricity from renewable sources over a two-year contract.
Materials & Resources 11	One point for: providing an area for recycling waste materials; for maintaining 75% or 95% of existing building structure in reused buildings; diverting 50% or 75% of construction, demolition, and land-clearing waste from landfill; using 5% of salvaged, refurbished, or reused materials; using 5% or 10% of total value of materials from reused materials and products (post-consumer and one-half post-industrial); using 20% or 50% of building materials or products that are extracted and manufactured within 500 miles; using products made from plants that are harvested within a 10-year cycle for 5% of the value of all building materials; using 50% of wood-based materials from Forest Stewardship Council-certified forests.
Indoor Environmental Quality 13	Must meet minimum requirements of ASHRAE 62-1999 and approved Addenda.[5] Must prohibit smoking in the building or provide ventilated smoking rooms verified by tracer gas testing (ASHRAE 129-1997). One point each for: installing a permanent carbon dioxide monitoring system; designing ventilation systems that result in air-change effectiveness of at least 0.9 (ASHRAE 129-1997); developing an IAQ management plan for construction and pre-occupancy phases; using low-emitting adhesives and sealants; using paints and coatings whose VOC/chemical component limits do not exceed Green Seal Standard GS-11; using carpet systems that meet or exceed Carpet & Rug Institute Green Label IAQ Test Program; using wood and agrifiber products containing no added urea-formaldehyde resins; designing to minimize pollutant cross-contamination of occupied areas; providing an average one operable window and one lighting control zone per 200 sf for occupied areas within 15 feet of the perimeter wall; providing individual controls for airflow, temperature, and lighting for 50% of occupants; complying with ASHRAE 55-1992, Addenda 1995, for thermal comfort standards, or, for naturally ventilated areas, using the 90% acceptability limits defined in the CHPS Manual[6]; installing a permanent temperature/humidity monitoring system; achieving a Daylight Factor of 2% (excluding direct sunlight penetration) in 75%; and achieving daylighting and views in 90% of all space occupied for critical visual tasks.
Innovation & Design Process 5	Up to 4 points for exceptional performance above the requirements set by LEED or for innovative performance in green building categories not addressed by LEED; one point for having a LEED Accredited Professional on the team.

Federal Guide to Green Specs

The U.S. Environmental Protection Agency, the Office of the Federal Environmental Executive, and the Whole Building Design Guide have issued the "Federal Guide for Green Construction Specs" (available free at http://fedgreenspecs.wbdg.org).

The 250-page document covers more than 60 green-building materials and methods and enables Federal building professionals to go online to develop green Federal buildings. The guide is organized according to the Construction Specification Institute's MasterFormat.

Why such a guide? "In speaking with Federal building officials, we learned that the 'greenies' in the Federal government didn't know how to write specifications, and the spec writers didn't know enough about green, or even the mandates that are out there, so we've tried to incorporate this information into document," says the EPA's Alison Kinn Bennett.

"Our tool is totally voluntary, but it does assist those in the Federal government to reference things that do have teeth," such as various Greening of Government Executive Orders, the Resource Conservation and Recovery Act, and EPA Energy Star and indoor environmental quality documentation, says Bennett. "LEED is not mandated, but it is the program of choice for many agencies, so we have flagged these items to their LEED credits."

Where the points have gone in LEED for New Construction

Sustainable Sites		
SS 1	Site selection	81.1%
SS 2	Urban redevelopment	15.3%
SS 3	Brownfield development	10.8%
SS 4.1	Public transportation access	63.1%
SS 4.2	Bicycle storage	85.6%
SS 4.3	Alternative fuel vehicles	34.2%
SS 4.4	Parking capacity	66.7%
SS 5.1	Protect or restore open space	31.5%
SS 5.2	Reduce development footprint	62.2%
SS 6.1	Stormwater rate and quantity	36.0%
SS 6.2	Stormwater treatment	42.3%
SS 7.1	Heat island effect, non-roof	59.5%
SS 7.2	Heat island effect, roof	51.4%
SS 8	Light pollution reduction	52.3%
Water Efficiency		
WE 1.1	Reduce water for landscaping 50%	86.5%
WE 1.2	No irrigation or no potable water in irrigation	66.7%
WE 2	Innovative wastewater technologies	23.4%
WE 3.1	Reduce water use 20%	71.2%
WE 3.2	Reduce water use 30%	55.0%
Energy & Atmosphere		
EA 1	Optimize energy performance	85.6%
EA 2.1	5% renewable energy	10.8%
EA 2.2	10% renewable energy	9.0%
EA 2.3	20% renewable energy	10.8%
EA 3	Additional commissioning	55.0%
EA 4	Ozone depletion	48.6%
EA 5	Measurement and verification	31.5%
EA 6	50% of building electricity from renewable sources	29.7%
Materials & Resources		
MR 1.1	Maintain 75% of existing shell	13.5%
MR 1.2	Maintain 100% of existing shell	5.4%
MR 1.3	Maintain 100% of shell and 50% of non-shell	3.6%
MR 2.1	Divert 50% of construction waste	80.2%
MR 2.2	Divert 75% of construction waste	56.8%
MR 3.1	Specify 5% resource reuse	11.7%
MR 3.2	Specify 10% resource reuse	7.2%
MR 4.1	Specify 5% recycled content	87.4%
MR 4.2	Specify 10% recycled content	70.3%
MR 5.1	20% local/regional materials	93.7%
MR 5.2	50% of MR 5.1 harvested locally	61.3%
MR 6	Rapidly renewable materials	6.3%
MR 7	Certified wood	25.2%
Indoor Environmental Quality		
EQ 1	Carbon dioxide monitoring	64.0%
EQ 2	Ventilation effectiveness	28.8%
EQ 3.1	Construction IAQ management plan (during construction)	64.0%
EQ 3.2	Construction IAQ management plan (before occupancy)	62.2%
EQ 4.1	Low-emitting adhesives & sealants	80.2%
EQ 4.2	Low-emitting paints	84.7%
EQ 4.3	Low-emitting carpet	93.7%
EQ 4.4	Low-emitting composite wood	44.1%
EQ 5	Indoor chemical and pollutant source control	64.9%
EQ 6.1	Operable windows, zoned lighting controls within 15 feet of perimeter	27.0%
EQ 6.2	Systems controls for 50% of occupants in working areas	18.9%
EQ 7.1	Comply with ASHRAE 55-1992	60.4%
EQ 7.2	Permanent monitoring system	53.2%
EQ 8.1	Daylight 75% of spaces	40.5%
EQ 8.2	Views for 90% of spaces	68.5%
Innovation & Design Process		
ID 1.1	Innovation in design	90.1%
ID 1.2	Innovation in design	78.4%
ID 1.3	Innovation in design	52.3%
ID 1.4	Innovation in design	27.0%
ID 2	LEED Accredited Professional	99.1%

Source: U.S. Green Building Council, September 2004

Building Teams for 111 LEED-NC Version 2 Certified projects adopted credits largely at rates anticipated by USGBC LEED staff. However, certain credits had higher-than-expected adoption rates (SS 4.2, WE 1.1, EA 1, MR 4.1, MR 5.1), while others were lower than expected (SS 3, EA 2.1, MR 1.1, MR 3.1, MR 6).

building is leased. Thus, it does the developer little good to wait until *after* the building has been built to obtain LEED certification: the developer needs to be certain that the building will, in fact, be rated at a specific level (Certified, Silver, Gold, or Platinum) upon completion in order to go out and market the project as if it were already built to LEED standards.

The pre-certification process overcomes this barrier by allowing the developer to submit to the USGBC a "scorecard" showing the credits the building will achieve, based on its design. If the USGBC approves the developer's plan, it will issue a "pre-certification document" which states, in effect, "If the building is constructed as described in this document, it will be certified (at such-and-such level) upon completion." Armed with this pre-certification document, the developer can then start leasing space in a green building, albeit one that exists only on paper.

The LEED-CS pilot got under way in 2003, with more than 30 buildings — three of them in China — ranging in size from 5,000 sf to one million sf. The projects include speculative office buildings, retail centers, and mixed-use facilities combining retail, parking, and residential.

While LEED-CS is still very much a work in progress — a draft document will available for public comment later this year or early in 2005 — Building Teams in the pilot program have already raised numerous questions that are being scrutinized by the LEED-CS Committee, the LEED Steering Committee, and the USGBC Board of Directors.[3]

Take carbon dioxide monitoring (EQ Credit 1). Without knowing in advance the exact tenant layout, how can the Building Team know how many monitors will be required and where to place them?

Mixed-use projects containing residential units also pose an issue, because housing units usually have individual mechanical systems or controls. In an office or retail building with centralized mechanical systems, it's easier to predict tenant demand and usage, but with rental or condo units, it could be more complicated.

Similarly, trying to use energy modeling (under EA Prerequisite 2) without knowing exactly what kinds of tenants will occupy the space makes it difficult to determine their energy consumption and what mechanical load will be required. In some cases, the load on mechanical systems for certain types of tenants can be reasonably estimated, but the uncertainty of who will actually occupy the space complicates the energy modeling process.

Even the relatively simple task of determining whether tenants will have "views" (under EQ Credits 8.1 and 8.2) can be complicated, since the developer cannot predict exactly how tenants will build out their spaces. At the pre-certification level, the only way to estimate whether views are possible to achieve would be to look at the floor plate and make an educated guess, but that could be worthless if a tenant's build-out blocks the view.

In fact, the most nettlesome aspect of this particular program is figuring out where LEED-CS stops and LEED-CI takes over. In the simplest terms, LEED-CS is supposed to cover physical aspects of the building that the developer or owner control; everything else is supposed to be the tenants' responsibility. From the feedback of Building Teams in the pilot program, however, it's not always easy to draw the line between the two.

LEED-CS's "Tenant Design & Construction Guidelines" (SS Credit 9) is intended to "provide tenants with a descriptive tool that both educates and helps them implement sustainable design and construction features in their tenant improvement build-out." The guidelines are supposed to help tenants adopt green building practices in their build-outs and "help in coordinating LEED-CI and LEED-CS certifications."

To accomplish this, developers and owners of LEED-CS projects are encouraged to publish an "illustrated document" for tenants that:

- Provides a description of the green design and construction features in the core and shell of the building, the various LEED-CS credits that were achieved, how they were earned, and how these credits contribute to the building's greenness.
- Enables tenants to coordinate their space build-outs with the core-and-shell building's systems and materials.
- Incorporates "user-friendly recommendations," including examples and strategies, as well as suggestions for which products and services to use.

There has been limited experience with this credit so far. In one case, a tenant worked with the Building Team on choices for materials and finishes for the core and shell and used the same materials and finishes in its build-out. But there is a certain degree of risk to developers in prescribing too much in their tenant guidelines, lest it turn off prospective lessees. It remains to be seen how the dynamic between core-and-shell developers and their tenants plays itself out. If the experience of other LEED programs is any barometer, it will take at least another year or so before all the kinks in LEED-CS are worked out.

LEED-CS pilot projects

70 Ionia
Grand Rapids, Mich.
Rockford Development Group

One Crescent Drive
Philadelphia, Pa.
Liberty Property Trust
and Synterra Partners

East Hills Center
Grand Rapids, Mich.

Prosper Center
Beijing, China
Fountainwood Real Estate
Development Company

LeSang Mall
Harbin, China
Hadian Real Estate Development Co.

Seattle Biomedical Research Institute
Building at 307 Westlake
Seattle, Wash.
SBRI, Harbor Properties,
and Vulcan Inc.

CAN DO Corporate Center
Hazelton, Pa.
Greater Hazleton CAN DO

Harborside Office Center
Port Huron, Mich.
Acheson Ventures

One Bryant Park
New York City, N.Y.
Bank of America and
The Durst Organization

UMB Bio Park Building One
Baltimore, Md.
University of Maryland

J.P. Morgan Chase
San Francisco, Calif.
Hines

IDX Tower
Seattle, Wash.
Hines

Calpine Center
Houston, Texas
Hines

1180 Peachtree
Atlanta, Ga.
Hines

One South Dearborn
Chicago, Ill.
Hines

Since 1978, Duro-Last® Roofing, Inc. has manufactured a custom-prefabricated, reinforced, thermoplastic single-ply roofing system that is ideal for any flat or low-sloped application. Extremely durable and easily installed by authorized contractors without disruption to daily operations, the Duro-Last roofing system is also leak-proof, resistant to chemicals, fire and high winds, and virtually maintenance-free. Hundreds of millions of square feet of Duro-Last membrane have been installed on all types of buildings throughout North America.

The Duro-Last Cool Zone® roofing system reflects up to 87% of the sun's energy — delivering real cost savings for building owners and managers. The Cool Zone system can also help in obtaining credits toward LEED and LEED-EB certification. From reducing heat islands and optimizing energy performance, to resource reuse and thermal comfort, the Cool Zone roofing system can be a part of a comprehensive package for improving building performance.

The Cool Zone roofing system also complies with California's stringent Title 24 regulations. Title 24 mandates the installation of highly-reflective cool roof systems — as defined by the Cool Roof Rating Council — on new and re-roof projects for most non-residential applications, beginning in October 2005. The Cool Zone system's exceptional reflectivity and thermal emissivity will clearly play a big part in helping California reduce statewide energy consumption.

When evaluating building products, building owners, facility managers, architects and other specifiers must consider not only their "greenness," but also whether they will perform as expected. At Duro-Last, we're proud that our roofing systems pass both tests with flying colors.

Duro-Last is excited to be exhibiting at Greenbuild 2004 in Portland, and we invite you to visit us at booth 988. We're eager to demonstrate how our Cool Zone roofing system provides exceptional building protection, and contributes to effective sustainable building design.

Please contact me with questions or comments at 800-248-0280, or tholling@duro-last.com.

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

Green Buildings and First-Costs – The Controversy That Will Not Die

A key issue that seems to have a life of its own is whether green buildings in general, and LEED-certified buildings in particular, cost more to build than non-LEED structures. We wrote extensively on that topic in our 2003 White Paper, but useful information on this topic keeps flooding in.

The single most valuable new study we've seen this past year is "Costing Green: A Comprehensive Cost Database and Budgeting Methodology" (September 2004), by Lisa Fay Matthiessen and Peter Morris of Davis Langdon Adamson.[1] DLA, a cost consulting company, maintains a proprietary database of the costs of 600 construction projects in 19 states.[2] Matthiessen and Morris used this unique resource to compare the cost of 45 buildings seeking LEED certification against 93 buildings with comparable design and construction programs but which do not have sustainable goals.

Their chief conclusion: "Many projects achieve sustainable design within their initial budget, or with very small supplemental funding."

To reach this conclusion, the authors conducted a point-by-point analysis of LEED credits for the two sets of buildings, which alone is worth the price of admission. For example, they found that building owners had trouble getting a point for reducing light pollution (SS Credit 8), not only because the standards were hard to comprehend, but also because local code officials said owners had not provided enough lighting to keep building exteriors or parking lots secure. "Low-level uniform lighting can be secure, but it can be difficult to argue with a fire marshal," says Matthiessen.

Likewise, establishing an air-quality plan for the construction phase was "high on the list" of points projects tried to achieve but failed to qualify for. The most common reason: lack of coordination and management between the contractor and all members of the construction crew. To be effective in earning this point, construction must be "carefully planned and sequenced, and crew members must be carefully trained and monitored."

On the other hand, the report documents support among Building Teams for the use of waterless urinals and low-flow toilets, raised-floor systems, and low-emitting materials. Construction waste management was achieved to some degree on almost every project, although rural projects felt greater cost impacts.

Regrettably, we do not have the space to catalog all the DLA findings related to the costs of LEED points, but Building Teams are well advised to review the rich data point by point.

From their analysis of construction costs for LEED-registered projects versus those not seeking LEED certification, the DLA researchers concluded that:

- There is a very large variation in costs of buildings, even within the same building program category.
- Cost differences between buildings are due primarily to program type.
- There are low-cost and high-cost green buildings.
- There are low-cost and high-cost non-green buildings.

As for what this means with regard to the cost of going green, the authors conclude that "comparing the average cost per square foot for one set of buildings to another does not provide any meaningful data for any individual project to assess what — if any — cost impact there might be for incorporating LEED and sustainable design. The normal variations between buildings are sufficiently large that analysis of averages is not helpful."

The DLA report concludes, "There is no 'one-size-fits-all' answer to the question of the costs of green." Most of the buildings the authors studied were able to achieve their LEED certification goals without additional funding; others required more money, but only for specific features, such as installing photovoltaics. In sum, they say, the analysis suggests that "the cost per square foot for buildings seeking LEED certification falls into the existing range of costs for buildings of similar program type."

From a budgeting point of view, the DLA report recommends that Building Teams ask not how much more reaching green goals will cost, but how to do it most effectively — by starting early in the project and monitoring the situation at every step of design and construction. They recommend a four-step process:

1. **Establish team goals, expectations, and expertise.** A lot depends on how familiar your team is with the feasibility and cost impact of various LEED points. Your team must have the expertise to be

[1] *www.davislangdon-usa.com/images/pdf_files/costinggreen.pdf*

[2] *Included in the DLA database:*
Academic buildings
Animal shelters
Art galleries
Auditoriums
Classrooms
Gymnasiums
Hospitals
Laboratories
Libraries
Multipurpose rooms
Museums
Offices
Parking garages
Sports facilities
Theaters
Vivariums

able to incorporate all sustainable elements smoothly. Finally, everyone has to agree on and accept the goals and values of the project.

2. **Include specific goals in the program.** The team should prepare a LEED checklist at the start of the project and at every program stage. Specific design measures necessary to meet the project goals should be laid out and routinely monitored. Three or four "contingency points" should be included in the design, in case the project falls short of reaching a specific LEED level. Don't try to "add a point" at the end: "Those last points tend to be difficult and very expensive," the authors say.

3. **Align the budget with the program during the programming phase.** To do so, the authors suggest that you must: a) understand your starting budget; b) generate a cost model for the project that allocates dollars to specific program elements, so that you understand where costs lie (they note that the cost model itself becomes as a communication tool for the Building Team); c) allocate the money; and d) address limitations in the budget at the programming stage. Too often projects suffer from a mismatch between budget and program, either out of lack of awareness or wishful thinking on the team's part.

4. **Stay on track through design and construction.** The authors recommend you start your documentation as early as possible and maintain it as you proceed. Update and monitor your LEED checklist to see if your sustainability goals are being met and whether you will reach the LEED level you were planning for. Finally, use energy and cost models as design tools. Energy models can help you establish the design criteria you need to meet various LEED points. Cost models can help you track cost impacts resulting from design or procedural changes. Combining these tools can give you an even more robust decision-making tool.

Matthiessen says that success in green building usually depends on the Building Team's level of commitment to making the project green. "I would say categorically that if I know the client and design team, I can tell you that the cost of green will go down as their level of commitment goes up."

Green Building from the Developers' Perspective

Sounds great, but how does all this work in the go-go world of real estate?

Roger Platt, SVP and legal counsel for the Real Estate Roundtable, in Washington, D.C., says some developers have played on the value of green building as a marketing tool, pointing to such publicity magnets as the Durst Organization's Four Times Square in Manhattan. To the real estate community, "the marketing angle seems to be the easiest thing to recognize as having value — being able to brag about your green efforts," says Platt, who calls himself a "constructive skeptic" when it comes to green building.

"Can you do green building and still be successful as a developer?" he asks, then nods affirmatively. "The most savvy people, the people who can do good buildings anyway, will also be able to do good *green* buildings." But in real estate, other factors often outweigh sustainable design. "The Durst Organization could have built a mud hut at that location and it would have rented up," he says.

Since 2003, the Urban Land Institute in Washington, D.C., has been holding a series of forums (under the chairmanship of Kenneth Hubbard of real estate developer Hines) to bring the development community into closer contact with green-building groups — with mixed success. "One developer said that of the 14 million square feet he leased last year, only one customer asked about green building, and that was for 200,000 square feet," says the ULI's Michael Pawlukiewicz. "The developers know it's coming, and price is not such a big issue anymore. But the market isn't asking for it yet."

John Gattuso agrees with Pawlukiewicz that the market isn't clamoring for sustainable buildings. "We're not there today, and we may never get there," says Gattuso, SVP of urban and national development for Liberty Property Trust, a Philadelphia-based real estate investment trust that controls 58 million square feet of office and industrial property. But he adds an important demurrer: "The value may be not that it's a *LEED* building, but that it's a *quality* building. It will achieve a higher rental rate because it's a quality building."

Liberty was founded in 1972, went public in 1994, and does $200-400 million a year in development. "We're an owner operator, not a merchant builder, so we're concerned about first costs and O&M costs," says Gattuso.

In the last 18 months, he says, the REIT has determined that it cannot expect its tenants to push the envelope on green buildings, but must do so itself. "We have an obligation, because we know the industry, to build better," he says. In the process of doing that, "We will create buildings that are better, more invigorating environments, and we should produce results for our shareholders."

In the last two years, Liberty has completed an eight-story office building on an abandoned site in downtown Allentown, Pa. Designed by Robert A.M. Stern, the project earned a LEED Gold rating, in part by reducing energy usage 40% over ASHRAE 90.1-1999 and cutting potable water usage by 500,000 gallons a year. More important, the project has become an anchor in the revival of the city's downtown, with retail stores, a bank, a restaurant, and a public plaza.

Liberty has since begun development of a 500-acre mixed-use center at the Philadelphia Navy Yard, with Stern as master planner. Gattuso said the city at first balked at the idea of sustainable design, with public officials expressing concern that achieving sustainability might conflict with its economic development agenda for the site. But when Gattuso and his colleagues at Liberty demonstrated the benefits of going green, the city turned around and required that all projects in the development reach LEED Certified, or even Silver.

Gattuso says Liberty's LEED projects are experiencing 1-2% first-cost premiums, but "we're seeing energy savings of 40%." The real benefit to the REIT is the improvement in quality that results from the integrated design process. "We save on mistakes through commissioning," says Gattuso. "If we spend $300,000 on the commissioning, we probably identify $450,000 to $500,000 in mistakes that we can avoid."

Dale Stinton, chief financial officer for the Chicago-based National Association of Realtors, says he, too, sees growing interest in sustainability among owners, but adds that they have to look carefully at which green features have a payoff period that makes sense.

For a new NAR office building in Washington, D.C., Stinton approved $2.5 million in sustainable improvements, including more than $1 million for a double-glazed curtain wall. "Every green-building improvement had a payback of less than 10 years, and most were no more than five years," with annual savings of $200,000, he says. The NAR even convinced the District of Columbia to allow them to install waterless urinals, which would have been a code violation. But Stinton ruled out installing photovoltaics ("fairly costly") and a vegetated roof ("we weren't sure the building could handle the weight load"). NAR employees recently moved into the building, which is seeking certification from the USGBC.

Stinton says the association's experience with greening its own building in the Nation's Capital has had an extremely positive impact on NAR members. "We feel so strongly about it that we now have some members on USGBC committees," he says. "We see that it's got a future, and I would not be surprised to see us strongly promoting it."

'Socially Responsible Investment' Gaining Favor

The green building agenda should not be driven solely by environmental considerations, but by social and economic values as well, according to Philip Parnell, MRICS, an investment valuation partner with London-based Drivers Jonas.

"Socially responsible investment" is gaining ground in the United Kingdom, Parnell told an Urban Land Institute forum in Madrid, Spain, this past summer. The U.K. has had a minister for social corporate responsibility since March 2000 and, since that year, has required pension funds to disclose their policies on SRI. "If the pensions use property as an investment medium, they must state their social, environmental, and ethical stance," he says.

The European Union has issued a directive on energy in buildings and is developing a system of labeling commercial buildings of more than 1,000 square meters. This will make the energy component of those buildings very clear to prospective tenants or purchasers. "It would be interesting to see how that influences occupants' choices of properties, or what they would pay for rent in such buildings," says Parnell. The program is scheduled to start in 2006.

Based on his own research, Parnell says there is a significant group of financial professionals in the U.K. who believe that, within five years, sustainable design will begin to exert a positive impact on rent and yields.

Rethinking Green Building Laws At the State and Local Level

State and local green building legislative programs began sprouting up in the late 1990s, spurred by the advent of the U.S. Green Building Council's LEED green building rating system. The development of LEED for New Construction, coupled with the USGBC's efforts to encourage states, counties, and municipalities to adopt LEED as a de facto standard, prompted discussion of sustainable design and construction in an ever-growing number of jurisdictions.[1]

The goal of these legislative and regulatory programs has been to motivate Building Teams to apply green design in public or private-sector projects. Most states and local governments started by greening their own backyard, with proclamations, executive orders, and ordinances that either encourage or require sustainable design of government-owned buildings. Some provide financial or in-kind incentives to owners, such as increased floor area ratios or streamlined project approvals.[2]

Before LEED came along in 2000, state and local governments were on their own in trying to figure out what constituted a green building. "LEED helped us define what a green building is," says Robert Bennett, manager of the G/Rated Green Building Program in Portland, Ore., which got started in 1999.

LEED did provide lawmakers and public officials with a convenient and easily understood tool, and some jurisdictions simply adopted it as a mandated standard, primarily for public projects. But given LEED's inherent flaws (which are only gradually being addressed in updates to the rating system), the question of how state and local governments should best go about developing cohesive green-building programs remains unanswered.

Carrot or stick — which is more effective? Should government offer financial or other incentives for green design (the carrot)? Or should government require the private sector to meet certain sustainable standards for new construction (the stick)? Should governmental units simply adopt LEED untouched as a standard, or should they modify LEED for local use? Or would they do better to forget LEED altogether and develop their own system out of whole cloth? These questions are not easily answered, because even the most well-established green-building programs are less than five years old, and quantifiable data on their relative success is not readily available.

Last year, we recommended that "an umbrella review committee" consisting of state, county, and municipal organizations, in conjunction with NGOs, state and local USGBC chapters, and other interested parties make a detailed review of state and local policies, legislation, executive orders, regulations, and incentives, to determine: a) how effective these laws and policies have been in enhancing sustainable development, b) what improvements or refinements could be made, and c) what guidance their experience might have for others.[3]

Regrettably, we were unable to convince a national legislative organization to champion such a review. In the absence of such a study, the editors surveyed state and local government officials, developers, and members of academia involved in some of the most respected green-building programs in the country for their advice on how to develop model state and local green building programs. Here are their recommendations:

1. **Develop a resource guide to complement legislation.** As Seattle's green building program was being planned, local real estate developer Vulcan Real Estate funded the publication of the "Resource Guide for Sustainable Development"[4] before developing the company's first green project. "You need to understand the criteria — the goals, principles, strategies, and

[1] *See "State and Local Government Tool Kit" at www.usgbc.org.*

[2] *For a summary of regulatory programs in place as of late 2003, see BD&C's "White Paper on Sustainability," November 2003, pp. 22-25. www.bdcmag.com*

[3] *BD&C "White Paper," pp. 42-43.*

[4] *Available at: http://www.usgbc.org/Docs/Resources/SLU_Final_10-22-02.pdf*

Model Green-Building Legislation Concepts

1. Develop a resource guide to complement legislation.
2. Work with the design/development community to create your program.
3. Government should lead by example.
4. Don't aim too high at first.
5. Localize your program, considering climate, water, and energy issues specific to your region.
6. Customize your program to "hot" markets. In initial stages, don't try to do everything at once.
7. Offer technical assistance to Building Teams to bring them up to speed and to build the best projects possible.
8. Use scorecards to educate Building Teams and to keep count of buildings' sustainable progress.
9. Strive for an integrated design approach to development.
10. Keep your program flexible and review it regularly with stakeholders.
11. Create administrative incentives for green buildings.
12. Remove legislative, regulatory, and administrative obstacles to green building.

State and local government green-building programs

Locale	Results	Lessons Learned
Arlington County, Va. *Offers increased floor area ratio for sustainable design.*	■ Five private-sector projects working toward LEED certification. ■ Two commercial projects taking part in FAR incentive program.	■ Requiring Silver LEED certification dampened developer interest; when requirement was lowered to LEED Certified, activity picked up. ■ Requirements must be enforceable and measurable. ■ Make sure sustainable elements provide useful benefit to buildings.
Austin, Texas *Offers financial incentives for city-certified green buildings (emphasis on energy).*	■ 6,000 multifamily units since 1998. ■ 28 commercial projects completed rating since 1995. ■ 16 more in process.	■ Don't make your rating system too easy. Make it enough of a challenge for builders to give their best. ■ Green commercial buildings have been shown to be marketable. ■ General contractors must exert a strong supervisory role over subcontractors. ■ Costs more to achieve highest ratings, but cost savings can be realized at lower rating levels. ■ Review the program and procedures every two years.
Berkeley, Calif. *Private-sector program provides technical assistance for developers to go green.*	■ 30 commercial and multifamily projects built. ■ 13 other projects in various stages of design/construction.	■ Political support is critical to program's success. ■ Evaluate projects every year. ■ Emphasize technical assistance over monetary incentives.
Chicago *Green-building program requires large city-funded buildings to receive LEED certification.*	■ Green-roof program will soon result in 100 green roofs totaling 1 million sf. ■ 20-25% energy savings buildings in program. ■ Sustainable police station had no cost extras.	■ Program works best when city leads by example, demonstrating design and construction process and advantages of green design to Building Teams. ■ Removing barriers to green design expected to increase developer participation in green program. ■ Incentives are important. City offers density bonus for including green roofs in downtown buildings. Also considering expedited permitting process for green buildings.
Minnesota *Created "Minnesota Sustainable Design Guide" for voluntary use on state and county buildings. New replacement guidelines designed for use on state-funded projects, which are now required to be green.*	■ First design guide used by five counties and adopted by state Dept. of Natural Resources. ■ Guide used in Univ. of Minnesota pilot project. ■ Guide used in total of 20 public buildings. ■ Posting guide on web influenced additional projects. ■ Creation of first design guide was basis for 2004 "Minnesota Sustainable Building Guidelines," which replaces original guide.	■ Both design guides developed in conjunction with state and academia. National experts involved in development of latest guide. ■ Original guide needed more rigorous means of accounting and clearer direction about what to do. ■ Means of accounting should favor life cycle assessment tools over point-based system. ■ Regional issues should be emphasized in the program. ■ Post-occupancy evaluations of projects using original design guide important in development of 2004 guide.
New Jersey *"Affordable Green" program for single- and multifamily residential.*	■ $13 million funding 24 projects with 1,282 units in 11 cities. ■ 12 different developers. ■ In FY04 program spent $3.54 million on seven projects totaling 472 units.	■ Providing technical assistance to developers can be an effective strategy. ■ Hands-on approach throughout the development process is essential.
Portland, Ore. *Municipally funded grant program for sustainable design.*	■ Spent $800,000 over five years on 72 commercial and residential projects. ■ Metro area has 45 LEED-registered buildings, most of which are private-sector. ■ In FY05 new seniors/family residential project will contain 150 units.	■ Government agencies must work with design/development community in development of programs. ■ Take an integrated approach to green buildings. ■ Land-use issues and other functional elements (e.g., transportation) must be addressed in conjunction with green-building program.
Seattle *LEED Incentive Program provides financial incentives for attaining LEED certification. Build Green program geared toward suburban projects.*	■ Incentive program spent $273 million on 21 projects totaling 2.1 million sf. ■ 16 are LEED projects. ■ Emphasis on the multifamily market.	■ Initial learning curve may result in some cost increases early on. ■ Support from top officials in all departments is critical. ■ Base local program on the strengths of your city or region. ■ Tailor program to market activity in your area. ■ Projects require champions to drive them forward. ■ Government must provide technical assistance to Building Teams. ■ First demonstrate sustainable building to private sector. ■ Present local case studies to design/development community.

construction process — before launching a project," says Hamilton Hazlehurst, Vulcan's real estate development manager. The firm, owned by Microsoft co-founder Paul Allen, has a private-sector lab and a multifamily residence seeking LEED certification and a corporate headquarters in development. "Vulcan sees value in sustainability and in providing a resource for their development partners," says Peter Dobrovolny, the city's sustainable building coordinator.

2. **Work with the design and development community to create your program.** "Building relationships helped us tremendously in getting our program up and running," says Portland's Bennett. In nearly a yearlong process, the city worked with the design/development community to find ways to quickly facilitate development of the program. "We invited them in and asked them what the barriers to their work were and what we should be doing," says Bennett.

3. **Government should lead by example.** Progressive cities jumpstart their programs by first greening publicly owned buildings. "First, you have to walk the walk," says Lucia Athens, chair of the Seattle Sustainable Building Program's Green Building Team. "You need to demonstrate sustainable building to the design/development community if you are going to ask them to do it in the private sector."

Chicago's Sadhu Johnston, assistant to the mayor for green initiatives, agrees. "This way you start to get Building Teams on board and understanding the costs and energy expectations."

4. **Don't aim too high at first.** When developers balked at seeking a LEED Silver rating in order to obtain increased floor area ratio, Arlington County, Va., lowered its requirement to allow projects receiving a Certified rating to obtain the increased FAR. "You have to listen to the design/development community and make the necessary changes," says Joan Kelsch, environmental planner for the county's Department of Environmental Services.

5. **Localize your program, considering climate, water, and energy issues specific to your region.** In coordination with the USGBC, Portland, Ore., developed its Portland LEED rating system, a regionalized version of LEED, structured to address environmental conditions specific to the city. "What you have to address with LEED is how to regionalize and add value to strategies," says the city's Bennett. "In our case, stormwater is crucial."

The city gave emphasis to stormwater and other local values by creating pre-approved innovation points, which are specific to Portland LEED. The four points include 100% on-site stormwater management; reduced parking; 90% construction and demolition management; and the creation of a mixed-use credit. The city recently proposed a new innovation point for green building projects that use clean-emission, low-sulfur diesel-powered construction equipment.

In Minnesota, consultants advised the state to develop its own overlay of LEED in order to emphasize energy concerns, says John Carmody, director of the Center for Sustainable Building Research at the University of Minnesota. This recommendation was incorporated into the "Minnesota Sustainable Building Guidelines,"[5] completed this year in accordance with state legislation created in 2002 requiring development of guidelines for use in new state-funded buildings funded after January 15, 2004. "If you look at the guidelines of programs across the country, about 80% of them are the same, but regional issues matter," says Carmody. "There's a discomfort with a one-size-fits-all system. If you look at the path they took with LEED Canada, they were saying, 'We'll use LEED as a template, but we need to tailor it to Canada.'"

6. **Customize your program to "hot" markets. In initial stages, don't try to do everything at once.** Seattle's Athens suggests conducting an analysis of current and projected market activity. "You need to understand where the market activity is going," she says. In Seattle, officials are gearing their program toward the area's hottest markets, high-rise multifamily residential development and commercial tenant improvement.

In re-evaluating its program, Arlington County officials saw development switching from commercial to mixed-use, including a lot of high-rise residential condos. "Our program didn't really apply to multifamily," says county planner Joan Kelsch. The county's bonus density program, which initially applied only to office buildings, now is open to any large development project.

7. **Offer technical assistance to Building Teams to bring them up to speed and to build the best projects possible.** Providing technical assistance can be vital in bringing a design/development community that may be new to green design up to speed. New programs in New Jersey and Seattle are built on this premise.

The recently unveiled New Jersey Building Greener program provides technical assistance and training for developers of single-family residential, says Darren Port, director of the New Jersey Green

[5] *Available at: www.csbr.umn.edu/b3*

Homes Office, which operates the New Jersey Affordable Green program.

Seattle's Technical Assistance Group (known as the TAG Team) invites participation from a variety of city departments to offer technical services on projects. "The idea is not to take the place of green-building consultants, but to provide focused attention from city departments in ways that will save projects time and money," says the city's Dobrovolny.

Providing technical assistance gives Building Teams a knowledge base for future projects, says Rahul Young, green building coordinator for Berkeley, Calif. "By teaching them how to do this once, they won't need our assistance in the future," he says.

8. **Use scorecards to educate Building Teams and to keep count of buildings' sustainable progress.** Although it doesn't mandate that private-sector projects obtain LEED certification, Arlington County, Va., does require all projects to complete a LEED scorecard as a way of educating its design/development community and to keep track of the progress of projects. "The expectation is that most private projects will obtain 21 LEED points," says the county's Kelsch. "Once they get to 21, it's not that far to 26" (which would qualify the project for certification).

The "Minnesota Sustainable Design Guide," the predecessor to the "Minnesota Sustainable Building Guidelines," contained a scoring system that enabled the design team and building operators to evaluate building performance. Each sustainable building strategy was awarded points based on specific performance indicators. One hundred points were allocated among the strategies according to perceived environmental and human impacts, as well as priorities specific to the Minnesota region, such as an emphasis on energy efficiency. The new guide also features a scorecard element.

9. **Strive for an integrated design approach to development.** Portland's comprehensive approach to green building makes its program stand out. "Our approach to green buildings includes policies, technical assistance, and incentives," says the city's Robert Bennett. These elements are then combined with complementary forces, such as active and engaged support from politicians and residents, to create a heavily integrated approach.

"For cities with land-use policies that don't make sense, a green building program is the last thing they need," Bennett says. "They need to think more about land planning and structural elements [such as transportation], because over time, it's the integration of these elements that will be the reason for far-reaching success."

10. **Keep your program flexible and review it regularly with stakeholders.** Incorporating flexibility into a program is essential, says Arlington County's Kelsch. "Allowing the developer to choose the components that they want to include in the project makes it more palatable." To help ensure its flexibility and openness, Arlington County originally built a three-year review process into its program, but has since changed it to a five-year review. "The program is not a forever kind of thing," says Kelsch.

11. **Create administrative incentives for green buildings.** Offering a streamlined permit review for LEED-certified or sustainable buildings, technical assistance, small capital grants, assistance in working through permitting issues raised by the use of green-building systems and materials, and assistance with public relations makes Portland's program developer friendly, says Dennis Wilde, senior project manager for locally based Gerding/Edlen Development Co.

Chicago is considering offering expedited project reviews for sustainable projects. "Typically, a green building comes to us with more thought and detail" than a conventional project, says the city's Sadhu Johnston. "That should allow us to expedite the review process for projects that meet our criteria."

12. **Remove legislative, regulatory, and administrative obstacles to green building.** Chicago is realigning its building code to accommodate green design, says Johnston. Currently, the code does not allow the use of waterless urinals, and gray water systems are not addressed and thus not allowed, says Erik Olsen, a mechanical engineer with OWP/P Architects in Chicago, which put together a report for the city that catalogued the barriers. The Department of Construction and Permits has formed a committee to review new technologies, including those having to do with sustainable construction, and the city is considering the creation of a green-building code.

LEED-NC Projects by State

State	Registered Projects
California	260
Pennsylvania	100
Washington	89
Oregon	82
New York	77
Massachusetts	66
Texas	61
Michigan	60
Illinois	58
Virginia	54
Georgia	46
Arizona	43
Maryland	41
Ohio	40
North Carolina	33
New Jersey	31
Colorado	31
Florida	31
Missouri	25
South Carolina	20
Vermont	18
District of Columbia	17
Connecticut	16
New Hampshire	15
Wisconsin	15
Maine	15
Utah	14
New Mexico	13
Iowa	13
Nevada	12
Indiana	11
Arkansas	10
Tennessee	10
Hawaii	8
Minnesota	7
Nebraska	6
Idaho	6
Alabama	6
Rhode Island	6
Kansas	6
Kentucky	5
Montana	4
Wyoming	4
Alaska	4
West Virginia	4
Louisiana	4
Mississippi	4
South Dakota	3
Oklahoma	3
Delaware	3
North Dakota	2
	1512

Source: U.S. Green Building Council, October 2004

Progressive Districts Promoting High-Performance Schools

Methodology

In September 2004, Reed Research Group conducted a survey for this Progress Report among key professionals in schools and universities to understand their opinions, perceptions, and actions regarding green schools and universities.

The editors and Reed Research Group would like to thank our partners for the K-12 survey – the Association of School Business Officials International (ASBO), the Council of Educational Facility Planners (CEFPI), and the National School Boards Association (NSBA) – and our partners for the university study, the Society for College and University Planning (SCUP) and the Association of Higher Education Facilities Officers (APPA), for their generous cooperation.

This survey was conducted online, via e-mail invitation from each organization. Respondent participation per group: CEFPI, 304; NSBA, 103; ASBO, 30; SCUP, 296; and APPA, 217.

K-12 schools, coupled with the university construction market, represent the single largest sector in the nonresidential construction industry. Construction spending for educational facilities is expected to reach nearly $83 billion in 2005.[1]

Of course, educational facilities are vital not only to the construction industry, but to the communities they serve. Each day, more than 50 million children and six million adults enter the nation's public schools to learn and teach.

Yet numerous research studies suggest that much of the nation's public schools infrastructure is outdated at best. Consider that the average school building is more than 40 years old, and that student enrollment has risen for 19 consecutive years while annual school spending has remained stagnant, and there's little wonder why so many of the nation's children go to school in overcrowded, dilapidated facilities.[2]

Several progressive states and local jurisdictions are

Largely suburban public-school districts, in a variety of sizes

	Total	ASBO	CEFPI	NSBA
Suburban	53%	43%	55%	49%
Urban	28%	23%	34%	11%
Rural	20%	33%	10%	41%
Base	409	30	304	101
<2,500 students	17%	23%	8%	40%
2,500 to 7,499	24%	40%	17%	36%
7,500 to 14,999	16%	20%	18%	12%
15,000 or more	42%	17%	57%	12%
Mean	11,208	7,658	13,576	5,911
Median	11,534	5,833	15,895	3,851
Base	405	30	273	102

In the K-12 survey, suburban districts (53%) and public systems (98%) predominate, with a wide variation in student population. Please note small sample size for ASBO throughout this section.

Respondents cover school business, facilities, and policy-making roles

	Total	ASBO	CEFPI	NSBA
Architect/designer	30%	-	44%	-
School board member	15%	-	-	65%
Facilities director/ manager	11%	17%	14%	1%
Superintendent/ administrator	9%	13%	3%	27%
Construction/capital projects manager	6%	-	8%	-
School business official	5%	57%	2%	1%
Consultant	4%	-	6%	1%
Facilities designer/ planner	3%	3%	4%	2%
Engineer	3%	-	4%	-
Other	12%	10%	15%	3%
Base	435	30	302	103

Respondents' job responsibilities fall closely in line with the organizations to which they belong – business officials in ASBO, designers/planners in CEFPI, school board members and administrators in NSBA.

How familiar are you with...

...the term "sustainable design" or "green building"?

	Total	ASBO	CEFPI	NSBA
Very familiar	52%	27%	69%	12%
Somewhat familiar	30%	40%	27%	37%
Have heard of it	10%	30%	3%	24%
Never heard of it	7%	3%	1%	27%
Mean (scale of 4)	3.28	2.90	3.64	2.33
Base	435	30	302	103

...the CHPS Best Practice Manual?

Very familiar	16%	3%	22%	4%
Somewhat familiar	23%	13%	27%	13%
Have heard of it	28%	47%	25%	30%
Never heard of it	33%	37%	26%	53%
Mean (scale of 4)	2.22	1.83	2.45	1.67
Base	435	30	302	103

...LEED?

Very familiar	42%	17%	57%	8%
Somewhat familiar	26%	33%	29%	17%
Have heard of it	12%	27%	8%	21%
Never heard of it	19%	23%	6%	54%
Mean (scale of 4)	2.92	2.43	3.37	1.78
Base	434	30	301	103

CEFPI members displayed the highest level of familiarity with sustainability, CHPS, and LEED among the three groups surveyed.

How would you describe the level of expertise about green buildings in your school district?

	Total	ASBO	CEFPI	NSBA
Very experienced	19%	3%	25%	7%
Somewhat experienced	42%	43%	47%	27%
Not much experience, but interested	27%	30%	23%	39%
No experience/ no interest	12%	24%	5%	27%
Mean (scale of 5)	3.66	3.20	3.90	3.10
Base	435	30	302	103

Most respondents (61%) said their school districts have some experience in green building, with another large group (27%) expressing interest.

[1] *Source: U.S. Commerce Department, from data compiled by Jim Haughey, PhD, Senior Economist, Reed Business Information.*

[2] *"Rankings & Estimates: Rankings of the States 2003 and Estimates of School Statistics 2004," National Education Association, May 2004.*

rethinking the way schools are designed and operated. They are adopting policies, programs, and practices as part of new construction and modernization programs that promote the development of "high-performance" schools. The ultimate goal is to create healthier and more effective learning environments that are less expensive to operate, minimize impact to the environment, and, most important of all, support and promote the education process.

California is leading the way in high-performance schools. In late 1999, with the approval of a statewide $6.7 billion K-12 construction program, several state agencies formed a partnership with utility companies and nongovernmental organizations to coordinate their separate "green" initiatives for schools. This partnership led to the formation of the Collaborative for High Performance Schools (CHPS), a nonprofit entity that has created materials, training programs, design criteria, and a rating system to help designers and school officials build high-performance, or "HP," schools.

The CHPS model, which is loosely based on the USGBC's LEED criteria but geared toward schools, has become the preeminent HP school design and rating system in the U.S. The program has been adopted by a half-dozen school districts across California, including the Los Angeles Unified School District, which has built or modernized more than 20

What level of consideration should be given to green design when a major project is being contemplated?

		Total	ASBO	CEFPI	NSBA
4-5	Top 2	81%	90%	82%	77%
3	Mid-range	14%	10%	14%	15%
1-2	Bottom 2	5%	-	4%	8%
Mean (scale of 5)		4.17	4.43	4.19	4.04
Base		433	30	301	102

All three groups of respondents showed a high level of support for sustainability in school construction.

Do green school buildings cost more to build?

	Total	ASBO	CEFPI	NSBA
Yes, but they're worth it	51%	47%	60%	28%
Yes, and they're not worth it	13%	17%	14%	8%
Green schools not more costly	10%	3%	12%	5%
Not sure	26%	33%	14%	59%

While the majority of respondents (51%) see sustainability as worth any construction premium (and another 10% see no added cost), a substantial group (26%) just aren't sure about additional first costs.

What initial cost differential would be acceptable to your district to get a green school?

	Total	ASBO	CEFPI	NSBA
Up to 5%	37%	10%	39%	39%
Up to 10%	29%	43%	30%	24%
Up to 15%	6%	10%	7%	3%
Up to 20%	5%	7%	3%	9%
>20%	1%	-	1%	2%
Mean	6.78	8.95	6.41	7.32
Median	6.26	8.31	6.02	5.50
Base	416	30	291	95
Not acceptable at any cost	14%	7%	14%	14%
Green buildings do not cost more to build	8%	23%	7%	8%

Surprisingly, school business officials showed the greatest support for paying extra (8-9%) for green schools. However, the small sample size for ASBO should be noted.

Have you incorporated sustainability into recent school designs?

	Total	ASBO	CEFPI	NSBA
Yes, quite extensively	21%	13%	26%	8%
Yes, somewhat	49%	40%	53%	38%
No, but we plan to do so	11%	17%	12%	5%
No	20%	30%	9%	50%
Base	437	30	304	103

The overwhelming majority of school districts (81%) have used sustainable design or plan to do so, according to respondents.

If you have used sustainable design in building projects, has it improved student performance?

	Total	ASBO	CEFPI	NSBA
Yes, quite extensively	21%	13%	26%	8%
Yes	38%	44%	41%	18%
No	5%	-	3%	14%
Don't know/Not sure	58%	56%	56%	68%
Base	296	16	236	44

The case for improved student performance in green schools has not been made, judging from these results, but anecdotal evidence is intriguing. One respondent wrote, "Standardized test scores rose fairly dramatically" after a year at one high-performance school.

Can green buildings serve as a teaching tool?

	Total	ASBO	CEFPI	NSBA
Yes	75%	73%	80%	61%
No	3%	-	3%	3%
Not sure	22%	27%	17%	36%
Base	433	30	301	102

Three-fourths of respondents (75%) see green schools as learning laboratories. "The science behind the design allows for real-world examples of innovation and cost effectiveness for students, staff, and community," said one school board official.

facilities using the CHPS criteria. Several states, including Massachusetts and Washington, are currently adapting CHPS to fit their school districts. HP school programs in Wake County, N.C.; Elk River, Minn.; Edmonds, Wash.; and New Jersey also have incorporated elements of sustainable design into their respective school building programs.[3]

With this background in mind, what are the public policy issues related to sustainability in the K-12 schools construction market? What are the obstacles and challenges to implementing high-performance schools programs, and what lessons learned can be learned from successful programs?

Two of the biggest obstacles to HP school

12 steps toward a high-performance school program

What does it take to implement a high-performance school initiative? Consultant John Zinner offers the following suggestions based on his experience implementing the CHPS program within the Los Angeles Unified School District:

1. Give CHPS precedence over other rating programs. Zinner favors CHPS over LEED for schools districts, as long as safeguards are put in place to ensure that the program is implemented. CHPS includes almost every LEED criteria relevant to schools. Many criteria have been modified to meet school needs. Criteria relevant to schools, such as acoustical performance, have been included in CHPS but do not exist in LEED. CHPS is also less expensive to implement because the paperwork requirements are much less onerous than LEED's.

2. Establish specific requirements for all projects. A CHPS program will be most successful if a school district analyzes the criteria and mandates those that it feels are important. CHPS has identified priorities with which most districts will probably agree, including daylighting, energy efficiency, and indoor air quality. First identify priorities and criteria that can be easily claimed. Use the CHPS scorecard to keep track.

3. Establish a goal for every project beyond the district's CHPS baseline. Every design team should be required to achieve a specified number of points in addition to the criteria mandated for all projects, even if the district minimum is at or above the CHPS 28-point minimum threshold.

4. Avoid the point game. Be aware that CHPS (and LEED) can all too easily become a point game in which the reasons for implementing the program, as well as its effectiveness, get lost.

5. Include CHPS funding in bond measures. To meet CHPS criteria typically costs more, although this increase is almost always offset by long-term dollar savings and benefits to students and staff. Soft costs make up most of the increase, including higher design fees, energy modeling, and commissioning. These costs should be incorporated into school bond measures to make sure they are in the budget.

6. Centralize implementation. Assign specific responsibility and authority for developing and implementing a CHPS program. With so many staff claiming responsibility for facilities, the path is open for a CHPS program to become disjointed or simply lost in the bureaucracy. Also, establish a process for resolving conflicting priorities over health and safety, energy efficiency, acoustics, and other building-related factors.

7. Utilize all available free assistance. Technical and financial assistance from utility companies, NGOs, and government agencies can be a godsend. Include such entities in a support or advisory committee.

8. Provide training. Architects, engineers, project managers, contractors, and facilities planners may be unfamiliar with the intricacies of HP schools. Training is imperative.

9. Track the results. It's impossible to prove that a CHPS initiative is successful without tracking the results. Collect and review all the scorecards, load the information into summary matrices, and require proof of implementation from project managers, contractors, and others in the construction process.

10. Educate students about the special nature of their schools. High-performance schools offer many opportunities to educate students about good design, the environment, healthy spaces, and the important role of occupants in building performance. Implement programs to educate students on such features as energy efficiency, water conservation, and the use of landscaping to moderate local climate conditions.

11. Maintain the benefits. The advantages of sustainable design can be lost if schools are not properly maintained or toxic cleaning supplies are utilized. Use CHPS's "Best Practices Manual: Volume IV, Maintenance & Operations."

12. Reconsider compliance self-certification. CHPS is self-certifying, to simplify the process and make it less expensive to implement. While these goals are justifiable to some extent, it is all too easy for high-performance strategies to be value engineered out of projects. Require that at least a minimal level of proof that what was built actually performed as designed. Commissioning can serve as the foundation.

initiatives are a shortage of funding and the related need to overcome entrenched attitudes about priorities for constructing public schools. (Note: While the following discussion focuses on public schools, many of the issues apply as well to universities and colleges.)

As the accompanying charts show, school business officials (47% of ASBO respondents) and school board members (28% of NSBA respondents) are less inclined to believe that HP schools are worth any possible added cost than are facilities planners (60% of CEFPI respondents).

Budget-conscious school officials and board members are also relatively unaware of sustainable design. As our research shows, while 27% of ASBO respondents were "very familiar" with the term, only 12% of NSBA respondents were, vs. 60% of CEFPI respondents. They were even less familiar with specific programs such as CHPS (17% of NSBA respondents and only 16% of ASBO respondents were even "somewhat familiar" with CHPS, vs. 49% for CEFPI respondents) or LEED (17% "very familiar" at ASBO, 8% at NSBA, 57% at CEFPI).

To overcome this information shortfall among those holding the pursestrings, CHPS provides educational materials and seminars aimed specifically at California school district officials.[4] The organization is also creating a "roadmap" to help school districts implement HP schools initiatives.

CHPS encourages school districts to employ an integrated design approach, embrace life cycle cost analysis, and apply for grants and incentives from utilities, government agencies, and NGOs to help offset some of the additional costs for HP schools, which CHPS estimates to be 1-2% of a project's budget. (Massachusetts Technology Collaborative reports cost premiums of 2-4% on the 16 projects participating in its Green Schools Initiative pilot program, which uses CHPS criteria.)

In many cases, school officials are quick to question additional upfront costs, reluctant to slow down tight planning and construction schedules, and are not entirely sold on the notion that HP schools will lead to gains in student performance or teacher productivity. Some school officials discount the findings of research studies relating sustainable design to improved test scores[5] as "too good to be true" and are looking for additional data in this area. (More on this in the Action Plan.)

BD&C's exclusive survey of 437 school officials, school board members, and facilities personnel show that 37% of respondents agree that sustainability is worth a construction cost premium of up to 5%, while another 29% would accept a premium of 10% for green schools. But 26% of respondents are "not sure" about the value of additional first costs for green schools, while another 13% say HP schools cost more to build and aren't worth the added cost.

In some state and local districts, funding policies can undermine HP initiatives, especially when they involve additional up-front cost. California allows local school districts to retain any savings in state funding on projects that come in under budget (the state generally funds 50% of new construction projects). As a result, Building Teams are having a tough time "selling" innovative systems and materials with higher first costs, particularly for non-energy-related features, even on the basis of life cycle costing.

Complicating this situation is the fact that many school districts have separate budgets for capital and operating expenditures. Even when Building Teams can document long-term savings and reasonable paybacks on advanced technology and systems (through energy modeling and life cycle analysis), they can run into trouble trying to sell these concepts to school boards and the public.

Experts agree that it takes a "champion" within the school district to see past the bureaucracy, and to spearhead the effort in informing and educating the school boards and communities. One superintendent challenged his assistant superintendents for facilities and operations to co-mingle the two budgets. School officials at LAUSD addressed backlash over first-cost issues by mandating the use of CHPS criteria, modifying district design guidelines to include more "baseline" CHPS criteria, and requiring projects to apply for grants and incentive programs.[6]

Education and training must go beyond school district officials to reach all the key stakeholders in school construction industry, including design and construction firms. Designers need to be proficient in the tools and techniques commonly used with HP schools, including energy modeling, life cycle costing, and nontraditional building technologies. Likewise, contractors need to know how to specify, build, and commission these facilities within budgets and schedules.

In some cases, the program criteria can be quite complicated, requiring a substantial investment in time and resources to understand and implement. Many architects and consultants that have dealt with the CHPS process recommend providing resources such as model specifications and materials lists, and eliminating referrals to third-party documents.

[3] *For an excellent review of the legal aspects of these programs, see "Building Healthy, High Performance Schools: A Review of Selected State and Local Initiatives," Tobie Bernstein and Zacharay Lamb, Environmental Law Institute, Washington, D.C., September 2003. www.eli.org*

[4] *"Best Practices Manual: Volume I, Planning," Collaborative for High Performance Schools, 2002.*

[5] *"Daylighting in Schools: An Investigation into the Relationship Between Daylight and Human Performance," Heschong-Mahone Group, 1999.*

[6] *"Building Healthy, High Performance Schools," Washington, D.C., September 2003.*

THE CARPET AND RUG INSTITUTE

The Carpet and Rug Institute (CRI) is the source for balanced facts and insight into how carpet and rugs can create a better environment — for living, working, learning, and healing.

CRI is the national trade association representing the carpet and rug industry. Headquartered in Dalton, Georgia, the Institute's membership consists of manufacturers representing over 95 percent of all carpet produced in the United States, and suppliers of raw materials and services to the industry.

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. We will make continuous progress toward the aspirational goal of no accidents, injuries, or harm to the environment and publicly report our health, safety, and environmental performance through the CRI Sustainability Report.

When it comes to sustainability, it is vital to look at each of three components: environmental, social, and economic. CRI and its membership think of it as a three-legged stool, each leg equally important in maintaining not only a balance, but a functional structure.

Ours is an industry that accepts its responsibility as a corporate citizen willing to actively contribute to a sustainable future. We support and embrace the Green Building movement, and are working hard on a unified "green" carpet standard that will ensure our responsibility as good market stewards. Ours is a very competitive industry, yet it demonstrates extraordinary unity and common ground when it comes to that journey toward a sustainable world.

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.

We can all be justifiably proud that CRI member companies 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.

Programs like the Carpet America Recovery Effort (CARE) (www.carpetrecovery.org) and Green Label are practical, working programs that will positively impact our environment.

Find out more about our sustainable efforts as well as our remarkable product by visiting our website www.carpet-rug.org.

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

Lack of training and technical assistance for school facilities personnel regarding operations and maintenance of HP schools has also been a challenge, according to architects that have worked on HP school projects. Facilities designed to exceed local or state energy codes by 15% or more often incorporate nontraditional mechanical/electrical and building technologies, including cool roofs, ground-source heat pumps, and thermal displacement ventilation. Without proper training on O&M of these technologies, energy performance may potentially be jeopardized. Facilities staff should be included periodically in project planning meetings, starting with the schematic design phase. The CHPS board recently released a best practices manual for maintenance and operations.[7]

Developing and implementing HP schools can require a tremendous amount of staff time and money — resources that budget-strapped states and local school districts rarely have. Successful initiatives, such as CHPS in California and the Green Schools

Sustainable design gaining ground in the halls of academe

Respondents' institutions: Mostly public, urban, four-year, and big

	Total	SCUP	APPA
Urban	46%	48%	42%
Suburban	26%	22%	31%
Mixed/multiple locales	15%	16%	13%
Rural	13%	13%	13%
Base	485	269	216
Public	69%	70%	67%
Private	31%	30%	33%
Base	480	263	217
Four-year	90%	88%	92%
Two-year	10%	13%	8%
Base	459	248	211
<2,500 students	13%	10%	16%
2,500 to 7,499	19%	20%	17%
7,500 to 14,999	22%	21%	24%
15,000 or more	46%	48%	43%
Mean	12,225	12,567	11,831
Median	13,606	14,422	12,806
Base	467	250	217

Most respondents represent large urban, four-year universities and colleges.

Respondents cover range of design and facility responsibilities

	Total	SCUP	APPA
Facilities director/manager	35%	11%	66%
Architect/designer	17%	28%	2%
Institutional administrator	16%	22%	7%
Facilities planner	9%	14%	2%
Construction/capital projects manager	9%	9%	8%
Facilities O&M staff	4%	1%	9%
Consultant/IT staff	4%	7%	-
Engineer	3%	2%	4%
Institutional official	3%	5%	1%
Base	504	289	215

More than three-fourths (77%) of APPA respondents performed facilities functions; 42% of SCUP respondents were designers or facilities planners.

How familiar are you with the term 'sustainable design" or 'green building'?

	Total	SCUP	APPA
Very familiar	68%	78%	55%
Somewhat familiar	26%	17%	39%
Have heard of it	5%	4%	6%
Never heard of it	1%	1%	-
Mean (scale of 4)	3.62	3.72	3.49
Base	511	294	217

How familiar are you with LEED?

	Total	SCUP	APPA
Very familiar	50%	61%	36%
Somewhat familiar	33%	20%	51%
Have heard of it	10%	10%	10%
Never heard of it	6%	9%	3%
Mean (scale of 4)	3.28	3.34	3.20
Base	510	294	216

Respondents see themselves as very familiar with "green building," somewhat less so with LEED.

How would you describe the level of expertise about green buildings at your institution?

	Total	SCUP	APPA
Very experienced	18%	25%	9%
Somewhat experienced	41%	40%	42%
Not much experience, but interested	31%	26%	38%
No experience	10%	10%	11%
Mean (scale of 4)	3.64	3.78	3.46
Base	508	293	215

College and university planners (SCUP) and higher education facilities officers (APPA) showed a high degree of familiarity with the term "sustainable design" (68% "very familiar") and with LEED (50% "very familiar"). Most (59%) see their institutions as at least "somewhat experienced" when it comes to expertise in sustainability. "Students definitely increase their incidental use of 'green' facilities over non-green facilities," said one SCUP respondent. One said students are "more motivated to enroll at 'green' institutions," while yet another stated, "Students are more conscious of recycling, not wasting energy, keeping areas clean, and shutting off the lights."

[7] *"Best Practices Manual: Volume IV, Maintenance & Operations," Collaborative for High Performance Schools, 2004.*

Initiative in Massachusetts, are the fruit of public-private partnerships of state agencies, utilities, and NGOs. By pooling their resources, these programs have been able to offer more in the way of education, technical assistance, and even grants for pilot projects or energy-efficiency measures.

Finally, while dozens of high-performance schools have been completed throughout the U.S., little hard data has been collected on the physical performance of these buildings. Most funding, by way of grants and incentives, focuses on the planning, design, and construction of schools. School districts don't want to pay extra for metering to determine whether the systems are saving energy. Commissioning and monitoring efforts are practically nonexistent.

Assessment of completed projects is crucial not only to determine whether HP school program criteria need to be changed, but also to evaluate more accurately whether high-performance schools produce healthier, more successful students.

What level of consideration should be given to green design when a major project is being contemplated?

	Total	SCUP	APPA
4-5 Top 2	82%	87%	74%
3 Mid-range	13%	9%	18%
1-2 Bottom 2	6%	4%	8%
Mean (scale of 5)	4.18	4.35	3.96
Base	510	294	216

Both SCUP and APPA respondents said green design deserves strong consideration in the design of campus buildings, with few (6% of total) at the low end of the scale.

Do green buildings cost more to build?

	Total	SCUP	APPA
Yes, but they're worth it	57%	62%	51%
Yes, and they're not worth it	13%	7%	21%
They're not more costly	11%	15%	7%
Not sure	18%	16%	21%

Most respondents saw sustainable buildings as worth any extra cost, although a substantial group (18% of total) were uncertain about any added cost.

What initial cost differential would be acceptable to your institution to get a green building?

	Total	SCUP	APPA
Up to 5%	45%	42%	50%
Up to 10%	25%	28%	20%
Up to 15%	6%	6%	7%
Up to 20%	4%	3%	5%
>20%	1%	1%	1%
Mean	6.35	6.42	6.28
Median	4.60	4.84	4.34
Base	487	276	211
Not acceptable at any cost	9%	8%	11%
Green buildings do not cost more to build	9%	12%	5%

A remarkably high percentage of SCUP and APPA respondents said their institutions would pay about 4-6% extra for sustainability.

Have you incorporated sustainability into recent building designs?

	Total	SCUP	APPA
Yes, quite extensively	21%	26%	14%
Yes, somewhat	49%	47%	53%
No, but we plan to do so	13%	11%	16%
No	16%	15%	18%
Base	513	296	217

Seventy percent of respondents' institutions had used sustainable concepts in at least some building designs. Another 13% planned to do so.

If you have used sustainable design in building projects, has it improved student performance?

	Total	SCUP	APPA
Yes	19%	25%	9%
No	12%	9%	16%
Don't know/Not sure	70%	66%	76%
Base	350	210	140

Whether sustainable design aids student performance remains largely unproven to the great majority (82%) of respondents. Some attributed greater energy, enthusiasm, and morale among students to green building.

Can green buildings serve as a teaching tool?

	Total	SCUP	APPA
Yes	79%	80%	77%
No	4%	3%	4%
Not sure	17%	16%	19%
Base	512	295	217

Nearly four-fifths (79%) of SCUP/APPA respondents said they believed in the educational benefits of green building. An APPA member said students will learn "how good design choices can lead to buildings that serve program goals, provide a healthy place to learn, and minimize environmental damage." Having functioning green buildings on campus is particularly helpful in teaching engineering and architecture students, "far more effective than pointing to a concept in a textbook," another APPA respondent said. A SCUP member said, "By learning how it functions, maintaining sustainable habits of behavior, and interacting with the building in appropriate ways, students will become educated consumers of their environment."

Green Building Comes Home

While this Progress Report is directed primarily at the nonresidential construction market, the $355 billion single-family housing market, coupled with $44 billion in multifamily housing, cannot be ignored. Homes represent well more than half (59%) of total building construction spending in the U.S.[1] Among respondents to our exclusive survey of *BD&C* recipients, 36% work at firms that do at least some residential construction.

Green construction in the residential market has, for the most part, blossomed at the local level. In the past decade, more than 30 green builder programs sponsored by utilities, municipalities, states, nonprofits, manufacturers, and local homebuilder associations (HBAs) have certified more than 30,000 homes (see chart).

HBA programs vary in size and scope. Most involve a checklist of factors related to energy usage, waste

[1] *Source: U.S. Commerce Department, from data compiled by Jim Haughey, PhD, Chief Economist, Reed Business Information.*

Residential Green-Building Programs

Locale ***Program name*** Year established	# of homes built	# of builders involved	Criteria/Notes	Certification method
Denver *Built Green* *Colorado Home Builders Assn. of Metropolitan Denver* 1995	23,722	110	Must meet a minimum energy requirement and attain at least 70 points (of a possible 833) from a checklist that covers energy, materials, IAQ, and resource conservation.	Mix of self-certification and third-party inspection (5% of all homes are inspected).
Atlanta *EarthCraft House* *Greater Atlanta Home Builders Assn. and Southface Energy Institute* 1999	1,780	130	Need at least 150 of a possible 489 points for certification, including a minimum of 75 points in energy measures (Energy Star-equivalent). Categories: site work, energy, resource efficiency, waste management, IAQ, water conservation, homebuyer education, and builder operations. Heavily focused on energy efficiency. Recently expanded its program to cover Georgia, South Carolina, Tennessee, and Alabama. Also provides checklists for remodeling, multifamily, community development, and affordable housing.	Each house is inspected by a program inspector.
Austin, Texas *Austin Green Building Program* 1990	4,200	400	Must meet prerequisites for city energy code and low-VOC paints and achieve at least 40 of 274 possible points. Checklist covers energy, materials, water conservation, IAQ, and site work. Homes certified on a one- to five-star level. City also has programs for commercial, multifamily, and municipal building.	Self-certification.
State of Wisconsin *Wisconsin Green Built Home* 1999	1,623	42	Need at least 50 of 232 possible credits for certification, including an Energy Star home rating (17 credits) and minimum credits in site work (3), materials (4), IAQ (5), and waste management (1).	Initial plan review and random site visits of at least 10% of registered homes.
Frisco, Texas *Frisco Green Building Program* 2001	2,996	155	Program is code-mandated. Residential building permit applicants are required to meet Energy Star homes criteria for energy efficiency and 21 additional criteria pertaining to water conservation, IAQ, and waste recycling.	Independent, third-party inspection.
Seattle metro area *Built Green of King and Snohomish Counties* 2000	5,000	75	Must meet state/local code and standards for energy, IAQ, water conservation, and stormwater management; prepare a jobsite recycling plan; and earn minimum credits from the checklist (site work, waste management, materials, energy, IAQ, and O&M). Homes certified on a one- to five-star level. Also offers checklists for remodeling, multifamily, and community development projects.	Third-party verification is optional for one-, two-, and three-star certification; required for four- and five-star ratings.
State of California *California Green Builder Program* *California Building Industry Assn.*, 2001	1,400	4	Must exceed Title 24 energy code by 15%; meet Energy Star criteria for air quality; divert 50% of job site waste from landfill; and decrease water consumption by 25%. HBA negotiates with local jurisdictions on behalf of builder to offer incentives, such as faster plan checks and lower permit fees.	Independent, third-party inspection.

management, site work, water conservation, and indoor environmental quality. Builders that attain a sufficient number of credits can label their homes green, thus benefiting from market differentiation, positive public image, and improved relations with local government officials (who control zoning, construction permits, and building codes). For homebuyers, these programs can add up to savings in utility costs and reduced mortgage rates through special green mortgage programs offered by lenders such as Fannie Mae and SunTrust Mortgage.

Participation in most HBA programs is voluntary. Boulder, Colo., and Frisco, Texas, are among the few cities that have code-mandated green standards, where builders must show how their houses will earn enough credits to be certified before the city will grant them building permits. Pleasanton, Calif., is considering similar code requirements.

The most successful green-homes programs have proven to be those that work closely with local homebuilder associations to ensure that green homes can be both affordable to the consumer and profitable for the builder. The guidelines must be flexible enough to allow builders to meet reasonable criteria

Residential Green Building Programs

Locale ***Program name*** **Year established**	**# of homes built**	**# of builders involved**	**Criteria/Notes**	**Certification method**
Santa Barbara County, Calif. *Santa Barbara Innovative Building Review Program* 1995	1,000	100	Must exceed Title 24 energy code by a certain percentage and attain additional credits from a checklist (energy, site work, materials, IAQ, structure, and water conservation). Target 1 rating is 20% above Title 24, plus five points; Target 2 is 30% above Title 24, plus 12 points; Target 3 is 40% above Title 24, plus 30 points. Incentives to participating builders include expedited plan checks and a 50% reduction on the energy plan-check fee. Free consultation to builders.	Mix of self-certification and review of plans by program manager.
Boulder, Colo. *Boulder Green Points Program* 1996	3,000	200	Program is code-mandated. Residential building permit applicants are required to comply with the program for new construction, additions, and remodels more than 500 sf. Must attain a minimum amount of points based on square footage (50 points for new homes up to 1,500 sf, 65 points for homes between 1,501 and 2,500 sf, etc.). Categories: waste management, materials, water conservation, framing, energy, and IAQ.	Mix of self-certification and city inspection.
Tacoma-Pierce County, Wash. *Built Green* *Master Builders Assn. of Pierce County,* 2003	400	19	Must meet state code for energy, IAQ, and water conservation and earn minimum credits from a checklist (site work, waste management, materials, energy, IAQ, and O&M). Homes certified on a one-, two-, or three-star level.	Self-certification checklist.
Kitsap County, Wash. *Built Green Kitsap* *Home Builders Assn. of Kitsap County* 1997	700	22	Must meet state/local code and standards for energy, IAQ, water conservation, and stormwater management, and earn minimum credits from a checklist (site work, waste management, materials, energy, IAQ, and O&M). Homes certified on a one-, two-, or three-star level. Also offers checklists for remodeling, developing, and light commercial construction.	Self-certification checklist. No inspection required.
Scottsdale, Ariz. *Scottsdale Green Building Program* 1998	371	99	Must meet 26 prerequisites, including increased insulation and thermal-rated windows, and achieve 26 points from the checklist for an Entry Level rating, 56 points for Advanced Level. Checklist (total of 368 points) covers site work, energy, IAQ, materials, waste management, and water conservation.	Inspection during and after construction by a city inspector.
Pacific Northwest *Earth Advantage* *Portland General Electric* 1999	2,207	128	Must surpass state energy code by 15% and earn 50 points each in energy credits (of 381 possible), IAQ (of 548), resource efficiency (of 524), and environmental responsibility (of 520). Offers a Gold rating for homes that far surpass minimum criteria for IAQ, energy, or resource conservation, and a Platinum rating for homes that meet all three criteria. Also covers remodeling and commercial construction.	Inspection by an Earth Advantage inspector.
Clark County, Wash. *Built Green Program* *Building Industry Assn. of Southwest Washington* 1999	60	18	Must meet state code for energy, IAQ, and water conservation; prepare a jobsite recycling plan; use at least one recycled-content building product; and earn minimum credits from the checklist (site work, waste management, materials, energy, IAQ, and O&M). Homes certified on a one-, two-, or three-star level.	Self-certification checklist.

without reinventing the wheel — or pricing green homes out of the market. Many programs train builders in cost-effective sustainable construction methods and the subtleties of marketing green homes.

Many HBA programs offer hundreds of possible credits with few or no prerequisites other than an energy component. To earn a green certification in Atlanta's Earth Craft House program, for example, builders must attain 150 of 489 possible points, 75 of which are required to meet the program's energy-efficiency measures; thus, builders can pick from among 414 other credits to gain the 75 additional credits they need to earn certification. In other words, not the highest standard, but a significant improvement over conventional housing design and construction, especially with regard to energy savings.

Some HBA programs provide incentives to encourage builders to participate. The California Building Industry Association negotiates with local jurisdictions to find ways to offset the additional costs builders assume to participate in its Green Builder Program, which requires homes to exceed the state's stringent Title 24 energy code by 15%. Lower permits fees, faster plan checks, priority field inspections, and

Residential Green Building Programs

Locale ***Program name*** **Year established**	**# of homes built**	**# of builders involved**	**Criteria/Notes**	**Certification method**
Portland, Ore. *G/Rated Green Building Incentive Program* 2001	26	26	Builders earn points from a checklist that covers site work, energy, water conservation, materials, IAQ, and O&M. Projects are inspected and jury-reviewed before certification. Also covers commercial construction.	Self-certification checklist.
State of Florida *Florida Green Home Designation Program* *Florida Green Building Coalition* 2001	77	40	Must obtain 200 of a possible 400 points, including a minimum in energy, site work, water conservation, IAQ, materials, and disaster mitigation. Builders can make up point deficiencies by adding the deficiency to the total minimum score of 200. Energy efficiency represents one-half of minimum point requirement. Offers checklists for light commercial construction and land development. Extra credit point awarded for disaster mitigation measures.	Mix of self-certification and inspection by an FGBC-accredited certifying agent.
Grand Rapids, Mich. *Green Built Program* *Home & Building Assn. of Greater Grand Rapids* 2002	14	14	Must meet Energy Star home requirements, plus 40 additional points from a checklist, which covers site work, water conservation, structure, and waste management.	Independent auditor completes and verifies the checklist.
Kansas City, Mo. *Build Green Program* *Home Builders Assn. of Greater Kansas City* 2002	9	12	Must earn a minimum number of points from a checklist (site work, energy, materials, IAQ, and recycling). Offers Bronze, Silver, Gold, and Platinum ratings, based on number of minimums and total possible points.	Self-certification.
Arlington County, Va. *Green Home Choice* 2003	12	5	Must earn at least 175 points from a checklist, including a minimum of 75 points in energy measures. Categories: site work, energy, IAQ, materials, waste management, and water conservation. County offers incentives to buildings, including faster plan reviews. Based on Atlanta's EarthCraft House program.	Each house is inspected by an program inspector.
Aspen/Pitkin County, Colo. *Efficient Building Program* 2003	50	45	Must meet several prerequisites, including waste management and air-tight ductwork, and attain at least 10% of total possible points for Level 1 ranking; 26% for Level 2; 51% for Level 3; and 76% for Level 4.	Mix of city inspection and self-certification.
State of Hawaii *Hawaii BuiltGreen* *Building Industry Assn. of Hawaii,* 2003	NA	NA	Must meet 21 prerequisites (job-site operations, water conservation, air conditioning, pest control, ventilation, and O&M) and earn minimum credits from checklist (569 possible credits). Homes certified on a one-, two-, or three-star level.	Self-certification.
Memphis, Tenn. *EcoBuild* *Memphis Light, Gas and Water,* 2003	13	4	Must surpass county energy code by 30%, and meet 28 prerequisites from a checklist that covers energy, water conservation, IAQ, materials, and community.	Review of plans and inspection during and after construction by third-party inspector.

complimentary advertising are among the extras that nearly 100 jurisdictions provide builders to offset these added costs. Of course, there are those who say that green programs should be strictly market-driven and not rely on government incentives.

One of the most crucial components of successful HBA programs has proven to be independent, third-party inspection of homes during and after construction. Post-construction inspection keeps builders on their toes and lends credibility to the program among consumers and local government officials. However, inspection can also add more than $400 to the cost of a home — and most builders pass that cost along to homebuyers.

Some HBA programs try to mitigate this cost by allowing the builder to certify a development based on inspecting only a small sample of homes, while other programs permit builders to self-certify their homes. Needless to say, these looser certification policies cast doubt on the credibility of the HBA programs in question.

At the national level, EPA's Energy Star program has grown exponentially in the past five years, with more than 250,000 homes certified. EPA certified 111,000 homes in 2003 (roughly 6% of all

Residential Green Building Programs

Locale ***Program name*** **Year established**	**# of homes built**	**# of builders involved**	**Criteria/Notes**	**Certification method**
San Antonio *Build San Antonio Green* *Metropolitan Partnership for Energy and Greater San Antonio Builders Assn.* 2004	2	14	Must meet 21 prerequisites, including low-flow fixtures and thermal-rated windows, and attain a certain number of credits from a checklist (materials, IAQ, energy, site work, and water conservation).	Random inspection and plan checks by MPE and GSBA staff.
State of Vermont *Vermont Builds Greener* *Vermont Energy Investment Corp.* 2003	15	15	Must meet 54 prerequisites, including Energy Star certification, and earn at least 100 of 430 points in a checklist (site work, building design, durability, energy, resource management, IAQ, and O&M). Extra points awarded to houses that are below average in size and subtracted for houses that are larger than average.	Review of plans and inspection by program manager.
State of North Carolina *NC HealthyBuilt Homes* *Western North Carolina Green Building Council* 2003	6	10	Must meet eight prerequisites, including state energy code and low-flow plumbing fixtures, and achieve at least 150 points from a checklist with minimums in each category (site, water, energy, IAQ, materials, and community). Program awaiting funding.	Independent, third-party inspection.
Alameda County, Calif. *Green Points Program* 2003	750	7	Must earn at least 10 points from each of three categories (IAQ, energy, and resource efficiency) and 20 additional points from any category. Project obtaining 60 points or more can earn a Gold rating. Also offers a program for remodeling and multifamily. City of Pleasanton has adopted the program.	Self-certification.
State of Arizona *I-Built* *Northern Arizona Building Assn.,* 2003	0	10	Checklist under development, to be completed by end of 2004.	Mix of self-checklist and third-party inspection.
State of New Jersey *N.J. Affordable Green Program* 1998	27	12	Must meet more then 20 prerequisites, including construction waste management and Energy Star certification, from a checklist that covers sitework, IAQ, resource efficiency, energy, and O&M. Program provides funding up to $7,500 per project to cover higher first costs.	Review of plans and inspection during and after construction by program manager.
Central New Mexico *New Mexico Building America Partner Program* *HBA of Central New Mexico* 2001	3,000	11	Must meet more than 30 prerequisites, including Energy Star certification, from a checklist that covers energy, IAQ, water conservation, materials, and waste management.	Review of plans and inspection during and after construction by third-party inspector.

new housing starts) and figures to certify 10% of new homes by the end of this year. Two thousand builders participate nationwide, including half the nation's top 100 builders and 24 of the top 25 firms.

However, Energy Star is limited to energy-efficiency measures, such as installation of Energy Star-rated appliances (water heaters, dishwashers, HVAC systems, etc.) and upgrades in building envelope performance (high-performance windows and air-tight construction) and HVAC ductwork. Energy Star homes must surpass 1993 Model Energy Code standards by 30% or current state codes by 15%. Many local HBA programs require homes to meet Energy Star criteria as well.

EPA also plans to launch a new label to certify indoor environmental quality in late 2005. The Air Plus program will set standards for moisture control, HVAC performance, radon control, pest control, and materials off-gassing.

Where, it might be asked, was the industry's largest trade group, the National Association of Home Builders, while all this was going on? For much of the decade, starting with the Austin, Texas, program in the early 1990s, the NAHB national office in Washington, D.C., was content to take a back seat on green building, wisely (in the estimation of knowledgeable observers) letting its affiliates create a steady revenue stream from training programs and inspection fees associated with their local HBA certification programs.

But the sleeping giant began to stir in the late 1990s, when a committee of the U.S. Green Building Council met in Racine, Wis., to begin development of a rating system for homes based on its nascent LEED program. Homebuilders were noticeably excluded from the meeting, their technical expertise and experience gained from the successful HBA programs ignored by the USGBC.

Today, there is widespread agreement that the USGBC's initial foray into the residential arena failed to recognize the need to balance environmental rigor with affordability for the home purchaser and profitability for the builder. As a result, the LEED-H initiative languished for another couple of years before being revived in the summer of 2002.

After stumbling in its initial attempt to create a national green residential program in late 1990s, the USGBC feels it finally has the pieces in place to create a LEED rating system for homes. Its LEED Homes committee, composed of 18 representatives from among homebuilders, architecture firms, HBAs, utilities, government agencies, USGBC members, and building product manufacturers, is currently formulating the criteria for LEED-H.

This time around, the LEED Homes committee has vowed not to step on the toes of the existing HBA programs. Instead, using the nation's top green HBA programs as a reference, it will market LEED-H to the more than 200 medium-to-large cities that don't have green HBA programs, and it will provide training and educational materials to existing HBA programs.

According to committee chair Ann Edminster, LEED-H will target the top 25% of homes built by the nation's homebuilding giants. Its pilot program will involve builders with extensive experience in green homes, including those heavily involved with the Energy Star homes program.

Edminster says the first draft of LEED-H is scheduled to be ready next spring, with the pilot program rolling out later in 2005.

Yet although its members have been given a seat at the LEED-H table, the NAHB still has concerns about LEED — as it does for anything that smacks of regulation or restrictions on its members.[2] On May 9, 2003, its board of directors approved a resolution citing "outside organizations" — a clear reference to the USGBC — that "have developed or are developing rating systems, certification programs, and construction criteria for the residential market that could be seen as competing and potentially detrimental" to its members and HBA green-building programs.

These outside organizations are "seeking to create a new umbrella organization to put established and fledgling HBA green-building and remodeling programs under one roof, with the expectation that this council or forum would increase market penetration" of programs not affiliated with the NAHB.

Rather than cede primacy to any such "outside organization," the board resolved that the NAHB would "take the leadership role and become the national voice for America's homebuilding industry members who want to engage in 'green' development, design, and construction." The NAHB is also putting the finishing touches on its model green homebuilding guidelines, aimed to help local HBAs that do not have a green program in place to establish one. The guidelines are due out early next year.

The sharp rhetoric of the NAHB resolution casts into relief fundamental differences between these two organizations. However, the residential construction industry is too important to the nation's economy and well-being for there to be a turf battle between the NAHB and the USGBC over sustainability for home construction. Both sides must compromise. More on this topic in the Action Plan.

[2] *See "NAHB Stakes a Claim on Green Building," Environmental Building News, June 2003, pp. 3-4.*

Healthcare – The Lost Sheep Of Sustainable Design

Hospitals and healthcare facilities would seem to be the most logical candidates among all building types to embrace sustainable design. Because they must operate around the clock, 365 days a year, and are packed with energy-gobbling high-tech equipment, hospitals consume huge amounts of energy (and water). To fight the spread of infection — about 2% of hospital patients get sick (or sicker) just from being hospitalized — they require frequent air exchanges and high-level cleaning standards to maintain indoor environmental quality.

Yet the $33 billion healthcare construction industry has dragged its feet on sustainable design. Only 49 of the projects registered with the USGBC under LEED for New Construction are in healthcare, versus 412 office buildings, 232 university facilities, and 146 K-12 schools. Just one hospital, in Boulder, Colo., has been certified.

"You would have expected the healthcare field to be the one to lead on this, but they didn't," says Greg Roberts, AIA, CSI, senior healthcare specifications writer with WHR Architects, Houston. "They own their own buildings, they operate them 24/7, they're one of the biggest energy users out there — sustainability would seem to be one of the main issues they'd be involved in."

In fact, hospitals operate under unique restrictions that make them slow to change. For example, natural ventilation is often impossible to achieve, at least in certain diagnostic or treatment areas where air circulation and quality has to be controlled. The same goes for daylighting: in some parts of a hospital, it just won't work.

Hospitals are also heavily regulated, and thus are reluctant to try anything new or controversial, such as waterless urinals. They face the constant threat of litigation, and live on the thinnest financial edge, neither of which encourages risk-taking. "When you bring up sustainable design to healthcare CEOs, the first thing they ask is how much it's going to cost, and if there's any extra cost, don't even bring it up," says Roberts. In the competition for scarce funds, says Robert Moroz, VP of facilities for Seton Medical Center, Austin, Texas, "They're going to buy a new CAT scanner — stuff that keeps the medical staff happy. That's viewed as more important than green building."

For a while, too, the green-building movement dropped the ball when it came to healthcare. After adopting LEED for New Construction in 2000, the U.S. Green Building Council put its resources into moving along other LEED programs (Existing Buildings, Commercial Interiors, Core & Shell) and let healthcare slide. Healthcare designers were on their own to figure out how to bring sustainability to hospital projects.

That situation has begun to change in recent months. This past October, a new guide to sustainable construction and operations for hospitals, the Green Guide for Health Care, was issued. Separately, the USGBC has reactivated the committee responsible for developing the LEED Application Guide to Healthcare. Many of the participants in GGHC are also involved in the LEED application guide, but the two efforts are independent.

The healthcare sustainability movement traces its roots to the medical waste crisis of the 1980s, when used syringes and other medical waste were washing up on East Coast beaches, apparently dumped in the ocean rather than being incinerated. Over the next decade, the Environmental Protection Agency, having determined that medical waste incinerators were releasing toxic dioxin and mercury into the air, began a program to close them down. This effort culminated in 1998 with EPA and the American Hospital Association establishing a program called "Hospitals for a Healthy Environment" (known as H2E) and signing a memorandum of understanding (available at www.h2e-online.org/about/mou/htm) calling for the AHA to reduce medical waste 33% by 2005 and 50% by 2010.

As part of this overall effort, the American Society of Healthcare Engineers (ASHE), a division of the AHA, decided to recognize sustainable design in its annual Vista Awards for excellence in hospital construction. They invited Gail Vittori, co-director of the Center for Maximum Potential Building Systems, in Austin, Texas, to help them develop the criteria. This resulted in the issuance of ASHE's "Green Healthcare Construction Guidance Statement" in January 2002 (available at www.healthybuilding.net/healthcare/ASHE_Green_Healthcare_2002.pdf).

Although the ASHE statement was only nine pages long, it caused quite a stir in healthcare circles. "We were surprised that it got so much attention," says Vittori. "People said we needed something like that for LEED." But Vittori, who had just been elected to the USGBC board, saw immediately that the Council had other priorities at the time. "Healthcare was on the agenda, but

Unique Components of GGHC Prerelease Draft 2.0 Pilot

Construction

Prerequisites/Credit	Description
Integrated Design Prerequisite 1 Integrated Design	Use cross-disciplinary design, starting early in the process. Include end-user stakeholders: physicians, nurses, administrators, housekeeping staff, and facilities personnel.
ID Prerequisite 2 Environmental Health Program	Environmental health program must describe design goals that minimize potential adverse impacts of the project on the health of occupants, local community, and global environment, while enhancing the healing environment for patients and the work environment for staff.
SS Credit 9 Places of Respite	5% of net usable program area to be programmed as places of respite with connection to the natural environment. One place of respite dedicated to staff; one outdoor place of respite accessible to patients and visitors.
WE Prerequisite 1 Potable Water Use for Equipment Cooling	Do not use potable water for once-through cooling for equipment (does not apply to cooling towers or evaporative cooling systems).
WE Credit 4.1 Process Water Use Reduction	Provide continuous measurement of potable water use for building systems, plus: laboratories, kitchens, sterile processing departments, laundries, radiology/imaging departments, surgical suites, and purified water systems.
WE Credit 4.2 Process Water Use Reduction	Use pumps, compressors, cooling towers, etc., that reduce potable water use by 10%; reduce water usage by 100,000 gallons a year.
EA Prerequisite 2 Minimum Energy Performance	References 2002 Pacific Gas & Electric's Savings By Design Healthcare Modeling Procedures in addition to ASHRAE.
EA Credit 7 Medical Equipment Efficiency	Use Energy Star- or top-25%-rated equipment for 75% of new medical equipment.
MR Credit 2.3 Construction Practices	Control particulate discharge from sandblasting operations. Designate an on-site environmental manager to oversee environmental goals for the project. Conduct environmental training for construction workers.
MR Credit 9.1 Furniture Reuse	Use 20% salvaged, refurbished, or reused furniture and medical furnishings.
MR Credit 9.2 Furniture Materials	Specify 40% of furniture and medical furnishings that meet 2 of 3: 1) no dioxin, mercury, cadmium, lead, or PVC in the product; 2) no chrome-plated finish; 3) FSC-certified wood.
MR Credit 9.3 Furniture/Furnishings Transport & Recycling	Specify 40% of furniture and medical furnishings that meet 2 of 3: 1) assembled within 500 miles of site; 2) transported with minimum packaging; 3) has "end of life" destination (e.g., biodegradable, "take back" program).
MR Credit 10 Copper Reduction	Eliminate use of copper metal roofing and roofing materials; specify ASTM B8133 flux and ASTM B828 joint technique for copper pipe.
MR Credit 11.1 Resource Use: Design for Flexibility	Increase building flexibility and adaptive reuse by use of at least 1: modular planning grids; interstitial spaces; or development of flexible "technology floors" for diagnostic and treatment facilities.
MR Credit 11.2 Minimize Materials	Devote 5% of building component value to modular building systems, raised-floor systems, etc. Modular casework must comprise 50% of total casework/millwork. Reduce material use by 5%, using exposed ceilings, polished concrete floors, etc.
EQ Credit 2 Increase Ventilation Effectiveness	Excludes areas not totaling >25% of total sf that are unoccupied or have no supply distribution, or where air distribution is restricted by code (e.g., operating suites, burn rooms).
EQ Credit 3.1 Construction IAQ Management Plan (during construction)	Includes a requirement to manage the site per Infection Control Risk Assessment Procedures established in JCAHO Environment of Care Standard (EC.3.2.1). Requires a written program to prevent mold and mildew growth.
EQ Credit 8.1 Daylight for Occupied Spaces	Provide 2% daylight factor for inpatient units and diagnostic/treatment areas for areas within 15 feet of a glazed exterior or atrium wall.
EQ Credit 8.2 Daylight & Views: Building Orientation	Incorporate views of on-site and distant natural features into design as an essential element of the healing process.
EQ Credit 8.4 Lighting & Circadian Rhythm	Provide lighting systems and controls for patient rooms and staff work areas based upon principles of biological (circadian) rhythm. Provide variation in day/night lighting for patients and lighting to support work performance and alertness for staff. Implement a no-rotation work routine for day and night shifts. Reduce glare. Provide variable-spectrum task lighting. In areas with no daylight, provide lighting that simulates diurnal variation and allows for individual control.
EQ Credit 9 Acoustic Environment	Specify materials, products, mechanical systems, and design features to attenuate sound and vibration per 1999 ASHRAE Application Handbook (Sound and Vibration Control, Chapter 46, Table 34).

down the line," she says.

It was clear to Vittori and others that a LEED Application Guide for Healthcare was not going to happen in the immediate future. (At its 2002 Greenbuild conference, the USGBC authorized establishment of a committee to develop such a guide, but the committee [co-chaired by Vittori and Carol Antle of Kaiser Permanente] did not take shape until well into 2003.)

Unique Components of GGHC Prerelease Draft 2.0 Pilot Operations

Prerequisites/Credit	Description
Integrated Operations Prerequisite 1 Integrated O&M Process	Develop an environmental health goals statement for O&M procedures and protocols. Document cross-disciplinary decision-making process for O&M.
IO Prerequisite 2 Recertification Process	Every two years, recertify compliance with construction and operations credit intents.
IO Prerequisite 3 Monitoring IAQ Performance	Establish IAQ compliance per "Guide to Managing Indoor Air Quality in Health Care Organizations," JCAHO, 1997.
Energy Conservation Prerequisite 1 Minimum Energy Performance	Benchmark energy performance using EPA national energy performance rating system. Achieve rating of 60 or more in EPA Energy Star program.
EC Credit 3 Energy-Efficient Equipment	Requires 75% of annual electrical, office, and medical equipment purchases be Energy Star-rated, or in top 25% for energy consumption.
Water Conservation Prerequisite 1 Water Use Measurement	Install metering devices to measure customary building systems, plus water use in: laboratories, kitchens, laundries, radiology/imaging departments, surgical suites, and purified water systems.
Chemical Management Credit 1.1 Airborne Contaminants	Includes a requirement to exceed by 10% "NIH-CDC Guidelines for Airborne Effluent from Laboratories That Handle Biohazards" (May 1999).
CM Credit 1.2 Hazardous Chemicals/Pollutants	Prepare a written plan for outdoor chemical storage to minimize risk from leakage and spills.
CM Credit 1.3 Indoor Pollutant Source Control	Substitute for glutaraldehyde and ethylene oxide sterilants when safer alternatives are available. Install controls for high-level chemical disinfectants and sterilants.
CM Credit 2.1 Chemical Waste Minimization Plan	Prepare a chemical waste minimization plan to minimize or eliminate chemical waste drainage into the sanitary system, especially for priority areas (dialysis, histology, etc.)
CM Credit 2.2 Pharmaceutical Waste Discharge	Develop an integrated plan to segregate waste bulk chemotherapy items and to separate other waste pharmaceuticals into hazardous and non-hazardous containers. Keep antibiotics, hormones, and other pharmaceutical waste from draining into sanitary sewers.
Waste Management Credit 1 Total & Regulated Medical Waste Reduction	Reduce total medical waste volume by a minimum 33% below 1998 level. For regulated medical waste, demonstrate that waste volumes will not exceed 10% of total waste stream and that incineration will be used only as permitted by regulation.
WM Credit 2 Food Waste Reduction	Divert 75% or more of food service organic waste by weight from the solid waste stream.
Environmental Services Credit 3 Cleaning Chemicals	Develop and maintain a low-impact environmental cleaning policy for floors, walls, furniture, and medical equipment, including use of metal-free floor finish, use of concentrates and dispensing systems, hand soaps without added antimicrobial agents for patients and visitors, and training of cleaning personnel.
Environmental Purchasing Credit 1 Food	Undertake environmentally preferable purchasing (EPP) of 25% or more certified organic or locally farmed (100-mile radius) foods and beverages (1 point) and procure 50% of meat and other such products produced without nontherapeutic antibiotics.
EP Credit 2.1 Janitorial Paper & Disposables	Follow EPA Comprehensive Procurement Guidelines (www.epa.gov/cpg/products.htm) for toilet tissue, paper towels, industrial wipes, facial tissue, and plastic trash liners.
EP Credit 2.2 Electronics Purchasing & Take Back	Develop an IT-environmental management plan to obtain commitments from IT equipment manufacturers to take back products at the end of their life cycle.
EP Credits 3.1-3.3 Mercury Elimination DEHP Reduction/Elimination Natural Rubber Latex	Develop a mercury-free policy. Eliminate use of barometers and other medical devices containing mercury. Purchase mercury-free MRI equipment and similar lab and medical equipment. Develop a plan to eliminate DEHP (diethyl hexylphthalate), especially in tubing, IV, and blood bags. Prohibit the purchase and use of surgical gloves, balloons, and other products containing natural rubber latex.
EP Credit 4 Furniture & Medical Furnishings Purchasing	Purchase 40% of annual volume of these products to comply with Construction MR Credits 9.1-9.3.

To (in her words) "jumpstart" the process, Vittori put together an ad hoc group that included WHR's Roberts, New York-based healthcare architect Robin Guenther, AIA, and Tom Lent, healthcare coordinator of the Healthy Building Network, Berkeley, Calif. Over the next two years, with funding from the Merck Foundation and ASHE, they set out to create something that looked like a LEED document, but was specific to healthcare — the Green Guide for Health Care (GGHC, available at www.gghc.org).

GGHC into the void

The draft version of GGHC was released earlier this year, and after 700 or so comments were reviewed, a revised pilot draft was issued in September. Although it is not a LEED document, GGHC emulates LEED in structure — it has categories and a point system and uses LEED language whenever possible — but it is vastly different in many ways.

First, GGHC comes in two parts: Construction and Operations. The original draft was a single document, but ASHE did not want to be associated with a document that included O&M, which is outside its domain. ASHE says it supports the "Construction" portion of GGHC and will remain in an advisory and educational role on the project.

In addition, GGHC's name was changed from "guidelines" to "guide." According to Roberts, this was done to make it clear that the document was a *voluntary guide* to best practices, not *regulatory guidelines*. This was done to avoid a repeat of what happened with the AIA Guidelines for Health Care Construction, which many states and local jurisdictions simply incorporated into their regulations.

One of the more progressive innovations in the Green Guide for Health Care is its explicit demand for *integrated design and operations*. GGHC requires projects to use cross-disciplinary design teams right from the start. Physicians, nurses, hospital administrators, facilities personnel, and housekeeping staff must be included. On the operations side, cross-disciplinary decision making is a prerequisite.

"LEED has an implicit direction to encourage integrated design, but we made it explicit," says Vittori. "It saves you time and dollars all along the way if that is embedded in the process. Everyone has something of value to share, and the overall process benefits tremendously if we have the composite wisdom of all the disciplines coming together."

The framers of GGHC put great emphasis on stating not only the intent but also the *health issues* related to each credit. For example, Environmental Quality Credit 8.4 explains how poor lighting can disturb circadian rhythm for patients and night staff, which disrupts the production of much-needed melatonin. The document recommends the use of lighting based upon principles of diurnal variation.

Perhaps the most elegant aspect of the Green Guide is its almost unwavering pursuit of *specific healthcare-related design and operations features*. For example, GGHS addresses the acoustical environment (totally absent in LEED). It offers credit for enhancing the healing process by giving patients views that offer a "connection to nature." It calls for reducing food waste and eliminating the use of natural latex products. It encourages creation of "places of respite" for patients, their families, and hospital staff. (The accompanying charts describe the unique or unusual components of GGHC in comparison to LEED programs.)

Finally, the GGHC pilot program differs from LEED in being *self-certifying*. In other words, the architect or hospital owner, not some outside entity, determines which points have been earned. Nor are there achievement levels — no Certified, Silver, Gold, and Platinum. "We had people that were pushing third-party certification, and we had other people who said self-certification is great," says Vittori. "We don't have an infrastructure to do certification." While some would argue that self-certification weakens the program, it does reduce the costs for registration and commissioning that sometimes undermine acceptance of LEED programs.

Over the next year or so, the GGHC pilot will provide an intriguing testing ground for sustainability in healthcare facilities. Meanwhile, the LEED Application Guide for Healthcare is expected out in 2005. More on sustainable healthcare design in the Action Plan.

Canada's 'Green Globes' Program Offers Online Auditing Tool

In Canada, a growing number of government agencies, industry organizations, and private firms seeking a more simplified approach for assessing and rating the environmental performance of buildings have adopted the Green Globes online auditing tool as an alternative or supplement to LEED Canada or Canada's BREEAM program (the latter based on the U.K.'s Building Research Establishment Environmental Assessment Method).

A common criticism of the major green building rating programs is the lack of resources and guidance offered to Building Teams for implementing the checklists. Taking a project from the initial checklist through planning, design, construction, and commissioning requires considerable interpretation, time, and money. Green Globes bridges this gap by incorporating design guidance into what is essentially an environmental auditing program.

Toronto-based environmental consultant ECD Energy and Environment Canada, operating agent for the BREEAM program in Canada, developed the Web-based tool as a relatively quick and inexpensive method for assessing and rating the environmental performance of new and existing buildings. ECD markets Green Globes as a potential building-rating alternative to LEED Canada, particularly with regard to the design of smaller commercial buildings and renovations.

Using the BREEAM environmental criteria, the tool breaks down each green component (site, energy, water, etc.) into a series of questions that project managers must answer during eight different stages of a project: project initiation, site analysis, programming, concept design, design development, construction documents, contracting and construction, and commissioning.

The program also incorporates a third-party energy-modeling tool that measures the building's projected energy performance against Canada's Model National Energy Code for Buildings. Facilities that exceed code by 25% qualify for financial incentives from Natural Resources Canada.

The software then generates a detailed report for each stage of the project that includes:

- A percentage of total points achieved.
- A summary of green features employed by the project team.
- Recommendations for improvement, including references to industry codes and standards, and links to related resources and product manufacturers.

Building Teams and property managers can use these reports as a self-assessment tool, a design guide, or even as a basis for generating a LEED or BREEAM submission. The tool has been harmonized with LEED criteria, but is not recognized by the USGBC.

The survey, which involves mostly yes or no responses, can be completed in about three hours. Registration (at http://www2.energyefficiency.org.) costs about $250 (Canadian) per building for inputting the data, generating the reports, and providing access to the online data and resources for one year.

Green Globes is largely a self-assessment system, with only about 15% of registered projects certified through third-party inspection. Final ratings for certification are based on the percentage of total points achieved (of 1,000 possible points) at the construction drawing stage. At that point, a third-party assessor verifies the project's Green Globe assessment report by reviewing construction documents and specifications. Projects that attain 55% of total points earn a "three globes" rating; 70%, "four globes"; 80%, "five globes."

To date, the Canadian government has been the most active user of Green Globes, representing about half of the 450 registered projects. Federal environmental guidelines recommend the program as an assessment tool for all government-owned existing buildings, and as an environmental integration framework for mid-sized projects of $1-10 million. LEED Canada is recommended for projects of more than $10 million.

Several large property management firms, including Great-West Life Realty Advisors, Vancouver, are using the existing buildings program to assess their portfolio. The Hotel Association of Canada and BOMA Toronto have adopted Green Globes for their respective environmental awards programs. BOMA Canada recently adopted the tool as the basis of its energy and environment performance recognition program. And there are plans to migrate Green Globes into the U.S. building market, according to ECD's Jiri Skopek.

Release of vinyl report postponed by USGBC

A technical report from a five-member subcommittee of the U.S. Green Building Council investigating the environmental and health impacts of PVC, or vinyl, has been postponed. PVC is used in numerous building products, including plastic pipe, flooring materials, and vinyl siding.

The report, from a subcommittee of the USGBC's Technical & Scientific Advisory Committee (TSAC), was to have been made public last July, but was delayed due to the ill health of a consultant.

The use of vinyl products in LEED projects has been opposed by environmental and healthcare groups primarily on the basis that the production of PVC releases dioxin, a persistent bioaccumulative toxin (PBT), into the atmosphere, posing an increased risk of cancer to PVC workers and nearby residents.

The industry, represented by the Arlington, Va.-based Vinyl Institute (a sponsor of this Progress Report), has stated that, in compliance with EPA regulations, it reduced dioxin emissions 80% between 1987 and 1995 and that current annual emissions from PVC manufacture are less than those from vehicle exhausts and household fireplaces.

TSAC chair Joel Todd says the report likely will be released for public comment by the end of the year.

Construction Waste Recycling Programs Gain Traction

After a slow start, recycling construction and demolition (C&D) waste is becoming a well-established practice in the green building industry. The trend received a substantial boost from two developments this past September.

The first was an announcement by Turner Construction Co., the country's largest commercial builder, to implement C&D recycling on all future projects. Turner Chairman Thomas Leppert says the company will implement C&D recycling on its projects initially to at least a 50% level, with the ultimate goal to recycle 100% of C&D waste on all new projects. Previously, Turner did C&D recycling only on projects registered with the USGBC's LEED program.

As part of the stepped-up program, Turner plans to negotiate national or regional agreements with major waste haulers, according to SVP Roderick Wille, Turner's manager of sustainable construction. Since 1995, Turner has completed, or currently has under contract, more than 85 green projects with a construction value of $7.6 billion. (Turner is a sponsor of this Progress Report.)

Shortly after the Turner announcement, the Associated General Contractors of America, the Washington, D.C.-based trade association representing the nation's largest contractors, released its Environmental Management System program.

Developed in partnership with the U.S. Environmental Protection Agency, the documents outline how contractors can establish an Environmental Management System that takes in

Manufacturers push C&D recycling efforts

Carpeting and ceiling tiles are the focal points of two major recycling programs in the building products field.

Two years ago, the carpet industry (through its trade association, the Carpet & Rug Institute, a sponsor of this Progress Report) launched an initiative to keep carpet waste out of landfills. Under a January 2002 voluntary agreement with the U.S. Environmental Protection Agency and 13 states, CRI agreed to set national goals for increasing the amount of reused and recycled post-consumer carpet, ultimately resulting in a landfill diversion rate of 40% by 2012.

The carpet industry created the Carpet America Recovery Effort to meet these goals, according to CARE executive director Robert Peoples, PhD. Last year, the program diverted 93.7 million pounds of post-consumer carpet from landfill, and recycled 86.6 million pounds. This was an 87% increase in diversion and a 64% increase in recycling compared to 2002.

Post-consumer carpet material is reused in the manufacture of non-carpet products as diverse as composite lumber, railroad ties, garage wall liner, roofing shingles, and nylon auto parts. The carpet industry continues to seek reuse opportunities for recycled material, which Georgia Tech researcher Matthew Realff says could someday amount to hundreds of millions of pounds in volume.

The other program involves mineral fiber ceiling tiles removed during renovation projects. Participants in the Armstrong Ceiling Recycling Program must first obtain verification that the tiles can be recycled. They are then removed, shrink-wrapped, and stacked on pallets to await shipment. When 30,000 sf of tile has been accumulated, Armstrong will pick it up, at no cost to the owner, in the continental U.S. and at some Canadian locations.

The program is particularly suited to large, single-story buildings. Logistical considerations make it less appropriate for high-rise buildings.

Armstrong says that preparation of the old tiles for shipping takes only slightly longer (about six minutes for one laborer for 1,000 sf) than dumping the old tiles into a pushcart and taking them to a dumpster. The company, which says it has recycled 20 million sf of tile since the program began in 1999, provides a checklist that enables a comparison of the costs of throwing the tile away and of recycling it.

As this Progress Report was going to press, a move was under way to develop a single national sustainability standard for carpet and textiles. This would unify the Sustainable Textile Standard developed by the Institute for Market Transformation to Sustainability, Washington, D.C., and the carpet and carpet fiber standard developed by Scientific Certification Systems, San Francisco. A single standard would reduce confusion in the market and help to eliminate "greenwashing," says CARE's Robert Peoples.

C&D recycling. An accompanying 148-page manual provides guidelines and templates for its implementation.[1]

According to the National Demolition Association, Doylestown, Pa., about 70% of the C&D waste stream consists of demolition debris; the remainder is construction waste. Certain materials, such as tars, glues, mastics, and adhesives, are covered by Material Safety Data Sheets required by the Occupational Safety and Health Administration's Hazardous Communication Rule, and can be considered hazardous. But NDA executive director Michael Taylor says most demolition waste is relatively inert, benign material that poses no risk to public health or the environment.

NDA identifies 14 recyclable building components, only three of which have any current economic value in the U.S. and Canada — metals (from I-beams to venetian blinds), aggregates (in certain areas of the country), and wood. In the Los Angeles area, where there is strong demand for subbase material for parking lots and roads, recyclers will pay top dollar to get aggregates. But in the Bay Area of San Francisco, demand is weaker because there are no longer quarries nearby with integral recycling operations.

A similar logistics problem confronted the project team for the 1.1 million-sf EPA Research & Administration facility in Research Triangle Park, N.C. General contractor Clark Construction's original waste management plan did not include recycling gypsum, because the firm couldn't find a gypsum recycler in the area. When EPA insisted that gypsum waste be recycled, the contractor was able to locate a vendor, and more than 80% of the project's construction debris was diverted from landfill.

A 1994-95 NDA waste characterization study found 1,800 landfills in the U.S. that accept C&D waste, but NDA believes this number has declined in the last decade. Although the EPA has urged all 50 states to address C&D waste disposal, only 38 have done so to date, Taylor says.

C&D recycling is "a bottom-line thing," according to the NDA's Taylor. "We believe in recycling, think it's the wave of the future, and promote it aggressively. It's just a matter of making it economically attractive."

Profit margins on many materials at the end of the recycling process are so low that it's cheaper to dispose of them in landfill, Taylor says. NDA members have invested in land and equipment for C&D landfills, only to mothball them when it became apparent that their investment would not generate the necessary return.

On the regulatory front, the Massachusetts Department of Environmental Protection is reviewing public comments on proposed regulations that would ban landfill disposal of five C&D materials — asphalt paving, brick, concrete, metal, and wood. Final regulations may be released by the end of this year, with implementation expected to occur nine months

[1] *The two-volume package is available from AGC for $129 (AGC members) or $193.50 (nonmembers). More information: www.agc.org.*

Why contractors support C&D waste reduction

	Agree or strongly agree
C&D recycling improves my company's public image	72%
Employees are willing to recycle C&D wastes once they are trained (e.g., source segregation)	55%
C&D recycling saves money	53%
Subcontractors are willing to recycle C&D wastes once they are trained	41%
Established waste disposal practices can be changed without major difficulty to include C&D recycling	39%
There are readily available markets for C&D recyclables	34%
C&D recyclables can be economically transported to recycling facilities	31%
Source: "C&D Debris Survey," Associated General Contractors of America, June 2004.	Base: 328

Most respondents to the AGC survey see the image benefit of debris recycling (72%), believe their own employees can be trained to do it (55%), and agree that it saves money (53%). But apparently they are less sanguine about getting subcontractors involved, changing current procedures, finding markets for recycled materials, and their ability to ship C&D waste to recycling facilities economically.

Recyclers' database online from the GSA

Two years ago, when the U.S. General Services Administration attempted to compile a database of C&D waste recycling firms in the U.S., the effort floundered. "A lot of companies did not respond to postcard notices, were difficult to locate, or had gone out of business," says Ellen Larson, an associate in Steven Winter Associates' office in Washington, D.C.

GSA has now hired the Norwalk, Conn.-based building systems consultant to update the information and create a searchable database. (GSA is a sponsor of this Progress Report.)

The new database currently contains listings for about 50 firms. It permits searches by state and ZIP code, and by more than 15 commonly recycled construction waste materials.

Companies not currently listed are encouraged to register by logging on to the Website at: http://cwm.wbdg.org

How C&D recycling cuts costs

Material	Tons	Recycling cost	Avoided disposal cost*	Savings
Ceiling tiles	6	$625	$708	$83
Asphalt	970	$2,367	$114,460	$112,093
Concrete	1,267	$4,092	$149,506	$145,414
Metal	19	$785	$2,242	$1,457
Cardboard	0.86	$105	$101	(-$4)
TOTAL	**2,263**	**$7,974**	**$267,017**	**$259,043**

*Cost that would have been paid if material were disposed; asphalt and concrete are typically recycled.
Source: Consigli Construction Co.; Massachusetts Department of Environmental Protection (2003).

A C&D recycling effort for a $6.9 million, 100,000-sf office/warehouse project in Milford, Mass., achieved an overall diversion rate of 97%. Cost savings from source separation and recycling amounted to nearly $260,000.

afterward. Massachusetts would become the first state to ban such materials on a statewide basis, says James McQuade, a regional planner with the department.

Massachusetts has 21 active landfills, nine of which accept C&D waste. Tipping (dumping) fees for C&D waste disposal generally run $80 a ton or more in Massachusetts, but vary widely across the country, ranging from $125-150 a ton in New York City to as little as $8 a ton in Midland, Mich. (see table).

Working with the Massachusetts Department of Environmental Protection, Consigli Construction Co., Milford, Mass., launched a recycling program in late 2001. A company-wide jobsite source separation program was initiated the following year.

Vance Freymann, Consigli's director of project development, says new construction typically generates four pounds of C&D waste per square foot of building area; renovation projects can generate anywhere from 50 to 150 pounds per square foot. "The primary obstacle is just the mindset that recycling is not going to be cost effective or feasible," he says. "Once you get over that hurdle and implement a good system, it becomes an ingrained practice."

As for C&D recycling within the USGBC's LEED program, LEED for New Construction awards one point if more than 50% of total C&D materials are diverted from landfills, two points for diverting more than 75% (MR Credits 2.1 and 2.1). While Consigli has easily met these requirements, Freymann says it is much more difficult to earn points by documenting that reused materials account for 5% or 10% of total project value (MR Credits 4.1 and 4.2).

The biggest single limitation for a recycling program is the nature of the local recycling infrastructure, says Kimberly Ann Pexton, sustainability director for James G. Davis Construction Corp., Rockville, Md. She cites the need in the Washington area for more outlets that would recycle drywall and for recyclers who would accept plywood, wood composite, plastics, and fiberglass. "We're able to recycle big items that generate a lot of waste, but a lot of the remaining materials don't have ready outlets," she says.

Pexton says architects can help to foster recycling programs by writing specifications which avoid materials that can't be downcycled or recycled.

Freymann adds: "Construction debris accounts for 30% of all landfill material. Make a dent in that, and you can make a serious impact on the environment."

Average landfill tipping fees (per ton)

Alabama	$26	Montana	$32
Arkansas	$28	Nebraska	$25
California		Nevada	$30
San Francisco	$75	New Hampshire	$76
Los Angeles	$18-24	New Jersey	$50
San Diego	$24	New York	$48
Connecticut	$48	North Carolina	$30
Delaware	$55	North Dakota	$27
Florida	$42	Ohio	$32
Georgia	$33	Oklahoma	$20
Illinois	$33	Oregon	$35
Indiana	$34	Pennsylvania	$55
Iowa	$33	Rhode Island	$58
Kansas	$28	South Dakota	$30
Kentucky	$31	Tennessee	$28
Louisiana	$25	Texas	$27
Maine	$52	Vermont	$64
Maryland	$49	Virginia	$35
Massachusetts	$72	Washington	$47
Mississippi	$26	West Virginia	$35
Minnesota	$50	Wisconsin	$36
Missouri	$33		

Sources: CARE; Waste News 2003; The Market Handbook and Biocycle Magazine (January 2004)

The charge for dumping a ton of debris in a landfill varies considerably, from as much as $150 a ton in New York City to as little as $8 a ton in Midland, Mich. But even rural states like Vermont ($64 a ton) can have high C&D tipping fees.

The Great USGBC Trade Association Debate

Since its founding in 1993, the USGBC has excluded trade associations from membership out of fear that trade associations, with their financial clout and lobbying influence, would overwhelm the fledgling organization and undermine its mission. But there was also a more pecuniary reason behind this ban. Co-founders David Gottfried and Mike Italiano gave themselves 60 days to raise $100,000 to launch the USGBC. Imagine their alarm when two major trade groups included $300 checks with their membership applications — the same fee nonprofit groups were paying. As Gottfried details in his book:

> Mike and I moved quickly to get our board to prohibit trade associations from becoming members ... If they joined, we feared we'd never recruit any of their members; not only that, but their strategy might snowball to other building product areas, such as carpet, drywall, and wood.[1]

Over the next decade, the USGBC stuck to this policy of limiting membership to specific types of organizations.[2] Individual corporations were encouraged to join, but not their trade groups. When trade associations questioned this policy, they were told that their corporate members could represent them in Council deliberations.

Even before the launch of the LEED rating program in 2000, trade associations, particularly those representing building product manufacturers, were on record with the USGBC that excluding them constituted a violation of the Council's stated policy of openness, transparency, and consensus building. They charged the USGBC with fostering "closed processes" that kept their viewpoints on issues such as product life cycle analysis and wood certification from being part of the deliberations of LEED committees and technical advisory groups. This was particularly crucial in decisions affecting how their products figured in LEED credits. With the subsequent adoption of LEED as a de facto standard by numerous government agencies and private-sector clients, trade associations saw themselves increasingly isolated from the Council's decision-making processes.

The outcry from trade associations resulted in the appointment of a USGBC task force. On July 31, 2003, the Council's board of directors charged the task force with reviewing options for resolving inconsistencies in how the USGBC determined membership eligibility, at the same time ensuring that USGBC policies and procedures were "consistent with its core values of leadership, diversity, openness, and consensus-based decision making."[3] Over the next few months, the task force convened separate meetings with trade associations on the one hand and environmental organizations and NGOs opposed to the admission of trade groups on the other. Last January, after a period of public comment, the task force issued its 27-page draft report.

The first difficulty the task force confronted was to define what the Council meant by "trade association." It was assumed at the outset that this term referred strictly to "business leagues" (commonly known as "501 c6" organizations, for the section of the IRS code that exempts them from taxes) united to promote (and protect) their mutual interests through research, public relations, and lobbying. The USGBC itself was a "c6" until 2003, when it became a "501 c3" nonprofit organization — yet another kind of trade association — with limited lobbying rights. Charitable foundations may also be granted "c3" status by the IRS. And there were "hybrid" associations that included both individual and corporate members.

These ambiguities led to what the task force called "confusion and inconsistency" in the USGBC's admission policy. For example, certain professional societies, such as the American Society of Interior Designers, were admitted, even though they were "c6" associations. Another early member, the Sustainable Buildings Industry Council, was a "hybrid" that allowed individuals, companies (including product manufacturers), and even trade associations to be members. Many "c3" foundations affiliated with "c6" trade associations were granted membership, even in cases where the two entities shared staff, board membership, and office space. The USGBC Executive Committee could also grant case-by-case exemptions to allow trade associations to be represented on committees or technical advisory groups. The National Association of Home Builders was granted such an exemption to participate on the LEED for Homes committee.

Another concern raised by the task force had to do with governmental adoption of LEED as a quasi-standard. The task force reported incidents of trade associations raising the issue of their exclusion from the USGBC as evidence of a lack of consensus to attempt to block adoption of LEED-referenced laws and

[1] *Greed to Green: The Transformation of an Industry and a Life, Berkeley, Calif.: WorldBuild Publishing, 2003, p. 122.*

[2] *See chart, p. 6, for categories and membership enrollment.*

[3] *"Background Paper: Trade Association Membership Question (draft)," USGBC, January 2004.*

[4] *"Background Paper," p. 11.*

[5] *The only published report of this meeting (in Environmental Building News, June 2004, p. 3) stated that professional associations such as ASID and the American Society of Landscape Architects will be eligible for membership, even if they are technically defined as 501 c6 organizations. The USGBC does not post the minutes of its Board meetings on its web site.*

ordinances by state and local governments.

At the Federal level, the task force reported that the Office of Management and Budget had received complaints that the USGBC's exclusionary membership policy violated OMB Circular A-119, which encourages Federal agencies to adopt private-sector, consensus-based standards. Would the exclusion of trade associations, task force members wondered, be used as "an argument to challenge widespread support of LEED" in the Federal government and elsewhere?[4]

In its report, the task force laid out eight options for the Council to consider, along with the pros and cons of each:

1) **Maintain the status quo.** The task force said this might be the "easiest route to resolving the issue," but it would leave open basic policy questions related to consistency and consensus building.

2) **Admit professional societies.** This would allow the USGBC to retain ASID and other professional societies as members, but it would not solve the transparency issue, nor would it necessarily keep out professional societies that opposed green building.

3) **Allow participation in LEED deliberations, but not membership.** This would give trade associations a voice in Council deliberations, but it might also "devalue" membership and open the door to large numbers of non-members who might be antagonistic to the USGBC's mission.

4) **Establish an advisory council.** This, too, was seen as a way to create dialogue, perhaps serving as a first step toward full membership, but it would be cumbersome to implement and would not resolve basic policy issues.

5) **Establish a non-voting category.** There is precedent here. In the early days of the USGBC, Federal agencies held only "liaison" status; only in 2001 were they granted full voting membership. However, this option would relegate trade associations to a junior membership class.

6) **Permit case-by-case involvement in specific projects.** This would give the USGBC maximum control, but it could also introduce the potential for bias as to which associations would be granted committee positions.

7) **Allow full membership of trade associations.** This would overcome objections about openness and transparency and allow the USGBC to move on to other issues. It could hold these new members accountable for violations of its ethics code. On the other hand, this option likely would be seen by many current members as diluting the purity of the USGBC's mission and "selling out" to trade associations. Membership and dues, which represent 28% of the USGBC budget, could fall off.

8) **Permit no trade association involvement.** This would require the USGBC to expel long-time members like ASID. Nothing would be resolved, and the battle would go on.

Last April, three months after the task force issued its report, the USGBC Board voted to continue the ban on the admission of industry trade associations to the USGBC and to "further explore" membership status for professional societies.[5] At a meeting later in the fall, according to USGBC staff, the Board once again wrestled with the definition of "trade association" (including "hybrids"). No final decision on professional societies or hybrids is expected before the end of the year.

Since assuming office last summer, CEO and founding chair S. Richard Fedrizzi has made a sincere effort to "increase the dialogue" with trade associations, holding more than 20 meetings with various groups. Trade associations were explicitly invited to attend a daylong planning session on life cycle analysis and its use in LEED in September.

Yet these overtures, while welcome, fail to address the basic issues of fairness, openness, and consensus building that the USGBC says it espouses. Until trade associations are given equal access to the decision-making process, USGBC policies will be viewed as flawed by major segments of the building industry. More on this in the Action Plan.

The Road Ahead for Green Building

Building Teams can look forward to significant developments from the USGBC in the next year or so. The Council's first task: Take LEED-NC 2.1 and, without omitting or adding credits, review each credit's performance, based on feedback from members and "credit inquiry reviews" from Building Teams doing LEED-registered projects.

For example, ASHRAE 90.1-1999 has been updated twice (in 2001 and 2004) since LEED Version 2 came out in 2000. The new LEED 2.2 will refer to ASHRAE 90.1-2004, but the energy performance requirements will be made proportional to the demands of ASHRAE 90.1-1999; thus, all buildings completed under LEED 2.0, 2.1, or 2.2 will meet the exact same energy requirements to get credits.

Other updates under consideration include:

- **Stormwater management.** SS Credit 6.1 separates "rate and quantity" of runoff from treatment of contaminants under SS Credit 6.2. Under consideration is a plan to lump stormwater volume control and treatment in one credit and offer another credit for controlling runoff from the site. "We're not sure this will go through," says LEED engineer Brendan Owens. "It's a different way of looking at site water management, and people are not going to understand it right off the bat, but it could be a first step" toward a more integrated approach to stormwater management.
- **Heat island effect (roofs).** SS Credit 7.2, which refers to "reflectivity" and "emissivity" in roofs, likely will be changed to use the Cool Roof Rating Council's Solar Reflectance Index calculation under ASTM E1918 — a more performance-based measure.
- **Natural ventilation.** There's a strong movement among LEED insiders to encourage the use of operable windows (EA Credit 7.1). Both ASHRAE 62 and 55 are under review to provide for natural ventilation. USGBC staff member Emily Mansone Turk says the Council wants to make it easier for design teams to use natural ventilation and thereby reduce in size or even eliminate the need for mechanical HVAC systems. "It's a big change, but a good change that will allow more projects to comply," says Turk.
- **The "500-mile" rule.** Turk calls this "the credit that has taken the biggest leap toward life cycle analysis." Currently, MR Credits 5.1 and 5.2 give points only for products manufactured within 500 miles of the job site. LEED 2.2 will take into account where materials are extracted, where parts are assembled, and how products are shipped, including transportation by rail or ship.
- **Rapidly renewable materials.** MR Credit 6 encourages the use of materials that are harvested within a 10-year cycle, such as bamboo or straw. The MR Technical Advisory Group is leaning toward eliminating the 10-year rule in favor of a performance standard encouraging "renewable biobased materials."
- **Wood certification.** Currently, only wood certified by the Forest Stewardship Council can contribute to MR Credit 7, but other certification groups (notably the Sustainable Forestry Institute, the Canadian Standards Association, and the Pan European Certification Program) are being given the opportunity to state their cases to the LEED Steering Committee. "It's a tough and challenging issue," says Turk.

The draft of LEED 2.2 has been presented to the LEED Steering Committee and was scheduled for a 30-day initial public comment period in late October. Following additional review and comment, it is expected that LEED 2.2 will go to USGBC members for balloting in the spring of 2005.

An even bigger step will be the transition to LEED 3.0, which will shift LEED from being a largely prescriptive system to one that is much more performance-based. According to Nigel Howard, USGBC Vice President for LEED and International Programs, LEED 3.0 likely will maintain the customary LEED categories — Sustainable Sites, Water Efficiency, etc. — but will provide guidance to the various LEED "product" committees (New Construction, Existing Buildings, etc.) to use performance-based criteria in setting up the credits. Howard expects a draft of this "framework" to be ready by the end of 2005.

To take a purely hypothetical example: under Site Selection, instead of granting individual prescriptive credits for controlling parking capacity, increasing development density, and providing transit access, LEED 3.0 might wrap these credits together into a single measure of "equivalent commuter energy" — a more performance-based factor that gives Building Teams greater flexibility to innovate than they have currently.

LEED 3.0 is also expected to address one of the most criticized aspects of the current LEED rating system, its disregard for regional differences. Every architect, engineer, and contractor knows there's a huge difference between building in Miami and building in Seattle due to differences in climate, seismic conditions, precipitation, energy costs, and so on. LEED 2.1 virtually ignores these differences. LEED 3.0 will attempt to introduce a "bioregional rating system" to account for regional

differences in climate, water availability, energy factors (cost, type, availability), and other regional differences.

Such a complex performance-based system will require the use of life cycle assessment. LCA has been defined as "an attempt to evaluate the environmental aspects of a product or a service in a cradle-to-grave fashion"[1] and has been called "the Holy Grail" of building product evaluation.[2] LCA is crucial to green building because it offers the hope of providing an elegant and definitive way of measuring how "green" a product is. This is especially important to building product manufacturers who want to differentiate their products from their competitors' and who want their products to contribute toward LEED credits.

With those issues in mind, last September the USGBC convened a meeting of more than 140 individuals representing building product trade associations, LCA practitioners, and environmentalists in Washington, D.C. The theme: "Integrating LCA into LEED."

The USGBC's Nigel Howard set out three requirements for integrating LCA into LEED:

1) **The playing field must be level.** LCA must be implemented in an objective, fair, and consistent manner.

2) **The methodology and data must be consistent**, preferably based on the U.S. LCI Database Project Methodology.[3]

3) **LCA must be practical and inexpensive to use.**

While there was widespread agreement on the basics, there was little agreement on a unified approach to integrating LCA into LEED. Should it be merely educational? How about using ISO Type III "eco-labels"? What about foreign systems, like the U.K.'s Envest? Or an "ecopoint" system like the Dutch Ecoindicator? What about giving credits for reducing "embodied life cycle impact benchmarks" (e.g., ozone depletion) or for using an integrated CAD/LCA tool to automate the process?

Although the intense, daylong meeting ended without consensus, the USGBC's Howard promised to review the findings and report back to the group. Clearly, integrating life cycle analysis into LEED or any sustainable design program is going to be a daunting task, one that is likely to take the USGBC, building product manufacturers, and Building Teams well into 2006.

[1] *"LCA for Mere Mortals," Rita C. Schenck, Institute for Environmental Research and Education, 2000. Electronic copy ($7) from www.iere.org.*

[2] *"Life Cycle Assessment for Buildings: Seeking the Holy Grail," Environmental Building News, March 2002. www.buildinggreen.com.*

[3] *"U.S. LCI Database Project Development Guidelines" (NREL/SR-33806), Athena Sustainable Materials Institute, published by National Renewable Energy Laboratory, February 2004. www.nrel.gov/lci/.*

Commissioning to get a facelift under LEED 2.2

Commissioning – the process of determining whether a building performs as it was designed to do – is crucial to LEED. Energy & Atmosphere Prerequisite 1 requires Building Teams to form a commissioning team; incorporate commissioning requirements into the construction documents; develop and use a commissioning plan; verify installation, functional performance, training and operation, and maintenance documentation; and complete a commissioning report.

Based on feedback from Building Teams, however, a perception has arisen that unclear expectations for commissioning often led to variations in cost, quality, and environmental benefit. According to Joe Higgins, PE, chair of the LEED 2.2 subcommittee addressing concerns about the commissioning requirements, these perceptions were especially prevalent in smaller, simpler projects, where commissioning costs often represent a larger percentage of the budget than in bigger projects.

In response, the LEED 2.2 review committee has been looking into possible refinements to the commissioning process:

- Smaller projects – probably those of less than 25,000 sf, with commensurate energy usage –will be allowed to have a qualified Building Team member perform the commissioning tasks, rather than using an independent commissioning authority.
- Minimum qualifications for team members performing the various commissioning requirements will be defined.
- To maximize environmental benefits, commissioning may be focused more directly on the chief energy-usage systems (HVAC, hot-water heating, and lighting controls). Commissioning for water usage, which has not been as consistent as that for energy systems and has therefore often been less effective, would either be eliminated or required as part of achieving specific water efficiency credits.
- Priority will be placed on creating clearer expectations on both the focus and timing of the review for the independent design review requirement.
- The design team itself will be required to write and update the owner's project requirements and design intent document as the project progresses. All too often this task has been delegated to the commissioning agent, contributing to further variations in commissioning costs and responsibility.
- The credit for "Additional Commissioning" (EA 3) likely will be renamed "Enhanced Commissioning." Greater emphasis will be placed on starting the commissioning early in the design process and, eight or so months after the building has been completed, validating that its operations are performing as designed, that the maintenance staff has been trained, and that an operations manual has been written. "We're trying to bridge the gap from when the design team leaves to when the operations team has taken over," says Higgins.

Higgins cautions that these proposals are still under review, but they could provide guidance to Building Teams for the next round of LEED commissioning. The subcommittee also is preparing a short "LEED Commissioning Reference Guide" that will provide minimum expectations, references, and clear examples to illustrate the "spirit" of the commissioning documentation.

Progress Report Action Plan

The editors of *Building Design & Construction* offer these recommendations to our 76,011 subscribers in the $358 billion North American design and construction market — the men and women responsible for building more than 20,000 commercial, industrial, institutional, and multifamily structures annually. We believe these action items to be practical and economically feasible. We also suggest possible "champions" to implement them — without, it should be noted, any obligation on their part.

We sincerely hope that government officials, civic leaders, nongovernmental organizations, environmental groups, and other stakeholders in the green-building movement will join us in helping to implement these modest proposals, and we welcome your response.

Please send your comments to: Robert Cassidy, rcassidy@reedbusiness.com.

Federal Initiatives

1. Sign a Memorandum of Understanding at the senior Federal staff level promoting 'best practices" in green building for Federal departments and agencies.

The Interagency Sustainability Working Group, comprised of more than 200 staff across the Federal bureaucracy, has drafted a memorandum that identifies reasonable goals and objectives that Federal departments and agencies should consider in their construction projects. The MOU draft encourages departments and agencies to consider "best practices" related to green building — without mandating them — in such areas as integrated design (e.g., "establish collaborative design practices"), energy conservation (e.g., "improve upon ASHRAE 90.1-2004 by such-and-such percentage") potable water reduction, and building commissioning, as well as daylighting, recycled-content materials, indoor environmental quality, and construction and demolition waste reduction.

While many Federal departments and agencies are making great strides in implementing sustainable practices in their building programs, a memorandum of understanding across the bureaucracy would complement current departmental and agency policy and provide a common set of performance objectives.

After being reviewed by the engineering offices of the appropriate Federal departments and agencies, the draft MOU should be revised and submitted to the Federal Environmental Executive, who chairs the Federal Green Building Council. (The FGBC consists of senior-level Federal executives whose agencies are involved in green building.) Final approval would come from the FGBC and the Federal Real Property Council, a high-level forum of senior Federal real property officers established last February by Executive Order of the President.

Champions: Interagency Sustainability Working Group and the Federal Environmental Executive.

2. Place 'green building" on the President's Management Agenda for Federal property management.

The President's Management Agenda (PMA) was launched by President Bush in August 2001 as "a bold strategy for improving the management and performance of the Federal government." Originally, the PMA honed in on five government-wide initiatives: human capital, competitive sourcing, financial performance, "electronic government" (IT), and budget and performance integration. Every year, Federal departments and agencies are graded by the Office of Management and Budget on their performance in these areas, from "red" ("has serious flaws"), to "yellow" ("intermediate level"), to "green" ("meets the standard"). The PMA is a tremendous motovational tool. Every Federal department and agency wants to "get to green."

This past year, "Federal property management" became the sixth government-wide initiative, and that presents an ideal opening for the green-building movement. Because the criteria for grading Federal property management are still being developed, the

coming year would be a perfect time for sustainability and related green-building language to be inserted into this initiative. Then all Federal agencies would be accountable to the public on how they are "getting to green" on green building.

Champions: OMB Office of Federal Financial Management, the Federal Green Building Council, and the Federal Real Property Council.

3. Issue an Executive Order promoting sustainable design and green building.

Current Federal policy related to green building is scattered among numerous executive orders, departmental policy statements, and Federal laws, such as the Energy Policy Act of 1992. They cover energy conservation, environmentally preferred purchasing, and a variety of related topics, but they don't focus specifically on sustainable design and construction. It's time that green building was recognized by an Executive Order of the President.

An Executive Order would crystallize the government's role in green building and ensure that sustainable design and construction received attention from the Federal bureaucracy.

Champions: Secretary of Energy, EPA Administrator, and appropriate White House staff.

4. Convene a White House Conference on Green Building.

At this writing, the outcome of the 2004 presidential election is unknown. Nonetheless, we recommend that whoever is elected convene a White House Conference on Green Building in 2005 or 2006.

Such a conference would serve as a catalyzing agent to bring green-building advocates together with key interest groups who thus far have shied away from the sustainability movement — specifically, the real estate brokers, the property insurers, the appraisers, the REITs, the speculative developers, and even, to some extent, the mainstream construction industry. The lure of a White House invitation to such a conference would bring these stakeholders to the discussion table in a public setting.

But, given the prevailing domestic and international political situation, how realistic is this recommendation? We believe it makes sense, no matter which candidate wins.

If Senator Kerry is elected, sponsoring such a conference would be well within his comfort zone; further, the green-building movement has an ally in Mrs. Heinz Kerry, whose family foundation has been a generous supporter of green-building initiatives.

If President Bush is re-elected, his seal on a sustainable-building conference would enhance his Administration's generally poor environmental record. It should be noted that, to his credit, Mr. Bush retained several Clinton Administration Executive Orders (EOs 13101, 13123, and 13148) related to energy and environmental conservation in buildings. He also approved the establishment of the Federal Green Building Council, as recommended by John L. Howard, Jr., the former Federal Environmental Executive.

A White House conference would garner high-level publicity for green building. More important, it would serve as a crucible for bringing together believers and nonbelievers, providing even greater impetus to sustainable development.

Champions: White House staff; Secretary of Energy; EPA Administrator.

State and Local Initiatives

5. Develop model guidelines for green-building legislative, regulatory, and incentive programs at the state and local level.

In our 2003 "White Paper on Sustainability," we called for the creation of "guidelines for states, counties, and municipalities to implement sustainable design policies, legislation, executive actions, regulations, and incentives." We were concerned that elected officials were mandating green-building laws and regulations without considering all their options; for example, requiring that all new public buildings be constructed to LEED Certified or Silver standard, without taking into account LEED's shortcomings (such as its poor consideration of local climate). Nine cities, most recently San Francisco, have jumped on the LEED bandwagon, and the mayors of Milwaukee and Madison, Wis., reportedly have expressed interest in doing so.

As a member of the USGBC, *BD&C* supports LEED in general, but we don't see it as a panacea for state and local governments. As we note elsewhere (see pp. 22-25), many successful green-building programs have operated independently of LEED or have customized LEED to fit local conditions and priorities.

We recognize that our humble attempt to suggest model guidelines leaves much to be desired. For that

reason, we continue to stress the need for a sophisticated review of existing green-building laws and regulations to lay out what's working and what's not; from that review, model guidelines could be developed to give states, counties, and cities a wide variety of options to meet their specific needs.

Such an effort should be spearheaded by a membership organization experienced in governmental affairs and public policy development. A one-day planning meeting in Washington, D.C. (where many such organizations have offices and staff) could get the ball rolling.

Champion: One of the following national legislative organizations (or equivalent entity): the Council of State Governments, the International City/County Management Association, the National Association of Counties, the National Conference of State Legislatures, or the National Governors Association.

6. Eliminate code restrictions and other regulations that unduly limit sustainable design, especially for hospitals and healthcare facilities.

It is the purpose of building codes and regulations to keep the public safe from harm, but because they are inherently restrictive, codes and regulations can limit the creativity and innovation that are at the core of sustainable design. As we have noted, the City of Chicago has begun to analyze its building code to see what can be done to resolve conflicts between code restrictions and LEED credits or other green-building concepts. We recommend that other jurisdictions also review their codes and regulations to eliminate or mitigate potential conflicts with sustainable design goals. We suggest further that the International Code Council take up this matter at the national level.

With regard to healthcare specifically, no building type is more heavily regulated than hospitals (with the exception of nuclear reactors, of course). From the Joint Commission on Accreditation of Healthcare Organizations on down, everyone wants a piece of the healthcare regulatory pie. And for good reason: public health and safety are at stake.

But do healthcare regulations go too far? For example, regulations prohibit hospitals from employing natural ventilation, because the air exchange within the building has to be controlled to prevent the spread of airborne infection. But what if, through sustainable design, it was possible to have operable windows in nontreatment areas without compromising patient care? Current regulation would prohibit their use. Maybe that needs to change.

Healthcare facilities are integral to the fabric of our communities, and the next generation of hospitals should be as green as possible. JCAHO and state and local healthcare regulators need to take current green concepts (the Green Guide for Health Care might be a starting point) and overlay them on their regulations and accrediting procedures to determine where the conflicts lie — and how they can be resolved.

Champions: State and local building code authorities and the International Code Council (for state and local building codes); JCAHO and healthcare regulatory agencies (for hospital regulations).

Institutional Initiative

7. Fund and execute studies of human health and performance in green buildings and high-performance schools.

As we noted in our 2003 "White Paper on Sustainability," there has been considerable research on the benefits of improved daylighting, indoor environmental quality, thermal control, etc., with regard to human health, worker productivity, and student achievement. Unfortunately, virtually all of this research predates the LEED program and the advancements in sustainable design that have come along in just the last few years.

In other words, we don't have strong, scientific evidence to prove categorically that state-of-the-art green buildings — say, LEED Silver or the equivalent — are any better than "conventional" Class A buildings on these measures. Wishing doesn't make it so.

The marketplace is eager to have such data. Some of it will come from the Workplace 2020 program that the U.S. General Services Administration (a sponsor of this report) has been pursuing (and which we reported on extensively in last year's White Paper).

But more needs to be done. Lawrence Berkeley National Lab (LBNL) and the Electric Power Research Institute (EPRI) have proposed a study that would compare key factors — energy and water usage data, basic building characteristics (i.e., LEED or LEED-like features), and occupant perceptions of health and the environment (impact of daylighting, thermal comfort, air quality, etc.) — in 20 or so LEED-type buildings versus 40 or so "reference" buildings. (LBNL is a division of the U.S. Energy Department, a sponsor of this report.)

The researchers say that such a study could be done in less than two years, for less than $1 million. We encourage the construction industry (particularly manufacturers of building products and their trade associations) to support this research.

Then there is the issue of whether high-performance schools actually improve student health and performance. Here, the National Research Council has proposed performing an "advisory study" to evaluate the existing research and determine if there are probable linkages between green schools and better student test scores, reduction in asthma, improved creativity, and other benefits that have been claimed but not fully documented. NRC advisory studies are highly respected within the research community; such a study would bring much-needed scientific rigor to the discussion of the "soft" benefits of high-performance schools.

Without research studies like these, even the staunchest advocates of green building will have to wonder if green buildings and high-performance schools really do anything special for people. In our school survey, for example, 58% of respondents who had incorporated sustainable design into school projects were still "not sure" if the measures had improved student performance. It would be good to know if they did.

Champions: Workplace 2020 (GSA); LBNL and EPRI; NRC Board on Infrastructure & Constructed Environment.

Design and Construction Industry Initiative

8. Promote a national program to reduce construction and demolition waste by 50% in five years.

The evidence is mounting that a significant amount of C&D waste can be diverted from landfills, especially in big jobs. To a great extent, it's a matter of will on the part of the property owner/developer and the general contractor to make C&D waste reduction a priority. As we note herein (pp. 46-49), forward-thinking contractors are making great headway in this area. With some careful planning and grim determination, good C&D recycling practice can be both economically feasible and good for the environment. As landfill becomes scarcer, states and local jurisdictions are going crack down on contractors to keep C&D waste out of their dumps. Better for the construction industry to take care of the problem voluntarily than to wait for the regulatory hammer to strike.

The Associated General Contractors of America has already taken a step in the right direction with its recently announced Environmental Management System program, which includes C&D waste diversion. The AGC should be the lead agency to implement a nationwide program to divert a substantial portion of America's C&D waste from landfill — say, 50% by 2010. Whatever the goal, 2005 should be the year to get moving on it.

Similarly, building product manufacturers should take a cue from the carpet industry, whose Carpet American Recovery Effort has become a model for recycling used building materials. (CARE is associated with the Carpet & Rug Institute, a sponsor of this report.) Insulation, ceiling tiles, and vinyl products are the most likely candidates to follow in CARE's footsteps.

Champions: Associated General Contractors of America; CARE.

NAHB and USGBC Initiative

9. For the green-homes sector, both the National Association of Home Builders and the USGBC need to put priority on the needs of the customer –the homebuyer.

At the national level, the NAHB and the USGBC claim to be working toward mutually agreeable goals. The NAHB has completed a draft of its model green-homes guidelines and plans to roll out the program early next year; the USGBC says it will come out with LEED for Homes sometime in 2005. The USGBC says LEED-H is designed to target the top 25% of the housing market, particularly in those regions where the NAHB has no local green-homes program.

All this sounds well and good, but it remains to be seen how this scenario will play out in the real world, at the local level. Given the competitive nature of the U.S. housing market, it's hard to believe that local homebuilders will concede the "top 25%" of the market to LEED. It's even harder to conceive of homebuilders in the 200 markets not covered by a local green-homes programs welcoming LEED at all. More than anything, homebuilders fear anything that smacks of regulation. From the homebuilders' perspective, what's to stop local jurisdictions from imposing LEED for Homes on them?

From the USGBC point of view, it could be argued that local homebuilder programs have barely touched

the tip of the housing market — 30,000 or so units over a decade, in a market that produces 1.75 million units a year. Energy Star has certified nearly 10 times as many energy-efficient homes in only five years. Moreover, local homebuilder programs are seen as less rigorous than comparable LEED programs — "LEED Lite," if you will — and many such programs rely on self-certification, not third-party review. LEED-Homes, the USGBC could argue, will bring more vigorous and structured energy and environmental design to the homebuilding industry, thus "transforming the market."

Lost in this debate are homebuyers' needs and priorities. Most would prefer to have energy efficiency and good environmental design, but not if it jacks up the price beyond an affordable level. Therefore, NAHB members at the local level need to recognize that there is something to this green-building phenomenon, and that they would be wise to address it before they get regulated into doing so. The USGBC, for its part, has to be aware that the residential market is extremely competitive and price-conscious. (Moreover, many of the decisions that affect sustainability, such as land development and site planning, are in the hands of developers, not the homebuilders.) In sum, any national green-homes program will have to balance both environmental sustainability and consumer affordability.

Champions: NAHB and USGBC.

USGBC Initiative

10. Reopen the trade association membership issue to permit trade associations to join as provisional members, progressing to full membership in a stated period of time.

Despite the Council's decision to continue to bar membership to trade associations (notably 501 c6 entities representing various groups of building product manufacturers), this issue is not going to go away. Many trade associations feel left out of the inner workings of the Council and its committees, where decisions affecting the eligibility of their products under LEED are made. They argue that the USGBC policies and procedures for implementing LEED may violate minimum standards of due process established by the American National Standards Institute. They wonder why an organization that prides itself on being open, transparent, and consensus-based would want to keep anyone out.

Nor do they buy the argument that trade associations will take over the Council if they are admitted: with 4,603 (89%) of the USGBC's 5,147 members coming from A/E firms, contractors, NGOs, universities, and government, it's hard to believe that trade associations could wrest control of the USGBC. In fact, trade associations that acted in a manner contrary to the Council's mission could be voted out by the other members.

Barring trade associations from membership is bad business. Trade associations could contribute dues, supply technical expertise, and support USGBC research, thus furthering the Council's agenda. Alternatively, they could continue to divert attention from the Council's real business, wasting staff time and members' energy. And there is always the threat of legal action that could drain the Council's coffers and slow its momentum.

Keeping trade associations out is also un-American. Since 1831, when Alexis de Tocqueville published *Democracy in America*, the American people have been known for their predilection to form associations. Trade associations are the corporate manifestation of that aspect of our national character.

There is a solution to this dilemma; it is, in fact, a proven remedy: *provisional membership*. In the early days of the USGBC, it was feared that Federal agencies would use their power to "take over" the Council; to keep them in check, they were granted provisional "liaison" membership. Of course, these same Federal agencies went on to become exemplary members and were eventually granted full membership. Why couldn't the same approach be used for trade associations?

Some trade associations might not like the idea of being "on trial" for a while, but it seems to be the only way to overcome the entrenched negative attitude toward trade groups among the current USGBC membership. We would prefer to see trade associations given full membership, with the understanding that they would have to adhere to the Council's basic mission or risk losing their right. In the current contentious climate, however, we think this compromise is worth trying.

Champion: U.S. Green Building Council Executive Committee.

We're interested in continuing the dialogue on green building. We want to hear other people's points of view and to share ours. That's why we're supporting the research and analysis in this white paper.

We know that our products help people improve their quality of life by lowering the costs of housing and safe drinking water. Without vinyl products, building and maintaining a home would cost more than it should for people who have to count every penny. Without PVC pipe, safe drinking water would cost more than it should for people struggling for subsistence throughout the world.

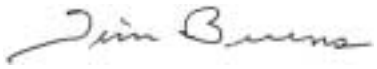
We know that our products help reduce energy demand. Without vinyl roofs, windows and siding, more energy may be needed to operate buildings and homes, which are already energy gluttons.

We also know that our manufacturing processes and products must be in concert with ecological systems.

Our members are committed to continuous improvements in their environmental, health and safety performance, and to maintaining open and ongoing communications with their neighbors, customers and the public.

These fundamentals are at the heart of the Vinyl Institute's interest in green building and sustainability. We believe that we have good news to tell — that we can contribute to a better future. And, we have things to learn.

Let's discuss the issues. Please come see us at booth 1083.



Tim Burns
President
The Vinyl Institute
www.vinylbydesign.com

Resources for Sustainable Design

Construction Waste Management
CARE
www.carpetrecovery.org

Construction Materials Recycling Association
www.cdrecycling.org

GSA Database of C&D Recyclers
http://cwm.wbdg.org

Education
California Division of the State Architect's Sustainable Schools Resource
http://www.sustainableschools.dgs.ca.gov/SustainableSchools

Collaborative for High Performance Schools
http://www.chps.net

Funders' Forum on Environment and Education
http://www.charityadvantage.com/f2e2/Welcome.asp

High Performance School Buildings Program
Sustainable Buildings Industry Council
http://www.sbicouncil.org/highperformanceschoolbuildings.htm

Los Angeles Unified School District Facilities Services Division
http://www.laschools.org

Massachusetts Technology Collaborative
http://www.mtpc.org

National Clearinghouse for Educational Facilities, U.S. Department of Education
http://www.edfacilities.org/rl/high_performance.cfm

New Jersey Schools Construction Corp.
http://www.njscc.com/index.asp

Rebuild America
EnergySmart Schools initiative, U.S. Department of Energy
http://www.rebuild.org/sectors/ess/index.asp

Energy Conservation
DOE Federal Greening Toolkit
www.eere.energy.gov/femp/techassist/greening_toolkit

DOE Greening Federal Facilities
www.eere.energy.gov/femp/techassist/green_fed_facilities.html

DOE Building Technologies Program
www.buildings.gov

DOE High Performance Buildings Initiative
www.highperformancebuildings.gov

DOE High Performance Buildings Case Studies Database
www.highperformancebuildings.gov/case_studies

Energy-10
www.nrel.gov/buildings/energy10
www.sbicouncil.org

EnergyPlus
www.energyplus.gov

Energy Tools Directory
www.energytoolsdirectory.gov

Homes
Austin, Texas, Green Building Program
www.ci.austin.tx.us/greenbuilder

Boulder, Colo., Green Points Program
www.ci.boulder.co.us/environmentalaffairs/green_points/index.htm

Built Green Colorado
http://www.builtgreen.org

California Building Industry Association Green Builder Program
http://www.thebii.org/cgbp.asp

Energy Star Qualified New Homes Program
http://www.energystar.gov

Field Guide to Green Homes and Green Mortgages, National Association of Realtors
http://www.realtor.org/libweb.nsf/pages/fg313

Greater Atlanta Home Builders Association
EarthCraft House program
http://www.earthcrafthouse.com

Green Globes Environmental Assessment for Buildings
http://www.greenglobes.com

National Association of Home Builders Research Center
http://www.nahbrc.org/index.asp

Residential Energy Services Network
www.natresnet.org

USGBC LEED for Homes program
www.usgbc.org/LEED/leed_homes.asp

State and Local Programs
Arlington County, Va., Green Building Program
www.co.arlington.va.us/des

Austin, Texas, Green Building Program
www.ci.austin.tx.us/greenbuilder/

Berkeley, Calif., Green Building Initiative
www.ci.berkeley.ca.us/sustainabledevelopment/greenbuilding/

Chicago Department of Environment
www.cityofchicago.org

Minnesota Sustainable Building Guidelines
www.csbr.umn.edu/b3

Minnesota Sustainable Design Guide
www.sustainabledesignguide.umn.edu/MSDG/guide2.html

New Jersey Affordable Green Homes
www.state.nj.us/dca/dhcr/hsg_prog/njgreenhomes.shtml

Portland (Ore.) G-Rated Green Building Program
www.green-rated.org

Resource Guide for Sustainable Development
www.usgbc.org/Docs/Resources/SLU_Final_10-22-02.pdf

Seattle Sustainable Building
www.cityofseattle.net/sustainablebuilding

Other Resources
Center for Green Building Research
www.green-buildings-research.org

Green Globes (Canada)
http://www2.energyefficiency.org/design/about.asp

"Field Guide for Sustainable Construction: Pentagon Renovation," Washington, D.C.: U.S. Dept. of Defense, June 2004.
http://renovation.pentagon.mil/Field%20Guide%20for%20Sustainable%20Con.pdf

Resource Guide for Sustainable Development
www.usgbc.org/Docs/Resources/SLU_Final_10-22-02.pdf

U.S. Green Building Council
1015 18th Street, N.W., Suite 805
Washington, D.C. 20036
202-828-7422
www.usgbc.org

Turner = Green Buildings

Turner is dedicated to consistently raising the bar on industry performance. It's important that we not only honor the values handed down to us from our founder Henry Turner, but it's our obligation to the people we serve: clients, employees and communities. We want to improve the quality of life in the communities in which we build and live. So when we look at improving our quality service, and look at upgrading the way we build, all signs point to Green.

Over the past ten years, Turner has worked on more than 85 Green buildings — with a construction value in excess of $7.6 billion. This enables Turner to apply the lessons learned from that experience to help clients build Green facilities more cost effectively and thus realize a faster return on their investment.

Turner's Green record is impressive, but we are not stopping here. Turner is strengthening its Green commitment through a number of activities, including:

- Construction site recycling on all projects, not just Green projects.
- A collaborative sponsorship with USGBC of the Emerging Builders Program. This will help improve the sustainable building curriculum at colleges and recognize students who will promote future Green building growth.
- A Green training program for employees, using Turner Knowledge Network. This will help educate employees about LEED™ and Green field operations guidelines, and help us achieve our goal of more than doubling the number of LEED™ accredited employees in the next 12 months.
- Creating an advisory council with leading Green industry experts to give objective advice on the best Green practices and help the company achieve its goals.
- Establish a national Center of Excellence to marshal the company's Green resources and talents. Led by Rod Wille, Senior Vice President and Turner's Manager of Green Buildings, the Green Center of Excellence will make the company's Green efforts even more effective, further increasing benefits to clients.

Turner is proud to be making an important commitment to expanding its Green efforts. It is good for our clients and for the environment.

Sincerely,

Thomas C. Leppert
Chairman and CEO
The Turner Corporation

www.turnerconstruction.com/greenbuildings

The editors of Building Design & Construction would like to thank the following individuals and organizations for their help in producing this Progress Report on Sustainability:

Academia
University of Minnesota
John Carmody

Architects, Engineers, & Contractors
Design Avenues
Ann Edminster

Dore & Whittier Architects
Mike Godfrey

H.L. Turner Group
Tom Hopper

HMC Architects
Eric Shamp

HMFH Architects
Doug Sacra

Mithun Architects
Chris Dixon

OWP/P Architects
Rand K. Ekman, AIA
Erik Olsen

Ray Tonjes Builder Inc.
Ray Tonjes

Seton Medical Systems
Robert Moroz, AIA

Symmes Maini & McKee Associates
Martine Dione

Watkins Hamilton Ross
Greg Roberts, AIA CSI

Consultants
Architectural Energy Corp.
Charles Eley

Building Knowledge Inc.
Jay Hall

Catalyst Partners
Keith Winn

Center for Maximum Potential Building Systems
Gail Vittori

ConSol
Mike Hodgson

Davis Langdon Adamson
Lisa Fay Matthiessen

ECD Energy and Environment Canada Ltd.
Simone Pertuiset
Jiri Skopek

EPRI
Annette Rohr, ScD

Gerding/Edlen Development Co.
Dennis Wilde

Steven Winter Associates
Ellen Larson

What's Working LLC
David Johnston

Zinner Consultants
John Zinner

Government
Arlington County, Virginia
Joan B. Kelsch

California Division of the State Architect
Panama Bartholomy

City of Austin, Texas
Richard Morgan

City of Berkeley
Rahul Young

City of Chicago
Chris Bushell
Sadhu Johnston

City of Portland, Ore.
Robert Bennett

City of Seattle
Lucia Athens
Peter Dobrovolny

Naval Facilities Engineering Command
Dennis Talton, RA, LAP

New Jersey Green Homes Office
Darren Port

Office of the Federal Environmental Executive
Dana Arnold
Edwin Piñero

Office of the Secretary of Defense
Get Moy, PhD

Pentagon Renovation and Construction Program Office
Theresa R. Pohlman, PhD

U.S. Department of Energy
Marilyn A. Brown
Drury Crawley, PhD
Beverly Dyer
William Fisk, PE
Paul Mathew, PhD
Schuyler Schell
Paul Torcellini, PhD

U.S. Environmental Protection Agency
Alison Kinn Bennett
Jonathan Passe

U.S. General Services Administration
David Eakin, PE
Marilyn Farley
Edward Feiner, FAIA
Donald Horn, AIA
Evangeline Johnson
Kevin Kampschroer
Les Shepherd
Steven C. Smith
Anthony Waller

Industry Trade Associations
National Association of Home Builders Research Center
Rich Dooley

National Association of Realtors
Richard Rosenthal
Dale Stinton

Institutes, Foundations & NGOs
EarthCraft House
Abigail Paine

Environmental Law Institute
Tobie Bernstein, JD

Kaiser Permanente
Carol Antle

Massachusetts Technology Collaborative
Rob Pratt
Richard Tinsman

National Research Council
Richard G. Little, AICP

U.S. Green Building Council
Michael Arny, PE
Penny Bonda, FASID
S. Richard Fedrizzi
Jim Hackler
Joe Higgins, PE
Taryn Holowka
Nigel Howard
Jerrold P. Lea
Emily Mensone Turk
Brendan Owens
Theresa Peyton
Kris Prendergast
Pegi Shriver
Peter Templeton
Kath Williams, Ed.D.

Urban Land Institute
Rachelle Levitt
Michael Pawlukiewicz

Publications
Environmental Building News/BuildingGreen
Nadav Malin

Professional Builder
Heather McCune

Real Estate
Drivers Jonas
Philip Parnell, MRICS

Hines
Kenneth Hubbard
Paul Naish

Real Estate Roundtable
Roger Platt

Thomas Properties Group
Craig Sheehy

Vulcan Real Estate
Hamilton Hazlehurst

Additional resources for the Progress Report on Sustainability may be found at: *www.bdcmag.com.*

Special thanks to the following for their help in conducting our exclusive education surveys:

APPA - Assn. of Higher Education Facilities Officers
Steve Glazner

ASBO - Assn. of School Business Officials Intl.
Anne Miller, PhD

CEFPI - Council of Education Facilities Planners
Ronald Fanning, FAIA
Thomas Kube

NSBA - National School Boards Assn.
Carol Chin
Joseph Vallani

SCUP - Society for College and University Planning
Terry Calhoun

Editorial Staff
Robert Cassidy
Editor-in-Chief
rcassidy@reedbusiness.com
630-288-8153

Gordon Wright
Executive Editor

Larry Flynn
Senior Editor

Dave Barista
Associate Editor

Monica Patankar
Editorial Intern

Catherine Clark
Editorial Assistant

Martha Richards
Reed Research Group

Jim Haughey
Senior Economist

Trudy Kelly
Editorial Assistant

Larry Nigh
Senior Art Director

Anna Abbinante
Manager of Creative Services

Michael Irace
Art Director

Bonnie James
Tom Rybarczyk
Curt Spannraft
Graphic Illustrators

Business Staff
Rob Goulding
Publisher
rgoulding@reedbusiness.com

Bertha Podgorny
Assistant to the Publisher
630-288-8081

Carol Platz
Marketing Manager

Elaine Dagons
Administrative Assistant

Victoria Jones
Production Manager

Karen Ruesch
Production Director

Business Office
2000 Clearwater Drive
Oak Brook, IL 60523
630-288-8000
www.bdcmag.com

Jim Casella
Chief Executive Officer
Reed Business Information®

Jeff Greisch
President
RBI Chicago Division

Building Design & Construction Progress Report on Sustainability

Directory of Sponsors

The Carpet & Rug Institute
310 Holiday Avenue
Dalton, GA 30720
706-278-3176
carpet-rug.org
carpetrecovery.org

Mailing Address:
PO Box 2048
Dalton, GA 30722-2048

The Construction Specifications Institute (CSI)
99 Canal Center Plaza, Suite 300
Alexandria, VA 22314
800-689-2900
www.csinet.org

Duro-Last Roofing, Inc.
525 Morley Drive
Saginaw, MI 48801
800-248-0280
www.duro-last.com

The Hardwood Council
American Hardwood Information Center
400 Penn Center Boulevard, Suite 530
Pittsburgh, PA 15235
412-829-0770
www.americanhardwoods.org

Lafarge North America, Inc.
12950 Worldgate Drive, Suite 500
Herndon, VA 20170
703-480-3808
www.lafargenorthamerica.com

Lonseal, Inc.
928 East 238th Street
Carson, CA 90745
310-830-7111
www.lonseal.com

North American Insulation Manufacturers Association
44 Canal Center Plaza, Suite 310
Alexandria, VA 22314
703-684-0084
www.naima.org

Turner Construction Company
375 Hudson Street
New York, NY 10014
212-229-6000
turner@tcco.com
www.turnerconstruction.com/greenbuildings

U.S. Department of Energy
Building Technologies Program
Energy Efficiency & Renewable Energy
1000 Independence Avenue, S.W.
Washington, DC 20585
202-586-8288
www.eere.energy.gov

U.S. General Services Administration
Public Buildings Service
1800 F Street, N.W.
Washington, DC 20405-0001
www.gsa.gov

The Vinyl Institute
1300 Wilson Boulevard
Arlington, VA 22209
703-741-5666
www.vinylinfo.org
www.vinylbydesign.com

Wood Promotion Network
700 West Pender Street, Suite 1515
Vancouver, BC V6C 1G8
Canada
604-891-1223
www.beconstructive.com
www.forestinformation.com
www.woodpromotion.net

'Progress Report on Sustainability' at Greenbuild Conference

Robert Cassidy, editor-in-chief of *Building Design & Construction*, will present the major findings and recommendations of the "Progress Report on Sustainability: The Green Building Movement, One Year Later," at 1 p.m., Wed., November 10, in Room A106 of the Oregon Convention Center, Portland.

Greenbuild attendees are invited to participate in the one-hour discussion.

Progress Report Available on BD&C Web Site

The entire contents of the Progress Report on Sustainability may be downloaded in .pdf form at: www.bdcmag.com.

PUBLISHED BY:

Building Design & Construction
A Reed Business Information® Publication
2000 Clearwater Drive,
Oak Brook, IL 60523
Phone: 630-288-8000
Fax: 630-288-8155
www.bdcmag.com

Address all inquiries to:
Robert Cassidy, Editor-in-Chief
630-288-8153
rcassidy@reedbusiness.com

Reed Business Information, a unit of Reed Elsevier Inc., is the publisher of specialized Business Publications and Market Intelligence for Building & Construction, Interior Design, Lodging and Foodservice, Engineering, Entertainment, Furniture Manufacturing/Retail Furnishings, Manufacturing, Medical/Scientific and Processing, Publishing, Printing and Packaging.

Printed on 100% post-consumer recycled paper with soy/vegetable inks.